

Environmental Impact Assessment of Six Laning through NH-4

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ABSTRACT - The Environmental Impact Assessment (EIA) is a systematic investigation of both Positive and Negative impacts on the physical, biological, socioeconomic environment, which would be caused or induced due to a proposed developmental project. EIA helps to develop environmental friendly projects and seeks to reduce environmental degradation caused by developmental activities. It also provides a plan to reduce the unconstructive environmental effects of proposed development project through alternative approaches, design modifications and remedial measures. Highway construction is a major activity of economic development especially in developing countries like India. Road development is a major source of damage to the environment, including ecological deterioration, habitat disturbance and damage to flora and fauna. The present report analyses the environmental impacts likely to occur due to the proposed widening of a 130 km stretch of NH-4 from Pune to Bangalore. The report highlights the importance of EIA in the sustainable development of highway project with a case study of vital link of about 130 Kilometers. The study concentrates on the environment impact assessment of the project in the light of the existing situation at the highway site. The parameters covered in study like Socio-Economic, Biological, Air, Water, Noise, Ecological & Soil. Samples of air, water & soil were taken to analyze their present conditions. Data was also collected from various Government offices like the forest department and town & country planning department.

Highway capacity was analyzed and it was observed that the present two lane highway is insufficient to handle the current traffic volume so the section requires six laning immediately to accommodate more traffic. After analyzing different parameters and discussing the probable impacts suggestions are made regarding the mitigation measures that can be taken at different stages in order to reduce the environmental impacts and awareness to the public through it.

Keywords: Biological, NH-4, Physical, Pune, Satara, Six Laning, Socioeconomic Environment

1.0 Introduction:

Environmental Impact Assessment is a tool used for decision making regarding projects, developments and programmes such as incinerators, airport runways, pig rearing and peat extraction. EIA is intended to identify the Environmental, Social and Economic impacts of a proposed development prior to decision-making. This means that it is easy to identify-

1. The most environmentally suitable option at an early stage
2. The best practicable environmental option
3. Alternative processes

The project managers can then address these problems in order to avoid or minimize environmental impacts in conjunction with their project planning. This results in the likelihood of the project planning stages running smoother. The Environmental Assessment is carried out by the Developer although the task is often carried out by Environmental Consultants. Environmental Assessment is

carried out in order to produce an Environmental Statement. The Environmental Statement must include:

- A description of the project: location, design, scale, size etc
- Description of significant effects
- Mitigating Measures
- A Non-Technical summary

1.1 Soil erosion and sedimentation management

Erosion control will be carried out as soon as possible after earthworks and it will include measures such as providing cut-off drains or immediate commencement of subsequent work such as road base and pavement construction.

1.2 Water quality management

Water Quality Management will be closely related to erosion and sedimentation control. Control measures to protect water will include

1. Temporary drainage to direct surface runoff in to silt ponds.
2. Temporary sanitation facilities will be provided at the construction workers camp site.
3. Waste oil and grease will be stored in proper containers and taken off site, so that there will be no discharge in to watercourses.
4. Fuel skid tanks will be sited away from any watercourses.
5. Maintenance site will be well managed and kept tidy to prevent possibility of contamination.

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1.3 Air quality management

Air Quality Management will be maintained to comply with environmental statutory requirements. Control measures will include

1. Site roads will be compacted and maintained.
2. A site speed limit of 20 km/hr will be imposed on earth roads.
3. Truck moving outside the site carrying soil or aggregates will not be overloaded to prevent spillage on public roads.
4. Vehicles and machinery will be properly maintained to reduce exhaust emissions.
5. Dust collectors and suppressors will be fitted on crusher, and asphalt mixing plants to prevent air pollution.

Noise control measures Noise levels will be maintained to comply with the statutory environmental requirements. Control measures will include

1. The proper maintenance of construction vehicles and equipment to reduce excessive noise.
2. Any "High Noise Area" will be posted with warning signs and workers will not be allowed to freely enter the area.
3. Tertiary crushers will be fitted with rock lining to act as natural sound insulator during the crushing process.
4. Natural vegetation will be maintained where possible to act as a natural buffer.
5. Only locations that are not within the near vicinity of housing areas will be selected for quarrying and mixing operations.

1.4 The EIA process

There are two steps in EIA. The two stages are

" Preliminary Assessment: Carried out in the early stages of planning

" Detailed Assessment: Carried out during project planning until the project plan is completed and are reported formally as an Environmental Statement.

2.0 Literature review :

2.1 General

The baseline environmental status is established by determining the baseline levels of significant environmental parameters, which could be affected by the implementation of the project. The baseline study is a cornerstone of EIA, since it defines the existing status of the ecosystem(s) potentially threatened by the developmental activities. Baseline data serve as reference points against which potential or actual project-induced changes can be measured

2.2 Prediction techniques

Canter and Sadler (1997) provide a listing of prediction techniques in their review which are applicable to different aspects of EIA (Table 4-1). Canter (1996) provides an excellent overview, based on American experience, of many of these

prediction techniques. In many EIA applications, these basic prediction techniques are actually combined. This is particularly true when using computerized modelling software for specific applications, as the application of a computer model usually requires collection of environmental information to set baseline values for the model's variables and to determine the values for model's parameters.

2.3 Toll road project

The Ministry of Public Works of the Republic of Indonesia commissioned an EIA for the Pune-Satara Toll Road Project. The road was planned as a 56 km long, dual 3-lane carriageway connecting the Pune-Satara and Pune-Khandala toll roads, with the goal being to complete the linkage of Jakarta and Bandung by good quality highways. A 50% reduction in travel time between the two cities was expected. Significant socioeconomic benefits to the region were anticipated, including increases in the development of industrial complexes along the corridor, increased tourism, and improved communication. Negative socioeconomic impacts include the appropriation of land, the weakening of existing community linkages through relocation, and the suppression of agricultural land. Compensation was unlikely to be sufficient to maintain pre-project living standards for those who were relocated. Numerous families would likely have experienced significant reductions in income. To counterbalance these negative effects, there was to be a bias in construction work hiring in favour of local people, especially those who were subject to relocation or land-take.

2.4 Review of EIA

Different jurisdictions use different arrangements for the review of projects (Table 2-3). Often EIA reports are reviewed by a review agency or by a special "Standing Committee" or "Commission" established to review projects in a given sector. In most cases, a technical evaluation of the EIA report is made by specialists. This technical evaluation provides the basis for the review. The output of the review is either a rejection of the project, or an approval report outlining terms and conditions under which the project may proceed. These terms and conditions are attached to any license, permit, or certificate issued by the approval authority. IAAs like the ADB and the World Bank also use experts for the review and evaluation of EIA reports submitted to them as part of their environmental assessment requirements. In most cases, the results of an EIA review are provided to the agency that is responsible for ultimately approving the proposed project. In many jurisdictions, project approval also depends on approval from the EIA agency. One output of the EIA review process is the terms and conditions that are attached to approvals. These terms and conditions define the environmental protection measures that must be integrated into a project. The terms and conditions may also specify environmental monitoring that must be undertaken in conjunction with the project. For example, in the PRC, EPB (National Environmental Protection Agency for large projects) staff must inspect construction projects to ensure that the environmental protection measures are installed and operable prior to giving final clearance to the project.

2.5 Cost Analysis

In the Philippines, the Forest Management Bureau estimates that mitigation measures required for timber concessions are about 1% of the total investments. The Department of Public Works and Highways reports that EIA level studies for urban highway projects require about 10% of the cost of the feasibility studies (or 0.001% of total project costs, excluding costs associated with acquiring land for the right of way), with the total cost for EIA studies ranging between US\$10,000 and US\$60,000. In Thailand, the costs have ranged from US\$ 1,000 for IEE-level studies to over US\$ 800,000 for detailed EIAs. The expenditures in Thailand for water resources development project EIAs range between 0.01% to 0.16% of the total project cost. Similar figures for industrial development projects range from 0.048% to 0.14% of the total cost.

2.6 Environmental protection

The 1972 UN Conference on Human Development at Stockholm influenced the need for a well developed legal mechanism to conserve resources, protect the environment and ensure the health and well being of the people in India. Over the years, the Government of India has framed several policies and promulgated number of Acts, Rules and Notifications aimed at management and protection of the environment. During last three decades an extensive network of environmental legislation has grown and presently it has a fairly complex body of environmental legislation aimed at ensuring that the development process meets the overall objective of promoting sustainability in the long run. Moreover, at a higher level, the Indian Constitution has also incorporated specific articles to address environmental concerns through the 42nd Constitutional Amendment of 1976. As per the notification all projects listed under Schedule-1 are required to obtain prior environmental clearance from the MOEF, subject to certain requirements criteria. Additionally, projects requiring environmental clearance are subject to environmental public hearing as part of EIA process per notification SO 318 (E) dated 10 April 1997

3.0 Methodology :

3.1 Possible impacts of the project

The impacts of project over the environment are to be listed by getting some information from the site and can be studied, with the help of EIA process also it will be minimize or can be mitigate by providing proper substitute to the impact after public hearing. Some impacts are listed below

1. Borrow Areas, Embankment Slopes
2. Protected forest/ sensitive areas
3. Road side plantation, . Air Quality, Noise level
4. Relocation utility lines/ Community utility
5. Compaction of soil, Borrowing of earth
6. Contamination of soil from fuel, construction waste and lubricants, Soil Erosion.
7. Emission from construction vehicles and machinery, Loss of top soil.

8. Water bodies and water sources.
9. Noise from blasting operation, vehicles, asphalt plants etc.

3.2 Collecting information related with impact area

After visiting to the site the information related with the project is collected including the related impact with its description. Some of them are listed as under

- Marginal impact some trees are lost in borrow areas
- Some degree of soil erosion on newly constructed Embankment and the issue of water logging in adjoining area will improve due to the raising of the road.
- No losses of protected forest, No sensitive area exists in the corridor -Heavy loss of road side trees leading to increase in air and noise pollution
- There will be slight increase in the pollution level of the air in few places. -The noise level might slightly increase in market places.
- Short term negative impact during transitory phase of shifting of utility lines, No impact on shifting wells, hand pumps etc
- Removing and cleaning of tree line herbaceous and shrubby covers from embankment will increase soil erosion, Excavations of borrow pits will increase soil erosion.
- The loss of top soil is due to the acquisition of agricultural land and due to construction dumps - The excavations in borrow areas may lead to marginal loosening of soil; also the compaction of soil may not be affected largely.

4.0 Theoretical aspect - EIA :

4.1 EIA

The Environmental Impact Assessment can be defined as the process of identifying, predicting, evaluating and mitigating the biophysical, social and other relevant effects of development projects proposals prior to major decisions being taken and commitments made. EIA report is also called as Environmental Impact Assessment Statement; sometime it is also called as only Environmental Statement i.e. ES.

4.2 Purposes of EIA

- I. Provide information for decision making on the Environmental consequences of proposed actions and
- II. Promote environmentally sound and sustainable development through the identification of appropriate enhancement and mitigation measures.

4.3 Short Term Objectives of EIA

- I. To protect the human health and safety
- II. To avoid irreversible changes and serious damage to the environment
- III. To safe ground valued resources, natural areas and ecosystems.
- IV. To enhance the social aspects of the proposals

4.4 Long Term Objectives

- I. To improve the environmental design of the proposal
- II. To ensure that resources are used appropriately and efficiently
- III. To identify appropriate measures for mitigating the potential impacts of the proposals
- IV. To facilitates inform decisions making, including settings the environmental terms and conditions for implementing the proposals.

4.5 Principles of EIA

General principles of EIA process are Environmental Impact Assessment should be:-

1. Purposive
2. Rigorous
3. Practical
4. Relevant
5. Cost effective
6. Efficient
7. Focused
8. Participative
9. Interdisciplinary
10. Credible
11. Integrated
12. Adaptive
13. Transparent
14. Systematic

4.6 EIA Process

The EIA process should applied as early as possible in decision making and throughout the life cycle of the proposed activity. It should be applied to all development proposals that may cause potentially significant effects also it is applied to biophysical impacts and relevant socio- economic factors, including health, culture, gender, lifecycle age and cumulative effects consistent with the concept and principles of sustainable development.

5.0 Case study - Six Laning through NH-4 :

5.1 Location of the project

The road widening project is located on National Highway No -4 which is going to be constructed from Pune to Satara

5.2 Basic Information about the project

The name of project is Development of Six Laning of Highway under (Golden Quadrilateral) Plan V of Road development. The road meets to six lane project Pune-Bangalore towards Karnataka state. The location contains some wells, rivers, hilly portions also fields of farmers up to the end. Different Soil strata having various types as black cotton soil, sandy soil, rock strata, hard murrum.

5.3 Necessity of EIA for the project

The main goal of EIA is to influence development decision-making by providing sound information on environmental impacts and the means for preventing or reducing those impacts. Three major outputs of the EIA process provide the primary means for integrating the results of a specific EIA into

the development planning decision process and the concurrent environmental regulatory process: an identification and analysis of the environmental effects of proposed activities (including their probability of occurrence); an environmental management plan which outlines the mitigation measures to be undertaken; and an environmental monitoring program which outlines the data that must be collected in conjunction with the project. All three outputs are required for the EIA process to be effective. Possible impacts of the project As I visited to site I observed that, there were certain effects of the project over the environment so that can be studied out to project as:-

- I. Emission from construction vehicles and machinery
- II. Noise from the vehicles, asphalt plants, due to blasting operation and equipment's.
- III. Roadside landscape development.
- IV. Accident risks from construction activities.
- V. Dust and its treatment.
- VI. Some health issues.

5.4 Data collected

I. As the emission from vehicles affect to human health via respiratory system. The dust settled due to emission may settle over the leaves of tree n causes reduction in the growth along with this the water sources get impure due to the same.

II. The activities of using heavy machinery and equipment's are localized and are intermittent. There may have certain serious impacts to the person results will be they loss their hearing power.

III. The positive impacts on bio-aesthetes and one beauty about landscaping and beautification of ponds and access roads will improve aesthetic consideration.

IV. The type of accidental risks may be due to ill-maintained machines and vehicles due to poor light conditions and at the work place or due to carelessness and poor management of the work involved.

V. The effects of the dust at constructions sites are rather adverse but localized in nature. And some time in case of extends in limits will results for purification treatment as per the condition.

VI. Health risks or issues are likely to be unavailability of wholesome drinking water, due to unhygienic conditions at site, due to handling of different Instruments which are not properly cleaned due to the lack of water and such adverse conditions create diseases.

5.5 Environmental monitoring data collected (Table 1)

5.5.1 National Pollutant Standards:-

The National air quality standards, surface water as well as noise standards are given as under, so that the comparison of air pollutants and other factors can be done from collected actual data of the project.

5.5.2 Acceptable limits of air

The air pollution due to the different vehicles as well as the machinery and the equipment gives the emissions of pollutants at crushing plant. The table gives an idea about the air pollutants from standard to the actual at site. The data is

collected from site under observation for 24 days and the average values are determined for different pollutants. The detail will be done in next phase.

5.5.3 Acceptable limits of noise

The limits of the noise are given as in the Table 3 for the comparison of collected noise coming out from different instruments at site. The sound is measured at different points and locations of this project. Table 4 shows the noise level at source itself, the noise at different points will be calculated in next phase. In the last part the study to be carried out for the locations of Khandala and Satara city, also on the site because it will be dangerous for the labourers also. Noise coming from equipment within a day was recorded at Wakad. The noise level for the different instruments is to be observed on the site and is given in Table-4.

6.0 Conclusions:

As the main aim of EIA is to influence development decision-making by providing sound information on environmental impacts and the means for preventing or reducing those impacts. Thus, EIA is necessary to know the adverse effect of any project to the environment, and by carrying out EIA we can minimize the adverse effect over humans, plants, animals as well as environment. Survey for this project gives idea about the pollutants from surface water, from air, from noise are to be studied and from this it can conclude that the SPM is more in this region. The DO content for the total organisms calculated and it is in limit. In case of air the range exceeds for Carbon monoxide up to 3654 ug/m³ so it can be controlled by means of plantation as well as reduction in vehicular emission.

Some impacts are as marginal impact some trees are lost in burrow areas, the compaction of soil may not be affected largely, the loss of top soil is due to the acquisition of agricultural land and due to construction dumps, no sensitive area exists in the corridor, no losses of protected forest, the

issue of water logging in adjoining area will improve due to the raising of the road, heavy loss of road side trees leading to increase in air and noise pollution etc impacts are identified.

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Table 1: Limits compared with actual of air pollutants

Pollut-ants	Time Weighte-d Average	Industr-ial Area	Reside-ntial area	On site
(SO ₂)	Annual 24 hours	80 ug/m ³ 120 ug/m ³	60 ug/m ³	For 24 hrs-0 105.34 ug/m ³
(NO _x)	Annual 24 hours	80 pg/m ³ 120 ug/m ³	65 ug/m ³	For 24 hrs- 112.10 ug/m ³
(CO)	8 hours 1 hour	5000 ug/m ³ 10000 ug/m ³	2000 ug/m ³	For 8 hrs- 365470 ug/m ³
(Pb)	Annual 24 hours	1.0 ug/m ³ 1.5 ug/m ³	0.75 ug/m ³	For 24 hrs- 0.09 ug/m ³
RPM	Annual 24 hours	120 ug/m ³ 150 ug/m ³	60 ug/m ³	For 24 hrs- 120.43 ug/m ³
SPM	Annual 24 hours	360 ug/m ³ 500 ug/m ³	140 ug/m ³	For 24 hrs- 556.47 ug/m ³

Table 2: Environmental monitoring data

S. N.	Components	Parameters
1	Air	SPM, RPM, SO ₂ ,NOX,CO,Pb,HC Existing National Ambient Air Quality Standard issued by the MPCB.
2	Noise	Noise measurement in dB (A) for day & night Monotoring Frequency. Monitoring standard. Existing Noise standard issued by the MPCB
3	Water Quality	Ph,BOD,COD, DO,Oil& Grease, Chloride Monotoring Frequency. Water quality standards issued by the MPPCB
4	Flora	No. of trees surviving after 1.5 yr. and 2yrs in relation to total number of trees planted Re-vegetation success.

Table 3 : Standard limits of noise Level(dB)

Trucks	96
Trains	90- 100
Cars	90 -105

Table-4: Noise from different source

S.N.	Sources	Actual noise observed at site in (dB)
1	Trucks/Bus	92
2	Cars	87
3	Grader	88

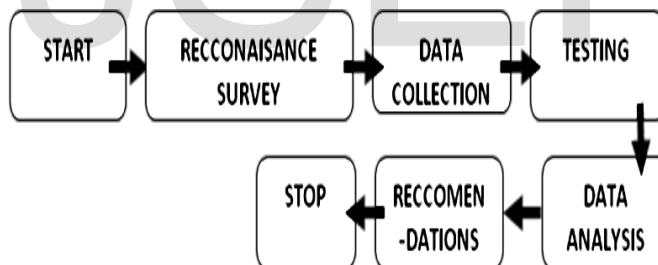


Fig.. No 1 Flow Chart of EIA Methodology



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