

ENVIRONMENTAL IMPACT ASSESSMENT FOR BUILDING CONSTRUCTION PROJECTS

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ABSTRACT

Rapid industrialization and population explosion in India has led to the migration of peoples from villages to cities which increase human settlement in world's growing cities and towns. This generates several issues with regard to the environment. Environmental Impact Assessment (EIA) is becoming a very important study before commissioning of any project plan or development in our country. In order to study either its beneficial or harmful effect; evaluation of any project through EIA has become a must; Indian construction industry is rapidly growing at a rate of 9.2% as against the world average of 5.5%. Undertaking EIA for construction industry and improving site management can reduce environmental impacts both on and off site. Several agencies use procedures for EIA of construction projects which might result in significant environmental impacts. The EIA study is necessary to prepare a detailed account of environmental impact of the proposed activity so that appropriate interventions could be taken. An attempt has been made in this paper to study environmental impact of building construction project using checklist analysis methodology. The study focuses on various parameters such as total area, parking area, rainwater harvesting system, basement area, sewage treatment plant, water quality, solid waste, source of water, depth of ground water, distance from the city centre, nearest sensitive zones and overall settlement density. The plan seeks to define the project in a holistic manner and suggest possible mitigation measures for development. The paper argues that through early planning before the start of the project as well as through all phases of the project's development, if environmental concerns are considered simultaneously with other technical and economic criteria, it may be possible to develop the housing projects with the protection of natural resources of that area.

KEYWORDS: Environmental Impact Assessment, Building Construction, Checklist Method

INTRODUCTION

Environmental Impact Assessment (EIA) is a relatively new planning and decision making tool first enshrined in the United States in the National Environmental Policy Act of 1969. It is a formal study process used to predict the environmental consequences of any development project. It is a technique which is meant to help us understand the potential environmental impacts of major development proposals.

In a span of one decade, between 2001 and 2011, the number of million plus cities in India has increased from 35 to 53, while the number of towns and cities has increased from 5161 to 7935, leading to an overall increase in the proportion of urban population from 27.8% to 31.2%. It is projected that India's urban population would increase from

380 million in 2014 to about 600 million in 2030. Such a massive increase in urban population would also create huge challenges for urban local bodies, mainly in maintaining the environmental quality without any compromise in the human well-being. It is beyond doubt that urban planning, infrastructural development and the resource consumption patterns of the emerging urban space will impact ecosystems both within cities boundary as well as outside, with implications for the quality of life for people across the country.

EIA-Terminologies

The term EIA refers to the anticipation of various impacts of a project that will have on the environment and the local community. It is a decision making tool, which guides decision makers in taking appropriate decisions prior to sanctioning clearance of a project. EIA is an iterative process. The key stages in the process include proposal identification, screening, scoping, impact assessment, mitigation, review, decision making and follow up. EIA is integrated into the project development process and is not seen as a barrier to development.

Depending on the types of project and severity of impact, generally two types of EIA are conducted.

Rapid EIA

This is carried out for projects that are likely to cause limited adverse impacts. In rapid EIA, data or information is collected for only one season (other than monsoon). Therefore, the time frame for undertaking rapid EIA is much shorter (3 months).

Comprehensive EIA

As the name suggests, this is conducted over a year as it involves collection of data/information for three seasons (other than monsoons). It is usually conducted for projects that are likely to cause more or a series of adverse impacts. However, in India, there are no clear guidelines on the type of projects for which comprehensive EIA should be conducted. As per the new EIA notification, the authority in charge of issuing environmental clearances (either the Union ministry for environment and forests (MoEF) or the state level body) is the decisive authority to finalize a rapid or a comprehensive EIA.

EIA Scenario

In India, EIA was first introduced in India based on the Environmental Protection Act (EPA), 1986. But formally it came in to effect, when MoEF has passed a major legislative measure under EPA in January 1994 for Environmental Clearance (EC) known as EIA Notification, 1994. Subsequently, EIA processes have been strengthened by MoEF by a series of amendments. The current practice is adhering to EIA Notification, 2006 and its amendments. The main laws in nation are Water Act (1974), The Indian Wildlife (Protection) Act (1972), The Air (Prevention and Control of Pollution) Act (1981) and The Environment (Protection) Act (1986). The responsible body for this is Central Pollution Control Board. EIC is the repository of one stop secondary data source for environmental impact assessment in India.

Need of EIA for Building Construction Projects

EIA in India experiences the lack of availability of timely and reliable environmental data which has been the major bottleneck in preparing quality EIA reports. Since environment is a multidisciplinary area, a multitude of agencies are involved in the collection of environmental data in India. However, there is no single organization in India that tracks

the data available among the multitude of data generators and makes it available in the form and manner required by the practitioner's field of EIA. This in turn affects the effectiveness of EIA process by causing delays in conducting EIAs and in reviewing the EIA reports for Environmental Clearance (EC). Further, the environmental data is often not available in a processed or value added form that can possibly enhance the quality of environmental decision making to address these issues.

A high standard of city environmental quality is characterized by clean environment with, safe and attractive streets, parks and open spaces. The intersection and overlap of the natural environment with the built and socio-economic environment constitutes the city environment. It is argued in the literature that the functioning of urban areas should maximise the quality of life of the people that live and work in such areas, without compromising the quality of life of those who reside in peri-urban areas and rural settlements outside their boundaries. Some important components of quality of life in urban neighbourhoods are summarised as follow:-

- **Environment:** important component of quality of life
- **Physical:** air quality, water quality, derelict land, open space, noise, litter
- **Built:** building type, condition, appearance
- **Social:** education, community participation, services, and leisure, crime, health, mental health
- **Economic:** employment and income

EIA is an effort to anticipate measures and weigh the socioeconomic and biophysical changes that may result from a proposed building construction project. Best practice EIA identifies environmental risks, lessens conflicts by promoting community participation, minimizes adverse environmental effects, informs decision makers, and promotes environmentally sound projects. EIA of building construction projects focuses on the prediction of environmental impact of the different components of the construction activity, ways and means to reduce adverse impacts by shaping the project to suit local environmental conditions, and presents the predictions and options to the decision-makers.

Environmental clearance for building construction projects

EIA is a procedure used to examine the environmental consequences or impacts, both beneficial and adverse, of a proposed development project and to ensure that these effects are taken into account in project design. The housing projects fall under category – 8 (a) of EIA Notification, 2006 (as amended). The built up area for the purpose of this Notification is defined as “the built up or covered area on all the floors put together including basement(s) and other service 8(b) of EIA notification deals with townships and area development projects.

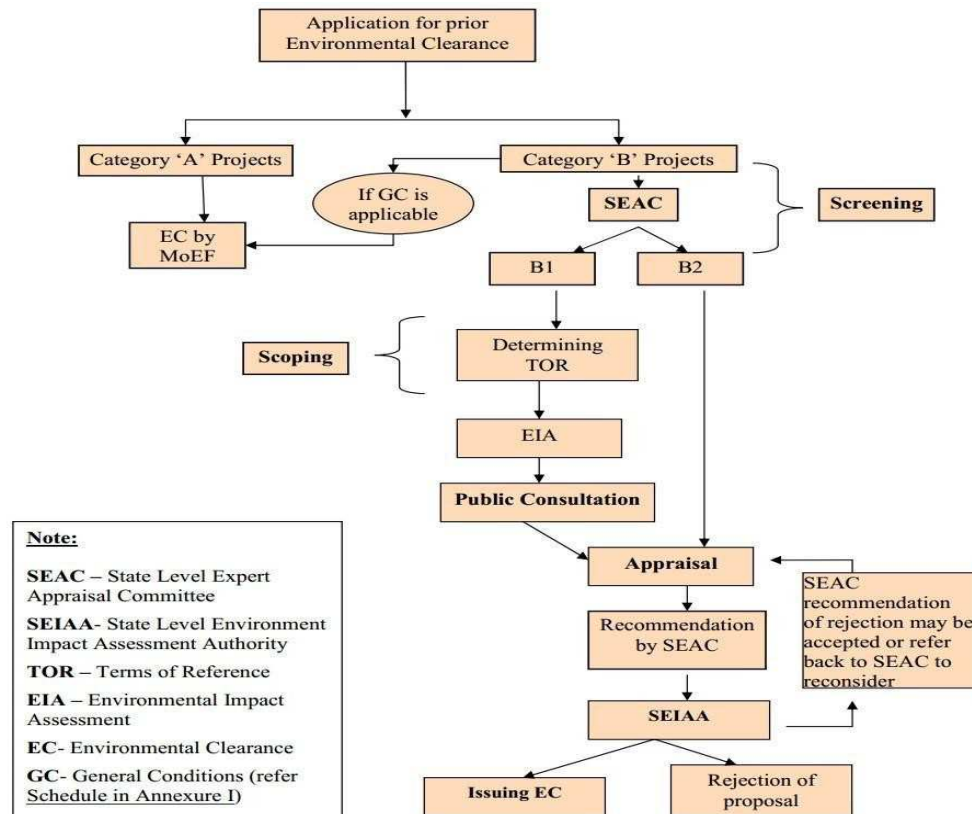


Figure 1: Schematic Flow Diagram for Environmental Clearance for Housing Projects

The course of action in an EIA depends on the prerequisites of the nation or patron, though, as a rule EIA processes have a regular constitution and the implementation of these main steps is an essential criterion of first-rate preparation. The environment impact assessment entails eight steps wherein each step is equally significant in influencing the overall performance of the project. Characteristically, the EIA progression commences with screening to certify that the time and reserves are concentrated at the proposals which matter environmentally and concludes with some kind of follow up on the execution of the verdicts and actions taken as an outcome of an EIA report. The eight steps implicated in EIA processes are: (a) Screening: This first stage of EIA establishes whether the anticipated project, necessitates an EIA and if it does, then the intensity of assessment required. (b)

Scoping: This step recognizes the key issues and impacts which further needs to be investigated and also delineates the periphery and time limit of the study. (c) Impact Analysis: The third stage of EIA identifies and envisages the likely ecological and social impact of the anticipated project and weighs upon the implication. (d) Mitigation: Mitigation advocates the actions to lessen and steer clear of the possible adverse environmental upshots of development activities. (e) Reporting: The end result of EIA is accounted in a form of a report to the decision-making body and other concerned parties. (f) Review of EIA: It reviews the sufficiency and efficacy of the EIA report and makes available the information essential for decision-making. (g) Decision-Making: It decides whether the project is cast off, accepted or needs additional alterations. (h) Post Monitoring: This final step of EIA comes into play once the project is bespoke. It tries to make certain that the impacts of the project does not go beyond the officially permitted standards and execution of the mitigation measures are done in the manner as stated in the EIA report.

Public Consultation Process

In the new EIA notification, the project proponent may have provision to directly approach (with approved public hearing proceedings) the regulatory authority concerned, along with the final environmental impact assessment or draft EIA report prepared after the public hearing and public consultations.

List of projects, which are exempted from public consultation.

- Modernization of irrigation projects (item 1(c) (ii) of the Schedule).
- 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.
- Expansion of Roads and Highways (item 7 (f) of the Schedule) which do not involve any further acquisition of land.
- All Building /Construction projects/Area Development projects and Townships (Item 8).
- All Category “B2” projects and activities.

Validity of Environmental Clearance

Validity of Environmental clearance as per new EIA notification

- Maximum 30 years for mining projects
- 10 years for River valley projects
- 5 years for all other projects

Environmental appraisal

The final EIA report and the other relevant documents submitted by the project proponent will be scrutinized in office within 30 days from the date of its receipt by the concerned regulatory authority with reference to the Term of Reference (TOR). Every application shall be placed before the EAC /SEAC and its appraisal completed within 60 days of its receipt with requisite documents.

STUDY AREA

Madurai is the second largest city in TamilNadu. One of the oldest continuously inhabited cities in the world, Madurai developed on the fertile plain of the River Vaigai and has been a major religious centre and settlement for two millennia. Today it is an important educational, industrial and tourism hub, but retains many remnants of its historic origins. The intricate network of rivers, channel, canals, tanks and groundwater forms the city's essential blue-green infrastructure, providing water, drainage and sanitation for domestic, agricultural and industrial use. The city is growing rapidly, and is Expected to rise from 1.4 million in 2011 to over 2 million people by 2031 (the end date for the upcoming Madurai Master plan). This will lead to further pressures on infrastructure, housing, and basic services.

The campus of an Engineering college is taken as the study area for this building construction project. It is an autonomous institution and it covers nearly about 140 acres of land.



Figure 2: Location Map of the Study Area

The land use pattern of the study area is classified as below (as on 31-03-2015). The building area covers road, walkway, parking, playground, green cover etc.

Table 1: Land Use Classification of the Study Area

Type of Area	In Acres	In Square Meters
Building Area	8.2	33,184.22
Road Area	4.632	18,745.04
Walkway	0.85	3,439.83
Parking Area	0.35	1,416.40
Playground Area	32.123	1,30,000
Green cover Area including Open Space	94.145	3,80,988.42
Total Land Area	140.3	5,67,773.89

METHODOLOGY

The checklist matrix has been used for the evaluation of the building construction projects supported by extensive field checks and surveys. The selected sites were existing namely college of Engineering building construction project in Madurai city. These EIA reports of building construction projects were critically reviewed with ground observations

using different building construction projects parameters. The review checklist consists of a questionnaire comprising the following six sections:

- Description of the project
- Consideration of alternatives
- Description of the environment likely to be affected by the project
- Description of the likely significant effects of the project
- Description of mitigation measures
- Non-technical summary

RESULT AND DISCUSSIONS

This study of building construction projects was administered via personal surveys, and details study of all EIA reports of selected study area was made to prepare a table of responses in a standard format covering various parameters of building construction projects as shown in table 2. All building construction projects sites have a green belt area and parking area. They have also installed sewage-treatment plants which are in operation, rain water harvesting system (ground based) and none of the projects have a basement parking system. The projects have ground water and lorry water as a source of water and the water table of the campus lies over the range of 700 feet from the ground surface.

Table 2: Study of Environmental Impacts Assessment Reports of Campus

S.No	Parameters	Study Area
1.	Location	Madurai
2.	Nearest railway station	Madurai, Railway station
3.	Project costs	-
4.	Power requirement	Yes
5.	Size of area	140 acre, 58hec.
6.	Green Area (%)	94.145 acres,60%
7.	Parking Facility	Provided
8.	Water requirement	Yes
9.	Solid waste generation	Yes
10.	Source of supply water	Ground water, Lorry water
11.	Sewage Generated	Yes
12.	STP Facility	Provided
13.	Rainwater harvesting system	Ground based
14.	Basement system	Provided
15.	Distance from the city center	Madurai,8Kms
16.	Nearest city/town	Madurai
17.	Water depth	700ft
18.	Nearest village	-

19.	Nearest water bodies.	Pond
20.	Nearest highway	NH-47
21.	Nearest sensitive zone	Schools, Temple, Govt. Elementary School.
22.	Nearest forest	None
23.	Nearest airport	Madurai airport(13.8KM)

Table 3: Checklists for Environmental Impact Assessment of Building Construction Projects in the Study Area (As Per Form – 1 A for Construction Projects Listed Under Item 8 of the Schedule)

S.No	1. Air Environment Information/Checklist Confirmation	Study Area
1.	Emissions from combustion of fossil fuels from stationary or mobile sources.	√
2.	Emission from construction activities including plant & equipment	√
3.	Dust or odours from handling of materials including construction materials, sewage & waste	√
S.No	2. Water And Land Environment Information/Checklist Confirmation	Study Area
1.	From handling storage use of hazardous materials	√
2.	From discharge of sewage or other effluents to water or the land	×
3.	By deposition of pollutants emitted to air into the land or into water	×
4.	Is there a risk of long term buildup of pollutants in the environment from these sources	×

S.No	3. Noise Environment Information/Checklist Confirmation	Study Area
1.	From operation of equipment e.g. engines, ventilation plant, crushers	√
2.	From industrial or similar processes	√
3.	From construction or demolition	√
4.	From blasting or pilling	×
5.	From construction or operational traffic	√
6.	From lighting or cooling system	√

S.No	4.Environmental Sensitivity Information/Checklist Confirmation	Study Area
1.	Area protected under international conventions national or local legislation for their ecological valu	×
2.	Areas which are important or sensitive for ecological reasons, wetlands, water courses or other water bodies, coastal zone biosphere , mountains, forests	√

3.	Areas used by protected important or sensitive species of flora and fauna for breeding, nesting, foraging, residing over wintering migration	×
4.	Inland coastal marine or underground waters	×
5.	State national boundaries	×
6.	Densely populated area	×
7.	Areas occupied by sensitive man made land uses	√

S.No	5. Risk Assessment Information/Checklist Confirmation	Study Area
1.	From explosions and spillages, fire etc, from storage handling, use of production of hazardous substances from any other causes	√
2.	From any other causes	×
3.	Could the projects affected by natural disaster causing environmental damage (e.g, floods, earthquakes, landslides, cloud burst etc.	√

S.No	6. Solid Waste Management Information/Checklist Confirmation	Study Area
1.	Municipal waste domestic or commercial wastage	√
2.	Hazardous wastage	×
3.	Sewage sludge or other sludge from effluent treatment	√
4.	Construction or demolition wastes	√

S.No	7. Vegetation Information/Checklist Confirmation	Study Area
1.	Is there any threat to of project to the biodiversity	×
2.	Will the construction involve extensive clearing or modification of vegetation?	×

S.No	8. Fauna Information/Checklist Confirmation	Study Area
1.	Is the likely to be any displacement of fauna-both terrestrial and aquatic or creation of barrier for there Movement?	×
2.	Is there any direct or indirect impacts on avifauna of the area?	×

S.No	9. Socio-Economic Status Information/Checklist Confirmation	Study Area
1.	Will the proposal results in any change to the demographic structure of local population?	×
2.	Will the project cause adverse effects on local communities, disturbances to sacred site or other cultural values?	×

Note: Here √ indicate YES and × indicate NO

From this above study to find the primary data is to be identified such as air, water and land, noise, environmental sensitivity, solid waste management, risk assessment, vegetation, flora and fauna and socio-economic status in qualitative manner. Planned approach is essential for integration between development, environmental conservation and overall wellbeing of people. Thus, creation and maintenance of campus that are tune with natural environment and resources use is an important component of sustainable system. The study shows the ground reality of various parameters in the project. The study area have rainwater harvesting system, proper parking facilities, adequate green area and contains the plants/trees that absorb the high level sound/noise, waste water treatment facility and solid waste management facility.

Possible mitigation measures are made to improve the environmental quality by following some green practices, renewable energy sources, air quality monitoring sensors, RO treatment plant that could increase the level of environment.

CONCLUSIONS

Environmental Impact Assessment or EIA can be considered as the appraisal of the probable impact that a proposed project may have on the natural environment. In broad, EIA process calls for assortment of resources which include personnel resources, funding, time to perform entire task, and can be done only for large sized projects which are attaining retorts from community. Putting into practice a few site control measure for the duration of construction can lessen the environmental impacts and ease the annoyance echelons to the neighbouring areas from the construction site.

The review of the EIA of study area reveal that some of the newly developed projects are characterized by severe shortage of basic services like potable water, well laid-out drainage system, sewerage network, sanitation facilities, electricity, roads and waste disposal. These in turn result in to numerous environmental and health impacts that must be addressed. The green cover and water bodies have been destroyed to give way to the rapidly developing urban settlements at the outskirts. Urban green infrastructure comprise of all natural, semi-natural and artificial networks of multifunctional ecological systems within, around and between urban areas, at all spatial scales. The burden of resource use in upcoming buildings or urban housing projects can be minimized in many ways. Properly designed housing projects can provide numerous services such as purification of air and water, pollution control, mitigation of floods and droughts, re-generation of soil fertility, moderation of temperature extremes, climate change mitigation and enhancing the landscape quality.

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