FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

ETHIOPIAN ROADS AUTHORITY

ENVIRONMENTAL PROCEDURES MANUAL

2001

PREFACE

This Standard Environmental Procedures Manual _ 2001is one of the series of "Design Manuals, Standard Contract Documents and Specifications" prepared under a credit from the International Development Agency (IDA). The Manual was developed through the assistance of the Louis Berger Group team.

This manual has been developed from current, international practice appropriately modified to take account of local experience and conditions and is written for the practicing Environmentalist.

ERA formed a Project Working Group charged with evaluating and commenting upon the draft Manuals and guiding the Consultant on the preparation of the final Manuals. This Manual was finalized by ERA Project Working Group. Members of the Working Group and the Louis Berger Group team for this Manual consists of the following:

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Companion Documents and Manuals Prepared under the same service are the following:

1. Geometric Design Manual –2001
2. Site Investigation Manual _ 2001
3. Pavement Design Manual Volume I_ 2001(Flexible & Gravel)
4. Pavement Design Manual Volume II_ 2001(Rigid Pavements)
5. Overlay/Rehabilitation Manual _ 2001
6. Drainage Design Manual Volume - 2001
7. Bridge Design Manual _ 2001
8. Standard Technical Specifications _ 2001
9. Standard Detail Drawings _ 2001
10. Standard Bidding Documents For Road Work Contracts National Competitive Bidding (NCT) _2001
11. Standard Tendering Documents For Road Work Contracts International Competitive Bidding (ICB) _2001

Appropriate reviews and comments were also provided by agencies and individuals through ERA's Project Working Group. The Working Group wishes to acknowledge the contributions made by all other specialists within ERA and outside of ERA in the preparation of these Manuals and Documents.

FOREWORD

This is the first comprehensive Standard Environmental Procedures Manual for Roads prepared for the use and technical guidance for design personnel of the Ethiopian Roads Authority and consultants doing Environmental Assessment Study during road design work for the Authority, however, it may also be used as a guide by other agencies undertaking relevant work in the road sector.

The Ethiopian Roads Authority has prepared this Manual in order to standardize Environmental Procedures for design of new roads and rehabilitation of existing roads.

The road network comprises a huge national asset that requires adherence to appropriate Environmental Procedures during design, construction and maintenance of roads, in order to provide a high level service. As the length of the engineered road network is increasing, appropriate choice of methods to preserve this investment becomes increasingly important.

The Procedures set out in this Manual shall be adhered to unless otherwise directed by the concerned bodies with in ERA. However, I will like to emphasize that careful consideration to sound engineering practice shall be observed in the use of the Manual, and under no circumstances shall the Manual waive professional judgment in applied engineering. For simplification in reference this Manual may be cited as " ERA Standard Environmental Procedures Manual –2001".

It is my sincere hope that this Manual will provide all users with both a standard reference and a ready source of good practice in Environmental considerations during design, construction and maintenance of roads, and will assist in a cost effective operation and environmentally sustainable development of our road network.

I look forward to the practices contained in this Manual being quickly adopted into our operations, thereby making a sustainable contribution to the improved infrastructure of our country.

As this Manual due to Technological development and change, requires periodic updating, comments & suggestions on all aspects from any concerned body, group or Individual as a feedback during its implementation is expected and that will be highly appreciated.

Tesfamichael Nahusenay
General Manager
Ethiopian Roads Authority

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LIST OF ACRONYMS

EA	Environmental Assessment
ECA	Environmentally Critical Area
ECPC	Environmental Clearance Permission Certificate
ECP	Environmentally Critical Project
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMB	Environmental Management Branch
EMP	Environmental Management Plan
EPA	Environmental Protection Authority
EPU	Environmental Protection Unit (of MEDaC)
ERA	Ethiopian roads Authority
EU	European Union
FDRE	Federal Democratic Republic of Ethiopia
IEIA	Initial Environmental Impact Assessment
IEIS	Initial Environmental Impact Statement
MEDaC	Ministry of Economic Development and Cooperation
NGO	Non-governmental Organization
PAPs	Project -Affected Persons
PP	Project Proponent
PPD	Planning and Programming Division
RAP	Resettlement Action Plan
TOR	Terms of Reference

CHAPTER 1

INTRODUCTION

1.1 General

This manual outlines standard methods and procedures for incorporating the environmental impact assessment process road project planning, design, construction and operation. This Manual has been prepared in consultation with the Ethiopian Environmental Protection Authority (EPA) and it provides a step-by-step approach to environmental management activities to be conducted during each phase of the road project cycle. It is principally aimed at two sets of users: those who are primarily responsible for executing road construction, rehabilitation, and maintenance works; and those involved in the preparation and supervision of contracts.

Although much of environmental management is good common sense, professional practice in the field has developed a special vocabulary and set of procedures that may be unfamiliar to the user of this Manual. In order to assist the User, therefore, the Manual defines terms, outlines procedures, describes essential tasks, and provides forms for use.

1.2 PURPOSE

ERA has initiated a comprehensive program to rehabilitate, upgrade and expand the highway network in Ethiopia. To plan and implement the program in a coherent way, using modern standards and technology, ERA decided to establish a uniform framework. Developing a Standard Environmental procedures Manual was part of this framework.

The purpose of this manual is to give guidance and recommendations to the engineers or other professionals responsible for the Environmental Impact Analysis in the design of roads in Ethiopia.

1.3 SCOPE

The procedures for the Environmental Impact Analysis presented in this manual are applicable to trunk roads, link roads, main access roads, collector roads, feeder roads and unclassified roads.

The use of the procedures described in this manual should help in achieving reasonable uniformity in the Environmental Impact Analysis for a given set of conditions.

1.4 ORGANIZATION OF THE MANUAL

The overall organization of this manual and the procedures are as follows:

Chapter 2 of the Manual describes the regulatory framework of the Ethiopian Roads Authority and the Environmental Management checklist for road projects is listed in Chapter 3.

In Chapters 4 through 10, specific Environmental Management activities at each Project Cycle are described in detail.

Appendix "A" contains sample documents and examples of the forms required for organizing and presenting data.

If detail knowledge about a particular issue is required, Bibliography and References are included for use at Appendix "B".

CHAPTER 2

REVIEW OF REGULATORY FRAMEWORK

2.1 GENERAL

The principal competent agency (with its replica in few of the Regions) is the Ethiopian Environmental Protection Authority (EPA) and the sectoral environmental units operate in close coordination with the EPA. The environmental review requirements of the EPA and that of the Environmental Management Branch of ERA are discussed in this Chapter.

2.2 ETHIOPIAN ENVIRONMENTAL PROTECTION AUTHORITY

The EPA's Environmental Impact Assessment (EIA) review process is shown in Figure 2. 1 In general, regulations require the screening of all development projects proposed by all line agencies, and the submission of the environmental study document for review by the EPA. Information on the proposed project is submitted to the EPA in an Initial Screening Format. Screening is a procedure that separates Schedule I Projects, those that require an EIA, from Schedule II Projects. An Initial Environmental Impact Assessment (IEIA) is prepared for Schedule II projects and submitted for review and a determination is made as to whether or not an EIA is required. Schedule I Projects, however, automatically require the preparation of an EIA.

If the project is a Schedule I process, the Terms of Reference (TOR) for the environmental activities must be approved by the EPA before work on the EIA begins. Successful completion of the EIA process results in the issuance of an Environmental Clearance Permission Certificate (ECPC). An ECPC is required before construction can begin. After the road is in service, the EPA requires the conduct of an Audit and the submission of an audit report. The definitions of Schedule Schedule II projects and I are shown in Table 2.1.

Table 2.1: EIA Road Project Categories

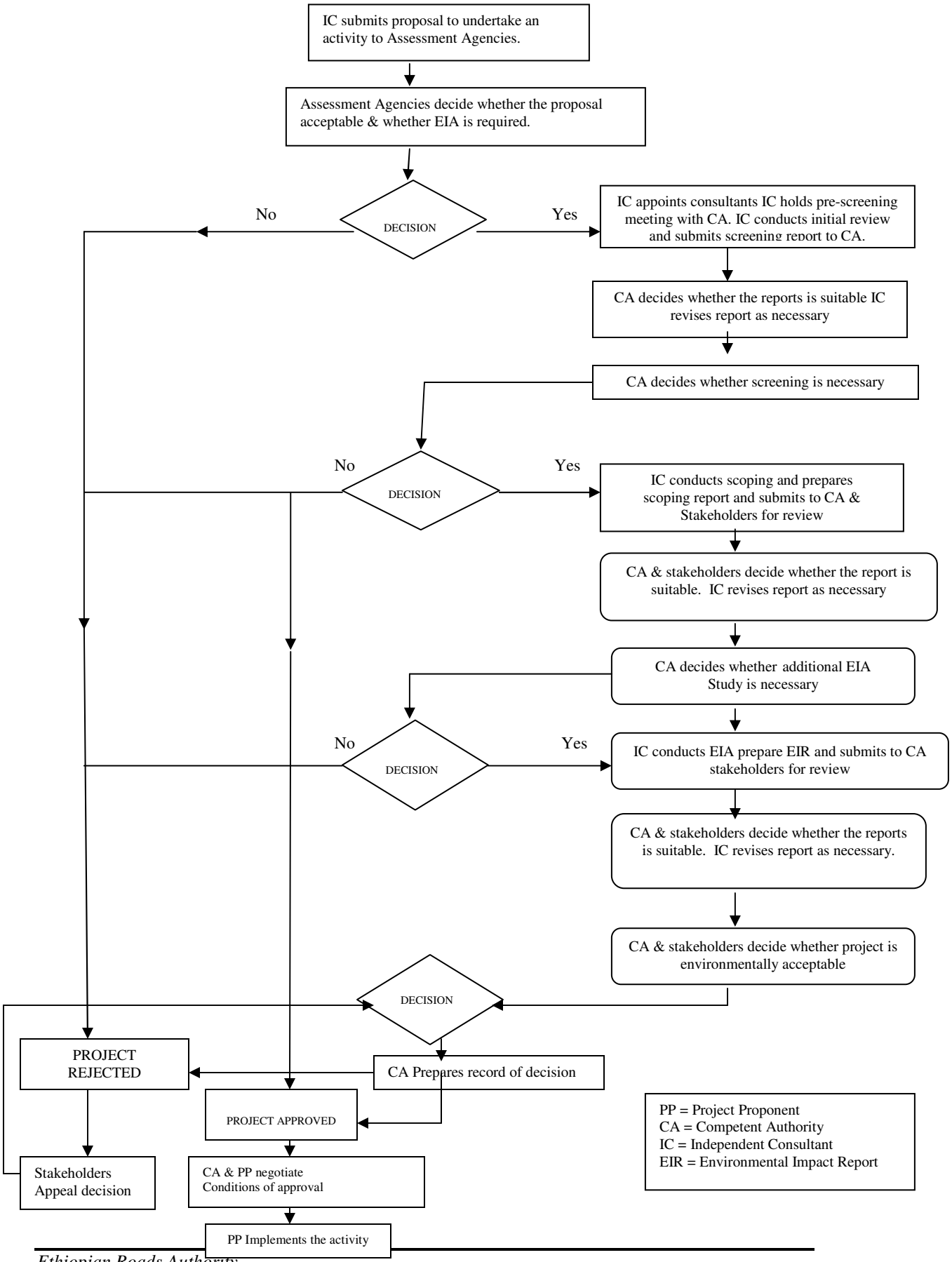
Schedule I Projects: Require an EIA	**Schedule II Projects: Require an IEIA in order to determine if an EIA is necessary**
Are defined as "Projects, which may have significant environmental impacts, and may, therefore, require full EIA" (*EIA Guideline Document, July 2000, Appendix. 1, P. 1*).	Are defined as " projects whose type, scale or other relevant characteristics have the potential to cause some significant environmental impacts but are not likely to warrant an EIS (EIA)" (*EIA Guideline Document, July 2000, Appendix. 1, P. 4*).
For the road sub-sector, these include "major urban roads, rural road programmes and trans-regional and international highways." (*EIA Guideline Document, July 2000, Appendix. 1, P. 1*).	For the road sub-sector, these include "upgrading / rehabilitation of major rural roads," (*EIA Guideline Document, July 2000, Appendix. 1, P. 4*).

More detailed information on the requirements of the EPA can be found in:

- *Environmental Impact Assessment Guidelines, Volume 1, Procedural Guideline*, EPA, June 1997
- *Environmental Impact Considerations for Transport Sector Projects*, EPA, January 1997.

(The user of this manual should note that in the EPA guidelines, the terms IEIA and IEIS, as well as the terms EIA and EIS are used, assessment referring to the process, and statement referring to the document. For the purposes of simplicity, this manual will use the general terms IEIA and EIA only.)

FIGURE2.1: EPA - SIMPLIFIED EIA PROCEDURAL FLOW



2.3 ERA ENVIRONMENTAL MANAGEMENT BRANCH

The Environmental Management Branch (EMB) was established in January 1998 with major responsibility of setting and implementing ERA environmental guidelines in support of the national level requirements for executing sustainable development practices among all line agencies. The EMB *Environmental Guidelines for the Road Sub-Sector* (1998), superceded by this Manual, *specifies* the requirements and procedures for the conduct of an EIA for road sector projects. The EMB *Guidelines* emphasize the preparation and use of contract specifications and conditions to ensure that environmental mitigation is both budgeted for and implemented by construction contractors.

The EMB EIA process begins with environmental screening in order to identify those projects that require environmental analysis and what level of environmental analysis will be undertaken. IEIA is required for projects that have the potential to cause some significant environmental impacts including upgrading rehabilitation of roads and "other works of similar extent" (EMB *Environmental Guidelines,* p21). EIA is required for new construction and/or upgrading of major roads, new construction and/or upgrading of regional roads, and "other works of similar extent" (EMB *Environmental Guidelines* p 22). TOR are prepared in conjunction with a project scoping process and must be approved prior to conducting the work for an EIA.

Following EIA procedures, environmental monitoring is to be conducted during project implementation to confirm compliance with the requirements of the works in the contract. An Environmental Monitoring Report shall be prepared to evaluate the accuracy of impact predictions and the effectiveness of mitigation measures. In addition, post-project evaluation during road operation is required. Fig. 2.2 shows the Environmental Impact Assessment procedure adopted by the EMB of ERA.

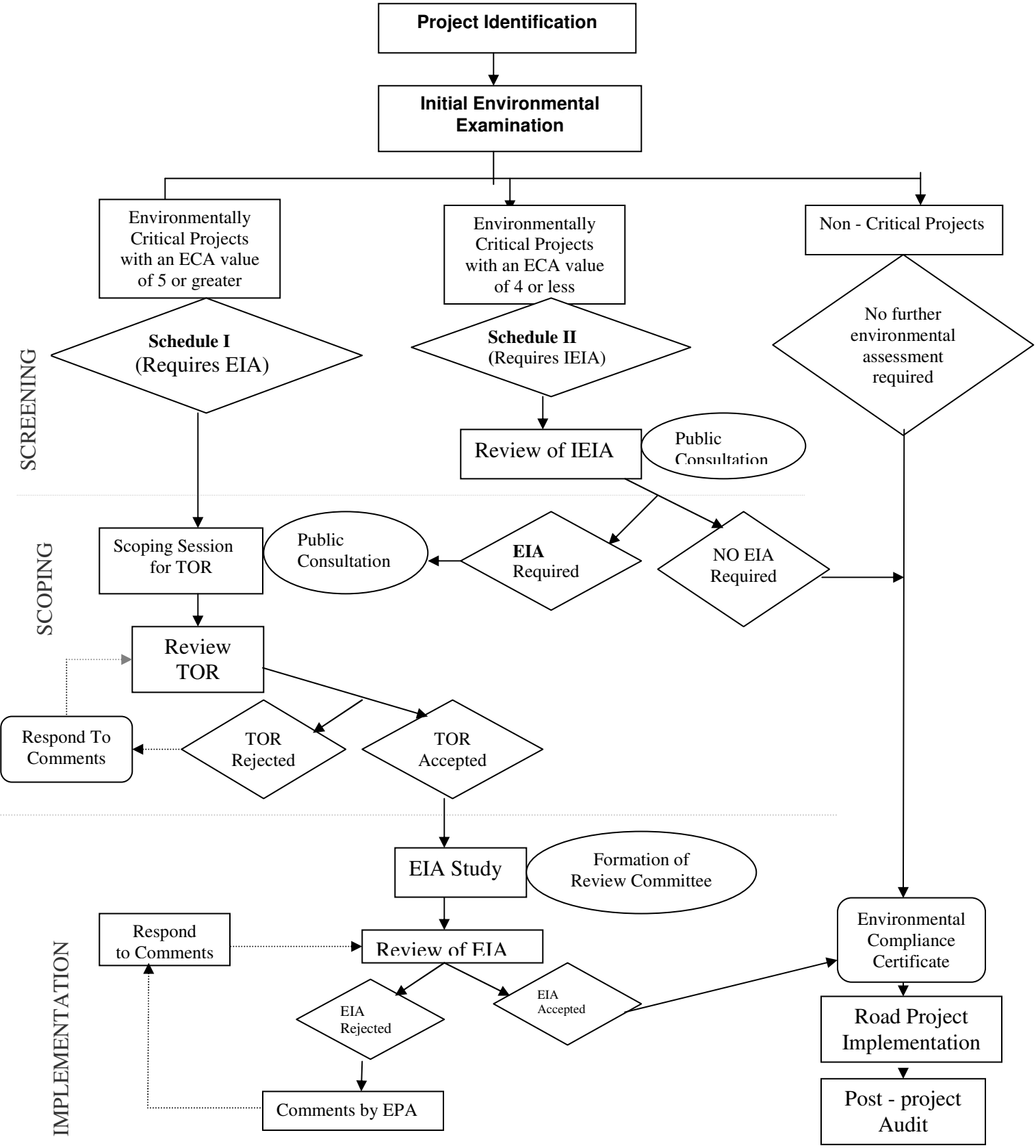
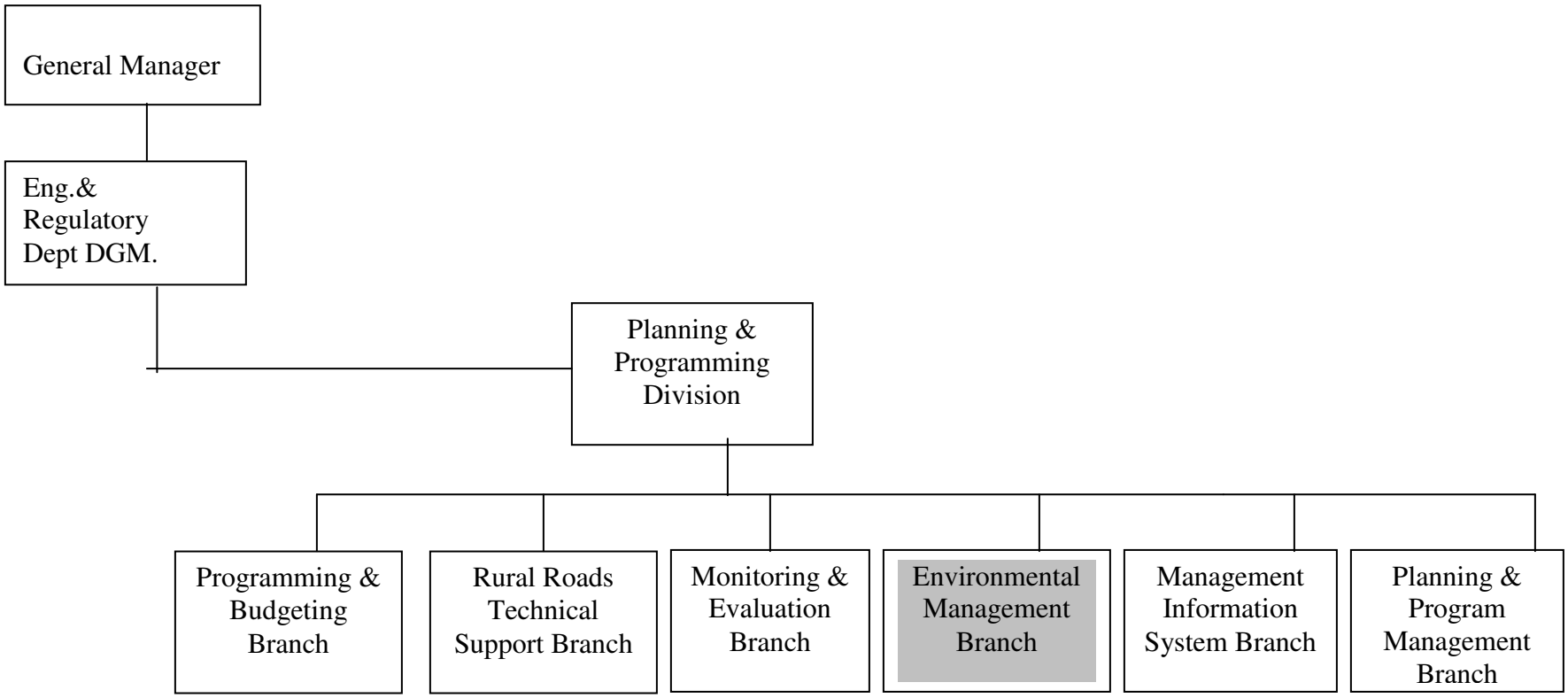

Project Identification
Initial Environmental Examination
Environmentally Critical Projects with an ECA value of 5 or greater
Environmentally Critical Projects with an ECA value of 4 or less
Non - Critical Projects
Schedule I (Requires EIA)
Schedule II (Requires IEIA)
No further environmental assessment required
SCREENING
Review of IEIA
Public Consultation
Scoping Session for TOR
Public Consultation
EIA Required
NO EIA Required
SCOPING
Review TOR
Respond To Comments
TOR Rejected
TOR Accepted
EIA Study
Formation of Review Committee
Respond to Comments
Review of EIA
EIA Rejected
EIA Accepted
Comments by EPA
IMPLEMENTATION
Environmental Compliance Certificate
Road Project Implementation
Post - project Audit

Fig.2. 3 ORGANIZATIONAL STRUCTURE OF PPD/EMB



CHAPTER 3

ENVIRONMENTAL MANAGEMENT AND THE ROAD PROJECT CYCLE

While road projects are generally intended to bring substantial benefits, the construction and maintenance of roads can have significant negative effects on surrounding communities and the natural environment. Over the past decade, many texts have been written on the subject of environmental management and environmental impact assessment for development projects. The principal ones are listed in the Bibliography and References Chapter and most especially Roads *and the Environment: a Handbook*, 1997 Technical Paper No. 376 published by the World Bank is of paramount importance.

3.1 CHECKLIST OF ROAD PROJECT ENVIRONMENTAL MANAGEMENT ACTIVITIES

Environmental management refers to the set of activities undertaken to ensure that a road development project enhances both the environmental context in which it is implemented, and the communities that it is meant to serve. Environmental management activities take place throughout all phases of the project cycle from planning and feasibility, to road construction, and use. The road project cycle can be considered in the following phases.

I. Project concept planning and pre-feasibility study phase
II. Feasibility study and preliminary design phase
III. Detailed design phase
IV. Tender document preparation phase
V. Tendering phase
VI. Construction phase
VII. In Service and maintenance phase

If a project under consideration is not phased in this way, it may be needed to adapt the road project cycle stages to suit the specific situation. This is encouraged as it is part of creating an effective

approach to a unique project and it will in no way hinder the user from using this Manual.

Environmental management activities in each stage of the road project cycle are briefly summarized in the following Table 3.1.

Table 3.1: Environmental Management Activities

ROAD PROJECT PHASE	ENVIRONMENTAL MANAGEMENT ACTIVITY
Project Concept Planning / Pre-feasibility Phase	• Describe and classify the project. • Identify alternatives to the proposed route corridor. • Participate in the initial site inspection visit and co-ordinate with project team members. • Screen alternatives to identify salient environmental parameters of the proposed road works and assess the sensitivity of the receiving environment. • Identifying means to control secondary development in the influence area of the project. • Scoping the environmental study • Conduct consultations with the public. • Prepare terms of reference (TOR) for the Environmental Assessment.
Feasibility Study / Preliminary Design Phase	• Procure consultancy services for the EA. • Undertake Environmental Assessment. • Submit the EA to the regulatory agency for review and approval. • Participate on the EA Review Committee. • Incorporate findings of the EA in to the project design and implementation process. • Preliminary design of mitigation measures. • Prepare an Environmental Management Plan.
Detailed Design Phase	• Detailed design of mitigation measures. • Prepare a Resettlement Action Plan (if required). • Prepare a Project Monitoring Plan.
Tender Document Preparation Phase	• Prepare the required contract conditions and specifications to implement environmental management procedures. • Update the Environmental Management plan.
Project Tendering Phase	• Evaluate tenders for compliance.
Construction Phase	• Monitoring to ensure that mitigation measures, conditions and specifications are fully implemented during construction.
In-service and Maintenance Phase	• Determine the need for and implement remedial measures during road use. • Post Project Audit including consultation with key stakeholders.

As can be seen, most environmental assessment activities are conducted early in the project cycle. This is done because it is important to identify problems early in the project-planning phase, at a time when it is the most cost effective to resolve them. A proactive approach at this stage often allows the planning group to make critical changes in advance of project formulation that either eliminate or reduce the potential for negative impacts. The definitions of key terms used in environmental management can be found in the Definition of Terms of this manual.

3.2 TYPES OF ENVIRONMENTAL DOCUMENTS AND THEIR CONTENTS

Environmental impact assessment is best thought of as the process used to analyze the potential environmental effects, both positiv4e and negative, and to communicate these to decision makers. There are three major objectives in an environmental impact assessment.

To help project proponents make decisions
To help technical personnel incorporate environmental considerations in the design and implementation of the project; and
To inform the public and key stakeholders regarding the development of the project and to facilitate their participation in the decision making process.

For any specific project, the environmental impact assessment report is often the principal guiding document at the center of the environmental management program.

For large multi-component projects in which there is the potential of significant effects on the surrounding environment and community, the successful environmental management program includes a multi - component package of documents, including the EIA, created to meet the unique needs of the specific project.

Conversely, it should be noted that not all projects require a full environmental assessment report to meet these objectives. Less extensive analyses, such as a self-standing Mitigation Plan, may be more appropriate. In scoping environmental work, the level of analyses should be adjusted in accordance with the potential severity of the environmental effects of the project. It is essential that the

limitations of time and budget be taken into account and that common sense guide the level of environmental documentation.

The various documents used in the environmental assessment process should include the following:

Initial Environmental Examination (IEE) is the first step in the EA process and shall identify and establish key project characteristics. On this basis, the project is classified according to type of road and the magnitude of the proposed construction or maintenance activities to be undertaken.

Initial Environmental Impact Assessment (IEIA) shall be conducted in the earliest stage of project preparation in order to establish the key environmental issues and includes a project description, existing conditions, identification of potential impacts, a discussion of alternatives to the project. It may also identify the mitigation needed to significantly reduce or eliminate impacts, and a determination of institutional capabilities to carry out environmental management activities.

Environmental Impact Assessment (EIA) the identification and evaluation of the likely effects of a proposed policy, program, or project on the environment; alternatives to the proposal; measures to be adopted to protect the environment; a standard tool for decision making.

Resettlement Action Plan (RAP) is prepared when the displacement of people or businesses along an alignment or within a right of way requires resettlement in consultation with communities and households requiring assistance with relocation and restoration of livelihood. This is often a separate document that is summarized in the EIA.

Mitigation Plan outlines specific steps that must be taken to avoid potentially negative environmental impacts identified in the environmental assessment or to minimize those impacts that are unavoidable. The Mitigation Plan can be a separate document, or as is most often the case, it is part of the EIA.

Environmental Management Plan (EMP) outlines the specific steps that must be taken at different stages in the project cycle to minimize both

short term and long term impacts resulting from road development activities.

Construction Monitoring Plan describes the procedures and mechanisms that will be used to correct problems identified during construction and later during service and maintenance. This is very important in making sure that the recommendations of the EIA and contract specifications and conditions are implemented. This document may also be separate from the EIA.

CHAPTER 4

PROJECT PLANNING AND PRE-FEASIBILITY PHASE

4.1 GENERAL

During project planning, the principal role of the Environmental Specialist on the Project Team is to advise on route selection, to avoid sensitive habitats or resource areas, and to propose changes or alternatives to the project design that will control secondary development in the influence area of the road. Environmental management activities during the Project Planning / Pre-Feasibility Phase include:

- Describe and classify the project.
- Identify alternatives to the proposed route corridor.
- Participate in the initial site inspection visit and co-ordinate with project team members.
- Screen alternatives to identify salient environmental parameters of the proposed road works and assess the sensitivity of the receiving environment.
- Identifying means to control secondary development in the influence area of the project.
- Scoping the environmental study
- Conduct consultations with the public.
- Prepare terms of reference (TOR) for the Environmental Assessment.

At this stage, the principal environmental issues associated with the project and the type of study be required are identified. These include an assessment of the project scale, the magnitude of likely impacts, and assessing the sensitivity of the project location.

4.2 CONDUCTING THE DESK STUDY

Environmental assessment begins with the collection of basic information and data. The desk study comprises a review of published and unpublished information concerning the physical, natural, socio-economic, and cultural characteristics of a study area. Desk studies are usually based on the following data sources:

- Published literature covering a range of topics
- Topographical maps
- Natural resource maps
- Aerial photographs

It is essential to prepare as detailed description of the project as is possible at this point in project planning. Project descriptions and details shall be updated as necessary during the project cycle.

4.2.1 PREPARING THE PROJECT DESCRIPTION

A clear project description is a prerequisite to environmental assessment. This should include not only the location of the road project alignment on maps and plans, but also all associated activities such as quarrying, demolition and disposal, construction camps, access roads, and asphalt plants. It is known that the locations of the above activities may not be known at this stage of the project cycle. However, estimates and considerations could be made. The labour requirements of the project should also be considered and identified as early as possible and form an essential element of the project description

In addition, baseline data should be sought from a variety of sources such as existing records, field survey and consultation with local residents and government agencies. The following information and preliminary data should be sought early in the work program:

- Documents such as maps (as large scale as possible); aerial photographs
- Existing environmental studies relevant to the region
- Information of relevant environmental requirements should be assembled including any statutory regulations and the requirements of the relevant lending agency

- Details on any current environmental restoration and protection programs in the influence area of the project
- Information on related government programs such as resettlement and the development strategy for the region, including information of ongoing development programs conducted by development agencies or non governmental organizations
- Reports of relevant projects operating in the zone of influence
- A list of contacts with relevant groups to be consulted such as the Environmental Protection Authority; donor organizations / agencies working in the area, principal community representatives.

The first step is to locate the route of the proposed road project on maps and plans and to locate all associated activities such as quarrying, demolition and disposal, construction camps, access roads, and asphalt plants as information becomes available. Special attention should be paid to locating the potential borrow sites for construction materials. A project description should contain as much of the information listed above as possible. However, not all of this information will be available at the same time or even at the time it is needed. It is necessary, therefore, to take an incremental approach to project description anticipating the need to update it as the project evolves and new information becomes available. A project description checklist is shown in Table 4.1.

Table 4.1: Project Description Checklist

PROJECT DESCRIPTION CHECKLIST

- Name of Project
- Expected implementation timeframe
- Name and contact information of Project Engineer
- Name and contact information of EMB counterpart
- Date of first site visit for geometric design
- Anticipated funding source
- Estimated cost
- Classification of road
- Type of intervention
- Map or set of aerial photographs on which the alignment is plotted
- List of all associated activities
- Description of labour requirements
- Location of quarries, construction camps, access roads,

asphalt plants and waste disposal sites

4.2.2 CLASSIFYING THE PROJECT

Environmental screening first involves classifying road projects according to the type of road and the magnitude of the proposed intervention (for example, new construction, upgrading, rehabilitation and maintenance of roads). The screening process includes the application of criteria that facilitate determining if the project is an Environmentally Critical or Non-critical Project, and then to efficiently assess the sensitivity of the receiving environment. The objective of this screening process is to identify the type of environmental analysis and documentation that will be required for each project in order to conduct adequate environmental screening.

Non-critical projects do not have substantial adverse effect on the bio-physical environment and involve the displacement of people or businesses and they do not significantly increase access to the influence area of the road. This may include:

- Upgrading involving only minor realignment, no extension and no new bridges for all road classes
- Rehabilitation, including reconstruction, where the widening is only a small percentage of the existing width of the travel area for all road classes
- Periodic and routine maintenance of all road classes
- Traffic management projects for all road classes

Environmentally critical projects, on the other hand, include all projects that have substantial adverse effect on the bio-physical environment and involve the displacement of people and businesses and those that significantly increase access to the influence area of the road. These include:

- New construction for all road classes
- Upgrading involving major realignment, significant extensions, and the construction of new bridges for all road classes
- Rehabilitation where widening will be a large percentage of the travel width of the road.

The current functional classification of roads, on the other hand, is as follows:

Class I: trunk roads connect centers of international importance and includes roads terminating at international boundaries. These must be linked to Addis Ababa by trunk roads.

Class II: link roads connect centers of national or international importance such as principal towns and urban centers.

Class III: main access link provincial centers to each other.

Class IV: collectors link locally important centers to each other or to a more important center or to a higher class of roads.

Class V: feeder roads include any road link to a minor center such as market and local locations.

Road construction and improvement (work that changes the nature, strength or quality of an existing road) projects are classified according to the magnitude if the proposed action as described above. General definitions for non-critical and critical projects as used in this manual are summarized in the following tables.

Table 4.2:Definition of Non-Critical Projects

ENVIRONMENTALY NON-CRITICAL PROJECTS
• Upgrading involving only minor realignment, no extension and no new bridges for all road classes • Rehabilitation, including reconstruction, where the widening is only a small percentage of the existing width of the travel area all road classes • Periodic and routine maintenance of all road classes • Traffic management projects for all road classes

Table 4.3:Definition of Environmentally Critical Projects

ENVIRONMENTALLY CRITICAL PROJECTS
• New construction for all road classes • Upgrading involving major realignment, significant extensions, and the construction of new bridges for all road classes • Rehabilitation where widening will be a large percentage of the travel width of the road.

4.2.3 PERFORMING OVERLAY ANALYSIS

According to Ethiopian environmental regulations and the requirements of every major donor organization and lending institution, all proposed development projects must undergo an environmental screening process. The outcome of environmental screening is a decision as to what type of environmental study is needed and what the magnitude of that effort should be. This involves classifying road project development activities, ranking them, determining the environmental sensitivity within the influence area of the road; that is, the area in which the project will cause an impact directly or indirectly.

Determining the environmental sensitivity of the influence area of the road or proposed road projects requires the use of overlay analysis. Categories of environmentally sensitive areas are defined in Ethiopian environmental regulations as follows:

- Land prone to erosion
- Land prone to desertification
- Areas which harbor protected, threatened, or endangered species
- Areas of particular scientific interest (e.g., fossil deposits)
- Areas of outstanding natural beauty such as national parks
- Areas of particular historic or archaeological interest
- Primary forest
- Wetlands of national or international importance
- Urban settlements

These categories are in some instances ambiguous and need to be clearly defined on a project-by-project basis before proceeding to data collection and mapping. For example, Ethiopian environmental regulations require that an environmental impact assessment is required for all projects located in areas "prone to soil erosion". What is meant by "areas prone to soil erosion"? What criteria should be used to classify and map these areas, soil type, + % slope, + rainfall intensity, + land use? This needs to be discussed and agreed with the relevant government agency experts on this subject prior to data collection and mapping. It should be noted that at present little of this data exists and there is less than complete coverage of essential mapping of this data for the entire country.

The formulation of overlay analysis of this magnitude and the establishment of the basic database is greatly enhanced by GIS capabilities. However, in the absence of GIS and a related environmental database, this data must be constructed on a project by project basis from both desk study and fieldwork. Data shall be collected on the ECAs on the basis of the proposed list in the table below.

Table 4.4 Environmentally Critical Areas Data

ENVIRONMENTALLY CRITICAL AREAS	ECA Value
• National Parks	5
• Watersheds	5
• Sanctuaries	5
• Primary forest	5
• Areas of aesthetic value	2
• Areas of touristic value	2
• Endangered species	5
• Unique historic resources	3
• Unique archeological resources	3
• Unique scientific areas	3
• Indigenous culture community	5
• Areas prone to soil erosion	5
• Critical slopes	
• Soil type	
• Rain fall intensity	
• Land use	

• Prime agricultural land	2
• Recharge areas for aquifers	2
• Protected water bodies	2
• Wetlands	3
• Densely populated areas (urban settlements) with air pollution or possible displacement of peoples and businesses	5
• Land prone to desertification	4

Generally, any area having one or more of the characteristics listed in the Table 4.4 can be considered environmentally sensitive. However, Environmentally Critical Areas (ECAs) should be ranked based on their relative sensitivity to disturbance or their value to the economy and environmental health. When the influence area of an ECP is a sensitive ECA, the project is categorized as Schedule I, and a full EIA is required. On the other hand, if the ECA for an ECP is considered to be less sensitive, the project is categorized as Schedule II project and in such cases, only an IEIA could be prepared and submitted to the EPA for review and determination whether a subsequent EIA is needed or not.

Using the above screening criteria with ECA values, an EIA would automatically be required for Environmentally Critical Projects (ECPs) with an ECA value of 5 or greater. An Initial Environmental Impact Assessment (IEIA) would automatically be required for all ECPs with an ECA value of 4 or less.

4.3 IDENTIFYING ALTERNATIVES TO THE PROPOSED PROJECT

Environmental impact assessments for road development projects must consider alternatives to the proposed project. Two types of alternatives are reviewed in an EIA: conceptual alternatives to the transportation problem; and alternative designs for the proposed project. Conceptual alternatives to the transportation problem are evaluated at the macro-level and involve comparing the potential environmental consequences of building a road with other conceptual

solutions such as restricting private vehicle usage, supporting public transportation, and encouraging non-motorized modes of transport. The no-build option must be included if accurate assessment of the possible changes resulting from the implementing the road project is to be achieved.

A consideration of design options usually involves assessing changes in the basic project concept such as routing, construction methods, or materials. Two to three design options are usually considered under which there may be several. It will be necessary to select options for consideration that are practical and sustainable and are supported by affected groups.

4.4 PREPARING FOR SITE INSPECTION AND SURVEY

A detailed field study, or site inspection, shall be conducted during the second stage of the environmental work in order to record the existing conditions along the project route and to note first hand the environmental sensitivity of the area. Preparations to conduct the field survey are essential to ensure an efficient and productive site visit. Advanced preparations include:

- Consultation with others who have been to the site and those who know the area
- The assembling of required materials such as maps and aerial photography, plans and elevations, sections;
- The creation of project specific data forms
- The preparation of data collection maps
- The purchase of local field identification manuals (i.e., flora / fauna identification manuals); and equipment such as a camera, compass or GPS, binoculars; etc

4.5 CONDUCTING SITE INSPECTION AND SURVEY

After preliminary office work, the project team will usually conduct a site inspection visit in preparation for geometric design. Where terrain constraints make such an inspection problematic, a flight can be made over the area and all potential routes can be directly examined from the air. If necessary, a field inspection can be made at

a later date to resolve any critical questions not satisfactorily explored during the project over-flight. It may be necessary for the site inspection team to be composed of the following personnel:

- Highway Engineer
- Soils and Material Engineer
- Hydrologist
- Chief Surveyor
- Bridge / Structures Engineer
- Environmental Specialist

In most cases, the site inspection and survey may significantly modify the understanding of the area obtained from desk study. Survey data should be extensively recorded on maps and photographically. At a minimum, relevant information shall be collected on all the components as listed below in Table 4.5.

Table 4.5 Environmental Issues and the Site Inspection

ENVIRONMENTAL COMPONENTS TO BE SURVEYED DURING THE SITE INSPECTION
▪ Soil and erosion ▪ Water resources ▪ Air quality ▪ Vegetation ▪ Animals (in particular, endangered species) ▪ Community life ▪ Economic activities ▪ Land acquisition and resettlement requirements ▪ Evidence of changes in land use (trends) ▪ Indigenous or traditional populations ▪ Cultural heritage ▪ Aesthetics and landscape characteristics ▪ Sensitive noise receptors ▪ Safety issues (risks and hazards) ▪ Competition between traffic modes ▪ Evidence of pollution

- Urban-growth plan.
- Infrastructure such as communication and transmission facilities
- Environmentally critical areas along the alignment

4.6 PREPARING THE POST-SITE INSPECTION REPORT

After completion of the site inspection and survey, data should be cataloged and evaluated. During this phase of the work, input from other technical experts should be integrated into the baseline data collected during the site inspection and survey. Environmentally critical areas along the route should be discussed and verified with relevant ministries or agencies. A preliminary assessment of potential environmental impacts should be made and discussed with project designers and other members of the technical team. Frequent consultations with other members of the site inspection visit team are essential to supplement the quality of the data collected and to keep up with changes in the project concept as these develop.

Record keeping becomes critical at this stage. A report summarizing the results of the site inspection and subsequent activities, should be prepared, submitted and discussed with the Head of the EMB.. This report is the basis of the Initial Environmental Examination and should follow the outline for the IEE. This should include the following as listed in Table 4.6:

Table 4.6 Initial Environmental Examination Outline

INITIAL ENVIRONMENTAL EXAMINATION
(Adapted from FDRE EPA Environmental Impact Considerations for Transport Sector Projects, Jan 97)

1.PROJECT DESCRIPTION
Location (Maps, aerial photos)
Road class
Expected volume of use
Type of project activities (including all offsite activities)
Sources of sand and gravel
Transport and labour requirements
Future expansion requirements

2. NEED FOR THE PROJECT
Purpose
Contribution to development of the influence area
Relationship to other planned activities in the influence area

3. ALTERNATIVES CONSIDERED
Route alternatives
Design alternatives

4. DESCRIPTION OF THE ENVIRONMENT
Geology and soils
Hydrology
Topography
Climate
Wind speed / direction
Vegetation and fauna
Vulnerable ecosystems
Unique landscapes

Socio-economic characteristics
Health and safety
Settlement pattern
Land use
Historical and cultural resources
Pollution

4. PRELIMINARY ASSESSMENT
Issues
Potential for induced development
Proposed mitigation

4.6.1 PREPARING THE INITIAL ENVIRONMENTAL EXAMINATION (IEE)

The Environmental Protection Authority of Ethiopia requires environmental screening for all development projects in the transportation sector. The results of the initial project screening are then reported in the IEE and submitted to the EPA for approval. Requirements for the IEE are contained in EPA *Environmental Impact Considerations for Transport Sector Projects* Jan 97. If you do not have a copy of this document, it is recommended that you obtain one form the EPA.

4.7 PERFORMING ENVIRONMENTAL SCOPING

Environmental scoping should be conducted for Schedule I Projects. Scoping is the process by which the limits of the EIA, in terms of the area covered and the time frame for the evaluation is determined. The main purpose of scoping is to identify the significant issues to be studied and to concentrate on the work as much as is possible to adequately address these. Issues scoping should be conducted in consultation with all relevant stakeholders and should involve the review of the Terms of Reference for the EIA.

The rationale behind scoping is that the process leads to greater satisfaction and fewer delays in the acceptance of the results of the EIA by both technical experts and affected communities. Experience has shown that where scoping has not taken place, delays and cost increases often occur when issues that were not originally included in the study were found, upon review of the EIA by the EPA Review Committee, to be of significance. It is therefore important to solicit input from all key stakeholders in the scoping process; and it is important that all parties understand the issues well enough to participate effectively. This requires the EMB to take adequate steps to inform the public, voluntary organizations, and technical experts on the EPA Review Committee. The role of the media in distributing information should not be overlooked.

The EPA review process requires that the ERA (EMB) consult the Authority for initial guidance on the contents of the EIA. The final Terms of Reference for the EIA are then submitted to EPA for review and approval, prior to procuring consultancy services for the environmental assessment.

4.8 PREPARING THE TERMS OF REFERENCE

The purpose of the TOR, to be prepared by ERA, is to stipulate the requirements for the EIA to be prepared by consultants. An example outline TOR for an EIA is shown in Table 4.7 below:

Table 4.7 : Outline of TOR for an EIA

OUTLINE OF TOR FOR AN EIA
1. Introduction 2. Background Information 3. Objectives 4. Environmental Assessment Requirements 5. Study Area 6. Scope of Work 7. Task 1: Description of the Proposed Project 8. Task 2: Description of the Environment 9. Task 3: Legislative and Regulatory Considerations 10. Task 4: Determination of Potential Impacts of the Proposed Project 11. Task 5: Analysis of Alternatives to the Proposed Project 12. Task 6: Development of Environmental Management Plan 13. Task 7: Assist Inter-Agency Coordination and Public/NGO Participation 14. Report 15. Consulting Team 16. Schedule 17.Other Information

A detail of the example TOR for EIA studies is included in **Appendix A.**

CHAPTER 5

FEASIBILITY STUDY / PRELIMINARY DESIGN PHASE

5.1 GENERAL

The key role of the environmental specialist at this stage in the project cycle is to reduce as much as possible the potential negative effects of the project; and propose changes in the preliminary design, if necessary, to preserve and protect the environment. Principal activities during the Feasibility Study / Preliminary Design Phase include:

- Procure consultancy services for the EA.
- Undertake Environmental Assessment.
- Submit the EA to the regulatory agency for review and approval.
- Participate on the EA Review Committee.
- Incorporate findings of the EA in to the project design and implementation process.
- Preliminary design of mitigation measures.
- Prepare an Environmental Management Plan.

5.2 CONTRACT TENDERING FOR THE ENVIRONMENTAL ASSESSMENT

In staffing the EIA Team, there is the opportunity for the transfer of knowledge regarding environmental management for road works. This resides in two key places. First is in the assignment of ERA EMB staff to the EA team and second is the inclusion of Environmental Protection Authority staff. It is therefore strongly recommended that regulatory agency staff be officially included as this could have benefits not only in capability building but in coordinating critical input from other sources. This may be especially true, for example, if resettlement is required for it will more than likely be handled by another agency or at a minimum it may be a coordinated effort of some kind.

5.3 CONDUCTING THE EIA

The *Environmental Impact Assessment* (EIA) is undertaken to establish the key environmental issues and may include:

- A project description
- A description of existing conditions
- The identification of predicted (both negative and positive) impacts
- An analysis of alternatives
- The identification of mitigation to reduce impacts
- A determination of institutional capabilities to carry out environmental management activities
- A monitoring plan and implementation program
- Consultation with the Public

Impact analysis refers to the formal identification and evaluation of the likely effects of the proposed project on the environment; alternatives to the proposal; and measures to be adopted to protect the environment. Impact analysis consists of comparing the expected changes in the area affected or served by the road, with and without the project. There are several types of impacts such as:

- Direct or indirect
- Positive or negative
- Short or long term
- Unavoidable or avoidable
- Temporary or permanent
- Random or assured
- Reversible or irreversible
- Specific or widespread

Direct impacts result from construction, maintenance, and traffic use. Impact analysis involves the systematic prediction of changes in the principal environmental issues considered to be relevant to the proposed project. Examples of principal environmental issues that may be covered in the EIA are listed below:

Table 5.1: Principal Environmental Components Checklist

PHYSICAL AND NATURAL ENVIRONMENT	SOCIO-CULTURAL ENVIRONMENT (PRESENT AND PROJECTED)
Geology Mineral resources Tectonic activity Topography Unique land features Soils / resources and structure Climate and meteorology Ambient air quality (airsheds) Wind direction and speed Precipitation / humidity Temperature Noise Surface and groundwater hydrology (water catchment) Flooding Drainage channel pattern Sedimentation Existing water pollution discharges Receiving water quality Flora and Fauna Species inventory Rare or endangered species Productivity Biochemical / nutrient cycle Environmentally sensitive habitat Wetlands Marshes Wildlands Grasslands Sensitive habitats including parks or preserves Significant natural sites Species of commercial importance Species with potential to become nuisances, vectors or dangerous	Population Cultural characteristics Physiological / psychological well-being Land use Planned development activities Social infrastructure and institutions Community structure Employment Agriculture Distribution of income Goods and services Recreation Public health Cultural properties Tribal peoples Customs, aspirations attitudes Archeological resources

It will not be necessary to consider a full range of environmental components at the same level of detail in every project. It is important to narrow the list by identifying which are of value in the project area. The affected community should be consulted in preparing a list of environmental components to be

considered. A preliminary list of the most critical components should be identified and how and to what extent the proposed design options would affect each component. Generally sufficient data should be collected in order to identify the possible effects in the following areas:

- Soils: loss of productive soil, erosion, and contamination
- Water resources: modifying surface or ground water flows, and pollution
- Air quality
- Flora and fauna ecosystems
- Communities and economic activities
- Indigenous peoples
- Cultural heritage
- Landscape aesthetics
- Noise
- Health and Safety

Consultations with affected groups and stakeholders is a very important aspect of an environmental impact assessment as it facilitates data collection, problem resolution and the successful implementation / operation of the road project.

CHAPTER 6

DETAILED DESIGN PHASE

6.1 GENERAL

Principal environmental management activities during the detailed design phase include the incorporation of mitigation into project design and submitting the EIA to the EPA review process:

- Detailed design of mitigation measures.
- Prepare a Resettlement Action Plan (RAP) if required.
- Prepare a Project Monitoring Plan.

6.2 APPLYING MITIGATION MEASURES

Mitigation includes the specific steps that must be taken to avoid potentially negative environmental impacts identified in the environmental assessment or to minimize those impacts that are unavoidable, if the decision has been made that anticipated project benefits outweigh negative impacts. The mitigation plan can be a separate document, or as is most often the case, mitigation is a part of the EA.

The mitigation plan should include the following:

- Identification and description of feasible and cost effective measures to reduce unavoidable impacts
- The prioritization of proposed mitigation measures; and
- Monitoring procedures to ensure that mitigation is properly implemented

The design of mitigation should provide details on proposed work programs and schedules to ensure that activities are synchronized

with engineering and construction. Compensatory measures should be proposed in situations where mitigation of the impact is not feasible.

6.3 MONITOR PROGRESS DURING DESIGN

Good communication with the design staff is critical to ensuring that the opportunities for resolving environmental problems through road project design are maximized. It is the responsibility of the environmental specialist to stay fully informed of developments in the design of the project during this stage and to effectively communicate mitigation requirements to the design staff.

6.4 SUBMITTING THE EIA TO EPA REVIEW PROCESS

In accordance with EPA regulations the completed EIA is submitted to the agency for review and approval. Review is conducted by a committee composed of experts in areas relevant to the project under consideration. It should also include a member of ERA EMB staff to facilitate responding to any questions that may arise during review. Successful conclusion of the review process results in the issuance of an Environmental Clearance Permission certificate. An ECP is required before the project can proceed to implementation.

6.5 PREPARING A RESETTLEMENT ACTION PLAN

Resettlement planning is a long and complex process. It involves a number of disciplines and requires the intervention and coordination of several Authorities. The Key elements in the resettlement process include: location, housing, infrastructure, institution building, social and economic development services, and community participation.

Human and social impacts include a number of key issues that are directly related to resettlement management, both from policy and operational perspectives. Some of the major impacts caused by road projects are:

- compulsory acquisition of land, property, and business
- economic losses for affected individuals and farm families with a temporary or permanent loss of income for subsistence
- people with fewer resources and skill become more vulnerable
- social disruption and break-up of family ties due to displacement and relocation
- health problems and various forms of psychological depression
- loss of community benefits and social disintegration

There are ways to avoid or reduce social impacts of road projects. For example, modification of road designs such as bypasses to avoid built up areas may significantly reduce the social and economic impacts. Alternatives may be considered in terms of their ability to meet transportation objectives in a cost-effective manner. Where large-scale land acquisition and loss of property and business are unavoidable, an impact identification and assessment of lost assets is considered the starting point for any planning of mitigative measures for the project-affected persons (PAPs). This aspect comprises at least four operations, which are:

- the identification and description of all affected persons and their lost assets
- a detailed survey of all project affected persons including demographic and socio-economic conditions by categories such as heads of family with titles, those without land titles, squatters, landless, indigenous people, and others for the resettlement action plan
- the determination of entitlements, eligibility for compensation and resettlement assistance according to prevailing land and property laws.

In general, involuntary resettlement should be minimized and where displacement is unavoidable, a resettlement and relocation plan should be implemented as a development program. All displaced persons, including those without title to land should be compensated for losses. Resettlers should be directly involved in the various stages of planning and implementation of the resettlement plan. A benchmark socio-economic survey of all project affected persons should be conducted early in the project cycle to avoid a new influx of people.

A socio-economic survey is the principal method used for collecting data for a resettlement plan. This is a detailed demographic and land ownership survey in which standard demographic and household characteristics are recorded. The survey enables the assessment of:

- the magnitude of the population displaced.
- Source of income and resource base of the affected persons, including incomes from on and off-farm activities
- total or partial loss of land and other assets
- extent of the loss of common property, public infrastructure and social services
- formal and informal institutions (for example, community organizations, NGOs) that may assist with designing and implementation of resettlement programs
- perceptions and attitudes of PAPs toward various resettlement options

Once the socio-economic survey is completed, an important task is to analyze and present the data in a clear and systematic manner understandable to decision-makers. From policy and implementation perspectives, the results of the survey should be presented as follows:

- a list of PAPs categorized by impact or losses
- a review of existing compensation policy to identify the impacts on affected persons.
- a list of actions and entitlements for each category
- resettlement action plan for implementation, monitoring and

When appropriation of land is necessary, the Resettlement Action Plan, an implementation and program budget shall be prepared with the objective of improving or at least restoring the economic and productive base of the PAPs in the new resettlement site. Periodic monitoring and evaluation of the Resettlement Action Plan (RAP) will be required. PAPs should participate in the monitoring and evaluation. This must include close consultation with communities and households requiring assistance with relocation and restoration of their livelihood.

The Resettlement Action Plan is often a separate document that is summarized in the EA or is sometimes part of an Environmental Management Plan (EMP). The results of the RAP should be incorporated into the EMP, as described in Section 7.2.. The preparation of RAP involves at least six essential operations:

- the demographic and socio-economic survey of the affected persons
- selection of the resettlement sites, physical planning and technical and economic feasibility studies of the resettlement packages
- the preparation of a time table and a budget
- development of the receiving site and infrastructure development
- transfer arrangements and relocation of PAPs
- the organization of social and economic support services

In many instances, a poorly prepared resettlement plan is the single most important reason for failure of resettlement operations. The principal objective of resettlement plan is to re-establish the social well being and economic productivity of the displaced community. It is therefore essential to approach all aspects of resettlement in a systematic manner from project preparation to the re-establishment of community life in the new settlement area.

Typical contents of a Resettlement Action Plan are shown below:

Table 6.1: Resettlement Action Plan Checklist

RESETTLEMENT AND REHABILITATION ACTION PLAN CHECKLIST
Objectives and principles
Project description
Project benefits
Project losses and impacts
Linkages with existing laws and guidelines
Entitlement framework
Replacement cost for losses
Income restoration
Choices and options
Consultation and participation
Targeting of vulnerable groups
Resolution of grievances
Development of proposals for resettlement site
Integration with host communities
Institutional arrangements
Guidelines for implementation
Implementation time table and budget

CHAPTER 7

TENDER DOCUMENT PREPARATION PHASE

7.1 GENERAL

Principal activities during this phase include incorporation of environmental requirements identified at previous stages into the tender documents. If the project is complex or has many components that require close coordination of activities, it is recommended that an Environmental Management Plan (see Section 7.3) also be prepared at this time.

7.2 SPECIFICATIONS OF ENVIRONMENTAL ISSUES IN THE TENDER DOCUMENTS

Environmental issues associated with new construction, upgrading, rehabilitation and maintenance of roads are various and should be properly addressed in the Tender Documents.

The Environmental Management Plan (see Section 7.3) shall contain the information for this purpose, and some mitigation measures to be considered for inclusion within the Tender Documents are:

- Impacts on soils: including erosion control, prevention of fuel spills during construction, planting, timely watering of plants, preservation of roadside vegetation and trees, etc.

- Impacts on water resources: including road design, bridge and tunnel construction, drainage installation, and any work-site plans which may affect water flows and quality; the protection of cut slopes, the provision containment basins, riverine gravel mining, etc..

- Impacts on air quality: including the maintenance of contractor's equipment, positioning of the asphalt mix plant, control of fugitive dust through watering and covering haulage trucks, etc.

- Impacts on flora and fauna: including management of the work force by controlling poaching and firewood collection, plant and equipment speed, noise and traffic, prevention of erosion and contamination during construction, etc.

- Impacts on communities: ensure that work camps, temporary works, and lifestyles of construction workers do not negatively affect adjacent communities; workers should be prohibited form hunting, fishing or otherwise using resources held in common by indigenous groups.

- Impacts of land appropriation and resettlement: including temporary works, traffic management, measures prescribed in the Resettlement Action Plan, preparation of the host area, etc.

- Impacts on cultural resources: including the requirements for the preservation and recovery of cultural remains discovered, measures to protect specific features, etc.

- Impacts on aesthetics and landscape: including modification of certain elements, e.g., bridges & retaining structures, location of borrow pits and quarries, deposition of spoil material, planting vegetation, etc.

- Impacts of noise: including noise protection devices, road maintenance, and work site management in noise sensitive areas, restriction of operating hours and application of equipment noise standards, etc.

- Impacts on human health and safety: including safe working practices, provision of safety features, management of work zones and construction, traffic, security of stockpiles, communicative diseases, etc.

- Clauses Relating to Impacts from Borrow Pits and Quarries: including access routes, restoration and requirements for road maintenance, etc.

7.3 UPDATE OF THE ENVIRONMENTAL MANAGEMENT PLAN

An Environmental Management Plan, prepared at the Feasibility Phase of the Project Cycle, outlines the specific steps that must be taken during construction as well as in-service phases to minimize both short term and long term impacts resulting from activities in both phases. It assigns specific tasks to the Client, the Contractor, and the Regulatory Agency to be performed within a specified period of time and cost. Typical components of an EMP include:

- Environmental issue
- Measures taken or to be taken
- Implementing organization
- Responsible organization
- Scheduling
- Estimated cost for the mitigation measures

The EMP should focus on two major areas: mitigation measures, and monitoring. The emphasis on each of these areas depends on the needs in the specific project context, as identified by the EA itself.

Mitigation Measures: Recommend feasible and cost-effective measures to prevent or reduce significant negative impacts to acceptable levels. Estimate the impacts and costs of mitigation measures. Consider compensation for impacts, that cannot be mitigated.

***Monitoring*:** The EMP should include detailed arrangements for monitoring the implementation and operation of the project and effectiveness of the mitigation measures.

Design of the monitoring program should include:

- Selecting the indicators, specifications and conditions for key issues
- Identify the control areas / treatments where these exist for key issues
- Confirm relationship between indicators and mitigation / environmental goals and objectives

- Assign tasks and responsibilities including a reporting structure and means to resolve conflicts
- Perform environmental compliance monitoring and reporting
- Analyze trends and recommend changes to environmental management with special consideration to erosion and sediment control and restoration of borrow-sites, etc.

The EMP presents a synthesis of all proposed mitigation and monitoring activities set to a timetable with specific responsibility assigned and follow-up actions defined. It is important to emphasize that the EMP is a set of tasks with specific assignments for the contractor, the regulatory agency, and the proponent. It addresses action to be taken during both construction and operation phases of a project and is usually divided into two broad components: one dealing with the natural environment and the other with the social environment. The social component most often contains the Resettlement Action Plan described in Section 6.5 above.

The EMP can take a table format as shown in Table 7.1 below or can be a combination of prose and table.

Table 7.1: Environmental Management Plan Matrix

Environmental Issue	Measures to be taken (TASKS)	Implementing Organization	Responsible Organization	Scheduling
Design Phase				
Issue 1	*Task 1*	*Agency or Unit*	*Agency or Unit*	*Date / Period*
Issue2	*Task 2*			
Contract Preparation Phase	…	…	…	…
Contract Tendering				
Construction Phase				
Operation Phase				

CHAPTER 8

TENDERING PHASE

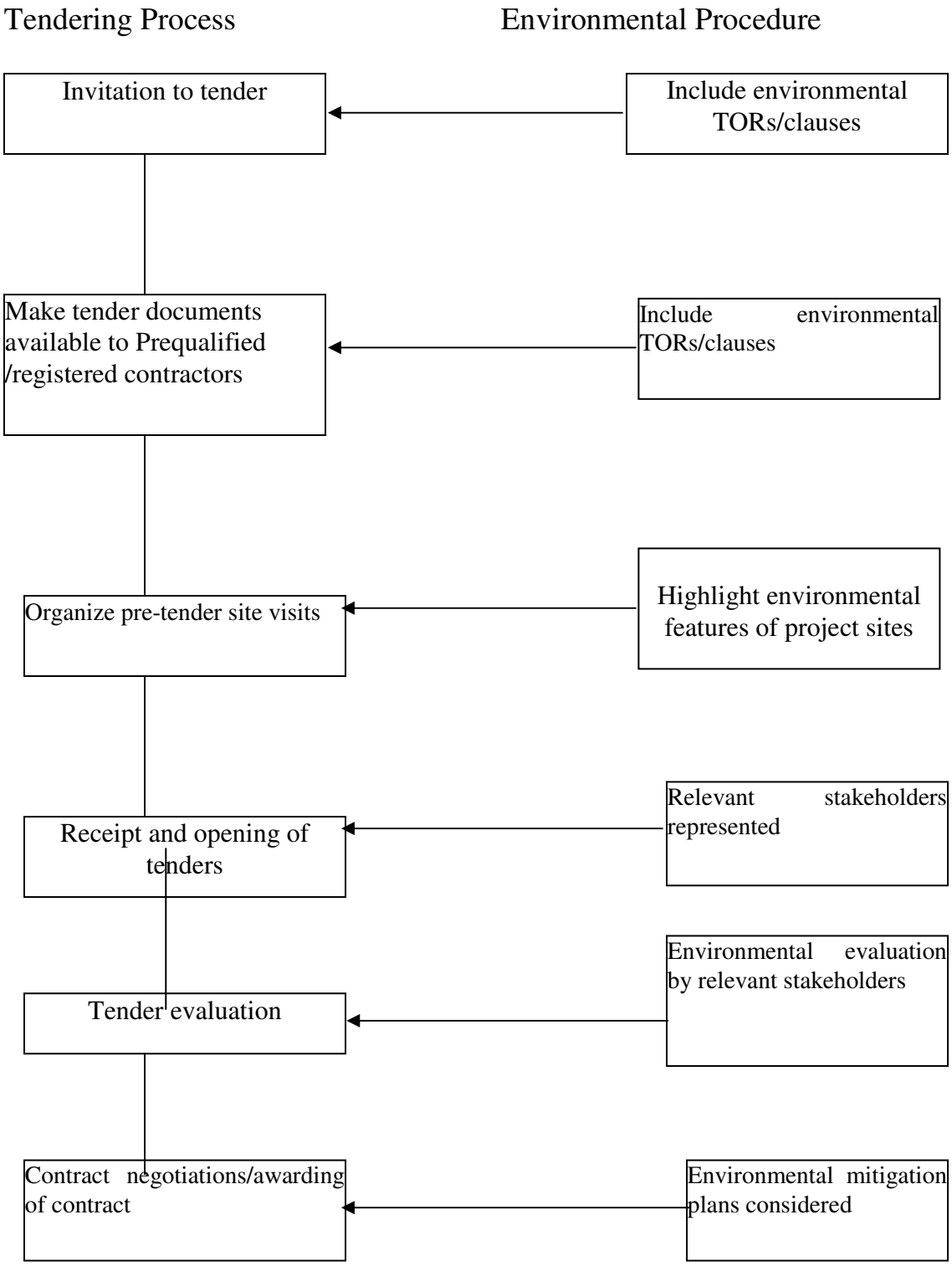
8.1 GENERAL

Principal activities during tendering include clarification of Environmental specifications and contract as required.

8.2 REVIEWING BIDS

Bids should be reviewed for compliance with the Contract Conditions. Bidders-proposed method statement should be checked for compliance with all aspects of the Environmental Management Plan.

Figure 8.1: Tendering Process Flow Chart



CHAPTER 9

CONSTRUCTION PHASE

9.1 GENERAL

The principal Environmental activity during the construction phase is monitoring to ensure that the mitigation measures are fully implemented in accordance with the contract and resolving problems, as they are encountered.

In general, the most critical project elements to be monitored are the implementation and effectiveness of erosion and sedimentation control measures, disposal of debris and wastes, management and reclamation of borrow pits, and materials handling and storage areas, etc.

In addition to the actual roadway construction, monitoring should take place of other sites and associated activities such as:

- Construction camp
- Quarry sites and borrow areas
- Excess material and spoil deposit sites
- Asphalt mixing plant
- Construction traffic access and haul roads between all of the above sites

9.2 PREPARING FOR CONSTRUCTION MONITORING

Photographs should be taken to record key environmental areas prior to commencement of construction. In addition, a standardized data collection form shall be used to facilitate data collection and reporting. Items to be included on the form are listed in Appendix D.

9.3 CONDUCTING CONSTRUCTION PHASE MONITORING

Monitoring during construction is an important aspect of the environmental management program. It will be necessary to visit the site at regular intervals to identify and address any existing or potential impacts during project implementation.

The Environmental Specialist should clearly and accurately report to the project implementation team at the earliest opportunity any unforeseen environmental implications of the construction or related works.

During construction observations shall be made of the environmental impacts given in Appendix D and described below:

- Noise from all types of equipment and traffic
- Air quality / emissions and dust problems from all types of equipment and traffic
- Impact on natural and planted vegetation: only those plants and trees actually required to be removed or trimmed for the implementation o f the road or bridge should be allowed.
- Movement of pedestrians and non-motorized traffic: every effort must be made to minimize the impact on this type of movement group
- Traffic management access to properties / access to site: this involves providing a logical method of organizing traffic access to both the construction depot and adjacent properties and reducing conflict between these
- Soil stability and earthworks
- Buildings and their clearance: it is necessary to monitor the demolition of all building affected by road project implementation
- Affect on drainage courses and water quality: examine existing adjacent structures for signs of turbidity, sedimentation / siltation, failure of the structure or signs of pollution such as an oily film on the surface of the water
- Affect on adjacent land: check to determine the magnitude of impacts resulting form the temporary use of adjacent properties. This should only be permitted with official permission from the relevant landholder.

- Material and equipment and disposal: it is important that used or excess material and equipment is disposed of properly and not have any impact on the immediate environment.
- Clearance of waste and return of land to its natural state: this is an important consideration that should also be reviewed at final inspection and hand over.

9.4 PROVISIONAL AND FINAL ACCEPTANCE OF THE COMPLETED PROJECT

The EMB representative shall participate in the provisional and final acceptance of the completed project. During this process a final check shall be made to ensure that all issues contained in the EMP have been addressed.

Figure 9.1 : Project Implementation Flow chart

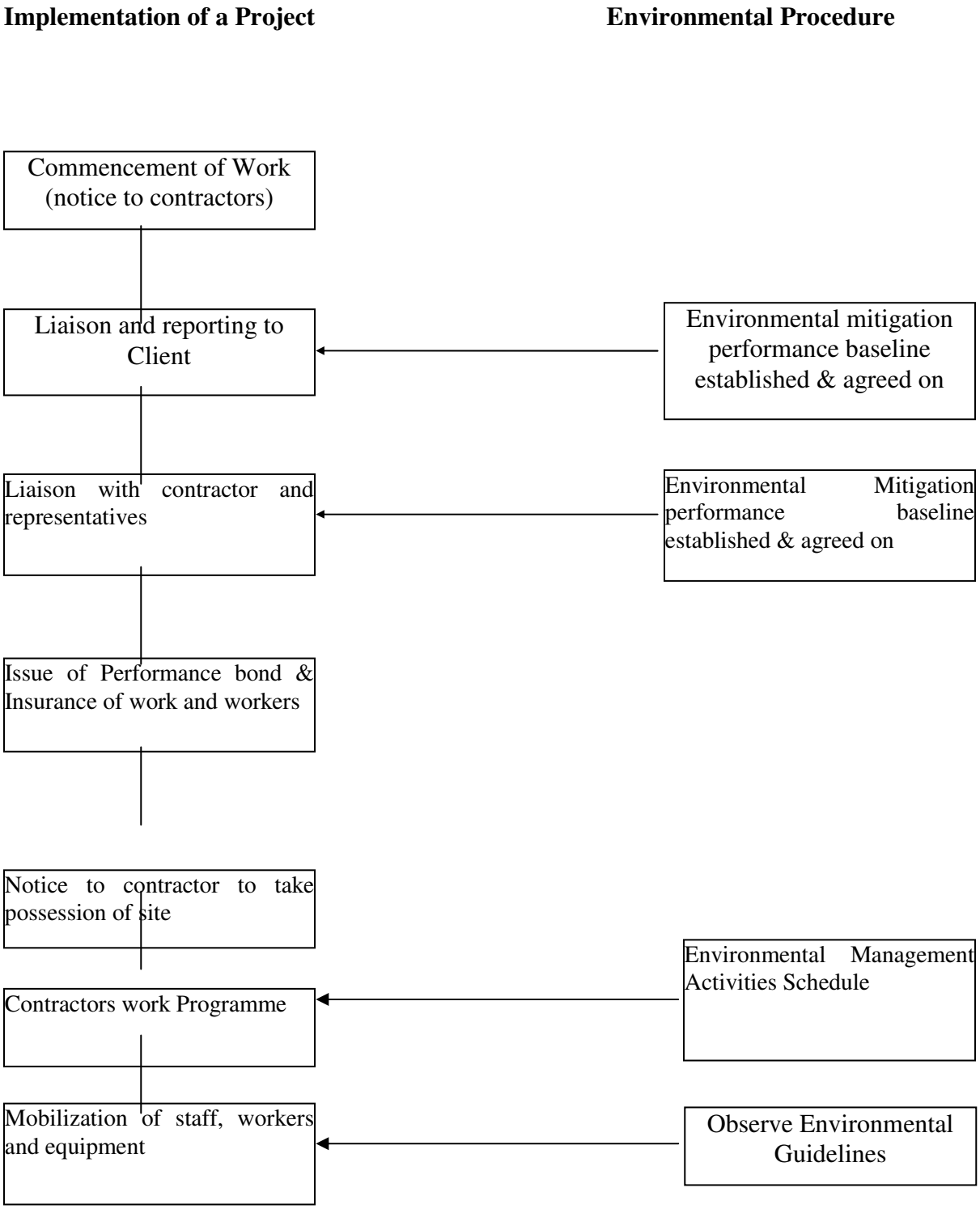
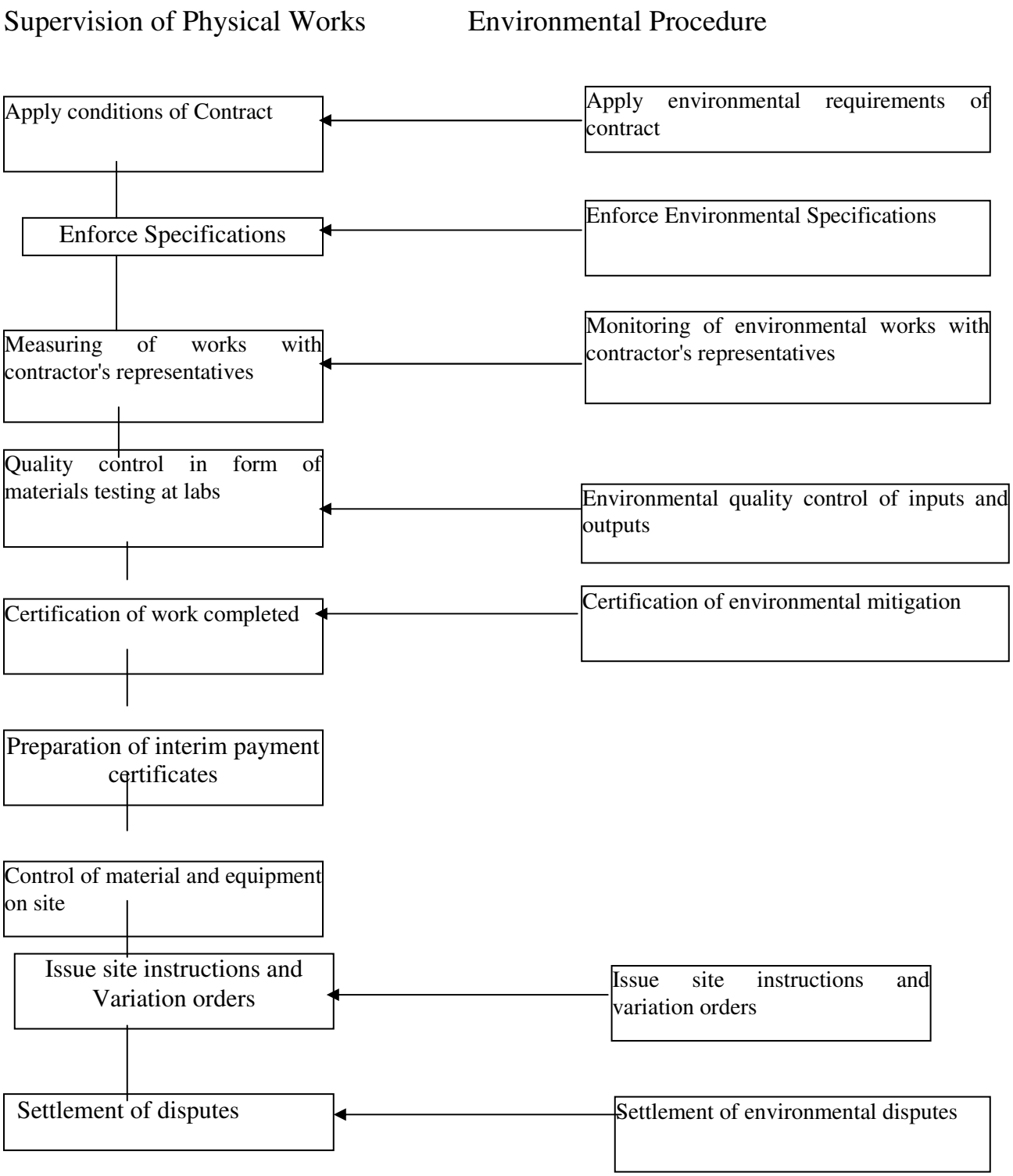


Figure 9.2: Project Supervision Flow chart


Supervision of Physical Works
Environmental Procedure
Apply conditions of Contract
Apply environmental requirements of contract
Enforce Specifications
Enforce Environmental Specifications
Measuring of works with contractor's representatives
Monitoring of environmental works with contractor's representatives
Quality control in form of materials testing at labs
Environmental quality control of inputs and outputs
Certification of work completed
Certification of environmental mitigation
Preparation of interim payment certificates
Control of material and equipment on site
Issue site instructions and Variation orders
Issue site instructions and variation orders
Settlement of disputes
Settlement of environmental disputes

CHAPTER 10

IN-SERVICE AND MAINTENANCE PHASE

10.1 GENERAL

Principal environmental management activities during this phase will include:

- Determining the need for and implement remedial measures during road use.
- Post Project Audit including consultation with key stakeholders.

- Conducting the Post-Project Evaluation and ensuring that maintenance is conducted in an environmentally sound manner.

Inadequate maintenance or improper practices (with respect to chemical use, waste disposal, etc.) may lead directly to environmental impact, if vegetation, aesthetics, quality of runoff water, functioning of drains, or accident frequency is affected. Indirectly, deterioration because of inadequate maintenance will eventually necessitate rehabilitation work, which has potentially greater impacts.

10.2 ROAD MAINTENANCE

Many adverse environmental impacts can be avoided through effective maintenance. However, road maintenance activities may also contribute to soil erosion, disturbance of water resources, chemical pollution, traffic disruption, noise, disturbance of established vegetation cover and a variety of other environmental impacts. Chemical pollution can be a consequence of the improper use of herbicides and pesticides. Waste materials such as excess vegetation from drain clearing can find its way into watercourses.

Some of the important issues to be considered during road maintenance include work site installations; the supply of materials; erosion control in and around material sources; and tree planting. As with any other activity, maintenance requires specific consideration to assess potential impacts. A list of environmental impacts associated with road maintenance should be prepared and should include route plans; physical, geometric,

and geotechnical data, along with information on existing structures and the drainage system.

Environmental data should include the location and extent of villages, classified sites, wooded areas, tree plantations, quarries and borrow pits, existing side and diverging ditches. In addition, the data should include the state of the road and it deterioration. Maps should be included showing eroded areas of areas where the drainage system has become silted-up. Problems with the disturbance of watercourses should also be noted.

ERA EMB staff should analyze data provided to assess the risk of failure of the original mitigation measures and should design improvements. It may be helpful to identify the reasons for failure since these may be due to not only unforeseen technical problems but also a lack of expertise or even negligence. Understanding reasons for the failure of mitigation may be very useful in designing the subsequent maintenance requirements.

10.3 POST PROJECT EVALUATION

The goal of Post-Project Evaluation is to confirm that the project was implemented in accordance with the terms and conditions imposed by the EIA process and to take remedial measures as required. Data from the road condition survey for maintenance can provide an important assessment mechanism.

The Post-Project Evaluation includes the following activities:

- Evaluating mitigation measures undertaken during construction
- Recommending any necessary remedial measures during road maintenance
- Conducting consultation with key stakeholders
- Identifying lessons learned for consideration in future road project planning
- Verify and evaluate effects

Post-Project Evaluation serves multiple purposes:

- Verification of compliance with conditions set out in construction permits and operating licenses
- Compares actual and predicted environmental impacts
- Assess environmental management and control of risks
- Recommends modification or development of mitigation measures in order to reduce the effect of unforeseen negative impacts
- Measures the accuracy of past predictions and the effectiveness of mitigation in order to transfer this experience to future projects
- Reviews the effectiveness of the environmental management program

The preliminary plan for the Post-Project evaluation should be prepared during the EIA process and more fully developed upon approval of the EIA by the EPA. Public participation in the evaluation is encouraged. Items for consideration may include:

- The control litter and limiting potential pollution sources
- The proper storage and management of maintenance materials and equipment
- The proper management of pesticide and herbicide so that sensitive receptors are not negatively effected
- The avoidance of direct discharge of highway runoff to receiving waters
- The reduction of pollutant concentrations in runoff by maintaining dense grass cover, increasing grass height and leaving cuttings on the ground
- The properly management of roadside and median vegetation, using only native species
- Conducting exposed shoulder clearing in dry season
- The proper disposing of waste from road maintenance activities

10.4 PROVIDING FEEDBACK TO THE ROAD PROJECT PLANNING PROCESS

The EPA EIA review process requires the submission of an Audit Report to the EPA. The conduct of the Post-Project Evaluation serves this purpose as well as providing the necessary feedback in the project planning phase for cost effective environmental management.

APPENDIX - A

DEFINITIONS OF TERMS

Emission: pollution discharged into the atmosphere from smokestacks, other vents, and surface areas of commercial or industrial facilities; from residential chimneys; and from motor vehicle, locomotive, or aircraft exhausts.

Endangered species: animals, birds, fish, plants, or other living organisms threatened with extinction by man-made or natural changes in their environment.

Environment: the conditions or influences under which any individual or thing exists, lives, or develops.

Environmental appraisal: preliminary review of the potential consequences of a project on the environment and an assessment of the capacity of the implementing agency to conduct environmental management activities.

Environmental assessment: the identification and evaluation of the likely effects of a proposed policy, program, or project on the environment; alternatives to the proposal; measures to be adopted to protect the environment; a standard tool for decision making.

Environmental assessment process: the systematic consideration of the likely effects of a proposed policy, program, or project on the environment; alternatives to the proposal; and measures to be adopted to protect the environment *leading to a decision*.

Environmental audit: an independent assessment of the current status of a party's compliance with applicable environmental requirements or of a party's environmental compliance policies, practices, and controls.

Environmental impact assessment: the identification and evaluation of the likely effects of a proposed policy, program, or project on the environment; alternatives to the proposal;

measures to be adopted to protect the environment; a standard tool for decision making.

Environmental impact statement: the Environmental Impact Assessment report.

Environmental indicator: a measurement, statistic or value that provides approximate gauge or evidence of the effects of environmental management programs or of the state or condition of the environment.

Environmental management: a coherent system of activities and responsibilities necessary for pollution control and nature conservation, supporting environmentally sustainable development.

Environmental mitigation: specific steps that must be taken to avoid potentially negative environmental impacts identified in the environmental assessment or to minimize those impacts that are unavoidable

Environmental monitoring: ensures that mitigation measures, conditions and specifications are fully implemented during construction and problems are resolved.

Environmental screening: is the process by which projects are categorized according to the proposed action and the sensitivity of the environment in which the project is being implemented. It is conducted early in the planning process to identify the principal environmental issues associated with the project and the type of study that will be required.

Environmental study scoping: defines the study area, the parameters to be considered, the methods to be used, and the time frame evaluated.

Erosion: the wearing away of land surface by wind or water, intensified by land clearing practices related to farming, residential or industrial development, road construction or logging.

Impact: the effect of one thing upon another.

Influence area: the area in which the project will cause a direct or indirect impact

Maintenance: means the act of preserving and keeping each type of road as nearly as possible in its original condition as constructed or as subsequently improved. Maintenance does not include upgrading or rehabilitation. Maintenance falls into two categories, *routine and periodic*. It refers to the preservation of the entire roadway, including carriageway, shoulders, roadsides, structures, and such traffic control devices as are necessary for safe and efficient utilization.

Mitigation: the minimization of undesirable impacts.

New construction: refers to the implementation of a road project on a new route.

Overlay :is a maintenance activity. It is a full-width, full-length placing of a thick layer of asphalt concrete on an existing deteriorated layer. Overlay is usually considered as capital improvement.

Overlay Analysis: refers to an activity in which the road project is superimposed on base maps containing the accurate geographic distribution of critical environmental data

Post-project environmental evaluation: (sometimes called post-project evaluation or auditing) of the environmental affects of the road project and any remedial actions are conducted during road operation and maintenance and play an important role in the planning of future road projects.

Sectoral environmental assessment: **examines the cumulative impacts of multiple projects planned in the same sector.**

Rehabilitation: means the act of restoring an existing road to its originally constructed, or subsequently upgraded condition. This operation is required when the road has deteriorated to an extent where normal road maintenance effort, procedures and expenditures are inadequate. Rehabilitation includes improvements to eliminate the

cause of defects and avoid excessive repetition of maintenance efforts.

Road: includes pavements, shoulders, embankments, rights-of-way, bridges, drainage structures, signs, guardrails, and related protective structures.

Road Maintenance: is a suitable routine, periodic and emergency activities to keep pavement, shoulders, slopes, drainage facilities and all other structures and property within the right-of-way as near as possible to their as-constructed or renewed condition. Pavement maintenance includes minor improvements to eliminate the cause of defects and avoid excessive repetition of maintenance efforts.

Routine Maintenance: means all road maintenance operations which are required to be carried out once or more per year on a section of road. These operations are typically small scale and simple, but widely dispersed.

Periodic Maintenance: means all road maintenance operations, which are occasionally required on a section of a road after a number of years. They are normally large scale and require specific identification, planning, and implementation and often require design.

Sustainable development: is a process of change in which the exploitation of resources, direction of investment, orientation of technical development, and the institutional change are made consistent with future as well as present social and economic needs; development that provides economic, social and environmental benefits in the long term.

Traffic management: projects refer to non-structural improvements in safety, economy and user convenience such as the provision of safety rest areas, scenic overlooks, bus lay byes, adjustment of utility facilities, railroad grade crossings, guardrails, emergency escape ramps, and road furniture such as traffic signs, markings and markers and curbs.

Upgrading: is any intervention, which improves the design standard of an existing road.

APPENDIX -B

B1- A SAMPLE TERMS OF REFERENCE (TOR) FOR ENVIRONMENTAL ASSESSMENT

B2- A SAMPLE TERMS OF REFERENCE (TOR) FOR ENVIRONMENTAL ASSESSMENT OF RURAL ROADS

B3 - SAMPLE CONTRACT SPECIFICATIONS

B4- CONSTRUCTION MONITORING CHECKLIST

APPENDIX -B:

B1- A SAMPLE TERMS OF REFERENCE (TOR) FOR ENVIRONMENTAL ASSESSMENT

1. *Introduction*

This section should state the purpose of the terms of reference, identify the project to be assessed, and explain the arrangements for the environmental assessment.

2. *Background Information*

Background information for potential parties who may conduct the environmental assessment would include:

- a brief description of the major components of the proposed project,
- a statement of the need for conducting it and the objectives it is intended to meet,
- a brief history of the project (including alternatives considered),
- its current status and timetable, and
- the identities of any associated projects.

If there are other projects in progress or planned within the region, which may compete for the same resources, they should also be identified here.

3. *Objectives*

This section will summarize the general scope of the environmental assessment and discuss its timing in relation to the processes of project preparation, design, and execution.

4. *Environmental Assessment Requirements*

This paragraph should identify any regulations and guidelines, which will govern the conduct of the assessment or specify the content of its report. They may include any or all of the following:

- National laws and/or regulations on environmental reviews and impact assessments;
- Regional, provincial or communal environmental assessment regulations;
- Environmental assessment regulations of any other financing organizations involved in the project.

5. ***Study Area***

Specify the boundaries of the study area for the assessment (e.g., water catchment, airshed). If there are any adjacent or remote areas which should be considered with respect to impacts of particular.

6. ***Scope of Work***

In some cases, the tasks to be carried out by a consultant will be known with sufficient certainty to be specified completely in the terms of reference. In other cases, information deficiencies need to be alleviated or specialized field studies or modelling activities performed to assess impacts, and the consultant will be asked to define particular tasks in more detail for contracting agency review and approval. Task 4 in the Scope of Work is an example of the latter situation.

7. ***Task 1.*** **Description of the Proposed Project**

Provide a brief description of the relevant parts of the project, using maps (at appropriate scale) where necessary, and including the following information: location; general layout; size, capacity, etc.; pre-construction activities; construction activities; schedule; staffing and support; facilities and services; operation and maintenance activities; required offsite investments; and life span. [Note: there may be particular types of information appropriate in the description of the project category you are concerned with. Specify them here.]

8. ***Task*** **2. Description of the Environment**

Assemble, evaluate and present baseline data on the relevant environmental characteristics of the study area. Include information on any changes anticipated before the project commences. [Annotate or modify the lists below to show the critical information for this project category, or that which is irrelevant to it. You should particularly avoid compiling irrelevant data.]

(a) Physical environment: geology; topography; soils; climate and meteorology; ambient air quality; surface and ground- water hydrology; coastal and oceanic parameters; existing sources of air emissions; existing water pollution discharges; and receiving water quality.

(b) Biological environment: flora; fauna; rare or endangered species; sensitive habitats, including parks or preserves, significant natural sites, etc.; species of commercial importance; and species with potential to become nuisances, vectors or dangerous.

(c) Socio-cultural environment (include both present and projected where appropriate): population; land use; planned development activities; community structure; employment; distribution of income, goods and services; recreation; public health; cultural properties; tribal peoples; and customs, aspirations and attitudes.

9. *Task 3.* Legislative and Regulatory Considerations

Describe the pertinent regulations and standards governing environmental quality, health and safety, protection of sensitive areas, protection of endangered species, siting, land use control, etc., at international, national, regional and local levels (The TOR should specify those that are known and require the consultant to investigate for others.)

10. *Task 4.* Determination of the Potential Impacts of the Proposed Project

In this analysis, distinguish between significant positive and negative impacts, direct and indirect impacts, and immediate and long-term impacts. Identify impacts, which are unavoidable or irreversible. Wherever possible, describe impacts quantitatively, in terms of environmental costs and benefits. Assign economic values when feasible. Characterize the extent and quality of available data, explaining significant information deficiencies and any uncertainties associated with predictions of impact. If possible, give the TOR for studies to obtain the missing information. [Identify the types of special studies likely to be needed for this project category.]

11. *Task 5.* Analysis of Alternatives to the Proposed Project

Describe alternatives that were examined in the course of developing the proposed project and identify other alternatives, which would achieve the same objectives. The concept of alternatives extends to siting, design, technology selection, construction techniques and phasing, and operating and maintenance procedures. Compare alternatives in terms of

potential environmental impacts; capital and operating costs; suitability under local conditions; and institutional, training, and monitoring requirements. When describing the impacts, indicate which are irreversible or unavoidable and which can be mitigated. To the extent possible, quantify the costs and benefits of each alternative, incorporating the estimated costs of any associated mitigating measures. Include the alternative of not constructing the project, in order to demonstrate environmental conditions without it.

12. *Task 6*. Development of Environmental Management Plan, with focus on three generic areas

Mitigation measures, institutional strengthening and training, and monitoring. The emphasis on each of these areas depends on the needs in the specific project context, as identified by the EA itself.

Mitigation of environmental impact: Recommend feasible and cost-effective measures to prevent or reduce significant negative impacts to acceptable levels. Estimate the impacts and costs of those measures. Consider compensation to affected parties for impacts, which cannot be mitigated. The plan should include proposed work programs, budget estimates, schedules, staffing and training requirements, and other necessary support services to implement the mitigating measures.

Institutional strengthening and training: Identification of institutional needs to implement environmental assessment recommendations. Review the authority and capability of institutions at local, provincial/regional, and national levels and recommend steps to strengthen or expand them so that the management and monitoring plans in the environmental assessment can be implemented. The recommendations may extend to new laws and regulations, new agencies or agency functions, intersectoral arrangements, management procedures and training, staffing, operation and maintenance training, budgeting, and financial support.

Monitoring: Prepare detailed arrangements for monitoring implementation of mitigating measures and the impacts of the project during construction and operation. Include in the plan an estimate of

capital and operating costs and a description of other inputs (such as training and institutional strengthening) needed to carry it out.

13. *Task* 7. Assist in Inter-Agency Coordination and Public/NGO Participation

Assist in coordinating the environmental assessment with other government agencies, in obtaining the views of local NGOs and affected groups, and in keeping records of meetings and other activities, communications, and comments and their disposition. (The Terms of Reference [TOR] should specify the types of activities; e.g., interagency scoping session environmental briefings for project staff and interagency committees, support to environmental advisory panels, public forum.)

14. *Report*

The environmental assessment report should be concise and limited to significant environmental issues. The main text should focus on findings, conclusions and recommended actions, supported by summaries of the data collected and citations for any references used in interpreting those data. Detailed or uninterrupted data are not appropriate in the main text and should be presented in appendices or a separate volume. Unpublished documents used in the assessment may not be readily available and should also be assembled in an appendix. Organize the environmental assessment report according to the outline below:

1. Executive Summary
2. Policy, Legal and Administrative Framework
3. Description of the Proposed Project
4. Baseline Data
5. Significant Environmental Impacts
6. Analysis of Alternatives
7. Environmental Management Plan

8. Appendices:

9. List of Environmental Assessment Papers

10. References Record of Interagency Forums / Consultation Meetings

15. ***Consulting Team***

Environmental assessment requires interdisciplinary analysis. Identify in this paragraph, which specializations ought to be included on the team for the particular project category.

16. ***Schedule***

Specify dates for progress reviews, interim and final reports, and other significant events.

17. ***Other Information***

Include here lists of data sources, project background reports and studies, relevant publications, and other items to which the consultant's attention should be directed.

APPENDIX B

B2- A SAMPLE TERMS OF REFERENCE (TOR) FOR ENVIRONMENTAL ASSESSMENT OF RURAL ROADS

1. ***Introduction***

This section should state the purpose of the terms of reference, identify the development project to be assessed, and explain the executing arrangements for the environmental assessment.

2. ***Background Information***

Pertinent background for potential parties who may conduct the environmental assessment, whether they are consultants or government agencies, would include a brief description of the major components of the proposed project, a statement of the

need for it and the objectives it is intended to meet, the implementing agency, a brief history of the project, (including alternatives considered), its current status and timetable, and the identities of any associated projects. If there are other projects in progress or planned within the region, which may compete for the same resources, they should also be identified here.

3. ***Objectives***

This section will summarize the general scope of the environmental assessment and discuss its timing in relation to the processes of project preparation, design, and execution.

4. ***Environmental Assessment Requirements***

This paragraph should identify any regulations and guidelines, which will govern the conduct of the assessment or specify the content of its report. They may include any or all of the following:

- National laws and/or regulations on environmental reviews and impact assessments;
- Regional, provincial or communal environmental assessment regulations;
- Environmental assessment regulations of any other financing organizations involved in the project.

5. ***Study Area***

Specify the boundaries of the study area for the assessment (e.g., water catchment, airshed). If there are any adjacent or remote areas which should be considered with respect to impacts of particular.

6. ***Scope of Work***

In some cases, the tasks to be carried out by a consultant will be known with sufficient certainty to be specified completely in the terms of reference. In other cases, information deficiencies need to be alleviated or specialized field studies or modelling activities performed to assess impacts, and the consultant will be asked to define particular tasks in more detail for contracting agency

review and approval. Task 4 in the Scope of Work is an example of the latter situation.

7. *Task 1.* Description of the Proposed Project

Location of roads; type of roads and expected volume of use; construction activities.

8. *Task 2.* Description of the Environment.

(a) Physical environment: geology; topography; soils; climate and meteorology; ambient air quality; surface and ground-water hydrology; coastal and oceanic parameters; existing sources of air emissions; existing water pollution discharges; and receiving water quality.

(b) Biological environment (of road site and potential area of influence of the road); ecologically important or sensitive habitats, including parks or preserves; significant natural, cultural or historic sites, etc.

(c) Socio-cultural environment (include both present and projected where appropriate): population; land use; planned development activities; community structure; employment; distribution of income, goods and services; recreation; public health; cultural properties; tribal peoples; and customs, aspirations and attitudes.

9. *Task 3.* Legislative and Regulatory Considerations

Describe the pertinent regulations and standards governing environmental quality, health and safety, protection of sensitive areas, protection of endangered species, siting, land use control, etc., at international, national, regional and local levels (The TOR should specify those that are known and require the consultant to investigate for others.)

10. *Task 4.* Determination of the Potential Impacts of the Proposed Project

The engineering plans should reflect "best practice" in road alignment and construction to ensure that potential negative environmental impacts are minimized (e.g., through measures to prevent soil erosion risk, to ensure proper drainage, and provide for waste disposal such as of cut and fill material, used oil, etc.). The EA should verify that this is the case. The EA should focus on the potential for negative environmental and social impacts

caused by planned and unplanned (spontaneous) in-migration of people: clearing of forest lands for agriculture; increased pressure on fuel wood, fodder and water resources; social disruptions and conflicts; threat to wild lands and important wildlife species, etc.

11. *Task 5*. Analysis of Alternatives to the Proposed Project

Describe alternatives that were examined in the course of developing the proposed project and identify other alternatives, which would achieve the same objectives. The concept of alternatives extends to siting, design, technology selection, construction techniques and phasing, and operating and maintenance procedures. Compare alternatives in terms of potential environmental impacts; capital and operating costs; suitability under local conditions; and institutional, training, and monitoring requirements. When describing the impacts, indicate which are irreversible or unavoidable and which can be mitigated. To the extent possible, quantify the costs and benefits of each alternative, incorporating the estimated costs of any associated mitigating measures. Include the alternative of not constructing the project, in order to demonstrate environmental conditions without it.

12. *Task 6*. Development of Environmental Management Plan, with focus on three generic areas

Mitigation measures, institutional strengthening and training, and monitoring. The emphasis on each of these areas depends on the needs in the specific project context, as identified by the EA itself.

Mitigation of environmental impact: Recommend feasible and cost-effective measures to prevent or reduce significant negative impacts to acceptable levels. Estimate the impacts and costs of those measures. Consider compensation to affected parties for impacts, which cannot be mitigated. The plan should include proposed work programs, budget estimates, schedules, staffing and training requirements, and other necessary support services to implement the mitigating measures.

Institutional strengthening and training: Identification of institutional needs to implement environmental assessment recommendations. Review the authority and capability of institutions at local, provincial/regional, and national levels and recommend steps to strengthen or expand them so that the

management and monitoring plans in the environmental assessment can be implemented. The recommendations may extend to new laws and regulations, new agencies or agency functions, intersectoral arrangements, management procedures and training, staffing, operation and maintenance training, budgeting, and financial support.

Monitoring: Prepare detailed arrangements for monitoring implementation of mitigating measures and the impacts of the project during construction and operation. Include in the plan an estimate of capital and operating costs and a description of other inputs (such as training and institutional strengthening) needed to carry it out.

13. *Task 7.* Assist in Inter-Agency Coordination and Public/NGO Participation

Assist in coordinating the environmental assessment with other government agencies, in obtaining the views of local NGO's and affected groups, and in keeping records of meetings and other activities, communications, and comments and their disposition. (The Terms of Reference [TOR] should specify the types of activities; e.g., interagency scoping session environmental briefings for project staff and interagency committees, support to environmental advisory panels, public forum.)

14. *Report*

The environmental assessment report should be concise and limited to significant environmental issues. The main text should focus on findings, conclusions and recommended actions, supported by summaries of the data collected and citations for any references used in interpreting those data. Detailed or uninterrupted data are not appropriate in the main text and should be presented in appendices or a separate volume. Unpublished documents used in the assessment may not be readily available and should also be assembled in an appendix. Organize the environmental assessment report according to the outline below:

1. Executive Summary
2. Policy, Legal and Administrative Framework
3. Description of the Proposed Project
4. Baseline Data
5. Significant Environmental Impacts

6. Analysis of Alternatives
7. Environmental Management Plan
8. Appendices:
9. List of Participants in the Environmental Assessment
10. References Record of Interagency Forums / Consultation Meetings

15. ***Consulting Team***

Members of the team should consist of people with the following specializations: rural sociology; human geography; terrestrial ecology (wildlife, plant and conservation ecology).

16. ***Schedule***

Specify dates for progress reviews, interim and final reports, and other significant events.

17. ***Other Information***

Include here lists of data sources, project background reports and studies, relevant publications, and other items to which the consultant's attention should be directed.

APPENDIX B

B3 - SAMPLE CONTRACT SPECIFICATIONS

The conditions of contract proposed below follow or are extracts from FIDIC Fourth edition- 1987, General Conditions of Contract, included in Procurement of Works, World Bank Report, December 1991.

This appendix provides guidance in the preparation of environmental contract specifications and conditions.

12.3.1 GENERAL ENVIRONMENTAL REFERENCE IN FIDIC.

19-1 SAFETY, SECURITY AND PROTECTION OF THE ENVIRONMENT:

The Contractor shall, throughout the execution and completion of the Works and the remedying of any defects therein.

(a) Have full regard for the safety of all persons entitled to be upon the Site and keep the Site (so far as the same is under his control) and the Works (so far as the same are not completed or occupied by the Employer) in an orderly state appropriate to the avoidance of danger to such persons, and

(b) Provide and maintain at his own cost all lights, guards, fencing, warning signs and watching, when and where necessary or required by the Engineer or by any duly constituted authority, for the protection of the Works or for the safety and convenience of the public or others, and

(c) Take all reasonable steps to protect the environment on and off the Site and to avoid damage or-nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation.

Elsewhere, FIDIC includes:

26.1 COMPLIANCE WITH STATUTES, REGULATIONS:

The Contractor shall conform in all respects including by the giving of all notice and the paying of all fees, with the provisions of:

(a) Any National or State Statute, Ordinance, or other Law, or any regulation, or bye - law of any local or other duly constituted authority in relation to the execution and completion of the Works and the remedying of any defects therein, and

(b) The rules and regulations of all public bodies and companies whose property or rights are affected or may be affected in any way by the Works and the Contractor shall keep the Employer indemnified against all penalties and liability of every kind for breach of any such provisions. Provided always that the Employer shall be responsible for obtaining any planning, zoning or other similar permission required for the Works to proceed and shall indemnify the Contractor in accordance with Sub-Clause 22.3.

1. GENERAL REQUIREMENTS

12.3.1. *Clauses Relating to Environmental Impacts on Water Resources*

(a) The Contractor shall ensure that full consideration is given to control of environmental aspects and that all provisions of design and specification requirements relating to pollution of the environment and protection of adjacent land and waterways are complied with.

12.3.2 CLAUSES RELATING TO ENVIRONMENTAL IMPACTS TO SOILS

In general, environmental specifications for contractors should include erosion control, prevention of fuel spills during construction, and planting as well as timely watering of plants, preservation of roadside vegetation and trees.

- Excavation work shall be performed with the minimum possible disturbance to the material below and beyond the prescribed limits of excavation.

- Any head load material shall be removed from above unstable banks prior to excavation and bank slopes shall be cut to the design angle of slope. For high bank provision shall be made for benching at 5-meter intervals in accordance with the standard drawings.

- For protection of banks against erosion cut-off drains and toe drains shall be provided as shown on the drawings or as directed on site by the engineer. Newly cut areas shall aIso be protected as soon as possible by the provision of turf or other approved plants.

- To the extent possible and as directed by the engineer, the contractor shall keep the excavations free of water and shall provide pumps, equipment and labor, and construct sumps, temporary drains or cofferdams as necessary for diverting or removing water from the vicinity of the excavated areas.

- For protection of embankment slopes against erosion, approved turf shall be placed and staked in position on the slopes to the direction and of the engineer.

12.3.3 CLAUSES RELATING TO IMPACTS TO WATER RESOURCES

These should cover road design, bridge and tunnel construction, drainage installation, and any work-site plans which may affect water flows and quality; this includes the protection of cut slopes, the provision containment basins, riverine gravel mining during dry season only.

- The contractor shall not interrupt or interfere with the flow of irrigation waters without making prior arrangements with and obtaining the agreement of the irrigation authorities. The contractor shall allow in his program for the construction of those works which might interface with the flow of irrigation waters to be carried out at such times as will cause the least disturbance to irrigation operations.

- The contractor shall comply with the following: Meet the requirements of regulations. Consult, with the engineer before locating and constructing project offices and sheds and installing construction plant. Prevent pollution of any kind to adjacent property resulting from the construction operation.

- Sites containing cement, line and similar items shall be suitably protected from rain and flood.

- Natural streams or channels adjacent to the works of this contract shall not be disturbed without the approval of the engineer.

- Material deposited within the stream or channel as a result of the drainage works shall be removed when the works are completed or at such time as the engineer requires.

- Where existing waterways are relocated in accordance with the contract works, the new alignments shall maintain the existing invert gradients and profiles unless otherwise required by the engineer.

- No bituminous material shall be discharged into a side drain, ditch, or watercourse.

12.3.4 CLAUSES RELATING TO IMPACTS ON AIR QUALITY

Specifications should incorporate the proposed mitigation measures as distinct tasks with a timetable, the maintenance of contractor's equipment, positioning of the asphalt mix plant, control of fugitive dust through watering and covering haulage trucks.

- Minimizing air pollution and emissions from equipment and facilities: all contractor's vehicles, and all equipment to be regularly maintained in accordance with manufacturers recommendations.

- The plant shall be equipped with a dust collector constructed to waste or return uniformly to the hot elevator all or any part of the material collected as directed without the escape of objectionable dust into the atmosphere.

- To prevent dust pollution during dry periods the contractor shall carry out regular watering of earth and gravel haul-roads and shall cover soil haulage trucks with tarpaulins.

12.3.5 CLAUSES RELATING TO FLORA AND FAUNA

Generally should include management of the work force by controlling poaching and firewood collection, machinery speed, noise and traffic, prevention of erosion and contamination during construction. In the case of tree removal: for example, this clause may state that removal should be limited only to trees absolutely necessary for the construction of the road works. Approval by the Site Engineer would be required for the removal of any tree not directly affected by the works.

- Selected tree removal shall consist of the removal of all trees shown on the drawings or designated by the engineer measuring 30 cm or more in diameter at a point measured one meter above the ground surface. The work shall consist of not only the removal and disposal to the satisfaction of the engineer of the individual tree but the stump and roots as well.

- When necessary to prevent damage to structures, other property or to prevent danger or prolonged interruption of traffic, trees designated for removal shall be cut in sections from the top downward.

- The contractor shall fill the holes caused by the removal of the stamps and roots as a consequence of the selected tree removal, with suitable material approved by the engineer.

- All trees, stumps, roots aid other refuse resulting from shall be disposed of by the contract outside the highway right of way in an approved disposal site.

- In the handling of bituminous materials, the surface of trees, structures, or other property adjacent to the road surface being treated shall be protected from the surface dressing works.

12.3.6 CLAUSES RELATING TO IMPACTS ON COMMUNITIES

These ensure that work camps, temporary works, and lifestyles of construction workers do not negatively affect adjacent communities; workers should be prevented form hunting, fishing or otherwise using resources held in common by indigenous groups. This may also include maximizing the use of the local labour supply; having consultations with local authorities on the locations of labour camps and establishing local labour relations.

- The contractor shall recruit locally as large a proportion of the workforce as is possible and shall provide appropriate training where necessary.

- The contractor shall comply with the following: Meet the requirements of local regulations. Consult with the engineer before locating and constructing project offices and sheds and installing construction plant. Prevent pollution of any kind to adjacent property resulting from the construction operation.

- Construction traffic management: Where pubic or private access to base camp, quarry and other contractors sites passes through existing developed areas, the contractor must post warning signs specifying speed limit and driver care, regularly maintain road to an adequate standard, provide speed bumps where necessary, liaise closely with the local community to reduce any potential conflict.

12.3.7 CLAUSES RELATING TO IMPACTS TO ADJACENT PROPERTY AND FROM LAND ACQUISITION AND RESETTLEMENT

Temporary works and traffic management should not disrupt nearby land-users; measures prescribed in the Resettlement Action Plan should be defined; contractors should take part in preparing the host area (infrastructure construction or upgrading) to accommodate increased use.

- Protection of adjacent properties: the impact of construction activities on buildings and land adjacent to right of way to be minimized through the use of temporary screening to be constructed where construction activities will be particularly intrusive annoying and lengthy. In addition, owners and occupiers of land and buildings to be given advanced warning of intrusive activities (for example piling), and its length of time and

frequency. The position of any new retaining walls and ROW boundary walls to be constructed only after full consultation and agreement with adjacent owners and occupiers.

- Private property shall not be used for storage purposes without the written permission of the owner or lessee and payment to him, if necessary.

- All operations necessary for the execution and completion of the works and the remedying of any defects therein shall, so far as compliance with the requirements of the contract permits, be carried on so as not to interfere unnecessarily or improperly with: (a) the convenience of the public, or (b) the access to, use and occupation of public or private roads and footpaths to or from properties, whether in the possession of the employer or of any other persons.

- The contractor shall be responsible for and shall pay the cost of strengthening any bridges or altering or improving any road communicating with or on the routes to the site to facilitate the movement of contractor's equipment or temporary works.

- Damage occurring to any bridge or road communicating with or on the routes to the site arising from the transport of materials or plant, the contractor shall notify the engineer as soon as he becomes aware of such damage.

- The contractor shall select, arrange for and if necessary pay for the use of sites for detours, for all central mixing plants for concrete and bituminous materials, for the storage of equipment, for office building, housing, or other uses necessary to the execution of the works.

- Before any land belonging to the government or to a private landowner is used for any purpose in connection with the execution of the works the engineer's approval shall be obtained.

- If any utility for water, electricity, drainage, etc., passing through the site will be affected by the works, such that a temporary diversion of the utility is necessary, either until reinstatement or a permanent diversion is made by the utility owner concerned, then the contractor shall provide a satisfactory alternative utility in full working order to the satisfaction of the owner of the utility and the engineer, before the cutting of the existing utility.

- On completion of the contract, or earlier if so directed by the engineer, all plant and any other encumbrances shall be removed,

the site properly cleaned, all damage made good, and if necessary, the land owner paid for the use of the land.

- The contractor shall furnish, maintain, and remove on completion of the work for which-they are required, all temporary road works such as sleeper t-racks and staging over roads, access and service roads, temporary crossings or bridges over streams or unstable ground. These shall be suitable in every respect for carrying all construction plant required for the work, for providing access and traffic for himself or others, or for any other purpose. Such temporary road works shall be constructed to the satisfaction of the engineer, but the contractor shall nevertheless be responsible for any damage done to or caused by such temporary road works.

- Before constructing temporary road works, the contractor shall make all necessary arrangements, including payment if required, with the public authorities of landowners concerned, for the use of the land and he shall obtain the approval of the engineer. Such approval will not, however, relieve the contractor of his responsibility. Upon completion of the works, the contractor shall clean up and restore the land to the satisfaction of the engineer or the landowner concerned.

- The contractor shall make all arrangements necessary to permit the passage along the road section relating to his contract of the construction plant, materials and employees belonging to other contractors engaged in the construction of contiguous stretches of road. For this purpose the contractor and the contractors concerned in the construction of the stretches contiguous to those through which they must pass shall, when necessary and with at least 15 days notice, request the engineer for permission to pass and submit a schedule for such passage. After the engineer has granted such permission and approved the schedule submitted, both the contractor permitting the passage and those, requesting it shall undertake to observe the schedule approved by the engineer for the passage along the site without having any right to extra payment in consequence of the restrictions of passage or the necessary temporary suspension of works due to the aforesaid schedule.

12.3.8 CLAUSES RELATING TO IMPACTS TO CULTURAL RESOURCES

Clauses should specify the rules for the preservation and recovery of cultural remains discovered during the construction phase; means to protect specific features or additional work that may be called for.

- All fossils, coins, articles of value or antiquity and structures and other remains or things of geological or archaeological interests discovered on the site shall as between the employer and the contractor be deemed to be the absolute property of the employer. The contractor shall take reasonable precautions to prevent his workmen or any other persons from removing or damaging any such article or thing and shall, immediately upon discovery thereof and before removal, acquaint the engineer of such discovery and carry out the engineer's instructions for dealing with the same.

12.3.9 CLAUSES RELATING TO IMPACTS TO IMPACTS ON AESTHETICS AND LANDSCAPE

Pertains to modifying certain elements (screens on bridges), planting vegetation.

12.3.10 CLAUSES RELATING TO IMPACTS ON THE NOISE ENVIRONMENT

The provision of building noise protection devices should indicate the location, design, and materials and methods of construction and account for future road maintenance needs; work site management in noise sensitive areas, restrict operating hours and apply equipment noise standards, for example.

- Subject to any provision to the contrary contained in the contract, none of the work shall be carried on during the night or on locally recognized days of rest without the consent of the engineer, except when work is unavoidable or absolutely necessary for the saving of life or property or for the safety of the works. In which case the contractor shall immediately advise the engineer.

- The contractor shall not use vehicles whose exhaust or noise emissions are grossly excessive, and in any built-up areas noise mufflers shall be installed and maintained in good condition on all motorized equipment under the control of the contractor.

- The contractor shall also avoid the use of heavy or noisy equipment in specified areas late at night or in sensitive areas such as near hospitals, schools for example.

- Restrictions on all night time working at construction site base camp, quarries, haul routes and other locations near sensitive locations such as housing and hospitals.

12.3.11 CLAUSES RELATING TO IMPACTS TO HUMAN HEALTH AND SAFETY

Includes practices for the installation of safety features, operation of work zones and construction traffic, security of stockpile sites, good housekeeping practices.

- The contractor must ensure that the potential danger to the public (including pedestrians, all road users. and adjacent building owners and occupiers) is kept to an absolute minimum. All work sites are to be clearly sign posted and fenced, and if necessary lit at night. Safe, traffic control arrangements to provide well-signed pedestrian routes to be provided to avoid construction activities.

- During the execution of the works the contractor shall keep the site reasonably free from all unnecessary obstruction and shall store or dispose of any contractor's equipment and surplus materials and clear away and remove from the site any wreckage, rubbish or temporary works no longer required.

- Upon the issue of any Taking-Over Certificate the contractor shall clear away arid remove from that part of the site to which such Taking-Over Certificate relates all contractor's equipment, surplus material, rubbish and temporary works of every kind, and leave such part of the Site and Works clean and in a workmanlike condition to the satisfaction of the engineer.

- Coarse aggregate storage piles shall be built up and removed in layers not exceeding one meter. The height of such stockpiles shall be limited to five meters. Stock piling of aggregate to be used for asphalt-concrete, coated macadam, bituminous surface treatment, or concrete will be permitted only at locations approved by the engineer. A separate stockpile shall be made for each nominal size of aggregate at each location. Unless otherwise approved by the engineer each stockpile shall be built at least 2 meters high by tipping in layers not more than one meter deep over the whole area of the stockpile. The contractor shall supply any planking or other material required in connection with the movement of vehicles over and about the stockpiles. In soft clay areas, stockpile heights will be limited for reason of stability.

- In cases where it is necessary or required by the engineer, the contractor shall construct and maintain temporary traffic ramps, and furnish all the labour and materials required therefore.

- In order to facilitate traffic through or around the works, or wherever ordered by the engineer, the contractor shall erect and maintain at prescribed points on the works and at the approaches

to the works, traffic signs, lights, flares, barricades and other facilities as required by the engineer for the direction and control of traffic.

- Where required, or where directed by the engineer, the contractor shall furnish and station competent flagmen whose sole duties shall consist of directing the movement of traffic through or around the works.

- The contractor shall furnish and erect within or in the vicinity of the project area, such warning and guide signs as may be ordered by the engineer.

- In all cases where single-lane traffic becomes necessary over a particular length of the works or over the approaches thereto the contractor, in maintaining through traffic, shall provide a single-lane at least three and a half meters wide on the roadway or embankment to be kept open to traffic.

- The contractor shall so conduct his operations as to offer the least possible obstruction, inconvenience, and delay to traffic and shall be responsible for the adequate control of the traffic using the lengths of single-lane above specified.

- At places where such single-lane traffic is in operation and when ordered by the engineer, the movement to the contractor's equipment from one portion of the work to another shall be subject to such single-lane traffic control.

- Spillage resulting from haulage operations along or across the roadway shall be removed immediately at the contractor’s expense.

- To the extent possible and as advised by the engineer, the contractor shall use selected routes and appropriate sized vehicles suitable to the class of road, and shall restrict loads to prevent damage to roads and bridges used for transportation purposes to the project site. The contractor shall be held responsible for any damage caused to the roads and bridges due to the transportation of excessive loads and shall be required to make good such damage to the approval of the engineer.

- On completion of the construction works, the contractor shall leave the work site in a clean and tidy condition to the approval of the engineer. The contractor shall remove all installations, construction plant and all surplus materials, including any debris

empty drums, displaced rocks and also restore areas damaged by fire or asphalt mixing.

- The engineer shall give instructions regarding the exact locations for stacking materials by the roadside. All sites chosen shall be on firm, well drained ground, clear of batters, drains and waterways, and in no case encroaching on the road where the material could create danger or obstruction to passing traffic.

- Aggregates and gravel shall be stacked neatly to template size, with the long axis of the stack generally parallel to the road centerline.

- Bitumen in drums should be stacked and formed into dumps (not scattered along the road).

- During excavation work, stable excavation slopes capable of supporting adjacent works, structures or machinery shall be maintained a t all times and adequate shoring and bracing shall be installed when the unshored excavated faces may otherwise be unstable. Where necessary, the contractor shall underpin or support adjacent structures, which may become unstable or be damaged by the excavation work.

- Heavy equipment for earthmoving, compacting or other similar purposes shall not be permitted to stand or operate closer than 1 - 5 m from the edge of open trenches or foundation excavation unless the pipes or structures have already been installed and covered with at least 60 cm of compacted backfill.

- Cofferdams, cut-off walls or other means of excluding water from excavations shall be properly designed and sufficiently strong to ensure that no sudden collapse capable of rapidly flooding the works is possible.

- Where the contractor is authorized to use explosives required for rock excavation, the explosives shall be stored, handle, and used with the utmost caution and strictly in accordance with the statutory government regulations. The contractor shall be responsible for the presentation of any unauthorized issue or improper use of any explosive and shall ensure that the handling of explosive shall be entrusted only to experienced and responsible men.

- All open excavations shall be adequately barricaded to prevent workmen or others from accidentally falling into them. Any open excavation in the road carriageway or shoulder areas shall in

addition be marked at night with white painted drums (or similar) and red or amber lighted lamps, to the satisfaction of the engineer.

- The contractor shall be responsible for the protection of any serviceable underground pipes, cables, conduit or other subsurface structure that may be encountered and shall be liable for the cost of repairing any damage caused to them by his operations

- The contractor shall provide and maintain at the site where bitumen is being heated adequate fire prevention and control measures and also first aid supplies and facilities.

12.3.12 CLAUSES RELATING TO IMPACTS FROM BORROW PITS AND QUARRIES

The contractor, in association with any other contractors using the same quarry, shall prepare a utilization plan for the quarry before commencement of activities. Showing the areas of land to be quarried, access routes to the quarry, the time scale, restoration program for the quarry, possible after use. This plan is to be submitted to the relevant supervisor and to be agreed by them before commencement of quarrying.

- Material sources should not be selected in nature reserves, protected forests, or in areas liable to slips or erosion.

- The contractor shall provide the engineer at least *30* days prior to the scheduled beginning of any operation with a complete statement of the origin and composition of all aggregate to be used in that particular operation. The method of selection and processing shall be approved by file engineer before full-scale production commences.

- The contractor shall be responsible for construction accesses, removing overburden and all other construction costs required for the furnishing of the materials including the returning of top soil and the leaving of the area and accesses in a tidy and sightly condition.

- Approval to open a new borrow area or to operate an existing one, shall be obtained from the engineer in writing before any borrow operation is commenced, pits shall be prohibited or restricted where they might interfere with the natural or designed drainage.

In side sloping terrain, borrow pits on the higher side of the road shall be so graded and drained-as to convey all surface water to the site drains and adjacent culverts without ponding. The edge of a borrow pit shall be not closer than 2 meters from the toe of any embankment or 10 meters from the top of any cut. All borrow pits or quarries used by the contractor shall be left in a trim and tidy condition with stable sides and slopes on completion of the work.

12.3.13 CLAUSES FOR THE MANAGEMENT OF WASTE MATERIALS

- Management of waste materials: all excavated material to be disposed off-site in locations approved by the local regulatory agency. No material is to be disposed down slope without specific approval of the site engineer, and will be approved only if existing drainage, agricultural land, housing, and slope stability is not affected. All waste oils to be disposed of in accordance with existing environmental regulations.

APPENDIX B

B4- CONSTRUCTION MONITORING CHECKLIST

The purpose of monitoring is to ensure contractor compliance with the environmental issues contained in the Contract, to assess any adverse environmental effects, and to prepare proposals to reduce or eliminate unforeseen adverse impacts.

Construction Checklist

PART 1: COMPONENT DESCRIPTION	PART 2 ENVIRONMENTAL ISSUES
1. DESCRIPTION: This includes the: • Title of project / Reference number: • Road class: (Class I – V) • Development activity:(new, upgrade, rehabilitation) • Area: • Length: • Construction of base camp • Quarrying and borrow pits • Construction of haul roads 2. SKETCH OF PROJECT AND HAUL ROADS 3. CONTRACTOR PERSONNEL • Number of staff • Nationalities • Approximate distance of camp from site. 4. MATERIALS • Type of material • Quality • Hazardous, non-hazardous • Quarry or borrow pit location • Method of transport • Method of storage • Method of disposal 5. EQUIPMENT ON PROJECT • Type of equipment • Make and model • Capacity • Number • Location 6. WATER SOURCES 7. FIRST AID FACILITIES 8. FIRE AND EMERGENCY FACILITIES 9. SANITARY FACILITIES FOR STAFF 10. OTHER RELEVANT INFORMATION	1. IMPACT ISSUE • Noise from all types of equipment and traffic • Air quality / emissions and dust problems from all types of equipment and traffic • Impact on natural and planted vegetation: removal or trimming of only those plants and trees directly affected by the implementation of the Project will be permitted. • Provisions for pedestrians and non-motorized traffic. • Access to properties /access to the site • Soil stability and earthworks • Removal of buildings • Effect on watercourses and water quality • Effects on adjacent land. • Material disposal • Equipment operation and disposal • Disposal of waste and reinstatement of land 2.SOURCE OF IMPACT 3.LOCATION 4.TYPE OF IMPACT 5. MANAGEMENT and MITIGATION of measures proposed to reduce or eliminate Impact. **6**. Implmentation of management and mitigation procedure and status.

APPENDIX C

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