

FOREWORD

The Environmental Assessment Regulations, LI 1652, was promulgated in 1999 to give comprehensive legal cover to the Ghana Environmental Impact Assessment procedures. The Regulations require that all developmental activities likely to impact adversely on the environment must be subject to Environmental Assessment. The LI provided a generic list of undertakings in Schedules I and 2 that must be subject to environmental assessment. This list was not comprehensive enough to cover all undertakings particularly emerging ones. In addition, the generic nature of the list did not facilitate easy screening of activities in order place them at the appropriate level of assessment.

The requirements of the LI also placed enormous responsibilities on different stakeholders depending on their statutory functions, areas of jurisdiction and interests. These include policy makers, regulatory agencies, planning authorities, financial intermediaries, training institutions and consultants providing services in Environmental Assessment. In order to ensure compliance with the requirements of the LI there was the need to provide sector specific environmental assessment guidelines.

The Environmental Assessment Capacity Development Programme (GEACaP) was therefore initiated in 2001 with financial assistance from the Netherlands Government to develop Environmental Assessment Sector Specific Guidelines for eight sectors, namely; Transportation, Mining (revision), Tourism, General Construction & Services, Energy, Manufacturing, Agriculture and Health. Eight networks made up of representatives from relevant stakeholder institutions were therefore formed to facilitate the development of the guidelines for these sectors.

This document provides guidelines for environmental assessment in the agricultural sector and covers the following:

1. Definition of the screening criteria for environmental assessment for energy sector investments.
2. Determination of the scope of Environmental Impact Assessment (EIA) for the sector.
3. Provision of systematic procedures on Environmental Impact Statement (EIS) preparations for the sector.
4. Provision of guidelines on potential impacts and mitigation measures.

The EPA strongly recommends all key stakeholders use these guidelines in assessing the environmental impacts of agricultural sector undertakings.

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ABBREVIATIONS

AER	ANNUAL ENVIRONMENTAL REPORT
AEA	AGRICULTURAL EXTENSION AGENT
APD	ANIMAL PRODUCTION DIRECTORATE
BPEO	BEST PRACTICABLE ENVIRONMENTAL OPERATION
CEPS	CUSTOM EXCISE AND PREVENTIVE SERVICE

CSD	CROP SERVICES DIRECTORATE
CSIR	COUNCIL FOR SCIENTIFIC & INDUSTRIAL RESEARCH
DAES	DIRECTORATE OF AGRICULTURAL EXTENSION SERVICES
DOF	DIRECTORATE OF FISHERIES
EIA	ENVIRONMENTAL IMPACT ASSESSMENT
EIS	ENVIRONMENTAL IMPACT STATEMENT
EMP	ENVIRONMENTAL MANAGEMENT PLAN
EPA	ENVIRONMENTAL PROTECTION AGENCY
GDP	GROSS DOMESTIC PRODUCT
GEACaP	GHANA ENVIRONMENTAL ASSESSMENT CAPACITY DEVELOPMENT PROGRAMME
GIPC	GHANA INVESTMENT PROMOTION CENTRE
GMA	GHANA MARITIME AUTHORITY
GWCL	GHANA WATER COMPANY LIMITED
GIDA	IRRIGATION DEVELOPMENT AUTHORITY
IEC	IMPORTANT ENVIRONMENTAL COMPONENTS
IPM	INTEGRATED PEST MANAGEMENT
ISSER	INSTITUTE OF STATISTICAL, SOCIAL AND ECONOMIC RESEARCH
LAC	LIMITS OF ACCEPTABLE CHANGE
MDA	MINISTRIES, DEPARTMENTS AND AGENCIES
MOFA	MINISTRY OF FOOD AND AGRICULTURE
MOFI	MINISTRY OF FISHERIES
NEP	NATIONAL ENVIRONMENTAL POLICY
NGO'S NON-GOVERNMENTAL ORGANISATIONS	
NRC	NATIONAL REDEMPTION COUNCIL
PEA	PRELIMINARY ENVIRONMENTALASSESSMENT
PER	PRELIMINARY ENVIRONMENTAL REPORT
PNDC	PROVISIONAL NATIONAL DEFENCE COUNCIL
PPRSD	PLANT PROTECTION AND REGULATORY SERVICES DIRECTORATE
PPP	POLICY PROGRAMMES PLANS

SEA	STRATEGIC ENVIRONMENTALASSESSMENT
SIA	SOCIAL IMPACT ASSESSMENT
TOR	TERMS OF REFERENCE
	VOLTA RIVER AUTHORITY
VSD	VETERINARY SERVICES DIRECTORATE
WHO	WORLD HEALTH ORGANISATION
	WOMEN IN AGRICULTURAL DEVELOPMENT
WRC	WATER RESOURCES COMMISSION

PART I:

BACKGROUND AND METHODOLOGY

1.0 INTRODUCTION

To promote sustainable development in Ghana, the National Environmental Policy (NEP) was put in place in 1991. The policy seeks to ensure reconciliation between economic development and natural resource conservation. The NEP requires the use of Environmental Impact Assessment (EIA) to ensure a sound management of resources and the environment.

In June 1999, the Environmental Assessment Regulations, LI 1652 was promulgated to support the EIA process.

Apart from providing the required complete legal backing to the EIA Procedures, LI 1652 places varying responsibilities on Ministries, Departments, Agencies (MDAs), and other relevant public and private institutions in Ghana depending on their statutory functions, areas of jurisdiction and interest to ensure environmental protection.

To facilitate the effective execution of institutional roles and responsibilities under LI 1652 and promote the nationwide use of EIA, a five (5) year nation-wide Environmental Assessment Capacity Development Programme (GEACaP) was initiated in 1999 with financial support from the Netherlands Government. At the formal launching of the program, participants endorsed the EIA as a valuable and reliable tool for the promotion of sustainable development in Ghana and recommended the preparation of sector specific guidelines for the following sectors: tourism, transportation, energy, agriculture, manufacturing, construction and services, forestry and wildlife, health and mining.

This document is the Agriculture Sector Guidelines prepared under the GEACaP to assist the Environmental Protection Agency (EPA) in the implementation of Environmental Impact Assessment procedures in Ghana. The document is in two parts.

Part I deals with the background and methodology. Areas covered include overview of the agricultural sector, environmental assessment processes, environmental management programme and project decommissioning.

Part II covers information and tools used in the environmental impact assessment. This includes the legal framework for EIA procedures in agriculture, general screening criteria, environmentally sensitive areas in agriculture and impact identification, evaluation and mitigation measures.

It is intended to provide guidelines that will be used through all stages of an Agricultural Project Cycle; i.e. identification, preparation, appraisal, implementation and post-implementation monitoring.

2.0 OVERVIEW OF THE AGRICULTURAL SECTOR

2.1 Agricultural sector Objectives and the National Economy

The mission is to promote sustainable agriculture and thriving agro-business through research and technology development, effective extension and other support services to farmers, fishermen, processors and traders for improved human livelihood.

Ghana's agriculture is predominantly small-scale (90% of farms are less than 2 ha in size) with the family operated farms using rudimentary technologies. Despite the low scale of technology, the small-scale farmers produce over 80% of the agriculture output.

About 4.2 million i.e. 50.6% of the labour force in Ghana is directly engaged in agriculture (2000 Census).

Ghana's agriculture by its characteristics contributes to wide spread environmental degradation through poor management practices. Unfortunately, most farmers are not aware of the linkage between farm practices and environmental degradation.

Agriculture is a key sector of the Ghanaian economy, accounting for 60% of total employment. In 2006 it contributed 35.8% to the GDP and is a major export earnings. In terms of foreign exchange earned by the country in 2006, agriculture contributed 41 % (ISSER - LEGON). The sector provides the bulk of food consumed in the country, and because the agricultural sector is the major source of raw material for industry, it is associated with most of the value added products in Ghana.

The 2003 Ghana Living Standards Survey reported that 54% of Ghana's poor were farmers with the poorest being food crop farmers. Small-scale male and female farmers carry out most farming in Ghana on holdings of less than 1.2 acres. Small-scale holders using low technology and inputs dominate the agricultural sector and contribute about 80% of the total agricultural production. Industrial crops such as oil palm, rubber, and pineapple are produced on large scale cooperate managed estate although small-scale holders also produce significant shares of these crops, especially oil palm and pineapple.

2.2 Key Sub-sector Activities

The agricultural sector in Ghana is made up of five (5) sub sectors namely; crops contributing 66.5% of agricultural GDP; cocoa 13.1%, forestry 8.4%, livestock 7.0%, and fisheries 5%. The Ministry of Food and Agriculture is responsible for the crops and livestock while the Ministry of Fisheries is responsible for the Fisheries sub-sector. The policies and actions relating to the forestry and cocoa sub-sectors are the responsibility of the Ministry of Land and Natural Resources and the Ministry of Finance and Economic Planning respectively. (Fact & Figures, MOFA, 2006)

Crop Production and Irrigation: The crop sub-sector has responsibility for the development of food, trees, horticulture and industrial crops grown. Most crop production activities are done under rain-fed conditions. However, the use of irrigation for production is increasing due to the increasing unreliability of rainfall for cereals (maize, rice, sorghum and millet); root and tubers (cassava, yam, cocoyam); industrial crops (tobacco, cotton, kola nut, oil palm, rubber, groundnut, coconut and sugar cane); horticultural crops (pineapple, mangoes, chillies, peppers, tomatoes, ginger, lime and oranges etc.) and other crops (plantain, bananas, beans etc.) production.

- Increasing agricultural productivity and development of an agro-based industrial economy is a main strategy for growth and poverty reduction (GPRS II — 2006). Expansion in area under cultivation to achieve increases in production associated with the use of low external inputs is resulting in reductions in vegetative cover (deforestation, Country Environmental Analysis (CEA), World Bank 2006).
- Crop production in Ghana is basically small-scale with most holdings less than 1 ha (2.45 acres). Large-scale crop production enterprises are found in the production of industrial crops e.g. rubber and oil palm. Cocoa, a major export earner has survived over the years on the back of small-scale farmers. Medium to large-scale farms are also being developed in the horticultural industry.
- Irrigation farming consists of different components and various technical or managerial options exist for each component. In Ghana, depending on the level of technology or type of management options, the types of irrigation may be classified as "formal" or "informal" (Traditional).
- Formal irrigation schemes are usually public developed schemes or farmer cooperative on behalf of the smallholders, and private investment. Total area under formal irrigation is 11,000 ha with potential up to 500,000 ha.
- Informal irrigation schemes refer primarily to those locally developed, owned and managed by individuals and community in response to their felt needs.
- The main type of irrigation systems being operated by either scheme above can be surface irrigation, overhead or pressurised irrigation (gravity flow is not possible and water has to be lifted by pumps). These can be applied as sprinkler and drip irrigation. Another type of irrigation is flood recession, which normally occurs along plains when the river flood recedes and the retained moisture is used for crop production.

Livestock & Poultry production: Livestock sub-sector comprises ruminants and non-ruminant production: The production systems are intensive, semi-intensive or extensive.

- The Large ruminant production (cattle) is an extensive system based on rangeland.
- The small ruminant production system is semi-intensive where housing and supplementary feeding are provided.
- Zero grazing of dairy cattle and feedlot (fattening) of cattle recurrently emerge as production system of ruminants.
- The non-ruminant comprises pig production that can be intensive, semi-intensive or extensive. The poultry production can be intensive; Semi-intensive and extensive: The poultry sector can either be vertical intensive and/or large-scale intensive, medium and small scale: The local poultry production is the extensive system (free range) Fisheries: The fisheries sub-sector comprises marine, brackish and fresh water fisheries. Fish can be produced through capture and culture fisheries, Fishing harbours and various types of landing sites are developed to aid the operations of the fishing crafts, Fish processing facilities and

associated infrastructure such as cold stores,, transportation systems water systems, water supply and] wastewater facilities and}power generation are also developed

Capture fisheries involves harvesting fish from the wild including: the ocean; lakes; rivers, -lagoons; and* other water bodies It requires the use of fishing crafts including canoes and different types of fishing gear like nets; traps; look and line•

Three main types of capture fisheries are identified depending on the type of fishing craft used and

Areas of operations namely:

- Industrial fishing which involves the use of trawlers, purse seiners, shrimpers and tuna vessels and operate in deep water beyond 30 metre depth.
- e Semi-industrial fishing involves the use of small wooden vessels with inboard engines. Semi-industrial trawlers operate beyond the 30m contour, while semi-industrial purse seiners can operate within the 30m contour.
- Artisanal fishing is dominated by operations of indigenous fisher men who use canoes that are mechanized and driven by outboard motors or canoes paddled manually.

About 50% of these canoes are mechanized and driven by outboard motors. They operate along the coast and beach anywhere without the aid of a fishing harbour.

In the inland sector, small-planked canoes are used on the rivers, lakes, reservoirs and estuarine areas.

Culture fisheries also known as aquaculture involves the creation of water bodies for the cultivation of fish and other aquatic organisms. Ponds are constructed in areas where the soil can retain water. Fish can also be grown in pens or net enclosures in water bodies like rivers, lakes and the sea. Juveniles or fingerlings are stocked. Culture fisheries can be:

- a) Extensive fish farming where the fish are left to grow on utilizing natural food;
- b) Semi-intensive; partially fed or the use of supplementary feed
- c) Intensive fish farming; completely fed by formulated feed.

Pesticide Management and Control: Several institutions including MOFA, EPA and Ministry of Health are involved in policy formulations and pesticide management and control in the country. To ensure an effective control and management of pesticide, Act 528 (1996) incorporated in Section II of EPA Act 490 of 1994 requires licensing of all stakeholders (importers, dealers, applicators and transporters and registration of pesticides). The Act spells out the following: (1) importation (2) formulation and manufacture of pesticides (3) distribution or sale of pesticide (4) commercial application and transportation as key activities under pesticide management. Other activities of environmental concerns are bulk storage and disposal of pesticide waste and containers.

The legislative instrument and regulations for the implementation of the Pesticide Act is in draft stage, thus leaving room for non-compliance.

The Ministry of Food and Agriculture (MOFA) is the line Ministry responsible for the agricultural sector with the exception of fisheries, cocoa, coffee and forestry. Its primary roles are the formulation of agricultural policies and planning, monitoring and evaluation within an overall national development framework.

The Ministry of Food and Agriculture operates a decentralized system with three levels of administration; i.e. District, Regional and National. The District Agricultural Development Unit (DADU), with the District Director of Agriculture (DDA) as its head, becomes a Department of Agriculture within the Local Government Service. The Staff consists of District Director of Agriculture (DDA), Various District Agricultural Officers (DAOs) and Agricultural Extension Agents

(AEAs). The AEAs are in direct contact with farmers and communities and are the main channels for dissemination of information and technical support from MOFA. The AEAs are supervised and technically supported by the various DAOs.

The Regional Director of Agriculture (RDA) is responsible for supervision and coordination of the activities of the districts. The Regional Agriculture Director is supported by a core team of technical experts (Regional Agriculture Officers) in the major disciplines of agriculture. At the national level, MOFA consists of five (5) main technical directorates as described below:

The Crop Services Directorate (CSD): It comprises four divisions: food crops, tree and industrial crops, horticultural and land and water management unit. The main function of CSD is to promote sustainable crop production by advising on effective policies, improved technologies and overall coordination of programmes/projects in the crop sub-sector in collaboration with other Directorates of MOFA and relevant institutions. It also provides the link between applied research and the extension services through commodity specialists. The Land and Water Management Unit is also the Environmental focal point for environment in MOFA responsible for ensuring environmental mainstreaming in policies, programmes and plans (PPP).

The Plant Protection and Regulatory Services Directorate (PPRSD): It is made of four (4) divisions: The Pest and Disease Management, Seed Inspection and Certification, Plant Quarantine and Pesticide Management. The Pest and Disease Management Division is responsible for the control of pest outbreaks, training of trainers on integrated pest management (IPM) strategies, technical backstopping, pest diagnosis and classical biological control. The Seed Inspection and Certification is tasked with the registration of seed growers, inspection, and seed testing for certification. The Plant Quarantine Division is responsible for inspections and certification of imported and exported plants and plant products. The pesticide Management Division carries out post registration inspections, monitoring and surveillance of pesticides, and trains pesticide dealers, and users on safe use.

The Agricultural Engineering Services Directorate (AESD): It is responsible for providing engineering support to agricultural development activities including recommendations for appropriate equipment.

The Directorate also provides technical support for mechanization, soil and water conservation activities.

The Animal Production Directorate (APD): It comprises four (4) divisions namely Non-Ruminant, Ruminant, Feed Resources Development, Livestock, Marketing and Processing.

The Non-Ruminant Division is responsible for the breeding, nutrition and proper management of pigs and poultry. The Ruminant Division is responsible for breeding, nutrition and management of cattle, sheep and goats. The Feed Resources Development Division is responsible for the development of feed resources including sowing of rangelands with improved legume seeds, seed production and commercial feed quality control. The Livestock, Marketing and Processing Division trains processors in modern dairy and meat processing into various products and facilitate marketing of livestock and livestock products.

The main function of the Directorate is to formulate and promote livestock policies, create an enabling environment for the use of appropriate and improved technologies and the coordination of livestock activities with other research Institutions and other directorates.

The Directorate also oversees the six (6) national nucleus livestock breeding stations which supply improved breeding stock to farmers.

The Veterinary Services Directorate (VSD): It is responsible for the animal health aspect of livestock sub sector and has four divisions namely: Disease Control and Field Services, Laboratory Services, Tsetse Control, Veterinary Epidemiology and the Veterinary Public Health and Regulatory Services.

Disease Control and Field Services is responsible for control, prevention and treatment of livestock and poultry diseases; The Laboratory Services supports field services in disease control, prevention and treatment by rendering diagnostic services vaccine production and research services; Tsetse Control, Veterinary Epidemiology; and the Veterinary Public Health and Regulatory Services is responsible for policy enforcement and development of livestock, livestock products, quality of veterinary drugs, vaccines used in Ghana and issuance of import and export health certificates).

The Directorate and the Veterinary Council also have an oversight responsibility in regulating private veterinary practice in the country

Other Directorates of MOFA are Directorate of Agricultural Extension Services (DAES); Women in Agricultural Development (WIAD) Policy Planning Monitoring and Evaluation Directorate (PPMED); Statistics, Research and Information (SRID); and Human Resource Development and Management (HRDM).

Ghana Irrigation Development Authority (GIDA) has the responsibility to formulate and execute plans to promote and develop on sustainable basis, the water resources of Ghana for farmers, agricultural related industries and institutions in the areas of irrigation and drainage, livestock development and pond fish culture.

The Ministry of Fisheries: It is responsible for the management and development of fisheries resources in Ghana to produce fish for domestic consumption and export. The Ministry ensures responsible fisheries through the formulation of appropriate policies and regulations to guide the development of the sub-sector. The Ministry works through the Fisheries Commission with the following Divisions: Administration, Marine Fisheries Management, Inland Fisheries Management, Marine Fisheries Research, Monitoring, Control and Surveillance.

3.0 THE ENVIRONMENTAL ASSESSMENT PROCESS

Environmental impact assessment is a planning and management tool, which aims at:

- a) Identifying and evaluating at the earliest possible planning stage, environmental changes which are caused by a specific project activity or development scheme.
- b) Ensuring that predicted negative impacts will be reduced, mitigated or compensated during the planning stage and that adequate environmental management instruments are established to monitor and control the negative impacts.

The guidelines are intended to help agricultural projects proponents, planners and administrators, environmental specialists, and project managers to perform the following tasks:

- Examine whether a statutory EIA process and detailed EIA studies are required according to national laws and regulations.
- Define the focus and boundaries of environmental appraisal for agricultural developments such as irrigated and rain-fed crop production, livestock farming, fisheries and aquaculture development, pesticides and agro-chemicals management.
- Classify the environmental components resulting from the activities in the sector in a systematic approach.

The guidelines do not provide solutions of the analysis, prediction and assessment of environmental impact, which a specific project may bring. Such changes are site-specific, depending on ecological conditions, as well as on technological, cultural and economic developments and decision-making at different levels.

The complexity of environmental processes in agro ecological systems is such that a general prediction of changes brought about by a specific activity is not possible. Accurate prediction of the environmental changes need site specific investigations which remain the domain of subject

specialists such as hydrologist, agricultural and water engineers, agronomist, land use planners, ecologist, biologist or public health specialist.

The guidelines, therefore, provide methodological frameworks for specialist appraisal and examples are given to describe how to assess the overall impact in a holistic manner by guiding in:

- a) Describing the procedure of environmental appraisals and its integration into the whole planning and implementation process;
- b) Identifying potentially important environmental changes by the use of tools such as checklist, etc;
- c) Evaluating environmental changes in a site specific context
- d) Preparing environmental impact assessment studies and proposals for environmental management plans.

Table 1: Basic Steps in EIA Procedure					
STEPS	1. Registration	2. Screening	3. Scoping	4. Stakeholder Consultation	5. Final EIA
ACTIVITY	Obtain and complete an EA registration form from EPA office or District Assembly office	Desktop examination of existing planning documents and other easily available information on the proposed project Site inspection	This is done out for EIA • Review of proposed site or alternatives • Identify all stakeholders	Brainstorm with the multidisciplinary team Hold public hearings • Discuss with the relevant specialist outside the team	Compilation of information and consultations Description of the environment Analysis and prediction of changes Overall environmental management and reporting
EXPECTED OUTPUT	EPA is aware of the proposed activity	Understanding of the project in relation to environmental issues Placing the project at the appropriate level of assessment	Define the boundary of focus of key issues of an EIA or SEA for Terms of Reference (TOR) preparation	Identify stakeholders who are involved, those affected positively and negatively by the project	Final EIA

TOOLS	EA registration form	- National laws and regulations - Description of proposed project activities - Environmental related information on the project - Checklist of interrelations	Scoping matrix and checklist - Rapid identification of environmental components - Impact analysis	Stakeholder analysis Problem analysis	mapping documents Resource information Impact matrix Indicators and Limits of Acceptable Change
RESPONSIBILITY	Proponent	EPA and District Planning office	Proponents and team of consultants	Proponent and EPA	Proponent and team consultants

3.2 The Basic Steps In EIA Procedure

In general, the procedure is organized into five (5) steps summarized in Table 1 and described in this section.

.Cfep Registration

In accordance with the Environmental Assessment Regulations 1999, LI 1652, every undertaking/development that may have an impact on the environment or public health is required to register with the EPA.

Many agricultural development projects involve activities such as land and water resources, and infrastructure developments that have the potential to affect the environment. (See Box 1 .)

Registration is done by obtaining and completing EA Registration Forms from EPA offices, District/Municipal/Metropolitan Assemblies. It is the responsibility of the proponent or his agent to register his undertaking

Box: 1 General agricultural development activities that impact the environment

Water resources development involves water supply systems (reservoirs & wells development); flood control systems (embankments, operation of weirs & sluices), drainage systems, irrigation delivery and water use systems including livestock watering points.

Land development involves land occupation, land clearing, landscape modification (terracing, grading); soil amelioration (leaching, topsoil sanding), rangeland and pasture development.

Agricultural activities involve crop selection; cropping, tillage and planting systems (ploughing, seedbed preparation); livestock production; capture fisheries and aquaculture; pest and weed control; fertilization; harvesting and post-harvest systems; on-farm processing; on-farm waste disposal (including manure management) and waste from abattoirs.

Infrastructure development involves construction of dams and reservoirs for water supply and fisheries related activities; abattoirs, housing, farm roads; off-farm waste disposal; storage and processing

Step 2: Screening

Screening is the initial assessment done just after registration of a proposal. Currently, EPA staffs perform the function of screening. The Agency has, however, initiated a decentralization process to get other stakeholders particularly the Planning Department of the Districts/ Municipalities/ Metropolitan Assemblies involved.

The objective of screening is to place the undertaking/activity at the appropriate level of assessment. By so doing, a decision is made whether to exempt it from further study.

The outcome of the screening exercise could be one of the following:

1. No objection to the undertaking, for which reason environmental clearance/permit is issued by the Agency. This means checklist registers No Significant (NS) effect.

2. Objection to the undertaking, that the project cannot be undertaken at the site as proposed. Checklist registers Very Significant effect (VS) and no economic or social benefits at all.
3. Preliminary Environmental Assessment (PEA) or Additional Information required. This may apply to "medium impact scale" type of proposals where the potential impacts/implications are known and relatively few and could be routinely resolved through application of limited mitigation measures or some form of design changes: Moderate Significance (MS),
4. Full scale environmental impact assessment (EIA) required. This applies to "significant impact scale" type of proposals where the potential implications are diverse, extensive, and/or obscure (not readily known). These require detailed field study and report: Very Significant but beneficial economically.
5. Strategic environmental assessment (SEA) may be required for agricultural policies, programmes, plans formulation, which are not site-specific but may have cumulative impacts. In making a screening decision at this early/registration stage, the following among others are considered:
 - The location, size and output of the proposed undertaking.
 - The type and level of technology options; waste types, quantities and management.
 - Concerns of the general public
 - Land use considerations
 - Any other factors relevant to the particular agricultural sub-sector/activity

Details of screening criteria for the agriculture sector in Ghana have been prepared covering all the sub-sector activities, thresholds, sensitivities and placement (levels of assessment) in Part II

Step 3: Scoping

Scoping is the process that determines the boundary of focus on key issues of an EIA or SEA. Scoping is undertaken if the screening of the proposed undertaking indicates that a detailed EIA or SEA is required.

The purposes of scoping are:

- To avoid generating/collating irrelevant data, information and other materials; incurring unnecessary costs; and fielding unneeded professions/disciplines
- To trim down or focus the study on only the key and relevant issues that will contribute to the required decision to be made about reasonable project alternatives.
- To provide an opportunity for the proponent; interested and affected parties to exchange information and express their views and concerns regarding the proposal before an impact assessment is undertaken.
- To provide an opportunity to agree on the actual terms of reference (TOR) that subsequently guide the EIA study.
- To provide an opportunity for the good review scheme.

The project proponent and his/her consultant(s) have final responsibility for scoping. Due to the complexities of resources usage and extent of impacts in agricultural projects, a multi-disciplinary team or advisory group is constituted to guide the scoping process,

The consultant(s) or the team undertaking the scoping process in an agricultural project should consider a combination of the following:

- Literature and general information survey on the features of the sector.
- Survey of the proposed site and other alternative sites.
 - Determination of the potential areas of the project influence.
 - Scenarios of undertakings plus site interaction, and any perceived consequences; may visit similar projects for observation and experience sharing.
 - Identification of all relevant stakeholders.
 - Initial determination of issues/areas for public information, consultation and participation.
 - Programme to elicit the concerns and inputs of identified stakeholders.

The scoping study/exercise, therefore, identifies the key impacts (potential sources and receiving medium), the major decision areas and leads to the generation of the TOR. These are presented in a Scoping Report for review by the regulatory authority (EPA). Review comments are further incorporated into the main environmental impact statement (EIS).

Step 4: Stakeholders and Consultations.

Stakeholder analysis for projects is carried out to determine who is involved, who benefits and who loses from the proposed development.

For agricultural sector development projects, stakeholders and actors may include:

1. Traditional Leaders
 2. Individuals, families and groups each with varying interests e.g., agricultural land users (farmers and farmer groups), land owners, pastoralists, fishermen, and fishermen associations, urban and rural water users; women, youth, local businessmen and agrobusinessmen.
 3. Government institutions such as Ministries of Food and Agriculture, Fisheries, Environment and Environmental Protection Agency, Water Resources Commission and water and development agencies; others such as Local Government, Forestry, Wildlife and other natural resource agencies and public health institutions.
 4. Non-Governmental Organizations (NGOs) international, national, local groups and environmental pressure groups.
 5. Others such as lawyers, media, scientists, researchers, educational institutions
 6. Planners and environmental specialists, development partners and financial institutions.
- Step 5: The Detailed EIA and Environmental Impact Statement

As a result of a scoping exercise, an approved TOR provides the guide to a detailed EIA study, which is commissioned by the proponent. The following working steps apply:

Gathering of information and consultations: Gather all planning documents and review them. The document should define the project objectives and activities, including engineering designs, agronomic measures, alternatives of site selection and technological options and operational guidelines e.g. water management and land and animal husbandry practices. Regional data on natural resources, land use and socio-economic development including Physical and natural resource base; ~~general~~ socio-economic data; public health; (SwBox

Description of the Environment: This is the description of the framework conditions, the natural resource base, the existing use of the resources and other environmental issues of concern.

- The framework conditions include socio-economic, legal and institutional conditions. Also to be described are type and characteristics, options for site locations, technical options regarding land husbandry, water use, water management;
- Description of the environmental profile of the area potentially affected by the project: Existing status, degradation and potentials of water, land and biological resources, competition for development and with public health and other issues of quality of life values;
- Description of resources having direct economic value, such as fish, wildlife, crops, timber, appear in the description of their land use systems from an ecological point of view and in the description of the economic sector of the environment: competition over resources for human economic development. Environmentally sensitive areas need to be identified. (See Part II).

Box 2: Data to be collected on natural resources, land use and socioeconomic conditions

- Status of water resources; stream flow, static water resources, water levels, floods, and flood hazards, sediment load and deposits, groundwater levels, ground water recharge, and water quality etc.
- Climate: rainfall, temperature, relative humidity, evapotranspiration etc.
- Soil data; soil mapping units, physical and chemical characteristics, suitability of soil for various uses, soil degradation status and risk, and soil contamination etc.
- Biological resources; fauna and flora (diversity, endemic species, distribution) description of biological trends, biological imbalances, agricultural pest and diseases etc.
- Land use type; farming system, cropping systems, settlements, natural woodland, planted forest, pastures, orchards, water bodies etc.
- Farming systems characteristics: description of farming systems, areas under different cropping patterns and crops, agricultural inputs and mechanization, labour and animal draught power, gender issues, crop damage by drought, floods or diseases, crop production and yield levels, crop budgets, marketing, off-farm activities.
- Competition for use of natural resources such as non-agricultural uses, uses of non-renewable resources, water uses, sources of water pollution, scarcity of water supply, navigation, flood hazards, use of wildlife, capture and culture fisheries, gathering of plants.

- General socio-economic data such as description of population, occupation, income, and gender issues
- Public health such as communicable and non-communicable disease hazards, nutrition, housing, sanitation

Analysis and prediction of environmental changes: Analysis and prediction of environmental changes involve public consultation, identification of environmental components likely to be affected by the project; selection of important environmental components, analysis of impact; risk assessment, and description of alternative site location and technical options. See Box 3.

Overall environmental appraisal/Professional Impact Assessment: This step has the following activities:

- Identification of project-specific environmental quality goals and evaluation to determine whether or not the project will substantially assist or hamper the achievement of these goals;
- Quantification or description of changes of important environmental components. The results can be presented in a Project Impact Matrix;
- Determination of the significance of changes; the significance can be expressed in a scoring system;
- Evaluation of the reduction of natural risks (e.g. flood hazards, drought); assessment of the residual risks of the project after safety measures or other technical and managerial measures are adopted.

- Recommendations [or Environmental Management and the Environmental Impact Statement include proposals to adopt site-specific environmental goal, definition of standards, and indicators, environmental management plans etc. Box 3. The organization and presentation of the report also follows the steps outlined for the detailed study. The following headings may be considered.
 - a) Description of the proposed development.
 - b) Baseline survey and inventory of the existing environment.
 - c) Development of proposed options/alternatives.
 - d) Potential impacts identification, prediction and evaluation.
 - e) Consideration of measures to mitigate adverse impacts.

Box 3: Detail description of the analysis and prediction process

- Public consultation: identification of the perceptions and consensus of people concerned and other interested parties (NGOs), donors and government officials, regarding existing and future environmental problems and conflicts over resource uses, and views on potentials of sustainable
- Identification of environmental components likely to be affected:
 - Description of important project activities and alternatives that can cause environmental impacts;
 - Conceptual analysis of cause-effect relations by using impact matrix which will establish linkages between project activities and environmental impacts;
 - Selection of important environmental components (IECs): From the overall description of framework conditions, public consultation and expert analysis, a subset of environmental components are chosen. The relative importance of a potential impact may help to suggest the level of effort that should be expended on the prediction in EIA. IECs can be ecologically sensitive resources, land use features or aspects of quality-of-life values that require further attention. Often, they are identified in the scoping as having economic, cultural, or scientific values. IECs can also be selected to be representative of the totality of environmental components and represent those components deemed important by the people. For example, a particular habitat or species can serve as an indicator of deterioration.
 - Prediction of impact involves description of characteristics and significance of changes of important environmental component such as soil, water, climate, and eco-biological resources and humans. The checklists for environmental appraisal can be used for analyzing and organizing information. In a rapid EIA, the expertise on which interpretation and prognosis is based, can be obtained from consultation with specialists. In a detailed EIA study, a team of specialists should be engaged to predict impact in more detail;
 - Risk assessment identifies the major risks associated with the project. It should be described in terms of natural, technical, and managerial risks, their causes and likelihood;
 - Description of alternative site locations, cost and technical options to minimize negative impacts. Check whether technical planning and operational plans are consistent with the state-of technology, guidelines for best management practices and Other practical recommendations for sustainable agriculture and water resource uses.

Recommendations for environmental management

Proposals to adopt site-specific environmental quality goal; definitions of standards and indicators. Proposals for an environmental management plan:

Recommendations for impact management through anticipatory planning: targets for structural interventions (water supply and distribution systems, flood control, drainage, farm roads, etc.), agronomy and land husbandry; Mitigation plan to reduce adverse impacts e.g. on other land users, water supply, habitat restoration/amelioration; in some projects, limits of acceptable change (LACs) have been defined for specific environmental components, with agreement on subsequent mitigative action if they are exceeded, e.g. LACs for percentage of vegetation cover or specific land uses;

Compensation plan for residual impacts, for example land compensation, habitat replacement;

Contingency plan to prevent accidents or to minimize natural hazards;

Action plans to enhance resource uses other than current project activities, e.g. social forestry programmes.

4.0 ENVIRONMENTAL MANAGEMENT PROGRAMME

Internal environmental management programme is an important component of project environmental policy. Management programmes in any development schemes are environmental quality monitoring, auditing, and annual environmental reporting

4.1 Environmental Quality Monitoring

Environmental monitoring is a planned, systematic collection of environmental data through series of repetitive measurements, surveillance and inspection to meet specific objectives and environmental needs.

Monitoring establishes environmental conditions; detects trends, seasonal and other predicted changes so that remedial measures can be taken to achieve good environmental performance. Also, monitoring may reveal unanticipated impacts, which may call for design improvements or changes. Regular data collection and evaluation provides early warning of significant impact that demand immediate action. It also, serves to check the predictions of the project. Focus must be on important components and their indicators.

Types of Environmental Monitoring

Baseline Monitoring refers to the measurement of environmental parameters and observations during a pre-project period for the purpose of determining the nature and ranges of natural variation in soils (fertility, moisture, organic contents), water bodies, rainfall patterns, humidity, drainage patterns, water levels, groundwater fluctuation, vegetation cover (plant species) and general ecology, sunshine and air quality, socioeconomic issues like health, land-use patterns, population and settlement, cultural resources, etc.

Effects Monitoring involves the measurement of environmental parameters during project construction and operation/implementation so as to detect changes in these parameters, which can be attributed to the introduction of the project.

Compliance Monitoring involves periodic sampling and/or continuous measurement of environmental parameters, levels of waste discharges from irrigated farmlands, aquaculture projects, livestock projects etc. into streams and other water bodies. This ensures that EPA regulatory requirements are observed and standards are met.

Surveillance and Inspection form part of environmental monitoring activities that need not necessarily involve measurement by the use of scientific instruments, for example, monitoring of the activities of fishing boats on high seas.

Indicators and Parameters

Environmental monitoring of projects is carried out effectively using set of performance indicators and described parameters to be measured. These must be linked to the baseline data; identified impacts and mitigation measures. Comparison of monitoring results to these could signal the need for

remedial measures/action. The frequency and duration and sampling sites for measurements/observations are clearly set.

Monitoring Responsibility

Institutional responsibilities for monitoring of agricultural projects, programmes and policies lie on both the project owner (internal) as well as regulatory (external) agencies.

In Ghana, the regulatory institutions for agricultural activities may include:

- Environmental Protection Agency
- The Ghana Standards Board
- Ministry of Food and Agriculture (PPRS, IDA, DCS and VSD, APD)
- Fisheries Commission and —Fisheries Directorate
- Council for Scientific Research and Industrial (CSIR)
- Volta River Authority (VRA)
- Ministry of Works, Housing and Water Resources Departments e.g. Ghana Water Company Limited (GWCL), Hydrology Department, Water Resource Commission ● Private institutions/organizations that provide scientific, laboratory and inspectorate services
- Community members and individuals

4.2 Environmental Management Plans (EMP) and Audit

A provisional EMP should be prepared as part of the project design, incorporated into the EIS based on the environmental issues identified. The EMP, which is aimed at managing impacts, describes in simple terms the measures to take in order to avoid or reduce impacts, resolve conflicts associated with the project, and defines follow-up activities. The EMP is a statutory requirement for large-scale undertakings as contained in section 24 (2) of LI 1652 (1999).

The provisional EMP contained in the EIS should be reviewed against the lessons learnt to develop a comprehensive EMP within 18 months of the project implementation to enhance the project performance and sustainability.

The plan should be developed for self-regulation and compliance which involves prevention, reduction of waste generation at source, and selection of pollution abatement techniques, which will constitute Best Practicable Environmental Option (BPEO). Some of the practices that should be reviewed are:

- Measures to control water pollution, sedimentation, and soil degradation.
- Reduction in chemicals (pesticides, fertilizers etc) inputs and surface run-offs. Incineration or proper disposal of livestock carcasses, containers/packages of hazardous chemicals, obsolete pesticides and veterinary drugs.
- Proper treatment of organic wastes (use of organic fertilizers and slurry).
- Improvement in agronomic practices and land husbandry methods.
- An Environmental Audit is a periodic and systematic objective evaluation of the effectiveness of the whole operational and management system. An independent expert commissioned by management could carry out this study.

EPA can also carry out its own audit (compliance) to verify and inform itself about the compliance status of the project. This will provide inputs in the Agency's review of the project's EMPs or Annual Environmental Reports. (See Boxes 4 & 5)

Box 4: Format for Preparing EMP

An EMP for an activity should contain the following information:

Executive Summary: A non- technical summary outlining the main issues addressed in the EMP

1.0 Introduction

- a) The project name, location, description, baseline data, current trends in the specific sub-sector, competitions and benchmark management goals.
- b) Environmental framework conditions: environmental policy statement, general and specific objectives; Legal and regulatory requirements concerning the sub-sector; occupational health and safety policy.

2.0 Potential Impacts Identification and Assessment

- a) Production Activities: main process activities description and other related activities.
- b) Potential releases and pollution types: agro-chemicals and pesticide application (solid, liquid, gaseous, particulate emissions) receiving environmental media (air, water, and land) effects (long term, short term, local/global, oneoff/cumulative). Other pollution types (audio, visual, farm residue, chemical containers etc.)
- c) Summary data of substances, pollution indicators requiring special control with reference to regulator or legal requirements e.g. EPA guidelines.
- d) Potential effects on the environment (if such substances/pollution indicators exceed the legal/regulatory requirements).

3.0 Current Environmental Management Practices and their limitations concerning waste avoidance, minimization, recycling, reuse, transportation and disposal, control burning, burial, etc. to mitigate potential impacts of the operational activities. Environmental Management issues include

- a) (Raw) material handling and storage
- b) Selection of best operating practice/procedures, technique production processes. Options for achieving objectives should aim at best practical environmental option, best operating practices/procedures and best available techniques
- c) Production planning and product development
- d) Energy Management (particularly in intensive livestock and poultry production and post-harvest Management)
- e) Sustainable Water Management
Emergency response, readiness procedures/contingency plan

4.0 Environmental Action Plan to address mitigation of potential impacts through waste management prevention, avoidance, minimization, recycling, reuse, disposal, control burning, burial, etc.

5.0 Occupational Health and Safety Action Plan: The plan should discuss current occupational health and safety practices and their limitations concerning hazard identification, control actions for accident prevention, avoidance, minimization and appropriate personnel protection

6.0 Programme to Meet Requirements:

- a) Management Structure, organization and personnel (e.g. programme for officer responsible for EMP, allocation of management responsibilities to achieve targets).
- b) Staff information and training (capacity building).
- c) External information and public complaints
- d) Life cycle of programme

7.0 Monitoring Plan

- a) Environmental impact monitoring

b) Compliance monitoring (national safety and pollution control guidelines/standards) Reporting

4.3 Annual Environmental Reports (AER)

Projects that have been granted environmental permits or certificates by the EPA based on the Environmental Impact Statements submitted are required to submit Annual Environmental Reports (AER). The AER legal requirement to be fulfilled twelve (12) months after commencement of operations and thereafter every twelve (12) months (Section 12 of LI 1652, 1999). The AER shall report on:

- Monitoring returns
- Adequacy and appropriateness of mitigation measures
- Environmental standards and measures
- Set targets etc.

Box: 5 Format of Annual Environmental Report (AER)

- Executive Summary
- Introduction
- Environmental policy objectives, strategies and targets for the year under review
- Description of company's operations
- Environmental activities for the year under review
- Environmental problems encountered during the year and their effects
- Progress report on land/water and other resources management
- Monitoring activities and Results
- Conclusion and way forward

4.4 Cost of Environmental Management

Planning and budgeting must be carefully done for effective cost management. Financial, material and human resources should include:

Technical & Material Costs include establishment and financial support for laboratories, workshops and provision of monitoring equipment and instruments; reagents and disposables, protective clothing and safety gadgets, vehicles, tools and other machinery.

Human resources include engagement of environmental management staff (salaries, welfare, etc); training, participating in/organizing relevant workshops, seminars, drill for staff, Information Technology for data, records management and emergency response.

Reporting costs are production and review of reports related to environmental management systems and performance.

5.0 PROJECT DECOMMISSIONING

In projects where structures are put up as in livestock, aquaculture and irrigation systems, proponent should indicate how the structures would be handled at the point when the project is being phased out. For livestock projects the following are suggested:

- Lease or sale of farm buildings to prospective farmers

- Demolish farm structures

- Remove and appropriately dispose of debris

- Sale of equipment which are not obsolete

- Sale of any scrap material

In case of rain-fed crop production where large tracts of land are cleared (such as oil palm plantation), it is important to indicate how the land will be rehabilitated after project period. For irrigation projects the following are suggested:

- Trees should be planted to cover the borrow pits which might have been used as source of soil for the construction of the earthworks such as embankments, dams, farm roads etc.

- Appropriately dispose of or level any unwanted heap of material left at the site.

- Dispose of any scrap material from the site.

PART II: INFORMATION AND TOOLS

6.0 LEGAL FRAMEWORK FOR EIA PROCEDURES IN AGRICULTURE

Land tenure: Communal or corporate ownership of land is the major feature of land tenure in most parts of Ghana. The "stool" or "skin" land is controlled and allocated by lineage or clan based landowning groups and allocated to individuals or households on an usufructuary basis. Where traditional tree crops (such as Shea) are a feature of the farming system, they are not always transferred with the land itself. In principle both men and women have equal rights to land, but in practice women are often allocated smaller areas of poorer quality land, which is farther away from the village or homestead.

Traditional land tenure system does not always provide the necessary security for investment in land and is considered a major impediment to private development of tree crop plantations, irrigation infrastructure, measures to maintain soil fertility, erosion control, etc.

In recent times and in particular in southern Ghana, where considerable areas of land have been taken out of shifting cultivation into settled cultivation, general pressure on land resources has been associated with changes in tenure and a move in some cases to outright private ownership. There is a Land Title Registration Law of 1986 that is expected to streamline land acquisition procedures.

Water Resources Legislation: Water Resources Commission Act No. 522 of 1996 is a comprehensive Act and it is the instrument to control the use and allocation of water resources for {11 users.

Fisheries: The Ministry of Fisheries and the Fisheries Commission regulate fisheries activities in the country. Fisheries management plans are prepared to manage the fisheries on sustainable basis* to ensure responsible fisheries in the capture and the culture fisheries. The Fisheries Act 625 of 2002 is to manage Ghana fisheries in the production sector. The Fisheries Commission collaborates with other agencies such as Food and Drugs Board, Ghana Standards Board and the Food Research Institute to regulate the processing, handling and the use of fish and fishery products under the statutory laws of those agencies.

Plant Protection and Regulation: The Prevention and Control of Pest and Diseases of Plant Act 307 of 1965 was used to establish the Plant Protection and Regulatory Services Department. The PPRSD is responsible for all aspects and activities of plant protection (quarantine, pesticide regulation and pest control) and the supply of certified seed to farmers. The PPRSD coordinates agrochemical registration with the EPA and monitors imports with the Customs, Excise and Preventive Services (CEPS). The import of crop protection chemicals (herbicides, fungicides, insecticides, etc) is liberalized. However, importers must register with the EPA and obtain an import license. Once the product arrives at the port, the EPA gives clearance after inspection and PPRSD monitors the sale through the different outlets. Other legal instruments include Part II of EPA Act *490 of 1994, (formerly Pesticide Control and Management, Act 528 of 1996) and Seed Certification and Standards Decree (NRC 100, 1972) and Regulations 1993.

Fertilizers: The Crops Services Directorate of MOFA is responsible for monitoring the safe use and environmental aspects of fertilizer use. Inadequate fertilizer use poses an environmental problem in Ghana, where declining yields push farmers to marginal lands, increase the rate of deforestation, and accelerate soil-nutrient mining.

The EPA has also set an approval mechanism in place for irrigation/drainage projects in excess of 20 ha. to ensure that the relevant water extraction criteria established are observed and mitigation measures are adhered to with regard to chemical water contamination mainly by fertilizers and pesticides.

Livestock Production and Health: The Veterinary Services Directorate coordinates and monitors veterinary drug imports and usage in the country, quarantine and movement of livestock, importation of both breeding stock and processed and unprocessed livestock products. It has legislation (The Animal Ordinance 1952) that empowers the Directorate to carry out its mandate. The Directorate has personnel at both the ports and borders to monitor livestock movements, imports etc.

The Meat Inspection Law is in preliminary stages preparation.

The Veterinary Surgeon's Law which was passed under PNDC Law 305C Of 1992 and became effective in 1993 is in use and currently under review.

The Diseases of Animals Act, 1961 (Act 183) is solely for the prevention and control of the spread of infectious and contagious diseases among animals. There is no existing legislation concerning the use of the existing rangelands, to assure environmental quality.

Land Use: A number of laws with other purposes in mind exist which touch cursorily on the management of rangelands. One such law is the Land Planning and Soil conservation (Amendment), Act 35 of 1957. This act has not been repealed but neither is it being implemented. The purpose of the Act is to improve the utilization of lands in designated areas by land planning and soil conservation. The Act has provisions for land preservation, reclamation and for protecting natural resources. It was to be implemented through committees established by the Minister of Food and Agriculture in designated areas for land planning and soil conservation.

The committees would have the power to protect sources of water, control of water usage, prevention and mitigation of erosion, reclamation of land and utilization of swamp land. They also have powers to transfer any farmer from an area, which is exhausted or inadequate. The Minister has power under the Act to regulate grazing uses, watering, livestock uses as well as provisions in relation to burning, clearing and destruction of vegetation. The Act was for some time implemented in seven areas in the Northern and Upper Regions.

Bush Fire Control. The Control and Prevention of Bushfires Law PNDC Law 229 of 1990 prohibits the setting of fires for any purpose except for farm slash, grass, herbage etc. if controlled and confined within farm boundaries, or used as a management tool in forest or wildlife reserves.

Agricultural mechanization: There is no legislation on most of the harmful practices of land preparation. Also there are no set standards on importation and use of agricultural machinery in the country in relation to environmental quality management.

Efforts should be made to set a regulatory mechanism to certify the suitability on a sample of such machinery/equipment in respect of their performance and harmful effect on the environment before any mass importation is carried out.

The main institutions whose regulations and policies are relevant in any undertaking in agriculture are listed in Table 2.

Institution	Legal Enactment	Purpose
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Environmental Protection Agency (EPA)	National Environment Policy EPA Act of 1994 Environmental Assessment Regulations (LI 1652 of 1999) Pesticides Control and Management Act 528 of 1996	Coordinating environmental activities including regulating, implementing and setting standards Granting of Environmental Permits Regulates importation, registration, distribution and disposal of pesticides
Water Resources Commission (WRC)	National Water Use Policy • WRC Act 522 of 1999 • Water Use Regulations (LI 1692 of 200A)	Regulating and management of the utilization of water resources Grants water rights and use of raw water
Ministry of Food and Agriculture	PPRS Act 307 of 1965 Seed certification and Standards Decree (NRC Decree 100, 1972) and Regulations LI 1993 Diseases of Animals Act 683, 1961 Veterinary Surgeon's Law PNDC Law 305 C 1992 Land Planning and Soil Conservation (Amendment) Act 35, 1957	Prevention and control of pest and diseases of plant Solely for prevention and control of the spread of infectious diseases among animals To guide utilization of lands in designated areas by planning and conservation. It has not been repealed.

Institution	Legal Enactment	Purpose
Ministry of Fisheries	Fisheries Development Law PNDC Law 256 of 1991 Fisheries Act 625 of 2002	Regulates fishing in both marine and inland waters and other fisheries activities
Ghana National Fire Service	Control and Prevention of Bushfire PNDC law 229, 1990	Prohibits the setting of fires for any purpose except for farm slash. Grass and herbage if controlled and confined within farm boundaries.
Ghana Investment Promotion Centre (GIPC)	Ghana Investment Code, 1985	It guides GIPC in awarding Enterprises and ensures that measures for prevention and control of any harmful effects to the environment are well spelt out.
Land Commission/Stool Lands Administration	Administration of Lands Act (1962) Administration of Lands (amendment) Decree (1979)	Land use tenure laws Regulate local, traditional land use
Wildlife Department (Min. of Lands & Forestry)	Wildlife Reserves Regulations LI 710 of 1971	Conservation and protection of wildlife reserves, endangered and threatened species
Metropolitan /District Assemblies	Local Government Act 462 of 1993	Enacting and enforcing byelaws and implementing government policy on environment at the local level.

7.0 GENERAL SCREENING CRITERIA

Screening an undertaking in the agricultural sector is conducted by considering various factors including:

- The physical, biological and social characteristics,
- Legislative and policy obligations,
- Type and level of technology options,
- Project design, Scale, construction and operation;
- Level of impacts on human lives, settlement, resources,
- General location sensitivity .

Table 3 & 4 present an example of checklist for screening of activities in the Agricultural Sector

Screening by Project Location

SIGNIFICANCE

Will the location of project result in:	NS	MS	VS	
Rehabilitation and resettlement?			☐	☐
Land take impact (e.g. sited in densely populated area)	☐		☐	☐
Relocation of people in/out of project area	☐		☐	☐
Denial of indigenous people access to current resource/land use	☐			
Increase conflict over land and resources tenure	☐			
Encroachment into sensitive areas?			☐	☐
Damage forest, farmlands, wildlife parks, etc	☐		☐	☐
Encroach on historical/cultural sites (eg. cemeteries)	☐		☐	☐
Sited in or near ecologically sensitive areas (wetlands, protected areas)	☐			
Alter the present or planned use of the area	☐			
Development on steep slopes				

Screening by Project Location	SIGNIFICANCE			
Will the location of project result in:	NS			
Hydrological effects?			☐	☐
Affect habitat of endangered species of flora and fauna			☐	☐
Restrict wildlife migration			☐	
Introduce new species in area			☐	
Impact on Navigation? (development)				
Interfere with shipping lanes				
Natural Induced disasters?				
Vulnerability to flooding	☐	☐		

Table 4: Screening by Project design, construction and operation

The design, construction and operation of the project will lead to changes in:	NS		VS	
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Water quality?			☐	☐
Discharge waste in drains/canals (effect on downstream water quality)			☐	☐
Risk of accidental spill into water bodies			☐	☐
Use chemicals which are difficult to break down			☐	☐
Cause Eutrophication				
Develop aquatic weeds				
Soil fertility?			☐	
Risk of leaching from application of pesticides, fertilizers and other agrochemicals			☐	
Cause waterlogging			☐	
Cause soil erosion				
Risk of soil salinization/acidification				☐
				☐

Screening by Project Location	SIGNIFICANCE		
Will the location of project result in:	NS	MS	VS
Hydrological resources?		☐	☐
Divert/impede natural water flow or causing flooding (downstream/upstream)		☐	☐
Over abstraction of surface water or ground water Use of reservoirs for water supply/flood control reduce river flow downstream		☐	☐
Socio-economic levels?			
Potential for employment generation/opportunities			
Attraction of social amenities, civic health facilities to the area			
Incorporation of education/extension programmes that emphasis sustainability, focusing on small-scale holders, women and the vulnerable			
Conflicts of water use/rights			
Changes in settlement patterns in/out of the project area			

Health impacts?		
Improving nutritional status and food security of the rural population, especially women & children		
of acute or long-term health hazard for personnel who handle agro-chemicals		
Risk of spread of chemicals by air, water via food chains		
Provision of facilities for storage and destruction of chemicals/waste products		
Land-use pattern		
Land & infrastructure modifications (e.g. construction of dams, roads, housing, system etc.)		

Note: NS No Significant effect, MS: Medium Significance, VS Very Significant,

B Beneficial?

The above checklists, with the other relevant information are useful in the dialogue between the proponent and EPA. They provide specific information on EPA's standpoint of what should be included in the EIA process.

Table 5: Scale of Undertaking in Agriculture and their level of assessment

Scale and level of Assessment			
Activity/undertaking	Small Scale Registration (Permit)	Medium Scale PEA	EIA Mandatory
1. CROP PRODUCTION			
1. Cereals, (Maize, Rice, Sorghum, Millet). Roots Tubers (Cassava, Yam, Cocoyam)	<2ha (5 acres)	2-8.3 ha	Above 8.3 ha. (20 acres)
2. Vegetables (Tomatoes, Garden Eggs, Pepper, Chilli, Water Melon, etc.)	<0.8ha (2 acres)	0.8-8.3ha.	Above 8.3 ha
3. Culture crops/meat products, 1 s, Avocado, Cut Flowers, Manes	<4.2ha. (10 acres)	4.2-8.3 ha	Above 8.3 ha.
4. Industrial, Tree/Plantation Crop (Tobacco, Cotton, Kola Nuts, Oil Palm, Coconut, Rubber, Plantain, Banana)	<6.2 (15 acres)	6.2-16.6 ha	Above 16.6ha. (40 acres)
5. Root and tubers	<2 ha.	2-8.3	Above 8.3 ha.
6. 1.2 nes/ Iss	<2 ha.	2-8.3	Above 8.3 ha.
11. OMER PESTICIDE RELATED ACTIVITIES			
1. Bulk storage of Pesticides	PEA at all level		
2. Transportation of Pesticide	PFA at all level		
3. Disposal of Pesticides	PFA at all level		
1. Pesticide tamers/ii Unwanted Pesticides	EIA mandatory	at all levels	

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iii) Spray Tank Mixture	Permit required	all levels
gistratlon o pro ct	accor ce d ass of pesticid EIA rmn< evaluation	528 of 1996, all cttypes (la, 1b, 11 thr(lgl Dossier submission and
111. IRRIGATION AND DRAINAGE		
1. Surface Irrigation (Basin, Furrow, Border)	<100 ha	100-1,000 ha >1,000 ha
2. Overhead S rinkler Dri Irri ation	<100 ha	000 ha 000ha
3. Flood Recession (Flood Plain Farming)	<2ha Surmce Area	2-10 ha Surface ha Surface Area
o san oun ents or mgaüon	a ce Area	2-10 ha Sur ace a Area Area
errs or IVIt10n	m el t	5-10 m

Activity/Undertaking		Scale and level of Assessment		
		Small Registration Permit	Medium PEA	Large EIA Mandatory
1	LIVESTOCK AND POULTRY PRODUCTION			
	Livestock: Beef, cattle	1-10	11-50	Above 50
	Dairy cattle	1-5	6-20	Above 20
	Goats and shee	1-30	31-100	Above 100
	Pigs: Sow unit (farrow to wean	1-10	11-100	Above 100
	Pigs: Fattening to sell Rabbits and Grasscutters	1-20 1-50	21-100 51-100	Above 100 Above 100
2	Poultry: Fowls (local Poultry) *	1-50	51-100	Above 100
	Poul Broilers	1-200	201-500	Above 500
	Poultry	1-2000	2001-5000	Above 5000
	Guinea Fowl and ducks	1-200	201-500	Above 500
	Turkey	1-50	51-100	Above 100
	Ostrich	1-20	21-100	Above 100
	* Under review			
V. FISHERIES				
1. Aquac ture ture FIS enes)		ess 1-5	— PEA Above 5ha registration	
i) Creation of,xmter bodies/ponds/hatcheries		EIA mandatory with it		
ii) Cage Qilture on livers, lakes, etc.		less than 500 m — Permit after screening above 500 m³— EIA mandat		
iii) Introduction of Exotic		EIA mandatory at all levels		

2. Capture Fisheries i) Industrial Fleet	Use of trawlers purse seiners, shrimpers and tuna vessels operating in deep waters, offshore, beyond 30m Depth. Industrial Fleet — EIA not required. Ministry of Transport screens documents before importation of vessel Vessel registered under National flag after survey by Ghana Maritime Authority (GMA) under the Ministry of Transport and Railways in accordance with the law Licensing of vessel by MOFI Re-Licensing of vessel periodically. Use of small wooden vessels with inboard engines, operated in inshore waters along the coast PER
ii) Semi-Industrial	EIA not required Licensing of vessel by MOFI Inspection of vessel during construction by Shipping Commissioner Artisanal/ Canoe Fisheries EIA not required Screening and permit for beach seine required
iii) Artisanal/Canoe Fisheries	Operation by indigenous fishermen, with mechanized and non mechanized canoes registration (Permit)

- Fishing port and landing sites: development and operation of fishing harbours, storage and processing facilities require EIA. Projects that fall under these activities are to be considered fully under "General Construction" Sector Guidelines.
- Manufacture and formulation of agrochemicals and pesticides fall under 'Manufacturing' Sector Guidelines.

Box 6: Level of Assessment/Placement

Placement	
Registratim (Pemit)	Prject nd anticipated to result in any adverse environmental impact. Permit be issued upon re\$stration
PEA (Preliminary Environmental Assessment Report)	Prject with limited emironmental impacts that can be routiæly resolved through application of limited n•iti atim nusuresor cEsi clun
ElAManchtory	PrOect vvith the pdmtial for siY1ificantly far reaching awirmnental impacts ddailed fidd stilly review

8.0 ENVIRONMENTALLY SENSITIVE AREAS IN AGRICULTURE

The following areas are considered as environmentally sensitive areas from the agricultural perspective. In line with the Environmental Assessment Regulations, LI 1652, any undertaking in the areas listed below shall require an EIA.

These include:

- Wetlands (e.g., mangroves, estuaries and lagoons)
- Ramsar sites or potential Ramsar site (Principally for conservation of birds but also includes wise use of wetland areas)
- Biosphere reserves. (Internationally designated site as part of a global network combining both conservation and sustainable use of natural resources)
- Geological conditions (e.g. Earth quake prone sites)
- National Nature Reserve (Nationally important nature conservation sites for biological or earth science interest)
- Highly erodible and marginally productive cropland (Areas along slopes with critical slope 17% and above with potentially unstable soils prone to erosion)
- Natural flood barriers
- World Heritage Sites (Protection of natural and cultural areas of outstanding universal value or areas of unique historical/archaeological or scientific interests)
- Site of Special Scientific Interest (SSSI) or potential (Special interest by reason of its flora, fauna, or geological or physiographical features).
- National Parks (Protection of wild and beautiful landscapes)
- Marine Nature Reserve (Conservation and protection of marine flora and fauna and sites of geological or physiographical interest).
- Areas which constitute the habitat of any endangered or threatened species of indigenous wildlife (flora and fauna)
- Areas Sacred Grooves/Cultural sites.
- Sources of Water Bodies and areas close to a water body (a minimum distance of 30m, aquifer recharge areas, areas with high water table (wells, boreholes, porous soil, etc.)
- Areas near Apiaries (honeybee sites), wildlife refuges, or parks, and
- Off-Reserves forests (riparian forests, hill forests, fire protection areas and buffers)

9.0 IMPACTS IDENTIFICATION, EVALUATION AND MITIGATION MEASURES

Agricultural activities generally involve complex relationships and interactions with natural ecosystems. Tables 7-9 summarize the major environmental issues and impacts of agricultural production activities, with the examples of mitigation and enhancement measures.

Table 7 Summary of Environmental Issues, Impacts and Mitigation/ Enhancement Measures Related to Irrigated, or Mechanized as Rain Fed Production

Environmental Issue	Environmental Impact	Mitigation/Enhancement Measures
Physical		
Soil	Soil erosion from site clearing cultivation on steep slopes Land clearing (for mechanized farming system) and improper tillage practices Loss of matter and nutrient removal by vegetation/crop harvesting and leaching Soil pollution from pesticides Waterlogging Salinization and alkalization	Promote soil and water conservation measures including terracing, water harvesting vegetative cover, windbreak and structural measures Instead of using conventional earth moving machines special tree dozers should be used for land clearing Adopt sound cultivation/tillage practices with the selection of conservation tillage implements Apply organic matter to improve soil structure and fertility Crop rotation with legumes for nitrogen fixing, agroforestry and use of inorganic fertilizer Provide drainage including disposal of water to evaporation ponds or the sea if quality of river flow is adversely affected by water Maintain channels to prevent and reduce inefficiencies resulting from siltation and weeds Allow for access to channels from maintenance in design Provide water for leaching as a specific operation • Set-up or adjust irrigation management infrastructure to ensure sufficient income to maintain both the arid drainage systems Analyze soils and monitor changes that potential problems can be managed

Environmental Impact Assessment Guideline for The AGRICULTURAL SECTOR

Environmental Issue	Environmental Impact	Mitigation/Enhancement Measures
Physical		
Water Quality	Pollution from fertilizers Pollution from pesticides Use of waste water for irrigation Effluent and waste from agroprocessing by-products	- Adhere to instruction for chemical applications - Balance of organic and inorganic fertilization - Integrated Pest Management Techniques - Water treatment - Education and training - Preventive and curative health - Incorporate recycling and re-use of by-products into IT project design - Effluent control measures in designing processing facilities and processing operations - Define and enforce return water quality levels (including monitoring) - Control industrial development - Designated land for saline water disposal - Educate for pesticide or sewage contamination dangers - Monitoring irrigation water quality

Environmental Issue	Environmental Impact	Mitigation/Enhancement Measures
Biological		
Crop Diversification	Monoculture, intensive system with short fallow period create favourable environment for pest and diseases	- IPM and training for intensive systems - Planting of multipurpose trees, agroforestry, land cover on slopes with plants - Use other appropriate means of soil conservation technique

Environmental Impact Assessment Guideline for The AGRICULTURAL SECTOR

Animal migration patterns	Infringement on mammal, fish or bird migration pattern during project operation	Avoidance of areas that infringe on known migratory patterns of protected, endangered or rare species Maintenance of migration routes corridor, fish ladders etc. • Restoration of habitat, fish ponds etc. Participatory planning and consultation between local residents, authorities and NGOs
Health	Health hazard from handling agricultural chemical Increased disease incidents from water-borne diseases The burning of fuel in wide range of agricultural machinery/equipment results in the pollution of air with gaseous waste products Excessive vibration of these machinery/equipment and noise levels, the operators are exposed to a lot of health risks	Adhere to instructions on appropriate use of fertilizers and pesticides; application of IPM, including training Use lined canals or pipes to discourage vectors Avoid stagnant or slow moving water Fill or drain borrow pits along canals and roads Complementary investment in disease prophylaxis and treatment, including training Allow sufficient time and money for extensive public discussions Regular maintenance of machinery schedule should be adhered to Minimize use of less vibratory equipment or protective equipment
Exotic Cultivars/Varieties	Introduction of new pests and diseases	Plant only certified exotic crop cultivars/varieties

Resettlement	Dislocation of population and communities	Siting of project to minimize dislocations
Loss of alternative land use or activities	Project implementation or benefits impaired due to conflicts of land ownership	Compensation to owners of dislocated property
Loss of cultural resources	Conversion of land may favour one group over another	Resettlement scheme ensuring at least equal standard of living and including environmental considerations of services, such as roads, water supply sanitation and health
	Disturbance of valuable resources, such as sacred forest and archeological site	Consultation with affected population, authorities and NGOs Pre-project socioeconomic surveys and land use assessment Measures to protect or restore affected resources if avoidance is not possible Define ecological requirements Operated dams to suit downstream requirements and encourage wildlife around reservoirs

Table 8: Summary of Environmental Issues, Impacts and Mitigation/Enhancement

Measures Related to Livestock

Environmental Issue	Environmental Impact	Mitigation/Enhancement Measures
Land and soil quality	Soil erosion from land clearing for stock water construction Soil erosion due to livestock trails/tracks (hoofing effect) Soil compaction due to livestock movement Loss of organic matter and nutrients due to land clearing Loss in pasture productivity Bush encroachment resulting from selective grazing	Fencing and planting of vetiver grass around stock water points Adequate and uniformly distributed watering points should be provided. Improvement of soil fertility through the planting of leguminous plants in pasture development Droppings from livestock fertilize the land Periodic rest of selected areas during a growing season (rotational grazing) Practice grazing management Diversification of livestock species and protection of sensitive areas

Water quality	Silting of water bodies and small dams contributes to sediment loads and turbidity which affect fish and other aquatic organisms. Impact of water quality (pollution of water by livestock faeces)	Proper waste and effluent management Provide for adequate treatment of effluents and solid waste from projects Provision of separate watering points for livestock and humans Provision of watering (ensure that livestock do not drink directly from water bodies)
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	Production of large quantities of manure and wastewater in the large-scale intensive system Production of from livestock waste for example ammonia, carbon dioxide, methane etc. Increase in herbicide and pesticide use	Install livestock manure management facilities, develop nutrient management plans Manage odor or improve animal nutrition and manure management to cut down methane emissions Production of biogas Control grazing to pasture quality increase/decrease
Biodiversity	Changes to the structure and composition of natural vegetation which are not necessarily Overuse of the vegetation combined with excessive trampling leads to soil compaction and reduction in plant cover Degradation of rangelands due to livestock diversification, bush fires and other human interaction	Assess carrying capacity of the rangelands and plans to maintain an ecological balance between the livestock and the flora and fauna Pasture reinforcement and rehabilitation: introduce nutritious and resistant legumes into rangelands to improve its condition Adopt and practice good grazing management. Culling of livestock to manageable levels Provide supplementary feeding

	Contamination of indigenous breeds with introduction of new breeds Excessive use of resource if animal numbers allowed to build up (ie. Not consumed locally or marketed) Pollution of public drinking water sources by acaricides and insecticides Poisoning of animals grazing the area where acaricide is pumped, dripped off treated livestock or deposited by spray from a spray race Toxicity to birds, which ingest poisoned ticks	Practice crop/livestock integration Education on bushfires and enforcement of laws and regulations Establish fodder banks and controlled grazing reserves Draw programme to sell surplus or unproductive animals Improve livestock marketing facilities Educate Public on livestock diversification Rehabilitate and reinforce pasture Use biodegradable drugs to avoid disposal of large volumes of water contaminated with chemicals Education on proper use of acaricides and sprays.
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	Increase in prevalence of malaria due to construction of livestock watering points Increase in tsetsefly population	Use longer lasting systemic acaricides, which are usually applied as a brush, spray or pour-on. These avoid the handling and disposal of large volumes of chemicals Provision of livestock watering points should be limited to strategic points so as to avoid focalized vegetation and destruction, an evenly spread of livestock numbers in the areas
	Risk of pollution/accidental spill of/into ground or surface water from disposal of wastewater, solid waste and effluent/effluence Production of green house gases (methane and nitrous oxide), which can contribute to global warming	Promote the use of traps and screens, insecticide, impregnated nets and use of sterile males. Proper waste and effluent management Provide for adequate treatment of effluents from projects Promote the making and use of compost Introduce biogas concept to farmers.
Socio-cultural		

	Damage places of religious, cultural/historical value	Protect places of religious, historical/cultural
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Table 9: Summary of Environmental Issues, Impacts and Mitigation/Enhancement Measures Related to Fisheries

Environmental Issue	Environmental Impact	Mitigation/Enhancement Measures
Water bodies		
Water quality and quantity	Pollution from oil and fuel spill and leakage, and from bilge flushing	Public education programmes on proper fuel and oil handling and bilge waste disposal provision of storage and handling facilities, bilge evacuation and disposal services Regular maintenance of machinery
	Contamination from domestic, sewage and agrochemicals affecting fishing survival and fish	Adequate pond water exchange and frequent pond flushing
	Oil pollution from coastal and inland navigation, and spills from drilling, transport operations and oil tankers (cleaning of tanks)	Siting in areas not susceptible to acidification (avoid waterlogged soils high in pyrite and organic matter)
	Death of pond water due to hydrogen sulfide formation	Coordination of aquaculture ponds with activities to double-up on water use (eg pond water reused for
	Loss of productivity or formation of toxic conditions in ponds from high temperatures, low oxygen and accumulation Water pollution from pond effluent (nutrient-rich and with varying chemical content depending on intensity of pond management)	Release into water body with adequate dilution and dispersal capability Treatment of water prior to release Timing of release with period of high water Shorter retention time of water in pond, more frequent water exchange flushing

	Concentration of pens, pilings and rafts in natural (man-made) water bodies to extend flat navigation is hampered, water circulation is restricted, water quality is decreased and capture fisheries precluded Dams and flood measures which alter water quality and stream flows and disrupt riverine and floodplain fisheries	Regulation of aquaculture activity to limit its average intensity Establishment of reservoir, dam construction (if feasible). Water release management to minimize damage to fisheries
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Environmental Issue	Environmental Impact	Mitigation/Enhancement Measures
Water bodies		
Biodiversity and fish stock	Direct Impacts: Capture Fisheries 1. Overexploitation of fisheries stock and long-term degradation of the ecosystem.	fisheries management for optimum sustained yield: Restricted harvests (minimum landed size limits, catch quotas, seasonal closures) Gear restrictions (trawl bans, specified net mesh sizes) Closure of areas (permanent reserves, periodic closures) Limited entry systems (licensing, exclusive access) Prohibited practices (use of explosives, drift nets) Consideration of sustainable traditional fishery practices and incorporation to extent possible modern fisheries management systems
	2. Capture of non-target species and habitat damage through use of certain equipment and fishing practices	Limitation or prohibition of use of such equipment and fishing practices. Testing and pilot scale use prior to large scale introduction of new technologies Expanded use of fish by development of new products markets By- catch reduction device

3. Pollution from oil, fuel spills and leakage and from bilge flushing	Public education programmes on proper fuel and oil handling and bilge waste disposal. Provision of storage and handling facilities, bilge evacuation and disposal services.
4. Diver and anchor damage	Public education programmes for fishermen on effect of damage and ways to avoid it. Installation of mooring buoys Designation of anchoring locations
5. "Ghost-fishing" and navigational hazards from abandoned or lost fishing nets and traps	Public education programmes for fishermen on hazards of abandoning gear

	6. Use of explosives and poison 7. Introduction of exotics leading to degradation of native stocks. Direct: Culture Fisheries 8. Clearing/conversion of coastal wetlands for construction of ponds 9. Erosion and siltation problems arising in construction phase 10. Competition of ponds for water and land resources demanded by other users. 11. Loss of productivity or formation of toxic conditions in ponds from high temperatures, low oxygen and waste accumulation.	• Prohibition of practices and enforcement of regulations Prohibition of exotics introduction Provision of ponds in areas of particular ecological significance Limitation of area converted to ponds Intensified management in existing and new ponds to discourage "shifting aquaculture" and low-input, extensive aquaculture which converts large areas Restriction of clearance to area needed for ponds. Pond construction during dry seasons Stabilization of exposed soil by compacting and also planting grasses or other ground covering Assessment of existing traditional land and water use for aquaculture as against agricultural, industrial and municipal demands. Planning, management and continuing negotiations to reach acceptable distribution of resources. Siting of pond to avoid disruption of traditional uses of water for washing and drinking. Coordination Of aquaculture ponds with other activities to double- up on water use (e. g. pond water reused for irrigation) Adequate pond water exchange for frequent pond flushing Regular monitoring of water quality Aeration of pond water
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	12. Acidification of pond water due to hydrogen sulphide formation 13. Local depletion of larval and juvenile 14. Water pollution from pond effluent (nutrient-rich and with varying chemical content depending on intensity of pond management). 15. Introduction of exotics with subsequent damage to native stocks by competition, predation, spread of disease and parasites. 16. Spread of disease in aqua culture and into natural stocks when stocking becomes too 17. Concentration of pens, pilings, and rafts in natural (non-pond) water bodies to extent that navigation is hampered, water circulation is restricted, water quality is lowered, and capture fisheries precluded.	• Siting in areas not susceptible to acidification (avoid waterlogged soils high in pyrites and organic matter) Adequate pond water exchange and flushing Regular monitoring of water quality Liming of soil and pond water Production of larvae and juvenile in nurseries Release into water body with adequate dilution and dispersal capability. Dilution prior to release Timing of release with period of high water Shorter retention time of water in pond: more frequent pond water exchange and flushing Treatment of water prior to release. Provide a tail pond to receive effluent Avoiding of exotic introductions except where adequate knowledge of biology and life history of species indicates low risk of negative impacts and where adequate safeguards against escape are taken. Regular monitoring for disease and parasites; if present and spreading, elimination of infected populations. Consideration of using sterile hybrids Monitoring of disease incidence Limitation of numbers when disease is positively correlated with fish densities If disease spreads, elimination of diseased individuals Quarantine of suspected diseased fish Regulation of aquaculture activity to limit it to acceptable intensity.
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	External Impacts: Capture Fisheries and Culture Fisheries	
	18. Dams which alter water quality and stream flows and disrupt riverine and floodplain fisheries.	Establishment of reservoir fishery. Water release management to minimize damage to fisheries.
	19. Irrigation schemes which alter water quality and quantity.	Development of fishery activities in conjunction with irrigation systems (e.g., use of pond water for irrigation, traps and nets in irrigation canals). Management of irrigation schemes to minimize damage to fisheries • Integrated watershed planning and

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20. Land use and agricultural practices in watersheds affecting sediment content and water quality.	Close coordination between fisheries and government agencies responsible for resource management in watersheds to alert them to impacts on fisheries.
21. Flood control measures damaging to water quantity and quality and aquatic habitats.	Floodprotection measures
22. Pollution from industrial effluent, sewage and agrochemicals affecting fish survival and tainting fish.	Appropriate steps taken for Wastewater Collection, Treatment, Reuse, and Disposal Systems. Serious consideration given to Plant Siting and Industrial Estate Management and Industrial Hazard Management.
23. Air pollution and acid rain affecting fish survival.	Appropriate actions taken against Atmospheric Pollution
24. Coastal development involving dredging, filling, destruction of mangrove swamps, construction and infrastructure development.	Integrated Coastal Zone Management plan put in place.
25. Oil pollution from coastal and inland navigation, and spills from drilling, transport operations, and oil tankers (cleaning of tanks).	Appropriate regulations put in place for Inland Navigation and development of Port and Harbour Facilities; Oil and Gas Development—Offshore and Oil and
26. Water-based tourism development which conflicts with fishing activities.	Appropriate regulations put in place for Tourism Development

	Indirect Impacts: Capture Fisheries and Culture Fisheries	
	27. Creation or expansion of port areas, shore facilities and infrastructure (roads, water, power) for processing and transport of fish products. 28. Pollution from effluent discharge from industrial fish processing plants	Appropriate measures put in place for Plant siting and industrial estate management; integrated coastal zone management; and development of port and harbor facilities. Discharge into waters with adequate dilution and dispersal capabilities Water quality monitoring for suspended solids, oils and grease, dissolved oxygen, nitrogen and coliforms. Reduction of wastes by recycling into usable products, reduction of water use. Treatment of waste prior to release.
Soil	Erosion and siltation problems arising during construction phase. Land use and agricultural practices in watersheds affecting sediment content and water quality Competition of ponds for water and lands resources demanded by other users	Integrated watershed planning and management • Close coordination between fisheries and government agencies responsible for resource management in watersheds to alert them of impacts on fisheries • Restriction of clearance to area needed for ponds Pond construction during dry seasons Stabilization of exposed soil by planting grasses or other ground covering Assessment of existing traditional land and water use and agricultural, industrial and municipal demands Planning, management and continuing negotiations to reach acceptable distribution of resources Siting of pond to avoid disruption of traditional uses of water for washing and drinking

Note: Indirect Impacts such as creation or expansion of port areas, shore facilities and infrastructure (roads, water, power) for processing and transport of fish products and pollution from effluent discharge from industrial fish processing plants.

See "plant and siting and industrial estate management" 'Coastal Zone Management'; and Port and Harbour Facilities otherwise discharge into waters with adequate dilution and dispersal capabilities and institute the following measures.

- Monitor water quality for suspended solids, oil and grease dissolved oxygen, nitrogen and coliforms.
- Reduce wastes by recycling into usable products, reduction of water use.

- Treat water prior to release of water-based tourism development, that conflicts with fishing activities should be considered for EIA or SIA

Table 10: Summary of Environmental Issues, Impacts and Mitigation/Enhancement Measures Related Post Harvest Activities

Environmental Issue	Environmental Impact	Mitigation/Enhancement Measures
Transportation	Pollution of atmosphere due to exhaust emissions from automobile	Promotion of the use of intermediate means of transport (IMFS)
Drying	Pollution of the atmosphere from mechanical dryers using wood or fossil fuel	Promotion of the use of solar dryers
Threshing	Dust pollution	The use of protective clothing e.g. and eye wear
Cleaning	Air dust pollution	The use of protective clothing e.g. Respirators and eye goggles
Chemical treatment of cereals and legumes	Quality pollution	Solar disinfection stations. Use of biological agents of <i>Teretöorm nigrescens</i> (Tn) to control larger grain borer (LGB)
Cold Storage	Leakage of refrigerant	Regular maintenance of equipment
Construction of structures	Desertification (use of timber and wood product to construct cribs, etc.)	Encourage the use of grain pre-cocoon
Agro-processing	Pollution by exhaust emission from engine driven machines Pollution of the environment from process effluent activation	Regular maintenance schedule should be adhered Treatment of liquid effluent according to EPA guidelines before disposal into open drains/surface bodies Incorporate recycling/re-use of effluent in to project design Effluent quality monitoring

Applying Pesticides

It is recommended that all persons using pesticides for commercial purposes obtain a pesticide applicator's certificate from the EPA. According to the Pesticide Control and Management Act, Act 528 of 1996, any person who purchases or uses a pesticide labeled "Restricted" must hold a pesticide application certificate.

Based on the risk that a pesticide formulation is likely to pose to its users, regulatory authorities need to decide if such a product can be freely distributed in the country, should be prohibited, or has to be restricted to certain users only.

Recommended restricted available of insecticides based on the WHO acute hazard classification.

<u>Class</u>		<u>Available for</u>
Ia	Extremely hazardous	Only individually licensed operators
1b	Highly hazardous	Trained and supervised operators who are known to observe precautionary measures strictly prescribed.
11	Moderately hazardous	Trained and supervised operators who are known to observe precautionary measures strictly prescribed.
111	Slightly hazardous	Train operators who observe routine precautionary measures.
IV	Unlikely to pose acute hazard in normal use	Caution to public respecting standard general hygiene measure and observing instructions for use given on the label source

Table 11 Summary of Environmental Issues, Impact and Mitigation/Enhancement Measures Related to Pest and Pesticide Management Activities

Environmental Issue	Environmental Impact	Mitigation/Enhancement Measures
Pollution due to pesticide characteristic	Higher water soluble pesticides contaminate water Pesticide characterized by low adsorption with soil particles, and low volatility are likely to be washed into surface or ground water Low degradable chemicals are more likely to be carried to aquatic systems and ground water Highly toxic chemicals are more harmful and poisonous to humans and other organisms	Use pesticides with low solubility, higher capacity to bind with soil particles and short breakdown period. Using the least toxic alternatives (short lived pesticides that have low toxicity to human, fish and wildlife when pesticide are required)
Chemical Pest Control	Loss of biodiversity (both fauna and flora) due to pesticide' activity on non target organisms Pesticide residues resulting from agricultural intensification or diversification Elimination of the natural enemies of crop pest and consequent alteration of biological pest control methods Development of pest resistance to pesticides thus encouraging further increases in the reliance on chemical pesticides Contamination of soil and water bodies Uncontrolled import, sale and distribution of pesticide Unsafe management of pesticides containers Underground water pollution resulting from pesticides	Promotion of IPM and alternatives to include: Monitoring and identifying pest population to determine when treatment is needed Using effective alternatives, biological, cultural and/or other control when they are available Using recommended pesticide at a minimum effective application rate Ensure application equipment is in good working order and is properly and regularly calibrated Enforce import regulations Ensure proper disposal of pesticides containers Education
Environmental Issue	Environmental Impact	Mitigation/Enhancement Measures

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Sprayer filling stations and Pesticide preparation	Contamination by chemical spills during filling	Locate the filling at least 10m from all water courses, wells and boreholes. Position the filling station at a lower elevation than wells such that spills
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Pesticide		Position filling station at a lower elevation than wells such that spills will run away from the water supply Have spill response equipment close by the mixing and storage site, including absorptive materials, shovels, protective gear etc.
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Pesticide storage	Leakage from spills Pollution of the environment Fire outbreaks	Do not store more pesticide than is required for the season. Ensure that facility is good and well secured Separate the storage facility from working and living areas Store pesticides in their original containers with the original labels. Dispose of unwanted, unmarked and damaged containers Follow label directions for storage Keep containers above floor level to protect them from damage. Storage structures be accessible by fire fighting equipment. Place warning signs at all entrances Do not store pesticides near livestock, food, feed, fertilizers or seed Keep containers tightly closed Keep a fire extinguisher, shovels and absorbent materials like clay, saw dust, sand etc.
Disposal of Pesticides Waste and containers	Contamination of ground water and water bodies in case of spills	Drain the container by pouring the residue into the sprayer tank each time or puncture containers destined for sanitary landfill or collection sites or store in a safe place until delivery. Clean sprayers or empty containers far away from water sources. Calculate rates and calibrate sprayers

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Pesticide Transport	Accidents leading to massive contamination of roads, land and water ways.	Drivers should be provided with transport emergency cards Continuous education of drivers transporting pesticides Transport only undamaged, labeled and securely closed pesticide containers Transport pesticides in non absorbent materials (metal, plastic not wood) Ensure have appropriate documents, special labels and vehicles placards when transporting pesticides Warning placards for hazard material be placed on the four sides of the vehicle used to transport pesticides if they are of a corrosive flammable or highly toxic nature A suitable fire extinguisher, and basic clean up kit, brooms and shovel and protective should be available for use by the driver
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AWENDIX
SCRFENING(RITm.1A

SCREENING CRITERIA AGRICULTURE SECTOR PROJECTS

THE AGRICULTURAL SECTOR IN GHANA

The agricultural sector in Ghana is made up of five (5) sub sectors namely

- Crops other than cocoa [which contributes 66.5% of agricultural GDP]
- Livestock [contributes 7.0% of agricultural GDP]
- Fisheries [contributes 5% of agricultural GDP]
- Forestry [non-reserved forest areas] 8.4%
- Cocoa [contributes 13.1 % of agricultural GDP]

Main Undertaking in Agricultural Sector

1. Crop production
2. Irrigation and drainage
3. Livestock
4. Fisheries
5. Agro-chemicals and Management
6. Post-harvest management — storage and processing
7. Non-Traditional Forest products [snail, mushroom, bee keeping]

Main activities in agricultural development

For many agricultural developments, the main activities, which have the potential to affect the environment, are:

2.1 Water resources development

This involves water supply systems [reservoirs and wells development]; flood control systems [embankment, operation of weirs and sluices,] drainage systems, irrigation delivery and water use systems, aquaculture.

2.2 Land development

This involves land occupation, land clearing, landscape modification [terracing, grading], soil amelioration [fertilization, mulching], tillage [ploughing seedbed preparation] ;

2.3 Commodity developments. This involves crop selection, cropping system livestock production system, aquaculture, pest and weed control; harvesting and post-harvest systems; on-farm processing and on-farm waste management.

2.4 Other infrastructure developments

This involves construction of housing, farm roads, off-waste management storage and processing.

● GENERAL SCREENING CRITERIA FOR AGRICULTURAL SECTOR PROJECTS

Screening of an undertaking in the agricultural sector is considering its physical, biological, social and economic characteristics. The general criteria for screening undertaking in agriculture are by:

- Legislative/policy obligation
- Project location sensitivity
- Project type/level of technology options

- Project design construction and operation
- Scale and level of impacts on human live settlement and resource.

Impact

CROP PRODUCTION

3.1.1 TYPES/CATEGORIES OF CROP PRODUCTION

1. Cereals	3. Industrial crops	5. Other crops
1.2 Rice 1.3 Sorghum 1.4 Millet	3.1.1 Rice 3.2 Cotton 3.3 Kola nuts 3.4 Oil palm 3.5 Rubber 3.6 Cashew 3.7 Shea nuts 3.8 Cocoa	5.1 Plantains 5.2 Bananas
2. Root and Tubers	4. Horticultural Crops	6. Legumes/Pulses
2.1 Cassava 2.2 Yam 2.3 Cocoyam 2.4 Sweet potatoes 2.5 Taro	4.1 Pineapples 4.2 Oranges 4.3 Lime 4.4 Mangoes 4.5 Chili 4.6 Pepper 4.7 Ginger 4.8 Tomatoes and Other vegetables 4.9 Cut flowers	6.1 Groundnut 6.2 Cow pea 6.3 Bambara beans 6.4 Soya bean

3.1.2 Level of technology/management options in crop production

1. Rainfed.
2. Irrigation
3. Mechanised [manual/partial/fully]
4. Level of operation [small scale, medium scale, large scale]
5. Infrastructure development Farmsteads [Residences]
 - Storage facilities,
 - Workshops and sheds office
 - Roads, water storage and distribution.
 - Primary [farm gate], processing/packaging
 - Secondary processing/, packaging, etc

3.1.3 Scale [size] for classification

Type/category	Scale [hectares]
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	Small A]	Medium [Category B]	' Large [category C]
Cereals	<2ha [5 acres]	2-8.3 ha.	Above8.3ha[2(hcres]
Vegetables	<0.8ha[2 acres]	0.8-8.3 ha	Above 8.3 ha.
Pineamles	<4.2ha[I	4.2 ha -8.3 lu.	[20acres]
Tree plantation/ crq)S	<6.25ha[15acres]	6.25-16.6 ln.	Above
Roots and tubers	<2.ha	2-8.3ha	8.3ha[20acres]
Legumes/pulses		2-8.3 ha	Above 166ha[40acre]
			Above 8.3 ha
			Above 8.3 ha

3.1.4 Categorization for decision making

Relevant Factors	Level of Significance			
2.Location [Sensitivity] 3.Level of impacts on Human life/Settlement Water Resources Soil Resources Any Other Resource				

Neutral positive

*NS No Significance Impact	-	1
MS.....Medium Significant Impact	-	2
VS Very Significant Impact	-	3

3.1.5 Placement

Catego	Placement	
	Only registration required [issue permit]	Project not anticipated to result in adverse environment impact requiring further review.
	Request for PER	Project with limited environmental impacts that can be routinely resolved through application of limited measures or design changes.
C	Request for EIA[Mandate 1Y]	Project with the potential for significantly far reaching environmental impacts requiring detailed field study and review.
D	Strategic Environmental Assessment {SEA}	Formulation of policies and programmes Development of strategy of action plan for sector/sub-sector.
	Reject/Disapprove/proposal	Location too sensitive for the scale and level of impacts.

3.1 IRRIGATION AND DRAINAGE

3.2.1 Level of technology/management option in Irrigation Agriculture

Irrigation farming consists of different components and various technical or managerial options exist for each component. In Ghana, depending on the level of technology or type of management options, an irrigation type may be classified as "Formal" or "Traditional"/ [Informal] all Formal irrigation schemes

These are usually public development schemes managed by a government institution or Farmer Cooperative on behalf of the smallholders.

- Government Management
- Co-operative Farming
- Mechanized

bl Traditional irrigation schemes

These refer primarily to schemes which are under local responsibility, controlled and operated by the community in response to their felt needs. They include:

- e Dug wells or ponds
- River diversion/development of swamps e Water spreading or harvesting
- Flash floods

3.2.2 Types of Irrigation Systems in Ghana

The type of irrigation systems being operated by either any of the schemes above include:

- Surface Irrigation
This type of irrigation obtains water from rivers or reservoirs and use gravity fed canal systems.
- Overhead irrigation
This type of irrigation is used where gravity flow is not possible and water has to be lifted by pumps. These include sprinkler and drip irrigation.
- Flood recession
This normally occurs along the flood plains when the river flood recedes and the retained moisture is used for crop production.

3.2.3 Activities in irrigation and drainage

1. Surface Irrigation
 - 1.1 Basin
 - 1.2 Furrow
 - 1.3 Border irrigation
2. Overhead Irrigation
 - 2.1 Sprinkler
 - 2.2 Drip
- 3 Flood Recession
 - 3.1 Flood Plains farming

3.2.4 Irrigation Infrastructure

1. Dams, weirs
2. Dugouts
3. Tube wells
4. Dug wells
5. Canals

3.2.5 Scale [Scheme] for Classification

Type of Irrigation	Small Scale <100 ha	Medium Scale 100-1,000 ha	>1,000 ha Large Scale
1. Surface Irrigation (Basin, Furrow, Border)			
2. Overhead (Sprinkler, Dri) Irrigation	<100 ha	100-1,000 ha	ha

3. 2.6Categorization for decision taking

N =Neutral - 0
NS = No Significant Impact - 1 MS =...Medium
Significant Impact - 2
VS Very Significant Impact - 3

3.2.7 Placement

3.3 LIVESTOCK AND POULTRY PRODUCTION

33.1 Types [Categories] of Livestock and Poultry Production

1. Livestock

- 1.1 Beef/Dairy cattle production
- 1.2 Small ruminant [sheep and goats production
- 1.3 Pigproduction
- 1.4 Rabbit production

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1.5 Grass-cutter domestication/production

2 Poultry

2.1 Fowls production

2.2 Guinea fowls production

2.3 Ducks production

2.4 Ostrich production

2.4 Turkey production

33.2 Production System and Stocking rate

Production Type	Rearing/productk)n System		
	Free range	Semi-Intensive	Intenö,'e
Cattle	l/ha	5-15/ha	16-30/1u
Sheep	20/ha	15-35/ha	36-50/1u
Pigs	20/ha	15-35/ha	36-50/1u
Goats	20/ha	I per 1.5m	I per 25m
Rabbits	Nd available	Not available	I per 0.36m
Grass-cutter	Not available	Not available	I per 0.36n
Poultry [fowls]	Nd available	[Deep litter] 6-8 birds or I bird per 380-500cm	[Battery cages] 4 birck per 380-413 cm
Floor space			
Guinea fmvls	Not available	Not available	Not available
Ducks	1 duck per 2m ²	I duck perm	I duck per 0.2-0.5m
tric	Nd aval e	Not avar	3 Ir sper a
Turkeys	1 bird per 20m	1 bird per Ion	I per 0.36-0.48m

3.3.3Scale [size] for classification

Type of Produ ction	SmalVCategory A1	Scale of Production	
		Medium [Categn•y B1	Large [Category C21
Beef, cattle	1-10	11-50	Above50
Dairy cattle	1-5	6-20	Above 20
Sheep and Goats	1-30	31-100	Above 100
Pigs: Sow unit (farrow to wean)	1-10	11-100	Above 100
Pgs: Fattening to sell	1-20	21-100	Above 100
Rabbits and Grass cutters	1-50	51-100	Above 100
Fowls (local Poultry) *	1-50	51-100	Above 100
Poultry (Broilers)	1-200	201-500	Above 500
Poultry (Layers)	1-2000	2001-5000	Above 5000

Guinea Fowl & ducks	1-200	201-500	Above 500
Turkey	1-50	51-100	Above 100
Ostrich	1-20	21-100	Above 100

3.3.4 Categorization for decision taking Relevant Factors

	N	NS	MS	VS
I. Scale of operation 2. Location [Sensitivity] 3 Level of impacts on o Human life/settlement o Water Resources o Soil Resource o Any other Resource				

Neutral

NS No Significant Impact 1 MS Medium Significant
Impact 2

VS Very Significant Impact

3

3.3.5 Placement

Category	Placement	Basis
C	Only registration Required [issue permit] Request for PER	Project not anticipated to result in adverse environmental impact requiring further review. Project with limited environmental impact that can be routinely resolved through application of limited mitigation measures or design changes
	Request for EIA [Mandatory] Strategic Environmental Assessment {SEA}	Project with the potential for significantly far reaching environmental impacts requiring detailed field study and review. Formulation of policies and programmes. Development of strategy of action plan for sector/sub-sector.
	Reject [Disimprove]	Location too sensitive for the scale and level of impacts

3.4 FISHERIES

3.4.1 Types/categories of Fish Production

1. Capture fisheries

1.1 Industrial

1.2 Semi-industrial

- 1.3 Artisanal/Canoe fisheries
2. Aquaculture [Culture fisheries]
 - 2.1 Intensive [Complete dependence on formulated fish].
 - 2.2 Semi-intensive [partially fed on supplementary feed].
 - 2.3 Extensive [Fish left to grow on their own utilizing natural food].

Impact

3.4.2 Activities in fisheries and scale for classification

Type of	Of activities	Scale		
		Small [Category A]	Medium [Category B]	Large [Category C]
Industrial/ Fleet	Use trawlers, purse seiners shrimps and tuna vessels			
	Operate in deep water [offshore] 30 meters depth and beyond			
Semi-industrial	Use of small wooden vessel with inboard engines			
	Operate in inshore waters along the coast, below 30 meter depth and above			
Artisanal	Operation by indigenous fishermen			
	• Use canoes non-mechanized or mechanized and driven by outboard motors			
Aquaculture	Creation of water bodies for cultivation of fish and other aquatic organisms	Below 1 ha	1 ha	Above 1 ha
	Cage culture in rivers, lakes and seas			
	• Production of fingerlings ** Introduction of exotic species			
Fishing Port Land	Development and operation of fishing harbours			
	Construction and operation of storage/processing facilities			

Currently

3.43 Categorization for decision taking

Relevant factors	Level of significance	N	NS	MS	VS
1. Scale of operation 2. Location [Sensitivity] 3. Level of impacts on • Human life/settlement • Water Resources • Soil Resource • Any Other Resource					

N Neutral 0
 NS No Significant Impact 1
 MS Medium Significant Impact - 2 VS Very
 Significant 3

Environmental

3.4.4 Placement

Category	Placement	Basis
	Only registration Required [issue permit]	Project not anticipated to result in adverse environmental impact requiring further review.
	Request for PER	Project with limited environmental impacts that can be routinely resolved through application of limited measures or design changes.
C	Request for EIA [Mandatory]	Project with the potential for significantly far reaching environmental impacts requiring detailed field study and review.
D	Strategic Environmental Assessment {SEA}	Formulation of policies and programmes. Development of strategy of action plan for sector/sub-sector.
	Reject [Disapprove] proposal	Location too sensitive for the scale and level of impact.

3.5 AGRO-CHEMICALS AND PESTICIDES MANAGEMENT

3.5.1 Classification of pesticides

Pesticides are classified according to the type of pest they control and by their toxicity levels. Table 1 : Classification by pest type

Type of Pesticides	Type of Pest controlled
Insecticide	Insects and other related pests such as ticks and spiders
Fungicide	Fungi
Herbicide	Weed
Nematicide	Nematodes
Rodenticide	Rodents
Acaricide	Mites, ticks and spiders
Arbicide	Trees, bushes, shrubs, etc
Avicide	Birds
Piscicide	Fish

Table: 2 Classification of Pesticides by toxicity levels or LD50 value

Classification	LD for rats [mg/kg body weight]			
	ORAL		DERMAL	
	Solids	Liquids	Solids	Liquids
Extreme hazardous	5	20	10	40
Highly hazardous	5-50	20-200	10-100	40-400
Moderately hazardous	50-500	200-2000	100-1000	400-4000
Least hazardous				

3.5.2 Fertilizers

Environmental Impact

Classification

1. Straight Compound
2. Compound

Straight

- Phosphatic fertilizers
- Nitrogenous fertilizers
- Potassic fertilizers

Compound

- NPK
- NPK plus micro nutrients

Classification based on influence on soil pH

Highly acidic	
Moderately acidic	4.0—6.5
Neutral	6.5-7.5
Moderately basic	7.5-8.5
Highly basic	Above 8.5

3.5.3 Major Activities under Pesticide and Agro-chemical Management and Control

Activities	Cat 0
Registration of pesticide	C
Manufacture and formulation	C
Bulk storage of agro-chemicals	
Transportation of agro-chemicals	

Commercial/large scale application [e.g. aerial spray, locust control]	B
Disposal of agro-chemical waste in containers.	B
Disposal of expired or obsolete pesticide	C

3.5.4 Placement

Category	Placement	Basis
	Only registration Required [issue permit]	Project not anticipated resulting in adverse environmental impact requiring further review.
	Request for PER	Project with limited environmental impacts that can be routinely resolved through application of limited mitigation measures or design changes.
C	Request for EIA [Mandatory]	Project with the potential for significantly far reaching environmental impacts requiring detailed field study and review.
	Strategic Environmental Assessment (SEA)	Formulation of policies and programmes. Development of strategy of action plan for sector/sub-sector .
	Reject Disapprove proposal	Location too sensitive for the scale and level of impact.