

Unit 3 Decision-making and post project activities

Mitigation measures and rehabilitation plans; Environmental Management plan- preparation, Green belt development; implementation and review; Policy and guidelines for planning and monitoring. Public hearing; Documentation of EIA findings, Report preparation, Post project audit – Ethical and Quality aspects of Environmental Impact, Environmental Audit.

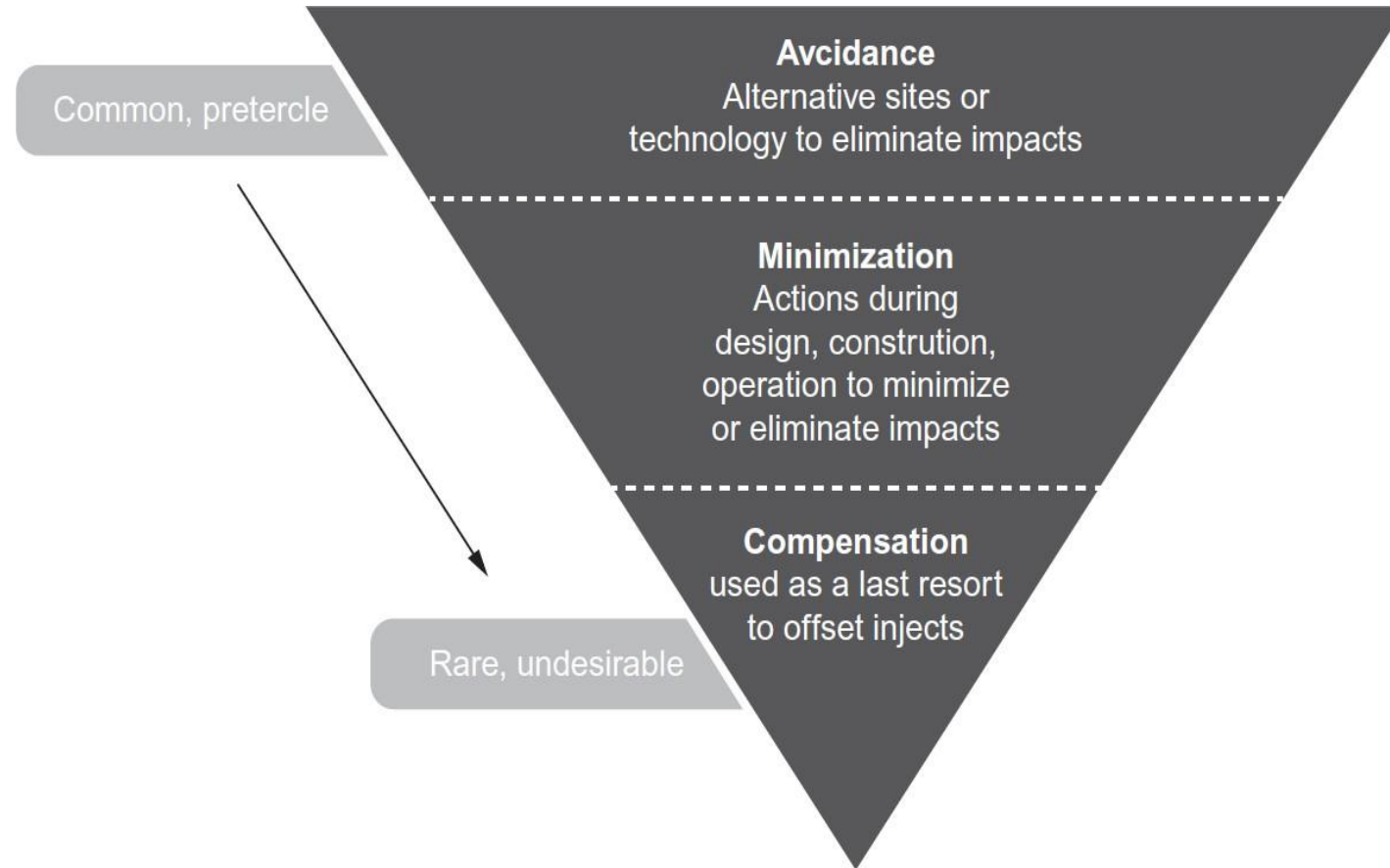
Steps in EIA process

- Screening
- Scoping
- Base line data
- Impact identification
- Prediction
- Evaluation
- Mitigation (some discussed in Unit 2 part 2)
- EIA preparation
- Public Consultation
- Review/Appraisal by EIA authority
- Environment audit



Draft EIA report preparation: PHASE 2

- The purpose of mitigation is to identify measures that safeguard the environment and the community affected by the proposed project.
- Mitigation is both a **creative and practical phase** of the (EIA) process.
- It seeks to find the best ways and means of ***avoiding, minimizing, and remedying impacts.***



Elements of Mitigation

Principles of Mitigation

- Give **preference** to avoid and preventive measures
- Consider **feasible alternatives** to the proposal and identify the best practical environmental option
- Identify **customized measures** to minimize each of the main impacts predicted
- Ensure they are **appropriate, environmentally sound and cost-effective**
- Use **compensation** or remedial measures as a last resort

Steps of Mitigation

- **Impact avoidance**
- **Impact minimization**
- **Impact compensation**

1. Impact avoidance

- Applied at an early stage of project planning.
- Not undertaking certain projects or elements that could result in adverse impacts;
- Avoiding areas that are environmentally sensitive

2. Impact minimization

- This step is usually taken **during impact identification and prediction** to limit or Reduce the degree, extent, magnitude, or duration of adverse impacts.
- Scaling down or relocating the proposal,
- Redesigning elements of the project, and
- Taking supplementary measures to manage the impacts.

3. Impact compensation

- Applied to remedy unavoidable residual adverse impacts.
- Rehabilitation of the affected site or environment
- Restoration of the affected site or environment to its previous state or better, as typically required for mine sites, forestry roads, and seismic lines; and
- Replacement of the same resource values at another location. For example, by wetland engineering to provide an equivalent area to that lost to drainage or infill.

Evaluation of mitigation strategy

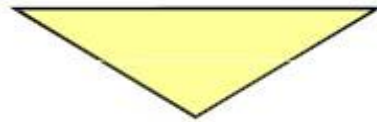
- *The extent to which this will avoid or reduce significant effects.*
- The evaluation of the strategy will take into account its
 - ❖ **Sustainability,**
 - ❖ **Integration,**
 - ❖ **Feasibility, and**
 - ❖ **Compliance** with statutory obligations under other licenses or approvals.
- It should outline the environmental management principles to be followed in the planning, design, establishment, and operation of the proposed development.
- It should include specific locational, layout, design, or technology features and an outline of ongoing management and monitoring plans.
- **The cost is usually about 10 % of the total cost of the project (although it depends on the nature, size, location etc. of the project)**

Do I mitigate **EVERY** impact? - Priority of impacts

NOT NECESSARILY.

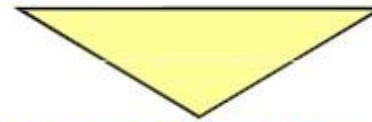
Mitigation is directed at two targets.

1 serious impacts



First, the most serious impacts identified by the EIA process should **ALWAYS** be mitigated.

2 easily mitigated impacts



After addressing the **most-serious impacts**, there may be small impacts for which, mitigation is easy and low-cost

Typical Mitigation measures for environment components

Control measures for water pollution	<ul style="list-style-type: none"> • Conjunctive use of ground/surface water, to prevent flooding/water logging/depletion of water resources.
	<ul style="list-style-type: none"> • Storm water drainage system to collect surface runoff
	<ul style="list-style-type: none"> • Minimize flow variation from the mean flow
	<ul style="list-style-type: none"> • Storing of oil wastes in lagoons should be minimized in order to avoid possible contamination of the ground water system
	<ul style="list-style-type: none"> • All effluents containing acid/alkali/organic/toxic wastes should be properly treated
	<ul style="list-style-type: none"> • All surface runoffs around mines or quarries should be collected, treated, and disposed
	<ul style="list-style-type: none"> • Monitoring of groundwaters
	<ul style="list-style-type: none"> • Neutralization and sedimentation of wastewaters, where applicable
	<ul style="list-style-type: none"> • Dewatering of sludges and appropriate disposal of solids
	<ul style="list-style-type: none"> • Included are land-use pattern, land filling, lagoon/ reservoir/garland canal construction, and rainwater harvesting and pumping rate

Case Study: Green Belts

- **Greenbelt** is often recommended as a part of the environment management plan (EMP).
- Depending on the size and magnitude of impacts, a minimum of **30% of total core area** of at least **10–15 m wide thick** greenbelt of **1500–2000 plants per hectare** is recommended as per the guidelines of the Central Pollution Control Board.

Main objectives of greenbelt

- isolate and protect the surroundings and neighboring areas of industries from **air, dust, and noise pollution**.
- Important to **the ecological health** of any given region.
- **To check the unrestricted sprawl** of large areas and to safeguard from encroachment.
- To minimize, confine, and restrict the adverse impacts of any **accident or natural calamity**.
- To act as **a sink for carbon dioxide, a source for oxygen** (To offset global warming).
- To act as a **stabilizer of climate** (Qualitative change in the local microclimate)

Design of Green belts

- The major consideration in greenbelt design and development is the **density (number per hectare) and width of the greenbelt**.
- Just a row of scattered and isolated trees will not form a greenbelt. Similarly, lawns and few ornamental herbs and shrubs are not going to make a greenbelt.
- Ideally, a green belt is a thick plantation of **at least 15 m width** on all sides of industrial units. The density of trees should be at least **1500–2000 trees per hectare** in 3 m x 3 m or 2 m x 2 m spacing.
- In certain cases such as high density plantations, it can be as high as 10,000 plants per hectare.

General criteria for selection of plants for greenbelts

- ❖ It is preferable to go for **tall and evergreen plants** that are locally adapted. Exotic species except those that got naturalized should not be introduced.
- ❖ **Trees with multiple uses** are more desirable than the useless fast growing species. They should be able to provide at least **non timber products** such as minor fruit, flower, and fodder.
- ❖ The plants chosen for greenbelts should be structurally and functionally **similar to the local trees**.
- ❖ Another criterion for selection is their **tolerance to pollution**, which is measured as air pollution tolerance index (APTI) for many of the trees grown in greenbelts and avenue plantations.
- ❖ Plants with thick canopy and high leaf area index are more preferable than others.
- ❖ **Resistance** to wind, cyclones, dust, heat, water logging or drought, etc. are among the other considerations.
- ❖ Even if it is the most suitable species, it is desirable to avoid monocultures (single species). **Polyculture or mixed culture** of different species is always better than a single species.

Environmental Management Plan (EMP)

- It is an organized plan required by law in an EIA report that is designed to assist in the implementation of Environmental Protection Measures (EPM).
- Essential to achieve **an environmentally sound design** by incorporating prevention and control, and compensatory and remedial measures.
- **What does EMP do?**
 - form the **basis for consultation and negotiation** on the EIA outcomes
 - Summarize environmental impacts identified in the EIA report.
 - Identify impacts that must be mitigated and describe mitigation measures.
 - Describe monitoring and reporting arrangements.
 - Provide costs estimates for mitigation and monitoring measures
 - **Verification** of mitigation measures and outcomes.
- It can be **prepared as a separate document or as a chapter in an EIA report.**
- In practice, it is accomplished by preparing separate plans for impact mitigation, monitoring and auditing of environmental parameters in an EIA report

Four Key Principles of EMP

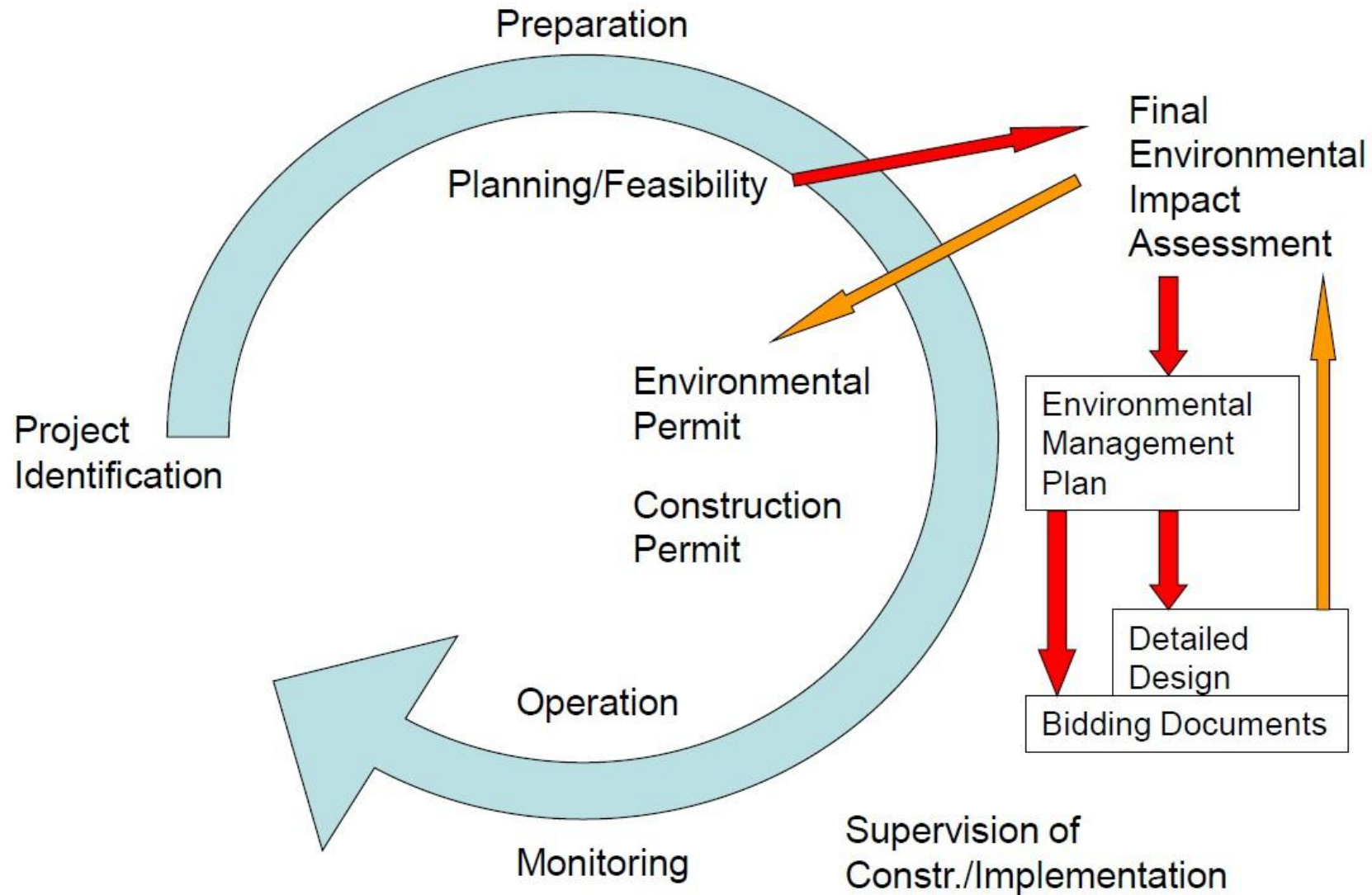
- **Integration:** *‘Ensuring that environmental concerns are integrated with planning and activities in other sectors is essential to the overall welfare and safety of beneficiaries.’*
- **Prevention Before Cure:** *‘Taking action as early as possible to minimize potentially large scale problems and irreversible effects.’*
- **Cost Effectiveness:** *‘With limited resources we must strive to maximize the efficiency of programs. Especially with environmental issues where a long-term approach is often required to support sustainable use and management of natural resources.’*
- **Local Participation:** *‘Involving local people with the development and management of environmental activities is fundamental to managing natural resources in a sustainable manner.’*

(UNHCR Environmental Guidelines August 2005)

What Regulations say about EMPs?

- Implementation of EMP is an integral part of overall project implementation
 - ❖ **For Category A projects, EMP is an essential feature of EIA**
 - ❖ For Category B projects, in some cases the EIA may be limited to EMP (no separate EIA report) – when issues are not significant or well within norms
 - ❖ The requirement of **EMP is included in the Financial Agreement**
 - ❖ EMP is an important part of the **project's Operation Manual**
 - ❖ **Any Loan borrower must report on compliance with EMP**

Integration of EMP into Standard EIA Practice



Contents for EMP

1. Details of the required technical works with necessary staff, supplies, equipment and costs during Pre-Construction; Construction, and Operational phases
2. Description of activities to be undertaken including consultation with the stakeholders, scheduling and expected output;
3. Designed operational plan for the implementation of EPMs that includes organizational chart with allocation of responsibilities including effective supervision, monitoring, auditing and reporting framework
4. Policy directives for the efficient functioning of EPMs and monitoring activities

In short, **POSDCORB** approach –

Planning; **O**rganizing: Use of Organizational Chart; **S**taffing; **D**irecting;
Coordinating; **R**eporting; **B**udgeting

Post monitoring details in EMP

S. no.	Activity	Schedule
<i>Air pollution monitoring</i>		
1.	Ambient air monitoring of parameters specified by CPCB in their air consents from time to time within the premises	Once every 3 months
2.	Ambient air monitoring of parameters specified by CPCB in their air consents from time to time at stations outside the premises	Once every season at each station
<i>Water pollution monitoring</i>		
3.	Monitoring of one sample of groundwater at site/nearby location. Parameters are essential parameters as per IS: 10500, 1991	Once in every season
<i>Noise-level monitoring</i>		
4.	Noise in the ambient atmosphere inside the premises	Once in a year
<i>Solid waste generation monitoring/record keeping</i>		
5.	Records of generation, handling, storage, transportation, and disposal of solid, aqueous and organic hazardous wastes as required by hazardous waste authorization	To be updated daily
<i>Environmental audit</i>		
6.	Environmental statement under the EP (Act), 1986	Once in a year

Environmental Management Plan

B. Monitoring

Proposed Mitigation Measure	Parameters to be Monitored	Location	Measurements (incl. Methods & equipment)	Frequency of Measurement	Responsibilities (incl. review and reporting)	Cost (equipment & individuals)
Pre-Construction Phase						
Construction Phase						
Operation and Maintenance Phase						
Total Cost for all Phases						

Example: Environmental Management Plan For a Power Plant Construction Project in X-land

B. Monitoring: Operation Phase

Potential Environmental Impacts	What <i>parameter is to be monitored?</i>	Where <i>is the parameter to be monitored?</i>	How <i>is the parameter to be monitored?</i>	When <i>is the parameter to be monitored?</i>
Air emissions of NO _x , SO ₂ , CO, and particulate matter (PM)	Emissions of air pollutants: (1) NO _x calculated as NO ₂ ; (2) SO ₂ ; (3) CO; (4) PM. The applicable standards are: (1) NO ₂ ≤ 400 mg/m ³ ; (2) SO ₂ ≤ 850 mg/m ³ ; (3) CO ≤ 150 mg/m ³ ; (4) PM ≤ 100 mg/m ³	At the stack of the power plant	By continuous monitoring equipment supplied with the power plant	Initial test at commissioning and annual subsequently. Continuous for NO _x and CO.
Air emissions of NO _x , SO ₂ , CO, and particulate matter (PM)	Ground level concentrations: (1) NO _x ; (2) SO ₂ ; (3) PM. The applicable environmental standards are: (1) NO _x : Annual average ≤ 40 µg/m ³ ; Max 24-hour average ≤ 150 µg/m ³ ; Max 30-min average ≤ 500 µg/m ³ (2) SO ₂ Annual average ≤ 40 µg/m ³ ; Max 24-hour average ≤ 150 µg/m ³ ; Max 30-min average ≤ 500 µg/m ³ (3) PM Annual average ≤ 50 µg/m ³ ; Max 24-hour average ≤ 125 µg/m ³ ; Max 30-min average ≤ 280 µg/m ³	In adjacent residential areas and/or nearest air quality monitoring stations	By buying data from the local air quality monitoring station	Once before commissioning of the plant and annually when the plant is in operation
Noise from construction works	Noise level, dB[A]. Applicable limits are 80 dB[A] on-site and 65 dB[A] off-site.	At 1 meter from operating turbines and in nearest residential areas	Measurements by a licensed organization using certified measurement devices	Once before commissioning of the plant and annually when the plant is in operation

Example: Environmental Management Plan For a Power Plant Construction Project in X-land

B. Monitoring: Construction Phase

	What <i>parameter is to be monitored?</i>	Where <i>is the parameter to be monitored?</i>	How <i>is the parameter to be monitored?</i>	When <i>is the parameter to be monitored?</i>
Potential Environmental Impacts				
Damage to vegetation	Clearing techniques and relocation procedures utilized; record of fees to environmental fund	Power plant site, pipeline and transmission line routes	Visual and by comparison with pre-construction photo survey	Monthly throughout construction period
Loss of fertile topsoil and soil erosion	Soil storage procedures and location	Soil storage sites	Visual	Weekly during site preparation and construction period
Air pollution by dust	Dust level	All active construction sites	Visual	During construction
Noise from construction works	Noise level, dB[A]	All active construction sites	Measurements by a licensed organization using certified measurement devices	During construction

Sample EMP Table format

Environmental Management Plan

A. Mitigation

	Project Activity	Potential Environmental Impacts	Proposed Mitigation Measures(s) (incl. Legislation & regulations)	Institutional Responsibilities (incl. Enforcement and coordination)	Cost Estimates
Pre-Construction Phase	1) 2) 3) ...				
Construction Phase	1) 2) 3) ...				
Operation and Maintenance Phase	1) 2) 3) ...				

Example: Environmental Management Plan

For a Power Plant Construction Project in X-land

A. Mitigation: Operation Phase

Project Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Institutional Responsibility	Costs
Liquid Fuel Combustion	Air emissions of NO _x , SO ₂ , CO, particulate matter, and volatile organic compounds (VOCs)	<ul style="list-style-type: none">•Low-NO_x burners and water injection to control NO_x;•Firing only low-sulfur (<0.1% by wt.) distillate fuel oil to control SO₂;•Good combustion control to control CO, PM and VOCs;•Stack height at least 45 m to facilitate dispersion.	<ul style="list-style-type: none">•Power plant operator•Power plant supply and installation (S&I) contractor	Rs. 12,00,000
Equipment Operation	Noise from equipment	Acoustic enclosures for the combustion turbines to ensure that noise does not exceed 80 dB(A) at 1 m	<ul style="list-style-type: none">•Power plant operator•S&I contractor	Rs. 4,00,000

Example: Environmental Management Plan For a Power Plant Construction Project in X-land

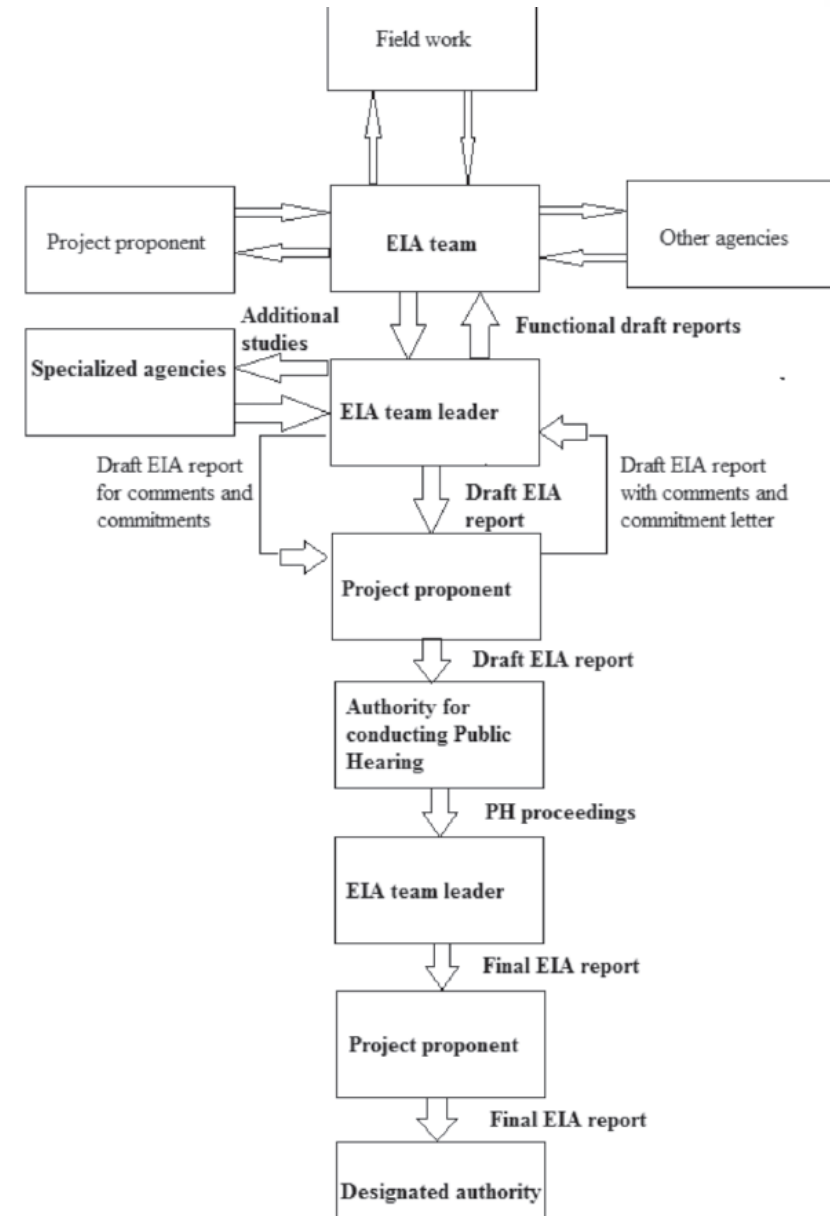
A. Mitigation: Construction Phase

Project Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Institutional Responsibility	Costs
Use of land within power plant construction area, along gas pipeline route, and along the transmission line route	Damage to vegetation	Appropriate clearing techniques (hand clearing, not mechanized clearing) will be utilized. Any trees of protected species will be relocated. In case relocation is not possible, the project developer will pay a special fee to the local environmental fund.	Contractor/ Plant Operating Company	Rs. 3,00,000
Use of land within power plant construction area, along gas pipeline route, and along the transmission line route	Loss of fertile topsoil and soil erosion	Fertile topsoil will be removed, stored in an isolated area away from construction activities, and covered with plastic to prevent runoff/erosion. Upon construction completion, topsoil will be returned and the area revegetated with plants similar to the original vegetation/native to the area.	Contractor/ Plant Operating Company	Rs. 2,80,000
Construction works	Air pollution by dust	When necessary, construction site will be sprayed with water, particularly during hot, dry, windy conditions.	Contractor/ Plant Operating Company	Rs. 4,00,000
Construction works	Noise from construction works	Construction will be confined to normal work-hours (8AM to 6PM). If construction must be conducted before/after these hours, local public will be notified at least one week in advance.	Contractor/ Plant Operating Company	-

Step 8 Impact assessment: EIA Report

The Draft EIA report

1. Introduction
2. Project Description
3. Description of the Environment
4. Anticipated Environmental Impacts & Mitigation Measures
5. Analysis of Alternatives (Technology & Site)
6. Environmental Monitoring Program
7. Additional Studies
8. Project Benefits
8. Environmental Cost Benefit Analysis
9. Environment Management Plan
10. Summary & Conclusion
11. Disclosure of Consultants engaged



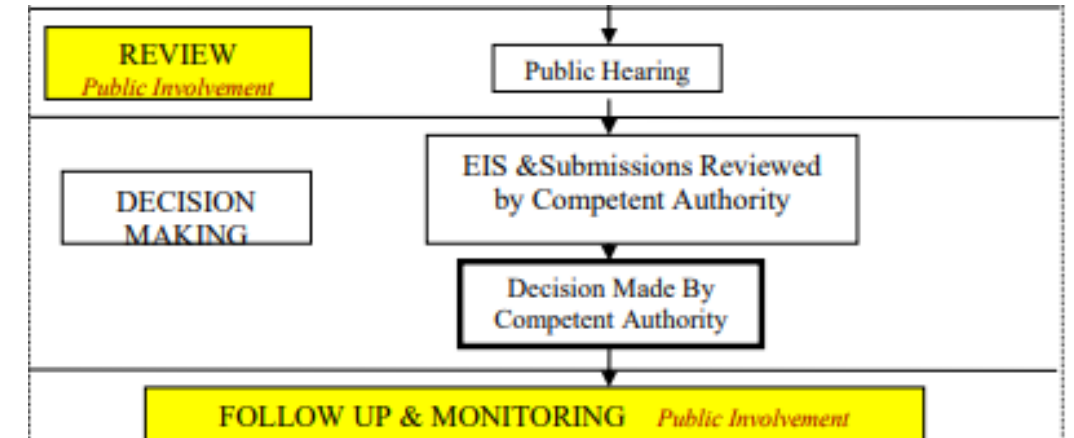
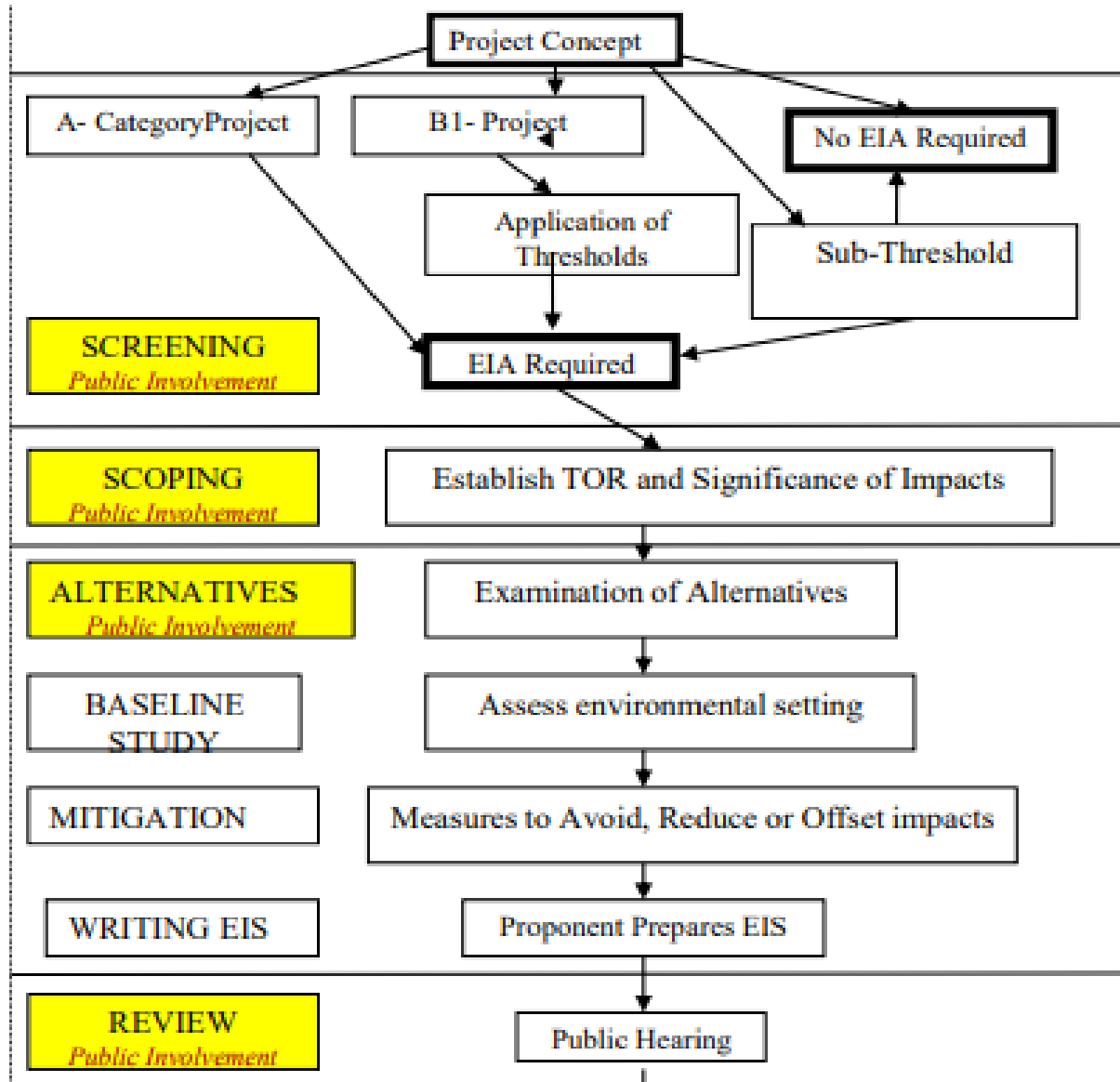
Steps in EIA process

- Screening
- Scoping
- Base line data
- Impact identification
- Prediction
- Evaluation
- Mitigation (discussed in Unit 2 part 2)
- EIA preparation
- Public Consultation
- Review/Appraisal by EIA authority
- Environment audit



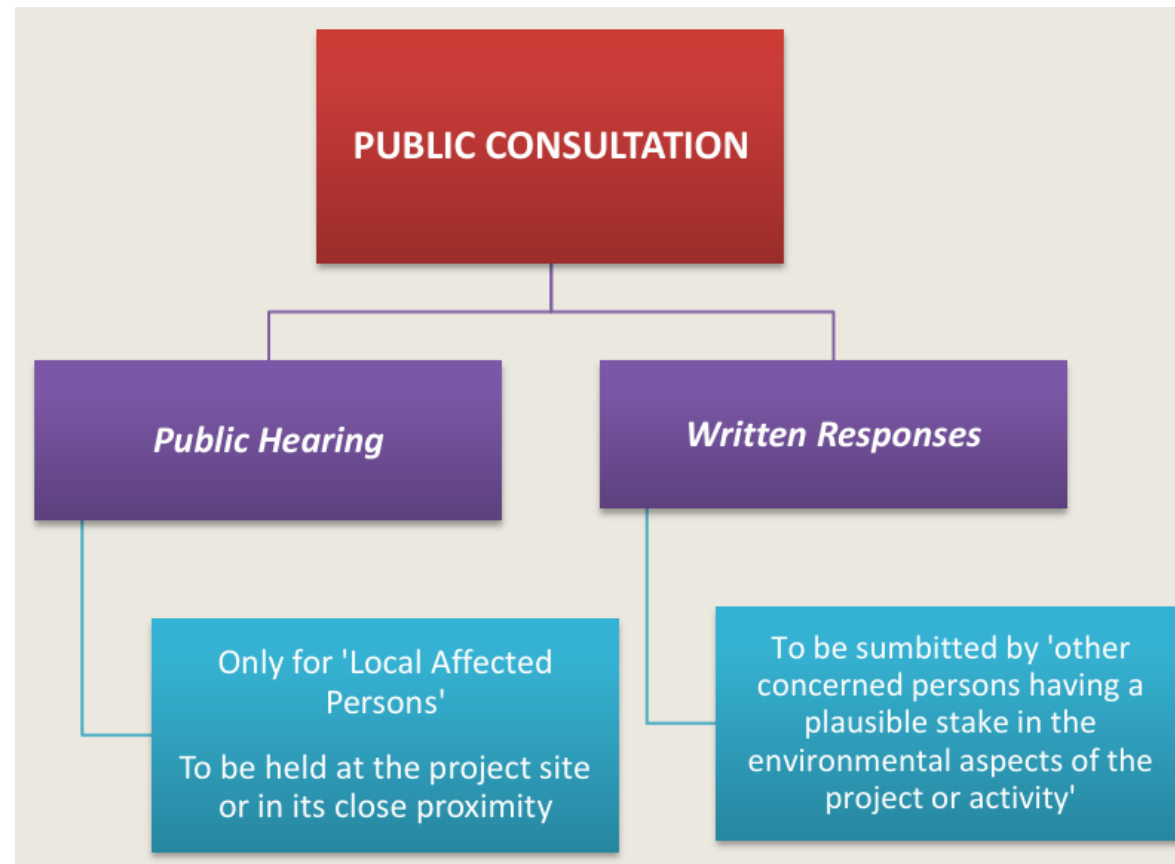
Draft EIA report preparation: PHASE 2

9. Public hearing



Public hearing

- form of participation in which stakeholders and proponents are brought together in a forum to express their opinions and offer suggestions on a proposed undertaking in order to influence the decision-making process



Objectives of public involvement

The key objectives of public involvement are to

- obtain **local and traditional knowledge** that may be useful for decision-making;
- facilitate consideration of **alternatives, mitigation measures**, and trade-offs;
- ensure that important impacts are not **overlooked** and benefits are maximized;
- reduce conflict through the **early identification** of contentious issues;
- provide an **opportunity for the public** to influence project design in a positive manner (thereby creating a sense of ownership of the proposal);
- improve **transparency and accountability** of decision-making;
- increase **public confidence** in the EIA process.

Key principles for Public Participation

Key principles for public involvement, which are widely agreed, are outlined as follows:

- **Inclusive** — cover all stakeholders
- **Open and transparent** — steps and activities are understood
- **Relevant** — focused on the issues that matter
- **Fair** — conducted impartially and without bias toward any stakeholder
- **Responsive** — to stakeholders' requirements and inputs
- **Credible** — builds confidence and trust

Who will be involved?

- Panel members
 1. EAC members from centre and state
 2. Collector, magistrate, Deputy commissioner
 3. PCB officers

Role of panel:

Only to record proceedings of hearing; cannot recommend for grant of EC

- Project proponent
- Vulnerable community

Documents for public hearing

- Draft EIA report
- Summary EIA report
- Local language as well as English
- Documents should be made public at least 30 days prior to date of public hearing

Public hearing can be hampered by

- Lack of understanding of project proposals
- Absence of NGOs to assist communities
- Misleading of communities

Benefits and difficulties of public participation

Benefits	Difficulties
<ul style="list-style-type: none">• Improved understanding• Identification of alternative and mitigation measures• Clarification of trade-offs for each alternative• Identification of forums to resolve issues• Induces of transparent procedures• Creation of accountability and sense of local ownership	<ul style="list-style-type: none">• Difficult to identify all affected parties• Communication difficulty due to linguistic and cultural diversities• Illiteracy• The lack of local knowledge on the projects• Unequal access to consultants• Time/cost implications

How one should prepare for the public consultation

1. Get Report/Agenda Ready

1. Site sensitivity

2. Stress on environment

3. Technology

4. Pollution control
measures

5. Issues related material
handling and storage

6. Case of cut and paste

7. Details on sensitive
issues

8. Violation to express
grievances

9. Complete information
and adhering to the
committed actions

2. Prior to public hearing

- the **selection** of **site** for the meeting (*Close proximity of the proposed project*)
- Selection of **date** in consultation with proponent, authority and affected communities
- **Letters should** be sent to government departments about public hearing.

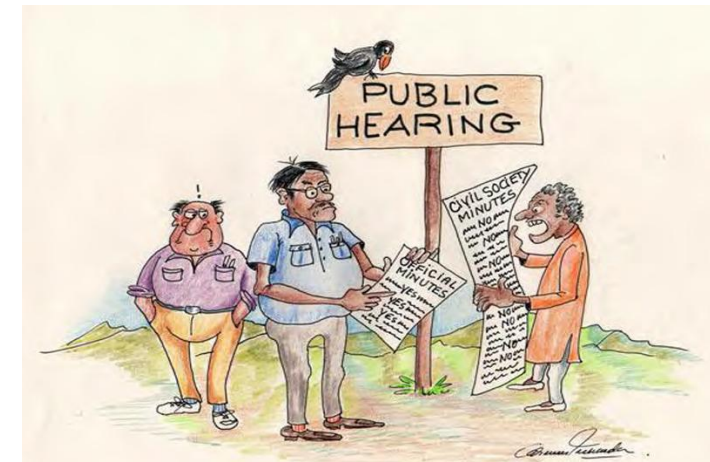
*Eg: Mining project → Ministry of mines and energy,
Regional administration, district assembly*

- posting of **notices, advertisement in all national newspapers, Radio and TV, and local TV channels**, posting of notices in local areas
- Notice has to be published at least **30 days** before the date of public hearing
- invitation of stakeholders
- selection of **panelists**
- **a reconnaissance trip to the project area of influence**

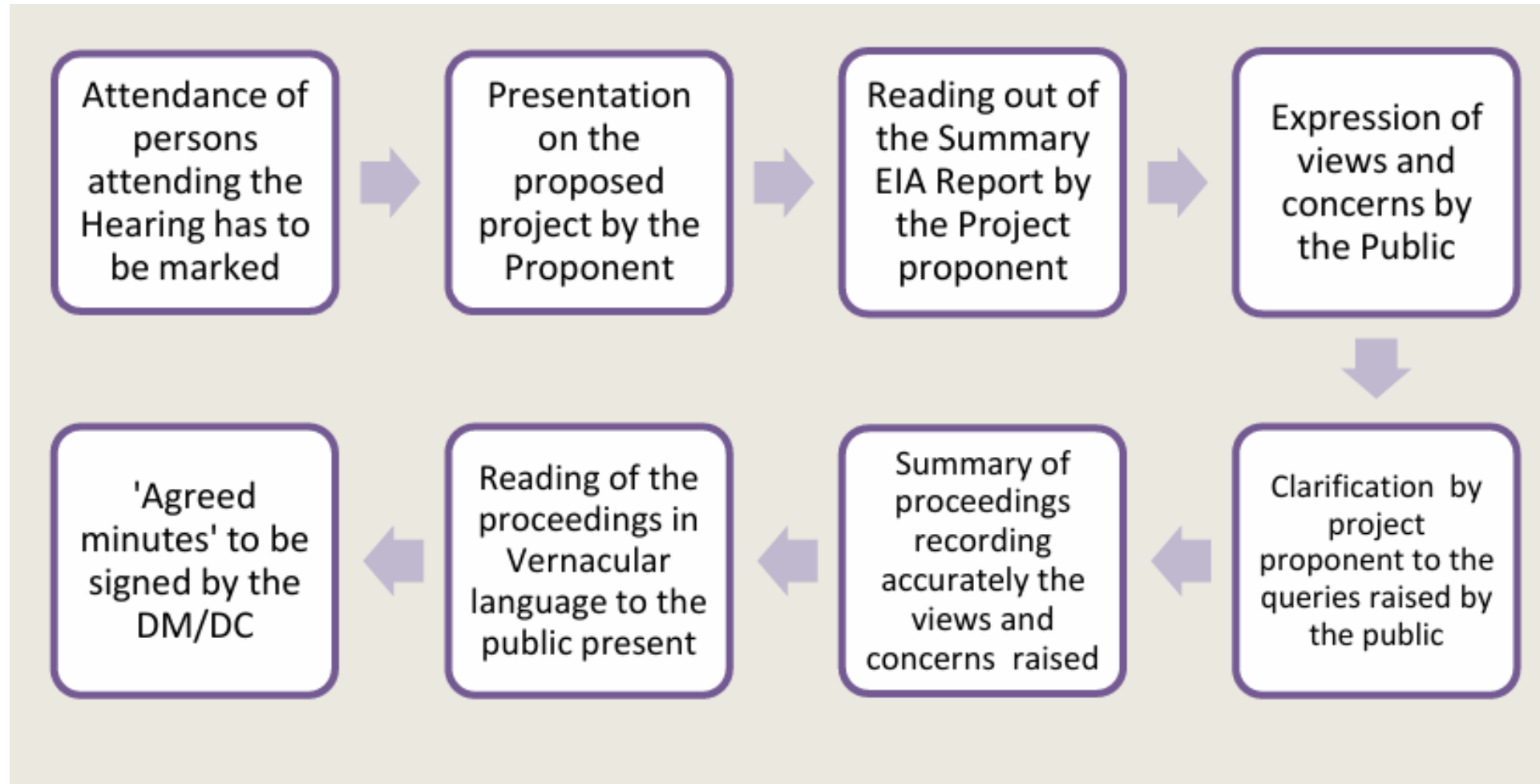


3. During public hearing

- the introduction of **panelists, government staff, NGOs, representatives** of all community groups
- the **purpose and objectives** of the public hearing should be made clear to participants
- the proponent will make a presentation on the project. Done in local language
- representatives and stakeholders present their opinions and concerns
- Questions should be directed at the contents of the EIA report
 - * Expertise of EIA consultant
 - * Scientists involved in studies
 - * when the study conducted
 - * Alternatives consideration
 - * Details of technology
- **Panel members collate all findings** and recommendations for EC
- **Minutes/Proceedings of hearing should be displayed in collector office, PCB, website**



There is no requirement that the Public Hearing should be completed in a single day; can be repeated also



If a Public Hearing is faulty and gave EC?

- Bring to the notice of the **Public Hearing panel**
- Environmental Clearance can be challenged before the **National Green Tribunal** based in New Delhi
- To be done **within 30 days** from the date when **environmental clearance** is granted.
- Extended to 90 days if the Tribunal is satisfied with the reasons provided for the delay.

How to know EC is given?

- MOEFCC website (<https://parivesh.nic.in/>)

Projects do not require Public Hearing

- Modernization of **irrigation projects**
- All projects or activities **located within industrial estates** or parks
- **Expansion of Roads and Highways** which do not require any further land acquisition
- Area Development projects and **Townships**
- All projects or activities concerning **national defence and security** or involving other strategic considerations as determined by the Central Government.

Steps in EIA process

- Screening
- Scoping
- Base line data
- Impact identification
- Prediction
- Evaluation
- Mitigation (discussed in Unit 2 part 2)
- EIA preparation
- Public Consultation
- Review/Appraisal by EIA authority
- Environment audit



Draft EIA report preparation: PHASE 2

10. Decision making

Decision making

- political choice between alternative directions weighing the benefits and costs negotiation, bargaining and trade offs balancing economic, social and environmental factors
- Continuous process comprising of
 - Interim decision at each stage of EIA

Decisions:

- proposal approved
- proposal approved with conditions
- proposal on hold pending further study
- proposal returned for revision and resubmission
- proposal rejected

Steps in EIA process

- Screening
- Scoping
- Base line data
- Impact identification
- Prediction
- Evaluation
- Mitigation (discussed in Unit 2 part 2)
- EIA preparation
- Public Consultation
- Review/Appraisal by EIA authority
- Environment audit



Draft EIA report preparation: PHASE 2

- ensure that **the terms and conditions** of environmental approval are **met**.
- ensure that the suggested feasible, practical, affordable, and likely to be successful **mitigation measures** are **implemented**.
- **monitor** the environmental impacts of developmental projects and **the effectiveness** of mitigation measures.
- monitor sustainable **environmental management** .
- enhance the control, management, knowledge, and **legitimize the acceptance** of the project.
- **strengthen future EIA** applications and mitigation measures.
- **Improved environmental quality.**

Challenges

- Cost incurred
- Accessibility of relevant data and information
- Ability to enforce decisions