

For project implementation

**Management concept to the eco-industrial Development of Philippine
Economic Zones, Philippines**

TECHNICAL REPORT

WASTEWATER MANAGEMENT GUIDELINE

June 2008

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1 INTRODUCTION

This Technical Report on the review of wastewater regulations and existing wastewater management infrastructure in industrial ecozones is an initial output on the development of a Wastewater Guideline that will ensure compliance by economic zones and locators with the provisions of the Philippine Clean Water Act of 2004 (RA 9275) and its Implementing Rules and Regulations.

The activity is part of the “Management Approach to Eco-Industrial Development of Philippine Economic Zones” project of the Philippine Economic Zone Authority (PEZA). The project is envisioned to enhance the environmental and economic performance of economic zones in the Philippines by developing and disseminating concepts of sustainable site development. It is being undertaken in partnership with the German Development Cooperation (GTZ) and the United Nations Development Programme (UNDP).

This report is a product of review of regulations, key informant interviews with PEZA, DENR-EMB, and LLDA, and review of past studies related to wastewater management in industrial ecozones. It covers legal and regulatory review, profiling of industrial ecozones, policy options, and proposed inputs to the wastewater guidelines for industrial estates.

1.1 Project Background

Emerging economies and the rapidly industrializing countries in Asia are aggressively promoting the establishment of industrial estates for export promotion, industry clustering, and direct foreign investments. In the last decade, the Philippine economy manifested the increased development of private and public ecozones which consistently contributed to economic growth as well as in providing more than half a million in employment.

Industrial estates generate large volume of wastewater from industrial processing operations and from employees (toilets and restaurants). Industrial activities are recognized as major contributors to the deterioration of the environment and to the loss of natural resources. Wastewater from industries does not only contain organic wastes but in some instances have heavy metals and hazardous contaminants that pose significant threats to health of aquatic life and the human population.

In the Philippines, some industrial estates have centralized wastewater treatment facility as part of the incentives to its locators or firms. However, there are industrial economic zones that do not provide for a centralized waste management facility and the respective firms have to manage their own treatment of wastewater to comply with the requirements of the Department of Environment and Natural Resources (DENR) or Laguna Lake Development Authority (LLDA).

With the passage of Republic Act 9275 or the Philippine Clean Water Act of 2004, wastewater quality management systems in economic zones have to be established and institutionalized to ensure compliance by locator enterprises and operators of common wastewater treatment plants.

The “Management Approach to Eco-Industrial Development of Philippine Economic Zones” project principally focuses on the two industrial zones of Mactan Island, Cebu. However, with the presence of a number of industrial ecozones within the area of jurisdiction of the LLDA, it was agreed to review LLDA’s wastewater regulations as it impacts compliance of locators and ecozones in the area for key inputs to the development of the PEZA Wastewater Guideline.

1.2 Scope of the Study

The assignment calls for the formulation of a Wastewater Quality Management Guideline that is applicable to both public and private economic zones under the jurisdiction of PEZA. The Guideline should be consistent with the provisions of RA 9275 and other relevant issuances. Specifically, the assignment covers the following aspects:

- a) Review of the Philippine Clean Water Act of 2004 (RA 9275), its Implementing Rules and Regulations and other relevant issuances that have direct implications on economic zone operations
- b) Analysis of current infrastructure and compliance systems of PEZA and economic zone locators and common wastewater treatment plant operators
- c) Proposal for improving compliance of PEZA, economic zone locator enterprises and operators of common wastewater treatment facilities with RA 9275
- d) Policy options or mechanisms, including the necessity of written agreements among PEZA, DENR, and LLDA, in improving wastewater management, Discharge Permit applications, and monitoring systems
- e) Identification of other agencies and organizations that must be consulted and/or involved in the formulation and implementation of the Wastewater Guideline. Specific roles of these agencies must be outlined in streamlining procedures and requirements
- f) Developing proposals in disseminating the Guideline for greater appreciation by economic zone enterprises
- g) Identifying possible linkages with respect to other EID initiatives (e.g. EID Information System, Technical Assistance on Sewage Treatment Plant (STP) operations in Mactan).

1.3 Structure of the Report

The structure of this draft Technical Report is as follows:

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|-----------|---|
| Section 2 | Wastewater Management Policies and Regulations including review of RA 9275 and its implementing rules and regulations, LLDA Board Resolutions, PD 1586 and PEZA requirements that directly or indirectly govern the management of wastewater. |
|-----------|---|

- Section 3 Industrial Ecozones and Infrastructure for Wastewater Management that present the profiles of industrial ecozones and locators arising from the secondary data collected; Issues and Concerns of Locators and Ecozone Developers which outlines the compliance and technical issues encountered by stakeholders
- Section 4 Proposed Policy Options presents the regulatory interventions to improve management of wastewater for inclusion in the Wastewater Guidelines.

2 WASTEWATER MANAGEMENT POLICIES AND REGULATIONS

The national legislative framework governing wastewater management in the Philippines is principally governed by four (4) main laws, namely:

- (1) Republic Act 9275 or the Philippine Clean Water Act of 2004 (CWA)
- (2) PD 1586 or the Environmental Impact Statement (EIS) System
- (2) PD 984 or the Pollution Control Law, and
- (3) PD 856 or the Code on Sanitation of the Philippines.

These main laws are further supported by a number of administrative orders and implementing rules and regulations.

These environmental regulations and their pertinent provisions that may have impacts on the implementation of wastewater management within PEZA ecozones are summarized for consideration in the development of the wastewater guideline. In addition, the various agencies tasked to enforce these laws are presented in the succeeding section.

Critical reviews and issues on the CWA and its implementing rules and regulations, as outlined in DENR Administrative Order (DAO) 2005-10, and its possible impacts on the on-going and future undertakings of PEZA are presented herein.

2.1 Institutions Regulating Wastewater Management

2.1.1 Department of Environment and Natural Resources and Environmental Management Bureau

The DENR is the primary government agency responsible for the promulgation of rules and regulations for the control of water, air, and land pollution in the Philippines. The DENR was created through Executive Order 192, which reorganized and merged the then National Pollution Control Commission (NPCC) and the National Environmental Protection Council (NEPC). All functions of NEPC and NPCC are now being implemented by the DENR through the Environmental Management Bureau (EMB) and its regional offices.

EMB is a line bureau of DENR and is mandated to formulate policies on environment and implement environmental laws such as the Philippine Clean Water Act of 2004 (RA 9275), Clean Air Act (RA 8749), Solid Waste Management Act (RA 9003), Environmental Impact Statement System (PD No. 1586), Toxic and Hazardous Waste Act (RA 6969).

The DENR-EMB and the LLDA are two important regulatory agencies that have direct control over the management of discharges from various water pollution sources.

2.1.2 Laguna Lake Development Authority (LLDA)

The LLDA is a quasi-government agency organized in 1966 by virtue of Republic Act 4850. The LLDA is empowered to provide regulatory and proprietary functions. The LLDA is mandated to lead, promote and accelerate the development and balanced

growth of the Laguna de Bay Region within the context of national and regional plans and policies.

LLDA reports directly through its Board of Management to the Secretary of DENR. However, unlike the DENR, the rules and regulations adopted by LLDA allow the agency to levy and retain any charges, other than fines and permit fees, for environmental protection programs.

LLDA was first to operate an Environmental User's Fee (EUF) system in the cities and towns in its jurisdiction¹. In terms of environmental standards and regulations for wastewater discharges, the LLDA follows the water quality criteria and effluent standards under DENR Administrative Order Nos. 34 and 35, respectively.

The LLDA requires companies within its jurisdiction to secure the LLDA Clearance for any proposed development. More recently, the authority to review and process ECC was devolved by the DENR to LLDA for development projects within its area of jurisdiction.

2.1.3 Department of Health

The Department of Health (DOH) is the principal government organization responsible for public health protection and sanitation. DOH is mandated to ensure access to basic health services to all Filipinos through the provision of quality health care services. Its mission is to guarantee equitable, sustainable, and quality health for all Filipinos, especially the poor and to lead the quest for excellence in health.

The DOH is mandated to implement Presidential Decree 856 or the Sanitation Code of the Philippines.

2.1.4 Local Government Units

Through the Local Government Code of 1991 (RA 7160), the Philippines has implemented a decentralized form of government. As such, there are two main levels of government: central or national government and local government units. The policy described in the Local Government Code is to devolve authority to LGUs who will operate autonomously under the regulatory supervision of the National Government.

LGUs are responsible for the provision of basic services, such as water supply systems, sewerage, and sanitation, either directly or through contracts with the private sector. They are also empowered to collect taxes and fees necessary for providing these services.

¹ Laguna de Bay Region includes the provinces of Rizal and Laguna, cities of San Pablo, Pasay, Caloocan, Quezon, Manila, Marikina, Pasig, Taguig, Muntinlupa and Tagaytay, towns of Tanauan, Sto. Tomas and Malvar in Batangas province, towns of Silang and Carmona in Cavite province, town in Lucban in Quezon province, and town of Pateros in Metro Manila.

2.1.5 PEZA

Environmental management in PEZA-registered industrial estates is explicitly stated in the IRR of RA No. 7916 (The Special Economic Zone Act of 1995), specifically pertaining to Part X or Protection of the Environment.

PEZA provides supplementary support to DENR on the monitoring and compliance of the locator's environmental commitment contained in its Environmental Compliance Certificate (ECC) as required by virtue of Presidential Decree 1586.

Industrial estate developers are required to state in their Application for Ecozone Approval detailed information about their proposed/existing on-site facilities and utilities like, but not limited to, wastewater collection, treatment, disposal and recycling. Also, PEZA requires that the industrial estate developer has a liquid waste management program in its Environmental Management Program.

*Under Section 7 of RA7916, it is stated that all environmental laws and regulations...
“particularly PD 984, 1151, 1152, 1586, as well as RA Nos. 6969 and 7526, including Memorandum Circulars and DAOs and the corresponding implementing guidelines relevant to the operation of PEZA are adopted without prejudice to other rules and regulations that may be prescribed by the PEZA on environmental protection.”*

Generally, PEZA-locator contracts are different being dependent on the locator's choice of economic zone, whether it decides to locate in a public or private industrial estate. Concerns on environmental management are fundamentally stipulated in the ECC issued by the DENR to the locator. More specifically, under the special conditions of these contracts, the locator is mandated that :

“within ninety (90) days from the date of signing of this [Registration] Agreement, the Registrant shall submit to the PEZA's Enterprise Regulation Department a copy of the ECC issued by the DENR-EMB. The Registrant shall comply with all the conditions contained in the said ECC.”

2.2 Republic Act 9275 Provisions Affecting Wastewater Management

RA 9275, otherwise known as the Philippine Clean Water Act (CWA) was enacted into law in March 22, 2004. The Implementing Rules and Regulations of RA 9275 was issued through DENR Administrative Order (DAO) 2005-10 signed May 16, 2005.

The CWA primarily addresses the abatement and control of pollution from land-based sources and covers all water bodies such as fresh, brackish, and saline waters, and includes but not limited to aquifers, groundwater, springs, creeks, streams, rivers, ponds, lagoons, water reservoirs, lakes, bays, estuarine, coastal and marine waters.

Section 3, Rule 3 further stated the CWA applicability to marine pollution and disposal of effluents on land including the transport and offsite disposal of effluent, sewage and septage, whether offshore and on land.

Provisions of PD 984 relative to wastewater discharges were subsumed by CWA. Under the CWA, development projects including subdivisions, commercial establishments and manufacturing plants which generate and discharge wastewater into the environment are required to secure from the DENR the Discharge Permit and pay the corresponding load based fees.

The computation of the discharge fee in the IRR of the CWA is based on a net waste load which considers the situation that water to be used by a facility already contains certain pollutants and therefore the discharge fee will be based on the net wastewater load to be discharged.

Water pollution control provisions of PD 984 (Pollution Control Law) is superseded by the Philippine Clean Water Act.

The CWA integrates the management and control of wastewater and water quality management policies that were previously issued through various laws being implemented among various agencies. Other than PD 984, some of the laws cited in the CWA are the following:

- Sanitation Code of the Philippines
- Marine Pollution Decree
- Fisheries Code
- Republic Act 7916 (PEZA law)
- Presidential Decree 1586 (Environmental Impact Statement System) and
- Local Government Code.

The DENR is the lead agency tasked to implement and enforce the CWA and is accorded majority of the functions and responsibilities. The CWA enables the creation and delegation of new regulatory, planning and infrastructure development functions to agencies and subsidiary multi-sectoral bodies and on streamlining inter-agency coordination. Through the designation of **Water Quality Management Areas** (WQMAs) and the integration of water quality management framework, the CWA hopes to achieve coordination of functions of various agencies. The formation of WQMAs is in recognition of the fact that water pollution occurs within spatial scales.

Another key feature of the CWA is the institutionalization of the **Wastewater Charge System** as well as an effluent trading system as market-based instruments (MBIs) to promote waste minimization and encourage companies to invest in clean production technologies.

A number of provisions and requirements in the CWA are still in the infancy stage. Table 1 presents the CWA provisions that have a direct impact to industrial operations and the status of implementation as of June 2008.

Table 1 Status of Implementation of CWA Provisions Affecting Industries and Ecozones as of June 2008

Requirement	Implementing Agency	Status
Standards and Guidelines		
Enforcement, review & revision of water quality guidelines (sec. 19e)	DENR	Under revision but DAO 34 still applies
Review and setting of effluent standards (sec. 19f)	DENR	Under revision but DAO 35 still applies
Establishment of internationally-accepted procedures for sampling & analysis of pollutants (sec. 19g)	DENR	Under revision
Source Categorization		
Categorization of point & non-point sources of water pollution (sec. 19h)	DENR	For review
Revision and publication of a list of Categories of Industry Sector (sec. 12)	DENR	Draft / under study
Sewage and Septage Management		
Connection of existing sewage line in certain establishments to available sewerage system for highly urbanized cities (HUCs) (sec. 8)	Agency vested to provide water supply and sewerage facilities and/or concessionaires in Metro Manila and HUCs	-
Employment of septage or combined sewage-septage management system for non-highly urbanized cities (sec. 8)	DPWH, in coordination with DENR, DOH, and other concerned agencies	Partial implementation by MWSS thru MWCI/MWSI
Formulation of guidelines and standards for the collection, treatment and disposal of sewage (sec. 8)	DOH in coordination with other government agencies	Guidelines prepared by DOH
Formulation of guidelines for the establishment and operation of centralized sewage treatment system (sec. 8)	DOH in coordination with other government agencies	-
Wastewater Charge		
Formulation of wastewater charge formula (sec. 13)	DENR	DAO 2005-10
Wastewater for Agricultural Use		
Formulation of guidelines for the re-use of wastewater for irrigation & other agricultural uses & for the prevention, control & abatement of pollution from agriculture & aquaculture activities (sec. 22c)	DA in coordination with DENR	Guidelines prepared by DA under AO 26, Series of 2007

The EMB with support from the Japan International Cooperation Agency (JICA) has initiated the development of the framework plan and preparation of the National Water Quality Status Report. The following guidelines have been drafted through the JICA project for final review and approval of the DENR Secretary:

- Procedures for the Revision of Water Quality Guidelines
- Revised Water Quality Guidelines
- Procedural Guidelines on Classification/Reclassification of Surface Fresh Waters, Coastal and Marine Waters, and Groundwater
- Procedural Guidelines for Industry Categorization
- Procedural Guidelines for Establishing General Effluent Standards and Industry-Specific Effluent Standards
- Operations Manual of Compliance Inspection
- Revised Guidelines in the Accreditation of Pollution Control Officers
- Procedural Guideline for Prioritization of Polluters for Compliance Inspection
- Procedural Guidelines for Designation of Water Quality Management Areas
- Procedural Guidelines for Designation of Non-Attainment and Attainment Areas
- Reference Manual on Water Quality Management Area Action Planning and LGU Compliance Scheme
- Procedural Guidelines for Water Quality Management Area Action Planning and LGU Compliance Scheme.

Although these guidelines are still in the draft form, a review of guidelines that will affect wastewater management of industries and industrial estates are also discussed in the succeeding sections.

2.2.1 Categorization of Industries

The categorization of industries will be used in developing future industry specific effluent standards. The draft procedural guideline for categorization of industries which was undertaken through the JICA project will use the Philippine Standard Industrial Classification (PSIC) as basis for industry classification or categorization.

Compared to the 17 major industry divisions under the PSIC system, the industry categories under the draft guidelines are reduced to only five major categories, as follows:

- Agricultural
- Mining and quarrying
- Manufacturing (food)
- Manufacturing (non-food)
- Services and utilities

For non-point sources, the categorization will be based on available studies and information. The categorization will be as follows:

- Urban runoff
- Agriculture divided into upland, paddy, and animal husbandry
- Forestry
- Hydromodification / habitat alteration
- Road, highway and bridge.

2.2.2 Effluent Standards and Industry-Specific Effluent Standards

Under RA 9275 and Rule 19(f) of DAO 2005-10, the DENR shall review and set effluent standards every five years from the effectivity of the Act. In the interim, DENR Administrative Order 35, series of 1990 still applies.

In the interim, the Effluent Standards as embodied in DENR Administrative Order No. 35, series of 1990 still applies.

The basis for the updating of DAO 35 will be performance of monitoring and enforcement functions in the past as well as current data on water quality of receiving waters. Other considerations include studies on the maximum allowable levels of pollutants that may be discharged by facilities regardless of industry category, protection of the general public, and trends/status of compliance of various industries with the parameters. Achievable effluent limits and treatment performance of several technology and/or management practice options will be evaluated.

In the revision of existing Effluent Standards, a Technical Committee (TC) will be created by the DENR. The TC shall include representatives from government agencies, industry associations, research and development institutions, academe, among others.

2.2.3 Effluent Quotas

Rule 18 of DAO 2005-10 directs regional industrial centers established pursuant to RA 7916 to allocate effluent quotas to pollution sources subject to approval of the DENR. However, the allocation of effluent quotas to pollution sources only apply to developments that qualify under a Programmatic EIA. The Programmatic EIA shall be guided by defining the carrying capacity of the receiving environment. (*Rule 18*)

2.2.4 Pre-treatment Standards

The DENR may impose in the future pre-treatment standards for sources of pollution upon the recommendation of the operators of sewerage system or wastewater treatment facilities. While the guidelines for setting pre-treatment standards is still being developed by the DENR, the operators of these treatment systems may require, through contract, effluent sources to meet the standards for wastewater discharged into or treated by their respective facilities. (*Rule 8.2*)

2.2.5 Mandatory Connection to Existing Sewerage Lines

Rule 8.3 of DENR AO 2005-10 requires the mandatory connection to existing sewerage lines. The DENR shall withhold permits or refuse the issuance of ECC for establishments that fail to connect their sewerage lines to available sewerage systems.

2.2.6 Wastewater Charge System

2.2.6.1 Governing Principles of the Wastewater Charge System

Section 13 of the CWA directs the DENR to prepare a wastewater charge formula which will consider the following:

- Provide strong economic incentive for companies to modify their production or management processes or to invest in pollution control technology in order to reduce the amount of water pollutants generated
- Cover the cost of administering water quality management or improvement programs
- Reflect damages caused by water pollution on the surrounding environment including the cost of rehabilitation
- Type of pollutant
- Classification of the receiving water body; and
- Other special attributes of the water body.

Rule 13. Wastewater Charge System

A wastewater charge system is hereby implemented in all areas including non-attainment areas, the Laguna Lake Region and Regional Industrial centers through the collection of wastewater discharge fees from all sources of wastewater discharges to include, but no limited to, effluent from wastewater treatment plant (WTP) and sewage treatment plant (STP), and discharges from water treatment facilities.

2.2.6.2 CWA Formula for the Wastewater Charge System

Previous permitting system does not mention the volume and concentration of wastewater discharge, except for the Environmental Users Fee System of the LLDA. In Section 14 of the IRR of RA9275, the volume of discharge is now used to compute the fee.

In accordance with DENR AO 2005-10, the guideline for the computation of the Wastewater Charge System in all management areas including the Laguna Lake Region and Regional Industrial Centers was issued by the DENR. The system establishes the economic incentives for polluters to modify production or management processes or to invest in pollution control technology to reduce the amount of water pollutants generated and discharged to waterways.

Initially, the DENR has established the use of BOD or TSS as the priority pollutant parameters in the computation of the wastewater discharge fee. The computation of the wastewater discharge fee will be based on the following formula:

$$\mathbf{WDF = Ln \times R}$$

Where:

R is the rate per kilogram (PhP/kg) which is initially fixed at PhP5.00 per kilogram for priority pollutants (BOD or TSS)
Ln refers to the net waste load (kg/year).

The net waste load, Ln is computed further as follows:

$$Ln_{(BOD5/TSS)} = [(C_f - C_a) (Q_f \times N_f)] \times 0.001$$

Where:

C_f is the average daily effluent concentration limit (mg/L) for priority pollutant parameter
C_a is the average water quality concentration limit for priority pollutant parameter of abstracted or intake water (mg/L)
Q_f is the average daily volumetric flowrate or final discharge effluent (m³/day)
N_f is the total number of discharge days in a year (days/year).

The formula applies to all industrial and commercial wastewaters.

Recycling of Wastewater

For industries that recycle their wastewater without discharge into any water body or land, the industry shall be required to pay only the permit fee.

Industries in Ecozones

For industries located in ecozones, the wastewater discharge fee shall be paid by the operator of the wastewater treatment plant. However, industries within the ecozones which are not connected to the centralized wastewater treatment plant will be liable for the wastewater charges individually. (*Rule 13.9*)

Similarly, the operator of a sewage treatment plant is required to pay the wastewater charges for effluents from the treatment facilities and may claim sewerage fees from establishments that use the facilities. Those that are connected to the treatment plant are required to pay only the administrative fee to the DENR.

2.2.6.3 LLDA Environmental Users Fee System

In 1996, the LLDA exercised its authority to collect fees from those entities that pollute Laguna de Bay. Resolution No. 25 of 1996 promulgated the Environmental Users Fee System. It cited Section 3 of EO 927 and Section 4(k) of RA 4850 as the enabling legislation.

Resolution No. 33 of 1996 established the rules and regulations for imposing the EUF and also established the fees. The EUF was instituted “in order to make environmental efforts more effective, a market-based policy instrument in the form of a user fee will be implemented to complement the existing regulatory mechanisms.

The EUF system is primarily aimed at reducing the pollution loading into the Laguna de Bay by enjoining all discharges of liquid waste to internalize the costs of environmental degradation and enhancement into their business decisions or actions.

The rules and regulations include the following components:

- Established rules and regulations for administering discharge permits
- Established fees for dischargers
- Required quarterly self-monitoring reports
- Prohibited discharge of untreated wastes

The rules and regulations apply to all development projects, installations, and activities that discharge liquid waste into and pose a threat to the environment to include industrial, commercial, domestic, and agricultural sources.

The EUF is being phased in gradually. In its first year of implementation (1997), the EUF was applied to industries with BOD loads greater than 4,000 kg BOD. For the second phase, the EUF was expanded to include all industries, subdivisions, and commercial establishments as well as food chains and restaurants. LLDA is now considering how the EUF can be expanded to include individual residences.

Funds collected from the EUF are being used for the water quality management program and projects like investments in infrastructure, technical assistance centers and training. A fixed fee is charged to cover the administrative cost of implementing the environmental user's fee system and a variable fee which is based on the unit load of pollution computed as the product of the volumetric rate discharge and the effluent concentration.

Board Resolution 332, Series of 2007 (Modified Wastewater Charge System)

In line with the implementation of the RA 9275 and the need to harmonize LLDA's EUF system with the Wastewater Charge System of the CWA, LLDA Board Resolution No. 332, series of 2007 was issued on March 22, 2007. BR 332 has the following major provisions:

- a) Industrial or commercial establishment interconnected to a central wastewater or sewage treatment plant or facility is exempted from securing the Discharge Permit.
- b) Only one Discharge Permit is issued for one industry/establishment even if there are multiple outlets or outfalls provided that the outfalls are from a common project or facility in a contiguous geographical area.
- c) There are three types of fees for the Discharge Permit – Processing Fee (PhP5,000), Fixed Fee (Table __), and Variable Fee.
- d) Variable fee formula is based on the net waste load model of DAO 2005-10
- e) Net waste load shall be limited to industry/establishment who abstract water from surface water. If the source of water is from groundwater or water suppliers, the concentration of water intake shall be assumed as zero.

Table 1. Schedule of Fixed Fees Based on LLDA BR 332

Volumetric Discharge	Rate of	Conventional Effluent	Effluent with Heavy Metals
0 – 30 cum/day		PhP8,000.00	
0 – 150 cum/day			PhP16,000.00

> 30 – 150 cum/day	PhP16,000.00	
> 150 cum/day	PhP24,000.00	PhP24,000.00

BR 332 uses one priority pollutant, either Biochemical Oxygen Demand (BOD₅) or Total Suspended Solids (TSS) in the calculation of the variable fee. The unit rate of charge is PhP 5.00 per kg for complying and PhP30.00/kg for non-complying industries.

Table 2. Selection of Priority Pollutant Parameter for Variable Fee Computation

Type of Industry	Priority Pollutant Parameter
Beverage Industry	BOD
Cement, Concrete, Lime & Gypsum	TSS
Dairy Products	BOD
Ferro Alloy Manufacturing	TSS
Phosphate Fertilizer Industry	TSS
Nitrogen Fertilizer Industry	TSS
Grain Milling Industry	BOD
Inorganic Chemicals	TSS
Leather Tanning and Finishing	BOD
Livestock Industry	BOD
Meat, Fish and Fruit Canning	BOD
Slaughtering and Meat Products	BOD
Metal Engineering and Finishing	TSS
Mining Industry	TSS
Organic Chemicals	BOD
Petroleum Refining	BOD
Plastic Materials & Synthetics	BOD
Pulp & Paper Mill	BOD
Steel & Non-Ferro Industry	TSS
Cane Sugar	BOD
Textile Milling & Finishing	BOD
Thermal Power Generation	BOD

Source: LLDA BR332

Administrative fines are also imposed by the LLDA to firms without valid wastewater discharge permits. An administrative fine of PhP 5,000 per year is imposed on firms operating without a valid LLDA clearance, computed from the original date when the proponent initiated operations.

2.3 “Code of Sanitation of the Philippines”

The Code of Sanitation (PD 856) was promulgated in December 23, 1975 by then President Ferdinand E. Marcos. Since its promulgation, it has been the basis of rules and regulations imposed for health and sanitation. Chapter XVII of the Code of Sanitation particularly contained provisions on the collection, handling, transport, treatment and disposal of sewage, domestic sludge and septage.

In 1995, the DOH issued the Implementing Rules and Regulations (IRR) of Chapter XVII of the Code. The IRR prescribed guidelines on proper handling, treatment and disposal of sewage. Specifically, the IRR contains the following:

- Approved individual excreta and sewage disposal systems
- Proposed design and construction of septic tanks, leaching tile field and house sewers
- Requirements on public sewerage systems

With the continuous degradation of the river systems due to indiscriminate dumping of septage collected from individual septic tanks and the results of pollution surveys indicating that 70% of pollution load comes from domestic sources, the DOH in 2004 issued a supplemental IRR to cover stricter guidelines on collection, handling, transport, treatment and disposal of domestic sludge and septage.

2.4 Regulatory Requirements

2.4.1 Permits and Clearances

Environmental permits and clearances are issued by the DENR and/or the LLDA.

ECC

The first environmental regulatory requirement for industrial estates and locators is the Environmental Compliance Certificate under the provisions of PD 1586.

Applications for ECCs of Environmentally Critical Projects (ECPs) such as heavy industries, major dams, power plants, etc. are processed by the DENR Central Office while projects that are located in Environmental Critical Areas (ECAs) but are not ECPs are reviewed by the DENR-EMB Regional Office. Those enterprises which are located within the jurisdiction of LLDA apply for ECCs to the LLDA by virtue of DAO 61, series of 2004 (*Delegation of Authority to the General Manager of the LLDA to Grant or Deny the Issuance of ECC/Certificate of Non-Coverage (CNC) for projects located in ECAs within the Laguna de Bay Region*).

Projects which are classified as ECPs are required to submit an Environmental Impact Statement (EIS) while those that are ECPs are required to submit an Initial Environmental Examination (IEE) or IEE Checklist (if available). Those applying for Certificate of Non-Coverage are required to submit a brief description of the project.

The DENR has issued several revisions to the implementing rules and regulations of PD1586 to strengthen its enforcement. The most recent issuance is DAO 2003-30 which streamlined the procedural requirements for ECC applications.

Based on the procedural manual of DAO 2003-30, the type of ECC application is categorized into four. Category A projects are the ECPs while projects which are located in ECAs fall under Category B. Category C projects are those projects that enhance environmental quality or provide mitigation to existing environmental issue. An example of a Category C project is the construction of a centralized wastewater treatment plant or sewage treatment plant. Category D projects are those that are exempted from the ECC requirements. Table 2 presents the category of projects and the corresponding requirement for ECC applications.

Table 3. Category of Projects and Corresponding Documentary Requirement

CATEGORY		APPLIES TO	DOCUMENTS REQUIRED FOR ECC/CNC APPLICATION	AGENCY IN-CHARGE OF ECC PROCESSING	
A: Environmentally Critical Projects	A-1: New	Co-located projects	Programmatic EIS	DENR-EMB Central Office	
		Single Project	EIS	DENR-EMB Central Office	
	A-2: Existing and to be expanded (including undertakings that have stopped operations for more than 5 years and plan to re-start, with or without expansion)	Co-located projects	Programmatic EPRMP	DENR-EMB Central Office	
		Single Project	EPRMP	DENR-EMB Central Office	
		A-3: Operating without ECC			
B: Non-Environmentally Critical But located in an ECA	B-1: New	Single Project	IEE or IEE Checklist (if available)	EMB Regional Office / LLDA	
		Single Project	EPRMP (based on a checklist if available)	EMB Regional Office / LLDA	
	B-2: Existing and to be expanded (including undertakings that have stopped operations for more than 5 years and plan to re-start, with or without expansion)	Co-located Project	PEPRMP		
		B-3: Operating without ECC			
C: Environmental Enhancement or Direct Mitigation		Co-located or Single Projects	Project Description	EMB Regional Office / LLDA	

CATEGORY	APPLIES TO	DOCUMENTS REQUIRED FOR ECC/CNC APPLICATION	AGENCY IN-CHARGE OF ECC PROCESSING
D: Not Covered		Project Description or Proof of Project Implementation prior to 1982 (if applying for CNC)	EMB Regional Office / LLDA

New requirements were introduced in DAO 2003-30 such as the Programmatic Environmental Impact Statement (PEIS), Environmental Performance Report and Management Plan (EPRMP) and Programmatic Environmental Performance Report and Management Plan (PEPRMP). The PEIS applies to industrial estates or economic zones and is a documentation of comprehensive studies on environmental baseline conditions of a contiguous area. It also includes an assessment of the carrying capacity of the area to absorb impacts from co-located projects.

The EPRMP applies to projects which are already existing and are planning to expand.

Industrial estates that are planning to expand are similarly required to submit the PEPRMP. This is a documentation of actual cumulative environmental impacts of co-located projects with proposals for expansions. The PEPRMP should also audit and describe the effectiveness of current environmental mitigation measures and plans for performance improvement.

PEZA made a cooperative agreement with the DENR to reduce the processing time for ECC applications of ecozone locators for non-ECPs from 60 days to 20 working days. An IEE checklist was also developed by PEZA and DENR-EMB in lieu of the IEE report. Under this agreement, PEZA's Environmental Safety Group (ESG) reviews the accomplished IEE checklist within 8 working days as to accuracy and completeness. Upon submission of complete requirements by the locator, the PEZA-ESG issues an endorsement letter to EMB. After which, the EMB conducts its substantive review of the ECC application.

Discharge Permit

The Wastewater Discharge Permit is required to all owners or operators of facilities that discharge effluents into a water body. The application shall be filed with the EMB Regional Office or to the LLDA.

The permit fee or fixed component under DENR AO 2005-10 is set as follows:

Table 4. Annual Permit Fee Schedule

Volumetric Rate of Discharge	Annual fee (PhP)	
	Without heavy metals	With heavy metals
Zero Discharge	2,000	

Volumetric Rate of Discharge	Annual fee (PhP)	
	Without heavy metals	With heavy metals
Below 10 m ³ /day	2,000	2,600
>10 m ³ /day – 30 m ³ /day	2,200	2,800
> 30 m ³ /day – 100 m ³ /day	2,500	3,100
>100 m ³ /day – 150 m ³ /day	2,700	3,300
> 150 m ³ /day	3,300	3,900

Based on Rule 14.9, the Discharge Permit shall be valid for a maximum period of five years from the date of its issuance, renewable for 5-year periods.

Currently, EMB has limited capacity to validate all industry discharges, hence, would tend to rely on the reports by the regulated community. EMB will compute based on the projected load on the permit and the submitted self monitoring report (SMR). If there is a huge variance from the projected load due to change in technologies, etc., then, the regulated company will need to prove the reduction in waste load through inspections and self-monitoring reports. This change will be factored in the wastewater discharge fee for the succeeding year.

Discharge fee is computed on an annual basis which will be paid in advance by the company. If the company shows significant difference on the basis of the computation, then, the company must prove the variance to get the reduction.

Locators not connected to the centralized treatment plant must be required to secure their own discharge permit for the DENR.

A certificate of inter connection will be issued by the IE to the locators as basis for exemption of the load based fee imposed by the DENR.

2.4.2 PCO Accreditation

Pursuant to DENR AO-26, Series of 1992, Industrial, commercial and manufacturing establishments and private entities, whose activities are potential and actual sources of water, air, and land pollution, shall each appoint and/or designate a Pollution Control Officer. Such appointment/designation shall be subject to accreditation by the Department in accordance with Section 8 of DAO 26.

All accredited PCOs shall submit a periodic report to the respective DENR Regional Office or LLDA every quarter, or as often maybe required, based on the operation and maintenance of pollution source and control facilities concerned.

Any establishment failing to designate/appoint shall be fined or penalized in accordance with Section 27 of the Philippine Clean Water Act of 2004.

2.4.3 Reporting and Monitoring

2.4.3.1 LLDA Board Resolution No. 106, series of 1999 (Policy Guidelines Governing all Industrial Estates/Parks within the Laguna de Bay Region)

LLDA issued Board Resolution 106 is an important regulation that aims to develop guidelines towards self-regulation of industrial estates. BR106 outlines the policies, standards, monitoring, inspection and assessment protocols for implementing the EUF system for all industrial parks and their locators.

Section IV of BR106 specifically requires all new industrial estates within the Laguna de Bay region to install a centralized wastewater treatment facility that is capable of treating both physico-chemical and biological parameters. It also directs individual locators to connect to the centralized wastewater treatment facility.

Locators with wastewaters containing heavy metal are required to undertake pre-treatment prior to connection to the central facility. The management of the industrial estate are given the responsibility by LLDA to review and approve the design of the treatment facility as well as monitor compliance of locators with the pre-treatment standards imposed by the industrial estate.

In BR106, locators and the industrial estates are required by LLDA to secure their respective Discharge Permits, even if connected to the centralized wastewater treatment facility. But with the issuance of BR332, this particular provision was amended. Therefore, it is only the industrial estates which need to secure the Discharge Permit to LLDA.

The implementation strategy of BR106 required the execution of MOA between LLDA and the industrial estate.

3 WASTEWATER TREATMENT INFRASTRUCTURE IN ECOZONES

3.1 Economic Zones in the Philippines

There are a total of 105 economic zones located throughout the country. Around 44 percent of economic zones are classified as private while 50 percent are IT parks or buildings. There are only four public economic zones. These are located in Baguio, Cavite, Mactan (Cebu), and Bataan.

Table 5. Distribution of Economic Zones According to Type

Type of IE	Number of Economic Zones	No. of Locators
Government/Public	4	425
Private	46	535
IT Parks/Buildings	52	212
Tourism Economic Zone	3	3
Total	105	1175

Source: PEZA, January 31, 2007

From 886 locators in 2001, there are now 1,175 locators in economic zones in the country (January 2007). Forty-six percent (46%) of locators are inside privately-owned economic zones while 36 percent are in public industrial estates. Only around 4 percent of the ecozones have at least one locator or operating enterprise. Most of these are in the information technology parks or buildings. Detailed distribution of these economic zones and the number of locators is shown in Table 5-2.

Table 6. Locator Distribution in Industrial Estates

ZONE	Number of Operating Locator Enterprises
PUBLIC ECONOMIC ZONES	425
Baguio City Economic Zone	15
Bataan Economic Zone	45
Cavite Economic Zone	254
Mactan Economic Zone	111
PRIVATE ECONOMIC ZONES	535
Agus Industrial Estate	1
Amkor Technology Special Economic Zone	1
Angeles Industrial Park SEZ	3
Calamba Premiere Industrial Park SEZ	34
Carmelray Industrial Park I SEZ	24
Carmelray Industrial Park II SEZ	40
Cebu Light Industrial Park SEZ	4
CIIF Agro-Industrial Park - SEZ	1
Cocochem Agro-Industrial Park SEZ	4

ZONE	Number of Operating Locator Enterprises
Daiichi Industrial Park SEZ	5
EMI - Jolou Realty, Inc. SEZ	1
Filinvest Technology Park SEZ	4
First Cavite Industrial Estate SEZ	63
First Oriental Business & Industrial Park - SEZ	1
First Philippine Industrial Park SEZ	19
Food Terminal, Inc. SEZ	4
Gateway Business Park SEZ	14
Greenfield Automotive Park SEZ	5
Jasaan Misamis Oriental SEZ	1
Jose Panganiban - SEZ	1
Laguna International Industrial Park SEZ	22
Laguna Technopark SEZ	84
Leyte Industrial Development Estate SEZ	2
Light Industry & Science Park of the Phils. I	38
Light Industry & Science Park of the Phils. II	24
Light Industry & Science Park of the Phils. III	1
Lima Technology Center SEZ	13
Luisita Industrial Park SEZ	5
Macroasia Ecozone	2
Mactan Economic Zone II SEZ	50
MRI Ecozone	4
New Cebu Township	2
People's Technology Complex SEZ	17
Philtown Technology Park - SEZ	1
Plastic Processing Center SEZ	2
Rapu-Rapu Ecozone	1
Rio Tuba SEZ	1
Sarangani Economic Development Zone	1
SRC Calumpang Economic Development Zone	1
Subic Shipyard SEZ	3
Tabangao SEZ	1
TECO SEZ	2
Toyota Sta. Rosa (Laguna) Special Economic Zone	4
Victoria Wave Special Economic Zone	13
West Cebu Industrial Park SEZ	7
YTMI Realty Special Economic Zone	4
INFORMATION TECHNOLOGY PARKS/BUILDINGS	212
6750 Ayala Avenue Building	2
Arcenas Estate IT Building	1
Asia Town Information Technology Park	12
Bigfoot Information Technology Park	1
BPI Buendia Center	1
Convergys IT Building	1
DBP IT Plaza	1

ZONE	Number of Operating Locator Enterprises
Diliman IT Building	1
East Cyber Gate	1
Eastwood City Cyberpark SEZ	30
EDSA Central IT Center	2
E-Square Information Technology Park	12
Eugenio Lopez, Jr. Communication Center SEZ	1
Exportbank Plaza Building	7
Federated IT Park	1
Gateway Office Tower	1
Global Trade Center	1
G. T. Tower International	5
HTMT Cyber Park	1
HVG Arcade IT Park	1
Innove IT Plaza	1
Insular Life Building	1
JY Square IT Center SEZ	2
Leyte Information Communication Technology Park	1
Mango Square	3
Marvin Plaza Building	2
MSE Center	1
Multinational Bancorporation Centre	6
Northgate Cyberzone SEZ	16
Octagon IT Building	2
Orient Square IT Building	4
Pacific IT Center SEZ	1
PBCom Tower	13
Peoplesupport Center IT Building	1
Philamlife IT Building SEZ	1
Pueblo de Oro IT Park	1
RCBC Plaza SEZ	23
Riverbank Center ICT Bldg I	1
Robinsons Big R Supercenter Cainta Junction	1
Robinsons Cyberpark	4
Robinsons Equitable Tower SEZ	8
Robinsons Metro Bacolod	1
Robinsons Place Novaliches	1
SM CyberZone 1	1
SM iCity SEZ	1
Sta. Rosa Commercial IT Park	1
Summit One Office Tower SEZ	10
The Block IT Park	1
The Enterprise Center SEZ	10
UnionBank Plaza	8
V-tech Tower	1
Wynsum Corporate Plaza IT Building	1
TOURISM ECONOMIC ZONE	3
Eastbay Arts, Recreational and Tourism Zone	1
Fort Ilocandia Tourism Economic Zone	1
Misibis Resorts and Estates	1

ZONE	Number of Operating Locator Enterprises
TOTAL	1175

Source: PEZA, January 31, 2007

3.2 Wastewater Treatment in Economic Zones

There is limited information about the availability of centralized wastewater treatment facility in the various economic zones. In a study conducted in 2001 through the International Development Research Center (IDRC), economic zones with or without a centralized wastewater treatment facility was presented. The economic zones were classified into those “without CWTF” including those industrial estates with a facility but are not operational and to those without CWTF including those that are still under construction. Random sampling of economic zones was developed for purposes of the particular study. There were 13 industrial estates that have operational centralized wastewater treatment facilities while seven do not have wastewater treatment facilities.

Table 7. Profile of Selected Ecozones with Details about CWTF, 2001

Industrial Estate	Location	Region	No. of Locators	Public/Private	With/Without CWTF
Baguio City Economic Zone	Baguio City	CAR	15	Gov't	Without
Bataan Economic Zone	Mariveles, Bataan	3	63	Gov't	Without ^a
Cavite Economic Zone	Rosario, Cavite	4	264	Gov't	With
Mactan Economic Zone I	Mactan, Cebu	7	112	Gov't	Without ^b
Calmelray Industrial Park I	Calamba, Laguna	4	24	Private	With
Calmelray Industrial Park II	Calamba, Laguna	4	29	Private	With
First Cavite Industrial Estate	Dasmariñas, Cavite	4	56	Private	With
First Philippine Industrial Park	Tanauan, Batangas	4	12	Private	With
Gateway Business Park	Gen. Trias, Cavite	4	18	Private	With
Laguna International Industrial Park	Biñan, Laguna	4	26	Private	With
Laguna Technopark, Inc.	Sta. Rosa & Biñan, Laguna	4	63	Private	With
Light Industry & Science Park I	Cabuyao, Laguna	4	38	Private	With
Light Industry & Science Park II	Calamba, Laguna	4	24	Private	With
Lima Technology Center	Lipa & Malvar, Batangas	4	13	Private	With
Mactan EZ II	Mactan, Cebu	7	43	Private	With
Victoria Wave	Caloocan City	NCR	16	Private	Without
Eastwood City Cyberpark	Quezon City	NCR	10	Private	Without
Clark Special Economic Zone	Angeles, Pampanga	3	119	Gov't	Without ^b
Subic Bay Freeport Zone	San Fernando, Pampanga	3	67	Gov't	With
Food Terminal Inc.	Taguig, Metro Manila	NCR	158	Gov't	Without ^b

Note: All public autonomous IEs have been considered to be government/public IEs.

^a CWTF is not operational.

^b Construction of CWTF is expected to start within the year.

Source: IDRC, 2001

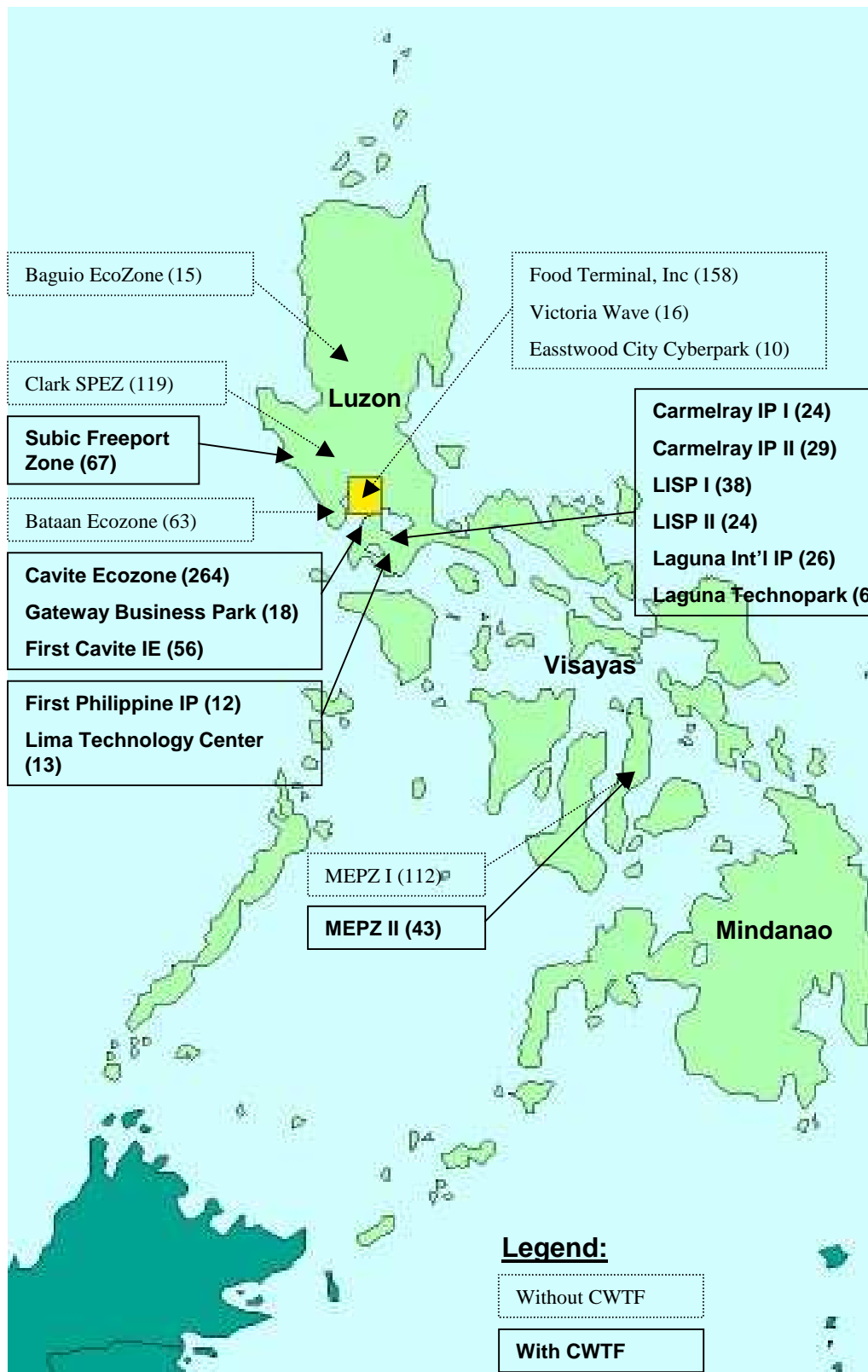


Figure 1. Location of Industrial Estates and Provision of CWTF

Source: IDRC, 2001

The industrial estates require the locators to pre-treat their process wastewater to approximate the characteristics of sewage prior to discharging to the centralized wastewater treatment facility. The CWTF are normally biological treatment facilities such as the conventional activated sludge and the sequencing batch reactors/digesters, which are adequate to treat domestic wastewater. If a firm produces only domestic wastewater, then this is discharged directly to the CWTF without any pre-treatment. In general, both domestic and process wastewaters are accepted by the CWTF provided that the wastewater characteristics satisfy the internal standards set by operator of the CWTF.

There is a wide variation in policies from one economic zone to another even among privately owned or publicly owned industrial estates. Apparently each economic zone is only obliged to follow the minimum requirements of PEZA (and DENR) and on top of that, specific standards or requirements can be instituted within their jurisdiction. This is true even with environmental management such as wastewater treatment. Table 8 tried to capture the differences and similarity among different industrial estates especially in terms of wastewater treatment.

Table 8. Wastewater Management Profiles of Industrial Estates

Industrial Estate	Sewerage/Treatment	Requirements
Baguio City Economic Zone Baguio City	Septic Tank	Requires pre-treatment
Bataan Economic Zone Mariveles, Bataan	Sewage treatment plant (currently not operational).	No CWTF
Cavite Economic Zone Rosario, Cavite	Two sewage treatment plants	Requires pre-treatment
Mactan Economic Zone I Mactan, Cebu	Sewerage system but no treatment.	No CWTF
Calmelray Industrial Park I Calamba, Laguna	Centralized sewerage collection & treatment facility.	Requires pre-treatment
Calmelray Industrial Park II Calamba, Laguna	Centralized sewage treatment plant	Requires pre-treatment
First Cavite Industrial Estate Dasmariñas, Cavite	Sewerage system connected to. CWTF	Requires pre-treatment
First Philippine Industrial Park Tanauan, Batangas	Centralized sewerage collection and treatment facility.	Requires pre-treatment
Gateway Business Park Gen. Trias, Cavite	Centralized industrial waste water treatment plant	No pre- treatment required
Laguna International Industrial Park Binan, Laguna	Centralized industrial waste water treatment plant	Requires pre-treatment
Laguna Technopark, Inc. Sta. Rosa & Binan, Laguna	Centralized treatment plant	Requires pre-treatment
Light Industry & Science Park I Cabuyao, Laguna	Centralized waste water treatment plant	Requires pre-treatment
Light Industry & Science Park II Calamba, Laguna	Centralized waste water treatment plant	Requires pre-treatment
Lima Technology Center Lipa & Malvar, Batangas	Centralized wastewater treatment facility	Requires pre-treatment
Mactan EZ II Mactan, Cebu	Wastewater treatment plant and storm drainage system.	Requires pre-treatment
Victoria Wave Caloocan City	Sewerage systems only, CWTF not operational	No CWTF

Industrial Estate	Sewerage/Treatment	Requirements
Eastwood City Cyberpark Quezon City	Wastewater disposal system	No CWTF
Clark Special Economic Zone Angeles, Pampanga	Sewerage/drainage system.	No CWTF
Subic Bay Freeport Zone Olongapo, Zambales	Centralized waste water treatment	No pre-treatment required
Food Terminal Inc. Taguig, Metro Manila	Sewerage system only	No CWTF

Source: IDRC, 2001

The most recent study that was undertaken related to reporting wastewater management systems in PEZA-registered economic zones was done through the EID project on baseline information for EID indicators. In that particular study, the wastewater generation and management at MEZ 1 and 2 were described.

The report stated that MEZ 1 already has a sewage treatment plant that was completed in August 2005. The plant is supposed to receive domestic wastewater from the firms at 4,700 – 4,800 cubic meters per day. Unfortunately, the STP was found to be not functioning fully due to some engineering flaws and is only receiving 800 cubic meters per day. MEZ 1 also has no system of monitoring wastewater generated by locators. Not all of the firms within MEZ 1 are tapped into the STP. Some of the locators use the storm drainage canals to discharge their domestic wastewater into the Mactan Channel, while other locators have installed their own STPs.

At MEZ 2, the STP is functional. The volume of wastewater is monitored by Aboitiz Land.

3.2.1 Effluent Standards and Pre-Treatment Requirements

LLDA has implemented interim effluent standards in four selected industrial parks with centralized wastewater treatment facility (Table 12). These ecozones are First Philippine Industrial Park (FPIP) and Lima Technology Center (LTC) in Batangas; Calmelray Industrial Park (CIP) I & II and Light Industry & Science Park I & II (LISP) in Laguna. These internal effluent standards are different from the standards for Inland waters Class “C” under DAO 35 as stipulated in Resolution No. 106 passed in 1999 by LLDA.

Table 9. Comparison of Interim Effluent Standards

Physico-Chemical Parameters	DENR Standards (“Class C”)	FPIP Batangas	LTC Batangas	CIP I & II Laguna	LISP I & II Laguna
BOD ₅ , mg/L	50	500	250	500	1000
TSS, mg/L	70	350	250	500	250
pH	6.5 – 9.0	6.0 – 8.0	6.0 – 9.0	6.5 – 9.0	6.5 – 9.0
Color, PCU	150	150	100	150	150
Oil/Grease, mg/L	5	10	5	50	10
COD, mg/L	100	800	500	1000	2000

3.2.2 Issues and Concerns of Ecozones and Locators on Wastewater Management

Industrial estates are specific areas that are zoned for industrial activity. Infrastructure and other services are provided such as roads, power, and utilities to facilitate the operation and growth of industries and to minimize impacts to the environment.

The competitive advantage of siting in an industrial estate are:

- Enhance the competitive advantage of the estate;
- Increase land-use efficiency;
- Increase land values in and around the estate;
- Reduce infrastructure and servicing costs;
- Encourage tenants not to move; and
- Reduce overall risk and environmental liability.

Other benefits are:

Companies	Society
<ul style="list-style-type: none"> • reduction in operating costs especially in materials, water and energy; • reduction in pre-treatment, transport and off site disposal costs for liquid, solid and hazardous wastes; • potential income from the sale of by products; • reduction in environmental liability and insurance costs; • improvement in public image; and • increase in employee productivity (recent studies suggest that environmentally-sound buildings can increase worker productivity by as much as 15 percent). 	<ul style="list-style-type: none"> • enhanced protection of natural ecosystems, habitats and landscapes; • more efficient use of resources such as land, water, energy and other natural resources; • the protection of cultural and archaeological resources; • reduced risks to human health and safety from industrial accidents and emissions; and • improved health for employees and human communities

Major environmental problems for the industrial sectors in industrial estates include:

- lack of environmental monitoring systems and necessary equipment in many industrial estates
- lack of financial resources for cost of implementing and maintaining of environmental protection facilities and performance in some industrial estates
- lack of suitable management organizations in some industrial estates
- some industrial estates are not equipped with the necessary environmental pollution control facilities such as wastewater treatment systems and solid waste management systems
- lack of an environmental operating standard that is accepted for all industrial estates

- In terms of wastewater management, the wastewater channeled to the centralized WTF of ecozones is covered by the existing effluent standards. The coverage of wastestreams from locators connected to the CWTF would be redundant. Monitoring, record-keeping, etc. would also be duplicative.
- IEs have not undertaken the programmatic EIA, hence, are not ready to allocate effluent quotas

4 PROPOSED PEZA POLICY DIRECTIONS ON WASTEWATER MANAGEMENT

4.1 Pre-Treatment Standards

A significant environmental benefit of locating industries within industrial estates is the opportunity to take advantage of economies of scale by providing common effluent and waste management facilities. At the same time, however, individual locators must be able to meet specific discharge or pre-treatment guidelines imposed by the industrial estate developer.

The pre-treatment standards depend on the industry mix and the type and scale of common treatment facilities. The standards for each locator should be detailed as part of the locator's contract with the industrial estate.

4.2 Self-Monitoring and Reporting

In the 1970s-1980s, the regulatory approach of the Government is the “command and control” approach, whereby violations of environmental regulations will automatically merit fines and penalties at in some instances closure of the company. This method resulted to confrontational setting between the DENR and the regulated community with few sustained compliance by industry.

In the 1990s, economic instruments such as polluter pays principle (PPP), guarantee funds, and financial liability schemes were introduced. The PPP for wastewater discharges was first introduced by the LLDA and to some extent merited the generation of funds for the management of Laguna Lake and is now legally outlined in the CWA.

The new approach that PEZA needs to look at is the “self-regulation” mode, whereby pollution prevention approaches, cleaner production, environmental management systems, and cooperation programs are introduced to industries and the industrial estates. In this way, the self-regulation mode allows the industry to comply with regulations based on self-interest such as wastewater reduction, savings in electricity, improvement of operations, etc. With this method come frequent sampling of locators during start-up and upset conditions. Once a record of consistent performance has been established, sampling for the parameters can be detailed.

Daily monitoring of liquid effluents is recommended for all the applicable parameters except for aromatics, metals, and sulfide which should be monitored on at least a monthly basis.



Industrial estates should encourage locators to analyze monitoring data, review it at regular intervals, and compare it with the operating standards so that any necessary corrective actions can be taken. Where feasible, industrial estates should educate the locators on ways to mitigate environmental problems.

There should be more effort at promoting preventive and voluntary initiatives such as cleaner production/pollution prevention as efficiency measures. PEZA also needs to promote less reliance on “end-of-pipe” controls whereby companies only look at standards and penalties and sanctions. The vision is that someday, environmental investments will not just be regulatory-driven but rather be part of the continuing business development and improvement objectives of all industries. We make IEs and locators realize that environmental management of a project is not only about treatment and disposal of wastes but also the management of other hidden costs such as production inefficiencies, future compliance cost, legal and financial liabilities, and image and relationship costs.

4.3 Provision of CWTF and Imposition of Pre-Treatment Standards

As outlined in the CWA, the provision of CWTF needs to be considered by IEs, most particularly proposed and new IEs. The industry locators are then mandated to connect to existing sewerage lines of the IEs. The CWTF operator of IE may then prescribe or impose pre-treatment standards to ensure proper operation of the CWTF and compliance with the Effluent Standards. This could be done through contract with the locators.

4.4 Programmatic EIA

As required in the new DENR Administrative Order 2003-30, new or expanding ecozones should be required to undertake the Programmatic EIA.

4.5 Effluent Quota System

The CWA provides for the imposition of the effluent quota system. In the absence of the guidelines from the DENR to implement this system, PEZA may in the meantime pilot an effluent quota system to new or expanding locators who are doing the programmatic EIA.

4.6 PEZA’s Role in Environmental Audit

PEZA should play a more active role in ensuring environmental compliance of locators and IEs. An annual environmental audit may be undertaken by PEZA. The audit will not necessarily entail regulatory and environmental sampling but more focused on looking at environmental requirements under the current regulations vis-à-vis compliance of the locators and IEs. This may be done by the development of a simple environmental compliance checklist for PEZA use.

It should be clarified from the start that PEZA is there to assist the locators and IEs in bridging compliance, anticipating possible non-compliance issues, and providing assistance to ensure compliance of its IEs and locators.

Appendix A. Category of Projects Under DAO 2003-30 of PD1586

Projects or Undertakings	Category		
	A	B ²	D – CNC
A. Heavy Industries			
1. Non-Ferrous Metal Industries			
Classified as large-scale industrial plants under the implementing rules and regulations of LOI no. 950;	=> 3,000 MT tons annual rated capacity of product	<3,000 MT product annual rated capacity of product	=< 1.0 MT annual rated capacity of product but not to exceed 200 MT of product annual rated capacity
Will process toxic non-ferrous metals such as cadmium, chromium, and lead.	=> 3,000 MT tons annual rated capacity of product	<3,000 MT product annual rated capacity of product	Use of toxic chemicals (e.g., Cyanide, cadmium, mercury) =<1 kg/month
2. Iron and Steel Mills			
Organized and coordinated arrangement of manufacturing processes designed to prepare or smelt or process iron ores, steel scraps or primary iron and steel mill products into marketable products except when process involves reheating or resizing only; and Classified as a large-scale industrial plants under the implementing rules and regulations of LOI no. 950	=> 3,000 MT product rated capacity	< 3,000 MT product rated capacity	=< 1.0 MT product rated capacity but not to exceed 200 MT of product annual rated capacity
3. Petroleum and Petrochemical Industries			
Refineries	>= 30,000 barrels annual production capacity	< 30,000 barrels annual production capacity	=< 1.0 barrels annual but not to exceed 200 barrels per year
Petrochemical industry projects	=> 30,000 tons annual production capacity	< 30,000 tons annual production capacity	=< 1.0 tons daily production capacity but not to exceed 200.0 tons per year
Storage of petroleum, petrochemical or related products		EIS: >= 5,000 MT capacity	< 20,000 L capacity
		IEE: < 5,000 MT capacity	
Recycling of oil and other petroleum-based chemicals		EIS: Processing => 10 MT per day	=< 1.0 MT daily processing capacity but not to exceed 200.0 MT per year
		IEE: Processing < 10 MT per day	
4. Smelting Plants	=> 15,000 MT annual rated capacity of raw materials OR Use of toxic chemicals >10.0 kg/month	< 15,000 MT annual rated capacity of raw materials OR Use of toxic chemicals < 10.0 kg/month	=< 1.0 MT daily production capacity but not to exceed 200.0 MT per year
5. Chemical Industries			
Manufacturing, processing and/or storage of hazardous and/or toxic materials		EIS: Use of toxic/hazardous materials >= 1.0 MT per month	Use of toxic/hazardous materials >= 1.0 Kg per month
		IEE: Use of toxic/hazardous materials < 1.0 MT per month	
Surface coating industries (paints, pigments, varnishes, lacquers, anti-fouling coating, printing inks)		EIS: => 30,000 MT annual production capacity	=< 1.0 MT daily production capacity but not to exceed

² **Category B** projects are *projects* or *undertakings* that satisfy these threshold/criteria AND are located in ECA.

Projects or Undertakings	Category		
	A	B ²	D – CNC
		IEE: < 30,000 MT annual production capacity	200.0 MT per year
Manufacture of agrichemicals		EIS: => 30,000 MT annual production capacity	=< 1.0 MT daily production capacity but not to exceed 200.0 MT per year
		IEE:< 30, 000 MT annual production capacity	
Pharmaceutical industries and manufacture of soap and detergents, health and beauty products, and other consumer products.		EIS: >= 50,000 MT annual production capacity	=< 1.0 MT daily production capacity but not to exceed 200.0 MT per year
		IEE: < 50,000 MT annual production capacity	
Manufacture of explosives, propellants and toxic chemical agents.		EIS: >= 5 MT daily production capacity	=< 100.0 Kg daily production capacity but not to exceed 2.0 MT per month
		IEE: >= 100.0 Kg but < 5 MT daily production capacity	
B. Resource Extractive Industries			
1. Major Mining and Quarrying Projects			
Mineral or ore-processing	>= 70,000 MT annual processing capacity (inputs)	< 70,000 MT annual processing capacity (inputs)	=< 1.0 MT daily processing capacity (inputs) but not to exceed 200.0 MT per year
Cement, other cement products, clinker, limestone and other non-metallic minerals processing plant.	>= 50,000 MT annual production capacity	< 50,000 MT annual production capacity	=< 1.0 MT daily production capacity but not to exceed 200.0 MT per year
Ceramic industries, manufacture of glass and glass products, manufacture and processing of calcium and other metallic minerals (e.g., copper, lead, zinc, sulfur, silver, magnesium and manganese)	>= 70,000 MT annual production capacity	< 70,000 MT annual production capacity	=< 1.0 MT daily production capacity but not to exceed 200.0 MT per year
Extraction of ores (on shore)			
<ul style="list-style-type: none"> Open pit method with mechanical operations, blasting or combinations thereof 	Regardless of capacity or area		
<ul style="list-style-type: none"> Other methods 	>= 150,000 MT per annum OR Mining area >= 25 hectares	<150,000 MT per annum AND Mining area < 25 hectares	=< 1.0 MT daily production capacity but not to exceed 200.0 MT per year
Limestone quarry and extraction of sand, stone and gravel and other non-metallic Minerals	>= 75,000 MT per annum OR Quarry area >= 20 hectares	<75,000 MT per annum AND Quarry area < 20 hectares	
Off-shore mining (including extraction of deuterium, oil and gas)	Regardless of capacity or area		
Coal mining	Regardless of capacity or area		
Extraction of Oil and Gas (on- shore)			
<ul style="list-style-type: none"> Extraction of oil 	>= 4,000 barrels (or equivalent) per day extraction rate	< 4,000 barrels (or equivalent) per day extraction rate	
<ul style="list-style-type: none"> Extraction of gas 	>= 250,000 cubic meters per day extraction/production rate	< 250,000 cubic meters per day extraction/production rate	
2. Forestry Projects			

Projects or Undertakings	Category		
	A	B ²	D – CNC
Logging Projects	Cutting of trees equivalent to $\geq 5,000$ cubic meters	Cutting of trees equivalent to $< 5,000$ cubic meters	Cutting of < 20 trees in an area < 5 hectares outside critical slopes
Major Wood Processing Projects	$> 4,000$ cubic meters (equivalent) of product per year	$> 1,000 - 4,000$ cubic meters (equivalent) of product per year	Less than on equal to $1,000$ cubic meters (equivalent) of product per year
Pulp and Paper Industries	$\Rightarrow 50,000$ MT annual production capacity	$< 50,000$ MT annual production capacity	
Introduction of Exotic Flora or Fauna	Regardless of number or area		
3. Dikes for/and Fishpond Development Projects			
Fishery/Aquaculture Projects (inland-based, e.g., lakes, rivers, bays, etc.)	≥ 25 hectares	≥ 1 hectare but < 25 hectares	< 1 hectare
Fishery/Aquaculture Projects in water bodies (coastal areas)	≥ 100 hectares	≥ 1 hectare but < 100 hectares	< 1 hectare
C. Infrastructure Industries			
1. Major Dams	Reservoir (flooded area) ≥ 25 hectares OR ≥ 20 million cubic meters capacity	Reservoir (flooded area) < 25 hectares AND < 20 million cubic meters capacity	
2. Major Power Plants			
Gas-fired thermal power plants	≥ 50.0 MW rated capacity	≥ 10.0 MW but < 50.0 MW rated capacity	< 10.0 MW rated capacity
Other thermal power plants (e.g., diesel, bunker, coal, etc.)	≥ 30.0 MW rated capacity	≥ 5.0 MW but < 30.0 MW rated capacity	< 5.0 MW rated capacity
Waste-to-energy projects including biogas projects	≥ 50.0 MW rated capacity	< 50.0 MW rated capacity	
Geothermal facilities	≥ 50.0 MW generating capacity	≥ 1.0 MW but less than 50.0 MW generating capacity	< 1 MW generating capacity
Hydropower facilities	Impounding ≥ 20 million cubic meters	Impounding < 20 million cubic meters	Run-of-river system
Renewable energy projects such as ocean, solar, wind, tidal power and fuel cell (for biogas and waste-to-energy projects refer to above)		EIS: ≥ 100 MW rated capacity IEE: ≥ 5 MW but < 100 MW rated capacity	< 5 MW rated capacity
3. Major Reclamation Projects	≥ 50 hectares	< 50 hectares	
4. Major Roads and Bridges			
Bridges and viaducts, new construction	≥ 10.0 Km	≥ 80 m but < 10.0 Km	< 80 m
Bridges and viaducts, rehabilitation/Improvement		$\geq 50\%$ increase in capacity (or in terms of length/width)	$< 50\%$ increase in capacity (or in terms of length/width)
Roads, new construction	≥ 20.0 Km (no critical slope) ≥ 10.0 Km (with critical slope)	< 20.0 Km (no critical slope) < 10.0 Km (with critical slope)	Farm-to-market roads of < 2 Km
Roads, rehabilitation/Improvement		$\geq 50\%$ increase in capacity (or in terms of length/width)	$< 50\%$ increase in capacity (or in terms of length/width)
Elevated roads, flyover/cloverleaf/interchanges		Regardless of size	
Tunnels and sub-grade roads and railways	≥ 1.0 Km	< 1.0 Km	
Pedestrian passages		Underpass	Overpass
On-grade railway system	New railways	Rehabilitation of railways	
5. Major Ports and Harbors			

Projects or Undertakings	Category		
	A	B ²	D – CNC
Airports		EIS: New projects OR major improvements (>= 50% extension/widening of runway) OR IEE: Minor improvements (< 50% extension/widening of runway) OR Private airstrip	Repair and rehabilitation of existing facilities (no expansion)
Causeways, Ports and harbors, new		EIS: >= 15.0 hectares reclamation OR >= 25.0 hectares (w/o reclamation) OR IEE: < 15.0 hectares reclamation OR < 25.0 hectares (w/o reclamation)	
Causeways, Ports and harbors, expansion or improvements		EIS: >= 5.0 hectares reclamation OR >= 10.0 hectares (w/o reclamation) OR IEE: < 5.0 hectares reclamation OR >= 1.0 hectares but < 10.0 hectares (w/o reclamation) [for Ro-Ro Projects: proponent can use the prescribed IEE Checklist]	< 1.0 hectares (w/o reclamation)
6. Irrigation, Water Supply or Flood Control Projects			
Water Supply Systems		EIS: more than six production wells and other systems (e.g., infiltration gallery, etc.) IEE: six or less production wells	
Water Supply System (Distribution only)		Level III	Level II and Level I
Irrigation System (distribution system only)		EIS: >= 1,000 hectares service area IEE: < 1,000 hectares service area	< 300 hectares service area
Impounding System or Flood Control Project		EIS: Reservoir (flooded area) >= 25 hectares IEE: Reservoir (flooded area) < 25 hectares	
7. Pipelines			
Fuel pipelines		EIS: Length >= 25 kilometers IEE: Length < 25 kilometers	
Other pipelines		EIS: Length >= 50 kilometers IEE: Length < 50 kilometers	

Projects or Undertakings	Category		
	A	B ²	D – CNC
8. Waste Management Projects			
Sanitary landfill for domestic wastes only		EIS: \geq 1,000 MT daily capacity IEE: $<$ 1,000 MT daily capacity	
Landfill for industrial and other wastes		EIS: Multi-users IEE: Single-user	
Materials Recovery Facilities		with composting facilities (see category of composting below))	Segregation only
Hazardous waste treatment, recycling, and/or disposal facilities (for recycling of lead, see details in <i>Heavy Industries</i>)		EIS: \geq 10.0 MT per year capacity IEE: $<$ 10.0 MT per year capacity	
Industrial and hospital waste (non-hazardous) materials treatment facilities		EIS: $>$ 50.0 cubic meters per day IEE: $<$ 50.0 cubic meters per day	
Domestic wastewater treatment facility		EIS: \geq 5,000 cubic meters daily capacity IEE: $<$ 5,000 cubic meters daily capacity	$<$ 30 cubic meters daily capacity
Receiving facilities, paper and plastic recycling		EIS: \geq 300,000 MT per annum to be treated IEE: $<$ 300,000 MT per annum to be treated OR involve use of chemicals	involve manual or mechanical processes only
Compost/fertilizer making		\geq 15 MT daily capacity or 5,475 MT annual capacity	$<$ 15 MT daily capacity or 5,475 MT annual capacity
D. Golf Course Projects			
Golf course projects/complex	\geq 9 hole golf course	$<$ 9 hole golf course	
E. Other Projects			
1. Buildings and other structures			
Family dwellings/apartment type			Regardless of area
Motels, Hotels, Condominium/Apartelles (residential) Commercial, [Business centers with residential units (mixed use), malls, supermarkets]		EIS: \geq 25,000 square meters (gross/total floor area including parking and other areas) IEE: \geq 10,000 square meters but $<$ 25,000 square meters (gross/total floor area including parking and other areas)	$<$ 10,000 square meters (gross/total floor area including parking and other areas) OR Kiosk-type or mobile fastfoods
Commercial, [office spaces only] Institutional and other related facilities: religious, government, and educational		EIS: \geq 50,000 square meters (gross/total floor area including parking and other areas) IEE: \geq 15,000 square meters (gross/total floor area) but $<$ 50,000 square meters (gross/total floor area including parking and other areas)	$<$ 15,000 square meters (gross/total floor area including parking and other areas)

Projects or Undertakings	Category		
	A	B ²	D – CNC
Institutional and other structures with laboratory facilities		Regardless of size or area	
Institutional and other related facilities: medical facilities		EIS: Tertiary hospitals or medical facilities IEE: Secondary or primary hospitals or medical facilities	Clinics (out-patient, health centers, dental clinics) including rural health units
Storage facilities, non-toxic/hazardous materials		>= 10,000.0 square meters (gross/total floor area)	< 10,000.0 square meters (gross/total floor area including parking and other areas)
Storage facilities, toxic or hazardous materials		EIS: >= 1,000 MT capacity IEE: < 1,000 MT capacity	< 100 Kg capacity
Subdivision and housing projects, resettlement projects and other similar (horizontal) land development projects		IEE: >= 10 hectares IEE Checklist: < 10 hectares	
Cemetery, crematorium, etc.		>= 5.0 hectares	< 5.0 hectares, OR funeral parlors, crematorium, columbarium
2. Agricultural Projects			
Livestock projects (Note: Only Contract growing is covered by the Philippine EIS System. Other livestock projects are deemed to be under the jurisdiction of the concerned LGU/s)		EIS: >= 100,000 heads poultry/birds OR >= 1,000 heads pigs/goats IEE: >= 10,000 heads but < 100,000 heads poultry/birds OR >= 100 heads but < 1,000 heads pigs/goats	< 10,000 heads poultry/birds OR < 100 heads pigs/goats
Agricultural plantation		EIS: >= 1,000 hectares IEE: >= 100 hectares but < 1,000 hectares	< 100 hectares
Agricultural processing facilities		EIS: => 50,000 MT annual production capacity IEE: => 5,000 MT but < 50,000 MT annual production capacity	< 5,000 MT annual production capacity
3. Textile, Wood, Rubber			
		EIS: => 50,000 MT annual production capacity IEE: < 50,000 MT annual production capacity	
4. Food and Related Industries			
Sugar Mills		EIS: => 50,000 MT annual production capacity IEE: < 50,000 MT annual production capacity	
Distillation and Fermentation Plants		EIS: => 50,000 MT annual production capacity IEE: < 50,000 MT annual production capacity	
Fruit and vegetable processing		EIS: >= 500 Kg daily processing capacity	

Projects or Undertakings	Category		
	A	B ²	D – CNC
		IEE: < 500 Kg daily processing capacity	
Processing of dairy products		EIS: >= 100,000 L (liquid) OR >= 100,000 Kg (solid) monthly production capacity	
		IEE: < 100,000 L (liquid) OR < 100,000 Kg (solid) monthly production capacity	
Coconut processing plants		EIS: >= 25,000 MT per month production capacity	
		IEE: < 25,000 MT per month production capacity	
Animal products processing (fish/meat processing, canning, slaughterhouses, etc.)		EIS: >= 10,000 Kg daily production capacity	< 500 Kg daily production capacity
		IEE: >= 500 Kg but < 10,000 Kg daily production capacity	
Food preservation (e.g., drying, freezing) and other methods aside from canning			Regardless of capacity (please see coverage under <i>building and other structures</i>)
Other types of food (and other food by-products, additives, etc.) processing industries		EIS: >= 50,000 MT annual production capacity (finished product)	
		IEE: < 50,000 MT annual production capacity (finished product)	
Leather and related industries		>= 1 MT raw hides per day (or 25 MT per month)	< 1.0 MT per day (or 25 MT per month)
5. Packaging Materials Industries			
Paper and plastic based products		>= 15,000 MT annual production capacity	< 15,000 MT annual production capacity
Glass-based products		>= 60 MT daily production capacity	< 60 MT daily production capacity
Metal-based products		>= 30 MT daily production capacity	< 30 MT daily production capacity
6. Tourism Projects			
Resorts and other tourism/leisure projects		EIS: >= 25 hectares	10 rooms/units OR 1,000 square meters in land area
		IEE: < 25 hectares	
		IEE Checklist: < 5 hectare	
7. Wildlife Farming or any related projects (as defined by PAWB)		Establishments or facilities for wildlife farming	

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