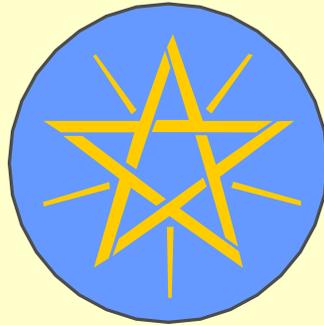


**FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA  
ENVIRONMENTAL PROTECTION AUTHORITY**



**ENVIRONMENTAL IMPACT ASSESSMENT  
GUIDELINE DOCUMENT**

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**ADDIS ABABA  
MAY 2000**

**FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA  
ENVIRONMENTAL PROTECTION AUTHORITY**

**FINAL DRAFT**

**ENVIRONMENTAL IMPACT ASSESSMENT  
GUIDELINE DOCUMENT**

**ADDIS ABABA  
JULY 2000**

**NOT FOR CITATION**

**This guidelines is still under development and shall be binding after consensus is reached between the Environmental Protection Authority and the Environmental Units of Competent Sectoral Agencies**

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**ACRONYMS:**

<b>ADLI</b>	Agricultural Development Led Industry
<b>CEA</b>	Cumulative Effects Assessment
<b>CSE</b>	Conservation Strategy of Ethiopia
<b>CSIR</b>	Council for Scientific and Industrial Research
<b>DWAF</b>	Department of Water Affairs and Forestry (South Africa)
<b>EIA</b>	Environmental Impact Assessment
<b>EIS</b>	Environmental Impact Statement
<b>EM</b>	Environmental Management
<b>EMP</b>	Environmental Management Plan
<b>EMS</b>	Environmental Management System
<b>EPE</b>	Environmental Policy of Ethiopia
<b>ERA</b>	Ecological Risk Assessment
<b>GVP</b>	Gross Value of Production
<b>IAPs</b>	Interested & Affected Parties
<b>IEM</b>	Integrated Environmental Management
<b>ISO</b>	International Standards Organisation
<b>PPP</b>	Policies, plans and programmes
<b>RECC</b>	Regional Environmental Co-ordination Council
<b>SABS</b>	South African Bureau of Standards
<b>SEA</b>	Strategic Environmental Assessment
<b>SOE</b>	State of the environment
<b>USEPA</b>	United States Environmental Protection Agency
<b>WHO</b>	World Health Organisation

## **TERMS USED IN THE GUIDELINES:**

### **Activity:**

A development action, either planned or existing, that may result in environmental impacts through pollution and/or resource use.

### **Affected environment**

Those parts of the socio-economic and biophysical environment impacted on by the development

### **Alternatives**

Possible courses of action, in place of another, that would meet the same purpose and need (of proposal). Alternatives can refer to any of the following but are not limited to: alternative sites for development, alternative projects for a particular site, alternative site layouts, alternative designs, alternative processes and materials. In EIA the so-called “no action” alternative may also require investigation in certain circumstances.

### **Assessment**

The process of collecting, organising, analysing, interpreting and communicating data that are relevant to some decision.

### **Auditing**

The process through which an EIA is inspected which then provides an opportunity and mechanism to learn from experience and to refine project design and implementation procedures.

### **Compliance**

To act in accordance with the rules and regulations.

### **Development:**

The act of altering or modifying resources in order to obtain potential benefits.

### **Environmental impact statement**

A report describing the process of examining the environmental effects of a development proposal, the expected impacts and the proposed mitigating measures.

### **Environmental aspect:**

A human activity or environmental element

### **Environmental issue:**

A concern felt by one of more parties about some existing, potential or perceived environmental impact.

### **Environmental impact:**

The degree of change in an environment resulting from the effect of an activity on the environment, whether desirable or undesirable. Impacts may be the direct consequence of an organisation’s activities or may be indirectly caused by them.

**Environmental impact assessment (EIA):**

A process of examining the environmental consequences of development.

**Evaluation**

The process of weighing information, the act of making value judgements or ascribing values to data in order to reach a decision.

**Informed decision-making**

Decision relating to the impacts on the environment based upon the best applicable knowledge available. In cases where a lack of information is evident, steps will be taken to collect information necessary to assess the impacts and sustainable use of resources.

**Interested party**

Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, customers and consumers, environmental interest groups and the general public.

**Impact**

The effect of an activity on the environment whether desirable or undesirable. Impacts may be the direct consequence of an organisation's activities or may be indirectly caused by them.

**Irreversible impact**

When the character, diversity or reproductive capacity of an environment is permanently lost.

**Land use**

The activities that take place within a given area or space.

**Mitigation**

Measures taken to prevent, reduce or rectify impacts of a particular project of the evaluation process concludes that the impacts are significant.

**Monitoring**

The repetitive and continued observation, measurement and evaluation of environmental data to follow changes over a period of time to assess the efficiency of control measures.

**Negative impact**

A change that reduces the quality of the environment (for example, by reducing species diversity and the reproductive capacity of the ecosystem, by damaging health, property or by causing nuisance).

**Participation**

Interested and affected individuals and groups will have an opportunity to participate in decisions about ways in which environmental concerns are addressed.

**Positive impact**

A change that improves the quality of the environment (for example, by increasing species diversity and the reproductive capacity of the ecosystem, by removing nuisances or improving amenities).

**Pristine**

Undisturbed natural landscape.

**Pro-active:**

Taking action in anticipation of a problem rather than in reaction to the problem.

**Rehabilitation**

Restoration of landscape more or less to its former scenic appearance.

**Scoping**

Scoping involves the identification and “narrowing down” of potential environmental impacts to ensure that the EIA focuses in key issues for decision-making.

**Screening**

The process whereby the responsible department(s) decides whether or not a project requires assessment, and the level of assessment that may be required.

**Scheduled activities**

Development actions that are likely to result in significant environmental impacts.

**Significant impact**

An impact that, by its magnitude, duration or intensity alters an important aspect of the environment.

**Value judgement**

A statement or opinion which is not capable of being falsified by comparison with fact.

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## CHAPTER 1 : INTRODUCTION AND PURPOSE OF THIS DOCUMENT

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This Guide to Environmental Impact Assessment (EIA) document provides a background to environmental impact assessment and environmental management in Ethiopia. In essence the document aims at being a reference material to ensure effective environmental assessment and management practice in Ethiopia for all parties who engage in the process. In this regard the document aims towards:

- Providing all interested parties with a consistent approach to EIA (including: project proponents, consultants, communities, NGO's and the authorities);
- Providing background information for the context of EIA in Ethiopia;
- Assisting proponents in identifying their EIA responsibilities;
- Assisting community and NGO groups in realising their environmental rights with regard to EIA;
- Assisting the authorities in determining their roles and responsibilities as decision-makers in the EIA process; and
- Assisting in decision-making with regard to cost and benefits of proposed development projects.

The document details the required procedures for conducting an EIA in Ethiopia and the requirements for environmental management. The document has been developed to support the ongoing development of environmental legislation. These requirements are presented on a step-by-step basis. In addition, the document specifies tools that may be considered when engaging in the EIA process. Reference is made to the legislation and policies that potential investors and developers must comply in Ethiopia and key issues for environmental assessment in specific development sectors are detailed for consideration.

This document has been derived in parts from concepts provided in previous documents prepared by the Environmental Protection Authority (EPA), in terms of the Ethiopian Environmental Policy. The EPA have prepared six volumes of Environmental Assessment Guideline documents which provide for EIA procedure as well as for EIA in specific development sectors in the country (including: agriculture, industry, transport, mining and dams and reservoirs). These documents were revised following a workshop with stakeholders held in March-April 1999.

In order to meet these objectives the document has been structured into five Chapters, as follows:

**Chapter 1** describes the purpose and aims of the document

**Chapter 2** provides a background to EIA in Ethiopia through describing the need for an integrated process and the legislative requirements. This section includes an overview of the responsibilities of the Competent Agency and identifies those projects that must be subjected to an EIA.

**Chapter 3** describes the Ethiopian approach to EIA. It is a comprehensive description of each of the phases within an EIA process and identifies the roles and responsibilities of each party engaging in the EIA process.

**Chapter 4** provides an overview of environmental standards that may be applied in Ethiopia and details how these standards and guidelines may be established.

**Chapter 5** identifies the issues and impacts that may be associated with development in some of the key sectors in Ethiopia

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## CHAPTER 2 : ENVIRONMENTAL ASSESSMENT AND MANAGEMENT IN ETHIOPIA

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### 2.1 Background

The environment has not featured on the development agenda in the past since the project evaluation and decision-making mechanisms have focussed on short-term technical feasibility and economic benefits. Past development practices have not anticipated, eliminated or mitigated potential environmental problems early in the planning process. This has resulted in a situation where the country experiences a seriously degraded natural environment. Further development has the potential to further damage fragile environmental systems.

In order to ensure that future developments in Ethiopia are sustainable it is essential to integrate environmental concerns into development activities. Environmental assessment and management have been recognised as effective tools for facilitating the inclusion of the principles of sustainable development into development proposals.

### 2.2 Legislative and Policy context

The Constitution (adopted on the 21<sup>st</sup> of August 1995) requires current and future legislation and the conduct of government to conform to a Bill of Rights. The concept of sustainable development and environmental rights are entrenched in the Rights of Peoples in Ethiopia through Articles 43 and 44 which state the following:

#### **Article 43:- The Right to Development**

1. *The Peoples of Ethiopia as a whole, and each Nation, Nationality and People in Ethiopia in particular have the right to improved living standards and to sustainable development.*
2. *Nationals have the right to participate in national development and, in particular, to be consulted with respect to policies and projects affecting their community.*
3. *All international agreements and relations concluded, established or conducted by the State shall protect and ensure Ethiopia's right to sustainable development.*
4. *The basic aim of development activities shall be to enhance the capacity of citizens for development and to meet their basis needs.*

#### **Article 44:- Environment Rights**

1. *All persons have the right to live in a clean and healthy environment.*
2. *All persons who have been displaced or whose livelihoods have been adversely affected as a result of State programmes have the right to commensurate monetary or alternative means of compensation, including relocation with adequate State assistance.*

The Environmental Protection Authority (EPA) was established in response to the requirements of the Constitution (Proclamation No 9/1995). The objective of the EPA is to:

*“...ensure that all matters pertaining to the country’s social and economic development activities are carried out in a manner that will protect the welfare of human beings as well as sustainably protect, develop and utilise the resource bases on which they depend for survival”* (Federal Negarit Gazeta of the Federal Democratic Republic of Ethiopia - Proclamation No 9/1995)

In addition to the EPA, the Investment Authority has responsibilities towards the environment. These are captured in the Federal Negarit Gazeta - Proclamation No 37/1996) which states that *“...the intended investment activity would not be convening the operational laws of the country and that, in particular, it complies with conditions stipulated in environmental protection laws...”*.

Section 2.4 provides a more detailed description of the roles and responsibilities of the EPA as the Competent Agency.

As one of its first responsibilities, the EPA (in conjunction with the Ministry of Economic Development and Cooperation) developed the Environmental Policy of Ethiopia (EPE) which was adopted in April 1997. The EPE supports Constitutional Rights through its guiding principles which are:

- a. Every person has the right to live in a healthy environment;
- b. Sustainable environmental conditions and economic production systems are impossible in the absence of peace and personal security. This shall be assured through the acquisition of power by communities to make their own decisions on matters that affect their life and environment;
- c. The development, use and management of renewable resources shall be based on sustainability;
- d. The use of non-renewable resources shall be minimized and where possible their availability extended (e.g. through recycling);
- e. Appropriate and affordable technologies which use renewable and non-renewable resources efficiently shall be adopted, adapted, developed and disseminated;
- f. When a compromise between short-term economic growth and long-term environmental protection is necessary, then development activities shall minimise degrading and polluting impacts on ecological and life support systems. When working out a compromise, it is better to err on the side of caution to the extent possible, as rehabilitating a degraded environment is very expensive, and bringing back a species that has gone extinct is impossible;
- g. Full environmental and social costs (or benefits foregone or lost) that may result through damage to resources or the environment as a result of degradation or pollution shall be incorporated into public and private sector planning and accounting, and decisions shall be based on minimising and covering these costs;

- h. Market failures with regard to the pricing of natural, human-made and cultural resources, and failures in regulatory measures shall be corrected through the assessment and establishment of user fees, taxes, tax reductions or incentives;
- i. Conditions shall be created that will support community and individual resources to sustainably manage their own environment and resources;
- j. As key actors in natural resource use and management, women shall be treated equally with men and empowered to be totally involved in policy, programme and project design, decision-making and implementation;
- k. The existence of a system which ensures uninterrupted continuing access to the same piece(s) of land and resource creates conducive conditions for sustainable natural resource management;
- l. Social equity shall be assured particularly in resource use;
- m. Regular and accurate assessment and monitoring of environmental conditions shall be undertaken and the information widely disseminated within the population;
- n. Increased awareness and understanding of environmental and resource issues shall be promoted, by government officials and by the population, and the adoption of a “conservation culture” in environmental matters among all levels of society shall be encouraged;
- o. Local, regional and international environmental interdependence shall be recognised;
- p. Natural resource and environmental management activities shall be integrated laterally across all sectors and vertically among all levels of organisation;
- q. The wealth of crop and domestic animal as well as micro-organism and wild plant and animal germplasm is an invaluable and inalienable asset that shall be cared for;
- r. Species and their variants have the right to continue existing, and are, or may be, useful now and/or for generations to come; and
- s. The integrated implementation of cross sectoral and sectoral federal, regional and local policies shall be seen as a prerequisite to achieving the objectives of this Policy on the Environment.

In addition to its Guiding Principles the EPE provides Sectoral Environmental Policies and Cross-sectoral Environmental Policies. Environmental Impact Assessment policies are included in the latter. The EIA policies are:

- a. To ensure that EIA's consider not only physical and biological impacts but also address social, socio-economic, political and cultural conditions;
- b. To ensure that public and private sector development programmes and projects recognise environmental impacts early and incorporate their containment into the development design process;
- c. To recognise that public consultation is an integral part of EIA and ensure that EIA procedures make provision for both an independent review and public comment before consideration by decision-makers;
- d. To ensure that the environmental impact statement always includes mitigation plans for environmental management problems and contingency plans in case of accidents;

- e. To ensure that, at specified intervals during project implementation, environmental audits regarding monitoring, inspection and record keeping take place for activities where these have been required by the Environmental Impact Statement (EIS);
- f. To ensure that preliminary and full EIA's are undertaken by the relevant sectoral ministries or departments if in the public sector, and by the developer, if in the private sector;
- g. To create by law and EIA process which requires appropriate environmental impact statements and environmental audits for private and state development projects;
- h. To establish the necessary institutional framework and determine the linkages of its parts for undertaking, coordinating and approving EIA's and the subsequent system of environmental audits required to ensure compliance with conditionalities;
- i. To develop detailed sectoral technical guidelines in EIA's and environmental audits;
- j. To ensure that social, socio-economic, political and cultural conditions are considered in EIA procedures and included in sectoral guidelines; and
- k. To develop EIA and environmental audit capacity and capability in the EPA, sectoral ministries and agencies as well as the regions.

EIA is not currently a legal requirement, however, the intent of these policies is for their promulgation into legislation and in this regard a framework environmental law is under preparation. The requirements of the EIA policy have been considered in the following principles.

### **2.3 EIA Objectives and Principles**

The primary purpose of conducting an EIA is to ensure that the environmental effects of proposed activities are adequately and appropriately considered before decisions are taken. This should serve as a key aid in the decision-making process for relevant authorities by providing comprehensive information on the environmental consequences of development. Evaluated information and supporting arguments enable decision makers to evaluate the overall impacts of a proposal and alternatives to that proposal.

There are a number of principles which underlie this objective, these include:

- *Early application* - the EIA process should be applied as early as possible in the proposed planning of investment as is practical. This should ensure that environmental issues are considered pro-actively before irrevocable decisions are taken. Practicality generally dictates that the EIA process is applied during project conceptualisation.
- *Participation* - this requires that all interested and affected parties have the opportunity to participate meaningfully in the EIA process.
- *Issues based* - EIA should focus on the resolution of issues which are considered to be important to those participating in the process.
- *Alternatives* - EIA should consider all feasible alternatives which may include different methods of undertaking a development, alternative sites, alternative sources of raw materials. The "no-go" option is another feasible alternative.

- *Accountability* - project proponents are accountable for the potential impacts of activities being undertaken as well as managing impacts. Consultants are accountable for providing sufficient information to enable decision-makers to take sound decisions. The Competent Agency is accountable for the decisions that are taken.

The two key objectives of the Ethiopian EIA process are the:

- Integration of environmental considerations in development planning processes in order to make use of natural resources in a responsible manner; and
- Protection and enhancement of the quality of all life forms.

## **2.4 The Competent Agency**

The Environmental Protection Authority (EPA) is the Competent Agency at the Federal level in Ethiopia. It is, therefore, the responsibility of this authority in the EIA process to:

- ensure that the proponent complies with requirements of the EIA process;
- maintain co-operation and consultation between the different sectoral agencies throughout the EIA process;
- maintain a close relationship with the proponent and to provide guidance on the process; and
- evaluate and take decisions on the documents that arise from the EIA process.

These factors will be discussed in more detail in Chapter 3.

At the regional level, the Federal EPA has devolved responsibility to the Regional equivalent to the EPA. The regional authorities should ideally establish an EPA-type institution to deal with environmental issues at the regional level. This is, however, a long-term objective. In the interim period, however, the Regional Environmental Co-ordination Committee (RECC), which comprise responsible officers from different sectoral Bureaus must take the responsibility at the Regional level. Seeing as that the RECC's are not sectoral based they can be viewed as being independent of the outcome of a specific EIA. Due to competence and capacity limitations, the RECC may chose to designate a specific sectoral Bureau to take responsibility for an EIA process. The sectoral Bureau must not, however, have a vested interest in the outcome of the EIA process. This is particularly important where a sectoral agency houses the secretariat of the RECC. The Federal EPA should act in an advisory capacity to the Regional EPA-type organisations.

It is the responsibility of the regional EPA bodies to inform the Federal EPA of projects that may be of national significance. Therefore the Federal authority should only be involved in EIA processes where a proposed activity may:

- have an environmental effect across the international boundaries of Ethiopia;
- have an environmental effect across regional boundaries within Ethiopia;

- have an effect on an environment of national or international significance, including but not limited to natural forests, wetlands, national parks, cultural heritage sites etc.
- have a Federal government department, the relevant regional authority or another statutory body as the proponent;
- have the Federal Investment Authority as the investment approval body.

Alternatively Federal EPA may have an EIA referred if agreed to between the Federal authority and the regional authority. This would typically happen in complicated EIA's where the Regional authority feels that it does not have the capacity or competency to deal with the application.

## **2.5 Scheduled activities**

The Schedule of activities that may be required to undergo an EIA process as detailed in Chapter 3 of this document is provided in Appendix 1. Note though that decision-making within the EIA process occurs after specific phases, therefore, not all of the Schedule 1 and 2 activities will be required to undertake a full EIA as per the process detailed in Section 3. All projects must be submitted to a Screening exercise. Those projects indicated in Schedule 1 are the most likely to require a full EIA to evaluate their environmental consequence.

**FIGURE 3.1. EIA APPLICATION PROCESS**

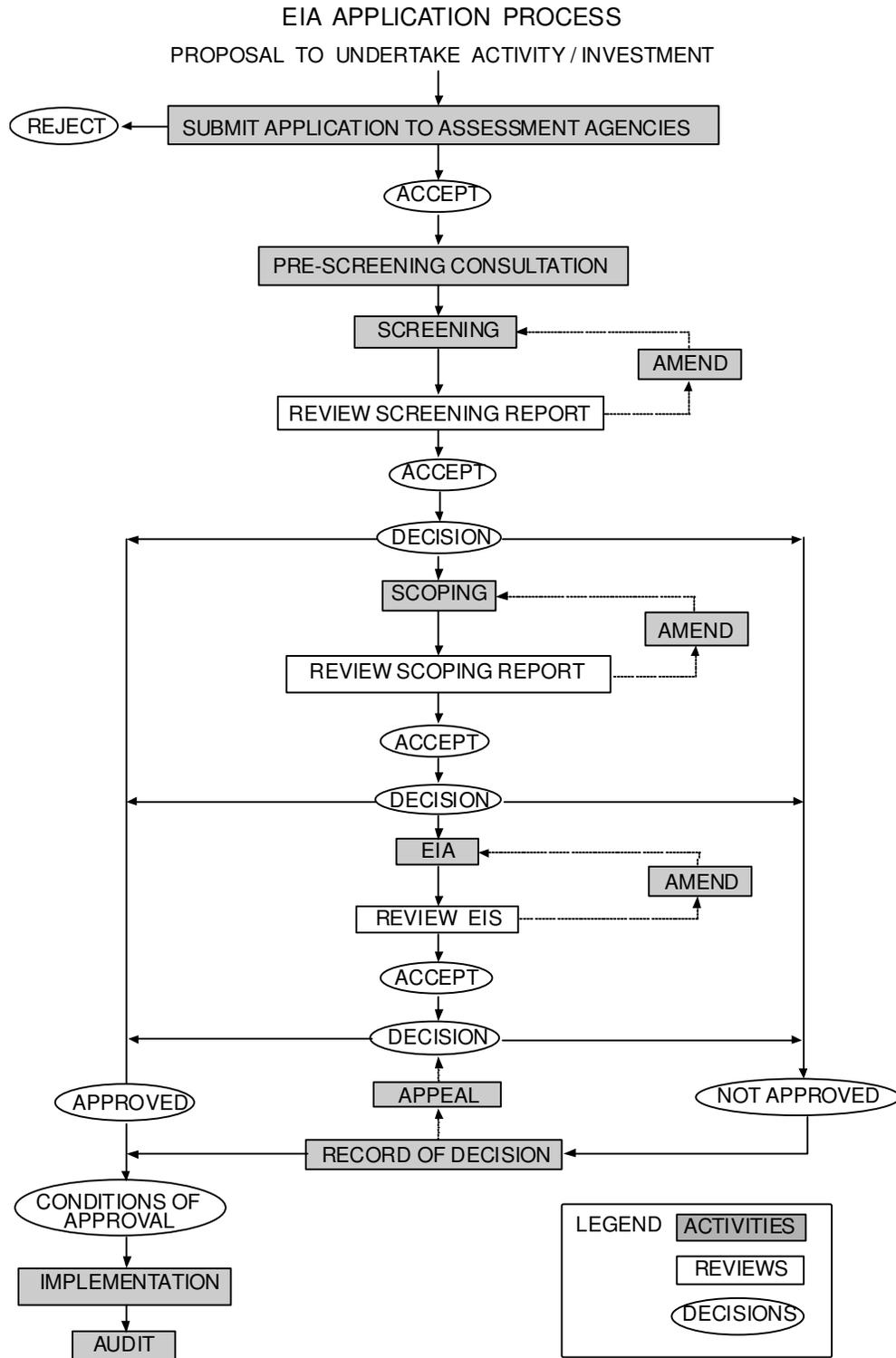
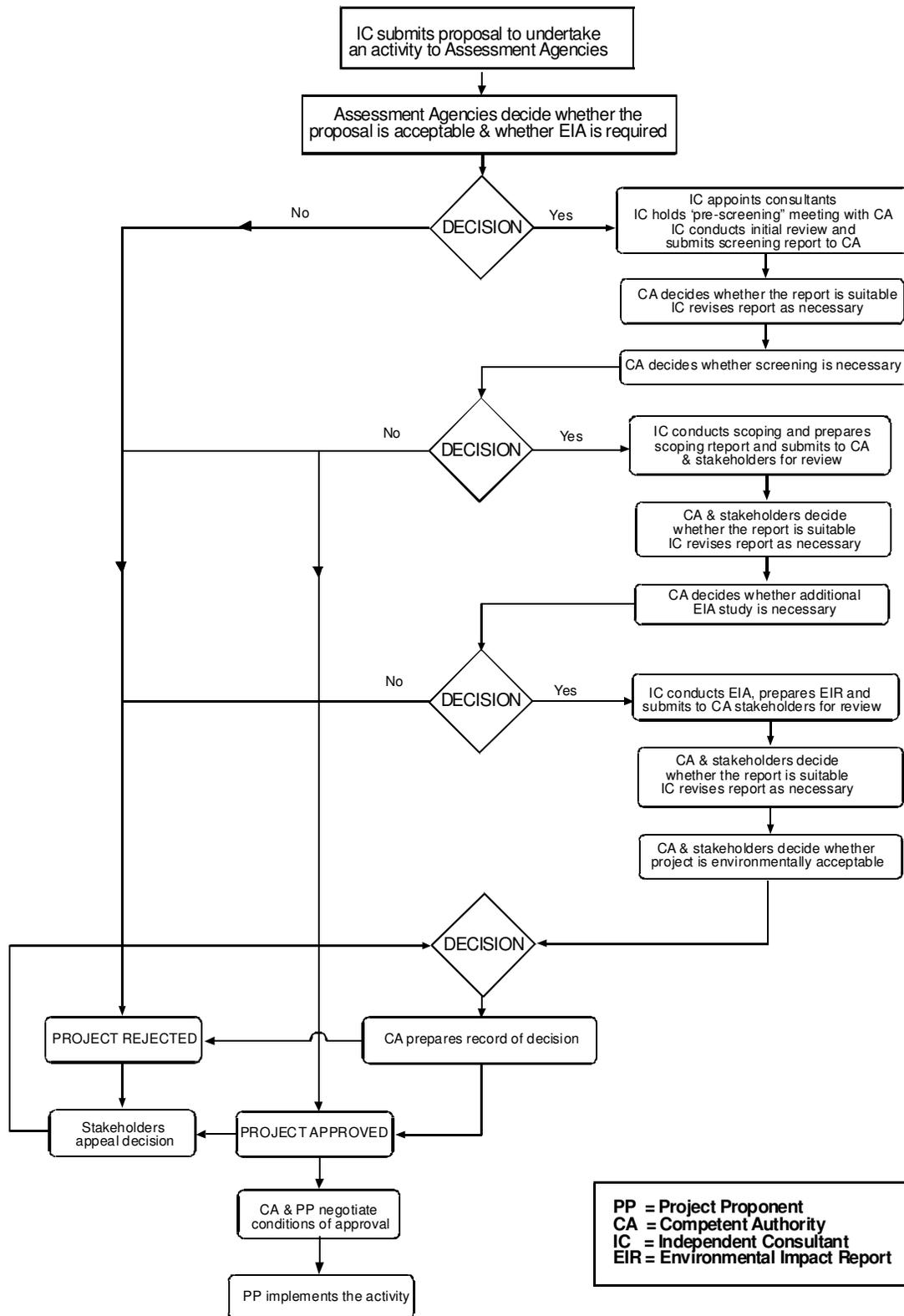


FIGURE 3.2

**SIMPLIFIED EIA PROCEDURAL FLOW IN ETHIOPIA**



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## CHAPTER 3 : THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

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The regulatory process for conducting an environmental impact assessment in Ethiopia is shown in Figures 3.1 and 3.2. Please refer to this figure throughout this Chapter and please note that the inclusion of activities prior to the “Pre-screening consultation” is for the sake of completion in terms of the investment process rather than for descriptive purposes in the following discussion. The assessment agencies should on issuance of an Investment Permit indicate the need for EIA to a potential investor and should not issue an Operation Permit without an Environmental Clearance Certificate.

Please also consider that project descriptions and the evaluation of impacts etc. must consider the full life-cycle of a project (including: construction, operation and decommissioning).

### 3.1 Roles and Responsibilities

There are a number of potential role players in an EIA, including:

- proponent
- consultant
- interested and affected parties
- Competent Agency

These roles are explained further.

#### 3.1.1 Proponent

The proponent is the project applicant (i.e. the developer). The proponent is responsible for complying with the requirements of the EIA process. The first responsibility of the proponent, however, is to appoint an independent consultant who will act on the proponent’s behalf in the EIA process. The proponent should ensure that the consultant has:

- expertise in environmental assessment and management;
- the ability to manage the required participation process
- the ability to produce reports that are readable, thorough and informative
- a good working knowledge of environmental impact assessment and management policies, legislation, guidelines and standards.

The proponent may appoint an independent consultant or a multi-disciplinary group of consultants.

The proponent is responsible for all associated costs incurred when following the EIA process. The proponent must ensure that adequate participation of the Competent Agency and interested and affected parties has been carried out.

On completion of the EIA, it will be the proponent's responsibility to ensure that the Conditions of Approval are carried out (including monitoring and auditing).

### 3.1.2 Consultant

The independent consultant acts on behalf of the proponent in complying to the EIA process and is responsible for showing that he/she has:

- expertise in environmental assessment and management;
- the ability to manage the required participation process
- the ability to produce reports that are readable, thorough and informative
- a good working knowledge of environmental impact assessment and management policies, legislation, guidelines and standards.

Further the consultant is responsible for all processes, plans and reports produced while following the EIA process and should have adequate access to facilities for storing this information. The consultant should also ensure that all of this information is made available to the Competent Agency. The consultant must ensure that adequate participation of the Competent Agency and interested and affected parties has been carried out.

The consultant must ensure that he/she has no vested (financial or otherwise) interest in the proposed development other than ensuring compliance to the EIA process. Furthermore, the consultant may not work for the Competent Agency while working for the proponent on a particular application. This is key aspect in ensuring that the findings of the EIA are unbiased and in the best interest of all stakeholders.

### 3.1.3 Interested and affected parties

Interested and affected parties (IAPs) are key to a successful EIA and are responsible for providing input and comments at various stages in the EIA process. The input from interested and affected parties should be sought during the scoping phase, in assessing and mitigating impacts and in the review of the EIS. In accepting the responsibility to participate, IAPs should ensure that their inputs and comments are provided within the specified (reasonable) time limit set by the proponent and his/her consultant. IAPs should not be confined for projects since diversity will enhance the output of the EIA and will ensure a detailed and unbiased assessment is carried out.

### 3.1.4 Competent Agency

As detailed in Section 2.4, the Federal EPA is the Competent Agency but has devolved EIA responsibility to the Regional EPA equivalent as specified by the Regional Environmental Committee on a project-by-project basis.

The Competent Agency is responsible for ensuring that the proponent/consultant complies with the requirements of the EIA process. This may mean regular and effective communication between the authority and the proponent/consultant to provide general guidance on procedure, information and reports required. The Competent Agency should also ensure that the authority requirements are adhered to. This may mean the involvement of

other responsible authorities (e.g. the Agricultural Bureau) as and when necessary. In involving other authorities, the Competent Agency must ensure appropriate information is provided to the sectoral authorities and that there is efficient and adequate opportunity for communication between the authority groups.

One of the most important functions of the Competent Agency is to evaluate/review and provide decisions on applications. The Competent Agency should:

- ensure that the evaluation/review and decisions provided are done efficiently and within reasonable time, and that the proponent is informed timeously of any delays that may be incurred through the review process; and
- ensure that the proponent/consultant is informed of any shortfalls in the process as identified through the reviews.

The Competent Agency should strive to ensure that the information required through the EIA process is kept to only that which is relevant to decision-making so as not to unnecessarily burden the proponent with additional cost or to increase the time spent on the EIA needlessly.

The Competent Agency must not be responsible for conducting an EIA as this would constitute a serious conflict of interest in the decision-making process.

### **3.2 Pre-screening consultation**

Pre-screening contact is advisable as it can save time for all parties. A mutual understanding of the requirements can be obtained from the outset. In this phase the proponent should contact the Competent Agency in the region and establish an official contact person who will assist in guiding the process. The consultation may take the form of a formal meeting, a telephonic conversation or correspondence by means of facsimile or electronic mail. Consultation at such an early stage should avoid delays caused by requests from the authority requiring additional information occurring at a later stage. The consultation will also provide the opportunity for an exchange of views.

It is also recommended that the proponent contact other sectoral agencies which may have an interest in the proposed project.

Pre-screening consultation will also allow the authority to register the application (by opening a file or capturing the information on computer).

### **3.3 Screening**

Prior to entering into the screening phase of the EIA it is recommended that the proponent appoint an independent consultant to assist in the process. The Screening phase of the EIA should decide the following:

- the need for and level of assessment;
- level of government to be responsible for the project (Federal or Regional)
- other necessary permits or approval processes (e.g. rezoning, etc)

- acceptability of the consultant to assist the proponent (as specified by the roles and responsibilities of the consultant – Section 3.1.2);
- the public participation process; and
- the total life-cycle of the project.

The screening process would form the same purpose as a “Preliminary Environmental Impact Assessment”.

Therefore, the proponent should submit to the Competent Agency a screening report that contains the following (Appendix 2):

- the title of the proposed activity;
- the name of the proponent and the consultant(s) representing the proponent;
- the address of the proponent and the consultant(s) representing the proponent (including telephone numbers, fax numbers and e-mail address)
- location of the proposed development;
- the proposed extent of the activity; and
- any potential environmental issues identified by the proponent (which may include a short description of the affected environment).

Five copies of the screening report and accompanying documentation must be submitted to the Competent Agency for review. The Competent Agency shall make its decision within one month from the day of receipt of the screening report of the proposed project regarding amendment, exemption or conducting detailed study and notify the proponent accordingly.

In addition, the Competent Agency must inform the applicant whether the applicant must advertise the application, and of the manner in which this must be done. The advantages of advertising at this early stage are to formally inform all IAPs of the potential project and the EIA process at the earliest opportunity. Advertising may take the form of “on-site” advertising where a notice board may be placed in the location of the site or through “media advertising” where an advert is placed in an appropriate newspaper (i.e. one that is read by the people where the development is proposed to take place).

### **3.4. Scoping**

Scoping is the process of identifying and “narrowing down” the potential environmental impacts associated with the development. The scoping process ensures that the EIA focuses on pertinent issues. The level of an impact assessment will depend on the nature and scale of the development proposal; its complexity; the sensitivity of the environment; and issues identified during the scoping process. Therefore, it is crucial that the scoping exercise is carried out effectively.

It is recommended that the proponent or his/her consultant prepare a detailed plan of study for the scoping exercise. This plan of study is important in ensuring that where public consultation is required, all the relevant parties, which may have an interest in the application, including other government departments, are identified.

If a plan of study for scoping is prepared, it should include:

- a brief description of the activity to be undertaken;
- a description of all tasks to be performed during scoping;
- a schedule setting out when the tasks contemplated will be completed;
- an indication of the stages at which the relevant authority will be consulted; and
- a description of the proposed methods of identifying the environmental issues and alternatives

The advantages of preparing a plan of study for scoping is that it communicate, at an early stage, the extent of the study. It is, therefore, recommended that the plan of study for scoping be provided to the Competent Agency for comment and/or approval.

Initial consultation with interested and affected parties (IAPs) really determines the scope of the impact assessment (or whether a full EIA is in fact required at all). It is important to maintain the scope throughout the assessment process. Public consultation and participation aims to assure the quality, comprehensiveness and effectiveness of the environmental assessment. It ensures that the views and concerns of all interested and affected parties are taken into consideration. Various techniques may be employed through the participation exercise, including

- public meetings;
- telephonic surveys;
- exhibits, displays and “open days”;
- newspaper advertisements;
- written information
- surveys, interviews and questionnaires
- working with established groups (e.g. NGO’s, community organisations etc)
- workshops and seminars

Public meetings are not always an effective means of conveying information to and receiving information from the public. Therefore, for participation it is important to consider the social and economic environment within the affected environment of the proposal area to select an appropriate consultation approach to ensure true consultation.

The scoping exercise should be documented in the form of a scoping report which is submitted to the authority for review and approval. The scoping report should basically be a concise presentation of the major issues identified and the public participation process. As a minimum, the report should reflect the following:

- a brief description of the project;
- all the alternatives identified during the scoping process;
- all the issues raised by interested and affected parties and how these will be addressed; and
- a description of the public participation process including a list of interested and affected parties, and minutes of meetings.

It is recommended that the scoping report contain a detailed plan of study for the EIA, should an EIA be considered to be necessary. This plan of study will ensure that the relevant alternatives are investigated further and that the critical issues are carried forward into further processes. Specialists may need to be appointed to assess certain aspects in detail, as identified through the issues in the scoping exercise. The plan of study for EIA will form the basis of Terms of Reference for the EIA. The plan of study for EIA should contain the following:

- a description of the environmental issues identified during scoping that may require further investigation and assessment;
- a description of the feasible alternatives identified during scoping that may be further investigated;
- an indication of additional information required to determine the potential impacts of the proposed activity on the environment;
- a description of the proposed method of identifying these impacts; and
- a description of the proposed method of assessing the significance of these impacts.

It is important that the information in this report is as comprehensive as possible since a decision regarding whether the project should go ahead or not, and whether an EIA is required to further investigate issues and alternatives, will be made on the basis of this report. In many cases where there are no major issues identified, the scoping report will be sufficient for a decision to be made and no further studies will be required.

Alternatively, further investigations may be required, or a full EIA may be called for.

The IAPs should be afforded an opportunity to review the scoping report. This ensures verification of the process before it is too far advanced. The kinds of situations which may prompt organisations to object would be where key parties have not been consulted, or where significant issues or alternatives are omitted from the proposed investigation. IAP review should determine whether the issues raised have been addressed in the scoping report. IAPs should be afforded a reasonable timeframe for their review - typically in the region of four weeks. The process of IAP review should be reflected in the final scoping report.

Five copies of the scoping report should be submitted to the Competent Agency for review. The Competent Agency should review the document to determine whether the process followed in preparing the report has been adequate and that there has been sufficient consultation with IAPs. Sufficiency should be based on the discretion of the reviewer.

The review should also contain an analysis of the information provided to determine whether due attention has been paid to possible project alternatives and whether the issues identified have been afforded appropriate attention. The authority should complete the review within four weeks of receipt of the scoping report. The authority may request, where it feels unqualified to review a scoping report, that the proponent appoint an independent specialist reviewer to provide comment on the report. The independent specialist should,

however, be selected by the authority to ensure an unbiased assessment of the report.

Following the review of the scoping report the Competent Agency may request that portions of the document be amended or may decide to approve or reject the application without the requirement for further investigation (Section 3.6). Should the information be inadequate to take a decision, the Competent Agency may request that the scoping report be supplemented by an EIS.

### **3.5 Environmental Impact Assessment**

In conducting the EIA, a proponent may be required to appoint technical specialists to prepare certain aspects of the Environmental Impact Statement (EIS). These specialist studies should be prepared in the form of specialist reports and appended to the EIS.

It is important that the EIA report is clearly and concisely documented, so that key issues can quickly and efficiently be identified by decision makers. An EIS should contain the following information:

- An executive summary (This summary has to be concise and present and highlight the main issues pertinent to decision making on the project. The summary should be developed in non-technical terms such that it may be readily understood by decision-makers and other stakeholders)
- List of consultants: Names and qualification of members of the study team.
- A description of the development project covering:-
  - Need
  - objectives
  - technical details
  - size, location, input and other relevant requirements
- An outline of the main development alternatives.
- A description of the baseline environmental, socio-economic and health conditions such as fauna, flora, habitats, soil, water, air, cultural artifacts, and socio-cultural, socio-economic and health considerations.
- An account of the prediction and assessment of each impact at all stages of the project cycle for each alternative. As much as possible impact prediction should be expressed quantitatively. Information for each impact must be provided on:
  - the methodology used.
  - the magnitude of immediate and cumulative impacts – long and short
  - term (expressed in appropriate units)
  - whether it is adverse or beneficial
  - whether it is reversible or irreversible
  - likelihood of its occurrence “with and without” scenarios
  - the time span for which impacts are predicted and the geographic boundaries selected to define the study area
  - Description of measures to
    - prevent or reduce significant adverse impacts or enhance beneficial effects and an assessment of their likely outcome.

- A description of residual impacts which can not be mitigated or can only be mitigated partially.
- A description of proposed monitoring schemes.
- A discussion of potential uses of the environment which will be prevented or rendered less productive due to adverse impacts.
- Description of relevant national and/or international legal reports, and guidelines used. In the absence of Ethiopian standards the EIA should include a description of the standards and an overview as to why a specific standard was used.
- Statement on the extent of involvement.
- Identification of information gaps and uncertainties.
- The budgetary implications and financial measures to be taken to ensure that mitigation measures can be adequately carried out.

Of greatest importance in the EIS is the assessment and description of impacts. In this regard, it may be useful to present results of the assessment in the form of a matrix summary, whereby the different activities and associated impacts on the environment are weighted with a scoring system. The scoring system is not necessarily used for comparative purposes but for a simple approach towards describing the significance of each impact. Impacts must be described according to the following criteria:

- *Nature of the impact* - this reviews the type of effect that a proposed activity will have on the environment and should include "what will be affected and how".
- *Extent* - this should indicate whether the impact will be locally extending as far as the site and its immediate surroundings, or whether the impacts may be realised regionally, nationally or even internationally.
- *Duration* - this should review the lifetime of the impact, as being short term (0-5 years), medium term (5-15 years), long terms (where the impacts will cease after the operation of the site) or permanent.
- *Intensity* - here it should be established whether the impact is destructive or innocuous and should be described as either low (where no environmental functions and processes are affected), medium (where the environment continues to function but in a modified manner) or high (where environmental functions and processes are altered such that they temporarily or permanently ceased).
- *Probability* - considers the likelihood of an impact occurring.

Mitigation measures should be clearly spelt out in the EIS. Mitigation measures aim to minimise or eliminate negative impacts and enhance the benefits wherever possible. The mitigation measures should be prepared as an operational management plan and could include:

- changes in project planning and design (particularly where the change in design may eliminate or reduce an impact);
- improving monitoring and management; and
- monetary compensation.

Often the mitigation measures will include a combination of these.

On completion, the EIS should be submitted to the Competent Agency, the IAPs and a specialist for review. The purpose of the review is to ensure that

the document is an adequate reflection of the environmental impacts that may result from the development and that the document provides sufficient information on which decisions may be taken. The EIS shall be submitted in five copies to the Competent Agency. The proponent is responsible for coordinating the IAP reviews, either through distributing the document to all of the IAPs or by making the document available in strategic places (e.g. public libraries, schools, clinics etc).

Review of EIS's of proposed projects will be made based on the EIA guidelines and appropriate environmental quality standards and the relevant legislation. Impacts identified in the document should be reviewed in terms of the EIS:

- socio-economic context and potential benefits;
- effect on public health or risk to life;
- scale;
- geographical extent;
- duration and frequency;
- reversibility or irreversibility;
- ecological context;
- regional, national or international importance; and
- degree of uncertainty.

The authority review should be completed within four weeks of submission of the final EIS.

If new issues were raised and addressed during the EIA process, these must be added as an addendum to the initial scoping report submitted.

When the review has been completed, the Competent Agency should decide whether to accept the application as it stands, reject the application or request that the document be amended.

### **3.6 Record of decision and appeal**

An application may be accepted or refused by the Competent Agency after the screening, scoping or EIA phases of the EIA (as per Figure 3.1). The Competent Agency must provide a record of decision report which should be provided to the proponent be made available to any interested and affected party on request.

The Record of Decision report should contain the following details:

- a brief description of the proposed activity, the extent or quantities and the surface areas involved, the infrastructure requirements and the implementation programme for which the authorisation is issued;
- the specific place where the activity is to be undertaken;
- the name, address and telephone number of the applicant;
- the name, address and telephone number of any consultant involved;
- the date of, and persons present at, site visits, if any;
- the decision of the relevant authority;
  
- the conditions of the authorisation (if any), including measures to

mitigate, control or manage environmental impacts or to rehabilitate the environment;

- the key factors that led to the decision;
- the date of expiry of the duration of the authorisation;
- the name of the person to whom an appeal may be directed;
- the signature of a person who represents the relevant authority; and
- the date of the decision.

The Record of Decision Report may form the basis of an Environmental Clearance Certificate if the project is approved and may contain the details of the Conditions of Approval.

A proponent or other interested party who is dissatisfied may object to actions, opinions or decision made not later than 30 days after receipt of such a decision. Appeal should be submitted in writing, clearly specifying the grounds for the appeal to the RECC's or to the General Manager of the EPA - depending on the Competent Agency for the EIA. The Head of the Competent Agency should make his decision within 30 (thirty) days following the receipt of the appeal.

Please note that the Competent Agency is responsible for the decision and is, therefore, solely responsible for dealing with the review, though he/she may choose to involve a specialist for aspects where competency is insufficient to provide an adequate review. It is not the proponent's responsibility to deal with the review in any capacity.

### **3.7 Conditions of approval**

The Conditions of Approval may be included into the Record of Decision but are typically prepared as a separate document.

Ideally, the EIA should specify clearly the mitigation measures for each identified impact. An EIA might indicate that a development would have a significant negative impact on the environment, without mitigation. In this instance, the authority, in approving a proposal may wish to make implementation of mitigation measures on condition of approval. The proponent may then be required to submit a detailed environmental management plan (EMP). The EMP would describe in detail how each mitigation measure would be undertaken. Monitoring criteria should also be supplied and responsibilities clearly defined. Positive measures should also be enhanced through management or mitigation measures.

The EMP may need to be publicly reviewed. Only once the adequacy of the EMP is agreed to, would the EIA and EMP be approved and development allowed to commence. Regular independent monitoring would be undertaken at the cost of the proponent. This would be relayed to the authority who would ensure and enforce compliance with EMP.

The condition of approval is a legally binding relationship between the authority and the developer. The purpose of the contract is to provide the authority with an additional means of ensuring that the EMP, and any other environmental requirements are implemented to their satisfaction.

### **3.8. Auditing**

It is the responsibility of the proponent to conduct regular internal audits of the environmental performance of the operation. The audits should be a systematic evaluation of the activities of the operation in relation to the specified criteria of the condition of approval. The auditing results should be submitted to the Competent Agency for review and comment. Included in the auditing process should be compliance monitoring of the surrounding environment. The compliance monitoring should be the responsibility of the proponent and the results submitted to the Competent Agency. The Competent Agency may choose to undertake *ad hoc* monitoring to verify the compliance monitoring results. The auditing of the competent agency would be in the form of verification of internal reports.

The auditing and monitoring results may be prepared in the form of an Environmental Performance Report which should describe the extent to which the organisation has complied to its environmental requirements. The report should be submitted to the Competent Agency but may further be submitted to the IAPs for their comment and review. The aim of the report should be to provide honest information about environmental performance.

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## CHAPTER 4 : STANDARDS AND GUIDELINES

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No environmental standards have as yet been established for Ethiopia. This may be a barrier to effective environmental management and assessment, as there is no consensus on acceptable environmental performance for polluters and/or resource users. In other countries government policy and legislation have called for the establishment of guidelines, parameters, limits, standards, values, norms, criteria and indicators to ensure sustainable use of the environment. The Environmental Protection Authority is in the process of establishing standards and guidelines that are applicable in Ethiopia. However, in the absence of Ethiopia specific standards, the evaluation of impacts in the EIA process must specify the standards used and why that particular standard has been used.

Setting standards or guidelines should consider local conditions and the socio-economic level of a particular situation. On this basis, the quoted standards of developed countries (like USA, Belgium etc) should be applied with caution, recognising the inherent limitations of their application.

This Chapter, therefore, provides background information to standards and guidelines in general.

A number of terms relate to levels of environmental quality and may include:

Standards:

Quantifiable limits with regard to volumes, concentrations and numbers (van Viegen, 1998) and values that are written into law

Guidelines:

Practical tools not written into law

Values and norms:

Limits that are generally acceptable by society. Norms are set by society.

Criteria:

Relate to specific objectives that need to be attained to achieve a predetermined result

Objectives:

The basis of action plans drawn up to achieve standards or remain within limits demarcated by standards. These are set by 'managers' in agreement with 'society'

The most commonly used terms though are standards and guidelines. They are quantifiable and if written into law, they are termed **standards**; if they are the basis of action plans for achieving them, they are sometimes termed **objectives** or **targets**; and if they are practical tools not written into law, they are usually termed **guidelines**.

The determination of standards and guidelines is situation specific, therefore, Ethiopia will in time determine its own standards and guidelines. Table 4.1 provides an overview towards the different processes for determining appropriate standards and guidelines.

Appendix 3 contains specific standards and guidelines from other parts of the world for air and water quality. Please note that the standards provided are for ambient concentrations are simply examples of the different ambient guidelines that may be used.

**Table 4.1 : STANDARDS AND GUIDELINES FOR AMBIENT CONDITIONS**

<b>ENVIRONMENTAL MEDIA</b>	<b>STDS/GUIDELINES/CRITERIA AVAILABLE</b>	<b>RATIONALE &amp; APPROACH</b>
Freshwater ecosystems	International <ul style="list-style-type: none"> <li>➤ World Health Organisation Guidelines</li> <li>➤ European Community Drinking Water Standards</li> <li>➤ Australian, Canadian and USA water quality criteria and guidelines</li> </ul> South African <ul style="list-style-type: none"> <li>➤ SABS Applications for water quality</li> <li>➤ CSIR Drinking Water Criteria</li> <li>➤ Dept of National Health &amp; Population Development Criteria for Water Quality</li> <li>➤ DWAF internal discussion document</li> </ul>	Rationale to: <ul style="list-style-type: none"> <li>➤ Develop a single set of guidelines and criteria that was appropriate as a baseline in SA</li> <li>➤ Modify international guidelines in the light of local research and experience</li> </ul> Approach taken: <ul style="list-style-type: none"> <li>➤ Guidelines to serve as a stand-alone source of information and support base for decisions. Site specific guidelines should support this base.</li> </ul>
Air environment	<ul style="list-style-type: none"> <li>➤ WHO Guidelines for "classical compounds"</li> <li>➤ USEPA Guidelines for 6 "criteria pollutants"</li> <li>➤ Canadian Guidelines</li> <li>➤ UK Guidelines</li> <li>➤ NZ Guidelines</li> </ul>	Not written into law but serves as important benchmarks.
Terrestrial Ecosystems	Do not exist	
Human Communities	No standards available – only value judgements, mostly of a regional or local scale	
Other Guidelines available	Canadian Environmental Quality Guidelines <ul style="list-style-type: none"> <li>➤ Includes guidelines on water (ambient and drinking), air, sediment, soil and tissue</li> </ul>	

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## **CHAPTER 5 : ISSUES FOR SECTORAL ENVIRONMENTAL IMPACT ASSESSMENT IN ETHIOPIA**

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The following sections describe issues for EIA in specific development sectors in Ethiopia. The EIA process, as described in Chapter 3 must be followed in each of these sectors, however, the details provided here aim at identifying the possible impacts as well as mitigation measures that should be considered in EIA's that may be conducted. The information provided is by no means comprehensive and would need to be embellished during the EIA process. The purpose of this section is to simply highlight potential environmental concerns related to these development activities.

The following sectors have been described:

- Agriculture
- Industry
- Transport
- Mining
- Dams and reservoirs
- Tannery
- Textile
- Hydropower generation
- Irrigation projects
- Resettlement projects

This section has been structured so as to describe the development sector in general and then to highlight the potential environmental impacts. The impacts are listed to assist the scoping and assessment phases in an EIA. It must be noted however that each project is unique and only some of the more generalized impacts are presented. The guidelines can also serve as an aid to authorities when reviewing the EIA process.

The issues for environmental assessment in each of the development sectors has been prepared as a Table. In the Tables, the left hand column broadly describes the potential broad scale issue that might result from the activity, the central column considers the specific action that might result from the activity while the right hand column provides a description of the potential impact that might result. When utilising the table, the reader is encouraged to firstly consider the potential for a particular issue occurring and then evaluate the potential for a specific impact. Potential measures for managing the environmental concerns are also provided for each sector.

## 5.1 Agriculture

### 5.1.1 Background

Agriculture is the dominant sector of the Ethiopian economy accounting for about 50% of GDP and 85 % of export revenue, and providing livelihood for 85 % of the population. Agriculture in Ethiopia is mainly mixed crop and animal production in the wetter highland and trans-human animal production in the drier lowlands. It is envisaged that agriculture will continue to dominate the economy and this aim is being furthered by the declared Agricultural Development-Led-Industrialization (ADLI) policy. The main objective of the ADLI policy is improving agricultural productivity of small holder agriculture and related industrialization, based on increased provision of agricultural raw materials to the industrial sector.

Past experience has shown that small scale peasant farming and some large scale mechanized agriculture have caused massive environmental degradation such as deforestation, soil erosion and water quality deterioration. Environmental degradation is compounded by unwise use of natural resources and the absence of integration of environmental requirements in most of the development projects.

The fast-tracking of development endeavours in this sector, in the absence of an Environmental Impact Assessment system, could lead to severe environmental impacts. Highlighting the environmental impact considerations associated with agriculture will hopefully make agricultural sector projects environmentally sustainable.

### 5.1.2 Issues for environmental assessment

ISSUES FOR ENVIRONMENTAL ASSESSMENT IN THE AGRICULTURAL SECTOR		
Issue	Sources/Causes	Impact
<b>CROP HUSBANDRY</b>		
Soil degradation	fertilizer use pesticide use mechanisation poor farming practices	Soil erosion through soil cultivation, deforestation and the removal of vegetation Soil compaction Sedimentation in the irrigation system Acidification of the soil through the use of fertilizers and the leaching process Salinisation of the soil Soil pollution through the use of pesticides & artificial fertilizers Nutritional deficiencies as a result of nutrients being taken out of the soil by crops
Local climatic change	Irrigation Ground cover Photosynthesis	Change in local humidity Changes in local temperature
Damage to water resource	Run-off Fertilizers Sediments Pesticides Nutrients and salts	Pollution of surface water Increased algal growth & eutrophication from nitrogen and phosphorus runoff into water Reduced water quality and sunlight penetration due to suspended particles Ground water pollution Increased nitrate concentrations Pesticide pollution of ground water Water supply contamination by waste oil from machinery Deterioration of water quality by sedimentation released by soil erosion

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<b>ISSUES FOR ENVIRONMENTAL ASSESSMENT IN THE AGRICULTURAL SECTOR</b>		
<b>Issue</b>	<b>Sources/Causes</b>	<b>Impact</b>
Genetic transformation	Importation of seeds & plants Importation of genetically modified foods/plants	Potential for human consumption of treated grain seed Threat to existing genetic diversity Threat to human health
Disturbance of the natural environment Aesthetics	Encroachment into the natural environment Barrier effects of cultivated land	Threat to biological diversity and preservation of ecosystems Obstruction of the migrational paths of wildlife Increased activity and impacts on natural environments Changes in biological diversity promoted by traditional farming activities Reduction of the aesthetic value of an area
Maintenance of culturally/historically significant sites	Encroachment of agricultural project onto significant sites	Loss or damage of historical monuments or relics, burial sites, sacred sites or other significant cultural or historical objects
Health and safety	Introduction of pests and diseases with new seeds and plants Irrigation systems Pesticides	Introduction of new species and varieties of pests & diseases Spread of pests through dissemination by irrigation systems Potential impacts of pesticide use in pest eradication
Land use conflict  Utilization of natural resources  Change in social structure	Change in land use Resettlement Barrier effects of cultivated land Secondary growth Use of new technologies	Conflict with other forms of land use Forced removal of permanent residents Obstruction to the migration paths of people and animals Influx of people looking for work opportunities in the project area Increased pressure on natural resources through migration Increased use of child labour Consequences of the introduction of new technologies and inputs such as greater risk and expense Increased pressure on local authorities and infrastructure
<b>ANIMAL HUSBANDRY</b>		
Over-utilization Soil damage Aesthetics	Overgrazing  Free grazing Manure Production  Livestock based industries and transport	Growth and production of animals impeded by overgrazing and the subsequent decrease in the food supply Trampling resulting in vegetation loss and soil erosion Use of vulnerable land leading to soil erosion through overgrazing Soil erosion may damage water resources Pollution of the soil by excess manure Disposal on land of by products from food industry Chrome pollution from tanning industry Overuse of transportation networks with increased production, leads to dust problems and a strain on infrastructure Alteration of the visual character of the landscape
Air pollution Acid rain Environmental health Global warming Dust Smell	Manure production  Livestock based industries and transport	Odour problems relating to manure production Impact on human and animal health due to excess ammonia and H <sub>2</sub> S production Dust production through increased transportation Increased GHG production by ruminants and through increased refrigeration and freezing facilities
Water pollution Eutrophication Overuse of resource	Manure production  Livestock based industries and transport Water consumption	Pollution of surface water by manure Eutrophication of water bodies by surplus nutrients from manure Pollution of ground water by nitrates from manure Overconsumption of water leads to a lowering of the water table
Health and safety	Introduction and growth of parasite populations  Inferior nutrition  Pesticides  Antibiotics	Potential for parasite population increase around watering sources, feeding places and/or pastures Increased vulnerability to disease due to inferior nutrition Introduction of new diseases or parasites with new livestock Movement of chemical pesticides, to eradicate pesticides, into the environment Implications of antibiotic use for developing resistant microbes and polluting the environment

ISSUES FOR ENVIRONMENTAL ASSESSMENT IN THE AGRICULTURAL SECTOR		
Issue	Sources/Causes	Impact
Genetic transformation	Introduction of exotic livestock breeds  Displacement of plant varieties	Displacements of plant varieties and subsequent loss of plant genetic variation due to greater efficiency in animal husbandry Loss of genes due to the introduction of exotic livestock breeds
Pressure on sensitive ecosystems	Expropriation of land for animal husbandry	Destruction or modification of vulnerable or valuable ecosystems
Maintenance of culturally/historically significant sites	Expropriation of land for animal husbandry	Loss or damage of historical monuments or relics, burial sites, sacred sites or other significant cultural or historical objects
Land use conflicts  Utilization of natural resources  Change in social structure	Changes in land use  Secondary growth Use of natural resources	Conflict over scarce land resources Uncontrolled immigration into the project area Conflict between existing populations and new comers Increased pressure on natural resources

### 5.1.3. Recommendations for environmental management

- Use of fertilizers: Consideration must be given to the use of both organic and artificial fertilizers, as well as nitrogen fixing plants. Fertilizer use should follow specific guidelines
- There should be control of seed importation by local authorities to stop the import of plant diseases and pests
- Ensure that the national legal framework, in terms of seed importation and plant spreading, is known to those involved in the project
- In the case of genetically modified organisms, obtainment of a permit
- Adequate provision of amenities for those relocated and those who move into an area
- Empowerment of women in all capacities
- Primary focus should be on the growth of subsistence foods
- The type of project must ensure the provision of a sustainable income for farmers
- Types of land tenure which can promote overgrazing should be considered e.g. Communal ownership
- Provision of adequate veterinary services
- Proximity to conservation areas may require the creation of buffer zones
- Local knowledge of animal husbandry should be utilised
- Due cognisance given to local traditions, taboos and other socio-cultural conditions linked to livestock and nutrition. Projects should avoid agricultural produce which would not be eaten
- Implementation of special measures to reduce soil erosion e.g. build terraces, cover exposed soil
- Preference should be given to strategies which provide the desired development without the loss of genetic material
- Alternative uses of manure should be investigated
- There should be protection of sites of cultural/historical/ecological importance

## 5.2 Industry

### 5.2.1 Background

There are about 1,263 industrial enterprises in Ethiopia. The majority of them are in manufacturing and processing, including textiles, chemicals, metal, leather, food and beverage, paper and printing, sugar, tobacco, wood-working, construction and mining.

Industrial activity is concentrated mainly in and around Addis Ababa, accounting for about two thirds of the manufacturing value added (MVA). This has resulted in a major water pollution problem in Addis Ababa. The limited number of project specific river basin studies carried out so far by Government bodies, have indicated that industrial/urban pollution of water resources is a problem especially in the Awash River and Rift Valley Lakes Basin. Furthermore, the new economic policy adopted by the government is envisaged to encourage the acceleration of local as well as foreign investment in the industrial and agricultural economic sectors of the country. The expected rapid development will have both positive and negative impacts. The economic development will improve the standard of living of citizens. However, the associated pollution could outweigh the benefits, particularly in Ethiopia which has poor infrastructure for public health and environmental protection. A proper monitoring mechanism incorporating design, operations, and shutdown of industrial plants needs to be established. EPA, therefore formulated a checklist for the manufacturing and processing industries. Environmental issues that were raised by EPA have been incorporated into this document.

### 5.2.2 Issues for environmental assessment

<b>ISSUES FOR ENVIRONMENTAL ASSESSMENT IN THE INDUSTRIAL SECTOR</b>		
<b>ISSUE</b>	<b>SOURCES/CAUSES</b>	<b>IMPACT</b>
Pressure on the natural resource base (effect on the overall ecosystem operation)	Extraction of raw materials Water consumption Energy consumption Prospect of employment- influx of people	Unsustainable utilization of natural resources eg water, trees, coal, soil
Water quality	Discharges of solid/dissolved substances eg mineral waste, animal and vegetable waste, waste-containing fibres, hazardous waste	Pollution of ground & surface water, silting, sedimentation, eutrophication
Soil quality	Discharges of solid/dissolved substances e.g. mineral waste, animal and vegetable waste, waste-containing fibres, hazardous waste	Salinisation, pollution of soil
Air quality	Emissions of dust Emission of gases Noise	Air pollution-damage or discomfort to natural environment & humans

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<b>ISSUES FOR ENVIRONMENTAL ASSESSMENT IN THE INDUSTRIAL SECTOR</b>		
<b>ISSUE</b>	<b>SOURCES/CAUSES</b>	<b>IMPACT</b>
Hazardous substances	Environmentally hazardous substances e.g. toxins, carcinogenic substances, ozone depleting substances, explosive or inflammable materials, radioactive substances	Environmental health
Sensitive ecosystems / species	Structure & layout of industrial plant & roads	Barrier to migration & dispersal-isolation & extinction Expropriate important areas from fauna & flora
	Operation of industrial plant & associated infrastructure	Threaten vulnerable, or conservation worthy species
Introduction of exotic species & pests	Transport - Introduction of exotic species Industrial site - Suitable living conditions for pests	Exotics threaten indigenous species Pests pose health risk
Associated infrastructure	Transport-roads, traffic, Power supply Telecommunications	Pollution Noise Threat to pedestrian & animal safety Threat to biodiversity Soil erosion Water pollution Visual impacts
Maintenance of the historical, cultural, or religious landscape	Construction, operation of industry Intrusion in landscape Migration of people	Negative impact on aesthetics Destruction and/or damage to significant buildings, areas
Change in social structure and way of life	Location of industry	Resettlement (See 6.10)
	Introduction of industrial way of life	Change in power structures Shifts in division of labour between genders Child labour
	Rural-urban migration	Slum settlements Conflicts between new and old residents, Change in land-use
Competition between land-uses	Occupation of land, impacts of industry	Negative economic impacts on other sectors e.g. agriculture

<b>ISSUES FOR ENVIRONMENTAL ASSESSMENT IN THE INDUSTRIAL SECTOR</b>		
<b>ISSUE</b>	<b>SOURCES/CAUSES</b>	<b>IMPACT</b>
Human health	<p>Use, accidental discharge &amp; transportation of inflammable, toxic, explosive, chemical substances</p> <p>Industrial activities such as painting, welding, electroplating, and battery manufacture result in exposure to heavy metals e.g. lead, mercury, cadmium, zinc, cobalt and beryllium</p> <p>Noise</p> <p>Factories that release mineral dust e.g. silica and asbestos-glass manufacturing industry, foundry, cement, asbestos plants</p> <p>Factories that release organic dust are those that process grain, cotton, coffee, sisal, wood etc.</p> <p>Solvents in printing industry, thinners in the manufacture of paints &amp; glues, dyes in textiles, leather &amp; shoes, organic materials used in chemical industries</p>	<p>Ill-health</p> <p>Hearing impairment, disturbance of sleep in the vicinity of the factory</p> <p>Inhalation of dust in high doses over a long duration can result in pneumoconiosis (asbestosis &amp; carcinoma of the lung)</p> <p>Organic materials may cause kidney &amp; liver damage, haematopoietic system damage, neurotoxicity and cancer.</p>
Human safety	<p>Mechanical equipment</p> <p>Explosions, fires e.g. manufacture of chemicals</p>	Injury, death

### 5.2.3 Recommendations for Environmental Management

- New industry to be sited at a sufficient distance from environmentally sensitive areas wherever practically possible
- Environmental monitoring during construction and operation
- Implement an environmental management system which ensures environmental responsibility at all levels
- Utilize environmentally friendly technologies
- Implement cleaner production strategy - alternative products, production processes, raw materials, energy sources, prevent or reduce waste, waste recycling, re-use
- Introduce water and energy saving measures
- Discharge points should be located downstream of supply sources of drinking water
- Delineation of location of waste dumps
- Locate chimneys and waste pipes appropriately
- Monitor volume and composition of discharges regularly
- Ensure that sensitive environments, and residential areas will not be affected by noise, especially at night
- Reliable information system and a mechanism for labelling, handling, and stocking of dangerous substances
- Maintain safety equipment

- Emergency procedures Rehabilitation upon closure of industry
- Training programme to assist labour force in adapting to an industrial way of li

### 5.3 Transport

#### 5.3.1 Background

The transport system constitutes one of the most vital component's of a country's physical infrastructure and plays a significant strategic role in overall development. Surface transport, comprising road and rail, is the major system in Ethiopia. The air transport service is also growing. Surface transport contributes about 99.5% of the total domestic passenger and cargo traffic delivered by motorized means of transportation. Road transport accounts for over 97% of this total. In line with the Agricultural Development Led Industrialization (ADLI) policy, the transportation sector is recognized as having a crucial role to play in sustainable development of the country. The Road Sector Development Programme has been created to speed up the improvement and expansion of the road network. The Ethiopian Airline envisages a 70% increase in its carrying capacity by the end of a five-year development plan period.

Transport normally confers scope for increased mobility, access to markets and public services and other benefits of reduced isolation. However improved transport, whether by new routes or through the rehabilitation and upgrading of existing ones may be accompanied by adverse environmental impacts.

A transport system development will invariably impact on the natural environment in the vicinity of the infrastructure. The severity of the impact and the possibility for adaptation to the impact and for undertaking mitigative measures depends on the characteristics of the ecosystem, the transport system dimension and the traffic volume as well as the changes the system brings about on settlement and land use.

These impacts can be differentiated according to whether they occur in the construction phase or during the operating phase. The impacts can be direct at the site and immediate environs or indirect in the adjoining region.

#### 5.3.2 Issues for environmental assessment

ISSUES FOR ENVIRONMENTAL ASSESSMENT IN TRANSPORT PROJECTS		
ISSUE	SOURCES/CAUSES	IMPACT
Pollution Environmental Health	Pesticide use Construction machinery	Release of pesticides, used for removal and clearing of vegetation, into the environment Oil and grease discharge from machinery used in construction Waste and sewage disposal from temporary worker settlements
Soil Erosion Modification of water courses Disturbance of riparian ecosystems	Bridge and drain construction Earthwork operations Quarry and borrow site operations Diversion of waterways	Promotion of soil erosion through inappropriately constructed drains Construction of bridges across watercourses change currents and increase erosion potential Soil instability which can lead to landslides Modification of water courses may affect the functioning of riparian ecosystems

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<b>ISSUES FOR ENVIRONMENTAL ASSESSMENT IN TRANSPORT PROJECTS</b>		
<b>ISSUE</b>	<b>SOURCES/CAUSES</b>	<b>IMPACT</b>
Modification of cultural resources Aesthetics	Expropriation of land for transport infrastructure Creation of embankment cuts, fills and quarries	Damage or loss of landscapes, cultural relics or other significant sites
Pollution of soil, water and air Environmental Health Nuisance	Waste disposal Secondary growth Accidents Vehicle emissions	Pollution caused by inadequate waste discharge and treatment facilities in settlements developed because of the project Introduction of environmentally dangerous substances into the environment during accidents Increase in emission of gases and particles into the atmosphere Pollution of water sources and vulnerable ecosystems by run-off water from the roads Crop damage and health problems from excessive dust creation Noise problems for developments in proximity to transport infrastructure
Barrier impacts created by transport infrastructure  Impairment of habitat functioning	Disturbance of the natural environment  Development of linear structures in the environment	Impediment of movement and communication for people and animals across transport artery Fragmentation of habitats and human land use
Degradation and loss of ecosystems, biodiversity and natural resources	Expropriation of the natural environment for transport infrastructure	Intrusive land use in the natural environment Change in demography of animal and plant species Degradation of breeding areas for commercially valuable fauna Indirect impact of pollution on flora and fauna outside the project area Increased accessibility to natural areas Creation of transmission corridors for alien invasive species Implications of future expansion of road projects on natural resources Modification of the way cities and villages expand – urban sprawl Loss of land which may result in resettlement or land use conflicts Induced development around transport infrastructure Increased availability of motorized alternatives may adversely affect the non-motorized transportation economy “Culture shock” from exposure of secluded communities to aggressive outside influences
Accidents Noise	Health and safety	Disturbance of settlements and significant sites near the transport facility from noise Explosions and fires during the transportation of oil, gas or other dangerous substances Increased accident risk for the public Increased health problems relating to dust and vehicle emissions Creation of transmission corridors for diseases and pests

### 5.3.3 Recommendations for environmental management

- Proper provision must be made for the management and disposal of waste and sewage from temporary worker settlement
- A clean-up programme must be instituted in the project area after the construction phase is complete
- Vulnerability of project area to erosion must be considered in the siting of transport infrastructure
- Excavation should not be undertaken during high erosion risk periods
- Location for excavations for sand, gravel and stone for construction should be sited away from erosion risk areas
- Systems should be implemented to minimize erosion during construction
- Design of drains and pipes must prevent erosion by water flowing off it on to the road
- Significant sites or relics must be identified and preserved
- Decrease visual impact by improving the design of transport facilities
- Vulnerability of natural features such as riverbanks and coastlines to barriers should be considered
- Attempts must be made to protect valuable ecosystems
- An accident response system should be put into place to support transport infrastructure
- Adequate compensation should be provided for people who are resettled
- Good traffic control systems must be developed
- Quarry and borrow sites should be rehabilitated after use

## 5.4 **Mining**

### 5.4.1 Background

The Ethiopian EPA defines mining as “all intrusions on nature with the objective of exploiting mineral resources”. Ethiopia has various valuable deposits such as gold, construction, industrial, and precious minerals, oil, and gas. The Ministry of Mines and Energy has a geological map depicting where these deposits are located. The major mining activities are limited to gold, soda-ash, construction minerals, oil, and gas. Mining results in disturbance of the surface, underlying strata including aquifers, and the atmosphere. It has negative impacts on the visual resources, biodiversity, soils, water, air quality, and noise levels; socio-economic environment; archaeology; and poses risks of flooding, and seismic hazards. Mining accounted for less than 3% of the GDP and less than 2% of merchandise exports in 1995. However, a new economic policy has resulted in high investment in mining. This could result in greater environmental damage.

5.4.2. Issues for Environmental Management

ISSUES FOR ENVIRONMENTAL ASSESSMENT IN THE MINING SECTOR		
ISSUES	SOURCES/CAUSES	IMPACTS
Pressure on the natural resource base	Extraction of raw materials Water consumption Energy consumption Prospect of employment-influx of people	Unsustainable utilization of natural resources e.g. water, trees, land clearance
Water quality	Mine water tailings Non-conventional extraction techniques Extraction of gold using mercury Mineral dressing operations Wastewater containing oil and other chemicals Discharge drainage-acid waste water containing heavy metals Washing & classification of sand, waste water, rock dust & residues of explosives Open pit water can contaminate fresh surface waters Blasting-nitrates & nitrites Spillages & leakages of fuel & lubricants from mechanical plants Waste dumps	Toxic impacts on ground & surface water, eutrophication Health impacts to animals & humans Affects other sectors e.g. drinking water, irrigation, agriculture
Soil quality	Extraction of sand & gravel from the river bed Clearing of vegetation exposes fertile topsoil Mining on slopes	Soil erosion
Air quality	Open pit mining-extraction of sands & gravels Transport of sand & gravel on open truck-dust discharges Noise Extraction-residue & slag which is resuspended as dust through wind erosion	Dust Nuisance to settlements along main road & close to quarry Impacts on vegetation & humans
	Extraction of coal through open pit mining-incomplete combustion	Toxic organic substances
Sensitive ecosystems / species	Borrow sites for open pit mining, stockpiling areas, access tracks, & quarries	Disturbance & replacement/ expropriation of the natural environment Barriers to migration, dispersal result in isolation and therefore threaten fauna & flora
Introduction of exotic species & pests	Transport-introduction of pests Industrial site provides suitable living conditions for pests	Threaten indigenous species Pests pose health risk
Associated infrastructure	Access roads	Pedestrian & wildlife mortality
Maintenance of the historical, cultural, or religious landscape	Intrusion in the landscape-waste dumps, open pit mining, tailing ponds, mining facilities Migration of people	Negative impact on aesthetics & scenic value Vandalisation of unprotected relics

ISSUES FOR ENVIRONMENTAL ASSESSMENT IN THE MINING SECTOR		
ISSUES	SOURCES/CAUSES	IMPACTS
Change in social structure & way of life	Labour-extraction of sand & gravel Location of industry	Women & child labour Change in power structures Resettlement (See 6.10)
	Employment: Rural-urban migration	Slum settlements, urbanisation, conflicts between newcomers & old residents Strain on community services Changes in land-use
Land-use	Mining requires a large amount of land	Conflicts with existing land-use and land tenure system
Economy	Initiation of other activities due to mining Mining (vibration & blasting)	Stimulation of economy due to secondary development Interfere with other activities
Human safety	Mechanical equipment, electrical energy, Explosives Accidental discharge of dangerous substances	Injury
Human health	Carcinogenic substances e.g. asbestos Quartz dust, nickel dust Radio-active substances Heavy metals- lead, mercury	Central nervous system disorder, acute illness
	Incomplete combustion of coal-Toxic organic gases e.g. carbon monoxide	Headache, vertigo (small amts), asphyxiation, and death (large amts)
	Waste created during operations e.g. gangue containing sulphides, tailings containing sulphide	Hazardous to people & environment
	Noise-mechanical plant operations & blasting in open pit mining	Hearing impairment, disturbance of sleep & psychosomatic illnesses

#### 5.4.3. Recommendations for environmental management

- Sufficient distance from vulnerable natural areas (including forests, historical sites, water resources etc.)
- Environmental management system to ensure environmental responsibility
- Knowledge of local, national, and international environmental requirements
- The following issues of health and safety are addressed in the Council of Ministers Regulations on Mining Operation No. 182/1994, and Labour Proclamation No. 42/1993:
  - Protective clothing and equipment
  - Training
  - Medical facilities
  - Procedures for safe transport, storage, handling, and use of explosives and chemicals
  - Notification of licensing authority upon serious accidents, and necessity for mitigatory measures
  - All installations to be rendered safe upon termination of license
  - Closure and rehabilitation plan - e.g. sinking fund
- The Council of Ministers Regulations on Mining Operation No. 182/1994 also forbids mining in sensitive locations as outlined in the regulations
- Wastes of hazardous products should be treated properly

- Measure for reduction of discharges to the air
- Location of discharge outlets for waste water, and of chimneys to ensure dispersal of discharge substances
- Plan of operation which considers short and long-term pollution
- Tailing ponds of adequate dimensions to withstand natural disasters
- Management of hazardous waste to be in accordance with the strictest national and international regulations and guidelines
- Rehabilitation measures upon closure - sinking fund account
- Geology of the area taken into account to prevent cave-ins or landslides
- Safety zones around open pit mining facilities
- Controlled use of dangerous substances
- Emergency procedures in case of accidents
- Water consumption to be in accordance with existing water use in the area
- Utilise environmentally friendly technology

## **5.5 Dams and Reservoirs**

### **5.5.1. Background**

Dams and reservoirs are built for hydroelectric power generation, irrigation, domestic and industrial water supply, fishery development, recreation and flood protection. Ethiopia is endowed with rich water resources, which are divided into 111.1 billion m<sup>3</sup> of annual surface water run off, and approximately 2.9 billion m<sup>3</sup> of ground water potential. However, a very small fraction of the resource is available for use and the water supply can be short at specific localities. According to 1990 estimates, clean water supply for domestic and municipal use was provided to only 27.2% of the total population of 51.5 million people. According to the Conservation Strategy of Ethiopia (CSE) only 1% of the water resource potential is used for irrigated agricultural development and hydro-power generation.

The need for self-sufficiency in food through expansion of irrigated agriculture and fishery resources, hydropower generation, provision of reliable water for domestic and municipal use has been steadily increasing and become critical. All these development endeavours involve construction of a large number of dams that might have significant adverse impacts on the bio-physical and human environment. The Agricultural Led Industrialization Development Strategy and new economic policy initiatives mean that dam and reservoir development projects have been given high priority.

Dams and reservoirs may cause irreversible social and environmental damages over a wide geographic area. Environmental impact assessment helps to identify such issues early enough so that corrective measures, options, monitoring mechanisms can be incorporated in the project's design and implementation.

### 5.5.2 Issues for environmental assessment

ISSUES FOR ENVIRONMENTAL ASSESSMENT OF DAM AND RESERVOIR PROJECTS		
ISSUE	SOURCES/CAUSES	IMPACT
Alteration of the microclimate	Creation of a large surface area for evaporation	Increase in evaporation leading to changes in temperature, fog and annual rainfall pattern.
Habitat loss Degradation of the natural environment Exceeding the carrying capacity of the natural environment	Expropriation of land for the development of dams and reservoirs  Induced development  Utilisation of natural resources	Replacement of valuable habitats by the dam or reservoir Degradation of the natural environment during the construction phase Increased population exceeding the ecological carrying capacity of the area Increased pressure on natural resources due to new activities Encroachment of anthropogenic activities into previously protected areas
Barrier impacts Obstruction of migratory pathways Change in the water regime	Control of water flow patterns Construction of obstructive structures across water course	Effect of inundation, altered water flow or ground water level on fauna and flora Dam or associated infrastructure forming a barrier to the movement of wildlife Implications of water flow changes to natural vegetation and wildlife Obstruction of fish migration by technical installations and regulation features Disturbance of feeding and spawning ground of valuable species of fauna and flora
Change in water regime Reduced water quality and increased pollution	Water consumption	Increase or decrease in flood peaks Reduction in the total water flow due to increased evaporation Reduced water quality due to a decrease in the water flow Pollution of water sources during the construction phase Increased concentration of nutrients leading to uncontrolled eutrophication Changes in the seasonal variation in the water flow affects navigation, fishing, cultivation and the drinking water supply downstream Change in the groundwater level in the surrounding area
Erosion Sediment Transport	Changes in water flow	Increased soil erosion in vulnerable areas Acceleration of transport of sediments and nutrients in the water course Repercussions of sediment build-up to downstream erosion, the backwater effect and flooding upstream
Loss of significant sites Degradation of cultural relics	Expropriation of land for dam and reservoir developments	Potential for submergence of culturally/ historically significant sites or objects
Loss of visually appealing sites Aesthetics Tourism potential	Disturbance of the natural environment  Modification of the river system	Change in water course or water flow through physical encroachment Creation of "hill side scars" Loss of tourist sites along the river
Displacement of people	Expropriation of land for dam and reservoir development	Potential for displacement of people and the implications of moving (see section 5.10)
Accessibility Utilization of water resources	Regulation of water flow	Decreased accessibility to water for drinking, irrigation or animal husbandry due to reductions in water flow Changes in ground water level because of regulation Water resource use conflict between up- and downstream users

Creation of new livelihood opportunities Decrease in livelihood opportunities downstream	Induced development around dams  Downstream water use	Sediment trapping leading to decreased productivity in agriculture and fishing Changes in water regime negatively impacting on fish Increased accessibility leading to new activities which replace the natural environment Establishment of a reservoir displacing other activities to ecologically vulnerable areas
Population growth Socio-cultural conflict	Induced development	Induced growth of the population caused by the project Potential conflict between new population groups and the original inhabitants Changes in the traditional lifestyle Increased pressure on natural resources
Risk of disease and infection Accidents	Health and safety	Creation of conditions favourable to growth of disease-spreading organisms Increase in spread of infection due to population growth Risk of reservoir being used as a drinking water source and recipient of sewage Material and personal loss through dam failure, landslides and flood waves Alteration of tectonic activity leading to earthquakes and landslides

### 5.5.3 Recommendations for environmental management

- Siting of the dam/reservoir must take into consideration the local earthquake and faulting activity
- which may cause breaching of the dam
- Population resettlement requires careful planning
- Potential uses of the dam/reservoir must be explored eg. Fisheries, irrigation, hydroelectric power and recreation
- Efforts must be made to minimize damage or loss of sites of cultural/historical/ecological significance
- Negative and positive impacts should be evenly distributed in society.

## 5.6 **Tannery**

### 5.6.1 Background

The leather and footwear industry contributed 639.6 million birr or 10.7% of gross value of production (GVP) for Ethiopia in 1995/96. Among the manufacturing industries, the leather industry is ranked third after food products and beverages, and textiles in terms of contribution to GVP. However, it contributes over 90% (366.7 million birr) of the manufactured exports. This is composed mainly of semi-finished leather and some leather articles.

### 5.6.2 Issues for Environmental Assessment

<b>ISSUES FOR ENVIRONMENTAL ASSESSMENT IN THE TANNERY SECTOR</b>		
<b>ISSUES</b>	<b>SOURCES/CAUSESS</b>	<b>IMPACTS</b>
Pressure on the natural resource base	Extraction of raw materials Water consumption Energy consumption Prospect of employment-influx of people	Unsustainable utilization of natural resources
Water quality	Arsenic & chlorobenzene	Contamination of groundwater
	Antimony & heavy metals	Contamination of sediments
	Process wastes-chromium sludge, methylene chloride Grease-rendering fleshing process-acid wastes Patent leather process-caustic wastes Discharge wastes-liquid effluents-organic matter, chromium, sulphide, ammonium, and other salts	Water pollution
Soil quality	Solid & liquid waste-antimony, volatile organic compounds, heavy metals, chrome, salts	Contamination of soil, Reduction of soil fertility
Air quality	Solvents	Air pollution Foul odours
	Powdered dyestuffs	Dust
Sensitive ecosystems / species	Structure & layout of industrial plant & roads	Barrier to migration & dispersal-isolation & extinction Expropriation of areas from fauna & flora
	Disposal of hazardous wastes	Health of environment
Maintenance of the historical, cultural, or religious landscape	Intrusion in the landscape Migration of people	Negative impact on aesthetics & scenic value Vandalisation of unprotected relics
Way of life	Labour	Women & child labour Change in power structures
	Employment: Rural-urban migration	Slum settlements, urbanisation, conflicts between newcomers & old residents Strain on community services Changes in land-use
Competition between land-uses	Industry requires a large amount of land	Conflicts with existing land-use and land tenure system
Economy	Initiation of other activities	Secondary development
	Interfere with other activities	Hinders development in other sectors
Human safety	Mechanical hazards e.g. handling of raw stock Machine operations-especially multi-cylinder machines, & drums used for tanning & dyeing Fatigue Hand tools Use of chemicals Work in danger areas of computer-operated machines	Physical stress, injuries

ISSUES FOR ENVIRONMENTAL ASSESSMENT IN THE TANNERY SECTOR		
ISSUES	SOURCES/CAUSESS	IMPACTS
Human health	Mechanical hazards-handling of raw stock (raw or wet hides)	Salt burns, dermatitis & other allergic reactions, anthrax, rabies
	Noise- Early stages of manufacture, drumming, buffing, & throughput staking	Hearing impairment
	Powdered dyestuffs Vegetable powders	Dust Carcinogens
	Organic chemicals Hydrogen sulphide-early stages of tanning process/ accidental discharge of sulphuric acid Solvents & dyestuffs-shoe industry Isocyanates-ingredient of polyurethane (footwear) Chrome oxide	Organic chemicals are toxic to humans and environment Hydrogen sulphide is highly toxic & flammable Solvents are harmful if inhaled, fire hazard Isocyanates are toxic Chrome oxide can cause dermatitis, allergies
	Pesticides & preservatives to treat bacterial damage & infestation-arsenic, PCP	PCP is a carcinogen

### 5.6.3 Recommendations for Environmental Management

- Implement an environmental management system which ensures environmental responsibility at all levels
- Implement cleaner production strategy
- Avoid the use of hazardous pesticides or preservatives
- Computerised measurement & dosing of process chemicals & dyestuffs
- Controlled separation of discharge liquids adds to efficiency of recycling - reduction of chrome consumption
- Remove unwanted parts of hide/skin such as hair, trimmings & unusable bottom splits before tanning. Can be profitably marketed as animal feeds / high humus-level dressing for agricultural land
- Use high exhaustion chemicals
- United States EPA has established standards (1985) for the control of sulphides, chromium & acidity
- Replace solvents with water / foam in roller-coating or spraying
- Liquid dyestuffs instead of powders
- Safety committees should be formulated and procedures well-known
- Proper identification of all chemicals
- EC has codes of practice for operation of hazardous machines
- Most countries have standards of 90 dB (A) for 8 hours of continuous exposure and use of ear protectors, sound absorbent hoods etc

## 5.7 Textiles

### 5.7.1 Background

In terms of gross value of production (GVP), textiles is second only to food and beverages in the manufacturing industry with a total GVP of 701 million birr (11.7% of total GVP). The textiles industry is second to the leather industry in export contribution earning 17 million birr (4.2% of total).

### 5.7.2 Issues for Environmental Assessment

ISSUES FOR ENVIRONMENTAL ASSESSMENT IN THE TEXTILES SECTOR		
ISSUES	SOURCES/CAUSES	IMPACTS
Pressure on the natural resource base	Extraction of raw materials Water Consumption Energy Consumption Prospect of employment-influx of people	Unsustainable utilization of natural resources
Pollution - water, soil, air	Discharge of non-biodegradable effluents from mills (dyes, acids, bases, salts, detergents, wetting agents, sizes and finishes)	Colour chemical oxygen demand mineral salts foaming
	Solid wastes e.g. fibre	Unightly, may cause anaerobic sludge layers
	Organic compounds e.g. starch with high biological oxygen demands	Increase cost of sewer discharge Anaerobic conditions in receiving streams
	Insecticides, pesticides	Toxic to bacterial & aquatic life
Sensitive ecosystems / species	Structure & layout of industrial plant & roads	Barrier to migration & dispersal-isolation & extinction Expropriate important areas from fauna & flora
	Operation of industrial plant & associated infrastructure	Threaten vulnerable, or conservation worthy species
Maintenance of the historical, cultural, or religious landscape	Intrusion in the landscape- Migration of people	Negative impact on aesthetics & scenic value Vandalisation of unprotected relics
Way of life	Labour	Women & child labour Change in power structures
	Employment: Rural-urban migration	Slum settlements, urbanisation, conflicts between newcomers & old residents Strain on community services Changes in land-use
Competition between land-uses	Industry requires a large amount of land	Conflicts with existing land-use and land tenure system
Economy	Initiation of other activities	Stimulate secondary development
	Interference with other economic sectors	Retard other economic activities
Human safety	Explosions, fires e.g. manufacture of chemicals	Injury, death
Human health	Noise	Hearing impairment
	Hazardous chemicals	Toxic

### 5.7.3 Recommendations for Environmental Assessment

- Industry to be sited at a sufficient distance from environmentally sensitive areas
- Environmental monitoring during construction and operation
- Implement an environmental management system that ensures environmental responsibility at all levels
- Utilize environmentally friendly technologies
- Implement cleaner production strategy - alternative products, production processes, raw materials, energy sources, prevent or reduce waste, waste recycling, re-use
- Introduce water and energy saving measures
- Discharge points should be located downstream of supply sources of drinking water
- Monitor volume and composition of discharges regularly
- International Association for Research and testing in the Field of Textile Ecology (Oeko -Tex) have developed European standards
- Computerised measurement and dosing of chemicals & dyestuff
- Ensure that sensitive environments, and residential areas will not be affected by noise, especially at night
- Reliable information system and a mechanism for labelling, handling, and stocking of dangerous substances
- Safety procedures to be understood well
- Maintain safety equipment
- Rehabilitation upon closure of industry
- Training programme to assist labour force in adapting to an industrial way of life

## 5.8 **Hydropower generation**

### 5.8.1 Background

Ethiopia is one of the few African countries with the potential to produce hydroelectric and geothermal power. As of mid-1991, however, no comprehensive assessment of this potential was available, although some estimates indicate that the total potential could be as much as 143 billion kilowatts. The main sources of this potential were thought to be the Abay (Blue Nile, 79.9 billion kilowatts), the Shebele (21.6 billion kilowatts), and the Omo (16.1 billion kilowatts). The remaining 25.9 billion kilowatts would come from rivers such as the Tekeze, Awash, Baro, Genale and Mereb.

Electric power production in 1985/86 totalled 998.7 million kilowatts-hours, 83 percent of which was produced by hydroelectric power installations. The regional electrical distribution system includes an interconnected system and a self-contained system. By 1988 most power generating sources, including all major hydroelectric power plants, were interconnected in a power grid.

It is envisaged that hydropower will continue to be the dominant power source in Ethiopia. The construction of more hydropower generating infrastructure is likely to occur along many of the major rivers. These projects impact on a large spatial area and their impacts are felt both upstream and downstream. For this reason, it is imperative that the impacts of hydropower generation are carefully considered.

5.8.2 Issues for environmental assessment

<b>ISSUES FOR ENVIRONMENTAL ASSESSMENT IN HYDROPOWER GENERATION PROJECTS</b>		
<b>ISSUES</b>	<b>SOURCES/CAUSESS</b>	<b>IMPACT</b>
Impacts on livelihood Water utilisation	Regulation of the water regime	Decrease in fish catches Transportation difficulties because of low flow and river morphology changes Flooding of agricultural land Erosion of fertile river banks Pollution of drinking water sources Decreased water supply downstream due to power-release policies
Intrusive impact on social systems in the project area	Involuntary resettlement Induced development	Involuntary resettlement has been treated as a separate issue (refer to section 6.10) Population influx may lead to social conflict Increased pressure on services and infrastructure
Health and safety	Stagnant water Efficiency of dams	Spread of waterborne diseases Accidental death through dam collapse
Encroachment into the natural environment	Induced development	Access routes may increase human contact with natural areas, increasing resource use, fire and erosion potential Access encourages invasion and competition from introduced plants, feral animals and parasitic organisms
Change in water regime Downstream water user rights Disruption of river functioning	Regulation of water flow Introduction of pollutants and salts into the water	Trapping of sediments and nutrients in dams and reservoirs due to decreased current velocity Decrease in sediment and nutrient supply downstream which affects agriculture Disturbance of the river's natural processes of erosion and deposition - increased erosion downstream Loss of water through increased evaporation Decrease in downstream water supply due to diversions and water transfers Creation of stratification of the water temperature in the dam Development of acidic conditions in anaerobic conditions from a change in the bacterial population of the water Increased concentration of pollutants and salts in dam Eutrophication of water bodies

<b>ISSUES FOR ENVIRONMENTAL ASSESSMENT IN HYDROPOWER GENERATION PROJECTS</b>		
<b>ISSUES</b>	<b>SOURCES/CAUSESS</b>	<b>IMPACT</b>
Damage to the natural environment Pollution Aesthetics	Construction operations Waste production in temporary settlements	Location of borrow areas and borrow pits may increase soil erosion or disturb sensitive environments Air and water pollution may be created by construction equipment, earth movement Waste disposal from temporary settlements Social conflict between residents of the area and temporary workers Siting of contractor facilities and other infrastructure which might destroy the natural landscape Noise pollution
Encroachment of hydropower generating infrastructure on the natural environment	Barrier impact of dams and reservoirs built for hydropower generation Damage to sensitive ecosystems Disturbance of fauna and flora	Damage to aquatic and terrestrial ecosystems Alteration of a free-flowing riverine habitat into a lacustrine habitat Disruption of ecosystem functioning especially riparian ecosystems Obstruction of migratory pathways for fauna and flora Decline in fisheries and breeding/spawning areas along rivers due to a curtailment of flooding Explosive growth of floating or rooted macrophytes which may impede navigation, fishing or prevent turbine operation Decay of plants in anaerobic conditions may lead to the formation of H <sub>2</sub> S gas Changes in riparian communities to tree-dominated vegetation Introduction of exotic fish and plant species which out compete indigenous species in the changed environment
Siting of hydropower infrastructure	Aesthetics Tourism	Loss of river Sources/Causes which could fill tourism potential Visual impact of siting of hydroelectric generation stations, lakes and transmission lines Loss of sites of archaeological/cultural significance

### 5.8.3. Recommendations for environmental management

- Siting of hydropower generating infrastructure must give consideration to :
  - sites of cultural/historical significance
  - sensitive ecosystems
  - places of religious/scientific value
  - tectonic activity
  - vulnerability of the area to erosion
- Efforts must be made to minimize resettlement
- A resettlement plan must be developed
- Preference must be given to the employment of local people
- Areas of rich or valuable biodiversity must be protected
- Water regulation should consider the needs of downstream users

## 5.9 Irrigation projects

### 5.9.1 Background

Irrigation projects are closely tied in with agricultural and hydropower generation. By virtue of these two facts, it is expected that many irrigation projects will be developed in Ethiopia, especially under the ADLI policy.

### 5.9.2 Issues for environmental assessment

<b>ISSUES FOR ENVIRONMENTAL ASSESSMENT OF IRRIGATION PROJECTS</b>		
<b>ISSUE</b>	<b>SOURCES/CAUSES</b>	<b>IMPACT</b>
Impact on downstream users Impact on groundwater users Lowering/ rise of the ground water table	Regulation of water flow patterns Water extraction for irrigation Poor water distribution systems	Changes in low flow which negatively impact on downstream users Uncontrolled flooding causing damage downstream Lowering of the ground water table Impact of lowered ground water on water consumption by humans, animals and plant life in the area Effect of lowered ground water on springs Potential rise of the water table through low irrigation efficiency
Decreased water quality Pollution concentration Ground water salinisation Change in river morphology	Water diversion for irrigation Agrochemical use Pesticide use Fertilizer use	Increase in pollution concentration because of decreased low flow Accumulation of toxic substances from increased pesticide use High levels of nitrates in the water from agrochemicals Creation of anaerobic conditions through the decay of organic substances Saline ground water caused by water logged conditions Poor saline drainage in areas of flat topography Saline intrusions into fresh water systems Impact of irrigation canals on river morphology

ISSUES FOR ENVIRONMENTAL ASSESSMENT OF IRRIGATION PROJECTS		
ISSUE	SOURCES/CAUSES	IMPACT
Soil salinisation	Fertilizers  Artificial methods of watering to crops	Potential for soil salinisation to occur through :  introduction of salts in irrigated water contribution of artificial fertilizers  rise in saline ground water creation of a "humidity/salinity bridge" by a change from rainfed to irrigation crops change in soil properties such as damage to soil structure  Soil structural collapse in specific soil types due to accumulation of salts Lowering of pH and accumulation of dangerous metals by leached metals, released through a change from rainfed to irrigation crops
Erosion Sedimentation	Abstraction of water	Impact of sediment transport on reservoir and abstraction points downstream eg. blockage of canals Change in river morphology from increases/decreases in the sediment load Soil susceptibility to runoff and erosion increased by wetting of the land
Sensitive ecosystems Animal migration Habitat functioning	Disturbance of the natural environment Induced settlement	Changes in the aquatic ecosystems Impact on sensitive or valuable ecosystems and pollution sensitive organisms Induced animal migration Increased pressure for natural resources by induced settlement of farmers Impairment of wetland functioning with repercussions for water quality downstream
Social conflict Change in the socio-economic state of the people	Induced development	Change in the income and amenity of people Increased human migration and settlement in the area Changes in marketing and physical infrastructure generated by the irrigation scheme
Increase in disease problems Accidents	Health and safety	Changes in movement of water, temperature or other factors creating favourable conditions for pests and disease-bearing organisms Introduction of disease-bearing organisms into previously unaffected areas through water distribution patterns Increased pressure on sanitation services Increase in farming accidents

### 5.9.3. Recommendations for environmental management

- The siting of an irrigation scheme must be decided so to avoid disturbance or destruction of:
  - Sensitive or biologically rich ecosystems
  - Sites of cultural/historical significance
  - Settlements of religious or scientific value
  - Areas with flat topography or with high water tables that are at risk from salinisation
  - Adequate health care facilities must be provided
  - On-going user involvement in the development of the project must be encouraged

- Capacity of irrigation canals to transport sediment loads must be determined
- Measures must be taken to prevent low irrigation efficiency caused by poor water distribution or a poor rain system
- management

Flood control measures should be implemented

## 5.10 Resettlement Projects

### 5.10.1 Background

Resettlement is a highly controversial activity that has implications for the socio-economic, natural and political environments. Within the Ethiopian context, resettlement has been associated with dam and reservoir projects, and more controversially with drought and famine victims. At the height of drought and famine in Ethiopia in 1984, programs were implemented to relocate millions of people from drought-stricken areas in order to combat drought, avert famine and increase agricultural productivity. This process was highly criticized and the program was a failure. The lasting implication of these projects was a negative image of resettlement projects. Whilst resettlement has undeniable implications for change, these projects can bring about positive changes for communities and the environment

The development of hydroelectric power in Ethiopia, in keeping with the Agricultural Development Led Industrialisation will most likely require resettlement of people in the future. For this reason, proper assessment, planning and management of resettlement projects is essential. Due to the sensitivity associated with resettlement projects the following description is simply an overview of the potential environmental issues associated with resettlement. Resettlement should not be seen in isolation of the other development sectors. It has been separated in this document to highlight its importance in terms of environmental assessment projects in Ethiopia.

### 5.10.2 Issues for environmental assessment

ISSUES FOR ENVIRONMENTAL ASSESSMENT IN RESETTLEMENT PROJECTS		
ISSUE	SOURCES/CAUSES	IMPACT
Social adjustment by the resettled community  Impacts on areas surrounding the project site	Movement of people out of an area	Production systems are dismantled People are impoverished when their productive assets or income sources are lost Relocation to environments where people's productive skills are less applicable Community institutions and social networks are weakened Kin groups are dispersed Cultural identity, traditional authority and the potential for mutual help are diminished Loss of access to natural resources Pressure on financial resources of individual families Huge financial implications for project owner Losses arising from sentimental attachment or aesthetic preference Disrupted access to places of cultural property e.g. pilgrimage centres and places of worship

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<b>ISSUES FOR ENVIRONMENTAL ASSESSMENT IN RESETTLEMENT PROJECTS</b>		
<b>ISSUE</b>	<b>SOURCES/CAUSES</b>	<b>IMPACT</b>
		<ul style="list-style-type: none"> <li>Relocation of cemeteries</li> <li>Pressure on public infrastructure and social services in host area</li> <li>Homelessness</li> <li>Marginalisation</li> <li>Loss of access to common property and shared resources</li> <li>Decreased food security</li> <li>Social disarticulation</li> <li>Loss of integrity and identity of indigenous cultures</li> <li>Dependence on government</li> <li>Increased government control over large segments of society</li> <li>Neglect of people not resettled</li> <li>Stagnation of areas surrounding site from which resettlement occurred</li> <li>Under-utilization of resources in areas surrounding project site</li> <li>Increased pressure on infrastructure and services in new settlement</li> </ul>
Change in the host community	Influx of new people into an area	<ul style="list-style-type: none"> <li>Greater competition for resources</li> <li>Adverse impacts on host communities</li> <li>Changes in community structures</li> <li>Conflict between resettled and host populations</li> </ul>
Spread of disease and pests	Health and safety	<ul style="list-style-type: none"> <li>Erosion of health status</li> <li>Psychological stress relating to displacement and loss of community identity</li> <li>Increased spread of disease through high population density and poor health and sanitation facilities</li> <li>Introduction of new diseases and pests to the resettled and host communities</li> </ul>
<ul style="list-style-type: none"> <li>Overutilization of natural resources</li> <li>Pollution</li> <li>Soil damage</li> <li>Habitat loss</li> </ul>	<ul style="list-style-type: none"> <li>Encroachment into the natural environment</li> <li>Consumption of natural resources</li> </ul>	<ul style="list-style-type: none"> <li>Impact of increased population density in relocation area</li> <li>Encroachment into natural environments</li> <li>Transportation capacity put under pressure</li> <li>Problems with access to potable water</li> <li>Overgrazing leading to nutrient-deficiencies and soil damage</li> <li>Soil erosion through land clearance</li> <li>Pollution of the environment by exceeding the capacity of natural services</li> <li>Deforestation</li> <li>Loss of biological diversity through encroachment and increased reliance</li> </ul>

### 5.10.3 Recommendations for environmental management

- Minimize resettlement as far as possible
- Carry out detailed plans for compensation and resettlement
- Discourage entrepreneurial intervention that might deplete the level of compensation reaching the resettlement people
- Develop a long term support program for the resettled
  
- Encourage public participation and ensure that displaced people are informed about the options and rights
- Provide structures for consultation with the host communities and local government and for conflict resolution
- Select replacement sights with a combination of productive potential, locational advantage and other factors at least equivalent to the advantages of the old site
- Ensure that adequate infrastructure and services are provided in the host community to meet the needs of the resettled community
- The carrying capacity of the host area must be determined
- Provide people displaced by a project with the means to improve, or at least restore, their former living standards, earning capacity, and production levels
- As far as possible provide land-for-land compensation
- Resettlement must ensure equal rights to women, children and indigenous populations and other vulnerable groups
- Create a long term monitoring system with the establishment of performance criteria

## APPENDIX 1 : SCHEDULE OF ACTIVITIES

**Schedule 1.** Projects which may have adverse and significant environmental impacts, and may, therefore, require full EIA.

### **A. Social infrastructure and service**

#### **1. Rural and Urban water supply and sanitation**

- Construction of dams, impounding reservoirs with a surface area of 100 hectares
- Ground water development for industrial, agricultural or urban water supply of greater than 4000 m<sup>3</sup> /day
- Canalization and flood-relief works (large scale)
- Drainage Plans in towns close to water bodies

#### **2. Waste Disposal**

- Waste disposal installations for the incineration, chemical treatment or land fill of toxic, hazardous and dangerous wastes
- Installation for the disposal of industrial waste
- Land fill site for waste disposal in major urban centre

#### **3. Urban Development**

- Hospital and educational facilities (large scale)
- Housing development covering an area of 50 hectares or more
- Designation of new towns, village and residential area
- Establishment of industrial estates
- Establishment or expansion of recreational areas in mountain areas, Parks and game reserves
- Shopping centres, complexes and establishment of open air market area in major urban centres
- Establishment of bus and rail terminal

### **B. Economic infrastructure and services**

#### **4. Transport**

- Major urban roads
- Rural road programmes
- Rail infrastructure and railways
- Airports with a basic runway length of 2,100 m or more
- Trans-regional and International high way

**5. Energy**

- High power transmission line
- Large bio-mass energy using plants
- Thermal power stations and other combustion installations with a heat output of 100 Mega Watts or more
- Hydroelectric power having dams over 15 meters high and ancillary structures covering a total area in excess of 20 hectares and/or reservoirs with a surface area in excess of 250 hectares
- Construction of combined cycle power station

**C. Production Sector**

**6. Agriculture**

- Land reclamation (large scale)
- Agricultural Projects necessitating the resettlement of 100 families or more
- Development of agricultural estates covering an area of 500 hectares or more involving changes in type of agricultural use
- Use of new pesticide or fertilizer other than those recognized or specified by the concerned government body
- Agricultural mechanization and other services (large scale)
- Introduction of new breed, species of crops, seeds or animals

**7. Irrigation and Drainage**

- Construction of dams and man made lakes and artificial enlargement of lakes with surface area of 250 hectares or more
- Surface water fed irrigation projects covering more than 100 hectares
- Ground water fed irrigation projects more than 100 hectares
- River diversions and water transfers between catchment
- Drainage area of Forestry wetlands or wildlife habitat covering an area of 10 hectares or more
- Dams and man made impoundment in low land areas covering an area of 100 hectares or more

**8. Forestry**

- Conversion of hill forest land to other land use
- Logging or conversion of forest land to other land use within the catchment area of reservoirs used for municipal water supply, irrigation or hydropower generation or in areas adjacent to parks
- Logging with special emphasis for endangered tree species
- Conversion of mangrove swamps for industry, housing or agricultural use covering an area of more than 10 hectares
- Clearing mangrove swamps on islands adjacent to parks
- Large scale afforestation/reforestation mono-culture forest plantation projects which use exotic tree species
- Conversion of forest areas which have a paramount importance of biodiversity conservation to other land use
- Resettlement programs in natural forest and wood land areas.

**9. Livestock**

- Large scale open range rearing of cattle, horses, sheep etc
- Large scale livestock production in Urban area
- Large scale slaughter house construction

**10. Fisheries**

- commercial fisheries
- introduction of exotic species

**11. Minerals extraction and processing**

**Large scale Mining Operation**

**Which the annual run of mine ore exceed:-**

- a. Gold, platinum and silver and other precious and semi precious minerals.
  - 100,000m<sup>3</sup> for placer operation
  - 75,000 tons for primary deposit mining
- b. Metallic minerals such as Iron, Lead, Copper, Nickel
  - 150,000 tons for open pit mining
  - 75,000 tons for under ground mining operations
- c. Industrial minerals such as kaolin, bentonite, diatomite, dolomite, quartz and coal
  - 120,000 tons
- d. Construction Minerals
  - 80,000m<sup>3</sup> for sand, gravel, pumice, stone, clay and the like
  - 10,000m<sup>3</sup> for dimension stones such as marble and granite
- e. Mineral Water
  - 20,000m<sup>3</sup>
- f. Thermal Water
  - 2,000,000m<sup>3</sup> for bathing, recreational and medicinal purposes
  - 25 Mega Watt, or geothermal steam capable of generating equivalent power for industrial and other purposes
- g. Extraction of salts from brines
  - 14,000 tons
- h. Large scale quarry site of construction minerals near to large population centre.

**12. Petroleum**

- Oil and gas fields development
- Construction of off shore pipe lines in excess of 50 km in length
- Construction of oil and gas separation, processing, handling and storage facilities
- Construction of product depots for storage of petroleum, gas or diesel (excluding service stations) which are located with in 3 km of any commercial or residential areas and which have a combined storage capacity of 60,000 barrels or more

### **13. Industry**

- Petrochemicals - (all size)
- Chemical where production capacity of each product or of combined products is greater than 50 tons/day
- Installations for the production of ferrous and non-ferrous metals, including smelting, refining, drawing rolling and surface treatment (all size)
- Installations for the extraction and processing of asbestos and cement products
- Manufacture or transport of pesticides or other hazardous and/or toxic materials
- Manufacturing of agricultural chemicals in puts (all sizes)
- Agro industry (large scale) such as sugar cane industries
- Beverage industries (large scale)
- Textile industries (large scale)
- Manufacture of rubber and plastic products (large scale)
- Manufacture of glass and glass products (large scale)
- Manufacture of electrical machinery apparatus, appliances and supplies
- Manufacture of wood and wood products, including furniture (large scale)
- Tannery and leather dressing factories (large scale)

**Schedule 2.** Projects whose type, scale or other relevant characteristics have potential to cause some significant environmental impacts but not likely to warrant an environmental impact study.

#### **A. Social infrastructure and services**

##### **1. Rural and Urban water supply and sanitation**

- Rural water supply and sanitation
- Land drainage (small scale)
- Sewerage system

##### **2. Waste disposal**

- Recycling plant (small scale)

##### **3. Urban development**

- Housing and commercial projects
- Cemetery site and establishment of religious institutions

#### **B. Economic Infrastructure and Services**

##### **4. Transport**

- Upgrading or rehabilitation of major rural roads
- Airports with basic runway length less than 2,100m

**5. Energy**

- Thermal power stations and other combustion installations with a heat output of less than 300 mega watts
- Electricity transmission lines
- Hydropower projects having dam height less than 15 meters and reservoirs with a surface area less than 250 hectares

**C. Production sector**

**6. Agriculture**

- Wide spread introduction of fertilizers
- Pest control programmes (large scale)

**7. Irrigation**

- Surface water fed irrigation projects covering less than 100 hectares
- Ground water fed irrigation projects covering less than 100 hectares

**8. Forestry**

- Protected forest reserves (large scale)
- Agro forestry (large scale)
- Productive forest reserves (large scale)

**9. Livestock**

- Intensive rearing of cattle (>50 heads); pigs (>100 heads); or poultry (>500 heads)
- Establishment of animal feed (large scale)
- Livestock fattening projects (large scale)
- Bee keeping projects (large scale)

**10. Fisheries**

- Artesian fisheries (large scale)
- Introduction of new harvesting technology

**11. Mineral extraction and processing**

- Small scale mining operations

**12. Industry**

- Agro-industries, including manufacturing of vegetable and animal oils and fats
- Manufacture, packing and canning of animal, fish and vegetable products
- Industries utilizing hazardous materials (small scale)

**Schedule 3.** Projects which would have no impact and does not require environmental impact assessment

**A. Social infrastructure and services**

- Educational facilities (small scale)
- Audio visual production
- Teaching facilities and equipment
- Training
- Medical centre (small scale)
- Medical supplies and equipment
- Nutrition
- Family planning

**B. Economic infrastructure and services**

- Telecommunication
- Research

**C. Production Sector**

- i Irrigation
  - Surface water fed irrigation projects covering less than 50 hectares
  - Ground water fed irrigation projects covering less than 50 hectares
- ii Agriculture
  - All small scale agricultural activities
- iii Forestry
  - Protected forest reserves (small scale)
  - Productive forest reserves (small scale)
- iv Livestock
  - Rearing of cattle (<50 heads); pigs (<100 heads), or poultry (<500 heads)
  - Livestock fattening projects (small scale)
  - Bees keeping projects (small scale)
- v Fisheries
  - Artesian fisheries (small scale)
- vi Industry
  - Agro industrial (small scale)
  - Other small scale industries having no impact to the environment
- vii Trade
  - All trades except trade in endangered species and hazardous material
- viii Financial assistance
  - Programme assistance
  - Non-project or special country support
  - Food aid

- ix Emergency Operations
- Assistance to refugee returned and displaced person

**D. All projects involved in environmental enhancement programmes**

All projects in environmentally sensitive areas should be treated as equivalent to Schedule 1 activities irrespective of the nature of the project. Sensitive areas may include:

- Land prone to erosion
- Land prone to desertification
- Areas which harbour protected, threatened or endangered species
- Areas of particular historic or archaeological interest
- Primary forests
- Wetland of national or international importance
- National Park and protected area
- Important landscape
- Religiously important area

**APPENDIX 2 : EXAMPLE OF AN APPLICATION FORM**

<b>APPLICATION FOR ENVIRONMENTAL AUTHORISATION</b>				<b>Page: 1</b>
For official use only	Federal		Application No:	
	Regional		Date received:	
	Responsible official:			
<b>PARTICULARS OF APPLICANT</b>				
Name of applicant:				
Contact Person:				
Postal Address:				
			Postal Code:	
Telephone No:		Facsimile No:		
Cellular No:		E-mail address		
<b>TITLE OF PROPOSED ACTIVITY</b>				
<b>DESCRIPTION OF PROPOSED ACTIVITY</b> (please append if insufficient space provided)				
<b>LOCATION OF PROPOSED ACTIVITY</b>				
Region:				
Nearest town:				
Name of property(s):				
Extent of property(s):				

<b>APPLICATION FOR ENVIRONMENTAL AUTHORISATION</b>		<b>Page: 2</b>	
<b>PROBLEMATIC ISSUES IDENTIFIED</b> (please append if insufficient space provided)			
<b>CONSULTANT</b> I propose to make use of the following consultant:			
Name of consultant:			
Contact Person:			
Postal Address:			
		Postal Code:	
Telephone No:		Facsimile No:	
Cellular No:		E-mail address	
<b>SIGNATURES</b>			
Applicant:		Date:	
Witness:		Date:	
Witness:		Date:	

**APPENDIX 3 : STANDARDS AND GUIDELINES FOR WATER AND AIR OF RELEVANCE  
IN ETHIOPIA**

**SOUTH AFRICAN WATER QUALITY STANDARDS  
AND GUIDELINES FOR DOMESTIC USE**

DETERMINAND	SABS 241 SPECIFICATIONS *		DWAf WATER QUALITY GUIDELINES ** Target water quality range	UNITS
	Recommended limit	Maximum allowable limit		
Turbidity	1	5	36159	NTU
Colour	20	-	15	Pt-Co units
Odour and taste	not objectionable	not objectionable	1	TON
pH	6.0-9.0	5.5-9.5	6.0-9.0	pH units
Conductivity	70	300	-	mS/m
Total Hardness	20-300	-	50-100	mg/l as CaCO <sub>3</sub>
Calcium	-	-	0-32	mg/l
Magnesium	70	100	0	mg/l as Mg
Sodium	100	400	0-100	mg/l
Potassium	-	-	0-50	mg/l
Chloride	250	600	0-100	mg/l
Sulphate	200	600	0-200	mg/l as SO <sub>4</sub> <sup>=</sup>
Ammonia	-	-	0-1.0	mg/l
Nitrate and nitrite	6	10	36310	mg/l N
Dissolved Organic Carbon	-	-	36279	mg C/l
Fluoride	1	1.5	0-1.0	mg/l
Zinc	1	5	36218	mg/l
Aluminium	-	-	0-0.15	mg/l
Arsenic	100	300	0	ug/l
Cadmium	10	20	36279	ug/l
Copper	0.5	1	36159	mg/l
Chromium (VI)	-	-	0-0.05	mg/l

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Cyanide	0.2	0.3	-	mg/l
Iron	0.1	1	0-0.1	mg/l
Lead	0.05	0.1	0-0.01	mg/l
Manganese	0.05	1	0-0.05	mg/l
Mercury	5	10	36159	ug/l
Phenolic compounds	5	10	36159	ug/l
Selenium	0.02	0.05	-	mg/l
Total coliform bacteria	0	5	36279	Counts/10 0ml
Faecal coliform bacteria	0	0	0	Counts/10 0ml
Standard Plate Count	100	-	0-100	Counts/1 ml
Coliphages	-	-	36159	Counts/10 0ml

\* South African Bureau of Standards (SABS) 241 - 1984 : Specification for water for domestic supplies

\*\*Department of Water Affairs and Forestry (DWAF) - South African Water Quality Guidelines, Volume 1 : Domestic Water Use, Second edition, 1996

**SOUTH AFRICAN GROUNDWATER QUALITY STANDARDS  
AND GUIDELINES FOR DOMESTIC USE**

DETERMINAND	SABS 241 SPECIFICATIONS *		DWAF WATER QUALITY GUIDELINES **	CLASSIFICATION SYSTEM FOR BOREHOLE WATER FOR POTABLE USE ***				UNITS
	Recommended limit	Maximum allowable limit	Target water quality range	Class 0	Class 1	Class 11	Class 111	
Turbidity	1	5	36159	-	-	-	-	NTU
Colour	20	-	15	-	-	-	-	Pt-Co units
Odour and taste	not objectionable	not objectionable	1	-	-	-	-	TON
pH	6.0-9.0	5.5-9.5	6.0-9.0	6.0-9.0	5.0-9.5	4.5 to 9.5-10	<4 to >10	pH units
Conductivity	70	300	-	0-70	70-150	150-370	> 370	mS/m
Total Hardness	20-300	-	50-100	-	-	-	-	mg/l as CaCO <sub>3</sub>
Total Dissolved Solids	-	-	-	0-450	450-1000	1000-2450	> 2450	mg/l
Calcium	-	-	0-32	-	-	-	-	mg/l
Magnesium	70	100	0	0	30-70	70-100	> 100	mg/l as Mg
Sodium	100	400	0-100	0-100	100-200	200-400	> 400	mg/l
Potassium	-	-	0-50	-	-	-	-	mg/l

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Chloride	250	600	0-100	0-100	100-200	200-600	> 600	mg/l
Sulphate	200	600	0-200	0-200	200-400	400-600	> 600	mg/l as SO <sub>4</sub> <sup>=</sup>
Ammonia	-	-	0-1.0	-	-	-	-	mg/l
Nitrate and nitrite	6	10	36310	36279	36438	36452	> 20	mg/l N
Dissolved Organic Carbon	-	-	36279	-	-	-	-	mg C/l
Fluoride	1	1.5	0-1.0	0-1.0	1.0-1.5	1.5-3.5	> 3.5	mg/l
Zinc	1	5	36218	0-3	3-5	5-10	> 10	mg/l
Aluminium	-	-	0-0.15	-	-	-	-	mg/l
Arsenic	100	300	0	0-10	10-50	50-200	> 200	ug/l
Cadmium	10	20	36279	0-5	5-10	10-20	> 20	ug/l
Copper	0.5	1	36159	-	-	-	-	mg/l
Chromium (VI)	-	-	0-0.05	-	-	-	-	mg/l
Cyanide	0.2	0.3	-	-	-	-	-	mg/l
Iron	0.1	1	0-0.1	0-0.1	0.1-0.2	0.2-2	> 2	mg/l
Lead	0.05	0.1	0-0.01	-	-	-	-	mg/l
Manganese	0.05	1	0-0.05	0-0.05	0.05-0.1	0.1-1	> 1	mg/l
Mercury	5	10	36159	-	-	-	-	ug/l
Phenolic compounds	5	10	36159	-	-	-	-	ug/l
Selenium	0.02	0.05	-	-	-	-	-	mg/l

Total coliform bacteria	0	5	36279	-	-	-	-	Counts/100m l
Faecal coliform bacteria	0	0	0	0	36159	36433	> 10	Counts/100m l
Standard Plate Count	100	-	0-100	-	-	-	-	Counts/1ml
Coliphages	-	-	36159	-	-	-	-	Counts/100m l

\* South African Bureau of Standards (SABS) 241 - 1984 : Specification for water for domestic supplies

\*\*Department of Water Affairs and Forestry (DWAF) - South African Water Quality Guidelines, Volume 1 : Domestic Water Use, Second edition, 1996

\*\*\* Institute for Water Quality Studies (IWQS), Department of Water Affairs and Forestry, 1996

**Classification system for assessment of suitability of Borehole Water for potable use  
(Institute for Water Quality Studies, Department of Water Affairs and Forestry, 1996)**

Classification Levels with regards to health effects are divided into four classes as follows:

Class 0 : Ideal water quality suitable for life time use (multiple generation use) and has no detrimental health effects.

Class I : In this range of concentration the key constituents will only in rare instances cause detrimental effects on health either in the short or long term, and is suitable for use for an entire lifetime. This is the class of safe water quality.

Class II : In this range of concentration, health effects may occur with long term use, but the short term detrimental health effects are either mild or rare. This class is essentially the concentration acceptable for short term or emergency use.

Class III : This is the concentration where serious health effects may be anticipated, particularly in infants, with short term use. The water quality in this class is not suitable for use unless an appropriate treatment process is used to remove the offending constituents, thus changing the water quality to a safer class (ie, I or II).

The criteria used to classify a borehole in the specific classes are as follows:

- ▶ If the concentration of any constituent for any sample for a specific borehole falls in Class III, the borehole is classified as a Class III borehole.
- ▶ If the concentration of any constituent for any sample for a specific borehole falls in Class II, and none in Class III, the borehole is classified as a Class II borehole.
- ▶ The upper value of Class I is used as the cut off value to determine whether a borehole would fall in Class I and also include Class 0 which is the ideal water quality.

Note: This list is not comprehensive, and lists those constituents most commonly responsible for water quality problems in groundwater. Other constituents may cause health effects.

### SOUTH AFRICAN AIR QUALITY LIMITS

#### Maximum allowable concentration for the most common pollutants

POLLUTANT	GUIDELINE CONCENTRATION					UNITS
	Instant peaks	1-hour avg	24-hour avg	1-month avg	annual avg	
Sulphur dioxide (SO <sub>2</sub> )	0.6	0.3	0.1	0.05	0.03	ppm
Nitrogen dioxide (NO <sub>2</sub> )	0.5	0.2	0.1	0.08	0.05	ppm
Ozone (O <sub>3</sub> )	0.25	0.12	-	-	-	ppm
Particulate <10 micrometers (PM-10)	-	-	180	-	60	ug/m <sup>3</sup>
Lead (Pb)	-	-	-	2.5	-	ug/m <sup>3</sup>
NO <sub>x</sub>	104	0.8	0.4	0.3	0.2	ppm
Nitrous oxide (NO)	0.9	0.6	0.3	0.2	0.15	ppm
Total suspended solids (Hi-vol)	-	-	300	-	100	ug/m <sup>3</sup>
Smoke (from CSIR Soiling index)	-	-	250	-	100	ug/m <sup>3</sup>

ppm = parts per million

ug/m<sup>3</sup> = parts per billion (ppb)

#### **Dust fall-out (deposition):**

Slight : less than 0.25 g/m<sup>2</sup>/day  
 Moderate : 0.25 to 0.50 g/m<sup>2</sup>/day  
 Heavy : 0.50 to 1.2 g/m<sup>2</sup>/day  
 Very heavy : more than 1.20 g/m<sup>2</sup>/day

(Above 24-hour limits not to be exceeded for more than 3 times per year)

**USA EPA STANDARDS:**

POLLUTANT	STANDARD VALUE						UNITS
	1-hour avg	3-hour avg	8-hour avg	24-hour avg	Quarterly avg	Annual Arithmetic Mean	
Sulphur dioxide (SO <sub>2</sub> )	-	0.5	-	0.14	-	0.03	ppm
Nitrogen dioxide (NO <sub>2</sub> )	-	-	-	-	-	0.053	ppm
Ozone (O <sub>3</sub> )	0.12	-	0.08	-	-	-	ppm
Particulate <10 micrometers (PM-10)	-	-	-	150	-	50	ug/m <sup>3</sup>
Particulate <2.5 micrometers (PM-2.5)	-	-	-	65	-	15	ug/m <sup>3</sup>
Lead (Pb)	-	-	-	-	1.5	-	ug/m <sup>3</sup>
Carbon monoxide (CO)	35	-	9	-	-	-	ppm

**WORLD HEALTH ORGANISATION (WHO) AIR QUALITY GUIDELINES FOR “CLASSICAL COMPOUNDS”:**

POLLUTANT	GUIDELINE VALUE				UNITS
	1-hour avg	8-hour avg	24-hour avg	Annual avg	
Sulphur dioxide (SO <sub>2</sub> )	-	-	125	50	ug/m <sup>3</sup>
Nitrogen dioxide (NO <sub>2</sub> )	200	-	40	-	ug/m <sup>3</sup>
Ozone (O <sub>3</sub> )	-	120	-	-	ug/m <sup>3</sup>
Lead (Pb)	-	-	-	0.5	ug/m <sup>3</sup>
Carbon monoxide (CO)	30 000	10 000	-	-	ug/m <sup>3</sup>

**FINLAND AMBIENT AIR GUIDELINES:**

POLLUTANT	GUIDELINE VALUE				UNITS
	1-hour avg	8-hour avg	24-hour avg	Annual avg	
Sulphur dioxide (SO <sub>2</sub> )	250	-	80	20	ug/m <sup>3</sup>
Nitrogen dioxide (NO <sub>2</sub> )	150	-	70	30	ug/m <sup>3</sup>
Particulate <10 micrometers (PM-10)	-	-	70	-	ug/m <sup>3</sup>
Carbon monoxide (CO)	20	8	-	-	ug/m <sup>3</sup>
Total Suspended Particulates (TSP)	-	-	120	50	ug/m <sup>3</sup>

**BELGIUM AIR QUALITY STANDARDS:**

POLLUTANT	GUIDELINE VALUE				UNITS
	1-hour avg	8-hour avg	24-hour avg	Annual avg	
Sulphur dioxide (SO <sub>2</sub> )	-	-	100-150	40-60	ug/m <sup>3</sup>
Nitrogen dioxide (NO <sub>2</sub> )	135-200	-	-	-	ug/m <sup>3</sup>
Ozone (O <sub>3</sub> )	180-360	110	65	-	ug/m <sup>3</sup>
Lead (Pb)	-	-	-	2	ug/m <sup>3</sup>

**AUSTRALIAN AMBIENT AIR QUALITY OBJECTIVES:**

Air quality goals recommended by the National Health and Medical Research Council

POLLUTANT	GUIDELINE VALUE				UNITS
	1-hour avg	8-hour avg	Quarterly avg	Annual avg	
Sulphur dioxide (SO <sub>2</sub> )	-	-	-	60	ug/m <sup>3</sup>
Nitrogen dioxide (NO <sub>2</sub> )	320	-	-	-	ug/m <sup>3</sup>
Ozone (O <sub>3</sub> )	240	-	-	-	ug/m <sup>3</sup>
Lead (Pb)	-	-	1.5	-	ug/m <sup>3</sup>
Carbon monoxide (CO)	-	10	-	-	ug/m <sup>3</sup>
Total Suspended Particulates (TSP)	-	-	-	90	ug/m <sup>3</sup>

