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Electric and Autonomous Vehicles

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Environmental Impact Assessment (EIA)

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TABLE OF CONTENTS

1. ENVIRONMENTAL IMPACT ASSESSMENT IN CONTEXT

Over the last five decades there has been a remarkable growth of interest in environmental issues – in sustainability and the better management of development in harmony with the environment. The growing awareness of the environmental impacts on the ecosystem highlighted in various reports and protocols issued by international agencies has prompted governments in different countries to continuously update their environmental laws. Associated with this growth of interest has been the introduction of new legislation and guidance, emanating from national and international sources, such as the European Commission and the World Bank/International Finance Corporation, that seek to influence the relationship between development and the environment. As a response to increasing concern regarding the environmental issues the process of an Environmental Impact Assessment (EIA) was established.

Environmental Impact Assessment is one of the most important tools employed in the contemporary environmental management and in the environmental policy of sustainable development. A core principle of sustainable development is to improve human well-being and to sustain these improvements over time without destroying the environment and without endangering the future welfare of people and the planet. But the consequences of climate change and the growing demand for energy and resources are making this objective more challenging. Attaining sustainability requires addressing many fundamental issues at local, regional, and global levels, and achieving the goals of sustainability presents a great challenge for all segments of society.

Environmental Impact Assessment helps us to analyse both the positive and negative impacts of any proposed activity and the subjective reduction of their negative impacts with the purpose of identification, examination, assessment, and evaluation of the likely and probable impacts and, thereby, helps to work out remedial action plans to minimize the adverse impacts. It is an important management tool for ensuring the justified use of natural resources during developmental process by focusing on the problems, conflicts, or natural resource constraints that could affect the viability of a project. It also examines the implications of a project that might harm people, their homeland or their livelihoods, or other nearby developments.

Environmental Impact Assessment is valuable, *interdisciplinary* objective *decision-making tools* with respect to alternate the routes for development process the technologies and projects. Moreover, it is an anticipatory mechanism, which establishes quantitative values for parameters indicating the quality of the environment before, during and after the proposed development activity, thus allowing measures that ensure environmental compatibility. In addition, it presents a clear and concise picture of all benefits and costs associated with the alternative courses of action and provide a mechanism for merging the concerns for environment and economics in the process of decision-making.

2. WHAT IS EIA?

Environmental Impact Assessment (EIA) is a *systematic process* to identify, analyse, predict, and evaluate in complexity the expected direct and indirect significant adverse impacts of proposed activities or projects relative to the physical, chemical, biological, cultural, and socio-economic components of the total environment. This process is applied prior to their permission, thereby allowing the avoidance measures to be taken. The emphasis, compared with many other mechanisms for environmental protection, is on prevention, when prevention is better than remedy. It is important that the EIA looks at alternatives that can minimise an environmental impact and maximise potential benefit.

The EIA definition adopted by the EU EIA Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment is

"Environmental impact assessment means a process consisting of:

- *(i) the preparation of an environmental impact assessment report by the developer, as referred to in Article 5(1) and (2);*
- *(ii) the carrying out of consultations as referred to in Article 6 and, where relevant, Article 7;*
- *(iii) the examination by the competent authority of the information presented in the environmental impact assessment report and any supplementary information provided, where necessary, by the developer in accordance with Article 5(3), and any relevant information received through the consultations under Articles 6 and 7;*
- *(iv) the reasoned conclusion by the competent authority on the significant effects of the project on the environment, taking into account the results of the examination referred to in point (iii) and, where appropriate, its own supplementary examination; and*
- (v) *the integration of the competent authority's reasoned conclusion into any of the decisions referred to in Article 8a."*

EIA is a *problem-solving approach* that focuses on conflicts, problems, or natural resource constraints that could affect the viability of a project, besides examining the project implications that affect the livelihood and household of people or other nearby developments. After predicting the problems, it identifies measures to minimize it and outline the ways to improve the project suitability for its proposed environment. As all the human activities have one or the other kind of impact that may be significant or insignificant, positive or negative, the negative and harmful effects are often far more common than the useful ones. Thus, there is a pressing need to evaluate the potentialities of a proposed project before it is undertaken. EIA provides a unique opportunity for mitigation measures to be incorporated into the planning process to minimize the problems. It further enables the monitoring programs to assess and establish future impacts and provide data on which managers can take informed decisions to avoid environmental damages.

An important characteristic of EIA is *public involvement* that is a valuable source of information on key impacts, potential mitigation measures and the identification and selection of alternatives. It ensures the EIA and decision-making process is open, transparent, and robust, and contributes to more informed choice and better environmental outcomes.

2.1. PRINCIPLES AND OBJECTIVES OF EIA

The EIA has been developed as a result of the failure of the traditional project appraisal techniques to account for the environmental impacts. In the past, many development projects were designed and constructed in an isolation from any consideration of their impacts on the environment, resulting in higher costs, failure of projects, significant environmental change, or negative social effects.

The *main aim of EIA* is to ensure that projects that are likely to have a significant effect on the environment are adequately assessed before they are approved. Because the impact assessment is based on a wide range of environmental factors, including population and human health, biodiversity, land, soil, water, air, climate, landscape, material assets, and cultural heritage, as well as on the interactions between these various elements, EIA has the potential to promote the development that is sustainable and optimizes the resource use and management opportunities. Providing a systematic examination of the environmental implications of a proposed action and alternatives before a decision is taken, the EIA is an assist tool which allows the decision makers to understand a proposed project's impacts in all its phases.

Objectives of EIA can be divided into two categories. The *immediate objectives* are to:

- improve the environmental design of the projects,
- ensure that resources are used appropriately and efficiently,
- identify appropriate measures for mitigating the potential negative impacts of the project, and
- facilitate the informed decision-making, including setting the environmental terms and conditions for implementing the project.

The *long-term objectives* are primarily aimed to:

- protect human health and safety,
- predict and avoid the irreversible changes and serious damage to the environment,
- protect the natural systems, resources, and the ecosystem components,
- promote the development that is sustainable and optimizes the resource use and management opportunities, and
- enhance the social aspects of the project.

The *basic principles* that govern the entire process of EIA, e.g. screening, scoping, identification of environmental impacts, and assessment of alternatives mean that EIA should be:

1) *Participative* – Process should provide appropriate opportunities to inform and involve the interested and affected publics, and their inputs and concerns should be addressed explicitly in the documentation and decision-making.

2) *Transparent* – EIA should have clear, easily understood, and open process with early notification procedure, ensure the public access to information, and a public record of decisions taken and reasons for them.

3) *Certainty* – The evaluation process and the duration of the assessment should be agreed in advance and to be observed by all participants.

4) *Accountability* – Decision-makers have the responsibility to take the appropriate actions and decisions in the assessment process.

5) *Credible* – EIA should be carried out with professionalism, rigor, fairness, objectivity, impartiality, and balance, and be subject to independent checks and verification.

6) *Cost-effective* – EIA and its results should guarantee the environmental protection at the lowest cost for society.

7) *Efficient* - The process should impose the minimum cost burdens in terms of time and finance on proponents and participants consistent with meeting accepted requirements and objectives of EIA.

7) *Focused* - The process should concentrate on significant environmental effects and key issues, i.e., the matters that need to be taken into account in making decisions.

8) *Adaptive* – EIA should be able to adapt and deal effectively with any proposal and newly occurred situation without compromising the integrity of the process, and be iterative, incorporating lessons learned throughout the proposal's life cycle.

9) *Practical* – EIA should identify measures for impact mitigation that work and can be implemented.

10) *Interdisciplinary* - EIA should ensure that the appropriate techniques and experts in the relevant bio-physical and socio-economic disciplines are employed, including use of traditional knowledge as relevant.

11) *Systematic* - Process should result in full consideration of all relevant information on the affected environment, of proposed alternatives and their impacts, and of the measures necessary to monitor and investigate residual effects.

12) *Rigorous* - Process should apply “best practicable” science, employing methodologies and techniques appropriate to address the problems being investigated.

The *principles are interrelated*, for example an impact assessment process that is systematic is more likely to be credible, whilst a focused and efficient process is more likely to also be

cost-effective. They should be applied as part of systematic and balanced approach, having regard to the context and circumstances.

EIA can be, and is now often, seen as a positive process that seeks a harmonious relationship between development and the environment. The nature and use of EIA will change as the relative values and perspectives also change.

2.2. EIA'S PURPOSE AND BENEFITS

Human well-being is closely connected to environmental sustainability. As a result, all forms of human development such as building infrastructure (i.e., roads and pipelines, mines, and tourism facilities etc.) have an impact on the surrounding natural environment and vice versa. This is evident when we consider the results of large-scale development like hotels for thousands of people, large hydroelectric dams or production capacities that often have irreversible impacts on the environment and the livelihoods of people because of large-scale deforestation, excessive water use, habitat destruction, etc..

Due to the complex relationship between the natural and human environments, it is very important to try to predict the environmental and social impacts of projects and planned developments that may alter the quality of the environment and impact well-being. As the human population continues to increase and natural resources become more limited, the importance of improving the sustainability of development and identifying mitigation measures and thus, the importance of creating high-quality EIAs becomes greater.

The *main advantages* resulting from the environmental assessment can be summarized:

- It ensures reducing costs and improving the quality of decision-making. A smooth and streamlined permission process is the key to the timely implementation of projects.
- The application of environmental assessments leads to improvements in environmental quality with resulting avoided damage to local populations, human health, nature, etc. The reduced negative environmental impacts in many cases are due to redesign and modification of projects, mitigation of impacts or the choice of more environmentally favourable options.
- The main added value of the EIA process is the possibility to assess various reasonable alternatives and improves the project design. It provides a comparison of options in terms of location and technologies, upon which to make the final decision and, if necessary, to adjust the project in its early development stages to minimise environmental impacts.
- It maximizes transparency and social acceptance of projects. Consultations with the public, environmental, local, and regional authorities are key features of the EIA procedure. Making information available ensures less resistance due to better stakeholder involvement and information disclosure and can help avoid (or minimize) litigation.

2.3. KEY EIA TERMINOLOGY

Term	Explanation
Alternatives	Different ways of carrying out the project in order to meet the agreed objective. Alternatives can take diverse forms and may range from minor adjustments to the project, to a complete reimagining of the project.
Baseline scenario	Description of the current status of the environment in and around the area in which the project will be located. It forms the foundation upon which the assessment will test.
Competent Authority	The authority which the Member States designate as responsible for performing the duties arising from the Directive.
Cumulative impacts	Changes to the environment that are caused by an activity/project in combination with other activities/projects.
Developer	The applicant for a development consent on a private project or the public authority which initiates a Project.
Development Consent	The decision of the Competent Authority which entitles the developer to proceed with the project.
Impact (Effect)	Any change in the physical, natural, or cultural environment brought about by a development project.
EIA process (EIA)	The process of carrying out an Environmental Impact Assessment as required by EU Directives. EIA process is composed of different steps: preparation of the EIA report, publicity and consultation, and decision-making.
EIA Report	It is the document prepared by the developer that presents the output of the assessment. It contains information regarding the project, its significant effect, the baseline scenario, the proposed alternatives, the features and measures to mitigate adverse significant effects as well as a non-technical summary and any additional information specified in Annex IV of the EIA Directive.
Enhacement	Improving elements of the environment.
Mitigation Measures	Changes to the proposed developments design or specified future actions that are intentionally designed to avoid, prevent, or reduce predicted adverse environmental impact.
Monitoring Measures	Procedures to keep under systematic review the significant adverse effects on the environment resulting from the construction and operation of a project, and to identify unforeseen significant adverse effects, to be able to undertake appropriate remedial action.
Compensatory Measures	Replacing an adverse impact either in kind or by something of a different nature to that which may be lost.
Non-Technical Summary	An easy-to-follow and understandable summary of the information included in the EIA Report addressed to a non-technical audience.

Project	The execution of construction works or of other installations, and/or other interventions in the natural surroundings and landscape including those involving the extraction of mineral resources.
Public Concerned	The public affected or likely to be affected by, or having an interest in, the environmental decision-making procedures.
Reasoned Conclusion	The explanatory statement made by the Competent Authority on the significant effects of the project on the environment, based on the examination of the EIA report and on the results of its own supplementary examination.
Screening	The process of determining whether a project listed in Annex II of the EIA Directive is likely to have significant environmental effects and EIA is required.
Screening Decision	Decision taken by the Competent Authority on whether a project listed in Annex II will be made subject to the EIA procedure.
Scoping	The process of identifying the content and extent of the information on key environmental issues to be submitted to the Competent Authority under the EIA process.
Scoping Opinion	The Competent Authority's decision on the scoping process.

3. EIA SYSTEM

As a consequence of increasing general public awareness of environmental issues after the second world war, as well as growing first hand evidence of the environmental consequences of industrial activities and infrastructure as such, public and private projects were gradually facing an increasing level of both public and institutional scrutiny in the United States, followed by Australia, Canada, Sweden, New Zealand, but later also in other countries over the world.

The first formal incorporation of the impact assessment process in a legislative form is represented by the National Environmental Policy Act (NEPA) enacted in the United States in 1970. The most significant outcome of NEPA was the requirement that all executive federal agencies have to prepare environmental assessments and environmental impact statements, addressing the potential environmental effects of their proposed actions, and release it to the public, to demonstrate how these considerations had been recognized. The NEPA has become a model for EIA systems introduced in other countries over the world.

In the international arena, formal establishing of EIA has progressed steadily over the last 20 years, gaining momentum from rising political acceptance of the problems associated with climate change, loss of biodiversity, threats to water sources and water quality, and other forms of the global environmental change. Hence, the environmental impact assessment, or sometimes simply the environmental assessment (EA), is recognized in a large number of international conventions, protocols, and agreements:

- the Convention on Transboundary Environmental Impact Assessment in a Transboundary Context (The Espoo Convention, 1991) that aims to ensure that the environmental impact of certain activities that are likely to have a significant adverse transboundary (cross-border) impact will be assess at an early stage of their planning;
- the Convention on Wetlands of International Importance (The Ramsar Convention, 1971) that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources;
- the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (The Aarhus Convention, 1998) that protects every person's right to a healthy environment, and grants the public rights and imposes obligations on public authorities on access to information and public participation and access to justice;
- the United Nations Framework Convention on Climate Change (1992);
- the United Nations Convention on the Law of the Sea (1982);
- the Protocol on Environmental Protection to the Antarctic Treaty (1991).

The latest search for the extent of EIA implementing indicated that 191 of the 193 member nations of the United Nations either have the national legislation or have signed some form of international legal instrument that refers to the use of EIA.

In Europe, the relevant work started under the aegis of the United Nations' Economic Commission for Europe (UNECE) in the 1970s. After years of consultation, the European Commission passed the first EIA Directive (85/337/EEC), which was adopted in 1985, and over the next three decades, amended several times.

Under the umbrella of the EIA the various specific forms have developed since the 1970s, e.g., social impact assessment (SIA), health impact assessment (HIA), or strategic environmental assessment (SEA). SEA is promoted as a way to extend impact assessment to higher level decision-making at policy, strategic programme and plan, a reaction to the project orientation of most EIA applications. A related approach, sustainability assessment (SA), has emerged in recent years, its focus being more specifically on sustainability criteria in the assessment of policies, plans or projects.

3.1. THE EUROPEAN UNION REGULATIONS ON EIA

The environment policy helps the European Union's (EU) economy to be more environmentally friendly, protects Europe's natural resources, and safeguards the health and wellbeing of people living in the EU. The integration of environmental concerns into other EU policy areas has developed to a key concept in the European policymaking. The main tool for ensuring the proper integration of environmental concerns into the decision-making process of projects became the environmental impact assessment procedure. Its aim is to provide a

high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation process of projects with a view to reducing their environmental impact. It ensures the public participation in decision-making and thereby strengthen the quality of decisions.

In Europe, relevant work started in the 1970s. After years of consultation, the European Commission passed the first Directive on the assessment of the effects of certain public and private projects on the environment (85/337/EEC), so called the EIA Directive, which was adopted in 1985. It stipulated the minimum procedural requirements for an EIA process and defined the projects that need to undergo EIA in order to attain the protection of the environment and the quality of life.

However, 10 years after the Directive was agreed, Member States were still carrying out widely diverse forms of EIA. The reason was that Member States have a certain degree of freedom in implementing the Directive, which had an impact on the quality and effectiveness of EIA. This was due to the differences in the political and social dynamics, legal and administrative frameworks, culture, and history. However, the rapid spread of the EIA concept and its central role in many countries' programmes of the environmental protection have confirmed the EIA as a proactive planning tool.

To improve the situation, the Directive has been amended in 1997, 2003, and 2009 to reflect international commitments taken by the EU under the Espoo and the Aarhus Conventions, and developments in other environmental legal areas. The Espoo Convention on EIA in a Transboundary Context widened the scope of the EIA Directive by increasing the types and number of projects covered and requiring mandatory environmental impact assessment. The amendment from 2003 was seeking to align the provisions on public participation with the Aarhus Convention on public participation in decision-making and access to justice in environmental matters. In 2009, the Annexes I and II of the EIA Directive have been changed by adding the projects related to the transport, capture and storage of carbon dioxide (CO2).

In 2011, the EIA Directive was consolidated in one legal act (EU Directive 2011/92/EU) and finally, amended again in 2014 (EU Directive 2014/52/EU). The last introduced changes aimed to reinforce the level of environmental protection, taking into account emerging challenges such as biodiversity, climate change, disaster and risk prevention, and resource efficiency, and at the same time reducing administrative burdens stemming from the EU law.

Over time the scope of EIA has been widened to also encompass the policies, plans and programmes at the larger scales, longer time frames and greater uncertainties. Such upper-scale assessments are today known as the strategic environmental assessment (SEA). The practice of SEA was particularly strengthened after the publication of the European Directive 2001/42/EC, which pushed for strategic assessments in the European Union. Tiering in environmental assessment and organized transfer of information from one level of planning and decision-making to another, e.g., from policies and plans to projects, or from SEAs to EIAs are shown in Fig. 1. There is the other EU legislation that may apply to plans, programmes, and projects, such the Water Framework Directive, Waste Framework

Directive, Habitats and Birds Directives, Landfill Directive, Industrial Emissions Directive, Marine Strategy Framework Directive, Seveso Directive, or Ambient Air Quality Directive, and should be taken into account when the assessment is carried out.

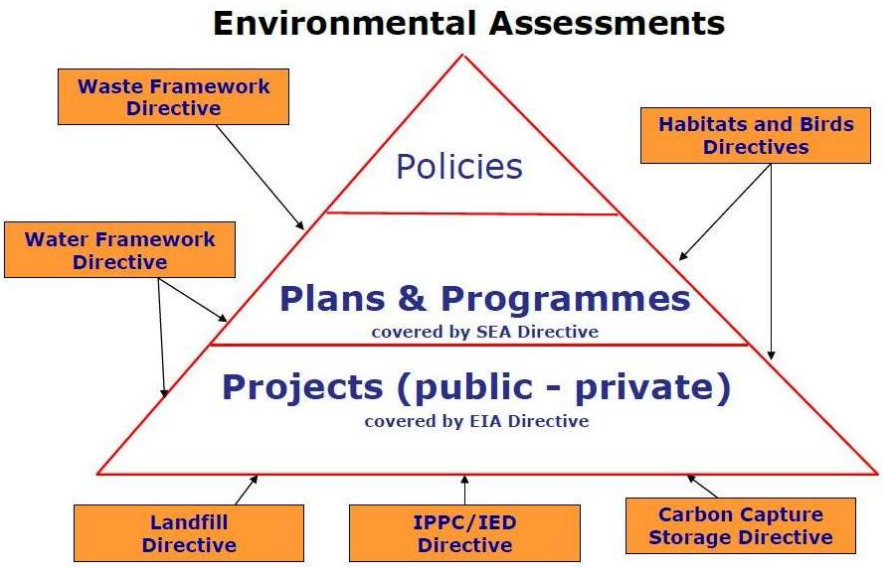


Fig. 1 Synergies between environmental assessments, the EIA/SEA Directives, and EU environmental laws

More than 30 years of application of the EIA Directive has shown that it is the one of the most cross-cutting pieces of the environmental legislation. It has ensured that basic principles for the assessment of numerous project categories were applied across the EU. In addition, its implementation has created the specific national dynamics. Member States have often built on the minimum requirements of the Directive and have later exceeded them, by introducing more stringent provisions, to ensure better environmental protection and more transparency.

4. EIA'S PROCESS

There are thousands of different types of EIA processes in the world. This is because the EIA can be applied to development proposals of different sizes, scales, and sectors; and the many decision-making contexts may accommodate different assessment scopes, procedures, technologies, information sources, participation techniques, etc. Despite this diversity, all EIA processes reflect some key stages.

The typical EIA process consists of a structured series of steps, which involve some iteration whereby some steps are revisited in the light of findings of subsequent steps. Not all the steps are needed for every application, and the extent to which they are implemented can vary.

Screening determines whether or not a proposal should be subject to EIA, and if so, at what level of detail.

Scoping seeks to identify at an early stage, from all of project's possible impacts and from all the alternatives that could be addressed, those that are the crucial, significant issues.

The consideration of alternatives seeks to establish the preferred or most environmentally sound option for achieving the objectives of a proposal. This includes looking for the alternative project locations, scales, processes, layouts, operating conditions, and the 'no action' option.

The description of the environmental baseline contains setting both the present and future state of the environment up, in the absence of the project, taking into account changes resulting from natural events and from other human activities.

The identification and prediction of impacts aim to ensure that all potentially significant environmental impacts (adverse and beneficial) and that the magnitude of identified change in the environment with a project by comparison with the situation without that project are identified.

Mitigation and impact management involves introducing the measures that are necessary to avoid, minimize, or offset any predicted adverse impacts and, where appropriate, to incorporate these into an environmental management plan.

The evaluation of significance focuses on the assessment of the relative significance of predicted impacts and impacts that remain even after applying mitigation measures.

EIA report is a vital step in the process. It is a comprehensive, structured document which contains the outputs of the assessment as information regarding the project, the baseline scenario, the likely significant effect of the project, the proposed alternatives, features, and measures to mitigate adverse significant effects as well as a non-technical summary and any additional information.

Public consultation and participation shall provide the quality, comprehensiveness, and effectiveness of the EIA, and assure that the public is given the opportunity to comment on the project and its environmental effects and the public's views are adequately taken into consideration throughout the decision-making process.

Review of EIA report involves a systematic appraisal of the quality of the EIA report, as a contribution to the decision-making process.

Decision-making on the project, to approve or reject it, involves a consideration by the relevant authority of the EIA report (including the consultation responses) together with other material considerations. The public is informed about the decision.

Follow-up monitoring involves recording of the significant adverse effects on the environment identified as well as auditing the effectiveness of the measures taken to mitigate them. This approach contributes to the effective project management.

The sequence of the EIA process stages can be explained with the help of flowcharts and diagrams that highlight crucial decision-making stages, such as the ones illustrated in Fig. 2.

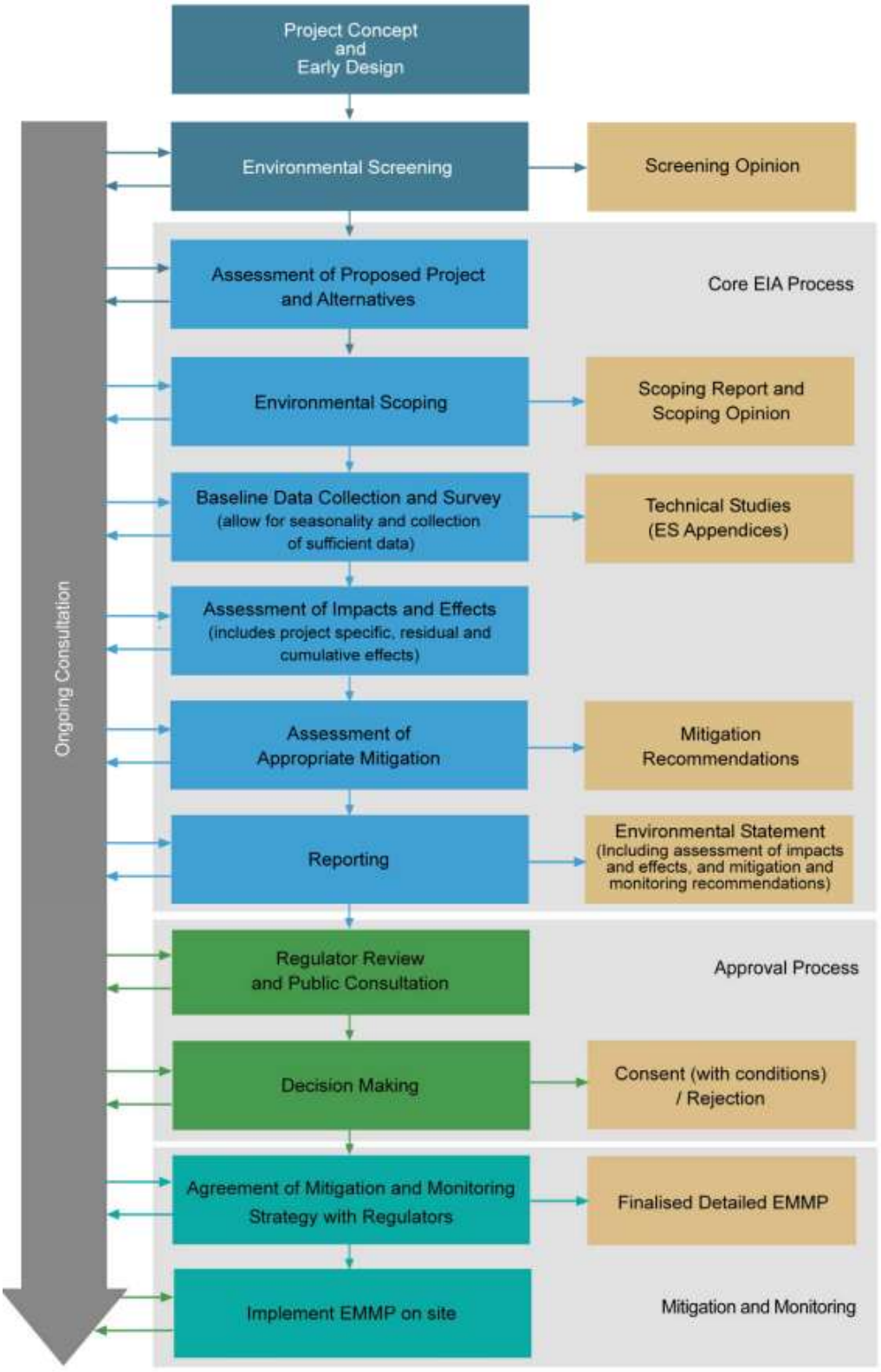


Fig. 2 EIA's key procedural stages

The EIA procedure begins with a development proposal (it can be a project, program, plan, or policy) that has potentially significant adverse environmental impacts. The early stages of *screening and scoping* will determine whether an EIA is needed, and, if so, what should be the assessment scope and information requirements. After the scope is defined, usually through Terms of Reference (ToR), the actual impact assessment and reporting takes place. This broad assessment stage includes *the characterization of baseline conditions, prediction of significant impacts, proposals of mitigation and compensation programs, and organization of information in EIA reports*. The EIA report is then reviewed by competent authorities and, at times, by the public. This review considers the completeness of information, its quality, and compliance with regulations and best practices. Reviewers are often required to recommend a final decision to an institution that has authority to reject or approve the proposal. Historically, in almost every case, the authorities decide to approve the proposed actions, though subject to certain conditions of the mitigatory nature. The approval decisions result in administrative outcomes such as a license or permit being granted, or permission to move forward on development plans. Finally, after the approval is granted, developers can implement their proposed actions. The last and long stage, known as follow-up, includes numerous monitoring, auditing, communication, and management activities.

The public participation in the EIA process shall be understood as activities that take place throughout the process. Some participation techniques, such as information sharing, meetings, and notices, are common in almost every stage. Consultations and hearings, however, are more common in the assessment, reporting, and follow-up stages. Depending on the outcomes of each stage, the process can be re-directed towards an earlier stage or even terminate.

A natural part of the EIA process, its initial phase, is a proposal of project, because there is no purpose in having an EIA if there is no development proposed. The experienced developers know that the social and environmental considerations should be engaged in the early stages of a project planning and design, so that the chances of conflicts and delays are reduced once EIA formally starts. Environmentally conscious developers have beforehand thinking about design alternatives, eco-efficient technologies, perception of communities, information needs of regulators, among other factors that will be considered in EIA decision-making. In practice, this results in better planning and the enhanced proposals that are less likely to have the significant adverse effects and, therefore, less likely to find objections in the assessment process.

4.1. SCREENING

Environmental impact assessment represents a systematic process that examines the environmental consequences of the developmental actions, in advance. The emphasis of environmental impact assessment is on prevention of inputs and therefore, is more proactive than reactive in nature. The EIA Directive requires that public and private projects that could

have the significant effects on the environment be made subject to an assessment prior to a decision being given by the competent authority.

Not every project automatically requires an environmental impact assessment. To ensure an efficient use of both public and private resources, the *screening stage* helps to identify whether the project's effects on the environment are expected to be significant, i.e. to determine whether an EIA is necessary. Experience gathered in the application of the EIA Directive shows that, in practice, it can be problematic to decide if the individual projects fall within its scope. Based on the information provided on the proposal or project description, authorities decide on the following outcomes:

1. a comprehensive EIA is needed,
2. a simplified EIA is needed,
3. more information or preliminary studies are needed before a screening decision can be reached, or
4. the proposal is exempt from EIA (but may be subject to other approval requirements).

The projects listed in Annex I (Table 1) to the EIA Directive 2011/92/EU or the annexes to the EU Member state laws are automatically subjected to an EIA because their environmental effects are presumed to be significant. The projects listed in Annex II (Table 2) do not necessarily have significant effects on the environment in every case and for those projects, the national authorities must decide whether an EIA is needed. This is done by the screening procedure, which determines the effects of projects on the basis of *threshold or criteria* or *case-by-case examination*. The threshold and criteria are specified in Annex III of the EIA Directive and refer to a mechanism by which quantitative or qualitative triggers are used to include or exclude the project from the EIA's requirements. They must be set so that they ensure that every project with likely significant effects on the environment is subject to an EIA, and that those without significant effects on the environment are not subject to an EIA.

The *thresholds* refer to the size of the land used for a development project, location, output, cost and finance, environmental effects, etc. This method of screening establishes the thresholds for the key features of a project, or an environmental parameter which exceeded the thresholds, would require an EIA. The threshold values adopted in the EU Member States are mostly technical and based on the attributes of length (meters, kilometres), weight (tons), square meters and performance capacity (kilowatts), but monetary thresholds (based e.g. on investment size) also exist.

Based on the past experience with similar forms of development, the *impact criteria* can be divided into three categories which reflect the different degrees of potential environmental impact:

- The impact of the proposed project is likely to be significant, but it can be easy identified. To assess the degree of impact, an Initial Environmental Examination (IEE) is required that helps to determine whether the potential environmental impact is significant or whether mitigation measures can be carried out to reduce or eliminate adverse impact.

- Project proposals which are likely to have significant environmental impact require an EIA report before they can be prepared.
- Project proposals which are located within or near a sensitive area require an environmental impact assessment report as well.

Through *case-by-case* examination the need for EIA is assessed through a unique procedure based on risk assessments for each project.

Table 1 Some projects listed under Annex I of the EU EIA Directive 2011/92/EU

Some projects under Annex I
Thermal power stations and other combustion installations with a heat output of 300 megawatts or more.
Nuclear power stations and other nuclear reactors including the dismantling or decommissioning of such power stations.
Integrated works for the initial smelting of cast iron and steel and installations for the production of non-ferrous crude metals from secondary raw materials by metallurgical, chemical, or electrolytic processes.
Construction of motorways, express roads, and a new road of four or more lanes, or widening of an existing road of two lanes or less so as to provide four or more lanes.
Waste disposal installations for the incineration, chemical treatment or landfill of hazardous waste or non-hazardous waste with a capacity exceeding 100 tonnes per day

Table 2 Some projects listed under Annex II of the EU EIA Directive 2011/92/EU

Some projects under Annex II
Deep drillings, in particular geothermal drilling or drilling for water supplies.
Industrial installations for hydroelectric energy production or for the harnessing of wind power for energy production (wind farms).
Manufacture and assembly of motor vehicles and manufacture of motor vehicle engines, railway equipment, or installations for the construction and repair of aircraft.
Installations for the manufacture of cement or ceramic products by burning, in particular the roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain.
Industrial estate development projects or urban development projects including the shopping centres and car parks; tramways, elevated and underground railways.
Holiday villages and hotel complexes outside urban areas and associated developments, or ski runs, ski lifts and cable cars and associated developments.

Each of these approaches to screening has its advantages and disadvantages. The screening method based on thresholds and/or criteria is relatively straightforward but has one obvious disadvantage. Although a project that comes below an inclusion threshold or criterion, and is thus not subject to an EIA, it may have the significant effects on the environment, nevertheless. For example, such projects may have an impact on sensitive areas (e.g., the areas identified as being valuable and important to the nature conservation) or the applicable legislation may fail to take account of the cumulative effect of a number of projects which, when taken together, may have the significant environmental effects. The case-by-case examinations allow for a better consideration of the local ecological conditions or environmentally relevant socio-economic contexts. However, it is generally a more resource- and time-consuming screening method.

Under the EU EIA Directive, the major building or development projects must first be assessed for their impact on the environment. This is done before the project can start. An EIA is required for the various projects such as nuclear power stations, long-distance railways, motorways, express roads, waste disposal installations for hazardous waste, or dams of a certain capacity. For other projects, including urban or industrial development projects, roads, tourism development and canalisation and flood relief works, it is up to the individual EU Member States to decide if there will be an EIA on a case-by-case basis or by setting specific criteria (such as the location, size, or type of project).

The EU-13 Member States (Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, and Slovenia) have adopted thresholds for the Screening or a combination of thresholds and case-by-case evaluation to determine whether a project should be subject to EIA.

Competent authorities are ultimately responsible for issuing a *Screening Decision* on whether the proposed project shall be subjected to an EIA procedure or not, based on the information provided by the developer. The Screening Decision must state the reasons for either requiring or not requiring the EIA and must be available to the public. The wide public participation in the screening process can avoid the later dispute and delay in the decision-making process.

The steps of screening process until a Screening Decision are presented on Fig. 3.

At the beginning of screening, there can be the limited information to determine whether or not the project is likely to have the significant effects on the environment. To help decide whether those considered impacts are significant, the checklists can be used. The example of screening checklist (Table 3) provides a list of questions about the project that can be used to help answer the question ‘Is this Project likely to have a significant effect on the environment?’

The second screening checklist of criteria for evaluating the significance of the environmental impacts, given in Table 4, provides a list of questions to help identify where there is the potential for the interactions between a project and its environment. It is to be used in case-by-case screening in conjunction with the previous screening checklist (Table 3).

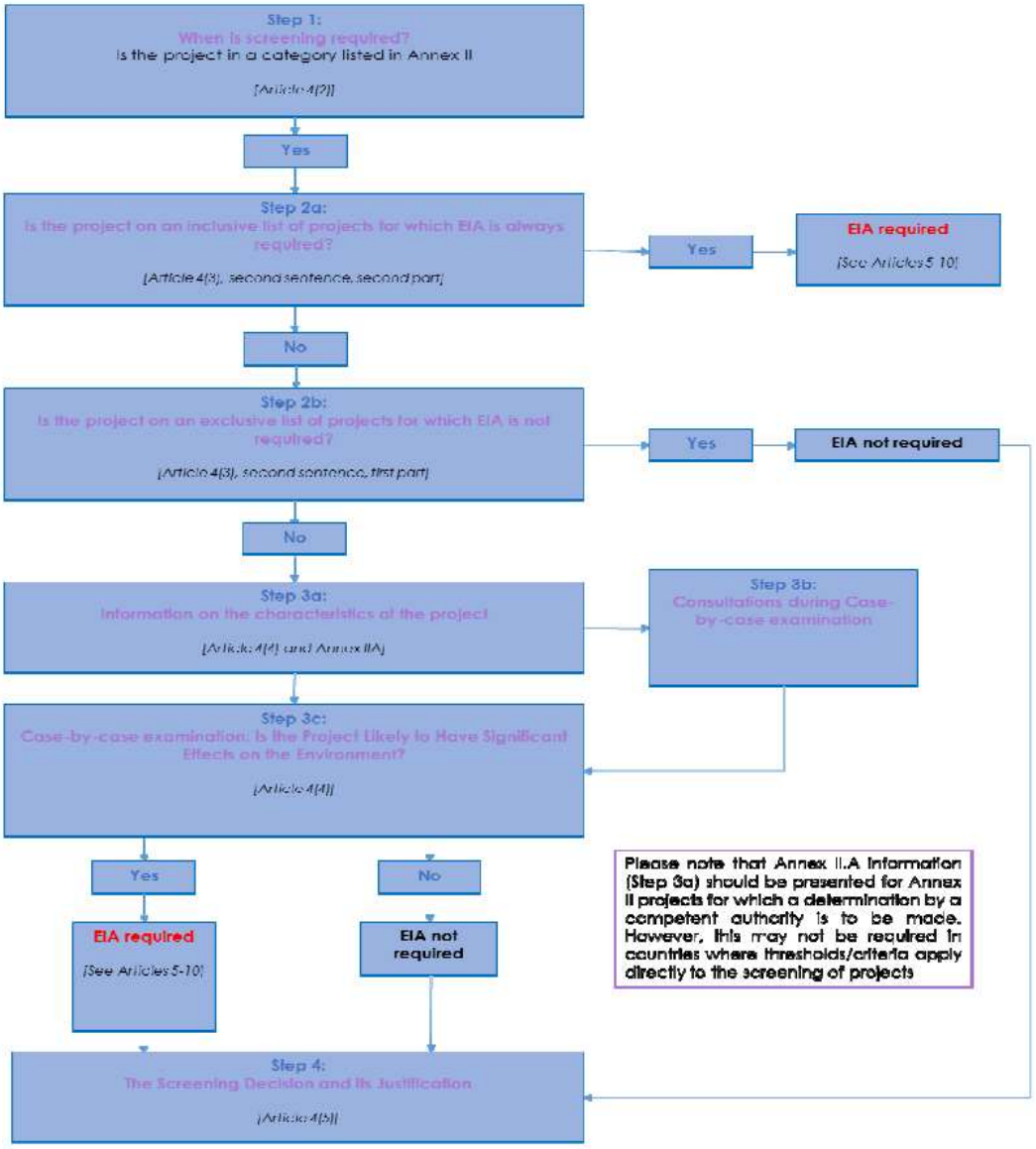


Fig. 3 The steps of screening process

Table 3 The screening checklist

Questions to be Considered	**Yes / No /? Briefly describe**	**Is this likely to result in a significant impact? Yes/No/? – Why?**
Brief Project Description: Development of 500 houses adjacent to an existing rural settlement at ABCville.		
1. Will the Project involve actions which will cause physical changes in the locality (topography, land use, waterbodies, etc.)**?**	Yes. The Project will involve development of a large site currently in agricultural use and crossed by a small river.	Yes. Loss of agricultural land and the diversion of rivers.
2. Will the Project involve the use, storage, transport, handling or production of materials which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health?	No, except in the small amounts typically used by householders.	No.
3. Will the Project produce solid wastes during construction or operation?	Yes. Construction will require excavation of a small hill and transport and disposal or re-use of a large quantity of soil.	Yes. Transport could have significant impact on neighbouring village.
4. Will the Project result in environmentally related social changes, for example, in demography, traditional lifestyles, employment?	No. The existing village was mainly built in the 1950s.	No.
5. Are there any other factors which should be considered such as consequential development that could lead to environmental impacts or the potential for cumulative impacts with other existing or planned activities in the locality?	Yes. The Project will require the extension of the village sewage works which is already overloaded.	Yes. There is not much space to extend the works and it already causes odour problems in the village
6. Are there any areas or features of historic or cultural importance on or around the location that could be affected by the Project?	? No information available about the area.	? Requires further investigation.
Summary of features of Project and of its location indicating the need for EIA:		

Table 4 Screening checklist for evaluating the significance of environmental impacts

Questions to be considered
1. Will there be a large change in environmental conditions?
2. Will new features be out-of-scale with the existing environment?
3. Will the impact be unusual in the area or particularly complex?
4. Will the impact extend over a large area?
5. Will there be any potential for transboundary impact?
6. Will many people be affected?
7. Will many receptors of other types (fauna and flora, businesses, facilities) be affected?
8. Will valuable or scarce features or resources be affected?
9. Is there a risk that environmental standards will be breached?
10. Is there a risk that protected sites, areas, features will be affected?
11. Is there a high probability of the effect occurring?
12. Will the impact continue for a long time?
13. Will the effect be permanent rather than temporary?
14. Will the impact be continuous rather than intermittent?
15. If it is intermittent, will it be frequent rather than rare?
16. Will the impact be irreversible?
17. Will it be difficult to avoid, or reduce or repair or compensate for the effect?

When the practitioners are uncertain about the need for an EIA, it is helpful to seek the views of the competent authorities early on so that the environmental assessment, if required, can be carried out as an integral part of the project development process.

4.2. SCOPING

Once a decision has been made that an EIA needs to be undertaken, determining the scope of the EIA including which the specific impacts need to be considered, is generally referred to as scoping. Thus, *scoping* is the process of determining the content and extent of the information on the *key environmental impacts* and issues of concern which should be submitted to a competent authority to make an informed decision (Scoping Opinion) about projects which are subject to EIA.

Scoping is an early stage in the EIA process and is designed to ensure that the environmental studies provide all the relevant information on:

- the impact of the project, in particular focusing on the most important impacts;
- the alternatives to the project;
- any other matters to be included.

The findings of scoping define the 'scope' of the environmental information to be submitted to the competent authority and the terms of reference (ToR) for the environmental studies to be undertaken to compile that information. The terms of reference outlines what work and studies will be done during the environmental assessment stage.

This stage defines the EIA report's content and ensures that the environmental assessment is focused on the most significant impacts of the project on the factors as are human beings, fauna and flora, soil, water, air, climate and the landscape, material assets and the cultural heritage, and the interaction between them, and that *time and money are not spent on unnecessary examinations.* Scoping assists in effective planning, management, and with resourcing of the EIA report. Here, there can be identified other legislation or regulatory controls that may be relevant to the project and can provide opportunities for the necessary assessment work, for different control systems, to be undertaken in parallel, thereby avoiding the duplication of effort and costs for all concerned.

Scoping should identify the *impacts*, *preliminary alternatives* and *scales* to the proposed project as well as *preliminary mitigating measures* that ought to be considered by the developer. The more participative and tailored the scope is, the lower the likelihood that the competent authorities will need to request additional information from the developers after the environmental report has been prepared and submitted for the development consent. Therefore, scoping can be considered as a "risk reduction tool" in the EIA process.

The most important issues for considering in this stage are the *reasonable alternatives*, i.e., whether the decision-makers should consider alternative locations for the whole proposal and its components, alternative technologies and layouts, alternative managerial approaches, the *'null alternative' or 'no action' scenario*, among others. Developers and the EIA practitioners should undertake scoping at an early stage, so as to ensure that the EIA report examines all of the relevant issues, irrespective of any legal requirement.

This stage provides an opportunity to open a dialogue between the competent authority and the developer about the project and the issues it raises. The competent authorities have to seek advice from the relevant environmental authorities and the local and regional authorities prior to giving a scoping opinion. In many cases, other interested parties and the general public are also given an opportunity to comment the project proposal. Consultees will, therefore, be involved in commenting on the scope of the EIA Report.

Scoping is divided into four steps as it is documented in Fig. 4.

- *Step 1 – Initiation of Scoping*

  Scoping can be initiated either by the developer requesting a scoping opinion from the competent authority (*voluntary scoping*) or can be *mandatory*, where the competent authority has to give an opinion on the scope of the EIA report.

  The scoping opinion should identify the content and extent of the information to be elaborated in the EIA report. Scoping is mandatory in Member States that most

recently joined the EU as Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Bulgaria, and Romania. If a scoping opinion has been requested, then the competent authority is required to consult the environmental local and regional authorities, and possibly with other interested organisations and the public to identify issues of concern.

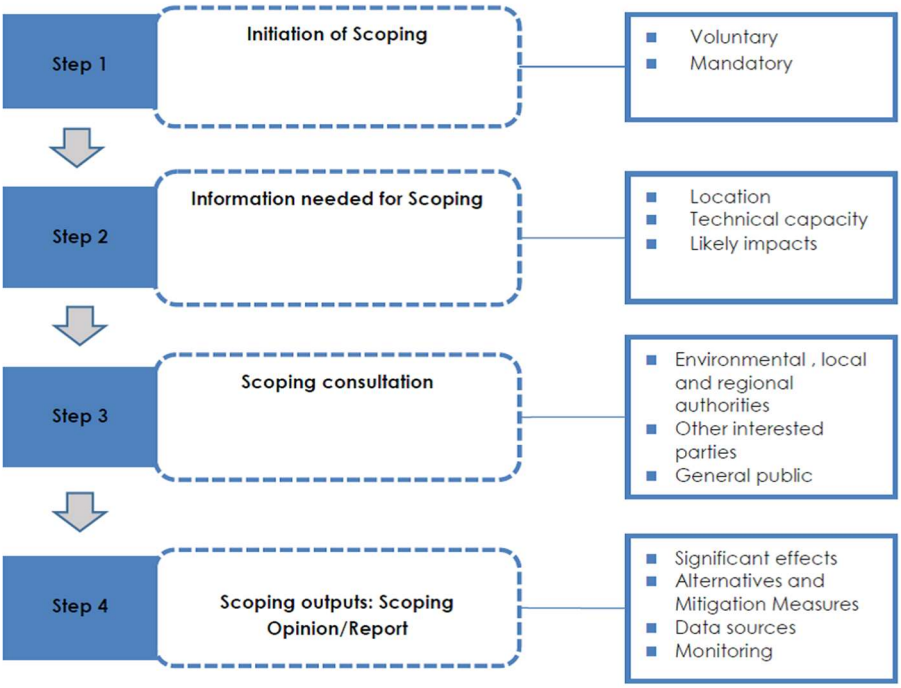


Fig. 4 The steps of the Scoping procedure

- *Step 2 – Information needed to undertake scoping*

The developers must provide to the competent authority with the information on the project in order to prepare a scoping opinion for them. The developer prepares a preliminary document that includes information on the project's specific characteristics, including the location, technical capacity, and a brief description of the project's likely impacts on the environment. The developer may need to carry out preliminary data collection and field work at this stage, in order to help determine what the significant impacts of the project are likely to be.

For example, information regarding the characteristics of the *potential impact* shall include:

- A brief description of the project's likely impacts considering the following factors: people, human health, fauna and flora, soils, land use, material assets, water quality and hydrology, air quality, climate, noise and vibration, the landscape and visual environment, historic and cultural heritage resources, and the interactions between them.

- Nature of the impacts, i.e. direct, indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative.
- Extent of the impact (geographical area, size of the affected population, habitat, species).
- Magnitude, complexity, and probability of the impact.
- Duration, frequency, and reversibility of the impact.
- Mitigation incorporated into the project design to reduce, avoid or offset significant adverse impacts.

- *Step 3 – Scoping consultation*

In all forms of scoping, consultations with the environmental authorities, local and regional authorities, other interested parties, and the public form the important parts of the process. Consultations help to ensure that all of the key impacts, issues, concerns, alternatives, and mitigation measures, which interested parties believe should be considered in the EIA, have been early addressed. The early involvement of stakeholders has benefits for the developer in terms of good public relations and in obtaining information about the local area. Moreover, by addressing concerns at the outset, there is less likelihood of the project being delayed, at the decision-making stage for example, because the important information has been overlooked.

To effectively involve other interested parties and the public, the information about the scoping process and a preliminary draft of the scoping opinion should be made publicly available. This may be facilitated by a range of means, for example:

- initial announcements about the scoping process in local or national newspapers,
- posting notices announcing the scoping process at the site, in the neighbouring area, and at the offices of local authorities,
- preparing a leaflet or brochure about the project, providing some details about what is being proposed with a plan or map, describing the EIA process, and the purpose of scoping, and inviting comments,
- publication of articles in newspapers, on radio or on television,
- publication on internet of all the above whenever possible.

Alternatively, face-to-face meetings could be organised to seek the feedback and give the opportunity to submit comments. The effective way of ensuring that participants understand how their views have been addressed is to summarise the results of the scoping process in the EIA Report.

- *Step 4 – The Scoping outputs: the Scoping Opinion*

The scoping opinion provides some methodological explanations of how to identify a project's significant impacts and their effects, alternatives, and mitigation measures, as well as possible data sources and monitoring measures in a preliminary way during scoping.

The purpose of scoping opinion is to identify the content and extent of the information on matters that should be covered in the EIA report which is prepared by the developer and submitted to a competent authority. Scoping should ensure that all of the relevant, most important issues are identified and addressed in an appropriate manner in the EIA report.

4.3. IDENTIFYING SIGNIFICANT IMPACTS

While a project's significant impacts on the environment have likely already been considered at the screening stage of EIA, it is during scoping where the competent authority or the developer must provide more insight into which impacts are really important, need to be included, and assessed further in the EIA report. *The assessment of significant impacts is an essential concept of the EIA*.

In EIA, the consensus is that *impacts* are defined as the changes resulting from an action, and *effects* are defined as the consequences of impacts.

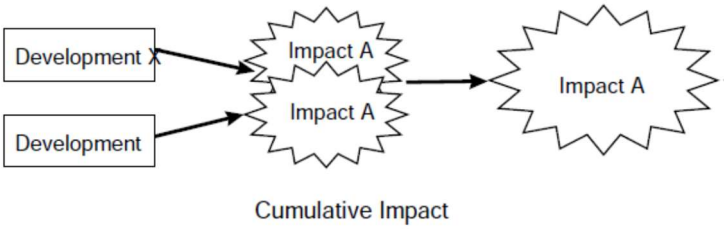
An *environmental impact* can be understood as *a change to the environment*, which can be both, adverse (negative) or beneficial (positive), and which is wholly or partially resulting from human activities (e.g. construction, combustion, transport), products (e.g. cars, computers, furniture) or services (e.g. education, catering, retailing). Impacts can be short, medium or long-term, reversible or irreversible, and permanent or temporary.

There are several *types of impacts*:

- *Direct* - impacts of an action, intervention or a specific project that occur in the same space and time. Known as primary impacts, they are the direct consequences that a project has on the environment.
- *Indirect* - impacts of a chain of activities associated or induced by a project that often occur later in time, affecting a broader area, but that are nevertheless reasonably foreseeable (secondary impacts).

- *Cumulative* – they result from the incremental effects of an action when added to other past, present and reasonably foreseeable future actions. The cumulative impacts could result from a number of minor impacts that individually have minor significance and may therefore not require an EIA. If assessed cumulatively, however, the impacts could have a higher significance and then require an EIA.

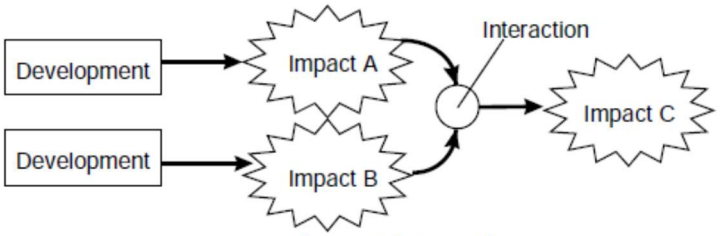
For example: development of a golf course may have an insignificant impact, but when considered with several nearby golf courses there could be a significant cumulative impact on local ecology and landscape.



Cumulative Impact

- *Synergistic* - impacts that result from the interaction among impacts of a project, or from the interactions among impacts of several projects within a same area that may be greater than their simple sum.

  For example: A chemical plant producing two streams of waste that are individually acceptable but react in combination producing highly significant levels of pollution.



Impact Interaction

- *Residual* - the impacts that remains after implementation of the project and all associated mitigation and other environmental management measures.

The consideration of impacts which are significant or important enough to merit attention are specify by the costs of assessment, review, and decision-making. As a good practice, all assessment methods should define clear thresholds or criteria for determining whether an impact is significant, based on the characteristics of an impact, in a clear manner that can be understood by anyone reading the EIA Report. A threshold can be defined as a quantitative or qualitative standard against which the significance of a given environmental effect may be determined. They are generally derived from scientific knowledge and are frequently included in regulatory standards. Thresholds help to determine the significance of environmental impacts, but they are not necessarily certain. While it is easy to quantify thresholds for e.g. changes in traffic volume or noise levels, for other effects, such as wildlife habitats, it is difficult to quantify this and quality descriptions should be relied upon. If no legislation or scientific

standards are available, the EIA practitioners can then evaluate impact significance in a more subjective way by using the *multi-criteria analysis method*.

Common criteria used to evaluate the significance include the magnitude of the predicted impact and the sensitivity of the receiving environment:

- *Magnitude* considers the characteristics of the change (timing, scale, size, and duration of the impact) which would probably affect the target receptor (population, human health, biodiversity, land, soil, water air and climate, etc.) as a result of the proposed project.
- *Sensitivity* is understood as the sensitivity of the receiving environment to change, including its capacity to accommodate the changes that the projects may bring about.

To determine the significance of an impact the following questions can be answered:

- Is there a risk that environmental standards will be breached?
- Will many people be affected?
- Will many receptors of other types (fauna and flora, businesses, facilities) be affected?
- Will valuable or scarce features or resources be affected?
- Is there a risk that protected sites, areas, or features will be affected?
- Will it be difficult to avoid, reduce, repair or compensate for the effect?
- Will there be a large change in environmental conditions?
- Will new features be out-of-scale with the existing environment?
- Will the effect be unusual in the area or particularly complex?
- Will the effect extend over a large area?
- Will there be any potential for trans-frontier impact?
- Will the effect continue for a long time?
- Will the effect be permanent, rather than temporary?
- Will the impact be continuous rather than intermittent?
- If it is intermittent, will it be frequent rather than rare?
- Will the impact be irreversible?

Once the environmental sensitivity and impact magnitude have been described, the next step is to scale and weight the two criteria by means of a matrix (Table 5 and Table 6), in order to determine how significant the predicted impacts will be.

Table 5 Example of scale of magnitude of the impact

Major	Loss of resource and/or quality and integrity of resource over a significant area; severe change/damage to key characteristics, features, or elements for more than 2 years
Moderate	Loss of resource, but not adversely affecting the integrity over a significant area; partial loss of/damage to key characteristics, features, or elements, for more than 6 months but less than 2 years
Minor	Some measurable change in attributes, quality, or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements

Table 6 Example of scale of sensitivity of the receiving environment

High	High importance and rarity, national scale, limited potential for substitution and low capacity to accommodate proposed form of change
Medium	Medium importance and rarity, national scale, and limited potential for substitution. The receiving environment has some tolerance of the proposed change subject to design and mitigation
Low	Low or medium importance and rarity, local scale. The receiving environment is tolerant of the proposed change subject to design and mitigation

These two matrices on sensitivity and magnitude can be combined to compile a simple matrix of significance as shown in the Table 7.

Table 7 Assessing significance

Impact magnitude	**Environmental sensitivity**		
	High	*Medium*	*Low*
Major	High	High	Moderate
Moderate	High	Moderate	Minor
Minor	Moderate	Minor	Negligible

Using Table 7, the impacts are individually ranked for their significance on the basis of the sensitivity of the environment and the magnitude of the change: a high environmental sensitivity and major magnitude of change would result in a high significance of the impact. While magnitude is determined by empirical prediction, sensitivity involves more subjective judgments in terms of how a certain environmental receptor is valued in the society.

The assessment of the project's future impacts might involve various uncertainties. That is why, a more risk-based approach can be used to assess significant effects when there is uncertainty about the receiving environment. This approach takes, in addition to both the

magnitude and the sensitivity of the receiving environment, the likelihood that the impact will occur in the future into account. There are two aspects of likelihood - probability and confidence:

Likelihood	Example
The *probability* of an effect occurring, which may range from certainty to a remote possibility. Is there a high probability of the effect occurring?	An accident at power plant could be catastrophic for the environment, but the probability of it occurring may be very small. This issue is related to the uncertainty about the future conditions and external influences
The assessor's *confidence* in judgments made about the sensitivity or value of the receiving environment. How confident am I regarding the value attached to the receptor that may be affected?	The potential for significant buried archaeological findings to be found is low; therefore, significant effects (on this receptor) are unlikely. This issue is related to assessment of imprecision related to the evaluation; due to a lack of baseline information and imprecise models for example.

4.3.1. METHODS AND TECHNIQUES USED FOR ASSESSING IMPACTS IN EIA

There are a number of factors which will influence the approach adopted for the assessment of impacts and impact interactions for a particular project. Therefore, the method applied for evaluating the significance of impacts should be practical and suitable for the project given the data, time, and financial resources available. Key points which should be considered when choosing the methods include:

- the nature of the impacts,
- the availability and quality of data,
- the availability of resources (time, finance, and staff).

Over the years, numerous methods have been developed to ensure that various stages of the EIA process are carried out in a comprehensive and systematic way. Generally speaking, the EIA methods should allow for the organisation of information and be beneficial for practitioners with the limited experience. The most frequently used EIA methods and techniques include checklists, expert opinions, mass balances, matrices and interaction diagrams, as well as qualitative models.

Checklists provide the prescribed lists of environmental parameters that are to be checked for possible impacts of the proposed project. They ensure that all likely events resulting from a project are considered. There are certain limitations when using checklists. For example,

checklists are neither able to discover interdependencies or synergisms between interacting environmental components, nor are they able to describe variations of environmental conditions. The exact form of the checklist can vary according to the type and detail of information required. The examples of the checklist are shown in Fig. 4 and 5.

	Potential Impact from Construction Activities				
Resource	Site Clearance	Earth Moving	Lay foundations	Import materials	Cumulative impacts
Air Quality	✓	✓			✓
Water Quality		✓			
Landscape	✓	✓		✓	✓
Ecology	✓				
Noise	✓	✓	✓	✓	✓
Archaeology	✓				
Traffic	✓	✓	✓	✓	✓

Fig. 4 Example of a simple checklist

Resource	Past Activities	Present Activities	Project Impact	Future Activities	Cumulative Impact
Groundwater	Contamination from industrial use	Contamination from surface water percolation	Excavation of site would result in mobilisation of contaminants	Contamination from surface water percolation	Contamination exceeds standards
Air quality	No significant impact from emissions	Emissions from existing power station within standards	Additional emissions	Emissions from existing power station within standards	Combined emissions of two power stations result in significant impact

Fig. 5 Example of a part of the descriptive checklist

Expert opinions and perspectives from the recognised experts in relevant fields are used in an attempt to resolve complex situations in a relatively short period of time. Consultations with the aid of questionnaires or workshops may be used.

Mass balance calculations refer to the analysis of existing situations and conditions with those that may result from proposed actions. They are mostly used in the context of air and water emissions as well as solid and hazardous wastes.

Matrices and interaction diagrams (networks) are used for cross-referencing a list of actions with environmental impact parameters. In this context, activities associated with various phases of a project or strategic action can be listed along one axis, with environmental components listed on the other. Inputs into a matrix can either be qualitative or quantitative. The simplest matrices indicate only the occurrence of an impact without any references to magnitude or significance (Fig. 6). In more sophisticated matrices, the quantitative estimates of an impact magnitude and significance can be combined with a weighting scheme, leading to an 'impact score' (Fig. 7). In the EIA practice, for example, Leopold matrix, Peterson matrix, or Component Interaction Matrix have been used.

The using of matrices provides a visual description of the relationship between two sets of the proposal being assessed, an identification of the impacts of different phases of a project, and an identification of the separate site-specific impacts affecting a region as a whole (even though it may be better to describe different aspects of a proposal, using separate matrices).

Potential Impact Area	*Proposed Action*			*Past Actions*	*Other Present Actions*	*Future Actions*	*Cumulative Impact*
	Construction	*Operation*	*Mitigation*				
Landscape	*	**	+			*	**
Ecology	**		+	*			**
Water Quality	*			**			**
Land Use	***	***			*	*	***
Cultural Heritage	*			**		*	***

*low adverse effect **moderate adverse effect ***high adverse effect
+ beneficial effect

Fig. 6 Example of a simple matrix

Environmental Component	A Relative Weighting (Total 100)	Construction B	Construction A x B	Operation B	Operation A x B
Air	10	3	30	2	60
Water	35	6	210	6	210
Noise	8	3	24	8	64
Landscape	10	5	50	1	10
Ecology	27	2	54	4	108
Total Cumulative Impact	100		368		452

A = relative weighting of environmental component (total 100)
B = Score of impact

Fig. 7 Example of a weighted matrix

Networks are used to identify the structure, key elements and interactions in a given system, using e.g. decision flowcharts and loop analysis. A network diagram visually describes the cause - effect links. The relative dependence of one factor on the condition of another one may be indicated by various arrow widths and heights (Fig. 8). Negative and positive feedback loops can also be identified if the nature of the interrelationship is indicated.

Overlay mapping and Geographical Information Systems (GIS) are methods for identifying the spatial distribution of impacts, mainly physical ones, and can assist in identifying where cumulative impacts and their interactions may occur as a result of a project. Both methods involve the preparation of maps or layers of information which are then superimposed on one another (Fig. 9). This can provide a composite picture of the baseline environment, identifying the sensitive areas or resources; to show the influences of past, present, and future activities on a project or receiving environment; and to identify where several impacts can cumulatively affect one particular receptor.

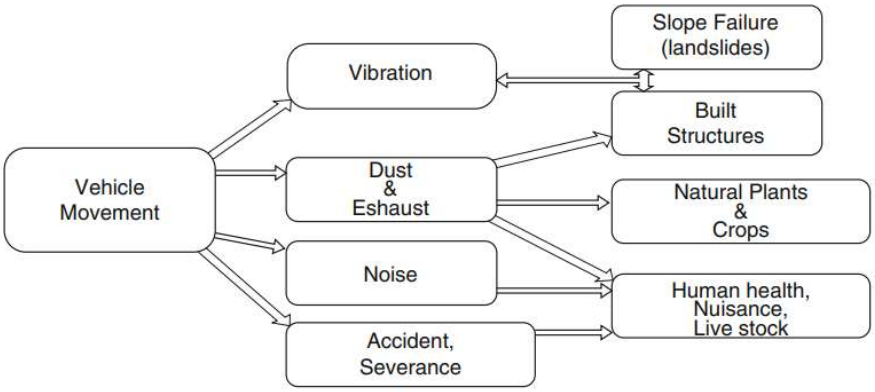


Fig. 8 Example of a network system diagram

When considering the cumulative impacts from different projects the baseline conditions should be mapped as the first. Information on other projects, such as their location and distribution of impacts if known, which may affect the resources should also be mapped. The maps showing the areas of influence of the other actions should be overlain on the map of the project and particular resource, for example a river. From this the areas where the project, together with other developments will potentially cumulatively affect the resource can be established. The diagram below illustrates how this works:

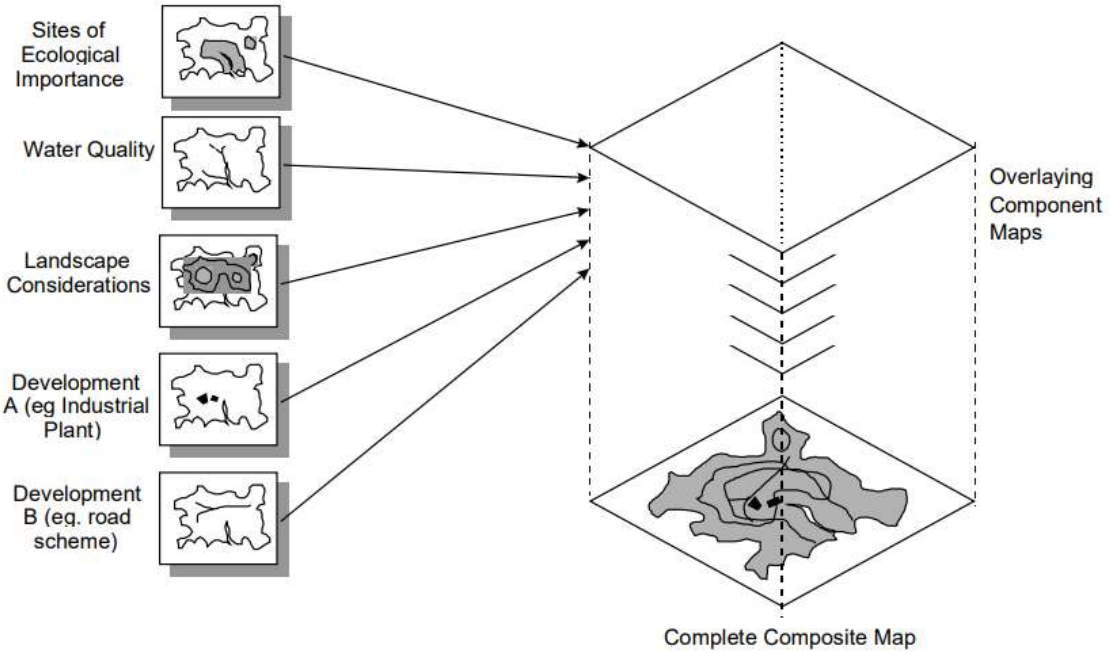


Fig. 9 Example of compilation of an overlay map from various component maps

GIS is suited to the large scale or complex projects and for projects where analysis or modelling is required. However, GIS can be expensive and is often not appropriate for small scale projects. For smaller scale simple projects overlay techniques are more suitable.

4.4. IDENTIFYING ALTERNATIVES AND MITIGATION MEASURES

The alternatives are essentially different ways in which the developer can feasibly meet the project's objectives, by carrying out a different type of action, choosing an alternative location or adopting a different technology or design for the project. The alternatives may end up becoming part of the project's final design, or its methods of construction or operation in order to avoid, reduce or remedy environmental effects. Alternatives should be identified as early in the project development process as possible, while it is still possible to alter the project. Early identification of alternatives can also allow for more efficient data collection. The alternatives and mitigation can range from a high level to very detailed aspects of project design.

Types of alternatives and mitigation measures:

- *alternative strategies* e.g. to manage demand or reduce losses rather than develop a new resource;
- *alternative sites or routes* for all or part of the project;
- *alternative technologies and raw materials* e.g. construction of a combined cycle gas turbine power plant rather than a coal fired power station;
- *alternative layouts or designs* e.g. locating the noisy activities away from sensitive receptors or replacing one large stack for gaseous emissions with two smaller ones;
- *alternative environmental measures* e.g. to ensure the safe passage of wildlife across a motorway, rather than the establishment of compensatory habitat.

The *mitigation hierarchy* is a sequence of actions to help reduce the adverse environmental impacts on the environmental factors, when (avoidance is the most preferred mitigation and offsets is the least preferred option):

1. *Avoid* – avoid the adverse environmental impacts altogether. This may include reducing the footprint or changing the location of footprint to avoid areas with the high environmental values.

2. *Minimise* – limit the degree or magnitude of the adverse impact. This may include reducing the footprint or carefully selecting technologies, processes (such as re-use of waste products) and management measures (such as bunding or dust and noise control measures) to reduce the impact.

3. *Rehabilitate* – repair, rehabilitate, or restore the impacted site as soon as possible. The adequate rehabilitation information is integral to the mitigation hierarchy to ensure the early identification of knowledge gaps and risk as well as development of criteria and research to meet objectives.

4. *Offset* – undertake a measure or measures to provide a compensatory environmental benefit or reduction in environmental impact to counterbalance the significant adverse environmental impacts from the implementation of a proposal. The measures are taken after all reasonable mitigation measures have been applied and a significant environmental risk or

impact remain. Offsets are not appropriate for all proposals and will be determined on a proposal-by-proposal basis.

4.5. COLLECTING DATA

When issuing a scoping opinion, the developer and the practitioners should be aware of what data can be feasibly collected during the preparation of the EIA report. Data should be collected and interpreted by the relevant experts, and, if highly technical data are used, then data should be verified for the accuracy of interpretation and relevance. Where no such experts are available in-house, the external experts should be used. Since the communities can have the local knowledge, the experts may also be found at the local level.

Data may be difficult to find. In some cases, the proxy indicators can be used that can help to understand the environmental situation in other ways. For example, a lack of the air quality monitoring data from an urban area could be resolved if there are data outlining trends in traffic flows/volumes over time, or trends in emissions from the stationary sources. The assumptions about the environment can be generated from other available data and can be useful in determining the relevance of impacts.

4.6. THE EIA REPORT

The information relating to a project's significant effects on the environment is gathered during the third stage: the *preparation of the environmental impact assessment report* (or EIA report). It is the most important document in the entire EIA process, which the developer must prepare and submit to the competent authority.

The EIA report serves as a tool to:

1) *communicate* the results of the assessment of significant impact or effects of a proposed project on the environment; and

2) *enable* the competent authority to reach a *reasoned conclusion* regarding the impacts of the proposed project on the environment, and whether and how the project should be granted a consent to be implemented.

EIA report should be of a sufficient quality to enable this judgment. It should match the scope and the level of detail requested by the competent authority in the scoping opinion, where one exists, and should be sufficient to allow for a reasoned conclusion on the significant impacts of the project on the environment. It has to be prepared for all Annex I projects and for all Annex II projects for which it was decided during screening as they may have the significant effects on the environment. The developers shall assure the competent experts to prepare the report, and the competent authorities need to ensure the sufficient expertise to examine

it. Failure to include all necessary information can result in the competent authority requesting the supplementary information.

The EIA report covers the following items:

A description of the project. This is an introduction to the project and comprises a description of its location (site, design, size, etc.), the physical characteristics of the construction (including any demolition or land-use requirements), characteristics of the operational phases (including energy demand, natural resources), as well as estimates of the expected residues, emissions, and waste produced during the construction and operation phases.

Baseline scenario. It is a description of the current state of the environment and around the area in which the project will be located, and the likely evolution thereof without the implementation of the project – so called 'do-nothing' scenario. *It provides a description of the status and trends of the environmental factors against which the alternatives and the project significant impacts can be compared and evaluated.* It forms the basis on which the ex-post monitoring can be used to measure the changes once the project has been initiated.

Essentially, carrying out the baseline assessment involves determining what is relevant and finding the data and information necessary to set the framework against which to assess impacts on the environment. It needs to be detailed and comprehensive enough to allow for an understanding of the extent of environmental impacts, but must be conducted within a reasonable time and with a reasonable amount of effort on the part of the developer. Here, the following types of data are used:

- *Physical*: topography, geology, soil types and quality, surface, ground and coastal water quality (waste water treatment), pollution levels (CO2, SO2 and NOx emissions, greenhouse gas emissions, municipal waste, waste generation), meteorological conditions, climate trends, etc.
- *Biological*: ecosystems (terrestrial and aquatic), specific flora and fauna, habitats, protected areas (Natura 2000 sites), agricultural land quality, etc.
- *Socio-economic*: demography, infrastructure facilities, economic activities (e.g. fisheries), industrial production, energy intensity and supply, transport trends, recreational users of the area, etc.
- *Cultural*: location and state of archaeological, historical, religious sites, etc.

The collection of relevant data is critical to a robust assessment of the baseline. If scoping has been carried out, it is possible that initial data has already been collected, which can be used for developing the baseline. In such cases, data should be checked for relevance and accuracy, and if necessary, expanded upon. In some cases, when the data may be difficult to find, the proxy indicators can be used for understanding the environmental situation in other ways. The quality in data collection from existing databases, free services, and other relevant environmental assessments should always be investigated. Data should be identified and interpreted by the qualified experts.

Environmental factors affected by the project. A description of the environmental factors impacted by the project as population, human health, *biodiversity* (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to mitigation and adaptation) including *climate change,* material assets (*use of natural resources*), cultural heritage, including architectural and archaeological aspects, and landscape, and *risk assessment of major accidents and disasters*.

In 2013, the issues of the *climate change* (both mitigation and adaptation) and biodiversity were integrated into the environmental impact assessment. Since most projects evaluate also the impact on greenhouse gas emissions, compared to the Baseline, through their construction and operation and through the indirect activities that occur due to the project. The EIA should assess the direct (on-site combustion of fossil fuels or energy use) and indirect (transport infrastructure, commercial development) greenhouse gas emissions generated through the project. To consider how the project contributes to the greenhouse gas reduction targets at the national, regional, and local levels, as well as identify the opportunities to reduce emissions through the alternative measures the Life Cycle Assessment (LCA) can be used.

The impacts of the climate changes on the project itself and the extent to which the project will be able to adapt to possible changes in the climate over the course of its lifetime is another aspect that should be considered under the risk assessment in the EIA analysis (*climate change adaptation*).

In this part of the EIA report, several key issues need to be also addressed by developers regarding the concerns about the biodiversity and the use of natural resources. These include, for instance, the degradation of ecosystems, the loss and degradation of habitats, the loss of species diversity, the loss of genetic diversity, and the sustainability of resources as far as possible, in particular land, soil, water, and energy.

Effects of the project on the environment. This section deals with the concepts of significant effects and the importance of cumulative effects. The focus on the ‘significant effects’ consists in identifying which effects are to be considered and which are determined to have only a negligible effect on the environment. The concept of cumulative effects means that effects considered to be insignificant in an isolation may have a significant impact on the environment when they interact with other effects. Because of their complex nature, the significance thresholds and criteria for the assessment of cumulative effects should be defined through a collaborative approach that involves all of the interested and affected parties in the process of data collection and analysis. They may also need to make greater use of the interdisciplinary perspectives and methods e.g. network diagrams and models that identify the cause-effect relationships which result in the cumulative effects, trend analyses that identify the historical, current and future trends for a given resource, and the interactive matrices that consider the interactions of magnitude of the impacts assessed individually.

Assessment of reasonable alternatives. The alternatives to the project (for example in terms of a project design, technology, location, size and scale) must be described and compared, with an indication of the main reasons for the selection of the option chosen being provided. 'Reasonable alternatives' must be relevant to the proposed project and its specific characteristics. In addition, the selection of alternatives is limited in terms of feasibility. On the one hand, an alternative should not be ruled out simply because it would cause an inconvenience or cost to the developer. At the same time, if an alternative is very expensive or technically difficult, it would be unreasonable to consider it to be a feasible alternative.

The process of identifying and assessing alternatives is iterative and requires some flexibility and good communication between all parties. Local knowledge and interests are also very important during the assessment of alternatives and, therefore, consultation with the public is very important both for identifying and assessing alternatives. A clear presentation of alternatives, and how they have been assessed, also lends transparency to the process, and can improve the public acceptance and support for projects.

Mitigation or Compensation Measures: The description shall explain the extent, to which the significant adverse effects on the environment are avoided, prevented, reduced, or offset, and should cover both the construction and operational phases of the project. These measures are assessed on the basis of how effective they are in reducing potentially significant adverse environmental impacts. In some cases, existing legislation refers to the use of best available techniques (BAT), as set out in reference documents, in order to ensure that operators use the latest, most effective and economically justified technology to protect the environment. From this perspective, best available techniques can provide a very reliable starting place for developers to identify risk management approaches and technologies that may be in turn be suggested as mitigation measures in an EIA report. The EIA report should clearly describe the adverse impact for which each measure is intended to avoid, mitigate, or compensate when implemented. It should also describe the effectiveness of such measures, their reliability and certainty, as well as the commitment to ensuring their practical implementation and monitoring of the results.

Monitoring. Monitoring measures proposed must be included in the EIA report, where the significant adverse effects have been identified, and in the decision to grant development consent. They should also ensure that any mitigation or compensation measures for the expected significant effects are carried out as planned. Monitoring should be carried out during the construction and operation of a project. Monitoring results should be made available to the competent authorities and to the public.

Non-technical Summary, i.e., an easily accessible summary of the content of EIA report presented without technical jargon, hence understandable to anybody without a background in the environment or the project. The focus is on the key information and options for decision-making. Often, the summary is the only part of the report that most people will read. It can be written for distribution to the public as an information brochure.

Quality of the EIA report. The developers are required to ensure that the EIA reports are prepared by the competent experts who understand the relevant legislation and technical parameters involved in carrying out an effective assessment and in the preparation of a high-quality report. In turn, the competent authority responsible for evaluating the report must have access to sufficient expertise to judge its quality and request revisions as appropriate. For those purposes, the accreditation systems and the lists of pre-qualified experts or institutions were adopted in many EU member states.

4.7. CONSULTATION

Consultation procedures are often highly detailed in national legislation, and also fall under international legislation (The Aarhus and Espoo Conventions). *Public participation takes place at every stage of the EIA process*, e.g. at scoping process where the public comments on the information provided on the proposed project. The public participation is one of the critical concepts of the EIA process. The involvement of various stakeholder groups, such as local people, project beneficiaries, NGOs, experts, etc. provides for quality, comprehensiveness and effectiveness. Usually, stakeholder's views are adequately addressed.

Public consultation is the process by which the concerns of the local affected persons and others who have a legitimate stake in the environmental impacts of the project are ascertained with a view to account all the material concerns in the project design. It can help to identify the issues that concern the local residents. These issues are often not the same as those of concern to the developer or outside experts.

The consultation comprises a public hearing at the project site or in its close proximity, or in writing form from other concerned persons. The public must have access to any information gathered during the preparation of the EIA report, the reactions of the competent authority and any other relevant information which may arise. The public must be given early and effective opportunities to participate, and be able to provide their comments and opinions.

If a project can likely cause the significant environmental effects in another Member State, then transboundary consultations must be carried out. The Member State in whose territory the project will be carried out send the affected Member State a description of the project (including any information on the likely transboundary impacts) and information about the nature of the decision which may be taken.

4.8. DECISION-MAKING: REASONED CONCLUSION AND DEVELOPMENT CONSENT

The direct outcome of the *assessment* of impacts of a project is the reasoned conclusion that should detail these examinations. The competent authority must *examine* information provided in the EIA report, as well as the results of the consultations and, where appropriate, requests any supplementary information. The competent authority has to not simply rely on the developer's assessment in the EIA report and compile the information gathered through the consultations but must carry out its own separate assessment of the project's significant effects. Reasoned conclusion forms part of the final decision on the project's development consent, i.e. in the decision that either grants or refuses permission to carry out a project.

Once the development consent decision has been reached, the public must be informed of its outcome.

4.9. MONITORING AND AUDITING AFTER DECISION

Major projects, such as roads, airports, power stations, petrochemical plants, or mineral developments have a long life-cycle that may cover a very long period (e.g. 50–60 years for the planning, construction, operation and decommissioning of a fossil-fuelled power station). The EIA relates primarily to the period before the decision, but it should not stop at the decision. It should be more than an auxiliary to the procedures to obtain a planning permission; rather it should be a means to obtain good environmental management over the life of the project. This means including monitoring and auditing in the EIA process, which involve the actual implementation of the proposed mitigation measures proposed in the EIA report. Monitoring and auditing are used to 'close the loop' of the impact prediction and condition setting.

Monitoring involves the measuring and recording of physical, social, and economic variables associated with development impacts (e.g. traffic flows, air quality, noise, employment levels). They are put in place to monitor the development of the project including its environmental effects identified so that to ensure the implementation of mitigation measures, or to identify previously unidentified adverse effects. Monitoring measures are proposed in the EIA report. The aim of this post-decision activity is to provide all the relevant information so that the project had the least possible negative environmental adverse effects on humans and the environment. Environmental impact *auditing* covers comparing the impacts predicted in an EIA report with those that really occur after a project implementation, in order to assess whether the impact prediction performs satisfactorily. The audit can be of both impact predictions (how good were the predictions?) and of the mitigation measures and conditions attached to the development (is the mitigation effective, are the conditions being honoured?).

Environmental monitoring and auditing should guarantee that impacts do not exceed legal standards, checks the implementation of mitigation measures, and provides early warning of a potential environmental damage. They can give essential feedback to improve the EIA process, but this is probably the weakest step of the process in many countries, yet.

Summarise, monitoring and auditing are important for several reasons:

- to identify the impacts that occur,
- to check that these are within the levels predicted and required by legislation,
- to determine that mitigation measures are properly implemented and work effectively,
- to ensure the environmental benefits expected are being achieved,
- and to provide feedback to improve future applications of the EIA process.

Monitoring measures are obligatory for projects for which the EIA has identified the significant environmental effects.

5. PROSPECTS: STRATEGIC ENVIRONMENTAL ASSESSMENT

There is a hierarchy of levels in decision making comprising projects, programmes, plans, and policies. Logically, policies shape the subsequent plans, programmes and projects that put those policies into practice. Policies are at the top of the decision-making hierarchy. As one moves down the hierarchy from policies to projects, the nature of decision-making changes, as does the nature of environmental assessment needed. Policy-level assessment tends to deal with more flexible proposals and a wider range of scenarios. Project-level assessment usually has well defined and prescribed specification. Policies, plans and programmes are more “strategic” as they determine the general direction or approach to be followed towards broad goals.

EIA has been a proven tool over the past 35 years and has a good track record in evaluating the environmental risks and opportunities of project proposals and improving the quality of outcomes. The main focus of the EIA is *how* the development should reduce the negative environmental impacts, if it is approved. In general, an EIA is carried out for the specific development projects, such as nuclear power stations, large dam developments and housing developments. In a sense, the EIA largely reacts to the development proposals rather than proactively foresee them. It does not consider *whether, where* and *what type* of development will be best for the economic and social development, as well as the sustainability of the environment and its resources.

However, there are a number of more strategic decisions that are typically made at a plan, programme and policy levels of decision-making and therefore, can have a major impact on the nature of later development. *A policy* can be defined as an inspiration and guidance rationalizing the course of government action. It states what is to be done and sets the context for plans, e.g. the development of a high-speed railway network to promote the shift a traffic

from air or road to rail. *A plan* is a set of linked proposed actions with a timeframe to implement the policy, e.g when and where the railway network will be implemented. *A program* can be defined as a set of projects that specify the design criteria of the plan objectives.

Here, the project-to-project approach of EIA which lacks the *strategic vision and spatial scope* that could allow for the consideration of the cumulative impacts of multiple projects in an area, does not guarantee the environmental quality. For example, the building of one luxury hotel on an unspoilt beach might not have a significant negative impact on the environment, but the development of a 20 km stretch of a beach will definitely have an impact.

These weaknesses in the EIA concept led to the need for a more strategic approach to the environmental assessment that can be incorporated in the policy, planning and programming level, allowing for a pro-active process that will integrate the concept of sustainability much better than the EIA. This process has become known as the *strategic environmental assessment* (SEA). Currently, in the European Union, the strategic assessment is carried out according to the Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (SEA Directive). The SEA Directive has not only had an impact on EU member states, but also within a wider international context.

The concept of SEA was suggested as the assessment tool that addresses the environmental implications of decisions made on a broader, more strategic level. It endorses the application of a systematic, pro-active EIA based and participative process that is prepared with a view to avoiding the unnecessary duplication in the tiered assessment practice. This tiered approach within the SEA and EIA is documented in Fig. 10.

	SEA			EIA
	'Higher tiers' / 'Lower tiers'			
Decision making level	Policy →	Plan →	Programme →	Project
Nature of action	Strategic, visionary, conceptual			Immediate, operational
Output	General			Detailed
Scale of impacts	Macroscopic, cumulative, unclear			Microscopic, localised
Timescale	Long to medium term			Medium to short term
Key data sources	Sustainable development strategies, state of the environment reports, vision			Field work sample analysis
Type of data	More qualitative			More quantitative
Alternatives	Area wide, political, regulative, technological, fiscal, economic			Specific locations, design, construction, operation
Rigour of analysis	More uncertainty			More rigour
Assessment benchmarks	Sustainability benchmarks (criteria and objectives)			Legal restrictions and best practice
Role of practitioner	Mediator for negotiations			Advocator of values and norms Technician, using stakeholder values
Public perception	More vague, distant			More reactive (NIMBY)

Fig. 10 The tiered approach within the SEA and EIA

Strategic environmental assessment can also help to promote sustainable development, when it is often expanded or integrated into sustainability assessment. This not only involves broadening the scope of assessment to also consider social and economic issues, but also potentially setting sustainability objectives and testing whether the policies or plans will help to promote a sustainability vision.

In 2016, a review of the implementation of the EU SEA Directive has shown that all Member State had transposed the Directive into country-specific legislation, and most had published supporting guidance. The average number of SEAs carried out per year varied from fewer than 10 (e.g. Croatia, Cyprus) to more than a thousand (e.g. Finland, Romania). Most SEAs are performed for spatial, land use or town and country plans; and most are at the local level.

The SEA and EIA are similar procedures, despite the former being carried out on plans and programmes, and the latter involving projects. For both assessments it is characteristic:

- an environmental report is prepared in which the likely significant effects (of plans, programmes or Projects) on the environment and the reasonable alternatives are identified;
- the environmental authorities and the public must be informed and consulted;
- the competent authority decides, taking the results of consultations into consideration;
- the public is informed of the decision afterwards.

While the scope of both assessments differs, often much of the work carried out under the SEA can be used for the EIA, as it is follows from Fig. 10. Alternatives identified during the SEA may be relevant for the EIA, some of the data gathered under the SEA may be used to form the baseline of the EIA. Practitioners carrying out the EIA should consult the SEA report done for any relevant plans or programmes with a view of avoiding the duplication of work. The SEA assessment process, presented in Fig. 11, is EIA based and is linked to plan and programme making stages in a continuous and integrated decision flow. If it is applied in the way shown in Fig. 11, the SEA process could be able to influence the underlying plan and programme making process, with a view to improving it from an environmental perspective.

The environmental benefits to be derived from SEA is much higher than that from EIA. The value added by the SEA in terms of plans and programs include:

- the opportunity to consider a wider range of alternatives and options at a higher level than at the project stage,
- the opportunity to consider the form and location of a development whether sectoral or in a region rather than the design or location of an individual project,
- an increased capability to address the cumulative and large-scale effects within the boundaries of plans and programs compared to the project level,
- assisting the sustainable development through addressing the consistency of plan and program objectives and options with the relevant strategies, policies, actions, and commitments.

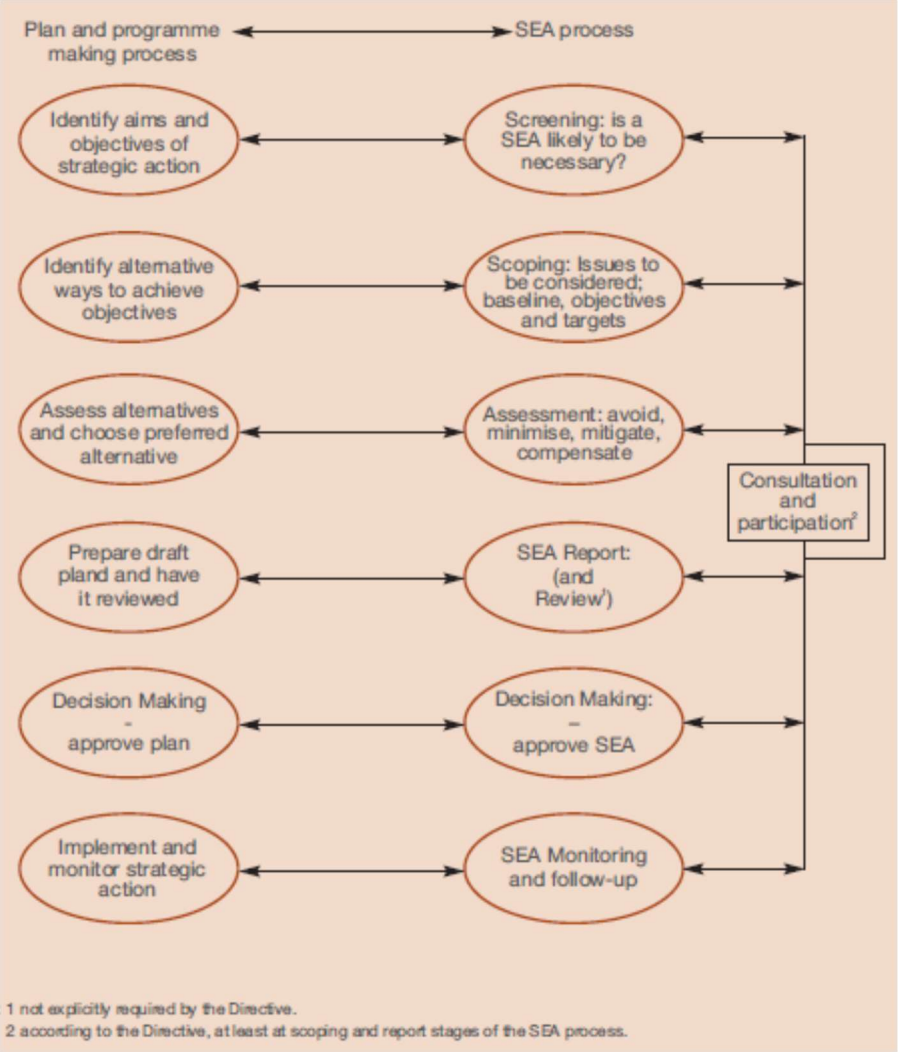


Fig. 11 The stages of SEA process based of the EU SEA Directive

The SEA process strengthens the transparency, accountability, and public participation in the development of the policy, plan, and program, and its effective implementation helps design a road map for the sustainable development.

DISCUSSION THEMES

1. Explain the meaning of Environmental Impact Assessment? What are its main advantages?
2. Explain the main purposes and objectives of an Environmental Impact Assessment.
3. Explain the basic principles that govern the EIA process. How one can understand that the principles are interrelated.
4. Describe the development of the EU regulation on EIA.
5. What international conventions or protocols are recognized the environmental assessment in?
6. Mention the steps (in order) needed to get the environmental approval. Briefly explain each of them.
7. What are the differences between the project screening and project scoping, and impact mitigation?
8. Discuss the strengths and weaknesses of the following screening methods: project lists with thresholds and case-by-case screening.
9. What is the role of the public participation in the EIA process?
10. What is the difference between Annex 1 and Annex 2 projects under the EIA Directive?
11. Explain the four basic steps of scoping?
12. What relationship is between the baseline scenario and proposed alternatives?
13. What is a ‘scoping opinion’ and who provides it?
14. What is the difference between an impact and effect in the EIA?
15. Magnitude of impact is not always synonymous with significance of impact. Provide examples to illustrate this point.
16. Explain the basic types of impacts – direct, indirect, cumulative, synergistic, and residual.
17. What one should consider when choosing the methods for assessing the impact.
18. What are the most frequently used EIA methods?
19. Explain the checklist method of impact assessment.
20. Explain the Matrices and interaction diagrams used for an assessment.
21. Explain the meaning of alternatives in EIA and describe their types.
22. Explain the mitigation hierarchy?
23. What is task of the EIA report?
24. Explain the main items of EIA report.
25. What is the difference between public participation and public consultation?
26. Why is it important to continue the EIA process beyond the decision for those projects which proceed to implementation?
27. What are the main differences between EIA and SEA?
28. Explain so called the tiered approach within the SEA and EIA.
29. What are the environmental benefits from SEA for the plans and programs?
30. Briefly explain the steps of the SEA process.

QIUZE

1) EIA is defined as (select one):

a) A process of identifying, predicting, and evaluating the likely impacts of a proposed project or development to define mitigation actions to reduce negative impacts and to provide positive contributions to the natural environment and well-being.
b) A report written by government representatives on the planned development impacts of environment, socio-economic issues and culture.
c) Project life-cycle assessment.

2) What is essential in an EIA? (select all that apply):

a) That it allows decision makers to assess a project's impacts in all its phases.
b) That it allows the public and other stakeholders to present their views and inputs on the planned development.
c) That it contributes to and improve the project design, so that environmental as well as socio-economic measures are core parts of it.

3) Which of the principles of EIA are not correctly explained?

a) Participation – appropriate/timely access for interested parties.
b) Certainty – information/outputs readily usable in decision making and planning.
c) Accountability – decision makers responsible for their actions and decisions.

3) What is the purpose of the "screening" step of the EIA? (select all that apply)

a) To assess the quality of the project design.
b) To facilitate informed decision making by providing clear, well-structured, factual analysis of the effects and consequences of proposed actions.
c) To determine whether a full EIA needed.

4) Which type of project usually requires an EIA? (select all that apply):

a) Small housing building.
b) Dams and reservoirs.
c) Industrial plants (large scale).
d) Community garden development.
e) Mining and mineral development (including oil and gas).
f) Development of wells in the community.
g) Thermal and hydropower development.
h) Outdoor recreation.

5) EIA is usually required for a development project when (select all that apply):

a) Large changes are expected in the environment.
b) Limited impacts are expected in the environment.
c) A small area is expected to be affected by the project.
d) There are potentials for transboundary impact.
e) Many people are likely to be affected by the project.
f) No cumulative impacts are expected.
g) There are protected areas in the project area of influence.

6) What is true of the „Scoping" step? (select all that apply):

a) It is a systematic exercise that establishes the boundaries of an EIA.
b) It clearly indicates what is relevant and what is not relevant within an EIA.
c) It serves as a work plan for the entire EIA process.

7) What is included in an impact assessment? (select all that apply)

a) a detailed assessment of the planned project and selected alternatives compared to the baseline conditions
b) qualitative descriptions measuring high, medium and low impacts
c) quantitative descriptions such as indicating the cubic metres of water withdrawn, sewage produced, and pollutants released
d) all the data collection, analyses, and developed plans summarized together in a well-structured and concise document

8) The key focus areas of mitigation measures should include (select all that apply):

a) Preventive measures that avoid the occurrence of impacts and thus avoid harm or even produce positive outcomes.
b) Measures that focus on limiting or lessening the severity and the duration of the impacts.
c) The identification of compensation mechanisms for those impacts that are unavoidable and cannot be reduced further.

9) Please select the one item from the list below that is NOT an example of a method for impact assessment:

a) Expert judgment.
b) Quantitative physical and mathematical models.
c) Social impact assessment.
d) One-off impact assessment.
e) Matrices and interaction diagrams.

10) What specific aspects does a good EIA report and review include? (select all that apply)

a) Assessment, mitigation measures and related plans.
b) A terms of reference (TOR).
c) A generalized set of assumptions about the project benefits described in highly technical terms.
d) A satisfactory prediction of the adverse effects of proposed actions and their mitigation using conventional and customized techniques.
e) Information that is helpful and relevant to decision making.

11) What are the key objectives of EIA review? (select all that apply)

a) Confirm the quality of the information and methods used in an EIA.
b) Ensure that it addresses all the critical and cumulative impacts and identified relevant mitigation measures
c) Take into account inputs from public comment.

12) Experience with EIA review in a number of countries has shown that public comment is a critical part of the EIA review process. What are common methods to ensure the public can comment on the project? (select all that apply)

a) Public hearing(s).
b) Written comments submitted to the proponent or government department.
c) Creation of TV shows and/or magazine articles to describe the project.

13) There is often a formal review and licensing procedure in EIA systems. Who would carry out such a procedure?

a) The proponent of the development project.
b) The government authority ultimately responsible for licensing development projects.
c) Another government agency or committee.
d) An independent body.

14) What kind of monitoring is referred to when we speak of monitoring a development project (select all that apply)

a) Monitoring indicators that measure the impacts on the environment and communities as a result of the development project.
b) Ensuring the fulfillment of all the commitments made in the approved EIA.
c) Keeping track of changes that may happen in the environment and communities because of the project.
d) Keeping track of the political context, to ensure that the project retains its licence.

15) Who carries out the data collection for monitoring indicators? (select all that apply)

a) The project's implementers.
b) National governments or independent agencies.
c) International development banks or aid agencies

16) Regarding the Strategic Environmental Assessment (SEA) …

a) Its main idea is that the environmental effects of certain projects should be identified in advance, even at an earlier stage than specified by the EIA Directive.
b) The assessment of environmental concerns at such an early stage is an expression of the principle of cost effectiveness.
c) The application of the SEA is prior to the EIA and the SEA Directive refers to policies.

CASE

A car washing and lubricating company has been operating for several years (more than 10 years) in a terrain with the following characteristics: porous, filterable with a phreatic level near to the surface (1.5 m depth). The company is located close by to a river branch which is quite useful for them since they discharge all the disposals and waste generated by this activity directly into the stream. These disposals contains a high level of oils and greases. All the dumping from the car maintenance goes directly into the soil since there are not palettes or gutters. The lubricating company operates for 20 hours for seven days per week. The municipality, since the local people has complained, has arranged the execution of an EIA and you are part of it.

a) What type of environmental evaluation has to be performed by the municipality according to this case?
b) What type of professionals will be part of the consultancy group performing the EIA?
c) Mention three environmental impacts of this activity.
d) Mention three mitigation measures you will propose as part of your environmental management plan to mitigate the impacts identified.

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