Environmental Impact Assessment: Tools, Methodologies and Impact with Analysis of Delhi's Azadpur Metro Station Line (PHASE III)

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Abstract— Environmental impact assessment (EIA) is a procedure for assessing the environmental implications of development projects and to implement policies and plans. Metro projects have gained significance in the past decade, and hence a study of the EIA parameters was conducted at the Jahangirpuri-Badli extension line of the phase 3 network, with testing of noise levels, TDS, TSS and chlorides of the samples collected from the Azadpur station underground construction. Evaluation was done as to ascertain whether the various concentrations were within the permissible limits.

Key words: Environmental impact assessment, metro, noise level, chorides, total dissolved solids, total suspension solids

I. INTRODUCTION

The term 'environmental assessment' describes a technique and a process by which information about the environmental effects of a project is collected, principles developer and from other sources, and taken into account by the planning authority in forming their judgements on whether the development should go ahead. The principal environmental regulatory agency in India is the Ministry of Environment and Forest (MOEF), New Delhi. MOEF formulates environmental policies and accords environmental clearances for different development projects. The aim is to:

- Ascertain positive and negative environmental impacts of the project.
- Mitigate negative environmental impacts.
- Enhance quality of environment in and around the project area by adoption of proper protection and conservation measures.

A. EIA as A Process: P

The emphasis, compared with many other mechanisms for environmental protection, is on prevention. The process involves a number of steps, as outlined in the figure. The order of the steps may vary.

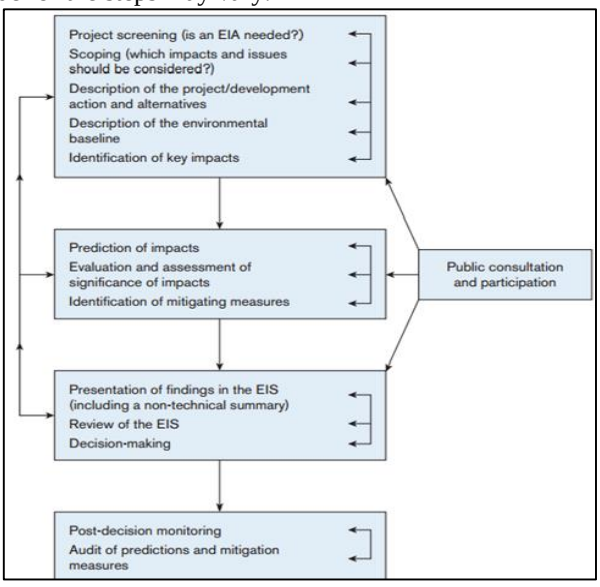

Fig. 1:

B. The Nature of Impacts:

The environmental impacts of a project are those resultant changes in environmental parameters, in space and time, compared with what would have happened had the project not been undertaken. The parameters may be any of the type of environmental receptors noted previously: air quality, water quality, noise etc.

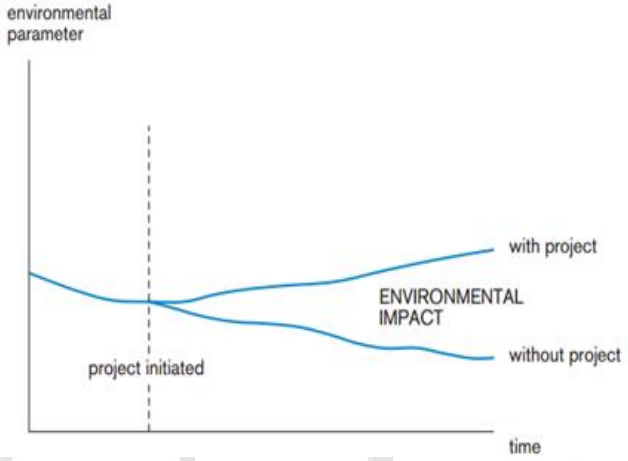

Fig. 2:

II. IMPACT OF METRO CONSTRUCTION AND OPERATION

Soil Erosion and Health Risk at Construction Site:

Run off from unprotected excavated areas, and underground tunnel faces can result in excessive soil erosion, especially when the erodability of soil is high. Mitigation measures include careful planning, timing of cut and fill operations and re-vegetation. In general, construction works are stopped during monsoon season.

Problems could arise from dumping of construction spoils (Concrete, bricks) waste materials (from contractor camps) etc. causing surface and ground water pollution. However, it is proposed to have mix concrete directly from batching plant for use at site. Batching plants will be located away from the site preferably, outside DUA. The other construction material such as steel, bricks, etc. will be housed in a fenced yard. The balance material from these yards will be removed for use/disposal. Mitigation measures include careful planning, cleaning redressing, landscaping and re-vegetation. Health risks include disease hazards due to lack of sanitation facilities (water supply and human waste disposal) and insect vector disease hazards of local workers and disease hazards to the local population. Mitigation measures should include proper water supply, sanitation, drainage, health care and human waste disposal facilities. In addition to these, efforts need to be made to avoid water spills, adopt disease control measures and employment of local labour. Problems could arise due to difference in customs of imported workers and local residents. These riskscould be reduced by providing adequate facilities in worker's camps and by employment of preferably local labour.

A. Traffic Diversions and Risk To Existing Buildings:

During construction, traffic diversions on roads will be essentially required. As most of the construction activities will be confined to centre of the road and most of the roads are double lane, it will be appropriate that the side lanes may also be utilised for traffic and also for smooth progress of construction activities. Advance information on communication systems will be an advantage to users of any particular road. As most of the proposed sections are elevated and located in the middle of the road with deck width being much less than the existing road width, hence risk to the existing buildings all along the route will be practically negligible. In underground portion, weather by cut and cover or by tunnelling, the building line is considerably away from the proposed cut and cover and tunnels. Hence no risk is foreseen to adjacent buildings.

B. Impact on Water Quality:

Construction activities may have impact on water bodies due to disposal of waste. The waste could be due to: the spillage of construction materials, dumping of used water from the stone crusher, oils and greases, and labour camp. But the quantities of such spills are very negligible. Care, however, needs to be taken to provide adequate sanitary facilities and drainage in the temporary colonies of the construction workers. Provision of adequate washing and toilet facilities with septic tanks and appropriate refuse collection and disposal system should be made obligatory. Contamination of ground water can take place, if the dump containing above substances gets leached and percolate into the ground water table.

C. Noise:

The main sources of noise from the operation of trains include:engine noise, cooling fan noise, wheel-rail interaction, electric generator and miscellaneous noise like passenger's chatting. An attempt has been made to predict the rise in ambient noise at different distances. The roughness of the contact surfaces of rail and wheel and train speed is the factors, which influence the magnitude of rail - wheel noise. The vibration of concrete structures also radiates noise. For these sections of the rail which are underground, there will be no impact on the ambient noise.

III. METHODOLOGIES OF THE PARAMETERS ANALYZED

A. Ph:

pH imbalances can inhibit-- or completely wipe out--biological processes in wastewater treatment plants, resulting in incomplete treatment and pollution of the receiving waters. pH meter, consisting of a potentiometer, a glass electrode, a reference electrode and a temperature compensating device was used. A balance circuit was completed through potentiometer when the electrodes were immersed in the sample taken in the field.

B. Total Dissolved Solids:

Total solids consists of dissolved and suspended solids. The total solids in the sample was determined by evaporating 50 mL of the sample in a dish of 65.90 g and weighing the dry sample left. The suspended solids were found by filtering the same volume of sample and weighing the residue left on a filter paper of 1.132g. The dissolved solids consists of inorganic salts, small amount of inorganic matter and dissolved gases. The suspended solids contain much of organic matter, and their increase shows an increase in water pollution,

C. Chlorides:

Chlorides in reasonable concentration are not harmful. They were tested using the argentotentric method, also called Mohr's method, in which 50 ml of the sample was titrated against N/35.5 silver nitrate solution in the burette taking potassium chromate as the indicator. The results were tabulated and the necessary calculations made using the normality equation.

D. Noise:

The permissible noise levels are 65-dBA (day) and 55-dBA (night) at commercial area and 55- dBA (day) and 45 dBA (night) at residential area. The instrument used was model Sesva SC 26 and the values were taken at intervals of 2m.

IV. OBSERVATION SET

Parameters	Observation	Method
pH	6.87	IS-3025
Turbidity	09	IS-3025
Total Dissolved Solids	664.0	IS-3025
Total Suspended Solids	12.0	IS-3025
Chlorides	112.5	IS-3025

Table 1: Water Testing

Parameter	Observation	Method
Grain Size	Gravel Sized -8% Sand Sized -32% Silt and Clay -60%	Sieve Analysis

Table 2: Soil Testing

Standard for	Day	Night
Industrial Area	75	70
Commercial Area	65	55
Residential Area	55	45
Silence Zone	50	40

Table 3: Permissible Noise Levels

Time	5-6 pm	6-7 pm
Leq	76.2	74.2
Lmax	89.9	85.5
L10	77.8	78.3
L50	73.8	69.8
L90	68.6	65.1
Lmin	64.4	62.5

Table 4: Noise Levels Tested at Azadpur Metro station:

V. RESULTS AND CONCLUSION

The samples were tested and their assessment accordingly made. All samples are within the permissible limits, except the noise levels which are above the permissible limits. In conclusion, environmental impact assessment was successfully carried out.

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