



जहाँ है हरियाली ।
वहाँ है खुशहाली ॥

Ministry of Environment & Forests
GOVERNMENT OF INDIA, NEW DELHI

Environmental Impact Assessment Guidance Manual
for
HIGHWAYS

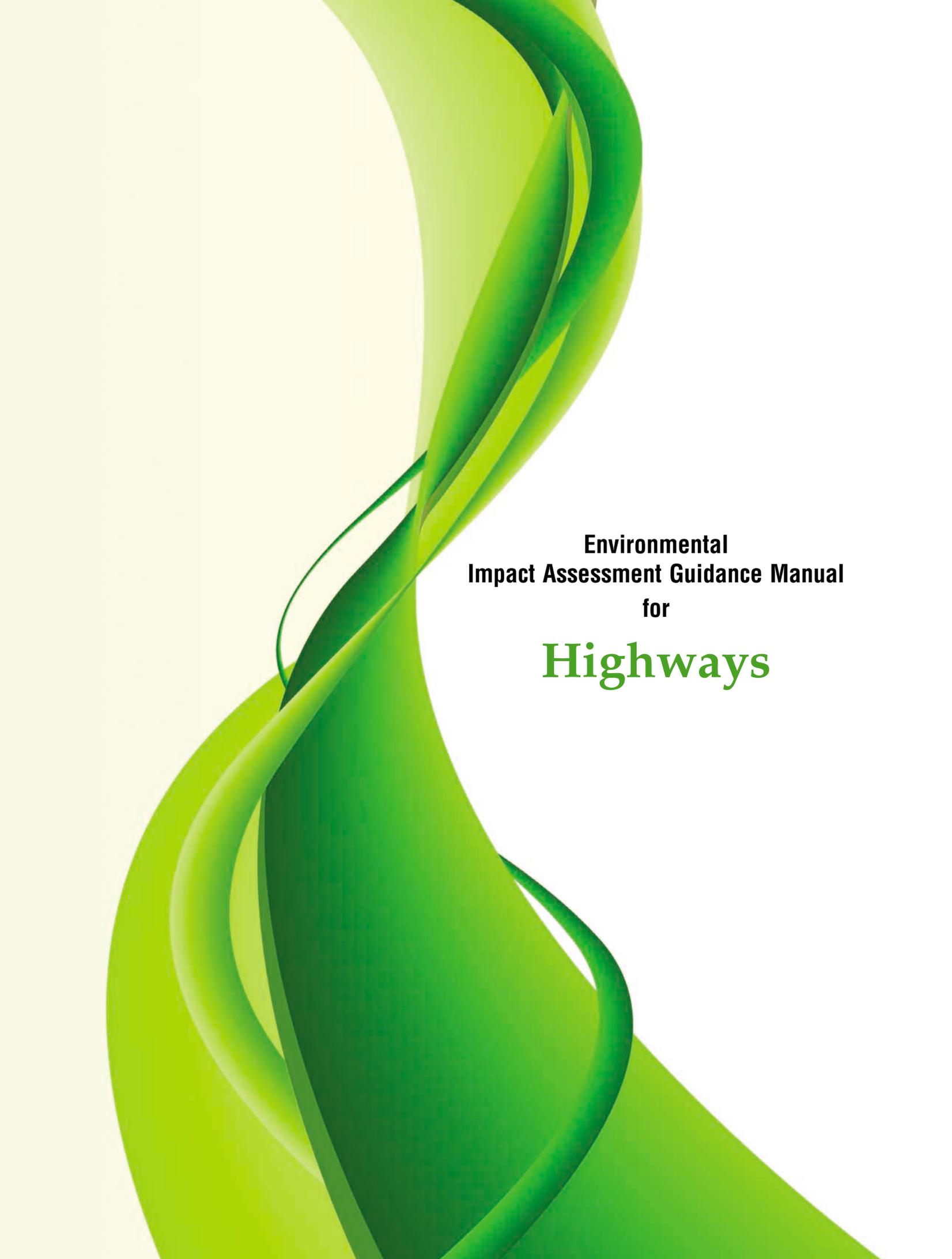


Prepared by



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February 2010

An abstract graphic on the left side of the page, consisting of several overlapping, flowing, ribbon-like shapes in various shades of green, from light lime to dark forest green. The shapes curve and twist, creating a sense of movement and depth. The background is a plain, light cream color.

**Environmental
Impact Assessment Guidance Manual
for
Highways**



Foreword

The EIA Notification 2006 not only reengineered the entire EC process specified under the EIA Notification 1994 but also highlighted the need to introduce specific sectors/categories under the sectors such as Industry and Infrastructure and also introduced new sectors such as Construction to be brought in the ambit of the EC process based on their extent of impacts on environment. The EIA Notification 2006 has notified 39 developmental sectors, which require prior environmental clearance. Based on the capacity, the Projects have been categorised into Category A or B which has been further categorised as B1 or B2. The Ministry of Environment and Forests (MOEF) has so far constituted 25 State level Environmental Impact Assessment Authorities (SEIAs) and State Expert Appraisal Committees (SEACs) to appraise B category projects.

The need for Sector specific manuals and guidelines for appraisal of projects under the EIA Notification 2006 has been felt for some time with a view to bringing clarity in the EC process consists of Screening, Scoping, Public Consultation and Appraisal for the purpose of granting and expediting environmental clearance. This need was further reinforced after the constitution of various SEIAs and SEACs in the various States, who were assigned this task for the first time. It was also felt that Manuals on each Sector would help in standardisation of the quality of appraisal and in reducing inconsistencies between SEACs/SEIAAs in granting ECs for similar projects in different States.

The MOEF at the first instance decided to bring out EIA Sector Specific Manuals for 37 developmental projects and the preparation of EIA Manuals of ten of these Sectors was assigned to Administrative Staff College of India (ASCI), Hyderabad.

1. Mining
2. Mineral Beneficiation
3. Ports & Harbours
4. Airports
5. (A) Building Construction
5. (B) Townships
6. Asbestors
7. Highways
8. Coal Washery
9. Aerial Ropeways
10. Nuclear Power Plants, Nuclear Fuel Processing Plants and Nuclear Waste Management Plants

The Manual for the sectors contain Model TOR of that Sector, technological options and processes for a cleaner production and waste minimisation, wherever applicable, monitoring of environmental quality, related regulations, and procedure of obtaining EC if linked to other clearances for eg., CRZ, etc.

The draft Manuals were uploaded on the MOEF website and comments/responses received were considered and finalised. Since the environmental clearance process itself is a dynamic one dependent on developmental needs, technologies available and standards for cleaner environment for a sustainable development, these manuals would require regular updation in the future. I hope the Manuals in their present form are of use and we would appreciate receiving responses from various stakeholders for further improvements that could be taken up in the future.

I congratulate the entire team in the Administrative Staff College of India, Hyderabad, experts of the sectors who were involved in the preparation of the Manuals, members of the Core and Peer Committees of various sectors and various Resource persons whose inputs were indeed valuable in the preparation and finalisation of the Manuals.



(JAIRAM RAMESH)

MINISTER OF STATE FOR ENVIROMENT & FORESTS

5th May 2010



Siripurapu K. Rao

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DIRECTOR GENERAL



Acknowledgements

Environmental Impact Assessment (EIA) is a planning tool generally accepted as an integral component of sound decision-making. EIA is to give the environment its due place in the decision-making process by clearly evaluating the environmental consequences of the proposed activity before action is taken. Early identification and characterization of critical environmental impacts allow the public and the government to form a view about the environmental acceptability of a proposed developmental project and what conditions should apply to mitigate or reduce those risks and impacts.

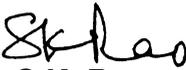
Environmental Clearance (EC) for certain developmental projects has been made mandatory by the Ministry of Environment & Forests through its Notification issued on 27.01.1994 under the provisions of Environment (Protection) Act, 1986. Keeping in view a decade of experience in the Environmental Clearance process and the demands from various stakeholders, the Ministry of Environment and Forests (MoEF) issued revised Notification on EC process in September 2006 and amended it in December 2009. It was considered necessary by MoEF to make available EIA guidance manuals for each of the development sector.

Accordingly, at the instance of the MoEF, the Administrative Staff College of India, with the assistance of experts, undertook the preparation of sector specific Terms of Reference (TOR) and specific guidance manual for **Highways**. I wish to thank **Mr. J. M. Mauskar**, IAS, Additional Secretary, Govt. of India MoEF for his continuing support during the preparation of the manuals. I wish to place on record also my sincere thanks to **Dr. B. Sengupta**, former Member Secretary, Central Pollution Control Board and Chairman of the Core Committee for his help in the preparation of the manuals. His suggestions helped us a great deal in improving the technical quality of the manuals. **Mr. M. Parabrahmam**, Former advisor MoEF and Chairman of the Peer Committee for this project, has given constant guidance to the ASCI project team. His vast experience has been immensely helpful in preparing these manuals. I would like to thank the officials of the Ministry, **Dr. Nalini Bhat** and **Dr. T. Chandini**, for coordinating the project from the Ministry side and for providing guidance whenever needed. My thanks are also due to **Dr. Bharat Bhushan** and **Dr. A. Senthil Vel** of MoEF for the valuable inputs they had given during our interactions with the officials at Delhi and Hyderabad.

I thank **Mr. G. K. Anand**, Professional Consultant and **Mr. G. Bala Subramanyam**, Advisor, Environment Area, ASCI, who, drawing on their vast experience in the sector, prepared the EIA guidance manual for the **Highways**. The efforts put by them are commendable.

I would like to thank all the Peer and Core Committee members for having given a valuable feed back in the preparation of the manual. I hope the manuals would prove to be useful to the community at large and to the experts working in this area in particular.

26 February, 2010


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ABBREVIATIONS

AAQ	Ambient Air Quality
ASCI	Administrative Staff College of India
BOD	Biological Oxygen Demand
CRZ	Coastal Regulation Zone
CPCB	Central Pollution Control Board
CZM	Coastal Management Zone
CO	Carbon Monoxide
DMP	Disaster Management Plan
dB	Decibels
DC	District Collector
Dy. Com	Deputy Commissioner
DM	District Magistrate
EIA	Environmental Impact Assessment
EAC	Expert Appraisal Committee
EC	Environmental Clearance
EMP	Environmental Management Plan
GoI	Government of India
GC	General Conditions
HTL	High Tide Line
IRC	Indian Road Congress
ISO	International Organization for Standardization
IFC	International Finance Corporation
IMD	Indian Meteorological Department
Kl	Kiloliters
Leq	Equivalent Continuous Sound Level
LTL	Low Tide Level
MoEF	Ministry of Environment and Forests
MoSRTTH	Ministry of Shipping, Road Transport & Highways
MSL	Mean Sea Level
NAAQS	National Ambient Air Quality Standards
NCHRP	National Cooperative Highway Research Program
pH	Hydrogen Ion Concentration
PM	Particulate Matter
R&R	Rehabilitation & Resettlement
SEIAA	State Level Environmental Assessment Authority
SEAC	State Level Expert Appraisal Committee
SPCB	State Pollution Control Board
TOR	Terms of Reference
UTPCC	Union Tertiary Pollution Control Committee
ZSI	Zoological Survey of India

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ABOUT THE MANUAL

Environmental Impact Notification S.O.1533 (E), of 14th September 2006 as amended in 2009 has made it mandatory to obtain environmental clearance for scheduled development projects. The notification has classified these projects as Category A & B. Category A projects (including expansion and modernization of existing projects) require clearance from Ministry of Environment and Forests (MoEF), Govt. of India (GoI) and for category B, from State Environmental Impact Assessment Authority (SEIAA), constituted by the Govt. of India

The existing Environmental Impact Assessment Manual of MoEF is common for all the sectors requiring prior environmental clearance. Considering the diversity in all the sectors related to infrastructure and industrial development, MoEF launched a programme for development of sector specific EIA guidance manuals. The EIA guidance manual will help the project proponent and consultant in the preparation of EIA report. It also helps the regulatory authority while reviewing the report and the public as well to be aware of the related environmental issues. This EIA guidance manual accordingly addresses their related environmental concerns for the specific sector, that is, Asbestos-based industries. The sector specific manual consists of twelve chapters, corresponding to the generic structure as per the EIA Notification.

Chapter 1: Introduction

This chapter contains the general information on highway projects, environmental clearance process, and identification of the project proponent

Chapter 2: Project Description

This chapter should cover the 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: Analysis of Alternatives (Technologies)

This chapter should cover the details of various alternatives in respect of both location of site and technologies to be deployed, in case the initial scoping exercise consider such a need.

Chapter 4: Description of Environment

This chapter should cover baseline data in the project area and study area.

Chapter 5: Anticipated Environmental Impact and Mitigation Measures

This chapter should cover the anticipated impact on the environment and mitigation measures. The method of assessment of impact including studies carried out, modeling techniques adopted to assess the impact where pertinent shall be elaborated in this chapter. It should give the details of the impact on the baseline parameters, both during the construction and operational phases and mitigation measures to be implemented by the proponent.

Chapter 6: Environmental Monitoring Programme

This chapter should cover the planned Environmental Monitoring Program. It should include the technical aspects of monitoring the effectiveness of mitigation measures.

Chapter 7: Additional Studies

This chapter should cover the details of the additional studies, if any, required in addition to those specified in the TOR and which are necessary to cater to more specific issues applicable to the particular project. These studies may be suggested either by the proponent itself or the regulatory authority.

Chapter 8: Project Benefits

This chapter should cover the benefits accruing to the locality, neighbourhood, region and nation as a whole. It should bring out details of benefits by way of improvement in the physical infrastructure, social infrastructure, employment potential and other tangible benefits.

Chapter 9: Environmental Cost Benefit Analysis

This chapter should cover the Environmental Cost Benefit Analysis of the project, if recommended by the Expert Appraisal Committee at the scoping stage.

Chapter 10: Environmental Management Plan

This chapter should comprehensively present the Environmental Management Plan (EMP), which includes the administrative and technical setup, summary matrix of EMP, the cost involved to implement the EMP, both during the construction and operational Phases.

Chapter 11: Summary & Conclusions

This chapter forms the summary of the full EIA report condensed to a maximum of ten A-4 size pages. It should provide the overall justification for implementation of the project and should explain how the adverse effects are proposed to be mitigated

Chapter 12: Disclosure of Consultants Engaged

This chapter should include the names of the consultants engaged along with a brief resume and nature of consultancy rendered

The contents of the manual are to be considered as version 1.0 (2010). An updating/revision of the manual will be taken up by the ministry as per requirements. In case of interpretation of any question related to law, the provisions of the original law and the rules made thereunder with various government directions/resolutions will have to be read and followed. In case of amendment to the original Act/Rules/Notifications made thereunder, the provisions as amended from time to time shall be applicable.

INTRODUCTION

1.0 Preamble

Environment plays a vital role in overall development of the country. Recognizing the importance of environmental protection and sustainable development, the Ministry of Environment and Forest (MoEF), Government of India had formulated policies and procedures governing the industrial and other developmental activities to prevent indiscriminate exploitation of natural resources and promote integration of environmental concern in developmental projects.

The Ministry of Environment & Forest has made prior environmental clearance (EC) for certain developmental projects mandatory through its notification issued on 14th September 2006 and as amended on 1st December 2009.

1.1 General Information on Highway Projects

Development of highway projects is generally intended to improve the economic and social welfare of the people. At the same time it may also create adverse impact on the surrounding environment. People and properties may be in the direct path of road works are affected. The environmental impact of highway projects include damage to sensitive eco-systems, soil erosion, changes to drainage pattern and thereby ground water, interference with wild life movement, loss of productive agricultural lands, resettlement of people, disruption of local economic activities, demographic changes and accelerated urbanization. Highway development and operation should, therefore, be planned with careful consideration of the environmental impact. To minimize these adverse effects that may be created by the highway development projects, the techniques of Environmental Impact Assessment (EIA) become necessary. Identification and assessment of potential environmental impact should be an integral part of the project cycle. It should commence early in the planning process to enable a full consideration of alternatives, and to avoid later delays and complications. Highway authorities should have a clearly designated staff member with overall responsibility for environmental matters and knowledge of environmental laws and regulations.

1.2 Environmental Clearance Process

As per the EIA notification of 14th September 2006 and its amendment dated 1st December 2009, highway projects are divided into two categories as mentioned below :

Project Activity	A Category	B Category	General Condition
Highways (Includes express ways)	New National Highways & Expansion of National Highways greater than 30 km, involving additional right of way greater	All state highway projects State highway expansion projects in hilly terrain (above 1,000 m AMSL) and or ecologically sensitive areas	Any project or activity specified in category B will be treated as category A, if located in whole or in part within 10 km from the boundary of: (i) Protected areas notified

	<p>than 20m involving land acquisition and passing through more than one State</p>		<p>under the Wildlife (Protection) Act, 1972; (ii) Critically polluted areas as identified by the Central Pollution Control Board from time to time; (iii) Eco-sensitive areas as notified under section 3 of the Environment (Protection) Act, 1986, such as, Mahabaleswar, Panchgani, Matheran, Pachmarhi, Dahanu, Doon Valley and (iv) inter-state boundaries and international boundaries</p> <p>Provided that the requirement regarding distance of 10km of the inter-state boundaries can be reduced or completely done away with by an agreement between the respective states or U.Ts sharing the common boundary in the case the activity does not fall within 10 kilometers of the areas mentioned at item (i), (ii) and (iii) above</p>
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The environmental clearance process for all projects will comprise a maximum of four stages. These four stages in sequential order are:

Stage (1)-Screening

In case of category ‘B’ projects or activities, this stage will entail the scrutiny of an application seeking prior environmental clearance made in Form 1* by the concerned SEAC for determining whether or not the project or activity requires further environmental studies for preparation of an Environmental Impact Assessment (EIA) for its appraisal prior to the grant of environmental clearance depending upon the nature and location specificity of the project. The projects requiring an Environmental Impact Assessment report shall be termed Category ‘B1’ and remaining projects shall be termed category ‘B2’ and will not require an Environmental Impact Assessment report.

Stage (2)- Scoping

‘Scoping’ refers to the process by which the EAC in the case of Category ‘A’ projects or activities, and SEAC in the case of Category ‘B1’ projects or activities, including applications for expansion and/or modernization and/or change in product mix of existing projects or activities, determine detailed and comprehensive TOR addressing all relevant environmental concerns for the preparation of an EIA report in respect of the project or activity for which prior environmental clearance is sought. The EAC or SEAC concerned shall determine the TOR on the basis of information furnished in the prescribed application Form 1 including TOR proposed by the applicant, a site visit by a sub-group of EAC or SEAC concerned only if considered necessary by the EAC or SEAC concerned and other information that may be available with the EAC or SEAC concerned.

Stage (3)- Public consultation

“Public consultation” refers to the process by which the concerns of local affected persons and others who have plausible stake in the environmental impact of the project or activity are ascertained with a view to taking into account all the material concerns in the project or activity design as appropriate. All Category ‘A’ and Category ‘B1’ projects or activities shall undertake Public consultation, except the following:

- Expansion of Roads and Highways which do not involve any further acquisition of land
- All projects or activities concerning national defence and security or involving other strategic considerations as determined by the Central Government

After completion of the public consultation, the applicant shall address all the material environmental concerns expressed during this process, and make appropriate changes in the draft EIA and EMP. The final EIA report, so prepared, shall be submitted by the applicant to the concerned regulatory authority for appraisal. The applicant may alternatively submit a supplementary report to draft EIA and EMP addressing all the concerns expressed during the public consultation

Stage (4)- Appraisal

Detailed scrutiny by the EAC or SEAC of the application and other document like the Final EIA report, outcome of the public consultations including public hearing proceedings, submitted by the applicant to the regulatory authority concerned for grant of EC

Flow-charts depicting these stages to obtain the prior environmental clearance for Highways projects are presented in **Figure 1.1 & Figure 1.2**

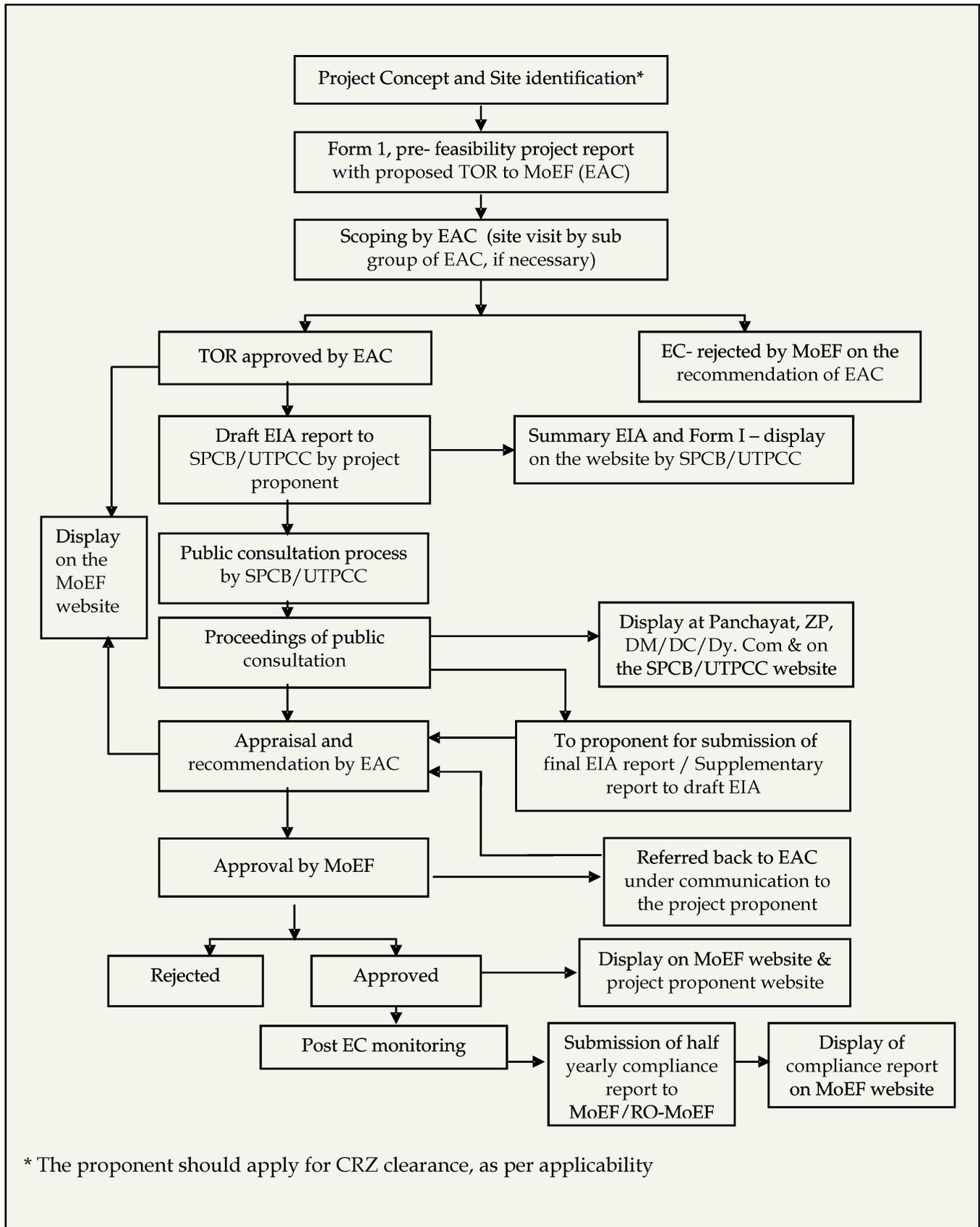


Figure 1.1 : Prior Environmental Clearance Process for Category A Projects

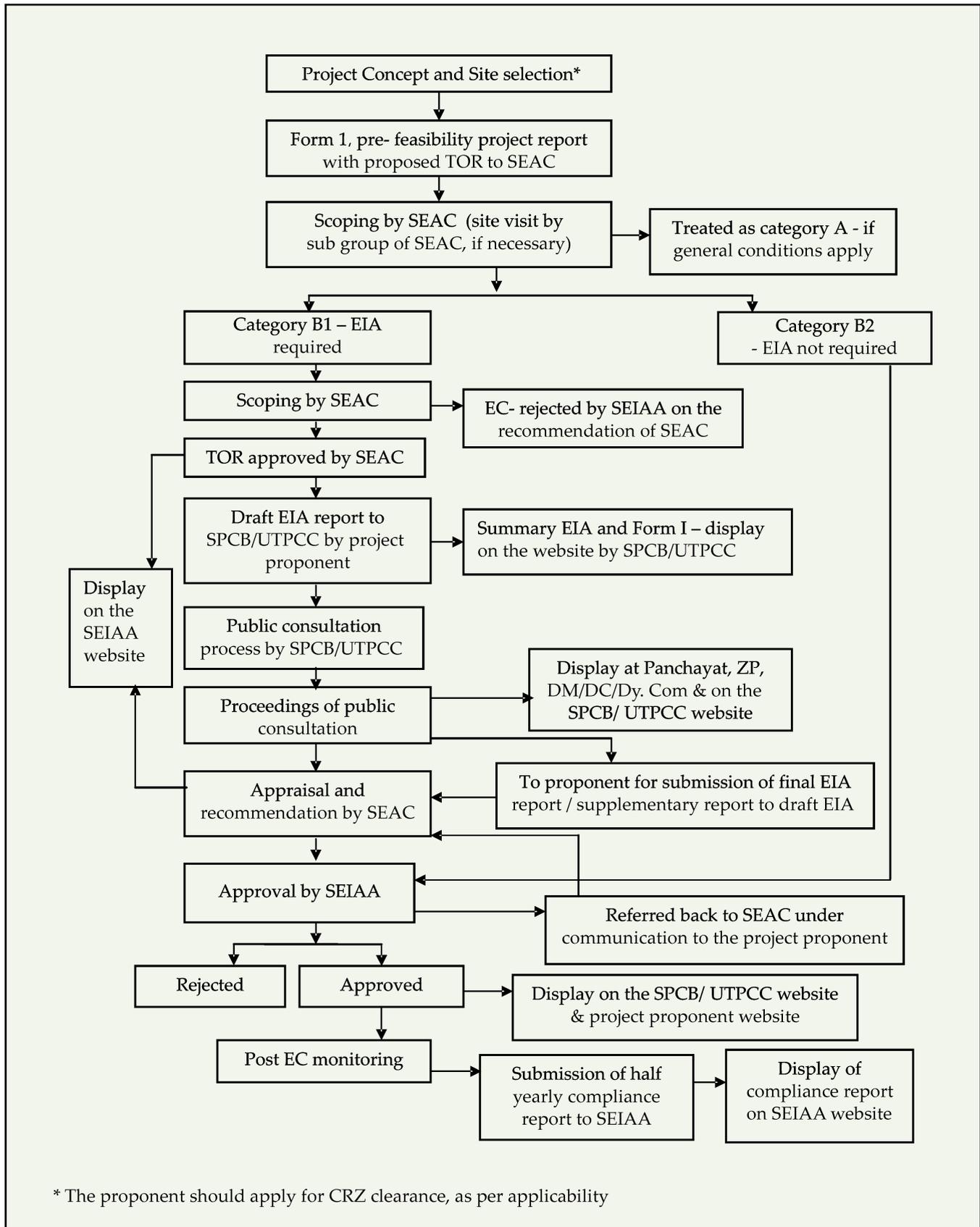


Figure 1.2 : Prior Environmental Clearance Process for Category B Projects

- The projects involving clearance under Coastal Regulation Zone Notification, 1991 shall submit with the application a CRZ map duly demarcated by one of the authorized agencies, showing the project activities, w.r.t. C.R.Z (at the stage of TOR) and the recommendations of the State Coastal Zone Management Authority (at the stage of EC). Simultaneous action shall also be taken to obtain the requisite clearance under the provisions of the CRZ notification, 1991 for the activities to be located in the CRZ[#]
- The projects to be located within 10km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory corridors of wild animals, the project proponent shall submit the 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 (at the stage of EC) [#]
- For the projects located in critically polluted areas as notified by CPCB, the project proponent shall make available a copy of their application for the TOR to the concerned SPCB. The SPCB should either send its representative at the time of consideration of the proposal by the EAC, at the stage of appraisal of the project for prescribing TOR or consideration of EC or provide their written comments with respect to pollution load in terms of ambient air quality, water quality or solid/hazardous waste management ^{##}

[#] S.O No. 3067 (E) dated 1st December 2009 of MoEF

^{##} Circular dated 25th August 2009 of MoEF

1.3 Terms of Reference (TOR)

Terms of Reference (TOR) for the Highway projects is prepared and attached as “**Annexure 1**” to this document. In addition, the proponent is required to identify specific issues, if any, pertinent to the project and include those issues also in the TOR for preparation of EIA and EMP report upon approval of the TOR by the Expert Appraisal Committee.

1.4 Validity of Environmental Clearance

The prior environmental clearance granted is valid for a period of five years. The regulatory authority concerned may extend this validity period by a maximum period of five years.

1.5 Post Environmental Clearance Monitoring

In respect of category A projects, it shall be mandatory for the project proponent to make public the environmental clearance granted for their project along with the environmental conditions and safeguards at their cost by prominently advertising it at least in two local newspapers of the district or state where the project is located and in addition, this shall also be displayed in the project proponent’s website permanently.

In respect of category B projects, irrespective of its clearance by MoEF/SEIAA, the project proponent shall prominently advertise in the newspapers indicating that the project has been accorded environmental clearance and the details of MoEF website where it is displayed.

The project management shall submit half-yearly compliance reports in respect of the stipulated prior environmental clearance terms and conditions on 1st June and 1st December of each calendar year. All such reports shall be public documents. The latest such compliance report shall be displayed on the web site of the concerned regulatory authority.

1.6 Transferability of Environmental Clearance

A prior environmental clearance granted for a specific project or activity to an applicant may be transferred during its validity to another legal person entitled to undertake the project or activity on application by the transferor or the transferee with a written “no objection” by the transferor, to, and by the regulatory authority concerned, on the same terms and conditions under which the prior environmental clearance was initially granted, and for the same validity period.

1.7 Generic Structure of Environmental Impact Assessment Document

In terms of the EIA notification of the MOEF dated 14th September 2006, the generic structure of the EIA document shall be as under:

- ▶ Introduction
- ▶ Project Description
- ▶ Analysis of Alternatives (Technology and Site)
- ▶ Description of the Environment
- ▶ Anticipated Environmental Impact & Mitigation Measures
- ▶ Environmental Monitoring Program
- ▶ Additional Studies
- ▶ Project Benefits
- ▶ Environmental Cost Benefit Analysis
- ▶ Environmental Management Plan
- ▶ Summary & Conclusion
- ▶ Disclosure of Consultants engaged

1.8 Identification of Project Proponent

Profile of the project proponent contact address with -mail, fax, phone numbers, implementing organization and project consultants should be furnished. All correspondence with the Ministry of Environment & Forests including submission of application for TOR/Environmental Clearance, subsequent clarifications, as may be required from time to time, participation in the EAC meeting on behalf of the project proponent shall be made by the authorized signatory only. The authorized signatory should also submit a document in support of his claim of being an authorized signatory for the specific project

1.9 Brief Description of the Project

Details of the project nature, size, location and its importance to the country and the region are to be included. Project site description- survey/ village, tehsil, district, state & extent of the land, latitude & longitude of the boundaries should be furnished.

Description of existing environmental laws/regulations on the proposed activity is to be brought out clearly. If there are any notified restrictions/limitations from environmental angle, issued by the district administration, state or central government, the same should be furnished. Details of litigation(s) pending against the project/ proposed site and or any direction passed by the court

of law against the project, if any, should be stated. Any other local/state regulations concerning the development projects on conversion of land use, the same should be adopted as per the procedures. Approval/clearance required under the following acts should be specifically stated:

- ▶ The Forest (Conservation) Act, 1980
- ▶ The Wildlife (Protection) Act, 1972
- ▶ The CRZ Notification, 1991

In case of expansion/ modernization of the project, the environmental compliance status for the existing project should be furnished for the following:

- ▶ Status of environmental clearance and conditions compliance for the existing project as applicable.
- ▶ Road factors :
 - ◆ Land width available
 - ◆ Geometrics – Curvature, Gradient, and pavement width etc
 - ◆ Structural condition of road and road structures
- ▶ Traffic factors :
 - ◆ Traffic volume- vehicles per day,
 - ◆ Traffic composition
 - ◆ Average speed of travel,
 - ◆ Time delays if any at railway crossings,
 - ◆ Presence of road intersection – nos./km,
 - ◆ Access control,
 - ◆ Accidents – fatal and injury accidents per year

1.10 Environmental Standards and Code of Practices

National standards and codes of practice of Indian Roads Congress (IRC) and MoSRT&H particular to environmental issues, which are relevant to the proposed project, should be furnished.

Details of the scope of study as per the Terms of reference approved by the Expert Appraisal Committee and the details of regulatory scoping carried out should be mentioned

2.0 General

The description of the project to be given in this chapter of the EIA study report should be reasonably adequate to understand the likely overall impact of the project construction and operational phases on various facets of environment and should include:

- ▶ Project coverage, master plan, phasing and scope
- ▶ Relevance of the project in the light of the existing development plans of the region /state / nation
- ▶ Description of all alternative alignments considered avoiding the ethnic minorities living in the proposed right-of-way
- ▶ Procedures and criteria adopted for selection of the alignment of right of way, alternative alignments considered, if any, details of land acquisition involved, rehabilitation of villages/ communities if any, proposed methods there of etc.,
- ▶ Overall suitability of the identified alignment and the proposed activity in the light of the existing environmental acts and serious deviations, if any

2.1 Broader Details of the Project and Location

- ▶ Description of the alignment, broad geology, topography, connectivity, demographic aspects, socio, cultural and economic aspects, villages, settlements
- ▶ Details of environmentally sensitive places, land acquisition, rehabilitation of communities / villages and present status
- ▶ Historical data such as climatic conditions, rainfall, history of cyclones, earthquakes etc
- ▶ Technologies involved for design and construction

Essential Maps to be Provided

- ▶ Highway alignment plan with the help of latest available cloud free satellite imagery of project alignment in 1:25,000 scale, and surrounding area covering 10 Km distance on either side of the proposed right of way showing the details of (i) Protected Areas notified under the Wild Life (Protection) Act, 1972, (ii) Critically polluted areas as identified by the Central Pollution Control Board from time to time, (iii) Eco-sensitive areas as notified under section 3 of the E (P) Act, 1986, such as Mahabaleshwar, Panchgani, Matheran, Pachmarchi, Dahanu, Doon Valley, and (iv) Inter-state boundaries and international boundaries
- ▶ Alignment plan, with details such as nature of terrain (plain, rolling, hilly), details of villages, tehsil, districts and states, latitude and longitude for important locations falling on the alignment shall be submitted

- ▶ A map derived from the recent satellite imagery covering aerial distance of 15 Km from the proposed alignment delineating environmental sensitive areas as specified in Form I of EIA notification dated 14th Sep 2006
- ▶ Land use map of the study area to 1: 25,000 scale based on recent satellite imagery of the study area 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
- ▶ Area drainage map covering 500 meters on either side of proposed right of way shall be clearly indicated. In case of any proposed diversion of nallah/canal/river either during the construction phase or operational phase, same shall also be shown in the map
- ▶ Detailed ground surveyed map in 1:2000 scale showing the existing features falling within the right of way namely trees, structures including archeological & religious, monuments etc.

The List of critically polluted industrial clusters/areas identified by CPCB is given in **Annexure 2**

2.2 Activities for Site Preparation

- ▶ 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 provided. Source and type of fill materials and its storage places should be furnished
- ▶ If the proposed route involves stripping, the details of the area to be stripped, locations, volume and quantity of earth to be removed, type of soil and proposal for utilization of removed top soil with location of dump site to be provided
- ▶ 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 its utilization plan or location of dump site to be provided
- ▶ If the proposed alignment is passing through any hilly area and avalanche area the details to be provided
- ▶ If the proposed route involves tunneling, the details of the tunnel and locations of tunneling with geological structural fraction should be provided. Quantity and type of cut material and its utilization plan should or location of dump be submitted
- ▶ In case of road passes through a flood plain of the river, the details of micro drainage, flood passages and information on flood periodicity in the area should be provided.
- ▶ If the proposed project involves any land reclamation*, details to be provided for the activity for which land to reclaimed and the area of land to be reclaimed
- ▶ If the proposed route involves any migratory path of animals, details about fauna, habitat and period of the year in which activity take place, should be provided
- ▶ Is there a possibility that the construction of roads will cause impact such as destruction of forest, poaching, reduction in wetland areas, if so, details should be provided
- ▶ If there will be any change in the drainage pattern after the proposed activity, details of changes should be furnished
- ▶ If the proposed route is passing through a city or town, with houses and human habitation on either side of the road, the necessity for provision of service ducts to be studied
- ▶ Whether project involves cutting/disturbance of mangroves? If so, the details should be furnished

- ▶ Whether the project involves any dredging? If so, details to be given
- ▶ Whether any likely ingress of saline water into groundwater due to the proposed project?
(* Fill material and land reclamation shall be planned as per Fly ash Rules 2009, where ever applicable)

2

If the Project Attracts the Provisions of CRZ Notification

- ▶ In case the proposed route falls totally or partially in CRZ area, indicate the category of the area and also show under what provision this activity is permitted
- ▶ CRZ maps indicating the High Tide Line (HTL), Low Tide Line (LTL), demarcated by one of the authorized agencies and the project activities superimposed on the map shall be submitted on 1:5000 scale map at the stage of TOR and recommendations of the State Coastal Management Authority at the stage of EC

2.3 Summary of Project Details

S.No	Description	Quantity
1	Length of new alignment proposed (kilometers)	
2	Width of the new alignment (meters)	
3	Length of existing alignment proposed to be strengthened/ widened (kilometers)	
4	Width of the existing alignment (meters)	
5	Width of the existing alignment after widening (meters)	
6	Total length of the alignment (kilometers)	
7	Number of bridges Major Minor	
8	Length of bridges (meters) Width of bridges (meters)	
9	Number of culverts	
10	Length of culverts (meters)	
11	Number and distance (meters) between underpasses	
12	Number of intersections	
13	Length of intersections (meters)	
14	Number of railway crossings	
15	Length of railway crossings (meters)	
16	Number of villages through which alignment passes	
17	Population of the villages through which alignment passes	
18	Length of new alignment proposed in agricultural land	
19	Width of new alignment proposed in agricultural land	
20	Length of new alignment proposed in forest area	
21	Width of new alignment proposed in forest area	

2.4 Natural Resources

Requirement of natural resources for construction along with their sources, its transportation, should be furnished. Water requirement during the construction stage along with its availability should be furnished. Utilization of solar energy for lighting etc should be explored. Utilization of fly ash should be explored. Raw materials and water requirement details may be given as in **Table 2.1 & 2.2.**

2.5 Man Power Requirement

The proponent shall indicate the requirement of various categories of manpower such as skilled, semi-skilled workers, technicians, engineers, managers and other professionals for both construction phase and operational phases

2.6 Project Implementation Schedule

The proponent shall submit the project implementation schedule bar chart and other relevant and related things

ANALYSIS OF ALTERNATIVES

3.0 General

In case, the scoping exercise results in the need for consideration of alternative solutions/alignments/technologies on account of predicted environmental impact, the details of such alternatives should be included in this chapter.

3.1 Consideration of Alternatives

Sound and sustainable highway project involve the consideration of two types of alternatives. These are usually referred to as alternative solutions to the transportation problem and alternative designs for a selected project. The first is an early planning period where general environmental impact from alternative solutions to a road transportation problem are identified and compared, resulting in the selection of an environmentally acceptable project option. This analysis should identify the preferred solution to the transportation problem for which the planning activity was initiated. The second stage is at the project design level, where the optimal or preferred project design is selected in terms of alignment, grade, pavement treatment, median type etc.

In describing the project and its alternatives, four key characteristics of each proposed alternative should be determined before a comparative analysis can be undertaken. The four characteristics are

- ▶ Spatial requirements
- ▶ Natural resources (including productive land) consumption
- ▶ Human resource benefits and costs (such as resettlement versus better access to market) and;
- ▶ Waste production during the construction and operation/maintenance periods

These details shall comprise of:

- ▶ Description of various alternatives viz locations or layouts or technologies studied
- ▶ Description of each alternative
- ▶ Summary of adverse and positive impact of each alternative
- ▶ Selection of the alternative which is the best with respect to use of resources and adverse environmental impact

DESCRIPTION OF THE ENVIRONMENT

4.0 General

Baseline conditions define the characteristics of the existing environment and shape projected future conditions, assuming no project is undertaken. They provide the basis from which project impact comparisons are made. Baseline analysis should take into account:

- ▶ Past trends in environmental quality
- ▶ Other current or proposed development programs in the project area.

Environmental components to be considered in relation to highway projects are: (a) land, (b) water, (c) air and meteorological (d) biological (e) noise (f) solid waste management (g) socio economic and health environment. Hence it is necessary to ascertain the baseline data of these environmental components. As a primary requirement of EIA process, the proponent should collect baseline data in the project area as well as the study area, which is likely to be affected by the project activity for one season (non-monsoon).

4.1 Study Area

As a primary requirement of EIA process, the proponent should collect primary baseline data in the right of way as well as the area falling within 500 meters on either side of right of way and secondary data should be collected within 15 km aerial distance as specifically mentioned at para 9(iii) of Form I of EIA Notification 2006. The study area mentioned in this document should be considered for guidance purpose. But the exact study area for different environmental components is to be submitted for review and appraisal by the expert appraisal committee. Map of the project area and study area clearly delineating the location of various monitoring stations (air / water / soil and noise) superimposed with locations of habitation should be shown. Monitoring should be done as per CPCB guidelines.

4.2 Land Environment

- ▶ Land use plan should be ascertained from the existing approved master plan of the region, if any. The environmental sensitivity areas as mentioned at Para 9 (III) of form I of EIA notification 2006, covering the following within an aerial distance of 15 km should be furnished along with the aerial distance from the project boundary:
 - ◆ Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value
 - ◆ Areas which are important or sensitive for ecological reasons – wetlands, mangroves watercourses or other water bodies, coastal zone, biospheres, mountains, forests
 - ◆ Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration
 - ◆ Inland, coastal, marine or underground waters
 - ◆ State, national boundaries

- ◆ Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas
 - ◆ Defense installations
 - ◆ Densely populated or built-up area
 - ◆ Areas occupied by sensitive man-made land uses (*hospitals, schools, places of worship, community facilities*)
 - ◆ Areas containing important, high quality or scarce resources (*groundwater resources, surface resources, forestry, agriculture, fisheries, tourism, minerals*)
 - ◆ Areas already subjected to pollution or environmental damage (*those where existing legal environmental standards are exceeded*)
 - ◆ Areas susceptible to natural hazard, which could cause the project to present environmental problems (*earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions*)
- ▶ Details of villages, survey numbers of the area, tehsil, districts and states, elevation above mean sea level & latitude and longitude of important locations and existing drainage system throughout the proposed highway alignment should be collected
 - ▶ The details of demographic profile should be given as in **Table 4.1**
 - ▶ Data of the proposed land and its availability is to be ascertained from local authorities, revenue records etc.
 - ▶ Description of the existing situation of the land along the alignment, study of the land use pattern, habitation, cropping pattern, forest area, environmentally sensitive places, mangroves, notified industrial areas, sand dunes, nature of the terrain (plain, rolling, hilly), sea, river, lake etc. by employing remote sensing techniques and also through secondary data sources. The land use/land cover classification system as per **Annexure 3** should be furnished
 - ▶ Details of the alignment passing totally or partially in CRZ area and applicable notified restrictions should be furnished
 - ▶ Identification of major and minor irrigation tanks, within 2 kms on the upstream side of alignment, in consultation with local and irrigation authorities should be done. This will help to identify the vulnerability due to breaches during the heavy rainfall
 - ▶ Identification of quarries, stone crushers and borrow areas should be undertaken. This will help in assessing the impact due to these activities and to prepare suitable mitigation plan. The details of identified quarries and borrow areas should be given as in **Table 4.2 & 4.3**
 - ▶ Inventory of the environmental features such as trees/ forests if any/ drainage lines, rivers and water crossings/ irrigation water courses/ water bodies/ grazing lands/ cultural properties/ utilities/ community facilities/ schools/hospitals/ seasonal markets or cultural congregations etc, along the proposed highway should be prepared

Geology

The geological information such as rock types, history of any volcanic activity, seismicity, and land slides and associated hazards should be covered. The alignment segments falling under each seismic zone should be listed. Details of precautionary measures proposed for the section of alignment falling under zone 5 should be listed.

Soil data

The soil profile of the highway alignment should be presented based on the soil series maps of National Bureau of Soil Survey and Land Use.

The suggested parameters for soil analysis are pH, Electrical conductivity, sand (%), silt (%), clay (%), texture, moisture retention capacity (%), infiltration rate (mm/hour), bulk density (gm/cc), porosity (%), organic matter (%), nitrogen (mg/1000g), potassium (mg/1000g), phosphorous (mg/1000g), sulphates and sodium sulphates. The soil sample locations and monitored values should be given as in **Table 4.4**.

4.3 Water Environment

Details of surface water bodies within right of way and within 500mts from the right of way should be documented along with the present usage. The description of these water bodies should be given as in **Table 4.5** Monitoring of surface water and ground water within the study area should be furnished. The samples should be collected and analyzed as per the standard procedures. The description of the water sampling locations should be given as in **Table 4.6 & 4.7** and the monitoring results should be given as in **Table 4.8 & 4.9**. The flow and other details of the streams crossing the alignment should be furnished.

The Central Pollution Control Board has stipulated criteria for raw water usages, use based classification of surface water and these are given in **Annexure 5**.

4.4 Air Environment

Meteorological Data

Meteorological data covering maximum and minimum wind speed, wind direction, rain fall, relative humidity and temperature for atleast 10 years period should be presented from the nearest meteorological station. Recording velocity and direction of wind along the proposed alignment, where sensitive receptors are located nearby, should be generated by installing continuous and self-recording anemometer. History of cyclones, earth quakes and snowfall data shall be collected from the nearest meteorological station for a period of 50 years.

Ambient Air Quality

Baseline data for the parameters - particulate matter size less than 10 μ m or PM₁₀ μ g/m³, particulate matter size less than 2.5 μ m or PM_{2.5} μ g/m³, sulphur dioxide (μ g/m³), nitrogen dioxide (μ g/m³) and carbon monoxide (μ g/m³) in the study area should be generated for one season other than monsoon as per CPCB norms. The monitoring locations and the result should be given as in **Table 4.10 & 4.11**. While selecting the monitoring locations specific importance should be given where ever sensitive environmental receptors exist. The National Ambient Air Quality Standards is given in **Annexure 4**.

4.5 Noise Environment

Baseline data in the study area should be generated. While selecting the monitoring locations specific importance is to be given for sensitive environmental receptors like thickly populated areas, hospitals, schools, wildlife corridors etc. Hourly monitoring of noise levels (Leq) should be recorded for 24 hours by using integrated noise meter. Noise standards have been designated for different types of land use, i.e. residential, commercial, industrial areas and silence zones as per

the Noise Pollution (Regulation and Control) Rules 2000 (**Annexure 6**). The description of noise monitoring locations should be given as in **Table 4.12**.

4.6 Biological Environment

The baseline status for biological environment should be established by studying distribution pattern, community structure, population dynamics and species composition of flora and fauna. The following should be covered:

- ▶ Details on secondary data on the existing flora and fauna in the study area, carried out by an university/institution under the relevant discipline (such as BSI, ZSI, WII, etc) should be included in the list of flora and fauna along with classification as per Schedule given in the Wild Life Protection Act, 1972 and in the Red Book Data and a statement clearly specifying whether the study area forms a part of an ecologically sensitive area or migratory corridor of any endangered fauna. The list of endangered and endemic species should be given as in **Table 4.13**.
- ▶ If the proposed project site involves any breeding or nesting ground, details about the name of the aquatic organism, type of habitat and period of year in which activity takes place should be provided
- ▶ If the proposed route requires cutting of trees, then the information should be provided for number of trees to be cut, their species and whether it also involved any protected or endangered species
- ▶ Location of national parks, sanctuary, and biosphere reserve, tiger reserve, elephant reserve and wildlife migratory routes with in aerial distance of 10 km either side of proposed alignment should be furnished
- ▶ Information on dependence of ethnic minorities on minor forest products should be furnished

4.7 Socio Economic and Health Environment

Baseline data in the study area particularly on human settlements, health status of the communities, existing infrastructure facilities should be collected through secondary sources. Present employment, livelihood and awareness of the population about the project should be collected. **Annexure 7** gives the illustrative types of socio-economic impact for reference.

The data required for R&R of the effected population as per the government norms should be collected.

ANALYSIS OF POTENTIAL ENVIRONMENTAL IMPACT & MITIGATION MEASURES

5.0 General

The aim is to ensure that potential environmental problems are foreseen and avoided at an early stage in planning cycle so as to pre-empt problems. The EIA mechanism shall be applied to the project in the following order of priority:

- ▶ **Avoid** adverse environmental impact
- ▶ **Minimize** and control adverse environmental impact
- ▶ **Mitigate** adverse environmental impact

Environmental impact should be considered not only as they pertain to road right of way, but also to the sites associated with the road project, which include deposit and borrow sites, materials treatment areas, quarries, access roads and facilities provided for project work.

5.1 Land Environment

Anticipated Impact

- ▶ Highway projects require large quantum of land and causes disturbance to the existing land usage. Impact on the land use pattern should be assessed
- ▶ Impact due to the removal of topsoil during highway construction and from storing, stockyards, workers camp etc.
- ▶ Impact on productive lands on selection of borrow areas
- ▶ Impact due to erosion and consequent modification of natural conditions
- ▶ Impact due to destabilization of slopes
- ▶ Impact due to diversion of natural surface water flows
- ▶ Impact due to construction of embankment leading to blocking of cross drainage and causing water logging
- ▶ Impact due to construction of bridges across, nallahs, streams, rivers/water bodies
- ▶ Impact on haul roads due to usage of heavy machinery for material transportation
- ▶ Impact due to ribbon development along the highway

Mitigation Measures

- ▶ While selecting road alignment attention must be paid to avoid areas prone to land slides, soil erosion, subsidence, fertile agricultural lands etc.
- ▶ The erosion potential of alternatives should be carefully examined and the one involving least disturbance to the natural ground should be preferred

- ▶ In case of flood prone areas and/or areas with very flat slopes, hydrological surveys have to be conducted before alignment finalization. Inputs derived from these surveys such as the need for provision of culverts/bridges or other cross/roadside drainage structures should be considered in the alignment finalization
- ▶ Checklist of points about the erosion control on the construction of highway projects in hilly areas is given in **Annexure 8**
- ▶ In hilly areas, specific geological studies should be conducted to avoid locations vulnerable for land slides
- ▶ Balancing filling and cutting requirements through alignment choice to reduce the need for borrow pits and to minimize excess spoil material generation should be considered
- ▶ Drainage improvements to avoid water logging and flooding due to disturbance of natural drainage pattern should be considered
- ▶ Possibility of storing and reuse topsoil by separating topsoil from subsoil during the initial excavation should be considered
- ▶ Engineering measures for slope protection and erosion prevention should be considered
- ▶ Maintenance of haul roads should be planned
- ▶ Borrow areas should be opened preferably from barren and infertile lands
- ▶ The stored topsoil should be spread back to restore the productivity of the exhausted borrow areas/ the accumulated top soil should be utilized for developing median plantation and for raising turfs in the embankment slopes

To prevent malaria, where other conditions permit, borrow pits should be well drained. To ensure efficient drainage, the bed level of the borrow pits should, as far as possible, slope down progressively towards the nearest cross drain, if any, and should not be lower than the bed of the cross drain

When it becomes necessary to borrow earth from temporarily acquired cultivable lands, the depth of borrow pits should not exceed 45 cm. The topsoil to a depth of 15 cm should be stripped and stacked aside. Thereafter soil may be dug out to a further depth not exceeding 30 cm and used in forming the embankment. The topsoil should then spread back on the land. It is most important to adopt this practice when the soil is borrowed from rich cultivable land

In waterlogged areas where the water table is near the surface, the lowering of the land even by 30 cm may make cultivation impossible. In such cases borrow pits should take the form of deep narrow continuous ditches (connected with natural drainage where possible) so as to conserve as much land as possible. In all such cases special anti-malaria measures may have to be adopted near habitations, in consultation with Public Health Authorities

Borrow pits should not be dug within 0.8 km of towns or villages. If unavoidable, they should not exceed 30 cm in depth and should be drained

(Source: Recommended Practice for borrow pits for road embankments constructed by manual operation: IRC: 10-1961)

- ▶ Identification of waterlogged areas under the following categories and plan for remedial measures as suggested in IRC: 34 – 1970 may be considered:

- ◆ Road construction in areas where the problem is one of water logging alone and is not tied up with flooding or salt infestation
 - ◆ Road construction in areas where in addition to water logging flooding for prolonged periods is also expected
 - ◆ Road construction in areas where in addition to water logging injurious salts are present in the subsoil or ground water
- ▶ Drainage improvements for prevention of soil erosion and siltation of watercourses should be planned. Slope stabilization techniques and erosion control measures should be planned especially for the projects undertaken in hilly areas, such as increasing vegetation, sausage walls/ gabions (IRC: SP: 48 – 1998), bally benching (IRC: SP: 48- 1998), check dams etc

5.2 Water Environment

5

Anticipated Impact

- ▶ Road construction activities that intersect drainage basins, generally modify the natural flow of surface water by concentrating flows at certain points and in many cases, increasing the speed of flow resulting in flooding, soil erosion, channel modification and siltation of streams. Impact due to surface water flow modifications should be assessed
- ▶ Impact on water table due to road drainage, excavation and construction of embankments and structures should be assessed
- ▶ Impact due to spillages and accidents of vehicles carrying chemicals should be assessed, especially if drinking water bodies are located within 500 meters in the u/s of the highway alignment
- ▶ Impact on water facilities such as, wells, hand pumps, tube wells etc falling along the highway alignment should be assessed
- ▶ Impact due to disposal of wastewater generated from the temporary project offices and temporary workers housing area should be assessed

Mitigation Measures

- ▶ Labour camps should not 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 should be strictly avoided. All the waste generated from the camps should be collected, stored and disposed in environmentally suitable manner. Standards for discharge of effluents is given in Annexure 9
- ▶ Appropriate drainage arrangements with catch drains and catch pits should be planned to prevent the spillage of chemicals and fuels reaching the water bodies
- ▶ Possibility of avoiding alignments which are susceptible to erosion
- ▶ Water flow speed control should be exercised to check surface runoff's and silt loads during construction activities
- ▶ Silt screens and sediment traps to be made before out-letting to water bodies to minimize turbidity and silting in local water bodies
- ▶ The effect of the proposed highway project on channel capacities and existing floodways should be evaluated. Care must be taken to evaluate the effects related to the delayed release from detention facilities since an increase in downstream peak discharges

- ▶ In dry areas road drainage can be designed to retain water in small dams or maintain a high water table, which increases the availability of more water and recharging of local aquifers

5.3 Air Environment

Anticipated Impact

- ▶ The immediate surroundings may have a greater impact. The existing surrounding features such as habitation, hospitals, schools, notified sanctuaries etc. up to 500 meters and impact on them should be addressed
- ▶ Impact due to dust generation from excavation of soil, cutting of embankment near to habitation, hospitals, schools, sanctuaries etc., up to 500 meters should be addressed
- ▶ Impact due to movement of heavy vehicles carrying construction materials in the haul roads
- ▶ Impact due to stone quarrying
- ▶ Impact due to dust generation from material handling, storage, operation of crushers and hot mix plants, movement of construction vehicles and construction activities
- ▶ Impact due to vehicular emissions from vehicles used for construction purpose
- ▶ Emission levels are expected to increase with the increase in vehicle numbers. There are models developed by various international agencies to predict vehicular emissions. In order to know the increase in pollution level, a mathematical modeling based on emission factors of various vehicles and traffic projection, increase in pollutants load in atmosphere can be calculated

Mitigation Measures

- ▶ Selecting road alignment, which avoids passing close to housing, schools, hospitals etc,
- ▶ Providing sufficient capacity to avoid traffic congestion, even with projected increase in traffic flow
- ▶ Provision of local access roads where access to main arteries has been restricted for the purpose of promoting traffic efficiency and safety
- ▶ Planting tall leafy vegetation between roads and human settlements
- ▶ Water sprinkling and transporting construction materials with tarpaulin coverage during the construction stage. During the sub-grade construction, sprinkling of water should be carried out on 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 properly and in no case, loose earth should be allowed to pile up along the alignment
- ▶ All the vehicles used during the construction stage to have valid PUC certificate
- ▶ Provision of air pollution control systems in stone crushers to meet the suspended PM value at distance of 40 meters less than 600 micrograms/Nm³. The stone crushing units should adopt the following pollution control measures:
 - ◆ Dust containment cum suppression system for the equipment
 - ◆ Construction of wind breaking walls
 - ◆ Construction of the metalled roads within the premises

- ◆ Regular cleaning and wetting of the ground within the premises
- ◆ Growing of a green belt along the periphery
- ▶ Hot mix units, if used on site, should be equipped with requisite air pollution equipment to meet the prescribed standard of MoEF and SPCBs
- ▶ Integration with the local government awareness campaign programmes on good practices of vehicle maintenance etc. to reduce the air emissions

5.4 Noise Environment

Anticipated Impact

- ▶ Impact of noise during construction activity, due to operation of various equipments
- ▶ Impact of noise on the surrounding community due to vehicle movement
- ▶ Impact of noise on wild life from crossing road corridors and becoming the highway corridor a barrier to regular wild life travel routes
- ▶ Prediction of noise levels should be done by using mathematical modeling at different representative monitoring stations
- ▶ Impact of vibrations during blasting activity, if any

Mitigation Measures

- ▶ Provision for stationary machines and equipment with acoustic enclosures and silencers, during the construction stage
- ▶ Development of bypass roads to avoid road alignment through noise sensitive areas
- ▶ Adoption of proper surface design and maintenance
- ▶ Provision of noise barriers.
- ▶ Prediction model outputs justifying the selection of type of the noise barrier and thickness of the noise barrier etc.
- ▶ Planting tall leafy and dense vegetation between roads and noise sensitive areas
- ▶ Provision of mandatory acoustic enclosure /acoustic treatment of room for stationary DG sets (5KVA and above). The acoustic enclosure/acoustic treatment of the room should be designed for minimum 25 dB (A) insertion loss for meeting the ambient noise standards, whichever is on the higher side. The DG set should be provided with proper exhaust muffler with insertion loss of minimum 25 dB (A)

- ▶ Building facade insulation, such as double window glazing, is an option usually adopted as a last resort in order to dampen noise in buildings. It is most likely to be needed in cases where noise impact result from an unforeseen expansion of traffic volume along existing roads
- ▶ Doubling the distance between the road and the receptor results in a decrease of 3 dB (A) in the noise level
- ▶ When traffic on road is doubled, the noise level increases 3 dB (A), all other factors being equal
- ▶ Doubling the speed results in an increase of 6 dB (A)

(Source: World Bank Technical Paper No.376)

5.5 Biological Environment

Anticipated Impact

- ▶ Impact due to removal of trees in the highway alignment
- ▶ Impact on forest resources, economically important plants including medicinal plants and threat to endangered species
- ▶ Impact on wildlife habitat and biodiversity due to change in land use
- ▶ Impact due to fragmentation of wildlife habitat and territories
- ▶ Impact due to changes in water quality, soil profile, noise, light and air pollution, which may affect the nature and character of habitats
- ▶ Pressure on habitats wildlife as a result of increased access provided by roads

Most animal species tend to follow established patterns in their daily and seasonal movements. The areas, which they travel on their way to and from feeding, breeding and birthing grounds, and between their seasonal ranges, are known as corridors. When a highway projects intersects or blocks a wildlife corridor, the result is either cessation of use of the corridor because animals are reluctant to cross the road, an increase in mortality because of collisions with vehicles, or a delay in migration which may result in the weakening of the population

Mitigating Measures

- ▶ Tree plantation plan to compensate the trees cut should be prepared as per the government norms
- ▶ Possibility of tree transplantation should be examined
- ▶ Identification of sensitive natural environments in the early planning stage so that alternative routes, changes in width of the road can be examined
- ▶ Possibility of twin new road corridors with previously established transport rights-of-way, such as railway lines
- ▶ Provision of wildlife underpass and hydraulic structure
- ▶ Compensate the loss of forest coverage by appropriate plantation programme. Survival rate of plants must be included in the contract specifications so as to ensure that the compensatory plantation achieves its objective
- ▶ Development of green belt on either side of the highway consisting of a variety of trees would help to enrich ecology of the area and add to aesthetics. The location for roadside green belt should be finalized keeping in view of future expansion of the highway
- ▶ Regeneration of rare plants of economic importance including medicinal plants
- ▶ Conservation plan for conservation and protection of flora and fauna, wildlife migratory species and medicinal plants

5.6 Socio – economic and Health Environment

Anticipated Impact

- ▶ Analysis of positive and negative impact on the present status of livelihood.
- ▶ Displacement of human settlement from proposed site. Impact on livelihood and loss of properties
- ▶ Impact on community resources such as grazing land, religious places and panchayat meeting place etc.
- ▶ Impact on the existing travel areas due to faster traffic, access controls and median barriers
- ▶ Impact due to accelerated urbanization
- ▶ Employment opportunity and access to other amenities such as primary education and health care facilities for local people

5

Mitigation Measures

- ▶ The splitting of a community can be minimized by taking account of local movements at the road design stage and by making provision for improved crossings or alternative access routes
- ▶ Rehabilitation plan for land outtees, homestead outtees, and for displaced persons
- ▶ Institutional arrangement for effective implementation and periodical review through project implementation
- ▶ Institutional capabilities to carryout the relocation and rehabilitation operation be assessed and, if necessary, strengthened
- ▶ Training to local people for employing them in the proposed project
- ▶ Mechanism for providing effective guidance in financial planning to effected people
- ▶ Integration with the local master plan to prevent conflict of interest

Throughout the world, the spread of AIDS and other sexually transmitted diseases (STDs) can be linked to the construction of roads and the resultant opening-up of new regions. Although there are no empirical data to support this theory, it is believed that migrant populations-particularly truck drivers and construction workers-whose mobility is enhanced by new road projects are the most likely vectors for these diseases. The particular impact of road construction can only be mitigated through education of both the migrant and local populations.

(Source: World Bank Technical Paper No. 376)

5.7 Solid Waste Management

Anticipated Impact

- ▶ Waste generated during construction may impact soil, agriculture and water quality
- ▶ Waste generated from workers' camps may impact surface and ground water quality and agriculture
- ▶ Impact due to oil spillage/leakage from machines and vehicles

Mitigation Measures

- ▶ As far as possible road design and alignment should be finalized to minimize waste generation through balancing of cut and fill operations and minimizing excess cuts requiring disposal
- ▶ In case debris generated from cutting in hill areas could not be reused, method of disposal should be addressed. One of the suggestions is indicated in **Figure 5.1**. The figure indicates construction of gabion walls on valley side at ridge locations to form a through for waste disposal. As the ridge locations usually have streams flowing through, length of the pipe provided at the culvert should be extended to let runoff flow out of the disposal location. After filling up of the disposal site, it shall be grassed and suitably vegetated to prevent erosion of the disposed soil

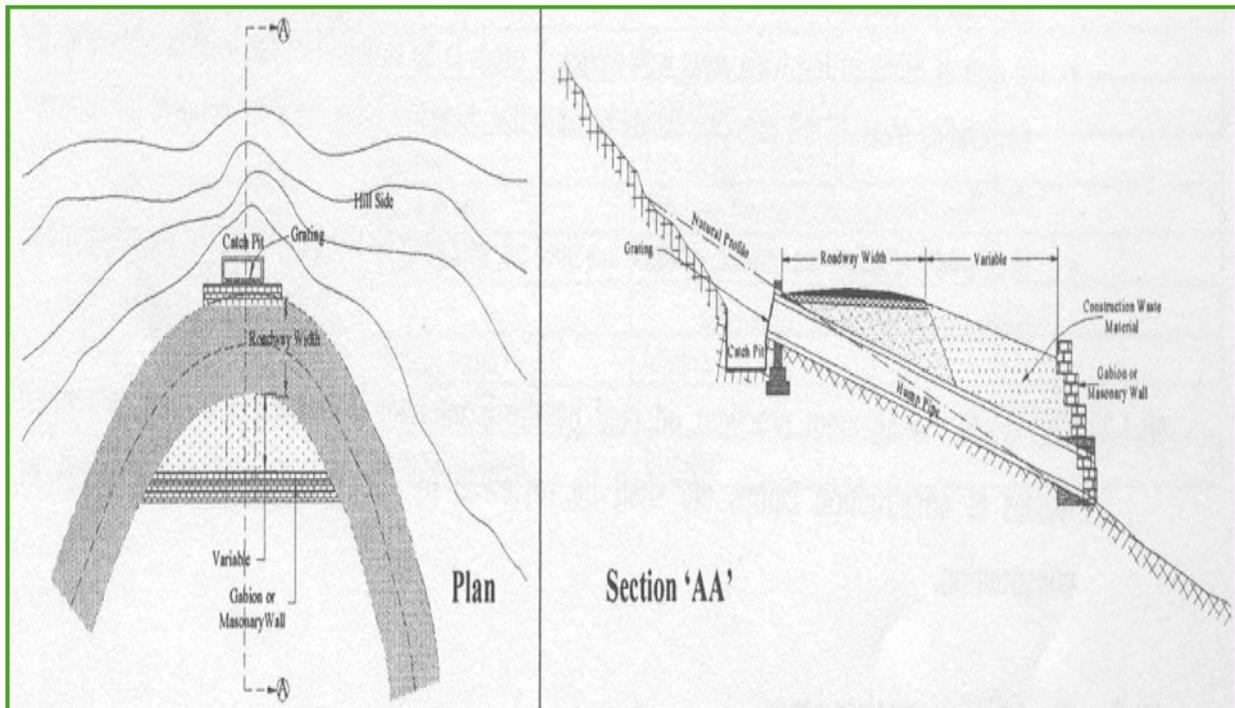


Figure 5.1: Schematic Layout of Waste Management in case of Hilly Areas
 (Source: *Environmental Codes of Practices, 2004 – Ministry of Rural Development, GoI*)

- ▶ Suitable topsoil management should be prepared. Loss of topsoil is a long term impact in highway projects due to site clearance and widening for road formation, development of borrow areas and temporary construction activities such as construction camps, material storage locations, diversion routes etc. The stripped topsoil should be carefully stockpiled at suitable places. In case of hilly and desert areas, topsoil with humus wherever encountered while opening up the site for construction should be stripped and stockpiled

The environmental concerns and measures to address in highway projects are given in a matrix form in **Annexure 10** for further reference.

ENVIRONMENTAL MONITORING PROGRAMME

6.0 General

This chapter should cover the technical aspects of monitoring the effectiveness of mitigation measures (including measurement methodologies, data analysis, reporting schedules, emergency procedures and budget). It shall also include

- ▶ Summary matrix of environmental monitoring covering location of monitoring stations, frequency of sampling, method of sampling analysis and data interpretation - during construction and operational stages
- ▶ Requirement of monitoring facilities
- ▶ Frequency of air quality monitoring
- ▶ Changes with reference to base line data and compliance to norms
- ▶ Plantation monitoring programme

6.1 Control Initiatives

List out data from MoSRTTH specifications for environmental management, code of practices of IRC, CPCB publication and other government guidelines and control objectives that would be implemented at appropriate stage in EIA. List of some of IRC codes of practices for highway projects is given in **Annexure 11**.

It should also cover different statutory returns/ compliance reports to be submitted such as:

- ▶ Submission of half yearly compliance report in respect of the stipulated prior environmental clearance terms and conditions in hard and soft copies to the regulatory authority concerned, on 1st June and 1st December of each calendar year
- ▶ Submission of environmental statement for the financial year ending 31st March to the concerned state pollution control board on or before 30th September every year

ADDITIONAL STUDIES

7.0 General

TOR to be adopted for Highway projects as commonly applicable is prepared and attached to this manual as **Annexure 1**. It may however, be necessary consider specific issues as applicable to individual projects. The EIA report and EMP should therefore address such issues also.

7.1 Items Identified by the Proponent

The proponent may be able to identify issues beyond those included in the common TOR as may be specifically considered by him important from environmental point of view. In such cases the proponent shall include such issues as additional studies under TOR and pursue them in the EIA study after the regulatory authority approves TOR.

7.2 Items Identified by the Regulatory Authority

During the scoping process, the regulatory authority may direct specific issues, beyond those is included in the TOR proposed by the proponent, as may be specifically considered important from environmental point of view. In such cases the proponent should pursue those issues as additional studies in the EIA report after the regulatory authority approves TOR.

7.3 Items Identified by the Public and Other Stakeholders

After completion of the public consultation, the applicant shall address all the environmental concerns expressed during the process, and make appropriate changes in the draft EIA and EMP. The final EIA report, so prepared, shall be submitted by the applicant to the concerned regulatory authority for appraisal. The applicant may alternatively submit a supplementary report to draft EIA and EMP addressing all the concerns expressed during the public consultation. A statement of the issues raised by the public and the comments of the applicant shall also be prepared in the local language and in English and annexed to the proceedings.

7.4 Natural Resource Conservation and Optimization

The use of alternate materials for construction focuses on the management and reuse of waste materials locally available in the project area with the added advantage of economizing the project cost, should be explored. Potential waste materials that can be used in highway projects include: flay ash, blast furnace slag, marble slurry, quarry overburden, and other industrial wastes. Lime or mechanical stabilization techniques should be utilized in case the materials available around the project area are not suitable for construction in its original condition. The guidelines for the use of waste materials as laid down in IRC code of practices should be examined for its application.

Fly Ash utilization proposals shall be prepared in accordance with notification No. S.O. 2804 (E) dated 3rd November 2009

No agency, person or organization shall, within a radius of 100 kilometers of a thermal power plant undertake construction or approve design for construction of roads or flyover embankments with top soil; the guidelines/specifications issued by the Indian Road Congress (IRC) as contained in IRC specification No. SP: 58 of 2001 as amended from time to time regarding use of fly ash shall be followed and any deviation from this direction can only be agreed to on technical reasons if the same is approved by Chief Engineer (Design) or Engineer-in-Chief of the concerned agency or organization or on production of a certificate of “fly ash not available” from the thermal power plant(s) (TPPs) located within hundred kilometers of the site of construction and this certificate shall be provided by the TPP within two working days from the date of receipt of a request for fly ash, if fly ash is not available

No agency, person or organisation shall within a radius of hundred kilometers of a coal or lignite based thermal power plant undertake or approve or allow reclamation and compaction of low lying areas with soil; only fly ash shall be used for compaction and reclamation and they shall also ensure that such reclamation and compaction is done in accordance with the specifications and guidelines laid down by the authorities

7.5 R & R Action Plans

- ▶ 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 and rehabilitation of the displaced people, civil and housing amenities being offered, etc and the schedule of the implementation of the project specific R&R Plan
- ▶ Details of budget provisions (capital & recurring) for the project specific R&R Plan
- ▶ Institutional arrangements for implementation of R&R

7.6 Road Safety Management System

The statistics of road accidents in India is quite alarming and the Road safety management system should be made an integral part of highway projects

Statistics of road accidents - 2007

During the calendar year 2007, number of road accidents reported at 4,79,216 were higher by about 4 percent compared with 4,60,920 accidents reported in the year 2006. The number of persons injured and killed as a result of road accidents during 2007 were 5,13,340 and 1,14,444 respectively and were higher by 3.4% and 8.2% compared to 4,96,481 and 1,05,749 reported for the preceding year

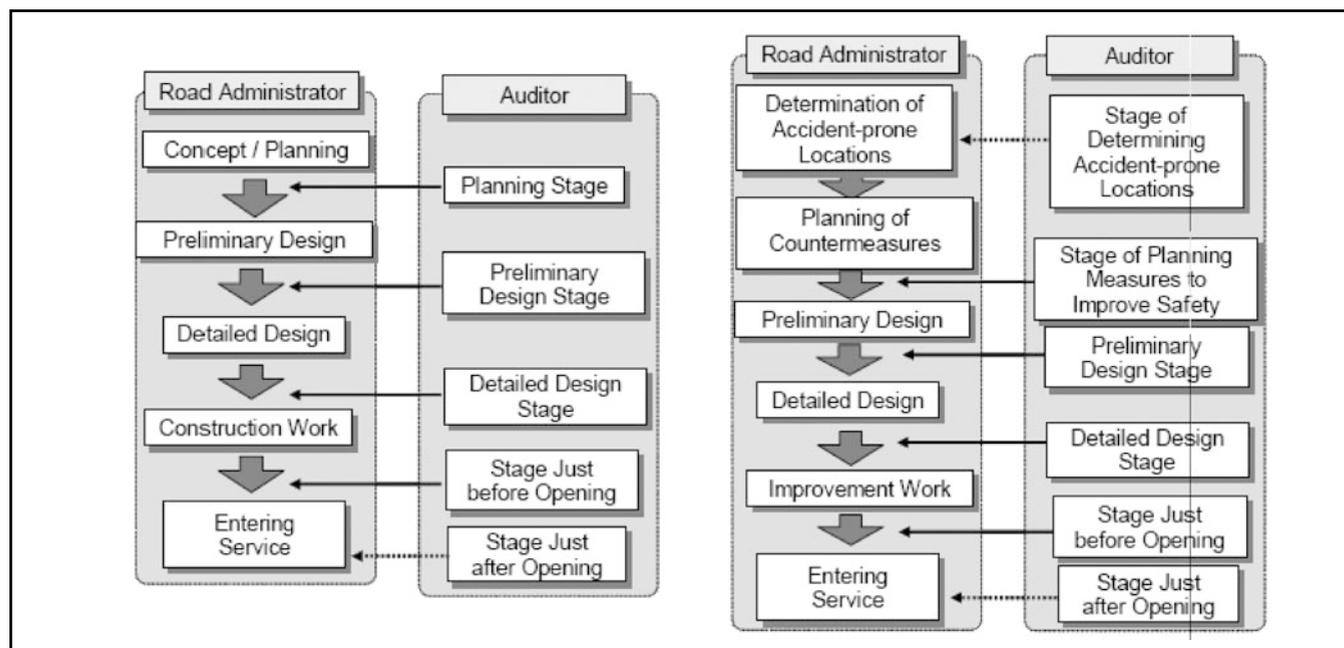
(Source: Road Transport Year Book (2006-07), MSRT&H, GoI released March 2009-www.morth.nic.in)

- ▶ IRC code of practice on road safety should be planned
- ▶ Identification of accident prone areas and suggest alternatives to avoid accidents during the planning stage itself

- ▶ Identification of habitat fragmentation and traffic accident of wildlife and mitigation measures
- ▶ Provision of speed breakers, safety signals, under and over bridges, service lanes and foot paths at appropriate locations through out the proposed road to avoid the accidents
- ▶ Provision for pedestrian access to the highways except at designated crossing points, when the highway passes through habitation. Requirement of pedestrian over bridges/subways should be assessed. Provision of traffic signals should be assessed
- ▶ Provision of roadside rest areas at strategic locations to minimize driver fatigue
- ▶ Accident data distribution should be reviewed and analyzed to predict and identify trends for correction and for future use – incase of expansion of the existing highways
- ▶ Provision should be made for indicating the availability of facilities for post accident emergency assistance and medical care to accident victims. Accurate and comprehensive accident records are the foundation of the accident analysis. Road accident forms, data collection, reporting and analysis covering the responsible departments should be addressed
- ▶ Road safety audit should be made an integral part of the highway project during the planning, construction and operational stage. The Road safety audit frame work in Japan is given below

7

Road Safety Audit Frame Work in Japan



Existing Highway Projects

New/ Expansion Highway Projects

(Source: Proceedings of the Eastern Asia Society for Transportation Studies, Vol. 5, pp. 2018 - 2031, 2005)

8.0 General

This chapter shall include benefits accruing to the locality, neighborhood, region and nation as a whole. It should bring out details of benefits such as:

- ▶ Improvements in the physical infrastructure and road access
- ▶ Improvement in social services by quicker and safe transport mode
- ▶ Development of tourism in specific areas
- ▶ Reduced pollution, vehicle maintenance, fuel saving due to better quality of roads
- ▶ Over all development in economy and improved life style

ENVIRONMENTAL COST BENEFIT ANALYSIS

9.0 General

If recommended by the Expert Appraisal Committee at the Scoping stage this chapter shall include the Environmental Cost Benefit Analysis of the project.

ENVIRONMENT MANAGEMENT PLAN

10.0 General

In practice, mitigation is emphasized in the EIA process following impact identification and prediction, and recommended measures will be an important part of the EIA report. These measures will be incorporated into the terms and conditions of project approval and implemented during the Environmental management stage of the EIA process. The objectives of environmental management are to:

- ▶ Ensure the mitigation measures are implemented
- ▶ Establish systems and procedures for this purpose
- ▶ Monitor the effectiveness of mitigation measures and
- ▶ Take any necessary action when unforeseen impact occur

10.1 Components of EMP

The EMP should contain the following components

- ▶ Summary of potential impact & recommended mitigation measures. Allocation of resources and responsibilities for plan implementation
- ▶ EMP for fly ash utilization
- ▶ Administrative and technical setup for management of environment
- ▶ Institutional arrangements proposed with other organizations/Govt. authorities for effective implementation of environmental measures proposed in the EIA
- ▶ Safe guards/mechanism to continue the assumptions/field conditions made in the EIA
- ▶ Environmental specifications for contractors should cover the required safeguards during the design and construction stage
- ▶ Approach towards voluntary compliance (ISO 14001) should be explained.

International good practices are given in **Annexure 12** for further reference.

10.2 Environmental Cell

It is desirable for the proponent to set up a separate environmental cell to oversee implementation of the EMP and evaluate the results of monitoring. Survey and analysis should be carried out periodically. Establishing a multidisciplinary internal environmental audit team for compliance review should be planned.

SUMMARY AND CONCLUSIONS

11.0 General

Summary of EIA shall be a summary of the full EIA report condensed to ten A-4 size pages at the maximum. It should necessarily cover in brief the following chapters of the full EIA report.

- ▶ Introduction
- ▶ Project description
- ▶ Description of the environment
- ▶ Anticipated environmental impact & mitigation measures
- ▶ Additional studies
- ▶ Project benefits
- ▶ Important Aspects of the Environmental Management Plan and
- ▶ Important Aspects of the Environmental Monitoring Programme
- ▶ Disclosure of consultants engaged

DISCLOSURE OF CONSULTANTS ENGAGED

12.0 General

The EIA consultants shall have accreditation with Quality Control of India (QCI)/National Accreditation Board of Education and Training (NABET) as per office memorandum dated 2nd December 2009 of MoEF. This chapter shall include the names of the consultants engaged with their brief resume and nature of consultancy rendered. The consultants should include the copy of the accreditation certificate and data provided by the other organizations/ laboratories including their status of approvals etc.

BIBLIOGRAPHY

- ▶ EIA Notification S.O 1533 dated 14th September 2006 and as amended 1st December 2009 (www.envfor.nic.in)
- ▶ Pollution Control Acts, Rules and Notifications issued thereunder (Pollution Control Law Series), CPCB (www.cpcb.nic.in)
- ▶ Proceedings for the workshop on Environmental Impact Assessment studies for developmental projects, CPCB
- ▶ Guidelines for developing green belts, Programme Objective Series, PROBES/75/1999-2000, CPCB
- ▶ Guidelines for Ambient Air Quality Monitoring, National Ambient Air Quality Series NAAQMS/25/2003-04, CPCB
- ▶ Assessment of Impact of Air Environment: Guidelines for conducting air quality modeling, Programme objective series: PROBES/70/1997-98, CPCB
- ▶ Fly Ash Notification S.O. 763 (E) dated 14th September 1999 and as amended 3rd November 2009
- ▶ Office Memorandum of MoEF dated 3rd November 2009 on New policy on expansion of existing ports and initiation of new projects along the coastline-regarding
- ▶ Comprehensive Environmental Assessment of Industrial Cluster, Ecological Impact Assessment Series, EIAS/5/2009-10
- ▶ Strengthening Institutions for Sustainable growth in the Highways Sector- India Country Environment Analysis, The World Bank
- ▶ World Bank Technical Paper No. 376, Roads and the Environment November 1997
- ▶ Asian Development Book 1993, Environmental Assessment Requirements and Environmental Review Procedures]
- ▶ Guidelines for Environmental Impact Assessment of Highways published by Indian Road Congress
- ▶ Effective Natural Disaster Management system for Highways, Editorial, Indian Highways, March 2008 by V.K. Sinha
- ▶ Sundar committee report on road safety and traffic management, February 2007
- ▶ Accidental deaths and suicides in India -2007, National Crime Records Bureau (www.ncrb.nic.in)
- ▶ Road Transport Year Book (2006-07), MSRT&H, GoI (www.morth.nic.in)
- ▶ Environmental Codes of Practices 2004, Ministry of Rural Development, GoI
- ▶ Guidelines for Assessment of Ecological Impact of National Road Schemes, 2009, National Roads Authority, Ireland (<http://www.nra.ie/>)

EIA Guidance Manual – Highways

- ▶ Environmental Impact Assessment of National Road Schemes-A Practical Guide,2008, National Road Authority, Ireland
- ▶ Guidelines for development of Road Impact of development, Department of Main Roads, Queensland Government (<http://www.mainroads.qld.gov.au>)
- ▶ Guidelines on design of Noise Barriers, 2003, Environmental Protection Department Highways Department, Government of Hong Kong (<http://www.epd.gov.hk/epd>)
- ▶ Environmental Impact Assessment Manual, 2001, MoEF

TABLES

Table 2.1 Estimated Raw Material Requirements

S. No.	Item	Quantity (tonnes)	Mode of transport	Source
1	Blue metal			
2	Bricks			
3	Sand			
4	Cement			
5	Fly ash			
6	Bitumen			
7	Diesel			
8	Others			

Table 2.2 Water Requirement

S. No	Purpose	Quantity	Source
1	For road preparation		
2	For dust suppression		
3	For drinking purpose		
4	Others		
5	Total		

Table 4.1 Demographic Profile

Particulars	With in the project area	With in 500 meter from the ROW
Population		
No. of villages		
Number of households village-wise		

Table 4.2 Quarries Identified for the Project

S. No	Location	Distance From Highway Project	Remarks

Table 4.3 Borrow Areas Identified for the Project

Chainage of road-km	Place	Type of connecting road	Distance from nearest highway	Remarks

Table 4.4 Soil Data in the Study Area

Sample location/ Parameter						
pH						
Electrical						
Conductivity						
Sand%						
Silt%						
Clay%						
Texture						
Moisture retention capacity%						
Moisture%						
Infiltration rate mm/hour						
Organic matter%						
Nitrogen						
Potassium						
Phosphorous						
Sulphates						
Sodium sulphate						
Calcium sulphate						

Table 4.5 Details of Important Water Bodies Crossing/Abutting the Project Road

Name of the water body	Chainage	Flow direction	Description

Table 4.6 Description of Ground Water Sampling Locations

Station No.	Location	Distance & Direction from project area	Project area/ study area	Environmental setting

Table 4.7 Description of Surface Water Sampling Locations

Station No.	Location	Distance & Direction from project area	Project area/ study area	Environmental setting

Table 4.8 Analysis of Ground Water

S. No	Parameters	Unit	Result			Standards
			GW1	GW2	GW3	

Table 4.9 Analysis of Surface Water

S. No	Parameters	Unit	Result			Standards
			SW1	SW2	SW3	

Table 4.10 Description of Ambient Air Quality Monitoring Stations

Station No.	Location	Distance & Direction from project area	Project area/ study area	Environmental setting

Table 4.11 Ambient Air Quality Monitoring Data

Parameter	Particulate Matter (PM _{2.5})**				Particulate Matter (PM ₁₀)**				Nox**				SO ₂ **				CO**			
	No. of samples	Range	Mean	98 percentile	No. of samples	Range	Mean	98 percentile	No. of samples	Range	Mean	98 percentile	No. of samples	Range	Mean	98 percentile	No. of samples	Range	Mean	98 percentile
Monitoring Station & Category*																				

- ▶ *Industrial, Residential, Rural and other areas/ecologically sensitive area (notified by Central Government)
- ▶ ** micro grams per M³

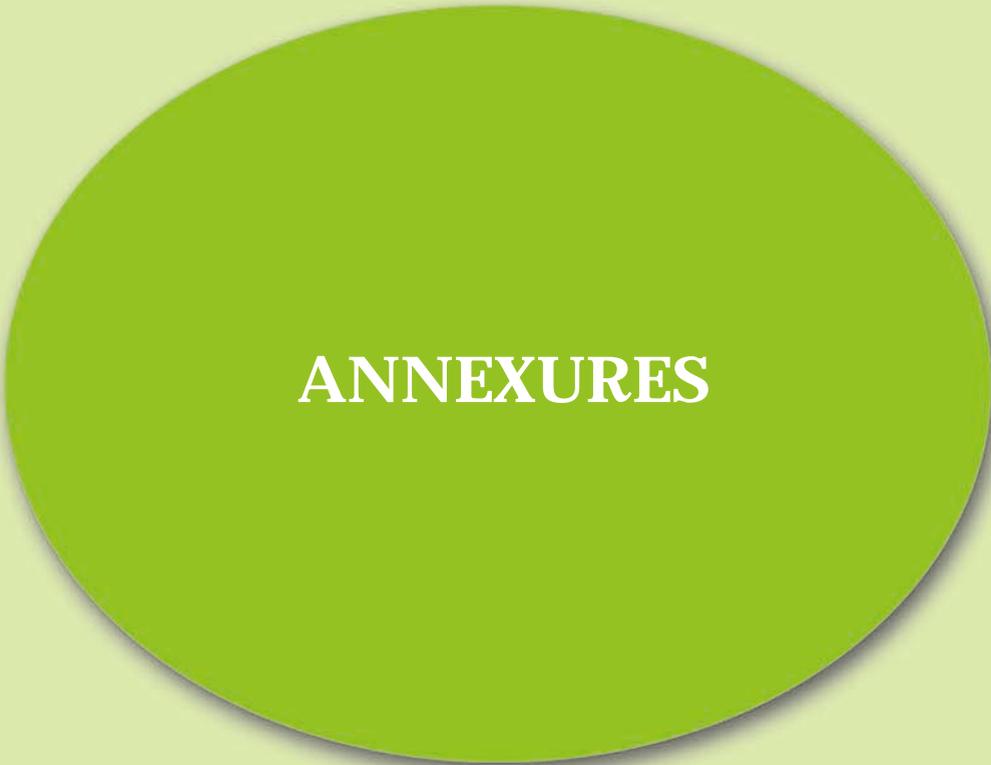
Table 4.12 Description of Noise Monitoring Stations

Station No	Locations	Class*	Average Day noise level (dBA)	Average Night noise level (dBA)	Day time (6.00 A.M. to 10.00 P.M) Standard (L _{eq} in dBA)	Day time (10.00 P.M. to 6.00 A.M) Standard (L _{eq} in dBA)	Environmental setting

*Industrial area/ Commercial area /Residential area /Silence zone

Table 4.13 List of Endangered and Endemic Species

S. No	Chainage of the road	Location	Endemic species	Endangered species



ANNEXURES

Annexure 1

Terms of Reference (TOR) for Highways

Objective

Terms of Reference (TOR) for preparation of Environmental Impact Assessment (EIA) and Environmental Management Plan for Highway Projects as per the EIA Notification, 2006 has been devised to improve the quality of the reports and facilitate the decision making transparent and easy. TOR will help the project proponents and consultants to prepare report with relevant project specific data, which are informative, compact and easy to comprehend. TOR for Highway Projects is expected to cover all environmental related features.

General Information

Developments of Highway Projects are generally intended to improve the economic and social welfare of the people. At the same time it may also create adverse impact on the surrounding environment. People and properties may be in the direct path of Road Works are effected. The Environmental impact of highway projects include damage to sensitive eco-systems, soil erosion, changes to drainage pattern and thereby ground water, interference with animal and plant life, loss of productive agricultural lands, resettlement of people, disruption of local economic activities, demographic changes, accelerated urbanization and increase in air pollution. Highway development and operation should, therefore, be planned with careful consideration of their environmental impact. To minimize these adverse effects that may be created by the Highway development projects the techniques of Environmental Impact Assessment (EIA) become necessary. Identification and assessment of potential environmental impact should be an integral part of the project cycle. It should commence early in the planning process to enable a full consideration of alternatives, and to avoid later delays and complications. Highway authorities should have a clearly designated staff member with overall responsibility for environmental matters and knowledge of environmental laws and regulations.

As per this EIA notification 2006, projects or activities included as Category 'A' in the Schedule shall require prior Environmental clearance from the Ministry of Environment and Forests on the recommendations of an Expert Appraisal Committee. All projects or activities included, as Category 'B' in the Schedule will require prior environmental clearance from the State/Union territory Environment Impact Assessment Authority

The Highway Projects are Included in Item No: 7(f) of Schedule of MOEF Notification 2006 with following Categorization :

Project Activity	A Category	B Category	General Condition
Highways (including express ways)	New National Highways & Expansion of National Highways greater than 30 km, involving	All state highway projects & State highway expansion projects in hilly terrain (above 1,000 m AMSL) and or ecologically	"Any project or activity specified in Category 'B' will be treated as Category 'A' if located in whole or in part within 10 km from the boundary of: (i) Protected areas notified under the Wildlife

	<p>additional right of way greater than 20m involving land acquisition and passing through more than one State</p>	<p>sensitive areas</p>	<p>(Protection) Act, 1972; (ii) Critically polluted areas as identified by the Central Pollution Control Board from time to time; (iii) Eco-sensitive areas as notified under section 3 of the Environment (Protection) Act, 1986, such as, Mahabaleswar Panchangi, Matheran, Pachmarhi, Dahanu, Doon Valley and (iv) inter-state boundaries and international boundaries Provided that the requirement regarding distance of 10km of the inter-state boundaries can be reduced or completely done away with by an agreement between the respective states or U.Ts sharing the common boundary in the case the activity does not fall within 10 kilometers of the areas mentioned at item (i), (ii) and (iii) above</p>
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All category A and category B1 Highway projects shall undertake Public Consultation except - “Expansion of Roads and Highways which do not involve any further acquisition of land & Projects or activities concerning national defence and security or involving other strategic considerations as determined by the Central Government.”

The EIA-EMP report should be based on generic structure given in Appendix III to the EIA notification 2006 for the project or its expansion /modernization. The EIA report should incorporate the page numbers of various chapters, sections and sub-sections, tables, appendices, drawings and figures etc., with titles shall be clearly indicated under the heading contents

1.0 Introduction

This chapter should cover the following:

- ▶ Purpose of the project, brief description of the project, project name, nature, size, its importance to the region and the country
- ▶ Profile of the project proponent, name and contact address with e-mail, organizational chart, project consultants etc., should be mentioned clearly
- ▶ Land description- village, tehsil, district, state and extent of the land must be mentioned clearly
- ▶ Whether the project attracts the provisions of General Conditions as per EIA notification 2006. If so, applicability to the project should be discussed
- ▶ The proponent should confirm that the project meets all the central/state/local environmental regulations and standards applicable for coal washeries and allied activities

- ▶ Any litigation(s) pending against the proposed project and/or any directions or orders passed by any court of law/any statutory authority against the project is to be detailed out
- ▶ In case of expansion/ modernization of the project, the environmental compliance status for the existing project should be explained
- ▶ National standards and codes of practice of Indian Roads Congress (IRC) and MoSRT &H particular to environmental issues, which are relevant to the proposed project should be furnished

2.0 Project Description

2.1 Broader Details of the Project, Location and Alignment

- ▶ Relevance of the project in light of the existing development plans of the region /state / nation
- ▶ Project coverage, master plan, phasing and scope
- ▶ Description of alternatives considered to avoid the ethnic minorities and indigenous people living in the proposed rights-of-way
- ▶ Procedures and criteria adopted for selection of the alignment of right of way and alternative alignments considered.
- ▶ Overall suitability of the identified alignment and the proposed activity in light of the existing Environmental Acts and deviations, if any
- ▶ Description of road alignment, broad geology, topography, connectivity, demographic aspects, socio, cultural and economic aspects, villages, settlements
- ▶ Details of land acquisition, rehabilitation of communities / villages present status
- ▶ Technologies involved for design, construction, equipment and operation
- ▶ Resources, manpower, time frame etc., required for project implementation
- ▶ Estimated cost of development of the project, environmental cost, funding agencies, whether governmental or on the basis of BOT etc,

Essential Maps to be Provided with TOR

- ▶ Highway alignment plan with the help of latest available cloud free satellite imagery of project alignment in 1:25,000 scale, and surrounding area covering 10 Km distance on either side of the proposed right of way showing the details of (i) Protected areas notified under the Wildlife (Protection) Act, 1972; (ii) Critically polluted areas as identified by the Central Pollution Control Board from time to time; (iii) Eco-sensitive areas as notified under section 3 of the Environment (Protection) Act, 1986, such as, Mahabaleswar, Panchgani, Matheran, Pachmarhi, Dahanu, Doon Valley and (iv) inter-state boundaries and international boundaries
- ▶ Alignment plan, with details such as nature of terrain (plain, rolling, hilly), details of villages, teshils, districts and states, latitude and longitude for important locations falling on the alignment shall be submitted
- ▶ A map derived from the recent satellite imagery covering aerial distance of 15 Km from the proposed alignment delineating environmental sensitive areas as specified in Form I of EIA notification dated 14th Sep 2006

- ▶ Land use map of the study area to 1: 25,000 scale based on recent satellite imagery of the study area 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
- ▶ Area drainage map covering 500 meters on either side of proposed right of way shall be clearly indicated. In case of any proposed diversion of nallah/canal/river either during the construction phase or operational phase, it shall also be shown in the map
- ▶ Detailed ground surveyed map in 1:2000 scale showing the existing features falling within the right of way namely trees, structures including archeological & religious, monuments etc.

2.2 Activities for Site Preparation

- ▶ 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 provided
- ▶ If the proposed route involves stripping, the details of the area to be stripped, locations, volume and quantity of earth to be removed, type of soil and proposal for utilization of removed top soil with location of dump site to be provided
- ▶ 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 dump site to be provided
- ▶ If the proposed route is passing through any hilly area, and avalanche area the details to be provided
- ▶ If the proposed route involves tunneling, the details of the tunnel and locations of tunneling 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 flood periodicity in the area should be provided
- ▶ If the proposed project involves any land reclamation, details to be provided for the activity for which land to be reclaimed and the area of land to be reclaimed
- ▶ If the proposed route involves any migratory path of animals, details about fauna, habitat and period of the year in which activity take place, should be provided
- ▶ Is there a possibility that the construction of roads will cause impact such as destruction of forest, poaching, reduction in wetland areas, if so, details are to be provided
- ▶ If there will be any change in the drainage pattern after the proposed activity, details of changes to be furnished
- ▶ 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 service ducts should be studied

If the Project Attracts the Provisions of CRZ Notification:

- ▶ In case the proposed route falls totally or partially in CRZ area, indicate the category of the area and also show under what provision this activity is permitted
- ▶ CRZ maps indicating the High Tide Line (HTL), Low Tide Line (LTL), demarcated by one of the authorized agencies and the project activities superimposed on the map shall be submitted on 1:5000 scale map at the stage of TOR

3.0 Analysis of Alternatives (Alignments & Technology)

In case, the scoping exercise results in need for alternatives this chapter shall include:

- ▶ Description of various alternatives like alignments or technologies studied
- ▶ Summary of adverse impact of each alternative
- ▶ Selection of alternative

4.0 Description of the Environment

Study Area

As a primary requirement of EIA process, the proponent should collect primary baseline data in the right of way as well as the area falling within 500 meters on the either side of the right of way and secondary data should be collected within 15 kms aerial distance as specifically mentioned at para 9(iii) of Form I of EIA Notification 2006. The study areas mentioned in this document should be considered for guidance purpose only. The exact study area for different environmental attributes (water, air, noise, soil etc) is to be submitted considering the proposed project activity and location, with proper reasoning, for review and approval by the expert appraisal committee. Monitoring should be done as per CPCB guidelines.

TOR should contain details of secondary data, the source of secondary data, meteorological data from nearest station of IMD along with wind roses and proposed monitoring locations should be marked on the study map. Similarly the proposed locations of monitoring stations of water, air, soil, noise etc shall be shown on the study area map. One season monitoring data excluding monsoon should be collected. Period/date of data collection should be clearly indicated.

4.1 Land Environment

- ▶ Data of the proposed land and its availability should be ascertained from local authorities, revenue records etc.
- ▶ Description of the existing situation of the land along the alignment. Study of the land use pattern, habitation, cropping pattern, forest area, environmentally sensitive places, mangroves, notified industrial areas, sand dunes, nature of the terrain (plain, rolling, hilly), sea, river, lake etc. by employing remote sensing techniques followed by ground truthing and also through secondary data sources
- ▶ Details of villages, tehsil, districts and states, elevation above mean sea level & latitude and longitude of important locations from where the alignment will be passing
- ▶ Data on erosion potential, and natural drainage should be provided
- ▶ Geology: rock types, history of any volcanic activity, seismicity, land slides and associated hazards
- ▶ Soil – soil cover, physical and chemical properties

In case of expansion/ modernization of the existing road, the following additional information shall be provided

Road factors: (i) Land width (ii) Geometrics – curvature, gradient, and pavement width etc. (iii) structural condition of road and road structures

Traffic factors: Traffic volume- vehicles per day/traffic composition/average speed of travel/ Presence of road intersection – nos./km and access control

4.2 Air Environment

- ▶ 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
- ▶ Wind rose (Wind direction and speed, 24 hourly data)
- ▶ Baseline data for the parameters -particulate matter size less than 10 μm or PM_{10} $\mu\text{g}/\text{m}^3$, particulate matter size less than 2.5 μm or $\text{PM}_{2.5}$ $\mu\text{g}/\text{m}^3$, sulphur dioxide ($\mu\text{g}/\text{m}^3$), nitrogen dioxide ($\mu\text{g}/\text{m}^3$) and carbon monoxide ($\mu\text{g}/\text{m}^3$) in the study area should be generated for one season other than monsoon as per CPCB norms.
- ▶ Monitoring stations are to be located based on dominating wind direction, habitations, notified sanctuaries and terrain features in the study area. The locations of monitoring stations should be clearly specified

4.3. Water Environment

- ▶ Determine the sensitivity of the study zone and identify the main potential impact, working from basic data on the drainage basin and watersheds, nature and frequency of flooding, water quality, water use, fauna species and habitats. Assess likely modification of baseline conditions arising from the project activity
- ▶ Details of springs, lakes, reservoirs within 500 meters of the proposed road right of way
- ▶ List the distance of the proposed alignment to the existing major water bodies used as drinking water in the down stream side of the alignment
- ▶ Fix-up the locations of representative monitoring stations along the proposed project road for surface and ground water resources and document them
- ▶ Samples should be collected for both surface and ground water and examined for physico-chemical, heavy metal and bacteriological parameters
- ▶ Delineation of water sheds and water drainage pattern in the study area using the topographical maps and the impact of the proposed highways in changes the water course etc for examining the drainage patterns especially during monsoon season and during floods

4.4. Noise Environment

- ▶ 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 near by 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
- ▶ Select the locations of monitoring stations along the alignment of the project covering sensitive locations such as residential, hospitals, schools, sanctuaries etc. Monitoring should be done for 24 hrs at each location

4.5. Biological Environment

- ▶ Details on secondary data on the existing flora and fauna in the study area, carried out by an university/institution under the relevant discipline (such as BSI, ZSI, WII, etc) shall be

included in the list of flora and fauna along with classification as per Schedule given in the Wild Life Protection Act, 1972 and in the Red Book Data and a statement clearly specifying whether the study area forms a part of an ecologically sensitive area or migratory corridor of any endangered fauna

- ▶ If the projects is located within 10km of the national parks, sanctuaries, biosphere reserves, migratory corridors of wild animals, then 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
- ▶ If the proposed project site involves any breeding or nesting ground, details about the name of the aquatic organism, type of habitat and period of year in which activity takes place should be provided
- ▶ If the proposed route requires cutting of trees, then the information should be provided for number of trees to be cut, their species and whether it also involved any protected or endangered species
- ▶ Quantitative estimation of forest and non-forest flora
- ▶ Assessment of fauna and avi- fauna indicating endangered and endemic species with respect to schedule of the wild life protection act
- ▶ Information on dependence of local people on minor forest products

4.6. Socio Economic and Health Environment

- ▶ Details of the properties, houses, businesses etc. activities likely to be effected by land acquisition and their financial loses annually.
- ▶ Data covering the vulnerable groups or persons including women, children, elderly, people below the poverty line, indigenous people and notified settlements
- ▶ Identification of historical and archeological sites
- ▶ Data on diseases in the locality and existing health care facilities
- ▶ Data on demography including traditional skills and sources of livelihood along the proposed site

5.0 Anticipated Impact and Mitigation Measures

This chapter shall describe the likely impact of the project on each of the environmental component, methods adopted for assessing the impact such as model studies, empirical methods, reference to existing similar situations, reference to previous studies, details of mitigation, methods proposed to reduce adverse effects of the project and reference to the models along with the inputs used should be mentioned. Mitigation measures should be proposed as required during the construction stage as well as the operation stage of the project for all the identified impact.

5.1 Land Environment

Anticipated Impact

- ▶ The road itself – land requirement, removal of vegetation, fragmentation of natural habitat, removal of buildings and severance of form land causes, direct impact. The most immediate and obvious effect of road development on soil is the elimination of the productive capacity of soil covered by the roads

- ▶ Impact of the project construction leading to soil contamination, soil erosion, destabilization of slopes, side- tipping of spoils material, loss of properties, loss of fertile lands and diversion of natural surface water flows are to be studied in detail
- ▶ 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)
- ▶ Impact due to construction of bridges across water bodies
- ▶ Indicate whether the proposed project will cause impediment to the movement of inhabitants
- ▶ Impact on the local area developments and integration with local master plan

Mitigation Measures

- ▶ The extent of environmental impact in construction, operation and post operation is largely determined during planning and route or site selection. Early consultation and determination of alternatives can substantially prevent and reduce the potential environmental impact of these projects
- ▶ While selecting new road alignments attention must be paid to avoid areas prone to land slides, soil erosion, fertile agricultural lands and environmental sensitive areas.
- ▶ Before finalizing the alignment erosion potential of each alternative should be carefully examined and the one involving least disturbance to the natural ground should be preferred
- ▶ Balancing filling and cutting requirements through alignment choice to reduce the need for borrow pits and to minimize excess spoil material generation is to be examined
- ▶ Drainage improvement requirements to minimize water logging and flooding due to disturbance of the natural drainage pattern are to be examined
- ▶ Afforestation plan to compensate for the cutting of the trees during the proposed road construction activity
- ▶ List the mitigative measures to address the impediments to the movement of inhabitants

5.2 Air Environment

Anticipated Impact

- ▶ The immediate surroundings may have a greater impact. The existing surrounding features such as habitation, hospitals, schools, notified sanctuaries etc. up to 500 meters and impact on them shall be addressed separately
- ▶ 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
- ▶ 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

Mitigation Measures

- ▶ Selecting road alignment, which avoids passing close to housing, schools and work places
- ▶ Providing sufficient capacity to avoid traffic congestion, even with projected increase in traffic flow

- ▶ Planting tall leafy vegetation between roads and human settlements
- ▶ Water sprinkling and transporting construction materials with tarpaulin coverage during the construction stage. Purchasing road metal from the crushing units, which are consented to operate by SPCB
- ▶ Crusher and hot mix units, if used on site, should be equipped with requisite air pollution equipment to meet the prescribed standard of MoEF and SPCBs
- ▶ Integration with the local government awareness campaign programmes on good practices of vehicle maintenance etc. to reduce the air emissions
- ▶ Environmental specifications for contractors should cover the required safeguards during the design and construction stage

5.3 Water Environment

Anticipated Impact

- ▶ Impact on surface water flow modifications can contribute to flooding, soil erosion, channel modification and siltation of streams
- ▶ Road drainage and excavation can lower the water table in surrounding areas while embankments and structures can raise water table by restricting flow. The potential effects include deterioration of vegetation, increased susceptibility to erosion loss of water for drinking as well as agriculture use
- ▶ Impact on water quality degradation (surface & ground water) can take place due to sedimentation, changes in biological activity in streams and on their banks
- ▶ Impact due to discharge of wastewater generation from the temporary project offices and temporary construction workers housing area
- ▶ Indicate whether there is a possibility of soil runoff from the bare lands resulting from earth moving activities such as cutting and filling will cause water quality degradation in downstream water courses or water bodies

Mitigation Measures

- ▶ Avoiding alignments which are susceptible to erosion, such as those crossing steep slopes
- ▶ Minimizing the number of water crossings wherever possible
- ▶ Leaving buffer zones of undisturbed vegetation (with increased in proportion to slope) between road sites and bodies of water
- ▶ Mitigation measures such as providing adequate drainage modifications, settling basins, paving, infiltration ditches etc. is to be examined
- ▶ Adequate sanitation facilities and hygiene at construction workers colony should be provided
- ▶ Safe measures for temporary storage of fuels
- ▶ Environmental specifications for contractors should cover the required safeguards during the design and construction stage

5.4 Noise Environment

Anticipated Impact

- ▶ Noise levels may increase during construction activity, due to operation of various machines and equipments
- ▶ Noise levels may increase during operation of the highway due to increased traffic activities
Prediction of noise levels should be done by using mathematical modeling at different representative locations
- ▶ Impact of vibrations during blasting activity, if any

Mitigation Measures

- ▶ Development of bypass roads to avoid road alignment through noise sensitive areas
- ▶ Adoption of proper surface design and maintenance
- ▶ Provision of noise barriers. Specifications for installation of noise protection devices clearly indicating the location, design and material, and also provide for future maintenance requirements
- ▶ Prediction model outputs justify the selection of type of the noise barrier and thickness of the noise barrier etc.
- ▶ Planting tall leafy and dense vegetation between roads and noise sensitive areas
- ▶ Interaction with the local government and vehicular manufacturers to conduct awareness campaign programmes on good practices of vehicle maintenance etc. to reduce the noise emissions
- ▶ Environmental specifications for contractors should cover the required safeguards during the design and construction stage

5.5 Biological Environment

Anticipated Impact

- ▶ Loss of wildlife habitat and biodiversity due to change in land use
- ▶ Fragmentation of wildlife habitat and territories
- ▶ Changes in water quality, soil profile, noise, light and air pollution, which may affect the nature and character of habitats
- ▶ Pressure on habitats wildlife as a result of increased access provided by roads
- ▶ Loss of forest resources, economically important plants, medicinal plants and threat to rare, endemic and endangered species

Mitigation Measures

- ▶ Identification of sensitive natural environments in the early planning stage so that alternative routes, changes in width of the road can be examined

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- ▶ Possibility of twin new road corridors with previously established transport rights-of-way, such as railway lines
 - ▶ Provision of animal crossings in identified areas
 - ▶ Compensate the loss of forest coverage by compensatory plantation programme
 - ▶ Development of green belt along the alignment
 - ▶ Regeneration and conservation of flora and fauna including rare plants of economic importance, medicinal plants and wildlife species
 - ▶ Institutional arrangements for implementation and monitoring of various mitigating measures
 - ▶ Environmental specifications for contractors should cover management of work forces (control of poaching and fire wood collection), machinery (speed, noise, and traffic), and prevention of erosion and contamination during construction

5.6 Socio-economic and Health Environment

Anticipated Impact

- ▶ Analysis of positive and negative impact on the present status of livelihood
- ▶ Displacement of human settlement from proposed site. Impact on livelihood and loss of properties
- ▶ Impact on community resources
- ▶ Impact on historical and archeological sites
- ▶ Impact on the existing travel areas due to faster traffic, access controls and median barriers
- ▶ Impact due to accelerated urbanization

Mitigation Measures

- ▶ Rehabilitation plan for land outees, homestead outees, and for displaced persons. Institutional arrangement for effective implementation and periodical review through project implementation to be incorporated
- ▶ Criteria and method of calculation of compensation for loss of land and crops. Mechanism for providing effective guidance in financial planning to effected people.
- ▶ Training to local people for employing them in the proposed project
- ▶ Employment opportunity and access to other amenities such as primary education and health care facilities for local people
- ▶ Integration with the local master plan to prevent conflict of interest.
- ▶ Stipulation of environmental specifications for contractors

5.7. Solid Waste Management

- ▶ Waste generated during construction may impact soil, agriculture and water quality
- ▶ Waste generated from workers’ camps may impact sanitation, water quality and agriculture
- ▶ Oil spillage/ leakage from machines and vehicles may contaminate earth
- ▶ Proper environmental specifications to be stipulated in the contract

6.0 Environmental Monitoring Programme

- ▶ Summary matrix of environmental monitoring, for all phases of the project viz. construction and operation
- ▶ Technical aspects of monitoring for achieving effectiveness in mitigation measures
- ▶ Requirement of monitoring facilities and methods adopted
- ▶ Frequency, location, parameters of monitoring
- ▶ Compilation and analysis of data and reporting system
- ▶ Procurement schedules and budgets in detail
- ▶ Training requirements

7.0 Additional Studies

Specific condition	Study required
Scoping Stage	▶ Studies directed by the Expert Appraisal Committee while deciding the TOR for the project
Public consultation	▶ Public hearing with the issues raised by the public and the response of the project proponent in tabular form should be prepared
Natural resource conservation and optimization	▶ Plan of action for conservation of natural resources by utilization of fly ash, steel melting shops’ slag and other metallurgical industries solid non hazardous waste
R & R action plans	<ul style="list-style-type: none"> ▶ 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 ▶ Details of budget provisions (capital & recurring) for the project specific R&R Plan
Road Safety	<ul style="list-style-type: none"> ▶ Examine road design standards, safety equipment specifications and Management System training to ensure that design details take account of safety concerns ▶ Identification of accident prone areas and avoidance/mitigation ▶ Identification of habitat fragmentation and traffic accident of wildlife and mitigation measures should be furnished

	<ul style="list-style-type: none"> ▶ Provision of speed breakers, safety signals, service lanes and foot paths should be examined at appropriate locations through out the proposed road to avoid the accidents ▶ Accident data and geographic distribution should be reviewed and analyzed to predict and identify trends – incase of expansion of the existing highways ▶ Preparation of traffic management plan ▶ Laws, regulations and enforcement related to speed, alcohol and vehicle safety should be reviewed ▶ Institutional frame work for monitoring of road safety ▶ Post accident emergency assistance and medical care to accident victims
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8.0 Project Benefits

It should bring out details of benefits by way of :

- ▶ Improvements in the physical infrastructure and road access
- ▶ Improvement in social services by quicker and safe transport mode
- ▶ Employment potential –skilled; semi-skilled and unskilled labour both during construction and operational phases of the project with specific attention to employment potential of local population as well as necessity for imparting any specialized skills to them to be eligible for such employment in the project
- ▶ Reduction in traffic congestion through city/town/ and other locations
- ▶ Development of tourism
- ▶ Reduced pollution, vehicle maintenance, fuel saving due to better quality of roads
- ▶ Over all development in economy and improved life style

9.0 Environmental Cost Benefit Analysis

If recommended by the Expert Appraisal Committee at the scoping stage, this chapter shall include the Environmental Cost Benefit Analysis of the project.

10.0 Environment Management Plan (EMP)

- ▶ Administrative and technical set up for the management of environment, clearly defining the roles and responsibilities of persons/ party handling various functions
- ▶ Summary matrix of EMP and budget provision for EMP, during pre-construction, construction and operation stage
- ▶ Summary matrix of Environmental monitoring, during construction and operation stage
- ▶ Institutional arrangements proposed with other organizations/Govt. authorities for effective implementation of environmental measures proposed in the EIA
- ▶ Safeguards/mechanism to continue the assumptions/field conditions made in the EIA, for arriving the site suitability

11.0 Summary & Conclusion (Summary EIA)

Summary EIA shall be a summary of the full EIA report condensed to ten A-4 size pages at the maximum. It should necessarily cover in brief the chapters of the full EIA report: Introduction,

project description, description of the environment, anticipated environmental impact & mitigation measures, additional studies, environmental monitoring programme, project benefits, environmental management plan and disclosure of consultants engaged

12.0 Disclosure of Consultants Engaged

This chapter shall include the names of the consultants engaged with their brief resume and nature of consultancy rendered.

Enclosures: Feasibility report/Form I/Photos of project site/summary of project details

Summary of Project Details

S.No	Description	Quantity
1	Length of new alignment proposed (kilometers)	
2	Width of the new alignment (meters)	
3	Length of existing alignment proposed to be strengthened /widened (kilometers)	
4	Width of the existing alignment (meters)	
5	Width of the existing alignment after widening (meters)	
6	Total length of the alignment (kilometers)	
7	Number of bridges Major Minor	
8	Length of bridges (meters)	
	Width of bridges (meters)	
9	Number of culverts	
10	Length of culverts (meters)	
11	Number and distance (meters) between underpasses	
12	Number of intersections	
13	Length of intersections (meters)	
14	Number of railway crossings	
15	Length of railway crossings (meters)	
16	Number of villages through which alignment passes	
17	Population of the villages through which alignment passes	
18	Length of new alignment proposed in agricultural land	
19	Width of new alignment proposed in agricultural land	
20	Length of new alignment proposed in forest area	
21	Width of new alignment proposed in forest area	

Details of National Parks etc with in 10 Km radius from the Highway

S.No	Item	Name	Aerial distance(km) and reference point on the Highway Alignment
1	National park		
2	Marine park		
3	Sanctuary/tiger reserve Elephant reserve/ Turtle nesting ground		
4	Core zone of biosphere reserve		
5	Reserved forest		
6	Wildlife habitat		
7	Habitat of endangered/exotic species		
8	Coral reef		
9	Mangroves		
10	Lakes/reservoirs/dams		
11	Breeding site		
12	Nesting site		

Annexure 2

List of Critically Polluted Industrial Clusters/Areas Identified by CPCB

S. No.	Critically Polluted Industrial Area and CEPI	Industrial Clusters/Potential Impact Zones
1	Ankleshwar (Gujarat) <i>CEPI-88.50 (Ac_Wc_Lc)</i>	GIDC Ankleshwar and GIDC, Panoli
2	Vapi (Gujarat) <i>CEPI-88.09 (Ac_Wc_Lc)</i>	GIDC Vapi
3	Ghaziabad (Uttar Pradesh) <i>CEPI-87.37 (Ac_Wc_Lc)</i>	<p>Sub-cluster A</p> <ul style="list-style-type: none"> • Mohan nagar Industrial area • Rajinder nagar Industrial area • Sahibabad Industrial area <p>Sub-cluster B</p> <ul style="list-style-type: none"> • Pandav nagar Industrial area • Kavi nagar Industrial area • Bulandshahar Road Industrial area • Amrit nagar • Aryanagar Industrial area <p>Sub-cluster C</p> <ul style="list-style-type: none"> • Merrut road Industrial area <p>Sub-cluster D</p> <ul style="list-style-type: none"> • Loni Industrial area • Loni Road Industrial area • Roop Nagar Industrial area <p>Sub-cluster E</p> <ul style="list-style-type: none"> • Hapur Road Industrial area • Dasna • Phikua <p>Sub-cluster F (other scattered Industrial areas)</p> <ul style="list-style-type: none"> • South side of GT road • Kavi Nagar • Tronica city • Anand Nagar • Jindal Nagar • Prakash Nagar • Rural Industrial estate
4	Chandrapur (Maharashtra) <i>CEPI-83.88 (Ac_Wc_Lc)</i>	Chandrapur (MIDC Chandrapur, Tadali, Ghuggus, Ballapur)
5	Korba (Chhatisgarh) <i>CEPI-83.00 (Ac_Ws_Lc)</i>	a) Industrial areas and their townships of NTPC, BALCO, CSEB (East) & CSEB (West) b) Korba town
6	Bhiwadi (Rajasthan) <i>CEPI-82.91 (Ac_Wc_Ls)</i>	a) RIICO Industrial areas Phase I to IV b) Bhiwadi town c) Other surrounding industrial areas: Chopanki, Rampura Mundana, Khushkhera Phase I to III.
7	Angul Talcher (Orissa) <i>CEPI-82.09 (Ac_Wc_Lc)</i>	a) MCL Coal Mining Area, Angul – Talcher region b) Industrial Area (60 km x 45 km) Following blocks of Angul District: - Kohina block - Talcher block - Angul block - Chhendipada block - Banarpal block And Odapada block of Dhenkamal District
8	Vellore (North Arcot) (Tamilnadu) <i>CEPI-81.79 (Ac_Wc_Lc)</i>	Ranipet, SIPCOST Industrial Complex
9	Singurauli (Uttar Pradesh) <i>CEPI-81.73 (Ac_Wc_Ls)</i>	<p>Sonebhadra (UP)</p> <ul style="list-style-type: none"> • Dala-Tola • Obra • Renukoot • Anpara • Renusagar • Kakri • Dudhichuwa • Bina • Khadia • Shakti Nagar • Rihand Nagar • Bijpur <p>Sigrauli (Madhya Pradesh) Vindhyachal Nagar and Jayant, Nigahi, Dudhichua, Amlohri & Jhingurdah townships</p>

S. No.	Critically Polluted Industrial Area and CEPI	Industrial Clusters/Potential Impact Zones
10	Ludhiana (Punjab) CEPI-81.66 (Ac_Wc_Ls)	Ludhiana Municipal limits covering industrial clusters: <ul style="list-style-type: none"> • Focal Point Along with NH_I_Tota Eight Phase • Industrial Area-B-From Sherpur chowk to Gill road & Gill road to Miller Kotla road (left Side of Road) • Mixed Industrial Area – Right side of Gill road • Industrial area – C (near Jugiana Village) • Industrial Area A & Extension: Area between old GT Road and Ludhiana by pass road • Industrial Estate : Near Dholwal chowk • Mixed Industrial Area (MIA) Miller gunj • MIA-By pass road • Bahdur Industrial Area • Tejpur industrial Complex.
11	Nazafgarh drain basin, Delhi CEPI-79.54 (As_Wc_Lc)	Industrial areas : Anand Parvat, Naraina, Okhla and Wazirpur
12	NOIDA (Uttar Pradesh) CEPI-78.90 (Ac_Wc_Lc)	Territorial jurisdiction of : <ul style="list-style-type: none"> • Noida Phase - 1 • Noida Phase - 2 • Noida Phase - 3 • Surajpur Industrial Area • Greater Noida Industrial Area • Village-Chhapparaula
13	Dhanbad (Jharkhand) CEPI-78.63 (Ac_Ws_Lc)	Four blocks of Dhanbad district: <ul style="list-style-type: none"> • Sadar (Dhanbad Municipality) • Jharia (Jharia Municipality, Sindri Industrial Area) • Govindpur (Govindpur Industrial Estate) • Nirsra
14	Dombivalli (Maharashtra) CEPI-78.41(Ac_Wc_Ls)	MIDC Phase-I, Phase-II
15	Kanpur (Uttar Pradesh) CEPI-78.09 (Ac_Wc_Ls)	<ul style="list-style-type: none"> • Industrial areas: • Dada Nagar • Panki • Fazalganj • Vijay Nagar • Jajmau
16	Cuddalore (Tamilnadu) CEPI-77.45 (As_Wc_Lc)	SIPCOT Industrial Complex, Phase I & II
17	Aurangabad (Maharashtra) CEPI-77.44 (Ac_Wc_Ls)	MIDC Chikhalthana, midc Waluj, MIDC Shendra, and Paithan Road industrial area
18	Faridabad (Haryana) CEPI-77.07 (Ac_Ws_Lc)	<ul style="list-style-type: none"> • Sector 27 - A, B, C, D • DLF Phase – 1, Sector 31, 32 • DLF Phase – 2, Sector 35 • Sector 4, 6, 24, 25, 27, 31, 59 • Industrial area Hatin • Industrial Model town Ship
19	Agra (Uttar Pradesh) CEPI-76.48 (As_Wc_Ls)	Nunihal Industrial Estate, Rambag Nagar, UPSIDC Industrial Area, and Runukata Industrial Area
20	Manali (Tamilnadu) CEPI-76.32 (Ac_Ws_Ls)	Manali Industrial Area
21	Haldia (West Bengal) CEPI-75.43 (As_Wc_Ls)	5 km wide Strip (17.4 x 5.0 km) of industrial area on the southern side of the confluence point of Rivers Hugli and Rupnarayan, covering Haldia Municipal Area & Sutahata Block-I and II <ul style="list-style-type: none"> • GIDC Odhav • GIDC Naroda
22	Ahmedabad (Gujarat) CEPI-75.28 (Ac_Ws_Ls)	
23	Jodhpur (Rajasthan) CEPI-75.19 (As_Wc_Ls)	<ul style="list-style-type: none"> • Industrial areas including Basni Areas (Phase-I & II), Industrial Estate, Light & Heavy industrial areas, industrial areas behind new Power House, Mandore, Bornada, Sangariya and Village Tanwda & Salawas. • Jodhpur city
24	Greater Coach (Kerala) CEPI-75.08 (As_Wc_Ls)	Eloor-Edayar Industrial Belt, Ambala Mogal Industrial areas
25	Mandi Gobind Garh (Punjab) CEPI-75.08 (Ac_Ws_Lc)	Mandi Govindgarh municipal limit and Khanna area
26	Howrah (West Bengal) CEPI-74.84 (As_Ws_Lc)	<ol style="list-style-type: none"> Liluah-Bamangachhi Region, Howrah Jalah Industrial Complex-1, Howrah
27	Vatva (Gujarat) CEPI-74.77 (Ac_Wc_Ls)	GIDC Vatva, Narol Industrial Area (Villages Piplaj, Shahwadi, Narol)

S. No.	Critically Polluted Industrial Area and CEPI	Industrial Clusters/Potential Impact Zones
28	Ib Valley (Orissa) CEPI-74.00 (Ac_Ws_Ls)	Ib Valley of Jharsuguda (Industrial and Mining area)
29	Varansi-Mirzapur (Uttar Pradesh) CEPI-73.79 (As_Wc_Ls)	<ul style="list-style-type: none"> • Industrial Estate, Mirzapur • Chunar • Industrial Estate, Chandpur Varanasi • UPSIC, Industrial Estate, Phoolpur • Industrial Area, Ramnagar, Chandaull
30	Navi Mumbai (Maharashtra) CEPI-73.77 (Ac_Ws_Ls)	TTC Industrial Area, MIDC, Navi Mumbai (including Blocks-D, C, EL, A, R, General, Kalva)
31	Pali (Rajasthan) CEPI-73.73 (As_Wc_Ls)	a) Existing industrial areas: Mandia Road, Puniyata Road, Sumerpur b) Pali town
32	Mangalore (Karnataka) CEPI-73.68 (Ac_Ws_Ls)	Baikampady Industrial Area
33	Jharsuguda (Orissa) CEPI-73.34 (Ac_Ws_Ls)	Ib Valley of Jharsuguda (Industrial and Mining area)
34	Coimbatore (Tamil Nadu) CEPI-72.38 (Ac_Ws_Ln)	SIDCO, Kurichi Industrial Clusters
35	Bhadravati (Karnataka) CEPI-72.33 (Ac_Ws_Ln)	KSSIDC Industrial Area Mysore Paper Mill & VISL Township Complex
36	Tarapur (Maharashtra) CEPI-72.01 (Ac_Ws_Ls)	MIDC Tarapur
37	Panipat (Haryana) CEPI-71.91 (As_Ws_sc)	Panipat Municipal limit and its industrial clusters
38	Indore (Madhya Pradesh) CEPI-71.26 (As_Ws_Ls)	Following 09 industrial areas: <ul style="list-style-type: none"> • Sanwer Road • Shivaji Nagar • Pologround • Laxmibai Nagar • Scheme No. 71 • Naviakha, • Pipliya • Palda • Rau • Indore city • Other surrounding industrial areas : Manglia, Rajoda, Barlal, Asrawad, Tejpur Gadwadi
39	Bhavnagar (Gujarat) CEPI-70.99 (As_Ws_Ls)	GIDC Chitra, Bhavnagar
40	Vishakhapatnam (Andhra Pradesh) CEPI-70.82 (As_Ws_Ls)	Bowl area (the area between Yarada hill range in the south to Simhachalam hill range in the north and sea on the east and the present NH-5 in the West direction)
41	Junagarh (Gujarat) CEPI-70.82 (As_Ws_Ls)	Industrial Areas: <ul style="list-style-type: none"> • Sabalpur • Jay Bhavani • Jay Bhuvneshwari • GIDC Junagarh (I&II)
42	Asansole (West Bengal) CEPI-70.20 (As_Ws_Ls)	Burnpur area surrounding IISCO
43	Patancheru- -Bollaram (Andhra Pradesh) CEPI-70.07 (As_Ws_Ls)	Industrial Area: <ul style="list-style-type: none"> • Patancheru • Bollaram

Note: Names of identified industrial clusters/ potential impact zones are approximate location based on rapid survey and assessment and may alter partially subject to the detailed field study and monitoring. Detailed mapping will be made available showing spatial boundaries of the identified industrial clusters including zone of influence/buffer zone, after in depth field study.

Aggregated Comprehensive Environmental Pollution Index (CEPI) scores of 70 and above are considered as critically polluted industrial clusters/ areas.

Source: Ecological Impact Assessment Series: EIAS/5/2009-10
 Details of Critically Polluted Industrial Areas and Clusters/ Potential Impact Zone in terms of the Office Memorandum no. J-11013/5/2010-IA.II(I) dated 13.1.2010

Annexure 3

Land Use / Land Cover Classification System

Level -I	Level -II	Level -III
1. Built-up land	1.1. Built -up land	1.1.1. Urban (towns & cities)
2. Agricultural land	2.1. Crop land	2.1.1. Irrigated crop land
	(i) Kharif (ii) Rabi (iii) Double cropped	2.1.2. Unirrigated crop land
	2.2. Fallow	2.2.1. Fallow
	2.3. Plantation	2.3.1. Types of plantation, casuarina, coconut, tea etc.
3. Forest	3.1 Evergreen/semi-evergreen	3.1.1. Dense / closed 3.1.2. Open
	3.2. Deciduous	
	3.3. Degraded scrub land	
	3.4. Forest blank	3.4.1. Degraded forest
		3.4.2. Forest blank
	3.5. Forest plantation	3.5.1. Types of plantation eg. teak, sal etc.
3.6. Mangrove		
4. Wastelands	4.1. Salt affected land	
	4.2. Water logged land	
	4.3. Marshy / swampy land	
	4.4. Gullied / ravinous land	
	4.5. Land with or without scrub	
	4.6. Sandy area (coastal & desartic)	Minimum mappable unit is 2.25 hectares on 1:50,000 scale
	4.7. Barren rocky / stony waste/ sheet rock areas	
5. Water bodies	5.1. River / stream	
	5.2 Lake/reservoir/tank canal	
6. Others	6.1. Shifting cultivation	6.1.1. Current
		6.1.2. Old / abandoned
	6.2. grassland / grazing land	6.2.1. Grassland / grazing land
	6.3. Snow covered/glacial area	6.3.1. Snow covered / glacial area
6.4. Mining area	6.4.1. Mining dumps	

Note: Land use / Land cover categories at different levels and corresponding scales for mapping are as follows:

Level – I – categories – 1:1000,000 scale

Level – II – categories – 1:250,000 scale

Level – III – categories – 1:50,000 scale and 1:25,000 scale

(Sources: Description and classification of land use / land cover : NRSA – TR – LU & CD – 01 –90)

Annexure 4

National Ambient Air Quality Standards (NAAQS)

Sl. No	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and other areas	Ecologically sensitive area (notified by central government)	Methods of measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur dioxide (SO ₂), µg/m ³	Annual*	50	20	-Improved West & Gaeke
		24 hours**	80	80	-Ultraviolet fluorescence
2	Nitrogen Dioxide (NO ₂), µg/m ³	Annual*	40	30	-Modified Jacob & Hochheiser (Na-Arsenite) -Chemiluminescence
		24 hours**	80	80	
3	Particulate Matter (Size less than 10m) or PM ₁₀ µg/m ³	Annual*	60	60	- Gravimetric - TOEM - Beta attenuation
		24 hours**	100	100	
4	Particulate Matter (Size less than 2.5m) or PM _{2.5} µg/m ³	Annual*	40	40	- Gravimetric - TOEM - Beta attenuation
		24 hours**	60	60	
5	Ozone (O ₃) µg/m ³	8 hours**	100	100	- UV photometric - Chemiluminescence - Chemical method
		1 hour**	180	180	
6	Lead (Pb) µg/m ³	Annual*	0.50	0.50	-AAS/ICP method after sampling on EPM 2000 or equivalent filter paper -ED-XRF using Teflon filter
		24 hours**	1.0	1.0	
7	Carbon Monoxide (CO) mg/ m ³	8 hours**	02	02	-Non Dispersive Infra Red (NDIR) spectroscopy
		1 hour**	04	04	
8	Ammonia (NH ₃) µg/m ³	Annual*	100	100	- Chemiluminescence - Indophenol blue method
		24 hours**	400	400	
9	Benzene (C ₆ H ₆) µg/m ³	Annual*	05	05	-Gas chromatography based continuous analyzer -Adsorption and Desorption followed by GC analysis
10	Benzo(a)Pyrene (BaP) – particulate	Annual*	01	01	-Solvent extraction phase only, ng/m ³ followed by HPLC/ GC analysis

Sl. No	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and other areas	Ecologically sensitive area (notified by central government)	Methods of measurement
(1)	(2)	(3)	(4)	(5)	(6)
11	Arsenic (As) ng/m ³	Annual*	06	06	AAS/ICP method - after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni) ng/m ³	Annual*	20	20	-AAS/ICP method after sampling on EPM 2000 or equivalent filter paper

* Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals

** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

Note :

Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation

(Source: National Ambient Air Quality Standards, CPCB Notification dated 18th November 2009)

Annexure 5

Criteria for raw water used for organized community water supplies (surface and ground water) primary parameters

	Parameters	Range/Limiting Value		Note
		Use with only disinfection	Use after conventional treatment	
1.	pH	6.5 to 8.5	6.0 to 9.0	To ensure prevention of corrosion in treatment plant and distribution system and interference in coagulation and chlorinating.
2.	Colour Pt. scale Hz Units	< 10	< 50	Color may not get totally removed during treatment
3.	Suspended Solids mg/l	< 10	< 50	High SS may increase the cost of treatment.
4.	Odour, dilution factor	< 3	< 10	May not be tackled during treatment.
5.	DO, (%saturation)	90-100	80-120	May imply higher chlorine demand.
6.	BOD, mg/l	< 3	< 5	Same as above.
7.	TKN, mg/l	< 1	< 3	Same as above.
8.	Ammonia, mg/l	< 0.05	< 1	Same as above.
9.	Faecal coliform MPN/100 ml		< 200	< 2000 Not more than 20% samples show greater than limit.
10.	EC, $\mu\text{mhos/cm}$	< 2000	< 2000	High conductivity implies dissolved high solids making water unpalatable.
11.	Chloride, mg/l	< 300	< 300	May cause physiological impact and unpalatable taste.
12.	Sulphates, mg/l	< 250	< 250	May cause digestive problems
13.	Phosphates, mg/l	< 0.7	< 1.0	May interfere with coagulation
14.	Nitrate, mg/l	< 50	< 50	May cause methemoglobinemia
15.	Fluoride, mg/l	< 1.0	< 1.5	Higher value shall cause fluorosis and lower value shall carries.
16.	Surfactants, mg/l	< 0.2	< 0.2	May impair treatability and cause foaming.

Additional Parameters for Periodic Monitoring (Seasonal – Only to be done when there are known natural or anthropogenic sources in the upstream catchment region likely or apprehended to contribute or other well founded apprehensions)

Parameters	Desirable	Acceptable	Note
Dissolved Iron mg/l	< 0.3	< 0.5	Affect taste and cause stains
Copper, mg/l	—	< 1.0	May cause live damage
Zinc, mg/l	—	< 5.0	Cause bitter stringent taste
Arsenic, mg/l	< 0.01	< 0.05	Cause hyperkeratosis & skin cancer
Cadmium, mg/l	< 0.001	< 0.005	Toxic
Total Chromium, mg/l	< 0.05	< 0.05	Toxic
Lead, mg/l	< 0.05	< 0.05	Physiological abnormality
Selenium, mg/l	< 0.01	< 0.01	Toxic symptoms similar to arsenic
Mercury, mg/l	< 0.005	< 0.0005	Carcinogenic and poisonous
Phenols, mg/l	< 0.001	< 0.001	Toxic and cause taste and odour problem
Cyanides, mg/l	< 0.05	< 0.05	Physiological abnormality
PAH, mg/l	< 0.0002	< 0.0002	Carcinogenic
Total Pesticides, mg/l	< 0.001	< 0.0025	Trend to bioaccumulates & carcinogenic

(Source: Ecological Impact Assessment Series: EIAS/03/2002-03 Published by CPCB)

Use Based Classification of Surface Waters in India

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	1. Total Coliforms Organism MPN/100ml shall be 50 or less 2. pH between 6.5 and 8.5 3. Dissolved Oxygen 6mg/l or more 4. Biochemical Oxygen Demand 5 days 20oC 2mg/l or less
Outdoor bathing (Organized)	B	1. Total Coliforms Organism MPN/100ml shall be 500 or less 2. pH between 6.5 and 8.5 3. Dissolved Oxygen 5mg/l or more 4. Biochemical Oxygen Demand 5 days 20oC 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	1. Total Coliforms Organism MPN/100ml shall be 5000 or less 2. pH between 6 to 9 3. Dissolved Oxygen 4mg/l or more 4. Biochemical Oxygen Demand 5 days 20oC 3mg/l or less
Propagation of Wild life and Fisheries	D	1. pH between 6.5 to 8.5 2. Dissolved Oxygen 4mg/l or more 3. Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	1. pH between 6.0 to 8.5 2. Electrical Conductivity at 25oC micro mhos/cm Max.2250 3. Sodium absorption Ratio Max. 26 4. Boron Max. 2mg/l

(Source: Guidelines for Water Quality Management –CPCB 2008)

Annexure 6

Noise Ambient Air Quality Standards

Area code	Category of area	Limits in db (A) Leq	
		Day time	Night time
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Silence zone	50	40

Note:

1. Day time shall mean from 6.00 a.m. to 10.00 p.m.
2. Night time shall mean from 10.00 p.m. to 6.00 a.m.
3. Silence zone is an area comprising not less than 100 meters around hospitals, educational institutions, courts, religious places or any other area, which is declared as such by the competent authority.
4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

* dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

A “decibel” is a unit in which noise is measured.

“A”, in dB(A) L_{eq} , denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.

L_{eq} : It is an energy mean of the noise level over a specified period

(Source: Noise pollution (Regulation and control) Rules, 2000)

Annexure 7

Illustrative types of socioeconomic impact

Impact Area	Potential Changes
General Characteristics and trends in population of region	Increase or decrease in population
Migration trends in study area	Increase or decrease in migration trends
Population characteristics in study area, including distributions by age, sex, ethnic groups, educational level and family size	Increase or decrease in various population distributions, people relocations
Distinct settlement of ethnic groups or deprived economic/ minority groups	Disruption settlement patterns, people relocations
Economic history for the region	Changes in economic patterns
Employment pattern in study area, including occupational distribution and location and availability of work force	Increase or decrease in overall employment or unemployment levels and change in occupational distribution
Income levels and trends for study area	Increase or decrease in income levels
Land values in study area	Increase or decrease in land values
Housing characteristics in study area, including in types of housing and occupancy levels	Changes in types of housing and occupancy levels
Health and social services in study area, including health, workforce, law enforcement, fire protection, water supply, wastewater treatment facilities, solid waste collection and disposal and utilities	Changes in demand on health and social services
Public and private educational resources in study area	Changes in demand on educational resources
Transportation systems in study area, including high way, rail, air and waterway	Changes in demand on transportation systems
Community cohesion, including organized community groups	Disruption of cohesion
Tourism and recreational opportunities in study area	Increase or decrease in tourism and recreational potential
Religious patterns and characteristics in study area	Disruption of religious patterns and characteristics
Areas of unique significance such as cemeteries of religious camps	Disruption of unique areas

(Source: Draft National EIA Guidance Manual-NEERI)

Annexure 8

Highway Projects in Hilly Areas - Checklist for Erosion Control

Does the road construction projects estimate provide for the necessary measure against soil erosion?
Have soil maps and aerial photographs studies and investigations been made to locate areas or sections with high erosion potential?
Has erosion potential been considered for each alignment?
Have geological maps been studied or local geological department consulted to avoid unstable strata? Does the selected alignment follow the lie of the land and avoid large-scale cutting?
Has use of tunnels to avoid deep cuts been investigated?
Is the road alignment suspect to damage/erosion by streams and torrents
Is consultation/coordination with other departments like forest department necessary? If so, have they been consulted?
How will adjacent and nearby streams, ponds and lakes be affected by project construction?
Does the road cross section involve a lot of disturbance to the natural ground?
Are the design cut slopes stable for the type of strata?
Are slope-stabilizing structures like breast walls, pitching etc. required?
Does the cut hill face require any special treatment to prevent slips?
Has the area of clearing and grubbing been clearly demarcated?
Has a work schedule been worked out for the different construction operations?
What erosion control works are required before clearing and other works are started?
Are any temporary erosion control measures required between successive construction stages?
Have sediment traps, benches, catch water drains, ditch paving, slope protection works and other erosion control items been identified on the plans and provide in the proposals?
Have the location and alignment of culverts been fixed with due consideration to erosion at outlets and siltation at inlets?
Have the necessary erosion control measures been taken at the outfalls of culverts
Has the proper disposal of surplus excavated material been thought of and provided for
Do any of the design measures require modification in the light of field conditions?

(Source: Hill Road Manual: IRC: SP: 48-1998)

Annexure 9

General Standards for Discharge of Effluents

S. No	Parameter	Standards			
		Inland surface water	Public sewers	Land for irrigation	Marine coastal areas
		(a)	(b)	(c)	(d)
1	Color & odour	*	—	*	*
2	Suspended solids mg/l, Max	100	600	200	1. For process waste water-100 2. For cooling water effluent 10% above total suspended matter of influent
3	Particle size of suspended solids	Shall pass 850 Micron IS sieve	—	—	1. Floatable solids max. 3 mm 2. Settleable solids max. 850 microns
4	pH Value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
5	Temperature	Shall not exceed 5°C above the receiving water temperature	—	—	Shall not exceed 5°C above the receiving water temperature
6	Oil and grease mg/l Max.	10	20	10	20
7	Total residual chlorine mg/l Max.	1.0	—	—	1.0
8	Ammonical Nitrogen (as N), mg/l Max.	50	50	—	50
9	Total Kjeldahl nitrogen (as NH ₃), mg/l Max.	100	—	—	100
10	Free ammonia (as NH ₃), mg/l Max.	5.0	—	—	5.0
11	Bio-chemical oxygen demand (3 days at 27°C), mg/l max.	30	350	100	100
12	Chemical oxygen demand, mg/l max.	250	—	—	250
13	Arsenic (as As), mg/l max.	0.2	0.2	0.2	0.2
14	Mercury (as Hg), mg/l max.	0.01	0.01	—	0.01
15	Lead (as Pb), mg/l max.	0.1	1.0	—	2.0
16	Cadmium (as Cd), mg/l max.	2.0	1.0	—	2.0
17	Hexavalent chromium (as Cr +6), mg/l max.	1.0	2.0	—	1.0

18	Total chromium (as Cr), mg/l max.	2.0	2.0	—	2.0
19	Copper (as Cu), mg/l max.	3.0	3.0	—	3.0
20	Zinc (as Zn), mg/l max.	5.0	15	—	15
21	Selenium (as Se), mg/l max.	0.05	0.05	—	0.05
22	Nickel (as Ni), mg/l max.	3.0	3.0	—	5.0
23	Cyanide (as CN), mg/l max.	0.2	2.0	0.2	0.2
24	Fluoride (as F), mg/l max.	2.0	15	—	15
25	Dissolved phosphates (as P), mg/l max.	5.0	—	—	—
26	Sulphide (as S), mg/l max.	2.0	—	—	5.0
27	Phenolic compounds (as C ₆ H ₅ OH), mg/l max.	1.0	5.0	—	5.0
28	Radio active materials: a. Alpha emitter micro curie/ml	10 ⁻⁷	10 ⁻⁷	10 ⁻⁸	10 ⁻⁷
	b. Beta emitter micro curie/ml	10 ⁻⁶	10 ⁻⁶	10 ⁻⁷	10 ⁻⁶
29	Bio-assay test	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent
30	Manganese (as Mn), mg/l	2	2	—	2
31	Iron (as Fe), mg/l	3	3	—	3
32	Vanadium (asV), mg/l	0.2	0.2	—	0.2
33	Nitrate nitrogen, mg/l	10	—	—	20

* All efforts should be made to remove colour and unpleasant odour as far as practicable

These standards shall be applicable for industries, operations or processes other than those industries, operations or process for which standards have been specified of the Environment Protection Rules, 1989

Source: G.S.R 422 (E) dated 19.05.1993 and G.S.R 801 (E) dated 31.12.1993 issued under the provisions of E (P) Act 1986

Annexure 10

Environmental Concerns & Measures to Address

Activity	Items to consider	Measures to address
Transact walk	Trees	Inventorization of environmental features Avoidance, design modifications to minimize adverse environmental impact Incorporating community concerns into finalizing alignment
	Forests	
	Drainage lines/ Rivers/water crossings	
	Irrigation water courses	
	Water bodies	
	Grazing lands	
	Cultural properties	
	Utilities	
	Community facilities	
	Major junctions	
	Seasonal markets or cultural congregations	
	Location for ramps, cattle crossing and bus bay	
	Location for stacking maintenance material	
Location for ducts for threading agricultural pipes		
Detailed surveys	Geological, geo-technical studies in hill areas	Stability analysis and measures to address slope instability in hill slopes and high banks Working out requirement of cut & fill
	Topographical surveys	
	Hydrological surveys in flood prone areas	Identification of flood prone areas and measures to avoid afflux Identification of agricultural use of land
Identification of material sources	Borrow material	Utilizing alternative materials
		Minimize requirements through design modifications
		Location criteria
	Quarry material	Utilizing alternative materials
		Material extraction from existing quarries
Water availability	Identification of perennial/community/private sources	
	Scheduling construction to suit water availability	

		Utilizing community water sources without conflict of uses
Assessment of environmental impact	Climatic factors	Scheduling construction considering the special weather phenomena
	Water bodies	Provision of silt fencing
		Rehabilitation of water bodies
	Stability of slopes	Measures for slope stabilization
	Soil erosion	Erosion control measures
		Land use control measures adjacent to the road
	Land use changes	Empowering Gram Panchayat/Road Authority to regulate development
	Agricultural lands	Avoidance from setting up construction camps, borrow areas
		Conservation of top soil
		Site restoration after construction
	Cultural properties	Avoidance through design modifications
		Planning for relocation & rehabilitation
	Common property resources	Avoidance through design modification
		Planning for relocation of consultation with community
Drainage	Provision of adequate number of CD structures	
Trees	Compensatory plantation & arrangements for road side plantation	
Forest areas	Avoidance through design modifications	
	Environment management measures during construction	
Natural habitats	Avoidance through design modification or formulating additional measures for avoiding impact	
Precautionary measures during construction to avoid environmental impact	Top soil	Stockpile top soil and preservation
	Construction sites	Provision of pollution control measures
		All measures to ensure public & worker's health/safety
		Water management
	Construction camps	Criteria for identification of sites and infrastructure arrangements
		Safe disposal of all wastes
		Enforcement of pollution control measures
	Borrow areas	Arrangements with land owners to include redevelopment
	Quarry areas	Rehabilitation of quarry areas if new quarries are opened
	Public/workers health & safety	Personal protective equipment to be provided
Public safety at construction sites to be undertaken		
Measures for worker's health & hygiene at construction camps		

Consultation with Community	Land for borrowing	Agreement to include borrow area rehabilitation
	Water for construction	Agreements with owners/community for utilizing water
	Site for construction camps	Rehabilitation of the land after construction
	Removal of trees	Tree plantation as per roadside plantation plan
		Avoidance through modification of alignment
	Cultural properties	Relocation costs to be covered in the project, if needs relocation
	Common property resources	Avoidance through modification of alignment
Relocation, if needed in consultation with community		
Traffic during construction	Provision of alternate routes or prior notice to the users	
Finalization of alignment	Concerns of community	Community concerns to be incorporated
	Environmental impact identified	Impact identified are to be mitigated by incorporation of provisions as per EcoPs
	Design aspects	Impact that can be mitigated through design modifications should be incorporated
Preparation of detailed drawings	All concerns/ impact identified	Designs for enhancements and mitigation measures including cost provision
Monitoring of progress	All environmental aspects identified	Monitoring implementation of environmental measures

(Source: *Environmental Codes of Practices 2004, Ministry of Rural Development, GoI*)

Annexure 11

Indian Road Congress Code of Practices for Highway Projects

S.No	Subject matter related to recommended code of practices	IRC Code
1.	Hill Road Manual	IRC: SP-48-1998
2.	Recommendations for Road Construction in Waterlogged Areas	IRC: 34-1970
3.	Guidelines for use of Fly Ash in Road Embankments	IRC: SP: 58-2001
4.	Ribbon development along Highways and its prevention	IRC: SP: 15-1996
5.	Guidelines for Environmental Impact Assessment of Highway Projects	IRC: 104-1988
6.	Guidelines on Road Drainage	IRC: SP: 42-1994
7.	Report containing recommendations of the IRC regional workshops on Highway Safety	IRC: SP: 27-1984
8.	Recommended practice for Borrow pits for Road Embankments constructed by Manual operation	IRC: 10-1961
9.	Road accident Forms	IRC: 53-1982
10.	Proceedings of International Seminar on sustainable development in Road Transport	8.10.2001
11.	Highway Safety Code	IRC: SP: 44-1996
12.	Guidelines for Pedestrian Facilities	IRC: 103-1988
13.	Guidelines on Safety in Road Construction Zones	IRC: SP: 55:2001
14.	Recommended practice for treatment of embankment slopes for erosion control	IRC: 36 – 1974
15.	Guidelines on bulk bitumen transportation and storage equipment	IRC: SP: 39
16.	Manual on landscaping of roads	IRC: SP: 21 – 1979
17.	Road safety for children	IRC: SP: 32 – 1988

Annexure 12

International Good Practices

Following boxes include compendia of 'good practice' guidelines, technical circulars, and policies, manuals, specifications etc., developed by road agencies and sectoral ministries to address environment issues. These are grouped into: 1. Planning and design 2. Construction management aspects and 3. Management of sensitive receptors.

1. Planning and Design of Roads

These manuals provide useful alternatives that can be adapted to develop cost effective solutions for Indian roads. Issuing authority: Department of Main Roads, Queensland government, Australia

- ▶ Road traffic noise management, 2000
- ▶ Road landscape manual, 1997
- ▶ Roads in the wet tropics, 1998
- ▶ Road drainage design manual, 2002
- ▶ Guidelines for the treatment of noise & vibration in national road schemes, 2004. The guidelines are being validated and are still to become a final document
- ▶ Road runoff & drainage environmental impact and management options, 2000. Issuing authority: Austroads Inc., Australia
- ▶ A guide to best practices for achieving context sensitive solutions, 2002, NCHRP Report 480

2. Construction Management Aspects

- ▶ Implementation of site safety cycle and provision of welfare facilities for workers at construction sites, 2002. The circular focuses on site safety
- ▶ Additional measures to improve site cleanliness and control mosquito breeding on construction sites, 2003. This carries measures to improve the hygiene surrounding a construction site with a wider responsibility on public work contractors
- ▶ Management of construction & demolition material including rock, 2002. The circular focuses on the reuse of waste material and encourages onsite sorting of construction and demolition related waste material
- ▶ Enhanced specification for site cleanliness and tidiness, 2002
- ▶ Waste management on construction site, 2003. This circular is meant for urban solid waste management during construction. It recommends sorting of material and is therefore relevant to the transport sector
- ▶ Role of department safety and environmental advisor on health, safety and environmental protection on construction sites, 2003. This circular along with the implementation of site safety (circular mentioned above) provide useful inputs towards developing comprehensive safety documents covering implantation. Issuing authority: Environment, transport & works bureau, Govt. Secretariat, Hong Kong

- ▶ Environmental monitoring & audit manual. The manual provides systematic monitoring procedures to minimize impact associated with construction. It was drafted with a purpose to ensure an increase in compliance to environmental assessments. Issuing authority: Highway Department, Hong Kong
- ▶ Construction site drainage, 1994. The guideline provides useful design drawings and is useful to help control wastewater and related pollution of aquatic systems. Issuing authority: Environmental Protection Department, Hong Kong
- ▶ Construction site best management practices (BMP) manual, 2003. Issuing authority: California Department of Transportation, USA
- ▶ Guidelines for the crossing of watercourses during the construction of national road schemes, 2005. The guidelines address construction issues along watercourses. Issuing authority: National road authority, Ireland

3. Management of Sensitive Receptors

- ▶ Fauna sensitive road design. Vol. 1, Past & existing, 2002. The guideline provides for management of impact on wildlife and transport corridors
- ▶ Indigenous cultural heritage: policy, guidelines and procedures, 2004. Issuing authority: Department of main roads, Queensland government, Australia
- ▶ Waterways & wetland works manual: Environment best practice guidelines, 2003. Issuing authority: Department of primary industries, water and environment, Tasmania, Australia
- ▶ Guidelines for assessment of ecological impact of national road schemes, 2004
- ▶ Guidelines for the testing & mitigation of the wetland archeological heritage for national road schemes, 2005. The guidelines addresses environmental sensitive road design keeping in mind wetland ecology
- ▶ Guidelines for the treatment of bats during the construction and for the treatment of badgers prior to the construction of national road schemes, 2005. This is a useful reference for the development of high-speed corridors and ensuring protection of wildlife species. Issuing authority: national road authority, Ireland

(Source: Strengthening institutions for sustainable growth in the Highways Sector-India country environment analysis, World Bank)

Annexure 13

Direct and Indirect Environment Impact - Highway Sector

Though transport assists economic growth, it can also reduce social welfare by creating local air, noise, and visual pollution, and act as an instrument through which natural habitat and biodiversity could be adversely impacted. Further, social impact occurs due to spatial or occupational dislocation of people. These impact can be very significant and are often not recognized or addressed. The range of issues and impact cover the natural and social environment, and are often accentuated in the context of their geographical location. Some of these are highlighted as follows:

Soil Degradation is one of the most immediate impact and occurs from loss of topsoil and decrease in the productive capacity of the soil covered by the road, which is significantly reduced further due to compaction with heavy machinery during construction.

Water Resources/Drainage Modifications in the natural hydrological environment may lead to changes in surface and ground water flows, water logging and water quality degradation.

Air Quality Changes due to air pollution caused by construction equipment and traffic related emissions, contributes to atmospheric pollution.

Noise Pollution that affects people and animals occurs with increase in vehicular noise, friction between vehicles and the road surface, driver's behavior, as well as construction and maintenance activities. Air, noise, and degraded water quality, together impact the health of the local population.

Biodiversity, which is the wealth of species and ecosystems, may be directly impacted due to habitat loss, fragmentation, alteration and restriction in animal migration paths.

Cultural Heritage that is synonymous with the "expression of human values" and has a high social and amenity value is impacted by the potential damage to sites, and remains of archeological, historical, and religious structures.

Landscape and Aesthetic Distortions due to road development leads to modifications in the regional landscape and changes in the natural relief and morphology of the vegetation, inclusive of avenue trees and recreational areas. Other direct impact can result from **material sourcing (mining, quarrying)** where inappropriate choice location or techniques can lead to wastage, scarcity for competing uses and/or aesthetic degradation. In addition, airborne silica, generated from stone crushers can cause increased morbidity and mortality from silicosis, cancer and lung diseases, and is a contributing risk factor for tuberculosis. The public and labor, including children, working without respirators and dust suppression control systems are subject to considerable health risks. Dust from these operations is also known to affect local communities often located in close proximity to such facilities.

Indirect impact is closely linked with such projects and may have more profound consequences on the environment as they pertain to not only roads right of way but also associated sites. These are more difficult to measure and over time can affect larger geographical areas than that covered by the proposed works under the project. Examples include degradation of surface water quality

by the erosion of land cleared as a result of new road; increase in deforestation of an area stemming from easier/more profitable transportation of logs to market; and increase in poaching during the works period, especially in eco-sensitive zones. Related changes also occur in land use and settlement patterns, due to migrations from rural areas, as a result of improved transportation facilities and better access. This leads to growth of “unplanned” urban and semi-urban townships with fragmented infrastructure facilities.

Transmission of disease in the truck community due to extended periods of time spent away from families leads to increased sexual activity with commercial sex workers. The unhealthy sexual practices cause an alarming increase in the spread of the HIV/AIDS virus. **Road safety** is a major concern, especially for the poor groups, who suffer from transport-related accidents because they use vulnerable modes such as walking and nonmotorized transport. Among other reasons, one of the factors causing accidents is poor design and engineering features related to highways operations.

The challenge, therefore, is to understand and apply mechanisms to address these issues and related impact, the values which society places on them, and to find ways of prioritizing and integrating the widely dispersed environmental and social concerns. This can be facilitated by public consultation with all groups of people (including the most vulnerable), integration of grievance redress mechanisms during project development, in the design, construction and operation phase. This will lead to an increase in project ownership by the people and the implementing agency, and make the project more sustainable. Further, institutional coordination becomes a necessity, especially where projects stretch between or among multiple political or administrative jurisdictions at planning and implementation stage.

(Source: Strengthening institutions for sustainable growth in the Highways Sector-India country environment analysis, World Bank)



QUESTIONNAIRE

QUESTIONNAIRE FOR ENVIRONMENTAL APPRAISAL (FOR HIGHWAY PROJECTS)

Note 1 : All information given in the form of Annexures should be properly numbered and form part of this proforma.

Note 2 : No abbreviations to be used – Not available should be clearly mentioned

I. General Information

- (a) Name of the project
- (b) Name of authorized signatory
- (c) Mailing address
E-mail
Telephone
Fax No.
- (d) Does the proposal relate to new project/
Expansion/modernization
- (e) Length in kilometers

II. Project Information

- (a) Location

Chainage	Village	Tehsil	District	State

- (b) Geographical information

1. Latitude :
2. Longitude :
3. G.T. Sheet No. (Survey of India Map No.) :
4. Elevation above Mean Sea Level (meters) :
Min. Max. :
5. Total Area proposed for the Project (in ha.) :
6. Nature of Terrain :
7. Nature of Soil (clayey, sandy, silty, loam etc) :

III. Current Land Use of the Proposed Project Site Area (in ha.)

- A. Agricultural
 1. Irrigated
 2. Un-irrigated
- B. Homestead
- C. Forest
- D. Notified Industrial Area/Estate

- E. Grazing
- F. Fallow
- G. Mangroves
- H. Orchards
- I. Sand dunes
- J. No development zone
- K. Marshes
- L. National Park/Sanctuary

Total

IV. Alternate Routes/Alignments Considered

- A. _____
- B. _____
- C. _____

V. Reason for selecting the proposed Route/Alignment:

VI. Land Use Plan

Does the proposed project conform to the approved land use all along the route/alignment?

Yes No

If not, clearly indicate, which of the stretches are not as per approved land use. Does it conform to the Regional Development Plan?

Yes No

VII. In case the Route/Alignment Falls Totally or Partially in the CRZ Area

A. What is the categorization of the area (as per approved CZMP)?

CRZ-I	<input type="text"/>	CRZ-II	<input type="text"/>
CRZ-III	<input type="text"/>	CRZ-IV	<input type="text"/>

B. Does the proposed activity qualify under the category of permissible activity?

Yes No

C. If yes, under what provision it is permitted

VIII. Environmental sensitivity details within 10 km from the boundary of the project for applicability of “General Condition (GC)” as per EIA notification dated 14.9.2006 and amendments as on date

S.No	Item	Name	Aerial Disance (in Km)
1	Protected areas notified under the wild life (Protection) Act, 1972		
2	Critically polluted areas as identified by the CPCB		
3	Eco-sensitive areas as notified unedr section 3 of the E (P) Act 1986		
4	Inter-state boundaries and international boundaries		

IX. Environmental sensitivity areas as mentioned at column 9(III) of EIA Notification 2006

S.No	Areas	Name/ Identity	Aerial distance (within 15 km) Proposed project location boundary
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value		
2	Areas which are important or sensitive for ecological reasons – Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests		
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration		
4	Inland, coastal, marine or underground waters		
5	State, National boundaries		
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas		
7	Defense installations		
8	Densely populated for built-up area		
9	Areas occupied by sensitive man-made land uses (<i>hospitals, schools, places of worship, community facilities</i>)		
10	Areas containing important, high quality or scarce resources (<i>ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals</i>)		
11	Areas already subjected to pollution or environmental damage (<i>those where existing legal environmental standards are exceeded</i>)		
12	Areas susceptible to natural hazard which could cause the project to present environmental problems (<i>earthquakes, subsidence, land slides, erosion, flooding or extreme or adverse climatic conditions</i>)		

Note: The details shall also include National park / Marine park / Sanctuary / Tiger reserve / Elephant Reserve / Turtle westing ground / Core zone of Biosphere reserve / Reserved forest / Wildlife habitat / Habitat of endangered /exotic species / Coral reef / Mangroves / Lakes / Reservoirs / Dams / Breeding site / Nesting site

X. Baseline data

Ambient air quality data

Noise data

Does the proposed project site involve any breeding or nesting ground?

Human Settlement

Human Settlement	Within the project area	With in 500 meters from the ROW
Population		
Number of Houses		

Yes No

If yes, provide the following details

- A. Name of the aquatic organism
- B. Type of habitat
- C. Period of year in which activity takes place
- D. Independent report of bio-habitat study may be furnished

XI. Does the Proposed Alignment/Route Involve Migratory Path of Animals?

If yes, please provide the following:

Yes No

- A. Name of fauna
- B. Habitat
- C. Period of the year in which activity take place

XII. Site Preparation

A. Is the proposed route/alignment located in low-lying area?

Yes No

Level before filling (above MSL in m) :
 Level after filling (above MSL in m) :
 Details of fill material required :

Quantity of fill material required (in cu.m)	Source

Would the above filling result in complete/partial filling of water Bodies?

B. Does the site involve stripping?

Yes No

If yes, provide the following details:

1. Size of the area to be stripped.
2. Location
3. Soil type
4. Volume and quantity of earth to be removed
5. Location of dumpsite
6. Proposal for utilisation of removed topsoil.

C. Does it involve cutting?

Yes No

If yes, please furnish the following details:

1. Size of the area to be cut
2. Depth of cut
3. Location
4. Soil type
5. Volume and quantity of earth and other material to be removed
6. Location of dumpsite

D. Does it involve tunneling?

Yes No

If yes, please furnish the following details:

1. Lithology :
2. Geological structural fraction :
3. Diameter (meters) :
4. Length (kilometer) :
5. Location :

E. Does the site preparation require cutting of trees?

Yes No

If yes, please furnish the following details:

1. How many trees are to be cut?
2. Species of the above trees
3. Are there any protected/endangered species?

Yes No

If yes, provide details

F. In case the road passes through a flood plain of a river, please furnish:

1. Detailed micro-drainage
2. Flood passages
3. Flood periodicity in the area

G. Does the proposed project involve construction on any sandy stretch?

Yes No

If yes, please furnish detail

H. Does the project involve extraction of sand, leveling or digging of sandy stretches within 500 meters of high tide line?

Yes No

If yes, mention the activity involved and area.

1. Stretch
2. Area (sq. meter)

I. Does the project involve any dredging?

Yes No

If yes, extent of dredging, disposal of dredged material etc)

J. Is any sand to be removed from sand dunes?

Yes No

K. Does the project involve cutting/destroying of mangroves?

Yes

No

If yes, give detail

1. Area
2. Species
3. Existing health

L. Does the project involve any land reclamation?

Yes

No

If yes, please provide the following details

- A. Activity for which land to be reclaimed
- B. Area of land to be reclaimed (Hectares)

XIII. Does the Project have any Adverse Effect on Biodiversity?

If so, details of flora and fauna so affected:

XIV. Whether there will be any Change in the Drainage Pattern after the Proposed Activity?

Yes

No

If yes, what are the changes?

- A. What is the maximum extent?
- B. Is any additional area will be flooded

XV. Project Details (A summary of project proposal shall be enclosed)

S.No	Description	Quantity/No.
1	Length of new alignment proposed (kilometers)	
2	Width of the new alignment (meters)	
3	Length of existing alignment proposed to be strengthened/widened (kilometers)	
4	Width of the existing alignment (meters)	
5	Width of the existing alignment after widening (meters)	
6	Total length of the alignment (kilometers)	
7	Number of bridges Major Minor	
8	Length of bridges (meters) Width of bridges (meters)	

9	Number of culverts	
10	Length of culverts (meters)	
11	Number and distance (meters) between underpasses	
12	Number of intersections	
13	Length of intersections (meters)	
14	Number of railway crossings	
15	Length of railway crossings (meters)	
16	Number of villages through which alignment passes	
17	Population of the villages through which alignment passes	
18	Length of new alignment proposed in agricultural land	
19	Width of new alignment proposed in agricultural land	
20	Length of new alignment proposed in forest area	
21	Width of new alignment proposed in forest area	

XVI. Natural resource conservation and optimization

The use of alternative materials for construction such as fly ash, quarry over burden etc should be furnished

XVII. Water requirements during construction

A. Water Requirements (cu.m./day)

S.No	Purpose	Demand	Source
1	Road making		
2	Dust Suppression		
3	Drinking		
4	Others (Please specify)		
TOTAL			

XVIII. Whether there will be Any Ingress of Saline Water into Ground Water Due to Project?

Yes No

If so details to be furnished

XIX. Solid Waste

A. Solid Waste generated during Road Construction (Tonnes/Day)

1. Top Soil
2. Overburden
3. Others (Please specify)

B. Method of disposal of solid waste

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XX. Projected Air Quality (taking into account the traffic projections)

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XXI. Green Belt

- A. Area already afforested (for existing projects), in ha.
- B. Area proposed to be afforested (in ha.)
- C. No of rows planned along the alignment
- D. Trees planted and proposed
1. Planted
 2. Proposed
 3. List of species
- E. Proposal for maintenance of plantation

XXII. Construction Phase

- A. Number of persons to be employed for construction
1. Peak
 2. Average
- B. What provision has been made for the sanitation for the construction workers?
- C. How the fuel (kerosene/wood, etc) requirement of labour force will be met to avoid cutting of trees from the adjoining areas.
- D. Measures for Health care with emphasis on protection from endemic diseases.

XXIII. Rehabilitation & Resettlement Plan including vocational training and other avenues of employment Population to be displaced

S.No	Name of Village	Population		
		Land oustees only	Homestead Ousteas only	Land + Homestead Ousteas

- A. Rehabilitation plan for oustees
- B. Site where the people are proposed to be resettled
- C. Compensation package
- D. Agency/authority responsible for their resettlement

XXIV. Does it Involve Displacement of Ethnic Minority?

Yes No

If yes, please furnish details

S.No	Name of the community	Number of Males	Number of Females	Total

Please specify any special measures for their rehabilitation

XXV. Relevant IRC code of practices and MOSRT&H guidelines planned for implementation

IRC code/MOSRT&H guidelines	Subject matter

XVI. Expenditure on Environmental Measures :

- A. Capital cost of the project (as proposed to the funding agency/financial institutions)
- B. Post of environmental protection measures (Rs. Lakhs)

S.No	Environmental safeguards	Capital Cost	Recurring Cost

XXVII. Public Hearing

- A. Date of Advertisement :
- B. Newspapers in which the advertisement appeared :
- C. Date of Hearing :
- D. Panel present :
- E. List of Public present :
- F. Summary of public hearing details :

S.No	Summary/ Issues raised by the public	Response of Project Proponent

G. Observations made by the public hearing panel:

XXVIII Court Cases

Was/is there any court case relating to the project or related activities? So, provide details present status

Verification: The data and information given in this proforma are true to the best of my knowledge and belief

Date:

Signature of the Applicant*
with full name & address

Place:

Given under the seal of organisation
on behalf of whom the applicant is signing

** Note: All correspondence with MoEF shall be made by the authorized signatory only. The authorized signatory should also submit a document in support of his claim of being authorized signatory for the specific project (refer notification No. S.O. 3067 (E) dated 1st December 2009)*