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वहाँ है खुशहाली ॥

Ministry of Environment & Forests
GOVERNMENT OF INDIA, NEW DELHI

Environmental Impact Assessment Guidance Manual for AERIAL ROPEWAYS

Prepared by

Administrative Staff College of India
Bellavista, Khairatabad, Hyderabad

February 2010

Environmental Impact Assessment Guidance Manual for

Aerial Ropeways

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, Hyderabd, 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

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DIRECTOR GENERAL

asci
Leadership through Learning

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 Aerial Ropeways. 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 II 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 **Dr. Valli Manickam**, Member of Faculty of ASCI, who, drawing on her experience, prepared the EIA guidance manual for the **Aerial Ropeways**. The efforts put by her 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

ASCI	-	Administrative Staff College of India
CPCB	-	Central Pollution Control Board
CRZ	-	Coastal Regulation Zone
CSR	-	Corporate Social Responsibility
CGWB	-	Central Ground Water Board
EAC	-	Expert Appraisal Committee
EIA	-	Environmental Impact Assessment
EC	-	Environmental Clearance
ETP	-	Effluent Treatment Plant
EMP	-	Environmental Management Plan
DMP	-	Disaster Management Plan
IA	-	Impact Assessment
MoEF	-	Ministry of Environment and Forests
R O	-	Regional offices
R&R	-	Rehabilitation and Resettlement
SEAC	-	State Expert Appraisal Committee
SPCBs	-	State Pollution Control Boards
STP	-	Sewage Treatment Plant
TOR	-	Terms of Reference

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ABOUT THE MANUAL

Environmental Impact Notification S.O.1533 (E), dt.14th September 2006,as amended 2009, issued under Environment (Protection) Act 1986, has made it mandatory to obtain environmental clearance for scheduled development projects. The notification has classified projects under two categories 'A' & 'B'. Category A projects (including expansion and modernization of existing projects) require clearance from Ministry of Environment and Forest (MoEF), Govt. of India (GoI) and for category B from State Environmental Impact Assessment Authority (SEIAA), constituted by Government of India.

The existing manual on Environmental Impact Assessment (EIA) of MoEF, is common for all the sectors requiring prior environmental clearance. Considering the diversity in all sectors related to infrastructure and industrial development projects, MoEF launched a program for development of sector specific technical EIA guidance manuals. The EIA guidance manual will help the project proponent/consultant in the preparation of the EIA report. It also helps the regulatory authority to review the report as well as the public to become aware of the related environmental issues. This EIA guidance manual accordingly addresses the related environmental concerns for the specific sector - "Aerial Ropeways". This manual consists of terms of reference (TOR), manual and questionnaire.

The sector specific manual consists of twelve chapters, which correspond to the generic structure given as per EIA notification 2006, as amended Dec 2009.

Chapter 1: Introduction

This chapter contains the general information on the aerial ropeway projects, major sources of environmental impact in respect of aerial ropeway projects and details of the environmental clearance process.

Chapter 2: Project Description

In this chapter the proponent should furnish detailed description of the proposed project, such as the type of the project, need for the project, project location, land availability, utilities (power and water supply) and infrastructure facilities such as roads and other requirements. The project implementation schedule, estimated cost of development should also be included.

Chapter 3: Analysis of Alternatives (Technology and Site)

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

Chapter 4: Description of Environment

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

Chapter 5: Impact Analysis and Mitigation Measures

This chapter describes the anticipated impact on the environment and mitigation measures. The method of assessment of impact including studies carried out, modelling techniques adopted to assess the impact where pertinent should 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 suggests the mitigation measures to be implemented by the proponent.

Chapter 6: Environmental Monitoring Program

This chapter should cover the planned environmental monitoring program. It should also 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 required in addition to those specified in the ToR and which are necessary to cater to more specific issues applicable to the particular project.

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 improvements in the physical infrastructure, social infrastructure, employment potential and other tangible benefits.

Chapter 9: Environmental Cost Benefit Analysis

This chapter should cover on Environmental Cost Benefit Analysis of the project.

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 phase and provisions made towards the same in the cost estimates of project construction and operation. This chapter should also describe the proposed post-monitoring scheme as well as inter-organizational arrangements for effective implementation of the mitigation measures.

Chapter 11: Summary and Conclusions

This chapter gives the summary of the full EIA report condensed to ten A-4 size pages at the maximum. It should provide the overall justification for implementation of the project and should explain how the adverse effects have been mitigated.

Chapter 12: Disclosure of Consultants

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

This manual is meant to provide general guidance for preparation of EIA report. The contents of the manual are to be considered as version 1.0 (2010). An updation / revision of the manual will be taken up as per the 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.

1 INTRODUCTION

1.0 Preamble

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

This manual provides information and guidance on Environmental Impact Assessment in aerial ropeway projects. It is intended as a resource for those who are involved in EIA practice. Particular emphasis is given to concepts, procedures and tools that are used currently or are potentially relevant in preparing environmental impact assessment reports for clearance from regulatory agencies. EIA is a technical exercise, to predict environmental impact, assess their significance, and provide recommendations for their mitigation. The assessment covers construction and operation of the development and future expansion. EIA report covers a wide range of technical disciplines and covers areas such as noise and vibration, air quality, ecology, water quality & hydrology, archaeology & cultural heritage, landscape & visual character, sustainability and socio-economics. The EIA report will describe how the project has been improved through the EIA process and what alternatives were considered.

1.1 General Information on Aerial Ropeways

Aerial ropeway development may have a wide range of impact on the environment through activities like construction work, reclamation, excavation and other related activities. Aerial ropeway development and operation should therefore be planned with careful consideration of their environmental impact. The preparation of EIA report and implementation of EMP is essential for effectively managing these adverse effects. Aerial ropeways are particularly important in regions where the facility of surmounting natural barriers gives them an advantage over railways or road in high altitude regions. The choice of a particular type depends upon the length and topography of the route, the type and intensity of traffic and the relative inaccessibility of the site.

Passenger Ropeway Categories Include:

- *aerial tramways (single and double reversible)* which are defined as Ropeways on which passengers are transported in cable-supported carriers and are not in contact with the ground or snow surface, and in which the carrier(s) reciprocate between terminals. Aerial tramway systems may have a single carrier, or group of carriers, that move back and forth on a single path of travel; or, two carriers, or groups of carriers, oscillating between terminals on two (usually very nearly parallel) paths of travel. The systems may be monocable or bicable.

- aerial lifts (detachable lifts, chair lifts, and similar equipment) which are defined as Ropeways on which passengers are transported in cabins or on chairs and that circulate in one direction between terminals without reversing the travel path.

- surface lifts (T-bar lifts, J-bar lifts, platter lifts, and similar equipment) which are defined as Ropeways on which passengers are propelled by means of a circulating overhead wire rope while remaining in contact with the ground or snow surface. Connection between the passengers and the wire rope is by means of a device attached to, and circulating with, the haul rope, known as a "towing device."

1.2 Environmental Clearance Process

The objective of the EIA Notification, 2006 and its amendments of Dec, 2009 is to set procedures of environmental clearance before establishment of identified nature and size. The suitability of site proposed for a proposed development is one of primary concerns in according environmental clearance to a project.

All aerial ropeway projects as per the EIA notification of 2006 and its amendments of Dec, 2009 fall under:

Project Activity		Category With Threshold Limit		General Conditions (GC) Apply*
		A	B	
7(g)	Aerial Ropeways	All projects located at altitude of 1000 mts and above All projects located in notified ecological sensitive areas	All projects except covered in column 3	

* "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 (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

This manual addresses the important issues to be discussed in the environmental impact assessment of aerial ropeway projects. Fig.1 shows the EIA clearance process for the aerial ropeway

projects. The EIA report should incorporate the page numbers of various chapters, sections and sub-sections, tables, appendices, drawings and figures etc., with titles should be clearly indicated under the heading contents.

1.3 Terms of Reference

The terms of reference (TOR) pertinent to preparation of EIA study reports for construction of aerial ropeways is given as Annexure 1 to this EIA guidance Manual. 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.

- 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 take 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)
- 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"

  Ref:- EIA amendment 2009

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

For 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.

For 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 should 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 should be public documents.

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 authorities concerned, on the same terms and conditions under which the prior environmental clearance was initially granted, and for the same validity period.

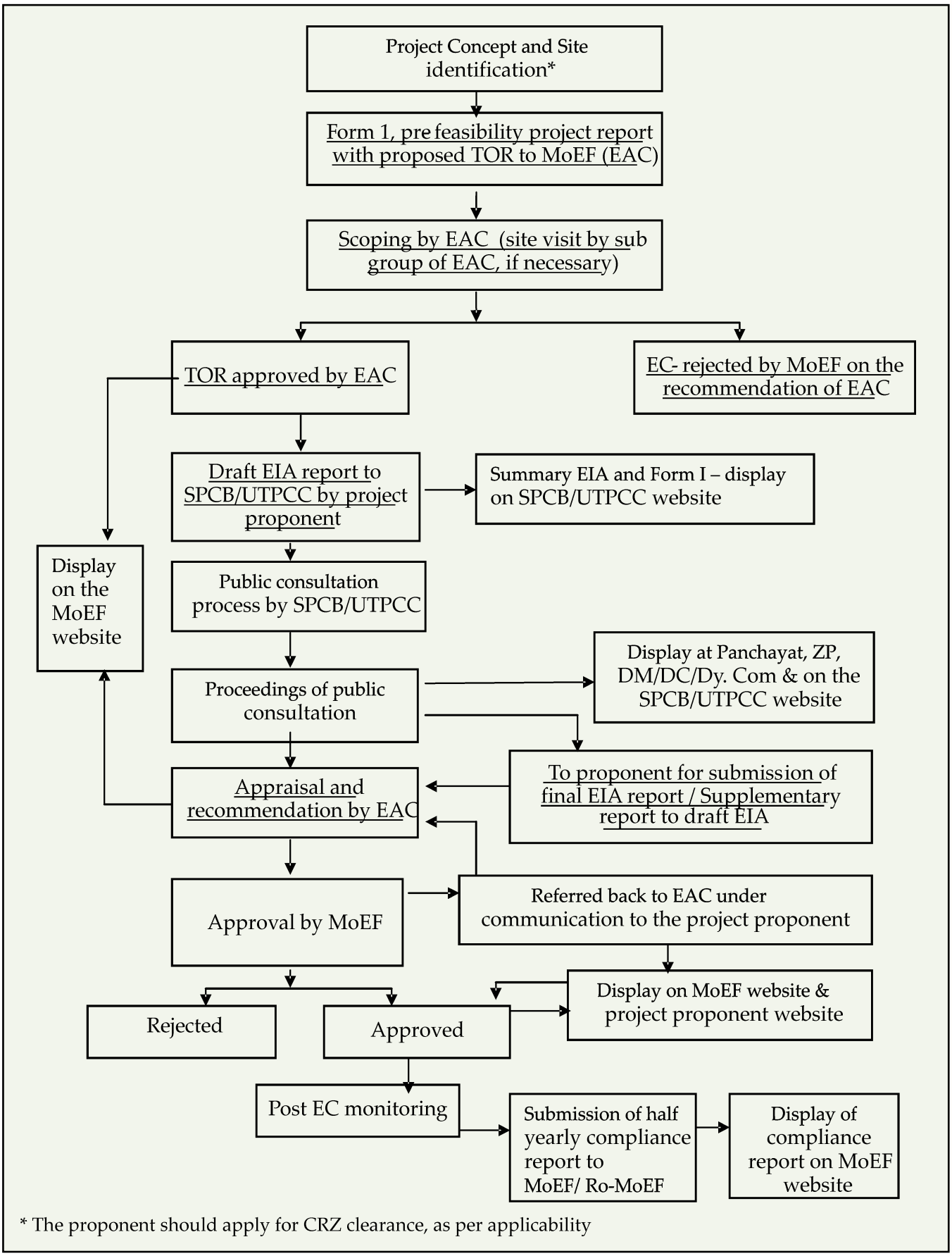

Figure 1.1: Prior Environmental Clearance Process for Category A projects

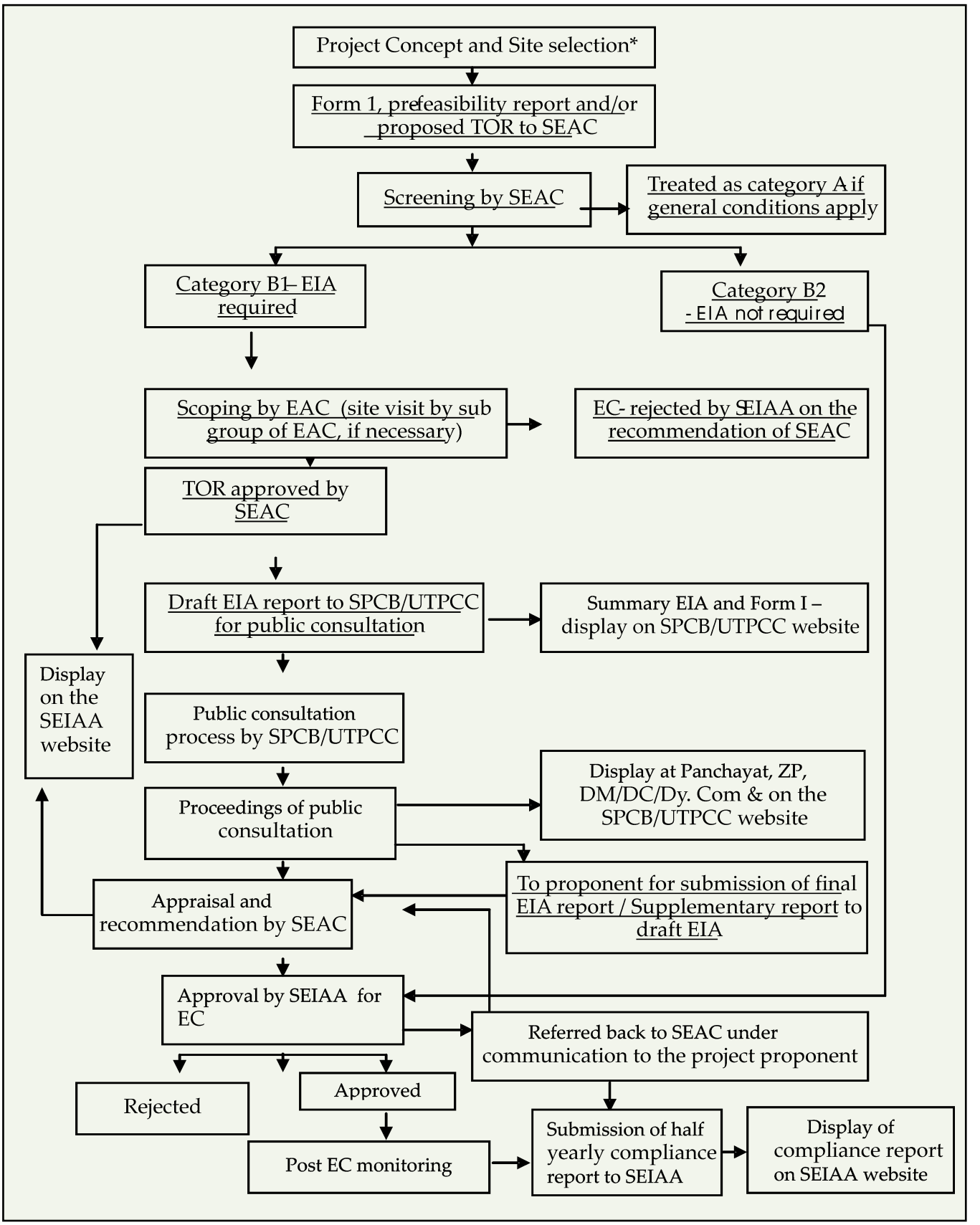

Figure 1.2: Prior Environmental Clearance Process for Category B projects

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 should be as under:

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

1.8 Profile of Project Proponent / Company

The details of the project proponent along with details of their address for communication / contact should be clearly mentioned in the introduction of the EIA Study. The profile of project proponent / company should include briefly the historical background on commercial activities carried out.

2

PROJECT DESCRIPTION

2

2.0 Background of the Project

The background of the project gives broad description of the area in which construction of aerial ropeway is proposed. It will highlight briefly the current existing scenario and the need for the construction of aerial ropeway in this area.

2.1 Description of the Project

The following should be given by the proponent in this chapter:

- The description of the project should include:
- the selection of the terminal locations
- the alignment selected giving proper reasons
- tower locations and angle stations
- emergency rescue
- construction methods
- types of cable car systems to be used

ii. Location (use maps showing general location, specific location, project boundary and project site layout showing its alignment).

Essential Maps to be provided

- Detailed layout plan of proposed project development, access/approach roads, landscape, and waste disposal etc; to be given. Layout plan of proposed development of built up areas with covered construction such as rest rooms, emergency care management, DG set rooms, etc; are to be given.
- A map of the project area and 10 km area from boundary of the proposed / existing project area, delineating project areas notified under the wild life (Protection) Act, 1972/critically polluted areas as notified by the CPCB from time to time /notified eco-sensitive areas/inter state boundaries and international boundaries
- A map covering aerial distance of a 15 km from the proposed project boundary delineating environmental sensitive areas as specified in column no 9(iii), Form I of EIA notification dated 14th Sept 2006
- Land use map of the study area to 1:25,000 scale based on recent satellite imagery of the project area and 500meter from the proposed project boundary delineating the cropping pattern, wastelands, forest area and built up areas, water bodies, human habitation and other specific features such as railway tracks, ports, airports, roads, major industries etc.

- Area drainage contour map of the project area and 500 meters from the proposed project area should be clearly indicated. In case of any proposed diversion of nallah/ canal/river, should also be shown in the map.
- Detailed ground surveyed map in 1:5000 scale showing the existing features falling within the right of way namely, trees, structures including archaeological and religious, monuments etc. The natural topography and landscape should be given clearly.

Details regarding the design and installation of the aerial ropeway are to be given. Some of the important issues like capacity and speed of the carrier, location and alignment of the installation, width of clearing, clearance (horizontal and vertical), structures and foundations, communications, loading and unloading areas, DG sets and fuel handling procedures.

Clear details of the procedures for passenger removal from stranded carriers are to be given. The terminal and base stations are to be also detailed out clearly. The latitude and longitude of the stations are to be mentioned. Details of speed and acceleration, stops and shut downs, types of brakes to be used are to be given. The estimated number of passengers to be transported per day along with the time taken for each trip is to given clearly.

The factors which should influence site selection for the development of a project are the infrastructure and utilities available, expected water and power requirement by the proposed new aerial ropeway and feasibility study of how much is available and what is the source of supply for power and water. Provision of alternate source of power in case of emergency also is to be made.

Site selection should be carried out in light of a holistic perspective of land use, development intensity, social well being and preservation of the environment.

2.2 Manpower Requirement

The project should indicate the requirement of various categories of manpower such as skilled, semi-skilled, unskilled workers, technicians, engineers, managers and methods for implementing and up gradation of specialized skills, where required, should be mentioned in the EIA report.

2.3 Project Implementation Schedule

The proponent should also submit the detailed project implementation schedule bar chart, CPM / PERT etc., duly bringing out interrelationship of major activities, including the mitigation measures that were studied for the project development and to be implemented in the year one itself to avoid adverse effects on the environment.

ANALYSIS OF ALTERNTIVES (Technology and Site)

3.0 General

Clear description of each alternative, and summary of the impact - adverse and positive with each site and technology, and selection of alternatives are to be explained in detail. The following points should be included in this section: -

- Description of various alternatives like locations or layouts
- Description of each alternative
- Summary of adverse / positive impact of each alternative
- Selection of alternative

3.1 Alternate Site

Different alignments are to be studied with their drawbacks examined in detail in terms of engineering feasibility, practicality of construction and operation, landscape, visual and environmental impact. Out of the various alternatives, the reasons for selecting the proposed site should be given in this section. The benefits and drawbacks of each alignments are to be clearly mentioned with reference to technical studies and environmental aspects.

Alternative site analysis

	Alternate 1	Alternate 2	Alternate 3
Heritage / cultural			
Visual Impact			
Traffic / parking / access			
Noise			
Socio - economic			
Vegetation			
Wild life			
Others			

3.2 Technology

The type of aerial ropeway systems to be used in this project is to be detailed out. The reasons for selecting the proposed type along with the comparison with other types and its advantages are to be highlighted.

DESCRIPTION OF THE ENVIRONMENT

4.0 Introduction

Environmental data to be considered in relation to aerial ropeway development include (a) land, (b) air, (c) noise, (d) water, (e) biological, (f) socio-economic and health environment and (g) solid waste. Hence it is necessary to ascertain the baseline data of these environmental facets.

Study Area:

Primary data by measurements, field surveys and secondary data from secondary sources are to be collected in the study area within 500 meters radius from the project boundary. Beyond 500 meters and upto 15kms (as mentioned at column 9(iii) of form 1 of EIA notification 2006), only secondary data is to be collected. Primary data should cover one season other than monsoon and secondary data for one full year.

Map of the study area clearly delineating the location of various monitoring stations (air, noise, water and soil) superimposed with location of habitats are to be shown. Monitoring should be done as per CPCB guidelines.

4.1 Land Environment

Data on the land availability is to be ascertained from local authorities, revenue records etc. justification for the proposed quantum of the area is to be given. Baseline data to be given includes description of existing situation of the land at the proposed project area including description of terrain, hill slopes, inland topography, slope and elevation. Study of land use pattern, habitation cropping pattern, forest cover, environmentally sensitive places etc, by employing remote sensing techniques and also through secondary data sources are to be detailed.

Baseline data is to be provided on rock types, and history of any volcanic activity, seismicity and associated hazards. The land use pattern covering forestland, total irrigated land, non-irrigated land, cultivable waste, are to be calculated and given as a map (Annexure 2) at locations were transfer facilities are likely to be provided enroute.

Soil data including type, classification, characteristics, soil properties etc., are important from engineering considerations for design of structures, porosity and permeability, sub soil permeability, inherent fertility etc. Baseline data of the soil, results of investigations carried out to be provided for the project area. The samples are to be collected and analyzed as per CPCB norms and given as shown in Table4.1 and the results are to be presented as shown in Table 4.2 (Annexure 3)

4.2 Water Environment

The physiography of the land will control the drainage pattern in the region. The drainage pattern in the area is to be drawn. Hydro-geological settings and the ground water levels are to be examined and presented.

Baseline data of ground water including data of pH, dissolved solids, suspended solids, coliform bacteria, oil is to be collected for one season. Usage purpose of ground water, if any, is to be indicated. If ground water is being utilized details of the requirements and availability and its use are to be given.

Baseline data on location of surface water like water bodies, lakes, their dimensions, present quality and their utility is to be provided. Details of the water bodies in the project area should be described specifically. Water quality is to be monitored for one season. Ground water, surface water and wastewater generated in the study area is to be collected as per CPCB norms (Annexure 3). The baseline data of ground water and surface water quality for the season is to be established. The description of the water sampling locations may be given as in Table 4.3 for ground water and Table 4.5 for surface water sampling points and the results to be presented as shown in Table 4.4 and 4.6 respectively. Central Pollution Control Board (CPCB) has stipulated criteria for raw water usages, use based classification of surface water are to be followed (Annexure 4).

4.3 Air Environment

The climatic data procured from secondary sources is very important for identifying the season and period of monitoring primary data. The methodology to be adopted for collection of climatic data specific to the site is to compile the mean monthly normals of atmospheric parameters, from previous 10yrs data recorded by the nearest IMD station. Wind Roses for each month giving the wind direction speed are to be collected and presented. Most probable wind speed class and wind direction at the nearest IMD site is to be estimated from this. The cloud cover details along with the humidity in the region are to be mentioned clearly. Site specific data for one season showing wind speed, temp, wind direction, cloud cover, relative humidity are to be compiled and presented in tabular form.

Baseline data of air pollutant parameters extending an area of 500meters from the project should be monitored at a number of locations. Baseline monitoring of ambient air parameters namely Particulate Matter PM 10 and PM2.5, carbon monoxide (CO), SOx and NOx and other parameters should be monitored. One season data is to be monitored other than monsoon as per the CPCB Norms. Sampling locations are to be located as per CPCB norms. Number and locations of Ambient Air quality monitoring (AAQM) stations are decided based on the nature of project, meteorological conditions, topography, selected pollution pockets in the area and likely impact areas. The monitoring locations for air quality are to be given as shown in Table 4.7 and monitoring results should be presented as in Table 4.8. The values should be compared with National Ambient Air Quality Standards (Annexure 5). The monitoring locations are to be shown on the area map.

4.4 Noise Environment

Baseline data on noise pollution at the project area and the neighborhood up to 500 meters or nearest residential areas is to be monitored as per the CPCB norms. Daytime and nighttime data should be collected and presented. The details of noise levels are to be given as indicated in Table 4.9. The Ambient Air Quality with reference of Noise is presented in Annexure 6.

4.5 Biological Environment

Details of secondary data on the existing flora and fauna in the study area, carried out by institution under the relevant discipline (such as BSI, ZSI, WII, etc) should be included in the list of flora and fauna along with the classification as per Schedule given in the Wild Life Protection Act, 1972 (for fauna) and in the Red Book Data (flora) 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 critically polluted areas / industrial clusters as identified by CPCB is given as Annexure 7.

The data should include the dominant species in the area, their densities and distribution and any important specimens that are present. Any species of commercial value (timber) should also be mentioned.

4.6 Socio-Economic Environment

Baseline data at the project area should include the demography, telecommunications, archaeological sites, particularly on settlements, health status of the communities, existing infrastructure facilities of the proposed area and area of impact due to the proposed activity. Present employment and livelihood of these populations, awareness of the population about the proposed activity should also be included. The demographic details are to be presented as shown in Table 4.10.

4.7 Solid Waste

Details of authorized municipal solid waste facilities and hazardous waste disposal facilities in the area should be inventorized, in case if it is proposed to utilize the same.

5

ANTICIPATED IMPACT AND MITIGATION MEASURES

5.0 Introduction

This chapter should describe the likely impact of the project on each of the environmental parameters, methods adopted for assessing the impact such as model studies (Annexure 8), details of mitigation measure proposed to reduce adverse affects of the project, and conservation of natural resources. The identification of specific impact followed with mitigation measures should be done for different stages.

5.1 Land Environment

Anticipated Impact

Some of the anticipated impact, especially during the construction phase which need to be addressed, are

- There may be a change in the topography and drainage pattern
- Top soil erosion
- Soil contamination due to project activities
- Loss of productive soil and impact on natural drainage pattern

Mitigation Measures

Some mitigation measures are identified and given below. These measures may be used wherever applicable

- Natural drainage patterns can often be maintained by preparing sodden waterways or installing culverts.
- Engineering plans can be drawn to reduce the area of earth cuts on fills below what might otherwise be acceptable, provide physical support for exposed soil or rock faces, concentrate or distribute - as appropriate the weight loading of foundations to areas or state better able to support that weight,
- The topsoil stockpile is to be protected or can be utilized.

5.2 Water Environment

Anticipated Impact

- Impact of water resources due to shifting of water courses, if any
- Impact of water withdrawal on surface water / ground water resources-Impact on exploitation of surface / ground water
- Waste water from washing of cable cars

- Waste water generation from toilets

Mitigation Measures

- Water conservation in landscaping
- STP for collection, treatment and disposal of sewage / waste waters

5.3 Air Environment

Anticipated Impact

- Construction phase would involve site clearances and preparation, infrastructure development, aerial ropeway construction and other related activities
- Operational phase would involve emission from vehicular movement and diesel generators.

Mitigation Measures

- Provision for spraying water to reduce dust emissions during the construction phase
- Proper maintenance of vehicles and DG sets.

5.4 Noise Environment

Impact Prediction

- Impact of vibrations on the surrounding environment
- Noise due to demolition / construction activities
- Impact due to present and future transportation activities by road
- Operation of DG sets

Mitigation Measures

Identification and adoption of mitigating measures for noise abatement including noise barriers for point sources and line sources and measures to minimize effect of vibrations due to construction activities are to be detailed. Acoustic enclosure to be provided for DG sets.

5.5 Biological Environment

Anticipated Impact

- Loss of forest cover
- Habitat fragmentation and blocking of migratory corridors due to project activities
- Loss of plants of economic importance

Mitigation Measure

- Mitigating measures to compensate the loss of forest cover by replantation.
- Restoration/Regeneration of rare plants of economic importance including medicinal plant species.

- Efforts should be taken to bypass the reserved forest and other ecological sensitive rea, so as to cause no disturbance to the ecology of the area.

5.6 Socio Economic and Health

Anticipated Impact:

- Details of public and private land in the proposed and immediate surroundings, socio-economic status of the affected owners of the private lands, if any should be properly compiled
- Impact of the project on socio cultural aspects should be assessed
- Damages to any historical sites if present in the area should be reported.

Mitigation Measures:

- Mitigating measures should take into account the needs of the people based on primary data as obtained through need assessment survey/study.
- Local people especially the woman and women self help group should be involved in selecting alternative location to be made available to the affected people if applicable.

Health and well being of Construction Workers

Construction activities are emitting large pollution to environment. Large volumes of suspended particulate matters are released during construction work leading to air pollution. Unhygienic site sanitation facilities cause damage to environment and to health of the construction workers.

Mitigation Measures

The objective is to ensure health and safety of the workers during construction, with effective provisions for the basic facilities of sanitation, drinking water, safety of equipments or machinery etc. Following are some of the recommendations to be followed:

- Comply with the safety procedures, norms and guidelines (as applicable) as outlined in IS 5228, IS 5229 and IS 5230, code of practice for construction of aerial ropeways, Bureau of Indian Standards
- Provide clean drinking water to all workers
- Provide adequate number of decentralized latrines and urinals to construction workers.
- Guarding all parts of dangerous machinery.
- Precautions for working on machinery.
- Maintaining hoists and lifts, lifting machines, chains, ropes, and other lifting tackles in good condition.
- Durable and reusable formwork systems to replace timber formwork and ensure that formwork where used is properly maintained.
- Ensuring that walking surfaces or boards at height are of sound construction and are provided with safety rails or belts.

- Provide protective equipment; helmets etc.
- Provide measures to prevent fires. Fire extinguishers and buckets of sand to be provided in the fire-prone area and elsewhere.
- Provide sufficient and suitable light for working during night time.
- Dangers, health hazards, and measures to protect workers from materials of construction, transportation, storage etc.
- Safety policies of the construction firm/division/company.

5.7 Solid Waste and Environment

Anticipated Impact:

Impact due to non-hazardous and hazardous solid waste generated during the construction and operational stages should be assessed.

Mitigation Measures:

Mitigation measures to comply the norms should be planned. Options for minimization of solid waste and environmentally compactable / recycling of waste to conserve natural resources should be planned. Management and disposal of temporary structures, made during construction phase should be planned.

ENVIRONMENTAL MONITORING PROGRAM

6.0 General

This includes the technical aspects of monitoring the effectiveness of mitigation measures (including measurement methodologies, data analysis, reporting schedules, emergency procedures, detailed budget and procurement schedules). The details include summary matrix of environmental monitoring, during construction and operation stage; requirement of monitoring facilities; frequency, location, parameters of monitoring; compilation and analysis of data; comparison with base line data and compliance to accepted norms and reporting system and plantation monitoring programme.

The description of the monitoring programme should include:

(a) A technical plan which spells out in detail the methodologies for measurement, the required frequencies of measurement, the planned location of measurement, data storage and analysis, reporting schedules and emergency procedures, and

(b) Detailed budgets and procurement schedules for, necessary equipment and supplies, technical and administrative manpower.

The environmental monitoring includes

- Air pollution monitoring in the areas were DG sets are in operation
- Noise level monitoring
- In case of usage of ground water monitoring the ground water table in the area
- Water usage, wastewater generated etc
- Records of generation, handling, storage, transportation and disposal of the solid, aqueous and organic hazardous wastes generated.
- Plantations, afforestation plan need to be monitored.

The entire data is to be furnished to the regulatory agencies.

7

ADDITIONAL STUDIES

7.0 General

TOR to be adopted for aerial ropeway 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 proponent or the regulatory authority may either identify such issues during the scoping process or other stakeholders including the public during public consultation. 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 material 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 Risk Assessment and Disaster Management Plan

Ropeways are liable to suffer from environmentally induced threats, risks and hazards as well as human -caused occurrences.

Disasters due to technical failures and natural causes should be identified. Natural disasters include earthquakes, landslides, rock falls, storms, avalanches, lightening etc and technical failures may include rope with broken wires in service, drive / return sheave shaft failure / tension system failure, mount assembly parts failure, over speeding of ropeway / brake failure, rollback,

slippage / fall of cabin, entanglement of cabin, swinging of cabin resulting in fall of passengers outside cabin, cabin derailment at station etc. while accidents include fire in fuel storage areas.

Personnel for disaster failure need to identified and properly documented in the disaster management plan. The various cells - technical, team for rescue (trained and skilled operators) are to be clearly indicated.

Risk Assessment:

- identify all potentially hazardous scenarios associated with the fuel storage at site that will impose risk to cable car passengers and workers during construction and operational phases;
- conduct Quantitative Risk Assessment to assess the associated risk and express the risks in both individual and societal terms;
- identify practicable and cost effective risk mitigation measures if required.

The following are the issues to be addressed with reference to technical and natural failures:

Reason	Prevention	Action required to be taken
Socketing failure	Proper material used, design of socket and periodic inspection	Maintenance guidelines to be followed regularly
Splicing failure	Periodic inspection	Training manpower, tools and tackles
Fall / slippage of cabin (Grip failure, Hanger failure, failure of joints, overloading)	Components to be replaced as per life cycles	Replacement at proper time intervals to be done
Cabin door opening (collisions, jerking, component failure)	Simple precaution like locking before leaving, cabin follow rules	Seat fasteners for seats to prevent falling of passengers
Mount assembly parts failure, tower failure (rusting, over-usage, deterioration, natural calamity)	Continuous monitoring, life cycle of components to be ascertained	Life cycle monitoring
to check for fatigue or corrosion of the anchor bolts on a sample tower	whether a continuous uphill load imposed by the subtended angle of the haul rope on any vertical tower might lead to excessive fluctuating loads on the anchor bolts;	Prevent water retention and resultant corrosion
Hitting of cabin (Improper demarcation of area, improper passenger management)	Proper signage, proper demarcation and cordoning of cabin, training of operators	Training of operators, proper maintenance
Electrocution (Lighting)	Proper rope earthing	Periodic monitoring
Entanglement of cabin (High wind, breakage of catenary wire)	Install and monitor Wind speed,	Periodic inspection of catenary wire, monitoring condition of wires
Natural causes like earthquakes, landslides, wind storm, hailstorm, flood, jungle fire	Earthquake resistant constructions, proper retention of landslide prone areas, early warning systems	Early warning systems

Safety Issues

Activities associated with aerial ropeway construction and operations also give rise to associated hazards and accidents. It is therefore desirable that based on the categories of hazards prevailing at the project site, risk assessment may be carried out by specialists in the field and recommendations may be implemented.

Risk assessment should be carried out for seismicity, slope stability, soil erodibility, and flood hazard (depending on the site). Disaster Management Plan must include emergency planning, emergency procedures, and details on safety measures adopted for the ropeway.

Maintenance of the ropeway for all structural, mechanical, and electrical components has to be done regularly and kept in a state of good repair. A systematic maintenance needs to be followed. Procedures for maintenance and specific frequencies for periodic lubrication, inspection and adjustment are to be clearly mentioned (Annexure 9).

The ropeway designer, wire rope or strand manufacturer should mention the frequency and methods for maintenance or inspections of wire rope or strand in the specification.

These may include, but not be limited to, the following:

a) conveyor belting;
b) drums and rollers;
c) conveyor belt tensioning system;
d) braking systems;
e) electrical control systems;
f) communications systems;
g) structures.

Maintenance Personnel

Conveyors need to be maintained by trained and competent personnel, and the owner shall be responsible for the supervision and training of such personnel, and such training shall be documented. All personnel need to practice good housekeeping, with particular emphasis on avoiding the development of any condition that might contribute to personal injury. Personnel must also comply with the operational rules and safety regulations of the specific conveyor.

Each conveyor shall be inspected annually, or certain specified hours of operation, whichever comes first, by a conveyor specialist independent of the owner. The inspection need to verify preservation of the original design integrity and cover the requirements of this standard for maintenance, operation, required self-inspections, and record keeping. Items found either deficient or in noncompliance need to be noted and action taken by the competent authority .

Operational log needs to be maintained for each conveyor. Daily entries should be made giving the following minimum information:

a) date;
b) names and work position of operating personnel;
c) operating hours and purpose of operations;

d) temperature, wind, and weather conditions;
e) record of compliance with daily operational inspection including signs, loading and unloading zones;
f) accidents, malfunctions, or abnormal occurrences during operation;
g) signature of the operator.

Maintenance log should be maintained wherein the actual execution of maintenance work shall be recorded. The log will state the components serviced, and the condition of the components. A record shall be kept of replacement of components.

Rescue of Passengers Along the Line

When designing an installation, suitable means for rescue should be provided (ladders, capstan, etc.) to facilitate the rescue of passengers who might remain trapped along the line on account of unforeseen stopping of the installation in a reasonably short time.

The chosen rescue equipment should be such that the rescue operation can be carried out in a same manner even at the most critical points of the route i.e. over water spread, rugged terrain, high elevation above the ground etc.

The areas exposed to the dangers of natural forces (landslides, rock falls, storms, earthquakes etc.) should be avoided as far as possible. In areas were wind speed are unpredictable proper precautions are to be taken. Under normal conditions, the following equation has to be considered for wind pressure:

For empty vehicles: $p=120kgf/m^2$
For passenger vehicles: $p=30kgf/m^2$.

The maximum speed of the vehicle needs to be determined based on the safety of travel. The maximum speeds for the various types of vehicles are given below: any deviation from these norms has to be agreed upon by the inspecting authority:

Type of cable:		
Continuous to and for movement bicable ropeways for passengers (IS5230:2003 reaffirmed 2008)	Attended cabins:	10m/s in long spans and 7.5 m/s over trestles
	Unattended cabins: 4 m/s over trestles	6m/s in long spans and
Continuous movement of monocable with automatic grips (IS 5229:1998)	Systems with closed gondolas having locked doors	6m/s
	Chairlift and system with open gondolas with adequate protection	5m/s
	Others	3 m/s
Continuous movement of monocable with fixed grips (IS 5228:2003 reaffirmed 2008)	Vehicle in station	<1.5m/s
	Along the line	<=3 m/s
	Minimum time spacing / seconds between passing of two vehicles	J= 4v fir single seat vehicles and j=7v for two seat vehicles, where v is the maximum speed in meters per second adopted for installation

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In areas subjected to storms and where the wind velocity exceeds frequently 150km/h, it is necessary to assume the pressure of the wind as the maximum value ascertained in the areas under consideration.

It is the responsibility of the operator to see if the following conditions are met:

(i) tightness of the structural connections
(ii) lubrication of all moving parts
(iii) alignment and clearances of all open gearing
(iv) installations and alignment of all drive components
(v) haul rope alignment at entrance to bull wheels
(vi) minimum clearances for carriers, track cables, and haul rope sags under the most adverse static loadings,
(vii) actual testing of evacuation equipment and procedures at the most difficult location.

The wire rope specifications should be given and include the following:

1. nominal diameter;
2. number and arrangement of wires;
3. strength grade;
4. type of core;

5. lay of wire rope;
6. minimum breaking force;
7. type of lubrication.

The strength of the wire rope upon which the designer shall base the ropeway calculations including design factor of safety will not be more than the minimum breaking force.

The nominal breaking strength of the wire rope at the time of putting into service should not be less than five times the maximum axial tension met with in service calculated for the most unfavourable conditions which may occur by the combination of the following factors: (IS 10891 part1)

a. counter weight
b. components of the ropeway and that of the loaded vehicles considered conventionally as uniformly distributed along the rope,
c. the frictional resistance in the tensioning device,
d. resistance to motion exerted by the line rollers
e. adequate amount of tension to limit the sag in the wire rope caused by its self weight and load supported by it.

The specification for track strand should include the following:

a) nominal diameter and tolerances;
b) number, type/profile, and arrangement of wires;
c) minimum values for tensile strength, torsion and ductility for wires;
d) lay length (outside wires) of track strand;
e) minimum breaking force;
f) type of lubrication.

Similarly the strength of track strand on which the designer should base all calculations should not be more than the minimum breaking force shown on the specification. The aggregate tensile strength for individual wires should not be exceeded when calculating the minimum breaking force of the track strand:

Generally a rope should be withdrawn from service when it is considered that:

a) The loss of strength in the rope due to wear or corrosion or both is approaching one sixth of the original strength;
b) The loss of strength in the rope due to fatigue, surface embrittlement or cracked and broken wires of any kind is approaching one-tenth of the original strength;
c) The outer wires have lost about one-third of their depth as result of any kind of deterioration;

d) The outer wires are becoming loose and displaced for any reason;

e) The rope has become kinked, distorted or damaged and the damaged piece cannot be removed; and

f) Examination of the rope leaves any doubt as to its safety for any reason whatsoever.

Carrier testing is to be performed to confirm design calculations. Carrier tests will simulate as a minimum the maximum design for carrier loads including restraining bars, foot rests, bubbles, etc. Carrier tests will help verify the carriers' ability to support a vertical load during the testing by arranging loads to simulate individual passenger positions. The details of the methods of testing are given in Annexure 10.

In designing trestles the following loads need to be considered:

a. The weight of the trestle and the whole pressure exerted by the ropes

b. The whole of the stresses due to friction which occurs during the motion of the carrying hauling rope. These stresses can be determined with a sufficient margin of safety as 2.5% of the load on the rollers

c. Weight of vehicles traveling with maximum load and

d. Load due to wind

7.5 Natural Resource Conservation

- Water conservation measures should be addressed.
- Reforestation / Re-plantation measures to be undertaken
- Top soil conservation measures to be addressed

7.6 R&R Action Plan

Detailed R&R plan with data on the existing socio-economic status of the population in the study area and broad plan for the 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 R&R Plan. Details of provisions (capital & recurring) for the project specific R&R Plan

Specific studies requirement depending on the site and activity proposed should be discussed.

National Policy on Resettlement and Rehabilitation for project affected families-2003 (published in the gazette of India, extraordinary part-i, section 1, no- 46, dated 17th February, 2004)gives the details of the national R&R policy.

8

PROJECT BENEFITS

General 8.0

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

- Improvements in the physical infrastructure by way addition of project infrastructure,
- Improvements in the social infrastructure
- Employment potential - skilled; semi-skilled and unskilled labour both during construction and operational phases of the project with specific attention to employment potential of the local population
- Tourism will be encouraged

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ENVIRONMENTAL COST BENEFIT ANALYSIS

9.0 General

If recommended by the State Expert Appraisal Committee, this chapter should include the environmental cost benefit analysis of the project.

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10

ENVIRONMENTAL 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:

- Summary of potential impact & recommended mitigation measures. Allocation of resources and responsibilities for plan implementation
- 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

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 is to be carried out periodically. It is necessary to establish a multidisciplinary internal environmental audit team for compliance review.

The report should provide details of maintenance of equipment with respect to

- air pollution
- noise pollution
- safety of the transport along the ropeway

10.3 Management Issues with Reference to Safety of Passengers Using the Ropeway

People riding chair lifts and aerial ropeways are subject to a degree of risk in the event of a malfunction or failure of a critical component. Accordingly, their is a need to take all practicable steps to ensure the equipment is maintained in good working order; a methodical approach to inspection and maintenance of chair lifts and aerial ropeways over the life of the plant must be in place.

The maintenance program requirements must be identified during the hazard identification, risk assessment and risk control process as required by the Occupational Health and Safety (Plant) Regulations. These requirements should address any information provided by the designer or manufacturer and also incorporate requirements that may be unique to the particular chairlift or aerial ropeway.

The maintenance program must include systems to identify potential safety issues so that necessary corrective action can be taken before the failure of a component.

The comprehensive maintenance program developed should be properly documented and implemented which includes relevant daily, weekly, monthly and annual or seasonal maintenance activities. Procedures for addressing all components subject to load, wear, corrosion or fatigue must be included:

- the types of lubricants required and frequency of application;
- the types of non-destructive testing required and frequency of testing;
- destructive testing and frequency of testing;
- the definitions and measurements to determine excessive wear and replacement criteria;
- the recommended frequency of service to specific parts and details of the service required;

Regular inspections must address:

- fire safety
- noise
- ride access by passengers, maintenance and operational staff;
- safety during the ride;
- fundamental mechanical and electrical safety;

The types of inspection activities must include the following:

- commissioning inspection including load test runs;
- pre-season inspection;
- daily and periodic maintenance inspections;
- annual inspection;
- periodic major inspection of critical components;

Procedures must be regularly recorded and maintained for:

- daily start-up, running and shut-down;
- daily and periodic maintenance; and
- environmental conditions

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11

SUMMARY AND CONCLUSION

11.0 General

It should be a summary of the full EIA report condensed to 10 A-4 size pages at the maximum. It should necessarily cover in brief the following chapters of the full EIA report: -

1. Introduction
2. Project description
3. Analysis of alternative
4. Description of the environment
5. Anticipated impact and mitigation measures
6. Environmental monitoring program
7. Additional studies
8. Project benefits
9. Environmental cost benefit analysis
10. Environmental management plan
11. Summary and conclusion
12. Disclosure of the consultant engaged

DISCLOSURE OF CONSULTANT 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 shall include the copy of the accreditation certificate and data provided by the other organizations/ laboratories including their status of approvals etc.

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GLOSSARY

actual (measured) breaking force: breaking force obtained to part a wire rope or strand during the breaking test.

aerial lift: Ropeways on which passengers are transported in cabins or on chairs and that circulate in one direction between terminals without reversing the travel path.

aerial tramway: Ropeways on which passengers are transported in cable-supported carriers and are not in contact with the ground or snow surface, and in which the carrier(s) reciprocate between terminals. Also called a reversible.

auxiliary power unit (APU): Generic term to generally describe a gas or diesel engine generally used as a backup to the prime mover. It can be designated as a prime mover or evacuation power unit depending upon use and configuration. On aerial tramways an APU can power the rescue drive.

bicable system: A system that uses track cable(s) to support the carriers and separate haul rope(s) to control motion of the carriers

carrier: The structural and mechanical assemblage in or on which the passenger(s) of a ropeway system are transported. Unless qualified, the carrier includes, for example, the carriage or grip, hanger, and cabin or chair.

conveyor: An outdoor transportation system wherein passengers are transported uphill on a flexible moving element (conveyor belt).

deropement: The term used when a rope or cable leaves its operating position relative to the groove of a sheave, carriage wheel, or saddle.

design capacity: The number of passengers per hour (pph) established by the designer as the current ultimate operating capability of the facility in the direction specified.

detachable grip lift: A ropeway system on which carriers circulate around the system alternately attaching to and detaching from a moving haul rope(s). The ropeway system may be monocable or bicable.

factor of safety (wire rope): The ratio of the nominal breaking strength of the rope and the maximum static design tension of the rope.

fixed grip lift: Ropeway system on which carriers remain attached to a haul rope. The ropeway system may be either continuous or intermittently circulating, and either monocable or bicable.

gondola: Name used to describe an aerial lift using cabins; - A cabin used on an aerial lift.

hanger: Structural element connecting a cabin, chair, or other passenger-carrying device to the track cable carriage or haul rope grip.

haul rope: A wire rope used on a ropeway that provides motion to carrier(s) and is powered by the drive sheave.

line: indicates the path of a wire rope on the up-going or return side of a ropeway

monocable system: A system that uses a single haul rope to both support and control motion of the carriers.

sheaves: Pulleys or wheels grooved for rope.

stop gate: A type of automatic stopping device that, when actuated by a passenger's weight, contact, or passage, will automatically stop the tramway.

surface lift: Ropeways on which passengers are propelled by means of a circulating overhead wire rope while remaining in contact with the ground or snow surface. Connection between the passengers and the wire rope is by means of a device attached to, and circulating with, the haul rope, known as a "towing device."

towing device: A carrier, fixed or detachable, used on surface lifts and tows to pull passengers. Classification or description is by the device configuration and action of the extension element (i.e., handle, button, J-bar, T-bar, platter, etc.).

tow path: The path along which a passenger is towed on a surface lift or tow from the load point to a point beyond the stop gate equal to 150% of the distance required to stop the empty surface lift or tow operating at full speed.

TABLES

Table No. 4.1 Description of Soil Sampling Locations

Station	Location	Distance & Direction from project area	Project area/ study area	Environmental setting

Table No. 4.2 Analysis of Soil Samples

Station No	Parameters	Unit	Result			Standards
			SS1	SS2	SS3	
1.						
2.						
3.						

Table No. 4.3 Description of Ground Water Sampling Locations

Station	Location	Distance & Direction from project area	Project area/ study area	Environmental setting

Table No. 4.4 Analysis of Ground Water

Station No	Parameters	Unit	Result			Standards
			GW1	GW2	GW3	
1.						
2.						
3.						

Table No. 4.5 Description of Surface Water Sampling Locations

Station	Location	Distance & Direction from project area	Project area/ study area	Environmental setting
SW				

Table No. 4.6 Analysis of Surface Water

Station No	Parameters	Unit	Result			Standards
			SW1	SW2	SW3	
1.						
2.						
3.						

Table No. 4.7 Description of Ambient Air Quality Monitoring Stations

Station	Location	Distance & Direction from project area	Project area/ study area	Environmental setting

Table No. 4.8 Analysis of Ambient Air Quality

Parameter	PM_{10}				$PM_{2.5}$				NO_x				SO_2				CO			
Monitoring Station & Category*	No. of samples	Maximum	Minimum	Mean	No. of samples	Maximum	Minimum	Mean	No. of samples	Maximum	Minimum	Mean	No. of samples	Maximum	Minimum	Mean	No. of samples	Maximum	Minimum	Mean

Table No. 4.9 Description of Noise Monitoring Stations

S. No	Locations	Environ-mental setting*	Average Day noise level (dBA)	Average Night noise level	Day time (6.00 A.M. to 10.00 P.M)	Day time (10.00 P.M. to to 6.00 A.M)	
					Standard (L_{eq} in dBA)	Standard (L_{eq} in dBA)	

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

Table No. 4.10 Demographic Profile

Particulars	With in the project site	With in 1 km from the project boundary
Population		
No. of villages		
Number of households village-wise		

ANNEXURES

Annexure 1

Terms of Reference (TOR) for Aerial Ropeways

Objective

Terms of Reference (TOR) for preparation of Environmental Impact Assessment (EIA) for aerial ropeways 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 aerial ropeway projects is expected to cover all environment related features.

General Information

Aerial ropeway development may have a wide range of impacts on the environment through activities like construction work, dredging, reclamation, landfills, excavation and other related activities. Aerial ropeway development and operation should therefore be planned with careful consideration of their environmental impact. The preparation of EIA report and implementation of EMP is essential for effectively managing these adverse effects.

The aerial ropeway projects as per the EIA notification of 2006 fall under Category 'B' and under Category A if located above 1000mts altitude or in ecologically sensitive areas.

Project Activity		Category With Threshold Limit		General Conditions (GC) Apply*
		A	B	
7(g)	Aerial Ropeways	All projects located at altitude of 1000 mts and above All projects located in notified ecological sensitive areas	All projects except covered in column 3	

* "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 (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

The report should incorporate the page numbers of various chapters, sections and sub-sections, tables, appendices, drawings and figures etc., with titles should 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-name, nature, size, location of the project, its importance
- Land description-plot/survey numbers/village, tehsil, district, state & content of the land Right of Way (ROW) details & alignment.
- Profile of the project proponent, name and contact address with email.
- Whether the project attracts the provisions of general condition of the EIA notification 2006. If so, applicability should be discussed.
- Whether the project attracts the provisions of CRZ notification. If so, applicability should be discussed.
- The proponent should confirm that the project meets the central/state/local environmental regulations and standards applicable for the project.
- Any litigation pending against the proposed project and/or any direction/order passes by any court of law against the project, if so, details thereof should be provided
- In case of expansion/modernization of the project, the environmental compliance status for the existing project should be explained.

2.0 Project Description

This chapter should cover the broader details of the basic activities, location, and layout and implementation schedule of the project.

- Type of the project-new, expansion, modernization.
- Need for the project.
- Relevance of the project in the light of the existing development plans of the region.
- Project coverage, master plan. Length of the proposed aerial rope way. Details of ROW. Height from MSL. Designed peak capacity of population.
- Description of the project site, geology, topography, transport and connectivity, demographic aspects, socio-cultural and economic aspects, villages, settlements.
- Technologies involved for design, construction, equipment and operation.
- Use of existing public infrastructure - road, railway and networks, water supply, electric power etc.
- Details of the land acquisition, rehabilitation of communities/villages present status of such activities.
- Resources, manpower and time frame etc - required for the project implementation

Essential Maps to be provided with Application

- Alignment map clearly demarcating location of structures and ROW of the proposed project
- A map of the project area and 10 km area from boundary of the proposed / existing project area, delineating project areas notified under the wild life (Protection) Act, 1972/critically polluted areas as identified by the CPCB from time to time /notified eco-sensitive areas/inter state boundaries and international boundaries
- A map covering aerial distance of a 15 km from the proposed project boundary delineating environmental sensitive areas as specified in column no 9(iii), Form I of EIA notification dated 14th Sept 2006
- Landuse map of the study area to 1:25,000 scale based on recent satellite imagery of the project area and 10 km from the proposed project boundary delineating the cropping pattern, wastelands, forest area and built up areas, water bodies, human habitation and other specific features such as railway tracks, ports, airports, roads, major industries etc.
- Area drainage contour map of the project area and 500meters from the proposed project area should be clearly indicated. In case of any proposed diversion of nallah/ canal/ river, should also be shown in the map.
- Detailed ground surveyed map in 1:5000 scale showing the existing features falling within the right of way namely trees, structures including archaeological and religious, monuments wild life corridors etc

3.0 Analysis of Alternatives (Technology and Site)

Incase, the scoping exercise results in need for alternatives this chapter should cover:

- Description of various alternatives like locations or alignments
- Description of each alternative
- Summary of adverse / positive impact of each alternative
- Selection of alternative

4.0 Description of the Environment

Environmental data to be considered in relation to aerial ropeway development include (a) land, (b) air, (c) noise, (d) water, (e) biological, (f) socio-economic and health environment and (g) solid waste.

Study Area:

Primary data by measurements, field surveys and secondary data from secondary sources are to be collected in the study area within 500meters from the project boundary. Beyond 500 meters and upto 15 kms, only secondary data is to be collected. Primary data should cover one season other than monsoon and secondary data for one full year.

Map of the study area clearly delineating the location of various monitoring stations (air, noise, water and soil) superimposed with location of habitats are to be shown. Monitoring should be done as per CPCB guidelines.

4.1 Land Environment

Data on the land availability is to be ascertained from local authorities, revenue records etc. justification for the proposed quantum of the area is to be given. Baseline data to be given on description of existing situation of the land at the proposed project area including description of terrain, hill slopes, inland topography, slope and elevation. Study of land use pattern, habitation cropping pattern, forest cover, environmentally sensitive places etc, by employing remote sensing techniques and also through secondary data sources.

Baseline data to be provided on rock types, regional tectonic setting (reported fractures/faulting/folding, warping), and history of any volcanic activity, seismicity and associated hazards.

Soil data including type, classification, characteristics, soil properties etc., are important from engineering considerations for design of structures, porosity and permeability, sub soil permeability, etc.

4.2 Air Environment

- Climate and meteorology (max and min temperatures, relative humidity, rainfall, barometric pressure, and history of cyclones and snowfall); the nearest IMD meteorological station from which climatological data (10 years) have been obtained to be indicated
- Wind rose (wind direction and speed, 24 hourly data)
- One season data is to be monitored other than monsoon as per the CPCB norms. Sampling locations are to be located as per CPCB norms.
- Baseline monitoring of ambient air parameters namely PM10, PM2.5, Sox, NOx, CO and other parameters should be monitored.

4.3 Noise Environment

Baseline data on noise pollution at the project area and the neighborhood up to 500 meters and environmentally sensitive receptors should be monitored as per the CPCB norms.

4.4 Water Environment

Water quality from all sources such as groundwater, municipal water, surface water need to meet the water quality norms prescribed for drinking water. Baseline data of ground water including data of pH, dissolved solids, suspended solids, BOD should be collected for one season. Usage purpose of ground water, if any, is to be indicated.

Baseline data on location of surface water like water bodies, lakes, present quality and their utility to be provided. Details of the water bodies in the project area should be described specifically. Water quality is to be monitored for one season.

4.5 Biological Environment

Details of secondary data on the existing flora and fauna in the study area, carried out by institution under the relevant discipline (such as BSI, ZSI, WII, etc) should be included in the list of flora and fauna along with the classification as per Schedule given in the Wild Life Protection Act, 1972 (for fauna) and in the Red Book Data (flora) 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 Baseline status of flora and fauna includes the following: -

- General Type and dominant species
- Densities and distribution
- Habitat value
- Historically important specimen
- Introduced species
- Rare and endangered species (location, distribution and conditions)
- Timber Value
- Commercially valued species

4.6 Socio Economic and Health environment

Baseline data at the project area should include the demography, telecommunications, archaeological sites, particularly on settlements, health status of the communities, existing infrastructure facilities of the proposed area and area of impact due to the proposed activity. Present employment and livelihood of these populations, awareness of the population about the proposed activity should also be included.

4.7 Solid Waste

Details of authorized municipal solid waste facilities, in the area should be inventorized, in case if it is proposed to utilize the same.

5.0 Anticipated Impact and Mitigation Measures

This chapter should describe the likely impact of the project on each of the environmental parameters, methods adopted for assessing the impact such as model studies, empirical methods, reference to existing similar situations, reference to previous studies, details of mitigation measure proposed to reduce adverse affects of the project, best environmental practices and conservation of natural resources. The identification of specific impact followed with mitigation measures should be done for different stages.

5.1 Land Environment

Anticipated Impact:

Some of the anticipated impact, which need to be addressed, are

- Estimation of anticipated impact on the surrounding land use pattern, on infrastructure like housing, ground water, surface water, road network, environmentally sensitive places etc,
- Impact on public utilities arising out of the utilities for the project activities
- Study of the problem of land slides and assessment of soil erosion potential and the impact
- Impact of project construction / operation on the landslides, surface drainage etc., are to be estimated.

Mitigation Measures

Proper mitigation measures have to be suggested.

- Improvement of road network infrastructure to handle the increase in traffic & truck parking arrangements
- Selection of suitable local plant species for greenbelt development

5.2 Air Environment

Anticipated Impact:

Anticipated impact during construction stage and operation stage should be predicted. The immediate surroundings may have a greater impact. The existing surrounding features up to 1 km and impact on them should be addressed separately. It is necessary to predict point source emissions and study air emissions from the vehicular traffic.

Mitigation Measures:

Mitigative measures are to be proposed during the construction stage as well as the operational stage of the project. Some measures include: -

- Mitigative measures to lower the emissions during loading, un-loading, transportation and storage of construction materials

5.3 Noise Environment

Anticipated Impact:

- Impact of vibrations on the surrounding environment including damage to materials/ structures
- Noise due to demolition / construction activities

- Impact due to noise levels generated by existing and proposed activities in relation to human environment and wildlife including avi-fauna
- Impact due to present and future transportation activities by road
- Impact of noise levels on auditory function, i.e. hearing activity
- Operation of DG sets

Mitigation Measures:

Identification and adoption of mitigating measures for noise abatement including noise barriers for point sources and line sources and also measures to minimize effect of vibrations due to demolition and while new construction.

5.4 Water Environment

Anticipated Impact:

- Impact on water resources due to shifting of surface watercourses, if any
- Impact of water withdrawal on surface water / ground water resources-
- Waste water generation

Mitigation Measures:

- Rainwater harvesting to maintain the water level
- Water conservation in landscape
- STP for collection, treatment and disposal of sewage

5.5 Biological Environment

Anticipated Impact:

- Loss of forest cover
- Habitat fragmentation and blocking of migratory corridors due to project activities
- Loss of plants of economic importance.
- Impact on the free movement of animals

Mitigation Measures:

- Mitigating measures to compensate the loss of forest cover by replantation
- Restoration / Regeneration of rare plants of economic importance including medicinal plants species
- Efforts should be taken to bypass the reserved forest and other ecological sensitive area, so as to cause no disturbance to the ecology of the area
- Measures for safe passage of animals

5.6 Socio-Economic and Health

Anticipated Impact:

- Details of public and private land in the proposed and immediate surroundings, socio-economic status of the of the affected owners of the private lands should be properly compiled
- Impact of the project on socio cultural aspects should be assessed
- Impact on any historical sites if present in the area should be reported.
- Impact on local infrastructure i.e. on connecting loads, parking areas, water supply, sanitation, garbage disposal etc especially during peak tourism days

Mitigation Measures:

- Mitigating measures should take into account the needs of the people based on primary data as obtained through need assessment survey/study.
- In plantation work, local species especially fruit bearing trees/orchads based on primary survey should be planted by involving local people
- Local people especially the woman and women self help group should be involved in selecting alternative location to be made available to the affected people if applicable.

5.7 Solid Waste

Anticipated Impact:

Impact due to non-hazardous generated during the construction and operational stages should be assessed.

Mitigation Measures:

Mitigation measures to comply the norms should be planned. Options for minimization of solid waste and environmentally compactable / recycling of waste to conserve natural resources should be planned. Management and disposal of temporary structures, made during construction phase should be planned.

6.0 Environmental Monitoring Program

This chapter should include details of environmental monitoring program. It should include the technical aspects of monitoring the effectiveness of mitigation measures (including measurement methodologies, data analysis, reporting schedules, emergency procedures, detailed budget and procurement schedules).

- Summary matrix of environmental monitoring, during construction and operation stage
- Requirement of monitoring facilities

- Frequency, location, parameters of monitoring
- Compilation and analysis of data, comparison with baseline data and
- Plantation monitoring program

7.0 Additional Studies

7.1 Public Consultation

Public hearing with the issues raised by the public and the response of the project proponent in tabular form should be discussed.

7.2 Risk Assessment and Disaster Management Plan

Activities associated with aerial ropeway construction and operations also give rise to associated hazards and accidents. It is therefore desirable that based on the categories of hazards prevailing at the project site, risk assessment may be carried out by specialists in the field and recommendations may be implemented.

Risk assessment should be carried out for seismicity, slope stability, soil erodibility, and flood hazard.

Disaster Management Plan must include emergency planning, emergency procedures, and details on safety measures adopted for the ropeway.

7.3 Natural Resource Conservation and Optimization

Water conservation measures should be addressed. Energy efficiency measures in the activity are to be drawn up.

7.4 R&R Action Plan

Detailed R&R plan with data on the existing socio-economic status of the population in the study area and broad plan for the 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 R&R Plan. Details of provisions (capital & recurring) for the project specific R&R Plan

Specific studies requirement depending on the site and activity proposed should be discussed

8.0 Project Benefits

This chapter should include benefits accruing to the locality, neighbourhood, region and nation as a whole. It should bring out details of benefits by way of:

- Improvements in the physical infrastructure by way addition of project infrastructure,
- Improvements in the social infrastructure like roads, railways, housing, water supply, electrical power, drainage, improved environmental conditions, etc.

- Employment potential - skilled; semi-skilled and unskilled labour both during construction and operational phases of the project with specific attention to employment potential of the local population as well as necessity for imparting any specialized skills to them to be eligible for such employment in the project on a long term basis i.e., during operational and maintenance stages of the project and
- Other tangible benefits like improved standards of living, health, education etc.

9.0 Environmental Cost Benefit Analysis

If recommended by the State Expert Appraisal Committee, this chapter should include the environmental cost benefit analysis of the project.

10.0 Environmental Management Plan (EMP)

- Summary of potential impact & recommended mitigation measures
- Allocation of resources and responsibilities for plan implementation
- 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 / filed conditions made in the EIA Environmental specifications for contractors should cover the required safeguards during the design and construction stage

11.0 Summary and Conclusion (Summary EIA)

It should be a summary of the full EIA report condensed to 10 A-4 size pages at the maximum. It should necessarily cover in brief the following chapters of the full EIA report: -

Introduction/ Project description /Analysis of alternative / Description of the environment / Anticipated environmental impact and mitigation measures / Environmental monitoring program /Additional studies / Project benefits / Environmental cost benefit analysis / Environmental management plan / Summary and conclusion / Disclosure of the consultant engaged

12.0 Disclosure of Consultants Engaged

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

Annexure - 2

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 (i) kharif (ii) rabi (iii) double cropped	2.1.1. Irrigated crop land 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 plantatin 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 & desertic)	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 - 3

Sampling, Frequency & Method of Baseline Environment Monitoring

Attributes	Sampling		Measurement Method	Remarks
A. Air Environment	Network	Frequency		
Meteorological ▸ Wind speed ▸ Wind direction ▸ Maximum temperature ▸ Minimum temperature ▸ Relative humidity ▸ Rainfall ▸ Solar radiation ▸ Cloud cover ▸ Environmental Lapse Rate	1 site in the project area	1 hourly continuous	Mechanical/automatic weather station Max / Min Thermometer Hygrometer Rain gauge As per IMD specifications As per IMD specifications Mini Sonde/SODAR	IS 5182 Part 1-20 Site specific primary data is essential Secondary data from IMD CPCB guidelines
Pollutants ▸ SPM	Nos. of sampling location to be decided	24 hourly twice a week	As per CPCB guidelines	Monitoring Network ▸ Minimum one locations in upwind side, two sites in ownwind side / impact zone
▸ RSPM		@4 hourly Twice a week, One non monsoon season		▸ All the sensitive receptors need to be covered for core zone and buffer zone
▸ SO_2		8 hourly, twice a week		
▸ NOx				

Attributes	Sampling		Measurement Method	Remarks
B. Noise	Network	Frequency		
▸ Hourly equivalent noise levels	Identified study area	Once in season	Noise level meter	IS:4954-1968 as adopted by CPCB
C. Water				
Parameters for water quality ▸ pH, temperature, turbidity, magnesium hardness, total alkalinity, chloride, sulphate, nitrate, fluoride, sodium, potassium, salinity ▸ Total nitrogen, total phosphorus, DO, BOD, COD ▸ Heavy metals ▸ Total coliforms, faecal coliforms ▸ Phyto plankton	▸ Set of grab samples for ground and surface water		Samples for water quality should be collected and analysed as per : ▸ IS : 2488 (Part 1-5) methods for sampling and testing of Industrial effluents ▸ Standard methods for examination of water and waste water analysis published by American Public Health Association.	
D. Land environment				
Soil ▸ Organic Matter ▸ Texture ▸ pH ▸ Electrical conductivity ▸ Permeability ▸ Water holding capacity ▸ Porosity	Sample from villages (soil samples be collected as per BIS specifica-tions)	One season	Collected and analysed as per soil analysis reference	Analysis be done as per BIS specifications

Adopted from: EIA manual 2001, Ministry of Environment and forests, New Delhi

Annexure - 4

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, µm/hos/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 methamoplobinemea
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 cancer	Cause hyperkeratosis & skin
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 arsenic	Toxic symptoms similar to
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 carcinogenic	Trend to bioaccumulates &

(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 OrganismMPN/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 20°C 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 20°C 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 20°C 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	E	1. pH between 6.0 to 8.5 2. Electrical Conductivity at 25oC micro mhos/cm Max.2250 disposal 3. Sodium absorption Ratio Max. 26 4. Boron Max. 2mg/l

Annexure - 5

National Ambient Air Quality Standards

S. 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/m³	Annual* 24 hours**	50 80	20 80	-Improved West & Gaeke -Ultraviolet fluorescence
2	Nitrogen Dioxide (NO_2), µg/m³	Annual* 24 hours**	40 80	30 80	-Modified Jacob & Hochheiser (Na-Arsenite) -Chemiluminescence
3	Particulate Matter (Size less than 10µm) or PM_{10}µg/m³	Annual* 24 hours**	60 100	60 100	- Gravimetric - TOEM - Beta attenuation
4	Particulate Matter (Size less than 2.5µm) or $PM_{2.5}$µg/m³	Annual* 24 hours**	40 60	40 60	- Gravimetric - TOEM - Beta attenuation
5	Ozone (O_3) µg/m³	8 hours** 1 hour**	100 180	100 180	- UV photometric - Chemiluminescence - Chemical method
6	Lead (Pb) µg/m³	Annual* 24 hours**	0.50 1.0	0.50 1.0	-AAS/ICP method after sampling on EPM 2000 or equivalent filter paper -ED-XRF using Teflon filter
7	Carbon Monoxide (CO) mg/ m³	8 hours** 1 hour**	02 04	02 04	-Non Dispersive Infra Red (NDIR) spectroscopy
8	Ammonia (NH_3) µg/m³	Annual* 24 hours**	100 400	100 400	- Chemiluminescence - Indophenol blue method
9	Benzene (C_6H_6) µg/m³	Annual*	05	05	-Gas chromatography based continuous analyzer -Adsorption and Desorption followed by GC analysis

10	Benzo(a)Pyrene (BaP) – particulate phase only, ng/m^3	Annual*	01	01	-Solvent extraction followed by HPLC/GC analysis
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 - 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
List of Critically Polluted Industrial Cluster/Area Identified by CPCB

S. No.	Critically Polluted Industrial Area and CEPI	Industrial Clusters/Potential Impact Zones
1	Ankleshwar (Gujarat) *CEPI-88.50* (*Ac_Wc_Lc*)	GIDC Ankleshwar and GIDC, Panoli
2	Vapi (Gujarat) *CEPI-88.09 (Ac_Wc_Lc)*	GIDC Vapi
3	Ghaziabad (Uttar Pardesh) *CEPI-87.37* (*Ac_Wc_Lc*)	**Sub-cluster A** • Mohan nagar Industrial area • Rajinder nagar Industrial area • Sahibabad Industrial area **Sub-cluster B** • Pandav nagar Industrial area • Kavi nagar Industrial area • Bulandshahar Road Industrial area • Amrit nagar • Aryanagar Industrial area **Sub-cluster C** • Merrut road Industrial area **Sub-cluster D** • Loni Industrial area • Loni Road Industrial area • Roop Nagar Industrial area **Sub-cluster E** • Hapur Road Industrial area • Dasna • Phikua **Sub-cluster F** (other scattered Industrial areas) • South side of GT road • Kavi Nagar • Tronica city • Anand Nagar • Jindal Nagar • Prakash Nagar • Rural Industrial estate
4	Chandrapur (Maharashtra) *CEPI-83.88* (*Ac_Wc_Lc*)	Chandrapur (MIDC Chandrapur, Tadali, Ghuggus, Ballapur)
5	Korba (Chhatisgarh) *CEPI-83.00* (*Ac_Ws_Lc*)	a) Industrial areas and their townships of NTPC, BALCO, CSEB (East) & CSEB (West) b) Korba town
6	Bhiwadi (Rajassthan) *CEPI-82.91* (*Ac_Wc_Ls*)	a) RIICO Industrial areas Phase I to IV b) Bhiwadi town c) Other surrounding industrial areas: Chopanki, Rampura Mundana, Khuskhera Phase I to III.
7	Angul Talcher (Orissa) *CEPI-82.09* (*Ac_Wc_Lc*)	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) *CEPI-81.79 (Ac_Wc_Lc)*	Ranipet, SIPCOST Industrial Complex
9	Singurauli (Uttar Pradesh) *CEPI-81.73* (*Ac_Wc_Ls*)	Sonebhadra (UP) • Dala-Tola • Obra • Renukoot • Anpara • Renusagar • Kakri • Dudhichuwa • Bina • Khadia • Shakti Nagar • Rihand Nagar • Bijpur Sigrauli (Madhya Pradesh) Vindhyachal Nagar and Jayant, Nigahi, Dudhichua, Amlohri & Jhingurdah townships

S. No.	Critically Polluted Industrial Area and CEPI	Industrial Clusters/Potential Impact Zones
10	Ludhiana (Punjab) *CEPI-81.66* (*Ac_Wc_Ls*)	Ludhiana Muncipal limits covering industrial clusters: • 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 Industrail 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 • Mixes 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 : • Noida Phase - 1 • Noida Phase - 2 • Noida Phase – 3 • Surajpur Industrial Area • Greater Noida Industsrial Area • Village-Chhaparaula
13	Dhanbad (Jharkhand) *CEPI-78.63* (*Ac_Ws_Lc*)	Four blocks of Dhanbad district: • Sadar (Dhanbad Municipality) • Jharia (Jharia Municipality, Sindri Industrial Area) • Govindpur (Govindpur Industrial Estate) • Nirsa
14	Dombivalli (Maharashtra) *CEPI-78.41*(*Ac_Wc_Ls*)	MIDC Phase-I, Phase-II
15	Kanpur (UttarPradesh) *CEPI-78.09* (*Ac_Wc_Ls*)	• 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*)	• 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*)	Nunihai Industraial Estate, Rambag Nagar, UPSIDC Industrial Area, and Runukata Industrial Area
20	Manali (Tamilnadu) *CEPI-76.32* (*Ac_Ws_Ls*)	Manali Industrial Area
21 22	Haldia (West Bengal) *CEPI-75.43* (*As_Wc_Ls*) Ahmedabad (Gujarat) *CEPI-75.28* (*Ac_Ws_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 Municipa Area & Sutahata Block-I and II • GIDC Odhav • GIDC Naroda
23	Jodhpur (Rajasthan) *CEPI-75.19 (As_Wc_Ls*)	• 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 Industrail 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*)	a) Liluah-Bamangachhi Region, Howrah b) 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*)	• 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: • 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 direcdtion)
41	Junagarh (Gujarat) *CEPI-70.82* (*As_Ws_Ls*)	Industrial Areas: • 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: • 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 - 8

Indian Standards on Wire Ropes and Wire Products

S No.	Title
Aerial ropeways for transportation of passengers - continuous movement monocable with automatic grips - code of practice for design and constuction	
1804: 1982	Fibre cores for steel wire ropes
2265: 1978	Galvanized steel wire strand for signalling purposes
2315:1978	Thimbles for wire ropes
2361:1994	Buldog grips - specificiation
2363: 1979 purposes	Drop forged sockets for wire ropes for general engineering
3121:1981	Rigging screws and stretching screws
3626:1978	Locked coil winding ropes:
Part 1: 1974	Socketing with zinc
Part 2: 1974	Socketing with white metal
5245	Methods for splicing of wire ropes
Part 1: 1969	Hand splicing of wire ropes
Part 2: 1971	Wire rope sling legs with ferrule-secured eye terminal
10891 Part 1: 1984	Steel wire ropes for aerial ropeways: part1 Haulage ropes
Continuous movement monocable repoways with fixed grips intended for transportation of passengers - code of pratice for construction	
6594:1977	Technical supply conditions for steel wire ropes and strands
10887: 1983	Steel wire rope for winches and ropeways used in forestry and agriculture
10891	Steel wire rope for winches and ropeways used in forestry and agriculture
Part1: 1984	Haulage ropes
Part2: 1986	Track ropes
3973: 1984	Code of practice for selection, installation and maintenance of wire ropes
Continuous to and fro movement bicable ropeways intended for transportation of passengers - code of practice for construction	

1804: 1996	Steel wire rope - fibre main core - specification
2266: 1989	Steel wire ropes for general engineering purposes specification
2363: 1981	Glossary of terms relating to wire ropes
5245 (part 1): 1969	Methods for splicing of wire ropes: part 1 hand splicing of wire ropes
1855:1977	Stranded wire ropes for winding and man riding haulages in mines
1856 :1977	Specifcation for steel wire ropes for haulage purposes
3626:2001	Locked coil winding ropes - specification
3937	Recommendations for socketing of wire ropes:
Part 1 : 1974	Sicketing with zinc
Part 2 : 1974	Socketing with white metal
Part 3 : 1994	Socketing with resins

Annexure - 9

Testing of Carrier

METHOD #1

Sometimes referred to as signature testing, actual data is used to determine what testing is required for fatigue testing. Determined by testing with independent certification the dynamic stress range and mean frequency of the frequencies produced by operation of a carrier on actual installations.

The following tests shall be performed on the same carrier so that the test carrier will receive a total of 5 million cycles.

Test #1	**Test #2**
- Upper Limit - Maximum stress produced by a loaded carrier. - Lower Limit - minimum stress produced by a loaded carrier. Test for four million (4,000,000) cycles at recorded frequency between Upper Limit and Lower Limit.	- Upper Limit - Maximum stress produced by an empty carrier. - Lower Limit - minimum stress produced by an empty carrier. Test for one million (1,000,000) cycles at developed frequency between Upper Limit and Lower Limit.

METHOD #2

Testing is accomplished by using values assigned or measured weights for the loads to be used in fatigue testing. Measure and record the following weights:

- Grip Weight, Maximum of specified sizes.
- Hanger Weight, Maximum of specified sizes.
- Chair/Cabin Weight, Maximum of specified sizes and extras, i.e. restraining bar, foot rest, bubble, etc.
- Passenger Weight, 170 pounds (77.1 kilograms) per passenger to maximum specified capacity of Chair/Cabin.
- Weight (dead plus live) = Grip Weight + Hanger Weight + Chair/Cabin Weight + Passenger Weight
- Weight (dead) = Grip Weight + Hanger Weight + Chair/Cabin Weight

The following tests shall be performed on the same carrier so that the test carrier will receive a total of 5 million cycles.

Test #1	**Test #2**
- Upper Limit 2.5 x Weight (dead plus live) - Lower Limit 0.5 x Weight (dead plus live) Test for four million (4,000,000) cycles at approximately 200 cycles/minute between Upper Limit and Lower Limits.	- Upper Limit 2.5 x Weight (dead) - Lower Limit 0.5 x Weight (dead) Test for one million (1,000,000) cycles at approximately 200 cycles/minute between Upper Limit and Lower Limits.

Annexure - 10

Safety Conditions

Column, including foundations and anchor bolts:

- Visual inspection for deterioration of the foundation or possible deterioration of the supporting ground
- Inspection of the grout between the tower base and the foundation to identify any deterioration in the condition of the grout and it's effective weatherproofing
- Testing of the anchor bolts and tower base plates or welds for corrosion and cracking using non-destructive testing or other appropriate test systems

- **Sheave assembly tower crossheads, rope lifting frame, and service platform, access ladder and rungs:**
  - Non-destructive testing to detect internal corrosion.
  - Crack detection on load critical welds.
  - Replacing, or where appropriate re-tensioning, of any bolts in the tower column, tower crossheads or frames
- **Chair, Hanger and Rope Grip assembly**
- **Ropes**
- Haul Rope
- Counterweight Tension Rope
- Guy Ropes or Stays
- **Rope Tensioning Equipment**
- **Communication and safety systems including emergency stop**
- **Drives**
- Main Drive
- Standby Drive
- Rescue Drive
- Integrity of power source for all drives
- **Sheave assemblies and rope guiding equipment**
- Line sheave assemblies, sheave bearings and liners
- **Bull wheels**
- Drive and return sheaves, bearings and liners
- Rope guiding equipment
- Alignment
- **Brakes**
- Service Brake
- Emergency Brake
- **Anti-rollback systems**
- Backstops and anti-rollback brakes
- **Loading and unloading stations and equipment**
- Safety Gates
- **Fire fighting equipment**
- Inspection and testing requirements in accordance with Australian Standards
- **Electrical systems and equipment**
- Earthing systems
- Control and monitoring devices
- **Emergency evacuation - procedures and equipment**
- **Corrosion protection**
- **Control of water condensation and drainage, and identification and elimination of water retention areas.**

QUESTIONNAIRE

QUESTIONNAIRE FOR ENVIRONMENTAL APPRAISAL (FOR AERIAL ROPEWAY PROJECTS)

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

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

I. General Information

1.1 Name of the project :

(a) Name of the authorized signatory :

(b) Mailing Address :

E-mail :

Telephone :

Fax No. :

(c) Does the proposal relate to new project / expansion / modernization :

1.2 Site Information

(a) Location of airport:

Village(s)	Tehsil	District	State

(b) Geographical information

- Latitude :
- Longitude :
- Total area envisaged for setting up of project (in ha) :
- Nature of terrain (hilly, valley, plains, coastal plains etc) :
- Seismic zone classification :

1.3 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 Distance (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 notified under section 3 of the E (P) Act 1986		
4	Inter-state boundaries and international boundaries		

1.4 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, resting, migration etc		
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 *(hospitals, schools, places of worship, community facilities)*		
10	Areas containing important, high quality or scarce resources *(ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)*		
11	Areas already subjected to pollution or environmental damage *(those where existing legal environmental standards are exceeded)*		
12	Areas susceptible to natural hazard which could cause the project to present environmental problems *(earthquakes, subsidence, land slides, erosion, flooding or extreme or adverse climatic conditions)*		

*** 0.5 km from Railway lines/National / State Highway should be maintained**

Description of the flora/vegetation in the project area

Description of fauna (non-domesticated) in the project area

1.5 Baseline Data

Meteorological data

Ambient air quality data

Water quality data

Human Settlement

	With in the project site	With in 1 km from the project boundary
Population*		
No. of villages		
Number of households village-wise		

1.6 Current land use of the proposed project site Area(in ha) :

Level –I
1. Built – up land
2. Agricultural land
3. Forest
4. Wastelands
5. Water bodies
6. Others
Total

2.0 Alternate Routes/Alignments considered

	Alternate route 1	**Alternate route 2**	**Alternate route 3**	**Alternate route 4**
Environmental Impact				
Reason for selecting the proposed Route / Alignment:				

3.0 Site Planning

Does the site preparation require cutting of trees?

Yes _____ No _____

If yes, please furnish the following details:

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

Yes _____ No _____

Yes _____ No _____

If yes, provide details
Does the project have any adverse effect on biodiversity?

If so, details of flora and fauna so affected: _____

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

A. Length of New alignment proposed (kms)

B. Width of the new alignment (metres)

Total length of the alignment (kilometres)

5.0 Raw Material required during construction

S.No	Item Quantity (Tonnes)	Mode of Transport Source
Bricks		
Sand		
Cement		
Bitumen		
Diesel		
Others(Please specify)		

6.0. Water required during construction (cu.m/day):

6.1. Water Requirement (cu.m / day)

Sl. No.	Purpose	Average Demand	Peak Demand	Source	Type treated/ Untreated/Fresh/ Recycled	Remarks
1	Ropeway Development					
2	Dust Suppression					
3	Drinking					
4	Others (please Specify)					
	Total					

6.2. Source of Raw Water Supply (Net)

S.No	Source	Cum/hr	Cum/day
1	Sea		
2	River		
3	Ground water		
4	Rainwater harvesting		
5	Municipal water supply		
6	Others		

6.3. Solid Waste:

A. Solid waste generated during development/ operation of ropeway (Tonnes / day)

1. Plastic wastes
2. Domestic wastes
3. Others (please specify)

Total:

7.0 Green belt development:

A. Total area of project (in ha)

B. Area already afforested (for existing projects), in ha

C. Area proposed to be afforested (in ha)

D. Width of green belt (minimum, in m.) along with alignment

E. Trees planted and proposed

NOs

1. Planted
2. Proposed
3. List of species

8.0 Rehabilitation & Resettlement Plan including vocational training and other avenues of employment:

A. Population to be displaced:

S.No.	Name of Village	Population	Land outsets only / Homestead	Land+ Home stead	Oustees only

B. Rehabilitation Plan for Oustees.

C. Site where the people are proposed to be resettled

D. Compensation package

E. Agency / Authority responsible for their resettlement

9.0 Environmental Management Plan

a. Details of Pollution Control Systems:

	Existing	**Proposed**
Air		
Water		
Noise		
Solid Waste		

b. Expenditure on environmental measures:

S.No		Capital cost		Annual recurring cost	
		Existing	Proposed	Existing	Proposed
1	Pollution control (provide break-up separately)				
2	Pollution monitoring (provide break-up separately)				
3	Fire fighting & emergency handling				
4	Green Belt				
5	Training in the area of environment & occupational health				
6	Others (specify)				

c. Details of organizational set up / cell for environmental management and monitoring:

d. Details of community welfare / peripheral development programmes envisaged / being undertaken by the project proponent:

10. Compliance with environmental safeguards (for existing units)

a. Status of the compliance of conditions of Environmental Clearance issued by MoEF, if any enclosed — Yes ☐ No ☐

b. Status of compliance of 'Consent to Operate' issued by SPCB, if any, enclosed — Yes ☐ No ☐

c. Latest 'Environmental Statement' enclosed — Yes ☐ No ☐

11. Public Hearing

(a) Date of Advertisement

(b) Newspapers in which the advertisement appeared

(c) Date of public hearing (DD/MM/YYYY)

(d) Public Hearing Panel chaired by & members present

(e) No. of people attended the public hearing meeting and number of people from the lease area.

(f) Summary/details of public hearing in tabular form.

Issues raised by the Public	Response/Commitment of Project Proponents	Suggestions made by the Public Hearing Panel

Date .....

Name and Signature of the Competent Officer/authority

E-mail:

Phone and Fax nos:

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

Note:

The project authorities are earnestly advised in their own interest to provide complete information on points, which they think are relevant to their proposal. Non-supply of required information may result in considerable delay in according environmental clearance.

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 an authorized signatory for the specific project (refer notification No. SO. 3067 (E) dated 1st December 2009)