जहाँ है हरियाली ।
वहाँ है खुशहाली ॥

Ministry of Environment & Forests
GOVERNMENT OF INDIA, NEW DELHI

Environmental Impact Assessment Guidance Manual for AIRPORTS

Prepared by

Administrative Staff College of India
Bellavista, Khairatabad, Hyderabad

February 2010

Environmental Impact Assessment Guidance Manual for AIRPORTS

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

Siripurapu K. Rao
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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 airports. 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 **Wg. Cdr. G S R Sharma**, resource person, who, drawing on his vast experience in the sector, prepared the EIA guidance manual for **airports** along with **Dr. Valli Manickam**, Member of Faculty of ASCI. The efforts put in by both of them are commendable.

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

26 February, 2010

S.K. Rao

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ABBREVIATIONS

ATC - Air Traffic Control
ARP - Aerodrome Reference Point
ASCI - Administrative Staff College of India
ATF - Aviation Turbine Fuel
AAQ - Ambient Air Quality
BSI - Botanical Survey of India
BLEVE - Boiling Liquid Expanding Vapour Explosion
CAEP - Committee of Aviation Environmental Protection
CPCB - Central Pollution Control Board
CRZ - Coastal Regulation Zone
CSR - Corporate Social Responsibility
EAC - Expert Appraisal Committee
EIA - Environmental Impact Assessment
EC - Environmental Clearance
ETP - Effluent Treatment Plant
EMP - Environmental Management Plan
FEDTI - Fire-Explosion and Toxicity Index
DMP - Disaster Management Plan
IA - Impact Asssessment
ICAO - International Civil Aviation Organization
IMD - Indian Meteorological Department
UTPCC - Union Teritory Pollution Control Centre
MoEF - Ministry of Environment and Forests
MCAA - Maximum Credible Accident Analysis
POL - Petrol / Paint Oil Lubricant
PCU - Passenger Car Units
RHP - Rain water Harvesting Plant
R&R - Rehabilitation and Resettlement
SPCBs - State Pollution Control Boards
STP - Sewage Treatment Plant
TOR - Terms of Reference
VOC - Volatile Organic compounds
VCE - Vapour Cloud Explosion
WG - Working Groups
WII - Wildlife Institute of India
ZSI - Zoological Survey of India

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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 - "Airports". 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 airport sector, major sources of environmental impact in respect of airport projects and details of the environmental clearance process.

Chapter 2: Project Description

This chapter contains the description of the project, such as the type of project, need for the project, project location, project layout, cargo handling methods, utilities and services, the project implementation schedule, estimated cost of development etc

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.

The contents of the manual are to be considered as version 1.0 (2010). The ministry as per the requirements will take up an updating/revision of the manual. In case of interpretation of any question related to law, the provisions of the original laws 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. Any obligations of international conventions, where GoI is a signatory and accepted for implementation are also to be followed.

1

INTRODUCTION

1.0 Preamble

Environment plays a vital role in overall development of the country. Recognizing the importance of environmental protection and sustainable development, the Ministry of Environment and Forest, 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.

Environmental Impact Assessment is a planning tool now generally accepted as an integral component of sound decision-making. The purpose of 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 impact allows 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 impact.

The Ministry of Environment & Forest has made environmental clearance (EC) for certain developmental projects mandatory through its notification issued on 27.01.1994 under the provisions of Environment (Protection) Act, 1986. The process of conducting public hearing has also been made mandatory for certain developmental projects through its notification issued on 10.04.1997. EIA notification 2006, as amended Dec 2009 was issued by the Ministry of Environment and Forests and is in vogue now. The categorization of the developmental projects / activities is specified in this notification.

1.1 General Information on Airport Sector

The aviation sector has been relatively free of major environmentally driven regulations in past, because the sector is considered a key contributor to driving the global economy and the only mode of rapid trans-national travel on offer to customers. However airport development has not kept pace with significant increases in aviation activity in India. While funding is one problem; rapid pace of change in aviation technologies is the other. While joint ventures in airport development have solved the first problem, innovative planning approaches are needed to solve the second. Central actions in connection with proposed airport development often require pursuant to the implementing guidelines of the Ministry of Environment and Forests (MoEF) under Government of India (GOI), which is in the process of formulating EIA manual for airport sector according to EIA notification dated 14th September 2006, as amended 2009

Major sources of the adverse effects on account of development of airport projects are due to the following:

(a) Location of airport;
(b) Construction activities;

(c) Airport operation, including air traffic and associated noise & emissions, and
(d) Cargo handling & storage, and land transport

1.2 Environmental Clearance Process

In terms of the 14th September 2006, as amended Dec 2009 notification of the MoEF, all airport projects are categorized under Category A in the Schedule, including expansion and modernization of existing projects or activities, shall require prior environmental clearance from the Central Government in the Ministry of Environment and Forests (MoEF) on the recommendations of an Expert Appraisal Committee (EAC) to be constituted by the Central Government for the purposes of this notification;

Project or Activity	Category with Threshold Limit	
Airports	**Category - A** **All Projects**	**Category - B** **-**
General Condition shall apply "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 notified 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 environmental clearance process for new projects will comprise of a maximum of three stages. These three stages in sequential order are:

Stage (1)- Scoping

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

Stage (2) - Public consultation

Public consultation" refers to the process by which the concerns of local affected persons and others who have plausible stake in the environmental impact of the project or activity are ascertained with a view to taking into account all the material concerns in the project or activity design as appropriate.

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

Stage (3) - Appraisal

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

Flow-chart depicting these stages in obtaining the prior environmental clearance for Airport projects is presented in **Figure 1.1**

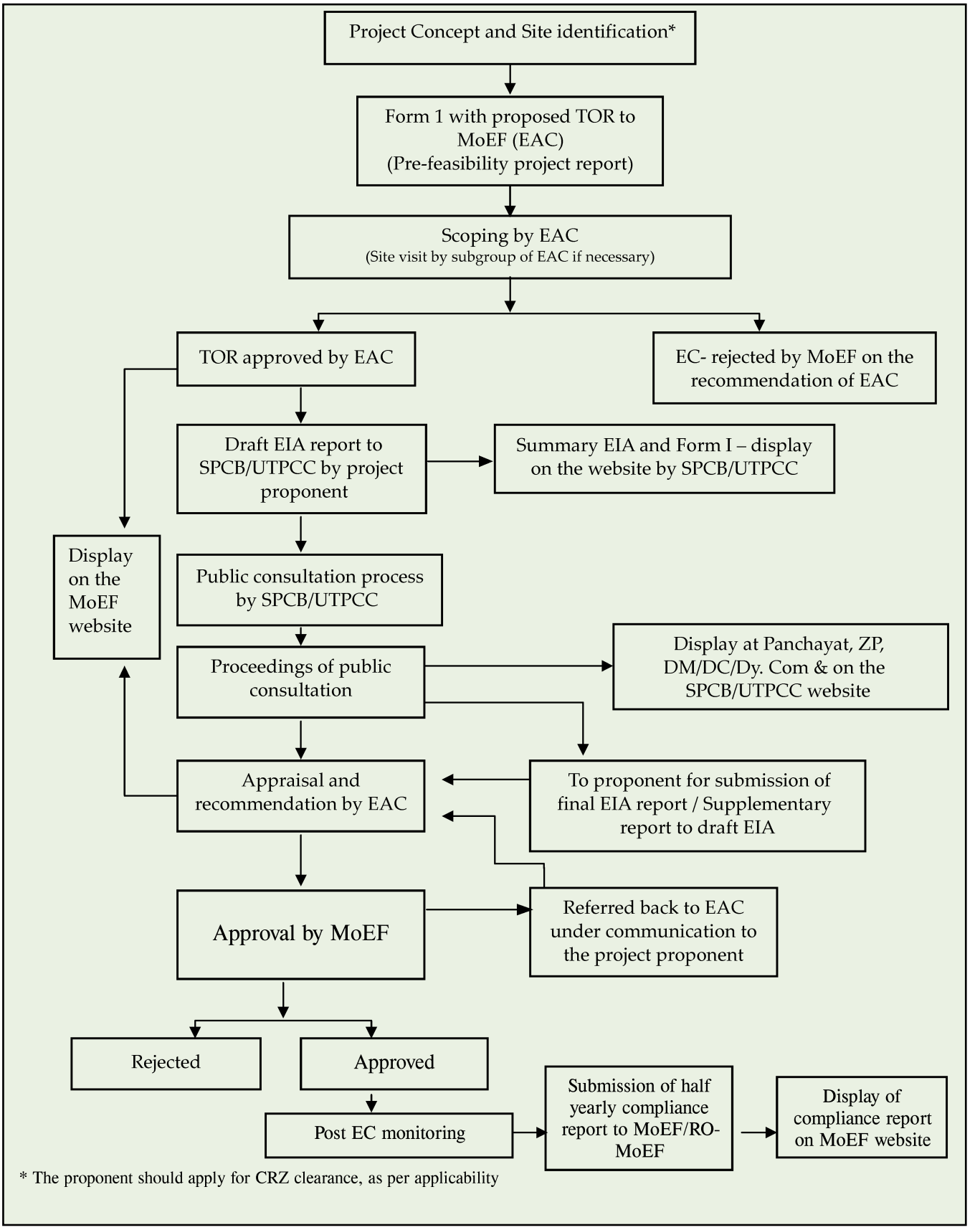


Figure 1.1: Prior Environmental clearance process for category A projects

- The projects involving clearance under Coastal Regulation Zone Notification, 1991 shall submit with the application a CRZ map duly demarcated by one of the authorized agencies, showing the project activities, w.r.t. C.R.Z (at the stage of TOR) and the recommendations of the State Coastal Zone Management Authority (at the stage of EC). Simultaneous action shall also be 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"

  (Reference: S.O 3067 (E) dated 1st December 2009)

1.3 Regulatory Compliance Requirement

The operational and geographic impact associated with airport development are covered by policy drives (both strategies and legislation) at global, regional and national levels.

The International Civil Aviation Organisation (ICAO), which oversees the level and direction of effort involved in addressing the environmental impact of the sector, also deals with the emissions from aircrafts.

ICAO: The ICAO agenda is focussed on the Committee of Aviation Environmental Protection (CAEP), whose 18 member states make recommendations through five groups:

- WG1-reducing noise (noise stringency limits engines);(www.icao.int)
- WG2 - land use planning and management, operating restrictions and other issues associated with noise such as modelling; (www.caa.co.uk)
- WG3-reducing emissions at source (emission limits); (www.caa.co.uk)
- WG4 - operational mechanism for reducing aviation emissions; (www.icao.int/icao/en/m.html) and
- WG5-market based options (legal & administrative issues surrounding emissions permit trading, environmental charges and voluntary agreements as a means to limit or reduce emissions) (www.icao.int).

The work of the CAEP is more technical in nature. The process of securing consensus in ICAO is lengthy, not least because membership is voluntary. Though the members are responsible for enacting certain standards and practices, they are not legally bound to do so. They are only honour bound to implement the resolution on environmental policies and practices.

India being one of the member states of ICAO, implements the resolution on environmental policies and practices adopted by ICAO through Director General of Civil Aviation (DGCA), under Ministry of Civil Aviation, GOI at national level to mitigate the operational impact associated with aviation at airports.

It ensures that environmental concerns are strategically integrated into air transport policy by improving technical environmental standards on noise and gaseous emissions; advancing long-term technology improvements; inspecting aerodrome site for issuing aeronautical clearance; improving the air traffic management and promoting flight safety environment at airports.

Geographic Impact:

Unlike the operational impact, the geographic impact operate on a local scale over a relatively shorter period of time and are more significant. Their intensity depends on the airport capacity as well as on the site location for a given aviation environment. There is hence a requirement for legislation on the airport development sector at national level. However, this is insufficient to meet the site-specific requirements at local level. Hence, appropriate local regulation /Acts are to be incorporated to make the environmental policy sector and site specific.

Since the applicability of some of the acts, Rules to the project is site specific, project proponent has to under take a reconnaissance of the site proposed for the project, survey the demand for the sector, ensure the applicability of legislation / Acts / Rules before selecting the site and then go ahead with EC process. The Air traffic demand survey is based on the traffic projections derived from "econometric multiple correlation on forecasting methodology. In this method, past usage is correlated with variables such as income and prices and then future usage is ordinate on the basis of past relationships. This does not separate cause from effect, but uses observed historical, statistical relationships with judgemental factors applied.

Air traffic projections based on capacity driven and demand driven constraints are factored. Unaccounted traffic diverted through rail, domestic aircraft etc., due to non-availability of landing rights to foreign aircrafts is shown as potential passengers. The projections based on existing traffic, are worked out and shown in Tables 1.1 to 1.4.

Litigations if any: In some of the states, there may be some litigation in process between public / State Govt. agencies/ other industries and the project proponent or other projects relevant to the project proposed. In such cases, court rulings / directions on the matter may be mentioned. These may be studied and highlighted in the project report.

1.4 Terms of Reference (TOR) for Preparation of EIA Report for Airport Projects

Duly catering to the commonly expected environmental concerns, Terms of Reference (ToR) for the airports sector is prepared and given in Annexure-1. In addition, the proponent is required to identify specific issues if any, pertinent to the project and include those issues also in the ToR for preparation of EIA and EMP report upon approval of the ToR by the Expert Appraisal Committee.

1.5 Validity of Environmental Clearance

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

1.6 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.

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 to the regulatory authority concerned. All such reports should be public documents.

1.7 Transferability of Environmental Clearance

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

1.8 Generic Structure of Environmental Impact Assessment Document

In terms of the EIA notification of the MoEF dated 14th September 2006 as amended Dec 2009, 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 Environmental Impact & Mitigation Measures
- Environmental Monitoring Programme
- Additional Studies
- Project Benefits
- Environmental Cost Benefit Analysis
- Environmental Management Plan
- Summary & Conclusion
- Disclosure of Consultants Engaged

1.9 Identification of Project Proponent

Profile of the project proponent, contact address with e-mail, fax, phone number etc should be furnished. 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

1.10 Brief Description of Project Proponent

In this section details of the project nature, size, location and its importance to the country and the region are to be included. Project site description; survey/khasra nos, village, tehsil, district, state & extent of the land, latitude & longitude of the boundaries are to be furnished.

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

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

- Status of Environmental Clearance and compliance for the terms & conditions for the existing project
- Validity of the Air & Water Consent orders, and Hazardous Waste Authorization (HWA) from SPCB/ PCC for existing project
- Notices/directions issued by the regulatory agencies under section 33(A) of the Water Act, 1974 as amended, under section 31(A) of the Air Act 1981 as amended and any directions issued under the provisions of the E (P) Act, 1986 during the last one year.

2

PROJECT DESCRIPTION

2.0 General

This chapter on project description in the EIA study report to be prepared by the proponent should include the following aspects:

- Purpose of the project, goals and objectives of the proposed project
- Overall suitability of the site and the proposed activity in light of the existing environmental acts and serious deviations, if any.
- Significance of the project both at local and national level including background information and overall scenario of the proposed activity in the Indian context
- Relevance of the project in light of the existing development plans of the region, project coverage, master plan, phasing and scope,
- Estimated cost of development of the project, environmental protection works both during construction and operations phase of the project, etc.
- Estimated water budget for the proposed project.

It is to be noted that the location as well as layout of airport structures also contribute to potential impact on the environment. The description of the project to be given in this chapter of the EIA study report should be reasonably adequate to understand the likely overall impact of the project construction and operational phases on various facets of environment. The proponent is to present the project description in the EIA report as required to obtain prior environmental clearance.

2.1 Description of the project

Description of the project should be brief but elaborate enough to assess the impact of the project location on the environment. Therefore these brief details should include:

- The location of the project with longitude, latitude, revenue village, tehsil, district and state
- Number of phases for development of Airport based on traffic demand,
- Capacity to handle new generation large aircraft,
- Sponsors' details,
- Envisaged project cost,
- Basis of project; BOO or BOT etc.,
- Project execution (Private or Joint Venture) (with details under Company Act 1956),
- Existing traffic; Domestic, International and Potential,
- Airport paved facilities; whether catering for futuristic operation / or existing operation.
- Villages, settlements, need for rehabilitation and resettlement (R&R) of communities/villages along with present status of such activities
- Land acquisition requirement- (present and future) and status,

Essential Toposheets / Maps to be provided

- A map of the study area (project area and area 10 km around its boundary) delineating the major topographical features such as land use, drainage, a location of habitats is to be given. Major constructions including roads, railways, pipelines, major industries if any in the area are to be marked clearly.
- A map of the study area covering aerial distance of 15 km from the proposed project boundary delineating environmental sensitive areas as specified in Form I of EIA notification 2006 as amended 2009 is to be shown.
- Land use map of the study area to 1: 25,000 scale, based on recent satellite imagery of the study area delineating the cropping pattern, waste land, forest area and built up area need to be prepared.
- Contour map at sufficient or acceptable intervals as available or as required for the study of project area and site plan of the area showing the proposed break-up of the land may be prepared.
- Layout plan of proposed airport development should be submitted to a scale of 1:5000. Description of covered and open facilities, landscape and other civil works such as under ground / over head water tanks; Sewage Treatment Plant(STP); Effluent Treatment Plant (ETP); Petrol / Paint, Oil, Lubricants(POL)stores; Aviation Turbine Fuel(ATF) store; Cargo storage and other maps and utilities (water & power) are to be shown in the layout (Table 2.1). Based on the terrain slope and drainage pattern of the region; perimeter boundary wall is to be planned for security of the site without allowing the storm waters to stagnate or enter project area. Key features are to be given as indicated in Table-2.2.
- Description of the project site its geology, hydrology, topography, and climate, connectivity by road/rail, demographic aspects, socio-cultural and economic aspects, villages, and settlements are to be identified.
- Details of environmentally sensitive places, land acquisition and rehabilitation of communities/ villages with their present status should be mentioned. The Siting criteria delineated by MoEF should be discussed. Notified restrictions and limitations from Environmental considerations etc., if any should be discussed.
- Historical and climatic data such as climatic conditions, rainfall, wind pattern, history of cyclones, storms surges, visibility etc. for the last 25 years are to be mentioned.
- In case of expansion/ modernization of the project, the environmental compliance status for the existing project should be explained. If the potential impact on environment exceed the existing project limits, fresh EIA process may be initiated before starting the project.
- Technologies involved for design, construction, equipment and operation should be brought out clearly in the document.
- Requirement of natural resources for construction along with their sources, technologies involved in the design, construction, equipment and operation should be furnished in the report by the proponent. Water requirement during the construction and operational phases should be covered along with the identified sources. Water balance flow chart should be prepared considering phases of construction and operation. Rainwater harvesting provisions should be explored. Utilization of solar energy for lighting etc may be explored. The resources requirement for the construction may be quantified.

Utilization of alternative construction materials such as fly ash and alternate energy such as solar etc should be explored

2.2 Description of Activities and Ancillary Operations

Details of various activities involved both during construction phase and operational phase along with flow charts duly indicating required resources should be described duly supported with sufficient details in appropriate tabular forms in order to enable assessment of impact of the activities on various facets of environment.

2.3 Housing

Requirement of housing for the workers and employees both during construction phase as well as operation phase should be specified in detailed and should be catered to by the proponent. In the event the proponent proposes to develop township for housing the workers/employees involved in the airport operations details of various types of buildings envisaged, layout plan of township, details of utilities and services along with methods of disposal and treatment of sewage should be given. The proponent should comply with all statutory provisions and directions, as may be, imposed by concerned local bodies in this regard. Details of utilities such as water supply, power supply, along with sources and distribution network should be mentioned in the EIA report.

2.4 Use of Public Infrastructure

The proponent should furnish the connectivities of national road and rail network to the proposed airport location. In case existing road and rail facilities are utilized for the airport activity, the proponent should furnish details of extra capacities required to augment the existing connectivity such that the infrastructure is not subjected to congestion. The layout of such road and rail facility should be incorporated in the project layout. Approval of appropriate authorities for the proposed layout of the connectivity should be pursued by the proponent and implemented as part of the project such that the public hitherto availing these utilities are not deprived of these road and rail facilities as a consequence of the post project implementation.

2.5 Man Power Requirement

The proponent should indicate the requirement of various categories of manpower such as skilled, semi-skilled, unskilled workers, technicians, engineers, managers and other professionals for both construction phase and operational phase. The proposed training methods for imparting and upgradation of specialized skills, where required, should be mentioned in the EIA Report.

2.6 Project Implementation Schedule

The proponent should also submit the detailed project implementation schedule bar chart, CPM / PERT chart etc., duly bringing out interrelationship of major activities.

3

ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

3.0 General

If the scoping results in need for alternatives, a clear description of the each alternative, and summary of the impact - adverse and positive with each site, and selection of alternatives are to be explained in detail.

3.1 Alternative Evaluation Criteria

Alternative sites and design process should be critically examined to maintain the positive environmental impact, socio-economic benefits & profitability and minimise the temporary adverse impact. Normally, the extent of displacement of people, the loss of agricultural land, relocation of flora & fauna and irreversible loss of natural resources permanently, will be deciding factors in selection/rejection of site. Project planning and the design process need to be flexible enough to adopt the modified basic project alternatives. The following steps will help in this process.

Source: Introduce proactive measures in the project design at source level to mitigate environmental impact, (e.g. ICAO measures on Aircraft design, redesign of storage tanks for storing hazardous material, landscape design, flood control measures and flight safety measures to counter risks due to birds and wildlife at airport.).

Process: Introduce reactive measures in the operational procedures (e.g. ICAO measures for flight procedures, Air traffic system procedures for surface traffic, sewage treatment plants, effluent treatment plants, waste disposal procedures, and rain water harvesting etc.,)

Receptors: Introduce defensive measures in the relocation of receptors.(e.g. Legally mandated procedures in relocation, safety and health of population and flora and fauna, and third party risk mitigation)

Funding: Incorporate budgeted funding for alternatives as described.

Multi Nodal Transportation, Environmental Impact & Trade offs:

Review the demand for the air transportation in the region, analyse the possibility of meeting it through alternate modes of transport such as road / rail. This involves study of interrelationships between environmental impact due to airports and the trade offs in which one impact has to be traded off against another

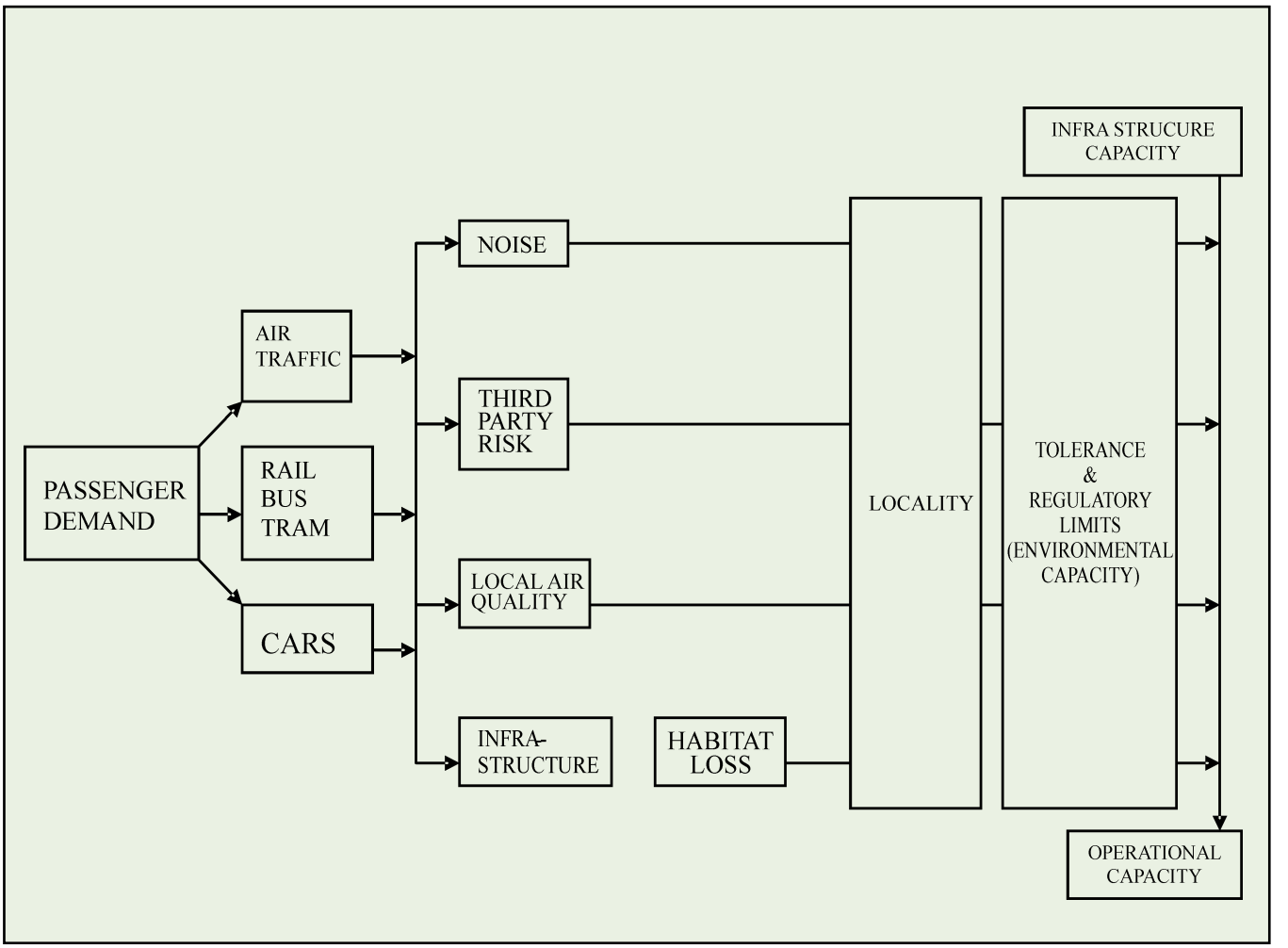


Fig 3.1 Interrelationships in Potential Impact

Fig3.1 provides schematic representation of the way in which different environmental impact relate to each other. It also indicates the regulatory and other social controls or restrictions that are associated with them and shows how these could reduce or restrict the operating capacity of an airport. The figure also provides a useful way of illustrating other trade offs. For example, local emissions arising from growing road traffic could in theory cause the air quality management zone in which the airport is located to fail to meet local air quality regulations. This constraint could be alleviated by the construction of a rail link to reduce car use, however, this would require additional land - take that could be restricted by habitat protection issues in the surrounding country side.

For example, the development of preferred noise routes designed to reduce community disturbance can result in departing aircraft having to fly farther during the early phase of flight. This can increase fuel burn and engine emissions. There may also be conflicts between the requirement at an airport to reduce fuel burn and emissions, and requirement to minimise noise.

4

DESCRIPTION OF ENVIRONMENT

4.0 General

Airport development may create a wide range of impact on the environment by construction work, reclamation, landfills, noise and emissions from aircraft effecting air quality and ground sources, cargo operations, and other airport related activities. Environment facets to be considered in relation to airport development can be categorized into seven groups: (a) land use (b) water quality (c) air quality (d) noise pollution (e) biological changes (f) socio-economic changes and occupational health and (g) solid waste management. Hence it is necessary to ascertain the baseline data of these environmental facets.

4.1 Study Area

Primary data through measurements and field surveys; and secondary data from secondary sources are to be collected in the study area within 10 km radius from Aerodrome Reference Point (ARP). Primary data should cover one season other than monsoon and secondary data is to cover one full year. The basis for selection of these criteria is that the aircraft gains a height of 1000ft in this area below which noise and air pollution are generated maximum during its take off stage. Secondary data should be collected within 15 km aerial distance for the parameters as specifically mentioned at column 9 (III) of Form I of EIA Notification, 2006. Details of secondary data, the method of collection of secondary data, should be furnished. Similarly the proposed locations of monitoring stations of water, air, soil and noise etc should be shown on the study area map.

The study areas mentioned in this document should be considered for guidance purpose but the exact study area for different environmental attributes (water, air, noise and soil etc.) is to be submitted considering the proposed activities and location, along with proper reasoning, for review and approval by the Expert Appraisal Committee.

Baseline data of various environmental parameters envisaged to be effected by airport activities are collected from secondary sources and through primary monitoring in the study area. This baseline data helps in evaluation of the predicted impact on various environmental attributes in the study area by using scientifically developed and widely accepted environmental impact assessment methodologies. This further helps in preparing an Environmental Management Plan (EMP) outlining the measures for improving the environmental quality and scope for future expansions for environmentally sustainable development. The baseline environmental study also helps to identify the critical environmental attributes, which are required to be monitored after implementation of the project.

The methodology involves analysis of secondary data including satellite imagery, to describe the existing environmental status in the study area of the project referring to the source of the data in each case. The primary data on the other hand describes the existing environmental status in an area of 10km radial distance from ARP through scientifically designed monitoring network. The methods defer from one parameter to the other. The basis for this depends on the relevance of the parameter and the impact of the airport activity on it.

4.2 Land Environment

Soil:

Land is one of the important and rare resources. Airport projects require considerable land area for development of activity areas, operational and non-operational buildings, areas for ancillaries, utilities including townships. Sometimes acquisitions of large stretches of land and areas being used by the local habitat may be necessitated requiring rehabilitation measures. Availability of land for earmarking for the airport without causing undue hardship to local habitat and their socio cultural and economic aspects is very important. Studies on land use aspects of ecosystem play an important role in identifying sensitive issues in the past and present development of the region. Existing baseline status of land use can be determined through a study of changes in the land use pattern in the past 10yrs by collecting data from secondary sources such as census, and land records. Interpretation of satellite data of current year will bring out the trends in the changes of land use pattern in the past. The land use pattern in study area is analysed with the help of a map to 1:25000 scale based on recent satellite imagery of the study area delineating the cropping pattern, forest area and built-up area etc. (Annexure-2).

Soil refers to the loose material composed of weathered rock and other minerals and also partly decayed organic matter that covers large parts of the earth's surface. It is an essential component of the terrestrial eco system. It acts as a medium of transport of various dissolved materials to the underlying ground water. Hence, impact on soil is important in EIA study. Soil formation is influenced mainly by climate, geology, relief and other biotic interactions. The soil characteristics in the study area of the project, which would affect the agricultural and afforestation potential of the area need to be studied.

Soil data including type, classification, characteristics, properties, etc are important from engineering considerations for structures etc. Changes in soil parameters may also affect plantation and vegetation, which in turn may endanger the health of habitat. Baseline data consisting of soil analysis -physical and chemical (Tables 4.1 and 4.2) within the project area is to be collected to assess its fertility. Data pertaining to coverage of land for other purposes and general slope of the terrain within the study area is collected to assess the trends in the land use patterns and the natural run off patterns.

Soil samples are collected all around the project site covering the agricultural and reserved forestland, if any in the study areas. Sampling frequencies and the methods of baseline environmental quality monitoring are given in Annexure 3. The samples are collected during the study period and analysed for physical, chemical parameters and heavy metal concentrations, as per standard methods of analysis. The nature of the soil is to be discussed based on the classification.

Physiography and Drainage Patterns:

The terrain and hill slope, general slope and elevation of the area, the flow direction of streams and rivers, the water bodies and wet lands and the vegetation which together describe the physiography of the land, will control the drainage pattern in the region. Land farms, terrain, may get affected due to construction of airport. It may require large scale quarrying, dredging and reclamation, which may cause changes in the topography. This in turn may affect the drainage pattern of the land / terrain. Baseline data pertaining to existing land at the proposed project area including the description of terrain hill slopes terrain features, slope and elevation are to be collected. Study of land use pattern, habitation, cropping pattern, forest cover, environmentally

sensitive places etc., is to be undertaken by employing remote sensing techniques and ground truthing. Ecological features of forest area; agricultural land; grazing land; wildlife sanctuary land & national parks; migratory routes of fauna; water bodies; and drainage pattern including the orders of the drain and water sheds are to be described. Settlements in the study area may be delineated with respect to ARP on the site map. High rise buildings, industrial areas and zones, slaughter houses and other features of flight safety importance may also be marked on the map. Secondary data from Central Water Board GOI; State ground water department, State Irrigation Department is to be obtained. Geomorphology of the region is to be clearly delineated. Study of land use patterns, habitation, cropping pattern, and forest cover data is undertaken. Information on the location of water bodies, drainage, forests, surface travel routes with respect to the project site is obtained within the study area and plotted on a map. This map will show the natural slopes and the drainage patterns, which give a guideline while planning the drains in the airport project. The drains help in discharge of storm water from the airport to avoid flooding and water logging in the project area.

4.3 Water Environment

Ground water quality is important, as change in its chemical parameters will affect the water quality. Airport activities during construction / operation may have impact on ground water quality. Due to airport construction existing low areas may be reclaimed with dredged spoil. The pollutants from dredged spoil are likely to enter into the ground water. This is likely to increase sedimentation of pollutants in airport area, which may migrate in time to the neighbouring ground water. Also runoff from solid waste if any, may percolate into the ground and may contaminate the ground water. Hence, they need to be studied through primary surveys and secondary sources. Monitoring locations are to be finalized as per CPCB norms which can represent the baseline conditions.

Ground water, surface water and waste water within study area are examined for physico-chemical, heavy metal and bacteriological parameters. The samples are collected and analysed as per procedures prescribed (Annexure 3). Baseline data on location sources of surface water like water bodies, lakes, their dimensions, present quality and their utility are to be provided. The location of sampling stations is to be provided as shown in Table 4.3. Similarly baseline data on the groundwater, surface water is to be provided. Water Table contour map for the pre monsoon months are made for the study area based on secondary data collected from state ground water board. Criteria for raw water used for organized community water supplies (surface and ground water) primary parameters are given in Annexure 4.

4.4 Air Environment:

Ambient air quality (AAQ) is important for the airport projects. The significance of aviation's impact on air quality will vary depending on many other factors such as, background pollution levels, other sources of pollution, weather and proximity of residential areas. Around many airports some large emission sources already exist (power stations, factories) that are not related to the airport at all. Also local roads and motorways, even roads associated with an airport, may be heavily used by non-airport traffic.

Aircraft engines produce emissions that are similar to other emissions resulting from any oil based fuel combustion. These, like any exhaust emissions, can affect local air quality at ground level. It is emissions from aircraft below 1,000ft, above the ground (typically around 3km from departure or, for arrivals, around 6km from touchdown) that are chiefly involved in influencing

local air quality. These emissions disperse with the wind and blend with emissions from other sources such as emissions from domestic sources , emissions from industries and from surface transport.

Important sources of emissions from airport include:

- airside and landside ground transport
- aircraft emissions from takeoff, approach and landing, engine testing and taxiing
- use of auxiliary power units to provide energy to stationary aircraft and ground power units.
- Fuel spillages, fire training, and construction activities

The local air quality relevant emissions attributed to aircraft operations at airports are oxides of nitrogen (NOx), carbon monoxide (CO), Hydrocarbons (HC), sulphur dioxide(SO2), particulate matter (PM10 and PM2.5). Aircraft engines, auxiliary power units, apron vehicles, de- icing, and apron spillages of fuel and chemicals that emit these pollutants. Local factors influence the significance of individual emissions for each airport, but often NOx is by far the most abundant and is considered the most significant pollutant from an air quality stand point. Standard emission factors, for various operation types for a range of common civil aircraft engine types maybe obtained from International Civil Aviation Organization (ICAO) database. Annexure 5.1 to 5.3.

The ambient air quality in area with radial distance 10km. from Aerodrome Reference Point (ARP), forms the baseline information. For new airport development, the sources of air pollution, for baseline studies are vehicular traffic, dust arising from unpaved village roads, domestic fuel burning and nearby industrial air emissions. For expansion / modernisation projects, additional pollutants include the airside and geographic sources in the airfield.

Meteorological Data

The methodology adopted for collection of micro meteorological 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. The parameters selected are atmospheric pressure in (mb) and relative humidity in percentage both recorded at 0830hrs & 1730hrs IST of each day. Maximum and minimum temperatures in 0C of each day; 24hrly rainfall in millimetres (mm) recorded at 0830hrs IST and 1730hrs of each day. The normals for each month are to be calculated and shown in a tabular form. Wind Roses for each month giving the wind direction, speed and percentage frequency; as per key Index and scale should be given. Most probable wind speed class and wind direction at the nearest IMD site is to be estimated from this. Sunshine duration, cloud cover "normal values" is to be compiled from secondary data for getting the monthly "normals".

The methodology adopted for monitoring surface observations is to be as per the standard norms. Onsite monitoring will be undertaken for one season except monsoon season for recording various meteorological variables in order to generate the site - specific data (Annexure 3). This data is then compared with the meteorological data of IMD for judging its reliability and consistency with regional meteorology.

The Central Monitoring Station (CMS) equipped with continuous monitoring equipment to record wind speed, direction, temperature (2m & 10m levels) and solar radiation is to be set up at the project site. Relative humidity and atmospheric pressure are recorded manually daily at 0830hr, and 1730hrs. Data on cloud cover and storms is recorded by visual observation. Rainfall is

monitored daily by rain gauge. Hourly averages of maximum and minimum values of wind speed, direction, solar radiation and temperature are recorded continuously at the site.

Upper air climatic data is useful in locating ground and elevated inversions and computing hourly mean mixing heights ,which are required for use in air dispersion models. They can be procured from nearest IMD station and other secondary sources. The air quality monitoring stations should be given as shown in Table 4.4 and the data is to be measured and recorded as shown in Table 4.5. The standards are given in Annexure 5.4.

4.5 Noise Environment

The effect of noise on population depends on the characteristics of the source, the time of its existence and the location with respect to the noise sensitive land use. Noise can cause Noise Induced Hearing Loss (NIHL) to annoyance depending on its loudness. The effects of noise from proposed airport, construction activity, and vehicular traffic can cause potential damage to hearing, physiological responses, annoyance and general community responses. The ambient noise measurement frequencies and standards are given in Annexure 3 and Annexure 6 respectively. The existing noise levels before starting the construction of airport are to be measured for collecting baseline data. The process is to be repeated during construction and operational phases of project as well.

Baseline data on noise survey is collected in the project area on a given day during study period at a given location covering residential, commercial and silence zones continuously for 24hrs, at hourly intervals. During each hour parameters like L10, L50, L90 and Leq are directly computed by the instrument capable of measuring Sound pressure Level (SPL) , Leq and octave band frequency analysis. The description of noise levels measured over a given (Leqs) of time interval is given using statistical quantities. These are calculated as per the noise level exceeding over certain percentage of time during the study period.

L10 is the noise level exceeding 10 percent of time,

L50 is the noise level exceeding 50 percent of the time,

L90 is the noise level exceeding 90 percent of the time,

Leq is the hourly equivalent noise level value computed by the noise integrating sound level meter.

Lday is the equivalent sound level (average noise level during 6am to 10 pm).

Lnight is the equivalent sound level (average noise level during 10 pm to 6 am.)

Ldn is Day Night sound level (24 hr equivalent sound level with weighted penalty for night) for community noise from all sources. Here 10 dB (A) is added to instantaneous sound value during night before calculating 24hrs average.

Ldn= 10 log 1/24 {i=1to15 (sigma) 10 (leq i/10) + i=1to9 (sigma) 10 {(leq i+10)}] .

The data is to be presented as shown in Table 4.6.

4.6 Biological Environment

Airport operations may cause change in local ecosystems, threaten endangered species, and disturb movements and breeding patterns of local wildlife. Airports are located within a variety of settings (both urban and rural), which support habitats and species of their own, some of which will have direct interaction with those located on the airport and vice versa. Some local areas will also be

designated for their nature conservation value. The biological environment of the airport should hence be seen as an integral component of the wider landscape scale ecological network. To accomplish this,

- Baseline data from field observations for various terrestrial and aquatic systems are to be generated.
- Comparison of the data with authentic past records to understand changes is undertaken.
- Environmental components like land, water, flora and fauna are characterised and,
- The impact of airport development on vegetation structure in and around project site is to be understood.

Data on sensitive habitats, wild or endangered species in the project area also is to be collected from Zoological Survey Of India (ZSI), Botanical Survey of India (BSI), Wildlife Institute of India (WII) and Ministry of Earth Sciences. Wildlife symbolizes the functioning efficiency of the entire eco system. Just as wild flora needs special treatment for preservation and growth, wild fauna as well deserves specific conservatory pursuits for posterity. As per Wildlife Act (1972), the various wild animals are enlisted in the schedules of wildlife Act based on the intensity of threat to them as rare, endangered, threatened, vulnerable etc. Primary data on survey of the wild animals and birds in the study area is collected and identified with the classification into various schedules taken from secondary data.

In case water bodies are located in the study area plantation analysis for one season is to be undertaken (Annexure 3)

4.7 Socio- Economic Environment

Airport development may often require relocation of the local community, which, sometimes causes ethnic, cultural, tribal or religious conflicts with local people. Industrialization and modernization may change the cultural traditions of the local community. To study the socio-economic aspects of people in the study area around proposed airport, baseline data on demographics, land used patterns, water resources for agricultural and industrial use, human settlements, health status of the communities, infrastructure facilities and economic conditions in the existing and relocated area, cultural and archaeological assets within the project area should be catalogued and presented.

Baseline data is collected from various secondary sources, such as District Census Statistical Handbooks -1991, and records of National Informatics Centre, New Delhi and supplemented by the primary data generated through process of a limited door to door socio-economic survey during the study period and during other stages of the project. Results are to be compiled and presented as in Table 4.7 and Table 4.8.

4.8 Solid Waste

Solid waste generation, in airport development is in three stages namely, site preparation, construction and operation. The types of waste, which are generated, can be classified into 4 categories namely, construction or demolition waste; municipal waste, i.e., biodegradable and recyclable waste; hazardous waste and E- waste.

Details of authorized municipal solid waste disposal facilities, biomedical treatment facilities and hazardous waste disposal facilities in the area are highlighted. The adequacy of these measures vis a vis waste generated is to be assessed and alternate measures need to be initiated.

5

ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

5.0 GENERAL

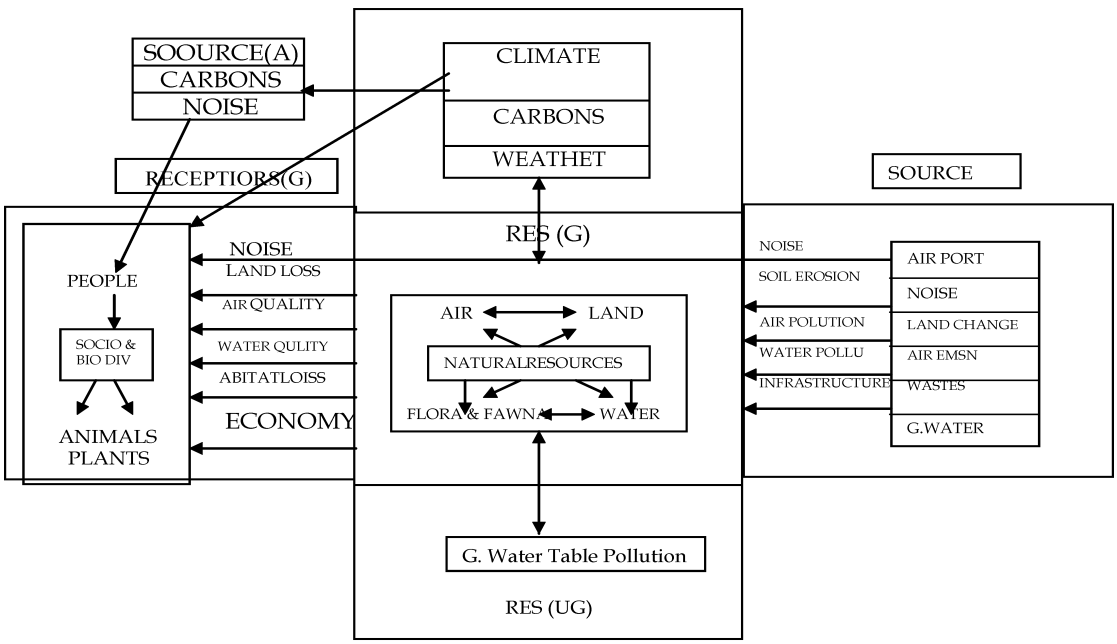
The aim is to ensure that potential environmental problems are foreseen and avoided at an early stage in planning cycle so as to pre-empt problems. The EIA mechanism shall be applied to the project in the following order of priority:

Avoid adverse environmental impact
Minimize and control adverse environmental impact
Mitigate adverse environmental impact

5.1. Identification of Impacts:

Various environmental parameters are to be studied during construction and operational phase of the airport project for assessment of their impact on the surrounding environment.

The prediction process involves resources, receptors and pathways linking them. Their nature, magnitude, extent of coverage and probability of occurrence determine their relevance and significance. The pathways, sources, resources, receptors and the cause and effect relationship in the prediction of impact process of a typical airport development project in operation, is shown in **Figure 5.1.**



A:- Air
G:- Ground
UG:- Underground

Figure 5.1 Pathways in Impact Prediction

Mitigation Measures and their Effectiveness: Mitigation measures are the avoidance, reduction or remedy of significant adverse effects as explained below:

- Avoidance (e.g. at source through design),
- Reduction involves lessening the severity of an impact,
- Remedy which could include compensation accepts that there will be adverse consequences but provides means by which those consequences can be mitigated or compensated for,
- Enhancement or improvements to the environment not related to an identified impact, but where there will be a net benefit to the environment,
- Only measures that can be implemented by the applicant, either directly or indirectly, e.g. via a legal obligation with other parties for instance, should be included,
- All significant adverse impact should be considered for mitigation and specific measures put forward; and attention should be paid to all stages of the development, in particular the construction stage where there is likely to be great potential for nuisance,
- All proposed mitigating measures should be capable of enforcement,
- Mitigating measures themselves sometimes have potentially adverse impact on other aspects of environment, which will also need to be assessed in terms of significance. This needs the co-ordination between various experts who may be involved in the process.

During the identification and prediction of the impact in construction and operational phases of the airport development project, the baseline conditions are either assumed to remain unchanged or revised as per trend analysis from known data collected till reference date of construction or operation of project.

5.2 Prediction of Impact During Construction Phases

The activities that take place during construction phases of airport project are levelling of site, construction and erection of main airport structures like terminal buildings, runways, taxi ways, auxiliary buildings etc. , and associated equipments in operation. The impact are on land use, soil, air quality, aquatic Ecology, demography and socio-economics, access roads and public expectations. The potential primary and secondary impact on the environment, their prediction, significance and mitigation are to be discussed.

5.3 Prediction of Impact During Operational Phase

The potential significant impact are on physiography / topography, land use, soil quality, ambient air quality, traffic densities, water resources, water quality, biological environment, noise levels, demography & socio- economics. Secondary impact on other areas of project such as commercial aspects include funding and profits.

Baseline conditions of the potential impact studied including their trends till the time of starting of operations is considered as the base. Where no trend analysis is available, the baseline data is assumed to remain unchanged during the study period and taken as the base value of the environmental parameter. The short term (24hrly), incremental value of the environmental parameter arising due to the development of airport is predicted qualitatively or quantitatively.

5.4 Land Environment

Anticipated Impact

The impact of the activities in the area on the land is to be clearly identified. Some of the impact include:

- Fuel storage and handling (delivery, storage and use of fuel for aircraft and other vehicles)
- Aircraft and vehicle maintenance,
- Waste burial, spillage, burning activities, fly tipping etc.
- Fire training, use of surfactants, etc.

Mitigation Measures

Mitigation measure should be clearly indicated and some of these include

- Transfers of fuels during refuelling operations, leak detection on underground pipes, containment of any surface spillage are to be monitored
- Aircraft maintenance, sensitivity of the location where activities are undertaken, and control of runoff of potential contaminants, chemicals etc are to be properly implemented and reported.
- Proper drainage systems, emergency containment in the event of a major spill during monsoon season etc are to be provided for.

The mitigation measures proposed during construction and operational phases, for impact on topography if any is to be detailed out. The various structures and associated Landscape when planned will tend to improve the aesthetic appeal of the site. Tree plantation along the perimeter of the project site will further improve the appeal. The plantation species should be carefully chosen to avoid bird nesting and to improve pollution control and noise control measures.

5.5 Water environment

Anticipated Impact

The main users of water include:-

- aircraft and vehicle washing
- aircraft potable water supply
- catering facilities
- toilets / laundries / cleaning fluids / and other domestic facilities

Maximum use of fresh water is for dwelling units, having colony, domestic traffic, Flight catering etc., The conservation measures for drinking water and ground water resources will reduce the impact on water resources drastically. Use of water from STP and Rainwater harvesting plant for green belt development / Tree plantation and for cooling plants will further reduce the burden on fresh water. Reuse of the waste water from these is to be planned for refills in tanks meant for fire fighting.

Mitigation Measures

Measure for mitigating the run off from the landscape area is to route it to rainwater harvesting structures for further use in fire fighting operation, cooling plants and air conditioners after treatment. This will also recharge the ground water table. The run off from paved structures like

Runways, Taxiways, can be routed through drains to oil separation tanks and sedimentation basins before being discharged into rainwater harvesting structures. Two lines of water supply - potable (fresh) and non-potable (treated); are to be incorporated in the project design for the benefit of end users, appropriately.

Storm water drains are to be built for discharging storm water from the air-field to avoid flooding /water logging in project area during monsoon season / cloud bursts.

5.6 Air Environment

Anticipated Impact

Short-term impact on ambient air quality due to air emissions from multiple volume sources (from moving source) such as aircrafts, surface vehicles and point sources such as DG Sets are predicted using relevant models. The model input data are the emissions from aircraft calculated on the basis of ICAO data, emissions from vehicles (Table 5.1 to 5.3) and emissions from DG Stack (Table 5.4).

For the short-term simulations for volume and point emission sources, the concentrations are estimated around numerous receptors to obtain an optimum description of variations in concentrations over the site in 10km radius covering 16 directions. The incremental concentrations are estimated for the study period representing pre-monsoon. The isopleths of these pollutants dispersion values are to be plotted, studied and compared with standards specified by CPCB for 24 hourly values. The maximum incremental Ground Level Concentrations (GLCs) due to the airport project for SPM, SO2, NOx, CO and HC are superimposed on the maximum baseline concentrations of the respective pollutants recorded during the study period to arrive at the likely resultants, concentrations after implementation of the project and the resultant concentrations are to be presented in tabular form (tables 5.5 to 5.7). The values are compared with CPCB standards.

From the projected air traffic figures for different types of aircraft for a given period (Table 1.3), the emissions from the aircrafts and point sources, 24 hourly short term incremental concentrations of air pollution, the total pollution load from domestic and international traffic for each successive year for NOx, CO & HC can be computed. The same for domestic and international traffic depending on aircraft type can also be computed.

Mitigation Measures

Mitigation measures for emissions from operational sources as introduced by ICAO are as follows:-

- Low fuel / emission aircraft departure procedures,
- Continuous Descent Approach and low power- low drop techniques,
- Design the airports to minimize aircraft holding and taxiing times
- Avoid Aircraft queuing on the ground,
- Avoiding unnecessary use of aircraft auxiliary power units,
- Taxiing management (e.g. towing and single engine taxi),
- Increasing the use of public transport,
- Encouraging staff to "car share "to use more sustainable transport access,
- The use of electric vehicles or less polluting fuels (liquid & natural gas),
- Use less polluting fuels in airport buildings,

- Ensure adequate vehicle maintenance,
- Energy management in buildings and for air field systems,
- Fugitive emission controls.

All these can contribute to reducing air quality related emissions, whilst at the same time, deliver in other economy benefits. For operational measures however, there may also be trade - offs with environmental capacity and noise which is described in the "Alternative's "analysis.

Air Quality Modelling for Surface Traffic Outside Airport Area

The baseline study on traffic volume outside the airport area and the observed speed is to be carried out. The anticipated increase in traffic due to project in terms of PCU (Passenger Car Units) / day is also shown in table, as per Indian Road Congress (IRC) conventions. The IRC recommendations are,

Road category	Max PCU / day
2-Lane Roads (7-m) with earthen shoulders	15000
4-Lane Highway with earthen shoulders	35000

Based on above, the existing peak hour traffic (in PCUs) is added to the proposed peak hour traffic (PCUs) to arrive at the total traffic in PCUs. This is verified for the adequacy of road capacity and suitable decisions are taken for widening the roads.

Mitigation measures include the increase in use of public transport and thereby reduce the emissions from vehicular transport. Review of the use of and fuels to power airside vehicles is to be undertaken at regular intervals.

5.7 Noise Environment

Anticipated Impact

Noise sources associated with airports are

- Aircraft noise - generated by aircraft in the air and during takeoff and landing
- Ground noise - ground based activities due to taxiing of aircraft, ground running of engines, auxiliary power units, ground service vehicles etc.

Noise Level Prediction: Noise during operational phase is generated by aircrafts, DG Sets and vehicular traffic. However, the latter two are localised while the aircraft noise is significant due to its movement over wide area. Suitable model may be chosen (Table 5.8). The model should calculate changes in noise impact resulting from new or extended runways, new traffic demand and fleet mix, revised routings and airspace structures, alternative flight profiles and modifications, and other operational procedures like reverse thrust. Noise contours showing the areas and the number of dwellings exposed to various aircraft noise levels are to be shown clearly.

Precise information on number of aircraft, types of aircraft, distribution of flights during the day and night are to be considered. In the absence of this information, the data is taken from peak traffic forecast of aircraft movement as per format in Table 5.8. Night time values are to be computed with additional penalty of 10 dB (A)

Lmax values are considered because it measures maximum sound pressure level occurring during a certain period of time during a single noise event. In practice, Lmax can identify serious noise

problems arising from short lived noise events, which are not picked up by Leq. It is to be borne in mind that the study is for worst case on the assumption that peak hour estimates are occurring at all hours of the day. Also effect of mitigation measures are not considered in the model, which further reduces the noise impact during actual operation. The results are compared with CPCB standards for various locations.

Mitigation Measures

ICAO requirements to noise management at airports are to be followed. Some of these include reduction of noise at source (Compared to standards), land use planning, restrictions on the use of the noisiest aircrafts.

The mitigation measures adopted are a combination of change in aircraft engine / air frame design and change in air traffic procedures for reduction of aircraft noise impact at operational source. Acoustic enclosures for DG sets, noise barriers for ground- run bays, ear plugs for operating personnel are the other mitigation measures for noise impact due to ground sources. These measures gave excellent results in the last two decades world over but fell short of expectations in recent times due to rapid growth in air traffic. Rewards for using noise free routes and penalties for flouting it is one method being used in other countries. This may involve trade-offs as the fuel consumption in flying through longer routes may increase. Acquiring land in the funnel zones along take off and landing paths where noise impact is more is another adopted method in some countries. Payment of compensation to residents in approach path for bearing with aircraft noise is yet another measure adopted by international aviation agencies.

In the Indian context, new generation aircraft of reduced emissions to air are not able to operate in majority of airports due to their large size and requirement of additional length of Runway. Expansion and modernisation of these airports can make them operate at these airfields and bring down air emissions at busy airports by de-congesting traffic over them.

The noise preferential routes which the aircraft overfly the least populated areas after takeoff and before landing are to be suggested. Night flying policy to limit the number of flights and amount of noise generated during this most sensitive time is to be formulated and calculated. Mitigation measures could also include introduction of higher landing fees for noisy aircraft and for night landing in threshold cases could be considered.

5.8 Biological Environment

Anticipated Impact

Based on the biological species found in the area, the biological value of the species found in the study area is to be assessed. This assessment will help in the development of landscaping which forms one of the important mitigation measures.

Mitigation Measures

A biological action plan can help in the planning of the landscaping activities of the airport area. Also proper selection of plant species to avoid bird nesting can help in minimizing bird strikes in the airport area. Proper Landscape management plans are to be identified for the airport area.

5.9 Socio-Economic Environment

Anticipated Impact

An assessment is to be made on the impact of the airport activity on the archaeology of the region. If it is found that the existing archaeology would be affected then a complete assessment of the potential effects is to be made. The document should be supported by photographs of elevations, architectural details and contextual photographs.

It is important that the cultural heritage of the region be highlighted in all international airports. This would enlighten the visiting population about the cultural and historical values of the region.

Impact on Occupation Health: Air pollution due to emissions of PM, NOx, SO2, HC and noise generation will effect the health of employees.

Mitigation Measures

Employees working in high noise zones are to be provided with health protection devices like earplugs / ear muffs. Air pollution control measures are to be adopted. Noise control measures such as noise absorbing building material in closed buildings, noise barriers in Ground run bays, Engine caps over DG sets etc., are to be ensured. Health camps both for employees and local populations are to be conducted.

5.10 Waste Management

Airports produce a large quantity of wastes from a wide variety of sources including:

- in-flight wastes
- scrap wastes
- oils and solvent, components from aircraft maintenance
- catering wastes
- domestic and office wastes
- textile, plastic, rubber and metal from aircraft refurbishment

The wastes have to be managed after segregation and identifying the method of management. Recycling of wastes such as paper, glass (produced from terminals and aircraft caterers), metal (at aircraft maintenance site), plastics (from aircrafts, terminals and offices), wood, waste oil and solvents (from maintenance and engineering operations), kitchen wastes and vegetable oils (from caterers) is to be effectively carried out.

After initiating the mitigation measures in construction phase, the solid waste is of importance to the soil in operational phase. The oily sludge from ETP and garbage are to be disposed off.

5.11 Energy Considerations

Airports are significant resource users in terms of energy consumption during the operational and construction phases. The main use of energy in airports include

- aircraft and vehicles,
- construction activities
- heating, ventilation and air conditioning systems

- lighting, both externally, (runway, airfield and roads) and internally (terminals, offices and other buildings)
- passenger and baggage handling facilities

This requires considering the use of potential alternative energy sources. This could include energy generation on-site, use of alternative energy fuels, construction of green building in case of new airports, installing low energy lighting systems within the terminals and office spaces etc.

ENVIRONMENTAL MONITORING PROGRAMME

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 & procurement schedules). The details include summary matrix of environmental monitoring during construction and operation stage; requirement of monitoring facilities and 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.

6.1 Post Project Monitoring

(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 needs to include

- Air pollution and meteorological data
- Compilation of emission inventory to quantify airport sources and the contribution to regional emissions
- Compilation of the emission inventory for aircraft sources should be undertaken.
- Storm water drain and check dams may be constructed to arrest the flow of silt loads emanating from airport during monsoon season.
- Ground water down stream of airport will be monitored. Heavy metal monitoring in surrounding wells and lakes should be taken up if necessary.
- Noise level monitoring by online integrated noise meters within airport premises continuously. This meter will be connected to central monitoring station where all the data is stored and processed.

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

- Submission of half yearly compliance report in respect of the stipulated prior environmental clearance terms and conditions in hard and soft copies to the regulatory authority concerned, on 1st June and 1st December of each calendar year
- Submission of environmental statement for the financial year ending 31st March to the concerned regulatory authority on or before 30th September every year
- Submission of Water Cess returns in Form 1 as per Rule 4 (1) of Water (Prevention & Control of Pollution) Cess Rules 1978 on or before the 5th of every calendar month

7

ADDITIONAL STUDIES

7.0 General

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

7.1 Items Identified by the Proponent

The proponent may be able to identify issues beyond those included in the common TOR as may be specifically considered by him important from environmental point of view for the proposed project or site selected. 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 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 Surface Access to Airport

The aim of the study is two fold.

- Improving the efficiency of Road Access.
- Reducing the emissions of pollutants and green house gases.

Road Access

Every airport does require a well-planned network of access roads. These may incorporate roads dedicated purely for airport access as well as other, non - dedicated roads. The access road network must also have sufficient capacity to cope with peak hour traffic to and from the airport. Hence, study on capacity of existing Highways leading to airport and of the proposed dedicated roads to the airport is to be undertaken. This involves,

- Study of Baseline conditions of traffic,
- Projected Demand of traffic,
- Assessment of Road capacity,

Reduction of Pollution & Carbon:

The use of cars as the dominant mode for accessing airport is, coming under greater scrutiny particular with local community. Key issues include;

- More congestion, delays, unreliable journeys and road casualties,
- Emission pollutants reducing local air quality and potentially affecting the health of local community,
- Generation of additional noise associated with traffic.

To obviate these impact, decreasing the proportion of journeys to the airport made by private car with increasing the share of journeys made by other modes including busses and coaches, trains and light rail, taxis and private hire vehicles, bicycles, walking and combinations of these modes. The most effective way in which to minimise the environmental effects related to airport surface access is to reduce the level of private car use through promotion of alternate modes.

Considering the associated problems in Rail link, taxi service, the best mode of passenger pick up is through coach and Bus services. Key factors that influence the choice to travel by coach are quality and reliability of service, frequency of and provision of information out a particular service, and the time of travel from pick up to the airport.

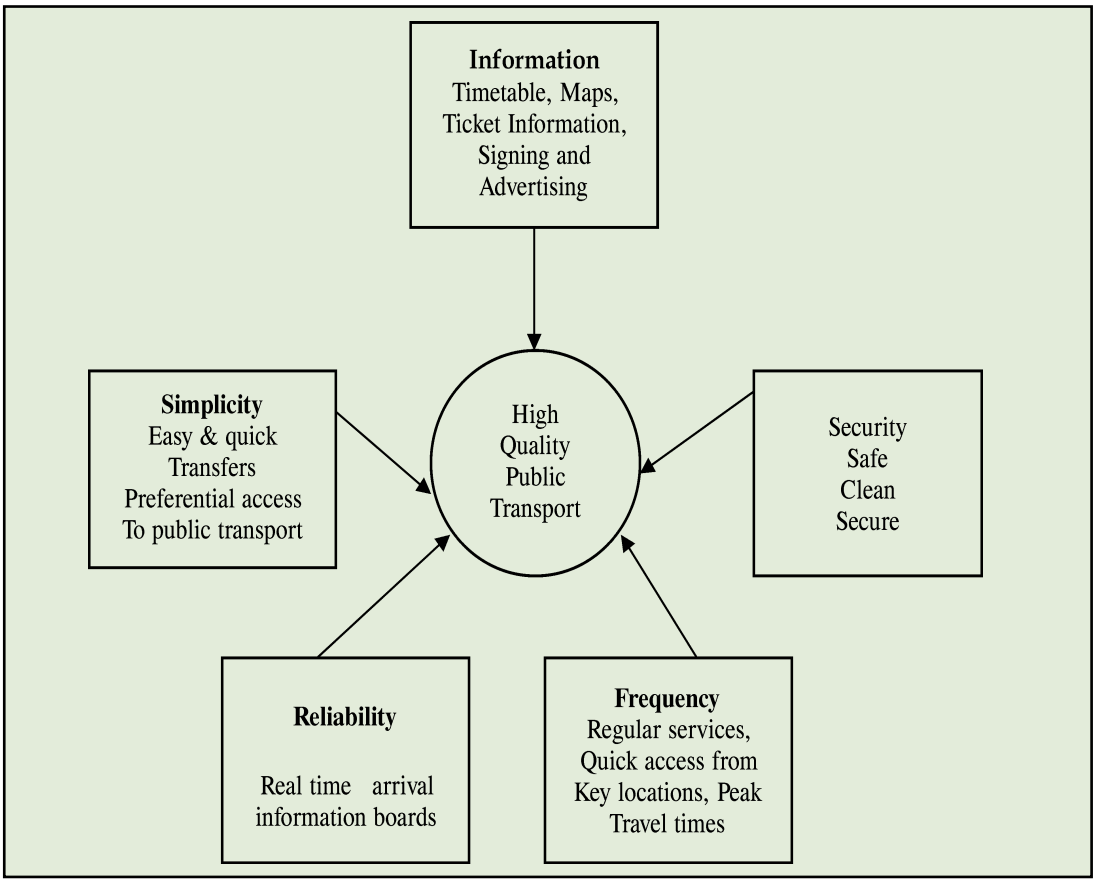


Fig. 7.1 Key Criteria for Successful Public Transport

Rail Link

Availability of Rail link to airport is further advantageous from pollution angle, provided its option is made more attractive to passengers by -

1. Quick and early access to airport terminal from airport rail station,
2. Discount for airline passengers using trains to get to or from airport,
3. Baggage transfer service between trains and aircraft taking into account, security concerns over control of checked luggage,
4. Competitive fares and ticketing agreements between airlines and rail operators that consolidate rail and air tickets.

The use of through - ticketing to link air and rail or bus services encourages the use of mass transit over private cars because it can offer,

- Reduced connection times,
- Comfort and security from already having a ticket,
- Convenience of having tickets for all segments of a journey in a single booklet,
- Single payment for entire journey avoiding the need for foreign currency immediately on arrival and,
- Potential savings from special tariffs and promotional arrangements.

The promotion of rail services should therefore be a primary aim of the travel plan wherever possible

7.5 Risk Assessment

Hazards & Risks

Hazard analysis involves the identification and quantification of various unsafe conditions (hazards) that may exist at an airport. Risk analysis on the other hand involves identification and quantification of risks to airport personnel, facilities and equipment due to accidents resulting from the hazards present.

At airports hazard occurrence may result in,

- Fire and / or explosion
- Leakage of flammable material
- Release of toxic material

Fuel

Fuel Storage at the Airport:

Two types of fuel are stored in underground tanks.

- Aviation Turbine Fuel (ATF) including under ground Fuel Hydrant system,
- HSD for ground service vehicles and DG set.

Chemical Storage

- Identification of Major hazardous units based on Manufacture, storage and import of hazardous Chemical Rules 1989 (amended in 2000) of GOI. E.g. Flammable substances, unstable substances and Toxic substances as rated in NFPA codes 49 and 345M,
- Identification of hazardous units and segments of Airports and Storage units based on relative ranking technique. Fire -explosion and Toxicity Index (FEDTI).

Preliminary Hazard Analysis for Process and Storage Areas at an airport and also for the whole airport is shown in Table 7.1. Assessment, relevance and reliability of analytical methods and framework used in risk assessment are given in Annexure 8.

Leakage of hazardous material due to accidents can be assessed by models and Maximum Credible Accident Analysis (MCAA). The out puts are damage distances of heat radiation, toxic releases, vapour cloud explosion etc.

Damage Criteria: The fuel storage and the supply pipelines may lead to fire and explosion hazards. This may release hydrocarbon, which does not contaminate soil and also is not toxic as it vaporizes slowly without leaving a residue.

Damage due to Fire from Flammable Liquid i.e. (ATF, HSD): The damage is mainly due to thermal radiation intensity and lethality is shown in Annexures 9.1 and 9.2.

Damage due to Explosion: It is sudden and violent release of energy accompanied by the generation of pressure wave which causes injury to people and damage to property and death to people in close proximity. (Boiling Liquid Expanding Vapour Explosion (BLEVE) or Vapour Cloud Explosion (VCE).

BLEVE Fire ball is combination of fire & explosion due to overheating of a pressurised vessel by primary fire.

Vapour Cloud Explosion is due to confined (in a vessel & pipeline) or unconfined explosion (in open air). The peak pressures in confined explosion reach hundreds of k Pa while in unconfined it is few k Pa.

Damage due to Hazards at ATF Store and HRD Store at Airport:

- Model simulations reveal that leakage at HRD store causing fire will be 100% lethal within 18 metres and 50% lethal with in 23 metres. Vulnerable zone within abnormal heat is within 34metres.
- BLEVE- fireball due to failure of ATF storage is 100% lethal within 72metres and 50% lethal with 111metres. Safe distance is 565metres.
- Safe distance for pool fire (leakage) at ATF storage is 436 metres and that at HSD storage is 109metres.

Design consideration for Hazardous material storage:

The implication of the above observations is that

- The location of ATF storage tank and HSD storage tank should be well within the Airfield taking into consideration the safety distance for population outside airfield, workers and equipment within airfield.

- The design consideration should be as per maximum fuel storage planned. The Dyke wall should be constructed as per standard norms for the capacity of tank keeping in view the meteorological and local factors within the airfield.

7.6 Disaster Management Plan

Emergency planning is an essential part of overall loss control programme for effective management of an accident / incident to minimise losses to people and property both in and out side the airfield.

Prevention Measures

These include formulation of technical and organisational measures for

- Controlling leakage of hazardous materials out of the facility
- Implementing proactive and reactive measures against threats to the safety of personnel and property.

Standard Operational Procedures(SOPs) & Action Plans and Resources

The preventive measures can be implemented successfully, provided the organisation is aware of the plan of action, the responsibilities and the requirement of resources. Hence, standard operational procedures, Action plans highlighting what is to be done and by whom and inventory of the resources required are important. These also include the discussion of role of Government organisations and those agencies under Mutual Aid Scheme.

7

Emergency Planning at Airport:

The objectives of Emergency plans are to,

- Rapidly control or contain hazardous situation.
- Minimise the risk and impact of accident
- Rescue and rehabilitate affected persons and prevent damage to property.

To action this, the following are required:

- Accurate and early detection of emergency,
- Command, co-ordination and response of organisational structures along with efficient trained personnel.
- Resource availability
- Appropriate Emergency response actions,
- Effective communication facilities,
- Regular review and update of plan,
- Proper training of concerned personnel.

Organisational Structure

- Airport in-charge is responsible for maintaining distribution and control of the plan and for review and revision of procedures,
- Safety in-charge is responsible for training of personnel on the drills and their adequacy,
- All employees and occupants are responsible for carrying out their responsibilities as per the plan.

Emergency Response at Airport

This includes:

- Accident initiation and raising the Alarm by Emergency control centre,
- Accident evaluation and classification of on site emergency by the Airport Director.
- Declaration by the Director to initiate action for mitigation and taking over from ATC Sr. Manager for control operations.
- Off site and External Agency Notification by Director,
- Implementation of on site response actions,
- Protective actions and evaluation, co-ordination of Response Actions with External agencies, Management of emergency resources by Emergency Operations centre located at ATC through various action addressees specified in SOPs.

Recovery

After termination of the emergency, the Director in conjunction with facility activities to normal management, establishes a Recovery organisation to manage those activities necessary to return to normalcy.

7.7 Rehabilitation and Resettlement (R&R) Plan

Impact on Economy & Environment:

Rehabilitation and Resettlement covers total families displaced due to project construction and villages affected. Impact assessment and mitigation measures proposed are to be tabulated.

Detailed R&R plan with data on the existing socio-economic status of the population in the study area and broad plan for resettlement of the displaced population is to be given. The site for the resettlement colony is to be earmarked. Alternative livelihood concerns/employment are to be addressed. Rehabilitation of the displaced people, civil and housing amenities being offered and the schedule of the implementation of the project specific R&R Plan may be prepared. Details of provisions (capital & recurring) for the project specific R&R Plan may be given. These include the financial help, employment; vocational training etc; due to loss of land, jobs, profession and livelihood. The commitment of project proponent in this regard may be recorded and expenditure may be budgeted.

In addition to the benefits derived during construction phase as per implementation of R&R plan, the population will get more employment during operational phase, mainly skilled and semi- skilled jobs. The environment 5km around airport may be more urbanised with cost of living going up. However, with increase in income this is off set. All the project-affected persons should be counselled to use the 'Rehabilitation Grant' received carefully, for future settlement. Settlements may increase due to influx of people in search of employment from outside. Civic amenities will improve in terms of power, drinking water, health care, education, communication and other infrastructures.

On the other hand flight safety hazard sources such as, slaughterhouses, which promote bird activity in airport vicinity and high-rise buildings, which form obstructions for aircraft operations, may develop. New small-scale industries may crop up in the surroundings, affecting the ambient air and water quality. Awareness of these hazards " and their role in aviation will make the population realise their social responsibilities.

8

PROJECT BENEFITS

8.0 General

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 of addition of project infrastructure, ancillary industries that may come up on account of the project
- Improvements in the social infrastructure like roads, railways, townships, housing, water supply, electrical power, drainage, educational institutions, hospitals, effluent treatment plants, improved waste disposal systems, 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 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.

8.1 Socio-Economic Benefits of the Project Mainly Include

- provision of additional revenue generation in terms of foreign exchange earned from operations,
- Triggering growth in the region;
- provision of additional employment;
- development of ancillary industries and trade centres;
- improvement in quality of life, flight safety awareness and literacy of people in the area and
- promote direct foreign investment in the region due to access to international markets

9

ENVIRONMENTAL COST BENEFIT ANALYSIS

9.0 General

If recommended by the Expert Appraisal Committee at the Scoping stage i.e., deciding upon the TOR, this chapter should include the Environmental Cost Benefit Analysis of the project.

9

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

10.0 General

The objective of Environmental Management Plan is to:

- Monitor the effectiveness of mitigation measures
- Ensure efficient operation of mitigation measures
- Establish systems and procedures for this purpose
- 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 set up 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
- EMP to comply the standards and code of practices modified under E (P) Act 1986
- Approach towards voluntary compliance should be explained ISO 14001

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 to be carried out periodically

The Environmental management plan should include:

- checking the final design documents to ensure they incorporate the management measures.
- Monitoring the construction and interacting with the contractor to ensure an understanding of compliance with the constraints involved with the Environmental protection or mitigation measures during construction and,
- Following construction, continuous monitoring during project operations to ensure that the project meets its environmental goals, and to initiate needed modifications to the project design or operations for this purpose.

11

SUMMARY AND CONCLUSIONS

11.0 General

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

- Introduction
- Project Description
- Description of the Environment
- Anticipated Environmental Impact & Mitigation Measures
- Additional Studies
- Project Benefits
- Important Aspects of the Environmental Management Plan and
- Important Aspects of the Environmental Monitoring Programme
- Disclosure of Consultants Engaged

DISCLOSURE OF CONSULTANTS ENGAGED

12.0 General

The team of consultants engaged in the project is to be given with brief resume of team mem bers and nature of consultancy rendered. 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

Airfield

An area of ground where aircraft can take off and land

Aerodrome

A defined area on land or water (including any buildings, installations,and equipments) intended to be used either wholly or in part for the arrival, departure and surface movement of the aircraft

Aerodrome Traffic Circuit

The specified path to be flown by aircraft operating in the vicinity of an aerodrome

Aerodrome Taxi Circuit

The specified path of aircraft on the manoeuvring area during specific wind conditions

Airport

An area consisting of a set of runways and buildings where non-military aircraft can take off and land

Airbase

Base for military aircraft

Airport Reference Point / (Aerodrome Reference Point) (ARP) :

A point on the airport designated as the official airport location.

Apron

A defined area on a land aerodrome intended to accommodate aircraft for the purposes of loading and unloading of the passengers, mail or cargo, fuelling,parking or maintenance

Apron Taxiway

A position of a taxi way system located on an apron and intended to provide a through taxi route across the apron

Aircraft Taxi Lane

A portion of an apron designated as a taxiway and intended to provide access to aircraft standards only

Aircraft

Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against earth's surface

Air Traffic

All aircrafts in flight or operating on the manoeuvring area of an aerodrome

Air Traffic Service

A generic term meaning variously, flight information service, alerting service, air traffic advisory service (air traffic control service, approach control service or aerodrome control service)

Approach Funnel

A specified airspace around a nominal approach path within which an aircraft approaching to land is considered to be making a normal approach

Airway

A control area or portion thereof established in the form of a corridor equipped with Radio navigation aids

ATS Route

A specified route designated for channeling the flow of traffic as necessary for the provision of air traffic services

Final Approach

That segment of an instrument approach procedure in which alignment and descent for landing are accomplished

Glide Path

A descent profile to determine for vertical guidance during final approach

International Civil Aviation Organization (ICAO)

A specialized agency of the United Nations whose objective is to develop the principles and techniques of international air navigation and to foster planning and development of international civil air transport

International Airport

Any airport designated by the contracting State or whose territory it is situated as an airport of entry and departure for international air traffic where the formalities incident to customs, immigration, public health animal and plant quarantine and similar procedures are carried out

Instrument Landing System (ILS)

It is designed to provide an approach path for exact alignment and descent of an aircraft on final approach to a runway

Landing Area

That part of a movement area intended for the landing or takeoff or aircraft

Movement Area

That part of an aerodrome to be used for the takeoff, landing and taxiing of aircraft, consisting **of** the manoeuvring area and the Apron(s)

Rapid Taxiway

A taxiway connected to a runway at acute angle and designated to allow landing aeroplanes to turn off at higher speeds than are achieved on other taxiways and thereby minimizing runway Occupancy times

RADAR: (Radio Detection and Ranging)

It is a surveillance system whereby radio waves are transmitted into the air and then received when they have been reflected by an object in the path of the beam to detect its range and direction

Runway

A defined rectangular area on land aerodrome prepared for the landing and takeoff of aircraft

Taxiing

Movement of an aircraft on the surface of an aerodrome under its own power, Excluding takeoff and landing

Taxiway

A defined path on a land aerodrome established for the taxing of aircraft and intended to provide a link between one part of the aerodrome and another including aircraft stand taxilane, apron taxiway and rapid exit taxiway

Touchdown

The point where the normal glide path intercepts the runway.

TABLES

Table 1.1 Air Traffic Projections

Existing Traffic in the year: ----------		
Domestic traffic	=	A (Embarking+ Disembarking +Potential passengers from other modes of transport) - B (Transfer from Domestic to International)
International traffic	=	C (Embarking + Disembarking + potential passengers from other modes of transport) + B (Transfer from Domestic to International)

Table 1.2 Forecast Traffic

Forecast Traffic	Annual Growth Rate Rate	Period	Forecast at the end of Period -
Domestic	R%	n yrs	(A-B)(1+R/100)*n
Inter	S%	n yrs	(C+B)(1+S/100)*n

Table 1.3 Peak Demand in Aircraft Movement Per Annum from The End of Period

(a) Large Aircraft (Type/Capacity) - 747/360 A330/260

(b) Medium Aircraft (Type/Capacity) - A320/165 B737/145

(c) Forecast Passengers International - Y
During the year Domestic - X

(d) number of days during peak month of traffic - n

Sl No	Forecast Details (ICAU)	International Aircraft B/747, A-330, A-320	Domestic Aircraft A-330, A-320, B-747
1	Capacity Average	255	190
2	Average Occupancy	60%	66%
3	Average Seats per air craft	153	125
4	No. of operations per Annum	Y/153	X/125.4
5	Peak Month operation (Dec)@ 10% of (4)	Y/153x0.1	X/125.4x0.1
6	Operations in Average Day of Peak Month (ADPM)	$Y/153 \times \frac{0.1}{n}$	$X/125.4 \times \frac{0.1}{N}$
7	Peak hour operations @ 20% of ADPM	$Y/153 \times \frac{0.1x0.2}{n}$	$X/125.4 \times \frac{0.1x0.2}{n}$
8	No of flight per million passengers during peak hour of the year (Y = 1000000)	131/ n	160/n
9	Peak hour passengers @ 23% of ADPM per International flights and 20% of ADPM per domestic flights	Y/n x 0.1 x 0.23	X/n x 0.1 x 0.20
10	No of passengers during peak hour per million passenger during the year	23002/n	19995/n

Table 1.4 Forecast Cargo Traffic (Y = 1000000)

Existing Cargo in MT for Export	=	D + (Actual)	E (Potential)	=	P (MT)
for Import	=	F + (Actual)	G (Potential)	=	Q (MT

Period	Annual Growth Rate		Quantity in MT	
	Export	Import	Export	Import
T years	K%	L%	$P\left(1+\frac{k}{100}\right)^{t}$	$P\left(1+\frac{L}{100}\right)^{t}$

Table 2.1 Key Design Features of Proposed Airport

Facility			Key Design Features
1	Civic Airport		
	(a)	Runway	Description, Handling Capacity, Restrictions, Nav aid
	(b)	Taxiway	Description, emergency usage
	(c)	Rapid Exit Taxi	Special feature if any
	(d)	Other Taxi ways	Special feature if any
	(e)	Parking Apron	Facility for Latest new air craft
	(f)	Maintenance	Special Features
2	Terminal Building		Area, Sealing Capacity in various phases, Aerobridges, security system, elevators Escalators, Walkalators, Baggage handling system, Flight info system, CCTV, Air conditioning.
3	Cargo Terminal		Logistics and redistribution
4	Communication, Navigation and Surveillance systems		ILS, Lighting system, RVR measuring.
5	Infrastructure		Main Access Road, Other Access Road, Aside Road, Rail Link, Water and Power Supply
6	Fuel Farm		Fuel farm design in collaboration with others
7	Car Park		Features for handling Peak capacity
8	Other facilities		Housing, maintenance workshops, offices, crash Rescue & Fire Fighting Station. ATC control tower, Ware house for Retail depot.
9	Miscellaneous		Ground Handling Equipment, CRF Eqpt, Fire detection alarm and Fire Hydraulic, Met equipment
10	Airport Management Systems		Monitoring of all operational, security and lighting equipment. Automation of storage and Retrieval systems.

Table 2.2 Features of Proposed Airport

Sl No	Description	Details
1	Runways, Length, Width, Orientation and NAV AIDS & Nos	
2	TAXI WAYS - Full length parallel length & Width & Nos.	
3	Taxi ways - Rapid Exit Length, Width & Numbers	
4	Other Taxi ways - Apron Taxi way, cargo Taxiway, Main Taxi way, General Aviation	
5	Apron Facilities, Aero Bridges, Cargo, Remote Parking, VIP, Maintenance and isolation	
6	Cargo Terminal - Capacity (MTPA)	
7	Passenger Terminals - domestic, International, Capacity, area, Peak hour Capacity	
8	Maintenance Hangars	
9	Car Park	
10	Access	
11	Ancillary Projects - Fuel Arm, Logistics Center, Hotel, Convention Center, Free Trade zone, Restaurants, Aviation Training, Flight Catering Centre, aircraft Maintenance etc.	

Table 4.1 Physical Properties of Soil

Station Code	Colour	Texture	Water Holding Capacity (%)	Porosity (%)	Sand (%)	Salt (%)	Bulk Density gm /cc	Permeability ml
S1								
S2								
S3								
S4								

Table-4.2 Chemical Properties of Soil

Parameters	Samples					
	S1	S2	S3	S4	S5	S6
pH						
Potassium						
Sodium						
Sodium Absorption Ratio						
Cat ion exchange capacity						

Table No. 4.3 Description of Ground Water Surface Water Sampling Locations

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

Table No. 4.4 Description of Ambient Air Quality Monitoring Stations

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

Table No. 4.5 Analysis of Ambient Air Quality

Monitoring Station Category (R,I,S)	Category of Station	Min.	Max.	Mean	95 Percentile	Min.	Max.	Mean	95 Percentile	Min.	Max.	Mean	95 Percentile	Min.	Max.	Mean	95 Percentile	Min.	Max.	Mean	95 Percentile

R - : Residential Area
I - : Industrial Area
S - : Sensitive Area

Table No. 4.6 Description of Noise Monitoring Stations

S. No	Locations	Class*	Average Day noise level (dBA)	Average Night noise level	Day time (6.00 A.M. to 10.00 P.M) Standard (Leq in dBA)	Day time (10.00 P.M. to 6.00 A.M) Standard (Leq in dBA)	Remarks

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

Table 4.7 Demographic Profiles of the Villages in the Atudy Area

Sl. No.	Demographic Feature	Study Area	Share in total Population (%)
1.0	Total Population		
2.0	Households		
3.0	Occupation		

Table 4.8 Other Infrastructural Facilities Available in the Study Area

Sr. No.	Name of the village	DWF	Tp	W	T	TW	HP	R	C	L	S	O	PO	TO	PT	P	B	RS	NW	CB	CoB

Note:

DWF : Drinking Water Facility
Tp ; Tap
W : Well
T : Tank
TW : Tube Well
HP : Hand Pump
R : River
C : Canal
L : Lake
S : Spring
O : Others
PO : Post Office
TO : Telegraph Office
PT : Post & Telegraph Offices
P : Phone
B : Bus
RS : Railway Service
NW : Navigable Waterways
CB : Commercial Bank
CoB : Co-operative Bank

Table 5.1 Emission From Petrol Driven Vehicles (2/3 Wheelers and Light Duty Vehicles LDVS) (With Reference Mass >350 kg, 1020-1250 kg and speed 40 km/hr)

Pollutant	MoEF Standard gm/km (1)		Emissions g/s/vehicle=1xspeed/3600 (2)		Total Emissions g/s=2xvehicles Nos. (3)	
	2/3 wheeler	Light Duty	2/3 wheelers	LDVS	2/3 Wheelers	LDVS
CO	40	19.7				
HC	15	2.7				

Co - Carbon Monoxide
HC- Hydrocarbon

Table 5.2 Emission from Diesel Driven Vehicles (Trucks/Busses and speed 30 km/hr) (Reference from 125 HP Engine and speed 30 km/hr) Format

Pollutant	**MoEF Standard gm/km vehicles (gm/kwh) (1)**	**Emissions (g/s vehicle) 1x HP x 0.746/3600 (2)**	**Total Emissions (g/s) = 2 x vehicles Nos. (3)**
CO	19		
HC	3.8		
NO_x	18		

NO_X - Oxides of Nitrogen

Table 5.3 Total Emissions From All Vehicles (From Tables 5.1, 5.2)

Parameter / Type of vehicle	Units	Value		
	-	Petrol Driven		Diesel Driven
	g/s	2/3 Wheelers	LDVS	Trucks/Buses
CO	"			
HC	"			
NOx	"	Not specified	Not specified	

Table 5.4 Emissions From Dg Stack

Parameter	Emission rate (gm/sec)
Particulate Matter	Emission Rate (gm/sec) = Emission limit (mg/Nm3) * flow rate (Nm3/hr)
CO	Emission Rate (gm/sec) = Emission limit (mg/Nm3) * flow rate (Nm3/hr)
NOx	Emission Rate (gm/sec) = Emission limit (mg/Nm3) * flow rate (Nm3/hr)
SO2:	Emission rate (gm/sec) = Stack exit gas flow rate (Nm3/hr * percentage of Sulphur in HSD x HSD density x Conversion factor 64/32

SO2 -Sulphur dioxide

Table 5.5 Resultant Concentrations Due to Incremental GLC (Base line value + Predicted Airport Value)

Pollutant	Max AAQ Concentrations Recorded during the Study Microgram/m^3)	Predicted Incremental (Max) Concentrations due to Airport Microgram/m3 (Aircraft+DG+Traffic in Airport)	Resultant Concentration (Microgram/m^3) during Post Project Scene (Max)
PM SO_2			
NO_x			
CO			
HC			

PM - Particulate Matter(10, 2.5).

Table 5.6 Record of Daily Traffic at Site

Date and Location	Traffic Category and AV Speed					Passenger Car Units (PCU) per days
Truck/Bus (MF= 3.0)	LCV (MF=1.0)	Car/Jeep (MF=1.0)	MAV (MF=3.0)	2/3 Wheeler (MF=0.5)	Others Tractors (MF=3.0)	(Factors Truck 3.0, Tractor 3.0; LDV-1.0, 2/3 wheelers 0.5)

MF - Multiplication factor

Table 5.7 The Peak Daily Traffic Case

Aircraft	Departure/Day	Approaches/day	Distribution of both departure and approach in %		
			Day Time (0700-1900)	Evening (1900-2200)	Night (2200-0700)
Peak Daily Traffic : Domestic = Nos			International = Nos		

Table 5.8 Post Project Noise Levels

Location of Noise Measurement	Pre Project Noise Level (Leg) dB(A)		Incremental Noise Levels Due to Project* (L max) dB (A)	Post Project Noise Levels (Leg) dB(A)	
	Day	Night		Day	Night

Night time values are computed with additional penalty of 10 dB (A)

* Integrated Noise Model (INM) version 6.0 developed by Federal Aviation Administration (FAA) office of environment and energy USA may be used till CPCB / MoEF come out with their recommended model.

Table 7.1 Preliminary Hazard Analysis For Process And Storage Areas And For Whole Airport

Source	Process	Potential Hazard	Provisions
DG Set	Production of Electrical Energy	Fire hazard in Lube oil system, cable gallery short circuit	Standard Cables to be used, Fire detection system to be used
Power Transfer unit		Fire and explosive	-do-
Switch Yard Control Room	220 KVA switch yard	Fire	-do-
ATF & HSD Storage Area	Fuel Storage for Aircraft, ground vehicles	Fire & Explosive	Precautions as per TAC, OISD to be followed. Fuel Hydrant system for Aircraft refuelling. Fire Detection alarm system.
Compressor House	Airport operation	Governor failure due o the failure of pins and springs leading to opening of safety valves & source ignition	Design precautions to be followed in manufacture and erection. Fire Detection Alarm system to be used.
Buildings	Electrical short circuit Eventually source ignition	Fire	All electrical fittings and cables will be provided of standard quality. All motor starters to be flame proof.
Chemical Store	Inflammable chemicals in Stores	Fire in Storage Areas due to inflammable nature of chemicals	Fire extinguishers at potential points. Fire Hydrant network as per TAC guidelines. Fire detection system.

ANNEXURES

Annexure 1
Terms of Reference (TOR) for environmental impact assessment of AIRPORTS

Objectives

Terms of Reference (TOR) for preparation of Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for Airport Development / Expansion / Modernization are prerequisites for obtaining Environmental clearance as per the EIA notification of September 2006 as amended December 2009 by Ministry of Environment and Forests (MoEF) GOI. They have been devised to improve the quality of the reports and make decision-making process transparent and easy. TOR will help the project proponents and consultants to prepare the report with relevant project specific data, which are precise, concise and easy to comprehend. TOR for Airport Development/ Expansion/ Modernization is expected to cover all environmental related features.

General Information

Airports are classified as international, domestic with customs facilities and domestic airports. Aviation compared to any other mode of transport, has grown rapidly and made significant contribution to the economic development of countries world over. Development / expansion / modernisation of airport facilities (referred as Project) are a right step towards meeting that end. Associated with the economic benefits, they may also create adverse impact on the surrounding environment during construction, operational and post operational phases of the project. These include pollution in land, air, water, noise, biological, socio-economic and health environments. The project development and operation should therefore be planned with careful consideration of their environmental impact. To minimise these adverse effects that may be caused by the project and to identify suitable alternate methods /sites; techniques of Environmental Impact Assessment became necessary.

1.0 Introduction

Airport development / expansion / modernisation is listed at Para 7 (a) of the schedule of list of projects dealing with physical infrastructure in MoEF notification as amended December 2009. It is a category 'A' project as stipulated in the EIA notification 2006. Prior environmental clearance before starting any Construction work or preparation of land except for security the land is mandatory for this project.

This chapter shall cover purpose of the project, details of project proponent, brief description of the project; name, nature, size, location of the project and its importance to the region.

Profile of the Project Proponent, name and contact address, Implementing Organization, Organizational Chart, Project consultants etc., should be mentioned clearly.

Land description/ plot/ survey / khasra nos, village, tehsil, district, state & extent of the land must be mentioned clearly.

Description of existing National/State environmental laws/ regulations on the proposed activity with annexure giving their references is to be brought out clearly.

Any litigations pending against the proposed project site and / or any directions or orders passed by any court of law against the project are to be detailed out.

In case of expansion/ modernization of the project, the environmental compliance status for the existing project should be explained.

In the beginning of the EIA report, the page numbers of various chapters, sections and sub-sections, tables, appendices, drawings and figures etc., with titles should be clearly indicated.

2.0 Project Description

The chapter should contain the broader details of the basic activities, location, lay out and implementation schedule of the project.

Background of the project may contain the following:

- Purpose of the project, goals and objectives of the proposed project
- Significance of the project both at local and national level and its contribution to national economy.
- Relevance of the project in light of the existing development plans of the region.
- Information on the proposed activity in the Indian context and its overall function.

Project details should include information related to:

- Project coverage, master plan, phasing and scope.
- Estimated cost of development of the project, environmental costs, funding agencies, whether governmental or on the basis of BOO or BOT etc
- Resources, manpower, time frame etc required for the completion of the project.

Essential Toposheets / Maps to be provided with TOR application

Topographical map

A map of the topo sheet of the study area (project area and area 10 km around its boundary) delineating the major topographical features such as land use, drainage, locations of habitats. Major constructions including roads, railways, pipelines, major industries, if any in the area are to be clearly shown.

A map of the study area covering aerial distance of 15 km from the proposed project boundary delineating environmental sensitive areas as specified in Form I of EIA notification of Sept 06.

Remote sensing imagery

Land use map of the study area to 1: 25,000 scale, based on recent satellite imagery of the study area delineating the cropping pattern, waste land, forest area and built up area may be prepared.

Digital Elévation Model (DEM) / Contour map

Contour map at sufficient or acceptable intervals as available in toposheets or as required for the study of project area and site plan of the area showing the various proposed break-up of the land may be prepared.

- Description of the project sites its geology, hydrology, topography, climate, connectivity by road/rail, demographic aspects, socio, cultural and economic aspects, villages, and settlements.
- Details of environmentally sensitive places, land acquisition and rehabilitation of communities/ villages with their present status. The siting criteria delineated by MoEF shall be discussed. Notified restrictions and limitations from environmental considerations etc., if any.
- Historical and climatic data such as climatic conditions, rainfall, wind pattern, history of cyclones, storms surges, visibility etc.,
- Layout plan of proposed project development , activity areas with facilities open to the sky such as runways, taxi/link taxi ways, aprons, drainages, sewage disposal, navigation facilities, communication facilities, airfield lighting, crash fire & rescue facilities, car parking, access/approach roads, refueling facilities, boundary wall, meteorological observatory, landscape, waste disposal etc;
- Layout plan of proposed development of built up areas with covered construction such as terminal buildings and associated facilities, air traffic control tower, Repair& Servicing(R&S) hangars, AC plants, DG set rooms, operational buildings such as RADAR and Instrument Landing System(ILS) structures, administrative buildings, utilities such as main and stand by power, water supply installations, cargo storage facilities, Petrol Oil Lubricant (POL) stores , Aviation Turbine Fuel(ATF) store and Bulk Petroleum installation.;
- In case of expansion/ modernization of the project, the environmental compliance status for the existing project shall be explained. If the potential impact on environment exceed the existing project limits fresh EIA process may be initiated before starting the project.
- Technologies involved for design, construction, equipment and operation are to be detailed.

3.0 Analysis of alternatives (Technology & Sites)

If the scoping results in need for alternatives a clear description of the each alternative, summary of the impact - adverse and positive with each site and selection of alternatives is to be detailed out.

4.0 Description of the Environment

Environmental data to be considered in relation to airport development would be: (a) land (b) ground water, surface water (c) air (d) biological (e) noise and vibration (f) socio economic and health environment.

Study area:

Primary data by measurements, field surveys and secondary data from secondary sources are to be collected in the study area within 10 km radius from Aero dome Reference Point (ARP). Beyond 10 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

Physiography and Drainage Patterns:

Land farms, terrain, may get affected due to construction of airport. It may require large scale quarrying, dredging and reclamation, which may cause changes in the topography. This in turn may affect the drainage pattern of the land / terrain.

Baseline data to be given on description of existing land area situation at the proposed project area including description of terrain hill slopes terrain features, slope and elevation. Study of land use pattern, habitation, cropping pattern, forest cover, environmental sensitive places etc., by employing remote sensing techniques and ground truthing is to be carried out.

Ecological features of forest area; agricultural land, grazing land, wildlife sanctuary land and national parks, migratory routes of fauna, water bodies, and drainage pattern including the orders of the drain and water sheds are to be shown clearly. Settlements in the study area may be delineated with respect to ARP on the site map. High rise buildings, industrial areas and zones, slaughter houses and other features of flight safety importance may also be marked on the map.

Soil

Land is one of the important and rare resources. Airport projects require considerable land area for development of activity areas, operational and non- operational buildings, areas for ancillaries, utilities including townships. Sometimes acquisitions of large stretches of land and areas being used by the local habitat may be necessitated requiring rehabilitation measures. Availability of land for earmarking for the airport without causing undue hardship to local habitat and their socio cultural and economic aspects is very important. Site suitability for developing airport is also to be approved by aerodrome standards, directorate in the DGCA, Ministry of Civil Aviation in accordance with Para (xi) of the Aircraft Rules 1937. Baseline data of the land and its availability is to be ascertained from local authorities, revenues records etc., Justification for the proposed quantum of the area to be given.

Soil data including type, classification, characteristics, properties, etc are important from engineering considerations for structures etc. Changes in soil parameters may also affect plantation and vegetation which in turn may endanger the health of habitat.

Baseline data consisting of soil analysis and land use pattern of agriculture lands within the project area is to be collected to assess its fertility. Data pertaining to coverage of land for other purposes and general slope of the terrain within the study area is collected to assess the trends in the land use patterns and the natural runoff patterns.

4.2 Water Environment

Ground water

Baseline data of ground water including data of pH, dissolved solids, suspended solids, BOD, DO, coliform bacteria, oil, fluorides, chlorides, heavy metals etc., to determine the quality of the ground water is to be estimated.

Surface water

Baseline data on location sources of surface water like water bodies, lakes, their dimensions, present quality and their utility to be provided.

4.3 Air Environment

Climatological Data: This is obtained from nearest India Meteorological Department (I M D) station for one full year. Micro meteorological data consisting of wind speed, wind direction, temperature, cloud cover, (amount and height), humidity, rainfall and wind rose, from primary and secondary sources in an area of 10km radius from ARP be obtained, on 24 hr basis.

Ambient Air Quality (AAQ) is important for the airport projects. The significance of aviation's impact on air quality will vary depending on many other factors such as, background pollution levels, other sources of pollution, weather and proximity of residential areas.

Aircraft engines produce emissions that are similar to other emissions resulting from any oil based fuel combustion. These, like any exhaust emissions, can affect local air quality at ground level. It is emissions from aircraft below 1,000ft, above the ground (typically around 3km from departure or, for arrivals, around 6km from touchdown that are chiefly involved in influencing local air quality. These emissions disperse with the wind and blend with emissions from other sources such as domestic heating emissions, factory emissions and transport pollution.

The local air quality relevant emissions attributed to aircraft operations at airports are oxides of nitrogen (NOx), carbon monoxide (CO), Unburnt hydrocarbons (NMHC and VOCs), sulphur dioxide(SO_2), particulate matter (PM10 and PM2.5).

Aircraft engines, auxiliary power units, apron vehicles, de- icing, and apron spillages of fuel and chemicals emit these pollutants. Local factors influence the significance of individual emissions for each airport, but often NOx is by far the most abundant and is considered the most significant pollutant from an air quality stand point.

Baseline data of these parameters extending over an area of 10km radial distance from ARP of the project by observation at a number of locations, predominantly in the windward direction duly taking into account changes in predominant wind direction in the monsoon period and changes in humidity in atmosphere. Specific importance is to be attached to areas in close proximity of project up to 3km is essential, considering the mobile source of emission such as aircraft.

4.4 Noise Environment

Noise pollution is created by airside sources such as aircraft, under their flight paths and also by landside sources such as, DG sets, surface traffic, heavy machinery and aircraft on ground in start-up, taxi, take off and ground run phases. This type of noise during daytime effects the workers' and local population's health in the long run. The existing noise levels before starting the construction of airport are to be measured for collecting baseline data. The process is to be repeated during construction and operational phases of as well.

Measurements should typically be taken as per by CPCB guidelines and recorded as dB(A) in an area of 10km radius from ARP. Hourly equivalent noise levels, Leq, for day and night separately are to be recorded once in each season. Monitoring should typically be conducted with frequency of measurements more along the runways, near residential areas and near ground sources. Locations, at which measurements were taken, should be noted on a base map. Recorded values can be presented in Tables.

4.5 Biological Environment

Airport operations may cause change in local ecosystems, threaten endangered species and disturb movements and breeding patterns of local wildlife. Existing biological conditions include the presence and distribution of indigenous and migratory animals, and indigenous plants. Known sensitivities of species of surrogate species should also be stated.

Baseline data on flora and fauna duly authenticated for study area should be furnished, based on field survey clearly indicating the Schedule of the fauna present. Data on sensitive habitats, wild or endangered species in the project area also is collected from Zoological Survey of India (ZSI), Botanical Survey of India (BSI), Wildlife Institute of India (WII) and Ministry of Earth Sciences.

4.6 Socio -Economic Environment

Airport development may often require relocation of the local community, sometimes causing ethnic, cultural, tribal or religious conflicts with local people. Industrialization and modernization may change the cultural traditions of the local community. Baseline data on demographics, settlements, infrastructure facilities in the existing and relocated area, economic conditions in the existing and relocated area, cultural and archaeological assets within the project area should be catalogued and plotted on a base map.

4.7 Solid Waste

The types of waste, which are generated, can be classified into construction or demolition waste and municipal waste, i.e., biodegradable and recyclable waste, hazardous waste and waste.

Details of authorized Municipal solid waste facilities, biomedical treatment facilities and hazardous waste disposal facilities in the area are to be given.

5.0 Anticipated Environmental Impact and Mitigation Measures

5.1 Prediction of impact

This 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, methods proposed to reduce adverse effects of the project, best environmental practices, conservation of natural resources; environmental management plan; post project environmental monitoring programme including budgeting for the expenditure proposed in the project cost. Reference to the models along with the inputs used may be given.

5.2. Land Environment

Physiography and drainage patterns

Anticipated Impact:

Impact of project construction/ operation on the land requirement/ use pattern is to be assessed by standard procedures. Affect of future growth of the airport facility and/ or of the ancillaries is to be carefully assessed by preparing master plans for the airport and the ancillaries. Impact on the public utilities arising out of the project activities and impact on the natural drainage system are equally important. Prediction of impact on the existing infrastructures like road network, housing, loss of productive soil and impact on natural drainage pattern is to be considered. Loss of agriculture land is to be estimated by super posing the project lay-out on the land use site map.

Mitigation Measures:

Mitigation measures to reduce adverse effects like adopting soil improvement techniques and adopting suitable methods to reduce land requirement are to be identified. Strengthening of road network, infrastructure to handle the increase in traffic, parking arrangements, integration of airport development with the local land use plan are to be considered. Conformance to statutory regulations is to be ensured.

Soil

Anticipated Impact:

Impact of airport construction / operation is to be assessed on the topography due to activities like large scale quarrying, filling of low lying areas with dredged spoil and burrowed material. Damage to green belt and plantation, changes in land use patterns, disturbance to existing protected areas like mangroves& forests and environmentally sensitive zones/areas, flooding due to filling up of low lying areas are to be assessed. Study on the trend of change in land use pattern for the last 10 years based on remote sensing data is to be made to establish trends in baseline data. Impact of the project construction / operation on the soil parameters, probability of settlement, subsidence, slides, surface drainage etc.is to be assed.

Mitigation measures:

Measures for holding storm / flood waters entering project area and construction of drainage lines are to be discussed. Measures for soil erosion at quarry / burrow sites from which soil is drawn for filling, during construction phase to be discussed. Phase wise plan of plantation and compensatory forestation clearly indicating the area to be covered under plantation and the species to be given. Details of the plantation already done to be given. To reduce adverse effects like adopting soil improvement techniques and adopting suitable design methods etc., are to be considered.

5.3 Water Environment

Anticipated impact:

Discharge of trade effluents and sewage, run off from cargo storages and toxic or harmful substances, and their percolation to underground water are to be assessed. Impact of airport operations on surface water sources, contamination due to cargo operations, impact on utility of surface water resources by the neighbouring colonies, impact on surface water flow (flooding) due to any anticipated obstructions and spillages etc. are some of the impact to be mitigated. Detailed water balance along with flow chart of water use for the airports is to be provided.

Mitigation measures:

Mitigation measures include paving the cargo areas, impervious roads, lined impervious drains; rooting surface drainage to settlement tank/ pits etc.., Protection measures to surface water resources during construction and operational phases along with identification and provision of alternatives for their conservation may be clearly mentioned.

5.4. Air Environment:

Anticipated impact:

The impact of project construction / operation on the ambient air quality on account of emissions of dust during construction and emission of gases from airside and land side sources such as aircraft, DG sets, surface traffic etc. in operational phases is to be assessed. Assessment of changes in AAQ parameters by suitable modeling techniques or empirical methods is to be resorted to. Prediction of fugitive dust / air emissions, prediction of point/line source emissions and emissions from the multi volume sources in the airport area is to be done in anticipation of increase in future air and surface traffic.

Mitigation measures:

Mitigation measures to reduce adverse effects during the construction stage and during the operation stage include alternative solutions such as closed conveyor system; lowering the emissions from the automobiles and the aircraft; institutional arrangements proposed with other agencies for effective implementation of environmental measures, applicable for environmental standards and compliance are to be proposed. Landscape development to mitigate the emission levels may be clearly mentioned.

Guidance on mitigation from airside sources, such as the procedures specified in ICAO Circular 303, AN176: and "Operational opportunities to minimize fuel use and emissions"; and the IATA "Guidance Material and Best Practices for Fuel Environmental Management" published Dec.2004 may be referred.

5.5 Noise Environment

Anticipated impact:

Impact on the noise environment is due to noise emitted by static and mobile sources from the groundside and airside are to be meduted. Noise pollution by static sources on ground are from aircraft in ground run, taxi mode and DG sets and machinery etc. Noise pollution by mobile sources is from aircraft engines and airframes under its flight path. Suitable modeling techniques may be used for prediction of noise levels.

Mitigation Measures:

Noise pollution can be controlled at the source of generation itself by employing techniques like control in the transmission path; installation barriers etc., Barriers between noise source and receiver can minimize the noise levels. Methods of reduction of noise from the airside sources are stipulated in chapter 3 standards in Annexure 16 of ICAO publication. Noise from DG sets may be reduced by provision of integral acoustic enclosure and by suitably modifying its dimensions. Certain proactive measures adopted in international practice, which act as deterrents for noise generation may be used.

5.6 Biological Environment

Anticipated Impact:

Impact of the projects during construction and operational phases, on the biological environment is to be assessed by suitable, empirical model studies. Effect of project on schedule-1 fauna and on fisheries due to displacement of water bodies if any is to be identified in the study area.

Mitigation measures:

In case of any Scheduled-1 fauna found in the area, the necessary plan for their conservation should be prepared in consultation with State forest Departments and details furnished. Measures adopted to preserve / relocate the water bodies as sources of irrigation and fisheries in study area be pointed. Phase wise plan of green belt near water bodies be provided. The expenditure may be budgeted in the project cost

5.7 Socio-Economic Environment

Anticipated Impact:

Impact on the local population, infrastructure facilities, utilities are a to detailed out.

Mitigation Measures:

Preservation of cultural, historical and religious sites to honour the sensitivities of the residents may be carried out. Measures of socio- economic benefits proposed to the local communities be provided by the project proponent.

5.8 Solid Waste:

Anticipated Impact:

Impact of the project construction / operation on generation of waste is to be assessed. Prediction of quantity of solid waste to be generated is waste is to be studied.

Mitigation measures:

Minimization of solid waste by using environmentally compatible disposable material; recycling of waste proper management and disposal of temporary structures, made during construction phase is to be done.

6.0 Environmental Monitoring Program

This chapter should include:-

- Summary matrix of environmental monitoring, during construction and operation stage of project
- Technical aspects of monitoring for achieving effectiveness in mitigation measures.
- Requirement of monitoring facilities
- Frequency, location, parameters of monitoring
- Compilation and analysis of data and reporting system

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 shall be provided.

7.2 Risk Assessment (ERA) and Disaster Management Plan (DMP)

Activities associated with airport 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 analysis may be carried out by specialists in the field and recommendations may be implemented. Some of the activities requiring attention under this category are

- Occupational hazards due to exposure etc.
- Fire and / or explosion
- Leakage of flammable material
- Release of toxic material

7.3 Natural resource conservation

Plan of action for conservation of natural resources and recycling of waste materials due to the project activity in the construction and operational phase of the project is to be discussed for open and covered area constructions. 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 project area and broad plan for resettlement of the displaced population, site for the resettlement colony, alternative livelihood concerns/employment for the displaced people, civil and housing amenities being offered, etc and the schedule of the implementation of the project specific R&R Plan if any is to be given. Details of provisions (capital & recurring) for the project specific R&R Plan.

8.0 Project benefits

This section details out the improvements in physical infrastructure, social infrastructure if any. Also it details out any employment potential and other benefits that are accrued if the project is taken up.

9.0 Environmental cost benefit analysis

The detailed environmental cost benefit analysis is to be taken up if recommended in the scooping stage of the project.

10.0 Environmental Management Plan (EMP)

Summary of potential impact and recommended mitigation measures are to be brought out. Budgeting for the EMP is also to be included in EIA.

- Administrative and technical set up for management of environment
- In built mechanism of self monitoring of compliance of environmental regulations
- 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, for arriving the site suitability

Awareness and Training Methodology of training imparted to field personnel may be specified.

Record keeping and reporting: Standard operational/administrative procedures for record maintenance and reporting may be prepared.

11.0 Summary & Conclusion (Summary EIA)

The summary should be a clear presentation of the critical facts that make up each issue, and the resolution of the issues. Whenever possible, the summary should make use of base maps, tables and figures. Information should be condensed into succinct, but meaningful presentations. It must be able to stand alone as a document. It should necessarily cover and brief the following chapters of the full EIA report and address the following:-

- Introduction
- Project description & Project benefits
- Environmental Examination
- Additional Studies
- Environmental Management Plan and Post Project Monitoring Program
- Environmental Risk Assessment (ERA) and Disaster Management Plan (DMP)

12.0 Disclosure of Consultants Engaged

The team of consultants engaged in this project is to be given.

Enclosures

Feasibility report/ Duly filled in questionnaire / Relevant figures and tables if referred as annexure in the text/ Photos, or plates of proposed project site, impact areas

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 3.6. Mangrove	3.5.1. Types of plantatin eg. teak, sal etc.
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 5.2	5.1. River / stream 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 • PM (10) • PM (2.5) • SO_2 • NO_x • Lead in PM	Nos. of sampling location to be decided	24 hourly twice a week @4 hourly. Twice a week, One non monsoon season 8 hourly, twice a week 24 hourly, twice a week	As per CPCB guidelines	Monitoring Network • Minimum one locations in upwind side, two sites in downwind side / impact zone • All the sensitive receptors need to be covered for core zone and buffer zone

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
• Peak particle velocity	150-200m from blast site	Once	PPV meter	
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 wastewater 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 specifications)	One season	Collected and analysed as per soil analysis reference	Analysis be done as per BIS specifications

Annexure 4.1

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	Cause hyperkeratosis & skin cancer
Cadmium, mg/l	< 0.001	< 0.005	Toxic
Total Chromium, mg/l	< 0.05	< 0.05	Toxic
Lead, mg/l	< 0.05	< 0.05	Physiological abnormality
Selenium, mg/l	< 0.01	< 0.01	Toxic symptoms similar to arsenic
Mercury, mg/l	< 0.005	<0.0005	Carcinogenic and poisonous
Phenols, mg/l	< 0.001	< 0.001	Toxic and cause taste and odour problem
Cyanides, mg/l	< 0.05	< 0.05	Physiological abnormality
PAH, mg/l	< 0.0002	< 0.0002	Carcinogenic
Total Pesticides, mg/l	< 0.001	< 0.0025	Trend to bioaccumulates & carcinogenic

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

Annexure 4.2

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

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

Annexure 5.1

Aircraft Emission Standards for Subsonic Engines Manufactured on or after 01-01-1983. (Ref: ICAO Annex 16 Vol-II PartIII, Chapt-2)

	(Sub sonic engines) before 01-01 - 1983	(ICAO Annex 16, Vol II Part III, Chap 2)
Serial Number	Parameter	Values
1	Hydrocarbons (HC) gm/KN	$Dp/F\infty = 19.6$
2	Carbon Monoxide (CO) gm/KW	$Dp/F\infty = 118$
3	Oxides of Nitrogen (NO_x) gm/KN	$Dp/F\infty = 40+2\pi\infty, 32+1.6\pi\infty$ HC - Total Hydrocarbon compounds of all classes and molecular wax hts contained in a gas sample,calculated as if they were in the form Methane. NO_x - The sum of the amounts of Nitric Oxide and Nitrogen dioxide contained in a gas sample as if Nitric odixe were in the form of Nitrogen dioxide
4	Smoke Number (SN)	$83.6 (F\infty)^{-0.274}$ or 50 which ever is lower

. as if the nitric oxide is in the form nitrogen dioxide

SN - The dimensionless term quantifying smoke emissions.

Dp - Mass (in gms) of gaseous pollutants (HC, CO, NOx) emitted during the reference emissions (LO) Cycle.

$F\infty$ - Rated output of the engine (in kilo newtons) in Max Thrust available for take-off under normal operating conditions at ISA sea level static conditions without use of water injections as certified.

- Pressure ratio i.e. ratio of Mean Total pressure at the last compressor discharge plan of the compressor to the mean total pressure at the compressor entry plane when the engine is developing take off thrust rating in ISA Sea Level static conditions (to which all engine performance should be corrected).

Annexure 5.2

Time and Thrust Setting for Reference L to (Landing, Take Off) Cycle

Phase	Time in Operating Mode (Mts)	Thrust Setting
Take Off	0.7	100% F
Climb	2.2	85% F
Approach	4.0	30% F
Taxi/Ground idle	26.0	7% F

Annexure 5.3
Emissions From Large/Medium/Small Aircrafts

Parameter	Units	Value		
Type of aircraft	-	B 747 - 400 (Large)	B767 - 400 (Medium)	A 330 - 300 (Small)
Engine Type	-	CF6-80C2B5F	CF6-80C2	CF6-80 EI
No of Engines	-	4	4	2
Rated output F				
Max Thrust				
	Kilo Newton	276	283	320
Smoke Number	-	17.9	17.8	17.2
TOTAL EMISSIONS (gm/Sec)				
Dp (HC)	gm/Sec	170.6	175.0	197.8
Dp)CO)	gm/Sec	1027.3	1053.4	1191.1
Dp (Nox)	Gm/Sec	609.4	624.9	706.6

Source: Emission Data Calculation based on ICAO Standard
(Ref: ICAO Annexure 16,Volume II part III, Chapter-2)

Annexure 5.4
National Ambient Air Quality Standards

S. No	Pollutants	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*	50	20	Improved west & Gaeke
		24 hours**	80	80	Ultraviolet fluorescence
2	Nitrogen Dioxide (NO_x), µg/m³	Annual*	40	30	- Modified Jacob & Hochhieser (Na - Arsenite) - Chemiluminescence
		24 hours**	80	80	
3	Particulate Matter (size less than 10 µm) or PM_{10}, µg/m³	Annual*	60	60	- Gravimetric - TOEM - Beta Attenuation
		24 hours**	100	100	
4	Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$, µg/m³	Annual*	40	40	- Gravimetric - TOEM - Beta Attenuation
		24 hours**	60	60	
5	Ozone (O_3), µg/m³	8 hours**	100	100	- UV Photometric - Chemiluminescence - Chemical method

6	Lead (Pb), µg/m^3	Annual*	0.50	0.50	- AAS/ICP method after sampling on EPM 2000 or equivalent filter paper - ED-XRF using Teflon filter
		24 hours**	1.0	1.0	
7	Carbon Monoxide (CO), mg/m^3	8 hours**	02	02	- Non-Dispersive Infra Red (NDIR) Spectroscopy
		1 hour**	04	04	
8	Ammonia (NH_3), µg/m^3	Annual*	100	100	- Chemiluminescence - Indophenol blue method
		24 hours**	400	400	
9	Benzene (C_6H_6), µg/m^3	Annual*	05	05	- Gas Chromatography based continuous analyzer - Adsorption and Desorption followed by GC analysis
10	Benzo(O)Pyrene (BaP) – Particulate phae 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 8 hourly or 1 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 limit specified above for the respective category, it shall be considered adequate reason to institute regular/continuous monitoring and further investigations.

(Source: As notified by CPCB in the Gazette vide No. b- 29016/20/90/PCI-I, dated. 18th November, 2009)

Annexure 6
Ambient Air Quality Standards in Respect of Noise

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

Guidance for Assessment Relevance and Reliability of Analytical Methods and Framework Used for Impact Prediction: Risk Assessment

Relevance		
Name	**Application**	**Remarks**
EFFECT WHAZAN	• Consequence Analysis for Visualisation of accidental chemical release scenarios & its consequence • Consequence Analysis for Visualisation of accidental chemical release scenarios & its consequence	Heat load, pressure wave & toxic release exposure neutral gas dispersion
HEGADIS	• Consequence Analysis for Visualisation of accidental chemical release scenarios & its consequence	Dense gas dispersion
HAZOP and Fault Tree Assessment	• For estimating top event probability	Failure frequency data is required
Pathway reliability and protective system hazard analysis	• For estimating reliability of equipment and protective systems	Markov models
Vulnerability Exposure models	• Estimation of population exposure	Uses probit equation for population exposure
F-X and F-N curves	• Individual / Societal risks	Graphical Representation

Annexure 9.1

Damage Due To Incident Radiation Intensity (World Bank Standards)

Sl No	Incident - Radiation (KW/m^2)	Type of Damage Intensity Damage to Equipment	Damage to People
1	37.5	Damage to process Eqpt	100% Lethality in 1 min.
2	25	Minimum energy required to ignite wood at indefinitely long exposure without a flame	50% lethality in 1 min. Significant injury in 10 sec.
3	19	Max. Thermal Radiation intensity allowed on thermally unprotected adjoining equipment	-
4	12.5	Minimum energy to ignite with a flame, melts plastic tubing	1% lethality in 1 min
5	4.5	-	Causes pain if more than 20 secs Blistering is unlikely
6	1.6		Causes no discomfort on long exposures

Annexure 9.2

Radiation Exposure And Lethality

Radiation Intensity (KW/m^2)	Exposure Time (Seconds)	Lethality (%)	Degree of Burns
1/6	-	0	No Discomfort even after Long exposure
4.5	20	0	1st
4.5	50	0	1st
8.0	20	0	1st
8.0	50	<1	3rd
8.0	60	<1	3rd
12.0	20	<1	2nd
12.0	50	8	3rd
12.5	-	1	-
25.0	-	50	-
37.5	-	100	-

Source: http://europe.osha.eu.int/good_practice/risks/ds/oel accessed December 2008

QUESTIONNAIRE

QUESTIONNAIRE FOR
ENVIRONMENTAL APPRAISAL FOR AIRPORTS

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 :

(b) Name of the authorized signatory :

(c) 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) :
- Nature of soil (sandy, clayey, sandy loam etc) :
- Seismic zone classification :
- Does the site falls under CRZ classification? :
- Land usage of the proposed project site :

Geographical Information of Aerodrome Reference Point: (ARP)

- Latitude :
- Longitude :
- G.T. Sheet No. (Survey of India Map No. :
- Elevation above Mean Sea level (metres) :
- Total Area proposed for the Project (in ha) :
- Nature of Terrain :
- Nature of Soil (Clayey, Sandy, salty, loam etc.,) :
- Permeability :

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 Disance (in Km)
1.	Protected areas notified under the wild life (Protection) Act, 1972		
2.	Critically polluted areas as identified by the CPCB		
3.	Eco-sensitive areas as notified 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/ Identify	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. Any application made for the Aeronautical clearance from Aerodrome Standards Directorate of DGCA; Ministry of Civil Aviation, GOI.

Yes ☐ No ☐

if YES, what is the progress?

3. Land use plan:

3.1 Does the proposed project conform to the approved land use all over the site? (To be certified by the concerned Department of State Government).

Yes ☐ No ☐

If not, clearly indicate which of the stretches are not as per approved land use.

3.2 Project Site Preparation:

Is the proposed project located in low- lying area?

Yes ☐ No ☐

Level before filling (above MSL in m) ☐

Level after filling (above MSL in m) ☐

Details of fill material required: ☐

Quantity of Fill material required (in cu.m) ///

Source ☐

Gradient Details: ☐

3.3 Would the above filling result in complete / partial filling of water bodies ☐

3.4 Does the site involve stripping?

Yes ☐ No ☐

If yes, provide the following details:

1. Size of the area to be stripped ☐
2. Location, ☐

3. Soil Type,

4. Volume and quantity of earth to be removed,

5. Location of dump site,

6. Proposal for utilisation of removed topsoil.

3.5. Does it involve cutting?

Yes ☐ No ☐

If yes , please furnish the following details:

1. Size of the area to be cut,

2. Depth of cut,

3. Location,

4. Soil Type,

5. Volume and quantity of earth and other material to be removed

6. Location of dump site.

3.6. 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 ☐

If yes, please provide details.

3.7 In case the site covers a flood plain of a river , please furnish:

1. detailed micro- drainage,

2. Flood passages,

3. Flood periodicity in the area.

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

Yes ☐ No ☐

If yes, please furnish details

Height (above MSL in metres)

3.9. Does the project involve extraction of sand, levelling or digging of sandy stretches within 500 metres of high tide line?

Yes ☐ No ☐

If yes, mention the activity involved and area.

1. Stretch

2. Area (sq. metre)

3.10 Does the project involve any dredging?

Yes ☐ No ☐

3.11 Whether there will be any change in the drainage pattern after the proposed activity?

Yes ☐ No ☐

If yes, what are the changes?

A. What is the maximum extent?

B. Is any additional area to be flooded?

4. Raw material Required During Construction:

S.No.	Item	Quantity (Tonnes)	Mode of Transport	Source
1	Blue metal			
2	Bricks			
3	Sand			
4	Cement			
5	Bitumen			
6	Diesel			
7	Others (Please specify)			

5. Water Required During Construction:

5.1 Water Requirement (cu.m / day)

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

5.2. 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		

5.3. Solid Waste:

A. Solid waste generated during Airport development (Tonnes / day)

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

Total:

6. Storage of inflammable / hazardous / toxic substances) :

S.No	Name	Consumption (in TPD)	Maximum Quantity at any point of time(tonnes)	Means of transportation
1	Bitumen			
2	Diesel			
3	Others (please specify)			

7. Landscape:

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. 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)