**ENVIRONMENTAL IMPACT ASSESSMENT GUIDELINES FOR THE HEALTH SECTOR**

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**Prepared by**

**Environmental Protection Agency**

**under the**

**Ghana Environmental Assessment Capacity Development Programme (GEACAP)**

**and**

**Ghana Environmental Assessment Support Programme (GEASP)**

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**FOREWORD**

The Environmental Assessment Regulations, LI 1652, was promulgated in 1999 to give comprehensive legal cover to the Ghana Environmental Impact Assessment procedures. These Regulations require that all developmental activities likely to impact adversely on the environment must be subject to Environmental Assessment. The objective of the LI is to ensure that such development activities are carried out in an environmentally sound and sustainable manner. The requirements of the LI, however, place enormous responsibilities on all stakeholders involved in development in Ghana. The nature of the responsibilities varies for different stakeholders, depending on their statutory functions, areas of jurisdiction and interests such as policy makers, implementing or regulatory agencies, planning authorities, financial intermediaries or institutions providing training or consultants providing services in EIA.

A national Environmental Assessment Capacity Development Programme (GEACaP) was initiated in 2001 with financial assistance from the Netherlands Government. This was to assist all relevant institutions in meeting their respective obligations under the LI, and to promote sustainable development in Ghana. An important aspect of the programme was the development of 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 formed to facilitate the development of the guidelines for these sectors. The key objectives of the Health Sector Core Team included:

1. Defining the screening criteria for environmental assessment for health sector investments.
2. Determining the scope of Environmental Impact Assessment (EIA) for the sector.
3. Providing systematic procedures on Environmental Impact Statement (EIS) preparations for the sector.
4. Providing guidelines on common potential impacts and mitigation measures.

This document covers all the areas outlined above and it is intended to provide guidelines for the conduct of environmental assessment in the health sector in Ghana

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# ACRONYMNS

BOD - Biological Oxygen Demand

CBHMS - Community Based Health Management System

CAR - Corrective Action Request

CH4 - Methane

CFC - Chlorofluorocarbons

CMR - Carcinogenic Mutagenic/ Reproductive Toxins

CO2 - Carbon Dioxide

EA - Environmental Assessment

EHS - Environmental, Health and Safety

EIA - Environmental Impact Assessment

EIS - Environmental Impact Statement

EMP - Environmental Management Plan

EP - Electrostatic Precipitators

EPA - Environmental Protection Agency

ESP - Environmental Sanitation Policy

GMTHS - Ghana Medium Term Health Strategy

GHS - Ghana Health Service

HCF - Health Care Facilities

HCl - Hydrogen chloride

HIA - Health Impact Assessment

HSSG - Health Sector Specific Guidelines

HVAC - Heating, Ventilation, and Air Conditioning

HWI - Hospital Waste Incinerator

HWMS - Health Care Waste Management Systems

IAEA - International Atomic Energy Agency

ILO - International Labour Organization

L I - Legislative Instrument

MEAs - Multilateral Environmental Agreements

MWRWH - Ministry of Water Resources, Works and Housing

MMDYE - Ministry of Manpower Development, Youth and

Employment

MLGRDE - Ministry of Local Government, Rural Development and

Environment

MOH - Ministry of Health

NDPC National Development Planning Commission

NDPS National Development Planning Systems

NEAP - National Environmental Action Plan

NO2 - Nitrous Oxides

NOX - Nitrogen Oxides

OPIM - Other Potential Infectious Materials

PAHs - Polycyclic Aromatic Hydrocarbons

PBT - Persistent, Bioaccumulative and Toxic

PCDD/Fs - Polychlorinated Dibenzo-p-Dioxins- and Furans

PEA - Preliminary Environmental Assessment

PER - Preliminary Environmental Report

PIC - Prior Informed Consent

POPs - Persistent Organic Pollutants

PPE - Personal Protective Equipment

PVC - Polyvinyl Chloride

SOX - Sulfur Oxides

VOC - Volatile Organic Compound

WAG - Waste Anesthetic Gas

WMDs - Waste Management Departments

# LIST OF RELEVANT STATUTES

**Statutory Acts**

1. Anatomy Act, 1965 (Act 280);
2. Atomic Energy Commission Act, 1963 (Act 240)[[1]](#footnote-2);
3. Atomic Energy Commission Act, 2000 (Act 588);
4. Atomic Energy Commission (Amendment) Law, 1993 (P.N.D.C.L.308)[[2]](#footnote-3);
5. Coroner’s Act, 1960 (Act 18);
6. Environmental Protection Agency Act, 1994 (Act 490);
7. Food and Drugs Act, 1992 (P.N.D.C.L. 305 B);
8. Ghana Health Service and Teaching Hospitals Act, 1996 (Act 525);
9. Local Government Act, 1993 (Act 462);
10. Mortuaries and Funeral Facilities Act, 1998 (Act 563);
11. Private Hospitals and Maternity Homes Act, 1958 (No. 9 of 1958);
12. Private Hospitals and Maternity Homes (Amendment) Decree, 1969 (N.L.C.D.395);
13. Registration of Births and Deaths Act, 1965 (Act 301);
14. Registration of Births and Deaths Act, 1965 (Amendment) Decree, 1968 (N.L.C.D. 285); and
15. Town and Country Planning Act, 1945 (Cap. 84)

**Legislative Instruments**

1. Environmental Assessment Regulations, 1999 (L.I. 1652);
2. Radiation Protection Instrument, 1993 (L. I. 1559); and
3. Registration of Births and Deaths Regulations, 1970 (L.I. 653).

**Multilateral Environmental Agreements (MEAs)**

1. Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa, 1991;
2. Basel Convention on the Transboundary Movement of Hazardous Wastes and their Disposal, 1989;
3. International Atomic Energy Regulations;
4. Montreal Protocol on Substances that Deplete the Ozone Layer, 1987;
5. Rotterdam Convention on Prior Informed Consent (PIC) Procedures, 1998; and
6. Stockholm Convention on Persistent Organic Pollutants (POPs), 2004.

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# 

# 1.0 INTRODUCTION

The ultimate aim of the national environmental policy of Ghana is to improve the surroundings, living conditions and quality of life of all citizen, both present and future. It seeks to ensure reconciliation between economic development and natural resource conservation, to make high quality environment a key element supporting the country’s economic and social development. In this respect, considerable attention has been given to the use of Environmental Impact Assessment (EIA) to help promote sustainable development in Ghana. In June 1999, the Environmental Assessment Regulation, 1999 (L. I. 1652) was promulgated.

L. I. 1652, among other things, places legal responsibilities on potential proponents and developers to ensure the protection of all components of the environment. The regulations clearly specify areas of national development, both physical and otherwise, where critical environmental issues and investigations are required to ensure that the environment is protected at all levels of development in all sectors of the economy. The development of sector specific guidelines, which will among other things, focus the preparation of EIA on all specific sectors has been widely recommended. It is in line with the above that this document also referred to as Health Sector Specific Guidelines (HSSG) is prepared to serve as a guide to developments within the health sector.

## 1.1 Purpose of this Guidelines

Development projects in the health sector are aimed at providing health benefits to the general public. However, these undertakings may have certain direct or indirect environmental impacts that must be assessed as to whether or not these impacts are positive or adverse. The Environmental Impact Assessment Guidelines for the health sector are designed to provide project developers, financiers, facility managers, and other decision makers a range of technical and background information that is needed for avoiding, minimizing and controlling Environmental, Health and Safety (EHS) impacts during the construction, operation and decommissioning phases of a project or facility in the health sector.

The Health Sector Guidelines’ primary focus is on the Environmental Assessment of projects that fall within the health sector specifically:

* Hospitals, Clinics, Laboratories and other Health Facilities;
* Mortuaries, Funeral Homes etc; and
* Solid and Liquid Waste Treatment and Disposal.

It is to be noted that the guidelines limit itself to the identification of potential health hazards and general impacts on health and the environment. The guideline do not provide information on the health effects (specific diseases, injuries, etc and related exposure standards) of the impacts due to specific development projects. Additionally, the guidelines do not provide solutions to the analysis, predictions and assessment of environmental impact which a specific undertaking may bring.

Public health and safety covers a wide spectrum of issues, which fall within the functions of several ministries, the major ones being, the Ministry of Health (MOH), Ministry of Local Government, Rural Development and Environment (MLGRDE), Ministry of Water Resources, Works and Housing (MWRWH), and the Ministry of Manpower Development, Youth and Employment (MMDYE).

The Environmental Impact Assessment Guidelines will assume higher importance for attaining sustainable development in the health sector in consonance with the objectives of the medium term national development policies, which include the Ghana Medium Term Health Strategy and the Environmental Sanitation Policy. In order to enforce the L.I. 1652, there is the need for the preparation of a sector specific environmental guideline for the health sector.

## 1.2 The Environment Impact Assessment Process in Ghana

1.2.1 Environment Impact Assessment (EIA)

EIA is a process that predicts the environmental consequences of a proposed development. It evaluates the expected effects on the natural environment, human health and on property. The process requires a multi-disciplinary approach.

The EIA compares various alternatives by which the project could be realized and seeks to identify the one which represents the best combination of economic and environmental costs and benefits. Alternatives include location as well as methods, process, technology and construction methods.

In Ghana, the EIA process involves the following steps:

* **Initial registration:** This is the initial registration required under L. I. 1652. of any undertaking which has the potential to impact negatively or positively on the environment,
* **Screening:** It is an important process that assists in the placement of a proposed project at the appropriate level of Environmental Assessment that is whether the project can be permitted at the registration stage or requires a Preliminary Environmental Assessment (PEA) or an EIA.
* **Scoping**: The aim of scoping is to ensure that the study identifies and addresses all key issues through consultations with relevant stakeholders for decision making. It involves setting the Terms of Reference for the EIA, and focusing on significant issues.
* **The EIA study includes the following:**
  1. Collection of baseline data and information;
  2. Public involvement/participation;
  3. Identification of impacts in terms of magnitude and significance;
  4. Socio- economic analysis of project effects/impact;
  5. Mitigating measures for each impact identified;
  6. Analysis of alternatives of the project; and
  7. Development of a monitoring programme and an environment management plan.

The above study is then documented in the form of an EA report and submitted to the EPA.

## 1.3 Applicability

The Environmental Impact Assessment Guidelines for the Health Sector include information relevant to the management of EHS issues which are associated with Health Care Facilities (HCF) which also includes, diverse range of facilities and activities involving general hospitals, small inpatient primary care hospitals, outpatient, assisted living, and hospice facilities. Ancillary facilities may include medical laboratories, research facilities, mortuary centers, blood banks and collection services.

# 2.0 POLICIES AND REGULATORY FRAMEWORK

## 2.1 Overview of the Health Sector in Ghana

In response to the health needs of the country, the policy of the Ministry of Health is aimed at promoting the primary health care concept through the intensification of preventive activities as well as providing each district and region with a hospital.

Historically, hospitals and clinics have been built in various locations in the country by the MOH and other health care providers without reference to each other with the general aim of providing health care for the population. Preference of religious missions for certain areas, political influences such as pressure from local authorities, opinion leaders and chiefs and the fact that the MOH has not engaged in a serious dialogue with other providers on the siting of facilities, has resulted in an inequitable distribution of hospitals, beds and health personnel throughout the country. For example the location of facilities in 55% of districts has mainly been historical. The initiation of a ‘Hospital Strategy’ which is a recent development is, however, a move to address the existing situation.

## 2.2 Organization and Management of Health Services

The Ministry of Health is the central government agency responsible for co-coordinating all health matters in the country. With the establishment of the Ghana Health Service (GHS), the role of the Ministry of Health is to focus on sector-wide policy formulation, monitoring and evaluation of progress in achieving targets as well as mobilizing resources. The Ministry of Health also initiates legislation and promotes intersectoral coordination and collaboration in support of health objectives.

At the national level the Ghana Health Service is headed by the Director General who has overall responsibility for planning, ensuring policy implementation, supervision, monitoring and evaluation. In addition, the established Ghana Health Service Governing Council is responsible for the overall management of the GHS. The main priorities of the Ghana Health Service at the national level include:

* Development of policy guidelines;
* Setting standards;
* Development of protocols and manuals particularly for child-care, safe motherhood, disease control, health and nutrition education, environmental health and other aspects of public health as well as treatment protocols for various ailments; and
* Development of systems for rational resource allocation as well as monitoring and evaluation of health service performance including hospitals.

A management team is operational in each region, district and sub-district and is responsible for strategic planning and the monitoring of performance of the services provided by service delivery units at corresponding levels.

The regional level is the stage at which specialist services in broad areas of medicine and surgery are provided at the regional hospitals. Cases from district may be referred to these regional hospitals.

The national level constitutes the apex of specialized and more sophisticated services. The major providers at this level are the teaching hospitals. Psychiatric hospitals function as specialized institutions.

Health Services delivered in the context of the District Health System constitute the Primary Health care system. Services here are organized at district, Sub-district, and Community levels. The district health centre is the referral levels for sub-district health facilities namely the health centres / polyclinics and health posts. Each district is expected to have a district hospital in the medium to long term. A sub-district is a geographical area served by at least one health centre that delivers public health, clinical and maternity services. The institutionalized Community Based Health Management System (CHPS) which entails the location of community health nurses within local communities as well as community clinics to facilitate health delivery in certain areas constitute the community level services currently in place. Cases from such communities and community clinics may be referred to the sub-district facilities (health centres and posts) or district hospitals.

**2.3 Stakeholder Institutions**

2.3.1 Hospital and Clinics:

The stakeholders vary to the same extent that providers, beneficiaries and socio-

political influences vary. The key stakeholders include the following:

* Political Authorities – These vary with the level at which the facility is to be placed. At the district level, the District Assembly and the District Health Council are key stakeholders, while at the regional level the Regional Coordinating Council’s role is paramount both as a facilitator and a decision maker. Other political leaders such as chiefs and opinion leaders also have a keen interest and wield a lot of influence on decisions regarding the establishment and location of facilities;
* Medical and Paramedical Professionals – This includes doctors, pharmacists, nurses and all other medical professionals and technicians including the support service personnel who have a role to play in the running of the facilities;
* Educational Institutions, the Universities, and other Training Institutions involved in training health professionals, whose students are trained (either partially or in full) using facilities of the hospitals or who have to provide funding for training in these institutions are important stakeholders;
* Planning Authorities e.g. District Assemblies;
* Waste Management Authorities (e.g. District Assemblies), EPA etc; and
* Other regulatory bodies e.g. Private Hospitals and Maternity Homes Board, Medical and Dental Council, Nurses and Midwives Council etc. These are institutions regulating the practice of medicine in health institutions.

2.3.2 Medical Laboratories, Medical Equipment, Therapy and Radiation Facilities:

The potential stakeholders in the health sector regarding medical laboratories, medical

equipment, therapy and radiation facilities include the

* Ministry of Health; Ghana Health Service
* Ghana Atomic Energy Commission (Radiation Protection Board);
* Research Institutes,
* Universities;
* Private Companies;
* Non-Governmental Organizations and
* Individuals who manufacture or otherwise produce, possess or use, sell, dispose of or lease, loan or deal with, import or export or transport any radiation device or radioactive material as well as other equipment and devices required for rendering of health care.

2.3.3 Mortuary Services, Funeral Homes Parlours, Cemeteries, Columbarium

Mausoleum, Hearse Service.

Stakeholders include:

* Births and Deaths Registry;
* Town and Country Planning Department;
* Ministry of Local Government, Rural Development and Environment;
* Metropolitan, Municipal and District Assemblies;
* Environmental Protection Agency;
* Practitioners of Private Facilities;
* Ministry of Health (Institutional Care Directorate, Pathology Departments of Hospitals; Occupational & Environmental Health Unit, GHS);
* Religious Bodies;
* Ministry of Chieftaincy Affairs;
* Traditional Rulers;
* Professional Bodies;
* The General Public; and
* Department of Factories Inspectorate.

2.3.4. Solid and Liquid Waste Treatment and Disposal

Stakeholders include:

* Ministry of Local Government, Rural Development and Environment;
* Environmental Protection Agency;
* Ministry of Health ; Ghana Health Service
* Ghana Atomic Energy Commission;
* Department of Factories Inspectorate;
* Ministry of Food and Agriculture (Plant Protection and Regulatory Services Directorate);
* Food and Drugs Board;
* Ghana Standards Board;
* Water Resources Commission;
* Minerals Commission;
* Ministry of Trade and Industries;
* The Private Sector;
* Association of Ghana Industries;
* Faith-based Organizations (CBOs)/Religious Bodies;

Non-Governmental Organizations (NGOs) and Community Based Organizations (CBOs);

Metropolitan, Municipal and District Assemblies;

Town and Contry Planning Department;

Waste Management Services Providers;

Traditional Authorities/Land owners;

Professional bodies;

Funding Agencies; and

* Communities.

## 2.4 Relevant Policies and Legal Regulations

2.4.1 Hospital and Clinics:

Since the late 1990s, consultations have been on-going in the Ministry of Health in an effort to rationalize the distribution of health facilities particularly hospitals, in order to provide efficient, effective, and equitable hospital services to the entire population of Ghana. It was recognized that the Ministry lacked a clear hospital operational policy and development strategy. An ideal development plan for the health sector in Ghana should involve the following components: civil works and support systems, healthcare equipment, hospital supplies and consumables, human resource and transport.

The general planning process for the construction of facilities has however not been comprehensive enough to consider very essential issues arising from developments and their implications not only for human resources, hospital supplies, consumables and maintenance but also for human health and the environment. Some of the reasons that have contributed to this situation have been cited as:

* The lack of standard guidelines for planning and development of hospitals in the country;
* The low involvement of technical end users and communities in the planning of hospital infrastructure; and
* Non-adherence to policies and principles for capital investment plan (e.g. option appraisal).

Some of the important proposals in the draft hospital strategy include the following:

That the future direction of capital development should focus on the development of a comprehensive national master plan for the determination of the location and size of hospitals in Ghana based on national standards. This should incorporate considerations of the following priority areas:

1. Development of appropriate guidelines for planning and construction of hospitals;
2. Assessment and review of the utilization of existing facilities;

Rationalization of existing hospitals and other health facilities in terms of projected future demands e.g. hospitals which may be upgraded into polyclinics in areas where the latter are non-existent. Similarly, the

upgrading of urban polyclinics to district hospitals would be considered in urban areas like Accra and Kumasi to help reduce the pressure on their respective leading hospitals;

1. Rehabilitation of existing facilities and expansion where necessary;
2. Provision of justification for new construction;
3. Facilitation of a mechanism for the involvement of technical end users, communities and District Assemblies in the various stages of the project cycle;
4. Ensuring effective collaboration with the District Assemblies and other stakeholders in the planning and implementation of hospitals at all levels; and
5. Formation of Technical Committee at all political administrative levels to assist in the identification and siting of projects.

It is emphasized that this should be done in the context of all providers of health care being viewed as components of a single health service.

The health sector’s latest 5 Year Programme of Work (2007- 2011) provides strategic direction towards the implementation of the sector’s policy goal of ensuring a healthy and productive population that reproduces itself safely. It builds on earlier programmes of work by placing health at the centre of the national development agenda by spelling out the role of the health sector in human as well as overall socio-economic development. Thus, while recognizing the role of increasing access to health services; it also acknowledges that better health and greater equity can be achieved only through intersectoral collaboration. Due to the fact that the underlying causes of diseases are multi-determined, programmes should be designed to exert leverage at multiple points including education, and environment among others.

Key bodies of legislation that regulate activities and developments within the sector include:

* The Ghana Health Service and Teaching Hospitals Act, 1996 (Act 525). This law provides for the establishment and running of hospitals at all levels of the GHS on the one hand and of teaching hospitals on the other hand. The Act 525 focuses on the administrative obligations of the Ministry. It provides for the formation of District and Regional Health Councils to facilitate the effective administration of the facilities; and
* The Private Hospitals and Maternity Homes Act 1958 (No. 9 of 1958) amended in 1969 as Private Hospitals and Maternity Homes (Amendment) Decree, 1969 (N.L.C.D. 395) provides guidelines for the establishment of private hospitals and maternity homes. It states among others that specifications on infrastructure for the facilities should meet the requirements of existing national laws. Thus that would include laws under the mandate of planning authorities as well as those on environmental assessment.

2.4.2 Medical Laboratories, Medical Equipment, Therapy and Radiation Facilities:

Issues dealing with medical laboratories, medical equipment, therapy and radiation facilities fall under the jurisdiction of two main bodies namely, Ministry of Health (Health Services) and Ghana Atomic Energy Commission.

The Ghana Health Service and Teaching Hospitals Act, 1996 (Act 525) is the key piece of legislation guiding the establishment and operation of the Ghana Health Service and teaching hospitals respectively. The Act 525 focuses on the administrative obligations of the Ministry. It is silent on the mode of acquisition and use of specific services such as medical laboratories, medical equipment, forms of therapy and radiation facilities.

Section 10 of the Atomic Energy Commission Act, 1963 (Act 240)[[3]](#footnote-4), empowered the Minister of Energy to make Regulations by Legislative Instrument to guide the construction, acquisition, installation and use of nuclear and irradiating devices. Act 240 was amended by the Atomic Energy Commission (Amendment) Law, 1993 (P.N.D.C.L.308)[[4]](#footnote-5) to provide for the establishment of a Radiation Protection Board under the Commission. The Radiation Protection Instrument, 1993 (L. I. 1559) sets out the necessary regulations controlling the use of radiation sources, the sale of irradiating device or radioactive material and application of ionizing radiation to persons etc.

The proponent of any undertaking concerning radiation device or radioactive material is under obligation to satisfy the requirements of L. I. 1559 and refer to Part III –Licensing Provisions, Sections 9 and 10, for the provisions guiding the application for and issue of a license.

2.4.3 Mortuary Services, Funeral Homes, Parlours, Cemeteries, Columbarium, Mausoleum, Hearse Service

Existing laws governing the dead and disposal of the dead are as follows:

* Registration of Births and Deaths Act, 1965 (Act 301) as amended by the Registration of Births and Deaths Act, 1965 (Amendment) Decree, 1968 (N.L.C.D. 285);
* Registration of Births and Deaths Regulations, 1970 (L. I. 653);
* Anatomy Act, 1965 (Act 280);
* Coroner’s Act, 1960 (Act 18);
* Local Government Act, 1993 (Act 462);
* District Assemblies Bye Laws, 1996;
* Town and Country Planning Act, 1945 (Cap. 84);
* The Mortuaries and Funeral Facilities Act, 1998 (Act 563);
* Environmental Protection Agency Act, 1994 (Act 490);
* Environmental Assessment Regulations, 1999 (L. I. 1652).

Acts 18, 280 and 301 as well as L.I. 653 had serious limitations that were reviewed together with Acts 462, 563 and 490 to facilitate their application. Though the Registrar of Births and Deaths is the sole authority for the operation of Act 301, certain provisions in L. I. 653 covering cemeteries, cremations, burials, embalmment and importation and exportation of the dead do not fall under his jurisdiction in practice. Their enforcement is by other Agencies e.g. District Assemblies. Some provisions in the existing laws (Act 301 and L. I. 653) fail to address the needs of the society of today and are without regard to the customs and traditions of the land.

The decentralization policy has shifted administrative functions to the district and in some instances sub-district levels. The Mortuaries and Funerals Facilities Act, 1998 (Act 563) which controls and regulates facilities for the storage and disposal of the dead requires that any practitioner of such a facility needs to obtain a requisite clearance from the Environmental Protection Agency.

2.4.4 Solid and Liquid Waste Treatment and Disposal

Waste management in Ghana is the responsibility of the Ministry of Local Government, Rural Development and Environment with the Environmental Protection Agency (EPA) acting as the regulatory authority responsible for environmental quality and effluent standards. The Agency is empowered to control and prevent the discharge of waste into the environment and to issue environmental permits and pollution abatement notices. The District Assemblies are responsible for collection and final disposal of waste.

Even though there is no comprehensive policy covering general waste management and hazardous waste management in particular, the policy framework of the management of waste in Ghana is covered by the Environmental Sanitation Policy of Ghana (ESP), 1999 (reviewed and adopted by cabinet in 2008). This empowers the Ministry of Local Government, Rural Development and Environment (MLGRDE) to coordinate issues of sanitation in the country. Under the ESP environmental sanitation is directly linked with health needs, productivity and welfare of the citizens.

Some other legislation, policy document and guidelines (both local and international) that invariably influence the management of waste in Ghana are as follows:

* Environmental Protection Agency Act, 1994 (Act 490);
* Environmental Assessment Regulations, LI 1652, 1999;
* National Environmental Action Plan (NEAP);
* Guidelines for the Development and Management of Landfills in Ghana, 2002;
* Local Government Act, 1994 (Act 462),
* Food and Drugs Act, 1992 (P.N.D.C.L. 305B);
* Health Care Waste Management Policy and Guidelines of MOH, 2006;
* Guidelines on Management of Health Care and Veterinary Waste, EPA , 2002;
* Draft Guidelines for the Safe Transport of Hazardous Materials in Ghana, EPA, 2008;
* Local Government Service Act, 2003 (Act 656);
* National Building Regulations, 1996 (L.I. 1630);
* District Assembly Bye-Laws, 1996;
* Town and Country Planning Act, 1945 (Cap 84);
* National Development Planning Commission (NDPC) Act, 1994 (Act 479);
* National Development Planning Systems (NDPS) Act, 1994 (Act 480);
* EPA Sector Specific Effluent Quality Guidelines, 2000;
* National Land Policy, 1999.
* Basel Convention on the Control and Transboundary Movements of Hazardous Wastes and their Disposal, 1989;
* Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa, 1991;
* Montreal Protocol on Substances that Deplete the Ozone Layer, 1987;
* Rotterdam Convention on Prior Informed Consent (PIC) Procedures, 1998;
* Stockholm Convention on Persistent Organic Pollutants (POPs), 2004; and
* International Atomic Energy Regulation

# 3.0 GENERAL DESCRIPTION UNDERTAKINGS OF THE

**HEALTH SECTOR**

## 3.1 General Description

The Health Sector includes a diverse range of facilities and activities involving general hospitals, small inpatient primary care hospitals, outpatient facilities, assisted living facilities, and hospice facilities. Ancillary facilities may include medical laboratories and research facilities, mortuaries, blood banks and collection services. The sector’s activities entails close contact among patients, health care providers, and support staff; extensive use of sharps and instruments designed for diagnostic and curative (invasive and noninvasive) procedures; and utilization of pharmaceutical, chemical, radiological, and other agents for diagnosis, treatment, cleaning, and disinfection. The basic infrastructure elements / activities of health care facilities are meant to:

* Improve the health and well-being of patients;
* Prevent transmission of infections among patients and staff;
* Minimize impacts of the health sector undertakings on the environment, health, and safety including maintenance of sanitary conditions by employing appropriate disinfection and sterilization techniques; and
* Provide potable water and clean air for all operations; and nosocomial infection control.

As part of day-to-day operations, health care facilities generate a variety of wastes, including air emissions, wastewater effluents, health care waste (e.g. infectious, pathologic, and chemical wastes), and municipal solid waste. Average electricity consumption for a health care facility is influenced by its design criteria, particularly by the availability or need for specific services. These may include a dedicated heating plant or in-house services such as kitchens and laundries, which may require outsourcing if unavailable in the facility.

## 3.2 Categories of Undertakings

Undertakings as defined in L. I. 1652 include: structure, construction, building, installation, investment and any modification, extension, abandonment, demolition, rehabilitation or decommissioning of such undertakings, which are likely to have significant impact on the environment. The following undertakings are considered under the health sector.

3.2.1 Hospital, Clinics and Health Facilities

* Out-Patient Clinic;
* In-Patient Clinic / Hospital; and
* Medical Laboratories, Medical Equipment, Therapy and Radiation Facilities.

Services to be delivered with respect to hospitals and clinics include the following:

i.) Preventive:

* Child Welfare Services (immunization, health education, and nutrition rehabilitation);
* Prenatal; and
* Postnatal care.

ii.) General Curative Care:

* Management of communicable and non-communicable diseases and injuries; and
* Day /Minor Surgery.

iii.) Specialties Services:

* Major General Surgery;
* Obstetrics and Gynecology including deliveries, caesarean section and infertility management;
* Accident and emergency services;
* Dental Services;
* Otorhinolaryngology (Ear, Nose and Throat);
* Ophthalmological services (eye care);
* Physiotherapy;
* Rehabilitation centers;
* Mental homes;
* Homes for the Aged; and
* Cosmotherapy (facials etc).

iv.) Paraclinical Services:

* Laboratory ( Basic Microbiology and Haematology, including Serology; Clinical Chemistry; Blood transfusion; Pathology Services);
* Imaging (Radiological Services; Ultrasound, Doppler; Electrocardiography CT scan; MRI etc);
* Radiotherapy;
* Spa, traditional/herbal clinics;
* Other forms of therapy; and
* Pharmacies and chemical shops.

v.) Support Services:

* Catering;
* Laundry;
* Central Sterilization;
* Supply Services;
* Transport Services;
* Maintenance Services;
* Security;
* Environmental Sanitation Services and

vi.) Water Works:

* Construction of trunk pipelines for transmission of water from the source to the point of distribution;
* Rehabilitation of existing facilities;
* Functional replacement of equipment or structures; and
* New ancillary facilities that do not increase the capacity

3.2.2Mortuary Services, Funeral Homes, Parlours, Cemetries, Columbarium, Mausoleum, Hearse Service

(i) Mortuary Services:

* Storage of human remains;
* Performance of autopsies including special laboratory investigations;
* Embalmment; Preparation of the dead for burial or cremation;
* Storage of human remains in the interest of science; and
* Training of practitioners.

ii.) Funeral Homes and Parlours:

* Storage of dead human bodies released from registered mortuaries for a period not exceeding seven (7) days;
* Embalmment; Preparation of the dead for burial or cremation or exportation; and
* Coordination of the rites and ceremonies with respect to the dead.

iii.) Cemeteries:

* Digging and closing of grave;
* Burials and exhumation of human remains;
* Provision of temporary storage in a vault; Construction of tombs;
* Preparation of flower beds and planting of flowers; and
* Other services as provided by the owner at the cemetery.

iv.) Columbarium:

* Provision of a niche or compartment for human remains;
* Opening, closing and sealing of niche or compartment where ashes are kept; and
* Provision of a canopy or tent for an interment or burial service.

v.) Mausoleum:

* Provision of crypt or compartment for human remains;
* Opening, closing and sealing of the crypt or compartment;
* Provisions of temporary storage in a vault or crypt; and
* Provision of a tent or canopy for internment services.

iv.) Hearse Service:

* Transportation of human remains; Transportation of coffin

3.2.4 Solid and Liquid Waste Treatment and Disposal

i.) Toxic and Hazardous Waste:

* Construction of incineration plant (high temperature, medium temperature, and co-incineration);
* Construction of recovery plant (off site);
* Construction of sewerage and wastewater treatment plant (off site);
* Construction of landfill facilities (secure landfills, normal land fills and co-disposal); and
* Construction of storage facility (off site).

ii.) Municipal Solid Waste:

* Construction of incineration plant (high temperature, medium temperature, and co-incineration);
* Construction of composting plant;
* Construction of recovery/recycling plant (gravity separation, filtrations, distillation, solvent extraction chemical regeneration);
* Construction of municipal solid waste landfill facility (High temperature, Medium temperature and co-incineration);
* Construction of waste depots; and
* Other treatment systems.

iii.) Municipal Sewerage and Sewage:

* Construction of wastewater treatment plant;
* Construction of nightsoil treatment plant;
* Construction of sewers and outfalls; and
* Construction of biodigesters.

iv.) Rehabilitation and Expansion Works

* Rehabilitation of solid and liquid waste treatment and disposal systems;
* Expansion of solid and liquid waste treatment and disposal systems; and
* Replacement of solid and liquid waste treatment and disposal systems.

# 

# 4.0 SCREENING CRITERIA

## 4.1 Screening Criteria for Hospitals, Clinics and Health Facilities (Medical Laboratories, Medical Equipment, Therapy and Radiation Facilities)

Screening criteria for placement of proposed clinics and hospitals at the appropriate level of assessment are based on the criteria for assessing developments in general as well as parameters which may be relevant to the sector. The criteria include:

* Type of facility: In-patient or out-patient;
* Size and scale;
* Services Provided;
* Technology inherent in equipment utilized for service provision;
* Waste and waste management characteristics;
* Location features (minimum separating distances between same facilities, parking etc;
* Land use and economic considerations;
* Occupational health and safety considerations; and
* Public health and safety considerations.

The variables distinguishing the individual criteria and the indicators describing them are provided in the Table 1 together with the proposed level of assessment. Whereas a few indicators by themselves suggest a certain level of assessment, many have to be evaluated on the basis of relevant thresholds. Often, the final assessment decision has to be made in light of several of these thresholds and other relevant factors. The overall level of assessment should be determined by the weighting or importance given to the component/indicators. Where some indicators warrant an Environmental Impact Assessment (EIA) and others a lower level of assessment, the whole project should be subjected to a level of assessment commensurate with the level of importance conferred on each indicator by the threshold for the proposed undertaking. For example, whereas an indicator like ‘in-patient facility’ may suggest a full EIA, combination of this with a small scale of operation may lead to a lower level of assessment.

*Refer to Table 1 on page 53 for summary of types of facility/undertaking, variables, description/indicators/threshold limits and levels of assessments.*

## 4.2 Screening Criteria for Mortuary Services, Funeral Homes, Parlours, Cemeteries, Columbarium, Mausoleum, Hearse Service

Screening criteria for any proposed mortuary or funeral facility should include, as a minimum, consideration of the following elements:

4.2.1 Definition of Facility and Location:

The proponent of the project must state the project title and the location of the project. Determination of scale of assessment depends on location such as environmentally sensitive areas specified within schedule 1, schedule 2 or schedule 5 of LI 1652.

4.2.2 Public Health Considerations:

This relates to facilities of waste management practice impacting on the environment e.g. biological liquid waste from post mortem, bathing and embalmment discharge into the environment. Proponents should provide information on:

* Type of waste treatment plant to be installed;
* Technology for the disposal of contaminated clothing, obsolete machinery/equipment and medical waste including human parts;
* Technology for the disposal of human ashes after cremation;
* Equipment for the purpose of filtering smoke during cremation;
* Standby generators for power to service refrigeration plant during power outage;
* Contingency plan in event of looting of graves and exhumation of bodies;
* Socio-cultural practices;
* Protest from the public against establishment and/or location of facilities in communities because of cultural beliefs, and
* Type of chemicals to be used and characteristics of effluents discharged.

4.2.3 Occupational Health and Safety:

Exposure of staff of the facilities to the following acute or long-term health hazards:

* Chemical hazard – handling of embalming chemicals, organic solvents, inhalation of sand dust (silica), emission of smoke during cremation;
* Biological hazard – infectious body fluid/blood e.g. Hepatitis B & C, HIV/AIDS, cholera etc;
* Ergonomic hazard - lifting of dead bodies, inappropriate tools for digging graves;
* Psychological hazard – stress, social stigma associated with morgue and funeral facilities;
* Proponents should state measures to mitigate the above hazards, e.g. provision of Personal Protective Equipment such as respirators, rubber gloves, Wellington boots, overalls, rubber aprons;
* The cremation equipment should be fitted with suitable hood, extractors and filters; and
* Storage facilities for human remains (refrigerator and cold room system) should be of standard construction specified by the mortuary and funeral facility board.

*See Table 2 on page 58 for summary of types of facility/undertakings, variables,*

*description/indicators/threshold limits and levels of assessments.*

## 4.3 Screening Criteria for Solid and Liquid Waste Treatment and Disposal

Various technologies exist for the disposal of wastes (liquid/solid, hazardous, sewage etc). The purpose of these screening criteria is to examine the factors, which determine the categories of undertaking, the levels of assessment and the possible effects a proposed project will have on human health and the environment-(soil, water bodies, living organisms etc)

The criteria for the placement of undertakings involving waste treatment and disposal depends largely on:

* The type of facility;
* Project size and scale;
* Location/adjacent land uses;
* Location features;
* General properties and characteristics of wastes;
* Type of technology, project design and characteristics;
* Public health and environmental implications;
* Occupational health and safety; and
* Land size.

*See Table 3 on page 60 for summary of types of facility/undertakings, variables, description/indicators/threshold limits and levels of assessments.*

# 5.0 POTENTIAL ENVIRONMENTAL IMPACTS OF UNDERTAKINGS WITHIN THE HEALTH SECTOR

There are many ways in which the environmental impacts of an activity could be identified. The identification of impacts starts with a delineation of the study area, collection and analysis of basic data on the project, including alternatives and the environment.

Different project alternatives may have different component activities and sources of impact. It is important to indicate that not only the individual activities have to be considered but also induced activities. The potential environmental impacts associated with the health sector have been categorized under the following types of facilities:

* Clinics and hospitals, Medical laboratories, therapy and radiation facilities;
* Mortuary services, funeral homes and parlours, cemeteries, crematoria etc; and
* Solid and liquid waste treatment and disposal.

The possible environmental impacts of the above undertakings are as outlined below. These impacts have been categorized into pre-construction, construction and operational phases.

## 5.1 Clinic, Hospital and Health Facilities (Medical Laboratories, Therapy and Radiation Facilities)

Activities such as site selection, construction and operation of clinics and hospitals as well as medical laboratories, therapy and radioactive facilities are considered in this section.

5.1.1 Pre-construction Phase:

The main issues to be considered under this phase is site selection such as:

* Likelihood of project to change the current land use of the area;
* Siting of project within a sensitive area e.g. Forest Reserve, Ramsar site, Wildlife Sanctuary etc;
* Compatibility of project with adjacent land uses;
* Possible relocation of utility services; and
* Public opinion /consultations.

5.1.2 Construction Phase:

(a) Impact on Land:

* Change in landform due to site clearance and excavations and earth works;
* Soil erosion as a result of exposure to rainfall and wind;
* Soil contamination by oil, fuel etc from construction equipment;
* Change to drainage system;
* Loss of flora and fauna from site clearance and
* General waste management (construction; commercial activities; human activities).

(b) Impact on Water:

* Surface water contamination due to storm water discharge;
* Increase siltation of streams due to erosion of exposed surfaces; and
* Possible groundwater contamination due to seepage of hydraulic oil etc.

(c.) Impact on Air Quality:

* Dust pollution as a result of land excavation, movement of construction vehicles and fumes from exhaust of vehicles; and
* Exhaust fumes discharge by machines.

(d) Traffic Impact

* Disruption of traffic as a result of transportation of construction materials.

(e) Occupational Health and Safety

* The use of construction equipment by workers could pose safety threats to workers;
* Noise induced hearing loss;
* Respiratory problems from exposure to dust; and
* Fire risk/hazard.

(f) Socio-economic Impacts

* Employment generation;
* Improvement of health facilities; and
* Teenage pregnancies/temporary marriages/co-habitation etc.

(g) Public Health Impacts

* Dust pollution;
* Noise pollution;
* Road traffic accidents; and
* Transmission of HIV/AIDS and other STDs.

5.1.3 Operational Phase Impacts:

During the operational phase, the potential impacts include:

(a) Impact on Water:

* Impact on surface water/ground water,
* Effluent from a treatment plant if any and its disposal implications on the receiving medium; and
* Contamination of ground water as a result of land disposal.

(b) Impact on Land:

* Disposal of solid wastes on land. Possible source of solid wastes are:
* Theatre waste i.e. human parts, cotton wool etc;
* Office waste e.g. paper, clips etc;
* Laboratory waste e.g. blood samples, needles, chemicals etc;
* Radioactive waste from radiation facilities;
* Pharmaceutical waste e.g. expired drugs;
* Loss of aesthetic view: and
* Decomposition of waste and health implications.

(c) Impact on air

* Odour due to bad operational practices e.g. mismanagement of biomedical waste;
* Emission of atmospheric pollutants from incineration of medical waste if the facility is available;
* Potential fire outbreaks resulting in air pollution;
* Emission from fumigation and disinfections; and
* Emission from generators.

(d) Traffic Impact:

* Disruption of normal traffic due to an increase in the number of vehicles within the vicinity. This will depend on the facilities in the area.

(e) Utilities.

* The use of electricity, water and telephone could spurt demands and alter the supply of these utilities to other users.

(f) Occupational Health and Safety Impacts

* Transmission of infections (Hepatitis B, TB, HIV/AIDS);
* Manual handling injury;
* Stress-related ailments;
* Fire outbreak from faulty electrical connections, or a fire source; and
* Radiation induced illness.

(g) Public Health Impacts

* Nosocomial infections.

## 5.2 Mortuary Services, Funeral Homes and Parlours etc.

5.2.1 Pre-Construction Phase Impacts:

Selection of a site for the construction of this facility could bring about some environmental impacts. These include:

* Conflict of project with land use;
* Public perception about the project; and
* Susceptibility of site to sensitive areas including natural disaster zones.

5.2.2 Constructional Phase Impacts

This includes site clearing and construction of a building. The possible impacts include:

(a) Impact on Air:

* Potential emission from construction equipment/machinery (e.g. exhaust fumes); and
* Dust generation.

(b) Impact on Land:

* Change to landform due to site clearance and excavations and earth works;
* Soil erosion as a result of exposure to rainfall and wind;
* Soil contamination by oil, fuel etc;
* Change to drainage system; and
* Loss of flora and fauna from site clearance.

(c) Impact on Water Resources:

* Potential surface water contamination due to storm water discharge;
* Increased siltation of nearby streams due to erosion of exposed surfaces; and
* Possible groundwater contamination due to seepage of spent oil.

(d) Occupational Health and Safety

* The use of construction equipment by workers could pose safety threats to workers;
* Noise induced hearing loss; and
* Respiratory problems from exposure to dust.

5.2.3 Operational Phase Impacts.

The main issues of concern in the operation of mortuary services are the disposal of liquid and solid wastes. The sources of liquid waste are:

* Wastewater from the washing of dead bodies;
* Liquid generated as a result of draining dead bodies of all fluids; and
* Waste generated in the use of chemicals.
* Sources of solid waste include:
* Human parts;
* Contaminated clothing etc; and
* Obsolete machinery and equipment.

Improper disposal of these could lead to soil and water contamination.

(a) Impacts on Land and Water Resources:

* Potential for pollution of site from chemical and biological liquid waste;
* Potential for leaching of human body fluids into water bodies; and
* Potential for discharging wastewater into water bodies and its implications.

(b) Impact on Air:

* Release of volatile substances into the atmosphere e.g. formaldehyde and CFCs;
* Odour due to bad operational practices e.g. mismanagement of biomedical waste; and
* Emission of atmospheric pollutants from incineration of medical wastes if the facility is available.

(c) Occupational Health and Safety

* The effects of cold room temperature on the health of the workers;
* Injury from manual handling of bodies;
* Possibility of getting infected with diseases;
* Hazards associated with usage, handling and disposal of chemicals; and
* Hazard from excessive noise by mourners.

## 5.3 Cemeteries/Crematoria

5.3.1 Pre-construction Phase Impacts

Siting of a cemetery could pose some problem to the environment. These include:

* Compatibility of activity with proposed and existing land use; and
* Public perception of the location/potential to cause public outcry.

5.3.2: Construction Phase

(a) Impact on land:

This involves clearing of vegetation, which could lead to:

* Lost of fauna and flora, and
* Exposure of land to erosion.

5.3.3: Operational Phase

(a) Impact on Water Resources

* Possible contamination of underground water due to seepage of waste water result of decomposition; and
* Improper disposal of ashes in the case of the crematorium.

(b.) Public Health/Social Implications:

* Health hazards in event of exposed graves;
* Unauthorized exhumation of bodies; and
* Hideout for criminal and social misfits.

(c) Impact on air:

* Emission of pollutants from burning dead bodies.

## 5.4 Solid and Liquid Waste Treatment and Disposal

Treatment of waste usually involves reduction of the hazardous components of the waste stream prior to final disposal into the environment.

5.4.1 **Construction of Waste Treatment Plants**

Pre-construction Phase Impacts

* Conformity of site to local land use;
* Potential to cause public outcry; and
* Buffer distances.

Construction Phase Impacts

(a)Impact on land

* Loss of aesthetic values of the landscape;
* Loss of flora and fauna; and
* Exposure of soil to erosion.

(b) Impact on Air

* Dust pollution as a result of land excavation, movement of constructional vehicles; and
* Exhaust fumes discharge by machines.

(c) Impact on Water Resources

* Ground water contamination due to leaching through the soil; and
* Runoffs to surface water.

(d) Occupational Health and Safety

* The use of constructional equipment by workers could pose safety threats to workers; and
* Noise induced hearing loss from construction equipment.

(e) Public Health and Safety

* Dust pollution;
* Road traffic accidents; and
* Transmission of communicable diseases e.g. HIV/AIDS, STIs etc.

Operational Phase Impacts

(a) Impact on Land

* Loss of aesthetic value of the landscape;
* Loss of flora and fauna which could be endangered;
* Exposure of soil to erosion; and
* Discharges to land (land contamination).

(b) Impact on Air

* Air emissions;
* Odour nuisance; and
* Potential plant failure and its implications.

(c) Impact on Water Resources

* Ground water contamination due to leachate;
* Disposal of treated effluent into water bodies has the potential for pollution; and
* Potential outburst or leakage of pipes carrying sewage to plant and its groundwater implications.

(d) Occupational Health and Safety/Public Health

* The use of plant equipment by workers could pose safety threats to workers;
* Excessive noise impacts from components of plant e.g. pumps, blowers, compressors and motors;
* Public health implications due to presence of pathogens e.g. helminthes and vectors.

5.4.2 **Construction of Incineration Plants**

Construction Phase Impacts

(a)Impact on Land

* Loss of aesthetic value of the landscape;
* Loss of flora and fauna; and
* Exposure of soil to erosion.

(b) Impact on Air

* Dust pollution as a result of land excavation, movement of constructional vehicles; and
* Exhaust fumes discharge by machines.

(c.) Impact on Water Resources

* Ground water contamination due to leaching through the soil; and
* Runoffs to surface water.

(d) Occupational Health and Safety

* The use of constructional equipments by workers could pose threats to safety of workers.

Operational Phase Impacts:

(a) Impact on Air

* Atmospheric emissions resulting from burning; and
* Potential to cause offensive smell to communities and passerby.

(b) Impact on Land

* Improper disposal of residue from incineration plants.

(c) Occupational Health and Safety

* Heat stress on workers; and
* Noise nuisance.

5.4.3 **Construction of Landfill:**

Critical issues/impacts to be considered in operating landfill sites are:

Construction Phase Impacts

(a) Impact on Land

* Loss of aesthetic value of the landscape;
* Loss of flora and fauna could be endangered;
* Exposure of soil to erosion; and
* Change in landform.

(b) Impact on Air

* Dust pollution as a result of land excavation, movement of constructional vehicles; and
* Exhaust fumes discharge by machines.

(c.) Impact on Water Resources

* Ground water contamination due to leaching through the soil; and
* Runoffs to water surfaces.

(d) Occupational Health and Safety

* The use of constructional equipment by workers could pose safety threats to workers; and
* Noise nuisance.

Operational Phase Impacts

(a) Impact on Land:

* Loss of flora and fauna;
* Change in landform; and
* Destruction of ecological sensitive areas.

(b) Impact on Water Resources

* Potential contamination of water table by leachate; and
* Surface water contamination.

(c) Impact on air quality:

* Odour from mismanagement of landfill;
* Escape of methane into the atmosphere and implications on climate change; and
* Air pollution as a result of haulage of waste to the landfill site.

(d) Public Health:

* Proliferation of rodents and insects harmful to human.

(e) Occupational Health and Safety

* Scavengers and workers coming into direct contact with waste.

(f) Socioeconomic Impacts:

Socioeconomic impacts to be considered as far as health related activities are concerned are:

* Job creation;
* Rural-urban, urban-rural migration;
* Income generation; and
* Improvement of health facilities.

# 

# 6.0 CHECKLIST FOR ENVIRONMENTAL ASSESSMENT OF HEALTH SECTOR PROPOSALS

In conducting an environmental assessment for any activity, there is the need to define the scope of work before commencement. In doing so, it is required that a study of the proposed area is conducted, followed by analysis of data on the proposed project as well as possible impacts on the environment. It is important that data is collected on relevant related issues through studies like a Health Impact Assessment (HIA) based on guidelines to be provided by the Ministry of Health.

To identify sources of impacts, a careful consideration of the project components and its activities should be made. It is very important to take into account all project phases. These phases include preconstruction, construction and operation and where relevant decommissioning. Identification of critical issues to be considered can be simplified using a checklist. These critical issues could be classified under the following:

## 6.1 Ecological:

* Water bodies;
* Flora and fauna;
* Wetlands and plains, and
* Animal migration.

## 6.2 Physical:

* Erosion;
* Land degradation;
* Dust pollution ; and
* Noise.

## 6.3 Socio-economic:

* Land use;
* Resettlement or relocation;
* Gender;
* Vulnerable groups;
* Income and amenities;
* Public health;
* Cultural resources; and
* Occupational health and safety.

**6.4 Legal:**

* Compliance with other existing policies and legal guidelines; and
* Compliance with existing statutory requirements

*Table 5 on page 66 shows the checklist to determine the impacts of critical issues which cover both constructional and operational phases of the health sector, with respect to the following undertakings:*

* Clinics and hospitals;
* Medical laboratories, therapy & radiation facilities;
* Mortuary services, funeral homes & parlours, cemeteries, crematoria etc, and
* Waste treatment & disposal.

# 

# 7.0 ENVIRONMENTAL PERMIT CONDITIONS

Any undertaking or project must comply with government policies and regulations before an environmental permit can be issued. The following permit conditions apply for health sector projects:

1. Compliance with all the mitigation, monitoring and other environmental management provisions made in the project Environmental Impact Statement (EIS), Preliminary Environmental Report (PER) or the completed Environmental Assessment Form One (EAI) or any other document as may be determined by the Agency;
2. Project must not be located in any environmentally sensitive area as defined in schedule 5 of LI 1652 and Annex A of these guidelines;
3. Site of projects must conform to local land use plans and land zoning of the localities, district, municipal and metropolitan assemblies;
4. Minimum separation distances must be maintained in conformity with buffer zones as defined by relevant institutions as follows:

* Mortuaries, funeral homes and cemeteries must be located at a prescribed distance from underground water bodies or pipes and dams, and surface water sources like rivers, lakes and streams;
* Waste treatment facilities should provide for a minimum buffer of 1-2 km radius from adjacent land uses like residences, water bodies etc in consultation with the relevant regulatory bodies;

1. Notify EPA on the completion of the project infrastructure for projects requiring PERs and EIAs;
2. Notify EPA of any major changes in the planned project development contrary to what is provided in the project EIS, PER or Form EAI;
3. Submit an Annual Environmental Report on the Company’s operations in accordance with Regulation 25 of L. I. 1652;
4. Where an existing facility is being expanded, an updated Environmental Management Plan covering the operations of the entire facility should be submitted within 6 months of the issue of a permit;
5. Notwithstanding this permit, the project is further subject to other relevant regulations and permits pertaining to the sub-sector by relevant Ministries, government departments and organizations and must be observed where applicable, e.g For private hospitals and clinics, medical laboratories, therapy and radiation facilities, the Private Hospitals and Maternity Homes (Amendment) Decree, 1969 (N.L.C.D.395), Town and Country Planning Act, 1945 (Cap. 84), Local Government Act 1993 (Act 402) and Radiation Protection Instrument 1993 (L. I. 1559) must be complied with;

* Mortuary Services and Funeral Homes must comply with Mortuaries and Funeral Facilities Act 1998 (Act 563), Local Government Act 1993 (Act 462), Town and Country Planning Act, 1945 (Cap. 84),, District Assembly Bye Laws1996;

1. An application to the Agency for approval must be resubmitted if operations on the registered undertaking do not commence within 18 months of issue of this permit in accordance with Regulation 21 of L. I. 1652;
2. An environmental management plan must be submitted within 18 months of commencement of operations for projects subject to EIA or PER in accordance with Regulation 24 of LI 1652; and
3. An Environmental Certificate must be obtained after 24 months of satisfactory compliance with relevant permit conditions in accordance with Regulation 22 of L. I. 1652.

# 8.0 SANCTIONS FOR DEFAULTING ON PERMIT CONDITIONS

Sanctions will be affected if proponent defaults one or more permit requirements. Sanctions will comprise one or more of the following measures: suspension, cancellation or revocation of permit. The following constitute circumstances under which this may occur.

1. Suspension, cancellation or revocation of permit and certificates if proponent:

* Acts in breach of any of the conditions to which his permit or certificate is subject;
* Is in breach of any provision of LI 1652 or other legislative enactment on environmental assessment;
* Fails to make payments required under the regulations within stipulated period;
* Fails to obtain any other authorization required by law in relation to his undertaking before commencement of operations;
* Is in breach of any conditions to which his permit is subject;
* Fails to comply with commitments to mitigation made in his assessment reports or environmental management plans;

1. Suspension of the environmental permit or certificate may occur in the event of significant changes in the environment, public health and safety due to natural causes before or during the implementation of the undertaking until the environmental assessment report and management plan has been revised on the basis of the new environmental conditions;
2. Revocation of the environmental permit or certificate may occur in the event of:

* The development of an undertaking significantly different from that for which the environmental permit was obtained;
* Social or financial loss to members of the public as a result of non-compliance with permit conditions;

1. The following constitute offences for which proponents are liable on summary conviction to the following penalties: a fine (based on fine units as determined by the courts) or imprisonment or both;

* Commencing an undertaking without the issuance of an environmental permit specific to that undertaking and contrary to Regulation I of L. I. 1652;
* Failure to comply with directives of the Agency to register an undertaking with the potential to impact on the environment and public health and safety contrary to Regulation 2 of L. I. 1652;
* Failure to conduct an Environmental Impact Assessment in respect of any health related undertaking for which the requirement has been specified;
* Willful submission of false information to the Agency; and
* Failure to submit an Annual Environmental Report in contravention with Regulation 25 of L. I. 1652.

# 9.0 FORMAT FOR THE PREPARATION OF ENVIRONMENTAL AUDIT

The final stage of EIA process is to carry out an environmental audit during the operational phase of the undertaking. Environmental auditing is considered as a systematic and independent examination to determine whether environmental quality activities or related result comply with planned arrangements and whether these arrangements are implemented effectively and are suitable to achieve desired objectives.

The audit should be carried out by a separate team of specialists different from the one that has prepared the EIA report.

**ENVIRONMENTAL AUDIT REPORT FORMAT**

Executive Summary

This should provide a concise summary of the findings of the Environmental Audit, issues of concern, recommended actions, time schedule for implementation and their cost. It should also summarize the opportunities for environmental enhancement and any gaps in information, further studies needed and the potential cost and time implications for undertaking them.

Introduction

This section should include the purpose, aims and objectives of the audit.

Description of the Undertaking

This portion of the report should describe the location, size, workforce, inputs and outputs, operations, processes and transportation of products.

Description of the Environment of the Undertaking

This section should describe the physical, ecological (if any) and human aspects including the environmental management systems of the undertaking. The environmental policy of the undertaking must be clearly stated.

Impacts and Evaluation/Auditing Process

In the case of technical audits, measurements may include amounts of all effluents, discharge rate after pre-treatment to air, water and land. Measurements may be taken on noise and vibration levels, solid wastes produced and their handling, storage, transport and eventual disposal.

Inventory of types and concentrations of chemicals used in operational or manufacturing processes and their emission levels and discharge into water and land must be recorded. Identification and evaluation of the impacts of these concentrations on the environment and health must be documented.

Findings and Recommendations

This part of the report should have three main sections.

**Part I**: The first section should cover a summary of findings and recommendations for management. It must be prepared in a way that the final results of the auditing are clear and focused. This section should also include the identification details, date of the audit, the audited area (sometimes only a branch of the undertaking is audited), identification of the lead auditor and the audited management representatives in the audited area.

Furthermore, a clear definition of the audit aims objectives must be restated together with an explanation of the audit processes and summary of the audit results that is duly signed by the lead auditor with date.

**Part II**: The section of the report should be an attachment of the Corrective Action Request (CAR) forms to section A. The auditor’s recommended corrective action request forms should be completed with each action to be taken on a separate CAR form. The form should include a description of the evidence of non-conformity with statements on the precise corrective actions to be taken by the audited party.

**Part III**: The last section of the report is also an attachment to the first section (Part I. It comprises the list of findings from the objective and evidenced observations of the auditor(s). This may cover the existing practices within the area of operations being audited, management structures or the entire environmental management systems.

# 10.0 FORMAT FOR THE PREPARATION OF ENVIRONMENTAL MANAGEMENT PLANS

## 10.1 Introduction

Under the provisions of Environmental Assessment Regulations, 1999 (L. I. 1652) it is required that: ‘*The person responsible for an undertaking in respect of which a Preliminary Environmental Report or an environmental impact statement has been approved shall submit to the EPA an Environmental Management Plan in respect of his operations within 18 months of commencement of operation and thereafter every 3 years*’.

The Environmental Management Plan (EMP) describes activities to be implemented by the proponent to address any identified environmental issues and achieve environmental policy objectives as set out by the EPA. The plan must identify current best practice issues as well as environmental non-compliance/compliance issues, provide corrective actions for non-compliance, designate responsibility for ensuring implementation and set target dates for completion.

The EMP itself addresses the essential management elements, and should be designed so that it can be augmented at a later stage to develop a full environmental management system that will be certifiable to the international standard for Environmental Management Systems (ISO 14001). The management plan is sometimes known as an “action plan.” The EMP may be presented as two or three separate plans covering mitigation, monitoring, and institutional aspects.

## 10.2 Existing Projects

For projects involving rehabilitation, upgrading, expansion, or privatization of existing facilities, remediation of existing environmental problems may be more important than mitigation and monitoring of expected impacts. For such projects, the management plans focuses on measures to mitigate and manage these problems.

For projects having significant environmental implications, it is particularly important that there be within the undertaking an in-house environmental unit with adequate budget and professional staffing strong in expertise relevant to the project (for projects such as mining, dams and reservoirs).

## 10.3 Environmental Objectives and Targets, Legal Framework, Auditing and Review

There are a number of procedures and systems that complement environmental management plans and therefore will need to be considered in the preparation and implementation of this plan. These procedures/systems include the following, environmental objectives and targets, legal framework, environmental auditing and reviews.

To ensure effective management of environmental plan and to promote continuous improvement and review, internal personnel must conduct regular reviews. Such reviews should consider all or part of:

* Existing management systems;
* The manner in which activities are completed;
* Waste management ;
* Implementation of the environmental management plan;
* Implementation of existing procedures;
* Environmental compliance;
* Environmental liability and risk;
* Environmental best practice; and
* Review of the environmental management plan.

## 10.4 Environmental Management Plan Format

*Execution Summary*

Introduction

* Brief description of the undertaking as approved by the EPA;
* Implementation schedule of the undertaking;
* Description of site.

Environmental Policy and Objectives

* The policy of the undertaking in protecting the environment;
* The EMP should state clearly and succinctly the environmental objectives of the proposed undertaking. These objectives must conform to the broader health sector development objectives; and
* Commitment for continuous compliance with the environmental requirements of EPA.

Organizational Structure and Budgets

* Top-level management and officers responsible in managing environmental issues;
* Name of environmental consultants and certified laboratory to analyze and complete monitoring report for the environment unit of the undertaking;
* Level of training of staff responsible for environmental issues;
* Level of awareness of environmental health management issues by other staff implementing measures;
* Frequency and type of training related to safety and environment for workers; and
* Estimated budget for implementing the Environmental Management Plan.

Environmental Requirements

* EIA approval conditions and appeal of EIA conditions as set by EPA;
* Related standards and regulations stipulated under environmental health by EPA;
* Reports on environmental monitoring and its frequency and record keeping;
* Copies of any written approval or permission by EPA and related organizations; and
* Renewals of licenses, if any, for the operations of the undertaking.

Formulation of a Operational Strategy and Monitoring Plans

* Specific environmental targets to be achieved;
* Participants in the environmental management of the undertaking;
* Plan of activities and timetable;
* Environmental information;
* Supporting needs;
* Assignment of implementation responsibilities
* Baseline studies for air, water, land use, ecology and noise prior to project for data comparison during future monitoring;
* Justification for choice of sampling stations for air, water and noise (on land use map);
* Effluent discharge point must be identified and reported preferably on a map;
* Frequency of monitoring;
* Sampling method for air, water, ecology and noise; and
* Record keeping on monitoring activities.

Significant Impacts and Control Measures

* Taking into account all the information gathered for the EMP, some recommendation for alternatives to project design or control measures might be formulated in order to improve the environment and development integration process;
* Identify public health and safety impacts due to the project implementation,
* Control measures such a different location for proposed air pollution control measures may be recommended etc;
* Suitable wastewater treatment system and air and noise pollution control equipment may need to be identified and equipment operation procedure may need to be altered; and
* Abandonment plan need to be prepared in cases where the project is delayed.

Environmental Contingency Plan

* The EMP will have to design several activities and propose the adoption of specific policies and measures;
* Action or emergency response must be ready for any emergency such as landslide, oil or hazardous chemical substances spill, failure on any pollution control equipment, etc;
* Relevant agencies involved in managing the contingency plan must be listed; and
* The EMP should explicitly identify who will be responsible for implementing each of the element of the plan.

Conclusions

* A statement of commitment of EMP prepared.

As a whole, the Environmental Management Plan will facilitate planning, monitoring, control and protection of the environment as well as the enforcement and implementation by the environment unit of the undertaking to ensure the compliance of EIA conditions.

A detailed internal review of the EMP to re-evaluate environmental issues, review audit results, re-assess objectives and targets and review the environmental policy should be conducted by internal personnel on an annual basis. The EMP should then be updated to incorporate the findings of that annual review.

# 11.0 FORMAT FOR THE PREPARATION OF ANNUAL ENVIRONMENTAL REPORT

It is required under Environmental Assessment Regulations, 1999 (L. I. 1652) that: a person granted an environmental permit shall submit an annual report of his undertaking after 12 months from the date of commencement of operations and after every 12 months thereafter to the EPA.

Annual Environmental Report is prepared annually as an output of the Environmental Management Plan. The annual report indicates the environmental performance throughout the year and reports on activities included in the Environmental Management Plan and the status of operations of the undertaking regarding environmental issues.

## 11.1 Format for Reporting

*Executive Summary*

Introduction

* Brief description of the undertaking as approved by the EPA;
* Implementation schedule of the undertaking; and
* Description of site.

Environmental Policy and Objectives

* The policy of the undertaking in protecting the environment;
* The Annual Report should state clearly and succinctly the environmental objectives of the proposed undertaking. These objectives must conform to the broader health sector development objectives of the country; and
* Commitment for continuous compliance with the environmental requirements of EPA.

Organizational Structure and Budgets

* Top-level management and officers responsible for managing environmental issues;
* Name of environmental consultants and certified laboratory to analyze and complete monitoring report for the environmental unit of the undertaking;
* Level of training of staff responsible for environmental issues;
* Level of awareness of environmental health management issues by other staff implementing measures;
* Frequency and types of training related to safety and environment for workers; and
* Estimated budget for implementing the Environmental Management Plan

Environmental Requirements

* EIA approval conditions and appeal of EIA conditions as set by EPA;
* Related standards and regulations stipulated under environmental health by EPA;
* Copies of any written approval or permission by and related organizations; and
* Renewals of licenses, if any for the operations of the undertaking.

Review of Previous Year’s Report

* Overview of last annual report;
* Environmental issues pending from previous year; and
* Recommendations from previous report.

Environmental Activities Planned for Year

* The environmental activities planned for the year with respect to the EMP;
* Monitoring programmes for the year; and
* Environmental management plans.

Results of Operations and Monitoring

* Environmental management systems performance in the year;
* Participants in the environmental management of the undertaking;
* Performance of implementation responsibilities;
* Accurate environmental information relevant to the undertaking;
* Supporting needs provisions (education & training, technical skills, institutional support, financial aspects);
* Specific environmental targets achieved and constraints;
* Sampling methods employed in air, water, ecology and noise monitoring;
* Results on studies for air, water, land use, ecology and noise monitoring during the year with effluent discharge points identified and reported preferably on a map;
* Analyses of results; and
* Recommendations for the future.

Significant Impacts and Control Measures

* Recommendation for alternatives to project design or control measures formulated in the year in order to improve the environment and development integration process;
* Public health and safety impacts identified during the project implementation; and
* Specific control measures such as identification and installation of air and noise pollution control equipment and suitable wastewater treatment system etc;

Environmental Contingency Plan

* Plans designed and activities proposed for future adoption of specific policies and measures; and
* Action or emergency response ready for any emergency such as landslide, oil or hazardous chemical substances spill, failure on any pollution control equipment, etc;

Conclusions

* A statement of commitment of the Annual Report.

# 12.0 ENVIRONMENTAL MONITORING AND DECOMMISSIONING

## 12.1 Introduction:

This section of the health sector guidelines amplifies the aim of Environmental Monitoring as a prelude to the presentation of the relevant guidelines for monitoring the Environmental Management Plan (EMP) of an approved development proposal. This document specifically presents the following:

* Guidelines for monitoring the Construction Phase of approved project proposals;
* Guidelines for monitoring the Operational Phase of approved proposals; and
* Guidelines for Decommissioning of projects in the sector.

Environmental Monitoring is a component and a built-in independent monitoring mechanism of the Environmental Monitoring Plan that aims at ensuring that the EMP actually gets implemented. It focuses on developing parameters, the measurements of which are used, for evaluation of the implementation of the EMP. For the purpose of review the typical provisions of the EMP are as follows:

* Environmental Policy;
* Mitigation Plans;
* Risk contingencies and emergency response schemes;
* Training of monitoring personnel
* Information Management System;
* Regulatory regime;
* Documentation and reporting, and
* Financial requirements for effective plan implementation.

## 12.2 Environmental Monitoring

The primary function of the Environmental Monitoring is to systematically collect environmental data through a series of repetitive measurements for the following purposes:

* To check that the planned mitigative measure of the EMP are implemented;
* To ensure that legal standards for pollution are not exceeded; and
* To provide early warning of environmental damage, so that action may be taken to reduce the harmful impacts on the environment.

Emphasis is laid on collection and use of quantitative indicators however it is recommended that where quantitative indicators are less appropriate (e.g. biological impacts, etc.) specification of measures and appropriate training of monitoring staff may be adequate.

## 12.3 Types of Environmental Monitoring

For the purpose of the specific purposes of Environmental Monitoring as stated in Section 12.2 above appropriate types of monitoring have been chosen. However, for clarification the types of environmental monitoring are presented below:

12.3.1 Baseline Monitoring:

It purports to measure environmental parameters during a pre-period for the purposes of determining the nature and ranges of natural variation and to establish where appropriate the nature of variation.

12.3.2 Effects Monitoring:

A process of measuring environmental parameter during construction and implementation/operation so as to detect changes in these parameters which can be attributed to the project.

12.3.3 Compliances Monitoring:

This monitoring focuses on measurement of periodic sampling and or continuous measurement of environmental parameters, including levels of waste discharges or process emission to ensure that regulatory requirements are observed and standards are met.

12.3.4 Surveillance and Inspection:

This is a method of monitoring that complements the Compliances Monitoring but need not be a repetitive measurement of quantities.

In view of the nature and varied sizes of undertakings in the Health Sector (e.g. big hospitals, small cottage industry undertakings, and small sewage disposal facilities) it is imperative to select appropriate mix of types of monitoring.

## 12.4 Health Sector Undertakings Subject to Environmental Monitoring

The Health Sector Undertakings required to be monitored have been identified and listed in the section on “Screening Criteria for the Health Sector”. However, the major classification of the undertaking has been listed without itemization of the undertakings, as follows.

* Hospitals, clinics and health facilities, Medical laboratories, medical equipment, therapy and radiation facilities;
* Mortuary services, funeral homes, cemeteries, hearse services, etc; and
* Solid and liquid waste treatment and disposal (General Waste, Hazardous Waste)

12.4.1 Construction Phase Monitoring

Construction works are integral component of the various types of health care projects. The aim of monitoring during the construction phase would be to assess the need for and success of mitigation measures. The following parameters should be monitored:

(a) Occupational health/safety monitoring parameters;

* Chemicals – acids, alkalis, bitumen, pitch, tar, epoxy-resin;
* Fumes – metal cutting, soldering, welding, oils, petrol, vapours (adhesives, paints, solvents);
* Dusts – block, brick, cement, concrete, sand;
* Vibration;
* Heat;
* Noise;
* Wet or damp work;
* Ergonomics;
* Personal Protective Equipment; and
* Housekeeping, sanitary convenience, first aid facility.

(b) Ambient air quality in vicinity of project;

(c.) Soil erosion – removal of vegetation/construction on sloping terrain;

(d) Loss of scenery;

(e) Loss of land and resettlement; and

(f) Water quality – surface/underground water.

12.4.2 Operational Phase Monitoring

It must be recognized that even when sufficient information may be available, the actual environmental impact arising from an activity may vary significantly from the expected impact, as even small variation in starting conditions can cause significant variations in results. It is therefore necessary to monitor environmental damage. All environmental and social characteristics, which are expected to be significantly affected by a project, must be monitored by a competent authority at least on an annual basis.

The following is the list of monitoring parameters specifically required to safeguard the environment. However, it should not be perceived that, this is an exhaustive list.

(a) Noise:

Noise level should be monitored especially during installation of new machinery or change in production process or structural designs; and noise measurements should be effected at a minimum distance of one meter from the industrial premises boundary.

(b) Ambient Air Quality:

Ambient air quality in vicinity of project for applicable pollutants and odour are assessed according to the National Environmental Standards for ambient air.

(c.) Waste Treatment Systems:

Systems developed to permit sludge, nutritive salts, hospital/laboratory waste and other waste products to be taken care of or to be returned after cleaning into eco-cycle should be monitored.

(d) Water Pollution:

Any project likely to contribute to the pollution of surface/ground water body should have the waste discharged monitored. Applicable parameter set out in the National Environmental Standards.

(e) Soil Pollution:

For any project likely to pollute soil, soil quality must be assessed annually.

(f) Erosion:

Where a project causes soil erosion, soil loss must be monitored and erosion control activities initiated.

(g) Landfill Gas:

Boreholes constructed around the periphery of the site should be monitored on monthly basis and gas analyzed for methane, carbon dioxide and oxygen

(h) Chemical Effect:

A project likely to entail acute and or long-term health hazards for personnel who handle chemicals, drugs or medical equipment (radiation racket) should undergo health surveillance at least once in twelve months.

(i) Safety/Health and Working Conditions:

Monitoring of the working environment should be done daily to identify, evaluate and control or mitigate any hazards. Parameters to monitor are:

* Noise, Heat Stress, Cold Stress, Illumination, Radiation, Dust Fume, Vapours: Measurement should be taken at least once a year and during change in machinery process and design;
* Personal Protective Equipment: Storage and usage should be monitored daily;
* House Keeping, Sanitary Convenience: These should be monitored daily; and
* Fire Fighting Equipment/Gargets: These should be monitored at least once every year.

(j) Medical Monitoring

A means of evaluating the adverse health and safety conditions on workers.

## 12.5 Decommissioning or Site Closure

Site closure will occur in one of several ways and site closure plans should be formulated prior to project implementation. Regional and local authorities must receive notification of intent to close a project, date of expected closure, and anticipated closure measures to be implemented, with time frames needed. When there is no longer any need for the project it may either be shut down or passed on to local inhabitants for further use. The following actions are to be taken in either case:

12.5.1 Closure General Requirement:

* All wastes should be removed for proper disposal elsewhere;
* Compacted soil must be aerated;
* Contaminated soils are to be contained and removed;
* Structures with no further use are to be fully dismantled;
* Re-seeding is to be undertaken as suitable; and
* Nothing is to be left on the project site for which there is not clear further use.

12.5.2 Permanent Closure

If the site were to be permanently closed additional requirements would include:

* Dismantling and removal of all physical infrastructures;
* Containment and removal of all solid waste;
* Containment and removal of all chemicals and equipment;
* Containment and removal of any contaminated soils;
* Aeration of compacted soils; and
* Re-forestation and seeding of cleared land.

12.5.3 Closure for Alternative Use

Site takeover for local use: When a site is to be left for combined local use, it is important to ensure that everything is removed which may pose a hazard to future uninformed users, and that the local population is fully trained in use of any infrastructure left for them.

12.5.4 Post Closure Phase

Projects with the potential to impact negatively on groundwater, surface water and emission of gases should be monitored after closure until the land has “stabilized”. However the frequency of monitoring could be reduced. It is proposed that initial site restoration would involve establishment of natural vegetation. If farming were permitted on the restored site then additional monitoring of crops for contaminant should be done.

## 12.6 Institutional Responsibilities for Monitoring

A person responsible for any premises upon which the project in situated should undertake monitoring programmes approved by the Environmental Protection Agency;

All monitoring data and records should be retained for a period of not less than three years from the date on which the data and or record was obtained;

All records and monitoring data should be made available to an authorized officer of an enforcing agency upon request and may require copies to be provided; and

Enforcing agencies as and when necessary should do external monitoring.

# 

**13.0 TABLES AND ANNEXES**

**Table 1: Screening Criteria for Hospitals, Laboratories, Clinics and Other Health Facilities**

|  |  |  |
| --- | --- | --- |
| Type of Facility  /Undertaking | Description/Indicator/Threshold Limit | Level of Assessment |
| Clinics, Health Centres and Posts. | Static, outreach or mobile outpatient facility with any of the following services:  (i) Preventive.   * Child Welfare services (immunization health education, nutrition rehabilitation). * Antenatal care. * Post – natal care.   (ii) General curative care   * Management of communicable and non-communicable diseases and injuries.   (iii) Specialist services e.g.   * Minor surgical procedures * Obstetrics and Gynaecological services. * Dental services. * Otorhinolaryngological services (Ear, nose and throat). * Ophthalmological services (eye care). * Physiotherapy   (iv) Paraclinical Services   * Laboratory – Basic Microbiology, Hematology and Biochemistry. | Initial Assessment. |
| Type of facilities / Undertaking | Description/Indicator/Threshold Limit | Level of Assessment |
| In-Patient Clinic/Hospital | (a) Small Scale i.e. up to 50 beds e.g. Polyclinics, maternity homes, private hospitals, with one or more of the following services:  (i) Preventive   * Child Welfare services (immunization health education, nutrition rehabilitation) * Antenatal care * Post – natal care   (ii) General Curative care   * Management of Communicable and non-communicable diseases and injuries. * Minor surgical procedures   (iii) Specialist services e.g. Obstetrics and Gynaecological services.   * Dental services * Otorhinolaryngological services. * Ophthalmological services * Orthopaedic services * Physiotherapy.   (iv) Paraclinical Services   * Laboratory (Basic Microbiology, Hematology Biochemistry) * Imaging (Radiological services, Ultrasound, Doppler) * Laser Therapy. * Radio Therapy.   (v) Support Services.   * Catering * Laundry * Sterilization * Transport   (b) Small scale facilities providing services in the following additional areas:  (i) Curative care:   * Major surgery * Deliveries * Blood Transfusions   (ii) Paraclinical Services:   * Pathological services – mortuary post- mortems etc. * Radio therapy. | PEA  EIA |
| In-Patient Clinic / Hospital | c.) Medium Scale facilities i.e. 51 – 100 beds e.g. district hospital with services including:  (i) Preventive –   * Child Welfare services (immunization health education, nutrition rehabilitation) * Antenatal care * Post – natal care.   (ii) General Curative care. – (As for small scale in a)   * Management of communicable and non-communicable diseases and injuries. * Minor surgical procedures.   (iii) Specialist Services – (As in (a) )   * Minor surgical procedures * Obstetrics and Gynaecological services * Dental services * Otorhinolaryngological services (Ear, nose and throat). * Ophthalmological services (eye care). * Physiotherapy | EIA |
| In-Patient Clinic/ Hospital | (iv) Paraclinical Services.   * Laboratory – Microbiology * Hematology, Biochemistry * Imaging as above * Radiotherapy   (v) Support Services   * Catering * Laundry * Sterilization * Transport and maintenance * Security * Environmental sanitation | EIA |
| Medium and Large  Scale Clinics,  Hospitals and Laboratories | (d) Large Scale i.e. 101 beds and above e.g. Regional hospitals or Teaching hospitals with the following services.  Preventive  Curative  (Specialist (As for medium scale operations)  Paraclinical/list as those under small scale.  Support services list.   * Facilities located in areas with one or more of the following features. * Environmentally sensitive water bodies (e.g. Surface water and ground water source for community with potential of being contaminated through sewage disposal or discharge of infective waste water from facility. * Site of facility does not conform to current land use plan and zoning of area by sub district, municipal and metropolitan assemblies. E.g. residential, fishing, farming and recreation) making it impossible to sustain current land uses during the implementation or beyond life of the project. * Facility to be located close to site of major commercial activity. Sport and recreation facilities, residential and animal husbandry. | EIA |

## Table 2: Screening Criteria for Mortuary Services and Funeral Homes

|  |  |  |
| --- | --- | --- |
| Type of Facility/Undertaking | Description/Indicator/Threshold | Level of Assessment |
| Mortuary Services, Funeral Homes & Parlours | * Size/Scale: Irrespective of size or scale * Location/site features * Facility should not be sited in areas listed in schedule 5 of * environmentally sensitive areas (L. I. 1652) and shall comply with existing regulations. E.g. the Mortuaries and Funeral Facilities Act, 1998 (Act 563), Local Government Act 1993, (Act 462). * Potential to contaminate drinking water sources (underground and surface water) from hazardous waste. * Evidence of hazardous waste: pathological, infectious, chemical, or contaminated clothing. * Potential for impact on human health and ecosystem by waste management procedures and disposal facilities. * Site must conform to local land use zoning according to Town and Country Planning Act, 1945 (Cap. 84),Bye laws of District Assemblies, 1996 etc. * Refrigeration and air conditioning system should have refrigeration that is ozone friendly and low energy consuming . * Waste treatment should meet rigorous health standards in Table 4. Potential for exposure of workers to significant risks from chemicals. * Potential for risks to ergonomic hazard. * Potential for risk to psychological problems among workers. * Potential for increased risk of injuries to workers. * Potential for noise in community and increase vehicular traffic. * Potential for attracting other social amenities and give facilities to the area. * Potential for employment generation and new employment opportunities | EIA |
| Cemeteries | * Size/scale (Less than three graves; More than three graves) * Should not be sited in areas listed in Schedule 5 of L. I. 1652 and comply with existing regulations, Mortuaries and Funeral Facilities Act, 1998 (Act 563), Local Government Act, 1993 (Act 462), etc. * Sited in or along water courses * Soil structure and texture not suitable. * Potential for natural disaster/flood/water lands. * Potential to contaminate drinking water sources (underground and surface) * Site must conform to local use zoning according to Town and Country Planning Act, 1945 (Cap. 84), land Bye-laws of District Assemblies, 1996 etc. * Potential to cause public outcry because of cultural beliefs. * Location should not be identified as having the potential to cause psychological nuisance * Location should not be identified as having an impact on natural biodiversity (e.g. affect habitat of endangered species). | EIA |
| Columbarium/Hearse Services | * Must be sited within a cemetery | EIA |
| Mausoleum | * Site must conform to local land use zoning | EIA |
| Crematorium | * Site must conform to local land use zoning | EIA |

## Table 3: Screening Criteria for Waste Treatment and Disposal

|  |  |  |
| --- | --- | --- |
| Type of Facility/Undertaking | Description/Indicator/Threshold | Level of Assessment |
| (A) Toxic and Hazardous Waste   1. Construction of incineration plant (High temperature, Medium temperature, and co-incineration); 2. Construction of recovery plant (off site); 3. Construction of sewerage and wastewater treatment plant (off site); 4. Construction of landfill facilities (secure landfills normal landfills and co-disposal) 5. Construction of storage facility (off site)   (B) Municipal Solid Waste   1. Construction of incineration plant High temperature, Medium temperature, and co-incineration); 2. Construction of composting plant; 3. Construction of recovery/recycling plant (gravity separation, filtration, distillation, solvent extraction, chemical regeneration); 4. Construction of municipal solid waste landfill facility (High temperature, Medium temperature, and co-incineration) 5. Construction of waste depots.   (C.) Municipal, Sewerage and Sewage   1. Construction of wastewater treatment plant 2. Construction of sewers and outfalls 3. Construction of night soil treatment facility 4. Recycling: Gravity separation; Filtration; Distillation; Solvent Extraction; Chemical Regeneration 5. Physical/Chemical; Neutralization; Precipitation/Separation; Detoxification (chemical) 6. Biological: Aerobic Reactor; Anaerobic Reaction; Soil Culture 7. Incineration: High temperature; Medium Temperature; Co-incineration 8. Immobilization: Chemical Fixation; Encapsulation; Solidification 9. Landfill: Secure Landfill; Normal Landfill; Co-disposal 10. Offshore: Ocean Incineration; Ocean Dumping; Export   **D)** Rehabilitation and expansion works   1. Rehabilitation of solid and liquid waste treatment and disposal systems 2. Expansion of solid and liquid waste treatment and disposal systems 3. Replacement of solid and liquid waste treatment and disposal systems | * Irrespective of size or scale due to potential source of hazardous nature of waste generated * Site must conform to local land use zoning. * There must be a buffer from the sites above with regards to the location of the undertaking and the radius of the buffer shall be determined by the regulatory Agency depending on the scale of the project. * Site should not be identified as a potential to cause migration of people in and out of project area. * Location should not be identified as having the potential to cause offensive smell to communities living around the project area. * Location should not be identified as having the potential to impact on natural biodiversity/affect habitat of endangered species. * The design of the project should not lead to :   a)Adverse changes in surface water/ground water  quality.  b) Discharge waste into drains/canals.  c) Risk of accidental spill into water bodies.  d) The use of toxic and hazardous chemicals which  are difficult to breakdown.  e) Diversion / obstruction of natural water flow.   * Irrespective of size or scale due to potential source of hazardous nature of waste generated. * Site must conform to local land use zoning. * There must be a buffer from the sites above with regards to the location of the undertaking and the radius of the buffer shall be determined by the regulatory Agency depending on the scale of the project. * Location should not be identified as having the potential to cause offensive smell to communities living around the project area. * Location should not be identified as having the potential to impact on natural, biodiversity/affect habitat of endangered species. | EIA  EIA  EIA  EIA |

## Table 4: Treatment and Disposal Methods for Categories of Health Care Waste

|  |  |
| --- | --- |
| **Type of Waste** | **Summary of treatment and disposal options/notes** |
| **Infectious Waste:** Includes waste suspected to contain pathogens (e.g. bacterial, viruses, parasites, or fungi) in sufficient concentration or quantity to cause disease in susceptible hosts. Includes pathological and anatomical material (e.g. tissues, organs, body parts, human fetuses, animal carcasses, blood, and other body fluids), clothes, dressings, equipment/instruments, and other items that may have come into contact with infectious materials. | **Waste Segregation Strategy:** Yellow or red coloured bag/ container, marked “infectious” with international infectious symbol. Strong, leak proof plastic bag, or container capable of being autoclaved.  **Treatment:** Chemical Disinfection; wet thermal treatment; microwave irradiation, safe burial on hospital premises, sanitary landfill; incineration (Rotary kiln, pyrolytic incinerator, single-chamber incinerator, drum or brick incinerator)   * Highly infectious waste, such as cultures from lab work, should be sterilized using wet thermal treatment, such as autoclaving * **Anatomical waste** should be treated using incineration (Rotary kiln; pyrolytic incinerator, single-chamber incinerator, drum or brick incinerator) |
| **Sharps:** Includes needles, scalpels, blades, knives, infusion sets, saws, broken glass, and nails etc. | **Waste Segregation Strategy:** Yellow or red colour code, marked “sharps”. Rigid impermeable, puncture-proof container (e.g. steel or hard plastic) with cover. Sharps containers should be placed in a sealed, yellow bag labeled “infectious waste”.  **Treatment: Chemical disinfection**; wet thermal treatment, microwave irradiation; encapsulation, safe burial on hospital premises; incineration (Rotary kiln; pyrolytic incinerator, single chamber incinerator; drum or brick incinerator)   * Following incineration, residues should be landfilled * Sharps disinfected with chlorinated solutions should not be incinerated due to risk of generating POPs * Needles and syringes should undergo mechanical mutilation (e.g. milling or crushing) prior to wet thermal treatment |
| **Pharmaceutical Waste**: Includes expired, unused, spoiled, and contaminated pharmaceutical products drugs, vaccines, and sera that are no longer needed, including containers and other potentially contaminated materials (e.g. drug bottles vials, tubing etc.). | **Waste Segregation Strategy:** Brown bag/container. Leak-proof plastic bag or container  **Treatment**: Sanitary landfill; Encapsulation; Discharge to sewer; Return expired drugs to supplier; Incineration (rotary kiln, pyrolytic incinerator); Safe burial on hospital premises as a last resort.   * Small quantities: Landfill disposal acceptable, however cytotoxic and narcotic drugs should not be landfilled. Discharge to sewer only for mild, liquid pharmaceuticals, not antibiotics or cytotoxic drugs, and into a large water flow. Incineration acceptable in pyrolytic or rotary kiln incinerators, provided pharmaceuticals do not exceed 1 percent of total waste to avoid hazardous air emissions. Intravenous fluids (e.g. salts, amino acids should be landfilled or discharged to sewer. Ampoules should be crushed and disposed of with sharps. * Large quantities: Incineration at temperatures exceeding 1200 °C. Encapsulation in metal drums. Landfilling not recommended unless encapsulated in metal drums and groundwater contamination risk is minimal. |
| **Genotoxic/Cytotoxic** **Waste**: Genotoxic waste may have mutagenic, teratogenic, or carcinogenic properties, and typically arises from faeces, urine, and vomit of patients receiving cytostatic drugs, and from treatment with chemicals and radioactive materials. Cytotoxic drugs are commonly used in oncology and radiology departments as part of cancer treatment. | **Waste Segregation Strategy:** See above for “infectious waste” Cytotoxic waste should be labeled “Cytotoxic waste”  **Treatment:** Return expired drugs to supplier; Chemical degradation; Encapsulation; Inertization; Incineration (rotary kiln, pyrolytic incinerator):   * Cytotoxic waste should not be landfilled or discharged to sewer systems * Incineration is preferred disposal option. Waste should be returned to supplier where incineration is not an option. Incineration should be undertaken at specific temperatures and time specifications for particular drugs. Most municipal or single chamber incinerators are not adequate for cytotoxic waste disposal. Open burning of waste is not acceptable. * Chemical degradation may be used for certain cytotoxic drugs * Encapsulation and inertization should be a last resort waste disposal option. |
| **Chemical Waste:** Waste may be hazardous depending on the toxic corrosive, flammable, reactive, and genotoxic properties. Chemical waste may be in solid, liquid, or gaseous form and is generated through use of chemicals during diagnostic/ experimental work, cleaning, housekeeping, and disinfection. Chemicals typically include formaldehyde, photographic chemicals, halogenated and nonhalogenated solvents, organic chemicals for cleaning/disinfecting and various inorganic chemicals (e.g. acids and alkalis) | **Waste Segregation Strategy**: Brown bag./Container. Leak-proof plastic bag or container resistant to chemical corrosion effects.  **Treatment**: Return unused chemicals to supplier; Encapsulation; Safe burial on hospital premises; Incineration (pyrolytic incinerator);   * Facilities should have permits for disposal of general chemical waste (e.g. sugars, amino acids, salts) to sewer systems * Small hazardous quantities: Pyrolytic incineration, encapsulation, or landfilling * Large hazardous quantities: Transported to appropriate facilities for disposal, or returned to the original supplier using shipping arrangements that abide by the Basel Convention. Large quantities of chemical waste should not be encapsulated or landfilled. |
| **Radioactive Waste**: includes solid, liquid, and gaseous materials that have been contaminated with radionuclides. Radioactive waste originates from activities such as organ imaging, turmor localization, radiotherapy, and research/clinical laboratory procedures, among others, and may include glassware, syringes, solutions, and excreta from treated patients | **Waste Segregation Strategy:** Lead box, labeled with the radioactive symbol.  **Treatment:** Radioactive waste should be managed according to national requirements and currents guidelines from the international Atomic Energy Agency. IAEA (2003). Management of Waste from the Use of Radioactive Materials in Medicine, Industry and Research. IAEA Draft Safety Guide DS 160 7 February 2003 |
| **Waste with high content of heavy metals:** Batteries, broken thermometers, blood pressure gauges, (e.g. mercury and cadmium content). | **Waste Segregation Strategy**: Waste containing heavy metals should be separated from general health care waste  **Treatment**: Safe storage site designed for final disposal of hazardous waste.   * Waste should not be burned, incinerated, or landfilled. Transport to specialized facilities for metal recovery. |
| **Pressurized Containers:** Includes containers/cartridges/ cylinders for nitrous oxide, ethylene oxide, oxygen, nitrogen, carbon dioxide, compressed air and other gases. | **Waste Segregation Strategy**: Pressurized containers should be separated from general health care waste.  **Treatment**: Recycling and reuse; Crushing followed by landfill   * Incineration is not an option due to explosion risks * Halogenated agents in liquid form should be disposed of as chemical waste, as above. |
| **General Health Care Waste** (including food waste and paper, plastics, cardboard): | **Waste Segregation Strategy**: Black bag / container. Halogenated plastics such as PVC should be separated from general health care facility waste to avoid disposal through incineration and associated hazardous air emissions from exhaust gases (e.g. hydrochloric acids and dioxins).  Treatment: disposal as part of domestic waste, Food waste should be segregated and composted. Component wastes (e.g. paper, cardboard, recyclable plastics (PET, PE, PP) glass) should be segregated and sent for recycling |
| Source: Safe Management of Wastes from Health–Care Activities. International Labour Organization (ILO) Eds. Pruss, A. Giroult, and P.Rushbrook (1999)  **Notes**:   1. Small quantities only 2. Low-level infectious waste only 3. Low-leveled liquid waste only 4. Halogenated and non-halogenated solvents (e.g. chloroform, TCE, acetone, methanol) are usually a laboratory-related waste stream for fixation land preservation of specimens in histology/pathology and for extractions in labs. 5. Note on incinerators. Pyrolytic and rotary kiln incinerators should be used. Use of single-chamber and drum/ brick incinerators are not normally considered good practice, except in emergency situations as a last option. | |

## Table 5: The Checklist to Determine the Impacts of Critical Issues of Undertakings of the Health Sector

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Critical Issue | Yes | | No | Unknown |
| Temporal | Permanent |
| **Land use**: Is the proposed project likely to:   * Change the current land use of the area? * Fall within an environmentally sensitive area? E.g. forest reserve, ramsar sites etc. * Be compatible with adjacent land uses? |  |  |  |  |
| **Animal life**: Is the proposed project likely to:   * Reduce or increase the number of unique, endangered species of animals? * Create a barrier to the migration of animals? * Cause attraction or entrapment of animal life? * Harm existing fish and wildlife habitats? |  |  |  |  |
| **Air quality**: Is the proposed project likely to  Emit pollutants into the atmosphere? e.g. generate a bad odour, dioxins, Nox, etc. |  |  |  |  |
| **Occupational health and safety**: Is the project likely to:   * Create any health hazards, injuries to workmen etc within the area of influence during all phases of the project? * Involve the risk of explosion or release of potentially hazardous substances? (Refer to Health Impact Assessment Study Report) |  |  |  |  |
| **Public Health:** Is the project likely to:   * Create health hazards that will adversely affect members of the public living in close proximity or far from undertaking? * Increase transmission of infectious diseases? * Affect the spread of HIV/AIDS and other STDs? (Refer to HIA report) |  |  |  |  |
| **Natural resources**: Is the proposed project likely to:   * Increase the rate of use of natural resources? * Deplete any non-reusable natural resources? |  |  |  |  |
| **Transportation and traffic circulation**: Is the proposed project likely to:   * Introduce additional vehicles to the area * Put pressure on existing parking facilities or creation of new parking lots and roads * Result in altering the normal transportation system * Increase traffic hazards to other vehicles and road users? |  |  |  |  |
| **Fire:** Hasthe proposed project high potential to cause fire? |  |  |  |  |
| **Utilities:** Is the proposed project likely to introduce new systems or alterations to the following utilities?   * Power e.g. Electricity * Communication systems * Water |  |  |  |  |
| **Effects on Community:** Will the project result in:   * Relocation of any community? * Relocation of any social amenity? * Bringing about conflicts with locally adopted developmental plans? |  |  |  |  |
| **Water quality:** Is the project likely to:   * Result in the disposal of any form of waste (treated or untreated) into any water body? * Lead to the abstraction from any water body? * Affect ground water quality? |  |  |  |  |
| **Aesthetics:** Will project result in:   * A change in any scenery? * The creation of an aesthetically offensive site? * A significant change in the visual character of the vicinity? |  |  |  |  |
| **Economic issues**: Will the project:   * Generate employment? * Increase foreign exchange? * Add value to or devalue properties within the vicinity? * Result in any tourist attraction? |  |  |  |  |
| **Noise:**  Will the project result in the   * Generation of excessive noise? |  |  |  |  |
| **Natural disasters:**  Is the proposed site for the project:   * Prone to earth quakes? * Prone to floods? |  |  |  |  |
| **Legal:** Does project need to:   * Comply with any existing statutory requirements? * Comply with any existing relevant policies and guidelines? |  |  |  |  |
| **Waste management:** Is the project likely to:   * Generate waste? * Dispose of waste? |  |  |  |  |

Issues with “yes” answers should be addressed; those with “unknown” should be investigated.

## Table 6: Development, Permitted and Prohibited Land Uses

|  |  |  |
| --- | --- | --- |
| Development | Permitted Uses | Prohibited Uses |
| 1. Hospitals, Clinics and Other Medical and Laboratory Facilities 2. Cemeteries/Crematoria 3. Waste Disposal Sites | * Cultural and educational facilities * Emergency service facilities * Other service and industrial service stations * Religions and community facilities * Conference and sport facilities * Public open space | * Industrial development * Major commercial centers * Hotels * Major commercial facilities * Sports and recreational facilities * Residential * Animal husbandry * For waste, disposal may be permitted subject t o other environmental conditions. |

# ANNEX 1: INDUSTRY-SPECIFIC IMPACTS AND MANAGEMENT

The following section provides a summary of EHS issues associated with health care facilities (HCF) which occur during the operations phase, along with recommendations for their management.

**HCF Design Considerations**

The design and functional layout of an HCF should ensure the following: separation of clean / sterilized and dirty/contaminated materials and people flows; development and inclusion of adequate disinfection / sterilization procedures and facilities; adequate space for the storage of recyclable materials (e.g. cardboard and plastic) for pickup; selection of heating, ventilation, and air conditioning (HVAC) systems that provide isolation and protection from airborne infections; design of water systems to provide adequate supplies of *potable* water to reduce risks of exposure to *Legionella* and other waterborne pathogens; provision of hazardous material and waste storage and handling areas; treatment and exhaust systems for hazardous and infectious agents; and selection of easily cleaned building materials that do not support microbiological growth, are slip-resistant, nontoxic, and nonallergenic, and do not include volatile organic compound (VOC)-emitting paints and sealants.

***Environmental Considerations***

Environmental issues associated with HCF include the following:

* Waste management;
* Emissions to air; and
* Wastewater discharges.

(a) Waste Management

Waste from health care facilities can be divided into two separate groups. The first consists of general waste, similar in composition to domestic waste, generated during administrative, housekeeping, and maintenance functions. The second group consists of specific categories of hazardous health care waste. Health care facilities should establish, operate and maintain a *health care waste management system (HWMS)* adequate for the scale and type of activities and identified hazards. Facility operators should undertake regular assessment of quantities of waste generated and categories to facilitate waste management planning. HWMS should include the following components:

*Waste Minimization, Reuse, and Recycling*

Facilities should consider practices and procedures to minimize waste generation, *without sacrificing patient hygiene and safety considerations*, including:

* Source reduction measures:

1. Consider options for product / material substitution to avoid products containing hazardous materials that require the product to be disposed as hazardous or special waste (e.g. mercury or aerosol cans), and preferring products with less packaging or products that weigh less than comparable products that perform the same function.
2. Use of physical rather than chemical cleaning practices (e.g. using microfiber mops and cloths), where such practices do not affect disinfection and meet relevant standards for hygiene and patient safety.

* Waste toxicity reduction measures:

Consider options for product / material substitution for equipment containing mercury or other hazardous chemicals; products that may become hazardous waste when disposed; products made of polyvinyl chloride (PVC); halogenated compounds; products that off-gas volatile organic compounds (VOCs), or products that contain persistent, bioaccumulative and toxic (PBT) compounds; products that contain substances which are carcinogenic, mutagenic or reproductive toxins (CMR)

* Use of efficient stock management practices and monitoring (e.g. for chemical and pharmaceutical stocks), including:
  1. Small / frequent orders for products that spoil quickly and strict monitoring of expiry dates; and
  2. First in first out basis.
* Maximization of safe equipment reuse practices, including:
  1. Reuse of equipment following sterilization and disinfection (e.g. sharp edge containers).

*Waste Segregation Strategies*

At the point of generation, waste should be identified and segregated. Non-hazardous waste, such as paper and cardboard, glass, aluminum and plastic, should be collected separately and recycled. Food waste should be segregated and composted. Infectious and / or hazardous wastes should be identified and segregated according to its category using a color-coded system. If different types of waste are mixed accidentally, waste should be treated as hazardous. Other segregation considerations include the following:

* Avoid mixing general health care waste with hazardous health care waste to reduce disposal costs;
* Segregate waste containing mercury for special disposal. Management of mercury containing products and associated waste should be conducted as part of a plan involving specific personnel training in segregation and clean up procedures;
* Segregate waste with a high content of heavy metals (e.g. cadmium, thallium, arsenic, lead) to avoid entry into wastewater streams;
* Separate residual chemicals from containers and remove to proper disposal containers to reduce generation of contaminated wastewater. Different types of hazardous chemicals should not be mixed;
* Establish procedures and mechanisms to provide for separate collection of urine, feces, blood, vomits, and other wastes from patients treated with genotoxic drugs. Such wastes are hazardous and should be treated accordingly ;
* Aerosol cans and other gas containers should be segregated to avoid disposal via incineration and related explosion hazard;
* Segregate health care products containing PVC to avoid disposal via incineration (see Air Emissions below) or in landfills.

*On-site Handling, Collection, Transport and Storage*

* Seal and replace waste bags and containers when they are approximately three quarters full. Full bags and containers should be replaced immediately;
* Identify and label waste bags and containers properly prior to removal (see Table 4);
* Transport waste to storage areas on designated trolleys / carts, which should be cleaned and disinfected regularly;
* Waste storage areas should be located within the facility and sized to the quantities of waste generated,. with the following design considerations:
  1. Hard, impermeable floor with drainage, and designed for cleaning / disinfection with available water supply;
  2. Secured by locks with restricted access;
  3. Designed for access and regular cleaning by authorized cleaning staff and vehicles;
  4. Protected from sun, and inaccessible to animals / rodents;
  5. Equipped with appropriate lighting and ventilation;
  6. Segregated from food supplies and preparation areas;
  7. Equipped with supplies of protective clothing, and spare bags / containers;
* Unless refrigerated storage is possible, storage times between generation and treatment of waste should not exceed 48 hours during cool season and 24 hours during hot season.
* Store mercury separately in sealed and impermeable containers in a secure location;
* Store cytotoxic waste separately from other waste in a secure location; and
* Store radioactive waste in containers to limit dispersion, and secure behind lead shields.

*Transport to External Facilities*

* Transport waste destined for off-site facilities according to existing guidelines for transport of hazardous wastes / dangerous goods;
* Transport packaging for infectious waste should include an inner, watertight layer of metal or plastic with a leak-proof seal. Outer packaging should be of adequate strength and capacity for the specific type and volume of waste;
* Packaging containers for sharps should be puncture-proof;
* Waste should be labeled appropriately, noting the substance class, packaging symbol (e.g. infectious waste, radioactive waste), waste category, mass / volume, place of origin within hospital, and final destination; and
* Transport vehicles should be dedicated to waste and the vehicle compartments carrying waste sealed.

*Treatment and Disposal Options*

Facilities receiving hazardous health care waste should have all applicable permits and capacity to handle specific types of health care waste. Wastes from each category should be treated according to the treatment methods and technologies described in Table 4. When selecting a waste disposal technology, operators should consider other potential health and environmental issues that may be generated by the treatment. The main types of treatment and disposal technologies and techniques available for health care waste are described below.

**Incineration** is a high temperature dry oxidation process to reduce organic, combustible waste to significantly smaller quantities of inorganic, incombustible matter. Incineration may produce gaseous air emissions, ash residues, and wastewater. Depending on the amount of waste generated and the other factors, HCFs may operate on-site incinerators, or waste may be transported to an off-site incineration facility. Incinerators should have permits to accept health care waste and be properly operated and maintained. Further guidance on incineration is contained in the ‘Emissions to Air’ section, below.

**Chemical disinfection** involves the addition of chemicals to kill pathogens in health care waste. Waste should be mechanically shredded prior to treatment. Treatment involves the use and handling of hazardous chemicals, in addition to disposal of hazardous residues following treatment.

**Wet thermal treatment** disinfects waste by exposing shredded waste to high temperatures / pressure steam inside an exposure tank. Wastewater discharges and odor may result. Autoclaving is a type of wet thermal disinfection process typically used to sterilize reusable medical equipment. Dry thermal disinfection involves the shredding, heating, and compacting waste in a rotating auger. Air emissions and wastewater may be generated, and residues require disposal.

**Microwave irradiation** involves the destruction of microorganisms through the microwave heating action of water contained within the waste. Following irradiation, waste is compacted and disposed of as part of the municipal waste stream. Contaminated wastewater may also be generated.

**Land disposal** involves the disposal of health care waste into landfill facilities. Properly designed and operated sanitary landfills will protect against air and groundwater contamination. Disposal of waste into open dumps is not considered good practice and should be avoided. Pretreatment of waste prior to land disposal may involve encapsulation (filling containers with waste and an immobilizing material and sealing the containers).

**Inertization** involves mixing waste with substances (e.g. cement) to minimize leaching of toxic waste into ground or surface water.

(b) Emissions to Air

Sources of air emissions at HCFs may include exhaust air from heating, ventilation, and air conditioning (HVAC) systems, ventilation of medical gases and fugitive emissions released from sources such as medical waste storage areas, medical technology areas, and isolation wards. Emissions may include exhaust from medical waste incineration if this waste management option is selected by the facility. In addition, air emissions may result from combustion related to power generation.

Exhaust air, including isolation wards, laboratories, and waste storage and treatment facilities) may be potentially contaminated with biological agents, pathogens, or other toxic materials, and should be treated by conveying the exhaust air to combustion air to render it non-toxic and non-contagious before discharge. Condensate and blowdown liquids should be classified as health care wastewater and treated accordingly (see ‘Wastewater’ below). A stack sufficiently tall to eliminate odor nuisances and optimize dispersion should be used. Stack heights for all waste treatment facilities should be determined in accordance with existing national guidelines.

*Incineration*

Large general hospitals may be equipped with their own incinerator plant, which is the major source of emissions to air and wastewater. Typically, only a relatively small portion of medical waste should be incinerated, and the need for a hospital waste incinerator (HWI) should be carefully evaluated against other technologies and techniques for waste management and disposal discussed above. Pollutants potentially emitted from HWIs include:

* Heavy metals;
* Organics in the flue gas, which can be present in the vapor phase or condensed or absorbed on fine particulates;
* Various organic compounds (e.g. polychlorinated dibenzo-p-dioxins and furans [PCDD/Fs], chlorobenzenes, chloroethylenes, and polycyclic aromatic hydrocarbons [PAHs]), which are generally present in hospital waste or can be generated during combustion and post-combustion processes;
* Hydrogen chloride (HCl) and fluorides, and potentially other halogens-hydrides (e.g. bromine and iodine);
* Typical combustion products such as sulfur oxides (SOX), nitrogen oxides (NOX), volatile organic compounds (including non-methane VOCs) and methane (CH4), carbon monoxide (CO), carbon dioxide (CO2), and nitrous oxide (N2O).

Pollution prevention and control measures include:

* Application of waste segregation and selection including removal of the following items from waste destined for incineration: halogenated plastics (e.g. PVC), pressurized gas containers, large amounts of active chemical waste, silver salts and photographic / radiographic waste, waste with high heavy metal content (e.g. broken thermometers, batteries), and sealed ampoules or ampoules containing heavy metals;
* Incinerators should have permits issued by authorized regulatory agencies and be operated and maintained by trained employees to ensure proper combustion temperature, time, and turbulence specifications necessary for adequate combustion of waste. This includes implementation of operational controls including combustion and flue gas outlet temperatures (combustion temperatures should be above 850 °C while flue gases need to be quenched very quickly to avoid formation and reformation of POPs) as well as use of flue gas cleaning devices meeting international standards.

Secondary air pollution control measures for hospital waste incinerators include the following:

* Wet scrubbers to control acid gas emissions (e.g. hydrochloric acid [HCl], sulfur dioxide [SO2, and fluoride compounds]). A caustic scrubbing solution will increase the efficiency for SO2 control;
* Control of particulate matter may be achieved through use of cyclones, fabric filters, and / or electrostatic precipitators (ESP). Efficiencies depend on the particle size distribution of the particulate matter from the combustion chamber. Particulate matter from hospital incinerators is commonly between 1.0 to 10 micrometers (μm). ESPs are generally less efficient than baghouses in controlling fine particulates and metals from HWI;
* Control of volatile heavy metals depends on the temperature at which the control device operates. Fabric filters and ESP typically operate at relatively high temperatures and may be less effective than those that operate at lower temperatures. Venturi quenches and venturi scrubbers are also used to control heavy metal emissions. The volatile heavy metals usually condense to form a fume (less than 2 μm) that is only partially collected by pollution control equipment;
* Management of incineration residues such as fly ash, bottom ash and liquid effluents from flue gas cleaning as a hazardous as they may contain high concentrations of POPs.

(c.) Wastewater

*Process Wastewater*

Wastewater from HCFs often has a quality similar to urban wastewater. Contaminated wastewater may result from discharges from medical wards and operating theaters (e.g. body fluids and excreta, anatomical waste), laboratories (e.g. microbiological cultures, stocks of infectious agents), pharmaceutical and chemical stores; cleaning activities (e.g.waste storage rooms), and x-ray development facilities. Wastewater may also result from treatment disposal technologies and techniques, including autoclaving, microwave irradiation, chemical disinfection, and incineration (e.g. treatment of flue gas using wet scrubbers which may contain suspended solids, mercury, other heavy metals, chlorides, and sulfates).

Depending on the effectiveness of hazardous waste management practices (in particular waste segregation strategies described above), hazardous health care wastes may enter the wastewater stream, including microbiological pathogens (wastewater with a high content of enteric pathogens, including bacteria, viruses, and helminthes / parasitic worms), hazardous chemicals, pharmaceuticals, and radioactive isotopes. Pollution prevention measures to minimize the generation of wastewater include the following:

* Waste segregation measures should be employed to minimize entry of solid waste into the wastewater stream, including:
  1. Procedures and mechanisms for separate collection of urine, feces, blood, and vomit from patients treated with genotoxic drugs to avoid their entry into the wastewater stream (as described above under waste segregation for hazardous and other wastes);
  2. Collection of large quantities of pharmaceuticals for separate treatment or return to manufacturer (see Table 4). Small quantities of mild, liquid pharmaceuticals, excluding antibiotics or cytotoxic drugs, may be discharged to sewer systems with a large water flow.

*Municipal Wastewater Treatment*

If wastewater is discharged to sanitary sewage treatment systems, the HCF should ensure that wastewater characteristics are in compliance with all applicable permits, and that the municipal facility is capable of handling the type of effluent discharged.

*On-site Wastewater Treatment*

In cases where wastewater is not discharged to sanitary sewage systems, HCF operators should ensure that wastewater receives on-site primary and secondary treatment, in addition to chlorine disinfection.

Techniques for treating wastewater in this sector include source segregation and pretreatment for removal / recovery of specific contaminants such as radio isotopes, mercury, etc.; skimmers or oil water separators for separation of floatable solids; filtration for separation of filterable solids; flow and load equalization; sedimentation for suspended solids reduction using clarifiers; biological treatment, typically aerobic treatment, for reduction of soluble organic matter (BOD); biological or chemical nutrient removal for reduction in nitrogen and phosphorus; chlorination of effluent when disinfection is required; dewatering and disposal of residuals as hazardous medical / infectious waste. Additional engineering controls may be required for (i) removal of active ingredients (antibiotics and miscellaneous pharmaceutical products, among other hazardous constituents), and (ii) containment and treatment of volatile constituents and aerosols stripped from various unit operations in the wastewater treatment system.

Wastewater generated from use of wet scrubbers to treat air emissions should be treated through chemical neutralization, flocculation, and sludge settling. Sludge should be considered hazardous, and may be treated off-site in a hazardous waste facility, or encapsulated in drums with mortar and landfilled. Sludge treatment should include anaerobic digestion to ensure destruction of helminthes and pathogens. Alternatively, it can be dried in drying beds before incineration with solid infectious wastes.

*Other Wastewater Streams & Water Consumption*

Contaminated streams should be routed to the treatment system for industrial process wastewater.

***Occupational Health and Safety Considerations***

Occupational health and safety impacts during the construction and decommissioning of health care facilities (HCF) are common to those of most civil construction facilities. General health and safety hazards occurring in HCFs include manual handling injuries, such as sprains and strains from lifting and carrying patients; falls, trips, and slips; injuries caused by moving objects; and mental stress. HCF health and safety hazards may affect health care providers, cleaning and maintenance personnel, and workers involved in waste management handling, treatment, and disposal. Industry specific hazards include the following:

* Exposure to infections and diseases;
* Exposure to hazardous materials / waste;
* Exposure to radiation; and
* Fire safety.

(a) Exposure to Infections / Diseases

Health care providers and personnel may be exposed to general infections, blood-borne pathogens, and other potential infectious materials (OPIM) during care and treatment, as well as during collection, handling, treatment, and disposal of health care waste.

The following measures are recommended to reduce the risk of transferring infectious diseases to health care providers:

* Formulate an exposure control plan for blood-borne pathogens;
* Provide staff members and visitors with information on infection control policies and procedures;
* Establish Universal / Standard Precautions to treat all blood and other potentially infectious materials with appropriate precautions, including:
  1. Immunization for staff members as necessary (e.g. vaccination for hepatitis B virus)
  2. Use of gloves, masks, and gowns
  3. Adequate facilities for hand washing. Hand washing is the single most important procedure for preventing infections (e.g. nosocomial and community). Hand washing should involve use of soap / detergent, rubbing to cause friction, and placing hands under running water. Washings of hands should be undertaken before and after direct patient contacts and contact with patient blood, body fluids, secretions, excretions, or contact with equipment or articles contaminated by patients. Washing of hands should also be undertaken before and after work shifts; eating; smoking; use of personal protective equipment (PPE); and use of bathrooms. If hand washing is not possible, appropriate antiseptic hand cleanser and clean cloths / antiseptic towelettes should be provided. Hands should then be washed with soap and running water as soon as practical.
  4. Procedures and facilities for handling dirty linen and contaminated clothing, and preparing and handling food
  5. Appropriate cleaning and waste disposal practices for the health care workplace
     + The following recommendations should be implemented when using and handling of needles / sharps:

1. Use safer needle devices and needleless devices to decrease needlestick or other sharps exposures
2. Do not bend, recap, or remove contaminated needles and other sharps unless such an act is required by a specific procedure or has no feasible alternative
3. Do not shear or break contaminated sharps
4. Have needle containers available near areas where needles may be found
5. Discard contaminated sharps immediately or as soon as feasible into appropriate containers
6. Used disposable razors should be considered contaminated waste and disposed of in appropriate sharps containers
   * + Establish policies to exclude animals from facility property.

In addition to the above recommendations, the following measures are applicable to personnel involved in waste management to reduce the risk of transferring infectious diseases:

* Implement immunization for staff members, as necessary (e.g. vaccination for hepatitis B virus, tetanus immunization);
* Provide adequate supplies of PPE for personnel involved in waste management including: overalls / industrial aprons, leg protectors, boots, heavy duty gloves, helmets, visors /face masks and eye protection (especially for cleaning of hazardous spills), and respirators (for spills or waste involving toxic dust or incinerator residue) as necessary;
* Provide washing facilities for personal hygiene, particularly at waste storage locations.

(b) Exposure to Hazardous Materials and Waste

HCF workers may be exposed to hazardous materials and wastes, including glutaraldehyde (toxic chemical used to sterilize heat sensitive medical equipment), ethylene oxide gas (a sterilant for medical equipment), formaldehyde, mercury (exposure from broken thermometers), chemotherapy and antineoplastic chemicals, solvents, and photographic chemicals, among others. In addition to the guidance provided above, hazardous materials and wastes should be handled according to existing national occupational health and safety guidelines.

*Waste Anesthetic Gas (WAG) Exposure*

Health care workers may be at risk of toxic exposure to nitrous oxide; the halogenated agents halothane (fluothane), enflurane (ethrane), isoflurane (forane); and other substances typically used as inhalation anesthetics. Recommended measures to control exposure to waste anesthetic gas (WAG used in the operating room for example) include use of a scavenging unit attached to the anesthesia unit. The scavenging unit may have a charcoal filter that absorbs halogenated anesthetic gases, but not nitrous oxide. Spent charcoal filters should be disposed of as hazardous waste. If there is no scavenging unit, or if the scavenging unit does not have a filter, vacuum lines are used to collect WAGs which are subsequently vented outside and dispersed.

(c.) Radiation

Occupational radiation exposure may result from equipment emitting X-rays and gamma rays (e.g. CT scanners), radiotherapy machines, and equipment for nuclear medicine activities. HCF operators should develop a comprehensive plan to control radiation exposure in consultation with the affected workforce. This plan should be refined and revised as soon as practicable on the basis of assessments of actual radiation exposure conditions, and radiation control measures should be designed and implemented accordingly.

(d) Fire Safety

The risk of fire in health care facilities is significant due to the storage, handling, and presence of chemicals, pressurized gases, boards, plastics, and other flammable substrates.

Additional recommendations for fire safety include:

* Installation of smoke alarms and sprinkler systems;
* Maintenance of all fire safety systems in proper working order, including self-closing doors in escape routes and ventilation ducts with fire safety flaps;
* Training of staff for operation of fire extinguishers and evacuation procedures;
* Development of facility fire prevention or emergency response and evacuation plans with adequate guest information (this information should be displayed in obvious locations and clearly written in relevant languages).

***Community Health and Safety Considerations***

Community health and safety issues during the construction, operations, and decommissioning of HCFs are generally common to those of most industrial facilities. Community hazards associated with health care facility environments, particularly related to hazardous health care waste, necessitate that members of the public receive adequate information regarding potential infection hazards within the facility, and at associated waste disposal sites (e.g. landfills).

# ANNEX 2: CLASSIFICATION OF WASTES

The wastes, which are referred to in this guideline can be grouped into two classes as General and Hazardous waste.

**General Waste** is a waste that does not pose an immediate threat to man or the environment, i.e household waste, builders’ rubble, garden waste, and certain dry industrial and commercial waste. It may, however, through decomposition, infiltration and percolation, produce leachate with an unacceptable high pollution potential. Also if not properly managed, general waste may be hazardous. General waste may also have insignificant quantities of hazardous substances dispersed within it, for example, batteries, pesticides (insecticides, herbicides, etc) and medical waste discarded on domestic and commercial premises.

**Hazardous Waste** is waste that can, even in low concentrations, have a significant adverse effect on public health and/or the environment. This would be because of its inherent chemical and physical characteristics, such as toxic, ignitable, corrosive, carcinogenic or other property. In general, the following types of waste should be regarded as potentially hazardous and any undertaking involving them must be subject to screening:

i.) **Inorganic Waste**: Acids and alkalis (e.g. strong acid and lead from recycling of automobile batteries); Cyanide Waste; Heavy metals sludge and solutions from the metallurgical industry, such as Chromium (VI) ion (Cr6+) from tanneries; Waste containing appreciable proportions of fibrous asbestos; Mercury from fluorescent lamps and batteries

ii.) **Oily Waste**: Waste primarily from the processing, storage and use of mineral oils:

Petrochemical wastes; Waste oils from vehicle servicing; Oils and hydraulic fluids from airports; Transformer oils containing Polychlorinated biphenyls (PCBs).

iii). **Organic Waste**: Halogenated and Non-halogenated solvent residues; Phenolic and resin waste; Pesticides waste (e.g. obsolete or damaged pesticides from agriculture);

Organic chemical residues.

iv.) **Putrescible Organic Waste**: Waste from the production of edible animal and vegetable oil; slaughterhouses; tanneries; and other animal and vegetable based products.

v.) **High Volume/Low Hazard Waste**: Waste that contains small quantities of highly dispersed hazardous substances. This waste presents a relatively low hazard. Examples are harbour dredge spoils, sewage sludge, soils and builders’ rubble, which are contaminated by heavy metals, oils and other pollutants.

vi.) **Miscellaneous Waste**: Infectious waste such as diseased human/ animal tissues, soiled bandages and syringes, which are referred to as “medical waste”, “hospital waste” or “healthcare waste”; Redundant chemicals or drugs; Laboratory waste; Explosive waste from manufacturing operations or redundant munitions; Contaminated packaging material (empty drums, cans, bags etc.) containing residues of solvents, pesticides etc.

**OTHER CLASSIFICATIONS**

The following terms are also defined:

**(a) Solid Waste**: Any solid, semi-solid, liquid, or contained gaseous materials discarded from industrial, commercial, mining, or agricultural operations, and from community activities. Solid waste includes garbage, construction debris, commercial refuses, sludge from water supply or waste treatment plants, or air pollution control facilities, and other discarded materials. Solid waste does not include solid or dissolved materials in irrigation return flows or industrial discharges.

**(b) Sewage**: Sewage is a mixture of human excreta and adequate volume of water to render it capable of flowing or being conveyed by gravity or pumping through sewers for disposal. The term sewage is also often used as synonymous to waste water. Therefore for clarity of definition, sewage is further classified as (i) Sanitary Sewage (consisting of human excreta); (ii) Non-Sanitary Sewage (largely waste water); and Combined Sewage (combined sanitary sewage and waste water). Usually a large part of the liquid waste discharges from the health care facilities are combined sewage and are considered hazardous.

**(c.) Waste Water:** Waste water is water which has become contaminated through its use for domestic, commercial, industrial, agricultural, etc. purposes; and which has been withdrawn or extracted from the usage processes for disposal or re-cycling. Waste water may be collected convey through pipes, covered/uncovered channels (open drains). Waste water at its source or in the cause of conveyance may be contaminated with sanitary sewage or miscellaneous wastes which converted the waste water into a combined sewage which must be conveyed and treated appropriately. Waste waters from medical service areas (e.g. wards, laboratories, theatres, etc) of health care facilities (excluding offices, stores, meeting places, catering services, etc) are to be considered and treated as hazardous wastes.

(**d) Sewer**: A sewer is a pipe or channel used for the conveyance of sewage or waste water. Sewers are usually placed underground and therefore require extensive excavation for their placement.

**(e) Sewerage**: It is the system of infrastructure used for the collection, storage and conveyance of sewage and waste water (e.g. sewers, pumping stations) and treatment plants (trickling filters, digesters, oxidation ponds. etc) and final disposal facilities including marine outfalls.

14.0 REFERENCES

Safe Management of Wastes from Health–Care Activities. International Labour Organization (ILO) Eds. Pruss, A. Giroult, and P.Rushbrook (1999)

1. Act 240 has been repealed by Section 16 (1) of the Atomic Energy Commission Act, 2000 (Act 588). Section 16 (2) saves subsidiary legislation made under Act 240 before the coming into force of Act 240 until regulations are made under Act 588. [↑](#footnote-ref-2)
2. Repealed by Section 16 of Act 588. [↑](#footnote-ref-3)
3. Act 240 has been repealed by Section 16 (1) of the Atomic Energy Commission Act, 2000 (Act 588). Section 16 (2) saves subsidiary legislation made under Act 240 before the coming into force of Act 240 until regulations are made under Act 588. [↑](#footnote-ref-4)
4. Repealed by Section 16 of Act 588. [↑](#footnote-ref-5)