Ministry of Transportation

DRAFT

Environmental and Social Management Framework (ESMF)

For The Transport Sector Development Program (TSDP)

(ROAD SECTOR)

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List of Acronyms

AER	Annual Environmental Report
ARIs	Acute Respiratory Infections
BOST	Bulk Oil Storage & Transportation Company
BP	Bank Policy
BRT	Bus Rapid Transit
CERSGIS	Centre for Remote Sensing and Geographic Information System
CI	Conservation International
DFR	Department of Feeder Roads
DUR	Department of Urban Roads
EA	Environmental Assessment
EAR	Environmental Assessment Regulations
ECG	Electricity Company of Ghana
ECOWAS	Economic Community of West African States
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMU	Environmental Monitoring Unit
EPA	Environmental Protection Agency
EPAA	Environmental Protection Agency Act
ESA	Environmental and Social Assessment
ESAs	Environmentally Sensitive Areas
ESM	Environmental and Social Management
ESMF	Environmental and Social Management Framework
FC	Forestry Commission
FSD	Forest Services Division
GAMA	Greater Accra Metropolitan Area
GDP	Gross Domestic Product
GHA	Ghana Highway Authority
GoG	Government of Ghana
GPRS I	Ghana Poverty Reduction Strategy
GPRS II	Growth and Poverty Reduction Strategy
GPRTU	Ghana Private Road Transport Union (of the TUC)
GT	Ghana Telecommunications Company
GWCL	Ghana Water Company Limited
HIV/AIDS	Human Immuno-deficiency Virus/ Acquired Immune Deficiency Syndrome
ILO	International Labour Organisation
LI	Legislative Instrument
MES	Ministry of Environment and Science
MLGRDE	Ministry of Local Government, Rural Development and Environment
MoH	Ministry of Health
MoT	Ministry of Transportation
MRT	Ministry of Road and Transport
MTDP	Medium Term Development Plan
MTEF	Medium Term Expenditure Framework
NDPC	National Development Planning Commission
NEAP	National Environmental Action Plan

NGO	Non-Governmental Organization
NMT	Non-Motorised Transport
OPD	Out Patient's Department
OSH	Occupational Safety and Health
PEA	Preliminary Environmental Assessment
PER	Preliminary Environmental Report
PLWAs	People Living with AIDS
PNDC	Provisional National Defence Council
PROTOA	Progressive Transport Owners' Association
PWD	Public Works Department
RTTFP	Road Transport and Transit Facilitation Program
SEA	Strategic Environmental Assessment
SMTDPs	Sectoral Medium Term Development Plans
STDs	Sexually Transmitted Diseases
SVP	Southern Voltaian Plateau
TOR	Terms of Reference
TSDP	Transport Sector Development Program
UEMOA	West African Economic and Monetary Union
URTI	Upper Respiratory Tract Infection
UTP	Urban Transport Planning Project
VSB	Voltaian Sandstone Basin
WB	The World Bank
WD	Wildlife Division
WHO	World Health Organisation
WRC	Water Resources Commission

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EXECUTIVE SUMMARY

Introduction

This Environmental and Social Management Framework (ESMF) will be used for the Transport Sector Development Program (TSDP), but with focus on road sector projects. The rationale for preparing the ESMF is as follows:

- The detailed designs of project road operations are yet to be carried out, consequently, the impacts are not known;
- The bulk project roads to be financed under the TSDP are yet to be identified;
- The Ministry of Transportation (MoT) found it useful to have a policy document establishing principles and procedures that will govern the mitigation of adverse environmental and social impacts induced by the TSDP road project operations, to share with various stakeholders in the road transport sector.

The Transport Sector in Ghana accounts for 9% of the country's GDP and is linked up with the economic sector with respect to macro-economic development and also addresses conditions of rural equity. Consequently transport improvement has been defined by the Ghana Poverty Reduction Strategy (GPRS) as an integral component for opening up of the country for productivity and hence poverty reduction. The fundamental policy objective of the Ministry of Transportation therefore is to establish an efficient, modally complementary and integrated transport system.

The Transport Sector is made up mainly of road transport, maritime and water transport, civil aviation and rail. Road transport is the major carrier in Ghana's land transport system, currently taking up about 98% of freight and 95% of passenger traffic. The Road infrastructure implementing sector is managed by the Ghana Highway Authority (GHA), Department of Feeder Roads (DFR) and the Department of Urban Roads (DUR), under the MoT.

The ESMF provides a corporate environmental and social safeguard policy framework, institutional arrangements and capacity available to identify and mitigate potential safeguard issues and impacts of each sub-project. With the use of the ESMF, national and local environmental and social requirements of the LI 1652 for any affected community and entity will be met. This will also be consistent with the OP4.01 and OP4.12 and other applicable safeguard provisions of the World Bank. The ESMF also represents a statement of policy, guiding principles and procedures of reference with focus on the road sector projects, agreeable to all key stakeholders such as the EPA, the World Bank, MoT and the implementing Agencies.

Existing Policy, Legal and Administrative Frameworks

The following national and World Bank environmental policies, legal and administrative frameworks were used as reference in the preparation of the ESMF.

- Ghana's Environmental Policy, which defines a set of policy and other actions that will make Ghana's development strategy more environmentally sustainable.

- The Environmental Protection Agency Act of 1994 (Act 490) which grants the Agency enforcement and standards setting powers, as well as the power to ensure compliance with EA requirements and procedures for proposed as well as existing undertakings.

- The Environmental Assessment Regulations (LI 1652), and EIA procedures which combine both environmental assessment and environmental management systems. The regulations prohibit commencing an "undertaking" without prior registration and environmental permit, and define the relevant stages of the procedures for EA. The environmental management system includes Environmental Management Plan, Environmental Certification and Annual Environmental Report.

- The World Bank's safeguard policies which include guidance on EA requirements - Environmental Assessment (OP4.01), and also the Involuntary Resettlement (OP/BP 4.12), Forestry (OP/BP 4.36), and Management of Cultural Property (OPN 11.03).

- The Ghana Poverty Reduction Strategy (GPRS I) and the Growth and Poverty Reduction Strategy (GPRS II), which are the framework sequence of policies and development strategy programs and projects to facilitate macro-economic stability, sustainable growth and poverty reduction, among others.

Road Sector Policy and Infrastructure

The Road Sector Development Program (RSDP) is for a five-year period (2002 – 2006/7), and aimed at improving the condition of the roads in Ghana. Its development objective is to achieve sustainable improvement in the supply and performance of roads and road transport services in a regionally equitable manner. Roads constitute the predominant mode of transportation for both passenger and freight services.

The Policy objectives include issues on: capacity development; sustainable funding; sound economic and environmental principles; operational efficiency of the road network; integration of road network with other modes of transport; development of safety programs; mitigation of negative environmental and social impact of roads and related activities.

Besides the key road sector institutions of GHA, DFR and DUR which operate under the MoT, there are other institutions whose functions relate to road sector activities, project corridor selection and management, and project approval. These include the lead environmental regulator - the EPA; the resource management institutions such as the Water Resources Commission, and Wildlife Division and Forest Services Division of the Forestry Commission; and the utility/service providing institutions, which include the Electricity Company of Ghana, Ghana Water Company and Ghana Telecommunications Company.

The Transport Sector Policy and Program

The road sector, in spite of the on-going RSDP has a range of problems. These include traffic congestion and inadequate maintenance, improvements and implementation of traffic control devices, among others. The RSDP comes to an end in December 2007 and will be replaced by the Transport Sector Development Program (TSDP). All new projects under preparation will be executed under the TSDP after 2007. The fundamental policy objective of the transport sector is to establish an efficient, modally complementary and integrated transportation network for the movement of goods and people at the least possible cost.

The TSDP includes various road projects, some of which have been identified. Three of the projects identified are:

- The Road Transport and Transit Facilitation Program (RTTFP);
- The Urban Transport Planning Project (UTP); and
- The Abidjan – Lagos Transport and Transit Facilitation Project (ALTTFP).

These projects include multiple sub-projects to be identified and assessed later, during detailed design. All these will be implemented using the ESMF as a basis for addressing any safeguards policies and concerns from pre-feasibility to post construction stages of the project implementation cycle.

Description of Baseline Conditions

The natural resources that usually have relevance to road projects include water resources, wildlife and biodiversity resources, coastal resources and air quality. In terms of water resources, three major drainage systems exist in Ghana. These are the Volta systems, south western river system and the coastal river system. Over 90 lagoons and associated wetlands mainly coastal are found in Ghana.

The wildlife and biodiversity resources comprise a diverse array of species including several of conservation concern. Over 3,600 plant species, representing the three major taxonomic groups can be found in Ghana. Several culture resources occur, including many sacred grooves and shrines, religious artefacts and places of worship, cemeteries, etc. People tend to have emotional attachment and sensibility to these places and objects. The topography and landscape consist of forests dissected plateau, savannah high plains, voltaian sandstone basin, ridges and escarpments. The total surface area of Ghana, including the area occupied by water bodies is 238, 539km^2. The area has various land uses, including agriculture, forestry and wildlife reserves.

Ghana has ten administrative regions. Land is governed by pieces of legislation relevant in the consideration of land tenure and acquisition. These include:

- The Administration of Lands Act, 1962 (Act 123);
- State Lands Act, 1962 (Act 125);
- State Lands Regulations 1962 (LI 230);
- State Lands (Amendment) (No. 2) Regulations 1963 (LI 285);
- Lands (Statutory Way Leaves) Act, 1963 (Act 186); and
- Office of the Administrator of Stool Lands Act, 1994 (Act 481).

The climate of Ghana has been classified into four main climate regions, the South-Western Equatorial, Dry Equatorial, Wet Semi-Equatorial and Tropical Continental (savannah) Climatic Zones.

Potential Environmental and Social Impacts

Guidelines for route and corridor selection and general screening have been included in the ESMF for the TSDP (Road Sector). These are based on the environmentally sensitive areas list (Schedule 5) of the LI 1652.

Beneficial impacts of the Road Sector/TSDP include specific and general impacts. The ESMF provides for environmental and social issues common to road sector activities and their potential degree of significance.

Environmental and Social Mitigation Principles

The ESMF offers options available and principles for preventing, minimizing or managing various environmental and social impacts as an integral part of road project planning and management. The Appendix 8 provides a summary of road project impacts, potential sources of these impacts and corresponding mitigation principles that may be used.

ESMF Implementation and Management

The ease of the ESMF utility to enhance the performance of the sector and related institutions has been taken into account. The figure 8.1 illustrates the environmental and social planning and management for a typical road sector project. Figures 8.2 and 8.3 also give the procedures for the environmental and social planning and management of road projects that are subject to Sectoral EA and EIA respectively. Tables 6.1 and 6.2 give the Road Sector Sensitivity Screening Criteria that facilitate screening of projects within the MoT and the implementing agencies.

Some general principles that will be observed in the implementation of the ESMF are provided. These include the road sector workplace HIV/AIDS programs, air quality management, soil quality management, water resource management and noise abatement.

1.0 INTRODUCTION

This ESMF will be used for the Transport Sector Development Program (TSDP), but with focus on road sector projects. The rationale for preparing this ESMF is as follows:

- The detailed designs of project road operations are yet to be carried out, consequently, the impacts are not known;

- The bulk project roads to be financed under the TSDP, are yet to be identified;

- The MoT found it useful to have a policy document establishing principles and procedures that will govern the mitigation of adverse environmental and social impacts induced by the TSDP road project operations, to share with various stakeholders in the road transport sector.

1.1. Road Infrastructure Needs

The transport sector accounts for approximately 9% of the GDP and generates a significant share of the total budgetary revenue of the country. Road is the dominant means of transport in Ghana. It has linkages with the economic sector with respect to macro-economic development, and in addressing conditions of rural equity for access and conveyance as economic development grows.

The Ghana Poverty Reduction Strategy (GPRS) defines transport improvement as an integral component for opening up the country for productivity. It has been determined that slow and weak progress in rehabilitating roads is a major impediment to poverty reduction. The GPRS establishes that road improvement is the centre of a successful systematic poverty reduction program. Transport improvement is known to be essential to accelerate connections to main food growing and potential agricultural growth areas of the country. The fundamental policy objective of the Ministry of Transportation (MoT) in this respect is to establish an efficient, modally complementary and integrated transportation network for the movement of goods and people at the least possible cost. The Transport Sector Development Program (TSDP) has been formulated within the framework of this policy direction to ensure the objectives of the GPRS are met.

Some general problems of the road transport sector include traffic congestion; inadequate maintenance, improvements and implementation of traffic control devices; and insufficient enforcement of traffic regulations. These problems could be attributed to the lack of proper institutional arrangement, capacity, regulatory mechanisms and enforcement, and also the lack of proper coordination. For instance, the various transport agencies have prepared separate, mode-focused policies which have produced an imbalance in the development of the individual modes, inhibited healthy competition and prevented the country from benefiting from intermodalism.

To make more informed decisions about planning and delivery of the transport systems, there is the need to develop a highly integrated planning and management framework representing all transport modes and services. This ESMF has been developed in response to that need of the road infrastructure sector of the Ministry of Transportation.

1.2. Environment and Social Context of Road Development

Transport development aims to improve the quality of life. A wide range of social benefits arise as a result of road development or road improvement interventions. These may include economic benefits, employment generation, social services, travel and transport, enhanced gender opportunities, fuel economy and reduced pollution.

Road development unfortunately, however, also exerts adverse effects on the social and physical environment within which they are executed. Ohene Safo R. (2006). The negative effects of road development may include: air and water resources quality deterioration, noise and vibration, soil erosion and sedimentation, public health impacts, disruption in public utilities and pedestrian-vehicular conflicts, landscape and habitat modification, and the expropriation of farmlands and structures.

1.3. Purpose and Objectives of the ESMF

The Environmental Assessment (EA) Regulations of Ghana provide the general framework and procedures for carrying out EA and environmental management (EM) of development activities of all sectors (including the transport sector). Some Development Partners (DPs) and funding institutions, including the World Bank also have their EA requirements, which should be followed as a key conditionality to fund projects.

As part of the credit agreement with the World Bank, the Bank's environmental and social safeguards policies (OP/BP 4.01, Environmental Assessment and OP/BP 4.12, Involuntary Resettlement) must be applied to any project which has adverse environmental and or social impacts. The ESMF is used in the case of operations with multiple sub-projects, various phases and spread over a long period - similar in concept to Strategic Environmental Assessment (SEA) under Ghana's EA system. The ESMF spells out corporate environmental and social safeguard policy frameworks, institutional arrangements and capacity available to identify and mitigate potential safeguard concerns and impacts of each sub-project. This ensures that the sub-projects meet the national and local environmental and social requirements and consistent with OP 4.01 and OP 4.12 and other applicable safeguard provisions of the Bank.

The decision by the MoT to prepare an ESMF in the implementation of the TSDP is to adapt for the ministry and the implementing agencies a framework that will facilitate compliance with relevant national, the World Bank EA and other requirements for sub-projects under the TSDP in a coherent manner. The ESMF represents a statement of policy, and provides the guiding principles and institutional arrangements as well as environmental and social safeguards instrument of reference, in the implementation of road sector activities. The framework gives a platform of standard principles and processes for the road sub-sector activities agreeable to all parties – MoT and the implementing Agencies, the EPA, the World Bank and others, as appropriate. The main objectives of the ESMF include:

- Assessment of potential adverse environmental and social issues or impacts commonly associated with road project activities and the ways to avoid, minimize or mitigate them;

- Establishment of clear procedures and methodologies for the environmental and social planning, review, approval and implementation of sub-projects to be financed under the RTTFP and UTP;

- Development of screening tool - checklist and guidelines to be used for site selection; and

- Specification of roles and responsibilities and the necessary reporting procedures for managing and monitoring road transport sector environmental and social concerns.

1.4. Methodology for the ESMF Preparation

The ESMF preparation involved document reviews and consultation with key stakeholders in the road sector, in addition to the lead road sector institutions. Key stakeholders consulted included the MoT, Ghana Highway Authority (GHA), Department of Urban Roads (DUR), and Department of Feeder Roads (DFR). The main national and the World Bank reference documents reviewed were the following:

- Environmental Protection Agency Act, 1994 (Act 490);
- Environmental Assessment Regulations, 1999 (LI 1652);
- The National Environmental Action Plan;
- The Ghana EIA Procedures; and
- The World Bank's Environmental and Social Safeguards Policies (OP/BP 4.01 and OP/BP 4.12).

2.0 EXISTING POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORKS

This section covers Ghana's environmental policy, legislation and the procedures for Environmental Assessment (EA), as well as those of the World Bank. There are no substantial differences in principle between the two sets of policies and operational procedures applicable to the environmental and social areas of development actions.

2.1. National Environmental Requirements

The principal environmental provisions and requirements in Ghana include or are found in the:

- Ghana Environmental Action Plan I & II (1993);
- Environmental Protection Agency Act, 1994 (Act 490);
- Ghana Environmental Impact Assessment Procedures (1995);
- Environmental Assessment Regulations, 1999 (LI 1652); and
- Environmental Assessment (Amendment) Regulations, 2002 (LI 1703).

The main environmental protection and management tools derived from the above list include the:

- Environmental Assessment (EA) system (comprising project-level EA and strategic-level EA) for proposed projects, policies, plans, programs, investments, etc;

- Environmental management system (comprising environmental management planning, annual environmental reporting, compliance monitoring and environmental auditing) for implementation phase management of projects, plans, programs, etc; and

- Other environmental quality and discharge guidelines, procedures and instruments.

The broad mandate for environmental protection and over-arching resources and development sustainability fall under the Environmental Protection Agency (EPA) as the lead regulator.

2.1.1. Ghana's Environmental Policy

The most effective tool for environmental protection is "prevention". This is reflected in the Environmental Policy of Ghana formulated in the National Environmental Action Plan (NEAP) of 1993. The NEAP defined a set of policy and other actions that would make Ghana's development strategy more environmentally sustainable. The Ghana environmental policy aims at a sound management of resources and the environment, and to avoid developments that are unsound or environmentally destructive. The policy seeks reconciliation between economic planning and environmental resources development with the view to achieving sustainable national development. Within this context and in relation to the transport sector, the policy seeks among others to:

- Develop procedures for the utilization of land resources that ensure the maximum degree of economy in the use of land and avoid or minimize conflicts;

- Institute and implement an environmental quality control and sustainable development programs by requiring prior EA of all developments; and

- Take appropriate measures to protect critical eco-systems, including the flora and fauna they contain against harmful effects, nuisance or destructive practices.

The specific objectives of the policy include:

- Ensuring sound management of natural resources and the environment;

- Protecting human, animals and plants and their biological communities and habitat;

- Guiding development in accordance with quality requirement to prevent, reduce and as far as possible eliminate pollution and nuisance; and

- Integrating environmental considerations in sectoral, structural and socio-economic planning at all levels.

The adoption of the NEAP led to the enactment of the EPA Act 490 (1994) which for the first time gave legal support to Environmental Assessment (EA) implementation in Ghana, after almost fifteen years of experimentation. The passing of the Ghana EIA Procedures into the EA Regulations (LI 1652, 1999) further consolidated EA application in Ghana.

2.1.2. The Environmental Protection Agency Act

The Environmental Protection Agency (EPA) Act, 1994 (Act 490) grants the Agency enforcement and standards setting powers, and the power to ensure compliance with such standards and guidelines. The EPA is also mandated to ensure compliance with the Ghana EA requirements and procedures for proposed as well as existing "undertakings". Additionally, the Agency is required to:

- Control and prevent the discharge of waste and the generation, treatment, storage, transportation and disposal of waste;

- Control and monitor use and advice on regulation and management of hazardous substances;

- Develop comprehensive database on environment and environmental protection for promotion of sound ecological systems, effective planning and sustainable development; and

- Create environmental awareness and build environmental capacity as relates all sectors.

The Agency is also vested with the power to determine what constitutes an "adverse effect on the environment" or an activity posing "a serious threat to the environment or public health", to require EAs, EMPs, AERs, etc of an "undertaking", to regulate and serve an Enforcement Notice for any offending or non-complying undertaking,

including transport sector undertakings. Furthermore, a requirement by EPA for an EA for an undertaking overrides any authorizing MDA from licensing, permitting, approving or consenting such undertaking, unless notified otherwise by the EPA.

2.1.3. Environmental Assessment Regulations and Procedures

The Environmental Assessment (EA) Regulations combine both an environmental assessment and environmental management systems. The regulations prohibit commencing an "undertaking" (including transport sector projects, investments, etc) without prior registration and environmental permit. Undertakings/activities are grouped into schedules to enable registration and securing environmental permit from the EPA through the EA system. The schedules include undertakings requiring registration and Environmental Permit (Schedule 1), EIA mandatory undertakings (Schedule 2), as well as Schedule 5-relevant undertakings (located in Environmentally Sensitive Areas) in Ghana.

The EA Regulations define the relevant stages in the procedure, including:

- Registration;
- Screening;
- Preliminary Environmental Assessment (PEA);
- Scoping and terms of reference (TOR);
- Environmental Impact Assessment (EIA);
- Public Notices and Public Hearing;
- Review of EA reports;
- Environmental permitting and certification; and also
- Environmental Management Plan (EMP); and
- Annual Environmental Report (AER).

The environmental management system refers to the implementation phase environmental stewardship requirements for projects, etc. These include EMP, AER and Environmental Certification. The regulatory Agency conducts compliance monitoring to verify compliance with given approval/permit conditions or against required environmental standard and/or project mitigations. The Agency may also require an environmental audit for a project. An Environmental Audit is a systematic environmental evaluation process that presents a comprehensive environmental status of an existing project or activity (including risks and liabilities).

An Annual Environmental Report is required to be submitted to the EPA on and for all undertakings granted Environmental Permit 12 months from commencement of operation, and annually thereafter. An annual report would provide an evidence of the extent of compliance with relevant mitigation commitments, monitoring requirements and results, etc. An Environmental Management Plan on the other hand, provides information on the system for meeting the environmental stewardship commitments (including mitigation and monitoring, training, reporting and resource allocation and responsibilities) for a project. EMPs are for projects qualified under PEA and EIA, and required to be submitted to EPA within 18 months of commencement of operations, and updated every 3 years thereafter.

2.2. The World Bank Requirements

2.2.1. The Bank's Safeguard Policies

The World Bank's Operational Policies (OP) includes guidance on Environmental Assessment requirements. The Bank's Safeguard Policies, ten of them, is meant to ensure that operations of the Bank do not lead to adverse impacts or cause any harm.

The Safeguard Policies are lumped into Environment, Rural Development, Social Development and International Law. The following four out of the ten are relevant for considerations under the ESMF. These are:

- Environmental Assessment (OP 4.01);
- Involuntary Resettlement (OP/BP 4.12);
- Forestry (OP/BP 4.36); and
- Management of Cultural Property (OPN 11.03).

2.2.2. Environmental Assessment (OP 4.01)

The OP 4.01 requires among others that screening for potential impacts is carried out early, in order to determine the level of EA to assess and mitigate potential adverse impacts. The Bank's project screening criteria group projects into three categories:

- Category A – Detailed Environmental Assessment;
- Category B - Initial Environmental Examination and
- Category C – Environmentally friendly

The EA ensures that appropriate levels of environmental and social assessment are carried out as part of project design, including public consultation process, especially for Category A and B projects. The OP 4.01 is applicable to all components of Bank financed projects, even for co-financed components.

2.2.3. Involuntary Resettlement (OP/BP 4.12)

The Policy on Involuntary Resettlement is intended to assist displaced people arising from development projects, in order not to impoverish any affected people within the area of influence of projects. An action plan that at least restores the standard of living must be instituted, in cases where resettlement is inevitable or loss of assets and impacts on livelihood occurs. Public consultation of "re-settlers" as well as the host communities is significant for the successful resettlement process and implementation of the action plan, in order to incorporate appropriate choices.

2.2.4. Forestry (OP/BP 4.36)

The OP/BP 4.36 aims at enhancing the environmental and social contribution of forested areas, and the need to reduce deforestation. The protection of forests through the control of forest-related impact of all investment operations is a concern of the policy. It promotes the restriction of operations affecting critical forest and conservation areas, while requiring that the sector and other relevant stakeholders should be consulted as appropriate.

2.2.5. Management of Cultural Property (OPN 11.03)

The policy is premised on the need to investigate and take inventory of cultural resources likely to be affected. Mitigations are provided for in cases of adverse impacts on physical cultural resources. Mitigation measures should be undertaken in

conjunction with the appropriate authorities, organizations and institutions who are also required to be consulted and involved in the management of cultural property.

The Bank does not support development actions likely to significantly damage non-replicable cultural property, and does assist only those projects sited or designed to prevent such damage.

2.2.6. Bank's Policy on Disclosure

The Bank's policy on disclosure currently under review requires that all the people residing in the given areas of a project have the right to be informed of the proposed development project in their respective areas. Prior to project appraisal therefore, the summary of the study of the development action along with other relevant information should be disclosed to or at the level of the Bank and the project area.

2.3. The Poverty Reduction Strategy of Ghana

2.3.1. Ghana Poverty Reduction Strategy (GPRS I)

The GPRS I is a comprehensive framework of policies and development strategies, programs and projects to facilitate macro-economic stability, sustainable growth and poverty reduction over a three-year period (2003-2005). The poverty reduction measures are required to express in the Sectoral Medium Term Development Plans (SMTDPs), the corresponding Medium Term Expenditure Framework (MTEF) and annual budgets, underpinned by monitoring and evaluation to track and identify the societal impact, among others.

The aim is to create wealth by transforming the nature of the economy to achieve growth, accelerated poverty reduction and protection of the vulnerable and excluded within a decentralized, democratic environment. The above will be achieved by among others, the active role of the private sector, promoting gainful employment and sustainable livelihoods, support by the provision of ***basic services, including transportation***, good governance and ***increased capacity of the public sector (including transport)***.

2.3.2. Growth and Poverty Reduction Strategy (GPRS II)

The central goal of GPRS II (2006-2009), which builds on GPRS I is to accelerate the growth of the economy to attain a middle-income status (with a per capita income of US$ 1000). The focus is on human resource development, changing the structure of the economy by developing the private sector, diversifying the export base and the modernization of agriculture and ***supporting infrastructure key among which is the transport sector***.

The GPRS II emphasizes the implementation of growth-inducing policies and programs with the potential to support wealth creation and sustainable poverty reduction. The document refers to the need to apply environmental impact assessment and environmental audit to ensure that the growth arising from the GPRS is environmentally sustainable.

3.0 ROAD SECTOR AND INFRASTRUCTURE

3.1. The Road Sector Development Program (RSDP)

The RSDP is a five-year program (2002 – 2006/7) intended to improve the condition of the roads in Ghana. Its development objective is to achieve sustainable improvement in the supply and performance of roads and road transport services in a regionally equitable manner. Sustainability involves physical, financial as well as environmental aspects and is closely related to the success of institutional reforms and institutional strengthening. Equitability encompasses bridging of geographic disparities largely between the south and the north (the later roughly comprising the three northern regions). There are disparities of income, disparities between urban and rural areas, gender inequalities, etc.

The RSDP was designed to reflect the integrated and donor coordinated approach to road development and management with particular emphasis on the comprehensive development framework. The RSDP funding is defined within the context of the Government's Medium Term Expenditure Framework (MTEP). It is a five-year slice of the road sector strategic plan including all road types that is trunk, feeder and urban roads funded by the Government of Ghana and various bilateral and multilateral donor agencies. It is aimed at removing transport bottlenecks relating to the following issues:

- Road maintenance financing – improvement in the stability of road maintenance funding to be in step with increase in maintenance requirements;

- Focus on the road sector's contribution to poverty reduction through the extension and maintenance of feeder roads and upgrading of roads in slum areas of towns;

- Conduction of social and environmental impact assessments to mitigate negative impacts of road activities and gender issues;

- Sector management and implementation capacity through institutional reforms;

- Sound sector programming and analysis through transforming the accounting and management information systems, decentralisation, etc.

The strategy of Government involves a coordinated and integrated program of road maintenance, rehabilitation and re-construction to achieve better transport services defined below.

1) Trunk road development to link the national capital, regional capitals, district capitals, major cities in neighbouring countries and major production centres. Focus will be on the building of three major highways to link up with the trans-ECOWAS highway project i.e. the improvement of the Accra – Yamoransa: Accra –Aflao: and Accra – Kumasi and one major road to a productive area in every region that links the rural areas in each region to the urban.

2) These major highway and regional road investments shall be supplemented by focused strategy to upgrade district and communal feeder roads for opening up

selected rural areas with high potential for poverty reduction in agriculture by linking them with markets in urban areas and peripheral cities. It is planned for the feeder roads to be improved to provide access to small towns, villages and production centres especially agricultural centres. Urban roads will be developed to move people and goods in cities economically, efficiently and safely. The defined action involves the selection of one major road to a productive centre in every region that provides a rural to urban linkage.

The program extends beyond road conditions to a variety of road safety measures, improved environmental practices, institutional strengthening, better reporting and information systems, etc. as detailed below:

- Institutional capacity and human resource development through the re-organisation of the Ministry of Transportation and the road agencies to enhance efficiency and effectiveness;

- Clearing of maintenance backlog - the improvement of maintenance backlog through either rehabilitation or re-construction;

- Investment priorities – adoption of common criteria in the form of the HDM -4 road appraisal tool in feasibility analysis through defining a framework of standards, including unit of construction/rehabilitation, vehicle operating costs, value of time, opportunity cost of capital and environmental, safety and additional socio economic impact;

- Cost recovery – the adoption of road user charges to fund maintenance;

- Private sector contracting – a move from force accounting system to the use of private contracting for maintenance works;

- Dependency on foreign technical assistance – a shift in emphasis from the use of foreign technical assistance to the use of local expertise;
- Expenditure control - authorisation of expenditure at secured funding, shortening of payment approval procedures and releases streamlined to follow programmed levels;
- Road transport regulation – installation of axle load on trunk roads;

- Non-motorised transport – promotion of the use of non-motorised transport;

- Donor co-ordination – establishment of donor co-ordination mechanisms;

- Capacity development – develop in-country capacity for Government institutions and the private sector to coordinate and manage the road network efficiently; and

- Funding sustainability – ensure sustainable funding for the road sector programs.

These factors directly correspond to the objectives of the GPRS. The major limitation is with the issue of intra- and inter-sectoral coordination to ensure that resources are concentrated in areas where they are mostly needed.

3.2. Institutional and Implementation Arrangements

This section discusses the key road sector agencies, as well as the other stakeholder institutions whose statutory functions bear on or relate to the sector or activities thereof.

3.2.1. The Ministry of Transportation (MoT)

Until March 1997 the Ministry of Roads and Highways was responsible for road infrastructure and the Ministry of Transport and Communications for the road transport services and other transport modes. The two ministries were amalgamated to become the Ministry of Roads and Transport (MRT) in that year, and later on following re-designation and realignment of functions became the Ministry of Transportation (MoT). The MoT has responsibility for the:

- Formulation and implementation of integrated transport policy and planning;
- Promotion of strategic investment in the sector;
- Development, implementation, monitoring of road projects; and
- Regulation of standards.

The MoT has the specific task of co-ordinating and guiding the activities of the three main executing agencies in the road sector under the ministry. The other related organisations under the ministry include: the Driver and Vehicle Licensing Authority, the Metro Mass Transit Limited and the Road Fund Secretariat.

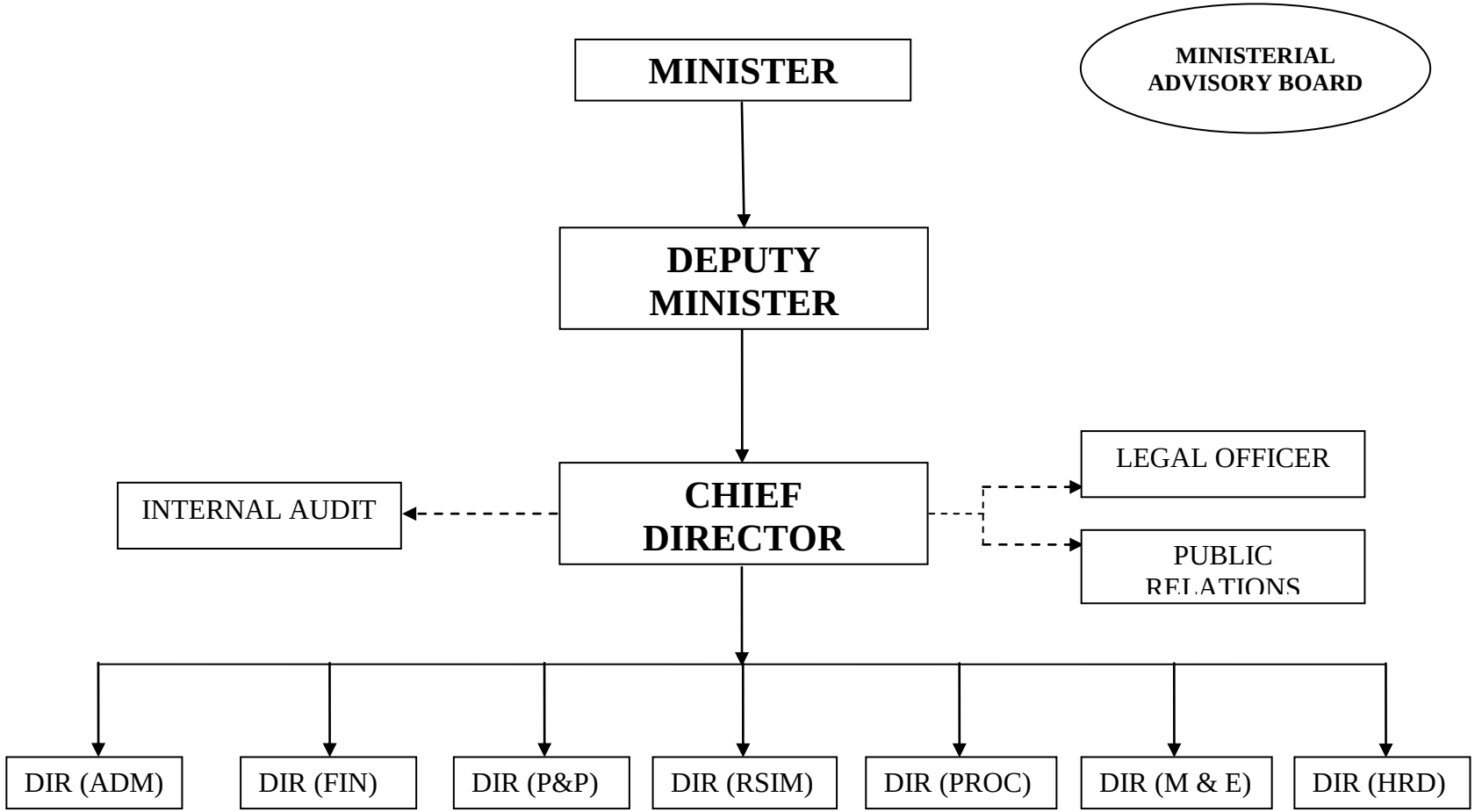
The MoT has a Deputy Director in-charge of Road Safety and Environment under the Directorate of Policy and Planning, as shown in figure 3.2. The figures 3.1 and 3.3 also show the organisational structures of MoT and the Directorate of Monitoring and Evaluation respectively.

3.2.2 The Ghana Highway Authority (GHA)

The GHA is a semi autonomous body with a responsible for the provision and management of trunk roads. It was originally established in 1974 as the organisation responsible for the development and administration of the entire national road network. Since the GHA Act of December 1997, its role is limited to the administration, control, development and maintenance of trunk roads and related facilities subject to the policies of the MoT.

The GHA has a 4-person Environmental Management Unit (EMU) that has oversight on environmental and social issues of the Authority's mandate. The EMU operates under the Road Safety and Environment Division. The figure 3.4 gives the organisational structure of the GHA and the placement of the Road Safety and Environment Division.

Figure 3.1 Ministry of Transportation - Organizational Structure



LEGEND

ADM = Administration
FIN = Finance
P & P = Policy and Planning
RSIM = Research, Statistics and Information Management
PROC = Procurement
M & E = Monitoring and Evaluation
HRD = Human Resource Development

Figure 3.2 Ministry of Transportation - Directorate of Policy and Planning Organizational Structure

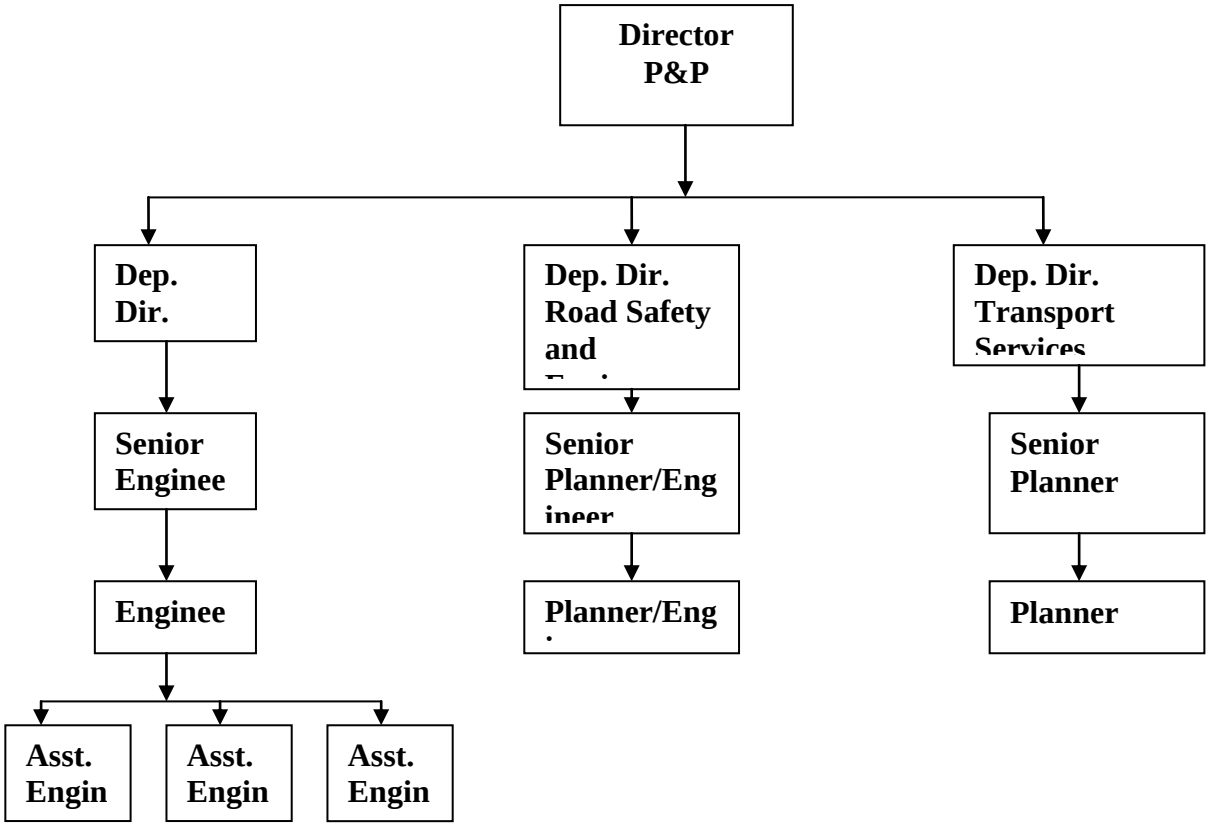


Figure 3.3A Ministry of Transportation - Directorate of Monitoring and Evaluation Organizational Structure

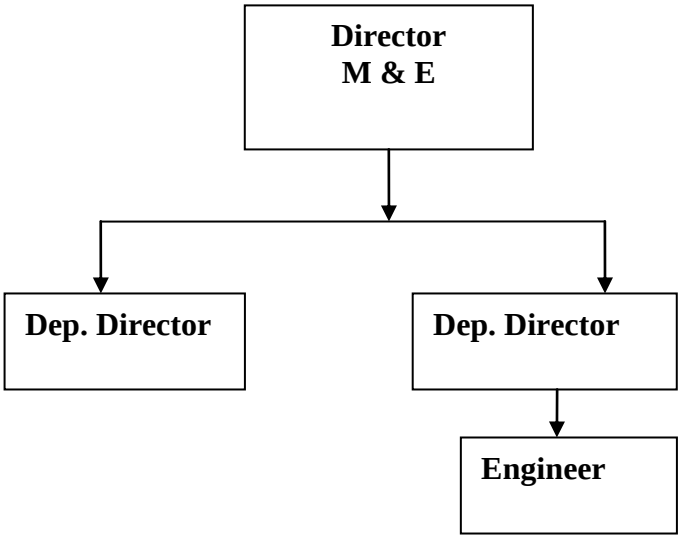
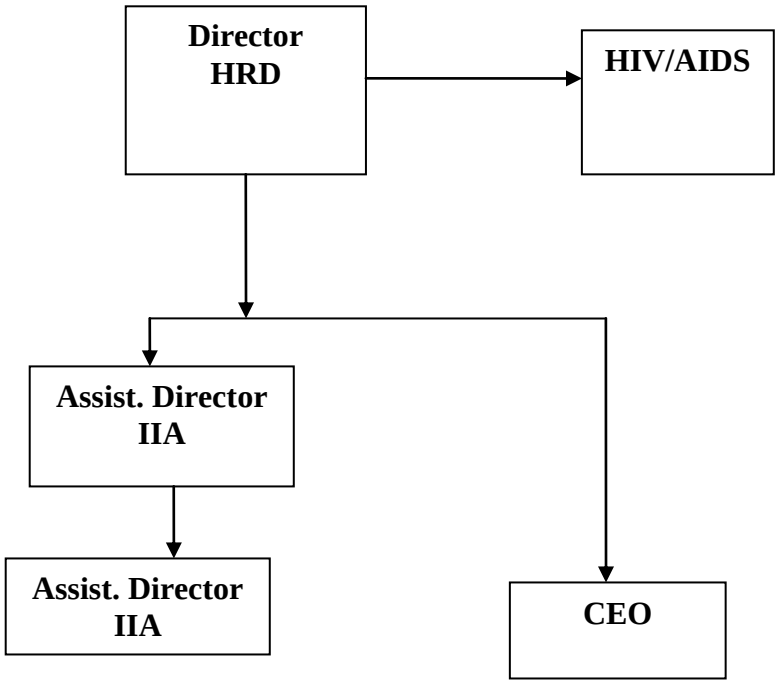


Figure 3.3B Ministry of Transportation - Directorate of Human Resource Development Organizational Structure



3.2.3 The Department of Feeder Roads (DFR)

The DFR is a civil service institution responsible for rural roads. It was set up under Government instrument in 1981 to have the sole responsibility for the planning, development and maintenance of rural roads. Prior to its establishment the responsibility for rural roads shifted from one agency to the other, such as the Public Works Department (PWD), Department of Social Welfare, Department of Rural Development, GHA, and the then Cocoa Marketing Board. The DFR has an Environmental Desk Officer responsible for environmental and social issues associated with the feeder road sub-sector. The figure 3.5 provides the organogram of the DFR.

3.2.4 The Department of Urban Roads (DUR)

The DUR is a civil service institution responsible for the provision of roads other than trunk roads in the metropolitan areas. It was established in 1989 as an implementing agency within the then MRT (now MoT). Prior to its establishment the responsibility for the roads were with the PWD and the then City Councils (now Municipal and Metropolitan Assemblies), and later with the GHA.

The DUR has an Environmental Desk Officer responsible for handling environmental and social issues that arise in the pursuit of the DUR's functions and activities. The Environmental Desk is located within the Planning and Development Unit (figure 3.6).

3.2.5 Other Institutions

The other institutions whose functions relate to the road sector, road project corridor selection and regulation, and project approvals and management include:

- Environmental Protection Agency (EPA);
- Water Resources Commission (WRC);
- Forestry Commission (FC);
- Wildlife Division (WD);
- Forest Services Division (FSD);
- Electricity Company of Ghana (ECG);
- Ghana Water Company Limited (GWCL);
- Ghana Telecommunications (GT); and
- Bulk Oil Storage & Transportation Company (BOST)

3.2.5.1 Environmental Protection Agency

The EPA has the mandate to decide on project screening, guide the conduct of any EA studies and to grant environmental approval for road sector projects to commence. Its mandate also covers monitoring of implementation phase of road projects to ensure compliance with approval conditions, mitigation measures, and other environmental commitments and quality standards.

Fig. 3.4A Ghana Highway Authority Organizational Structure

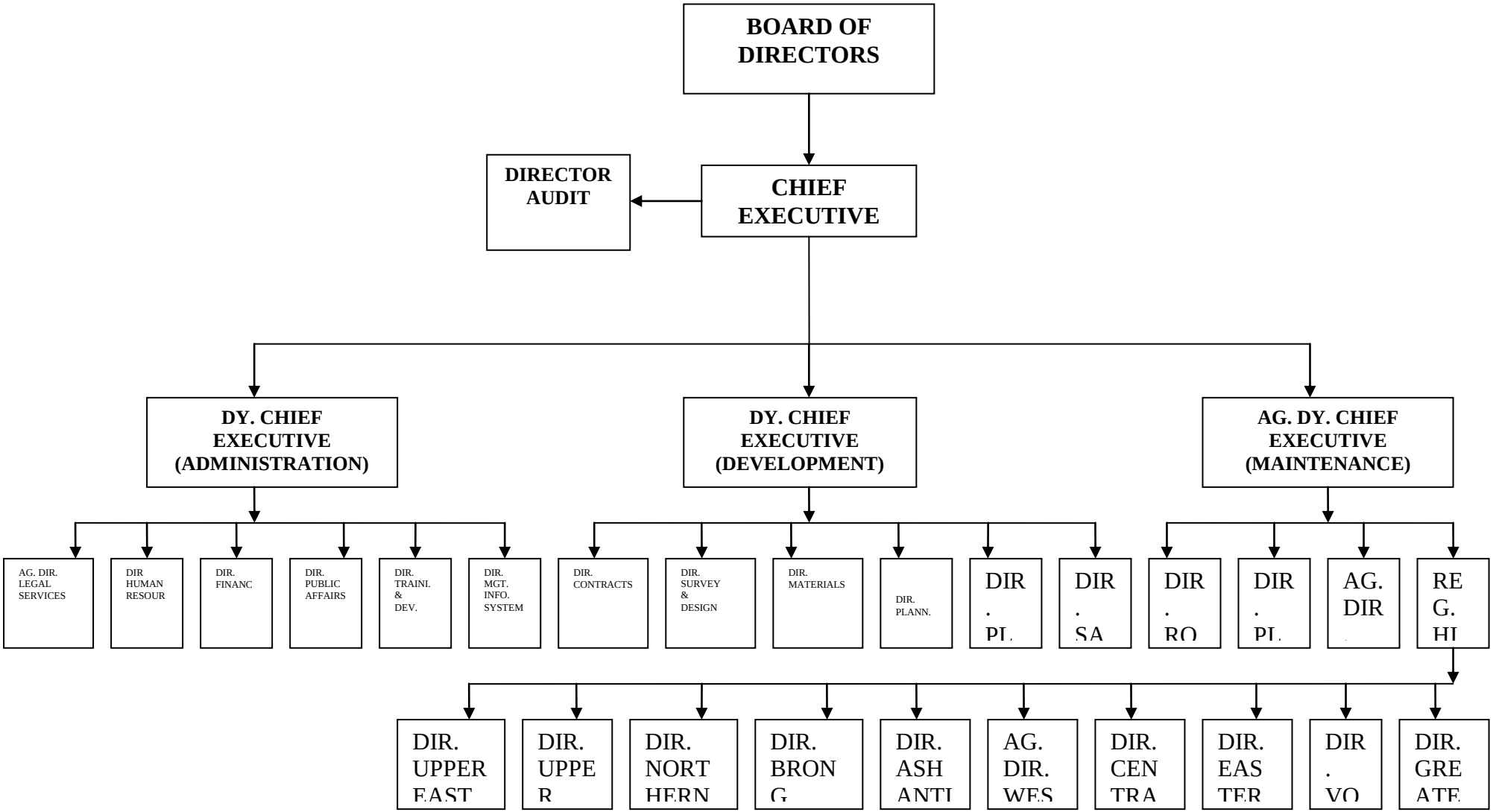


Fig. 3.4B Ghana Highway Authority
Road Safety & Environment Division

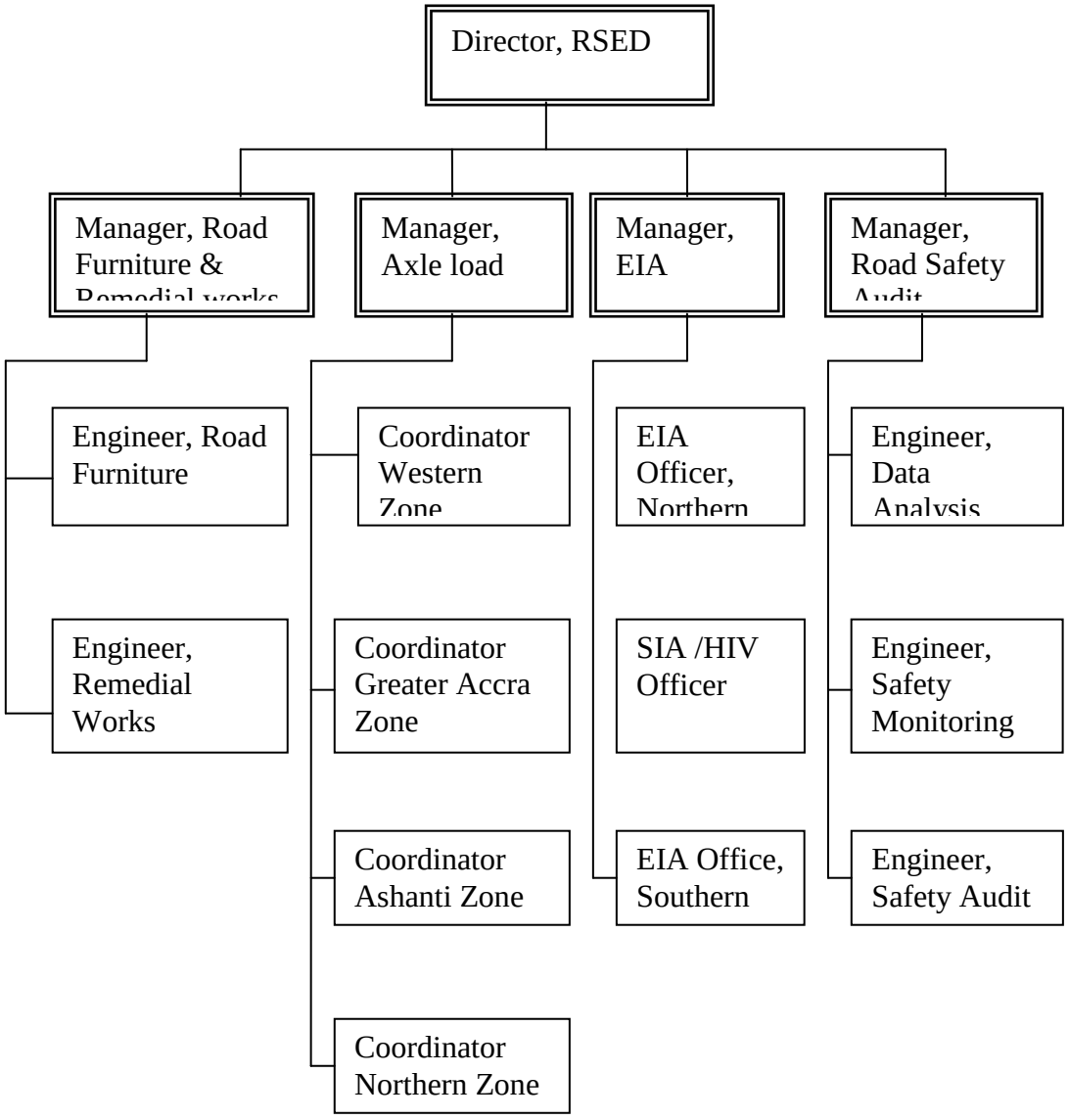


Fig. 3.5 Department of Feeder Roads – Organizational Structure

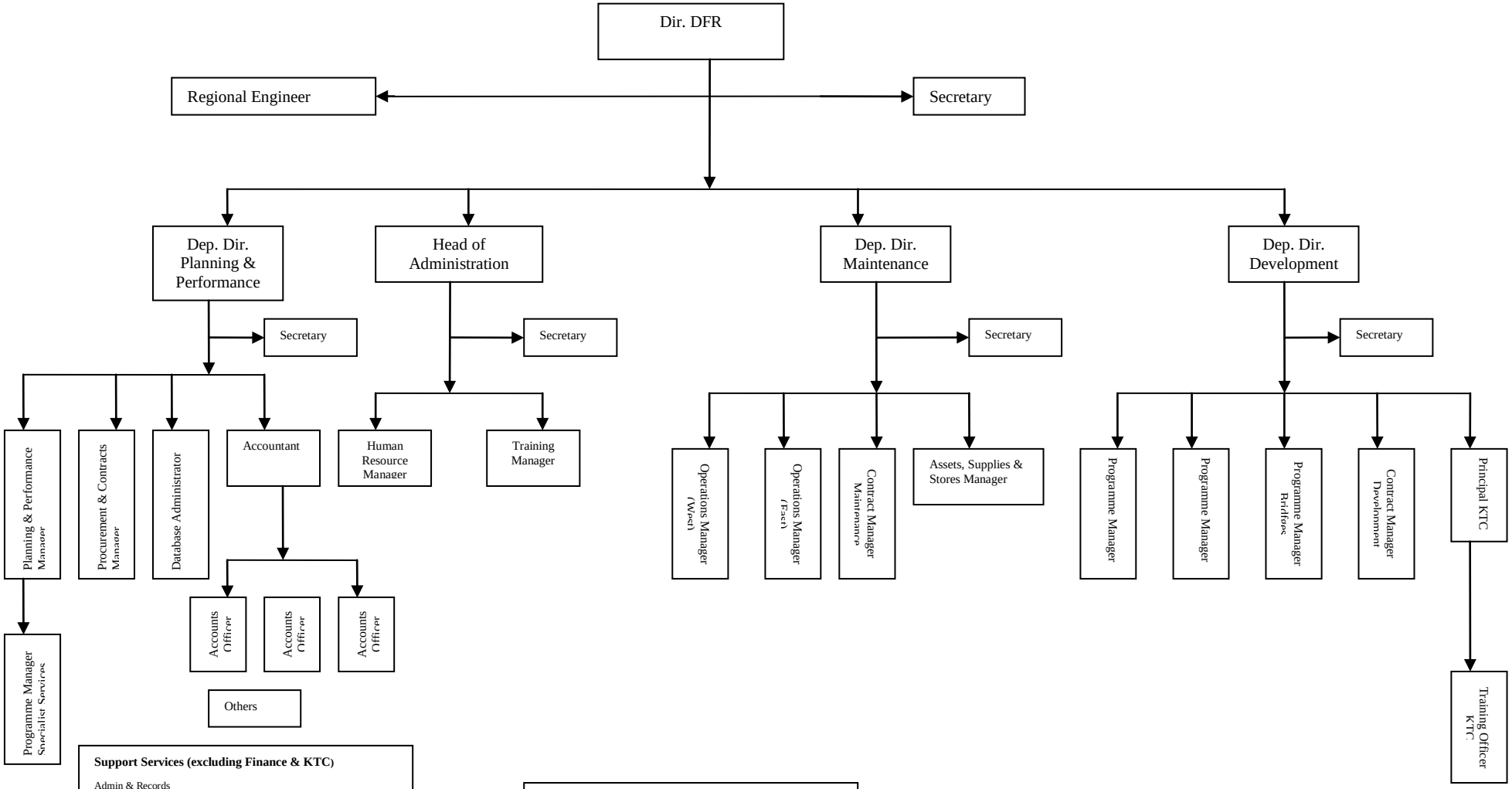
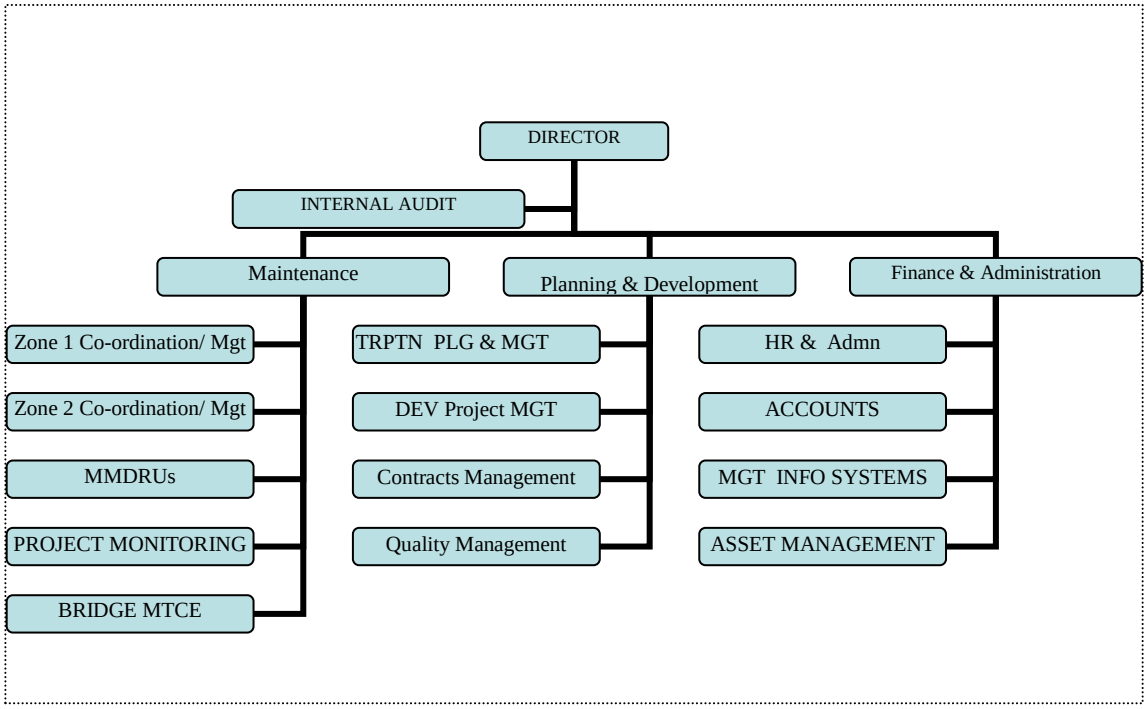


Fig. 3.6 Department of Urban Roads – Organizational Structure



3.2.5.2 Resource Management Institutions

The Water Resources Commission (WRC), the Wildlife Division (WD) and the Forest Services Division (FSD) of the Forestry Commission (FC) are the water, wildlife and forest resource management institutions respectively. These institutions become relevant whenever such resources under their management are likely to be impacted on or implicated in a proposed road project. Such a stakeholder institution would then be consulted in the planning and decision processing to prevent, avoid, reduce or mitigate the likely impact of the project. They may also have to give their consent with respect to the extent to which such resources may be affected or lost as a result of the road development.

3.2.5.3 Utility Service Providing Institutions

The ECG, GWCL, GT and BOST are public/private institutions that provide and/or manage utility services including, electricity, water, telecommunications and petroleum transmission and storage infrastructure. These are all linear transmission facilities either through underground pipes or overhead lines, often along existing road network corridors (where roads exist). Road construction or re-construction and other road services and interventions tend to affect such transmission lines. These often require relocation, realignment, etc to make room for the road project, which calls for the involvement of the respective utility companies or institutions to be consulted in the road project decision-making processes as appropriate.

3.3 Road Infrastructure

3.3.1 The Road Network

Ghana's road network is about 50,000km comprising of highways or trunk roads (13,366.8km), urban roads (4,064km) and feeder roads (32,601.8km). The trunk roads link the national and regional capitals, major cities in neighbouring countries and major production centres. Feeder roads provide access to small towns, villages and production centres, especially agricultural centres. Urban roads are described as special facilities to move people and goods in cities economically, efficiently and safely. They are located within cities and major towns.

A large proportion of the roads (81%) are gravel roads which makes them very susceptible to weather conditions, which therefore requires regular maintenance programs to sustain them. The distribution of road surface types is given in Table 3.1.

Table 3.1: Road Surface Type

Surface Type	Trunk Road (km)	Feeder Road (km)	Urban Road (km)	Total (km)
Asphaltic Concrete and Portland Cement Concrete	1,474	-	-	1,474
Bituminous Surface Treatment	5,018	1,097	1,935	8,050
Gravel	6,874.8	31,504	2,129	40,507.8
Total	13,366.8	32,601	4,064	50,031.8

The network condition is generally poor. The current road condition mix is estimated at 34% good, 26% fair and 40% poor. Most paved roads are in fair condition whilst most gravel and earth roads are in poor condition. The details of the current condition are given in Table 3.2.

Table 3.2: Road Condition Mix of the National Network

ROAD TYPE	PAVED			UNPAVED			TOTAL		
	Good (%)	**Fair (%)**	**Poor (%)**	**Good (%)**	**Fair (%)**	**Poor (%)**	**Good (%)**	**Fair (%)**	**Poor (%)**
Trunk	51.3	31.2	17.5	8.0	28.4	63.6	29.4	29.8	40.8
Feeder	57.0	19.0	24.0	35.0	26.0	39.0	36.0	26.0	38.0
Urban	42.0	60	32.0	17.0	90	74.0	29.0	17.0	54.0
National	50.0	28.0	22.0	30.0	26.0	44.0	34.0	26.0	40.0

3.3.2 Road Network Classification System

The road network has a functional classification system for each road type. The road classification is given in Table 3.3.

Table 3.3: Road Classification

Trunk Road	Feeder Road	Urban Road
National	Inter District	Major Arterial
Inter-Regional	Connector	Minor Arterial
Regional	Access	Distributor/Collector
-	-	Access/Local

3.3.2.1 Trunk Roads

Trunk roads are classified using socio-economic considerations as follows:

- **National** – Roads linking the National capital to regional Capital, important border towns in neighbouring countries, ports and major tourist sites;
- **Inter-regional** – Second hierarchy roads serving as important lines of communication between the various regions to ensure regional coherence; and
- **Regional** – The third category link district capitals to their respective regional capitals or to the nearest district capitals and major industrial, trade or tourist centres.

3.3.2.2 Feeder Road System

The functional classification of the feeder road system is as follows:

- **Inter District** – Roads that cross more than one district;
- **Connector** – Feeder roads that link a trunk or higher class feeder road; and
- **Access** – Feeder roads that start from either a trunk or higher class feeder road and ends in a community.

3.3.2.3 Urban Road System

The urban road system is classified into four main classes as follows:

- **Major Arterials** – Roadways that serve most of the inter-city trips. Principal arteries are further divided into freeways and main arterials;
- **Minor Arterials** – They augment the major arterials in the formation of a network of roads that connect urbanised areas. Travel speeds on the minor arterials can be as high as those on the major arterials;
- **Distributor/Collector** – roads, which primarily carry traffic within individual urbanized areas and trip distances, are usually shorter than those on the arterial roads;
- **Access/local** – These are streets that provide access to residence and to adjacent lands and properties and residential driveways.

4.0 THE TRANSPORT SECTOR POLICY AND PROGRAM

The road sector has a range of problems including traffic congestion and inadequate maintenance, improvements and implementation of traffic control devices, among others, in spite of the RSDP. Some of these problems could be attributed to the lack of proper institutional arrangement, regulatory mechanisms and enforcement, and also the lack of proper coordination of the transport sector on the whole. For instance, the various transport agencies have separate, mode-focused policies which have produced an imbalance in the development of the individual modes, inhibited healthy competition and prevented the country from benefiting from inter-modalism.

The 5-year RSDP comes to an end in December 2007 and will be replaced by the Transport Sector Development Program (TSDP). All new projects under preparation will be executed under the TSDP after 2007. The fundamental policy objective of the transport sector is to establish an efficient, modally complementary and integrated transportation network for the movement of goods and people at the least possible cost.

4.1 Overview of the Transport Sector

The main sub-sectors of the transport sector include:

- Transport infrastructure;
- Land passenger transport;
- Rail, pipeline;
- Civil aviation;
- Maritime and inland water transport; and
- Road traffic.

The Government of Ghana is gradually changing her role from being transport service provider to regulator and controller. This involves policy development and with various stakeholders who provide or are affected by transport services. They need to be consulted on issues of transport policy, planning and development. For example Transport Unions – GPRTU, PROTOA, etc. control road transport services operations. Consequently policies on transportations should allow for adequate consultation and feedback from these stakeholders.

The Government can finance the following category of transport elements:

- Commercial transport – freight transport operations, financially viable passenger operations. Commercial transport should be operated without Government subsidy.
- Transport operations for handicaps and vulnerable e.g. low-income passengers, who need access and mobility but cannot afford, physically challenged. Government should subsidize.
- Public and private agencies involved in the management, control and regulations of transport system - such agencies need to be formed from user charges regulations.

Regulation aimed at ensuring that services provided by both public and private sectors are satisfactorily delivered. It must address a large number of important issues, including:

- Interest of the consumer, private sector concerns about profitability;

- Undesirable behaviour by the private sector as market abuses, neglect of safety and environmental standards; and
- Incentives to the private sector that encourages best practice.
- Monopolies, anti-competitive behaviour and predatory pricing;
- Public goods and public hazard; and
- Gender and other discrimination.

Intermodalism in the transport sector is not effective as the country focused almost exclusively on improving individual modes, with little attention to how improvement in one mode affected others. To achieve national development goals, the transport sector seeks to;

- Develop, maintain and operate an efficient transport system that supports trade and agro-industry;
- Transform Ghana into a transport hub for West Africa;
- Promote safety and security in all transport modes;
- Promote non-motorized transport as an intermediate means of transport;
- Improve accessibility and mobility for all transport users especially the poor, the physically challenges, the elderly and women and children; and
- Promote the use of Information and Communication Technology (ICT) in all modes to improve service delivery.

The strategic objectives of the sector include, among others to:

- Expand growth and reduce poverty;
- Integrate planning, development and service provision;
- Ensure economic and environmental services;
- Advance institutional development;
- Develop human resource and apply new technology; and
- Meet custom needs.

4.2 Components of the Transport Sectors

4.2.1 Transport Infrastructure

The strategic objective requires integrating infrastructure planning, development and maintenance, with emphasis on intermodal coordination, which includes:

- Ensuring access to reliable affordable transportation;
- Making transportation safer and more secure;
- Systemizing and prioritizing expansion;
- Improving the legal and regulatory environment;
- Developing sound and sustainable financial base systems;
- Protecting social structures, health and environment and conserve resources;
- Developing sustainable maintenance management systems.

4.2.2 Land Passenger Transport

Land passenger transport involves movement by rail, bus, minibus, taxi, tro-tro, private motorcars, motorcycles, and NMT such as bicycles, foot, and push carts among others. The strategic objectives of the sector are to:

- Integrate land use and spatial development;
- Improve planning and regulations;

- Promote rail-based mass transport; and
- Promote non-motorized transport.

4.2.3 Surface Freight Transport

This is the domestic and international conveyance of goods by rails, roads, island water and pipeline. The strategic objectives of the sector are to improve legal and regulatory environment, and promote competitive freight transport within existing infrastructure.

4.2.4 Railway

Ghana's railway net is 950km of mostly single track rail of 1.067w. Though not a major system of transportation, it is heavily relied on by mining companies for the exports of their products. Rail transport, however, has the potential of serving a vital part of economy growth

4.2.5 Pipeline

This is used to transport petroleum products from Tema to Akosombo. Others to operate in the not too distance future are from Buipe through Tamale to Bolgatanga and the West Africa Gas Pipeline to transport natural gas from Nigeria to Benin, Togo and Ghana.

4.2.6 Civil Aviation

The sector comprises international air transport services, and focuses on aviation safety, airports and air traffic management, navigation services, institutional development, etc. The sector consists of international and domestic airlines that operate to and from KIA to Kumasi, Sunyani and Tamale. A maintenance bay has been established to service domestic operation aircraft. Kotoka, the only international airport in Ghana handles about 800,000 passengers and 50,000 tons of freight annually The Civil Aviation Act 2004 (Act 678) repealed the PNDC Law 151 of May 1986. With this Act the government plans to separate aircraft management from other functions.

The strategic objectives of the sector are to:

- Integrate planning, development and operations to develop Kotoka international airport for the sub-region;
- Improve aviation safety, security and environmental protection;
- Improve financing; and
- Develop human resources.

4.2.7 Maritime and Inland Water Transport

Maritime and inland water transport includes all forms of transport by sea as well as inter-modal links with inland ports and waterways. It covers freight moving into and from sea ports as well as freight and passenger traffic on the Volta Lake and other inland waterways.

The Volta Lake transport spans about 450km from the south to the north with ports at Akosombo, Buipe and Yapei and major ferry crossing at Yeji, Kete Krachi, Dambai and Kpando. Lake transport is important in the transport if petroleum products, cement and agricultural commodities. For the people along the lake it is their means

of transport. Small boats and canoes also operate on Akosombo, Pra, Oti, Black Volta, While Volta, and Volta south of Akosombo and Lake Bosumtwi.

Improving lake transport will complement land transportation and offer certain economic advantages to users. Greater use of lake transport will also divert some truck movements from transport corridors, reducing overloading on roads, traffic congestions and road maintenance costs. The strategic objectives of the sector include to:

- Integrate planning, development and operations;
- Make transport safer and more secured;
- Support economic and environmental sustainability;
- Improve legal and regulatory environment for investment and services; and
- Develop financing options.

4.2.8 Road Transport

Road traffic consists of motorized and non-motorized vehicles, drivers, pedestrians, road network and safety facilities, and road operations as well as interactions affecting users, infrastructure and the environment. Road Transport is managed by the Ghana Highway Authority, Department of Feeder Roads, and Department of Urban Roads. In 1987, the Road Fund Act (Act 536) was promulgated to provide a legal framework for road maintenance. The sector carries over 95% of the country surface freight and passenger traffic.

4.3 Road Transport and Transit Facilitation Program (RTTFP)

The Road Transport and Transit Facilitation Program (RTTFP) is a proposed program intended to facilitate cross border transport. The program will ensure the removal of non-tariff barriers to transit. It will also reduce transport costs and transit time for persons and goods, while taking into account the impact of international transport on the population bordering major transit corridors. The RTTFP will involve multiple sub-projects and a wide range of related activities which cannot be determined in advance, but will be selected at the planning stages as and when implementation is due.

The main transport corridors in the West Africa sub-region are proposed to be improved by ECOWAS and UEMOA. This is to enhance efficiency and competitiveness, in order to boost intra-regional and international trade. This is identified as a key contributory stimulus to growth and to poverty reduction within the sub-region. The ECOWAS and UEMOA are preparing a regional transport and facilitation program, of which the proposed RTTFP is a part. The program will complement the arranged customs unions in both ECOWAS and UEMOA countries.

In 2001 UEMOA instituted a road transport and infrastructure strategy which defines the objectives for regional road infrastructure, information systems and transport and transit facilitation. ECOWAS is following suit in defining its transport strategy and policies, with the aim of strengthening the community decisions on free movement of goods and persons. Already ECOWAS has adopted a decision on the establishment of a regional road transport and transit facilitation program in support of intra-community trade and cross-border movements, since January 2003.

4.4 Urban Transport Planning Project (UTP)

The Urban Transport Project (UTP) is a public transportation system for Accra the capital of Ghana (and perhaps other major urban centres). Its objective is the improvements in traffic management in the city, with a Bus Rapid Transit (BRT) corridor for the Greater Accra Metropolitan Area (GAMA).

The rapid growth of the private vehicle fleet, combined with reliance on para-transit (tro-tros and taxis) has resulted in extreme traffic congestion throughout the city, and poor quality transit service. The UTP is intended to remedy the situation by the MoT implementing a BRT system on major radial and circumferential routes. The project is in the planning stages, but with the likelihood of a pilot corridor becoming operational in 2007.

In order to inform decisions and as an input to the preparation of an EA for the project there are plans for collecting baseline data, prior to implementing the BRT system. This essentially will help to understand the travel patterns of people living in the GAMA, and the role that transport plays in their lives. As an inevitable difficulty in city life, urban dwellers need to make necessary trade-offs between where they live, where they work and the cost of travel. The survey will help understand the travel behaviour of people in GAMA, with a special focus on residents and business activities along the projected BRT pilot corridor. It will also reveal the transport constraints faced by residents and impact on transport choices, hence the scope of these trade-offs as well as how general welfare could be improved through better public transit.

5.0 DESCRIPTION OF BASELINE CONDITIONS

This section describes natural resources, social and climatic conditions as well as land form, land use and related characteristics that have relevance or some implications for road development and the road sector generally.

5.1 Natural Resources

5.1.1 Drainage and Water Resources

Three major drainage systems exist in Ghana, covering about 5% (911,800Km2) of the total area of Ghana. These are the Volta River System (70%), South Western River System (22%) and Coastal River System (8%) (EPA, 2005).

Within the Volta River Basin lies nearly three-fourth of the total land surface area of the country. The basin can be subdivided into smaller basins – the Black Volta, the White Volta, the Oti and the Volta. The numerous streams and tributaries of rivers in northern Ghana, all of which are tributaries of the Volta System dwindle in the dry season and flood in the rainy season (Dickson and Benneh, 1988).

The Tano, Ankobra and Pra basins form the South Western River Systems. The Pra has the largest basin in the closed forest. Unlike the rivers in northern Ghana, the forest rivers are perennial with higher flow pattern (Dickson and Benneh, 1988).

The Ayensu and Densu rivers make up the coastal river system. The only area of internal drainage in Ghana is that around Lake Bosumtwi, a natural lake with a surface area of approximately 39km^2 and surrounded by hills. It is located about 34km to the South-East of Kumasi (Dickson & Benneh, 1988) where numerous streams flow into the lake.

The above characteristics of water bodies in the two halves of Ghana implies that any disturbance of water quality resulting from road construction and road use could exert severer effect in the northern half during the long dry season. The characteristic widespread seasonal flooding requires careful route selection or the need to elevate the base of roads significantly above the general elevation of the corridor neighbourhood. In the southern half, the regularity and high flow of rivers potentially enhance the assimilative and regenerative capacity of the water bodies to support water quality and aquatic life.

The Water Resources Commission Act, 1996 (Act 522) and the Water Use Regulations, 2001 provide for the regulation and management of all water resources and related matters. The Regulations define the different types of water use that requires a water use permit, for instance to divert, impound, convey and use water from a river, stream, etc and the procedure and public hearing requirements, etc.
The Community Water and Sanitation Agency (CWSA) Act, 1998 establishes the CWSA to facilitate mainly the provision of safe water services to rural communities and also small towns. The CWSA has the mandate to prescribe safe water supply (and sanitation related services) standards and guidelines. It also ensures safe water sustainability, hygiene education and public awareness on water related health

hazards, and provides technical assistance in their planning and execution to District Assemblies and others.

5.1.2 Wildlife and Biodiversity Resources

The fauna of Ghana, though thought to be relatively impoverished, comprise a diverse array of species including several of conservation concern (MES, 2000). Many of the ecologically important areas are protected. These include the:

- Bia and Kakum Conservation Areas;
- Bomfobiri, Owabi and Agumatsa Wildlife Sanctuary;
- Kogya Strict Nature Reserve;
- Digya National Park; and
- Kalakpa Resource Reserve.

Current records indicate that there could be as many as 221 species of amphibians and reptiles, 724 species of birds and 225 mammalian species (with 93 recorded to inhabit the savannah ecological zone (MES, 2002, cited in Ashong, 2004).Threatened species in Ghana include four species of marine turtles and three species of crocodiles. Three species of frogs (*Hyperolius baumanni, H. fusciventris and H. sylvaticus*) and the lizard, *Agama sylvanus* have been found to be endemic in the country (MES, 2002).

A total of over 3,600 plant species, representing the three major taxonomic groups can be found in Ghana (MES, 2002). The wet evergreen forest exhibits the most diverse level of endemism and species richness in Ghana. The Ankasa and Nini-Suhien Conservation Areas are biological 'hotspot', because of their high biological diversity (CI, 2002, cited in EPA, 2005).

Noise and vibration which are associated with road construction could exert severe adverse effects on wildlife and biological resources, and might drive wildlife away from their natural habitat. The sensitivity of wildlife resources and conservation areas must always be taken into account in road construction. The Wild Animals Preservation Act, 1961 (Act 43) and its subsidiary regulations, the Wildlife Conservation Regulations, 1971 and Wildlife Reserves Regulations are significant provisions for wildlife resource protection. The Wildlife Reserves Regulations for instance, establish and designate 6 Reserves:

- Mole National Park;
- Digya National Park;
- Bui National Park;
- Shai Hills Game Production Reserve;
- Kogyae Strict Nature Reserve; and
- Owabi Wildlife Sanctuary.

The regulations provide for restricted entry to and protection of animals and plants life in the reserves, protection of amenities, and the prohibition to light fire, pollute water, litter, clear or any area of the reserves.

5.1.3 Coastal Resources

There are over 90 lagoons and associated wetlands in Ghana. Most coastal resources (lagoons, beaches, and wetlands), etc are very important in the cultural lives of the coastal communities, with some coastal resources serving as worship points or places to traditional believers. Many of such resources are gradually losing their integrity, quality and aquatic life because of the level of pollution. Typical examples are the Chemu, Kpeshie and Korle lagoons. Besides, five of the six Ramsar Sites in Ghana are located in the coastal areas. Environmental degradation is common in coastal areas, because of population pressure and intense infrastructure development and use.

The Wetlands Management (Ramsar Sites) Regulations, 1999 were made pursuant to the Wild Animals Preservation Act, 1961 (Act 43) and constitutes an important provision for sensitive coastal resources protection. The accession to the Convention on Wetlands of International Importance, especially as Waterfowl Habitat was adopted at Ramsar in 1971, but the Convention entered into force in Ghana in 1988.
The Regulations establish and designates six Ramsar Sites where certain activities are restricted or proscribed. These sites and adjoining areas are however subject to sustained development pressure, including extensive coastal roads infrastructure.

5.1.4 Air Quality

An assessment of roadside air quality in 2003 carried out by the EPA, indicated that road side users experience extreme pollution (EPA 2004). Particulate matter concentration along seven major roads in the city of Accra ranged from 33.7μg/m^3 to 309.18μg/m^3 and that of lead also ranged from 2μg/m^3 to 188μg/m^3. The overall mean value of 26.4μg/d1 for a population of 396 sampled in Accra was higher than the World Health Organization's recommended level of 20μg/dl (EPA, 2005)

5.2 Social

5.2.1 Population Distribution

Ghana has ten administrative regions. The distribution of the population across the country is highly uneven. The Upper East, Upper West, and Northern Regions, all of which can be found in the Savannah zone together have 17.5% of the total population. The Ashanti Region has 19.1% and Brong Ahafo region which lies in the middle belt has 9.6%, while the Greater Accra Region, with the national capital and lying in the dry equatorial climatic zone has 15.4%. The Western Region has 10.2%, while the Volta, Central and Eastern Regions have 8.6%, 8.4% and 11.1% respectively. The pattern of population distribution and density do not necessarily reflect road network density, except that construction of roads within high population centres carry greater liabilities and public health risks, especially in urban centres, than in sparsely populated rural communities.

5.2.2 Cultural Resources

Cultural resources in any country are very important in identifying any particular group of people. In some cultures rivers, mountains, trees, etc are revered. There are sacred groves and shrines, religious artefacts and places of worship, cemeteries, etc, which people tend to have emotional attachment and sensibility. It is therefore

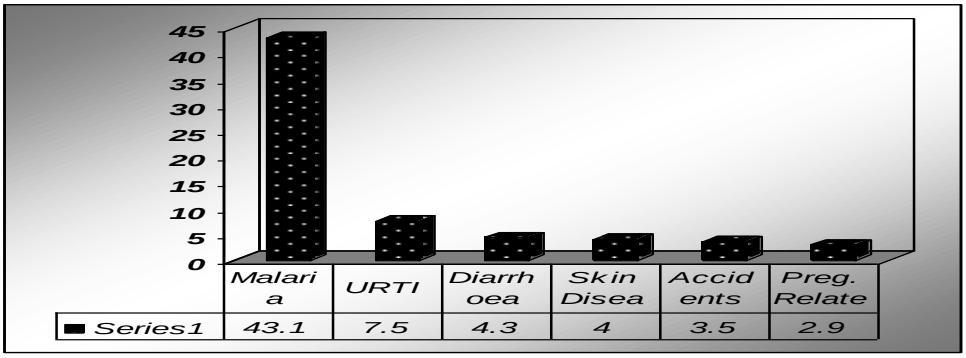
necessary to consider these during road construction in order not to offend any people, but rather preserve our cultural heritage. Furthermore good road networks facilitate the movement of people to festivals which form one of the elements of the culture of the people

5.2.3 Health

The distribution of health facilities appears skewed in favour of regions in the southern sector. However, by virtue of the relatively low population densities of the northern half of the country, the population per facility ratio shows fairly equitable distribution. The Greater Accra and Volta Regions have the lowest population per facility while Central, Eastern, and Northern regions have the highest population per facility ratio. However, by reason of proximity of the Central and Eastern Regions to Accra, the Northern Region may be considered the most disadvantaged in comparison.

Road construction results in air pollution which affect the health of people exposed. For example, figure 1 indicates that upper respiratory tract infections (URTIs) are the second highest recorded ailments at Ghana's Out Patient's Department (OPD). The main sources particulate emission that give such high ranking for URTIs include road construction and unpaved road use. This calls for strict environmental management practices to suppress dust generation, especially during road construction in order not to aggravate the situation. Pits and trenches left abandoned and unfilled, and inadequate or lack of drainage after road construction allow rainwater and run-off to collect in such depressions and pits. These become breeding good ground for mosquitoes, which cause malaria and other ailments. Communities along such road corridors become exposed and suffer higher incidence of malaria, which is the leading cause of out patients' visits and mortality in Ghana.

Figure 5.1: Incidence of Common Diseases in Ghana



Source: Year 2000 Population and Housing Census

5.3 Topography and Landscape

The physiographic regions of Ghana are broadly the Coastal Plains, the Forest Dissected Plateau, the Savannah High Plains, the Voltaian Sandstone Basin (VSB) and the ridges and escarpments bordering the VSB.

5.3.1 The Forest Dissected Plateau

Many years of intensive erosion have reduced this area to uniformly low height between 240m and 300m above sea level. The different rock formations in this region have given rise to different relief types, ranging from hills that stand up to 60-90 metres above sea level to steep sided hills rising above 240m above the flat valley bottom (Dickson and Benneh, 1988).

5.3.2 The Savannah High Plains

The topography is gently rolling with average height of the plain ranging between 180m and 300m above sea level. Small rounded hills composed mainly of granite are scattered on this plain (Dickson and Benneh, 1988).

5.3.3 The Voltaian Sandstone Basin (VSB)

Covering an area of about 112,768km^2, the VSB is made up of an almost flat extensive plain with heights ranging between 60m and 150m in that part of the basin south of the east-west Black Volta and up to about 180m above sea level in that part north of the river (Dickson and Benneh, 1988)

5.3.4 Ridges and Escarpments

These comprise the Southern Voltaian Plateau (SVP), the Gambaga escarpment and the Akwapim-Togo Ranges. The SVP marks the southern boundary of the Volta Basin while the Gambaga scarp marks the northern limit of the VSB. Average elevation does not exceed 450m above sea level. The Akwapim-Togo Ranges are fold mountains forming the eastern boundary of the VSB. The ranges start from near the mouth of the Densu, West of Accra, and run in a north-easterly direction across the Volta Region and Togo and beyond (Dickson and Benneh, 1988)

5.4 Land Use

5.4.1 Land Use Categories

The total surface area of Ghana, including the area occupied by water bodies is 238, 539km^2 (EPA, 2005). Using LANDSAT thematic satellite data covering the period January 1989 and January 1991, seven broad generalized categories of land use was identified as follows:

- Agriculture (crops and livestock);
- Forestry and wildlife department;
- Savannah;
- Water bodies;
- Wet lands;
- Unclassified (mine sites and tourist sites); and
- Build up area.

Table 5.1 shows the land use cover and the total area coverage of Ghana.

Table 5.1: Land Use Cover and Area Coverage

Land Use	**Area km^2**	**% of total**
Agricultural land	146, 810	61.5
Forestry and wildlife	8,400	3.5
Savannah	47,860	20.1
Shrub Thicket	73	0.3
Built up area	73	0.3
Bare land	12	0.05
Water body	11,800	5
Wet lands	954	0.4
Unclassified	1,561	0.6
Total	238,539	100

Source: CERSGIS, (2000)

5.4.2 Land Tenure and Acquisition

There are pieces of legislation relevant in the consideration of land, land tenure, right of way and acquisition. These include the:

- The Administration of Lands Act, 1962 (Act 123);
- State Lands Act, 1962 (Act 125);
- State Lands Regulations 1962 (LI 230);
- State Lands (Amendment) (No. 2) Regulations 1963 (LI 285);
- Lands (Statutory Way Leaves) Act, 1963 (Act 186); and
- Office of the Administrator of Stool Lands Act, 1994 (Act 481).

The Administration of Lands Act, 1962 consolidates with amendments the enactments relating to the administration of Stool and other lands. The Act concerns in particular Stool Land and Kumasi Town Lands, which may authorize the occupation and use of land (any Stool or Kumasi Town Land) for any purpose which is conductive to the public welfare or the interests of the State.

The State Lands Act, 1962 provides for the acquisition of land by the State whenever this is of national interest and other purposes connected therewith. The Act concerns land other than land covered by the Administration of Lands Act, 1962.
The State Lands Regulations were put in place following the State Lands Act and contains procedures, instructions and directives for the acquisition of land by the State for national interests and related purposes.

The Office of the Administrator of Stool Lands Act, 1994 generally provide for the administration of Stool Lands. The Act sets out among others the procedures for the administration of Stool Lands. The Administration of Lands Act, 1962 and the State Lands Act, 1962 are still in effect, however, with modifications necessary to give effect to the Office of the Administrator of Stool Lands Act. The Act defines the distribution of any revenue accruing from stool lands.

5.5 Climate

Using the average characteristics of rainfall, temperature and humidity for a period of 25 – 30 years, Ghana can be classified into four main climatic regions. These are the South-western Equatorial Climatic Zone, Dry Equatorial Climatic Zone, Wet-semi Equatorial Climatic Zone and Tropical Continental (savannah) Climatic Zone.

5.5.1 South-Western Equatorial Climatic Zone

Being the wettest climatic region in Ghana, it has a double maxima rainfall regime. Mean annual rainfall is above 190cm and an average monthly precipitation of not less than 2.5cm. The highest monthly temperature of about 30^{o}C occurs between March and April and the lowest of about 26^{o}C in August. Monthly relative humidity (average) of 75-80% during the two rainy seasons and the lowest of 70-80% during the rest of the year. (Benneh and Dickson, 1988)

5.5.2 Dry Equatorial Climatic Zone

This climatic zone also has double rainfall maxima, however, with a more marked dry season. Mean annual rainfall of between 74 and 89cm are recorded. Surprisingly, this region is the driest in the country also recording mean monthly temperatures of 30^{o}C between March and April and 26^{o}C in August. Highest average relative humidity does not exceed 75%, with the lowest being about 60% (Benneh and Dickson, 1988).

5.5.3 Wet-semi Equatorial Climatic Zone

A double maxima rainfall regime, and with a mean annual rainfall of between 125 and 200cm is recorded. Some of the wetter areas include the Akwapim-Togo Ranges and the Southern Voltaian Plateau where annual rainfall exceeds 165cm. The first rainy season is from May to June and the second rainy season is from September to October. With a more pronounced dry season, temperatures and relative humidity are, however, as in the south-western equatorial and the dry equatorial climatic zone (Benneh and Dickson, 1988).

5.5.4 Tropical Continental Climatic Zone

This climatic region, unlike the three others has a single rainy season which starts in May and ends in October, followed by a prolonged dry season. Mean annual rainfall of between 100 and 115cm is recorded. Mean annual temperatures vary from about 36^{o}C in March to about 27^{o}C in August. Relative humidity of between 70 and 90% may be recorded during the rainy season, but may fall to as low as 20% during the dry season. The zone between the wet-semi equatorial region and Salaga, however, experiences a modified form of the typical interior Savannah and the wet-equatorial climatic. Here a double maxima rainfall regime is experienced, recording mean annual rainfall of between 115 and 125cm. here, the first season (May to June), is rather the minor season. Mean monthly temperatures range from 30^{o}C in March to about 24^{o}C in August. Higher relative humidity of 90 to 95% and 75 to 80% are recorded in the rainy seasons respectively (Benneh and Dickson, 1988).

Table 5.2: Summary of rainfall characteristics in the different climatic zones

Climatic zone	**Rainfall characteristics**	**Impact of Rainfall characteristics on road construction**
South-Western Equatorial Climatic Zone	*Wettest climatic zone in Ghana *Double rainfall maxima: -May to June -September to October *Mean annual rainfall is over 190cm * Average monthly rainfall of not less than 2.5cm.	Dust generation during road construction will be minimal. However, between May and June, road construction may be heavily impeded. Movement of heavy machinery may be difficult because of the amount of rainfall. Sand for road construction if kept unprotected could also be eroded into water bodies, thus causing siltation.
Wet Semi Equatorial	*Double maxima rainfall regime: -May to June -September to October *Mean annual rainfall is 125cm *Akwapim -Togo ranges however, records average annual rainfall of over 165cm	Road construction between the months of May and June would be problematic. Movement of heavy and noisy construction machinery in zone of the Akwapim Togo Ranges could cause landslides (and mudslides during the rainy season)
Dry Equatorial Climatic Zone	*Driest climatic zone in the country *Double rainfall maxima: -May to June -September to October *Mean annual rainfall of between 74cm and 89cm	Due to relatively low level of rainfall, road construction might not face much difficulty even during the rainy. However, due to poor drainage network in Accra, flooding is common in rainy seasons, which can impede road construction (between May and June).
Tropical Continental Climatic Zone	*Single rainy season : May to October *Mean annual rainfall is between 100cm and 115cm	Long dry period (November to April) gives enough ideal time for road construction. Though rainfall amount is relatively low, the existence of the iron pan implies that relatively small amount of rainfall could still cause flooding.

6.0 POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

Road infrastructure and indeed the transport sector play a strategic role in the socio-economy of Ghana. A wide range of social benefits and also environmental will arise as a result of the road component of the TSDP. These will include economic benefits, employment generation, social services, travel and transport, enhanced gender opportunities, fuel economy and reduced pollution. In spite of the numerous benefits, the sub-projects under the TSDP, including the RTTFP and UTP will also have adverse environmental and social impacts which need to be assessed using the ESMF prior to implementation of such projects.

6.1 Impact Identification

The Ghana EIA Procedures and the EA Regulations (LI 1652), list construction of highways and roads both as:

- Undertakings requiring registration with the EPA (i.e. Schedule 1 undertakings); and
- Undertakings for which EIA is mandatory (i.e. Schedule 2 undertakings).

In a situation where an "undertaking" is listed under both schedules 1 and 2, the higher requirement (i.e. Schedule 2) applies. This therefore means that in Ghana, EIA is mandatory for any road or highway construction project, irrespective of the type or nature or size of the activity, or the location. Accordingly, road projects are mostly subject to EIA. However, routine maintenance and other less impacting road rehabilitation activities are often grouped together and subject to Sectoral EA.

The Schedule 5 of the LI 1652 lists the twelve Environmentally Sensitive Areas (ESAs) in Ghana. (Appendix 2). The importance of the ESAs list is that it helps establish all areas considered sensitive for purposes of development, and therefore must be avoided as far as possible. However, where development must occur within or near an ESA, such a project will be subject to detail EIA, even for Schedule 1 undertakings. The ESAs include environmental and social criteria, among others. On the basis of the ESAs the following sensitivity criteria in Tables 6.1 and 6.2 are used as screening guidelines and will apply in the ESMF for screening road projects and for route/corridor selection under the TSDP.

6.2 Beneficial Impacts of the Road Sector (TSDP)

6.2.1 Specific Benefits

At the national level the TSDP will contribute to economic growth by lowering transport costs, ensuring economies of scale and reducing domestic production costs. It will help enhance market opportunities, trade expansions and market integration and effective competition. The RTTFP will specifically reduce transport costs and transit time and facilitate cross border transport. It will address the impact of international transport on the population bordering major transit corridors. It will also ensure the removal of non-tariff barriers to transit.

Table 6.1: Road Sector Sensitivity Screening Criteria – Environmental

Types of Road Project (Infrastructure / Service)	**Environmental Sensitivity Criteria**	**Screening Outcome (Level of EA)**
Routine maintenance: • Patching of potholes • Light grading • Trees and bush clearing • Cleaning of gutters, drains and culverts Periodic maintenance, minor rehabilitation and minor improvement: • Spot improvement • Repair and resurfacing short stretches of roads • Upgrading of gravel to bituminous roads Major rehabilitation: • Reconstruction of heavy degraded road section • Upgrading • Placing asphalt concrete overlaps • Repair and construction of bridges • Repair and construction of culverts and other structures	***Non-environmentally sensitive site/route, single or few component activities*** Maintenance / installation / culvert, etc. projects Labour-intensive (limited machinery use) Impacts generally localised, less severe, and scope of impacts narrow, short-term and reversible. Mitigations are easy to design and implement. No need to generate much primary data, especially as baseline.	Sectoral Environmental Assessment
	Within/bordering or < 0.5 km from an area Declared by law as Wildlife Conservation Areas (including National Parks, Resource Reserves, Wildlife Reserves, Strict Nature Reserves, Ramsar Sites and Wildlife Sanctuaries), or Forest Reserves or Globally Significant Biodiversity Areas	Environmental Impact Assessment
	Within/bordering or < 0.5 km from an area Constituting the natural habitat of any threatened (endangered, data deficient and vulnerable), rare or endemic flora and fauna	
	Within/bordering or < 0.5 km from a Hilly area with gradient > 45 degrees and prone to erosion or rock fall or mudslide or landslide	
	Within/bordering or < 0.5 km from an area Susceptible to erosion, flooding, geological hazards (including earthquake, tremor and landslide)	
	Within/bordering or < 0.5 km from an area Constituting the head water region of a river or stream or the bank of the drainage channel of a water body	
	Within/bordering or < 0.5 km from a Low lying acting as natural buffer against shore erosion, strong winds or for storm floods	
Road construction Asphalt plant Bituminous plant Work Camp	***Program or Plan-like Proposals*** Many phases involved, precise locations may not yet be fully known; Many activities/sub-projects (but type of sub-projects may not yet fully determined); and Diverse impacts affecting other sectors Implementation/construction spread over long periods.	Strategic Environmental Assessment

Table 6.2: Road Sector Sensitivity Screening Criteria - Social

Types of Road Project (Infrastructure/ Service)	**Social Sensitivity Criteria**	**Screening Outcome (Level of EA)**
Routine maintenance: • Patching of potholes • Light grading • Trees and bush clearing • Cleaning of gutters, drains and culverts Periodic maintenance, minor rehabilitation and minor improvement: • Spot improvement • Repair and resurfacing short stretches of roads • Upgrading of gravel to bituminous roads Major rehabilitation: • Reconstruction of heavy degraded road section • Upgrading • Placing asphalt concrete overlaps • Repair and construction of bridges • Repair and construction of culverts and other structures Road construction Asphalt plant Bituminous plant Work Camp	***Non-socially sensitive site/route, single or few component activities*** Maintenance / installation / culvert, etc. projects Labour-intensive (limited machinery use) Impacts generally localised, less severe, and scope of impacts narrow, short-term and reversible. Mitigations are easy to design and implement. No need to generate much primary data, especially as baseline.	Sectoral Environmental Assessment
	Within/bordering or < 0.20 km from A known historical, archaeological or scientific site or infrastructure	Environmental Impact Assessment
	Within/bordering or < 0.20 km from A cultural resource or site (e.g. cemetery, sacred grove, shrine, church, mosque)	
	Within/bordering or < 0.20 km from A medical or health facility (e.g. a hospital or clinic)	
	Within/bordering or < 0.10 km from An educational or research facility	
	Within/bordering or < 0.20 km from A human settlement or community or township	
	Involving resettlement Or relocation or compensation of more than 20 different persons or families	
	Program or Plan-like Proposals Many phases involved, precise locations may not yet be fully known; Many activities/sub-projects (but type of sub-projects may not yet fully determined); and Diverse impacts affecting other sectors Implementation/construction spread over long periods.	Strategic Environmental Assessment

In urban areas, poor transportation results in the lack of affordable access to public transit services. For instance, the BRT system under the UTP will provide major radial and circumferential network that will improve traffic management in Accra. It will reduce the extreme traffic congestion throughout the city, with the beneficial effects extended to the entire GAMA and improve general welfare.

In rural areas transport plays a direct role in poverty reduction by enhancing economic development, and by facilitating income generation activities linked to agriculture and other sectors, due to their dependence on agricultural livelihoods.

6.2.2 General Benefits

The socio-economic and environmental benefits that will generally accrue from the TSDP are discussed in this section.

6.2.2.1 Economic Benefits to Rural Areas

Road improvement provides socio-economic benefits as accessibility and commercial activities are enhanced to facilitate economic integration at all levels. Road development will attract in-migration of people to settle along the road creating more villages and towns and increasing the population of the district that is benefiting from the road intervention. This in turn results in the increase in the demand for goods which causes more people to engage in various economic activities.

Increased production results in employment generation. It also generates increased farm employment and reduces out-migration in search of jobs in the urban centres. In the construction phase, opportunities for skilled as well as unskilled labour will be available to earn income. The impact on employment and income is considered to be significant and positive.

At the local level trading in farm produce will intensify as production levels are increased and diversified and access is gained to wider markets. This will contribute to GDP growth. New industry tends to locate where land is available and infrastructure exists; road corridors are logical choices. Roadside commercial development takes place in response to speculation that improved access and greater visibility will bring more customers. Incomes earned directly or indirectly will bring improvements in the standard of living of the people involved with the project.

6.2.2.2 Travel and Transport

The Road Sector/TSDP will help improve the welfare and general well being of both rural and urban beneficiaries through increased access to health care, education and other social services, rendered closer due to enhanced accessibility. It will provide benefits in respect of road safety or reduced accidents.

Road improvements will reduce the tear and wear on vehicles. Also, the improvement of the pavement and the vertical as well as the horizontal alignment result in cost-effective fuel consumption per tonnage of payload. The effect on overall vehicle operational costs will be positive and significant. This will significantly reflect in improved travel and waiting times, increased frequency of transport services and reduced transport costs.

6.2.2.3 Gender Issues (Economic Opportunities for Rural Women)

The program will bring new economic openings for women such as improvement in the agriculture and trading sectors. As more settlements spring up following the new road intervention, women will expand their opportunities for catering and trading, since there will be increased demand for food, goods and services, both in the construction and operation phases. Road availability will indirectly benefit women by easing the drudgery of long distance walking with children to health care centres, etc. The transportation of people and products between the villages will become faster and safer.

6.2.2.4 Impacts on Physical Environment

Road Sector/TSDP will contribute to the ease of movement of vehicles which will result in cost effective fuel consumption and reduced exhaust fumes emission by vehicles plying the road. This in turn will contribute to air quality improvement in settlements along road corridors.

6.3 Potential Adverse Impacts of the Program

Development under the Road Sector/TSDP could exert adverse effects on the social and physical environment within which they are implemented. Stakeholders' views on environmental and social issues common and significant to road sector activities were surveyed (through a study questionnaire – Appendix 3) as part of the ESMF participatory processes. Analysis of the responses ranking the various environmental and social issues is given in Table 6.3. The results clearly identified dust or air quality impacts as the most common and also significant occurrence in road development, out of twenty-two issues or concerns. Seven concerns identified as most significant also fell within the first ten common road sector issues (except for road safety). These include water contamination, pubic safety, tree and vegetation removal (topsoil losses), run off and abandoned pits or trenches near constructed roads.

The stakeholders also indicated the need to include eighteen (18) out of the twenty-two (22) environmental and social parameters in the ESMF. In addition, the following six issues were identified (in the responses) for inclusion in the ESMF:

- Spread of STDs and HIV/AIDS;
- Child delinquency / teenage pregnancy;
- Long (extended) road construction duration;
- Utility services disruption;
- Traffic disruption during construction; and
- Improper alternative routing.

The four issues or parameters that some respondents had doubt or disagreed with for inclusion in the ESMF were:

- Induced developments;
- Habitat disruption;
- Forestry concerns; and
- Wildlife concerns.

The issues listed and the weights attached on the whole will provide some useful guide in the scoping stage and terms of reference preparation for Sectoral EA and EIA of sub-projects under the TSDP.

Table 6.3: Environmental and Social Issues Common to Road Sector Activities and their degree of Significance (in a decreasing order)

	Issues that are Common (in a decreasing order)			**Issues that are Significant (in a decreasing order)**
1	Dust		1	Dust
2	Tree& vegetation removal		2	Water contamination
3	Top soil removal		3	Pubic Safety
4	Pits/trenches near road		4	Tree& vegetation removal
5	Noise		5	Run off
6	Inadequate drains along roads		6	Pits/trenches near road
7	Road construction waste generation & disposal		7	Top soil removal
8	Induced development		8	Resettlement
9	Stream diversion / blocking		9	Compensation issues/agreement
10	Run off		10	Inadequate drains along roads
11	Compensation issues/agreement		11	Flooding
12	Flooding		12	Noise
13	Cultural concerns		13	Cultural concerns
14	Water contamination		14	Stream diversion / blocking
15	Habitat disruption		15	Road accidents
16	Road accidents		16	Forestry concerns (e.g. access)
17	Pubic Safety		17	Wildlife concerns
18	Extensive construction (impact) corridor		18	Habitat disruption
19	Forestry concerns (e.g. access)		19	Road construction waste generation & disposal
20	Wildlife concerns		20	Archaeological losses
21	Resettlement		21	Induced development
22	Archaeological losses		22	Extensive construction (impact) corridor

6.4 Assessment of Road Sector Impacts

The main adverse environmental and social impacts of road projects identified in section 6.3 are assessed in this section.

6.4.1 HIV/AIDS

The HIV/AIDS pandemic is a severe one that should continue to engage the attention of authorities in the road transport sector and in the management of workers in the sector. The facts below support the need for the inclusion of clear principles on HIV/AIDS in the TSDP.

Findings of international studies of HIV/AIDS in work places suggest that the road sector is a breeding ground and a vehicle for the HIV/AIDS epidemic. The reason is simple. People working in the road sector have to be mobile, they have to spend much time away from their homes and satisfy their sexual needs on the road. Migration -

short term or long term, increases opportunities to have sexual relationship with multiple partners, thus becoming a critical factor in the propagation of HIV/AIDS.

Ministry of Health (MoH) national sentinel surveys that are on-going indicate that in 2005 the most affected age groups are those between 20-34 years. Considering the youthful nature of the age group most affected and the fact that the road construction and transport sector is largely made up of a youthful population, any impact of the epidemic on the sector will adversely affect the overall national development. Despite a reduction in prevalence of the infection from 3.1% in 2004 to 2.7 in the country indicating that the situation is stabilising, there is a need for concerted action to maintain those interventions that have led to this reduction. The interventions must also be scaled up to ensure that their impacts are felt as far as possible.

The mode of transmission of HIV/AIDS is largely through a pleasurable and natural activity. Some conditions in road transport sector may naturally facilitate the transmission of the virus and consequently fuel the epidemic. These are to do with the predominantly migrant nature of the workers which create absences of workers from family for prolonged periods. This is a situation that has the potential to fuel the practice of extramarital affairs and unsafe sexual practices.

Ghana currently experiences severe manpower shortages largely professional, but also artisanal, due to brain drain, and an explosive HIV infection would worsen this situation. Some of the grave consequences for the society as a whole will include losses in productivity, health care costs, and people management costs such as recruitment, retraining, absence and relief. Although awareness of the disease is said to be very high amongst the Ghanaian population, behavioural change lags far behind this awareness. This is likely to be the case among road sector workers as well.

6.4.2 Health and Safety Impacts

6.4.2.1 Injuries
Accidents constitute one of the most important risks in road construction and maintenance resulting in injuries. These are likely to arise from moving machinery in the course of operation, unguarded parts of equipment and a disregard for health and safety measures. These are likely to pose risks to the workers. Injuries may also arise from road traffic accidents which may occur when parts of roads are being plied while road construction is still underway. This has the potential of harming both workers and road users, including pedestrians. Other sources of injuries are noise, vibration and heat, and also lubricants some of which contain solvents with potential to cause skin irritation and allergies, respiratory disorders and acute poisoning.

6.4.2.2 Public Health Impacts
These include damage to health from air pollution, communicable diseases such as tuberculosis, and also malaria whose transmission may be enhanced by pits (collecting water) created from excavation and quarrying during constructional activities, as well as injuries.

6.4.2.3 Health Damage from Air Pollution
Air pollution adversely affects health of people engaged directly or indirectly in road sector activities. The effects are due largely to particulates from vehicular emissions

and constructional equipment powered by gasoline or diesel as well as silica in dust from the earth agitated by constructional equipment and vehicles plying on uncompleted and untarred roads. The resultant effects are acute respiratory disorders, lung and heart diseases, the type of ailment depending on the size of particulates as well as the materials adsorbed on them. Larger particulates cause acute irritation of the upper airways resulting in coughs and colds, while particulates with diameters of the order of 2.5u to 10u are inhaled into the lower airways, (bronchi and bronchioles) and may enter the lungs. Acute manifestations of its effects include inflammatory conditions like bronchitis, bronchiolitis and pneumonia which may be rapidly fatal. Other pollutants like SO2, NO2 and CO emanating from vehicular emissions also contribute to respiratory ill health. Asthmatics are particularly sensitive to irritant substances like SO2 which may bring on attacks. Long term exposure is associated with chronic lung diseases such as lung cancer and silicosis. Apart from respiratory effects, dust may result in irritation of mucous membranes or allergic reactions that may be particularly harmful to the eyes and skin.

Poor air quality in the urban environment tends to be particularly associated with high levels of particulates from vehicular emissions. An air quality monitoring project established by the Ghana EPA jointly with the US EPA in Accra showed that from March 2005 to March 2006, levels of particulates were much higher in roadside locations. Compared to residential and commercial locations, the level in roadside locations was 2 to 4 times those in the others. In line with this, studies conducted by the Ghana Health Service during the same period indicated that over 51% of persons reporting with a new episode of ARIs during the same period were resident in roadside locations. This is strongly suggestive of the fact that vehicular emissions constitute an important trigger factor for respiratory illnesses.

6.4.3 Water Resources Impacts

Road development activities can modify the hydrology of an area, affecting aquifer re-charge, groundwater discharge, and the water table and flow characteristics. There can also be deterioration in water quality of both surface and groundwater. Potential sources of impacts are site preparation and clearing activities, heaping of materials, blocking and narrowing water channels and flows at certain points. In some cases the speed of flow may be increased resulting in flooding, ponding, soil erosion, channel modification and siltation of streams. Earthworks, road drainage and excavation, erection of embankments and structures can reduce or raise the water table (through restricting flow). Other sources of water pollution include sedimentation, changes in biological activity in streams and on their banks, chemicals spillage, contaminated run off from petroleum product drippage, exhaust emissions, pavement and tyre wear, and corrosion of metals, among others.

6.4.4 Landscape Alteration Impacts

Landscape modifications occur, sometimes very severe in areas surrounding road developments, particularly where the road construction leads to conflict with adjoining landscape features (e.g. natural relief and morphology, hydrology, recreational areas, cultural heritage sites). Quarrying, burrow pits and gravel winning associated with road construction potentially scar and degrade the landscape.

6.4.5 Impacts on Soil

The important soil properties to support productive activities and biodiversity are lost through compaction with heavy machinery, topsoil removal and sheet erosion in high rainfall areas, road waste dumping, spillages, and excavations and burrow pits, among others. Erosion might result in adverse cumulative effects far beyond the road corridor and the project area of influence, affecting slopes, streams, rivers, and dams. Agriculture may be affected and also fishing through sediment transfer in run-off into water bodies. Road development although narrow and linear in character removes considerable amount of land from production. Spillage of hazardous products in transit is also a potential source of soil pollution.

6.4.6 Land Acquisition and Property Loss

Compulsory land acquisition (expropriation of property for public projects) and demolishing of structures such as buildings, shops associated with road developments can result in displacement of communities, loss of business, properties and incomes, social stress, social and psychological disruption for the affected individuals and families.

6.4.7 Communities and Economic Activities Impacts

Road development can have significant long term adverse impacts on human communities. These impacts include splitting up of communities, loss of roadside community business and social activities, disruption of links between villages and their farmlands, increased land and property values leading to higher rents, and displacement of lower-income tenants. The introduction of faster traffic, access controls, and median barriers generally cuts traditional lines of travel or communication in communities.

6.4.8 Noise and Vibration Impacts

Heavy duty machinery and vehicular movement, friction between vehicles and the road surface, driver behaviour, vehicles' horns, construction and maintenance activities, asphalt plant operations, resonance of traffic and piling (especially for interchange and bridge construction) increase ambient noise levels and vibration far beyond the immediate road corridor. The effects of excessive noise and vibration include human welfare and physiological disruption, hearing impairment and communication problems. These may cause elevated stress levels and associated behavioural and health problems. They can also cause auditory fatigue, sleep disorders, and even contribute to learning problems in children. Vibrations can damage roadside structures, particularly makeshift or lightly constructed buildings. Noise also has the potential to disrupt wildlife habitats and movement in sensitive areas.

6.4.9 Impacts on Cultural Resources

Road developments lead to damage to areas of historic, scientific, social and amenity values, and also affect the aesthetics of cultural monuments and archaeological resources. This can occur where road design and construction do not take account of such cultural heritage and resources. Damage may also be caused by road construction related works such as quarries and burrow sites, and unregulated access to cultural heritage sites.

6.4.10 Habitat Destruction and Disruption (flora and fauna impacts)

Important wildlife habitats, threatened and endangered species of flora and fauna may be destroyed in road projects. Road corridors, particularly in new construction may cut through ecosystems and compromise their stability and health. Plant and animal communities may be fragmented into weaker ecological sub-units, rendering them vulnerable to invasions and degradation. The opening up of burrow pits and quarries to support road construction is equally destructive to wildlife and habitats.

Erosion from poorly constructed and rehabilitated sites (of both road and related areas) can lead to downstream siltation, contaminating water resources and ruining fish spawning grounds. Alterations of flow regimes, flood cycles, tidal flows and water levels can upset trophic dynamics by affecting the life cycle of plankton, with corresponding effects on the entire food chain. Re-channelling of waterways is often undertaken as part of road construction to avoid flooding and make crossing structures simpler. In the process, natural streambeds are interfered with adverse consequences.

6.4.11 Waste Generation and Disposal Impacts

Different forms of solid and liquid waste including excavation spoil, construction waste, waste asphalt, sewage, garbage and oil spills from construction equipment are generated. Areas alongside road construction and also newly constructed road turn to become centres of intense trading which leave in its trail serious sanitation problems.

6.4.12 Traffic Disruptions and Diversion Impacts

There can be serious disruptions to local traffic and also accidents during road construction and rehabilitation. The situation can be aggravated without carefully planned detours and road closures. The effect of traffic disruptions includes increased travel time, congestion, social stress and agitations.

6.4.13 Utility Disruption Impacts

Construction activities usually require re-alignment of utility supply lines such as water, telephone and electricity. This can disrupt the supply of essential services to communities for rather long periods, especially where road project execution takes unusually long duration.

7.0 ENVIRONMENTAL AND SOCIAL MITIGATION PRINCIPLES

The section provides general road sector mitigation principles of the ESMF covering thirteen broad areas for use in the project EAs under the Road Sector/TSDP.

7.1 HIV/AIDS Mitigation Principles

The national strategic plan for HIV enjoins each sector to develop sector specific plans and strategies, hence the provision in the MoT's organisational structure in figure 3.3, to cater for the road transport sector specific workplace policy. There is commitment at all levels of management to ensure that necessary budgetary allocations are made towards HIV issues, and that the policy is implemented as intended. Highlights of the principles which will be followed are set out below, based on ILO guidelines and those of the Ghana AIDS Commission.

- It will be applicable to all employees of the sector. The provisions will also be binding on contractors.
- HIV/AIDS prevention clauses will be incorporated into works contracts and the bills of quantity.
- The ethical principles governing handling of persons with other medical conditions will apply. Relationships of infected /potential workers will be governed by the basic human rights as enshrined in the Constitution of Ghana. Dismissals will not be based on HIV status.
- Provisions regarding HIV/AIDS will be integrated as far as practicable with existing labour relations policies and regulations.
- An HIV/AIDS prevention and treatment policy for work places will be prepared.
- Due care and confidentiality will be exercised in handling information regarding the HIV status of workers in the sector.
- The policy will advocate for the establishment of workplace programs on HIV for road contractors and will include preventive activities through:
    - Advocacy via information provision, education and communication;
    - Peer education and counselling;
    - Condom use promotion and distribution;
    - Counselling and care for people living with AIDS (PLWAs) –
        - Facilitation of voluntary counselling and testing of HIV status of workers,
        - Provisions for management of sexually transmitted infections (STI),
        - Assistance to bereaved families,
        - HIV /AIDS education to communities in which workers of the sector are working will be included in target groups for education and information provision.

7.2 Health and Safety Mitigation Principles

The following constitute the basic principles that will be observed to prevent and control health hazards as well as safety risks in the transport/road construction sector.

7.2.1 Air Pollution Mitigation Principles

The WHO estimates that air pollution causes approximately 2 million pre-mature deaths a year more than half of these occurring in developing countries. It further indicates that reducing levels of particulates (PM10) will reduce deaths in polluted cities by as much as 15% every year. Projects will factor the potential health benefits in controlling air pollution generated in road development and the transport sector.

The transport sector agencies will collaborate with EPA to develop air quality management plans which will, among others aim at the following principles:

- Facilitating the use of cleaner fuels and the use of compressed natural gas;
- Promoting the culture of vehicular maintenance in the country;
- Ensuring effecting use of water to control dust emission; and
- Banning the importation of over-aged vehicles.

7.2.2 Occupational Safety and Health Principles

A comprehensive occupational safety and health (OSH) policy based on the tenets of the Labour Act 651, 2003 will be implemented for the transport sector. Its provisions will be extended to contractors engaged to work in the sector. It will also protect the general public. Commitment to the implementation will be facilitated through resources allocation for its take-off.

The TSDP will incorporate a system of hazard identification and risk assessment of hazards identified. Employee health care services will be taken care of through preventive care in the form of appropriate immunizations, and pre-employment and periodic health screening as well as exit examinations. Medical care for ill-health and injuries will also be catered for.

7.2.3 Community Health Principles

Community outreach programs will be factored in all new projects planned for in any location. This will help protect the communities from injury or ill-health caused directly or indirectly by the road transport activities.

7.3 Particulate Emission Mitigation Principles

The principles to follow to reduce air quality impacts, especially particulate matter by the contractor will include:

- Water dousing to minimize dust;
- Contract specifications to include dust control measures;
- Re-routing traffic away from populated areas and reducing traffic congestion;
- Covering of hauling trucks carrying sand to avoid dust emission;
- Locating material storage areas away from communities and environmentally sensitive receptors;
- Selecting road alignments which avoids houses, schools, and workplaces; and
- Planting tall, leafy and dense vegetation between roads and human settlements to filter pollutants.

7.4 Soil Pollution Mitigation Principles

A number of mitigation and management principles will be used to protect the soil including:

- Minimizing the area of ground clearance along the construction corridor;

- Avoiding sensitive alignments, including steep slopes;
- Progressive replanting of disturbed areas during construction;
- Specifying as contractors' obligation to cover issues such as erosion control, spillage prevention during construction, and planting and ensuring effective re-vegetation;
- Engineering solutions such as intercepting ditches at the tops and bottoms of slopes, with gutters and spillways used to control the flow of water down a slope;
- Enforcement of emission and discharge standards by the EPA;
- Guidelines for transport of hazardous substances defining permissible routes; and
- Emergency response procedures for spillages.

7.5 Water Resource Protection Principles

Mitigation principles to prevent, minimize and manage impacts on water resources from road projects will include:

- Avoiding alignments which are susceptible to erosion, such as those crossing steep slopes;
- Minimizing the number of water crossings through alternative route surveys;
- Using clean fill materials around watercourses such as quarried rock containing no fine soil;
- Providing reservations/buffer zones of undisturbed vegetation between road sites and water bodies;
- Providing settling basins to remove silt, pollutants, and debris from road runoff water before discharge to adjoining streams or rivers;
- Constructing run-off channels, contouring or other means of erosion control;
- Paving sections of roads susceptible to erosion and sedimentation; and
- Compensating by providing alternative source of water such as bore holes for communities adversely affected.

7.6 Habitat Protection Principles

Mitigation principles to address habitat destruction and disruption impact in road projects by contractor will include the following:

- Avoiding environmentally sensitive areas to prevent severe impacts on flora and fauna;
- Crossing of water bodies will be minimized, and buffer zones of undisturbed vegetation will be left between roads and watercourses;
- Replanting in road rights-of-way and adjacent areas to accelerate re-vegetation and succession;
- Re-engineering road cross-section designs by using narrower widths, lower vertical alignments, smaller cuts and fills, flatter side slopes, and less clearing of existing vegetation;
- Providing wildlife and animal crossings to facilitate movements;
- Fencing or planting barriers to reduce the risk of collisions between animals and vehicles;
- Providing "aquatic crossings" with culverts designed with the needs of migratory aquatic species in mind;

- Installing traffic control measures, e.g. speed limits, particularly at night in areas of frequent animal crossing, erection of warning signs, etc; and
- Installing roadside reflectors to scare animals away from the roadway when vehicles approach at night.

7.7 Landscape Improvement Principles

The following mitigation principles will be followed to address the effects of landscape alterations:

- Reforestation or re-vegetation of all scarred areas during road projects;
- Landscaping of areas adjoining right of way;
- Selection of alignment characteristics that best fit the chosen corridor into the landscape; and
- Prompt reclamation of degraded lands.

7.8 Land Acquisition and Economic Impact Principles

The following mitigation principles will be followed to prevent or reduce impacts of / from land acquisition and loss of property:

- Choosing route locations away from built-up areas and restricting the extent of road works to avoid interference with existing activities;
- Adoption of a reduced speed design, reduced right-of-way land requirements, or design changes (underground drainage, for instance) to reduce impacts on properties and activities;
- Alternative considerations in route selection;
- Integration of mitigation measures in road designs, where appropriate;
- Compensation rates for owners of the land, properties, etc that reflect current market realities; and
- Resettlement / rehabilitation of affected persons where possible (preparation of resettlement action plan).

7.9 Noise and Vibration Mitigation Principles

Noise and vibration will be minimized through the following mitigation principles:

- Application of a bituminous surface layer over worn concrete roadways against frictional noise;
- Use of open-graded asphalt smooth, well-maintained surfaces such as freshly laid asphalt without grooves and cracks will keep noise to a minimum;
- Road design will avoid steep grades and sharp corners to reduce noise resulting from acceleration, braking, gear changes, and the use of engine brakes by heavy trucks at critical locations;
- Provision of noise barriers, including “tree belt” or “tree buffer”;
- Environmental specifications for contractors in the road construction, quarrying and other such activities in noise and vibration-sensitive areas (with special attention paid to equipment noise standards, hours of operation, material haulage routes, and other aspects of work-site management; and
- Enforcement of noise control guidelines (EPA permissible noise levels).

7.10 Cultural Resources Preservation Principles

- Road construction will avoid alignments that cut through known cultural sites;

- Cultural resources uncovered during road works will be handed over to the National Museums and Monuments Board for preservation or preservation of the site;
- Salvage excavation and relocation of artefacts or ruins from a cultural site;
- Collaboration between the Road Agencies and the Museums and Monuments Board in determining and avoiding damage to cultural sites and resources; and
- Marking and fencing important cultural sites during the construction period.

7.11 Waste Generation and Disposal Principles

Waste management mitigation principles will include:

- Disposal of construction and related waste materials at designated and approved waste dump site;
- Adoption of waste minimization measures;
- Incorporation of waste management plan in road planning and contract specifications;
- Collaboration with relevant District Assemblies to enforce appropriate sanitation and other bye laws; and
- Public awareness campaigns to observe proper waste management measures.

7.12 Traffic Disruption Mitigation Principles

- Provision of carefully planned diversion routes during construction; and
- Use of signboards and other public information mechanisms to inform the public in advance of construction work, schedule closure or diversion, etc.

7.13 Utility Disruptions Mitigation Principles

The following mitigation principles will be followed by the Road Sector Agencies to minimize impacts of utility disruptions:

- Issuance of advance public notices about disruptions;
- Collaboration with utility providers to plan and quickly re-align utility services;
- Provision of alternative supplies where applicable, e.g. water supply by tankers to affected communities; and
- Restoration of utility lines and other structures damaged during the construction.

8.0 ESMF IMPLEMENTATION AND MANAGEMENT

The successful implementation of the ESMF depends on the commitment of the sector and related institutions, and the capacity within the institutions to apply or use the framework effectively, and the appropriate and functional institutional arrangements, among others. This section addresses the key ESMF areas relevant to its successful implementation:

- Implementing the ESMF;
- Institutional arrangements;
- Capacity building;
- Environmental and social monitoring; and
- Environmental and social principles and clauses.

8.1 Implementing the ESMF

The figure 8.1 illustrates the environmental and social planning and management for road sector projects under the TSDP. The environmental and social planning covers the environmental and social assessment (ESA) and the pre-project/project planning processes. Key stages of the ESA include proposal screening, PEA or Sectoral EA, EIA and also mitigation measures, while the pre-project/planning process involves project concept, identification, design and appraisal. The ESA process links up with the pre-project/planning process. This signifies the importance of the two processes (i.e. EA and feasibility) to interact and to influence one another, in order to evolve a road project that is a product of these two activities or studies.

In the context of the ESMF, environmental and social planning is a process that identifies and assesses (through "consultation") the potential concerns and implications that may arise with the implementation of a road project, in order to influence the design and other engineering feasibility options and decisions, for informed and sustainable project development.

The project environmental and social management (ESM) as shown in figure 8.1 is also linked to the project implementation activities. The ESM comprises monitoring, management (of environmental and social impacts and mitigations), auditing and reporting (Annual Environmental Report, EMP, etc), while project implementation activities include construction, landscaping, decommissioning of sites, facilities, equipment and machinery and also road use. The ESM is a process of follow up during the implementation phase of a road project to verify:

- The adequacy of the environmental and social considerations and assumptions (made at the planning phase);
- Effectiveness of mitigation measures being implemented;
- Compliance with mitigation and other environmental and social requirements;
- Any unanticipated or residual impacts that have arisen requiring remedial action;
- How far the road construction contractor is meeting or adhering to required environmental and social principles, standards and commitments; and
- Extent to which project monitoring and reporting requirements are being met.

The place of mitigation measures in the figure 8.1 exemplifies the logical connection between the planning and the implementation phases of a road project. The mitigation measures once identified are incorporated into the road project design. In this way, the outcomes of the ESA become integral part of the road project design and costing, but not as an after-thought, or an add-on after the project design and planning is complete. The linkages between the ESA and the pre-project/ planning, and between the ESM and project implementation activities (figure 8.1), reflect the relationship that exists between the EMU of GHA or the Environmental Desks and the Planning Divisions of the road sector agencies.

Figures 8.2 and 8.3 give the procedures for the environmental and social planning and management of road projects that are subject to Sectoral EA (or PEA) and EIA respectively. The significance of the roles and relationship between the Environmental and Planning Units are further highlighted. The important role of the EPA in the schemes and EPA's relationship with the Environmental Units or Desks of the road sector agencies are shown. The places of the private sector involvement in road activities (i.e. as EA consultants and road construction contractors) in the schemes are also indicated in the figures 8.2 and 8.3.

The Tables 6.1 and 6.2 (pages 58 and 59) give the Road Sector Sensitivity Screening Criteria that guide route/corridor selection and screening of projects within the MoT and the implementing agencies. The World Bank and Ghana's EA requirements and operational procedures are harmonised as far as possible, which makes the ESMF responsive to the objectives of good practice, in the following respects:

- Early consideration of environmental and social issues (starting at the screening stage);
- Identification and early consultation with stakeholders;
- Prevention of adverse impacts through the consideration of feasible alternatives; and
- Incorporation of mitigation measures into planning and (engineering) design.

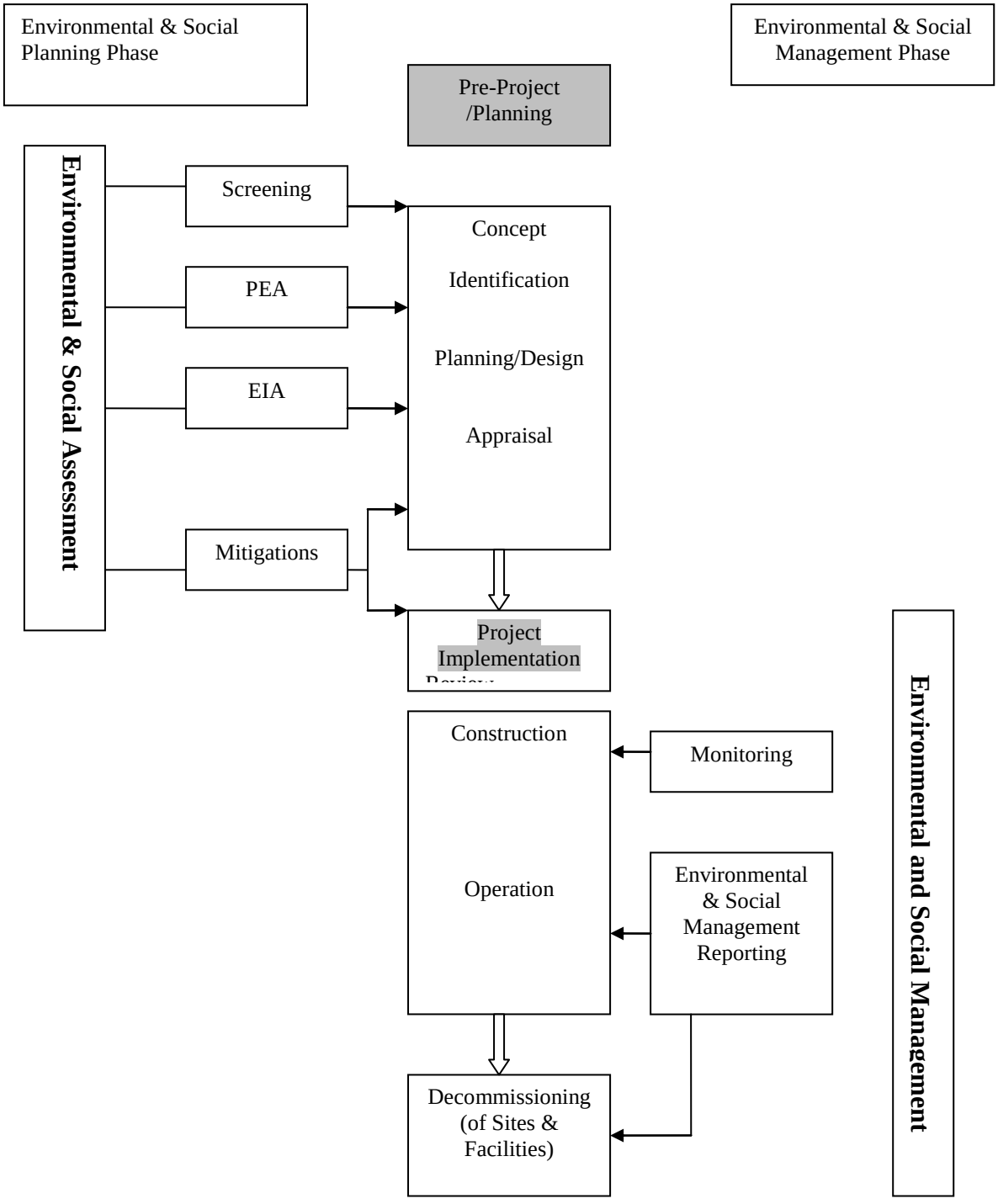
The main levels of EA following screening (i.e. screening outcomes) under the Ghana Regulations are that:

- No further EA required;
- Preliminary Environmental Assessment (PEA) required;
- Environmental Impact Assessment (EIA) required; or
- Strategic Environmental Assessment (SEA) required.

This corresponds in principle with the Bank's EA requirements of:

- Category C;
- Category B;
- Category A;
- Sectoral or Regional EA.

Fig. 8.1 ***Environmental and Social Planning and Management Scheme for Road Sector Projects***



Source: Derived from the Environmental Assessment in Ghana: A Guide Context of EIA within Environmental Planning & Management

Fig.8.2 Environmental and Social Planning and Management of Projects subject to Sectoral (or Preliminary) Environmental Assessment

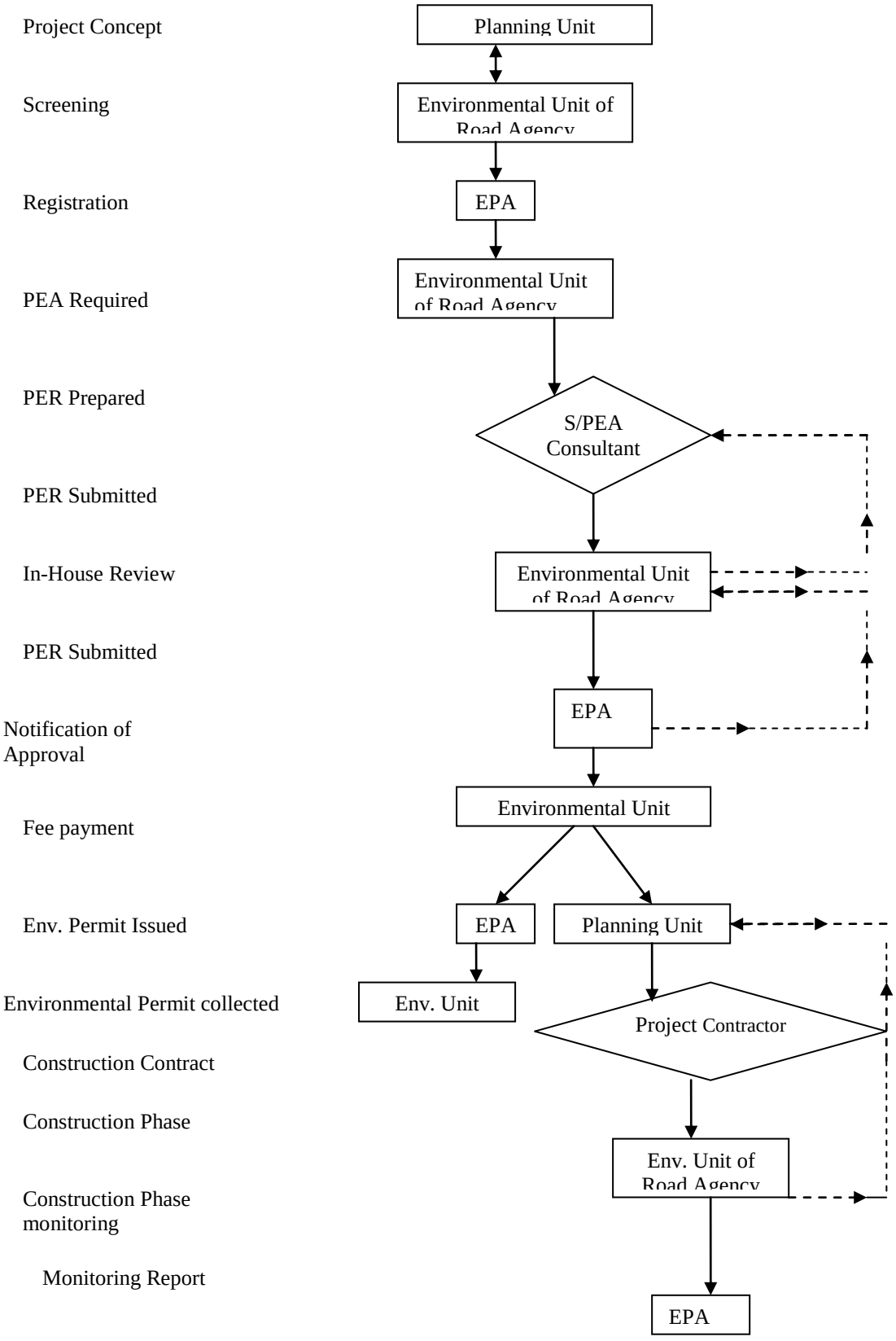
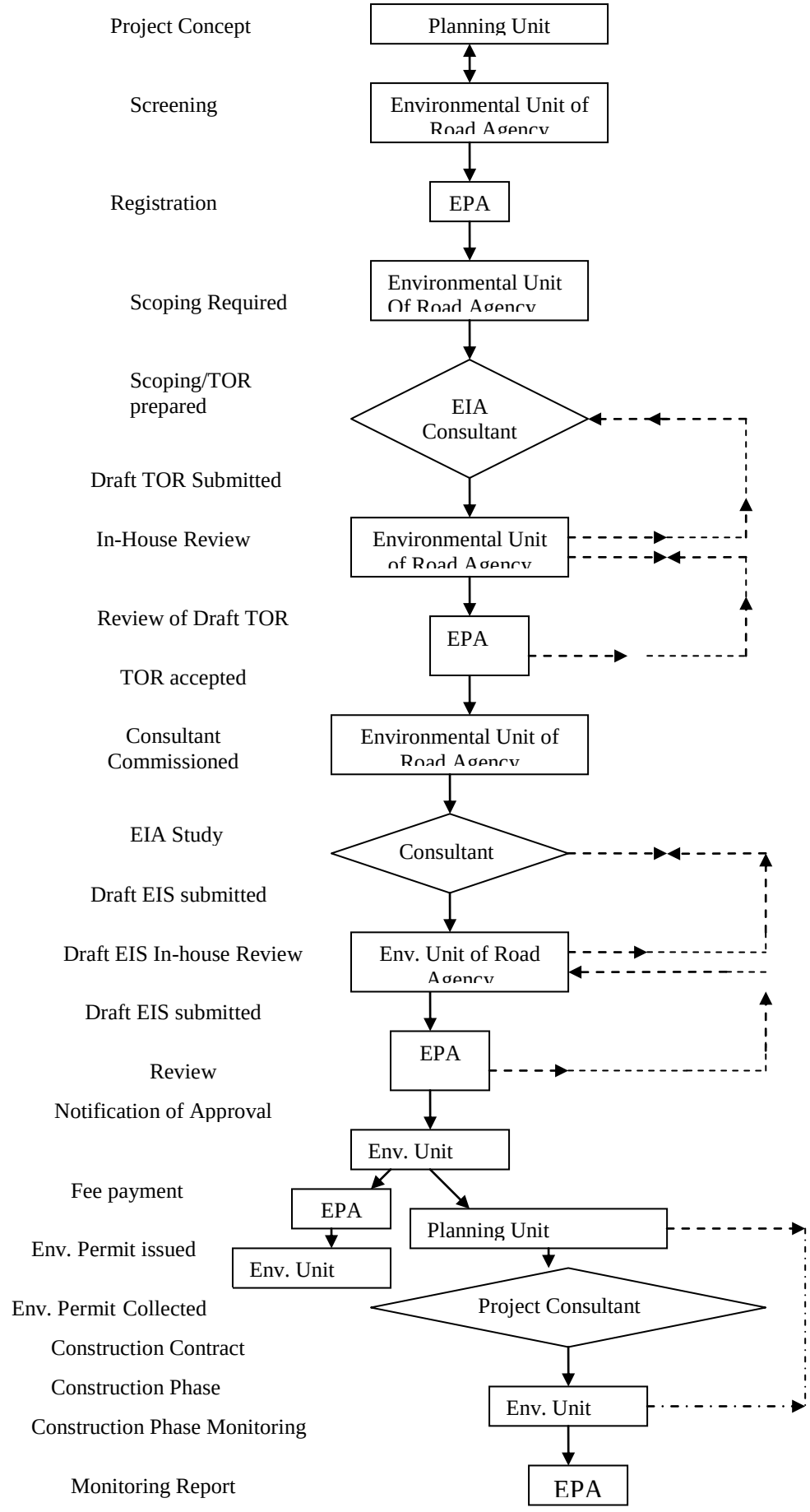


Fig. 8.3 Environmental and Social Planning and Management of Projects Subject to Environmental Impact Assessment



One or a combination of the environmental and social criteria or factors in the Tables 6.1 and 6.2 leads to the assigned screening outcome or decision on the appropriate level of EA for a particular road project. The screening guideline is detail and specific on environmental and social sensitivity criteria, in order to readily help avoid sensitive sections of a selected route or alignment. This inherently engenders the consideration of alternative routes or construction corridors or segments, as far as possible, as an incentive to settle for the lower PEA or Sectoral EA requirement rather than EIA.

8.2 Institutional Arrangements

The GHA, DUR and the DFR are the main road sector executing agencies under the MoT. The other institutions whose functions relate to road projects in terms of interference with utility provision and service lines, and natural resource management in corridor selection, and project environmental approvals and management include:

- Environmental Protection Agency (EPA);
- Water Resources Commission (WRC);
- Forestry Commission (FC);
- Wildlife Division (WD);
- Forest Services Division (FSD);
- Electricity Company of Ghana (ECG);
- Ghana Water Company Limited (GWCL);
- Ghana Telecommunications (GT); and
- Bulk Oil Storage & Transportation Company (BOST)

The role of the EPA is fundamental as a lead environmental regulator, which oversees compliance with EA requirements in Ghana, and issues environmental permits for road projects. The agency therefore has an important role in the implementation of the ESMF. The other institutions, on the other hand, come in as and when relevant areas or resources under their jurisdiction or management are likely to be affected by or implicated in a road project. These institutions are grouped broadly into two – resource based ones (WRC, FC, WD, and FSD), and the utility service providers (ECG, GWCL, GT and BOST). They all have a significant role and are consulted as appropriate. They participate in the EA processes and in project decision-making that helps prevent or minimize impacts and to mitigate them. These institutions may also be required:

- To issue a consent or approval for an aspect of a project;
- To allow an area to be included in a project; or
- To allow impact to a certain extent or impose restrictions or conditions.

Furthermore, the institutions may have monitoring responsibility or supervisory oversight during construction in an area of concern or interest to them.

8.3 Capacity Building

The institutions understand and appreciate the purpose of the ESMF, their expected roles and the extent to which the ESMF will facilitate their statutory mandates and in the performance of their functions. This helps to engender the required corporation and collaboration in the implementation of the ESMF.

The broad areas for capacity building to enhance their respective roles and collaboration include the following:

1. Project screening techniques, screening tools and the applicable legislations and procedures;
2. General project planning and management inter-faced with environmental and social assessment and management;
3. Environmental Impact Assessment (EIA);
4. Strategic Environmental Assessment (SEA);
5. Review techniques and specifically review of PER, EIS and SEA, etc;
6. Environmental Management Planning;
7. Monitoring and Environmental Audit;
8. Annual Environmental Report preparation and other reporting requirements;
9. Public participation techniques Public Hearing Procedure;
10. Public awareness creation / educational techniques (on environmental, social and health issues).

The key EA and EM functional areas of the institutions and the respective institutional capacity needs are given in Appendix 4.

8.4 Environmental and Social Monitoring

Monitoring is a key component of the ESMF during project implementation. The significance of monitoring stems from the fact that the inputs derived from the ESA into the project design and planning, including mitigation measures are based largely on "predictions". It is essential that the basis for the choices, options and decisions made in formulating or designing the project and other environmental and social safeguard measures are verified for adequacy and appropriateness. Monitoring verifies the effectives of impact management, including the extent to which mitigation measures are successfully implemented. Monitoring specifically helps to:

- Improve environmental and social management practices;
- Check the efficiency and quality of the EA processes;
- Establish the scientific reliability and credibility of the EA for the project (as well as the quality of experts providing EA consultancy services in the road sector); and
- Provide the opportunity to report the results on safeguards and impacts and proposed mitigation measures implementation.

Monitoring is one of the principal activities of the environmental and social management (ESM) phase of a road project (Figure 8.1). Various stakeholders carry out monitoring functions for varied purposes. Once environmental permit is secured for a project, contract is awarded and the project implementation will commence. The Environmental Units or Desks of MoT, GHA, DUR and the DFR commence monitoring as an important feedback mechanism. This ensures that the environmental and social mitigation measures:

- Identified in the planning phase (contained in the EA report), and incorporated in the project design and costed are being implemented;

- Are maintained throughout the construction phase and where applicable in the road-use phase and to the decommissioning of sites, facilities and equipment; and
- Where inadequate, additional remedial actions are identified (including corrective measures or re-design of mitigation measures).

The monitoring by the Environmental Units is effectively on the contractor engaged in the road construction project, and covers other areas such as adherence to the environmental and social clauses and principles. The monitoring results from the executing agencies are reported to the MoT and EPA, in addition to their own agencies for necessary action.

The EPA carries out its own compliance monitoring to satisfy itself that the permit conditions and relevant standards and mitigation measures are being fulfilled by the executing agency. The monitoring report (which may be an AER) from the executing agencies often forms the basis for EPA's compliance monitoring. Traditionally, EPA's oversight role covers or represents the monitoring interest of the other institutions. These institutions such as WRC, WD, FSD, etc, however, have the right to perform their own monitoring activities and to deal with the contractor through the executing agencies.

8.5 Some Mitigation Principles and Clauses

Comprehensive lists of environmental and social clauses are presented in Appendices 1A and 1B, in addition to the following general principles which will be observed as appropriate in the implementation of the ESMF by all stakeholders:

8.5.1 Road sector and workplace HIV/AIDS programs

- The ethical principles governing handling of persons with other medical conditions will apply. Relationships of infected / potential workers will be governed by the basic human rights as enshrined in the Constitution of Ghana.
- Due care and confidentiality will be exercised in handling information regarding the HIV status of workers in the sector.
- The contractors will have a workplace program on HIV/AIDS.
- HIV/AIDS education to communities in which workers of the sector are working will be included in target groups for education and information provision.

8.5.2 Air quality management

- Contract specifications for road contractors will include dust control measures.
- Hauling trucks carrying sand bound for a road project site will be completely covered and secured to avoid dust emission.

8.5.3 Soil quality management

- Road construction contractors will undertake progressive replanting of all disturbed areas during construction, not after construction phase.

- As contractors' obligation road project contracts will specify provision for erosion control, spillage prevention during construction, and planting and ensuring effective re-vegetation.
- Contractors will ascertain that all raw materials, including sand, aggregates and other construction materials are sourced from approved sites, and must have evidence of EPA's or relevant MDA's permit.

8.5.4 Water resource management

- The need to provide reservations or buffer zones of undisturbed vegetation between road sites under construction and nearby water bodies will be adhered to.

8.5.5 Noise abatement

- Contractors will adhere to EPA's permissible noise levels and ensure construction workers comply.

- Contractors will use signboards and other public information mechanisms to inform the public in advance of construction work, scheduled closure or diversion.

8.5.7 Public safety and health

- All open ditches and other potential hazards and sites will be marked with visible tapes to avoid accidents, or else the contractor will be held accountable for accidents that occur on project site and areas of influence.

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APPENDICES

APPENDIX 1A

Environmental and Social Clauses (TSDP)

1.0 General

a) The Contractor shall comply with any specific Environmental Management Plan (EMP) for the works he is responsible for. The Contractor shall inform himself about such an EMP, and prepare his work strategy and plan to fully take into account relevant provisions of that EMP.

b) The Contractor shall prepare method statements indicating the period within which he /she shall maintain status on site after completion of civil works to ensure that significant adverse impacts arising from such works have been appropriately addressed.

c) The Contractor shall adhere to the proposed activity implementation schedule and the monitoring plan/strategy to ensure effective feedback of monitoring information to project management so that impact management can be implemented properly, and if necessary, adapt to changing and unforeseen conditions.

d) Besides the regular inspection of the sites by the Supervising Engineer (SE) for adherence to the contract conditions and specifications, the Owner may appoint an Inspector to oversee the compliance with these environmental conditions and any proposed mitigation measures. The Environmental Protection Agency (EPA), regional environmental authorities or other relevant stake holders may carry out similar inspection duties. In all cases, as directed by the SE, the Contractor shall comply with directives from such inspectors to implement measures required to ensure the adequacy of rehabilitation measures carried out on the bio-physical environment and compensation for socio-economic disruption resulting from implementation of all works.

e) The Contractor shall implement all measures necessary to avoid undesirable adverse environmental and social impacts wherever possible, restore work sites to acceptable standards, and abide by any environmental performance requirements specified in an EMP.

f) If the Contractor fails to implement the approved EMP after written instruction by the Supervising Engineer (SE) to fulfil his obligation within the requested time, the Owner reserves the right to arrange through the SE for execution of the missing action by a third party on account of the Contractor.

g) The Contractor will contact the proper agency for preparation of RAP, based on the RPF, where land is acquired, assets lost, or impact on livelihood occurs.

2.0 Dust Abatement

a) The contractor shall minimize the effect of dust on the surrounding environment resulting from earth mixing sites, asphalt mixing sites, dispersing coal ashes, vibrating equipment, temporary access roads, etc. to ensure safety, health and the protection of workers and communities living in the vicinity of dust producing activities.

b) During the performance of the work and any operations appurtenant thereto, the contractor shall carry out proper and efficient measures, such as sprinkling with water or other means, whenever necessary to reduce the dust nuisance, and to prevent dust which has originated from his operations from damaging crops, cultivated fields, and dwellings or causing a nuisance to persons. The contractor will be held liable for any damage resulting form dust originating from his operations.

3.0 Noise Due to Construction Activities

The contractor shall ensure the noise levels emanating from machinery, vehicles and noisy construction activities (e.g. excavation, blasting) are kept at a minimum for the safety, health and protection of workers within the vicinity of high noise levels and nearby communities. The national noise limit standard for the residential area in day time is 55 dB while at night is 45dB.

4.0 River, Stream and Creek obstruction

a) The contractor shall ensure the existing water flow regimes in rivers, streams and other natural or irrigation channels are maintained and/or re-established where they are disrupted due to works being carried out.

b) The contractor shall take all possible steps to prevent pollution of streams, rivers and other natural water bodies/reservoirs.

c) Bitumen, oils, lubricants and waste water used or produced during the execution of works will not be released directly into rivers, streams, irrigation channels and other natural water bodies/reservoirs without prior treatment and also ensure that stagnant water in uncovered burrow pits is treated in the best way to avoid creating possible breeding grounds for mosquitoes.

5.0 Quarrying, Earth Burrowing, etc.

a) Prevent and minimize the impacts of quarrying, earth burrowing, piling and building of temporary construction camps and access roads on the bio physical environment, including protected areas and arable lands, local communities and their settlements. In as much as possible restore/rehabilitate all sites to acceptable standards.

b) At the end of the construction phase, all construction sites shall be landscaped and rehabilitated to acceptable standards. The stated areas shall be first landscaped, dressed with topsoil and covered with tree planting, field sods or grass seeding.

6.0 Protection of Archaeological and Historical Sites

a) Upon discovery of ancient heritage, relics or anything that might be or is believed to be of archaeological or historical importance during the execution of works, immediately suspend activity and report such findings to the SE so that the National Museums and Monuments Board may be expeditiously contacted for fulfilment of the measures aimed at protecting such historical or archaeological resources.

b) The contractors shall take the necessary measures to prevent any person or equipment that may damage the article or things and shall provide barricades, fences, and signals and, if necessary, protect against atmospheric agents, as directed by the engineer, also guard service may be required by the engineer.

c) The supervising engineer shall take the following measures:

- Notify the National Museums and Monuments Board
- Request that a representative make a site inspection;
- Cessation of work in the vicinity of the find until the visit of the representative; and
- Decision by the National Museums and Monuments Board on possible salvage or excavation within 48-72-hours of notification.

7.0 Vegetation and Wildlife

a) Discourage construction workers from engaging in the exploitation of natural resources such as hunting, fishing, and collection of forest products or any other activity that might have a negative impact on the social and economic welfare of the local communities.

b) The contractor shall care, in planning, constructing, maintaining and operating temporary works such as camps, roads, spoil, stockpile and construction facilities areas, to avoid unnecessary damage to areas of particular environmental interest, such as patches of remaining forest, valuable trees and erosion of sensitive areas, as well as areas in which the presence of wildlife has been noted.

c) In case some part of a forest or single trees have to be removed, or where erosion problems that may affect some portion of the permanent or temporary works are expected, and in any case where in the engineer's opinion it is beneficial for land conservation, the contractor may be required to carry out landscaping, seeding and planting of trees, as well as executing drainages and water control works according to the prescriptions contained in the pertinent sections of these specifications.

d) No valuable trees or crops shall be damaged or removed by the contractor during the execution of the works without the prior consent of the engineer.

e) Hunting in the proximity of camps and facilities and in general in the project area is strictly prohibited, even if allowed by local rules or regulation in force in Ghana and/or in the project region.

8.0 Use of Materials

The contractor, in as much as possible, shall use local materials to avoid importation of foreign material and long distance transportation.

9.0 Worksite/Camp Site Waste Management

a) All vessels (drums, containers, bags, etc.) containing oil/fuel/surfacing materials and other hazardous chemicals shall be banded in order to contain spillage. Used oil and hydraulic fluid generated on the construction sites must be collected in a closed container and stored temporarily in a safe place and sent to an authorized recycling depot.

b) All drainage and effluent from storage areas, workshops and camp sites shall be captured and treated before being discharged into the drainage system in line with applicable government water pollution control regulations.

c) The contractor shall take all possible steps to prevent pollution of streams, rivers, and other water supplies, at or in the vicinity of the site and shall comply with applicable laws, orders and regulations in force in Ghana concerning the control and abatement of water pollution.

d) Entry of runoff to the site shall be restricted by constructing diversion channels or holding structures such as banks, drains, dams, etc. to reduce the potential of soil erosion and water pollution.

e) Construction waste shall not be left in stockpiles along the road, but removed and reused or disposed of on a daily basis.

f) If disposal sites for clean spoil are necessary, they shall be located in areas, approved by the SE, for landfill and where they will not result in material being easily washed into drainage channels. Whenever possible, spoil materials should be placed in low lying areas and should be compacted and dressed with top soil and then planted with species indigenous to the locality.

g) The contractor shall provide all sanitary facilities (e.g. garbage collection and disposal, drinking water facilities, etc.) in construction workers' camps.

10.0 Material Excavation and Deposit

a) The Contractor shall obtain appropriate licenses/permits from relevant authorities to operate quarries or burrow areas.

b) The location of quarries and burrow areas shall be subject to approval by relevant local and national authorities, including traditional authorities if the land on which the quarry or burrow areas fall in traditional land.

c) New extraction sites:

- Shall not be located in the vicinity of settlement areas, cultural and historical sites, wetlands or any other valued ecosystem component, or on high or steep ground or in areas of high scenic value.
- Shall not be located in archaeological areas. Excavations in the vicinity of such areas shall proceed with great care and shall be done in the presence of government authorities having a mandate for their protection.
- Shall not be located in forest reserves. However, where there are no other alternatives, permission shall be obtained from the appropriate authorities and an environmental impact study shall be conducted.
- Shall be rehabilitated. Areas with minimal vegetation cover such as flat and bare ground, or areas covered with grass only or covered with shrubs less than 1.5m in height, are preferred.
- Shall have clearly demarcated and marked boundaries to minimize vegetation clearing and to avoid any unnecessary damage on other resources.

d) Vegetation clearing shall be restricted to the area required for safe operation of construction work. Vegetation clearing shall not be done more than two months in advance of operations.

e) Stockpile areas shall be located in areas where trees can act as buffers to prevent dust pollution. Perimeter drains shall be built around stockpile areas. Sediment and other pollutant traps shall be located at drainage exits.

f) The Contractor shall deposit any excess material in accordance with the principles of these general conditions, and any applicable EMP, in areas approved by local authorities and/or the SE.

g) Areas for depositing hazardous materials such as contaminated liquid and solid materials shall be approved by the SE and appropriate local and/or national authorities before the commencement of work. Use of existing, approved sites shall be preferred over the establishment of new sites.

11.0 Rehabilitation and Soil Erosion Prevention

a) To the extent practicable, the Contractor shall rehabilitate the site progressively so that the rate of rehabilitation is similar to the rate of construction.

b) Always remove and retain topsoil for subsequent rehabilitation. Soils shall not be stripped when they are wet as this can lead to soil compaction and loss of structure.

c) Topsoil shall not be stored in large heaps. Low mounds of no more than 1 to 2m high are recommended.

d) Re-vegetate the stockpiles with recommended grass species to protect the soil from erosion, discourage weeds, and maintain an active population of beneficial soil microbes.

e) Locate stockpiles where they will not be disturbed by future construction activities.

f) The contractor shall reinstate natural drainage patterns where they have been altered or impaired.

g) The contractor shall collect toxic materials from construction areas and keep them protected in designated sites until proper disposal. Backfill excavated areas with soils or overburden that is free of foreign material that could pollute groundwater and soil.

h) Identify potentially toxic overburden and screen with suitable material to prevent mobilization of toxins.

i) Ensure reshaped land is formed so as to be inherently stable, adequately drained and suitable for the desired long-term land use, and allow natural regeneration of vegetation.

j) Minimize the long-term visual impact by creating landforms that are compatible with the adjacent landscape.

k) Minimize erosion by wind and water both during and after the process of reinstatement.

1) Compacted surfaces shall be deep ripped to relieve compaction unless subsurface conditions dictate otherwise.

m) Re-vegetate with plant species that will control erosion, provide vegetative diversity and, through succession, contribute to a resilient ecosystem. The choice of plant species for rehabilitation shall be done in consultation with local research institutions, the Forestry Department, and the local people.

12.0 Water Resources Management

a) The Contractor shall, at all costs, avoid conflicting with water demands of local communities.

b) Abstraction of both surface and underground water shall only be done with the consultation of the local community and after obtaining a permit from the Water Resources Commission.

c) Abstraction of water from wetlands shall be avoided. Where necessary, permission has to be obtained from relevant authorities.

d) No construction water containing spoils or site effluent, especially cement and oil, shall be allowed to flow into natural water drainage courses.

e) Waste water from washing out of equipment shall not be discharged into water courses without pre treatment.

f) Site spoils and temporary stockpiles shall be located away from the drainage system, and surface runoff shall be directed away from stockpiles to prevent erosion.

13. 0 Traffic Management

a) Location of access roads shall be done in consultation with the local community especially in important or sensitive environments. Access roads shall not traverse wetland areas.

b) Upon the completion of civil works, all access roads shall be ripped and rehabilitated.

c) Access roads shall be watered regularly to suppress dust emission

14.0 Disposal of Unusable Elements

a) Unusable materials and construction elements such as electro-mechanical equipment, pipes, accessories and demolished structures will be disposed of in a manner approved by the SE. The Contractor has to agree with the SE which elements are to be surrendered to the Client's premises, which will be recycled or reused, and which will be disposed of at approved landfill sites.

b) Unsuitable and demolished elements shall be dismantled to a size fitting on ordinary trucks for transport.

15.0 Repair of Private Property

a) Should the Contractor, deliberately or accidentally, damage private property, he shall repair the property to the owner's satisfaction and at his own cost. For each repair, the Contractor shall obtain from the owner a certificate that the damage has been repaired satisfactorily in order to indemnify the Client from subsequent claims.

b) In cases where compensation for inconveniences, damage of crops etc. are claimed by the owner, the Client has to be informed by the Contractor through the SE. This compensation is in general settled under the responsibility of the Client before signing the Contract. In unforeseeable cases, the respective administrative entities of the Client will take care of compensation.

16.0 Contractor's Environment, Health and Safety Management Plan (EHS-MP)

Within 6 weeks of signing the Contract, the Contractor shall prepare an EHS-MP to ensure the adequate management of the health, safety, environmental and social aspects of the works, including implementation of the requirements of these general conditions and any specific requirements of an EMP for the works. The Contractor's EHS-MP will serve two main purposes:

a) For the Contractor, for internal purposes, to ensure that all measures are in place for adequate EHS management, and as an operational manual for his staff.

b) For the Client, supported where necessary by SE, to ensure that the Contractor is fully prepared for the adequate management of the EHS aspects of the project, and as a basis for monitoring of the Contractor's EHS performance. The Contractor's EHS-MP shall provide at least:

- A description of procedures and methods for complying with these general environmental management conditions, and any specific conditions specified in an EMP;
- A description of specific mitigation measures that will be implemented in order to minimize adverse impacts;
- A description of all planned monitoring activities (e.g. sediment discharges from burrow areas) and the reporting thereof; and
- The internal organizational, management and reporting mechanisms put in place.

The Contractor's EHS-MP will be reviewed and approved by the Client before start of the works. This review should demonstrate if the Contractor's EHS-MP covers all of the identified impacts, and has defined appropriate measures to counteract any potential impacts.

16.1. Health and Safety

a) In advance of the construction work, the Contractor shall mount an awareness and hygiene campaign. Workers and local residents shall be sensitized on health risks particularly of AIDS.

b) Adequate road signs to warn pedestrians and motorists of construction activities, diversions, etc. shall be provided at appropriate points.

c) Construction vehicles shall not exceed a maximum speed limit of 40km per hour.

16.2. Traffic Safety

a) Ensure public safety, and meet traffic safety requirements for the operation of work to avoid accidents.

b) The contractor shall be responsible for the safety along the roads related to the site, and he shall take all necessary precautions for the protection of the work and the safety of the public on the roads affected by his activities.

c) Roads subject to interference by the work shall be kept open or suitable detours shall be provided and maintained by the contractor, who shall provide, erect, and maintain all necessary barricades, suitable and sufficient flashlights, flagmen, danger signals, and signs.

d) The contractor shall submit his weekly activities schedule and the locations of his work along the existing public roads to the authorities concerned, and obtain all necessary approvals prior to commencement of the respective work.

e) At the road crossings or in heavy traffic locations, the contractor shall carry out the work within the working hours as directed by the engineer, and after the completion of the work he shall immediately make the necessary backfill and pavement at the crossings.

f) The contractor shall provide temporary passes and bridges to give an access to the existing villages, houses, etc., to the satisfaction of the engineer and the authorities concerned whenever he disturbs such existing way during the execution of the works.

17.0 Reporting

The Contractor shall prepare monthly progress reports to the SE on compliance with these general conditions, the project EMP if any, and his own EHS-MP. It is expected that the Contractor's reports will include information on:

- EHS management actions/measures taken, including approvals sought from local or national authorities;
- Problems encountered in relation to EHS aspects (incidents, including delays, cost consequences, etc. as a result thereof);
- Lack of compliance with contract requirements on the part of the Contractor;
- Changes of assumptions, conditions, measures, designs and actual works in relation to EHS aspects; and
- Observations, concerns raised and/or decisions taken with regard to EHS management during site meetings.

It is advisable that reporting of significant EHS incidents be done "as soon as practicable". Such incident reporting shall therefore be done individually. Also, it is advisable that the Contractor keeps his own records on health, safety and welfare of persons, and damage to property. It is advisable to include such records, as well as copies of incident reports, as appendices to the bi-weekly reports. Details of EHS performance will be reported to the Client through the SE's reports to the Client.

18.0 Training of Contractor's Personnel

The Contractor shall provide sufficient training to his own personnel to ensure that they are all aware of the relevant aspects of these general conditions, any project EMP, and his own EHS-MP, and are able to fulfil their expected roles and functions. Specific training should be provided to those employees that have particular responsibilities associated with the implementation of the EHS-MP. General topics should be:

- EHS in general (working procedures);
- Emergency procedures; and
- Social and cultural aspects (awareness creation).

19.0 Cost of Compliance

It is expected that compliance with these conditions is already part of standard good workmanship and state-of-the-art as generally required under this Contract. The item "Compliance with Environmental Management Conditions" in the Bill of Quantities covers these costs. No other payments will be made to the Contractor for compliance with any request to avoid and/or mitigate an avoidable EHS impact.

APPENDIX 1B

Environmental and Social Clauses (Urban Projects)

1.0 General

a) The Contractor shall comply with any specific Environmental Management Plan (EMP) for the works he is responsible for. The Contractor shall inform himself about such an EMP, and prepare his work strategy and plan to fully take into account relevant provisions of that EMP.

b) The Contractor shall prepare method statements indicating the period within which he/she shall maintain status on site after completion of civil works to ensure that significant adverse impacts arising from such works have been appropriately addressed.

c) The Contractor shall adhere to the proposed activity implementation schedule and the monitoring plan/strategy to ensure effective feedback of monitoring information to project management so that impact management can be implemented properly, and if necessary, adapt to changing and unforeseen conditions.

d) Besides the regular inspection of the sites by the Supervising Engineer (SE) for adherence to the contract conditions and specifications, the Owner may appoint an Inspector to oversee the compliance with these environmental conditions and any proposed mitigation measures. The Environmental Protection Agency (EPA), regional environmental authorities or other relevant stakeholders may carry out similar inspection duties. In all cases, as directed by the SE, the Contractor shall comply with directives from such inspectors to implement measures required to ensure the adequacy of rehabilitation measures carried out on the bio-physical environment and compensation for socio-economic disruption resulting from implementation of all works.

e) The Contractor shall implement all measures necessary to avoid undesirable adverse environmental and social impacts wherever possible, restore work sites to acceptable standards, and abide by any environmental performance requirements specified in an EMP.

f) If the Contractor fails to implement the approved EMP after written instruction by the Supervising Engineer (SE) to fulfil his obligation within the requested time, the Owner reserves the right to arrange through the SE for execution of the missing action by a third party on account of the Contractor.

g) The Contractor will contact the proper agency for preparation of RAP, based on the RPF, where land is acquired, assets lost, or impact on livelihood occurs.

2.0 Dust Abatement

a) The contractor shall minimize the effect of dust on the surrounding environment resulting from earth mixing sites, asphalt mixing sites, dispersing coal ashes, vibrating equipment, temporary access roads, etc. to ensure safety, health and the protection of workers and communities living in the vicinity of dust producing activities.

b) During the performance of the work and any operations appurtenants thereto, the contractor shall carry out proper and efficient measures, such as sprinkling with water or other means, whenever necessary to reduce the dust nuisance, and to prevent dust which has originated from his operations from damaging crops, cultivated fields, and dwellings or causing a nuisance to persons. The contractor will be held liable for any damage resulting form dust originating from his operations.

3.0 Noise Due to Construction Activities

The contractor shall ensure the noise levels emanating from machinery, vehicles and noisy construction activities (e.g. excavation, blasting) are kept at a minimum for the safety, health and protection of workers within the vicinity of high noise levels and nearby communities. The EPA permissible noise guidelines for the residential area in day time is 55 dB while at night is 45dB.

4.0 River, Stream and Creek Obstruction

a) The contractor shall ensure the existing water flow regimes in rivers, streams and other natural or irrigation channels are maintained and/or re-established where they are disrupted due to works being carried out.

b) The contractor shall take all possible steps to prevent pollution of streams, rivers and other natural water bodies/reservoirs.

c) Bitumen, oils, lubricants and waste water used or produced during the execution of works will not be released directly into rivers, streams, irrigation channels and other natural water bodies/reservoirs without prior treatment and also ensure that stagnant water in uncovered burrow pits is treated in the best way to avoid creating possible breeding grounds for mosquitoes.

5.0 Protection of Archaeological and Historical Sites

a) Upon discovery of ancient heritage, relics or anything that might be or is believed to be of archaeological or historical importance during the execution of works, immediately suspend and report such findings to the SE so that the National Museums and Monuments Board may be expeditiously contacted for fulfilment of the measures aimed at protecting such historical or archaeological resources.

b) The contractors shall take the necessary measures for preventing that any person or equipment may damage the article or things and shall provide barricades, fences, and signals and, if necessary, protect against atmospheric agents, as directed by the engineer. Also guard service may be required by the engineer.

c) The supervising engineer shall take the following measures:

- Notify the National Museums and Monuments Board
- Request for a representative to make a site inspection;
- Cessation of work in the vicinity of the find until the visit of the representative; and
- Decision by the National Museums and Monuments Board on possible salvage or excavation within 48-72 hours of notification.

6.0 Vegetation and Wildlife

a) Discourage construction workers from engaging in the exploitation of natural resources such as hunting, fishing, and collection of forest products or any other activity that might have a negative impact on the social and economic welfare of the local communities.

b) The contractor shall take care, in planning, constructing, maintaining and operating temporary works such as camps, roads, spoil, stockpile and construction facilities areas, to avoid unnecessary damage to areas of particular environmental interest, such as patches of remaining forest, valuable trees and erosion of sensitive areas, as well as areas in which the presence of wildlife has been noted.

c) In case some part of a forest or single trees have to be removed, or where erosion problems that may affect some portion of the permanent or temporary works are expected, and in any case where in the engineer's opinion it is beneficial for land conservation, the contractor may be required to carry out landscaping, seeding and planting of trees, as well as executing drainages and water control works according to the prescriptions contained in the pertinent sections of these specifications.

d) No valuable trees or crops shall be damaged or removed by the contractor during the execution of works without the prior consent of the engineer.

e) The contractor shall avoid forest reserves as much as possible. However, where there are no other alternatives, permission shall be obtained from the appropriate authorities and an environmental impact study shall be conducted.

f) Areas with minimal vegetation cover such as flat and bare ground, or areas covered with grass only or covered with shrubs less than 1.5m in height, are preferred.

g) The line route shall be clearly demarcated to minimize vegetation clearing and to avoid any unnecessary damage to other resources.

h) Vegetation clearing shall be restricted to the area required for safe operation of construction work.

i) Hunting in the proximity of camps and facilities and in general in the project area is strictly prohibited, even if allowed by local rules or regulation in force.

7.0 Use of Material
The contractor, in as much as possible, shall use local materials to avoid importation of foreign material and long distance transportation.

8.0 Work Site/Campsite Waste Management
a. All vessels (drums, containers, bags, etc.) containing oil/fuel/surfacing materials and other hazardous chemicals shall be banded in order to contain spillage. Used oil and hydraulic fluid generated on the construction sites must be collected in a closed container and stored temporarily in a safe place and sent to an authorized recycling depot.

b. All drainage and effluent from storage areas, workshops and camp sites shall be captured and treated before being discharged into the drainage system in line with applicable government water pollution control regulations.

c. The contractor shall take all possible steps to prevent pollution of streams, rivers, and other water supplies, at or in the vicinity of the site and shall comply with applicable laws, orders, and regulations in force in Ghana concerning the control and abatement of water pollution.

d. Entry of runoff to the site shall be restricted by constructing diversion channels or holding structures such as banks, drains, dams, etc. to reduce the potential of soil erosion and water pollution.

e. Construction waste shall not be left in stockpiles along the road, but removed and reused or disposed of on a daily basis.

f. If disposal sites for clean spoil are necessary, they shall be located in areas, approved by the SE, for landfill and where they will not result in material being easily washed into drainage channels. Whenever possible, spoil materials should be placed in low lying areas and should be compacted and dressed with top soil and then planted with species indigenous to the locality.

g. The contractor shall provide all sanitary facilities (e.g. garbage collection and disposal, drinking water facilities, etc.) are provided in construction workers camps

9.0 Rehabilitation and Soil Erosion Prevention
a) To the extent practicable, the Contractor shall rehabilitate the site progressively so that the rate of rehabilitation is similar to the rate of construction.

b) The contractor shall reinstate natural drainage patterns where they have been altered or impaired.

c) Ensure reshaped land is formed so as to be inherently stable, adequately drained and suitable for the desired long-term land use, and allow natural regeneration of vegetation.

10.0 Water Resources Management
a) No construction water containing spoils or site effluent, especially cement and oil, shall be allowed to flow into natural water drainage courses.

b) Site spoils and temporary stockpiles shall be located away from the drainage system, and surface runoff shall be directed away from stockpiles to prevent erosion.

11.0 Traffic Management
a) Location of access roads shall be done in consultation with the local community especially in important or sensitive environment. Access roads shall not traverse wetland areas.

b) Upon the completion of civil works, all access roads shall be ripped and rehabilitated.

12.0 Disposal of Unusable Elements

a) Unusable materials and construction elements such as electro-mechanical equipment, pipes, accessories and demolished structures will be disposed of in a manner approved by the SE. The Contractor has to agree with the SE which elements are to be surrendered to the Client's premises, which will be recycled or reused, and which will be disposed of at approved landfill sites.

b) Unsuitable and demolished elements shall be dismantled to a size fitting on ordinary trucks for transport.

13.0 Repair of Private Property

a) Should the Contractor, deliberately or accidentally, damage private property, he shall repair the property to the owner's satisfaction and at his own cost. For each repair, the Contractor shall obtain from the owner a certificate that the damage has been made good satisfactorily in order to indemnify the Client from subsequent claims.

b) In cases where compensation for inconveniences, damage of crops etc. are claimed by the owner, the Client has to be informed by the Contractor through the SE. This compensation is in general settled under the responsibility of the Client before signing the Contract. In unforeseeable cases, the respective administrative entities of the Client will take care of compensation.

14.0 Contractor's Environment, Health, and Safety Management Plan (EHS-MP)

Within 6 weeks of signing the Contract, the Contractor shall prepare an EHS-MP to ensure the adequate management of the health, safety, environmental and social aspects of the works, including implementation of the requirements of these general conditions and any specific requirements of an EMP for the works.

The Contractor's EHS-MP will serve two main purposes:

a) For the Contractor, for internal purposes, to ensure that all measures are in place for adequate EHS management, and as an operational manual for his staff.

b) For the Client, supported where necessary by SE, to ensure that the Contractor is fully prepared for the adequate management of the EHS aspects of the project, and as a basis for monitoring of the Contractor's EHS performance.

The Contractor's EHS-MP shall provide at least:

a) A description of procedures and methods for complying with these general environmental management conditions, and any specific conditions specified in an EMP;
b) A description of specific mitigation measures that will be implemented in order to minimize adverse impacts;
c) A description of all planned monitoring activities (e.g. sediment discharges from burrow areas) and the reporting thereof; and
d) The internal organizational, management and reporting mechanisms put in place.

The Contractor's EHS-MP will be reviewed and approved by the Client before start of the works. This review should demonstrate if the Contractor's EHS-MP covers all of the identified impacts, and has defined appropriate measures to counteract any potential impacts.

14.1. Health and Safety

a) In advance of the construction work, the Contractor shall mount an awareness and hygiene campaign. Workers and local residents shall be sensitized on health risks particularly of HIV/AIDS.

b) Adequate road signs to warn pedestrians and motorists of construction activities, diversions, etc. shall be provided at appropriate points.

c) Construction vehicles shall not exceed maximum speed limit of 40km per hour.

14.2. Traffic Safety

a) Ensure public safety, and meet traffic safety requirements for the operation of work to avoid accidents.

b) The contractor shall be responsible for the safety along the roads related to the site, and shall take all necessary precautions for the protection of the work and the safety of the public on the roads affected by his activities.

c) Roads subject to interference by the work shall be kept open or suitable detours shall be provided and maintained by the contractor, who shall provide, erect, and maintain all necessary barricades, suitable and sufficient flashlights, flagmen, danger signals, and signs.

d) The contractor shall submit his weekly activities schedule and the locations of his work along the existing public roads to the authorities concerned, and obtain all necessary approvals prior to commencement of the respective work.

e) At the road crossings or in heavy traffic locations, the contractor shall carry out the work within the working hours as directed by the engineer, and after the completion of the work he shall immediately make the necessary backfill and pavement at the crossings.

f) The contractor shall provide temporary passes and bridges to give an access to the existing villages, houses, etc., to the satisfaction of the engineer and the authorities concerned whenever he disturbs such existing way during the execution of the works.

15.0 Reporting

The Contractor shall prepare monthly progress reports to the SE on compliance with these general conditions, the project EMP if any, and his own EHS-MP. It is expected that the Contractor's reports will include information on:

- EHS management actions/measures taken, including approvals sought from local or national authorities;
- Problems encountered in relation to EHS aspects (incidents, including delays, cost consequences, etc. as a result thereof);
- Lack of compliance with contract requirements on the part of the Contractor;
- Changes of assumptions, conditions, measures, designs and actual works in relation to EHS aspects; and
- Observations, concerns raised and/or decisions taken with regard to EHS management during site meetings.

It is advisable that reporting of significant EHS incidents be done "as soon as practicable". Such incident reporting shall therefore be done individually. Also, it is advisable that the Contractor keeps his own records on health, safety and welfare of persons, and damage to property. It is advisable to include such records, as well as copies of incident reports, as appendixes to the bi-weekly reports. Details of EHS performance will be reported to the Client through the SE's reports to the Client.

16.0 Training of Contractor's Personnel

The Contractor shall provide sufficient training to his own personnel to ensure that they are all aware of the relevant aspects of these general conditions, any project EMP, and his own EHS-MP, and are able to fulfil their expected roles and functions. Specific training should be provided to those employees that have particular responsibilities associated with the implementation of the EHS-MP. General topics should be:

- EHS in general (working procedures);
- Emergency procedures; and
- Social and cultural aspects (awareness creation on social issues).

17.0 Cost of Compliance

It is expected that compliance with these conditions is already part of standard good workmanship and state-of-the-art as generally required under this Contract. The item "Compliance with Environmental Management Conditions" in the Bill of Quantities covers these costs. No other payments will be made to the Contractor for compliance with any request to avoid and/or mitigate an avoidable EHS impact.

APPENDIX 2

Environmentally Sensitive Areas – Schedule 5 of LI 1652

- All areas declared by law as national parks, watershed reserves, wildlife reserves and sanctuaries including sacred groves,
- Areas with potential tourist value,
- Areas which constitute the habitat of any endangered or threatened species of indigenous wildlife (flora and fauna),
- Areas of unique historic, archaeological or scientific interests,
- Areas which are traditionally occupied by cultural communities,
- Areas prone to natural disasters (geological hazards, floods, rainstorms, earthquakes, landslides or volcanic activities).
- Areas prone to bushfires.
- Hilly areas with critical slopes.
- Areas classified as prime agricultural lands.
- Recharge areas of aquifers.
- Water bodies characterized by one or any combination of the following conditions:
    - water tapped for domestic purposes;
    - water within controlled and/or protected areas;
    - Water that supports wildlife and fishery activities.
- Mangrove areas characterized by one or any combination of the following conditions:
    - areas with primary pristine and dense growth;
    - areas adjoining the mouths of major river systems;
    - areas near or adjacent to traditional fishing grounds;
    - areas that act as natural buffers against shore erosion, strong winds or storm floods.

APPENDIX 3

QUESTIONNAIRE

Environmental and Social Management Framework (ESMF)
For the Road Transport Sector Development Program

Background
Environmental Assessment (EA) or EIA has been an important environmental prevention, planning and management tool in Ghana since the 1980s, in ensuring sound and sustainable investments and developments. The EPA Act 490 (1994) and the EA Regulations, LI 1652 (1999) are the main legal basis for EA application in Ghana.

The Ghana EA system provides for both the planning phase (environmental assessment), and the implementation (construction and operation) phase (environmental management) of development actions, investments, etc. An additional feature of Ghana's EA system is the all-inclusive definition of "environment", which covers the natural and social environment (including cultural resources), and also human and ecosystem health, etc.

The EA Regulations give the general framework and procedures for carrying out EA and Environmental Management (EM) of activities of all sectors (e.g. Agriculture, Mining, Transportation, etc). The decision by the MoT to prepare an ESMF is to move away from the generalized EA framework, and to adapt a Road Transport Sector specific EA system. The advantages will be numerous. The ESMF will provide a platform of standard principles and processes for the road sub-sector programs and activities agreeable to all parties – MoT and the implementing Agencies, the EPA, the World Bank, and others – eliminating the need to always re-negotiate, to screen on project by project basis, etc.

The ESMF will represent a statement of policy, and provide the guiding principles, institutional arrangements and administrative procedures as the environmental and social safeguards instrument of reference, in the implementation of road sector programs. It will replace MoT's Resettlement Policy Framework (RPF) approved by the World Bank in 2000. This policy identifies resettlement processes, issues of compensation etc.

The purpose of this questionnaire is to explore:
The adequacy, workability and familiarity with the RPF;
The extent to which the RPF interfaced with the Ghana EA Procedures and the system of property valuation;
EA capacity or awareness within the relevant institutions generally;
The existing capacity and/or availability to facilitate the application of or compliance with the ESMF;
Capacity in the private sector to provide competent services under the ESMF; and
Opportunities for enhanced institutional collaboration and elicit input on the scope of the ESMF.

The responses provided to the questionnaire will be treated confidential and used only for the above purpose

General Information

A1. Institution/Department (*Name*)…….

A2. Respondent's Name (*optional*)…… Position…….

A3. Respondent's Qualification ……

A4. Respondent's Unit/Section…….

A5. Unit/Section Responsible for EA/EM…….....

General Knowledge of EA Instruments

B1. Are you conversant with the main Environmental Assessment (EA) legislation, procedures and framework applicable to the road transport sector?

	EA Instruments / Documents	**Are you aware of this?**	**Have you used it in the past**	**Purpose for using it (Comments)**
1	EPA Act, 1994 (Act 490)	Yes □ No □	Yes □ No □	
2	EA Regulations, 1999 (LI 1652)	Yes □ No □	Yes □ No □	
3	Ghana EIA Procedures	Yes □ No □	Yes □ No □	
4	Resettlement Policy Framework (MoT)	Yes □ No □	Yes □ No □	
5	World Bank's Environmental & Social Safeguards Policies (OP/BP 4.01 & OP/BP 4.12)	Yes □ No □	Yes □ No □	

B2. List any other relevant legislation/requirement/information source important to the road sector (on environment and social issues)……

……..

EA / EM Functions and Capacity Needs

C1. Which of the following EA / EM activities or functions are performed by your Department/ Organisation?

	Tick	EA & EM Activities	Comments
1	□	Planning phase activities	
2	□	Design/engineering	
3	□	Proposal preparation for EA consultants	
4	□	Providing Guidance to EA consultant & for the EA work	
5	□	Registering road projects with EPA	
6	□	Screening of road projects	
7	□	Preparing Scoping with TOR for EIA studies	
8	□	Submission/review of Scoping Report and acceptance of TOR	
9	□	Organising Public Consultation, Public Hearing, document disclosure	
10	□	Handling Resettlement issues	
11	□	Handling Compensation issues	
12	□	Ensuring quality EA is carried out	
13	□	Submitting EA report for review and approval	
14	□	Payment of fees and permit collection	
15	□	Taking custody of EA and related reports	
16	□	Ensuring implementation of mitigations, etc	
17	□	Implementing mitigations	
18	□	Proposal/TOR preparation for construction contracts/contractors	
19	□	Construction phase supervision	
20	□	Monitoring road projects	
21	□	Reporting on findings	
22	□	Please specify any other	

C2. Which of the above activities are you personally engaged in? (*state the numbers representing the activities*)……

C3. Rank adequacy of existing capacity to perform EA functions

	Capacity to perform EA functions	Rank with "5" as highest					If ranking is below "4" suggest capacity building required
		1	2	3	4	5	
1	Rate your capacity to adequately handle your functions						
2	Rate the ability of relevant officials in your institution to perform EA functions						
3	Rate the ability of officials of other relevant institutions to performing their required EA functions						
4	Rate the ability of private sector experts (consultants) offering EA services to handle EA						

C4. Please state number of staff in the institution with EA / EM capacity

	Staff Capacity	Formal Training	On the Job Learning	Comments
1	Number of staff with EA/EM capacity			
2	Number needed (considered adequate) to handle EA/EM in the institution			

Road Infrastructure/Services and related EAs

D1. What are the main classes or types of Road Transport interventions or projects or infrastructure or services that require investments or that are undertaken by the MoT and the Implementing Agencies? …….

…….

…….

…….

D2. Have you been involved in a road sector project? Yes □ No □

D3. If Yes state how many

D4. What was/were your role(s)?.....

……

D5. Please specify the category of road projects and the corresponding level of EA they are subjected to.

Type of Road Activity/Service	Type of EA Applied	Indicate where compensation or resettlement involved

Road Projects and Institutional Roles

E1. Which institutions did you work with on the road project(s)? ……

…….

…….

E2. Which institutions tend to be more relevant to the road sector (on environmental and social issues)?……

…….

E3. Do any of the following institutions play any part in the EA of a road sector project?

	Institution	Response		Institution	Response
1	Ministry of Transportation	Yes □ No □	8	Wildlife Division	Yes □ No □
2	Ghana Highway Authority	Yes □ No □	9	Forest Services Division	Yes □ No □
3	Department of Urban Roads	Yes □ No □	10	Land Valuation Board	Yes □ No □
4	Feeder Roads Department	Yes □ No □	11	Utility Service Providers	Yes □ No □
5	Environmental Protection Agency	Yes □ No □	12	Metropolitan/Municipal / District Assemblies	Yes □ No □
6	Water Resources Commission	Yes □ No □	13	Traditional Authorities	Yes □ No □
7	Forestry Commission	Yes □ No □			

E4. List any (other) departments/organisations that must be included in or omitted from the13 listed above in the institutional arrangements under the ESMF ……

……

……

Environmental and Social Areas of Interest

The table below contains a list of 22 Environmental and Social parameters or concerns associated with the road transport sector.

F1. Which of these would you rank as a common and a significant occurrence, arising from road projects (with 5 as highest & 1 lowest)?

F2. Which of these would you expect to feature in the ESMF?

	Environmental /Social Parameters	**Common**						**Significant**					**Tick the Parameters you wish considered in the ESMF**
		1	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**	
1	Dust												○
2	Noise												○
3	Road accidents												○
4	Public safety												○
5	Resettlement												○
6	Compensation issues/agreement												○
7	Wildlife concerns												○
8	Forestry concerns (e.g. access)												○
9	Habitat disruption												○
10	Water contamination												○
11	Stream diversion / blocking												○
12	Flooding												○
13	Run off												○
14	Induced development												○
15	Cultural concerns												○
16	Archaeological losses												○
17	Pits / trenches near roads												○
18	Inadequate drains along roads												○
19	Road construction waste generation & disposal												○
20	Top soil removal												○
21	Tree & vegetation removal												○
22	extensive construction(impact) corridor												○
Please add any others													

APPENDIX 4

Institutional Needs Assessment

Name of Institution	Activity	No. of Staff with capacity	No. Needed	Level of ability to perform	Knowledge of EA Legislation Procedure	Comments
GHA	1,2,3,4,5,6,7,8,9,10,11,12, 13,14,15,16,19,18,19,20,21	3	7	3		
DUR						
WD	1,4,7,8,12,16,10,11	6	12	2		
FC	1,2,11,17	1	10	3		
DFR	1,2,3,4,5,6,7,8,9,10,11,12, 13,14,15,16,19,18,19,20,21	8	5	4		
WRC	4,12,14	1	2	4		
FSD	8,23,24	0	-	5		All field staff have learnt on the job
EPA	4,5,7,7,8,9,12,15,16	10	100	4		EA administration has been decentralized. Need to train all staff.

The numbers (under "Activity") represent the type of EA/EM function performed by the Institutions/Agencies as in C1 of Appendix 3.

APPENDIX 5

Analysis of Environmental / Social Issues Common to Road Sector Activities

	Environmental / Social Parameters	Common								"Average"	Ranking
		GHA	EPA	DUR	DFR	WD	FS D	WRC	FC		
1	Dust	H	H	H	H	H	H	H		H	1
2	Noise	H	H	H	H	M	H	L		H	5
3	Road accidents	M	M	M	M	H	M	-		M	16
4	Public safety	M	M	M	H	M	M	M		M	17
5	Resettlement	M	M	H	L	M	M	H	L	M	21
6	Compensation issues/agreement	M	M	H	M	M	M	H	M	M	11
7	Wildlife concerns	L	L	M	L	M	M	-	M	M	20
8	Forestry concerns (e.g. access)	L	L	H	L	M	M	M	L	M	19
9	Habitat disruption	M	M	H	L	H	M	M	M	M	15
10	Water contamination	H	H	M	M	H	M	H	M	M	14
11	Stream diversion / blocking	M			M	M	M	H	M	M	9
12	Flooding	M	M	M	L	M	M	M	M	M	12
13	Run off	M	M	M	M	M	M	M	M	M	10
14	Induced development	M	M	H	M	M	M	M	H	M	8
15	Cultural concerns	M	M	H	M	M	M	L	L	M	13
16	Archaeological losses	L	L	L	L	M	M	L	L	L	22
17	Pits / trenches near roads	H	H	H	H	H	M	M	M	H	4
18	Inadequate drains along roads	H	H	M	M	H	H	L	M	H	6
19	Road construction waste generation & disposal	H	M	M	H	H	L	H	M	H	7
20	Top soil removal	H	H	H	M	H	H	M	M	H	3
21	Tree & vegetation removal	H	H	H	H	H	M	H	M	H	2
22	Extensive construction (impact) corridor	H	M	H	L	M	-	M	M	M	18

L - Represents Low Occurrence
M - Represents Medium Occurrence
H - Represents High Occurrence

APPENDIX 6

Analysis of Environmental / Social Issues Significant to Road Sector Activities

	Environmental / Social Parameters	Significant								"Aver-age"	Rank-ing
		GHA	EPA	DUR	DFR	WD	FS D	WRC	FC		
1	Dust	H	H	H	H	H	H	H	M		**1**
2	Noise	H	H	H	M	M	H	L	M		**12**
3	Road accidents	H	M	M	M	-	M	-	H		**15**
4	Public safety	H	H	H	M	M	M	H	M		**3**
5	Resettlement	H	H	H	M	M	M	H	M		**8**
6	Compensation issues/agreement	H	M	H	M	M	H	H	M		**9**
7	Wildlife concerns	H	M	M	M	M	M	-	M		**17**
8	Forestry concerns (e.g. access)	H	M	M	M	M	M	M	M		**16**
9	Habitat disruption		M	H		H	M	M	M		**18**
10	Water contamination	H	H	H	M	H	H	H	M		**2**
11	Stream diversion / blocking	H	M	M	M	M	H	M	M		**14**
12	Flooding	H	H	M	M	L	H	M	M		**11**
13	Run off	H	L	H	H	M	H	M	H		**5**
14	Induced development	M	M	H	M	M	M	-	M		**21**
15	Cultural concerns	H	H	H	M	M	M	M	M		**13**
16	Archaeological losses	M	M	L	M	H	L	M	M		**20**
17	Pits / trenches near roads	H	H	H	H	H	M	M	L		**6**
18	Inadequate drains along roads	H	H	H	M	H	M	M	M		**10**
19	Road construction waste generation & disposal	M	M	H	H	M	L	M	M		**19**
20	Top soil removal	H	M	H	M	H	M	H	M		**7**
21	Tree & vegetation removal	H	H	H	H	M	M	H	M		**4**
22	Extensive construction (impact) corridor	H	M	H	L	M	-	M	M		**22**

APPENDIX 7

Ranking of Environmental and Social Impacts/Issues associated with Road Projects (according to respondents of the study questionnaire)

	Environmental / Social Parameters	**Commonly Occurring (with 1 as most & 22 as least common)**	**Ranking of Significance (with 1 as most & 22 as least significant)**
1	Dust	1	1
2	Noise	5	12
3	Road accidents	16	15
4	Public safety	17	3
5	Resettlement	21	8
6	Compensation issues/agreement	11	9
7	Wildlife concerns	20	17
8	Forestry concerns (e.g. access)	19	16
9	Habitat disruption	15	18
10	Water contamination	14	2
11	Stream diversion / blocking	9	14
12	Flooding	12	11
13	Run off	10	5
14	Induced development	8	21
15	Cultural concerns	13	13
16	Archaeological losses	22	20
17	Pits / trenches near roads	4	6
18	Inadequate drains along roads	6	10
19	Road construction waste generation & disposal	7	19
20	Top soil removal	3	7
21	Tree & vegetation removal	2	4
22	Extensive construction (impact) corridor	18	22

APPENDIX 8

Summary of Potential Environment and Social Impacts Associated with Road Transport Sector and Mitigation Measures			
No	**Impact**	**Potential Source**	**Mitigation Measures**
1	**Soil Impacts** Loss of productive soil elimination of the productive capacity of the soil covered by roads particularly where the site for the road development is also suitable for agriculture.	Removal of productive soil Compaction with heavy machinery during construction Burrow pits and gravel winning, Quarries Spoil dumping Site preparation and clearing	• Minimizing the area of ground clearance; • Avoiding sensitive alignments, including steep slopes • Progressive replanting of disturbed areas during construction not after • Terracing of nearby marginal farmland to make it more productive on the long term; • Remediation of affected soils by using a sub soils to break up hardpan produced by compaction with heavy equipment;
	Erosion	Removal of vegetation and Soil disturbance coupled with poor drainage Site preparation and clearing	• Specifications for contractors responsibilities to cover such issues as erosion control, prevention of fuel spills during construction, and planting as well as timely watering of plantings. • Minimizing the area of ground clearance
	Destabilization of slopes which can lead to landslides	Creation of road cuts or embankments. Excessive steepness of cut slopes, deficiency of drainage, modification of water flows,	• Balancing filling and cutting requirements through route choice, so as to avoid/minimize the production of excess spoil material and reduce the need for borrow pits; • Avoiding the creation of cut slopes and embankments of an angle greater than the natural angle of repose for the local soil type; and • Engineering solutions such as intercepting ditches at the tops and bottoms of slopes. Gutters and spillways are used to control the flow of water down a slope; • Terraced or stepped slopes to reduce the steepness of a slope. riprap, or rock material embedded in a slope face, sometimes combined with planting, retaining structures, such as gabions (rectangular wire baskets of rocks), etc should be explored
2	Soil contamination during road construction and traffic operations. **Water Resources Impacts** Modification of flow of surface waters	Daily traffic operation on very busy roads. Metals from emissions such as chromium, lead, and zinc remain in the soil for hundreds of years. Pollutants settling in roadside soil can impair the growth of vegetation increasing potential for erosion. Spillage of hazardous products in transit. Site preparation and clearing	• Enforcement of emission standards and introduction of control legislation and mechanism • Guidelines for transport of hazardous products defining permissible routes • Emergency response procedures for spillage • Avoiding alignments which are susceptible to erosion, such as those crossing steep slopes; • Minimize the number of water crossings • Use clean fill materials around watercourses such as quarried rock

Summary of Potential Environment and Social Impacts Associated with Road Transport Sector and Mitigation Measures			
No	**Impact**	**Potential Source**	**Mitigation Measures**
	Ground water table modifications Water quality degradation (surface and groundwater)	Concentrating flows at certain points and, in some cases, increasing the speed of flow resulting in flooding, soil erosion, channel modification, and siltation of streams. - Earthworks Road drainage and excavation & embankments and structures can reduce or raise the water table (through restricting flow) • Sedimentation, changes in biological activity in streams and on their banks • Uncontrolled construction activities, • Chemicals spillage • Chronic pollution of surface runoff from exhaust emissions, pavement and tyre wear, petroleum product drippage, and corrosion of metals	containing no fine soil; and • Provide reservations/buffer zones of undisturbed vegetation between road sites and water bodies • Introduce Water speed reduction measures e.g. grasses, riprap, and other devices in water channels etc • Provide settling basins to remove silt, pollutants, and debris from road runoff water before discharge to adjoining streams or rivers • Construction of runoff channels, contouring or other means of erosion control • Pave sections of roads prone to erosion and sedimentation particularly relevant near water crossings. • Compensatory measures such as provision of bore holes and wells for communities adversely affected • Adopt environmental enhancements measures in design such as water retention structures in dry areas, and raising inlets to drainage culverts in high water table areas, retarding basins in areas prone to flooding to reduce runoff peaks, spillways
3	**Air Quality Impacts** Dust Emissions such as Nitrogen oxides (NO_X), Hydrocarbons (HC), Carbon monoxide (CO). Sulfur dioxide (SO_2), Particulates including suspended airborne particles from diesel fuel combustion, materials produced by tyre, brake and road wear, and dust, lead (Pb) Aldehydes etc.	Construction-related air pollution Batching plants and asphalt plant operations Material dump sites Vehicular emissions Haulage of materials	• Water dousing to minimize dust • Contract specifications include dust control measures • Rerouting traffic away from populated areas and reducing traffic congestion. • Provision of Bypass roads. • Covering of Hauling trucks carrying sand with canvass to avoid dust emission; • Location of material storage areas away from communities and environmentally sensitive receptors • Selecting road alignments which avoids housing, schools, and workplaces; • Avoiding placement of busy intersections, near housing, schools or workplaces; • Taking account of prevailing wind direction when siting roads and road features, including refueling stations, near population centres; • Avoiding steep grades and sharp curves which would promote deceleration, acceleration and shifting wherever possible; • Sealing high-use dirt roads, where

Summary of Potential Environment and Social Impacts Associated with Road Transport Sector and Mitigation Measures			
No	**Impact**	**Potential Source**	**Mitigation Measures**
			they pass through populated areas, to control dust; and • Planting tall, leafy, and dense vegetation between roads and human settlements to filter pollutants • Vehicle emissions standards as well as inspection and maintenance requirements;
4	**Habitat Destruction and disruption (flora and fauna impacts)** Habitat loss Habitat fragmentation	Right of way and land take Road intersecting habitat, Borrow and pits, and quarries When a road cuts through an ecosystem it affects the ecosystem's stability and health. Roads tend to fragment an area into weaker ecological sub-units, thus making the whole more vulnerable to invasions and degradation. Corridor restrictions Accidental death and poaching of animal species. Aquatic habitat damage -Erosion from poorly constructed and rehabilitated sites can lead to downstream siltation, ruining spawning beds for fish. Constriction of flows at water crossings can make the current too fast for some species. Alterations of flood cycles, tidal flows, and water levels can upset trophic dynamics by affecting the life cycle of plankton, and have corresponding effects on the rest of the food chain. Rechanneling of waterways is often undertaken as part of road construction to avoid flooding and make crossing structures simpler. In the process, natural streambeds are dug up and useful obstructions, including large boulders, are removed.	• Avoid environmentally sensitive areas to prevent severe impacts on flora and fauna. • Water crossings should be minimized, and buffer zones of undisturbed vegetation should be left between roads and watercourses. • Planting in road rights-of-way and adjacent areas can help to support local flora and fauna. • Re-engineering road cross-section designs by using narrower widths, lower vertical alignments, smaller cuts and fills, flatter side slopes, and less clearing of existing vegetation. • Provision of animal crossings to facilitate movements • Fencing or plant barriers can reduce the risk of collisions between animals and vehicles. • Provision of aquatic crossings: Culverted crossings should be designed with the needs of migratory aquatic species in mind. • Baffles might be installed to slow the flow enough to allow fish movement etc • Traffic control measures- speed limits, particularly at night and in areas of frequent animal crossing, warning signs • Roadside reflectors to scare animals away from the roadway when vehicles approach at night.
5	**Noise and**	Vehicular movement -	• Surface design and maintenance

Summary of Potential Environment and Social Impacts Associated with Road Transport Sector and Mitigation Measures			
No	**Impact**	**Potential Source**	**Mitigation Measures**
	Vibration Degradation of human welfare and hearing impairment, communication problems and leading to elevated stress levels as well as associated behavioural and health effects. Causing auditory fatigue, temporary and permanent loss of hearing ability, sleep disorders, and can even contribute to learning problems in children. Damage to roadside structures particularly makeshift or lightly constructed buildings through vibration Disruption of wildlife habitat and movement	friction between vehicle and the road surface; Driver behaviour- using vehicles' horns, playing loud music, shouting at each other, and causing their tyres to squeal as a result of sudden braking or acceleration. Construction and maintenance activities Asphalt plant operations Resonance of traffic Piling for interchange construction and bridges	• Application of a bituminous surface layer over worn concrete roadways is effective in reducing frictional noise. • Use open-graded asphalt • Smooth, well-maintained surfaces such as freshly laid asphalt without grooves and cracks will keep noise to a minimum. • Road design should avoid steep grades and sharp corners to reduce noise resulting from acceleration, braking, gear changes, and the use of engine brakes by heavy trucks at critical locations. • Provision of Noise barriers – concrete, earth, metal, window glazing etc. • Environmental specifications for contractors - In carrying out construction, quarrying, or other such activities in noise-sensitive areas, special attention may have to be paid to equipment noise standards, hours of operation, material haulage routes, and other aspects of work-site management.
6	**Landscape Alteration and aesthetics**	Lack of harmony between the road and Landscape features such as natural relief and morphology, hydrology, vegetation, recreational areas, cultural heritage sites. Quarrying, Borrow pits and gravel winning associated with road construction	• Reforestation • Landscaping of route • Selection of alignment characteristics that best fit the route into the landscape e.g. Vertical and horizontal alignment should follow the natural relief • Reclamation of degraded lands
7.	**Impact on communities and economic activities** Splitting of Communities	Both new roads and reconstruction requiring widening can split a community. Introduction of faster traffic, access controls, and median barriers generally cuts traditional lines of travel or communication in communities Provision of longer alternative routes for local movements affects businesses and pedestrian	• Resettlement and compensation may need to be considered for those whose housing, land; welfare or livelihood is directly affected by a project. • Take account of local movements in road design stage • Make provision for improved crossings or alternative access routes. • Provision of alternative space for displaced activities and service areas adjacent to the new routes for displaced businesses

Summary of Potential Environment and Social Impacts Associated with Road Transport Sector and Mitigation Measures			
No	**Impact**	**Potential Source**	**Mitigation Measures**
	Loss/disruption of roadside community business and social activity Increased land and property values leading to higher rental values, a turnover in occupancy, and displacement of lower-income tenants	movements Disruption of links between villagers and their farmlands by a new road or increased traffic. Roadside business activities including the selling of goods, small businesses such as cafes and vehicle, repair shops; bus or taxi stops can be disrupted by road const. Added to this list of activities are social activities associated with the roadside . In rural areas, in particular, but also in urban areas and at entrances to towns and villages, the roadside provides a social disruption People congregate along the roads to talk, smoke, drink or watch the traffic Increased traffic flows as a result of road improvements can increase conflicts between local activities and the efficiency and safety of traffic functions of the road. Further conflicts and safety concerns arise when road improvement plans call for widening the road and reducing encroachments and accesses. Creation of by pass roads Although by-pass roads can reduce conflict between road use and community welfare, they also can lead to loss of business and death of communities increased by infrastructural improvements, new roads, road improvements Creation of diversion routes	• Planning of temporary traffic diversions,
8	**Impacts from land acquisition and resettlement**	Compulsory land acquisition (expropriation of properties for public projects).	• Impacts on roadside land users can be avoided by choosing route locations away from built-up areas and by restricting the

Summary of Potential Environment and Social Impacts Associated with Road Transport Sector and Mitigation Measures			
No	**Impact**	**Potential Source**	**Mitigation Measures**
	displacement of communities loss of business, properties and incomes social stress economic loss, social and psychological disruption for the affected individuals and their families.	Demolishing of structures such as houses, buildings, shops	extent of road • Works to avoid interference with existing activities. • Adoption of a reduced speed design, reduced right-of-way land • Requirements, or design changes (underground drainage, for instance) can avoid impacts on properties and activities. • Compensation of owners of the land and properties on the basis of the current market rates • Resettlement of affected persons where possible
9	**Impact on Cultural Heritage** Damage could affect the historic, scientific, social, and amenity values; aesthetic impacts on cultural monuments and archaeological sites;	Damage caused by road construction, related works such as quarries and borrow sites, and unregulated access to cultural heritage sites.	• Road construction should avoid any alignment that cuts through known cultural sites • Cultural sites uncovered during road works should lead to possible realignment of the road. • In some unusual cases it is preferable to leave a cultural site buried beneath the road. • Excavation, erosion control, restoration of structural elements, rerouting of traffic, and site mapping. • Salvage excavation and relocating artifacts or ruins from a site. • Dialogue between the road department and Monuments and Museums board is required to avoid damage to cultural sites • Marking and fencing important cultural sites during the construction period
10	**Waste Generation**	Excavation spoils Inappropriate Construction camp design and mismanagement leading to sewage and garbage pollution; Spills from construction equipment operation and servicing. Construction waste	• Disposal of construction related waste materials at designated waste dump site • Waste minimization measures • Waste management plan to be incorporated in road planning

Summary of Potential Environment and Social Impacts Associated with Road Transport Sector and Mitigation Measures			
No	**Impact**	**Potential Source**	**Mitigation Measures**
		Waste asphalt	
11	**Traffic Disruptions and interruption of local traffic**	Carelessly planned detours and road closures.	• Provision of planned diversion routes during construction • Use of signboards and other public information mechanisms to inform public in advance of construction work and schedule
12	**Utility Disruptions**	Construction activities and the need to realign utility supply lines	• Advance public notices • Collaboration with utility providers • Provision of alternative supplies where applicable e.g. water supply by tankers to affected communities • Restoration of utility lines and other structures damaged during the construction
13	**Public Safety and Health**	Exposure to atmospheric emissions from construction equipment Exposure to excessive and continuous noise and vibration from construction activities Lack of warning sign and safeguards Influx of migrant workers and introduction of diseases such as STDs	• Servicing of construction equipment • Use of equipment with low operating noise levels • Restricting construction works to day time hours • Introduction of traffic/speed control devices • Intensive public awareness campaigns • Provision of signboards • Provision of Diversions where possible during construction period • open ditches and other potential hazards to be properly marked with visible tapes
14	**Occupational Health and Safety**	Accidents from operation of construction equipment	• Training of workers in equipment use • Provision of personal protective equipment and clothing • Enforcement of the use of such equipment • Frequent maintenance of equipment • Safety rules for workers and their enforcement • Emergency procedures and training