

**IN THE HON'BLE NATIONAL GREEN TRIBUNAL, SOUTHERN ZONE
BENCH, CHENNAI**

Original Application No. 2 of 2023

IN THE MATTER OF: -

J. Jagan kumar

.... Applicant

Versus

**The Addl. Chief Secretary, Govt
Of Kerala and Ors.**

.... Respondent

REPLY AFFIDAVIT FILED ON BEHALF OF MOEF&Cc



Filed by:
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BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
SOUTH ZONE, CHENNAI
ORIGINAL APPLICATION No. 2 of 2023

IN THE MATTER OF

Shri Jagan Kumar J.

... APPLICANT

VERSUS

The Additional Chief Secretary Government of Karnataka, Department of Forest,
Ecology and Environmental Science & Ors.

...RESPONDENTS

REPLY AFFIDAVIT IN COMPLIANCE OF HON'BLE NGT'S DIRECTION DATED
03.11.2023 ON BEHALF OF THE RESPONDENT NO.6, *i.e.*, MINISTRY OF
ENVIRONMENT, FOREST AND CLIMATE CHANGE.

MOST RESPECTFULLY SHOWETH:

I, Dr. Murali Krishna working as Scientist "E" in the Ministry of Environment, Forest and Climate Change (MoEF&CC), Regional Office at Bengaluru and I the deponent do hereby solemnly affirm and state on oath as under:-

1. That I am competent to swear the present affidavit on behalf of MoEF&CC and I am duly authorized to depose by way of the present affidavit.
2. That the answering respondent is not replying to the present application in para-wise manner. However, the answering respondent craves leave to file a detailed affidavit as and when necessary and required or directed by this Hon'ble Tribunal to do so.
3. It is humbly submitted that this application has been filed with regard to the high rise commercial building architected with glass facades. The applicant has pointed out several environmental issues due to high-rise commercial buildings with the glass facades. The petitioner has provided a reference of a residential project wherein the SEIAA, Karnataka granted EC on 23.06.2016 by stipulating a condition, **"Use of glass shall not exceed 40% of exposed area to reduce the electricity consumption and load on air conditioning. If necessary, use high quality double glass with special reflective**

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coating in windows." In view of this, the petitioner has requested to take necessary steps to ban glass facades buildings or direct for renovation of such standing glass facades buildings and to frame rules restricting the same. It has been further requested to stop issuing environmental clearances and permissions including Consent to Establish (CTE) to such projects. Applicant has also prayed to direct the respondent authority to conduct survey of the Glass Facades buildings which is exceeding more than 40% of exposed area and submit reports.

4. That the Hon'ble Tribunal vide its order dated 03.11.2023 has observed as follows:

"The Central Pollution Control Board (CPCB) has furnished the draft guidelines on 'Environmental Guidelines for Buildings' with specific reference to the EIA Notification, 2006. It is not known whether the same is approved or notified by the MoEF&CC.

2. The learned counsel appearing for the MoEF&CC seeks time to get appropriate instructions in this regard.

5. In this regard, it is humbly submitted that such guidelines are not available in the online/offline records of the IA-3 Section of the Impact Assessment (IA) Division, dealing with the subject in the Ministry. Instead, the Environmental Impact Assessment (EIA) Guidance Manual, as prepared by Administrative Staff College of India (ASCI), Hyderabad and published by the Ministry during February 2010, is generally used as a reference material for conducting environmental appraisal of Building Construction/Township projects. The aforesaid EIA Guidance Manual will help the project proponent/consultant in the preparation of the EIA reports. The aforesaid manual also helps the regulatory authority to review the report as well as the public to become aware of the related environmental issues. Copy of the *Environmental Impact Assessment Guidance Manual for Building, Construction, Township and area Development project for granting prior Environmental Clearance* dated 05.05.2010 is annexed as **Annexure-R/1**.

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6. Further, the Ministry prescribes the guidelines to be followed for building and construction projects to ensure sustainable environmental management, which were issued vide Ministry's OM 09.06.2015. Copy of OM dated 09.06.2015 is annexed as **Annexure-R/2**.

Rule Position as per the EIA Notification, 2006:

7. It is submitted that the answering respondent has issued an Environmental Impact Assessment (EIA) Notification number S.O. 1533 E dated 14th September, 2006. The EIA Notification, 2006 as amended regulates developmental projects in respect of construction of new projects/activities/expansion or modernization of existing projects in different parts of the country for grant of prior Environmental Clearance under sub section (3) of section 3 of the said Act, in accordance with the procedure specified in the notification. Copy of the EIA Notification, 2006 is annexed as **Annexure-R/3**.
8. That, EIA Notification, 2006 as amended covers 38 projects/activities in its Schedule which inter-alia includes different types of infrastructure projects viz. Airports, Ports, Highways, and Building & Construction Projects etc. as specified and classified in the schedule of the said notification. All such projects/activities shall require prior environmental clearance from the concerned regulatory authority, e.g., MoEF&CC in the Central Government for matters falling under Category 'A' in the Schedule and the State Environment Impact Assessment Authority (SEIAA) at State level for matters falling under Category 'B' in the said Schedule, before starting any construction work. Broadly, following categories projects/activities are covered under the ambit of EIA Notification, 2006 as amended:
- a. All new projects or activities listed in the Schedule to this notification;
 - b. Expansion and modernization of existing projects or activities listed in the Schedule to this notification with addition of capacity

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beyond the limits specified for the concerned sector, that is, projects or activities which cross the threshold limits given in the Schedule, after expansion or modernization;

c. Any change in product - mix in an existing manufacturing unit included in Schedule beyond the specified range.

9. That under the provisions of the EIA Notification, 2006 as amended, Environment Clearance for Building and Construction Projects & Township and Area Development Projects are covered under entry 8 (a) & (b) of the Schedule to the EIA Notification, 2006. The entry 8(a) and 8(b) of the Schedule of EIA Notification 2006 provides as follows;

“8(a): Building and Construction projects - >20000 sq. m and <150000 sq. m of built-up area require EC.

8(b): Townships and Area Development projects - Covering an area >50 ha. And or built up area >150000 sq. m – require EC.

That the aforementioned entries under item 8(a) and 8(b) are qualified as category ‘B’ projects under the EIA Notification, 2006 and requires appraisal by the State Level Expert Appraisal Committees (SEACs) and approved by the State Level Environment Impact Assessment Authorities (SEIAAs). Further, that as per the EIA Notification, 2006, in the absence of a duly constituted SEIAA/SEAC, a category ‘B’ project shall be considered at the Central Level as category ‘B’ project.”

10. That at the requirement of taking Environment Clearance for any building construction project is governed by the aforesaid provisions, stated in paras above.
11. It is submitted that the present Reply Affidavit may kindly be taken on record and into consideration and the Hon’ble Tribunal may pass appropriate Order(s), direction(s) as deemed fit and proper under the facts and circumstances of the present case.

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12. That other/ancillary issues raised in the application under reply do not pertain to the answering respondent. The Answering Respondent seeks leave to make additional submissions, if required, during the course of the proceedings.


DEPONENT

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VERIFICATION

Verified at Bengaluru on 26th day of February 2024 that the contents of the above Affidavit are correct to my knowledge and belief based on official records and nothing material has been concealed therefrom.


DEPONENT

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जहाँ है हरियाली ।
वहाँ है खुशहाली ॥

Ministry of Environment & Forests
GOVERNMENT OF INDIA, NEW DELHI

Environmental Impact Assessment Guidance Manual
for
BUILDING, CONSTRUCTION, TOWNSHIPS
and AREA DEVELOPMENT PROJECTS



Prepared by



Administrative Staff College of India
Bellavista, Khairatabad, Hyderabad

February 2010

**Environmental
Impact Assessment Guidance Manual
for**

**Building,
Construction,
Townships
and
Area Development**



Foreword

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

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

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

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

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

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

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



(JAIRAM RAMESH)

MINISTER OF STATE FOR ENVIROMENT & FORESTS

5th May 2010



Siripurapu K. Rao

M.A. (Cantab), Ph.D. (Cantab)

DIRECTOR GENERAL



Acknowledgements

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

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

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

I thank **Dr. I. V. Murali Krishna**, Professor and Former Director R&D JNT University, resource person, who, drawing on his vast experience in the sector, prepared the EIA guidance manual on **Building, Construction, townships and area development projects** 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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Representative of GMR Samshabad International Airport Ltd	
Representative of CPCB Regional office, Bangalore	

ABBREVIATIONS

ADA	- Area Development Authority
ASCI	- Administrative Staff College of India
BUD	- Built up area
CGWB	- Central Ground Water Board
CPCB	- Central Pollution Control Board
CRZ	- Coastal Regulation Zone
CSR	- Corporate Social Responsibility
CTP	- Chief Town Planner DP Development Plan
DMP	- Disaster Management Plan
DP	- Development Plan
EAC	- Expert Appraisal Committee
EC	- Environmental Clearance
ECS	- Equivalent Car Space
EIA	- Environmental Impact Assessment
EMP	- Environmental Management Plan
ETP	- Effluent Treatment Plant
FSI	- Floor Space Index
GRIHA	- Green Rating for Integrated Habitat Assessment
IA	- Impact Assessment
LPCD	- Liters Per Capita Per Day
MLD	- Million Liters Per Day
MoEF	- Ministry of Environment and Forests
MSL	- Mean Sea level
NDC	- National Development Council
O & M	- Operation and Maintenance
R O	- Regional offices
R&R	- Rehabilitation and Resettlement
SPCBs	- State Pollution Control Boards
STP	- Sewage Treatment Plant
TCPO	- Town and Country Planning Department
TOR	- Terms of Reference
UPDFI	- Urban Development Plans Formulation and Implementation

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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 - "**Building, Construction, Townships and Area Development Projects**". This manual consists of terms of reference (TOR), manual and questionnaire.

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

The manual is given in two sections - Section A and Section B.

Section A of this manual describes issues to be addressed for environmental clearances in building and construction projects as defined in the item 8 (a) of the EIA notification 2006.

Section B gives details with issues related to Townships and area development projects as defined in the item 8 (b) of the EIA notification 2006.

The chapter headings are the same in each section but specific issues are discussed in the respective sections.

Chapter 1: Introduction

This chapter contains the general information on the building sector, major sources of environmental impact in respect of building, construction, townships and area development projects and details of the environmental clearance process.

Chapter 2: Project Description

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

Chapter 3: Description of Environment

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

Chapter 4: 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 5: Analysis of Alternatives (Technology and Site)

This chapter includes the options, details of the alternatives of materials that are to be used in building construction and the energy conservation methods to be adopted. The various details regarding the transportation sector, road connectivity, link facilities, parking details etc. are to be discussed in this chapter.

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 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 10: 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 11: 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.

Section A
**BUILDING
AND
CONSTRUCTION PROJECTS**

INTRODUCTION

1.0 Preamble

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

1.1 General Information on Building Construction

Construction activities in India have been pursued without giving much attention on environmental issues. This has resulted in pressure on its finite natural resources. Unplanned and unsustainable urban development has led to severe environmental pressures. The green cover, ground water resources have been forced to give way to the rapidly developing urban centres. Modern buildings built in our cities have high levels of energy consumption because of requirements of air-conditioning and lighting. In this scenario it is necessary to critically assess the utilization of natural resources in these activities.

Approximately 50 percent of the energy use in buildings is devoted to producing an artificial indoor climate through heating, cooling, ventilation, and lighting. Water conservation and efficiency programs have begun to lead to substantial decreases in the use of water within buildings. Studies have shown that water-efficient appliances and fixtures can reduce consumption by up to 30 percent or more. As demand on water increases with urban growth, the economic impact of water conservation and efficiency will increase proportionately. Water efficiency not only can lead to substantial water savings, but it also can reduce the requirement for expansion of water treatment facilities.

The building industry is slowly beginning to recycle its waste but there is need to achieve significant waste reductions through more reuse of building material and adaptation, as opposed to demolition.

Conventional buildings often fail to consider the interrelationship among building siting, design elements, energy and resource constraints, building systems, and building function. Green buildings, through an integrated design approach, take into consideration the effect these factors have on one another. Climate and building orientation, design factors such as daylighting

opportunities, and building envelope and system choices, as well as economic guidelines and occupant activities, are all factors that need to be considered in an integrated approach.

Application of new building concepts can yield for savings during the construction process. Measures that are relatively easy to implement can result in savings to natural resources in the following areas:

- ▶ Lower energy costs, by monitoring usage, installing energy-efficient lamps and fixtures, and using occupancy sensors to control lighting fixtures;
- ▶ Lower water costs, by monitoring consumption and reusing stormwater and/or construction wastewater where possible;
- ▶ Lower site-clearing costs, by minimizing site disruption and movement of earth and installation of artificial systems;
- ▶ Lower landfill dumping fees and associated hauling charges, through reuse and recycling of construction and demolition debris;
- ▶ Lower materials costs, with more careful purchase and reuse of resources and materials;
- ▶ Possible earnings from sales of reusable items removed during building demolition; and

1.2 Environmental Clearance Process

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

The applicant will have to furnish, along with the application, in addition to Form 1 and the supplementary Form 1A, a copy of the conceptual plan. The details of the categories mentioned in the given schedule are as follows:

Project or Activity	Category with threshold limit - B Category	General Conditions
8.	Building /Construction projects/Area Development projects and Townships	
8(a)	Building and Construction projects ≥20000 sq.mtrs and <1,50,000 sq.mtrs. of built-up area#	"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

8(b)	Townships and Area Development projects.	Covering an area ≥ 50 ha and or built up area $\geq 1,50,000$ sq .mtrs ++	<p>(Protection) Act, 1972; (ii) Critically polluted areas as identified by the Central Pollution Control Board from time to time; (iii) Eco-sensitive areas as notified under section 3 of the Environment (Protection) Act, 1986, such as, Mahabaleswar Panchangi, Matheran, Pachmarhi, Dahanu, Doon Valley and (iv) inter-state boundaries and international boundaries.</p> <p>Provided that the requirement regarding distance of 10km of the inter-state boundaries can be reduced or completely done away with by an agreement between the respective states or U.Ts sharing the common boundary in the case the activity does not fall within 10 kilometers of the areas mentioned at item (i), (ii) and (iii) above</p>
#(built up area for covered construction; in the case of facilities open to the sky, it will be the activity area)			
++All projects under Item 8(b) shall be appraised as Category B1			

This section of the manual addresses the important issues to be discussed in the environmental impact assessment of building construction projects. Fig.1 shows the EIA clearance process for the building construction, townships and area development projects.

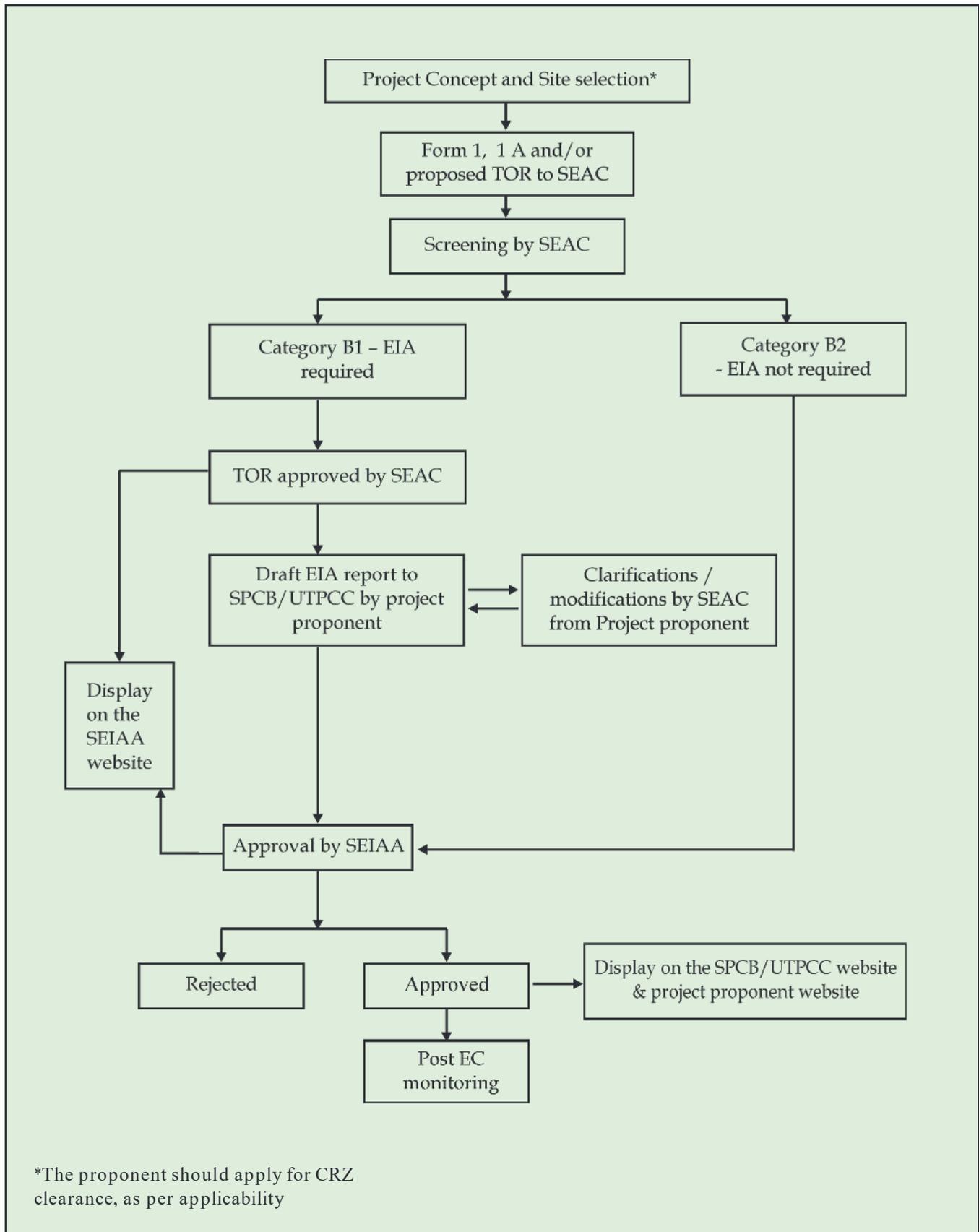


Figure 1.1: Prior Environmental Clearance Process for Category B Projects

The projects requiring an Environmental Impact Assessment report termed Category 'B1' and remaining projects termed Category 'B2' and will not require an Environment Impact Assessment report. For categorization of projects into B1 or B2 except item 8 (b), the Ministry of Environment and Forests should issue appropriate guidelines from time to time. All projects and activities listed as Category 'B' in Item 8 of the Schedule (Construction / Township / Commercial Complexes /Housing) shall not require scoping and will be appraised on the basis of Form 1/ Form 1A and the conceptual plan.

- ▶ The projects involving clearance under Coastal Regulation Zone Notification, 1991 shall submit with the application a CRZ map duly demarcated by one of the authorized agencies, showing the project activities, w.r.t. C.R.Z (at the stage of TOR) and the recommendations of the State Coastal Zone Management Authority (at the stage of EC). Simultaneous action shall also be take to obtain the requisite clearance under the provisions of the CRZ notification, 1991 for the activities to be located in the CRZ
- ▶ The projects to be located within 10km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory corridors of wild animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden thereon (at the stage of EC)
- ▶ All correspondence with the Ministry of Environment & Forests including submission "of application for TOR/Environmental Clearance, subsequent clarifications, as may be required from time to time, participation in the EAC meeting on behalf of the project proponent shall be made by the authorized signatory only. The authorized signatory should also submit a document in support of his claim of being an authorized signatory for the specific project"

Ref:- EIA notification - Amendment 2009

1.3 Terms of Reference (TOR)

The terms of reference (TOR) pertinent to preparation of EIA study reports for building construction, township and area development projects is attached as Annexure 1 to this EIA guidance Manual. TOR relevant to individual projects is to be added by the proponent and should be submitted with the application along with 'Form 1' and 'Form 1A' and the State Level Expert Appraisal Committee. The issues are addressed separately for building construction projects and townships and area development projects.

1.4 Validity of Environmental Clearance

The prior environmental clearance granted is valid for a period of five years. The regulatory authority concerned may extend this validity period by a maximum period of five years provided an application is made to the regulatory authority by the applicant within the validity period, together with an updated Form 1, and Supplementary Form 1A, for construction projects or activities (item 8 of the schedule)

1.5 Post Environmental Clearance Monitoring

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

The Project management shall submit half-yearly compliance reports in respect of the stipulated prior environmental clearance terms and conditions on 1st June and 1st December of each calendar year. All such reports shall be public documents.

1.6 Transferability of Environmental Clearance

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

1.7 Generic Structure of Environmental Impact Assessment Document

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

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

1.8 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

1.9 Brief Description of Project

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:

1

- ▶ 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.

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.

2.1 Description of the Project

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

Essential Toposheets / Maps to be Provided with TOR application

A map of the study area 500meters from the boundary of the project area, delineating the major topographical features such as land use, drainage, locations of habitats, major constructions including roads, railways, pipelines, industries if any in the area are to be mentioned.

A map covering aerial distance of 15 kms from the boundary of the proposed project area delineating environmental sensitive areas as specified in Form I of EIA notification dated 14th Sept. 2006. In the same map the details of environmental sensitive areas present within a radial distance of 1 Km from the project boundary should be specifically shown.

Remote Sensing Satellite Imagery

Land use map of the study area in 1:10,000 scale based on high resolution satellite imagery delineating the forest, agricultural land, water bodies, settlements, and other cultural features.

Digital Elevation Model / Contour Map

Contour map on 1:10000 scale for the study area showing the various proposed break-up of the land.

Description of the project site, geology, topography, climate, transport and connectivity, demographic aspects, socio, cultural and economic aspects, villages, settlements should be given.

Details of environmentally sensitive places, land acquisition, rehabilitation of communities/ villages, present status of such activities are to be mentioned.

Historical data on climate conditions such as wind pattern, history of cyclones, storm surges, earth quake etc., for the last 25 years are to be given. An analysis and interpretation of the data has to be given by the project proponent.

Detailed layout plan of proposed project development, communication facilities, access/approach roads, landscape, sewage disposal facilities, and waste disposal etc; to be given. Layout plan of

proposed development of built up areas with covered construction such as buildings, recreational facilities, DG set rooms, water supply installations etc; are to be given. Requirement of natural resources and their sources are to be detailed out.

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 to avoid loss of time and money in planning the project.

2.2 Site Selection

Development of new construction projects, should not have a negative impact on the existing bio diversity and ecosystem of the site. Development of the project on the located site should not disturb sites with heritage and cultural values such as protected monuments. Geographical latitude and microclimatic factors such as wind loads and solar access should be assessed. The way in which a building or group of buildings are sited in relation to other buildings, natural topography and landscape should be given clearly.

The factors which should influence site selection for the development of a project are the infrastructure and utilities available, expected water and power requirement by the proposed new buildings and feasibility study of how much is available and what is the source of supply for power and water. The developer should submit the list of items asked in Form 1 and 1A.

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

Proposed land use must conform to the approved Master Plan/Development plan of the area. If there is no approved Plan, consent from appropriate authority should be taken and should be submitted for Environment clearance. If the area is outside municipal limits /outside planning area, full justification for the proposed development should be provided.

2.3 Manpower Requirement

The proponent should indicate the requirement of various categories of manpower such as skilled, semi-skilled, unskilled workers, technicians, engineers, and managers during the construction phase.

The proponent should give the details of compliance of Acts related to employees' service and their welfare measure as per the provisions of government of India. This is because the building and other construction works is characterized by its casual nature, temporary relationship between employer and employee, uncertain working hours, lack of basic amenities and inadequacy of welfare facilities.

The following are the Acts for compliance by proponent regarding Manpower employment. The proponent should follow any later modification or Revisions for these Acts automatically

- ▶ Minimum Wages Act 1948,
- ▶ Contract Labour (Regulation & Abolition) Act1970

- ▶ Inter-State Migrant Workmen (Regulation of Employment & Conditions of Services) Act 1979
- ▶ The Building and other construction workers (Regulation and Employment of Service) Act, 1996
- ▶ The Building and other construction workers Welfare Cess Act 1996.

2.4 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.

DESCRIPTION OF THE ENVIRONMENT

3.0 Introduction

Environment facets to be considered in relation to building construction are: (a) land (b) air (c) noise (d) water (e) biological (f) socio-economic and (g) solid waste management. Hence it is necessary to ascertain the baseline data of these environmental facets.

Study Area

In the case of building construction projects, EIA guidelines are specifically mentioned in Form 1A of EIA notification 2006. The following details are to be given:

1. Site development area
2. Area with angular distance of 500 meters surrounding the site.

The project study area comprises the site earmarked for building construction with specified surrounding area. The baseline data collection / monitoring should be from primary and secondary sources and field monitoring studies. When secondary data is used source of data is to be mentioned clearly. The period of study for collecting primary data would be one season other than the monsoon season.

3.1 Land Environment

Existing status of baseline conditions of land use can be determined by studying the changes in the land use pattern in the past 10yrs by collecting data from secondary sources such as census records, agricultural census and land records. The land use pattern covering forest land, total irrigated land, non-irrigated land, cultivable waste, are to be calculated and given as a map (Annexure 2).

Mainly climate, geology, relief and other biotic interactions influence soil formation. The soil characteristics in the project area, which would affect the agricultural and afforestation potential of the area need to be studied. Particle size scale is to be given based on the texture analysis. Soil porosity and SAR ratios are important and are to be assessed for all locations. The samples are to be collected and analyzed as per CPCB norms (Annexure 3). The hydraulic conductivities in soil are important for building construction activities and are given in Annexure 4. The rating chart for the soil test values for primary nutrients is given in Annexure 4. The physical and chemical properties of soil are to be analysed and presented as given in Table 3.1 and 3.2

3.2 Water Environment

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

examined and presented. Ground water and surface water in the study area is to be collected as per CPCB norms (annexure 3) and examined for physico- chemical, heavy metals and bacteriological parameters. The drinking water and fresh water standards are given in Annexure 5. These projects create a continuous demand on the water resources. As per BIS, for residential buildings with a population of 20,000-1,00,000, the per capita consumption is 100-150 lpcd and for those with population above 1,00,000, the consumption is 150-200 lpcd. Out of the 150 to 200 litres per head per day, 45 litres per head per day for flushing requirements and the remaining quantity for other domestic purposes. For the other types of buildings, the water requirement varies between 30 to 340 lpcd. The water requirements for different type of buildings are given in Annexure 6. The format for ground water quality data presentation is given in Table 3.3 and Table 3.4 and for surface water quality as shown in Tables 3.5 and 3.6.

3.3 Air Environment

The climatic data procured from secondary sources is very important for identifying the season and period of monitoring primary data. The climatic data can help in using suitable building technologies and energy conservation measures. The methodology to be adopted for collection of climatic data specific to the site is to compile the mean monthly normals of atmospheric parameters, from previous 10yrs data recorded by the nearest IMD station. Wind Roses for each month giving the wind direction speed are to be collected and presented. Most probable wind speed class and wind direction at the nearest IMD site is to be estimated from this.

Baseline data of air pollutant parameters extending an area of 500meters from the project should be monitored at a number of locations. Description of baseline data of ambient air parameters namely RSPM, nitrogen dioxide, sulphur dioxide, and carbon monoxide are to be collected. One season data is to be monitored other than monsoon as per the CPCB Norms. Sampling locations are to be located as per CPCB norms. The air quality standards are given in Annexure 7. Number and locations of Ambient Air quality monitoring (AAQM) stations are decided based on the nature of project, meteorological conditions, Topography, selected pollution pockets in the area and likely impact areas. The parameters measured, frequencies of sampling, technique to be as prescribed by CPCB are given in Annexure 3. The monitoring locations for air quality are to be given as shown in Table 3.7. The monitoring locations are to be shown on the area map. The data is to be shown as represented in Table 3.8.

3.4 Noise Environment

Construction equipment and road traffic are the major sources of noise. Baseline data of noise at the project area and the neighbourhood habitat areas is to be ascertained. Day-time and night-time data should be collected and presented as shown in Table 3.9. The parameters, frequencies of sampling are shown in Annexure 3 and the standards for noise are given in Annexure 8.

3.5 Biological Environment

Baseline data from field observations for various terrestrial and aquatic systems are to be generated. Wild life sanctuaries and National parks location within 10km radius from project boundary are

identified based on secondary data. 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.

3.6 Socio-economic Environment

Baseline data on the socio economic environment in the study area is to be collected. The issues to be focused include demographic structure, economic activity, education, literacy profile, land use and infrastructure resources. Primary data through designed questionnaires from the house hold survey within the study area is collected and from secondary sources represented as shown in Table 3.10 and 3.11. The demographic details consisting of population distribution, Average household size, population density, sex ratio, social structure and literacy levels within project study area are concluded from this data collected.

3.7 Solid Waste

Present data available on solid waste generated in the area are to be collected. If possible the present quantities of wastes – hazardous, biomedical and non-hazardous generated in the study are to be collected and presented.

ANTICIPATED IMPACT AND MITIGATION MEASURES

4.0 Introduction

Impacts can be classified in the presentation as direct, indirect and cumulative impacts. These can be further subdivided for convenience and clarity to positive and negative impacts, random and predictable impacts, local and widespread impacts, temporary and permanent impacts, long term and short term impacts. The report should preferably cover the impacts as discussed above. Identification and assessment of environmental liability of earlier use of the project site, especially if there had been an industrial unit at that site is to be clearly mentioned.

Suitable avoidance / mitigation methods can be given for each of the alternatives provided. The most feasible one can be chosen by the project proponent. The list of critically polluted areas identified by CPCB is given in Annexure 9.

Prediction of Impact During Construction Phases

The activities that take place during construction phases of the project are leveling of site, construction and erection of buildings etc., and associated equipments in operation. The potential primary and secondary impacts on the environment, their prediction, significance and mitigation are to be discussed. Dismantling of unwanted existing structures, site clearance, storage and haulage of construction materials, and disposal of surplus earth, debris and refuse is to be mentioned clearly in the report.

Prediction of Impact During Operational Phases

The potential significant impacts are on topography, land use, soil quality, ambient air quality, noise levels, traffic densities, water resources, water quality, biological environment, demography and socio-economics. During construction and operational phase of the project, various activities may have impact on some or other environmental parameters. Various environmental attributes are to be studied during these phases for their overall impact on the surrounding environment.

4.1 Land Environment

Anticipated Impact

Impacts caused due to activity have to be identified and mentioned clearly in the EIA report. Some of the impacts could be

- ▶ Compaction of soils by earth moving equipment
- ▶ Erosion and modification of surface
- ▶ Over exploitation of agricultural soils due to future development in a zone sensitive to erosion
- ▶ Irreversible salinization and acidification of mangrove swamp soils

Mitigation Measures

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

- ▶ The environmental impact of soil erosion can best be mitigated by removing vegetative cover only from the specific site on which construction is to take place and by disturbing the vegetation in adjacent areas as little as possible. Land clearing activities should be kept to the absolute minimum and use crushed stone rather than asphalt or concrete for surfacing parking areas should be attempted.
- ▶ Disturbing the existing vegetation and natural contour of the land as little as possible can mitigate increases in surface runoff. Vegetation along watercourses should not be cleared indiscriminately. Neither should potholes or swamps be drained unless absolutely necessary for successful completion of the activity.
- ▶ Construction, land management, or mining activities that result in the soil being laid bare could be scheduled in such a way that some type of vegetative cover appropriate to the site could be established prior to the onset of intense rain or windstorms. If grass is to be seeded, mulch of straw will help to protect the soil from less extreme erosive forces until vegetative and root development begins.
- ▶ Natural drainage patterns can often be maintained by preparing sodden waterways or installing culverts.
- ▶ Steep slopes can be terraced, thereby effectively reducing the length of slope.
- ▶ Check dams built near construction sites can reduce the quantity of eroded soil particles reaching free-flowing streams or lakes.
- ▶ Use of “floating” foundations and height restrictions in earthquake zones and increased foundation height, wall strength, and roof support in areas periodically subject to cyclones can reduce the hazards.
- ▶ All forms of temporary structures should be avoided from the flood plain, and all permanent structures should be raised to a height above the level which flood waters can be expected to reach once every 100 years (100-year flood).
- ▶ Installation of underground drainage structures helps to reduce sediment loads
- ▶ Engineering plans can be drawn to reduce the area of earth cuts on fills below what might otherwise be acceptable, provide physical support for exposed soil or rock faces, concentrate or distribute – as appropriate the weight loading of foundations to areas or state better able to support that weight, restricting the number, frequency and area of movement of heavy machinery
- ▶ Compatibility between adjacent land uses can best be assured by providing a green belt between the proposed activity and nearby properties where any significant degree of incompatibility is likely to result.

4.2 Water Environment

Construction Phase

The construction phase would involve water requirements for the following activities

- ▶ site preparation: Involves levelling for infrastructure development and removal of vegetation. Water is required for dust settlement, consolidation, compaction and curing.
- ▶ Construction of building infrastructure involves water for construction activities and domestic and other water requirements for labour and staff onsite.
- ▶ The period of this activity is the be mentioned

Impact Prediction

- ▶ Use of large quantities of water in curing
- ▶ Use during the operational phase by residence for routine activities

Mitigation Measures

Measures for reducing water demand during construction

To avoid wastage of curing water, following guidelines are to be followed:

- ▶ Curing water should be sprayed on concrete structures; free flow of water should not be allowed for curing.
- ▶ After liberal curing on the first day, all concrete structures should be painted with curing chemical to save water. This will stop daily water curing hence save water.
- ▶ Concrete structures should be covered with thick cloth/gunny bags and then water should be sprayed on them. This would avoid water rebound and will ensure sustained and complete curing.
- ▶ Ponds should be made using cement and sand mortar to avoid water flowing away from the flat surface while curing.
- ▶ Water ponding should be done on all sunken slabs, this would also highlight the importance of having an impervious formwork.

The quantity of ground water usage and waste water generated during both the phases is to be estimated based on the population, reuse and recycle activities planned. Based on the quantification of waste water, the treatment plants should be suitably designed. The effluent discharge standards are given in Annexure 10.

4.3 Air Environment

Anticipated Impact

Construction phase would involve site clearances and preparation, infrastructure development, building construction and other related activities and

Operational phase would involve emission from vehicular movement and diesel generators, and negligible emissions from sewage and solid waste handling and disposal.

The building material carrying vehicles as well as the construction machinery generate emissions

and pollute the environment. Dusts include brick and silica dusts, wood dust from joinery and other woodworking and from earthmoving and other vehicle movements within the site. Asbestos-containing dust especially during the demolition of buildings is very harmful. It is a difficult task to separate these wastes. Construction machineries pose a special threat to air quality. It is estimated that construction machineries emit toxic pollutants and are sources of fine particulate matter (PM_{2.5}, which lodges deeply in the human lung) and oxides of nitrogen (NO_x), a key ingredient in the formation of ground-level ozone and urban smog.

Mitigation Measures

The main concerns during demolition activities are the emissions generated by the vehicles and the machineries. Air Pollution may be caused by areas or point sources such as cities, industrial areas, factories or by linear sources such as highways. Vegetation buffers can minimize the built-up of pollution levels in urban areas by acting as pollution sinks.

- ▶ Wind erosion is a serious problem in areas where the ground is virtually bare and devoid of vegetation. Vegetation methods are found to be most effective in the form of windbreaks and shelterbelts.
- ▶ A dense belt provides greater shelter immediately to leeward but the sheltered area is not as extensive as when a more permeable zone of vegetation is provided.
- ▶ Plants are good absorbers of sulphur dioxide. Parks with trees have an SO₂ level lower than city streets.
- ▶ Heavy roadside planting in the form of shelterbelts can result in reduction in airborne lead.
- ▶ Complete dust interception can be achieved by a 30 m belt of trees. Even a single row of trees may bring about 25 percent reductions in airborne particulate.
- ▶ Evergreen trees are found to be more effective.
- ▶ The species chosen must be resistant to pollutants, particularly in the early stages of their growth.

Mitigation Measures for Dust Control

Adopting techniques like, air extraction equipment, and covering scaffolding, hosing down road surfaces and cleaning of vehicles can reduce dust and vapour emissions. Measures include appropriate containment around bulk storage tanks and materials stores to prevent spillages entering watercourses.

The other measures to reduce the air pollution on site are:

- ▶ Sprinkling of water and fine spray from nozzles to suppress the dust.
- ▶ On-Road- Inspection should be done for black smoke generating machinery.
- ▶ Promotion of use of cleaner fuel should be done.
- ▶ All DG sets should comply emission norms notified by MoEF.
- ▶ Vehicles having pollution under control certificate may be allowed to ply.

- ▶ Use of covering sheet to prevent dust dispersion at buildings and infrastructure sites, which are being constructed.
- ▶ Use of covering sheets should be done for trucks to prevent dust dispersion from the trucks, implemented by district offices.
- ▶ Paving is a more permanent solution to dust control, suitable for longer duration projects. High cost is the major drawback to paving.
- ▶ Reducing the speed of a vehicle to 20 kmph can reduce emissions by a large extent. Speed bumps are commonly used to ensure speed reduction. In cases where speed reduction cannot effectively reduce fugitive dust, it may be necessary to divert traffic to nearby paved areas.

4

Material storages / warehouses – Care should be taken to keep all material storages adequately covered and contained so that they are not exposed to situations where winds on site could lead to dust / particulate emissions. Fabrics and plastics for covering piles of soils and debris is an effective means to reduce fugitive dust.

4.4 Noise Environment

Anticipated Impact

During the construction phase of the site, the following source of noise pollution is expected:

- ▶ Construction equipment

During operational phase the following sources of noise pollution is expected:

- ▶ Diesel generator operations
- ▶ Increase in transport noise from within the site from near by roads.

Mitigation Measures

It is important that no new development is carried out within areas where expected noise levels will cause mental and physical fatigue or permanent loss of hearing. In case development in such areas is essential, adequate sound insulation should be provided for the building. There are two ways of applying controls or measures. The first is to plan so as to keep the noise at a distance. Under this aspect comes the separation of housing from traffic noise by interposing buffer zones, and the protection of schools and hospitals by green belts, public gardens, etc. The second is the principle of shading or screening. Use of noise deflectors can also help in reducing the noise. This consists of deliberately interposing a less vulnerable building to screen a more vulnerable one or by providing a solid barrier such as a wall between the source and the location to be protected.

Setting up the barriers: National Building Code 2005 suggests that design solutions such as barrier blocks should be used to reduce external LA10 noise levels to at least 60-70dB(A) at any point 1.0 m from any inward looking façade. Green belts and landscaping could act as an effective means to control noise pollution. In case of railway tracks, a minimum distance of 50m to 70m may be provided between the buildings and the tracks. Thick belts of planting greater than 30 meters are useful for cutting the noise levels from road traffic. Strong leafy trees may be planted to act as noise baffles. Shrubs and creepers may also be planted for additional protection between tree

trunks; artificial mounds and banks should be formed where practicable. As little hard paving and as much grass as possible may be used. The creation of green belt is particularly advisable on the perimeter of aerodromes, along railway lines and arterial roads, through or past built up areas and adjoining industrial zones.

Control of noise from Air traffic: The problem caused by aircraft noise have become very acute, therefore a commonly used criterion is the noise exposure forecast (NEF). Aircraft noise can seriously affect living conditions no matter how much insulation has been applied. For this reason it is recommended that no residential development should be allowed beyond NEF 35 level. For very critical buildings such as buildings necessary for maintaining and supplementing the airport services, and for commercial development, such as hotels, it is possible to provide sealed windows and to centrally air condition the entire building.

Control of noise from railway lines: Wherever possible no residential or public building zone should be along the railway lines. The appropriate zones along side railway lines are industrial and commercial buildings other than office buildings.

Control of noise from road traffic: Trees with heavy foliage planted on both sides of carriage way help slightly muffle the noise provided; the foliage extends for a considerable distance of 30m or above.

4.5 Biological Environment

The mitigation measures should be suggested that will help in reducing the impact on terrestrial ecology and aquatic ecology. Massive plantation, landscaping are to be ensured in the new construction areas. Also trees, plants should be identified for specific areas so that the plants survive in these conditions. The few common pollutant resistant species are given in Annexure 11.

4.6 Socio- economic

Anticipated Impact

The impact on the socio-economic status of the people in the area is to be studied and detailed out. Positive impacts could include job creation, preservation of environment, infrastructure development and benefits to local population by way of job opportunities. Long term impacts include aspects of demography, aesthetics, and archeological sites. Negative impacts include impacts on cultural aspects and well being.

Construction activities generate large volumes of particulate matters during construction work leading to air pollution. Unhygienic site sanitation facilities cause damage to environment and to health of the construction workers. Buildings sensitive to the environment and its resources should address these issues.

Mitigation Measures

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

- ▶ Comply with the safety procedures, norms and guidelines (as applicable) as outlined in the document Part 7 _Constructional practices and safety, 2005, National Building code of India, Bureau of Indian Standards
- ▶ Provide clean drinking water to all workers
- ▶ Provide adequate number of decentralized latrines and urinals to construction workers.
- ▶ Guarding all parts of dangerous machinery.
- ▶ Precautions for working on machinery.
- ▶ Maintaining hoists and lifts, lifting machines, chains, ropes, and other lifting tackles in good condition.
- ▶ Durable and reusable formwork systems to replace timber formwork and ensure that formwork where used is properly maintained.
- ▶ Ensuring that walking surfaces or boards at height are of sound construction and are provided with safety rails or belts.
- ▶ Provide protective equipment; helmets etc.
- ▶ Provide measures to prevent fires. Fire extinguishers and buckets of sand to be provided in the fire-prone area and elsewhere.
- ▶ Provide sufficient and suitable light for working during night time.
- ▶ Dangers, health hazards, and measures to protect workers from materials of construction, transportation, storage etc.
- ▶ Safety policies of the construction firm/division/company.

4

4.7 Solid Waste

The construction phase waste will comprise of excavated and demolition material while operational phase waste may comprise of domestic, commercial and biomedical wastes, depending upon the type of the project. The different types of wastes need to be handled as per their needs and regulatory requirements. It is not possible to dispose off all type of wastes onto the land and has to be dealt with depending upon their type and characteristics. Building construction leads to generation of sand, gravel, concrete, stone, bricks, wood, metal, glass, polythene sheets plastic, paper etc. as waste.

Type of wastes, which are generated, can be classified into four categories.

1. Construction or demolition waste, i.e., massive and inert waste
2. Municipal waste, i.e., biodegradable and recyclable waste
3. Hazardous waste,
4. E-waste

The waste characterization in constructional stage should be estimated by reviewing other similar already existing projects and given in tabular form. Similarly wastes generated in operational phase should be estimated and classified as

- ▶ biodegradable
- ▶ recyclable
- ▶ inert
- ▶ hazardous

and quantified for percentage composition estimation.

Construction and Demolition Waste Management

The construction and demolition waste includes debris, concrete (often recycled and reused at the site), steel and other metals, pallets, packaging and paper products, fluorescent tubes, wood beams, joists, studs, baseboards, cabinets and cupboards, railings, brick, doors and casings, interior windows, bathroom fixtures, light fixtures, ceiling grid and tile, furnishings, replant trees, shrubs. Orderly deconstruction is the proper measure for reuse of the demolished matter. In contrast to demolition, where buildings are knocked down and materials are either land filled or recycled, deconstruction involves carefully taking apart portions of buildings or removing their contents with the primary goal being reuse. It can be as simple as stripping out cabinetry, fixtures, and windows, or manually taking apart the building frame. Gross segregation of construction and demolition wastes into roadwork materials, structural building material, salvaged building parts and site clearance wastes is necessary. Additional segregation is required to facilitate reuse/recycling.

Disposal of excess earth that is unearthed due to the construction activity is to be properly undertaken.

Waste recycling plans should be developed for construction and demolition projects, prior to beginning construction activity. The plans should identify wastes to be generated, and designate handling, recycling and disposal method to be followed. Handling of waste material requires special precautions such as personal protective equipment and special procedures to prevent the injury. Developers must operate safe methods for waste collection, storage, and disposal operations in a manner to protect the health and safety of personnel, minimize environmental impact and promote material recovery and recycling.

Solid Waste During Operational Phase

Adequate provision should be made for storage of solid waste and for easy access to the dustbins;

- ▶ for labours from source to the place of storage, and
- ▶ from the place of storage to a collection point specified by the waste collection authority and/or contractor
- ▶ Three colours of wheeled bins: - dark grey for inert waste, green for wood and ply waste and blue for hazardous waste can be used.

A minimum of 4% of the total site area should be allocated for storage and pre treatment of the waste. This storage area should be covered and the pollutants from the waste should not affect the surrounding.

Access to and from Bin Storage Areas

Wheeled bins should be made access with ramps. To ensure this vehicle access, paths should be

paved and at least 1.2 metres wide with a maximum gradient of 1 in 10. The surface of the path should be smooth, continuous and hardwearing. Ramped kerbs should be provided where the path meets the highway, and bins should not have to pass across designated parking spaces. Where collection vehicles have to enter developments, there should be sufficient space on paved roads with turning circles for easy circulation. This ensures the refuse vehicles to enter the vicinity of the site without being prevented from doing so by cars parked close to the entrance. Vehicles should never have to reverse onto or from a highway to make a collection. Roadways used by refuse vehicles must be designed to withstand a laden weight of not less than 28 tonnes.

Municipal Solid Waste Management

Waste generated by users- Domestic wastes food leftovers, vegetable peels, plastic, house sweepings, clothes, ash, etc. commercial waste generally comprises of paper, cardboard, plastic, wastes like batteries, bulbs, tube lights etc.

Three-bin system is a good option for segregation at household level. Storage facilities should be created and established by taking into account quantities of waste generation in a given area and the population densities. A storage facility should be so placed that it is accessible to users, within a radius of 25 meter from the source. Local authorities should provide different coloured bins for different categories of waste. Adequate provision should be made for storage of solid waste.

Three colours of wheeled bins: - dark grey for non-recyclable waste, green for kitchen food/ compostable garden waste and blue for paper (generally used for flats, schools, offices etc). In addition, boxes must be provided for the collection of other recyclable materials; a green box is used for paper and a black box is used for cans and plastic collections. Individual properties should be allocated a 20-litter bin although for single-family occupancy. Boxes should have lids. Flats and multi-storeyed buildings should have bulk dustbin type container, with a general guide of one 1100 litre bin being adequate for every 60 units, for smaller blocks. The one to five ratio outlined above could be increased or decreased according to the number or properties with greater or less than two bedrooms per unit. The ratio of approx one paper bin to three residual waste bins is only a guide. Waste and Cleansing Section can advise on individual cases.

Hazardous Waste Management

Products, such as paints, cleaners, oils, batteries, and pesticides that contain potentially hazardous ingredients require special care when you dispose of them. Improper disposal of household hazardous wastes can include pouring them down the drain, on the ground, into storm sewers, or in some cases putting them out with the trash.

Hazardous wastes from construction and demolition activities are centering oil, formwork oil, tar and tar products (bitumen, felt, waterproofing compounds, etc.), wood dust from treated wood, lead containing products, chemical admixtures, sealants, adhesive solvents, Explosives and related products and equipment used in excavation, acrylics, and silica, etc. The dustbins for these wastes should be made of durable materials like metal, HDPE, fibre glass and masonry if the projects spans for more than a year.

List of Hazardous wastes from construction projects

- ▶ Asbestos products – insulation, tiles etc
- ▶ Fuels and Heating oils and other volatile / flammable liquids such as coolants, grease etc.
- ▶ Centering oil, formwork oil

- ▶ Tar and Tar products (bitumen, felt, water proofing compounds etc.)
- ▶ Lead containing products
- ▶ Chemicals, admixtures, sealants, adhesives solvents etc.
- ▶ Paints, pigments, dyes and primers
- ▶ Pesticides
- ▶ Tarpaulin
- ▶ Explosives and related products and equipment used in excavations
- ▶ Product packaging (cement bags, cartons, containers, plastic covers etc.)
- ▶ Plastics, Acrylics, Silica, PVC
- ▶ Fluorescent Lamps Intact and Crushed, Halogen Lamps, Arc Lamps, UV Lamps, High Pressure Sodium Lamps, , Neon Lamps, Incandescent Lamps.
- ▶ Mercury Containing Lamps and Tubes, Mercury Vapour Lamps, Mercury Containing Devices – Mercury switches, relays, regulators, thermostats, thermometers, manometers and debris containing mercury
- ▶ All types of Batteries
- ▶ Electronic Ballasts, PCBs, Transformers, capacitors, switchgear, Lead Cable, Oil filled / gel filled cables
- ▶ Electronic Waste– computer products, circuit boards, CRTs, electronic parts, solder dross, weld waste.

Due to the characteristics, the wastes generated from the healthcare establishments are also hazardous in nature. Biomedical wastes have to be dealt with as per the Biomedical Wastes (Handling & Management) Rules, 2000.

- ▶ Lead based paints and other hazardous materials may be removed from the structure prior to deconstruction or demolition activities to minimize special handling and disposal requirements for the construction and demolition waste. These activities must be conducted by qualified personnel using appropriate health and safety procedures in accordance with the regulatory requirements.
- ▶ Isolated storage for hazardous wastes released from the whole site should be provided on site.
- ▶ Source segregation of similar wastes is highly recommended.
- ▶ Installation of fire extinguisher is mandatory near storage of hazardous wastes.

E-waste Management

Collection and storage

Various types of electrical and electronic wastes generated in the building, which includes PC in case of offices and homes, Xerox machine components from office and shops, should be collected separately for transportation to the authorized recyclers approved by the state/Central pollution control boards. There should also be provision for storage of these wastes in the building before transportation.

ALTERNATIVE TECHNOLOGIES

5.0 General

Consideration of alternative technologies to be used in building material, energy conservation and transportation methods are to be addressed in this chapter.

5.1 Building Materials

The conventional practice of clay, brick consumes large quantity of energy in terms of coal and other fuels which are primarily non-renewable and highly polluting. Water requirements of building industry are also very high. Steel which is used in the construction process is manufactured by non-renewable resource. Normally conventional materials used for construction are non-renewable sources.

Use of alternative technologies for each component of the buildings of envelope, superstructure, finishes and the road and surrounding areas are discussed in detail. Some of them are given below:

- ▶ Brick and block products with waste and recycled contents such as fly ash (waste from coal burning plants), blast furnace slag, sewage sludge, waste wood fibre etc.
- ▶ Fly ash based lightweight aerated concrete blocks can be used for walls.
- ▶ Perforated bricks can be used for wall structures.
- ▶ Brick panel with joists, Filler slab roofing, brick funicular shell roofing, RCC channel units, micro-concrete roofing tiles are some of the alternative techniques for roofing.

Some of the alternate materials for openings in construction are:-

- ▶ Use of precast thin lintels, use of ferrocement-sunshade cum lintel etc.
- ▶ Use of renewable timber for doors and windows
- ▶ Use of steel manufactures from recycled content
- ▶ Aluminum from verified recycled content
- ▶ Saw dust based doors and window frames
- ▶ Ferrocement shutters, PVC doors and windows, Rice husk boards, Natural fibre-reinforced polymer composite door panels
- ▶ Bamboo based products, bamboo strips boards.
- ▶ Alternatives for finishes include Fly ash, Ceramic tiles, Terrazzo floors

The use of the alternatives for building materials will help reduce the use of non-renewable resources and impact on natural resources. The materials used should be mentioned specifically in the EIA report.

Natural Hazard Prone Areas

Areas likely to have moderate to high intensity of earthquake, or cyclonic storm, or significant flood or inundation, or land slides/ mud flows / avalanches etc are identified as risk zones. The structural design of foundation, elements of masonry, timber, plain concrete, reinforced concrete, pre-stressed concrete, and structural steel should conform to the general structural safety of the National Building code (Annexure 12).

Green Buildings

The appearance of a Green Building will be similar to any other building. However, the difference is in the approach, which revolves round a concern for extending the life span of natural resources; provide human comfort, safety and productivity. This approach results in reduction in operating costs like energy and water, besides several intangible benefits. Some of the salient features of a Green Building are:

- ▶ Minimal disturbance to landscapes and site condition
- ▶ Use of Recycled and Environmental Friendly Building Materials
- ▶ Use of Non-Toxic and recycled/recyclable Materials
- ▶ Efficient use of Water and Water Recycling
- ▶ Use of Energy Efficient and Eco-Friendly Equipment
- ▶ Use of Renewable Energy
- ▶ Indoor Air Quality for Human Safety and Comfort
- ▶ Effective Controls and Building Management Systems

Issues in Green Building

Energy Efficiency and Renewable Energy

- ▶ Building orientation to take advantage of solar access, shading, and natural lighting
- ▶ Effects of micro-climate on building
- ▶ Thermal efficiency of building envelope and fenestration
- ▶ Properly sized and efficient heating, ventilating, and air-conditioning (HVAC) system
- ▶ Alternative energy sources
- ▶ Minimization of electric loads from lighting, appliances, and equipment
- ▶ Utility incentives to offset costs

Direct and Indirect Environmental Impact

- ▶ Integrity of site and vegetation during construction
- ▶ Use of integrated pest management
- ▶ Use of native plants for landscaping
- ▶ Minimization of disturbance to the watershed and additional non-point-source pollution

- ▶ Effect of materials choice on resource depletion and air and water pollution
- ▶ Use of indigenous building materials
- ▶ Amount of energy used to produce building materials

Resource Conservation and Recycling

- ▶ Use of recyclable products and those with recycled material content
- ▶ Reuse of building components, equipment, and furnishings
- ▶ Minimization of construction waste and demolition debris through reuse and recycling
- ▶ Easy access to recycling facilities for building occupants
- ▶ Minimization of sanitary waste through reuse of graywater and water-saving devices
- ▶ Use of rainwater for irrigation
- ▶ Water conservation in building operations
- ▶ Use of alternative wastewater treatment methods

5

Indoor Environmental Quality

- ▶ Volatile organic compound content of building materials
- ▶ Minimization of opportunity for microbial growth
- ▶ Adequate fresh air supply
- ▶ Chemical content and volatility of maintenance and cleaning materials
- ▶ Minimization of business-machine and occupant pollution sources
- ▶ Adequate acoustic control
- ▶ Access to daylight and public amenities

Community issues

- ▶ Access to site by mass transit and pedestrian or bicycle paths
- ▶ Attention to culture and history of community
- ▶ Climatic characteristics as they affect design of building or building materials
- ▶ Local incentives, policies, regulations that promote green design
- ▶ Infrastructure in community to handle demolition-waste recycling
- ▶ Regional availability of environmental products and expertise



Building Green concentrates on one key aspect of the greening process: the use of plants on and around urban buildings. Green buildings and greenspaces together define an integrated approach to plant life in cities that is central to any green programme. Trees and shrubs can help reduce overall energy use in buildings. The amount of energy saved depends on the building type, choice of tree species, positioning around the building and the prevailing climate.

Balconies and small terraces have become standard architectural features for multiple dwelling developments. The balcony garden is a natural development of the balcony's role as a link between interior and exterior environments.

Green walls - Modern cities provide enormous areas of wall space, in many cases stretching high above the street. Not all of this space is appropriate for growing plants, but much of it is – certainly much more than has been utilised in recent years.

Roofs present by far the most significant opportunities for the greening of buildings. Many cities have millions of sqmts of unused and unattractive roofs. They represent enormous wasted opportunities for improving the quality of city life. Some of the advantages for green roof include:-

- ▶ protection of roof surface from ultra-violet radiation and mechanical damage
- ▶ thermal insulation
- ▶ acoustic insulation
- ▶ lower maintenance costs for roofing materials
- ▶ reduction of stormwater runoff
- ▶ gardens for inhabitants of buildings
- ▶ masks ugly rooftops
- ▶ complements building forms
- ▶ absorption of CO₂, some air pollutants and dust

GRIHA, an acronym for Green Rating for Integrated Habitat Assessment, is the National Rating System of India. It is a green building 'design evaluation system', and is suitable for all kinds of buildings in different climatic zones of the country (www.mnre.gov.in and www.grihaindia.org). The basic benefits of following GRIHA rating system are

- ▶ Up to 30% reduction in energy consumption
- ▶ Limited waste generation due to recycling
- ▶ Less consumption of water
- ▶ Reduced pollution load & liability

The details for developing greening of roofs are given in Annexure 20.

5.2 Energy Conservation

There is a need to adopt energy efficient technologies for conservation of energy. This section discusses some important recommendations of the energy conservation building code and the National building code 2005 on energy conservation.

The building form can affect the solar access of the building. The compactness of the building is measured using a ratio of surface area to volume. $Compactness = S/V$, where, S = Surface area and V = volume. The orientation of the building is also an important fact with regard to energy conservation in the building. The building envelope for all air conditioned buildings / spaces are to comply with the ECBC code (www.beeindia@nic.in). Roofs and opaque walls should comply

with the maximum assembly U factor or the minimum insulation R-value as given in Table 5.1 and Table 5.2 respectively.

Table 5.1 Roof assembly U-factor and insulation R-value requirements

Climate Zone	24-Hour use buildings Hospitals, Hotels, Call Centers etc.		Daytime use buildings Other Building Types	
	Maximum U-factor of the overall assembly ($W/m^2 \cdot ^\circ C$)	Minimum R-value of insulation alone ($m^2 \cdot ^\circ C/W$)	Maximum U-factor of the overall assembly ($W/m^2 \cdot ^\circ C$)	Minimum R-value of insulation alone ($m^2 \cdot ^\circ C/W$)
Composite	U-0.261	R-3.5	U-0.409	R-2.1
Hot and Dry	U-0.261	R-3.5	U-0.409	R-2.1
Warm and Humid	U-0.261	R-3.5	U-0.409	R-2.1
Moderate	U-0.409	R-2.1	U-0.409	R-2.1
Cold	U-0.261	R-3.5	U-0.409	R-2.1

Source: ECBC Code 2005

Table 5.2 Opaque wall assembly U-factor and insulation R-value requirements

Climate Zone	Hospitals, Hotels Call Call Centers etc.		Other Building Types (Daytime)	
	Maximum U-factor of the overall assembly ($W/m^2 \cdot ^\circ C$)	Minimum R-value of insulation alone ($m^2 \cdot ^\circ C/W$)	Maximum U-factor of the overall assembly ($W/m^2 \cdot ^\circ C$)	Minimum R-value of insulation alone ($m^2 \cdot ^\circ C/W$)
Composite	U-0.352	R-2.35	U-0.352	R-2.35
Hot and Dry	U-0.369	R-2.20	U-0.352	R-2.35
Warm and Humid	U-0.352	R-2.35	U-0.352	R-2.35
Moderate	U-0.431	R-1.80	U-0.397	R-2.00
Cold	U-0.369	R-2.20	U-0.352	R-2.35

The concept of passive solar design emphasizes architectural design approaches that minimize building energy consumption by integrating conventional energy-efficient devices, such as mechanical and electrical pumps, fans, lighting fixtures, and other equipment, with passive design elements, such as building siting, an efficient envelope, appropriate amounts of fenestration, increased daylighting design, and thermal mass. The basic idea of passive solar design is to allow daylight, heat, and airflow into a building only when beneficial.

Passive building design starts with consideration of siting and day-lighting opportunities and the building envelope; then building systems are considered. Almost every element of a passive solar design serves more than one purpose. Landscaping can be aesthetic while also providing critical shading or direct air flow. Window shades are both a shading device and part of the

interior design scheme. Masonry floors store heat and also provide a durable walking surface. Sunlight bounced around a room provides a bright space and task light.

Day-lighting brings light into a building interior and distributing it in a way that provides more desirable and better quality illumination than artificial light sources. This reduces the need for electrical light sources, thus cutting down on electricity use and its associated costs and pollution. The general day-lighting principles include:-

- ▶ Avoid direct sunlight on critical tasks and excessive brightness.
- ▶ Bring the daylight in at a high location.
- ▶ Filter the daylight.
- ▶ Bounce daylight off of surrounding surfaces.
- ▶ Integrate daylight with other building systems and strategies.

Energy efficient lighting design focuses on methods and materials that improve quality of lighting (Annexure 13). The general lighting systems need to comply with the ECBC code and apply to the following:-

- (a) Interior spaces of buildings,
- (b) Exterior building features, including facades, illuminated roofs, architectural features, entrances, exits, loading docks, and illuminated canopies, and,
- (c) Exterior building grounds lighting that is provided through the building's electrical service.

Exceptions to above:

- (a) Emergency lighting that is automatically off during normal building operation and is powered by battery, generator, or other alternate power source; and,
- (b) Lighting in dwelling units except for dwelling units where the developer is providing lighting fixtures inside the units (however, common area lighting of residential complexes fall under purview of the code)

Solar photovoltaic systems (SPV) can be used as it is direct conversion of sunlight into electricity and could be a viable option. Street lighting, fixed type solar lighting system are some applications of SPV systems. The recommended values for illuminance is given in Annexure 14.

The design considerations for the air conditioned space, the outdoor design conditions and the minimum fresh air conditioned spaces required are given in Annexures 15 to 17.

Development of Energy Efficient Windows

Indian buildings still lack the use of energy efficient glazing system, whereas more and more buildings are being converted into air-conditioned buildings without implementing any energy efficiency measures in almost all the climatic zones. This indicates a considerable amount of electricity wastage in Indian housing, which can be reduced easily through energy efficient glazing. A significant reduction in specific energy demand is possible just by replacing the current single glazed windows with energy efficient multiple glazed windows. In hot & dry with double glazed,

double glazed Low-E and triple glazed energy efficient windows, savings of 5% to 27% were observed for 10% and 20% glazing area respectively. For other five climatic zones the possible savings are given below.

Energy saving potential of multiple glazed windows over single glazing (24 hours usage)

Window Type	Percentage Area	Specific Energy Demand kWh/m ² /a (includes lighting) [Percentage saving as compared to the single glazing]				
		Warm & Humid	Composite	Moderate	Cold & Cloudy	Cold & Sunny
Double Glazed	10%	350 [7.8]	299 [11.7]	139 [6.1]	145 [3.9]	472 [9.6]
	20%	385 [7.8]	334 [11.1]	145 [11]	150 [4.4]	514 [10.9]
Double Low-E with Argon	10%	336 [11.5]	286 [15.6]	134 [9.4]	142 [5.9]	428 [19.2]
	20%	369 [11.7]	323 [14.1]	137 [15.9]	147 [6.3]	446 [25.6]
Triple Glazed Energy Efficient Windows	10%	322 [15.3]	268 [20.9]	124 [16.2]	140 [7.8]	401 [24.3]
	20%	354 [15.3]	307 [18.3]	129 [20.8]	145 [7.6]	431 [28.1]

Source: MoEF manual on Large construction projects

These simulation results are on the basis of 24 hours usage of the building and can fit well for the residential sector. For commercial sector buildings operation for 8 hours a day and 5 days a week, the results indicate a much better saving potential in most of the climates except moderate and cold & sunny because the buildings are in use during day hours. Simulations were carried out for 20% window area (generally practiced in commercial buildings for natural lighting) with 5 days a week and 8 hours of operation. Details of energy saving potential in commercial buildings are given below.

Energy saving potential for commercial buildings of multiple glazed windows over single glazing

Window Type	Percentage saving as compared to the single glazing					
	Hot & Dry	Warm & Humid	Composite	Moderate	Cold & Cloudy	Cold & Sunny
Double Glazed	15.8	8.1	14.3	6.2	5.7	11.3
Double Low-E with Argon	26.1	12.3	14.7	16.2	6.8	26.9
Triple Glazed Energy Efficient Windows	28.1	16.5	18.6	21.5	8.1	28.7

(Source: Inderjeet Singh 2004)

5.3 Transportation

Some of the factors are important and must be taken into the consideration, while planning, are the movement of heavy traffic loads and operation of construction machinery. Construction machinery due to its operation produces smoke, dust and noise and vibration. Internal road design should be done with due consideration for environment, and safety of the people residing or working near the roads. Proper sidewalk should be provided for the residence to commute. The width of sidewalk depends upon the expected pedestrian flows and should be fixed with the help of guidelines given by IRC in IRC: 103-1988 (Annexure 18).

According to population size, the cities have been classified into five categories, i.e., less than 50,000, 50,000 to 2,00,000, 2,00,000 to 10,00,00, 10,00,000 to 50,00,000, and above 50,00,000 and the area requirements for one car parking is given in Annexure 19.

Parking facilities for residence and visitors

- ▶ For individual homes it is necessary to provide 1 visitor car park
- ▶ For multi dwelling units it is necessary to provide an additional 10% parking area over and above the normal parking requirements
- ▶ Design of the building is to ensure that adequate parking provisions are made to cater to the occupants as well as visitors
- ▶ The parking provisions should take into consideration the two wheelers and four wheelers. It is also desirable to design parking facilities with basement / stilts parking to reduce the heat island effect. When inevitable the surface parking planned should cover issues to address heat island effect.
- ▶ It is also desirable to have electric charging facility for vehicles which could cater for both two and four wheelers.
- ▶ Parking provision for bicycles
- ▶ Internal Circulation to provide for movement of fire tender, paving that permits infiltration of rain water, avoidance of very sharp and blind corners
- ▶ Elimination of risks to children and old people in crossing the internal roads to reach play areas and recreational facilities.

ENVIRONMENTAL MONITORING PROGRAM

6.0 General

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

- ▶ Summary matrix of environmental monitoring covering location of monitoring stations, frequency of sampling, method of sampling analysis and data evaluation - during construction and operational stages
- ▶ Requirement of monitoring facilities
- ▶ Frequency of air quality monitoring of stack emission, static background dust sampling at project boundary
- ▶ Stack monitoring provisions as per CPCB norms
- ▶ Changes with reference to base line data and compliance to accepted norms
- ▶ Plantation monitoring programme and greening of roof tops etc (Annexure 20)

The description of the monitoring programme should include:

- (a) A technical plan which spells out in detail the methodologies for measurement, the required frequencies of measurement, the planned location of measurement, data storage and analysis, reporting schedules and emergency procedures, and
- (b) Detailed budgets and procurement schedules for, necessary equipment and supplies, technical and administrative man power.

The environmental monitoring includes

- ▶ Air pollution
- ▶ Noise level monitoring
- ▶ Water quality monitoring and ground water level monitoring
- ▶ Maintenance of rainwater harvesting pits and other water conservation methods used are to be done regularly (Annexure 21).

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

ADDITIONAL STUDIES

7.0 General

This chapter covers the risk assessment and disaster management plan. Apart from these, R & R Action Plan and Natural Resource Conservation plan are also included in this chapter.

7.1 Risk Assessment and Disaster Management Plan (DMP)

Emergency prevention through good design, operation, maintenance and inspection are essential to reduce the probability of occurrence and consequential effect of such eventualities. The overall objective of the Emergency Response Plan ERP is to make use of the combined resources at the site and outside services to achieve the following:-

- ▶ Localize the emergency
- ▶ Minimize effects on property and people
- ▶ Effective rescue and medical treatment
- ▶ Evacuation

Major hazards identified include:-

- ▶ Hazards pertaining to fires in buildings
- ▶ Fire in diesel storage areas
- ▶ Earthquakes
- ▶ LPG gas leak

7.2 Natural Resource Conservation

Plan of action for conservation of natural resources and recycle waste materials due to the project activity in the construction and operational phase of the project is to be discussed.

7.3 R&R Action Plan

Detailed R&R Plan with data on the existing socio-economic status of the population in the study area and broad plan for 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 .

PROJECT BENEFITS

8.0 General

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

- ▶ Improvements in the physical infrastructure of project, 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 and hospitals 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

ENVIRONMENTAL MANAGEMENT PLAN

9.0 General

Environmental Management Plan (EMP) deals with evaluation of significance of unavoidable or residual impacts following mitigation and the proposed monitoring. The Environmental Management Plan (EMP) is needed to ensure that the mitigation measures specified in the EIA will actually be complied with when the project is approved for implementations. The administration of EMP may be required the establishment of an Environmental management cell to house monitoring staff after the closure of the EIA office. Funding to cover the costs of establishing and operating an appropriate Environmental Management Cell to administer the EMP should be guaranteed in the basic project budget.

The EIA report should include a description of the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored after approval of EIA. The environmental management plan should clearly mention the landscaping and the tree plantation to be taken up in the area. Also the parks and gardens if any to be developed are to be mentioned. The total number of plantations to be developed in the area is to be mentioned.

The plans to be adopted for handling of the domestic wastewaters and the solid waste management plan are to be detailed out.

SUMMARY AND CONCLUSIONS

10.0 General

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)

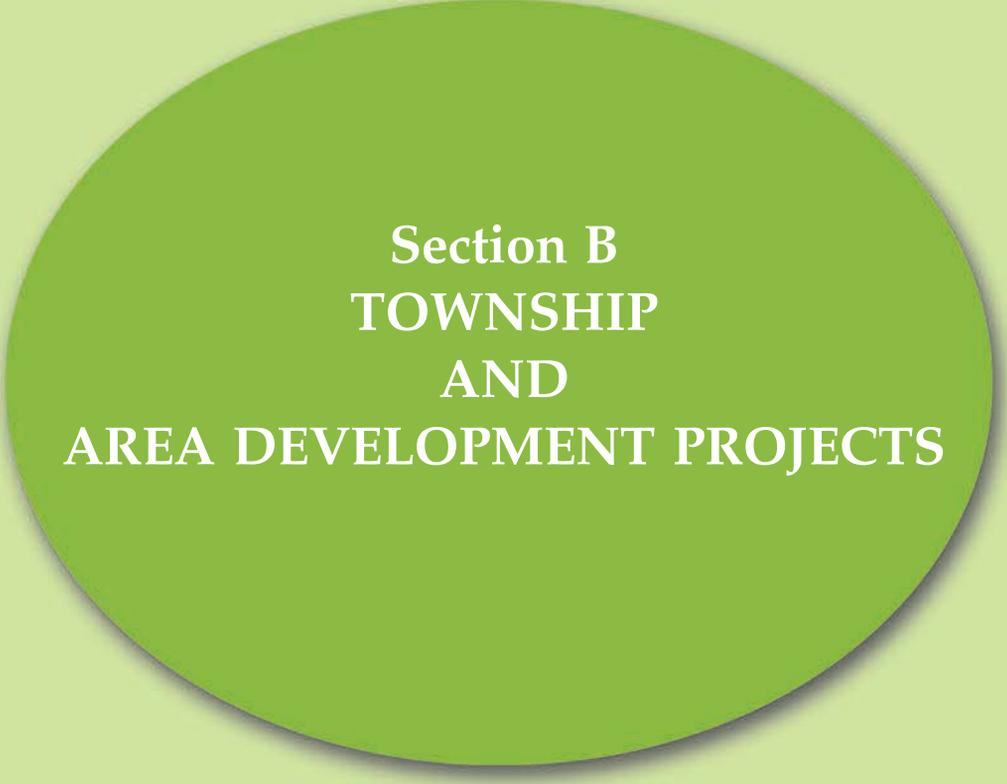
The following should be highlighted in the EIA report

- ▶ Public health and safety issues related to the project;
- ▶ The socio-economic impacts of the project;
- ▶ New building technologies to be implemented
- ▶ Energy conservation measures to be implemented
- ▶ Statement of overall impact of the construction activity on the environment.

DISCLOSURE OF CONSULTANT ENGAGED

11.0 General

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



**Section B
TOWNSHIP
AND
AREA DEVELOPMENT PROJECTS**

INTRODUCTION

1.0 Preamble

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

1.1 General Information on Township and Area Development Projects

Township in general, is self contained and integrated in the social infrastructure needs, services, shopping, entertainment and waste management. Infrastructure and services include road network, water supply and management, electricity supply and management and proper communication services. Social infrastructure includes schools, medicare, recreation and community centre. Shopping centre with adequate facilities should be housed in the township itself.

Proper waste management including garbage collection, segregation, treatment and disposal with the township should be provided. Maintenance of infrastructure and proper security and safety of the residents is to be ensured.

1.2 Environmental Clearance Process

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

The applicant will have to furnish, along with the application, in addition to Form 1 and the supplementary Form 1A, a copy of the conceptual plan. The details of the categories mentioned in the given schedule are as follows:

Project or Activity	Category with threshold limit - B Category	General Conditions
8.	Building /Construction Projects/Area Development Projects and Townships	
8(a)	Building and Construction projects	<p>≥20000 sq.mtrs and <1,50,000 sq.mtrs. of built-up area#</p> <p>notified under the Wildlife</p>
8(b)	Townships and Area Development	<p>Covering an area ha and or built up area ≥ 1,50,000 sq. mtrs. ++</p> <p>"Any project or activity specified in Category 'B' will be treated as Category 'A' if located in whole or in part within 10 km from the boundary of: (i) Protected areas notified under the Wildlife (Protection) Act, 1972; (ii) Critically polluted areas as identified by the Central Pollution Control Board from time to time; (iii) Eco-sensitive areas as notified under section 3 of the Environment (Protection) Act, 1986, such as, Mahabaleswar Panchangi, Matheran, Pachmarhi, Dahanu, Doon Valley and (iv) inter-state boundaries and international boundaries.</p> <p>Provided that the requirement regarding distance of 10km of the inter-state boundaries can be reduced or completely done away with by an agreement between the respective states or U.Ts having the common boundary in the case the activity does not fall within 10 kilometers of the areas mentioned at item (i), (ii) and (iii) above</p>
<p># (built up area for covered construction; in the case of facilities open to the sky, it will be the activity area)</p>		
<p>++All projects under Item 8(b) shall be appraised as Category B1</p>		

This manual addresses the important issues to be discussed in the environmental impact assessment of building construction, townships and area development projects. Fig.1 shows the EIA clearance process for the building construction, townships and area development projects.

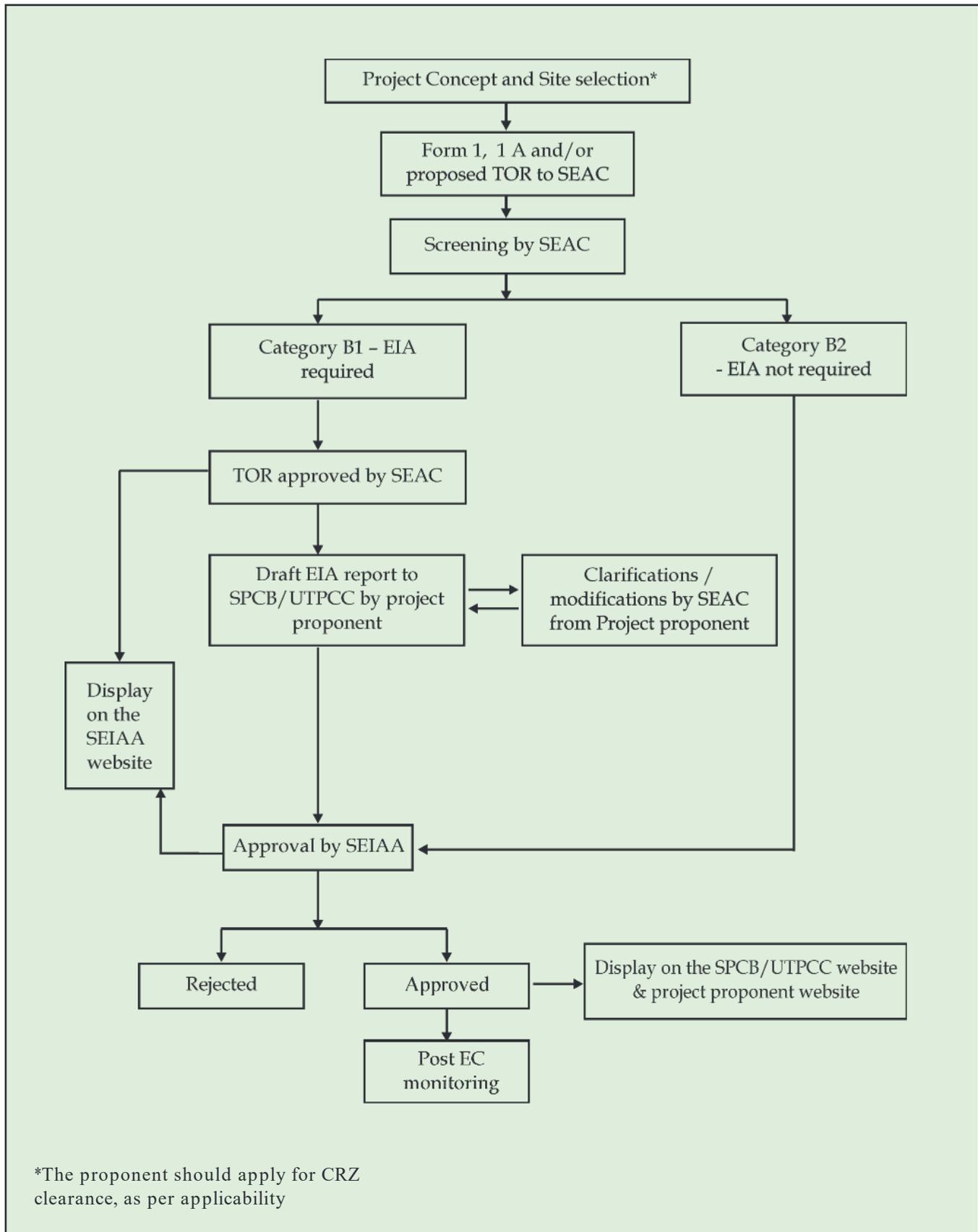


Figure 1.1: Prior Environmental Clearance Process for Category B Projects

The projects requiring an Environmental Impact Assessment report termed Category 'B1' and remaining projects termed Category 'B2' and will not require an Environment Impact Assessment report. For categorization of projects into B1 or B2 except item 8 (b), the Ministry of Environment and Forests should issue appropriate guidelines from time to time. All projects and activities listed as Category 'B' in Item 8 of the Schedule (Construction / Township / Commercial Complexes / Housing) shall not require scoping and will be appraised on the basis of Form 1 / Form 1A and the conceptual plan.

- ▶ The projects involving clearance under Coastal Regulation Zone Notification, 1991 shall submit with the application a CRZ map duly demarcated by one of the authorized agencies, showing the project activities, w.r.t. C.R.Z (at the stage of TOR) and the recommendations of the State Coastal Zone Management Authority (at the stage of EC). Simultaneous action shall also be take to obtain the requisite clearance under the provisions of the CRZ notification, 1991 for the activities to be located in the CRZ
- ▶ The projects to be located within 10km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory corridors of wild animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden thereon (at the stage of EC)
- ▶ All correspondence with the Ministry of Environment & Forests including submission “of application for TOR/Environmental Clearance, subsequent clarifications, as may be required from time to time, participation in the EAC meeting on behalf of the project proponent shall be made by the authorized signatory only. The authorized signatory should also submit a document in support of his claim of being an authorized signatory for the specific project”

Ref:- EIA notification - Amendment 2009

1.3 Terms of Reference (TOR)

The terms of reference (TOR) pertinent to preparation of EIA study reports for building construction, township and area development projects is attached as Annexure 1 to this EIA guidance Manual. TOR relevant to individual projects is to be added by the proponent and should be submitted with the application along with 'Form 1' and 'Form 1A' and the State Level Expert Appraisal Committee. The issues are addressed separately for building construction projects and townships and area development projects.

1.4 Validity of Environmental Clearance

The prior environmental clearance granted is valid for a period of five years. The regulatory authority concerned may extend this validity period by a maximum period of five years provided an application is made to the regulatory authority by the applicant within the validity period, together with an updated Form 1, and Supplementary Form 1A, for construction projects or activities (item 8 of the schedule)

1.5 Post Environmental Clearance Monitoring

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

The Project management shall submit half-yearly compliance reports in respect of the stipulated prior environmental clearance terms and conditions on 1st June and 1st December of each calendar year. All such reports shall be public documents.

1.6 Transferability of Environmental Clearance

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

1.7 Generic Structure of Environmental Impact Assessment Document

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

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

1.8 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

1.9 Brief Description of Project

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

2.0 General

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

2.1 Description of the Project

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

Essential Toposheets / Maps to be Provided with TOR application

A map of the study area 2 km from the boundary of the project area, delineating the major topographical features such as land use, drainage, locations of habitats, major constructions including roads, railways, pipelines, industries if any in the area are to be mentioned.

A map covering aerial distance of 15 kms from the boundary of the proposed project area delineating environmental sensitive areas as specified in Form I of EIA notification dated 14th Sept. 2006. In the same map the details of environmental sensitive areas present within a radial distance of 1 Km from the project boundary should be specifically shown.

Remote Sensing Satellite Imagery

Land use map of the study area in 1:10,000 scale based on high resolution satellite imagery delineating the forest, agricultural land, water bodies, settlements, and other cultural features.

Digital Elevation Model / Contour Map

Contour map on 1:10000 scale for the study area showing the various proposed break-up of the land.

Description of the project site, geology, topography, climate, transport and connectivity, demographic aspects, socio, cultural and economic aspects, villages, settlements should be given.

Details of environmentally sensitive places, land acquisition, rehabilitation of communities / villages, present status of such activities are to be mentioned. .

Historical data on climate conditions such as wind pattern, history of cyclones, storm surges, earth quake etc., for the last 25 years are to be given. An analysis and interpretation of the data has to be given by the project proponent.

Detailed layout plan of proposed project development, communication facilities, access / approach roads, landscape, sewage disposal facilities, and waste disposal etc; to be given. Layout plan of proposed development of built up areas with covered construction such as buildings, recreational facilities, DG set rooms, water supply installations etc; are to be given. Requirement of natural resources and their sources are to be detailed out.

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 to avoid loss of time and money in planning the project.

2.2 Site Selection

Apart from the issues addressed in Section A of this manual the following are to be ensured.

Proposed land use must conform to the approved Master Plan / Development plan of the area. If there is no approved Plan, consent from appropriate authority should be taken and should be submitted for Environment clearance. If the area is outside municipal limits / outside planning area, full justification for the proposed development should be provided.

Sites for new townships should conduct an analysis of the cultural and historical conditions, the urban context considerations, availability of water and other critical infrastructures like electricity, roads with adequate width and capacity and environmental considerations including ecosystems and diversity .

The land use zoning has to be consider with special reference to the natural hazard prone areas identified.

Land Use Zoning in Natural Hazard Prone Areas

Town and country planning has developed regulations for zones identified as natural hazard zones in India. These include earthquake, floods, hilly terrains etc.

The regulations for Land Use Zoning for Natural Hazard Prone Areas are to be notified under section

- 1) u/s 73(f) of Model Town & Country Planning Act, 1960; OR
- 2) u/s 143(f) of Model Regional and Town Planning and Development Law; OR
- 3) u/s 181(f) of Model Urban & Regional Planning and Development Law (Revised) of UDPI Guidelines

As may be applicable in the states under the existing provisions of Town and Country Planning legislation as and when Master Plan / development Plan of different cities / towns / areas are formulated.

The purpose of the land use zoning is for development of particular area to serve the desired purpose efficiently and to preserve its character.

Identification of Natural Hazard Prone Areas

Earthquake Prone Areas

- a. Intensities of VII or more on Modified Mercalli or MSK intensity scale are considered moderate to high. areas under seismic zones III, IV and V as specified in IS 1893. Therefore, all areas in these three zones will be considered prone to earthquake hazards.

- b. In these zones the areas which have soil conditions and the level of water table favourable for liquefaction or settlements under earthquake vibrations will have greater risk to buildings and structures which will be of special consideration under Land Use Zoning.
- c. Under these zones, those hilly areas which are identified to have poor slope stability conditions and where landslides could be triggered by earthquake or where due to prior saturated conditions, mud flow could be initiated by earthquakes and where avalanches could be triggered by earthquake will be specially risk prone.
- d. Whereas, earthquake hazard prone areas defined in 'a' above are identified on the map given in IS 1893 to small scale and more easily identified in the larger scale state wise maps given in the Vulnerability Atlas of India, the special risky areas as defined in 'b' and 'c' above, have to be determined specifically for the planning area under consideration through special studies to be carried out by geologists and geo-technical engineers.
- e. If an active fault trace is identified by GSI (Geological Survey of India), a structure for human occupancy should not be placed over the fault trace and must be set back by a minimum of 15 m on either side of fault trace..

Cyclone Prone Areas

- a. Areas prone to cyclonic storms are along the sea coast of India where the cyclonic wind velocities of 39 meter per second or more are specified in the Wind Velocity Map given in IS 875 (part 3) to a small scale and easily identified in the Vulnerability Atlas of India where the Maps are drawn state wise on a larger scale.
- b. In these cyclone prone areas, those areas which are likely to be subjected to heavy rain induced floods or to flooding by sea-water under the conditions of storm surge, are specially risky due to damage by flood flow and inundation under water.
- c. Whereas, areas under 'a' are easily identified, those with special risk as under 'b' have to be identified by special contour survey of the planning area under consideration and study of the past flooding and storm surge history of the area. These studies may have to be carried out through the Survey of India or locally appointed survey teams, and by reference to the Central Water Commission, Government of India and the department of the State or U.T dealing with the floods.

Flood Prone Areas

- a. The flood prone areas in river plains (unprotected and protected by bunds) are indicated in the Flood Atlas of India prepared by the Central Water Commission and reproduced on larger scale in the statewise maps in the Vulnerability Atlas of India.
- b. Besides the above areas, other areas can be flooded under conditions of heavy intensity rains, inundation in depressions, backflow in drains, inadequate drainage, failure of protection works, etc.
- c. Whereas, the flood prone areas under 'a' are identified on the available maps as indicated, the areas under 'b' have to be identified through local contour survey and study of the flood history of the planning area. Such studies may be carried out through Survey of India or local survey teams, and by reference to the Central Water Commission and the departments of the state or U.T dealing with the floods.

Land Slide Prone Areas

- a. While it is known that most hilly areas are prone to landslides/landslips, the susceptibility of the various areas to landslide varies from very low to very high. Landslide zoning naturally requires mapping on large scale. Normally medium scale of 1:25000 is at least chosen.

In preparation of the landslide zone map, two types of factors are considered important as listed here below:

1. *Geological/Topographic Factors/Parameters*

- ▶ Lithology
- ▶ Geological Structures / Lineaments
- ▶ Slope-dip (bedding, joint) relation
- ▶ Geomorphology
- ▶ Drainage
- ▶ Slope angle, slope aspect and slope morphology
- ▶ Land use
- ▶ Soil texture and depth
- ▶ Rock weathering

2. *Triggering Factors*

- ▶ Rainfall
- ▶ Earthquake
- ▶ Anthropogeny

- b. Whereas the factors listed under geological/ topographic parameters have been considered as basic inputs for the landslide potential model, the three triggering factors namely, rainfall, earthquake and anthropogeny were considered external factors which trigger the occurrence of a landslide.
- c. Whereas, the landslide prone areas under ‘a’ are available for some parts of the country on the maps given in Landslide Hazard Zonation Mapping in the Himalayas of Uttranchal and Himachal Pradesh States using Remote Sensing and GIS Techniques, pub. By National Remote Sensing Agency, Department of Space, Government of India, Hyderabad and Landslide Hazard Zonation Atlas of India – Landslide Hazard Maps and Cases Studies prepared by Building Materials & Technology Promotion Council, Ministry of Urban Development & Poverty Alleviation, Govt. of India, the risky areas in other parts of the country have to be determined specially for the planning areas under consideration through special studies to be carried out by the State/ UT governments and the concerned Competent Authorities.

Land Use Zoning of Flood Prone Areas :

(a) Preparation of Flood Contour Maps

The following actions should be taken to prepare the flood contour maps by taking up special studies/surveys as found necessary in the Development Area:

- i. Prepare detailed contour plan of the area liable to flood on a scale of 1 in 15000 or larger scale showing contours at interval of 0.3 to 0.5 metre;
- ii. Fix reference river gauges or maximum flood levels due to heavy rains with respect to which the areas are likely to be inundated; Demarcate areas liable to flooding by *floods in rivers* of return periods of 5, 25, 50 and 100 years or by *excessive rainfall* of return period of 5, 10, 25, and 50 years;
- iii. Mark on the maps the submersion contours for these flood stages.

(b) Regulation for Land Use Zoning

- i. Installations and Buildings of Priority 1 should be located in such a fashion that the area is above the levels corresponding to a 100 year flood or the maximum observed flood levels whichever higher. Similarly they should also be above the levels corresponding to a 50-year rainfall flooding and the likely submersion due to drainage congestion;
- ii. Buildings of Priority 2 should be located outside the 25 year flood or a 10 year rainfall contour, provided that the buildings if constructed between the 10 and 25 year contours should have either high plinth level above 25 year flood mark or constructed on columns or stilts, with ground area left for the unimportant uses;
- iii. Activities of Priority 3 viz. play grounds, gardens and parks etc. can be located in areas vulnerable to frequent floods.

Planning in Hill Areas

In order to ensure environmentally sound development of hill towns, the following restrictions and conditions may be proposed for future activities.

An integrated development plan should be prepared taking into consideration environmental and other relevant factors including ecologically sensitive areas, hazard prone areas, drainage channels, steep slopes and fertile land.

Water bodies including underground water bodies in water scares areas should be protected. Where cutting of hill slope in an area causes ecological damage and slope instability in adjacent areas, such cuttings shall not be undertaken unless appropriate measures are taken to avoid or prevent such damages.

No construction should be ordinarily undertaken in areas having slope above 30° or areas which fall in landslide hazard zones or areas falling on the spring lines and first order streams identified by the State Government on the basis of available scientific evidence.

Construction may be permitted in areas with slope between 10° to 30° or spring recharge areas or old landslide zones with such restrictions as the competent authority may decide.

These criteria are to be taken into consideration for a specific site and wherever applicable.

2.3 Manpower Requirement

The proponent should indicate the requirement of various categories of manpower such as skilled, semi-skilled, unskilled workers, technicians, engineers, managers during the construction phase.

The proponent should give the details of compliance of Acts related to employees' service and their welfare measure as per the provisions of government of India. This is because the building and other construction works is characterized by its casual nature, temporary relationship between employer and employee, uncertain working hours, lack of basic amenities and inadequacy of welfare facilities.

The following are the Acts for compliance by proponent regarding Manpower employment. The proponent should follow any later modification or Revisions for these Acts automatically

- ▶ Minimum Wages Act 1948,
- ▶ Contract Labour (Regulation & Abolition) Act 1970
- ▶ Inter-State Migrant Workmen (Regulation of Employment & Conditions of Services) Act 1979
- ▶ The Building and other construction workers (Regulation and Employment of Service) Act, 1996
- ▶ The Building and other construction workers Welfare Cess Act 1996.

2.4 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.

DESCRIPTION OF THE ENVIRONMENT

3.0 General

Environment facets to be considered in relation to townships and area development are: (a) land (b) air (c) noise (d) water (e) biological (f) socio-economic and (g) solid waste management. Hence it is necessary to ascertain the baseline data of these environmental facets.

Study Area

In the case of townships projects, EIA guidelines are specifically mentioned in Form 1A of EIA notification 2006. The following details are to be given:

1. Site development area
2. Area with angular distance of 2kms surrounding the site.

The project study area comprises the site earmarked for building construction with specified surrounding area. The baseline data collection / monitoring should be from primary and secondary sources and field monitoring studies. When secondary data is used source of data is to be mentioned clearly. The period of study for collecting primary data would be one season other than the monsoon season.

3.1 Land Environment

Existing status of baseline conditions of land use can be determined by studying the changes in the land use pattern in the past 10yrs by collecting data from secondary sources such as census records, agricultural census and land records. The land use pattern covering forest land, total irrigated land, non-irrigated land, cultivable waste, are to be calculated and given as a map (Annexure 2).

Soil formation is influenced mainly by climate, geology, relief and other biotic interactions. The soil characteristics in the project area which would affect the agricultural and afforestation potential of the area need to be studied. Particle size scale is to be given based on the texture analysis. Soil porosity and SAR ratios are important and are to be assessed for all locations. The samples are to be collected and analyzed as per CPCB norms (Annexure 3). The hydraulic conductivities in soil are important for building construction activities and are given in Annexure 4. The rating chart for the soil test values for primary nutrients is given in Annexure 4. The physical and chemical properties of soil are to be analysed and presented as given in Table 3.1 and 3.2

3.2 Water Environment

The physiography of the land will control the drainage pattern in the region. The drainage pattern in the area is to be drawn. Hydro-geological settings and the ground water levels are to be examined and presented. Ground water, surface water and waste water generated in the study area is to be collected as per CPCB norms (Annexure 3) and examined for physico-chemical, heavy metals and bacteriological parameters. The drinking water and fresh water standards are given in Annexure 5. These projects create a continuous demand on the water resources. The format for

ground water quality data presentation is given in Table 3.3 and Table 3.4. The amount of water demand can be calculated based on the occupancy of the building and the per capita consumption (Annexure 6) as given by BIS for different categories.

$$\text{Total quantity of water used} = \text{Occupancy} \times \text{Quantity (LPCD)}$$

Similarly the format in which the data for surface water quality is to be presented is shown in Table 3.5 and Table 3.6.

3.3 Air Environment

The climatic data procured from secondary sources is very important for identifying the season and period of monitoring primary data. The climatic data can help in using suitable building technologies and energy conservation measures.

The methodology to be adopted for collection of climatic data specific to the site is to compile the mean monthly normals of atmospheric parameters, from previous 10yrs data recorded by the nearest IMD station. Wind Roses for each month giving the wind direction speed are to be collected and presented. Most probable wind speed class and wind direction at the nearest IMD site is to be estimated from this.

Baseline data of air pollutant parameters extending an area of 2 Km from the project should be monitored at a number of locations. Description of baseline data of ambient air parameters namely RSPM, nitrogen dioxide, sulphur dioxide, and carbon monoxide are to be collected. One season data is to be monitored other than monsoon as per the CPCB Norms. Sampling locations are to be located as per CPCB norms. The ambient air quality standards are given in Annexure 7. Number and locations of Ambient Air quality monitoring (AAQM) stations are decided based on the nature of project, meteorological conditions, Topography, selected pollution pockets in the area and likely impact areas. The parameters measured, frequencies of sampling, technique to be as prescribed by CPCB are given in Annexure 3. The monitoring locations for air quality are to be given as shown in Table 3.7 and data should be represented as shown in Table 3.8. The monitoring locations are also to be shown on the area map.

3.4 Noise Environment

Construction equipment and road traffic are the major sources of noise. Baseline data of noise at the project area and the neighbourhood habitat areas is to be ascertained. Daytime and nighttime data should be collected and presented as shown in Table 3.9 the parameters, frequencies of sampling are shown in Annexure 3 and the standards for noise are given in Annexure 8.

3.5 Biological Environment

Baseline data from field observations for various terrestrial and aquatic systems are to be generated. Wild life sanctuaries and National parks location within 10km radius from project boundary are identified based on secondary data. 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.

3.6 Socio-economic Environment

Baseline data on the socio economic environment in the study area is to be collected. The issues to be focused include demographic structure, economic activity, education, literacy profile, land use, health status and infrastructure resources. Primary data through designed questionnaires from the house hold survey within the study area is collected and from secondary sources and represented as shown in Table 3.10 and 3.11. The demographic details consisting of population distribution, Average household size, population density, sex ratio, social structure and literacy levels within project study area are concluded from this data collected.

3

3.7 Solid Waste

Present data available on solid waste generated in the area are to be collected. If possible the present quantities of wastes – hazardous household wastes, electronic wastes, biomedical and non-hazardous generated in the study are to be collected and presented.

ANTICIPATED IMPACT AND MITIGATION MEASURES

4.0 Introduction

Impacts can be classified in the presentation as direct, indirect and cumulative impacts. These can be further subdivided for convenience and clarity to positive and negative impacts, random and predictable impacts, local and widespread impacts, temporary and permanent impacts, long term and short term impacts. The report should preferably cover the impacts as discussed above. Suitable avoidance / mitigation methods can be given for each of the alternatives provided. The most feasible one can be chosen by the project proponent.

Prediction of Impact during Construction Phases

The activities that take place during construction phases of the project are leveling of site, construction and erection of buildings etc., and associated equipments in operation. The potential primary and secondary impacts on the environment, their prediction, significance and mitigation are to be discussed.

Prediction of Impact During Operational Phases

The potential significant impacts are on topography, land use, soil quality, ambient air quality, noise levels, traffic densities, water resources, water quality, biological environment, demography and socio- economics. During construction and operational phase of the project, various activities may have impact on some or other environmental parameters. Various environmental attributes are to be studied during these phases for their overall impact on the surrounding environment. The guidance for assessment and impact is given in Annexure 9.

4.1 Land Environment

Anticipated Impact

Impacts due to activity have to be identified that are caused. Some of the impacts could be

- ▶ Compaction of soils by earth moving equipment
- ▶ Erosion and modification of surface
- ▶ Over exploitation of agricultural soils due to future development in a zone sensitive to erosion
- ▶ Irreversible salinization and acidification of mangrove swamp soils

Mitigation Measures

Soil erosion is an important parameter which needs to be addressed during the construction phase. Some of the mitigation measures include:

- ▶ The environmental impact of soil erosion can best be mitigated by removing vegetative cover only from the specific site on which construction is to take place and by disturbing the vegetation in adjacent areas as little as possible. Land clearing activities should be kept to the absolute minimum and use crushed stone rather than asphalt or concrete for surfacing parking areas should be attempted.

- ▶ Evolve strategies to stockpile top soil and reuse later for landscaping purpose
- ▶ Adopt measures such as temporary and permanent seeding, mulching, early dikes, silt fencing, sediment traps and sediment basins.
- ▶ Open areas can be landscaped
- ▶ Paved areas can be installed with permeable paving.
- ▶ Impermeable surfaces direct all runoff towards storm water collection pits.
- ▶ Disturbing the existing vegetation and natural contour of the land as little as possible can mitigate increases in surface runoff. Vegetation along watercourses should not be cleared indiscriminately. Neither should potholes or swamps be drained unless absolutely necessary for successful completion of the activity.
- ▶ Construction, land management, or mining activities that result in the soil being laid bare could be scheduled in such a way that some type of vegetative cover appropriate to the site could be established prior to the onset of intense rain or windstorms. If grass is to be seeded, mulch of straw will help to protect the soil from less extreme erosive forces until vegetative and root development begins.
- ▶ Natural drainage patterns can often be maintained by preparing sodden waterways or installing culverts.
- ▶ Steep slopes can be terraced, thereby effectively reducing the length of slope.
- ▶ Check dams built near construction sites can reduce the quantity of eroded soil particles reaching free-flowing streams or lakes.
- ▶ Use of “floating” foundations and height restrictions in earthquake zones and increased foundation height, wall strength, and roof support in areas periodically subject to cyclones can reduce the hazards.
- ▶ All forms of temporary structures should be avoided from the flood plain, and all permanent structures should be raised to a height above the level which flood waters can be expected to reach once every 100 years (100-year flood).
- ▶ Installation of underground drainage structures helps to reduce sediment loads
- ▶ Engineering plans can be drawn to reduce the area of earth cuts on fills below what might otherwise be acceptable, provide physical support for exposed soil or rock faces, concentrate or distribute – as appropriate the weight loading of foundations to areas or state better able to support that weight,
- ▶ restricting the number, frequency and area of movement of heavy machinery
- ▶ Compatibility between adjacent land uses can best be assured by providing a green belt between the proposed activity and nearby properties where any significant degree of incompatibility is likely to result.

Natural Topography

It is essential to avoid disturbance to the site by retaining the natural topography of the site or design the landscape with at least 15% to 25% of the site area. For credit purposes it should be noted that the parking areas, walkways etc landscaping over built structures such as roofs, basement etc will not be considered. Similarly potted plants also will not be considered.

- ▶ turf design on site so as to conserve water

- ▶ design landscape to ensure minimum consumption of water – i.e. drought tolerant species
- ▶ reduce the demand for irrigation water through water efficient management techniques
- ▶ turf and each type of bedding area may be segregated into independent zones based on watering needs.

4.2 Water Environment

Construction Phase

The construction phase would involve water requirements for the following activities

- ▶ site preparation: Involves levelling for infrastructure development and removal of vegetation. Water is required for dust settlement, consolidation, compaction and curing.
- ▶ Construction of building infrastructure involves water for construction activities and domestic and other water requirements for labour and staff onsite.
- ▶ The period of this activity is to be mentioned

4

Impact Prediction

- ▶ Use of large quantities of water in curing
- ▶ Use during the operational phase by residence for routine activities

Mitigation Measures

Measures for reducing water demand during construction

To avoid wastage of curing water, following guidelines are to be followed:

- ▶ Curing water should be sprayed on concrete structures; free flow of water should not be allowed for curing.
- ▶ After liberal curing on the first day, all concrete structures should be painted with curing chemical to save water. This will stop daily water curing hence save water.
- ▶ Concrete structures should be covered with thick cloth/ gunny bags and then water should be sprayed on them. This would avoid water rebound and will ensure sustained and complete curing.
- ▶ Ponds should be made using cement and sand mortar to avoid water flowing away from the flat surface while curing.
- ▶ Water ponding should be done on all sunken slabs, this would also highlight the importance of having an impervious formwork.

Some of the common practices and devices that can save water are:

Monitoring water use: Use of water meter conforming to ISO standards should be installed at the inlet point of water uptake and at the discharge point to monitor the daily water consumption.

Use of water saving devices/ fixtures: About 40% of all water used indoors is in the bathroom and toilets and more than 10% of that used is in the kitchen. The conventional fixtures used in toilets use water at the rate of 12-15 litres per flush. The opportunity to lower the consumption through Low flow flushing systems, Sensor based fixtures, Waterless urinals, Tap aerators etc can be encouraged to reduce the water usage.

Installation of dual pipe plumbing for using recycled water / rain water can reduce usage of potable water considerably. There can be two lines, one supplying fresh water for drinking, cooking and bathing etc and other for supply of recycled water for flushing, landscape irrigation, car washing, thermal conditioning etc.

The quantity of ground water usage and waste water generated during both the phases is to be estimated based on the population, reuse and recycle activities planned. Based on the quantification of waste water, the treatment plants should be suitably designed.

In townships and area development projects, it is expected that all the buildings are connected by sewers. Treatment plants normally used for building sewage are based on biological processes. In addition, artificial wetlands or reed bed systems for waste water treatment based on the use of deep – rooted plants can also be used at decentralized level. Aerobic treatment systems, anaerobic treatment systems, Root zone treatment system, Decentralized Wastewater Treatment Systems” which includes Primary treatment: sedimentation and floatation, Secondary anaerobic treatment in fixed-bed reactors: baffled upstream reactors or anaerobic filters, Tertiary aerobic treatment in sub-surface flow filters and Tertiary aerobic treatment in polishing ponds are some of the methods for treatment of the waste waters generated in the township. The effluent discharge standards are shown in Annexure 10.

Rainwater Harvesting

It is essential to provide rain water harvesting or storage systems to capture atleast 50% of the runoff volumes from the roof surfaces. In coastal areas where the groundwater table is shallow and water percolation is limited collection tanks may be provided. Given below are some details of run off coefficients from different surfaces.

Run off Coefficients for Typical Surface Types

Surface Type	Runoff Coefficient
Roofs conventional	0.70 to 0.80
Roofs inclined	0.85 to 0.95
Concrete /Kota Paving	0.60 to 0.70
Gravel	0.50 to 0.60
Brick Paving	0.75
Vegetation	
1%–3%	0.20
3%–10%	0.15
> 10%	(more the vegetation cover – less the runoff coefficient) 0.10
Turf slopes	
0%–1%	0.25
1%–3%	0.35
3%–10%	0.40
> 10%	0.45

- ▶ The rainwater harvesting structure is to be designed based on the sub-surface characteristics. The factors to be considered include weathering, fractures and joints for rocky sites and thickness of aquifer for sedimentary sites.
 - ◆ Rainwater harvesting structures must be kept a safe height above the highest level of ground water table in order that the ground water quality is safeguarded. Depending on the certainty of information about the highest level of ground water table and the trend of rise of ground water table, this gap may be from 3 to 5 metres.
 - ◆ The intensity of peak hourly rainfall and peak daily rainfall should be based on observations made by Indian Meteorological Department rather than inferred from annual rainfall.
 - ◆ The peak hourly rainfall should be adopted for calculating the components for recharging groundwater, and peak daily rainfall should be adopted for calculating the capacity of storage tank.
 - ◆ Only the terrace runoff may be considered for storage and reuse after pre-treatment and disinfection.

Types of Structures Include :

- ▶ Recharge pits, Recharge trenches, Recharge shaft
- ▶ Trench with recharge well, Shaft with recharge well
- ▶ Recharge through abandoned hand pumps, abandoned tube well
- ▶ Recharge well
- ▶ Percolation tank
- ▶ Check dam
- ▶ Sub-surface dyke
- ▶ Roof top rain water harvesting

It is important that roof top structures to capture rainwater include in their design flushing arrangements so as to let out impurities such as paper wastes, leaves, bird droppings etc. The runoff from rainwater harvesting structures is to be treated depending upon its source. For example:

- a. The runoff from terrace and ground surface should always be segregated and given appropriate pre-treatment before recharging ground water.
- b. Runoff from parking areas must also be treated for removal of oil and grease.
- c. Activated carbon filter should be included in the pre-treatment of runoff from lawns and landscaped areas for arresting pesticides.

In designing the ground water recharge structures following points should be taken into consideration:

1. Annual rainfall, peak intensity and duration of each storm
2. Type of soil and subsoil conditions and their permeability factor : Infiltration rates of soil and hydraulic conductivities of water transmission are required to be considered while

constructing recharge systems. Normally hydraulic conductivities (K- values) of various soils in m/ day , which can serve the purpose of assessing the final infiltration rates of soils. These can be used in the absence of measured values of soils under recharge. K values need to be measured for a particular site for efficient results. As mentioned earlier the specific yields for different formations and porosities of soil are given in Annexure 4.2 and 4.3 respectively.

The main site conditions to be assessed in case of (surface/ subsurface) storage structures are:

- ▶ Availability of suitable catchments (Rooftops are usually recommended as against surface catchments in this case as quality control measures can be relatively easier to apply and monitor).
- ▶ Foundation characteristics of soil near the house
- ▶ Location of trees
- ▶ Estimated runoff to be captured per unit of the catchment
- ▶ Availability and location of construction material (MoRD, GoI, 2004)

4.3 Air Environment

Anticipated Impact

Construction phase would involve site clearances and preparation, infrastructure development, building construction and other related activities and

Operational phase would involve emission from vehicular movement and diesel generators, and negligible emissions from sewage and solid waste handling and disposal.

The building material carrying vehicles as well as the construction machinery generate emissions and pollute the environment. Dusts include brick and silica dusts, wood dust from joinery and other woodworking and from earthmoving and other vehicle movements within the site. Asbestos-containing dust especially during the demolition of buildings is very harmful. It is a difficult task to separate these wastes. Construction machineries pose a special threat to air quality. It is estimated that construction machineries emit toxic pollutants and are sources of fine particulate matter (PM_{2.5}, which lodges deeply in the human lung) and oxides of nitrogen (NO_x), a key ingredient in the formation of ground-level ozone and urban smog.

Mitigation Measures

The main concerns during demolition activities are the emissions generated by the vehicles and the machineries. Air Pollution may be caused by areas or point sources such as cities, industrial areas, factories or by linear sources such as highways. Vegetation buffers can minimize the build-up of pollution levels in urban areas by acting as pollution sinks.

- ▶ Wind erosion is a serious problem in areas where the ground is virtually bare and devoid of vegetation. Vegetation methods are found to be most effective in the form of windbreaks and shelterbelts.
- ▶ A dense belt provides greater shelter immediately to leeward but the sheltered area is not as extensive as when a more permeable zone of vegetation is provided.
- ▶ Plants are good absorbers of sulphur dioxide. Parks with trees have an SO₂ level lower than city streets.

- ▶ Heavy roadside planting in the form of shelterbelts can result in reduction in airborne lead
- ▶ Complete dust interception can be achieved by a 30 m belt of trees. Even a single row of trees may bring about 25 percent reductions in airborne particulate.
- ▶ Evergreen trees are found to be more effective.
- ▶ The species chosen must be resistant to pollutants, particularly in the early stages of their growth (Annexure 11).

Mitigation Measures for Dust Control

Adopting techniques like, air extraction equipment, and covering scaffolding, hosing down road surfaces and cleaning of vehicles can reduce dust and vapour emissions. Measures include appropriate containment around bulk storage tanks and materials stores to prevent spillages entering watercourses.

The other measures to reduce the air pollution on site are:

- ▶ On-Road- Inspection should be done for black smoke generating machinery.
- ▶ Promotion of use of cleaner fuel should be done.
- ▶ All DG sets should comply emission norms notified by MoEF/ CPCB.
- ▶ Vehicles having pollution under control certificate may be allowed to ply.
- ▶ Use of covering sheet to prevent dust dispersion at buildings and infrastructure sites, which are being constructed.
- ▶ Use of covering sheets should be done for trucks to prevent dust dispersion from the trucks, implemented by district offices.
- ▶ Paving is a more permanent solution to dust control, suitable for longer duration projects. High cost is the major drawback to paving.
- ▶ Locally found gravel may be applied to access roads as it adds a protective layer over the exposed soil and helps control dust generation in some situations. It is important that gravel contain a minimal percentage of fines and clean gravel be added periodically, as the fines migrate to the surface and create dust.
- ▶ Reducing the speed of a vehicle to 20 kmph can reduce emissions by a large extent. Speed bumps are commonly used to ensure speed reduction. In cases where speed reduction cannot effectively reduce fugitive dust, it may be necessary to divert traffic to nearby paved areas.

Material storages / warehouses – Care should be taken to keep all material storages adequately covered and contained so that they are not exposed to situations where winds on site could lead to dust / particulate emissions. Fabrics and plastics for covering piles of soils and debris is an effective means to reduce fugitive dust. However, these materials can be costly and are subject to degradation from the sun, weather, and human contact. Straw and hay can also be used to cover exposed soil areas, although they can be disturbed by wind and vehicles.

4.4 Noise Environment

Anticipated Impact

During the construction phase of the site, the following source of noise pollution is expected:

- ▶ Construction equipment

During operational phase the following sources of noise pollution is expected:

- ▶ Diesel generator operations
- ▶ Increase in transport noise from within the site from near by roads.

Mitigation Measures

There are two ways of applying controls or measures. The first is to plan so as to keep the noise at a distance. Under this aspect comes the separation of housing from traffic noise by interposing buffer zones, and the protection of schools and hospitals by green belts, public gardens, etc. The second is the principle of shading or screening. This consists of deliberately interposing a less vulnerable building to screen a more vulnerable one or by providing a solid barrier such as a wall between the source and the location to be protected.

Setting up the barriers: National Building Code 2005 suggests that design solutions such as barrier blocks should be used to reduce external LA10 noise levels to at least 60-70dB(A) at any point 1.0 m from any inward looking façade. Green belts and landscaping could act as an effective means to control noise pollution. In case of railway tracks, a minimum distance of 50m to 70m may be provided between the buildings and the tracks. Thick belts of planting greater than 30 meters are useful for cutting the noise levels from road traffic. Strong leafy trees may be planted to act as noise baffles. Shrubs and creepers may also be planted for additional protection between tree trunks; artificial mounds and banks should be formed where practicable. As little hard paving and as much grass as possible may be used. The creation of green belt is particularly advisable on the perimeter of aerodromes, along railway lines and arterial roads, through or past built up areas and adjoining industrial zones.

Control of noise from road traffic: Trees with heavy foliage planted on both sides of carriage way help slightly muffle the noise provided; the foliage extends for a considerable distance of 30m or above. The codes to be referred for noise control and maintaining minimum standards are given in Annexure 8.

4.5 Biological Environment

The mitigation measures should be suggested that will help in reducing the impact on terrestrial ecology and aquatic ecology. Massive plantation, landscaping are to be ensured in the new construction areas. Also trees, plants should be identified for specific areas so that the plants survive in these conditions. The details of the drought resistant species are given in Annexure 11.

4.6 Socio- economic

Anticipated Impacts

The impact on the socio-economic status of the people in the area is to be studied and detailed out. Positive impacts could include job creation, preservation of environment, infrastructure development and benefits to local population by way of job opportunities. Long term impacts include aspects of demography, aesthetics, and archeological sites. Negative impacts include impacts on cultural aspects and well being.

Township and area development projects could create a severe social impact. Some of these could include increase in noise and interference with existing access to habitation, storm water drainage and enjoyment of open space. Unhygienic site sanitation facilities cause damage to environment and to health of the construction workers.

Mitigation Measures

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

- ▶ Comply with the safety procedures, norms and guidelines (as applicable) as outlined in the document Part 7 Constructional practices and safety, 2005, National Building code of India, Bureau of Indian Standards
- ▶ Provide clean drinking water to all workers
- ▶ Provide adequate number of decentralized latrines and urinals to construction workers.
- ▶ Guarding all parts of dangerous machinery.
- ▶ Precautions for working on machinery.
- ▶ Maintaining hoists and lifts, lifting machines, chains, ropes, and other lifting tackles in good condition.
- ▶ Durable and reusable formwork systems to replace timber formwork and ensure that formwork where used is properly maintained.
- ▶ Ensuring that walking surfaces or boards at height are of sound construction and are provided with safety rails or belts.
- ▶ Provide measures to prevent fires. Fire extinguishers and buckets of sand to be provided in the fire-prone area and elsewhere.
- ▶ Provide sufficient and suitable light for working during night time.

4

4.7 Solid Waste

The construction phase waste will comprise of excavated and demolition material while operational phase waste may comprise of domestic, commercial and biomedical wastes, depending upon the type of the project. The different types of wastes need to be handled as per their needs and regulatory requirements. It is not possible to dispose off all type of wastes onto the land and has to be dealt with depending upon their type and characteristics. Building construction leads to generation of sand, gravel, concrete, stone, bricks, wood, metal, glass, polythene sheets plastic, paper etc. as waste.

Type of wastes, which are generated, can be classified into four categories.

1. Construction or demolition waste, i.e., massive and inert waste
2. Municipal waste, i.e., biodegradable and recyclable waste
3. Hazardous waste,
4. E-waste

The waste characterization in constructional stage should be estimated by reviewing other similar already existing projects and given in tabular form. Similarly wastes generated in operational phase should be estimated and classified as

- ▶ biodegradable

- ▶ recyclable
- ▶ inert
- ▶ hazardous

and quantified for percentage composition estimation.

Construction and Demolition Waste Management

The construction and demolition waste includes debris, concrete (often recycled and reused at the site), steel and other metals, pallets, packaging and paper products, fluorescent tubes, wood beams, joists, studs, baseboards, cabinets and cupboards, railings, brick, doors and casings, interior windows, bathroom fixtures, light fixtures, ceiling grid and tile, furnishings, replant trees, shrubs. Orderly deconstruction is the proper measure for reuse of the demolished matter. In contrast to demolition, where buildings are knocked down and materials are either land filled or recycled, deconstruction involves carefully taking apart portions of buildings or removing their contents with the primary goal being reuse. It can be as simple as stripping out cabinetry, fixtures, and windows, or manually taking apart the building frame. Gross segregation of construction and demolition wastes into roadwork materials, structural building material, salvaged building parts and site clearance wastes is necessary. Additional segregation is required to facilitate reuse/recycling.

Waste recycling plans should be developed for construction and demolition projects, prior to beginning construction activity. The plans should identify wastes to be generated, and designate handling, recycling and disposal method to be followed. Handling of waste material requires special precautions such as personal protective equipment and special procedures to prevent the injury. Developers must operate safe methods for waste collection, storage, and disposal operations in a manner to protect the health and safety of personnel, minimize environmental impact and promote material recovery and recycling.

Solid Waste During Operational Phase

Adequate provision should be made for storage of solid waste and for easy access to the dustbins;

- ▶ for labours from source to the place of storage, and
- ▶ from the place of storage to a collection point specified by the waste collection authority and/or contractor
- ▶ Three colours of wheeled bins: - dark grey for inert waste, green for wood and ply waste and blue for hazardous waste can be used.

A minimum of 4% of the total site area should be allocated for storage and pre treatment of the waste. This storage area should be covered and the pollutants from the waste should not affect the surrounding.

Access To and From Bin Storage Areas

Wheeled bins should be made access with ramps. To ensure this vehicle access, paths should be paved and at least 1.2 metres wide with a maximum gradient of 1 in 10. The surface of the path should be smooth, continuous and hardwearing. Ramped kerbs should be provided where the path meets the highway, and bins should not have to pass across designated parking spaces.

Where collection vehicles have to enter developments, there should be sufficient space on paved roads with turning circles for easy circulation. This ensures the refuse vehicles to enter the vicinity of the site without being prevented from doing so by cars parked close to the entrance. Vehicles should never have to reverse onto or from a highway to make a collection. Roadways used by refuse vehicles must be designed to withstand a laden weight of not less than 28 tonnes.

Municipal Solid Waste Management

Waste generated by users- Domestic wastes food leftovers, vegetable peels, plastic, house sweepings, clothes, ash, etc. commercial waste generally comprises of paper, cardboard, plastic, wastes like batteries, bulbs, tube lights etc.

Three-bin system is a good option for segregation at household level. Storage facilities should be created and established by taking into account quantities of waste generation in a given area and the population densities. A storage facility should be so placed that it is accessible to users, within a radius of 25 meter from the source. Local authorities should provide different coloured bins for different categories of waste. Adequate provision should be made for storage of solid waste.

Three colours of wheeled bins: - dark grey for non-recyclable waste, green for kitchen food / compostable garden waste and blue for paper (generally used for flats, schools, offices etc). In addition, boxes must be provided for the collection of other recyclable materials; a green box is used for paper and a black box is used for cans and plastic collections. Individual properties should be allocated a 20-litter bin although for single-family occupancy. Boxes should have lids. Flats and multi-storeyed buildings should have bulk dustbin type container, with a general guide of one 1100 litre bin being adequate for every 60 units, for smaller blocks. The one to five ratio outlined above could be increased or decreased according to the number or properties with greater or less than two bedrooms per unit. The ratio of approx one paper bin to three residual waste bins is only a guide. Waste and Cleansing Section can advise on individual cases.

Hazardous Waste Management

Products, such as paints, cleaners, oils, batteries, and pesticides that contain potentially hazardous ingredients require special care when you dispose of them. Improper disposal of household hazardous wastes can include pouring them down the drain, on the ground, into storm sewers, or in some cases putting them out with the trash.

Hazardous wastes from construction and demolition activities are centering oil, formwork oil, tar and tar products (bitumen, felt, waterproofing compounds, etc.), wood dust from treated wood, lead containing products, chemical admixtures, sealants, adhesive solvents, Explosives and related products and equipment used in excavation, acrylics, and silica, etc. The dustbins for these wastes should be made of durable materials like metal or even masonry if the projects spans for more than a year.

List of Hazardous wastes from construction projects

- ▶ Asbestos products – insulation, tiles etc
- ▶ Fuels and Heating oils and other volatile / flammable liquids such as coolants, grease etc.
- ▶ Centering oil, formwork oil
- ▶ Tar and Tar products (bitumen, felt, water proofing compounds etc.)

- ▶ Wood Dust
- ▶ Lead containing products
- ▶ Chemicals , admixtures, sealants, adhesives solvents etc.
- ▶ Paints, pigments, dyes and primers
- ▶ Carbon black
- ▶ Pesticides
- ▶ Tarpaulin
- ▶ Explosives and related products and equipment used in excavations
- ▶ Product packaging (cement bags, cartons, containers, plastic covers etc.)
- ▶ Plastics, Acrylics, Silica, PVC
- ▶ Fluorescent Lamps Intact and Crushed, Halogen Lamps, Arc Lamps, UV Lamps, High Pressure Sodium Lamps, , Neon Lamps, Incandescent Lamps.
- ▶ Mercury Containing Lamps and Tubes, Mercury Vapour Lamps, Mercury Containing Devices – Mercury switches, relays, regulators, thermostats, thermometers, manometers and debris containing mercury
- ▶ All types of Batteries
- ▶ Electronic Ballasts, PCBs, Transformers, capacitors, switchgear, Lead Cable, Oil filled / gel filled cables
- ▶ Electronic Waste– computer products, circuit boards, CRTs, electronic parts, solder dross, weld waste.

Due to the characteristics, the wastes generated from the healthcare establishments are also hazardous in nature. Biomedical wastes have to be dealt with as per the Biomedical Wastes (Handling & Management) Rules, 2000.

- ▶ Lead based paints and other hazardous materials may be removed from the structure prior to deconstruction or demolition activities to minimize special handling and disposal requirements for the construction and demolition waste. These activities must be conducted by qualified personnel using appropriate health and safety procedures in accordance with the regulatory requirements.
- ▶ Isolated storage for hazardous wastes released from the whole site should be provided on site.
- ▶ Source segregation of similar wastes is highly recommended.
- ▶ Installation of fire extinguisher is mandatory near storage of hazardous wastes.

E-waste Management

Collection and Storage

Various types of electrical and electronic wastes generated in the building, which includes PC in case of offices and homes, Xerox machine components from office and shops, should be collected separately for transportation to the authorized recyclers approved by the state / Central pollution control boards. There should also be provision for storage of these wastes in the building before transportation.

ALTERNATIVE TECHNOLOGIES

5.0 General

The use of modern building material, energy conservation methods and transportation methods along with traffic regulations within the area is to be given in this chapter

5.1 Building Materials

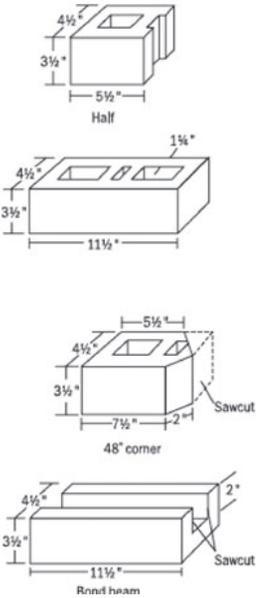
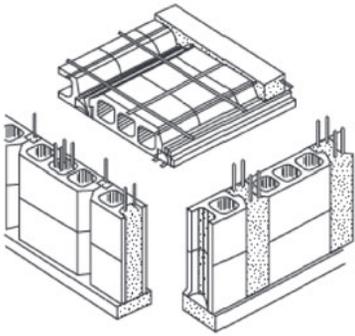
Use of alternative technologies for each component of the buildings of envelope, superstructure, finishes and the road and surrounding areas are discussed in detail (NBCCode 2007). Some them are given below:

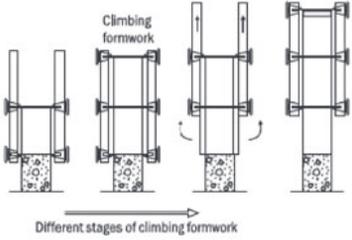
- ▶ Brick and block products with waste and recycled contents such as fly ash (waste from coal burning plants), blast furnace slag, sewage sludge, waste wood fibre etc.
- ▶ Fly ash based lightweight aerated concrete blocks can be used for walls.
- ▶ Perforated bricks can be used for wall structures.
- ▶ Brick panel with joists, Filler slab roofing, brick funicular shell roofing, RCC channel units, micro-concrete roofing tiles are some of the alternative techniques for roofing.

Some of the alternate materials for openings in construction are:-

- ▶ Use of precast thin lintels, use of ferrocement-sunshade cum lintel etc.
- ▶ Use of renewable timber for doors and windows
- ▶ Use of steel manufactures from recycled content
- ▶ Aluminum from verified recycled content
- ▶ Saw dust based doors and window frames
- ▶ Ferrocement shutters, PVC doors and windows, Rice husk boards, Natural fibre- reinforced polymer composite door panels
- ▶ Bamboo based products, bamboo strips boards.
- ▶ Alternatives for finishes include Fly ash, Ceramic tiles, Terrazzo floors

The use of the alternatives for building materials will help reduce the use of non-renewable resources and impact on natural resources. The materials used should be mentioned specifically in the EIA report. Alternative options in building materials are summarized below.

	Conventional Materials	Alternate
<p>Wall</p> 	<p>Clay bricks with cement mortar</p>	<p><i>Earth blocks</i>- Earth blocks stabilized with 5%–15% of cement are good choice for low cost, low-rise construction in hot-humid climates.</p> <p>Brick and block products with waste and recycled contents such as fly ash (waste from coal burning plants), blast furnace slag, sewage sludge, waste wood fibre, rice husk ash, etc.</p> <p>Concrete blocks using lime or waste wood fiber provide reduction of waste and saves energy. Fly ash can be used to replace about 15% to 35% of the total cementitious material. The slag content can be used to replace the same between 20% and 25%.</p> <p><i>Fly ash-based lightweight aerated concrete blocks</i>- Fly ash is a waste product of thermal power plant. Fly ash-based lightweight aerated concrete blocks are manufactured for walling and roofing purposes by mixing fly ash, quick lime, or cement and gypsum with a foaming agent like aluminium powder.</p> <p><i>Fal-G (Fly ash, lime, and gypsum)</i>- Fal-G products are manufactured by binding fly ash, lime, and calcined gypsum (a by-product of phosphogypsum or natural gypsum).</p>
<p>Roof</p> 	<p>The conventional material used for roofing is RCC, as it is suitable for longer spans. The constituents of RCC, i.e, cement, sand, aggregate and steel all are energy intensive materials and high-embodied energy content.</p>	<p>Use of lightweight synthetic aggregate- The example is fly ash based aggregate, which is suitable for manufacture of brick, blocks, and is good substitute for clinker and natural aggregates.</p> <p>Pre-cast/aerated cellular concrete walling blocks and roofing slabs- These are manufactured by the aerated cellular concrete manufacturing process. When used in multi-storied structures, they reduce the weight, resulting in a more economical design. They have high rating to fire resistance and provide better insulation.</p>

	Conventional Materials	Alternate
<p>Superstructure</p>  <p>Different stages of climbing formwork</p>	<p>Structural frame of building comprises of footing, columns, beams and lintels, over which the envelope of building is supported.</p>	<p>Ferro cement- The composite Ferro cement system is simple to construct and is made of Ferro cement—a rich mortar reinforced with chicken or /and welded wire mesh.</p> <p>Metals- A variety of metals are used in buildings, but the major building material used structurally is steel. Steel has a high-embodied energy and recyclable content, as well as scrap value. Aluminium forms the second most common material used for roofing sheets, window frames, and cladding systems, which has the highest recyclable content.</p> <p>Use of fly ash and /or blast furnace slag concrete -The amount of cement used in concrete can be reduced by replacing a portion of the cement with coal fly ash (waste material from coal burning power plants) and/or GGBF (ground-granulated blast furnace) slag in conventional mixes.</p> <p>Recycled aggregates Recycled aggregates- Crushed concrete, brick, glass, or other masonry waste can also be used in conventional mixes.</p> <p>Lightweight concrete- Aluminium powder when added to lime reacts and form hydrogen bubbles, and a lightweight cementitious material (high strength to weight ratio and an insulation value of R-10 in a 20.32-cm thick wall) is formed which could be used in conventional mixes.</p>

	Conventional Materials	Alternate
Roads and open spaces	This part of housing units consists of compound walls, grills, roads, sidewalks, parking lots, drains, curbs, landscaped areas, street furniture, tree covers, flowerbeds	<p>Permeable paving- Permeable (porous) paving should be used to control surface water runoff by allowing storm water to infiltrate the soil and return to the ground water.</p> <p>Gravel/crusher fines- Loose aggregate material used to cover pedestrian surfaces.</p> <p>Porous asphalt (bituminous concrete)- A porous asphalt layer constructed with “open- graded” aggregate (small fines removed), which leaves voids between the large particles unfilled by smaller fine.</p> <p>Porous Concrete- A concrete mix without the fine aggregate, and with special additives for strength.</p> <p>Permeable paving is not intended to replace standard impervious paving, but to limit the use of impermeable paving to heavy traffic areas.</p>
Roads and open spaces		Use of grass pavers on the road, parking and pedestrian areas is a solution to reduce the heat island effect.
Use of Bamboo in Road construction		Bamboo has been used for road reinforcements in Orissa, which has proved its credibility.
Use of bamboo fence instead of steel grills		Use of steel in fencing, grills, tree covers, and benches and even in streetlights can be easily replaced by bamboo.

Natural hazard prone areas

Areas likely to have moderate to high intensity of earthquake, or cyclonic storm, or significant flood or inundation, or land slides/ mud flows / avalanches etc are identified as risk zones. The structural design of foundation, elements of masonry, timber, plain concrete, reinforced concrete, pre-stressed concrete, and structural steel should conform to the general structural safety of the National Building code (Annexure 12)

Green Buildings

The appearance of a Green Building will be similar to any other building. However, the difference is in the approach, which revolves round a concern for extending the life span of natural resources;

provide human comfort, safety and productivity. This approach results in reduction in operating costs like energy and water, besides several intangible benefits. Some of the salient features of a Green Building are:

- ▶ Minimal disturbance to landscapes and site condition
- ▶ Use of Recycled and Environmental Friendly Building Materials
- ▶ Use of Non-Toxic and recycled / recyclable Materials
- ▶ Efficient use of Water and Water Recycling
- ▶ Use of Energy Efficient and Eco-Friendly Equipment
- ▶ Use of Renewable Energy
- ▶ Indoor Air Quality for Human Safety and Comfort
- ▶ Effective Controls and Building Management Systems

5

Issues in Green Building

Energy Efficiency and Renewable Energy

- ▶ Building orientation to take advantage of solar access, shading, and natural lighting
- ▶ Effects of micro-climate on building
- ▶ Thermal efficiency of building envelope and fenestration
- ▶ Properly sized and efficient heating, ventilating, and air-conditioning (HVAC) system
- ▶ Alternative energy sources
- ▶ Minimization of electric loads from lighting, appliances, and equipment
- ▶ Utility incentives to offset costs

Direct and Indirect Environmental Impact

- ▶ Integrity of site and vegetation during construction
- ▶ Use of integrated pest management
- ▶ Use of native plants for landscaping
- ▶ Minimization of disturbance to the watershed and additional non-point-source pollution
- ▶ Effect of materials choice on resource depletion and air and water pollution
- ▶ Use of indigenous building materials
- ▶ Amount of energy used to produce building materials

Resource Conservation and Recycling

- ▶ Use of recyclable products and those with recycled material content
- ▶ Reuse of building components, equipment, and furnishings
- ▶ Minimization of construction waste and demolition debris through reuse and recycling
- ▶ Easy access to recycling facilities for building occupants
- ▶ Minimization of sanitary waste through reuse of graywater and water-saving devices
- ▶ Use of rainwater for irrigation

- ▶ Water conservation in building operations
- ▶ Use of alternative wastewater treatment methods

Indoor Environmental Quality

- ▶ Volatile organic compound content of building materials
- ▶ Minimization of opportunity for microbial growth
- ▶ Adequate fresh air supply
- ▶ Chemical content and volatility of maintenance and cleaning materials
- ▶ Minimization of business-machine and occupant pollution sources
- ▶ Adequate acoustic control
- ▶ Access to daylight and public amenities

Community issues

- ▶ Access to site by mass transit and pedestrian or bicycle paths
- ▶ Attention to culture and history of community
- ▶ Climatic characteristics as they affect design of building or building materials
- ▶ Local incentives, policies, regulations that promote green design
- ▶ Infrastructure in community to handle demolition-waste recycling
- ▶ Regional availability of environmental products and expertise

Building Green concentrates on one key aspect of the greening process: the use of plants on and around urban buildings. Green buildings and greenspaces together define an integrated approach to plant life in cities that is central to any green programme. Trees and shrubs can help reduce overall energy use in buildings. The amount of energy saved depends on the building type, choice of tree species, positioning around the building and the prevailing climate.

Balconies and small terraces have become standard architectural features for multiple dwelling developments. The balcony garden is a natural development of the balcony's role as a link between interior and exterior environments.

Green walls - Modern cities provide enormous areas of wall space, in many cases stretching high above the street. Not all of this space is appropriate for growing plants, but much of it is – certainly much more than has been utilised in recent years.

Roofs present by far the most significant opportunities for the greening of buildings. Many cities have millions of sqmts of unused and unattractive roofs. They represent enormous wasted opportunities for improving the quality of city life. Some of the advantages for green roof include:-

- ▶ protection of roof surface from ultra-violet radiation and mechanical damage
- ▶ thermal insulation
- ▶ acoustic insulation
- ▶ lower maintenance costs for roofing materials
- ▶ reduction of stormwater runoff

- ▶ gardens for inhabitants of buildings
- ▶ masks ugly rooftops
- ▶ complements building forms
- ▶ absorption of CO₂, some air pollutants and dust

GRIHA, an acronym for Green Rating for Integrated Habitat Assessment, is the National Rating System of India. It is a green building 'design evaluation system', and is suitable for all kinds of buildings in different climatic zones of the country (www.mnre.gov.in and www.grihaindia.org). The basic benefits of following GRIHA rating system are

- ▶ Up to 30% reduction in energy consumption
- ▶ Limited waste generation due to recycling
- ▶ Less consumption of water
- ▶ Reduced pollution load & liability

The details for developing greening of roofs are given in Annexure 20.

5.2 Energy Conservation

There is a need to adopt energy efficient technologies for conservation of energy. This section discusses some important recommendations of the energy conservation building code and the National building code 2005 on energy conservation.

The building form can affect the solar access of the building. The compactness of the building is measured using a ratio of surface area to volume. $Compactness = S/V$, where, S = Surface area and V = volume. The orientation of the building is also an important fact with regard to energy conservation in the building. The building envelope for all air conditioned buildings / spaces are to comply with the ECBC code (www.beeindia@nic.in). Roofs and opaque walls should comply with the maximum assembly U factor or the minimum insulation R-value as given in Table 5.1 and Table 5.2 respectively.

Table 5.1 Roof Assembly U-factor and Insulation R-value Requirements

Climate Zone	24-Hour use buildings Hospitals, Hotels, Call Centers etc.		Daytime use buildings Other Building Types	
	Maximum U-factor of the overall assembly (W / m ² -°C)	Minimum R-value of insulation alone (m ² -°C / W)	Maximum U- factor of the overall assembly (W / m ² -°C)	Minimum R-value of insulation alone (m ² -°C / W)
Composite	U-0.261		R-3.5	U-0.409 R-2.1
Hot and Dry	U-0.261		R-3.5	U-0.409 R-2.1
Warm and Humid	U-0.261		R-3.5	U-0.409 R-2.1
Moderate	U-0.409		R-2.1	U-0.409 R-2.1
Cold	U-0.261		R-3.5	U-0.409 R-2.1

Source: ECBC Code 2005

Table 5.2 Opaque Wall Assembly U-factor and Insulation R-value Requirements

Climate Zone	Hospitals, Hotels, Call Centers (24-Hour)		Other Building Types (Daytime)	
	Maximum U-factor of the overall assembly (W/m ² -°C)	Minimum R-value of insulation alone (m ² -°C/W)	Maximum U-factor of the overall assembly (W/m ² -°C)	Minimum R-value of insulation alone (m ² -°C/W)
Composite	U-0.352	R-2.35	U-0.352	R-2.35
Hot and Dry	U-0.369	R-2.20	U-0.352	R-2.35
Warm and Humid	U-0.352	R-2.35	U-0.352	R-2.35
Moderate	U-0.431	R-1.80	U-0.397	R-2.00
Cold	U-0.369	R-2.20	U-0.352	R-2.35

The concept of passive solar design emphasizes architectural design approaches that minimize building energy consumption by integrating conventional energy-efficient devices, such as mechanical and electrical pumps, fans, lighting fixtures, and other equipment, with passive design elements, such as building siting, an efficient envelope, appropriate amounts of fenestration, increased daylighting design, and thermal mass. The basic idea of passive solar design is to allow daylight, heat, and airflow into a building only when beneficial.

Passive building design starts with consideration of siting and daylighting opportunities and the building envelope; then building systems are considered. Almost every element of a passive solar design serves more than one purpose. Landscaping can be aesthetic while also providing critical shading or direct air flow. Window shades are both a shading device and part of the interior design scheme. Masonry floors store heat and also provide a durable walking surface. Sunlight bounced around a room provides a bright space and task light.

Components of Solar Techniques

Advanced Solar Passive Techniques	
Passive heating : Heat storage modulates the excess and deficit in solar gain over the daily cycle	Spontaneous warming effect resulting from the absorption of solar radiation. The temperature rise this induces leads to heat flow from the affected surface to other surfaces and indoor air, as well as to heat storage within the building structure.
Passive heating <i>Direct gain method:</i>	Glazed windows are located to face the south (in the northern hemisphere) to receive maximum sunlight in winter. To reduce heat losses during the night these windows are often double-glazed and have insulating curtains. Some examples of thermal storage materials are concrete, bricks, stone, and water.
Passive heating : <i>Indirect gain :</i>	thermal storage wall is placed between the glazing and habitable space. This prevents solar radiation from directly entering the living space.

Passive heating : <i>Trombe wall</i> :	A trombe wall is a thick solid wall with vents at its lower and upper ends.
Passive heating : Solar chimneys :	This system is a kind of modified trombe wall that is incorporated into the roof. A solar chimney is essentially a collector panel with minimum thermal inertia on the south face (in the northern hemisphere) of the building.
Passive heating: Sunspaces / solaria :	It essentially consists of a greenhouse constructed on the south side of the building with a thick mass wall linking the two.
Passive Cooling: Evaporative cooling :	Passive cooling systems rely on natural heat sinks to remove heat from a building. They derive cooling directly from evaporation, convection radiation without using any intermediate electrical devices.
Passive Cooling:	The evaporative cooling with increase in moisture content of the air is called direct evaporative cooling and when there is no increase of moisture content it is called indirect cooling.
Passive Cooling: Indirect evaporative cooling systems :	The most commonly used system is a desert cooler, which comprises water, evaporative pads, a fan and a pump.
Passive Cooling: Roof sprays:	External cooling through humidification can be achieved by keeping the surfaces of roofs moist using sprays or a lawn sprinkler. The surface temperature can be reduced significantly, but large amounts of water are used.
Passive Cooling: Roof Pond:	A water body covering the roof functions similarly to a soil cover, it minimizes the diurnal temperature range. It is a technically demanding and expensive solution.
Radiative cooling:	Nocturnal cooling: Night sky cooling can use very low-energy passive systems and can be very effectively used for office buildings, institution, residential buildings.
Ground cooling:	Heat dissipation to the ground can be achieved by conduction or by convection.
Ground cooling strategies : Earth berm structure :	Underground structures in contact with the earth are benefited by the huge thermal mass of the adjacent ground and are thus not affected by hot days or chilly nights.
Ground cooling strategies : Geothermal cooling or earth-air tunnel systems :	Hot summer air is passed through a buried pipe and as it passes through there is an exchange of heat between the air and the surrounding earth. Hence, during the summer, the air gets cooled up and during the winter it gets heated up. This air is circulated to

		the living spaces where it takes up the humidity and cools the structure by convection.
	Ground cooling strategies : Ventilation strategies:	Chimneys Chimney or stacks can be used to provide high -level ventilation outlet devices. Wind towers Wind towers are generally used in hot and dry climates for cooling.

Day-lighting brings light into a building interior and distributing it in a way that provides more desirable and better quality illumination than artificial light sources. This reduces the need for electrical light sources, thus cutting down on electricity use and its associated costs and pollution. The general day-lighting principles include:-

- ▶ Avoid direct sunlight on critical tasks and excessive brightness.
- ▶ Bring the daylight in at a high location.
- ▶ Filter the daylight.
- ▶ Bounce daylight off of surrounding surfaces.
- ▶ Integrate daylight with other building systems and strategies.

Energy efficient lighting design focuses on methods and materials that improve quality of lighting (Annexure 13). The general lighting systems need to comply with the ECBC code and apply to the following:-

- (a) Interior spaces of buildings,
- (b) Exterior building features, including facades, illuminated roofs, architectural features, entrances, exits, loading docks, and illuminated canopies, and,
- (c) Exterior building grounds lighting that is provided through the building's electrical service.

Exceptions to above:

- (a) Emergency lighting that is automatically off during normal building operation and is powered by battery, generator, or other alternate power source; and,
- (b) Lighting in dwelling units except for dwelling units where the developer is providing lighting fixtures inside the units (however, common area lighting of residential complexes fall under purview of the code)

Solar photovoltaic systems (SPV) can be used as it is direct conversion of sunlight into electricity and could be a viable option. Street lighting, fixed type solar lighting system are some applications of SPV systems. The recommended values for illuminance is given in Annexure 14.

A new lighting technology in the form of Light Emitting Diodes is also available nowadays. These are solid light bulbs, which are extremely energy efficient. An LED lamp generally lasts about 10 times longer than CFLs and about 130 times more than an ordinary Incandescent lamp. Certified Emissions Reductions (CERs) on the basis of the CO emissions reductions that would occur because of the low electricity consumption of CFLs compared to incandescent bulbs.

5.3 Transportation

Road network: A well-planned road network both within the township and connecting to the nearest highway or main road need to be established so that proper communication links are established.

Some of the factors are important and must be taken into the consideration, while planning, are the movement of heavy traffic loads and operation of construction machinery. Construction machinery due to its operation produces smoke, dust and noise and vibration. Road design should be done with due consideration for environment, and safety of the people residing or working near the roads.

Transportation system is dependent on a number of factors, like design of the engine of the vehicles, traffic rules and regulations, which are not under our control. However the Hierarchy of roads, Road geometry and traffic calming, Entry and exit points, Parking norms can be planned.

Hierarchy in roads should be adopted to segregate the traffic according to the size, frequency and density of traffic. Arterial roads meant for intra-urban through traffic with intersection spacing of 500m, sub-arterial roads meant for intra-urban through traffic with frontage access, no standing vehicles having high cross traffic, high capacity intersections and minimum roadway intersection spacing 300 m. Collector Streets for collecting and distributing traffic from and to local streets and also for providing access but no parked vehicles and having heavy cross traffic and minimum roadway intersection traffic spacing 150 m. Local Streets for access to residence, business or other abutting property, having necessary parking and pedestrian movement (Annexure 18). Design considerations for roads of different hierarchy are given below

Design Considerations for Roads of Different Hierarchy

Type of Road	Design speed	Right of way
Arterial	80 kph	50-60m
Sub-arterial	60 kph	30-40 m
Collector street	50 kph	20– 30 m
Local Street	30 kph	10-20 m

Source: UDPFI guidelines volume i august 1996

Traffic calming is required in school, hospital zones. The tools of traffic calming include:-

1. Installation of speed humps by raising the surface of the street in certain spots.
2. Narrowing the street to give drivers the feeling they are in a crowded place, which will make them slow down and totally or partially blocking half the entrance to a side street so drivers cannot turn in but still can come out.
2. Speed tables, build outs, etc.
3. Space for vehicles at the entrance gate for checking before entry.

The entry and exit points design is very important as it should not disturb the existing traffic. Sufficient parking provisions are to be made. Visitors parking should not disturb the traffic of surrounding area. Additional space should be left for the lanes as per the design of existing road, surrounding the site. The standard spacing for car parking are given in Annexures 19.1 and 19.2.

Parking facilities for visitors

- ▶ For individual homes it is necessary to provide 1 visitor car park
- ▶ For multi dwelling units it is necessary to provide an additional 10% parking area over and above the normal parking requirements
- ▶ Design of the building is to ensure that adequate parking provisions are made to cater to the occupants as well as visitors
- ▶ The parking provisions should take into consideration the two wheelers and four wheelers. It is also desirable to design parking facilities with basement / stilts parking to reduce the heat island effect. When inevitable the surface parking planned should cover issues to address heat island effect.
- ▶ It is also desirable to have electric charging facility for vehicles which could cater for both two and four wheelers.

ENVIRONMENTAL MONITORING PROGRAM

6.0 General

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

The description of the monitoring programme should include:

- (a) A technical plan which spells out in detail the methodologies for measurement, the required frequencies of measurement, the planned location of measurement, data storage and analysis, reporting schedules and emergency procedures, and
- (b) Detailed budgets and procurement schedules for, necessary equipment and supplies, technical and administrative manpower.

The environmental monitoring includes

- ▶ Air pollution
- ▶ Noise level monitoring
- ▶ Water quality monitoring and ground water level monitoring
- ▶ Maintenance of rainwater harvesting pits and other water conservation methods used are to be done regularly.

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

ADDITIONAL STUDIES

7.0 General

This chapter covers the risk assessment and disaster management plan. Apart from these, R & R Action Plan and Natural Resource Conservation plan are also included in this chapter.

7.1 Risk Assessment and Disaster Management Plan (DMP)

Emergency prevention through good design, operation, maintenance and inspection are essential to reduce the probability of occurrence and consequential effect of such eventualities. The overall objective of the Emergency Response Plan ERP is to make use of the combined resources at the site and outside services to achieve the following:-

- ▶ Localize the emergency
- ▶ Minimize effects on property and people
- ▶ Effective rescue and medical treatment
- ▶ Evacuation

Major hazards identified include:-

- ▶ Hazards pertaining to fires in buildings
- ▶ Fire in diesel storage areas, garbage storage and disposal area
- ▶ Earthquakes
- ▶ LPG gas leak
- ▶ Flooding from natural and man-made causes
- ▶ Electrical accidents

7.2 Natural Resource Conservation

Plan of action for conservation of natural resources and recycle waste materials due to the project activity in the construction and operational phase of the project is to be discussed.

7.3 R&R Action Plan

Detailed R&R Plan with data on the existing socio-economic status of the population in the study area and broad plan for 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 .

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

PROJECT BENEFITS

8.0 General

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

- ▶ Improvements in the physical infrastructure of project, 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 and hospitals 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

ENVIRONMENTAL MANAGEMENT PLAN

9.0 General

Environmental Management Plan (EMP) deals with mitigation of unavoidable or residual impacts. The Environmental Management Plan (EMP) is needed to ensure that the mitigation measures specified in the EIA will actually be complied with when the project is approved for implementations. The administration of EMP may be required the establishment of an Environmental management cell to house monitoring staff after the closure of the EIA office. Funding to cover the costs of establishing and operating an appropriate Environmental Management Cell to administer the EMP should be guaranteed in the basic project budget.

The EIA report should include a description of the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored after approval of EIA. The facilities to be included are:

- ▶ Water supply and management: A well-planned and sustainable water management system is to be built within the township, providing round the clock water supply to residents. This also reduces dependence on municipal water supply.
- ▶ Electricity supply and management: Although an integrated township depends on a public or private utility supplier for basic power supply, it has to have adequate, back-up power for both homes and common areas during temporary or scheduled power cuts or disruptions by the utility supplier.
- ▶ Infrastructure maintenance: Proper and regular maintenance of roads, pathways, parks, electrical and plumbing infrastructure, children play areas and common areas including community centre is essential for a well-developed integrated township.
- ▶ Provision of Effective Controls and Building Management Systems such as Automatic Fire Alarm and Fire Detection and Suppression System etc. must be ensured. Adequate access to fire tenders should be provided.
- ▶ Provisions should be kept for the integration of solar water heating system and other energy conservation methods.
- ▶ Plan and design of green belt to mitigate dust, noise and odour near sources of air pollution (DG sets) and meteorology.
- ▶ Plan of maintenance for rainwater harvesting structures in the project area (taking into consideration the groundwater storage, ground water table and soil permeability).

The waste treatment facilities to be included are:

- ▶ Sewage treatment plant has been designed to treat the wastewater from the building. The wastewater be treated to tertiary level and after treatment, reused for flushing of toilets in apartment building, horticulture and air conditioning.
- ▶ Grey water treatment: Grey water is the wastewater that comes from clothes washers, bathtub, showers, bathroom wash basins, kitchen sinks and dish washers. It is that waste

water that is not contacted with toilet waste. This treated grey water can be used for landscaping, flushing requirements etc. It is essential to provide on-site grey water treatment system to treat atleast 50% of the water generated in the building to standards suitable for flushing and landscaping.

- ▶ Treated wastewater reused for landscaping, car washing etc. and partly discharged. Treated sewage should conform to E(P) Rules. Sewage Treatment Plants and monitored on a regular basis
- ▶ Spent oil from DG Sets should be stored in HDPE drums in isolated covered facility and disposed off as per the Hazardous Wastes (Handling & Management) Rules, 2003. Spent oil from DG Sets should be disposed off through registered recyclers only.
- ▶ Management of increment in storm water run off caused due to the built up and paved surfaces created in the township
- ▶ Root zone treatment provides an opportunity to treat waste water in a decentralised manner. Similarly, vessel-type converters can treat bio-degradable solid wastes in small space and relatively free from odour.

The environmental management plan should clearly mention the landscaping and the tree plantation to be taken up in the area. Also the parks and gardens if any to be developed are to be mentioned. The total number of plantations to be developed in the area are to be mentioned.

The plans to be adopted for handling of the domestic wastewaters and the solid waste management plan are to be detailed out.

SUMMARY AND CONCLUSIONS

10.0 General

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.

The summary should highlight the significance of the baseline data collected, impacts identified and the proposed environmental monitoring systems during the construction and operational phases of the project.

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)

The following should be highlighted in the EIA report

- ▶ Public health and safety issues related to the project;
- ▶ The socio-economic impacts of the project;
- ▶ New building technologies to be implemented
- ▶ Energy conservation measures to be implemented
- ▶ Statement of overall impact of the construction activity on the environment.

DISCLOSURE OF CONSULTANT ENGAGED

11.0 General

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

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- ▶ www.epa.gov/npdes/pubs/chap03_conguide accessed September 2008

GLOSSARY

- ▶ “Built Up Area (BUA)” means the gross permissible built up area of a Township.
- ▶ “Township” means an integrated development of a contiguous land parcel which contains within itself requisite physical and social infrastructure, with access to off site physical and social infrastructure and fulfils all conditions laid down under this policy.
- ▶ “Ancillary Housing” means housing developed principally to support the workforce of an economic activity developed within the Township.
- ▶ “On-site Physical Infrastructure” means all the on site services such as roads including approach Roads, Street lights, Water supply system, Sewerage system, Storm water drainage system, Electrical Network, Communication Network, Sewage Treatment Plants, Percolation Wells, Solid Waste Disposal system, Common Effluent Treatment Plants (CETP), spaces for Informal Services etc. as provided for in Schedule
- ▶ “On-site Social Infrastructure” means all the on site amenities supportive to the resident population as per the prevailing norms such as Nursery, Crèche, Primary school, Composite School, Dispensary, Polyclinic, Community Hall, Library, Convenience Shopping, Playfields, Parks, Police station, Public parking, Bus station, Fire station, Post office etc, EWS Housing for the informal service providers of the Township, all the components necessary to facilitate barrier free accessibility for the Senior citizens and Physically challenged persons as prescribed by the concerned GDCRs and land reservations for social infrastructure requisite on the macro scale to be handed over to the local Authority as may be prescribed by the Authority.
- ▶ “Scale Category (SC)” means Township categories based on the scale of land area, BUA and investment as defined in the Policy.
- ▶ “Use Category (UC)” means Township categories based on the predominant activity as defined in the Policy.
- ▶ “Vulnerable Area” means areas where development of Townships will be subject to compliance to norms for mitigation of potential hazards and their impacts.
- ▶ “Developer” means a Company, a Government Corporation, a group of Companies in Joint Venture, undertaking the development of the Township.
- ▶ “Facility Management Services” means the services offered by a private sector, public sector, joint sector or consortium for the Operation & Maintenance of all on site physical and social infrastructure.



TABLES

Table 3.1 Physical Properties of Soil

Station Code	Colour	Texture	Water Holding capacity (%)	Porosity (%)	Sand (%)	Salt (%)	Bulk Density gm / cc	Permeability ml

Table-3.2 Chemical Properties of Soil

Parameters	Samples					
pH						
Potassium						
Sodium						
Sodium Absorption Ratio						
Cation exchange capacity						

Table 3.3 Description of Ground Water Sampling Locations

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

Table 3.4 Analysis of Ground Water

S. No	Parameters	Unit	Result			Standards
			GW1	GW2	GW3	

Table 3.5 Description of Surface Water Sampling Locations

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

Table 3.6 Analysis of Surface Water

S. No	Parameters	Unit	Result			Standards
			SW1	SW2	SW3	

Table No. 3.7 Description of Ambient Air Quality Monitoring Stations

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

Table-3.8 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				

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

Table No. 3.9 Description of Noise Monitoring Stations

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

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

Table 3.10 Demographic Profiles of the Villages in the Study Area

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

Table 3.11 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

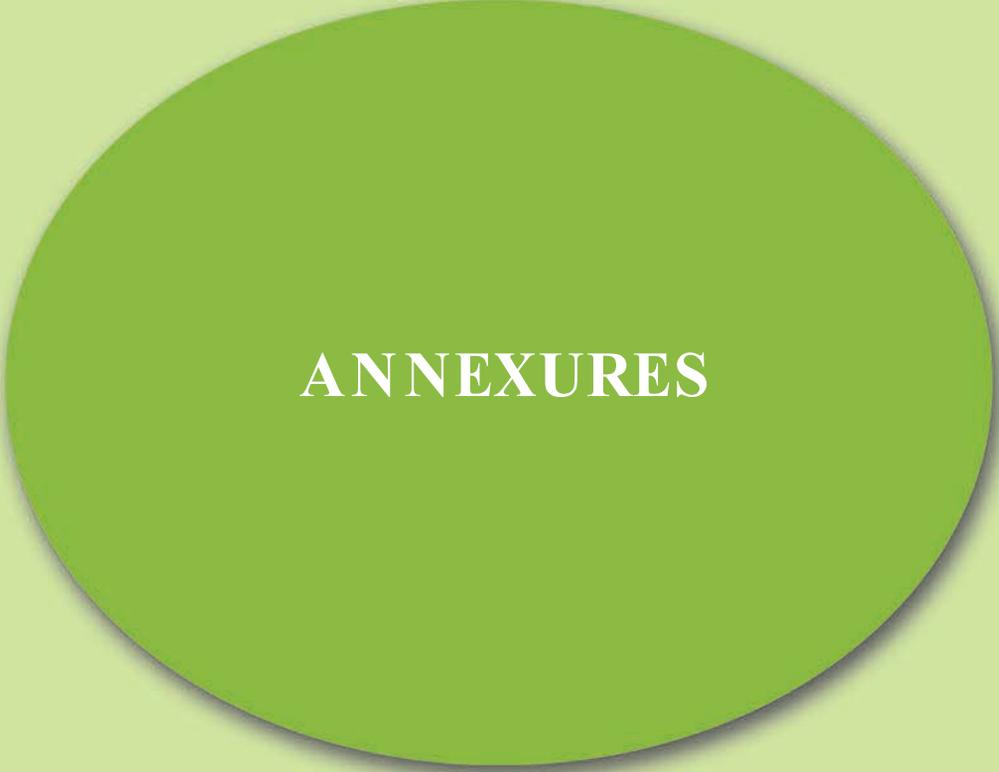
B : Bus

RS : Railway Service

NW : Navigable
Waterways

CB : Commercial Bank

CoB : Co-operative Bank



ANNEXURES

Annexure 1

Terms of Reference (TOR) For Environmental Impact Assessment of Building, Construction and Township and Area Development Projects

Objective

Terms of Reference (TOR) for preparation of Environmental Impact assessment (EIA) and Environmental Management Plan for building construction projects (=1,50,000 sq .mtrs) township and area development projects (= 50 ha) as per the EIA notification, 2006 has been devised to improve the quality of the reports and facilitate the decision making transparent and easy. TOR will help the project proponents and consultants to prepare report with relevant project specific data, which are easily implementable. As per the EIA notification 2006, schedule item 8 corresponds to Building construction projects / area development projects and townships. The details of the categories mentioned in the given schedule are as follows:

Project or Activity	Category with threshold limit – B Category	General Conditions
8	Building /Construction projects/Area Development projects and Townships	
8(a)	Building and Construction =20000 sq.mtrs and <1,50,000 sq.mtrs.	<p>“Any project or activity specified in Category of built-up area# ‘B’ will be treated as Category projects ‘A’ if located in whole or in part within 10 km from the boundary of: (i) Protected areas notified under the Wildlife (Protection) Act, 1972; (ii) Critically polluted areas as identified by the Central Pollution Control Board from time to time; (iii) Eco-sensitive areas as notified under section 3 of the Environment (Protection) Act, 1986, such as, Mahabaleswar Panchangi, Matheran, Pachmarhi, Dahanu, Doon Valley and (iv) inter-state boundaries and international boundaries</p> <p>Provided that the requirement regarding distance of 10km of the inter-state boundaries can be reduced or completely done away with by an agreement between the respective states or U.Ts sharing the common boundary in the case the activity does not fall within 10 kilometers of the areas mentioned at item (i), (ii) and (iii) above</p>
8(b)	Townships and Area Development projects. Covering an area = 50 ha and or built up area =1,50,000 sq .mtrs ++	
#(built up area for covered construction; in the case of facilities open to the sky, it will be the activity area)		
++All projects under Item 8(b) shall be appraised as Category B1		

EIA clearance is required in the case of the following:-

- a. Building construction projects (=1,50,000 sq .mtrs)
- b. Township and area development projects (= 50 ha)

Accordingly the TOR to address the above two aspects of item 8(b) of the EIA notification 2006 are covered in this document. The TORs are given in two subsections (I) and (II) in which subsection (I) deals with building construction projects (=1,50,000 sq .mtrs) and subsection (II) deals with township and area development projects (= 50 ha).

I. Building and Constructions projects(=1,50,000 sq .mtrs)

General Information :

Building and construction projects as per the EIA notification of 2006 are under category 'B' covering built up area =1,50,000 sq .mtrs. All projects and activities listed as Category 'B' in Item 8 of the Schedule (Construction / Township / Commercial Complexes / Housing) do not require scoping and will be appraised on the basis of Form 1 / Form 1A and the conceptual plan. All projects in this category will be appraised as Category B1. An application seeking prior environmental clearance in all cases should be made in the prescribed Form 1 and Supplementary Form 1A, after the identification of prospective sites for the project to which the application relates, before commencing any construction activity, or preparation of land, at the site by the applicant. The applicant should submit along with the application, in addition to Form 1 and the Supplementary Form 1A, a copy of the conceptual plan.

1.0 Introduction

Profile of the project proponent, name and contact address, implementing organization, organizational chart, project consultants etc., should be mentioned clearly.

Land description- plot/ survey numbers, village, tehsil, district, state and area of the land must be mentioned clearly.

Description of Centre/State/Local regulations and standards applicable for townships and area development projects should be discussed.

Any litigation(s) pending against the proposed project and / or any directions or orders passed by any court of law/ any statutory authority against the project is to be detailed out.

2.0 Project Description

Goal and objectives of the proposed project, significance of the project both at local and regional level, relevance of the project in light of the existing development plans of the region are to be mentioned clearly. Background information and overall scenario of the proposed activity in the Indian Context, procedures adopted for selection, Criteria for selection of the site for the proposed activity, such as environmental, socio-economic, minimization of impacts, ecological sensitivity, Impact of existing activities on the proposed activity, etc. should be spelt out. Resource and manpower requirements have to detailed. Time frame for project initiation, implementation and completion should be detailed.

- ▶ Total site area
- ▶ Total built up area (provide area details) and total activity area
- ▶ Source of water and consumption
- ▶ Source of power and requirement
- ▶ Source of Power
- ▶ Connectivity to the city center, utilities and transportation networks community facilities
- ▶ Parking requirements

- ▶ Type of building material to be used
- ▶ Environmental liability of the site
- ▶ Existing structure / type of material – demolition debris etc.

Essential Toposheets / Maps to be Provided with TOR Application

A map of the study area 500meters from the boundary of the project area, delineating the major topographical features such as land use, drainage, locations of habitats, major constructions including roads, railways, pipelines, industries if any in the area are to be mentioned.

A map covering aerial distance of 15 kms from the boundary of the proposed project area delineating environmental sensitive areas as specified in Form I of EIA notification dated 14th Sep 06. In the same map the details of environmental sensitive areas present within a radial distance of 1 Km from the project boundary shall be specifically shown

Remote Sensing Satellite Imagery

Land use map of the study area in 1: 10,000 scale based on high resolution satellite imagery delineating the forest, agricultural land, water bodies, settlements, and other cultural features.

Digital Elevation Model / Contour Map

Contour map on 1:10000 scale for the study area showing the various proposed break-up of the land.

Description of the project site, geology, topography, climate, transport and connectivity, demographic aspects, socio, cultural and economic aspects, villages, settlements should be given.

Details of environmentally sensitive places, land acquisition, rehabilitation of communities / villages, present status of such activities are to be mentioned. .

Historical data on climate conditions such as wind pattern, history of cyclones, storm surges, earth quake etc., for the last 25 years are to be given.

Detailed layout plan of proposed project development, communication facilities, access / approach roads, landscape, sewage disposal facilities, and waste disposal etc; to be given. Layout plan of proposed development of built up areas with covered construction such as DG Set rooms, Administrative buildings, Utilities such as Main and Stand By Power, Water supply installations etc; to be given.

Requirement of natural resources and their sources are to be detailed out.

Site Selection and Planning

The environmental impacts of construction and operation are established during the early phases of site selection and planning. Planning, site selection and design form an important stage in the development of these projects and will determine their environment impact(s)

Some Important factors for development, which should be addressed, are: -

- ▶ Status of ownership of land

- ▶ The boundaries of the project area
- ▶ A map that identifies the locations of all proposed development activities; and
- ▶ A map and photo mosaic showing the area proposed to be disturbed in relation to existing topographic features, township grids, wetlands and water bodies.
- ▶ Proximity to local communities;
- ▶ Proximity to sensitive surface or ground water bodies
- ▶ Compatibility with local building regulations
- ▶ Existing drainage pattern
- ▶ Any forest-cover within the proposed developmental area.

3.0 Description of the Environment

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

Study Area:

Map of the study area clearly delineating the location of various monitoring stations (air / water / soil and noise) superimposed with location of habitats are to be shown. Monitoring should be done as per CPCB guidelines. Primary data should be collected for one season except rainy season. Monitoring of the parameters should be carried out within the study area.

3.1 Land Environment

The first feature which should influence the development of a new project is the existing land use pattern of the neighbourhood of the project, whether the proposed development conforms to the development for that area or not. Study of land use pattern, habitation, cropping pattern, forest cover, environmentally sensitive places etc, employing remote sensing techniques and ground truth and also through secondary data sources.

Geographical latitude and microclimatic factors such as solar access and wind loads have a major impact. The following parameters have to be addressed under the baseline data for land environment.

a. Topography

Slope form

Landform and terrain analysis

b. Soil

Type and characteristics

Porosity and permeability

Sub-soil permeability

Inherent fertility

3.2 Water Environment

Identify Project activities, including construction phase, which may affect surface water or groundwater. Estimate water intake requirements and identify the source of water to be used. Describe how water will be taken from the surface water / river and conveyed to the site. Ground water budgeting has to be provided. Rainwater harvesting has to be detailed out.

Baseline water quality from all sources such as ground water, municipal water, surface water need to be determined and compared to the water quality norms prescribed for drinking water and State PWD specifications for construction water. Quantity of wastewater is to be provided.

3.3 Air Environment

Climatological data is to be obtained from nearest India Meteorological Department (IMD) station for one full year. Micro meteorological data consisting of wind speed, wind direction, temperature, cloud cover, (amount and height), humidity, inversions, rainfall (peak and average & daily rainfall) and wind rose patterns, from primary and secondary sources in the study area.

Baseline data of air pollutant parameters extending an area of 500 meters from the project should be monitored at a number of locations. Description of base line data of ambient air parameters namely RSPM, nitrogen dioxide, Sulphur dioxide, and carbon monoxide are to be collected. One season data is to be monitored other than monsoon as per the CPCB Norms. Sampling locations are to be located as per CPCB norms.

3.4 Noise Environment

Construction equipment and road traffic are the major sources of noise. Baseline data of noise at the project area and the neighbourhood habitat areas is to be ascertained. Daytime and nighttime data should be collected.

3.5 Biological Environment

Baseline data on the flora and fauna for the study area is to be detailed out. An inventory map is to be prepared along with a description of the existing terrestrial, wetland and aquatic vegetation. If there are any rare and endangered species in the study area they are to be clearly mentioned.

3.6 Socio Economic Environment

Baseline data should include the demography, settlements, existing infrastructure facilities in the proposed area.

3.7 Solid Waste

Solid wastes from construction sector can be categorized into two phases i.e. during construction & during operation. Details of the following are to be given:

- ▶ Construction or demolition waste, i.e., massive and inert waste
- ▶ Municipal waste, i.e., biodegradable and recyclable waste
- ▶ Hazardous waste
- ▶ E-waste

Details of authorized municipal solid waste facilities, biomedical treatment facilities and hazardous waste disposal facilities in the area should be included.

4.0 Anticipated Environmental Impacts and Mitigation Measures:

4.1 Land Environment

Anticipated Impacts:

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

- ▶ Impact on the natural drainage system and soil erosion.
- ▶ Loss of productive soil and impact on natural drainage pattern.
- ▶ Study of the problem of land slides and assessment of soil erosion potential and the impact

Mitigation Measures :

Proper mitigation measures have to be suggested.

- ▶ If the topsoil is proposed to be preserved, the details relating to the quantity of topsoil stored, demarcated area on plan where it is stored along with preservation plan is to be given
- ▶ Details of soil erosion plan are to be given.

4.2 Air Environment

Anticipated Impact :

Impacts on air quality during the construction and operation phase should be predicted. The existing surrounding features of the study area and impact on them should be addressed separately. It is necessary to predict the following if any

- ▶ Prediction of point source emissions
- ▶ Prediction of air emissions from the vehicles during the construction and operation phases.

Mitigating Measures :

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

- ▶ Mitigative measures during construction phase due to reduce the emissions during loading, un-loading, transportation and storage of construction materials.
- ▶ Greenbelt development.
- ▶ Dust mitigation

4.3 Noise Environment

Impact of project construction / operation on the noise on account of construction equipment and road traffic is to be studied.

Anticipated Impact:

- ▶ Noise due to demolition / construction activities
- ▶ Impact due to present and future transportation activities
- ▶ Impact of noise due to work at night.

Mitigating Measures :

- ▶ Site plan and details for construction management showing the layout of noise and dust barriers should be given

4.4 Water Environment

Impact of construction and operational phases on the surface and ground water on account of the building construction is to be estimated.

Anticipated Impact:

- ▶ Impact of water withdrawal on surface water is to be given
- ▶ Impact on ground water potential is to be detailed
- ▶ Waste water generation

Mitigating measures:

Prediction of ground water contamination and suggested mitigating measures to minimize the pollution level

- ▶ Hydrogeological information should be clearly detailed.
- ▶ Details of water conservation within the buildings
- ▶ Details of rainwater harvesting to recharge the ground water

4.5 Biological Environment

Impact of project during construction and operational phases on the biological environment on account of project activity is to be detailed.

Anticipated Impact:

Impact of construction activity on flora and fauna is to be given.

Mitigating measures :

- ▶ Tree survey plan showing protected / preserved / transplanted / removed trees are to be given.
- ▶ Proposed landscape plan with details about species that are to be planted are to be given

4.6 Socio Economic Environment***Anticipated Impact:***

Predicted impact on the communities of the proposed activity is to be given. Impact on surroundings on socio-economic status is to be detailed.

Mitigation Measures:

Mitigation measures to reduce adverse effects are to be given.

4.7 Solid Waste and Environment**Anticipated Impact:**

Impact of the project during construction and operational phases for generation of waste is to be assessed.

Mitigation Measures :

Options for minimization of solid waste and environmentally compactable disposal are to be given. Management and disposal of temporary structures, made during construction phase are to be addressed. Mitigation measures for handling biomedical wastes, e-wastes, municipal solid waste are to be detailed.

5.0 Specific Studies

Describe the project energy requirements, infrastructure requirements needed for this activity. Discuss the steps taken to integrate the needs of other stakeholders into the location and design of access infrastructure to reduce and manage overall environmental impacts from resource development.

5.1 Building Material and Technologies

- ▶ Detail the types of materials use in each component part of the building and landscape(envelope, superstructure, openings, and roads and surrounding landscape).
- ▶ Detail out the plans and sections of buildings showing use of new technologies and non-conventional methods
- ▶ Detail out the plans and sections of building using new construction techniques

5.2 Energy Conservation

- ▶ Use of alternate renewable resources such as solar / wind power etc is to be discussed.
- ▶ Discuss the options considered for supplying the power required for the Project and the environmental implications, including opportunities to increase the energy efficiency of the Project;
- ▶ Details of U &R values are to be given
- ▶ Details of the renewable energy systems (sizing and design), building costs and integration details are to be provided

5.3 Transport

- ▶ Estimate any environmental implications from transportation (rail, road) related emissions associated with the construction and operational phases and suggest suitable options
- ▶ Provide a site plan showing the details of connectivity existing and proposed road and rail transport.
- ▶ Provide a site plan showing buildings, roads, and open spaces, confirming the hierarchy of roads as per the rules given by UDPFI guidelines.

- ▶ Discuss the impact of increased vehicle traffic and requirements for access improvements on roads in the site development area as a result of the Project, considering other existing and planned developments and operations in the region including what measures will be taken to reduce traffic and enhance vehicle safety on external roads;
- ▶ Discuss any expected change in traffic volume by Average Annual Daily Traffic (AADT) and any seasonal variability in traffic volume (include mitigation measures) prior to construction, during construction and at full site operation;

6.0 Environmental Monitoring Program

- ▶ Frequency, location, parameters of monitoring
- ▶ Compilation and analysis of data and reporting system

7.0 Additional Studies

7.1 Risk Assessment (ERA) and Disaster Management Plan (DMP):

Discuss emergency plans for any environmental risks and such as earthquakes

- ▶ Types of Emergency; internal and external origin
- ▶ Emergency evacuation plan
- ▶ Emergency Procedures
- ▶ Helipad facilities for buildings with height beyond 60mts

7.2 Natural Resource Conservation

Plan of action for conservation of natural resources and recycle waste materials due to the project activity in the construction and operational phase of the project is to be discussed.

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 Management Plan (EMP)

Detailed EMP may be formulated to mitigate the residual impacts which should inter alias include the impact due to change in land use; due to loss of agricultural land and grazing land besides other impacts of the projects. Budgeting of the EMP may be included in EIA. The EIA should discuss in detail the following aspects:

- ▶ Sewage treatment plant has been designed to treat the wastewater from the building. The wastewater be treated to tertiary level and after treatment, reused for flushing of toilets in apartment building and gardening.
- ▶ Treated wastewater reused for landscaping, car washing etc. and partly discharged. Treated sewage should conform to E(P) Rules. Sewage Treatment Plants and monitored on a regular basis

- ▶ Spent oil from DG Sets should be stored in HDPE drums in isolated covered facility and disposed off as per the Hazardous Wastes (Handling & Management) Rules, 2003. Spent oil from DG Sets should be disposed off through registered recyclers only.
- ▶ Provision of Effective Controls and Building Management Systems such as Automatic Fire Alarm and Fire Detection and Suppression System etc. must be ensured. Adequate access to fire tenders should be provided.
- ▶ Provisions should be kept for the integration of solar water heating system and other energy conservation methods.

10.0 Summary & Conclusion (Summary EIA)

This document should summarize the significant findings of the study. The summary must describe each significant environmental issue and its resolution in sufficient detail so that its importance and scope, as well as the appropriateness of the approach taken to resolve it are well understood. Wherever possible, the summary should make use of base maps, tables and figures given in the report. The following should be addressed in the summary if applicable: -

- ▶ Potential interruption or limitation of accesses to dwellings, businesses or productive resources either permanently or temporarily;
- ▶ Encroachment or reduction of green areas, parks, and other recreational areas;
- ▶ Demolition of buildings high architectural or historical value;
- ▶ Potential deterioration of urban quality and property value in the immediate vicinity of the works or deterioration of unique architectural characteristics in the neighbourhood;

11.0 Disclosure of Consultant Engaged

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

Enclosures

Conceptual plan / Questionnaire / Photos

II. Township and Area Development Projects (= 50 ha)

General Information

Township and area development projects as per the EIA notification of 2006 are under category 'B' covering an area = 50 ha. All projects and activities listed as Category 'B' in Item 8 of the Schedule (Construction / Township / Commercial Complexes / Housing) do not require scoping and will be appraised on the basis of Form 1 / Form 1A and the conceptual plan. All projects in this category will be appraised as Category B1. An application seeking prior environmental clearance in all cases should be made in the prescribed Form 1 and Supplementary Form 1A, after the identification of prospective sites for the project to which the application relates, before commencing any construction activity, or preparation of land, at the site by the applicant. The applicant should submit along with the application, in addition to Form 1 and the Supplementary Form 1A, a copy of the conceptual plan.

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Profile of the project proponent, name and contact address, implementing organization, organizational chart, project consultants etc., should be mentioned clearly.

Land description- plot/ survey numbers, village, tehsil, district, state and area of the land must be mentioned clearly.

Description of Centre/State/Local regulations and standards applicable for townships and area development projects should be discussed.

Any litigation(s) pending against the proposed project and / or any directions or orders passed by any court of law / any statutory authority against the project is to be detailed out.

2.0 Project Description

Goal and objectives of the proposed project, significance of the project both at local and regional level, relevance of the project in light of the existing development plans of the region are to be mentioned clearly. Background information and overall scenario of the proposed activity in the Indian Context, procedures adopted for selection, Criteria for selection of the site for the proposed activity, such as environmental, socio-economic, minimization of impacts, ecological sensitivity, Impact of existing activities on the proposed activity, etc. should be spelt out. Resource and manpower requirements have to be detailed. Time frame for project initiation, implementation and completion should be detailed.

Essential Toposheets / Maps to be Provided with TOR Application

A map of the study area 2 km from the boundary of the project area, delineating the major topographical features such as land use, drainage, locations of habitats, major constructions including roads, railways, pipelines, industries if any in the area are to be mentioned.

A map covering aerial distance of 15 kms from the boundary of the proposed project area delineating environmental sensitive areas as specified in Form I of EIA notification dated 14th Sep 06. In the same map the details of environmental sensitive areas present within a radial distance of 1 Km from the project boundary shall be specifically shown

Remote Sensing Satellite Imagery

Land use map of the study area in 1: 10,000 scale based on high resolution satellite imagery delineating the forest, agricultural land, water bodies, settlements, and other cultural features.

Digital Elevation Model / Contour Map

Contour map on 1:10000 scale for the study area showing the various proposed break-up of the land.

Description of the project site, geology, topography, climate, transport and connectivity, demographic aspects, socio, cultural and economic aspects, villages, settlements should be given.

Details of environmentally sensitive places, land acquisition, rehabilitation of communities / villages, present status of such activities are to be mentioned. .

Historical data on climate conditions such as wind pattern, history of cyclones, storm surges, earthquake etc., for the last 25 years is to be given.

Detailed layout plan of proposed project development, communication facilities, access / approach roads, landscape, sewage disposal facilities, and waste disposal etc; to be given. Layout plan of proposed development of built up areas with covered construction such as DG Set rooms, Administrative buildings, Utilities such as Main and Stand By Power, Water supply installations etc; to be given.

Requirement of natural resources and their sources are to be detailed out.

Site Selection and Planning

The environmental impacts of construction and operation are established during the early phases of site selection and planning. Planning, site selection and design form an important stage in the development of these projects and will determine their environment impact(s)

Some Important factors for development, which should be addressed, are: -

- ▶ Status of ownership of land
- ▶ The boundaries of the project area
- ▶ A map that identifies the locations of all proposed development activities; and
- ▶ A map and photo mosaic showing the area proposed to be disturbed in relation to existing topographic features, township grids, wetlands and water bodies.
- ▶ Proximity to local communities;
- ▶ Proximity to sensitive surface or ground water bodies
- ▶ Compatibility with local building regulations
- ▶ Existing drainage pattern
- ▶ Any forest-cover within the proposed developmental area.

3.0 Description of the Environment

Environmental data to be considered in relation to township development would be: (a) land (b) water (c) air (d) biological environment (e) noise (f) socio-economic environment.

Study Area :

Map of the study area clearly delineating the location of various monitoring stations (air / water / soil and noise) superimposed with location of habitats are to be shown. Monitoring should be done as per CPCB guidelines. Primary data should be collected for one season except rainy season. Monitoring of the parameters should be carried out within the study area.

3.1 Land Environment

The first feature which should influence the development of a new project is the existing land use pattern of the neighbourhood of the project, whether the proposed development conforms to the development for that area or not.

Study of land use pattern, habitation, cropping pattern, forest cover, environmentally sensitive places etc, employing remote sensing techniques and ground truth and also through secondary data sources.

Geographical latitude and microclimatic factors such as solar access and wind loads have a major impact. The following parameters have to be addressed under the baseline data for land environment.

a. Topography

Slope form

Landform and terrain analysis

b. Soil

Type and characteristics

Porosity and permeability

Sub-soil permeability

Inherent fertility

3.2 Water Environment

Identify Project activities, including construction phase, which may affect surface water or groundwater. Estimate water intake requirements and identify the source of water to be used. Describe how water will be taken from the surface water / river and conveyed to the site. Ground water budgeting has to be provided. Rainwater harvesting has to be detailed out.

Baseline water quality from all sources such as ground water, municipal water, surface water need to be determined and compared to the water quality norms prescribed for drinking water and State PWD specifications for construction water. Quantity of wastewater is to be provided.

3.3 Air Environment

Climatological data is to be obtained from nearest India Meteorological Department (IMD) station for one full year. Micro meteorological data consisting of wind speed, wind direction, temperature, cloud cover, (amount and height), humidity, inversions, rainfall (peak and average daily rainfall) and wind rose patterns, from primary and secondary sources in the study area.

Baseline data of air pollutant parameters extending an area of 2kms from the project should be monitored at a number of locations. Description of base line data of ambient air parameters namely RSPM, nitrogen dioxide, Sulphur dioxide, and carbon monoxide are to be collected. One season data is to be monitored other than monsoon as per the CPCB Norms. Sampling locations are to be located as per CPCB norms.

3.4 Noise Environment

Construction equipment and road traffic are the major sources of noise. Baseline data of noise at the project area and the neighbourhood habitat areas is to be ascertained. Daytime and nighttime data should be collected.

3.5 Biological Environment

Baseline data should include list of dominant, rare, endangered, threatened, endemic and indicator species and species abundance and distribution of biological species of study area. An inventory map is to be prepared along with a description of the existing terrestrial, wetland and aquatic vegetation. Include any rare vascular and non-vascular plant species and rare plant communities in the study area. Details for fauna and flora to be included are:

- ▶ General type and dominant species
- ▶ Densities and distributions
- ▶ Habitat value
- ▶ Historically important specimen
- ▶ Rare and Endangered species (location, distribution and conditions)
- ▶ Specimen of scientific or aesthetic interest

3.6 Socio Economic Environment

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

3.7 Solid Waste

Solid wastes from construction sector can be categorized into two phases i.e. during construction & during operation. Details of the following are to be given:

- ▶ Construction or demolition waste, i.e., massive and inert waste
- ▶ Municipal waste, i.e., biodegradable and recyclable waste

- ▶ Hazardous waste
- ▶ E-waste

Details of authorized municipal solid waste facilities, biomedical treatment facilities and hazardous waste disposal facilities in the area should be included.

4.0 Anticipated Environmental Impacts and Mitigation Measures:

4.1 Prediction of Impacts:

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, 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.

4.2 Land Environment

Anticipated Impacts:

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

- ▶ Estimation of anticipated impacts on the surrounding land use pattern, on infrastructure like housing, road net work, environmentally sensitive places etc,
- ▶ Impact on the public utilities arising out of the utilities for the project activities.
- ▶ Impact on the natural drainage system and soil erosion.
- ▶ Loss of productive soil and impact on natural drainage pattern.
- ▶ Study of the problem of land slides and assessment of soil erosion potential and the impact
- ▶ Impact of construction activity on the fertility status of soil in the study area
- ▶ Prediction of ground water pollution due to seepage of pollutants through soil column

Mitigation Measures:

Proper mitigation measures have to be suggested.

Improved road network infrastructure to handle the increase in traffic

- ▶ Selection of suitable local plant species for greenbelt development in and around the sites.
- ▶ Top soil conservation plan and its re-utilization depending on its quality

4.3 Water Environment

Impact of construction and operational phases on the surface and ground water on account of the township is to be estimated.

Anticipated Impacts:

- ▶ Impact on water sources due to shifting of watercourses, if any
- ▶ Impact of water withdrawal on surface water / ground water resources. Impact on exploitation of surface / ground water

- ▶ Waste water generation
- ▶ Information regarding how the waste water is to be disposed off

Mitigating Measures:

Prediction of ground water contamination and suggested mitigating measures to minimize the pollution level

- ▶ Water conservation within the buildings
- ▶ Rainwater harvesting to recharge the ground water
- ▶ Water conservation in landscape
- ▶ Adequate measures to be adopted for water conservation during construction and operation stage.

4.4 Air Environment

Anticipated Impacts:

Impacts on air quality during the construction and operation phase should be predicted. The existing surrounding features of the study area and impact on them should be addressed separately. It is necessary to predict the following if any

- ▶ Prediction of point source emissions
- ▶ Prediction of air emissions from the vehicles during the construction and operation phases.

Mitigating Measures:

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

- ▶ Mitigative measures during construction phase due to reduce the emissions during loading, un-loading, transportation and storage of construction materials.
- ▶ Mitigative measures to reduce the point source emissions.
- ▶ Greenbelt development.
- ▶ Dust mitigation
- ▶ Estimate any environmental implications from transportation (rail, road) related emissions associated with the construction and operational phases and suggest suitable options
- ▶ Operation of DG sets

4.5 Noise Environment

Impact of project construction / operation on the noise on account of construction equipment and road traffic is to be studied.

Anticipated Impacts:

- ▶ Noise due to demolition / construction activities
- ▶ Impact due to noise levels generated by existing
- ▶ Impact due to present and future transportation activities

- ▶ Operation of DG sets
- ▶ Impact of noise due to work at night.

Mitigating Measures:

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

4.6 Biological Environment

Impact of project during construction and operational phases on the biological environment on account of project activity is to be detailed.

Anticipated Impacts:

- ▶ Impact of construction activity on fauna
- ▶ Pre- and post- topography, soil and parent material conditions and their contribution to flora and fauna and
- ▶ Aquatic and terrestrial ecosystem diversity.

Mitigating Measures :

- ▶ Mitigating measures to compensate the loss of vegetation cover / providing green belt development
- ▶ Regeneration / Restoration of rare plants of economic importance including medicinal plants species which require protection and conservation
- ▶ Identification of measures through scientific conservation plan for protection and conservation of flora, fauna including wildlife, migratory avi-fauna, rare, endemic and endangered species and medicinal plants etc.

4.7 Socio Economic Environment

Anticipated Impacts:

Predicted impact on the communities of the proposed activity is to be given. Impact on surroundings on socio-economic status is to be detailed. Present status of housing, public utilities, commercial structures, transportation. Impact of the project in construction and operational phases on socio cultural aspects is to be assessed.

Mitigation Measures:

Mitigation measures to reduce adverse effects are to be given.

4.8 Solid Waste and Environment

Anticipated impacts

Impact of the project during construction and operational phases for generation of waste is to be assessed.

Mitigation Measures:

Mitigation measures to reduce adverse effects. Options for minimization of solid waste and environmentally compactable disposal are to be given. Management and disposal of temporary structures, made during construction phase are to be addressed. Mitigation measures for handling biomedical wastes are to be detailed.

5.0 Specific Studies

Describe the project energy requirements, associated infrastructure and other infrastructure requirements.

Discuss the steps taken to integrate the needs of other stakeholders into the location and design of access infrastructure to reduce and manage overall environmental impacts from resource development;

5.1 Building Material and Technologies

Anticipated issues and concerns

- ▶ High consumption of resources
- ▶ High transportation cost

Alternate methods

- ▶ Re-use of debris at existing site
- ▶ Use of Ready-Mix concrete
- ▶ Use of ash-based bricks and flyash should be explored to the maximum extent possible.
- ▶ Construction should conform to the requirements of local seismic regulations.

5.2 Energy Conservation

- ▶ Explore use of alternate renewable resources such as solar / wind power etc is to be discussed.
- ▶ Discuss the options considered for supplying the power required for the Project and the environmental implications, including opportunities to increase the energy efficiency of the Project;
- ▶ Details of U & R values are to be detailed

5.3 Transport

- a) Include a map showing transportation access to the site from highways;
- b) Discuss how public access to, or within the project area managed during the construction phases of the Project;
- c) Discuss the impact of increased vehicle traffic and requirements for access improvements on roads in the site development area as a result of the Project, considering other existing and planned developments and operations in the region including what measures will be taken to reduce traffic and enhance vehicle safety on external roads;
- d) Discuss any expected change in traffic volume by Average Annual Daily Traffic (AADT) and any seasonal variability in traffic volume (include mitigation measures) prior to construction, during construction and at full site operation;

- e) Distance to the main access road along with the width of the roads are to be given

5.4 Storm Water Management

Storm water management plan should be implemented so as to prevent sudden discharge of excessive volumes of storm water to the receiving waters thus reducing the shock load on municipality drainage system, and impact on receiving water body are to be detailed out.

6.0 Environmental Monitoring Program

- ▶ Frequency, location, parameters of monitoring
- ▶ Summary matrix of environmental monitoring, during construction and operation stage
- ▶ Requirement of monitoring facilities
- ▶ Compilation and analysis of data and reporting system

7.0 Additional Studies

7.1 Risk Assessment (ERA) and Disaster Management Plan (DMP):

Discuss emergency plans for any environmental risks and such as earthquakes

- ▶ Types of Emergency; internal and external origin
- ▶ Emergency evacuation plan
- ▶ Emergency Procedures
- ▶ Helipad facilities for buildings with height beyond 60mts

7.2 Natural Resource Conservation

Plan of action for conservation of natural resources and recycle waste materials due to the project activity in the construction and operational phase of the project is to be discussed.

7.3 R&R Action Plan

Detailed R&R plan with data on the existing socio-economic status of the population in the study area and broad plan for 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 Management Plan (EMP)

- ▶ 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
- ▶ Provision of Effective Controls and Building Management Systems such as Automatic Fire Alarm and Fire Detection and Suppression System etc. must be ensured. Adequate access to fire tenders should be provided.
- ▶ Provisions should be kept for the integration of solar water heating system and other energy conservation methods.

Detailed EMP may be formulated to mitigate the residual impacts which should inter alias include the impact due to change in land use; due to loss of agricultural land and grazing land besides other impacts of the projects. Budgeting of the EMP may be included in EIA. The EIA should discuss in detail the following aspects:

Sewage Treatment Plan

- ▶ Sewage treatment plant has been designed to treat the wastewater from the township. The wastewater be treated to tertiary level and after treatment, reused for flushing of toilets in apartment building and gardening.
- ▶ Treated wastewater reused for landscaping, car washing etc. and partly discharged. Treated sewage shall conform to E(P) Rules. Sewage Treatment Plants and monitored on a regular basis

Emission from Diesel Generator (DG) Set

- ▶ The stack height and emissions from D.G. sets should conform to the norms of Central Pollution Control Board. The certification of space design for DG sets done by competent authority.

Solid Waste Management

- ▶ Spent oil from DG Sets should be stored in HDPE drums in isolated covered facility and disposed off as per the Hazardous Wastes (Handling & Management) Rules, 2003. Spent oil from DG Sets should be disposed off through registered recyclers only.

10.0 Summary & Conclusion (Summary EIA)

This document should summarize the significant findings of the EIA report. The summary must describe each significant environmental issue and its resolution in sufficient detail so that its importance and scope, as well as the appropriateness of the approach taken to resolve it are well understood. Wherever possible, the summary should make use of base maps, tables and figures given in the report. The following should be addressed in the summary if applicable: -

- ▶ The need for resettlement of families/ if any agriculture/ the presence of squatters or any other land titling conflicts;
- ▶ Potential interruption or limitation of accesses to dwellings, businesses or productive resources either permanently or temporarily;
- ▶ Encroachment or reduction of green areas, parks, and other recreational areas;
- ▶ Demolition of buildings high architectural or historical value;

- ▶ Potential deterioration of urban quality and property value in the immediate vicinity of the works or deterioration of unique architectural characteristics in the neighbourhood;

11.0 Disclosure of Consultants Engaged

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

Enclosures

Conceptual plan / Questionnaire / Photos

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	2.1.1. Irrigated crop land
	(i) kharif (ii) rabi (iii) double cropped	2.1.2. Unirrigated crop land
	2.2. Fallow	2.2.1. Fallow
	2.3. Plantation	2.3.1. Types of plantation, casuarina, coconut, tea etc.
3. Forest	3.1 evergreen / semi-evergreen	3.1.1. Dense / closed 3.1.2. Open
	3.2. Deciduous	
	3.3. Degraded scrub land	
	3.4. Forest blank	3.4.1. Degraded forest 3.4.2. Forest blank
	3.5. Forest plantation 3.6. Mangrove	3.5.1. Types of plantation 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 & desartic)	Minimum mappable unit IS 2.25 hectares on 1:50,000 scale
	4.7. Barren rocky / stony waste / sheet rock areas	
5. Water bodies	5.1. River / stream	
	5.2 Lake / reservoir / tank / canal	
6. Others	6.1. Shifting cultivation	6.1.1. Current 6.1.2. Old / abandoned
	6.2. grassland / grazing land	6.2.1. Grassland / grazing land
	6.3. Snow covered / glacial area	6.3.1. Snow covered / glacial area
	6.4. Mining area	6.4.1. Mining dumps

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

Level – I	– categories	– 1:1000,000 scale
Level – II	– categories	– 1:250,000 scale
Level – III	– categories	– 1:50,000 scale and 1:25,000 scale

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

Annexure 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 ▶ Adiabatic Lapse Rate	1 site in the project area	1 hourly continuous	Mechanical / automatic weather station Max / Min Thermometer Hygrometer Rain gauge As per IMD specifications As per IMD specifications Mini Sonde / SODAR	IS 5182 Part 1-20 Site specific primary data is essential Secondary data from IMD CPCB guidelines
Pollutants ▶ SPM	Nos. of sampling location to be decided	24 hourly twice a week	As per CPCB guidelines	Monitoring Network ▶ Minimum one locations in upwind side, two sites in downwind side / impact zone
▶ RSPM		@4 hourly. Twice a week, One non monsoon season		▶ All the sensitive receptors need to be covered for core zone and buffer zone
▶ SO ₂		8 hourly, twice a week		
▶ NO _x				
▶ Hourly equivalent noise levels	Identified study area	Once in season	Noise level meter	IS:4954-1968 as adopted by CPCB
C. Water				
Parameters for water quality ▶ pH, temperature, turbidity, magnesium hardness, total alkalinity, chloride, sulphate, nitrate,		▶ 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	

fluoride, sodium, potassium, salinity ▶ Total nitrogen, total phosphorus, DO, BOD,COD ▶ Heavy metals ▶ Total coliforms, faecal coliforms ▶ Phyto plankton			▶ 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)	<i>One season</i>	Collected and analysed as per soil analysis reference	Analysis be done as per BIS specifications

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

Annexure 4

Annexure 4.1 Hydraulic Conductivities of Soil

S No.	Soils	K- values (m / day)
1	Clay surface	0.01-0.2
2	Deep clay layer	10^{-8} - 10^{-2}
3	Loam	0.1-10
4	Fine sand	1-5
5	Medium sand	5-20
6	Coarse sand	20-100
7	Gravel	100-1000
8	Sand and gravel	5-100
9	Clay, sand & gravel	0.001-0.1

Source: MoWR, GoI, 2004, pg. 15, 84

Annexure 4.2 Specific Yield of Different Formation

	Yield (%)
Sand :	10-30
Gravelly Sand (coarse sand) :	15-30
Sand and Gravel :	15-25
Sand stone coarse-grained :	10-15
Sand stone fine-grained :	5-15
Thick plastic clay :	3-5
Weathered rock :	2-5
Clay :	1-10
Fractured and jointed rock :	0.50-5

Annexure 4.3 Typical Porosities of soil

Soil Texture	Porosity
Sandstone	0.19
Sandy loam sub soil	0.36
Sandy loam plough layer	0.42
Clay loam subsoil	0.44
Recently ploughed clay loam	0.58

Source: Manual on norms and standards for EC of large construction projects-MoEF

Annexure 4.4 Rating Chart for Soil Test Values of Primary Nutrients

Nutrient	Rating*			Recommended test**
	Low	Medium	High	
Organic carbon Available nitrogen alkaline KMnO ₄ N (Kg/ha)	<0.50	0.50-0.75	>0.75	Colorimetric method; Datta et al
Available phosphorus Olsen's P (Kg/ha)	<280	281-560	>560	Kjeldahl apparatus
Available potassium Ammonium Acetate-K (Kg/ha)	<10 <120	11-25 121-280	>25 >280	Olsen method Ammonium acetate extraction method
*Subject to minor variation as per local conditions. **Tests to be performed at ICAR (Indian Council of Agricultural Research)–accredited laboratory.				

Source: Singh D, Chhoker, P K and Pandey, R N. 2000. Soil plant water analysis: a methods manual. New Delhi: Indian Agricultural Research Institute, 160 pp.

Annexure 5.1

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, $\mu\text{m}/\text{hos}/\text{cm}$	< 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 methamoglobinemia
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 5.2 Use Based Classification of Surface Waters in India

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional disinfection	A	<ol style="list-style-type: none"> Total Coliforms Organism MPN / 100ml shall be 50 treatment but after or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical Oxygen Demand 5 days 20oC 2mg/l or less
Outdoor bathing (Organized)	B	<ol style="list-style-type: none"> Total Coliforms Organism MPN / 100ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20oC 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	<ol style="list-style-type: none"> Total Coliforms Organism MPN / 100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20oC 3mg/l or less
Propagation of Wild life and Fisheries	D	<ol style="list-style-type: none"> pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	<ol style="list-style-type: none"> pH between 6.0 to 8.5 Electrical Conductivity at 25oC micro mhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l

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

Annexure 6

Water Requirements for Different Types of Buildings

Sl. No	Type of Building	Consumption (liters/day)
i)	Factories with bath rooms	45 per head
ii)	Factories without bath rooms	30 per head
iii)	Hospital (including laundry):	
	a) Number of beds not exceeding 100	340 per head
	b) Number of beds exceeding 100	450 per head
iv)	Nurses' homes and medical quarters	135 per head
v)	Hostels	135 per head
vi)	Hotel (up to 4 star)	180 per head
vii)	Hotel (5 star and above)	320 per head
viii)	Offices	45 per head
ix)	Restaurants	70 per seat
x)	Cinemas, concert halls and theaters	15 per seat
xi)	Schools	
	a) Day schools	45 per head
	b) Boarding schools	135 per head

In addition, water demand of visitors to these building is considered as 15 LPCD

Source: National Building Code, 2005

Annexure 7

National Ambient Air Quality Standards (NAAQS)

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

10	Benzo(a)Pyrene (BaP)–particulate phase only, ng / m ³	Annual*	01	01	-Solvent extraction followed by HPLC / GC analysis
11	Arsenic (As) ng / m ³	Annual*	06	06	-AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni) ng / m ³	Annual*	20	20	-AAS/ICP method after sampling on EPM 2000 or equivalent filter paper

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

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

Note:

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

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

Annexure 8

Ambient Noise Standards

Area Code	Category of Area	Noise Levels Db(A) eq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial	65	55
C	Residential	55	45
D	Silence	50	40

*#Day – 6 AM – 10 PM, Night 10 PM – 6 AM; Silence zone is not less than 100 m from around hospitals, schools, courts, religious places.

Source: National Pollution Regulations In India, CPCB, Pollution Control Law Series: PCL/06/2001-02

The IS standards for noise abatement include :

- ▶ IS-4954-1968 for Noise abatement in town planning recommendations
- ▶ IS-3098-1980 for Noise emitted by moving road vehicles, measurement
- ▶ IS-10399-1982 for Noise emitted by stationary road vehicles, methods of measurement
- ▶ IS-6098-1971 for Air borne noise emitted by rotating electrical machinery
- ▶ IS-4758-1968 for Noise emitted by machines

Annexure 9

List of Critically Polluted Areas as Identified by CPCB

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

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

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

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

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

Source: Ecological Impact Assessment Series: EIAS/5/2009-10

Details of Critically Polluted Industrial Areas and Clusters/ Potential Impact Zone in terms of the Office Memorandum no. J-11013/5/2010-IA.II(I) dated 13.1.2010

Annexure 10

General Standards for Discharge of Effluents

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

12	Chemical oxygen demand, mg/l max.	250	—	—	250
13	Arsenic (as As), mg/l max.	0.2	0.2	0.2	0.2
14	Mercury (as Hg), mg/l max.	0.01	0.01	—	0.01
15	Lead (as Pb), mg/l max.	0.1	1.0	—	2.0
16	Cadmium (as Cd), mg/l max.	2.0	1.0	—	2.0
17	Hexavalent chromium (as Cr +6), mg/l max.	2.0	1.0	—	2.0
18	Total chromium (as Cr), mg/l max.	2.0	2.0	—	2.0
19	Copper (as Cu), mg/l max.	3.0	3.0	—	3.0
20	Zinc (as Zn), mg/l max.	5.0	15	—	15
21	Selenium (as Se), mg/l max.	0.05	0.05	—	0.05
22	Nickel (as Ni), mg/l max.	3.0	3.0	—	5.0
23	Cyanide (as CN), mg/l max.	0.2	2.0	0.2	0.2
24	Fluoride (as F), mg/l max.	2.0	15	—	15
25	Dissolved phosphates (as P), mg/l max.	5.0	—	—	—
26	Sulphide (as S), mg/l max.	2.0	—	—	5.0
27	Phenolic compounds (as C ₆ H ₅ OH), mg/l max.	1.0	5.0	—	5.0
28	Radio active materials:	10 ⁻⁷	10 ⁻⁷	10 ⁻⁷	10 ⁻⁷
	a. Alpha emitter micro curie / ml				
	b. Beta emitter micro curie / ml	10 ⁻⁶	10 ⁻⁶	10 ⁻⁶	10 ⁻⁶

29	Bio-assay test	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent
30	Manganese (as Mn), mg/l	2	2	—	2
31	Iron (as Fe), mg/l	3	3	—	3
32	Vanadium (as V), mg/l	0.2	0.2	—	0.2
33	Nitrate nitrogen, mg/l	10	—	—	20
* These standards shall be applicable for industries, operations or processes other than those industries, operations or process for which standards have been specified of the Environment Protection Rules, 1989					

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

Annexure 11

Drought Resistant Species

Tree species	Common Name	Tree species	Common Name
<i>Prosopis cineraria</i>	Khejri	<i>Azadirachta indica</i>	Neem
<i>Capparis deciduas</i>	Kiari , Caperbrush	<i>Diospyros melanoxylon</i>	Tendu
<i>Tamarix aphylla</i>		<i>Ougeinia oojeinensis</i>	
<i>Acacia tortillas</i>		<i>Commiphora caudata</i>	
<i>Zizyphus nummularia</i>	Jungli Ber	<i>Bauhinia variegata</i>	Kachnar
<i>Prosopis juliflora</i>	Kikar	<i>Eucalyptus tereticornis</i>	
<i>Tecomella undulata</i>	Rugtora / Wavy leafed Tufmella	<i>Pongamia Pinnata</i>	Karanj
<i>Colophospermum mopane</i>		<i>Casia siamea</i>	
<i>Salvadora oleoides</i>		<i>Anacardium occidentale</i>	Cashew
<i>Acacia aneura</i>		<i>Holoptelia integrifolia</i>	
<i>Parkinsonia aculeate</i>		<i>Acacia catechu</i>	Katha
<i>Dichrostachys cineraria</i>		<i>Boswellia serrata</i>	Lobaw
<i>Acacia holosericea</i>		<i>Butea monosperma</i>	Palash
<i>Borassus flabellifera</i>	Tar	<i>Casseea fistula</i>	Amaltas
<i>Grewia tenax</i>	Falsa	<i>Albizia amara</i>	
<i>Commiphora wightii</i>	Guggal	<i>Dalbergia latifolia</i>	Eastern Rose wood
<i>Acacia seyal</i>		<i>Erythrina Indica</i>	Coral Tree
<i>Eucalyptus camaldulensis</i>	Eucalyptus	<i>Ficus bengalensis</i>	Banyan
<i>Hardwickia binnata</i>		<i>Ficus religiosa</i>	Peepal
<i>Pithecelobium dulce</i>	Jungle Jalebi	<i>Santalum album</i>	Sandal
<i>Celtis australis</i>		<i>Syzygium cuminii</i>	Clove
<i>Acacia albida</i>		<i>Terminalia alata</i>	
<i>Albizia lebbek</i>	Shirish	<i>Madhuca latifolia</i>	Mahua
<i>Acacia nilotica</i>	Babul	<i>Acacia auriculiformis</i>	
<i>Acacia ferruginea</i>		<i>Terminalia bellirica</i>	Harad
<i>Casuarina equisetifolia</i>	Jhar	<i>Dendrocalamus strictus</i>	Lathi Baans
<i>Leucaena leucocephala</i>	Subabul	<i>Moringa oleifera</i>	Drumstick
<i>Melea azedirach</i>		<i>Terminalia arjuna</i>	Arjun
<i>Sesbania grandiflora</i>			
<i>Tamarindus indica</i>	Imli		
<i>Wrightia Tinctoria</i>			
<i>Morus indica / alba</i>	Mulberry		
<i>Ailanthus excelsa</i>			

Source : Manual on norms and standards for EC of large construction projects-MoEF

Annexure 12

For General Structural Safety

1. IS: 456:2000 “Code of Practice for Plain and Reinforced Concrete
2. IS: 800-1984 “Code of Practice for General Construction in Steel
3. IS: 801-1975 “Code of Practice for Use of Cold Formed Light Gauge Steel Structural Members in General Building Construction
4. IS 875 (Part 2):1987 Design loads (other than earthquake) for buildings and structures Part 2 Imposed Loads
5. IS 875 (Part 3):1987 Design loads (other than earthquake) for buildings and structures Part 3 Wind Loads
6. IS 875 (Part 4):1987 Design loads (other than earthquake) for buildings and structures Part 4 Snow Loads
7. IS 875 (Part 5):1987 Design loads (other than earthquake) for buildings and structures Part 5 special loads and load combination
8. IS: 883:1966 “Code of Practice for Design of Structural Timber in Building
9. IS: 1904:1987 “Code of Practice for Structural Safety of Buildings: Foundation”
10. IS1905:1987 “Code of Practice for Structural Safety of Buildings: Masonry Walls
11. IS 2911 (Part 1): Section 1: 1979 “Code of Practice for Design and Construction of Pile Foundation Section 1
 - Part 1: Section 2 Based Cast-in-situ Piles
 - Part 1: Section 3 Driven Precast Concrete Piles
 - Part 1: Section 4 Based precast Concrete Piles
 - Part 2: Timber Piles
 - Part 3 Under Reamed Piles
 - Part 4 Load Test on Piles

For Cyclone/Wind Storm Protection

12. IS 875 (3)-1987 “Code of Practice for Design Loads (other than Earthquake) for Buildings and Structures, Part 3, Wind Loads”
13. IS Guidelines for improving the Cyclonic Resistance of Low rise houses and other building

For Earthquake Protection

14. IS: 1893-2002 “Criteria for Earthquake Resistant Design of Structures (Fifth Revision)”
15. IS:13920-1993 “Ductile Detailing of Reinforced Concrete Structures subjected to Seismic Forces - Code of Practice”
16. IS:4326-1993 “Earthquake Resistant Design and Construction of Buildings - Code of Practice (Second Revision)”

- 17 IS:13828-1993 “Improving Earthquake Resistance of Low Strength Masonry Buildings - Guidelines”
- 18 IS:13827-1993 “Improving Earthquake Resistance of Earthen Buildings - Guidelines”,
- 19 IS:13935-1993 “Repair and Seismic Strengthening of Buildings - Guidelines”

For Protection of Landslide Hazard

- 20 IS 14458 (Part 1): 1998 Guidelines for retaining wall for hill area: Part 1 Selection of type of wall.
- 21 IS 14458 (Part 2): 1997 Guidelines for retaining wall for hill area: Part 2 Design of retaining / breast walls
- 22 IS 14458 (Part 3): 1998 Guidelines for retaining wall for hill area: Part 3 Construction of dry stone walls
- 23 IS 14496 (Part 2): 1998 Guidelines for preparation of landslide – Hazard zonation maps in mountainous terrains: Part 2 Macro-zonation

Note 1 : Whenever an Indian Standard including those referred in the National Building Code or the National Building Code is referred, the latest revision of the same shall be followed except specific criteria, if any, mentioned above against that code.

Note 2: Codal Provisions / Guidelines Pertaining To Protection For Cyclone Or Landslide Hazard Can Be Omitted Whenever Not Applicable.

Annexure 13

Annexure 13.1 Interior lighting power

Space Function LPD (W / m ²)		Space Function LPD (W / m ²)	
Space Function	LPD (W / m ²)	Space Function	LPD (W / m ²)
Office-enclosed	11.8	Library	
Office-open plan	11.8	Card File & Cataloging	11.8
Conference / Meeting / Multipurpose	14.0	Stacks	18.3
Classroom / Lecture / Training	15.1	Reading Area	12.9
Lobby	14.0	Hospital	
For Hotel	11.8	Emergency	29.1
For Performing Arts Theater	35.5	Recovery	8.6
For Motion Picture Theater	11.8	Nurse Station	10.8
Audience / Seating Area	9.7	Exam Treatment	16.1
For Gymnasium	4.3	Pharmacy	12.9
For Exercise Center	3.2	Patient Room	7.5
For Convention Center	7.5	Operating Room	23.7
For Religious Buildings	18.3	Nursery	6.5
For Sports Arena	4.3	Medical Supply	15.1
For Performing Arts Theater	28.0	Physical Therapy	9.7
For Motion Picture Theater	12.9	Radiology	4.3
For Transportation	5.4	Laundry – Washing	6.5
Atrium-first three floors	6.5	Automotive – Service Repair	7.5
Atrium-each additional floor	2.2	Manufacturing	
Lounge / Recreation	12.9	Low Bay (<8m ceiling)	12.9
For Hospital Area	8.6	High Bay (>8m ceiling)	18.3 Dining
For Hotel	14.0	Detailed Manufacturing	22.6
For Motel	12.9	Equipment Room	12.9
For Bar Lounge / Leisure Dining	15.1	Control Room	5.4
For Family Dining	22.6	Hotel / Motel Guest Rooms	11.8
Food Preparation	12.9	Dormitory – Living Quarters	11.8
Laboratory	15.1	Museum	
Restrooms	9.7	General Exhibition	10.8
Dressing / Locker / Fitting Room	6.5	Restoration	18.3
		Bank Office – Banking Activity Area	16.1

Corridor/Transition	5.4	Religions Buildings	
For Hospital	10.8	Worship-pulpit, choir	25.8
For Manufacturing Facility	5.4	Fellowship Hall	9.7
Stairs-active	6.5	Retail	
Active Storage	8.6	Sales Area	18.3
For Hospital	9.7	Mall Concourse	18.3
Inactive Storage	3.2	Sports Arena	
For Museum	8.6	Ring Sports Area	29.1
Electrical/Mechanical	16.1	Court Sports Area	24.8
Workshop	20.5	Indoor Field Area	15.1
Sleeping Quarters	3.2	Warehouse	
Convention Center – Exhibit Space	14.0	Fine Material Storage	15.1
Medium/Bulky Material Storage	9.7	Parking Garage – Garage Area	2.2
		Transportation	
		Airport – Concourse	6.5
		Air/Train/Bus – Baggage Area	10.8
		Terminal – Ticket Counter	16.1

Source: Manual on norms and standards for EC of large construction projects-MoEF

Annexure 13.2 Exterior Building Lighting Power

Exterior Lighting Applications	Power Limits
Building entrance (with canopy)	13 W / m ² (1.3 W / ft ²) of canopied area
Building entrance (without canopy)	90 W / lin m (30 W / lin f) of door width
Building exit	60 W / lin m (20 W / lin f) of door width
Building facades	2 W / m ² (0.2 W / ft ²) of vertical facade area

Source: Manual on norms and standards for EC of large construction projects-MoEF

Annexure 14

Recommended Values of Illuminance for Some Common Activities as Recommended by National Building Code 2005

Sl. No.	Type of interior or activity	Range of service Illuminance in Lux limitation	Quality class of direct glare	Remarks
1	Commerce			
1.1	Offices			
1.1.1	General Offices	300-500-700	1	
1.1.2	Deep plan general offices	500-750-1000	1	
1.1.3	Computer work stations	300-500-750	1	
1.1.4	Conference rooms, executive offices	300-500-750	1	
1.1.5	Computer and data preparation rooms	300-500-750	1	
1.1.6	Filing rooms	200-300-500	1	
1.2	Drawing offices			
1.2.1	General	300-500-750	1	
1.2.2.	Drawing boards	500-750-1000	1	
1.2.3	Computer aided design and drafting	-	-	Special lighting is required
1.2.4	Print rooms	200-300-500	1	
1.3	Banks and building societies			
1.3.1	Counter office area	300-500-750	1	
1.3.2	Public area	200-300-500	1	
2	Retailing			
2.1	Small shops with counters	300-500-750	1	The service illuminance should be provided on the horizontal plane of the counter. Where wall displays are used, a similar illuminance on the wall is desirable.
2.2	Small service shops with Island Displays	300-500-750	1	
2.3	Supper markets, Hyper Markets			
2.3.1	General	300-500-750	2	
2.3.2	Checkout	300-500-750	2	

Sl. No.	Type of interior or activity	Range of service Illuminance in Lux limitation	Quality class of direct glare	Remarks
2.3.3	Showroom for large objects, for example, cars, furnitures.	300-500-750	1	
2.3.4	Shopping precincts and arcades	100-150-200	2	
3	Places of Public Assembly			
3.1	Public rooms, village halls, worship halls	200-300-500	1	
3.2	Concert Halls, Cinemas and Theaters			
3.2.1	Foyer	150-200-300	-	
3.2.2	Booking Office	200-300-500	-	Local or localized lighting may be appropriate
3.2.3	Auditorium	50-100-150	-	Dimming facilities will be necessary. Special lighting of the aisles is desirable.
3.2.4	Dressing rooms	200-300-500	-	Special mirror lighting for make up may be required.
3.2.5	Projection room	100-150-200	-	
3.3	Churches			
3.3.1	Body of church	100-150-200	2	
3.3.2	Pulpit, lectern	200-300-500	2	Use local lighting
3.3.3	Choir stalls	200-300-500	2	Local lighting may be appropriate.
3.3.4	Alter, communion table, chancel	100-150-200	2	Additional lighting to provide emphasis is desirable
3.3.5	Vestries	100-150-200	2	
3.3.6	Organ	200-300-500	-	
3.4	Hospitals			
3.4.1	Anaesthetic rooms			
3.4.1.1	General	200-300-500	-	
3.4.1.2	Local	750-1000-1500	-	
3.4.2	Consulting area			
3.4.2.1	General	200-300-500	-	
3.4.2.2	Examination	750-1000-1500	-	
3.4.3	Corridors			

Sl. No.	Type of interior or activity	Range of service Illuminance in Lux limitation	Quality class of direct glare	Remarks
3.4.3.1	General	100-150-200	-	
3.4.4	Ward corridors			
3.4.4.1	Day, screened from bays	150-200-300	-	
3.4.4.2	Day, open to natural light	150-200-300 (Total)		
3.4.4.3	Morning/ Evening	100-150-200	-	
3.4.4.4	Night	5-10	-	
3.4.5	Cubicles			
3.4.5.1	General	200-300-500	-	
3.4.5.2	Treatment	750-1000-1500	-	
3.4.6	Examination			
3.4.6.1	General	200-300-500		
3.4.6.2	Local inspection	750-1000-1500		
3.4.7	Intensive therapy			
3.4.7.1	Bed head	30-50		
3.4.7.2	Circulation between bed ends	50-100-150		
3.4.7.3	Observation	200-300-500	-	
3.4.7.4	Local Observation	750-100-1500		
3.4.7.5	Staff base (day)	200-300-500		
3.4.7.6	Staff base (night)	30		
3.4.8	Laboratories			
3.4.8.1	General	200-300-500	-	
3.4.8.2	Examination	300-500-750	-	
3.4.9	Nurse's station			
3.4.9.1	Morning/ day/ evening	200-300-500	-	
3.4.9.2	Night desks	30	-	
3.4.9.3	Night, medical trolleys	50-100-150	-	
3.4.10	Operating Theatres			
3.4.10.1	General	300-500-750		
3.4.10.2	Local	10000 to 50000	-	Special operating lights are used
3.4.11	Pathology departments			
3.4.11.1	General	200-300-500		
3.4.11.2	Examination	300-500-750		

Sl. No.	Type of interior or activity	Range of service Illuminance in Lux limitation	Quality class of direct glare	Remarks
3.4.11.3	Pharmacies	200-300-500		
3.4.11.4	Reception/ enquiry	200-300-500		
3.4.11.5	Recovery rooms	200-300-500		
3.4.12	Ward-circulation			
3.4.12.1	Day	50-100-150		
3.4.12.2	Morning / Evening	50-100-150		
3.4.12.3	Night	3-5		
3.4.13	Ward-bed head			
3.4.13.1	Morning/ Evening	30-50		
3.4.13.2	Reading	100-150-200		
3.4.14	Night			
3.4.14.1	Adult	0.1-1		
3.4.14.2	Pediatric	1		
3.4.14.3	Psychiatric	1-5		
3.4.14.4	Watch	5		
3.4.15	X-Ray areas			
3.4.15.1	General	150-200-300		
3.4.15.2	Diagnostic	150-200-300		
3.4.15.3	Operative	200-300-500		
3.4.15.4	Process dark room	50		
3.4.16	Surgeries			
3.4.16.1	General	150-200-300		
3.4.16.2	Waiting rooms	100-150-200		
3.4.17	Dental Surgeries			
3.4.17.1	Chair	Special lighting		
3.4.17.2	Laboratories	300-500-750	-	
3.4.18	Consulting Rooms			
3.4.18.1	General	200-300-500		
3.4.18.2	Desk	300-500-750	-	
3.4.18.3	Examination Couch	300-500-750	-	
3.4.18.4	Ophthalmic Walls and near –vision charts	300-500-750	-	
3.5	Hotels			

Sl. No.	Type of interior or activity	Range of service Illuminance in Lux limitation	Quality class of direct glare	Remarks
3.5.1	Entrance Halls	50-100-150		
3.5.2	Reception, cashier's and porter's desk	200-300-500	-	Localised lighting may be appropriate
3.5.3	Bars, Coffee base, dining rooms, grill rooms, restaurants, lounges	50-200		The lighting should be designed to create an appropriate atmosphere.
3.5.4	Cloak Rooms, baggage rooms	50-100-150	3	
3.5.5	Bed Rooms	30-50-100	-	Supplementary local lighting at the bed head, writing table should be provided.
3.5.6	Bathroom	50-100-150	-	Supplementary local lighting near the mirror is desirable
3.5.7	Food preparation and stores, cellars, lifts and corridors	-	-	See 'General Building Areas'
3.6	Libraries			
3.6.1	Lending Library			
3.6.1.1	General	200-300-500	1	
3.6.1.2	Counters	300-500-750	1	Localised lighting may be appropriate
3.6.1.3	Bookshelves	100-150-200	2	The service illuminance should be provided on the vertical face at the bottom of the bookstack.
3.6.1.4	Reading Rooms	200-300-500	1	
3.6.1.5	Reading Tables	200-300-500	1	Localised lighting may be appropriate
3.6.2	Catalogues			
3.6.2.1	Card	100-150-200	2	
3.6.2.2	Microfiche/ Visual display units	100-150-200	2	
3.6.3	Reference Libraries			
3.6.3.1	General	200-300-500	1	
3.6.3.2	Counters	300-500-750	1	Localised lighting may be appropriate

Sl. No.	Type of interior or activity	Range of service Illuminance in Lux limitation	Quality class of direct glare	Remarks
3.6.3.3	Bookshelves	100-150-200	2	The service illuminance should be provided on a vertical surface at the foot of the bookshelves.
3.6.3.4	Study tables, carrels	300-500-750	1	
3.6.3.5	Map room	200-300-500	1	
3.6.4	Display and exhibition areas			
3.6.4.1	Exhibits insensitive to lights	200-300-500	-	
3.6.4.2	Exhibit sensitive to light, for example, pictures, prints, rare books in archives	50 to 150	-	
3.6.5	Library Workrooms			
3.6.5.1	Book repair and book binding	300-500-750	2	
3.6.5.2	Catalogue and sorting	300-500-750	2	
3.6.5.3	Remote book stores	100-150-200	3	
3.7	Museums and Art Galleries			
3.7.1	Exhibits insensitive to light	200-300-500	-	
3.7.2	Light sensitive exhibits for example, oil and temper paints, undyed leather, bone, ivory, wood etc.	150	-	This is the maximum illuminance to be provided on the principal plane of the exhibit.
3.7.3	Extremely light sensitive exhibits, for example, oil and temper paints, undyed leather, bone, ivory, wood, etc.	50	-	This is the maximum illuminance to be provided on the principal plane of the object.
3.8	Sports Facilities Multi purpose sports halls	300-750	-	The lighting system should be sufficiently flexible to provide lighting suitable for the variety of sports and activities that take place in sports halls. Higher illuminance of 1000-2000 lux would be required for television coverage.

Sl. No.	Type of interior or activity	Range of service Illuminance in Lux limitation	Quality class of direct glare	Remarks
4	Education			
4.1	Assembly Halls			
4.1.1.	General	200-300-500	3	
4.1.2.	Platform and stage	-	-	Special lighting to provide emphasise and to facilitate the use of the platform / stage is desirable.
4.2	Teaching spaces General	200-300-500	1	
4.3	Lecture Theatres			
4.3.1	General	200-300-500	1	
4.3.2	Demonstration benches	300-500-750	1	Localised lighting may be appropriate
4.4	Seminar rooms	300-500-750	1	Localized lighting may be appropriate
4.5	Art rooms	300-500-750	1	
4.6	Needlework Rooms	300-500-750	1	
4.7	Laboratories	300-500-750	1	
4.8	Libraries	200-300-500	1	
4.9	Music Rooms	200-300-500	1	
4.10	Sports Halls	200-300-500	1	
4.11	Workshops	200-300-500	1	
5	General Building Areas			
5.1	Entrance			
5.1.1	Entrance halls, lobbies, waiting rooms	150-200-300	2	
5.1.2	Enquiry desks	300-500-750	2	Localised lighting may be appropriate.
5.1.3	Gatehouses	150-200-300	2	
5.2	Circulation areas			
5.2.1	Lifts	50-100-150	-	
5.2.2	Corridors, passageways, stairs	50-100-150	2	
5.2.3	Escalators, travelators	100-150-200		
5.3	Medical and First aid centers			

Sl. No.	Type of interior or activity	Range of service Illuminance in Lux limitation	Quality class of direct glare	Remarks
5.3.1	Consulting rooms, treatment rooms	300-500-750	2	
5.3.2	Rest rooms	100-150-200	1	
5.3.3	Medical stores	100-150-200	1	
5.4	Staff Rooms			
5.4.1	Changing, locker and cleaners rooms, cloakrooms, lavatories	50-100-150	-	
5.4.2	Rest rooms	100-150-200	1	
5.5	Staff Restaurants			
5.5.1	Canteens, cafeterias, dining rooms, mess rooms	150-200-300	2	
5.5.2	Servery, vegetable preparation, washing-up area	200-300-500	2	
5.5.3	Food Preparation and cooking	300-500-750	2	
5.5.4	Food stores, cellars	100-150-200	2	
5.6	Communications			
5.6.1.	Switchboard rooms	200-300-500	2	
5.6.2	Telephone apparatus rooms	100-150-200	2	
5.6.3	Telex room, post room	300-500-750	2	
5.6.4	Reprographic room	200-300-500	2	
5.7	Building Services			
5.7.1	Boiler houses			
5.7.1.1	General	50-100-150	3	
5.7.1.2	Boiler Front	100-150-200	3	
5.7.1.3	Boiler Control Room	200-300-500	2	Localized lighting of the control display and the control desk may be appropriate
5.7.1.4.	Control rooms	200-300-500	2	Localized lighting of the control display and the control desk may be appropriate

Sl. No.	Type of interior or activity	Range of service Illuminance in Lux limitation	Quality class of direct glare	Remarks
5.7.1.5	Mechanical Plant room	100-150-200	2	
5.7.1.6	Electrical power supply and distribution rooms	100-150-200	2	
5.7.1.7	Store rooms	50-100-150	3	
5.8	Car Parks			
5.8.1	Covered Car Parks			
5.8.1.1	Floors	5-20	-	
5.8.1.2	Ramps and Corners	30	-	
5.8.1.3	Entrances and exits	50-100-150	-	
5.8.1.4	Control booths	150-200-300	-	
5.8.1.5	Outdoor Car Parks	5-20	-	

Source: Manual on norms and standards for EC of large construction projects-MoEF

Annexure 15

Air Conditioning, Heating and Mechanical Ventilation in Various Places

Sl. No (1)	Category (2)	Inside design conditions		
		Summer (3)		Winter(4)
1	Restaurants	DB 23 TO 26°C RH 55 TO 60%		DB 21 TO 23°C RH not less than 40 %
2	Office buildings	DB 23 TO 26°C RH 50 TO 60%		DB 21 TO 23°C RH not less than 40 %
3	Radio & Television Studio	DB 23 TO 26°C RH 45 TO 55%		DB 21 TO 23°C RH 40 to 50 %
4	Departmental stores	DB 23 TO 26°C RH 50 TO 60%		DB 21 TO 23°C RH not less than 40 %
5	Hotel guest rooms	DB 23 TO 26°C RH 50 TO 60%		DB 23 TO 24°C RH not less than 40 %
6	Class rooms	DB 23 TO 26°C RH 50 TO 60%		DB 23 TO 24°C RH not less than 40 %
7	Auditoriums	DB 23 TO 26°C RH 50 TO 60%		DB 23 TO 24°C RH not less than 40 %
8	Recovery rooms		DB 23 TO 26°C RH 50 TO 60%	
9	Patient rooms		DB 23 TO 26°C RH 50 TO 60%	
10	Operation theaters		DB 17 TO 27°C RH 45 TO 55%	
11	Museums and libraries		DB 20 TO 22°C RH 40 TO 55%	
12	Telephone terminal rooms		DB 22 TO 26°C RH 40 TO 50%	

Source: Table-2 of Part 8 Building services – section 3 – Air conditioning, heating and mechanical ventilation of National Building Code – 2005

Annexure 16

Outdoor Conditions Source

Station	cooling DB/MCWB						cooling WB/MCDB						Heating DB/MCWB			
	0.4%		1.0%		2.0%		0.4%		1.0%		2.0%		99.6%		99.0%	
	DB	MCWB	DB	MCWB	DB	MCWB	WB	MCDB	WB	MCDB	WB	MCDB	DB	MCWB	DB	
MCWB	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Ahmedabad	42.3	24.1	41.2	23.5	40.0	24.3	28.7	34.3	28.2	33.6	27.8	33.1	11.5	9.0	12.9	9.8
Akola	43.4	24.0	42.2	23.3	41.0	23.6	27.6	37.8	26.7	34.4	26.1	33.5	12.7	10.3	13.9	10.6
Allahabad	43.7	23.4	42.2	23.5	40.8	22.7	28.8	33.0	28.4	32.8	28.0	32.6	7.9	7.0	9.1	8.3
Amritsar	41.6	23.2	40.3	24.6	38.9	24.4	29.3	34.8	28.8	34.8	28.4	33.4	2.7	2.3	4.0	3.5
Aurangabad	40.3	22.1	39.3	22.9	38.3	21.3	26.3	36.2	25.3	33.1	24.7	31.4	10.6	8.2	12.0	9.1
Banglore	34.7	19.6	34.0	19.6	33.1	19.2	23.5	28.9	22.9	28.2	22.5	27.7	14.9	13.0	15.7	13.8
Barmer	43.1	24.2	42.0	23.6	41.0	23.3	28.5	37.9	27.8	35.3	27.2	33.3	9.5	5.1	10.7	5.5
Belgaum	36.5	19.4	35.7	19.6	34.7	19.2	24.3	29.2	23.8	29.5	23.2	28.2	13.2	11.3	14.3	12.2
Bhagalpur	42.4	26.8	40.7	27.4	38.9	25.6	30.0	37.1	29.6	36.4	29.2	35.2	11.4	10.3	12.6	12.4
Bhopal	41.7	22.0	40.5	21.7	39.3	21.3	26.0	31.0	25.6	30.3	25.2	29.9	9.8	6.8	11.0	8.0
Bhubaneshwar	38.9	25.5	37.6	26.6	36.3	26.3	29.4	35.2	28.9	33.3	28.5	32.7	14.4	13.1	15.4	14.0
Bikaner	44.8	22.4	43.4	22.4	42.0	23.1	28.5	34.6	27.9	33.1	27.3	34.7	3.8	2.2	5.3	3.1
Chennai	38.4	26.2	37.3	26.7	36.3	26.4	29.1	33.8	28.6	33.2	28.1	31.9	19.5	20.2	18.7	19.3
Chitradurg	36.6	18.8	35.8	19.0	35.0	19.6	23.9	28.9	23.5	28.2	23.2	28.5	15.4	12.5	16.4	13.3
Dehradun	37.8	23.5	36.3	23.9	34.8	22.8	27.0	31.3	26.5	30.1	26.0	29.8	5.9	5.0	6.8	5.8
Dibrugarh	34.0	27.4	33.2	26.8	32.3	26.7	28.3	32.6	27.8	31.8	27.4	31.3	7.5	7.2	8.7	8.4
Gorakpur	41.1	26.2	40.3	26.0	39.1	26.4	29.9	35.2	29.7	35.5	29.4	34.7	7.9	7.5	9.0	8.4
Guwahati	34.4	26.9	33.4	27.3	32.7	26.8	28.8	32.4	28.3	31.8	27.9	31.5	10.2	9.8	11.3	10.8
Gwalior	43.9	23.0	42.5	22.9	41.3	23.5	27.9	32.9	27.6	32.4	27.3	32.7	4.9	3.8	6.4	5.3
Hissar	44.7	26.5	43.3	25.8	41.7	27.9	30.1	40.2	29.9	39.0	29.4	36.8	5.0	4.2	6.1	5.2
Hyderabad	40.4	22.5	39.2	22.5	38.2	22.4	25.6	33.7	25.2	32.4	24.8	32.0	14.4	12.4	15.5	12.9
Imphal	31.1	23.3	30.2	23.5	29.6	22.9	25.0	29.5	24.6	28.6	24.3	28.3	3.9	3.6	5.0	4.6
Indore	41.1	20.7	40.4	20.6	38.9	21.0	25.7	31.0	25.2	30.0	24.8	29.8	8.2	5.0	9.7	6.5
Jabalpur	42.6	22.7	41.2	23.2	39.8	22.5	26.8	31.8	26.4	32.0	26.0	31.2	7.8	6.7	9.3	7.6
Jagdelpur	39.4	22.3	38.6	22.5	37.4	22.4	26.4	32.4	25.9	31.8	25.4	30.7	8.9	7.9	10.1	8.7
Jaipur	42.8	22.5	41.4	22.6	39.4	22.6	27.4	33.1	27.0	32.1	26.6	31.7	6.4	4.5	8.0	5.8
Jaisalmer	43.7	23.7	42.5	23.1	41.4	23.5	27.7	34.8	27.3	34.5	26.9	34.4	5.0	2.5	6.5	3.7
Jamnagar	37.1	24.4	36.1	25.6	35.3	25.1	29.2	33.0	28.4	32.5	27.9	32.0	10.0	8.6	11.7	10.5
Jodhpur	42.0	23.2	40.8	23.0	39.6	22.7	28.0	35.4	27.4	33.7	26.9	33.8	7.5	4.3	8.7	5.4
Jorhat	34.4	28.2	33.6	27.7	32.9	27.3	28.7	32.7	28.3	32.1	28.0	31.8	9.6	9.0	10.6	10.1
Kolkata	37.2	25.4	36.2	26.1	35.2	26.5	29.5	34.3	29.0	33.4	28.6	32.7	12.0	10.9	13.1	12.9
Kota	43.5	23.0	42.4	22.6	41.2	22.6	27.3	35.2	26.8	33.0	26.5	31.8	9.9	6.7	10.8	7.6
Kurnool	41.6	23.2	40.3	24.6	38.9	24.4	29.3	34.8	28.8	34.8	28.4	33.4	2.7	2.3	4.0	3.5
Lucknow	42.0	24.2	40.8	24.8	39.3	24.5	28.8	33.3	28.4	32.4	28.0	32.2	7.5	6.8	8.4	7.7
Manglore	33.9	24.4	33.9	24.0	33.4	24.2	27.1	31.0	26.7	31.0	26.4	30.7	19.7	17.0	20.5	18.1
Mumbai	35.3	22.8	34.3	23.3	33.5	24.0	27.9	31.8	27.5	31.3	27.2	31.1	16.5	13.9	17.8	14.8
Nagpur	43.8	23.6	42.6	23.9	41.4	23.6	27.3	31.2	26.6	33.2	26.2	31.9	11.5	9.4	12.8	10.2
Nellore	40.4	27.8	39.0	28.1	37.8	27.2	30.0	37.1	29.4	35.4	28.8	34.0	19.4	18.3	20.2	19.3
New Delhi	41.8	23.6	40.6	23.8	39.4	23.5	28.4	33.3	28.0	33.3	27.6	32.7	6.0	5.2	7.1	6.3
Panjim	34.0	24.8	33.5	25.2	33.0	25.2	27.7	32.3	27.4	31.5	27.0	30.9	19.6	17.8	20.3	18.7
Patna	40.7	23.4	39.5	23.7	38.0	24.7	29.0	33.9	28.6	33.1	28.3	32.6	8.0	7.6	9.2	8.6
Pune	38.4	20.5	37.4	20.4	36.3	20.6	24.8	30.9	24.4	30.6	24.0	29.6	9.2	8.0	10.3	9.2
Raipur	43.6	23.3	42.2	23.3	40.8	23.0	27.1	31.8	26.8	32.0	26.5	31.2	11.3	9.9	12.6	10.4
Rajkot	40.8	23.1	39.9	23.8	38.9	23.4	28.1	33.9	27.6	33.3	27.1	32.3	10.9	6.5	12.2	7.7
Ramgundam	43.4	25.6	42.2	25.1	40.7	25.8	28.3	37.3	27.9	35.6	27.4	34.4	12.5	11.2	13.7	12.5
Ranchi	38.9	22.1	37.7	21.8	36.4	21.5	26.2	31.7	25.6	30.4	25.2	29.2	9.1	7.2	10.4	8.3
Ratnagiri	34.1	22.4	33.4	23.2	32.8	23.6	27.6	31.1	27.3	30.8	27.0	30.2	18.3	14.9	19.2	16.5

Annexure 16

Outdoor Conditions Source

Station	cooling DB/MCWB						cooling WB/MCDB						Heating DB/MCWB			
	0.4%		1.0%		2.0%		0.4%		1.0%		2.0%		99.6%		99.0%	
MCWB	DB	MCWB	DB	MCWB	DB	MCWB	WB	MCDB	WB	MCDB	WB	MCDB	DB	MCWB	DB	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Ratnagiri	34.1	22.4	33.4	23.2	32.8	23.6	27.6	31.1	27.3	30.8	27.0	30.2	18.3	14.9	19.2	16.5
Raxaul	38.6	23.1	36.9	24.5	35.5	24.6	28.9	33.0	28.4	32.0	28.1	31.8	7.5	7.3	8.5	8.2
Saharanpur	41.3	23.8	39.6	24.6	38.1	24.0	28.5	33.6	28.1	32.9	27.8	32.5	1.7	1.5	3.0	2.7
Shilong	24.2	19.7	23.5	19.4	22.8	18.9	20.7	23.3	20.3	22.7	19.9	22.2	-1.0	-1.1	0.1	-0.5
Sholapur	41.1	21.6	40.1	21.6	39.1	21.2	26.6	32.6	25.8	32.1	25.1	31.5	16.3	12.4	17.2	12.5
Sundernagar	36.1	19.1	34.6	19.9	33.1	19.4	25.2	30.1	24.8	29.2	24.4	28	1.8	1.3	2.8	2.2
Surat	38.4	22.7	36.9	23.9	35.7	23.4	28.3	32.4	27.9	31.7	27.6	31.4	14.8	12.6	16.2	12.5
Tezpur	34.2	27.4	33.3	26.5	32.5	27.1	28.9	32.8	28.4	31.8	28.0	31.4	10.5	10.0	12.4	10.9
Trichirapalli	39.6	24.6	38.7	25.1	37.8	24.9	27.7	34.5	27.2	33.7	26.9	33.3	19.3	18.2	20.1	18.7
Thiruvananthapuram	33.9	26.0	33.4	26.1	32.9	25.9	27.7	32.4	27.4	31.9	27.0	31.0	21.6	20.1	22.2	20.8
Veraval	35.2	23.9	33.8	23.5	32.8	26.6	29.1	32.3	28.7	31.6	28.4	31.1	14.3	10.1	15.6	12.3
Visakhapatnam	36.4	26.5	35.6	27.3	35.0	27.1	29.2	33.8	28.8	33.0	28.4	32.5	15.4	14.9	16.8	16.2

NOTE: Abbreviations used:
 DBT – Dry-bulb temperature
 WBT - Wet-bulb temperature
 MCDB – Mean coincidental dry-bulb temperature
 MCWB – Mean coincidental wet -bulb temperature

Source: Table-3 of Part 8 Building services – section 3 – Air conditioning, heating and mechanical ventilation of National Building Code – 2005

Annexure 17

Minimum Air Requirements for Ventilation of all Common Areas and Commercial Facilities

Sl. No	Application	Estimated Maximum occupancy	Outdoor air requirement		Remarks
			Persons / m ²	I / s / person (I / s) / m ²	
1	2	3	4	5	6
1	Commercial dry cleaner	30	15		
2	<i>Food and Beverage Service</i>				
	Dinning rooms	70	10		
	Cafeteria, fast food	100	10		
	Bars. Cocktail lounges	100	15		Supplementary smoke equipment may be required.
	Kitchen (cooking)	20	8		Make up air for food exhaust may require more ventilating air. The sum of the outdoor air and transfer air of acceptable quality from adjacent spaces shall be sufficient to provide an exhaust rate of not less than 27.5 m ² /h / m ² (7.51 / sm ²)
3	Hotels, Motels, Resorts, Dormitories				Independent of room size
	Bed rooms	15			
	Living rooms			15	
	Baths			18	Installed capacity for intermittent use.
	Lobbies	30	8		
	Conference rooms	50	10		
	Assemble rooms	120	8		
	Dormitory sleeping areas	20	8		See also food and beverage services, merchandising, barber and beauty shops, garages, offices.
	Office space	7	10		Some office equipment may require local exhaust

Sl. No	Application	Estimated Maximum occupancy	Outdoor air requirement		Remarks
			Persons / m ²	I/s / person (I/s) / m ²	
1	2	3	4	5	6
	Reception areas	60	8		
	Telecommunication centers and data entry areas	60	10		
	Conference rooms	50	10		
4	Public Space Corridors and utilities			0.25	
	Public restrooms / s / we or urinal		25		Normally supplied transfer air
	Lockers and dressing rooms			2.5	Local mechanical exhaust with no re-circulations recommended
	Elevators			5.0	Normally supplied by transfer air
	Retail stores, sales floor and show rooms floors				
	Basement and street	30		1.50	
	Upper floors	20		1.00	
	Storage rooms	15		0.75	
	Dressing rooms	1.00			
	Malls and arcades	20		1.00	
	Shipping and receiving	10		0.75	
	Warehouse	5		0.25	
	Smoking lounge	70	30		Normally supplied by transfer air, local mechanical exhaust, exhaust with no recirculation recommended
5	Specialty shops				
	Barber shop	25	8		
	Beauty parlour	25	13		
	Florists	8	8		Ventilation to optimize growth may dictate requirements

Sl. No	Application	Estimated Maximum occupancy	Outdoor air requirement		Remarks
			I/s/person	(I/s)/m ²	
		Persons/m ²			
1	2	3	4	5	6
	Clothiers, furniture			1.50	
	Hardware, drugs, fabric	8	8		
	Supermarkets	8	8		
	Pet shops				
6	Sports & amusement Spectator areas	150	8		When internal combustion engines are operated for maintenance of playing surface, increased ventilation rates may be required
	Game rooms	70	13		
	Ice arenas (playing areas)				Higher values may be required for humidity control
	Swimming pools (pool and deck area)			2.50	
	Playing floors (gymnasium)	30	10		
	Ballrooms & discos	100	13		
	Bowling alleys (seating area)	70	13		
7	Theatre Ticket booths	60	10		Special ventilation will be needed to eliminate special stage effects (for example. Dry ice vapors mists.etc)
	Lobbies	150	10		
	Auditorium	10	8		
	Stages, studies	70	8		
8	Transportation Waiting rooms	100	8		Ventilation within vehicles may require special consideration
	Platforms	100	8		
	Vehicles	150	8		

Sl.No	Application	Estimated Maximum occupancy	Outdoor air requirement		Remarks
			Persons / m ²	I/s / person (I/s) / m ²	
1	2	3	4	5	6
9	Workrooms Meat processing	10	8		Spaces maintained at low temperature at (-10o f to +50o F or –23 to +10 C) are not covered by these requirements unless the occupancy is continuous; ventilation from adjoining space is permissible. When the occupancy is intermittent. Infiltrations will normally exceed the ventilation requirements
	Photo studio	10	8		
	Darkrooms	10	2.50		
	Pharmacy	20	8		
	Bank vaults	5	8		
	Duplicating, Printing	2.50			Installed equipment shall incorporate positive exhaust and control (as required) of undesirable contaminants (toxic and otherwise)
	Education Classrooms	50	8		
	Laboratories	30	10		Special contaminant control systems may be required for process or functions including laboratory animal occupancy.
	Training shop	30	10		
	Music rooms	50	8		
	Libraries	20	8		
	Lock rooms	2.50			
	Corridors	2.50			
	Auditoriums	150	8		

Sl.No	Application	Estimated Maximum occupancy	Outdoor air requirement		Remarks
			Persons / m ²	I / s / person (I / s) / m ²	
1	2	3	4	5	6
11	Hospital, Nurses and convalescent homes Patient rooms	10	13		Special requirements or codes provisions and pressure relationships may determine minimum ventilation rates and filter efficiency. Greening contaminants may require higher rates.
	Medical procedure	20	8		
	Operating rooms	20	15		
	Procedure recovery and ICU	20	8		
	Autopsy			2.50	Air shall not be re-circulated into other spaces.
	Physical therapy	20	8		
	Correctional cells	10	10		
	Dinning halls	100	8		
	Guard stations	40	8		

- ▶ This table prescribes supply rates of acceptable outdoor air required for acceptable indoor air quality. These values have been chosen to dilute human bioeffluents and other contaminants with an adequate margin of safety and to account for health variations among people and varied activity levels.
- ▶ Net occupiable space

Source: Table-4 Part 8 Building Services – Section 3 – Air conditioning, heating and mechanical ventilation of National Building Code – 2005.

Annexure 18

Space Standards for Footpath

Capacity (Persons)		Required width of footpath (m)
All in one direction	In both directions	
1220	800	1.5
2400	1600	2.0
3600	2400	2.5
4800	3200	3.0
6000	4000	4.0

Source: UDPFI Guidelines volume 1 August 1996

Annexure 19.1

Space standards for Car Parking

S.No	Use / Use Premises	Equivalent car spaces (ECS) per 100 sq mt of floor area 0.50 – 1.50
1	Residential Group housing, plotted housing (plots above 250 sq.mt) and mixed use	
2.	Commercial	
	i. Wholesale trade and freight complex (including parking for loading and unloading	1.50 – 2.50
	ii. City centre, district centre, hotel, cinema and others	1.00 – 2.00
	iii. Community centre, local shopping centre, convenience shopping centre	0.50 – 1.50
3	Public and semi-public facilities	
	i. Nursing home, hospitals, (other than government), social cultural and other institutions, government and semi-government offices	0.50 – 1.50
	ii. Schools, college and university, government hospitals	0.25 – 0.75
4	Industrial Light and service industry, flatted group industry, extensive industry	0.50 – 1.00

Note:

1. For the provision of car parking spaces, the space standards shall be as under:
 - i) For open parking 18.0 sq.mt. per equivalent car space.
 - ii) For ground floor covered parking 23.0 sq.mt. per equivalent car space.
 - iii) For basement 28.0 sq.mt. per equivalent car space.
2. In the use premises, parking on the above standards may be provided on the ground floor, or in the basement (where the provision exists).
3. In case of organized centers like strict centre and community centre to meet with the above demand of parking, additional underground space (besides the basement) may be provided below the piazzas or pedestrian or open spaces but within the setback lines.
4. Plots forming part of any commercial development, basement(s) maximum equivalent to the plot area within the building envelope line, may be permitted for parking and services such as electric substation with specifications and approval, installation of electrification for fire fighting equipment with the approval and any other services with appropriate approval.

Annexure 19.2

Area requirements for parking

Sl No.	Occupancy	One Car parking Space for Every				
		Population less than 50 000	Population between 50 000 to 200 000	Population between 200 000 to 1 000 000	Population between 1 000 000 to 5 000 000	Population above 5 000 000
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)a)	Residential			a) 2 tenements having built-up area 101 to 200 m ²	1 tenement of 100 m ² built up area	1 tenement of 75 m ² built up area
b)	Lodging establishments, tourist homes and hotels, with lodging accommodation	12 guest rooms	8 guest rooms	4 guest rooms	3 guest rooms	2 guest rooms
ii)	Educational			70 m ² area or fraction thereof of the administrative office area and public service areas	50 m ² area or fraction thereof of the administrative office area and public service areas	35 m ² area or fraction thereof of the administrative office area and public service areas
(iii)	Institutional (Medical)	20 beds (Private)	15 beds (Private)	10 beds (Private)	5 beds (Private)	2 beds (Private)
		30 beds	25 beds (Public)	15 beds (Public)	10 (Public)	5 beds
(iv)	a) Assembly halls, cinema theatres	20 seats	80 seats	25 seats	15 seats	10 seats
	b) Restaurants	60 seats	40 seats	20 seats	10 seats	5 seats
	c) Marriage Halls, community halls	600 m ² plot area	400 m ² plot area	200 m ² plot area	50 m ² plot area	25 m ² plot area
	d) Stadia and exhibition center	240 seats	160 seats	50 seats	30 seats	20 seats
a)v)	Business Offices and firms for private business	300 m ² area or fraction thereof	200 m ² area or fraction thereof	100 m ² or fraction thereof	50 m ² area or fraction thereof	25 m ² area or fraction thereof
b)	Public or semi-public offices thereof	500 m ² area or thereof	300 m ² area or fraction thereof	200 m ² area or fraction thereof	100 m ² area or fraction thereof	50 m ² area or fraction thereof

Sl No.	Occupancy	One Car parking Space for Every				
vi)	Mercantile (See Note 2)	300 m ² area or fraction thereof	200 m ² area or fraction thereof	100 m ² area or fraction thereof	50 m ² area or fraction there of	25 m ² area or fraction thereof
vii)	Industrial	400 m ² area or fraction thereof	300 m ² area or fraction thereof	200 m ² area or fraction thereof	100 m ² area or fraction thereof	50 m ² area or fraction thereof
viii)	Storage			500 m ² area or fraction thereof	250 m ² area or fraction thereof	125 m ² area or fraction thereof

Source: National Building Code of India, 2005

Annexure 20

Step-By-Step Guide To Greening An Existing Roof

1. Designing

Planning and Design

- ▶ contact local planning authority if necessary
- ▶ contact experts as needed
- ▶ calculate
 - ▶ loadbearing capacity
 - ▶ angle and aspect of roof
 - ▶ area of roof
 - ▶ strength and durability of existing waterproofing
- ▶ draw roof to scale, including various extensions, ducts, chimneys etc.
- ▶ make planting plan, including consideration of sunlight, sheltered areas, areas visible from ground level
- ▶ select roof seals, drainage method, and possible subsidence preventions for roofs > 20°
- ▶ calculate soil and plant needs

Preparation

- ▶ identify possible sites for obtaining 'threatened' turf
- ▶ obtain quotes for materials, and professional and contractors fees where necessary
- ▶ order materials

2. Installing

Setting up the framework

- ▶ position clamps and connectors
- ▶ install timbers at eaves and batons to prevent soil slippage
- ▶ construct border drainage

Sealing the roof

- ▶ clean the roof
- ▶ prepare all technical fittings
- ▶ lay first layer of protection foil and seal all edges
- ▶ lay second layer of protective fleece
- ▶ weigh down with stones

Putting in a Drainage Layer

(for flat roofs 0°-5°)

- ▶ install drain plates
- ▶ cover with fleece layer
- ▶ install clay layer for 0° roof
- ▶ cover with filter layer
- ▶ check border drainage

3. Greening**Laying the soil**

- ▶ mix materials (topsoil, sand, clay aggregate etc.)
- ▶ lift soil to roof (using soil bags, hoists, cranes as necessary)
- ▶ lay even depth of soil and rake to smooth out surface

Planting

- ▶ collect turves and purchase plants
- ▶ roll out turf perpendicular to ridge
- ▶ bed in additional plants
- ▶ sow with wildflower seed mix for dry conditions, rake in
- ▶ water well
- ▶ plant self-clinging climbers at base of chimneys, ducts etc. to cover vertical surfaces

Maintenance

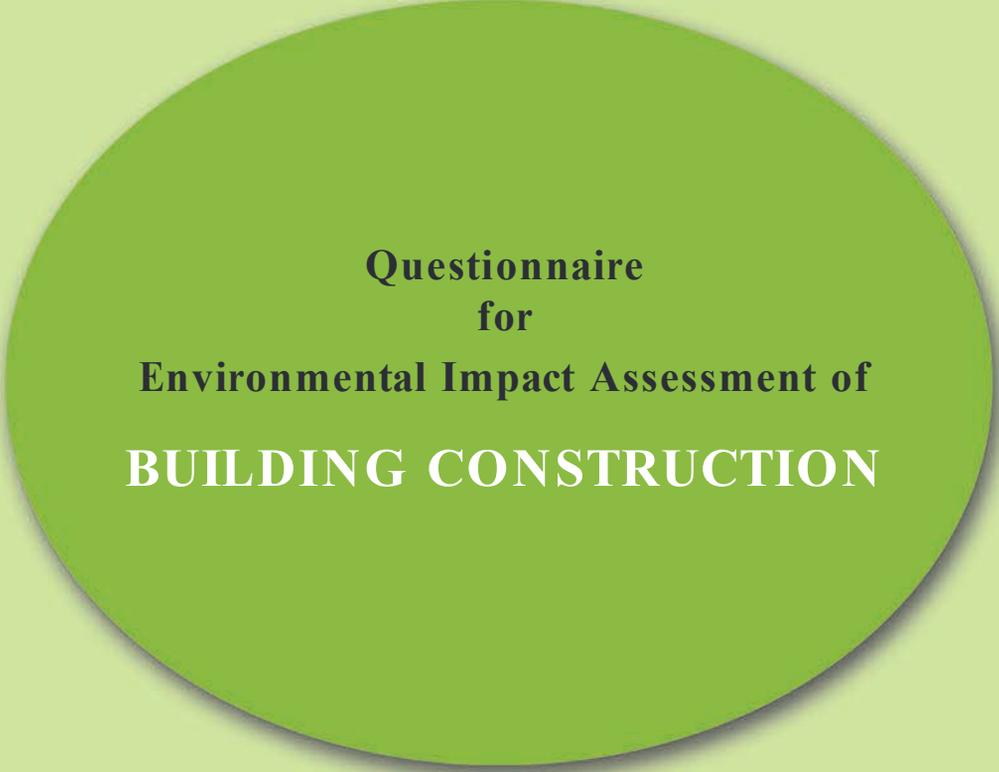
- ▶ water well for initial few weeks, then water only during periods of severe drought
- ▶ remove tree seedlings occasionally

Annexure 21

Rain water run-off for different roof top areas

Rain Fall in mm	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
Roof Top Area m ²																				
20	2	3	5	6	8	10	11	13	14	16	18	19	21	22	24	26	27	29	30	32
30	2	5	7	10	12	14	17	19	22	24	26	29	31	34	36	38	41	43	46	48
40	3	6	10	13	16	19	22	26	29	32	35	38	42	45	48	51	54	58	61	64
50	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80
60	5	10	14	19	24	29	34	38	43	48	53	58	62	67	72	77	82	86	91	96
70	6	11	17	22	28	34	39	45	50	56	62	67	73	78	84	90	95	101	106	112
80	6	13	19	26	32	38	45	51	58	64	70	77	83	90	96	102	109	115	122	128
90	7	14	22	29	36	43	50	58	65	72	79	86	94	101	108	115	125	134	144	154
100	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160
110	9	18	26	35	44	53	62	70	79	88	97	106	114	123	132	141	150	158	167	176
120	10	19	29	38	48	58	67	77	86	96	106	115	125	134	144	154	163	173	182	192
130	10	21	31	42	52	62	73	83	94	104	114	125	135	146	156	166	177	187	198	208
140	11	22	34	45	56	67	78	90	101	112	123	134	146	157	168	179	190	202	213	224
150	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240
200	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256	272	288	304	320
250	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400
300	24	48	72	96	120	144	168	192	216	240	264	288	312	336	360	384	408	432	456	480
400	32	64	96	128	160	192	224	256	288	320	352	384	416	448	480	512	544	576	608	640
500	40	80	120	160	200	240	280	320	360	400	440	480	520	560	600	640	680	720	760	800
1000	80	160	240	320	400	480	560	640	720	800	880	960	1040	1120	1200	1280	1360	1440	1520	1600
2000	160	320	480	640	800	960	1120	1280	1440	1600	1760	1920	2080	2240	2400	2560	2720	2880	3040	3200
3000	240	480	720	960	1200	1440	1680	1920	2160	2400	2640	2880	3120	3360	3600	3840	4080	4320	4560	4800

Source: Manual on norms and standards for EC of large construction projects-MoEF



**Questionnaire
for
Environmental Impact Assessment of
BUILDING CONSTRUCTION**

Questionnaire for Environmental Impact Assessment of Building and Construction Projects

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

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

I. General Information

1.1 Name of the project :

(a) Name of the authorized signatory :

(b) Mailing Address :

E-mail :

Telephone :

Fax No. :

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

1.2 Site Information

(a) Project Site :

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 :

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 unedr section 3 of the E (P) Act 1986		
4	Inter-state boundaries and international boundaries		

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

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

	problems (<i>earthquakes, subsidence, land slides, erosion, flooding or extreme or adverse climatic conditions</i>)		
--	---	--	--

*** 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. Land Use Plan:**2.1 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.

2.2 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:

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

2.4 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.

2.5 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.

2.6 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.

2.7 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.

2.8 Does the proposed project involve construction on any sandy stretch?Yes No

If yes, please furnish details

Height (above MSL in metres)

2.9 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)

2.10 Does the project involve any dredging?Yes No **2.11 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?

3. Raw Material Required During Construction :

S. No.	Item	Quantity (Tonnes)	Mode of transport	Source
1)	Bricks			
2)	Sand			
3)	Cement			
4)	Metal			
5)	Diesel			
6)	Others			

4. Water Required for Construction and Operational Phases:**4.1 Water Requirement**

Water Requirement (cu.m / day)					
S. No.	Purpose	Average demand	Peak demand	Source	Type - Treated / untreated / Recycled
1.	Construction				

2.	Air Pollution reduction (dust suppression etc,)				
3.	Domestic purposes				
4.	Others				
	Total				

4.2 Source of Raw Water Supply During Construction Phase

Source of Raw Water Supply during construction phase		
S.No	Source	Cu.m / day
1	Sea	
2	River	
3	Water body	
4	Ground water	
5	Municipal water supply	
6	Others	

4.3 Water Supply During Operational Phase

Water Supply during operational phase		
S.No	Source	Cu.m / day
1	Sea	
2	River	
3	Water body	
4	Ground water	
5	Municipal water supply	
6	Others	

4.4 Sewage, Collection, Treatment and Disposal

Sewage, Collection Treatment and Disposal		
S.No	Item	Quantity / day
1	Mode of collection of domestic effluent	
a.	Surface drains	
b.	Underground	
C	System and capacity	
2.	Mode of treatment	
a.	Septic tank and filters (capacity)	
b.	Biological treatment capacity	
c.	Others	
3.	Mode of disposal	

a.	Soakpits	
b.	Disposal to local sewer	
C.	water bodies	
d.	Others	

5. Energy Consumption:

- ▶ Hydrocarbons, Yes _____ No _____
- ▶ gas, Yes _____ No _____
- ▶ electricity and Yes _____ No _____
- ▶ any other non-conventional energy source Yes _____ No _____

6. Power Distribution in the Region

Power system		
S.No	Item	Remarks
	Source and power supply capacity	
	Distribution system at present	
	Alternate supply if any	
	In case of DG set (Fuel type)	

7. State the impacts predicted on the quality and quantity of Transport linkages:

- a. Road _____
- b. Rail _____
- c. Water _____
- d. Air _____
- e. Others _____

8. Impact of the Developmental activity on surroundings

Impact of the new development on the surrounding areas		
S.no	Item	Impact
1	Traffic management at peak hours	
2	Buffer zone planned, if so, details	
3	Provision of service roads	
4	Measures proposed to regulate unplanned slums, shops, etc.	
5	Others	

9. Landscaping / Tree Plantation

S.No	Phase	Areas / no. with reference to total project area
1	Total area of project	
2	Area planted during construction phase	
3	Area to be planted during operational phase	
4	No. of trees already planted	
5	No. of trees proposed to be planted	
6	Parks and gardens to be developed	
7	impacts from proposed landscaping	
8	special features of proposed landscape design	

10. Special features in development / construction

S.No	Phase	Areas / no. with reference to total project area
1	Greening of supply chain	
2	Flyash utilization	
3	Green rating	
4	Intelligent building	
5	Timber-free construction	
6	energy efficiency for lighting & ventilation	
7	measurable impacts on human health	
8	Impact on heat islands and inversions	

11 Environmental Management Plan

11.1. Details of Pollution Control Systems :

	Existing	Proposed
Air		
Water		
Noise		
Solid Waste		

11.2. 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)		

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

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

12. 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

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)

**Questionnaire
for
Environmental Impact Assessment of
TOWNSHIPS
AND
AREA DEVELOPMENT PROJECTS**

Questionnaire for Environmental Impact Assessment of Townships and Area Development Projects

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

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

I. General Information

1.1 Name of the project :

- (a) Name of the authorized signatory :
- (b) Mailing Address :
- E-mail :
- Telephone :
- Fax No. :
- (c) Does the proposal relate to new project / expansion / modernization :

1.2 Site Information

(a) Project Site :

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 :

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 unedr 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

Sl. No	Areas	Name/ Identity	Aerial distance (within 15 km) Proposed project location boundary
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value		
2	Areas which are important or sensitive for ecological reasons – Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests		
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, resting, migration etc		
4	Inland, coastal, marine or underground waters		
5	State, National boundaries		
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas		
7	Defense installations		
8	Densely populated for built-up area		
9	Areas occupied by sensitive man-made land uses (hospitals, schools, places of worship, community facilities)		

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

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

Description of the flora / vegetation in the project area

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

1.5 Baseline data

Meteorological data

Ambient air quality data

Water quality data

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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. Land use plan :**2.1 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.

2.2 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:

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

2.4 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.

2.5 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.

2.6 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.

2.7 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.

2.8 Does the proposed project involve construction on any sandy stretch?

Yes No

If yes, please furnish details
Height (above MSL in metres)

2.9 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)

2.10 Does the project involve any dredging?

Yes No

2.11 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?

3. Details of New Town

- ▶ Provide a Key map showing the location of the New Town
- ▶ Area of the New Town.
- ▶ Population (Dwelling units).
- ▶ Township density:
 - ◆ gross density
 - ◆ net density

- ▶ Provide a land use map of the proposed town giving the break up of area and percentages under different land use types
- ▶ Total number of houses to be constructed and percentage of the demand which these will satisfy.
- ▶ House types-Areas/Income levels.
- ▶ Attach master plan for the New Town, indicating sectors/neighborhoods with densities/population and amenities provided.

4. Details of facilities provided in the New Town

4.1 Residential

- i. Type of development
 - low rise/high rise/ medium rise/ mixed.
 - Specify the number of storeys in each case.
- ii. Population in each of the neighborhood sectors.
- iii. Density, plot size, floor area ration, site coverage
- iv. Development controls , if any

4.2 Commercial

- i. Hierarchy of commercial activities and approximate population served by each.
- ii. Types and numbers of commercial establishments
- iii. Extent of commercial activities in the formal sector/informal sector

4.3. Educational: No. Areas

- a. Nursery school
- b. Primary school
- c. Higher secondary school
- d. College
- e. Technical/Vocational Training Institutes

4.4. Health No. Areas

- a. Dispensaries
- b. Health Clinics
- c. Nursing Homes (No. of beds)
- d. Bio-medical waste management

4.5. Parks, Playgrounds: No. Areas

- a. Totlots
- b. Cluster Open spaces
- a. Neighborhood open spaces.

- b. Sector open spaces
- c. Open spaces at town level

4.6. Recreational:

- a. Area and percentage of open spaces under recreation
- b. Cinema Hall
- c. Swimming pools
- d. Water-based recreation
- e. Others

4.7. Other facilities No

- a. Post Office
- b. Bank
- c. Telephone Booth
- d. Milk Booth
- e. Police Station
- f. Any other, specify

4.8. Infrastructural Facilities :

Transport

- a. Mode of travel from residence to work place
- b. Mode of travel to surrounding areas
- c. Mode of travel within the town.

5. Phase wise development of the New Town

1. Provide a phase wise breakup of area, population and facilities planned.
2. Indicate the time lag between the phases
3. Densities at different phases of town development
4. Future development envisaged

6. Impact of the new Town on Surrounding Areas

1. Proposed land use plan for peripheral area, if any
2. Is there a buffer zone planned around the new town? Details thereof.
3. What are the activities that are likely to come up in the surrounding areas relating to the demand of the proposed new town during the construction phase (stone quarrying, manufacturing of lime, bricks, extraction of timber, etc)
4. Agencies and the measures proposed to regulate development in the periphery.

Proposed institutional set up

- a. Management of the town –

Name of the authority and functions.

b. Association of residents, if any

7. Raw material required during construction:

S. No.	Item	Quantity (Tonnes)	Mode of transport	Source
1)	Bricks			
2)	Sand			
3)	Cement			
4)	Metal			
5)	Diesel			
6)	Others			
7)				

8. Water required for construction and operational phases:

8.1 Water requirements

Water Requirement (cu.m / day)					
S. No.	Purpose	Average demand	Peak demand	Source	Type - Treated / untreated / Recycled
1.	Construction				
2.	Air Pollution reduction (dust suppression etc.)				
3.	Domestic purposes				
4.	Others				
	Total				

8.2 Sources of raw water supply during construction phase

Source of Raw Water Supply during construction phase		
S.No	Source	Cu.m / day
1	Sea	
2	River	
3	Water body	
4	Ground water	
5	Municipal water supply	
6	Others	

8.3 Sources of water supply during operational phase

Water Supply during operational phase		
S.No	Source	Cu.m / day
1	Sea	
2	River	
3	Water body	
4	Ground water	
5	Municipal water supply	
6	Others	

8.4 Sewage, collection, treatment and disposal

Sewage, Collection Treatment and disposal		
S.No	Item	Quantity / day
1	Mode of collection of domestic effluent	
a.	Surface drains	
b.	Underground	
c.	System and capacity	
2.	Mode of treatment	
a.	Septic tank and filters (capacity)	
b.	Biological treatment capacity	
c.	Others	
3.	Mode of disposal	
a.	Soakpits	
b.	Disposal to local sewer	
c.	water bodies	
d.	Others	

8.5 Water Harvesting and Recharging Scheme

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8.6 Storms water drainage

- a. Collection
- b. Disposal
- c. Treatment, if any

9. Energy Consumption :

- ▶ Hydrocarbons, Yes _____ No _____
- ▶ gas, Yes _____ No _____
- ▶ electricity and Yes _____ No _____
- ▶ any other non-conventional energy source Yes _____ No _____

10. Power distribution in the region

Power system		
S.No	Item	Remarks
	Source and power supply capacity	
	Distribution system at present	
	Alternate supply if any	
	In case of DG set (Fuel type)	

11. State the impacts predicted on the quality and quantity of Transport linkages:

- | | |
|-----------|--|
| 1. Road | |
| 2. Rail | |
| 3. Water | |
| 4. Air | |
| 5. Others | |

12. Impact of the Developmental activity on surroundings

Impact of the new development on the surrounding areas		
S.No	Item	Impact
1	Traffic management at peak hours	
2	Buffer zone planned, if so, details	
3	Provision of service roads	
4	Measures proposed to regulate unplanned slums, shops, etc.	
5	Others	

13. Is the new town population likely to utilize any of the facilities in the surrounding region? Specify the extent of use in each case:

- a. Education
- b. Health
- c. Transport
- d. Commerce
- e. Recreation
- f. Others

14. Landscaping / Tree Plantation

S.No	Phase	Areas / no. with reference to total project area
1	Total area of project	
2	Area planted during construction phase	
3	Area to be planted during operational phase	
4	No. of trees already planted	
5	No. of trees proposed to be planted	
6	Parks and gardens to be developed	
7	impacts from proposed landscaping	
8	special features of proposed landscape design	

15. Other information

- (i) Measures proposed for construction labour – their living requirement, health and hygienic conditions, sewage treatment and disposal arrangements etc.
- (ii) Measures proposed to counter encroachments in and near the new town.
- (iii) Housing of construction workers in the different construction phases and the amenities provided for them. What is the future of such Housing?
- (iv) How are the service population proposed to be accommodated in the new town? What percentage of service population has been catered to?
- (v) How are the informal sector population proposed to be accommodated in the New Town in regard to their living and working.
- (vi) Does the New Town intend to provide services and amenities (ex Education, Health, Recreation, etc) to population living in the surrounding areas? Specify the type of services and approximate number of people likely to utilize these services.
- (vii) How are the running costs of the town proposed to be met? Mention the approximate amount and percentage of total - by residents, town authorities and others
- (viii) Proposed employment prospects within the New Town to dependents of the employees other than jobs in the agency building the New Town.

(ix) Any other relevant information

Describe in detail the manner in which the promoters of new town will interact with the township management, township population and township amenities on a day-to-day and month-to-month basis.

16 Environmental Management Plan

16.1. Details of Pollution Control Systems:

	Existing	Proposed
Air		
Water		
Noise		
Solid Waste		

16.2. 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)				

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

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

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17. 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

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)

F. No. 19-2/2013-IA-III

Government of India

Ministry of Environment, Forest and Climate Change

(Impact Assessment Division)

Indira Paryavaran Bhawan
Aliganj, Jor Bagh Raod
New Delhi-110 003Dated: 09th June, 2015**OFFICE MEMORANDUM****Sub: Clarification regarding Gazette Notification No. S.O. 3252 (E) dated 22.12.2014 on applicability of Environment Clearance-reg.**

Vide Gazette Notification No. S.O. 3252 (E) dated 22.12.2014, the Ministry of Environment, Forest and Climate Change has exempted the School, College and Hostel for educational institution from obtaining prior Environment Clearance under the provisions of the EIA Notification, 2006 subject to Sustainable Environmental Management.

The Ministry is in receipt of representation from various educational institutions regarding issuing clarification on status of universities, and other educational institutions. The matter has been further examined in the Ministry and it is clarified that the Notification No. S.O. 3252 (E) dated 22.12.2014 provides exemption to buildings of educational institutions including universities from obtaining prior Environment Clearance under the provisions of the EIA Notification, 2006 subject to sustainable environmental Management. In case of medical universities/institutes the component of Hospitals will continue to require prior Environment Clearance.

The Guidelines to be followed for building projects to ensure sustainable environmental management in pursuance of Notification No. S.O.3252 (E) of 22nd December 2014 under EIA Notification 2006 are at Annexure-I.

This issues with the approval of the Competent Authority.

Manoj
9.6.15
(Manoj Kumar Singh)
Joint Secretary

Copy to:-

1. All the officers of IA Division
2. The Chairperson/Member Secretaries of all the SEIAAs/SEACs.
3. The Chairman of all the Expert Appraisal Committees
4. The Chairman, CPCB
5. The Chairpersons/Member Secretaries of all SPCBs/UTPCCs.
6. IT Consultant, MoEFCC for uploading into the website.

Copy for information:

1. PS to MOS (Independent Charge).
2. PPS to Secretary (EF&CC).
3. All Divisional Head.
4. Website, MoEF&CC
5. Guard File.

**GUIDELINES TO BE FOLLOWED FOR BUILDING AND CONSTRUCTION PROJECTS
TO ENSURE SUSTAINABLE ENVIRONMENTAL MANAGEMENT
IN PURSUANCE OF NOTIFICATION No. S.O. 3252 (E) OF 22nd DECEMBER, 2014
UNDER ENVIRONMENT IMPACT ASSESSMENT NOTIFICATION, 2006
[INDUSTRIAL SHED AND EDUCATIONAL INSTITUTIONS]**

The Notification dated 22nd December, 2014 has taken out the industrial shed*, school, college, hostel for educational institution from the requirement of prior Environment Clearance (EC) under EIA Notification, 2006 and stipulated that such buildings shall ensure sustainable environmental management, solid and liquid waste management, rain water harvesting and may use recycled materials such as fly ash bricks. These Guidelines will be applicable to all buildings and constructions which come under the ambit of Notification No. S.O. (E) 3252 of 22nd. December 2014. To ensure sustainable environment management these guidelines as suited will be applicable on the projects under Item 8 (a) of EIA Notification in addition to the conditions stipulated in the EC.

Land, Air, Noise, Water, Energy, Biological, Socio-economic, and Solid & other Waste Management are the main environment facets to be considered in relation to pre, during & post building construction, therefore, it is necessary to ascertain the baseline data of these environmental facets.

The project proponent should file the information about description of project as per points described below prior to start of the project. Information pertaining to compliance on other points be filed at six monthly interval to the respective State Pollution Control Board and the Regional Office of the Ministry of Environment, Forests and Climate Change.

The compliance of the following will be ensured by the respective State Pollution Control Board before giving 'Consent-to-Operate' to industries and by the Local Urban Bodies and the Development Authorities while giving the 'Occupancy Certificate' to the buildings and constructions. These Certificates should be submitted by the above authorities to the Regional Office of MoEFCC. Ministry of Environment, Forest and Climate Change can assess/evaluate/monitor the compliance of conditions enumerated in the Guidelines through verification by Regional Offices or deputed organisations / person.

S. No.	Environmental Parameters	Implementation and monitoring parameters to be included in local by-laws.
a.	Pre-requisites	<p>Brief description of the project</p> <p>01. Name of the Project, Survey number, Village, Taluka, District, State to be mentioned with Google Earth Image and GPS Co-ordinates of the plot to be submitted.</p> <p>02. Location & distance from nearby landmark places / services to be mentioned.</p> <p>03. Total Built-up area (FSI and Non- FSI) should be mentioned with detailed calculations certified by local planning and sanctioning authority.</p> <p>04. Form 1, Form 1A and Consolidated statement as per Environment Notification dated September 14, 2006 to be submitted to local planning and sanctioning authority, Regional Office, MoEFCC and SPCB</p>
b.	Environment Impacts on Project Land	<p>05. The building layout, set-back/side margin, podium, basement ventilation etc. is prepared based on local building bye-laws and is approved by local competent authorities. The Project Proponent shall obtain all necessary clearance/ permission from all relevant agencies including Town Planning Authority before commencing the work.</p> <p>06. Provisional fire NOC to be obtained from local CFO (Chief Fire Officer)</p> <p>07. "Consent-to-Establish and Consent-to-Operate" shall be obtained as required from State Pollution Control Board as provided in the Air (Prevention and Control of Pollution) Act, 1981 and Water (Prevention and Control of Pollution) Act, 1974</p> <p>08. The project proponent shall put in place a credible enforcement mechanism for compliance of energy conservation measures with its allottees, as projected, in perpetuity. This would be monitored by the designated Energy Conservation/ efficiency Authority in the State.</p> <p>09. Soil and ground water samples will be tested to ascertain that there is no</p>

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threat to ground water quality by leaching of heavy metals and other toxic contaminants.

10. Top fertile soil to be preserved and to be later used in landscape.
11. The excavation/demolition debris must be disposed off in designated landfill areas or to be used within site for levelling purpose. Under no circumstance, the debris will be disposed in river bed/lakes etc.
12. Undertaking to be given by project proponent that occupancy will be given only after drainage and water connections are in place.
13. Dust/smoke prevention measures such as wheel washing, water sprinkler, screening, barricading and debris chute must be installed.
14. This should comply with the provisions of eco-sensitive zone regulations, coastal zone regulations, heritage areas (identified in the master plan or issued separately as specific guidelines), water body zones (in such zones, no construction is permitted in the water-spread and buffer belt of 30 m minimum around the FTL [full tank level]), various hazard prone area regulations, and others if the site falls under any such area.
15. The site planning should take into account heat island effect, size and density of the built-up areas cause heat island effect, wherein higher air temperatures are created in the dense urban areas as against the low-rise surrounding built-up areas. The solar access in the morphology of clusters can be understood in terms of utilization of direct (and not reflected or diffused) solar radiation, mainly for day lighting and heat gain. This defines the minimal distances between the buildings and the relations between built-up volume and open spaces.
16. The proportion of open spaces and built-up edges should be designed such that it ensures winter solar access and summer ventilation.

c. Water

17. Proponent shall obtain permission for ground water withdrawal from State Ground Water Authority.
18. Storm water control and its re-use as per CGWB and BIS standards for various applications.
19. The natural flow of existing storm water channel should not be altered or diverted.
20. Keeping in view the use of large quantities of water in curing, measures for reducing water demand during construction should be followed. Curing water should be sprayed on concrete structures; free flow of water should not be allowed for curing. After liberal curing on the first day, all concrete structures should be painted with curing chemical to save water. Concrete structures should be covered with thick cloth/gunny bags and then water should be sprayed on them. This would avoid water rebound and will ensure sustained and complete curing. Ponds should be made using cement and sand mortar to avoid water flowing away from the flat surface while curing.
21. The developer should ensure groundwater and municipal water meet the water quality norms as prescribed in the Indian Standards for various applications (Indian Standards for drinking [IS 10500-1991], irrigation applications [IS 11624-1986]).
22. The use of potable water during construction should be minimized.
23. Separation of grey and black water should be done by the use of dual plumbing line for separation of grey and black water.
24. Source of water to be identified.
25. Water treatment measures such as filtration, softeners, RO etc should be implemented.
26. Low flow fixtures and sensors to be used to promote water conservation.
27. Water meters to be installed to monitor consumption of water.
28. Water balance table/chart should be prepared.

d. Waste Water Treatment

29. Sewage treatment plant of capacity capable of treating 100% waste water to be installed on site.
30. Tertiary treatment such as dual media filter, activated carbon filter and ozonization/ chlorination to be provided so that the treated water

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characteristics are as per Central Pollution Control Board (CPCB) norms.

31. If STP and pump room are installed in basement, adequate ventilation as per NBC air changes norms should be provided.

32. Treated waste water to be recycled for flushing and gardening.

e. Drainage Pattern

33. Excess treated water disposal plan to be submitted.

34. Total paved area of the site under parking, roads, paths or any other use should not exceed 25% of the site area or net imperviousness of the site not to exceed the imperviousness factor as prescribed by the NBC 2005 (BIS 2005b), whichever is more stringent.

35. The final disposal point for excess treated water discharge will be municipal sewer for areas where sewerage network is present.

36. In areas where sewerage network is absent, the excess treated water can be used for agriculture or can be disposed off as per CPCB rules.

37. Storm water disposal plan to be submitted.

38. The final disposal point for storm water will be municipal storm drain for areas where storm water network is present.

39. In areas where storm water network is absent, the storm water surface runoff can be disposed off in nearby natural water streams/ nallas.

f. Ground Water

40. Hydro-geological survey for ground water analysis shall be submitted.

41. Aquifer capacity and Ground water yield shall be determined.

42. Rain water harvesting plan shall be submitted indicating the number of recharge pits and bores and total rain water to be harvested.

43. Rain water to be harvested and as a safety precaution, rainwater on-line filters be provided as per NBC norms.

g. Solid Waste Management

A} During construction phase:

44. Disposal of muck during construction phase should not create any adverse effect on the neighbouring communities and be disposed taking the necessary precautions for general safety and health aspects of people, only in approved sites with the approval of competent authority. The Rules on the Solid Waste Management including Construction Waste issued by the MoEFCC as amended will be applicable.

45. Construction spoils, including bituminous material and other hazardous materials, must not be allowed to contaminate watercourses and the dump sites for such material must be secured so that they should not leach into the ground water.

46. Any hazardous waste generated during construction phase, should be disposed off as per applicable rules and norms with necessary approvals of the State Pollution Control Board.

47. Miscellaneous site debris such as broken tiles etc shall be used on site for leveling /backfilling purpose.

48. Packaged STP /mobile toilets shall be provided for labour camp.

49. Polymer bags used for cement and gypsum shall be handed over to authorized recyclers.

50. Cardboard boxes and other packaging material will be handed over to authorized recyclers.

B} Post construction phase:

51. Organic waste composter (OWC) or Vermiculture pits shall be installed on site for biodegradable waste treatment (capacity calculated at 0.3kg/tenement/day) The manure generated shall be used for landscaping.

52. The non-biodegradable waste or e-waste shall be handed over to authorized recyclers.

53. STP sludge shall be removed using filter press or centrifuge mechanism. The dried sludge cakes shall be used as manure in landscaping.

54. Minimize waste generation; streamline waste segregation, storage, and

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disposal; and promote resource recovery from waste.

55. Resource recovery from waste: Employ resource recovery systems for biodegradable waste as per the Solid Waste Management and Handling Rules, 2000 of the MoEFCC. Make arrangements for recycling of waste through local dealers.
56. Use of covering sheets should be done for trucks to prevent dust dispersion from the trucks and washing of tyres when trucks with soil / debris coming on road.
57. Hazardous Waste Management: Products, such as paints, cleaners, oils, batteries, and pesticides that contain potentially hazardous ingredients require special care when being disposed. Improper disposal of household hazardous wastes can include pouring them down the drain, on the ground, into storm sewers, or in some cases putting them out with the trash.

The hazardous wastes from construction and demolition activities are centering oil, formwork oil, tar and tar products (bitumen, felt, waterproofing compounds, etc.), wood dust from treated wood, lead containing products, chemical admixtures, sealants, adhesive solvents, Explosives and related products and equipment used in excavation, acrylics, and silica, etc.

h. Air Quality and Noise Levels.

A) During construction phase:

58. The diesel required for operating DG sets shall be stored in underground tanks and clearance from Chief Controller of Explosives shall be taken, as applicable.
59. Ambient noise levels should conform to residential standards both during day and night as per Noise Pollution (Control and Regulation) Rules, 2000. Incremental pollution loads on the ambient air and noise quality should be closely monitored during construction phase. Adequate measures should be made to reduce ambient air and noise level during construction phase, so as to conform to the stipulated standards by CPCB/ SPCB.
60. Burning of waste to be banned.
61. The construction site DG to be maintained regularly so that the smoke emission and noise levels are as per permissible norms.
62. Regular P.U.C check for all construction machinery coming on site be done.
63. Noise cancellation and insulation devices such as mufflers, barricades etc to be used to avoid noise propagation to adjoining areas.

B) Post construction phase:

64. DG to be regularly maintained so that the smoke emission and noise levels are as per permissible norms. It shall be at least 6 meters away from the boundary.
65. Air quality monitoring to be done quarterly.
66. STP and water pumps, air blowers etc should be installed with noise cancellation devices or suitable acoustical enclosures to be given so that the noise levels as per NBC norms are maintained.

C) During Construction & Operation

67. The provisions of the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981) and the rules made thereunder be complied for control of noise pollution during construction and operation.
68. Setting up the barriers: National Building Code 2005 suggests that design solutions such as barrier blocks should be used to reduce external LA10 noise levels to at least 60-70 dB (A) at any point 1.0 m from any inward looking façade. Green belts and landscaping could act as an effective means to control noise pollution. In case of railway tracks, a minimum distance of 50m to 70m may be provided between the buildings and the tracks.

i. Energy

69. Appropriate processes and material be used to encourage reduction in carbon foot print.
70. Use of glass be reduced by up-to 40% to reduce the electricity consumption and load on air-conditioning. If necessary, use high quality double glass with special reflective coating in windows.
71. Solar water heater to be provided adequately.

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72. Common area lighting should be Solar / LED.
73. Install energy meters to monitor overall consumption, and timer-switch for all common area lighting, and other consumption of measurable energy.
74. Fly ash should be used as building material in the construction as per the provisions of Fly Ash Notification of September, 1999 and amended as on 27th August, 2003 and 3rd November, 2009.
75. Wherever possible recycled materials having low embodied energy be used.
76. Use of light coloured, reflective roofs having an SRI (solar reflectance index) of 50% or more should be promoted. The dark coloured, traditional roofing finishes have SRI varying from 5% to 20%.
77. Optimize use of energy systems in buildings that should maintain a specified indoor environment conducive to the functional requirements of the building by following mandatory compliance measures (for all applicable buildings) as recommended in the Energy Conservation Building Code (ECBC) 2007 of the Bureau of Energy Efficiency, Government of India. The energy systems include air conditioning systems, indoor lighting systems, water heaters, air heaters, and air circulation devices.
78. Use the concept of passive solar design of buildings using architectural design approaches that minimize energy consumption in buildings by integrating conventional energy-efficient devices, such as mechanical and electrical pumps, fans, lighting fixtures, and other equipment, with the passive design elements, such as building orientation, landscaping, efficient building envelope, appropriate fenestration, increased day lighting design, and thermal mass.
79. The building should be oriented optimally based on Sun-path and engineering analysis to curtail excessive solar radiations.
80. Lighting systems should comply with the ECBC 2007 and applicable to interior spaces of buildings, exterior building features, including facades, illuminated roofs, architectural features, entrances, exits, loading docks, and illuminated canopies, exterior building grounds etc. except emergency lighting and lighting in dwelling units.
81. All the point light sources installed in the building for general lighting shall be LEDs or LEDs or equivalent. All the linear light sources installed in the building for general lighting shall be T-5 or at least 4 Star BEE rated TFLs or equivalent. The installed interior lighting power shall not exceed the LPD (Lighting Power Density) value as recommended by ECBC 2007.
82. Automatic Lighting shutoff control be installed: Interior lighting/Exterior Lighting systems shall be equipped with an automatic control device in accordance with ECBC 2007. Occupancy sensors that shall turn the lighting off within 30 minutes of occupant leaving the space. It should also have option for manual turning on lights when the space is occupied. ECBC requires controls in day lit areas that are capable of reducing the light output from luminaries by at least half and Controlling of exterior lighting with photo-controls where lighting can be turned off after a fixed interval.
83. The tapping of renewable sources of energy for lighting, heating, cooling and ventilation needs, deserve special attention. For captive solar power generation, a minimum of 15 percent of sanctioned load is the requirement.
84. Solar photovoltaic (SPV) systems are direct energy conversion systems that convert solar radiation into electric energy. SPV systems should be installed to reduced use of conventional sources of energy. Roof tops of buildings as well as other exposed areas such as of parking shades should be utilized for installation of SPV systems.
85. Hot water requirement in buildings should be met through use of various types of solar water heating systems, viz. flat plate collector; single glazed double glazed; evacuated tube collectors; and Water heating with solar concentrators.
86. The Project Proponent should ensure regular energy audit.
 - i. To validate the predicted energy consumption, thermal comfort, and visual comfort criteria by an energy auditor approved by the BEE, Government of India.

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		<p>ii. To ascertain continued safety in the operation of the electrical and mechanical systems of the building through proper maintenance by the owner or the occupants.</p> <p>87. This will be ensured in the contract document by providing for the commissioning of all electrical and mechanical systems by the respective supplier or builder. Moreover, the respective facility management group, assigned by the owner or the occupants themselves, will carry out the maintenance facilities.</p> <p>88. Energy conservation measures like installation of CFLs/LEDs for the lighting the areas outside the building should be integral part of the project design and should be in place before project commissioning. Used CFLs and TFLs should be properly collected and disposed off /sent for recycling as per the prevailing guidelines/ rules of the regulatory authority to avoid mercury contamination. Use of solar panels may be done to the extent possible.</p>
j.	Traffic Movement System	89. Width of driveways, parking provision, ramp width and slope to be kept as per local bye laws.
k.	Provisions for Differently able	<p>90. The Project Proponent should provide at least the minimum level of accessibility for persons with disabilities.</p> <ul style="list-style-type: none"> • Ensure accessibility and usability of the facilities in the building by employees, visitors and clients with disabilities. • Ensure access to facilities and services by adopting appropriate site planning to eliminate barriers as per the recommended standards (NBC 2005 [BIS 2005f]). • Layout and designing of interior and exterior facilities as per principles of universal design such as prescribed by the National Building Code of India, building management policies and procedures, provision of auxiliary aids & appliances, and staff training in disability awareness.
l.	Green Belt/Green Cover	<p>91. Provide minimum 1 tree for every 80 sq.mt of plot area.</p> <p>92. Wherever trees are cut or transplanted, compensatory plantation in the ratio of 1:3 to be done in the premise.</p> <p>93. Native species of trees to be planted.</p> <p>94. Vegetation to provide as shading and promote evaporative cooling. In hot and dry climates, evaporative cooling through appropriately sized wet surfaces or fountains have a desirable effect. It should be planned for maximum benefit.</p> <p>95. The project should have detail proposal for tree plantation, landscaping, creation of water bodies etc along with a layout plan to an appropriate scale.</p>
m.	Disaster/Risk Assessment Plan	<p>96. Fire tender movement plan to be submitted.</p> <p>97. Firefighting system to be provided as per the fire NOC.</p> <p>98. Turning radius to be kept as per Fire NoC or as prescribed in the local by-laws.</p> <p>99. Public address system to be installed as per the Fire Safety norms.</p> <p>100. Place of assembly to be indicated.</p>
n.	Socio Economic Impact and CSR	<p>101. Biodegradable and non-biodegradable waste bins to be provided for every household to promote waste segregation at source.</p> <p>102. Importance of environment and various environment drives to be initiated.</p> <p>103. Importance of maintenance of environment infrastructure to be showcased by issuing pamphlets etc.</p> <p>104. Provision for health care, medical kit, crèche, First-Aid room shall be given during construction phase for the construction workers.</p> <p>105. Adequate shelter for resting hours, crèche, clean and potable drinking water to be provided to construction workers.</p> <p>106. All local labour welfare laws must be complied.</p> <p>107. Concerns of the communities being affected by the Project are to be responded on priority, and all possible CSR is to be rendered to make the responses effectively beneficial..</p>

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o. Environment Management Plan (EMP)

108. Detailed environment management plan comprising of estimated capital cost and O&M cost for the following environment infrastructure should be submitted:

- a. Sewage Treatment Plant
- b. Landscaping
- c. Rain Water Harvesting
- d. Power backup for environment infrastructure.
- e. Environment Monitoring
- f. Solid Waste Management
- g. Solar and Energy Conservation

109. Environment Monitoring Cell with defined functions and responsibility shall be set up and its details be submitted.

END NOTE:

Industrial Shed*: The word 'industrial shed' implies building (whether RCC or otherwise) which is being used for housing plant and machinery of industrial units and shall include godowns and buildings connected with production related and other associated activities of the unit in the same premise.

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**(Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii)
MINISTRY OF ENVIRONMENT AND FORESTS
New Delhi 14th September, 2006
Notification**

S.O. 1533(E). - Whereas, a draft notification **under sub-rule (3) of Rule 5 of the Environment (Protection) Rules, 1986 for imposing** certain restrictions and prohibitions on new projects or activities, or on the expansion or modernization of existing projects or activities based on their potential environmental impacts as indicated in the Schedule to the notification, being undertaken in any part of India¹, unless prior environmental clearance has been accorded in accordance with the objectives of National Environment Policy **as approved by the Union Cabinet on 18th May, 2006** and the procedure specified in the notification, by the Central Government or the State or Union territory Level Environment Impact Assessment Authority (SEIAA), to be constituted by the Central Government in consultation with the State Government or the Union territory Administration concerned under sub-section (3) of section 3 of the Environment (Protection) Act, 1986 for the purpose of this notification, was published in the Gazette of India ,Extraordinary, Part II, section 3, sub-section (ii) vide number S.O. 1324 (E) dated the 15th September ,2005 inviting objections and suggestions from all persons likely to be affected thereby within a period of sixty days from the date on which copies of Gazette containing the said notification were made available to the public;

And whereas, copies of the said notification were made available to the public on 15th September, 2005;

And whereas, all objections and suggestions received in response to the above mentioned draft notification have been duly considered by the Central Government;

Now, therefore, in exercise of the powers conferred by sub-section (1) and clause (v) of sub-section (2) of section 3 of the Environment (Protection) Act, 1986, read with clause (d) of sub-rule (3) of rule 5 of the Environment (Protection) Rules, 1986 and in supersession of the notification number S.O. 60 (E) dated the 27th January, 1994, except in respect of things done or omitted to be done before such supersession, the Central Government hereby directs that on and from the date of its publication the required construction of new projects or activities or the expansion or modernization of existing projects or activities listed in the Schedule to this notification entailing capacity addition with change in process and or technology shall be

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

undertaken in any part of India only after the prior environmental clearance from the Central Government or as the case may be, by the State Level Environment Impact Assessment Authority, duly constituted by the Central Government under sub-section (3) of section 3 of the said Act, in accordance with the procedure specified hereinafter in this notification.

¹Includes the territorial waters

2. Requirements of prior Environmental Clearance (EC):- The following projects or activities shall require prior environmental clearance from the concerned regulatory authority, which shall hereinafter referred to be as the Central Government in the Ministry of Environment and Forests for matters falling under Category 'A' in the Schedule and at State level the State Environment Impact Assessment Authority (SEIAA) for matters falling under Category 'B' in the said Schedule, before any construction work, or preparation of land by the project management except for securing the land, is started on the project or activity:

- (i) All new projects or activities listed in the Schedule to this notification;
- (ii) Expansion and modernization of existing projects or activities listed in the Schedule to this notification with addition of capacity beyond the limits specified for the concerned sector, that is, projects or activities which cross the threshold limits given in the Schedule, after expansion or modernization;
- (iii) Any change in product - mix in an existing manufacturing unit included in Schedule beyond the specified range.

3. State Level Environment Impact Assessment Authority:- (1) A State Level Environment Impact Assessment Authority hereinafter referred to as the SEIAA shall be constituted by the Central Government under sub-section (3) of section 3 of the Environment (Protection) Act, 1986 comprising of three Members including a Chairman and a Member – Secretary to be nominated by the State Government or the Union territory Administration concerned.

- (2) The Member-Secretary shall be a serving officer of the concerned State Government or Union territory administration familiar with environmental laws.
- (3) The other two Members shall be either a professional or expert fulfilling the eligibility criteria given in Appendix VI to this notification.

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

- (4) One of the specified Members in sub-paragraph (3) above who is an expert in the Environmental Impact Assessment process shall be the Chairman of the SEIAA.
- (5) The State Government or Union territory Administration shall forward the names of the Members and the Chairman referred in sub- paragraph 3 to 4 above to the Central Government and the Central Government shall constitute the SEIAA as an authority for the purposes of this notification within thirty days of the date of receipt of the names.
- (6) The non-official Member and the Chairman shall have a fixed term of three years (from the date of the publication of the notification by the Central Government constituting the authority).
- ¹“(7) All decisions of the SEIAA shall be taken in a meeting and shall ordinarily be unanimous:
Provided that, in case a decision is taken by majority, the details of views, for and against it, shall be clearly recorded in the minutes and copy thereof sent to MoEF.”

4. Categorization of projects and activities:-

- (i) All projects and activities are broadly categorized in to two categories - Category A and Category B, based on the spatial extent of potential impacts and potential impacts on human health and natural and man made resources.
- (ii) All projects or activities included as Category ‘A’ in the Schedule, including expansion and modernization of existing projects or activities and change in product mix, 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;
- (iii) All projects or activities included as Category ‘B’ in the Schedule, including expansion and modernization of existing projects or activities as specified in sub paragraph (ii) of paragraph 2, or change in product mix as specified in sub paragraph (iii) of paragraph 2, but excluding those which fulfill the General Conditions (GC) stipulated in the Schedule, *will* require prior environmental clearance from the State/Union territory Environment Impact Assessment Authority (SEIAA). The SEIAA shall base its decision on the recommendations of a State or Union territory level Expert Appraisal Committee (SEAC) as to be constituted for in this notification. ^{II} “In the absence of a duly constituted SEIAA

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

or SEAC, a Category 'B' project shall be considered at Central Level as a Category 'B' project;"

5. Screening, Scoping and Appraisal Committees:-

The same Expert Appraisal Committees (EACs) at the Central Government and SEACs (hereinafter referred to as the (EAC) and (SEAC) at the State or the Union territory level shall screen, scope and appraise projects or activities in Category 'A' and Category 'B' respectively. EAC and SEAC's shall meet at least once every month.

- (a) The composition of the EAC shall be as given in Appendix VI. The SEAC at the State or the Union territory level shall be constituted by the Central Government in consultation with the concerned State Government or the Union territory Administration with identical composition;
- (b) The Central Government may, with the prior concurrence of the concerned State Governments or the Union territory Administrations, constitute one SEAC for more than one State or Union territory for reasons of administrative convenience and cost;
- (c) The EAC and SEAC shall be reconstituted after every three years;
- (d) The authorised members of the EAC and SEAC, concerned, may inspect any site(s) connected with the project or activity in respect of which the prior environmental clearance is sought, for the purposes of screening or scoping or appraisal, with prior notice of at least seven days to the applicant, who shall provide necessary facilities for the inspection;
- (e) The EAC and SEACs shall function on the principle of collective responsibility. The Chairperson shall endeavour to reach a consensus in each case, and if consensus cannot be reached, the view of the majority shall prevail.

6. Application for Prior Environmental Clearance (EC):-

An application seeking prior environmental clearance in all cases shall be made in the prescribed Form 1 annexed herewith and Supplementary Form 1A, if applicable, as given in Appendix II, after the identification of prospective site(s) for the project and/or activities to which the application relates, before commencing any construction activity, or preparation of land, at the site by the applicant. The applicant shall furnish, along with the application, a copy

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

of the pre-feasibility project report except that, in case of construction projects or activities (item 8 of the Schedule) in addition to Form 1 and the Supplementary Form 1A, a copy of the conceptual plan shall be provided, instead of the pre-feasibility report.

7. Stages in the Prior Environmental Clearance (EC) Process for New Projects:-

7(i) The environmental clearance process for new projects will comprise of a maximum of four stages, all of which may not apply to particular cases as set forth below in this notification. These four stages in sequential order are:-

- Stage (1) Screening (Only for Category 'B' projects and activities)
- Stage (2) Scoping
- Stage (3) Public Consultation
- Stage (4) Appraisal

I. Stage (1) - Screening:

In case of Category 'B' projects or activities, this stage will entail the scrutiny of an application seeking prior environmental clearance made in Form 1 by the concerned State level Expert Appraisal Committee (SEAC) for determining whether or not the project or activity requires further environmental studies for preparation of an Environmental Impact Assessment (EIA) for its appraisal prior to the grant of environmental clearance depending up on the nature and location specificity of the project . The projects requiring an Environmental Impact Assessment report shall be termed Category 'B1' and remaining projects shall be termed Category 'B2' and will not require an Environment Impact Assessment report. For categorization of projects into B1 or B2 except item 8 (b), the Ministry of Environment and Forests shall issue appropriate guidelines from time to time.

II. Stage (2) - Scoping:

(i) "Scoping": refers to the process by which the Expert Appraisal Committee in the case of Category 'A' projects or activities, and State level Expert Appraisal Committee in the case of Category 'B1' projects or activities, including applications for expansion and/or modernization and/or change in product mix of existing projects or activities, determine detailed and comprehensive Terms Of Reference (TOR) addressing all relevant environmental concerns for the preparation of an Environment Impact Assessment (EIA) Report in respect of the project or activity for which prior environmental clearance is sought. The Expert Appraisal Committee or State level Expert Appraisal Committee

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

concerned shall determine the Terms of Reference on the basis of the information furnished in the prescribed application Form1/Form 1A including Terns of Reference proposed by the applicant, a site visit by a sub- group of Expert Appraisal Committee or State level Expert Appraisal Committee concerned only if considered necessary by the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned, Terms of Reference suggested by the applicant if furnished and other information that may be available with the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned. All projects and activities listed as Category 'B' in Item 8 of the Schedule (Construction/Township/Commercial Complexes /Housing) shall not require Scoping and will be appraised on the basis of Form 1/ Form 1A and the conceptual plan.

- (ii) The Terms of Reference (TOR) shall be conveyed to the applicant by the Expert Appraisal Committee or State Level Expert Appraisal Committee as concerned within sixty days of the receipt of Form 1. In the case of Category A Hydroelectric projects Item 1(c) (i) of the Schedule the Terms of Reference shall be conveyed along with the clearance for pre-construction activities .If the Terms of Reference are not finalized and conveyed to the applicant within sixty days of the receipt of Form 1, the Terms of Reference suggested by the applicant shall be deemed as the final Terms of Reference approved for the EIA studies. The approved Terms of Reference shall be displayed on the website of the Ministry of Environment and Forests and the concerned State Level Environment Impact Assessment Authority.
- (iii) Applications for prior environmental clearance may be rejected by the regulatory authority concerned on the recommendation of the EAC or SEAC concerned at this stage itself. In case of such rejection, the decision together with reasons for the same shall be communicated to the applicant in writing within sixty days of the receipt of the application.

III. Stage (3) - Public Consultation:

- (i) "Public Consultation" refers to the process by which the concerns of local affected persons and others who have plausible stake in the environmental impacts of the project or activity are ascertained with a view to taking into account all the material concerns in the project or activity design as appropriate. All Category 'A' and Category B1 projects or activities shall undertake Public Consultation, except the following:-

- (a) modernization of irrigation projects (item 1(c) (ii) of the Schedule).

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

- (b) all projects or activities located within industrial estates or parks (item 7(c) of the Schedule) approved by the concerned authorities, and which are not disallowed in such approvals.
- (c) expansion of Roads and Highways (item 7 (f) of the Schedule) which do not involve any further acquisition of land.
- III “(cc) maintenance dredging provided the dredged material shall be disposed within port limits.”;
- III “(d) All Building or Construction projects or Area Development projects (which do not contain any category ‘A’ projects and activities) and Townships (item 8(a) and 8(b) in the Schedule to the notification).”
- e) all Category ‘B2’ projects and activities.
- f) all projects or activities concerning national defence and security or involving other strategic considerations as determined by the Central Government.
- (ii) The Public Consultation shall ordinarily have two components comprising of:-
 - (a) a public hearing at the site or in its close proximity- district wise, to be carried out in the manner prescribed in Appendix IV, for ascertaining concerns of local affected persons;
 - (b) obtain responses in writing from other concerned persons having a plausible stake in the environmental aspects of the project or activity.
- (iii) the public hearing at, or in close proximity to, the site(s) in all cases shall be conducted by the State Pollution Control Board (SPCB) or the Union territory Pollution Control Committee (UTPCC) concerned in the specified manner and forward the proceedings to the regulatory authority concerned within 45(forty five) of a request to the effect from the applicant.
- (iv) in case the State Pollution Control Board or the Union territory Pollution Control Committee concerned does not undertake and complete the public hearing within the specified period, and/or does not convey the proceedings of the public hearing within the prescribed period directly to the regulatory authority concerned as above, the regulatory

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

authority shall engage another public agency or authority which is not subordinate to the regulatory authority, to complete the process within a further period of forty five days,.

- (v) If the public agency or authority nominated under the sub paragraph (iii) above reports to the regulatory authority concerned that owing to the local situation, it is not possible to conduct the public hearing in a manner which will enable the views of the concerned local persons to be freely expressed, it shall report the facts in detail to the concerned regulatory authority, which may, after due consideration of the report and other reliable information that it may have, decide that the public consultation in the case need not include the public hearing.
- (vi) For obtaining responses in writing from other concerned persons having a plausible stake in the environmental aspects of the project or activity, the concerned regulatory authority and the State Pollution Control Board (SPCB) or the Union territory Pollution Control Committee (UTPCC) shall invite responses from such concerned persons by placing on their website the Summary EIA report prepared in the format given in Appendix IIIA by the applicant along with a copy of the application in the prescribed form, within seven days of the receipt of a written request for arranging the public hearing. Confidential information including non-disclosable or legally privileged information involving Intellectual Property Right, source specified in the application shall not be placed on the web site. The regulatory authority concerned may also use other appropriate media for ensuring wide publicity about the project or activity. The regulatory authority shall, however, make available on a written request from any concerned person the Draft EIA report for inspection at a notified place during normal office hours till the date of the public hearing. All the responses received as part of this public consultation process shall be forwarded to the applicant through the quickest available means.
- (vii) 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.

IV. Stage (4) - Appraisal:

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

- (i) Appraisal means the detailed scrutiny by the Expert Appraisal Committee or State Level Expert Appraisal Committee of the application and other documents 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 environmental clearance. This appraisal shall be made by Expert Appraisal Committee or State Level Expert Appraisal Committee concerned in a transparent manner in a proceeding to which the applicant shall be invited for furnishing necessary clarifications in person or through an authorized representative. On conclusion of this proceeding, the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned shall make categorical recommendations to the regulatory authority concerned either for grant of prior environmental clearance on stipulated terms and conditions, or rejection of the application for prior environmental clearance, together with reasons for the same.
- (ii) The appraisal of all projects or activities which are not required to undergo public consultation, or submit an Environment Impact Assessment report, shall be carried out on the basis of the prescribed application Form 1 and Form 1A as applicable, any other relevant validated information available and the site visit wherever the same is considered as necessary by the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned.
- (iii) The appraisal of an application shall be completed by the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned within sixty days of the receipt of the final Environment Impact Assessment report and other documents or the receipt of Form 1 and Form 1 A, where public consultation is not necessary and the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee shall be placed before the competent authority for a final decision within the next fifteen days. The prescribed procedure for appraisal is given in Appendix V ;

7(ii). Prior Environmental Clearance (EC) process for Expansion or Modernization or Change of product mix in existing projects:

All applications seeking prior environmental clearance for expansion with increase in the production capacity beyond the capacity for which prior environmental clearance has been granted under this notification or with increase in either lease area or production capacity in the case of mining projects or for the modernization of an existing unit with increase in

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

the total production capacity beyond the threshold limit prescribed in the Schedule to this notification through change in process and or technology or involving a change in the product –mix shall be made in Form I and they shall be considered by the concerned Expert Appraisal Committee or State Level Expert Appraisal Committee within sixty days, who will decide on the due diligence necessary including preparation of EIA and public consultations and the application shall be appraised accordingly for grant of environmental clearance.

8. Grant or Rejection of Prior Environmental Clearance (EC):

- (i) The regulatory authority shall consider the recommendations of the EAC or SEAC concerned and convey its decision to the applicant within forty five days of the receipt of the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned or in other words within one hundred and five days of the receipt of the final Environment Impact Assessment Report, and where Environment Impact Assessment is not required, within one hundred and five days of the receipt of the complete application with requisite documents, except as provided below.
- (ii) The regulatory authority shall normally accept the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned. In cases where it disagrees with the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned, the regulatory authority shall request reconsideration by the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned within forty five days of the receipt of the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned while stating the reasons for the disagreement. An intimation of this decision shall be simultaneously conveyed to the applicant. The Expert Appraisal Committee or State Level Expert Appraisal Committee concerned, in turn, shall consider the observations of the regulatory authority and furnish its views on the same within a further period of sixty days. The decision of the regulatory authority after considering the views of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned shall be final and conveyed to the applicant by the regulatory authority concerned within the next thirty days.
- (iii) In the event that the decision of the regulatory authority is not communicated to the applicant within the period specified in sub-paragraphs (i) or (ii) above, as applicable, the

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applicant may proceed as if the environment clearance sought for has been granted or denied by the regulatory authority in terms of the final recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned.

- (iv) On expiry of the period specified for decision by the regulatory authority under paragraph (i) and (ii) above, as applicable, the decision of the regulatory authority, and the final recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned shall be public documents.
- (v) Clearances from other regulatory bodies or authorities shall not be required prior to receipt of applications for prior environmental clearance of projects or activities, or screening, or scoping, or appraisal, or decision by the regulatory authority concerned, unless any of these is sequentially dependent on such clearance either due to a requirement of law, or for necessary technical reasons.
- (vi) Deliberate concealment and/or submission of false or misleading information or data which is material to screening or scoping or appraisal or decision on the application shall make the application liable for rejection, and cancellation of prior environmental clearance granted on that basis. Rejection of an application or cancellation of a prior environmental clearance already granted, on such ground, shall be decided by the regulatory authority, after giving a personal hearing to the applicant, and following the principles of natural justice.

9. Validity of Environmental Clearance (EC):

The "Validity of Environmental Clearance" is meant the period from which a prior environmental clearance is granted by the regulatory authority, or may be presumed by the applicant to have been granted under sub paragraph (iv) of paragraph 7 above, to the start of production operations by the project or activity, or completion of all construction operations in case of construction projects (item 8 of the Schedule), to which the application for prior environmental clearance refers. The prior environmental clearance granted for a project or activity shall be valid for a period of ten years in the case of River Valley projects (item 1(c) of the Schedule), project life as estimated by Expert Appraisal Committee or State Level Expert Appraisal Committee subject to a maximum of thirty years for mining projects and five years in the case of all other projects and activities. However, in the case of Area Development projects and Townships [item 8(b)], the validity

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

period shall be limited only to such activities as may be the responsibility of the applicant as a developer. This period of validity may be extended by the regulatory authority concerned by a maximum period of five years provided an application is made to the regulatory authority by the applicant within the validity period, together with an updated Form 1, and Supplementary Form 1A, for Construction projects or activities (item 8 of the Schedule). In this regard the regulatory authority may also consult the Expert Appraisal Committee or State Level Expert Appraisal Committee as the case may be.

10. Post Environmental Clearance Monitoring:

- ^{IV} (i)(a) In respect of Category 'A' project, it shall be mandatory for the project proponent to make public the environment 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.
- (b) In respect of Category 'B' projects, irrespective of its clearance by MoEF / SEIAA, the project proponent shall prominently advertise in the newspapers indicating that the project has been accorded environment clearance and the details of the MoEF website where it is displayed.
- (c) The Ministry of Environment and Forests and the State/Union Territory Level Environmental Impact Assessment Authorities (SEIAAs), as the case may be, shall also place the environmental clearance in the public domain on Governmental portal.
- (d) The copies of the environmental clearance shall be submitted by the project proponents to the Heads of local bodies, Panchayats and Municipal Bodies in addition to the relevant offices of the Government who in turn has to display the same for 30 days from the date of receipt.”;
- ^{IV} (ii) It shall be mandatory for the project management to submit half-yearly compliance reports 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.
- ^{IV} (iii) All such compliance reports submitted by the project management shall be public documents. Copies of the same shall be given to any person on application to the

concerned regulatory authority. The latest such compliance report shall also be displayed on the web site of the concerned regulatory authority.

11. Transferability of Environmental Clearance (EC):

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 by 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. No reference to the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned is necessary in such cases.

12. Operation of EIA Notification, 1994, till disposal of pending cases:

From the date of final publication of this notification the Environment Impact Assessment (EIA) notification number S.O.60 (E) dated 27th January, 1994 is hereby superseded, except in suppression of the things done or omitted to be done before such suppression to the extent that in case of all or some types of applications made for prior environmental clearance and pending on the date of final publication of this notification, the Central Government may relax any one or all provisions of this notification except the list of the projects or activities requiring prior environmental clearance in Schedule I , or continue operation of some or all provisions of the said notification, for a period not exceeding one year from the date of issue of this notification.

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

SCHEDULE

(See paragraph 2 and 7)

LIST OF PROJECTS OR ACTIVITIES REQUIRING PRIOR ENVIRONMENTAL CLEARANCE

Project or Activity		Category with threshold limit		Conditions if any
		A	B	
1		Mining, extraction of natural resources and power generation (for a specified production capacity)		
(1)	(2)	(3)	(4)	(5)
^v 1(a)	(i) Mining of minerals. (ii) Slurry pipelines (coal lignite and other ores) passing through national parks / sanctuaries / coral reefs, ecologically sensitive areas.	≥ 50 ha. of mining lease area in respect of non-coal mine lease. > 150 ha of mining lease area in respect of coal mine lease. Asbestos mining irrespective of mining area All projects.	<50 ha ≥ 5 ha .of mining lease area in respect of non-coal mine lease. ≤ 150 ha ≥ 5 ha of mining lease area in respect of coal mine lease.	General Condition shall apply Note: Mineral prospecting is exempted.”;
1(b)	Offshore and onshore oil and gas exploration, development & production	All projects		Note Exploration Surveys (not involving drilling) are exempted provided the concession areas have got previous clearance for physical survey
1(c)	River Valley projects	(i) ≥ 50 MW hydroelectric power generation; (ii) ≥ 10,000 ha. of culturable command area	(i) < 50 MW ≥ 25 MW hydroelectric power generation; (ii) < 10,000 ha. of culturable command area	^v “General Condition shall apply. Note: Irrigation projects not involving submergence or inter-state domain shall be appraised by the SEIAA as Category ‘B’ Projects.”;

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(1)	(2)	(3)	(4)	(5)
1(d)	Thermal Power Plants	^v " ≥ 500 MW (coal / lignite / naphtha & gas based); ≥ 50 MW (Pet coke diesel and all other fuels including refinery residual oil waste except biomass); ≥ 20 MW (based on biomass or non hazardous municipal waste as fuel).";	< 500 MW (coal / lignite / naphtha & gas based); <50 MW ≥ 5MW (Pet coke, diesel and all other fuels including refinery residual oil waste except biomass); ≥ 20 MW > 15 MW (based on biomass or non hazardous municipal waste as fuel).";	^v "General Condition shall apply. Note: (i) Power plant up to 15 MW, based on biomass and using auxiliary fuel such as coal / lignite / petroleum products up to 15% are exempt. (ii) Power plant up to 15 MW, based on non-hazardous municipal waste and using auxiliary fuel such as coal / lignite / petroleum products up to 15% are exempt. (iii) Power plants using waste heat boiler without any auxiliary fuel are exempt.";
1(e)	Nuclear power projects and processing of nuclear fuel	All projects		
2		Primary Processing		
2(a)	Coal washeries	≥ 1 million ton/annum throughput of coal	<1million ton/annum throughput of coal	General Condition shall apply (If located within mining area the proposal shall be appraised together with the mining proposal)
2 (b)	Mineral beneficiation	≥ 0.1million ton/annum mineral throughput	< 0.1million ton/annum mineral throughput	General Condition shall apply (Mining proposal with Mineral beneficiation shall be appraised together for grant of clearance)

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

3				
(1)	(2)	(3)	(4)	(5)
3(a)	Metallurgical industries (ferrous & non ferrous)	a) Primary metallurgical industry All projects b) Sponge iron manufacturing ≥ 200 TPD c) Secondary metallurgical processing industry All toxic and heavy metal producing units $\geq 20,000$ tonnes /annum	Sponge iron manufacturing <200TPD Secondary metallurgical processing industry i.) All toxic and heavy metal producing units <20,000 tonnes /annum ii.) All other non –toxic secondary metallurgical processing industries >5000 tonnes/annum	^v “General condition shall apply. Note: (i) The recycling industrial units registered under the HSM Rules, are exempted. (ii) In case of secondary metallurgical processing industrial units, those projects involving operation of furnaces only such as induction and electrical arc furnace, submerged arc furnace, and cupola with capacity more than 30,000 tonnes per annum (TPA) would require environmental clearance. (iii) Plant / units other than power plants (given against entry no. 1(d) of the schedule), based on municipal solid waste (non-hazardous) are exempted.”
3(b)	Cement plants	≥ 1.0 million tonnes/annum production capacity	<1.0 million tonnes/annum production capacity. All Stand alone grinding units	General Condition shall apply
4				
(1)	(2)	(3)	(4)	(5)
4(a)	Petroleum refining industry	All projects	-	-
4(b)	Coke oven plants	$\geq 2,50,000$ tonnes/annum	<2,50,000 & $\geq 25,000$ tonnes/annum	^v “General Condition shall apply.”
4(c)	Asbestos milling and asbestos based products	All projects	-	-

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(1)	(2)	(3)	(4)	(5)
4(d)	Chlor-alkali industry	≥300 TPD production Capacity or a unit located out side the notified industrial area/ estate	^v “(i) All projects irrespective of the size, if located in a Notified Industrial Area/ Estate. (ii) <300 tonnes per day (TPD) and located outside a Notified Industrial Area/ Estate.”	^v “General as well as specific condition shall apply. No new Mercury Cell based plants will be permitted and existing units converting to membrane cell technology are exempted from this notification.”
4(e)	Soda ash Industry	All projects	-	-
4(f)	Leather/skin/hide processing industry	New projects outside the industrial area or expansion of existing units out side the industrial area	All new or expansion of projects located within a notified industrial area/ estate	^v “General as well as specific condition shall apply.”
5		Manufacturing / Fabrication		
5(a)	Chemical fertilizers	^v “All projects except Single Super Phosphate.”	^v “Single Super Phosphate.”	-
5(b)	Pesticides industry and pesticide specific intermediates (excluding formulations)	All units producing technical grade pesticides	-	-
5(c)	Petro-chemical complexes (industries based on processing of petroleum fractions & natural gas and/or reforming to aromatics)	All projects -	-	-
5(d)	Manmade fibers manufacturing	Rayon	Others	General Condition shall apply
5(e)	Petrochemical based processing (processes other than cracking & reformation and not covered under the complexes)	Located out side the notified industrial area/ estate -	Located in a notified industrial area/ estate	^v “General as well as specific condition shall apply.”

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(1)	(2)	(3)	(4)	(5)
5(f)	Synthetic organic chemicals industry (dyes & dye intermediates; bulk drugs and intermediates excluding drug formulations; synthetic rubbers; basic organic chemicals, other synthetic organic chemicals and chemical intermediates)	Located out side the notified industrial area/ estate	Located in a notified industrial area/ estate	^v "General as well as specific condition shall apply."
5(g)	Distilleries	(i) All Molasses based distilleries (ii) All Cane juice/ non-molasses based distilleries ≥ 30 KLD	All Cane juice / non-molasses based distilleries - <30 KLD	General Condition shall apply
5(h)	Integrated paint industry	-	All projects	General Condition shall apply
5(i)	Pulp & paper industry excluding manufacturing of paper from waste paper and manufacture of paper from ready pulp with out bleaching	Pulp manufacturing and Pulp & Paper manufacturing industry	Paper manufacturing industry without pulp manufacturing	General Condition shall apply
5(j)	Sugar Industry	-	≥ 5000 tcd cane crushing capacity	General Condition shall apply
5(k)	^v Omitted			
6	Service Sectors			
6(a)	Oil & gas transportation pipe line (crude and refinery/ petrochemical products), passing through national parks / sanctuaries / coral reefs / ecologically sensitive areas including LNG Terminal	All projects		-

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(1)	(2)	(3)	(4)	(5)
6(b)	Isolated storage & handling of hazardous chemicals (As per threshold planning quantity indicated in column 3 of schedule 2 & 3 of MSIHC Rules 1989 amended 2000)	-	All projects	General Condition shall apply
7		Physical Infrastructure including Environmental Services		
7(a)	Air ports	^v "All projects including airstrips, which are for commercial use."	-	^v "Note: Air strips, which do not involve bunkering/ refueling facility and or Air Traffic Control, are exempted."
7(b)	All ship breaking yards including ship breaking units	All projects	-	-
7©	Industrial estates/ parks/ complexes/ areas, export processing Zones (EPZs), Special Economic Zones (SEZs), Biotech Parks, Leather Complexes.	If at least one industry in the proposed industrial estate falls under the Category A, entire industrial area shall be treated as Category A, irrespective of the area. Industrial estates with area greater than 500 ha. and housing at least one Category B industry.	Industrial estates housing at least one Category B industry and area <500 ha. Industrial estates of area > 500 ha. and not housing any industry belonging to Category A or B.	^v "Genral as well as special conditions shall apply. Note: 1. Industrial Estate of area below 500 ha. and not housing any industry of Category 'A' or 'B' does not require clearance. 2. If the area is less than 500 ha. but contains building and construction projects > 20,000 Sq. mts. And or development area more than 50 ha it will be treated as activity listed at serial no. 8(a) or 8(b) in the Schedule, as the case may be."
7(d)	Common hazardous waste treatment, storage and disposal facilities (TSDFs)	All integrated facilities having incineration & landfill or incineration alone	All facilities having land fill only	General Condition shall apply

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(1)	(2)	(3)	(4)	(5)
7(e)	^v "Ports, harbours, break waters, dredging."	≥ 5 million TPA of cargo handling capacity (excluding fishing harbours)	< 5 million TPA of cargo handling capacity and/or ports/ harbours ≥10,000 TPA of fish handling capacity	^v "General Condition shall apply. Note: 1. Capital dredging inside and outside the ports or harbors and channels are included; 2. Maintenance dredging is exempt provided it formed part of the original proposal for which Environment Management Plan (EMP) was prepared and environmental clearance obtained."
7(f)	Highways	i) New National High ways; and ii) Expansion of National High ways greater than 30 KM, involving additional right of way greater than 20m involving land acquisition and passing through more than one State.	^v " i) All State Highway Project; and ii) State Highway expansion projects in hilly terrain (above 1,000 m AMSL) and or ecologically sensitive areas."	General Condition shall apply. Note: Highways include expressways."
7(g)	Aerial ropeways	^{v(xvi)(a)} "(i) All projects located at altitude of 1,000 mtr. And above. (ii) All projects located in notified ecologically sensitive areas."	^{v(xvi)(b)} "All projects except those covered in column (3)."	General Condition shall apply
7(h)	Common Effluent Treatment Plants (CETPs)		All projects	General Condition shall apply
7(i)	Common Municipal Solid Waste Management Facility (CMSWMF)		All projects	General Condition shall apply
8		Building /Construction projects/Area Development projects and Townships		
8(a)	Building and Construction projects		≥20000 sq.mtrs and <1,50,000 sq.mtrs. of built-up area#	#(built up area for covered construction; in the case of facilities open to the sky, it will be the activity area)
8(b)	Townships and Area Development projects.		Covering an area ≥ 50 ha and or built up area ≥1,50,000 sq .mtrs ++	++All projects under Item 8(b) shall be appraised as Category B1

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

Note:-**V^(xvii) “General Condition (GC):**

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 Wild Life (Protection) Act, 1972, (ii) Critically Polluted areas as identified by the Central Pollution Control Board from time to time, (iii) Eco-sensitive areas as notified under section 3 of the Environment (Protection) Act, 1986, such as, Mahabaleshwar Panchgani, Matheran, Pachmarhi, Dahanu, Doon Valley, and (iv) inter-State boundaries and international boundaries:

Provided that the requirement regarding distance of 10 km 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 case the activity does not fall within 10 kilometres of the areas mentioned at item (i), (ii) and (iii) above.”

Specific Condition (SC):

If any Industrial Estate/Complex / Export processing Zones /Special Economic Zones/Biotech Parks / Leather Complex with homogeneous type of industries such as Items 4(d), 4(f), 5(e), 5(f), or those Industrial estates with pre –defined set of activities (not necessarily homogeneous, obtains prior environmental clearance, individual industries including proposed industrial housing within such estates /complexes will not be required to take prior environmental clearance, so long as the Terms and Conditions for the industrial estate/complex are complied with (Such estates/complexes must have a clearly identified management with the legal responsibility of ensuring adherence to the Terms and Conditions of prior environmental clearance, who may be held responsible for violation of the same throughout the life of the complex/estate).

[No. J-11013/56/2004-IA-II (I)]
(R.CHANDRAMOHAN)

JOINT SECRETARY TO THE GOVERNMENT OF INDIA

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

APPENDIX I
(See paragraph – 6)
FORM 1

VI(a) “(I) Basic Information

Serial Number	Item	Details
1.	Name of the project/s	
2.	S. No. in schedule	
3.	Proposed capacity/area/length/tonnage to be handled/command area/lease area/number of wells to be drilled	
4.	New/Expansion/Modernization	
5.	Existing Capacity/Area etc.	
6.	Category of Project i.e. 'A' or 'B'	
7.	Does it attract the general condition? If Yes, please specify.	
8.	Does it attract the specific condition? If Yes, please specify.	
9.	Location	
	Plot/Survey/Khasra No.	
	Village	
	Tehsil	
	District	
	State	
10.	Nearest railway station/airport along with distance in kms.	
11.	Nearest Town, city, District Headquarters along with distance in kms.	
12.	Village Panchayats, Zilla Parishad, Municipal Corporation, Local body (complete postal addresses with telephone nos. to be given)	
13.	Name of the applicant	
14.	Registered Address	
15.	Address for correspondence:	
	Name	
	Designation (Owner/Partner/CEO)	
	Address	
	Pin Code	
	E-mail	
	Telephone No.	
Fax No.		
16	Details of Alternative Sites examined, if any. Location of these sites should be shown on a topo sheet.	Village-District-State 1. 2. 3.
17.	Interlinked Projects	
18	Whether separate application of interlinked project has been submitted?	

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

19.	If yes, date of submission	
20.	If no, reason	
21.	Whether the proposal involves approval/clearance under: If yes, details of the same and their status to be given. (a) The Forest (Conservation) Act, 1980 ? (b) The Wildlife (Protection) Act, 1972 ? (c) The C.R.Z. Notification, 1991 ?	
22.	Whether there is any Government Order/Policy relevant/ relating to the site ?	
23.	Forest land involved (hectares)	
24.	Whether there is any litigation pending against the project and/or land in which the project is propose to be set up ? (a) Name of the Court. (b) Case No. (c) Orders/directions of the Court, if any and its relevance with the proposed project.	

(II) Activity

1. **Construction, operation or decommissioning of the Project involving actions, which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.)**

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
1.1	Permanent or temporary change in land use, land cover or topography including increase in intensity of land use (with respect to local land use plan)		
1.2	Clearance of existing land, vegetation and buildings?		
1.3	Creation of new land uses?		
1.4	Pre-construction investigations e.g. bore houses, soil testing?		
1.5	Construction works?		
1.6	Demolition works?		
1.7	Temporary sites used for construction works or housing of construction workers?		
1.8	Above ground buildings, structures or earthworks including linear structures, cut And fill or excavations		

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

1.9	Underground works including mining or tunneling?		
1.10	Reclamation works?		
1.11	Dredging?		
1.12	Offshore structures?		
1.13	Production and manufacturing processes?		
1.14	Facilities for storage of goods or materials?		
1.15	Facilities for treatment or disposal of solid waste or liquid effluents?		
1.16	Facilities for long term housing of operational workers?		
1.17	New road, rail or sea traffic during construction or operation?		
1.18	New road, rail, air waterborne or other transport infrastructure including new or altered routes and stations, ports, airports etc?		
1.19	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?		
1.20	New or diverted transmission lines or pipelines?		
1.21	Impoundment, damming, culverting, realignment or other changes to the hydrology of watercourses or aquifers?		
1.22	Stream crossings?		
1.23	Abstraction or transfers of water from ground or surface waters?		
1.24	Changes in water bodies or the land surface affecting drainage or run-off?		
1.25	Transport of personnel or materials for construction, operation or decommissioning?		
1.26	Long-term dismantling or decommissioning or restoration works?		
1.27	Ongoing activity during decommissioning which could have an impact on the environment?		
1.28	Influx of people to an area in either temporarily or permanently?		
1.29	Introduction of alien species?		

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

1.30	Loss of native species or genetic diversity?		
1.31	Any other actions?		

2. Use of Natural resources for construction or operation of the Project (such as land, water, materials or energy, especially any resources which are non-renewable or in short supply):

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
2.1	Land especially undeveloped or agricultural land (ha)		
2.2	Water (expected source & competing users) unit: KLD		
2.3	Minerals (MT)		
2.4	Construction material – stone, aggregates, sand / soil (expected source – MT)		
2.5	Forests and timber (source – MT)		
2.6	Energy including electricity and fuels (source, competing users) Unit: fuel (MT), energy (MW)		
2.7	Any other natural resources (use appropriate standard units)		

3. Use, storage, transport, handling or production of substances or materials, which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health.

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
3.1	Use of substances or materials, which are hazardous (as per MSIHC rules) to human health or the environment (flora, fauna, and water supplies)		
3.2	Changes in occurrence of disease or affect disease vectors (e.g. insect or water borne diseases)		
3.3	Affect the welfare of people e.g. by changing living conditions?		
3.4	Vulnerable groups of people who could be affected by the project e.g. hospital patients, children, the elderly etc.,		
3.5	Any other causes		

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

4. Production of solid wastes during construction or operation or decommissioning (MT/month)

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
4.1	Spoil, overburden or mine wastes		
4.2	Municipal waste (domestic and or commercial wastes)		
4.3	Hazardous wastes (as per Hazardous Waste Management Rules)		
4.4	Other industrial process wastes		
4.5	Surplus product		
4.6	Sewage sludge or other sludge from effluent treatment.		
4.7	Construction or demolition wastes		
4.8	Redundant machinery or equipment		
4.9	Contaminated soils or other materials		
4.10	Agricultural wastes		
4.11	Other solid wastes		

5. Release of pollutants or any hazardous, toxic or noxious substances to air (Kg/hr)

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
5.1	Emissions from combustion of fossil fuels from stationary or mobile sources.		
5.2	Emissions from production processes		
5.3	Emissions from materials handling including storage or transport		
5.4	Emissions from construction activities including plant and equipment		
5.5	Dust or odours from handling of materials including construction materials, sewage and waste		

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

5.6	Emissions from incineration of waste		
5.7	Emissions from burning of waste in open air (e.g. slash materials, construction debris)		
5.8	Emissions from any other sources		

6. Generation of Noise and Vibration, and Emissions of Light and Heat:

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
6.1	From operation of equipment e.g. engines, ventilation plant, crushers		
6.2	From industrial or similar processes		
6.3	From construction or demolition		
6.4	From blasting or piling		
6.5	From construction or operational traffic		
6.6	From lighting or cooling systems		
6.7	From any other sources		

7. Risks of contamination of land or water from releases of pollutants into the ground or into sewers, surface waters, groundwater, coastal waters or the sea:

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
7.1	From handling, storage, use or spillage of hazardous materials		
7.2	From discharge of sewage or other effluents to water or the land (expected mode and place of discharge)		
7.3	By deposition of pollutants emitted to air into the land or into water		
7.4	From any other sources		
7.5	Is there a risk of long term build up of pollutants in the environment from these sources?		

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

8. Risk of accidents during construction or operation of the Project, which could affect human health or the environment

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
8.1	From explosions, spillages, fires etc from storage, handling, use or production of hazardous substances		
8.2	From any other causes		
8.3	Could the project be affected by natural disasters causing environmental damage (e.g. floods, earthquakes, landslides, cloudburst etc)?		

9. Factors which should be considered (such as consequential development) which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
9.1	Lead to development of supporting, utilities, ancillary development or development stimulated by the project which could have impact on the environment e.g.: <ul style="list-style-type: none"> • Supporting infrastructure (roads, power supply, waste or waste water treatment, etc.) • housing development • extractive industries • supply industries • other 		
9.2	Lead to after-use of the site, which could have an impact on the environment		
9.3	Set a precedent for later developments		
9.4	Have cumulative effects due to proximity to other existing or planned projects with similar effects		

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(III) Environmental Sensitivity

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

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(IV). Proposed Terms of Reference for EIA studies

^{VI(b)} "I hereby given undertaking that the data and information given in the application and enclosures are true to the best of my knowledge and belief and I am aware that if any part of the data and information submitted is found to be false or misleading at any stage, the project will be rejected and clearance give, if any to the project will be revoked at our risk and cost."

Date: _____

Place: _____

Signature of the applicant
With Name and Full Address
(Project Proponent/Authorised Signatory)

NOTE:

1. The projects involving clearance under Coastal Regulation Zone Notification, 1991 shall submit with the application a C.R.Z. map duly demarcated by one of the authorized agencies, showing the project activities, w.r.t. C.R.Z. (at the stage of TOR) and the recommendations of the State Coastal Zone Management Authority (at the stage of EC). Simultaneous action shall also be taken to obtain the requisite clearance under the provisions of the C.R.Z. Notification, 1991 for the activities to be located in the CRZ.
2. The projects to be located within 10 km of the National Prks, Sancturies, Biosphere Reserves, Migratory Corridors of Wile Animals, the project proponenet 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)."
3. All correspondence with the Ministry of Environment & Forests including aubmission 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 proponenet shall be made by the authorized signatory only. The authorized signatory should also submit a document in support of his claim of being and authorized signatory for the specific project."

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

APPENDIX II
(See paragraph 6)

FORM-1 A (only for construction projects listed under item 8 of the Schedule)

CHECK LIST OF ENVIRONMENTAL IMPACTS

(Project proponents are required to provide full information and wherever necessary attach explanatory notes with the Form and submit along with proposed environmental management plan & monitoring programme)

1. LAND ENVIRONMENT

(Attach panoramic view of the project site and the vicinity)

- 1.1. Will the existing landuse get significantly altered from the project that is not consistent with the surroundings? (Proposed landuse must conform to the approved Master Plan / Development Plan of the area. Change of landuse if any and the statutory approval from the competent authority be submitted). Attach Maps of (i) site location, (ii) surrounding features of the proposed site (within 500 meters) and (iii) the site (indicating levels & contours) to appropriate scales. If not available attach only conceptual plans.
- 1.2. List out all the major project requirements in terms of the land area, built up area, water consumption, power requirement, connectivity, community facilities, parking needs etc.
- 1.3. What are the likely impacts of the proposed activity on the existing facilities adjacent to the proposed site? (Such as open spaces, community facilities, details of the existing landuse, disturbance to the local ecology).
- 1.4. Will there be any significant land disturbance resulting in erosion, subsidence & instability? (Details of soil type, slope analysis, vulnerability to subsidence, seismicity etc may be given).
- 1.5. Will the proposal involve alteration of natural drainage systems? (Give details on a contour map showing the natural drainage near the proposed project site)
- 1.6. What are the quantities of earthwork involved in the construction activity-cutting, filling, reclamation etc. (Give details of the quantities of earthwork involved, transport of fill materials from outside the site etc.)

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

- 1.7. Give details regarding water supply, waste handling etc during the construction period.
- 1.8. Will the low lying areas & wetlands get altered? (Provide details of how low lying and wetlands are getting modified from the proposed activity)
- 1.9. Whether construction debris & waste during construction cause health hazard? (Give quantities of various types of wastes generated during construction including the construction labour and the means of disposal)

2. WATER ENVIRONMENT

- 2.1. Give the total quantity of water requirement for the proposed project with the breakup of requirements for various uses. How will the water requirement met? State the sources & quantities and furnish a water balance statement.
- 2.2. What is the capacity (dependable flow or yield) of the proposed source of water?
- 2.3. What is the quality of water required, in case, the supply is not from a municipal source? (Provide physical, chemical, biological characteristics with class of water quality)
- 2.4. How much of the water requirement can be met from the recycling of treated wastewater? (Give the details of quantities, sources and usage)
- 2.5. Will there be diversion of water from other users? (Please assess the impacts of the project on other existing uses and quantities of consumption)
- 2.6. What is the incremental pollution load from wastewater generated from the proposed activity? (Give details of the quantities and composition of wastewater generated from the proposed activity)
- 2.7. Give details of the water requirements met from water harvesting? Furnish details of the facilities created.
- 2.8. What would be the impact of the land use changes occurring due to the proposed project on the runoff characteristics (quantitative as well as qualitative) of the area in the post construction phase on a long term basis? Would it aggravate the problems of flooding or water logging in any way?

- 2.9. What are the impacts of the proposal on the ground water? (Will there be tapping of ground water; give the details of ground water table, recharging capacity, and approvals obtained from competent authority, if any)
- 2.10. What precautions/measures are taken to prevent the run-off from construction activities polluting land & aquifers? (Give details of quantities and the measures taken to avoid the adverse impacts)
- 2.11. How is the storm water from within the site managed?(State the provisions made to avoid flooding of the area, details of the drainage facilities provided along with a site layout indication contour levels)
- 2.12. Will the deployment of construction labourers particularly in the peak period lead to unsanitary conditions around the project site (Justify with proper explanation)
- 2.13. What on-site facilities are provided for the collection, treatment & safe disposal of sewage? (Give details of the quantities of wastewater generation, treatment capacities with technology & facilities for recycling and disposal)
- 2.14. Give details of dual plumbing system if treated waste used is used for flushing of toilets or any other use.

3. VEGETATION

- 3.1. Is there any threat of the project to the biodiversity? (Give a description of the local ecosystem with it's unique features, if any)
- 3.2. Will the construction involve extensive clearing or modification of vegetation? (Provide a detailed account of the trees & vegetation affected by the project)
- 3.3. What are the measures proposed to be taken to minimize the likely impacts on important site features (Give details of proposal for tree plantation, landscaping, creation of water bodies etc along with a layout plan to an appropriate scale)

4. FAUNA

- 4.1. Is there likely to be any displacement of fauna- both terrestrial and aquatic or creation of barriers for their movement? Provide the details.

- 4.2. Any direct or indirect impacts on the avifauna of the area? Provide details.
- 4.3. Prescribe measures such as corridors, fish ladders etc to mitigate adverse impacts on fauna

5. AIR ENVIRONMENT

- 5.1. Will the project increase atmospheric concentration of gases & result in heat islands? (Give details of background air quality levels with predicted values based on dispersion models taking into account the increased traffic generation as a result of the proposed constructions)
- 5.2. What are the impacts on generation of dust, smoke, odorous fumes or other hazardous gases? Give details in relation to all the meteorological parameters.
- 5.3. Will the proposal create shortage of parking space for vehicles? Furnish details of the present level of transport infrastructure and measures proposed for improvement including the traffic management at the entry & exit to the project site.
- 5.4. Provide details of the movement patterns with internal roads, bicycle tracks, pedestrian pathways, footpaths etc., with areas under each category.
- 5.5. Will there be significant increase in traffic noise & vibrations? Give details of the sources and the measures proposed for mitigation of the above.
- 5.6. What will be the impact of DG sets & other equipment on noise levels & vibration in & ambient air quality around the project site? Provide details.

6. AESTHETICS

- 6.1. Will the proposed constructions in any way result in the obstruction of a view, scenic amenity or landscapes? Are these considerations taken into account by the proponents?
- 6.2. Will there be any adverse impacts from new constructions on the existing structures? What are the considerations taken into account?
- 6.3. Whether there are any local considerations of urban form & urban design influencing the design criteria? They may be explicitly spelt out.
- 6.4. Are there any anthropological or archaeological sites or artefacts nearby? State if any other significant features in the vicinity of the proposed site have been considered.

7. SOCIO-ECONOMIC ASPECTS

- 7.1. Will the proposal result in any changes to the demographic structure of local population? Provide the details.

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

- 7.2. Give details of the existing social infrastructure around the proposed project.
- 7.3. Will the project cause adverse effects on local communities, disturbance to sacred sites or other cultural values? What are the safeguards proposed?

8. BUILDING MATERIALS

- 8.1. May involve the use of building materials with high-embodied energy. Are the construction materials produced with energy efficient processes? (Give details of energy conservation measures in the selection of building materials and their energy efficiency)
- 8.2. Transport and handling of materials during construction may result in pollution, noise & public nuisance. What measures are taken to minimize the impacts?
- 8.3. Are recycled materials used in roads and structures? State the extent of savings achieved?
- 8.4. Give details of the methods of collection, segregation & disposal of the garbage generated during the operation phases of the project.

9. ENERGY CONSERVATION

- 9.1. Give details of the power requirements, source of supply, backup source etc. What is the energy consumption assumed per square foot of built-up area? How have you tried to minimize energy consumption?
- 9.2. What type of, and capacity of, power back-up to you plan to provide?
- 9.3. What are the characteristics of the glass you plan to use? Provide specifications of its characteristics related to both short wave and long wave radiation?
- 9.4. What passive solar architectural features are being used in the building? Illustrate the applications made in the proposed project.
- 9.5. Does the layout of streets & buildings maximise the potential for solar energy devices? Have you considered the use of street lighting, emergency lighting and solar hot water systems for use in the building complex? Substantiate with details.
- 9.6. Is shading effectively used to reduce cooling/heating loads? What principles have been used to maximize the shading of Walls on the East and the West and the Roof? How much energy saving has been effected?
- 9.7. Do the structures use energy-efficient space conditioning, lighting and mechanical systems? Provide technical details. Provide details of the transformers and motor efficiencies, lighting intensity and air-conditioning load assumptions? Are you using CFC and HCFC free chillers? Provide specifications.
- 9.8. What are the likely effects of the building activity in altering the micro-climates? Provide a self assessment on the likely impacts of the proposed construction on

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

creation of heat island & inversion effects?

- 9.9. What are the thermal characteristics of the building envelope? (a) roof; (b) external walls; and (c) fenestration? Give details of the material used and the U-values or the R values of the individual components.
- 9.10. What precautions & safety measures are proposed against fire hazards? Furnish details of emergency plans.
- 9.11. If you are using glass as wall material provides details and specifications including emissivity and thermal characteristics.
- 9.12. What is the rate of air infiltration into the building? Provide details of how you are mitigating the effects of infiltration.
- 9.13. To what extent the non-conventional energy technologies are utilised in the overall energy consumption? Provide details of the renewable energy technologies used.

10. Environment Management Plan

The Environment Management Plan would consist of all mitigation measures for each item wise activity to be undertaken during the construction, operation and the entire life cycle to minimize adverse environmental impacts as a result of the activities of the project. It would also delineate the environmental monitoring plan for compliance of various environmental regulations. It will state the steps to be taken in case of emergency such as accidents at the site including fire.

APPENDIX III

(See paragraph 7

GENERIC STRUCTURE OF ENVIRONMENTAL IMPACT ASSESMENT DOCUMENT

S.NO	EIA STRUCTURE	CONTENTS
1.	Introduction	<ul style="list-style-type: none"> • Purpose of the report • Identification of project & project proponent • Brief description of nature, size, location of the project and its importance to the country, region • Scope of the study – details of regulatory scoping carried out (As per Terms of Reference)
2.	Project Description	<ul style="list-style-type: none"> • Condensed description of those aspects of the project (based on project feasibility study), likely to cause environmental effects. Details should be provided to give clear picture of the following: <ul style="list-style-type: none"> • Type of project • Need for the project • Location (maps showing general location, specific location, project boundary & project site layout) • Size or magnitude of operation (incl. Associated activities required by or for the project) • Proposed schedule for approval and implementation • Technology and process description • Project description. Including drawings showing project layout, components of project etc. Schematic representations of the feasibility drawings which give information important for EIA purpose • Description of mitigation measures incorporated into the project to meet environmental standards, environmental operating conditions, or other EIA requirements (as required by the scope) • Assessment of New & untested technology for the risk of technological failure

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

3.	Description of the Environment	<ul style="list-style-type: none"> • Study area, period, components & methodology • Establishment of baseline for valued environmental components, as identified in the scope • Base maps of all environmental components
4.	Anticipated Environmental Impacts & Mitigation Measures	<ul style="list-style-type: none"> • Details of Investigated Environmental impacts due to project location, possible accidents, project design, project construction, regular operations, final decommissioning or rehabilitation of a completed project • Measures for minimizing and / or offsetting adverse impacts identified • Irreversible and Irretrievable commitments of environmental components • Assessment of significance of impacts (Criteria for determining significance, Assigning significance) • Mitigation measures
5.	Analysis of Alternatives (Technology & Site)	<ul style="list-style-type: none"> • In case, the scoping exercise results in need for alternatives: • Description of each alternative • Summary of adverse impacts of each alternative • Mitigation measures proposed for each alternative and • Selection of alternative
6.	Environmental Monitoring Program	<ul style="list-style-type: none"> • Technical aspects of monitoring the effectiveness of mitigation measures (incl. Measurement methodologies, frequency, location, data analysis, reporting schedules, emergency procedures, detailed budget & procurement schedules)
7.	Additional Studies	<ul style="list-style-type: none"> • Public Consultation • Risk assessment • Social Impact Assessment. R&R Action Plans
8.	Project Benefits	<ul style="list-style-type: none"> • Improvements in the physical infrastructure • Improvements in the social infrastructure

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

		<ul style="list-style-type: none"> • Employment potential –skilled; semi-skilled and unskilled • Other tangible benefits
9.	Environmental Cost Benefit Analysis	If recommended at the Scoping stage
10.	EMP	<ul style="list-style-type: none"> • Description of the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored, after approval of the EIA
11	Summary & Conclusion (This will constitute the summary of the EIA Report)	<ul style="list-style-type: none"> • Overall justification for implementation of the project • Explanation of how, adverse effects have been mitigated
12.	Disclosure of Consultants engaged	<ul style="list-style-type: none"> • The names of the Consultants engaged with their brief resume and nature of Consultancy rendered

APPENDIX III A

(See paragraph 7)

CONTENTS OF SUMMARY ENVIRONMENTAL IMPACT ASSESSMENT

The 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: -

1. Project Description
2. Description of the Environment
3. Anticipated Environmental impacts and mitigation measures
4. Environmental Monitoring Programme
5. Additional Studies
6. Project Benefits
7. Environment Management Plan

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

APPENDIX IV

(See paragraph 7)

PROCEDURE FOR CONDUCT OF PUBLIC HEARING

1.0 The Public Hearing shall be arranged in a systematic, time bound and transparent manner ensuring widest possible public participation at the project site(s) or in its close proximity District -wise, by the concerned State Pollution Control Board (SPCB) or the Union Territory Pollution Control Committee (UTPCC).

2.0 The Process:

2.1 The Applicant shall make a request through a simple letter to the Member Secretary of the SPCB or Union Territory Pollution Control Committee, in whose jurisdiction the project is located, to arrange the public hearing within the prescribed statutory period. In case the project site is covering more than one District or State or Union Territory, the public hearing is mandated in each District, State or Union Territory in which the project is located and the applicant shall make separate requests to each concerned SPCB or UTPCC for holding the public hearing as per this procedure.

2.2 The Applicant shall enclose with the letter of request, at least 10 hard copies and an equivalent number of soft (electronic) copies of the draft EIA Report with the generic structure given in Appendix III including the Summary Environment Impact Assessment report in English and in the official language of the state/local language, prepared strictly in accordance with the Terms of Reference communicated after Scoping (Stage-2). Simultaneously the applicant shall arrange to forward copies, one hard and one soft, of the above draft EIA Report along with the Summary EIA report to the following authorities or offices, within whose jurisdiction the project will be located:

- (a) District Magistrate/District collector/Deputy commissioner/s
- (b) Zila Parishad or Municipal Corporation or Panchayats Union
- (c) District Industries Office
- (d) Urban Local Bodies (ULBs) / PRIs Concerned / Development authorities.
- (d) Concerned Regional Office of the Ministry of Environment and Forests

2.3 On receiving the draft Environmental Impact Assessment report, the abovementioned authorities except the Regional Office of MoEF, shall arrange to widely publicize it within their respective jurisdictions requesting the interested persons to send their comments to the concerned regulatory authorities. They shall also make available the draft EIA Report for inspection electronically or otherwise to the public during normal office hours till the Public Hearing is over.

2.4 The SPCB or UTPCC concerned shall also make similar arrangements for giving publicity about the project within the State/Union Territory and make available the Summary of the draft Environmental Impact Assessment report (Appendix III A) for

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

inspection in select offices or public libraries or any other suitable location etc. They shall also additionally make available a copy of the draft Environmental Impact Assessment report to the above five authorities/offices as given in para 2.2.

3.0 Notice of Public Hearing:

3.1 The Member-Secretary of the concerned SPCB or UTPCC shall finalize the date, time and exact venue for the conduct of public hearing within 7(seven) days of the date of receipt of the draft Environmental Impact Assessment report from the project proponent, and advertise the same in one major National Daily and one Regional vernacular Daily / Official State Language. A minimum notice period of 30(thirty) days shall be provided to the public for furnishing their responses;

3.2 The advertisement shall also inform the public about the places or offices where the public could access the draft Environmental Impact Assessment report and the Summary Environmental Impact Assessment report before the public hearing. In places where the newspapers do not reach, the Competent Authority should arrange to inform the local public about the public hearing by other means such as by way of beating of drums as well as advertisement / announcement on radio / television.

3.3 No postponement of the date, time, venue of the public hearing shall be undertaken, unless some untoward emergency situation occurs and then only on the recommendation of the concerned District Magistrate/District collector/Deputy Commissioner, the postponement shall be notified to the public through the same National and Regional vernacular dailies and also prominently displayed at all the identified offices by the concerned SPCB or Union Territory Pollution Control Committee;

3.4 In the above exceptional circumstances, fresh date, time and venue for the public consultation shall be decided by the Member – Secretary of the concerned SPCB or UTPCC only in consultation with the District Magistrate/District collector/Deputy Commissioner and notified afresh as per procedure under 3.1 above.

4.0 Supervision and Presiding over the Hearing:

4.1 The District Magistrate/District collector/Deputy Commissioner or his or her representative not below the rank of an Additional District Magistrate assisted by a representative of SPCB or UTPCC, shall Supervise and preside over the entire public hearing process.

5.0 Videography

5.1 The SPCB or UTPCC shall arrange to video film the entire proceedings. A copy of the videotape or a CD shall be enclosed with the public hearing proceedings while Forwarding it to the Regulatory Authority concerned.

6.0 Proceedings

6.1 The attendance of all those who are present at the venue shall be noted and annexed with the final proceedings.

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

- 6.2 There shall be no quorum required for attendance for starting the proceedings.
- 6.3 A representative of the applicant shall initiate the proceedings with a presentation on the project and the Summary EIA report.
- 6.4 Persons present at the venue shall be granted the opportunity to seek information or clarifications on the project from the Applicant. The summary of the public hearing proceedings accurately reflecting all the views and concerns expressed shall be recorded by the representative of the SPCB or UTPCC and read over to the audience at the end of the proceedings explaining the contents in the local/vernacular language and the agreed minutes shall be signed by the District Magistrate/District collector/Deputy Commissioner or his or her representative on the same day and forwarded to the SPCB/UTPCC concerned.
- 6.5 A Statement of the issues raised by the public and the comments of the Applicant shall also be prepared in the local language or the Official State language, as the case may be, and in English and annexed to the proceedings:
- 6.6 The proceedings of the public hearing shall be conspicuously displayed at the office of the Panchyats within whose jurisdiction the project is located, office of the concerned Zila Parishad, District Magistrate/District collector/Deputy Commissioner, and the SPCB or UTPCC . The SPCB or UTPCC shall also display the proceedings on its website for general information. Comments, if any, on the proceedings which may be sent directly to the concerned regulatory authorities and the applicant concerned.

7.0 Time period for completion of public hearing

- 7.1 The public hearing shall be completed within a period of 45 (forty five) days from date of receipt of the request letter from the Applicant. Thereafter the SPCB or UTPCC concerned shall sent the public hearing proceedings to the concerned regulatory authority within 8(eight) days of the completion of the public hearing. Simultaneously, a copy will also be provided to the project proponent. The applicant may also directly forward a copy of the approved public hearing proceedings to the regulatory authority concerned along with the final Environmental Impact Assessment report or supplementary report to the draft EIA report prepared after the public hearing and public consultations incorporating the concerns expressed in the public hearing along with action plan and financial allocation, item-wise, to address those concerns.”.
- 7.2 If the SPCB or UTPCC fails to hold the public hearing within the stipulated 45(forty five) days, the Central Government in Ministry of Environment and Forests for Category ‘A’ project or activity and the State Government or Union Territory Administration for Category ‘B’ project or activity at the request of the SEIAA, shall engage any other agency or authority to complete the process, as per procedure laid down in this notification.

APPENDIX –V

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(See paragraph 7)

PROCEDURE PRESCRIBED FOR APPRAISAL

1. The applicant shall apply to the concerned regulatory authority through a simple communication enclosing the following documents where public consultations are mandatory:
 - Final Environment Impact Assessment Report [20(twenty) hard copies and 1 (one) soft copy]
 - A copy of the video tape or CD of the public hearing proceedings
 - A copy of final layout plan (20 copies)
 - A copy of the project feasibility report (1 copy)
2. The Final EIA Report and the other relevant documents submitted by the applicant shall be scrutinized in office within 30 days from the date of its receipt by the concerned Regulatory Authority strictly with reference to the TOR and the inadequacies noted shall be communicated electronically or otherwise in a single set to the Members of the EAC /SEAC enclosing a copy each of the Final EIA Report including the public hearing proceedings and other public responses received along with a copy of Form -1or Form 1A and scheduled date of the EAC /SEAC meeting for considering the proposal.
3. Where a public consultation is not mandatory, the appraisal shall be made on the basis of the prescribed application Form 1 and EIA report, in the case of all projects and activities other than Item 8 of the Schedule. In the case of Item 8 of the Schedule, considering its unique project cycle, the EAC or SEAC concerned shall appraise all Category B projects or activities on the basis of Form 1, Form 1A and the conceptual plan and make recommendations on the project regarding grant of environmental clearance or otherwise and also stipulate the conditions for environmental clearance.”
4. Every application shall be placed before the EAC/SEAC and its appraisal completed within 60 days of its receipt with requisite documents / details in the prescribed manner.
5. The applicant shall be informed at least 15 (fifteen) days prior to the scheduled date of the EAC /SEAC meeting for considering the project proposal.
6. The minutes of the EAC /SEAC meeting shall be finalised within 5 working days of the meeting and displayed on the website of the concerned regulatory authority. In case the project or activity is recommended for grant of EC, then the minutes shall clearly list out the specific environmental safeguards and conditions. In case the recommendations are for rejection, the reasons for the same shall also be explicitly stated.

Note: The principal rules were published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (ii) vide notification number S.O. 1533 (E), dated 14th September, 2006 and amended vide S.O. 1737 (E), dated the 11th October, 2007.

APPENDIX VI

(See paragraph 5)

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

COMPOSITION OF THE SECTOR/ PROJECT SPECIFIC EXPERT APPRAISAL COMMITTEE (EAC) FOR CATEGORY A PROJECTS AND THE STATE/UT LEVEL EXPERT APPRAISAL COMMITTEES (SEACs) FOR CATEGORY B PROJECTS TO BE CONSTITUTED BY THE CENTRAL GOVERNMENT`

1. The Expert Appraisal Committees (EAC(s) and the State/UT Level Expert Appraisal Committees (SEACs) shall consist of only professionals and experts fulfilling the following eligibility criteria:

Professional: The person should have at least (i) 5 years of formal University training in the concerned discipline leading to a MA/MSc Degree, or (ii) in case of Engineering /Technology/Architecture disciplines, 4 years formal training in a professional training course together with prescribed practical training in the field leading to a B.Tech/B.E./B.Arch. Degree, or (iii) Other professional degree (e.g. Law) involving a total of 5 years of formal University training and prescribed practical training, or (iv) Prescribed apprenticeship/article ship and pass examinations conducted by the concerned professional association (e.g. Chartered Accountancy),or (v) a University degree , followed by 2 years of formal training in a University or Service Academy (e.g. MBA/IAS/IFS). In selecting the individual professionals, experience gained by them in their respective fields will be taken note of.

Expert: A professional fulfilling the above eligibility criteria with at least 15 years of relevant experience in the field, or with an advanced degree (e.g. Ph.D.) in a concerned field and at least 10 years of relevant experience.

Age: Below 70 years. However, in the event of the non-availability of /paucity of experts in a given field, the maximum age of a member of the Expert Appraisal Committee may be allowed up to 75 years

2. The Members of the EAC shall be Experts with the requisite expertise and experience in the following fields /disciplines. In the event that persons fulfilling the criteria of "Experts" are not available, Professionals in the same field with sufficient experience may be considered:

- **Environment Quality Experts:** Experts in measurement/monitoring, analysis and interpretation of data in relation to environmental quality
- **Sectoral Experts in Project Management:** Experts in Project Management or Management of Process/Operations/Facilities in the relevant sectors.
- **Environmental Impact Assessment Process Experts:** Experts in conducting and carrying out Environmental Impact Assessments (EIAs) and preparation of Environmental Management Plans (EMPs) and other Management plans and who have wide expertise and knowledge of predictive techniques and tools used in the EIA process
- **Risk Assessment Experts**
- **Life Science Experts in floral and faunal management**
- **Forestry and Wildlife Experts**

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

- **Environmental Economics Expert with experience in project appraisal**

3. The Membership of the EAC shall not exceed 15 (fifteen) regular Members. However the Chairperson may co-opt an expert as a Member in a relevant field for a particular meeting of the Committee.
4. The Chairperson shall be an outstanding and experienced environmental policy expert or expert in management or public administration with wide experience in the relevant development sector.
5. The Chairperson shall nominate one of the Members as the Vice Chairperson who shall
preside over the EAC in the absence of the Chairman /Chairperson.
6. A representative of the Ministry of Environment and Forests shall assist the Committee as its Secretary.
7. The maximum tenure of a Member, including Chairperson, shall be for 2 (two) terms of 3 (three) years each.
8. The Chairman / Members may not be removed prior to expiry of the tenure without cause and proper enquiry.

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006