5.2.3 METHODS FOR IMPACT IDENTIFICATION

INTRODUCTION:

A logical and systematic approach needs to be taken to impact identification. The aim is to take account of all of the important environmental/project impacts and interactions, making sure that indirect and cumulative effects, which may be potentially significant, are not inadvertently omitted.

PROCESS:

This process begins during screening and continues through scoping, which identifies the key issues and classifies them into impact categories for further study. In the next phase, the likely impacts are analyzed in greater detail in accordance with terms of reference specifically established for this purpose. Over time, a number of EIA methodologies and tools have been developed for use in impact identification.

METHODS:

The most common formal methods used for impact identification are:

• Checklists; • matrices; • networks;
• Overlays and geographic information systems (GIS);

A) Checklists

Checklists annotate the environmental features or factors that need to be addressed when identifying the impacts of projects and activities. They can vary in complexity and purpose, from a simple checklist to a structured methodology or system that also assigns significance by scaling and weighting the impacts (such as the Battelle Environmental Evaluation System). Both simple and descriptive checklists can be improved and adapted to suit local conditions as experience with their use is gained.

Checklists provide a systematized means of identifying impacts. They also have been developed for application to particular types of projects and categories of impacts (such as dams or road building). Sectoral checklists often are useful when proponents specialize in one particular area of development.

B) Matrices

A matrix is a grid-like table that is used to identify the interaction between project activities, which are displayed along one axis, and environmental characteristics, which are displayed along the other axis. Using the table, environment-activity interactions can be noted in the appropriate cells or intersecting points in the grid. 'Entries' are made in the cells to highlight impact severity or other features related to the nature of the impact, for instance:

• Ticks or symbols can identify impact type (such as direct, indirect, cumulative) pictorially;
• Numbers or a range of dot sizes can indicate scale; or
• Descriptive comments can be made.

C) Networks

Networks illustrate the cause-effect relationship of project activities and environmental characteristics. They are, therefore, particularly useful in identifying and depicting secondary impacts (indirect, cumulative, etc).

Simplified networks, used in conjunction with other methods, help to ensure that important second-order impacts are not omitted from the investigation.

More detailed networks are visually complicated, time-consuming and difficult to produce unless a computer programme is used for the task.

However, they can be a useful aid for establishing 'impact hypotheses' and other structured science-based approaches to EIA.

D) Overlays and geographic information systems

Overlays can be used to map impacts spatially and display them pictorially. The original overlay technique, popularized by McHarg, is an environmental suitability analysis in which data on topographic features, ecological values and resource constraints are mapped onto individual transparencies and then aggregated into a composite representation of potential impacts. This approach is useful for comparing site and planning alternatives, for routing linear developments to avoid environmentally sensitive areas and for landscape and habitat zoning at the regional level. Disadvantages: lack of precision in differentiating the likelihood and magnitude of impacts and relating them to project actions. A modern version of the overlay method is the computer-based geographical information system (GIS). In simple terms, a GIS stores, retrieves, manipulates and displays environmental data in a spatial format. A set of maps or overlays of a given area provide different types of information and scales of resolution. The use of GIS for EIA purposes is not as widespread as commonly imagined. The main drawbacks are the lack of appropriate data and the expense of creating a usable system. However, the potential application of GIS to EIA is widely acknowledged and its use is expected to increase in the future, particularly to address cumulative effects.

	ADVANTAGES	DISADVANTAGES
Checklists	• easy to understand and use • good for site selection and priority setting • simple ranking and weighting	• do not distinguish between direct and indirect impacts • do not link action and impact • the process of incorporating values can be controversial
Matrices	• link action to impact • good method for displaying EIA results	• difficult to distinguish direct and indirect impacts • have potential for double-counting of impacts
Networks	• link action to impact • useful in simplified form for checking for second order impacts • handles direct and indirect impacts	• can become very complex if used beyond simplified version
Overlays	• easy to understand • focus and display spatial impacts • good siting tool	• can be cumbersome • poorly suited to address impact duration or probability

5.2.4 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Preparation of environmental management plan is required for formulation, implementation and monitoring of environmental protection measures during and after commissioning of projects. The plans should indicate the details as to how various measures have been or are proposed to be taken including cost components as may be required. Cost of measures for environmental safeguards should be treated as an integral component of the project cost and environmental aspects should be taken into account at various stages of the projects:

- Conceptualization: preliminary environmental assessment
- Planning: detailed studies of environmental impacts and design of safeguards
- Execution: implementation of environmental safety measures
- Operation: monitoring of effectiveness of built-in safeguards

The management plans should be necessarily based on considerations of resource conservation and pollution abatement, some of which are:

- Liquid Effluents
- Air Pollution
- Solid Wastes
- Noise and Vibration
- Occupational Safety and Health
- Prevention, maintenance and operation of Environment Control Systems
- House-Keeping
- Human Settlements
- Transport Systems
- Recovery - reuse of waste products
- Vegetal Cover
- Disaster Planning
- Environment Management Cell

1. Liquid Effluents
    - Effluents from the industrial plants should be treated well to the standards as prescribed by the Central/State Water Pollution Control Boards.
    - Soil permeability studies should be made prior to effluents being discharged into holding tanks or impoundments and steps taken to prevent percolation and ground water contamination.
    - Special precautions should be taken regarding flight patterns of birds in the area. Effluents containing toxic compounds, oil and grease have been known to cause extensive death of migratory birds. Location of plants should be prohibited in such type of sensitive areas.
    - Deep well burial of toxic effluents should not be resorted to as it can result in re-surfacing and ground water contamination. Re-surfacing has been known to cause extensive damage to crop and livestock's.
    - In all cases, efforts should be made for re-use of water and its conservation.
2. Air Pollution
    - The emission levels of pollutants from the different stacks, should conform to the pollution control standards prescribed by Central or State Boards.

- Adequate control equipment should be installed for minimizing the emission of pollutants from the various stacks.
- In-plant control measures should be taken to contain the fugitive emissions.
- Infrastructural facilities should be provided for monitoring the stack emissions and measuring the ambient air quality including micro-meteorological data(wherever required) in the area.
- Proper stack height as prescribed by the Central/State Pollution Control Boards should be provided for better dispersion of pollutants over a wider area to minimize the effect of pollution.
- Community buildings and townships should be built up-wind of plant with one-half to one kilometer greenbelt in addition to physiographical barrier.

3. Solid Wastes
   - The site for waste disposal should be checked to verify permeability so that no contaminants percolate into the ground water or river/lake.
   - Waste disposal areas should be planned down-wind of villages and townships.
   - Reactive materials should be disposed of by immobilizing the reactive materials with suitable additives.
   - The pattern of filling disposal site should be planned to create better landscape and be approved by appropriate agency and the appropriately pretreated solid wastes should be disposed according to the approved plan.
   - Intensive programs of tree plantation on disposal areas should be undertaken.
4. Noise and Vibration
   Adequate measures should be taken for control of noise and vibrations in the industry.
5. Occupational Safety and Health
   Proper precautionary measures for adopting occupational safety and health standards should be taken.
6. Prevention, maintenance and operation of Environment Control Systems
   - Adequate safety precautions should be taken during preventive maintenance and shut down of the control systems.
   - A system of inter-locking with the production equipment should be implemented where highly toxic compounds are involved.
7. House - Keeping
   Proper house-keeping and cleanliness should be maintained both inside and outside of the industry.
8. Human Settlements
   - Residential colonies should be located away from the solid and liquid waste dumping areas. Meteorological and environmental conditions should be studied properly before selecting the site for residential areas in order to avoid air pollution problems.
   - Persons, who are displaced or have lost agricultural lands as a result of locating the industries in the area, should be properly rehabilitated.
9. Transport Systems
   - Proper parking places should be provided for the trucks and other vehicles by the industries to avoid any congestion or blocking of roads.
   - Sitting of industries on the highways should be avoided as it may add to more road accidents because of substantial increase in the movements of heavy vehicles and unauthorized shops and settlements coming up around the industrial complex.

- Spillage of chemicals/substances on roads inside the plant may lead to accidents. Proper road safety signs both inside and outside the plant should be displayed for avoiding road accidents.

10. Recovery - reuse of waste products
    Efforts should be made to recycle or recover the waste materials to the extent possible. The treated liquid effluents can be conveniently and safely used for irrigation of lands, plants and fields for growing non-edible crops.
11. Vegetal Cover
    Industries should plant trees and ensure vegetal cover in their premises. This is particularly advisable for those industries having more than 10 acres of land.
12. Disaster Planning
    Proper disaster planning should be done to meet any emergency situation arising due to fire, explosion, sudden leakage of gas etc. Firefighting equipment and other safety appliances should be kept ready for use during disaster/emergency situation including natural calamities like earthquake/flood.
13. Environment Management Cell
    Each industry should identify within its setup a Department/Section/Cell with trained personnel to take up the model responsibility of environmental management as required for planning and implementation of the projects

5.2.5 ROLE OF NGOs IN THE PROTECTION OF ENVIRONMENT

The protection of environment is a pressing issue. Every person, organization and Institution has an obligation and duty to protect it. Environmental protection encompasses Not only pollution but also sustainable development and conservation of natural resources and the ecosystem. Today, the necessity of environmental awareness and enforcement is more demanding and urgent than ever before.

NGOs are simply agencies or groups, which are different from government bodies. However, NGOs are distinctive in containing a voluntary component and also because they do not operate for profit. Over the past quarter of a century and especially during the past few decades there has been a rapid growth in the numbers of NGOs involved in the development, in the number of people working for NGOs and in the amount of money that flows into these voluntary agencies working in the activities such as –Disaster management and relief, development, public health, rehabilitation, environment protection etc. However, this paper focuses on the role played by NGOs particularly in the protection of environment

The emergence of NGOs represents an organized response by civil society especially in those areas in which the state has either failed to reach or done so in adequately. The importance of public awareness and NGOs involvement in environmental protection is acknowledged worldwide. NGO's have been taking a number of steps to promote discussion and debate about environmental issues, outside the broad spheres of popular media and the educational system.

NGOs can make the following Contributions:

- Conducting education and citizen awareness programmes in the field of environment
- Fact – finding and analysis
- Filing public interest litigations
- Innovation and experimenting in areas which are difficult for government agencies to

make changes in

- Providing expertise and policy analysis
- Providing factual and reliable information with a network of professional expert staff
- Remaining independent while passing relevant information to the public and governmental bodies
- Solidarity and support to environmental defenders
- Working in collaboration with the government for capacity building and promotion of community participation in environmental awareness and protection and
- Working out at the grass root level and reaching far – flung areas with or without the government invitation.

Achievements of environmental NGOs with special reference to

WWF (India), Teri and Clean- India

1. WWF (India) is engaged in a multitude of activities for protection and conservation of the environment in the Indian context. Climate change and energy conservation are among the chief areas of concern for the organization. The forest and biodiversity conservation division strives to promote and enhance conservation of forest ecosystems in the country through a participatory approach involving key stakeholders. Through its environment education programme, it aims at strengthening individual and institutional capacity in nature conservation and environmental protection through widespread education and awareness.

Intimately involved in the conservation of tigers in India since the late 1960s, WWF's significant efforts culminated in the launch of Project Tiger in 1973. It seeks to conserve and protect the biodiversity of maritime life and resources by sensitizing the people at large.

The pollution of the river waters and the imminent threat to aquatic life is a cause of great concern. WWF (India) has stepped in on a number of occasions to launch campaigns for securing their habitat, like 'Save the River Dolphin' project. WWF believes that if you secure an animal's habitat, you secure its right to live

2. CLEAN-INDIA

Deeply concerned with the deteriorating environmental situation in the country, Development Alternatives initiated the CLEAN-India (Community Led Environment Action Network) programme with five schools in the national capital in 1996. Today, CLEAN Delhi has about forty schools regularly involved in monitoring water and air quality in over 150 locations spread across Delhi. Over 2000 children have been directly trained on environmental assessment and improvement activities. They keep vigil, assess environmental quality, plead, cajole and lead the community in monitoring environment. Action programmes like solid waste management, plantation drives, energy conservation, paper recycling, etc. to improve local environmental conditions have also been initiated by schools, resident welfare associations, business and industrial associations as well as individual households.

Campaigns against the use of polybags, firecrackers during Diwali and toxic (chemicalbased) colours during Holi and for saving the city's 'Green Treasure' are also carried out.

The experience in Delhi indicates that when environment assessment is community based, it mobilises the community to review the local environmental conditions and take requisite measures, without waiting for undue external support.

Encouraged by the Delhi experience, NGOs from different towns have operationalised the CLEAN-India programme. The present CLEAN-India Centers are**:**

Delhi, Shillong, Faizabad, Ladakh, Bangalore, Berinag (Kumaon Hills), Jhansi, Sagar, Bilaspur, Lalitpur, Madurai and Thiruvananthapuram. Almost 100 NGOs from across the country have expressed their interest to initiate the programme in their respective towns.

3. TERI (INDIA)

Tata Energy Research Institute (TERI) was formally established in 1974 with the purpose of tackling and dealing with the immense and acute problems that mankind is likely to be faced with in the years ahead:

On account of the gradual depletion of the earth's finite energy resources which are largely non-renewable and on account of the existing methods of their use which are polluting TERI has launched a major project, the first phase of which is completing near completion. This project called growth with resource enhancement of Environment and nature (GREEN INDIA-2047)" has vigorously estimated the reduction in India's key natural resources during the period 1947-97, and has completed economic values of consequent loses, which in some cases are alarmingly high. On the basis of past experience and a careful analysis of the cost behind the degradation that has taken place in the past strategies for the future have been developed, Where by a fresh and creative approach can be taken in the next 50 years.

The global presence and reach attained by TERI are not only substantiated by its presence in different parts of the world, but also in terms of wide geographical relevance of its activities. Symbolic of this fact is the annual Delhi Sustainable Development Summit (DSDS), a major event focusing on sustainable