SOUTHERN AFRICAN POWER POOL

CONFIGURATION MANAGEMENT

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SOUTHERN AFRICAN POWER POOL

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT GUIDELINES FOR TRANSMISSION INFRASTRUCTURE

Within the

SOUTHERN AFRICAN POWER POOL REGION

ENVIRONMENTAL SUBCOMMITTEE

FINAL Report

Sept 2010

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Acronyms and Abbreviations

SAPP	Southern African Power Pool
ESIA	Environmental and Social Impact Assessment

EIA	Environmental Impact assessment
SADC	Southern African development Community
DBSA	Development Bank of Southern Africa
IFC	International Finance Co-operation
WB	World Bank
AfDB	Africa Development Bank
DANIDA	Danish international Development Agency
CIDA	Canadian International development Agency
EPM	Environmental Management Plan
SAIEA Assessment	Southern Africa Institute of environmental
ESC	SAPP Environmental Sub- Committee

Executive Summary

This document provides a recommended framework and Guide to a systematic approach to performance of environmental impact assessment (EIA) for power Transmission Infrastructure projects in the Southern African Power Pool (SAPP) region.

Adoption of such a systematic approach is essential when considering the transboundary nature of the projects. The approach presented is based generally on that of the World Bank and the Africa Development Bank (AfDB).

The guide provides an overview of the need and regional relevance of EIA for Transmission infrastructure, followed by a detailed presentation of recommended format and components. The guide also addresses the need for, and approach to, the development of an Environmental Management plan (EMP), public participation, identification of impacts and possible mitigation measures and ongoing environmental monitoring and reporting.

The Guideline is not a regulatory document, but rather a tool designed to assist in the successful completion of an EIA. Adherence to the steps provided in the guidelines will assure that the EIA is complete and that all environmental requirements of the host country and Finance institutions (World Bank, DBSA, AfDB, and IFC) are addressed.

In addition, the guides are designed to assist in the future development of environmental services, expertise within the SAPP region and its regulators, academic and public sectors and minimise the need for external assistance in the performance of EIAs.

1. Introduction

1.1. What is the Southern Africa Power Pool (SAPP)?

The SAPP is a Regional body that was formed in 1995 through a SADC treaty to optimise the use of available energy resources in the region and support one another during emergencies. The Power Pool, whose Coordination Centre is in Harare, Zimbabwe, comprise of twelve SADC member countries represented by their respective Electric Power Utilities. There are four governance documents covering the rights and obligations of the SAPP members. These are:

i. Inter-governmental Memorandum of understanding (IGMOU), which grants permission for utilities to participate in the SAPP and enter into contracts and guarantees the financial and technical performance of the power utilities;

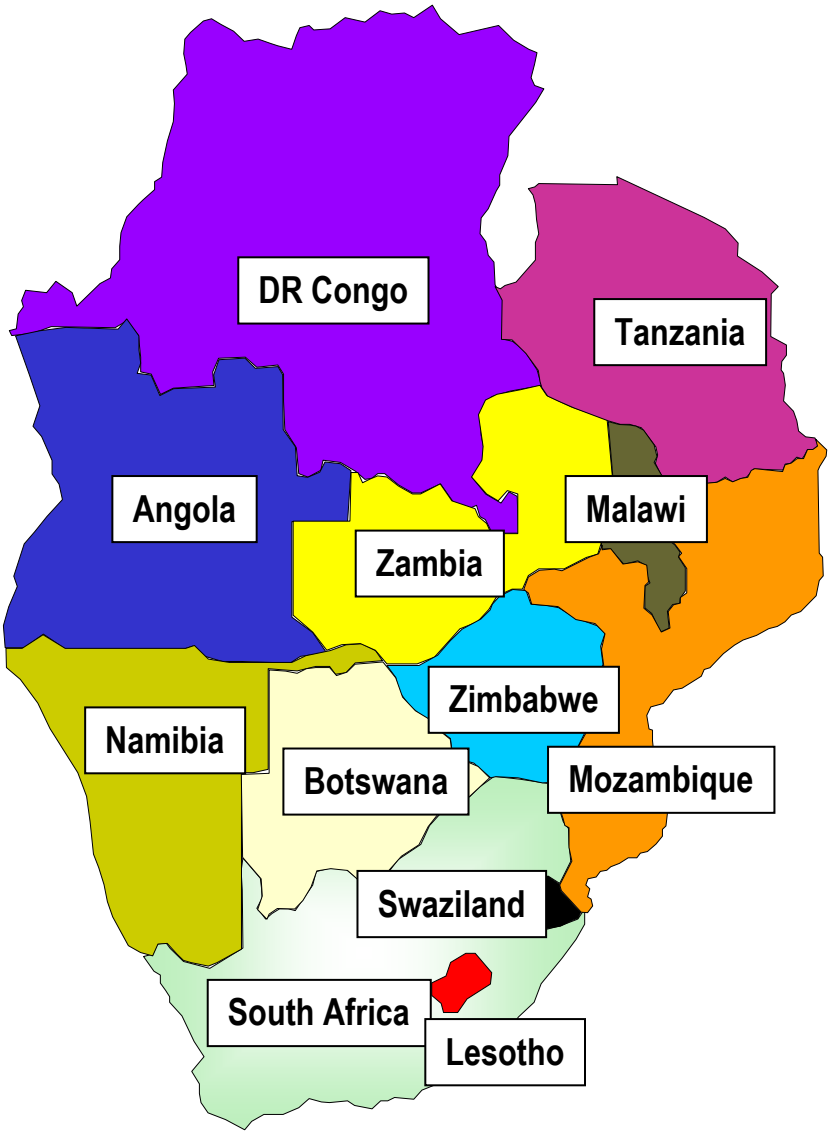
ii. Inter-utility memorandum of understanding (IUMOU) between parties, defining ownership of assets and other rights, e.g. provision for change in status from participating to operating member;

iii. Agreement between operating members (ABOM), which determines the interaction between the utilities with respect to operating responsibilities under normal or emergency conditions;

iv. Operating guidelines (OG), which defines the sharing of costs and functional responsibility for plant operation and maintenance including safety rules

Figure 1.

Southern African Power Pool



1.2 Southern African Power Pool - Vision and Objectives

1.2.1 The SAPP Vision.

The SAPP has the following vision;

- Facilitate the development of a competitive electricity market in the SADC region
- Give the end user a choice of electricity supplier
- Ensure that the southern Africa is the region for choice for investment by intensive energy users
- Ensure sustainable energy developments through sound economic, environmental and social practices.

1.2.2 The SAPP Objectives;

- To provide a forum for the development of a world class, robust, safe, efficient, reliable and stable interconnected electricity system in the southern African region
- Coordinate and enforce common regional standards of quality of supply, measurement and monitoring of systems performance
- Harmonise the relationship between member utilities
- Facilitate the development of a regional expertise through training programmes and research
- Increase power accessibility in rural communities
- Implement strategies in support of sustainable development priorities

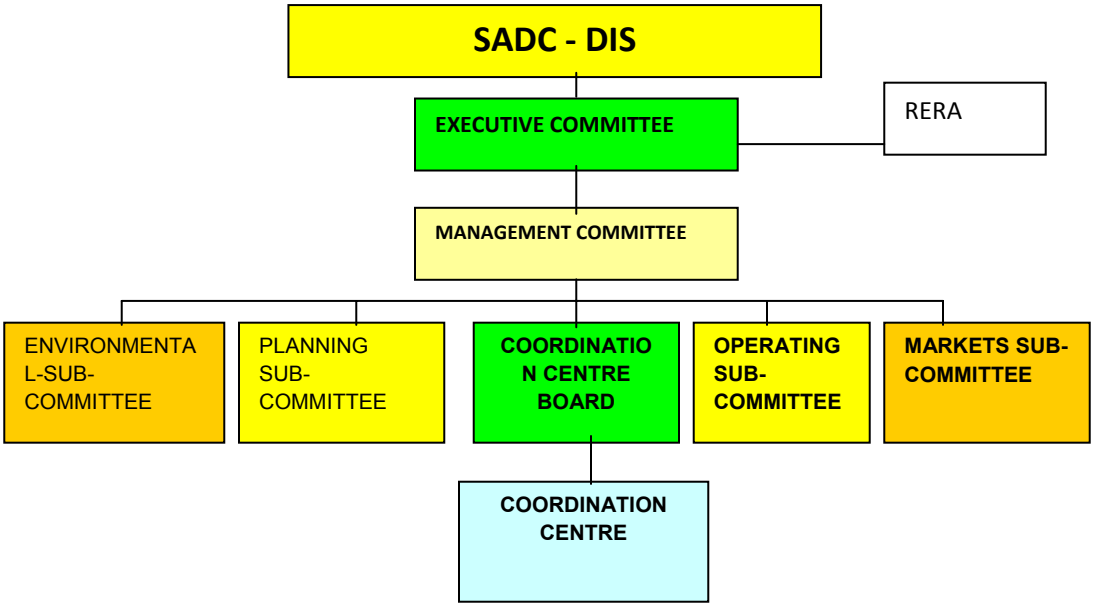
1.3 Membership.

The SAPP comprise of twelve member utilities of which nine of these are inter-connected. The twelve are Botswana Power Corporation (BPC), Elecridade de Mozambique (EDM), Electricity Supply Commission of Malawi (ESCOM), Empresa Nacional de Electricidade (ENE- Angola), Eskom, Lesotho power Corporation (LEC), NamPower, Societe National d'Electricite (SNEL - DRC), Swaziland Electricity Company (SEC), Tanzania electricity Supply Company Ltd (TANESCO), ZESCO Limited – Zambia, Zimbabwe electricity Supply Authority (ZESA). Of these, the following are non- operating members, ENE, ESCOM, and TANESCO.

Table 1. The SAPP Membership.

No	Full Name of Utility	Status	Abbreviation	Country
1	Botswana Power Corporation	OP	BPC	Botswana
2	Electricidade de Mocambique	OP	EDM	Mozambique
3	Electricity Supply Corporation of Malawi	NP	ESCOM	Malawi
4	Empresa Nacional de Electricidade	NP	ENE	Angola
5	ESKOM	OP	Eskom	South Africa
6	Lesotho Electricity Corporation	OP	LEC	Lesotho
7	NAMPOWER	OP	Nam Power	Namibia
8	Societe Nationale d'Electricite	OP	SNEL	DRC
9	Swaziland Electricity Board	OP	SEB	Swaziland
10	Tanzania Electricity Supply Company Ltd	NP	TANESCO	Tanzania
11	ZESCO Limited	OP	ZESCO	Zambia
12	Zimbabwe Electricity Supply Authority	OP	ZESA	Zimbabwe
	OP = Operating Member			
	NP = Non-Operating Member			

Figure 2.The SAPP Reporting Structure.



The SADC Government Ministries and Officials are responsible for policy matters normally under their control within the national administrative and legislative mechanisms regulating the relations between the Government and the national power utility.

The Chief Executives of the member utilities and a representative from the SADC Secretariat form the Executive Committee. The Executive Committee will refer matters such as requests for membership by non- SADC countries and major policy issues that may arise to the SADC Energy Ministers. A country with ore than one utility would need to designate one utility to represent it on the Executive Committee.
The management Committee oversees and decides on the recommendations of the Sub-Committees and the Coordination Centre Board.

The Operating Sub-Committee consist of representatives from those power utilities already interconnected and exchange power on a major scale (There presentably nine countries interconnected. These are Botswana, South Africa, Zambia, Zimbabwe, DR Mozambique, Namibia and Swaziland. The duties of the Committees include the Congo, Lesotho, establishment and updating of methods and standards to measure technical performance operating procedures including operating reserve obligations.

The Planning Sub-Committee establishes and updates common planning and reliability standards, review integrated generation and transmission plans, evaluate software and other planning tools, and determine transfer capacity between systems.

Markets Sub-Committee is responsible for the design and continued development of the electricity market in the region and determines criteria to authorise this trade

The Coordination Centre reports to the co-coordination Centre Board consisting of a maximum of two representatives of each National power Utility. Its function include the implementation of SAPP objectives, provides focal point for SAPP activities, and provision of power pool statistics and maintaining a pool database for planning and development

The Environmental Sub-Committee advises the SAPP on issues related to air and water quality, land use, climate change and renewable energy issues. The committee advise the Management Committee on standards and Environmental Management Systems to ensue sustainable energy developments within the SAPP.

The Sub-Committee consists of Environmental Managers from each utility. Its duties are:

- to offer direction to the Management Committee on environmental matters,
- keep abreast of World and Regional environmental matters,
- liaise with government environmental agencies,
- Report all findings and recommendations to the Management Committee and Planning and Operation Sub-committees, and
- carry out other functions and activities as assigned or approved by the Management Committee.

In addition, the Environmental Sub-committee will:

- play an advisory role to the Management Committee and Planning and Operation Sub-committees,
- liaise with local, national, regional and international environmental organisations, and
- provide a peer review to members of the SAPP in environmental management.

1.4 Purpose of the SAPP ESIA Guidelines

The SAPP Environmental Sub-committee identified the need for ESIA Guidelines for Transmission infrastructure as the first priority amongst a family of ESIA Guidelines. The Sub-committee has also designed ESIA Guidelines for Thermal Plant and for Hydro Schemes.

The purpose for SAPP ESIA Guidelines is to assist stakeholders in the Southern Africa Region participating in or conducting an ESIA within the power utility sector. As more transmission projects cut across borders, as joint projects require co-operation of two or more utilities and as these projects seek international funding, there is greater need for a concerted effort to streamline the ESIA process and improve co-ordination amongst the member utilities. From the SAPP point of view, it makes good business sense to document and harmonise our environmental management requirements.

Many of the international funding bodies have their own ESIA requirements. In these cases, a project will have to comply with that body's directives/guidelines. The SAPP ESIA Guidelines do

not intend to replace either the international funding requirements or the individual country's legislation. Its purpose is to supplement these mandates, or to provide guidelines in the absence of country legislation pertaining to a specific issue related to transmission infrastructure.

For the purpose of this document, transmission infrastructure is considered to be any power line constructed for the purposed of moving electricity from its point of origin to a customer, and will also cover lines used for distribution purposes, substations and switching stations.

1.5 Goals, Objectives and Guiding Principles

To be sustainable, a development project must take into consideration the economic, socio-political and environmental implications that will result from the proposed project and all reasonable measures shall be taken to ensure that the negative impacts are minimised and positive impacts maximised to such an extent that there is no net-negative impact resulting from the project. An ESIA should be seen as part of the project development proposal and not as a separate process. Together, the SAPP Planning and Environmental Sub-committees support improving project planning by incorporating environmental management considerations into the decision-making process.

The above mentioned framework identifies and lists the following goals, objectives and guiding principles:

Goal – To promote environmentally sustainable livelihoods and development

Long-term Objectives:

- Conservation and sustainable use of natural resources,
- Protection and enhancement of the quality of all forms of life,
- Promotion of public awareness on environmental issues,
- Strengthening and building capacities to carry out ESIA,
- Integration of environmental considerations in development planning process,
- Generation, storage, and dissemination of environmental information, and
- Linking grassroots development strategies to global and international initiatives.
- To improve the efficiency of electrical systems, by minimising the interaction between the infrastructure and the environment

Short-term Objectives (Project Specific):

- To assess the nature, intensity and duration of impacts, positive and / or negative, to proposed development projects,
- To assist in decision-making with regard to costs and benefits of proposed development projects,
- To promote local community and public participation in the ESIA process, and
- To promote social and cultural considerations in project design.

Guiding Principles:

- Adoption of appropriate policies and legislation to guide the ESIA process,
- All development projects to be subjected to the ESIA process,
- Equity in allocation of and access to resources, poverty alleviation, and promotion of social justice,
- Popular participation of all affected and interested parties including grassroots communities, in the ESIA process,
- Accountability of all participating parties to the public,
- Transparency throughout the ESIA process,
- The ESIA process to take special consideration of the role played by women and children in resource management and any impacts on these groups,
- The ESIA process to be a tool in the promotion of sustainable livelihoods and sustainable living.

2.0 PROJECT PLANNING AND THE ENVIRONMENT

2.1 What is an Environmental and Social Impact Assessment (ESIA)

The ESIA is a ***documented, systematic assessment of likely environmental, social and economic impacts resulting from the construction, operation and implementation of a proposed project, plan or policy". It is a***tool used to help ensure that issues related to sustainable development are taken into account early in the project planning process, along with the more traditional technical and economic considerations.

It is a valuable tool that enables undesirable effects on the different spheres of the environment that may arise from the implementation of a project to be identified and avoided. It is an aid to planners, and decision and policy makers. An ESIA facilitates the following:

- Identifies adverse environmental impacts as well as potential benefits that might be expected to occur,
- Allows the incorporation of appropriate mitigation measures into a project and ensures that proper planning and budgeting for these measures can be carried out at the beginning of the project,
- Identifies the critical problems which require further study or monitoring, and
- Enables the selection of optimal alternatives from the various relevant options available.
- Enhance the positive impacts
- Involves public participation in project planning and implementation

2.2 Why an ESIA?

ESIA is intended to prevent or minimise potentially adverse environmental impacts and enhance the overall quality and benefits of a project, plan or policy. The ESIA process allows environmental issues to be addressed in a timely and cost-effective way during project design,

preparation and implementation. ESIA can therefore help reduce overall project costs, assist in completing projects on schedule and help design projects, which are acceptable to stakeholders. ESIA encourages ownership of the project by the public through their participation.

2.2.1 Development Assistance Agency Requirements

Development Assistance Agencies (DAAs), such as the US Agency for International Development (USAID), the Danish International Development Agency (DANIDA), and the Canadian Development Assistance Agency (CIDA), may assist SAPP in the development of Transmission infrastructure through technical assistance, grants or loans. Many development assistance agencies require that a project comply with certain environmental criteria as a requirement for receipt of funding or other assistance. Demonstration of compliance is provided by the ESIA.

2.2.2 Financial Institutions.

International Finance Institutions (IFIs), such as the World Bank (WB), African Development Bank (AfDB), Development Bank of Southern Africa (DBSA) and other commercial finance institutions typically require performance of an acceptable ESIA) as a condition for funding or assistance. Power transmission projects, are addressed in the IFCs EH &S Guidelines. For reference, the most current versions of the Pollution Prevention and Abatement Handbook (PPAH) and EH & S Guidelines are accessible on line at:
http://ifcln1.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines/
Most financial institutions and assistance agencies funding development projects have a built-in requirement for ESIA. Some countries also have legislative requirements to conduct a satisfactory ESIA before a project can proceed.

The ESIA is not meant to replace traditional appraisal tools such as technology assessment; instead it complements them as it includes socio-economic effects of the projects.

ESIA is usually applied at the project level, however, there is a need to institutionalise ESIA in policy and planning activities to ensure that the environmental effects of policies can be evaluated in a much wider context and the cumulative effects assessed and monitored.

2.3 Stakeholders Participation in the ESIA

Stakeholders' engagement is an essential component of an ESIA process. It leads to better and more acceptable decision-making. This can help to identify whether all impacts have been included and whether all risk groups have been identified.

Taking stakeholders viewpoints into account enhances project viability. The World Bank (1991) has found that where such views are seriously considered and incorporated in the ESIA process, projects are likely to be more successful. Stakeholders' engagement is particularly important during the scoping, impact assessment, and mitigation phases of an ESIA. During scoping, public involvement is undertaken to ensure that all the significant issues are identified, local information about the project is gathered and alternative ways of achieving the project

objectives are considered. Public involvement is particularly important in understanding the nature and extent of potential socio-cultural impacts

The form of participation needs to be realistic and participants need to be able to see that they can influence the direction of a project. Participation has the advantages that it can help to demonstrate that vested interests are not having an undue influence and it can play a role by promoting dialogue in consensus building.

For projects which transcend national boundaries, a common forum should be considered to update each party on the progress for facilitation of completion of ESIA by all parties.

2.3.1 Public Consultation

There should be adequate public consultation and participation in all the phases of a project. This helps in the identification of preferred project alternatives. The objective being to give the affected people a chance to influence the direction of the development project with a view to enhancing their well being (World Bank, 1987). Different countries have different requirements for consultation but the general format is that meetings are conducted at which the proponent explains all aspects of the project and seeks stakeholders' views. Together any likely impacts to arise out of the project implementation are identified and mitigation measures proposed. Public consultation should, however, take the format that is most appropriate to the area of operation.

Consultation in the ESIA process is of paramount importance and should be a continuous process from scoping, during ESIA Study report preparation, draft ESIA report and during ESIA finalisation and review.

A Guide to Opportunities for Public Participation in Environmental Assessment Processes in the Southern Africa Development Community (SADC) has been assembled by Southern African Institute of Environmental Assessments [SAIEA]. The handbook contains a clear description of all the rights that communities and the public has to participation in environmental decision making as conferred by international, regional and SADC region convention laws and policies related to environmental impact assessment and decision making. The document is found on:

The One-Stop Participation Guide: A Handbook of Public Participation in Environmental Assessment in Southern Africa.

http://www.saiea.com/calabash/handbook/index.html

After the Environmental Management plan (EMP) has been prepared, it should be disseminated as widely as possible to enable the concerned parties to comment on it. Adequate time should be allowed for review of the findings and recommendations before public hearings are held. After the ESIA has been finalised, the ESIA report should be made available for public consumption and review.

3.0 TRANSMISSION INFRASTRUCTURE ESIA PROCESS

The Environmental and Social Impact Assessments (ESIAs) should be linked with the project cycle as early as possible. This should be initiated at the project identification phase. When pre-feasibility studies are being undertaken, the screening process should also begin. Route/site selection is one of the most important tasks. Refer to Figure 2 and 3.

3.1 **Correlation between the Route/site selection Process and ESIA**

This process identifies the best route and related cost for transmission infrastructure through an analysis of alternatives taking into account constraints on social and natural environment. It is of vital importance for minimising the impacts of the infrastructure. There is a close relationship between route selection, design process and the ESIA. An ESIA should define and describe the selected route, the alternative routes and the justification for the choice. Appendix 2 describes the phases of the selection of the best route and, in general, the route selection process.

3.2 Project proponent for Transmission infrastructure

The project proponent may be private, government or any organisation whose intention is to undertake a project, which might have both negative and positive impacts on the environment (biological, physical, economic or socio-cultural).

The project proponent must be clearly defined, along with the role it is to play along each phase of the project life cycle. Responsibilities should be highlighted from the onset of the project, in order to ensure that planning is adequate and that resources are available.

3.3 Project preparation

Project planning is central to any transmission infrastructure ESIA which will assist decision makers in project implementation. There are several preparatory steps that need to be done before an ESIA can be carried out. The recommended steps include but are not limited to:

- establish compliance to legal requirements
- establish policy requirements
- establish related administrative requirements
- consult all stakeholders

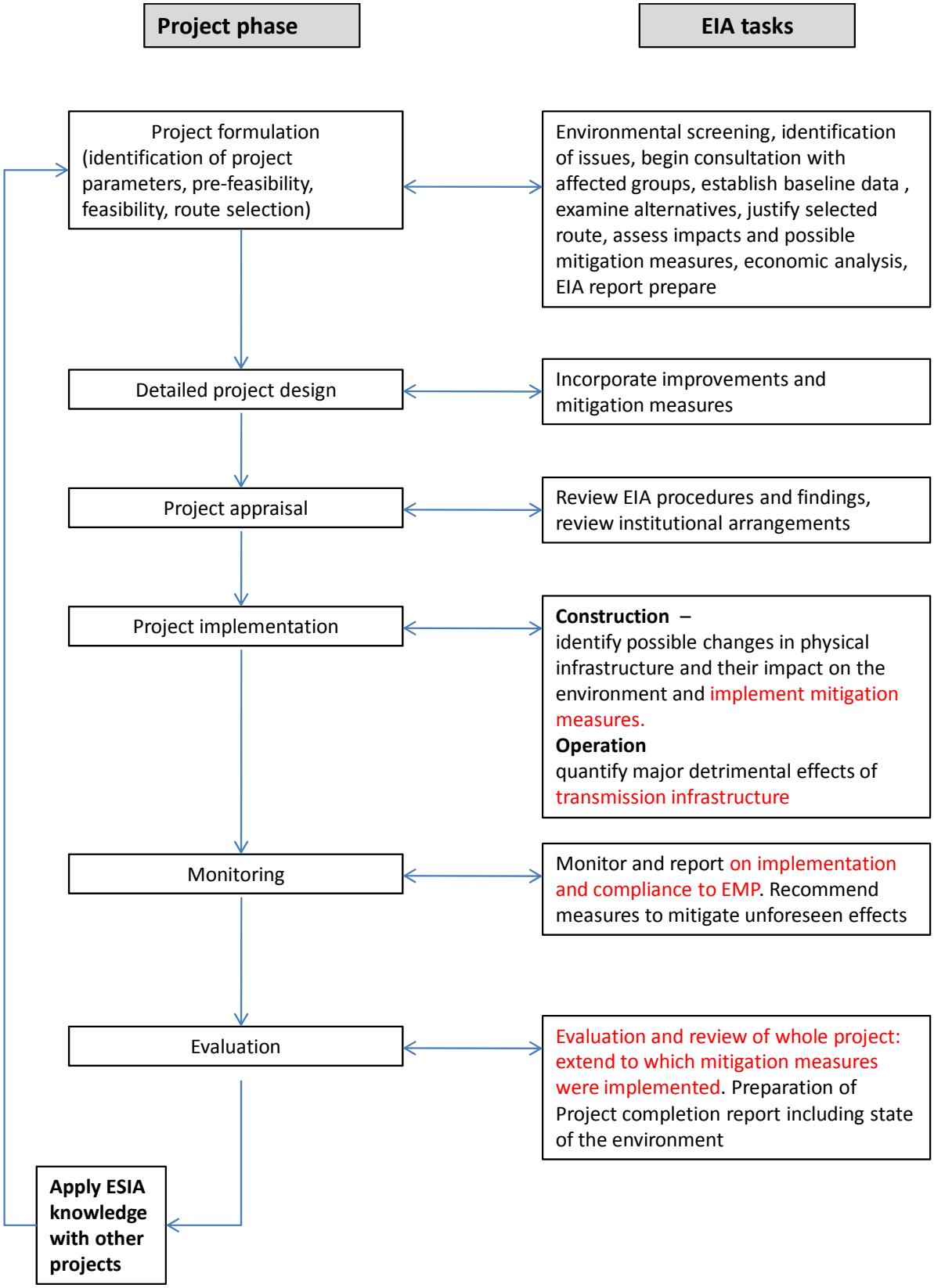
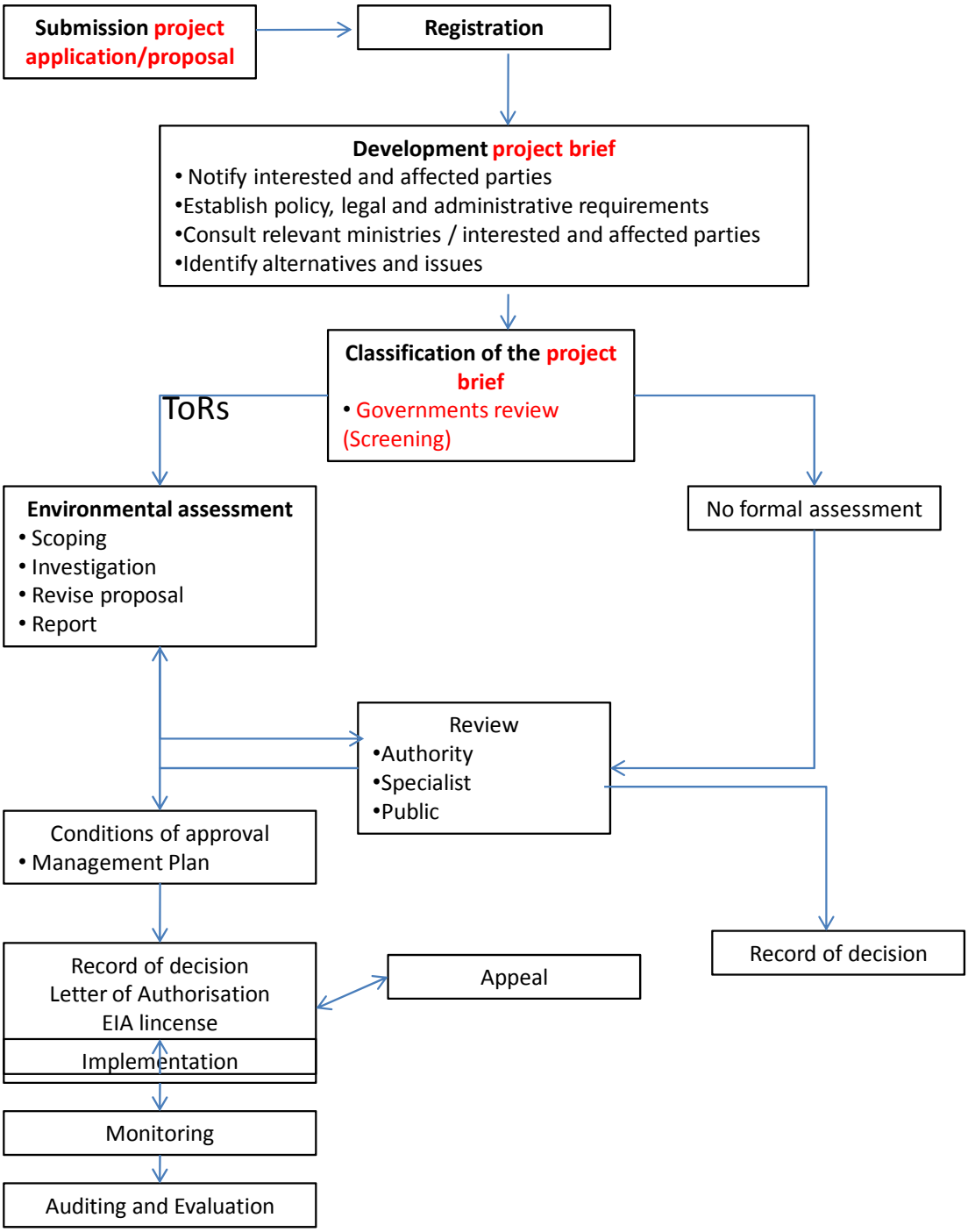


Figure 3: The ESIA Process in the Project Cycle


Submission project application/proposal
Registration
Development project brief
• Notify interested and affected parties
•Establish policy, legal and administrative requirements
•Consult relevant ministries / interested and affected parties
•Identify alternatives and issues
Classification of the project brief
• Governments review (Screening)
ToRs
Environmental assessment
• Scoping
• Investigation
• Revise proposal
• Report
No formal assessment
Review
•Authority
•Specialist
•Public
Conditions of approval
• Management Plan
Record of decision
Letter of Authorisation
EIA lincense
Appeal
Record of decision
Implementation
Monitoring
Auditing and Evaluation

3.4 Environmental Screening for Transmission Infrastructure

Environmental screening is undertaken during project identification and pre-feasibility studies (Figure 2 & 3).The purpose of screening is to categorise whether a project requires a full ESIA or partial ESIA. This is because certain projects may have less impact than others (World Bank, 1991). For example, the World Bank has four screening categories namely:

Category A: An ESIA is normally required because the project may have diverse significant impacts (projects in this category are forestry, large industrial plants, irrigation and drainage, mineral development (including oil and gas), pipelines (oil, gas, and water), resettlement, rural roads, tourism, urban development, large transmission infrastructure, etc.).

Category B: A limited environmental analysis is appropriate, as the project may have specific environmental impacts. Projects in this category include agro-industries (small scale), aquaculture & marine culture, small industries, mini-hydropower station, public facilities (hospitals, schools, housing complexes, rural electrification, telecommunications, small-scale tourism, rural water supply, etc.

Category C: Environmental analysis is normally unnecessary, as the project is unlikely to have significant environmental impacts. Projects in this category include education, family planning, nutrition, institutional development, technical assistance, etc.

Category D: Environmental projects for which separate ESIAs are not required, as the environment is the major focus of project preparation.

It is important to note that each country may have its own categorisation procedures in the screening process but harmonising procedures is essential where joint or trans-boundary projects are concerned.

These Categories are guidelines and utility must make use of their internal capacity to ensure that ESIAs are carried out accordingly.

3.5 Project Brief /Preliminary ESIA Document/ mini ESIA/Prospectus

(Please note the words will be used interchangeably.)

A project brief is necessary for the Relevant Government Authority to determine the category of the project (screening). . The Project Brief should include but not limited to the following:

- description of existing environment of the project site
- objectives and characteristics of the project and reasonable alternatives
- major activities that will be conducted during site preparation, construction and during operational stage

- specification of materials to be used
- products and by products including liquid and solid waste
- Scope of stakeholders consultation and participation

Once the project brief is finalised, it should be sent to the authorising agency for review. It is important to note that this may not be a requirement in some countries.

3.6 - Scoping for Transmission Infrastructure.

Scoping is an important component in ESIA methodology. During scoping, main environmental and social issues are identified; these issues will serve as providing the TOR for the specialist studies to be carried out during the impact assessment phase. The depth of analysis required for each impact is also identified and stated in the TOR. This mainly aims at:

- Providing an opportunity for consultants, relevant authority, project proponent, interested parties and affected parties to express their views and concerns regarding the proposal before an ESIA proceeds.
- To focus the study on key and relevant issues for quick decision-making.
- To facilitate an effective and efficient assessment process that saves resources, time, cost and delays. The project proponent or their consultant is responsible to arrange for scoping exercises in the study area.
- Identifying and consulting potential stakeholders with an interest in the project.

3.7 Terms of Reference for the ESIA

It is at this stage that the transmission infrastructure ESIA's Terms of Reference (TOR) are prepared. Issues to be considered in preparing the TORs should include but not limited to the following: (GRZ, 1997)

- Objectives of the Transmission infrastructure ESIA (In no priority order)
    - project activities
    - Issues being addressed
    - Planning of the transmission project
    - need for the transmission project
    - long term validity of the project
    - project design
    - project implementation, operation and maintenance

- Legal and Policy framework
    - summary of relevant legislation and regulations
    - International protocol
    - local environmental policies

- planning of future constraints (future natural parks, road and railways construction)

- Route selection
  - criteria for route selection
  - analysed route alternatives
  - description of the selected route and reasons of the choice
  - Way leaves and Servitudes

- Territory description around the transmission infrastructure
  - geographic database (information on topography, , hydrography, geology, seismology, etc)
  - data related to human activities (population presence and density, land use, infrastructures such as airport and highways, natural parks, naturalistic trails)

- Environmental impact identification and assessment Methodology
  - Identification of all impacts relevant to the different phases of the specific project (construction, operation)
  - Identification of the area of impact around the line
- Public health
  - electric and magnetic field requirements

- Ecological considerations
  - effect on flora and fauna
  - effect on endangered species
  - effect on soil
  - effect on breeding populations of fish and wildlife
  - effect on wetlands, rivers, aquifer, if any
  - effect on aerial extent of their habitat

- Social, economic and cultural including
  - employment
  - social disruption (resettlement and compensation)
  - migration or immigration
  - communication (roads opened up, closed, re-routed, etc)
  - local economic impacts
  - visual disruption
  - loss of land use potential
  - safety and fire risk
  - nuisance issues: (dust, noise and theft)
  - Communicable diseases; HIV/AIDS

- Landscape
  - area opened up or closed

    - visual impacts
    - blending with surroundings
    - recreation facilities

- Landuse
    - effect on landuse
    - possible multiple uses

- Water
    - effect on surface water
    - effect on underground water
    - effect on flow regimes

- Mitigation and Monitoring
    - comprehensive and detailed plan of mitigation measures
    - compensation schemes, training
    - monitoring plans
    - rehabilitation parameters
- Conclusions and Recommendations
    - summary findings
    - Socio - economic benefits, etc.

3.8 The Environmental and Social Impact Assessment for Transmission Infrastructure

Once the scoping exercise has identified the key issues to be included in the ESIA, the next step in the ESIA process is to carry out a detailed study of the key impacts. At the same time it is important to explain why some impacts are considered insignificant. According to Roe et al (1995), the study should ensure that it attempts to answer the following questions:

- What environmental and social impacts will occur as a result of the project?
- What environmental characteristics does the area have, which could potentially have a negative impact on the operation of the power line
- What will be the extent, magnitude and duration of the impacts?
- What will be the significance of these impacts within the local, national, regional, and international context?
- What can be done to mitigate, reduce, or avoid altogether the negative impacts, or optimise positive impacts?
- What residual impacts might need compensation?

Many methods have been proposed to carry out the study. These include matrices, questionnaires, checklists, interviews, overlays, networks, models and simulations. The simplest method, according to Roe et al (1995), is to compile a list of key impacts that were identified in the ESIAs of other similar studies and compare them to the proposed project. The method

chosen should, however, provide the planners and decision makers with accurate information, with regard to the likelihood and extent of the impacts to be expected.

The study should also identify and assesses alternatives to the project. Only the best alternative (one with the least adverse impacts) should be selected based on less negative impacts and cost-benefit analysis. An important alternative to be analysed always is the “no project”. This is a very important analysis because it helps the proponents measure the impacts from the project against those, which would have taken place without the project. The “no project” alternative must clearly indicate the broader scale impacts that can be expected from the project not coming to fruition.

The team undertaking the ESIA should be multi-disciplinary in nature. The World Bank suggests that the team should include but not be limited to an ecologist, biologist, archaeologist, social scientist, soil scientist, economist/demographer, engineer, etc. Some countries in the region may request the participation of a local consultant familiar with the project area. The specialists to be used will be determined during the scoping phase of the project. Generic lists of specialists should not be transferred from one project to the next.

Public meetings within the project area are an integral part of the ESIA study. Every possible initiative should be undertaken to ensure that, as many people from the area are aware of the meetings and able to attend them. These meetings enable interested and affected parties to contribute their concerns, which might have been overlooked during the scoping exercise. The public meetings should ideally be chaired by an independent person not affiliated to the project proponent. Minutes of the public meetings and any other correspondence from stakeholders should be kept. They will form part of the ESIA report (as appendices).

3.8.1 Common Environmental and Social Impacts

The most common environmental impacts related to transmission infrastructure projects.

- effects on existing land use (land value, ecologically sensitive sites, existing utilities e.g. telecommunications),
- visual intrusion on the landscape,
- increased erosion and interference with local drainage patterns,
- increased access and its associated effects (from the transmission project itself or construction and maintenance roads),
- hazard of electrical shock and strike to birds or other wildlife, and
- potential localised human health problems.
- Introduction of alien species or increased growth of invasive species
- Fragmentation of habitats

An environmental input at the design stage can help to reduce the above adverse environmental impacts and to enhance the positive impacts. Impacts on the environment can be minimised during the construction and operational phases, by strictly adhering to the design, legislation

and environmental guidelines. Environmental impacts associated with transmission infrastructure are summarised in Table 1.

3.9 Mitigation Measures for Transmission infrastructures

As the World Bank (1991) notes “electric power transmission systems include the transmission line, its right of way (ROW), switchyards, and access or maintenance roads”. Construction of these systems affects several resources within and sometimes beyond the ROW.

Table 2. Typical/potential Environmental and Social Impacts and mitigation measures for transmission infrastructure

Project activity	Environmental aspects	Environmental and Social effects	Mitigation measures
Project Route selection and Siting			
• Often potential impacts can be avoided or more easily and cost effectively mitigated if environmental criterion are included in the site selection process • Being linear projects, the environmental impacts of transmission power lines are directly related to the types of environment transverse, and the length of the line	• Disturbance of existing land use • Increased access • Aesthetics • Interference with other existing infrastructure	Potential effects on: • Land values • Sensitive ecological areas • Erosion and drainage patterns • Cultural resource sites • Visual character of the landscape • Telecommunications and airports	• Select right-of-way or site that avoids sensitive habitats and limits conflicts with existing land uses • Use common corridors to minimise impacts on undisturbed areas and lessen increased access to undeveloped areas • Incorporate appropriate buffer zones (see table2)
Construction phase			
• Impacts that cannot be avoided through sitting and route selection can often be lessened through planning and design	• Disturbance of existing habitats and land uses • Human Displacement	• Erosion • Water quality effects during stream crossing • Vegetation clearing Loss of property and livelihood	• Implement erosion control plan • Construct scheduling and sedimentation control • Restrict corridor width and avoid unnecessary clearing • Rehabilitation plan • Resettlement action plan

			• Compensation Policy
Operations Phase			
• Impacts that cannot be avoided through sitting and route selection can often be lessened through planning and design	• Electrification to rural areas • Access • Electromagnetic field (EMF) • Encroachment • Electrocutions: wildlife and humans • vandalism	• Social impacts and the benefits to new users • Utilisation of cleared right-of-way for agriculture or wildlife movement • Potential health effects • Soil erosion • Growth of unwanted vegetation within the servitude	• Public Education and awareness • Discourage residences in high voltage R-O-W • Vegetation management plan • Installation of reflectors and bird guards • Install anti climbers • Community policing • Symbolic safety signs

Table 3 Suggested Power Line Way leave sizes (DOEA, SA 1992)

Transmission lines	Suggested distance between parallel power lines	Suggested wayleave
765 kV	60 metres	80 metres
533 kV	40 metres	60 metres
500 kV	40 metres	60 metres
420 kV	35 metres	55 metres
400 kV	35 metres	55 metres
330 kV	35 metres	50 metres
275 kV	32 metres	47 metres
132 kV	25 metres	31 metres
88 kV	15 metres	31 metres
66 kV	15 metres	31 metres
33 kV (H-Pole)	14 metres	31 metres
33 kV	14 metres	22 metres
22 kV	12 metres	15 metres
11 kV	5 metres	10 metres

3.10 Documentation and Reporting

An ESIA process culminates in the preparation of an ESIA report. The Environmental Management Plan is part of the information to be included in the ESIA report. After the draft report is prepared, it is distributed to stakeholders and to the environmental authority. In addition, notices are to be run in the media in a language understood by the interested and affected people. The notices should also include an address to which comments can be sent and a date on which public hearing meetings will be conducted. After these public hearing meetings, the ESIA report should be revised to include the concerns raised during the meeting and those received by mail.

Reports and documents should be managed in a manner which would ensure that the information in the reports is accurate and up to date and that the necessary information is kept as prescribed by legislature.

4. Components of the ESIA Report

The ESIA report should contain as much information about the project and project area as possible. It should cover at least the following: overview of the project, existing characteristics of the project area, potential impacts of the project (comparison of alternatives), identification and quantification of impacts, techniques used to quantify the impacts, results of detailed impact quantification, mitigation measures including environmental budgets (compensation, resettlements, monitoring and auditing), monitoring and auditing techniques, etc (GRZ, 1997). (Refer to appendix 1)

4.1 Monitoring

Monitoring in the ESIA process happens at two levels: to verify impact prediction and adequacy of mitigation measures. Essentially monitoring finds out if any major mistakes or omissions had been made in the project assessment and implementation and comes up with strategies to solve the unidentified problems.

Monitoring will be dependent on the type of environment involved and the degree to which they are affected. Monitoring should include regular measurement of things like

- resettlements, compensation
- Wildlife; fauna and flora
- Compliance to EMP
- . General Safety and Health issues
- Land owner complaints

Another valuable indicator, which should be monitored, is the number and reason for outages occurring on a line in operation. This could indicate potential negative interactions between the line and the environment.

Monitoring reports must be produced and submitted to the proponent and the environment Authority.

4.2 Auditing

After the project has been implemented, it should be audited. The audit should be at three levels: the ESIA report, the EMP (mitigation plan), and the institutional capacity to implement the mitigation plan. An audit will detect the weaknesses in the process or identify the procedures, which need to be developed to ensure the protection of both the social and natural environment.

Prior to the audit commencing, clear audit parameters should be identified. Qualified individuals should carry out the audit and the findings from the final audit report should be verified. In the

case of trans - boundary projects, the possibility of making the audit report available to the interested and affected parties is recommended.

5.0 REVIEW AND DECISION MAKING

After receiving the ESIA report, the Authorising body, will conduct a final review of the document. It may send copies of the report to the stakeholders for feedback. If the ESIA report meets the conditions and regulations for that kind of project, the proponent will be allowed to proceed with the project. If the report is found wanting, either of the two things can be done: the proponent will be asked to do some further investigations on specified topics or an independent environmental consultant can be engaged (at proponent's cost) to do the additional work for them. If the ESIA reveals major adverse impacts, which cannot be mitigated, the project may be rejected.

If the ESIA report has been approved, the environmental management plan, monitoring and auditing plans along with conditions of approval should be included in the project documents as a legal requirement. A rehabilitation plan should form part of the environmental management plan.

5.1 EIA Format

Adherence to standard format and procedures will ensure that ESIAs are consistent from project to project or for multiple proposals for the same project. Such consistency will also facilitate comparison of projects and project alternatives. This section presents a framework for organizing an EISA for Transmission infrastructure projects. It leads the user step-by-step through each component.

Table 4. Model ESIA Table of Contents

EIA SECTION
ESIA Preliminaries Title Page Executive Summary Table of Contents List of Tables List of Figures List of Appendices and Annexes Terms, Acronyms, and Abbreviations
Section 1: Policy, Legal, and Administrative Framework
Section 2: Project Objectives and Description
Section 3: Baseline and Background Data
Section 4: Environmental impacts of Construction
Section 5: Environmental impacts of Operation
Section 6:Analysis of Alternatives
Section 7: Mitigation Plan
Section 8: Environmental Management Plan
Section 9: Institutional Strengthening Requirements
Section10: Conclusions
Section 11:Recommendations
Section 12: Tables and Figures

5.2 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

An important objective of the environmental and social impact assessment is to develop procedures and plans to ensure that the mitigation measures and monitoring requirements approved during the EIA and environmental compliance review will actually be implemented throughout the course of the project. As such, strong emphasis must be placed on the development of a responsive EMP during the processing and on setting out conditions and targets to meet during project implementation. An EMP must be specifically spelled out as a requirement under the Terms of Reference (TOR) for performance of ESIA.

Contents of EMP Section of the ESIA.

The minimum recommended contents of EMP are as follows:

1. Summary of Potential Impacts.
2. Description of Planned Mitigation Measures
3. Description of Planned Environmental Monitoring
4. Description of Public Consultation Process
5. Description of the Responsibilities and Authorities for Implementation of Mitigation Measures and Monitoring Requirements
6. Description of Responsibilities for Reporting and Review
7. Work Plan including staffing chart, proposed schedules of participation by various members of the project team and activities and inputs of various government agencies
8. Environmental Responsible of Procurement Plan? Not clear
9. Detailed Cost Estimates
10. Mechanisms for feedback and adjustment

    The EMP is the key means by which implementation of mitigation measures is tracked and assured. The development of mitigation measures, monitoring program, institutional arrangements and scheduling can be aided by the use of the matrices sited in the AfDB Guidelines on;

    http://www.adb.org/Documents/Guidelines/environmental_Asessment/Environmental*Management*Plans.pdf

    Additional contents of EMP should include:

Institutional Arrangements – where arrangements with the following organisations are made to ensure optimal functioning of the EMP;

- Regulatory agencies – for routine reporting of monitored data
- Local government bodies – to keep appraised of operating procedures, changes or developments that may be of concern to local interests
- Local Fire Departments and rescue teams
- Local police services
- Local communities

This section should summarize the predicted adverse environmental and social impacts that must be mitigated

11. Description of Proposed Mitigation Measures

This section should set out clear and achievable targets and quantitave indicators of the level of mitigation required. Each measure should be briefly described in relation to the impact and conditions under which it is required. These should be referred to designs, development activities, equipment descriptions and operating procedures and implementation responsibilities.

12. Description of Monitoring Programs and Parameters

This section should outline the specific monitoring protocol, parameters and expected frequencies. It should identify objectives and specify the type of monitoring required. It also describes environmental performance indicators, which provide linkages between impacts and mitigation measures identified in the EIA Report.

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APPENDIX1. Suggested Route Selection and Siting Process

The following steps of the route selection and siting process are strictly correlated with ESIA and their synthesis should be reported in the ESIA Report:

- planning of the new transmission infrastructure, that is the identification of the need and the main characteristics in the framework of the overall and local power system planning, as well as of other specific development plans (economic, industrial, etc.) ;
- identification of the best route and site through analyses of alternatives, by considering all restraints and involving all stakeholders;
- detailed design in order to integrate the transmission infrastructure into the surrounding environment, by the selection of particular components or solutions for specific environmentally and Socially- critical situations.

A brief presentation of the content of the above three items in the routing and siting process followed in Italy is provided as an example.

Planning

The planning should consider the forecast for energy demand and supply connected with the economic and industrial development of the geographic areas, which will be affected by the line, and analyse alternative solutions.

This in order to:

- justify the need for the line
- correctly identify the best structure of the grid and its main characteristics (voltage level, substations, etc.), in order to maintain its validity during the planned life and to simplify future developments, by minimising line modifications and, therefore the overall costs and environment impacts.

Identification of the line's route

The second phase is the identification of the best route of the line. In fact, transmission infrastructure are linear projects. There is a certain degree of flexibility in siting the line. The analysed area generally has a width that accounts for about 30%-40% of the length of the direct line joining the terminal stations. This area is often limited by physical restraints, such as lakes, mountains, etc. Inside this area, a detailed analysis is performed to identify all additional parameters which are not suitable for the line. These restraints are the presence of urban areas, areas of particular environmental value, airport, natural obstacles, etc.

The analysis for high-voltage line is performed with thematic maps and is integrated by aerophotogrammetric analysis and by site investigations. The alternatives routes are plotted in a thematic map (normally 1:100.000 scale), which should contain all the land and environment parameters constraining the pathway. It is very important to indicate also the alternative routes

considered and discarded. The ESIA should contain the motivations for their exclusion. The involvement of all the stakeholders in this selection process is very important.

At the end of this process, a route is selected among the possible ones, based on the following general siting criteria (which are related to economic and environmental values):

- avoidance of restricted zones ;
- distance from zones of landscape value;
- distance from mountain edges, preference for valley routings;
- distance from urban areas;
- route with constant slope;
- minimisation of infrastructure crossing (e.g. highways, railways, other power lines, etc.).

The above process should also consider the economic aspects through a cost- benefit analysis.

Detailed design

After the preliminary route is identified, a detailed design of the line starts. At first, a detailed and careful design analysis identifies the specific characteristics in order to integrate the power lines into the surrounding environment (such as type of tower or pole to be used for the different situations, etc.).

An area about 2 km wide, containing the selected route, is analysed in order to identify the environmental impact of the line. The width of 2 km is dictated by the visual impact. The thematic map should consider all the most important items (presence of houses, historical places, paths of particular landscape value, viewing points, roads, bird migratory corridors, land use, forested areas, etc.)

For each section of the line, the impact of all the potential social and natural environment issues (land use, flora, fauna, electromagnetic field phenomena, visual impact, etc.) both during the construction and operation phases are analysed and classified by order of importance. For specific cases where critical areas are identified, slight route modifications or specific mitigation solutions are selected always bearing in mind economic aspects. All of these aspects should be reported in ESIA report.