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Urban Development Sector Unit
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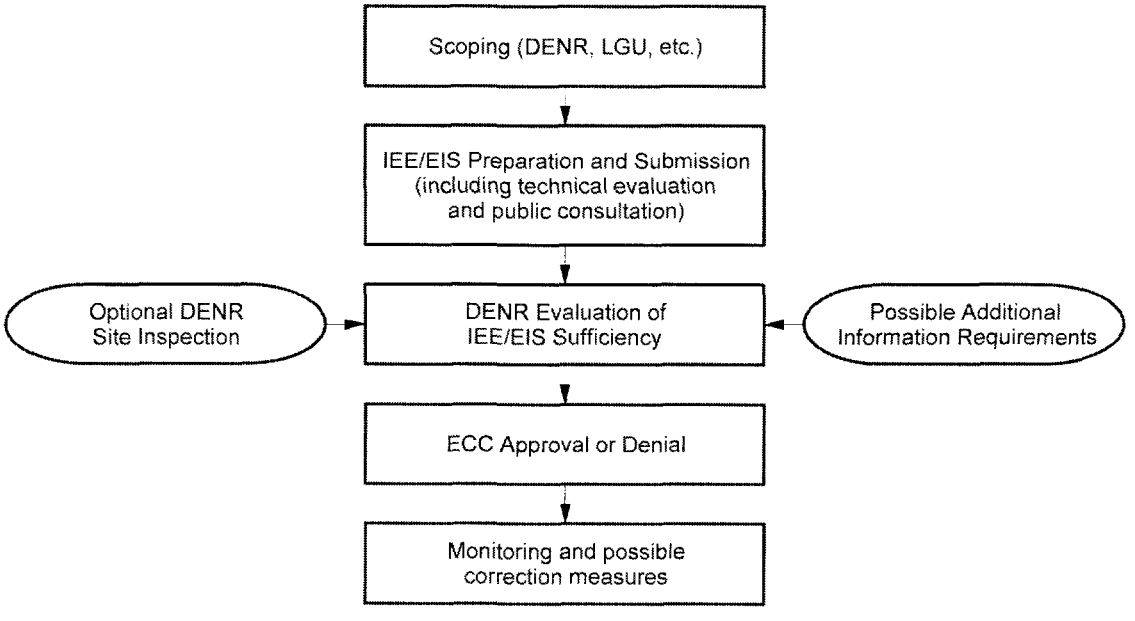
The World Bank
Washington DC, USA

LGU Urban Water Supply and Sanitation Project
The Philippines

Operational Manual: Environmental Assessment

Version 2, July 2000



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The findings and views expressed in this report are entirely those of the Consultant and should not be attributed in any matter to the World Bank or to its affiliated organizations

PREFACE

The present Environmental Assessment volume of the Operational Manual (2nd version) describes the methodology and process to minimize adverse environmental impacts and to include proper mitigation measures for the LGU Urban Water Supply and Sanitation Project (LGU-UWSSP).

The manual is a toolkit for the borrower and/or consultants to prepare the Environmental Impact Statement (EIS) reports, to obtain the required Environmental Clearance Certificate (ECC), and to safeguard appropriate environmental monitoring and management, according to both Philippines and the World Bank regulations. The various steps for conducting the assessment are summarized in a checklist. Additionally, the manual provides technical considerations for the possible project components water supply, sanitation, drainage, and wastewater disposal and management.

The operational manual will be subject to review during the implementation of the project, and will be updated with experiences and recent findings of the project if appropriate. Upon the request of the LGU or consultant, sample IEEs and an electronic version of the current manual can be provided.

Important parts of the present document have been extracted from the DENR DAO 96-37 Procedural Manual. In the case that any discrepancies would exist with the current DENR regulations, the latter will prevail. Also, it advised to contact the regional environmental unit of the World Bank if it appears that procedures do not correspond with the World Bank environmental regulations.

The operational manual will be subject to review during the implementation of the project, and will be updated with experiences and recent findings of the project if appropriate. Upon the request of the LGU or consultant, sample IEEs and an electronic version of the current manual can be provided.

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
APL	Adaptable Program Loan
BWP	Barangay Water Program
BWSA	Barangay Waterworks and Sanitation Associations
CALA	Cavite-Laguna Urban Development and Environmental Management Study
CAS	Country Assistance Strategy
CENRO	Community Environment and Natural Resources Office (DENR-RO)
DAO	Department Administrative Order
DBP	Development Bank of the Philippines
DENR	Department of Environment and Natural Resources
DENR-RO	DENR Regional Office
DILG	Department of Interior and Local Government
DOF	Department of Finance
DOH	Department of Health
DPWH	Department of Public Works and Highways
EA	Environmental Assessment
ECA	Environmental Critical Area
ECC	Environmental Compliance Certificate
ECP	Environmental Critical Project
EDCOP	Engineering and Development Corporation of the Philippines
EIA	Environmental Impact Assessment
EIARC	EIA Review Committee
EIS	Environmental Impact Statement
EMB	Environmental Management Bureau
EMP	Environmental Management Plan
EMPAS	Environmental Management and Protection Areas Sector (DENR RO)
EPM	Environmental Performance Monitoring
FS	Feasibility Study
GFI	Government Financing Institution
GOP	Government of the Philippines
Gpm	gallons per minute
IEE	Initial Environmental Examination
IESM	Institute of Environmental Science and Management
INFRACOM	Infrastructure Committee
IRA	Internal Revenue Allocations
IRR	Implementing Rules and Regulations (of Local Government Code)
LLDA	Laguna Lake Development Authority
LGU	Local Government Units
LGU-UWSSP	LGU Urban Water Supply & Sanitation Project
LWUA	Local Water Utilities Administration
masl	meters above sea level
mbsl	meters below surface level
MDC	Municipal Development Council
MDF	Municipal Development Fund
ME	Municipal Engineer

MHO	Municipal Health Officer
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MiP	Mitigation Plan
MoP	Monitoring Plan
MPDO	Municipal Planning and Development Officer
MWSS	Manila Waterworks and Sewerage System
NEDA	National Economic Development Agency
NIPAS	National Integrated Protected Areas System
NWC	National Water Commission
NWRB	National Water Resources Board
O&M	Operation and Maintenance
PAMB	Protected Area Management Board
PCSD	Palawan Council for Sustainable Development
PDC	Provincial Development Council/Coordinator
PENRO	Provincial Environment and Natural Resources Office (DENR)
PS	Private Sector
PSP	Private Sector Participation
PSPs	Provincial Water Supply, Sewerage and Sanitation Sector Plans
R&R	Resettlement and Re-allocation
RAP	Resettlement Action Plan
RWSA	Rural Waterworks and Sanitation Associations
RWSSP	Rural Water Supply and Sanitation Project
SEP	Strategic Environmental Plan (for Palawan)
SI	Sanitary Inspector (LGU/DOH)
SLA	Subsidiary Loan Agreement
TDS	Total Dissolved Solids
TSP	Total Suspended Particles
VIP	Ventilated Improved Pit (latrine)
WD	Water District
WDDP	Water Districts Development Project
WSS	Water Supply and Sanitation
WSSPMO	Water Supply and Sanitation Program Management Office (DILG)

SUMMARY CHECKLIST

Based on experiences in previous batches, the following checklist provides a general overview of the applied process and the various steps to be taken.

Preparations:

- ❑ Discussion with DILG-WSSPMO on the project schedule and coordination arrangements
- ❑ Discussion with the Engineering Consultant on cooperation and the various logistical issues
- ❑ Collection of existing data and reports on project areas

Environmental Assessment:

- ❑ Discussions with the LGU officials on the various environmental aspects and possible requirements
- ❑ Visit and assessment of the different filed sites
- ❑ Discussions on the findings with the LGU officials and Engineering Consultant
- ❑ Discussions on the project with the DENR Regional Office
- ❑ Preparation of a first draft EA/IEE report
- ❑ Presentation of the environmental aspects in the community consultations
- ❑ Updating and preparation of the draft EA/IEE report for LGU and WB approval
- ❑ Finalization of the EA/IEE report

EA/IEE Submission:

- ❑ Collection of the necessary signatures
- ❑ Copying of the report including all annexes
- ❑ Submittal of the EA/IEEs to the DENR Regional Offices
- ❑ Payment of DENR submission fees by the LGUs
- ❑ Regular Contact regularly about the status of the review

Monitoring (after receiving the ECC, before signing of SLA):

- ❑ Distribution of additional copies of the EA/IEE to all concerned parties (PMO, DILG, GFI, World Bank)
- ❑ Completion of PMU filing system with the official documents (EA/IEE, ECC, Land titles, etc.)
- ❑ Provision of copies of all official documents to the GFI and the WB
- ❑ Notification of the GFI on environmental conditions (for SLA)

Monitoring (after signing of SLA):

- ❑ Regular field inspections during the construction activities (PMU, PMO/GFI)
- ❑ Discussions with the Operators on environmental conditions (GFI)
- ❑ Submittal of quarterly compliance reports by the LGUs to the PMO/GFI
- ❑ Submittal of quarterly compliance reports by the LGUs to the DENR
- ❑ Submittal of Annual Environmental compliance reports by the PMO/GFI to the World Bank and DENR

1 GENERAL OVERVIEW OF THE EA PROCESS

1.1 Purpose of the manual

1.1.1 General

The goal of the LGU Urban Water and Sanitation Project is to support a program of investments in independently operated/managed Water Utilities. This is consistent with GOP sectoral objectives of expanding water supply and sanitation service coverage on the basis of demand, and of facilitating private sector participation in service coverage. The individual projects may involve any or all of the following in participating LGUs:

- Construction, expansion or rehabilitation of reservoirs, wells and intake structures, transmissions mains and pumping stations, and treatment and distribution systems;
- Provisions for operation and maintenance of the above mentioned systems;
- Establishment or strengthening of metering, billing and collection functions; and
- Strengthening of overall water utility management;
- Improvement of sanitary conditions (toilets, wastewater disposal, drainage).

It is the responsibility of the borrower (i.e. the LGU) to carry out Environmental Assessments, both required within the Philippines and the World Bank regulatory framework, and to obtain the environmental clearances for each individual project before starting of construction. Thus, environmentally sound practices have to be incorporated into the project design, and possible negative impacts will have to be mitigated to acceptable levels.

The present volume of the Operational Manual describes the methodology and process to minimize adverse environmental impacts and to include proper mitigation measures. The manual is a toolkit for the borrower and/or consultants to prepare the Initial Environmental Examination (IEE) reports and to obtain the required Environmental Clearance Certificate (ECC). The manual does not intend to provide full IEE "*blueprints*"; own analysis and initiatives will always be required during each IEE preparation.

The proposed methodology is mainly based on and combines the following guidelines and documents:

- DENR Administrative order No. 96-37: Revising DENR administrative order No.21, series of 1992, to further strengthen the implementation of the Environmental Impact Statement (EIS) system. (1996; Annex A. I);
- DENR DAO 96-37 Procedural Manual (electronic copy[1]; January 1997);
- World Bank OP, BP, and GP 4.01: Environmental Assessment (1999; Annex B. I, Annex B. II, Annex B. III, respectively);
- World Bank Operational Directive 4.30: Involuntary Resettlement (1990; Annex B. IV);
- NEDA Board resolutions 5 on the national policy and strategy on urban sewerage and sanitation (1994; Annex A. II) and 12 on the common definitions and terms in water supply, sewerage and sanitation (1995; Annex A. III).

[1] Selected parts of the present document have been extracted from the DENR files.

- Implementing rules and regulations of Chapters II "*Water Supply*" and XVII "*Sewage collection and disposal, excreta disposal and drainage*" of the Code of Sanitation of the Philippines (P.D. 856, Annex A. V and Annex A. VI, respectively)
- Water Code of the Philippines and the implementing rules and regulations, P.D. 1067 (National Water Resources Board, 1979; Annex A. VII).

Additional references and background documentation are listed in Chapter 6.

1.1.2 Report outline

Chapter 1 provides a general introduction to the Environmental Assessment process, including background information on institutional and policy developments in the environmental and the water sector in the Philippines. Chapter 2 provides an overview of the formal procedures to be applied for the preparation of the IEE/EA reports. To secure the appropriate environmental safeguards, Chapters 3 and 4 elaborate on the main report components and specific technical guidelines, respectively. Monitoring and follow-up activities are provided in Chapter 5. Main references and additional background materials are listed in Chapter 6.

1.2 Policy, legal and administrative framework

1.2.1 Environmental Assessment in the Philippines

The Philippine Environmental Impact Statement (EIS) system was established in 1979 (Presidential Decree (PD) No. 1586). Since then, the EIS system has undergone several refinements/revisions to make it a more effective planning, management and regulatory tool in addressing environmental problems in the country. The Department of Environmental and Natural Resources (DENR) has consistently strengthened the process by introducing new features and requirements to adapt the system in response to changing economic realities and growing environmental consciousness of the Philippine population.

The latest is the DAO 96-37, a revision of DAO 21, Series of 1992, streamlining the EIS system while strengthening the processes for its implementation. The revised administrative order addresses in particular regulations to:

- Ensure that environmental considerations are incorporated at the earliest possible stage of project development;
- Further streamline the current procedures in the conduct of the Environmental Impact Assessment (EIA) in order to improve its effectiveness as a planning, regulatory and management tool;
- Enhance maximum public participation in the EIA process to validate the social acceptability of the project or undertaking so as to ensure the fullest consideration of the environmental impact of such project or undertaking.

The EIS system covers projects and undertakings categorized as Environmental Critical Projects (ECPs)[2] and projects located in Environmental Critical Areas (ECAs)[3]. All

[2] ECPs include heavy industries, resource extractive industries, infrastructure projects and golf course projects.

[3] ECAs include all areas declared by law as national parks, watershed reserves, wildlife preserves and sanctuaries; areas set aside as aesthetic tourist spot; areas which constitute the habitat for any endangered or threatened species of indigenous Philippine wild life (flora and fauna); areas of unique historic

projects or undertakings falling within these categories are required to first secure an Environmental Clearance Certificate (ECC) prior to construction and operation. The DENR Secretary or the Regional Executive Director issues the ECC. It certifies that based on the representation of the preparer, as reviewed and validated by the Environmental Impact Assessment Review Committee (EIARC), the proposed project or undertaking will cause an acceptable environmental impact and that the proponent has complied with the requirement of the EIS system.

The Environmental Impact Assessment Division of the Environmental Management Bureau (EMB) and Regional Offices of the DENR confirmed that the proposed individual project towns fall within the ECA category. Its justification is based on the fact that (i) non-of the descriptions of the DENR critical projects fit the proposed interventions, and (ii) that no major negative impacts are expected. The above implicates the necessity to prepare Initial Environmental Examination (IEE) for each of the separate towns[4]. An IEE[5] is a document required of proponents describing the environmental impacts of, and mitigation and enhancement measures for, projects or undertakings located in an ECA.

In some cases, aside from the national regulations, specific regional environmental regulations or considerations may prevail (e.g. Palawan, Laguna Lake area, Manila, etc..). For example, in the Palawan province approval of the Palawan Council for Sustainable Development (PCSD) has to be obtained (i.e. Republic Act 7611, see Annex C. I). The mandate of the PCSD, established under the Office of the President, is to govern, implement and direct the policy for the Strategic Environmental Plan (SEP).

1.2.2 World Bank EA requirements

World Bank procedures for environmental screening are described in the Operational Policy 4.01: Environmental Assessment (1999; Annex B. I to this manual). As the current project basically focus on environmental mitigation by improving community access to safe water and improved sanitation, the project has been assigned to the Category B. This implies the requirement of the preparation of an environmental analysis or limited Environmental Assessment. Major environmental issues to be addressed include adverse impacts in terms of protection of watersheds, wastewater discharge, and draw down of groundwater (section 3.3).

Special attention should be paid to public participation, possible involuntary resettlement and compensation for loss of income due to the development of the water supply

archeological or scientific interest; areas which are traditionally occupied by cultural communities or tribes (indigenous cultural communities); areas which are frequently visited and/or hard-hit by natural calamities; areas with critical slopes; areas classified as prime agricultural lands; recharge areas of aquifers; water bodies tapped for domestic purposes, controlled and/or protected by appropriate authorities, or which supports wildlife and fishery activities; mangrove areas with primary pristine and dense young growth, adjoining mouth of major river systems, near or adjacent to traditional productive fry or fishing grounds, which acts as natural buffers against shore erosion, strong winds and storm floods, or on which people are dependent for their livelihood; Coral reefs with 50% and above live coral cover, with spawning and nursery grounds of fish, or which acts as natural breakwater of coastlines.

[4] Although in some cases it may even not be necessary that an IEE has to be prepared according to DENR guidelines, it is recommended to submit IEEs as a standard procedure. This will prevent unforeseen surprises in a later stage of the project preparation, and hence delay in the implementation the projects.

[5] The IEE replaces the Project Description (PD) required under DAO 21, series of 1992.

systems according to WB regulations (OD 4.30: Involuntary resettlement, see Annex B. IV). Key issues include the necessary compensation for land acquisition and the possible displacement of people and resettlement. Details are given in the Operational Manuals on Public Participation and Economic Compensation prepared as separate Volumes.

As most of the necessary constructions for the water supply systems are small, resettlement and land acquisition are not major issues in the current project. However, if applicable, the relevant measures have to be incorporated into the Environmental Management Plan (EMP) of the various towns (section 3.3.1).

The substantive requirements for World Bank Category B projects (i.e. OD 4.01: Environmental Assessment, see Annex B. I) overlap to a large extent with the Philippine IEE requirements (see Annex A. I). In order to facilitate a smooth implementation and environmental screening, an IEE model combining both the EA requirements of the WB has been developed. As such, the IEE is equivalent to the required EA, including the environmental baseline data, presentation of alternatives, Environmental Management and Monitoring plans.

WB Environmental clearance will be obtained through a general monitoring process of the project as a whole (see Chapter 5). In practice, WB clearance of the individual IEEs is given if (1) the environmental assessment is implemented, (2) the ECC is obtained from DENR, and (3) monitoring is secured according to the procedures described in this manual, prior to the start of the construction.

1.2.3 Other

Additional to the Philippine and World Bank regulations, the Government Financial Institution (GFI) may have its own environmental guidelines and procedures. As the GFI will be the direct lending agency for the LGUs, they will also be responsible for implementation, environmental monitoring and reporting of the individual projects.

For example, the DBP published in 1999 a series of environmental guidelines to be applied by prospective clients (DBP, 1999a-f). The guidelines describe and elaborate on the various regulations in the Philippines (section 1.2.1). The most relevant sections of the guidelines include proposed Environmental Performance Monitoring (EPM) forms for construction and operational activities (see Annex C. II) and DBPs General Environmental Covenants and Warranties (Annex C. III). Application of the latter however should be checked with the actual conditions agreed upon in the SLA.

1.3 Project preparation cycle

Project preparation, including all environmental assessment activities, is coordinated through the WSSPMO of the DILG.

The environmental assessment should be closely coordinated with the other project preparation activities (e.g. engineering design, economic analysis, SB and community consultation). The IEE preparation should start simultaneously with the initial (engineering) assessment and pre-feasibility study in order to include all environmental aspects in to the selection process and engineering design right from the beginning. The

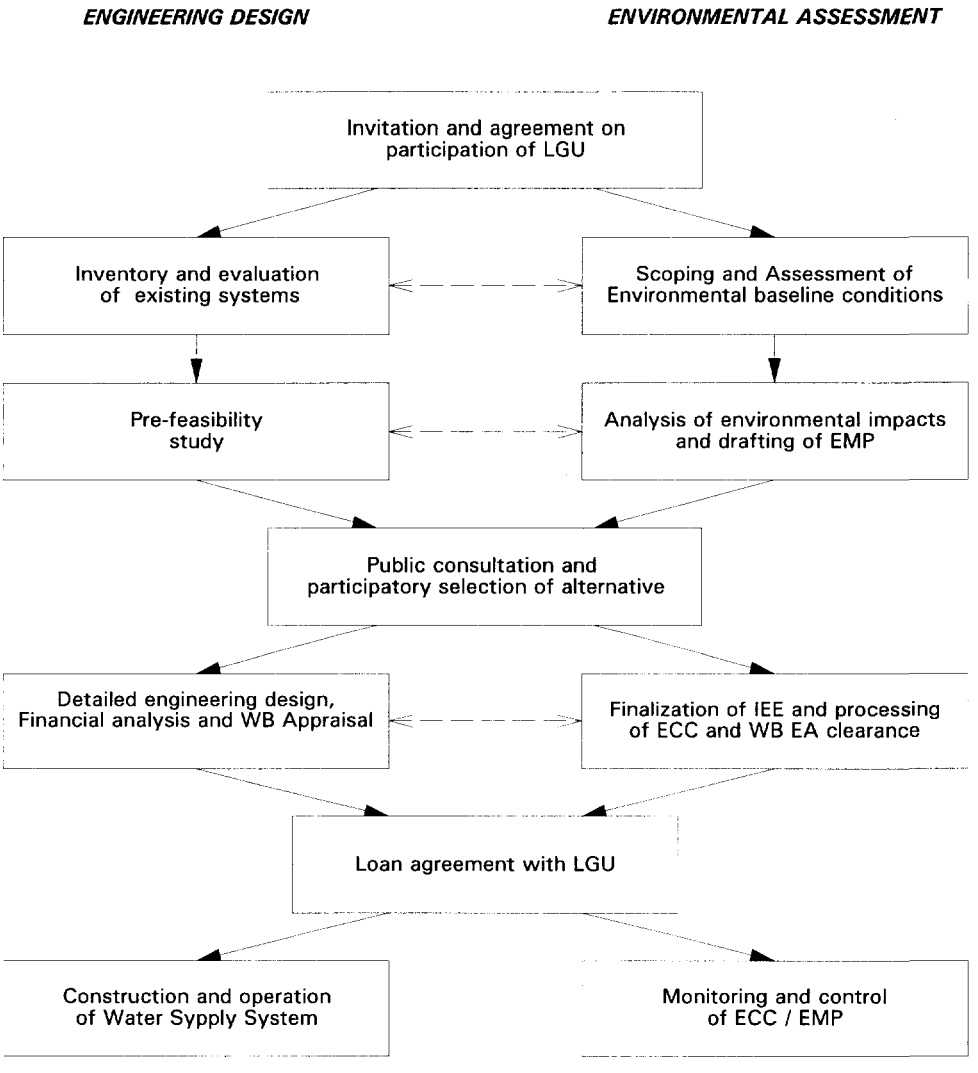
IEE preparation and ECC processing should be completed before the signing of the loan agreement with the LGU.

Figure 1 shows schematically the project procedures indicating the scheduling and coordination of the EA activities. The main steps include:

- (non-formal) Scoping meetings (see also sections 1.4 and 2.3.3);
- Inventory of the environmental baseline conditions (section 3.2).
- Potential environmental impacts, direct and indirect, including opportunities for enhancement (section 3.3).
- Systematic environmental comparison of alternative investments, sites, technologies and designs, including all the significant adverse environmental impacts that are anticipated.
- Drafting of mitigation or environmental management plan (EMP).
- Community consultation and participatory selection of WS alternative;
- Submission to and clearance of DENR and the World Bank;
- EMP Compliance Monitoring (Chapter 5).

Although the DILG will still be involved in the discussions and support of the LGUs after the SLA between the LGU and the GFI has been signed, the GFI takes over the formal responsibility of the implementation and the subsequent environmental monitoring (Chapter 5).

Figure 1 Schematic presentation of EA scheduling



1.4 Public consultation and participation

Both Article IV of the DENR DAO 96-37 and the WB OD 4.01 emphasize the importance of public participation and a transparent EIS process in gaining understanding and achieving social acceptability for a project or undertaking. The goal of public participation is to enable citizens to take responsibility for environmental protection and management through active involvement in decision making. Within the process of IEE preparation, participation of the local authorities and population is secured through regular consultations during the entire EA process (similar to World Bank "*stakeholder workshops*").

The public consultations must be sufficiently integrated into the process of the formulation and evaluation of technical alternatives. Therefore, it is recommended to include the public consultations on environmental issues during the multiple public hearings to be organized during the technical assessment, feasibility study and design. The consultations may deal with the environmental aspects of any or a combination of the following themes:

- The proponent, in terms of responsibility towards the area and the community;
- The impact study, as an impact assessment tool;
- The project, including its elements, its implementation and related development;
- The elements and features of the environment likely to be affected by the project;
- The impact, as assessed;
- The options, as studied and assessed;
- Monitoring, follow-up, and mitigating measures;
- Negotiated settlements/compensations
- Assurances and guarantees for compliance to the environmental management plan
- Procedures and grounds for appeals

Details on the organization of the public hearings/consultations are given in the specific chapters of the Operation Manual on Participation and Public Consultation.

Public consultations should be conducted for projects in environmentally critical areas. These public consultations or workshops are structured group meetings where a variety of key stakeholders groups share knowledge and work toward creating a common vision. Unlike a public hearing, a public consultation is by invitation only, and there is no required public notice. Instead, the public consultation is used specifically to address and resolve concerns brought to the attention of the DENR regional office. The project proponent or a designated representative must be present during the public consultation to respond to comments and questions.

To increase the impact and success of the public consultations on environmental issues, planning them should focus on:

- The goals and agenda should be realistic and not be over-ambitious;
- Participants should be well informed on the scope of the public consultation, as the sessions are only as valuable as the relevance of opinions and knowledge that the participants bring to the table;
- The workshop facilitator's job often requires a keen political insight as well as communication and group skills;
- The floor time allowed to the DENR representative, the project proponent and EIA preparers should be limited and defined so not to limit the time allocated for public participants.

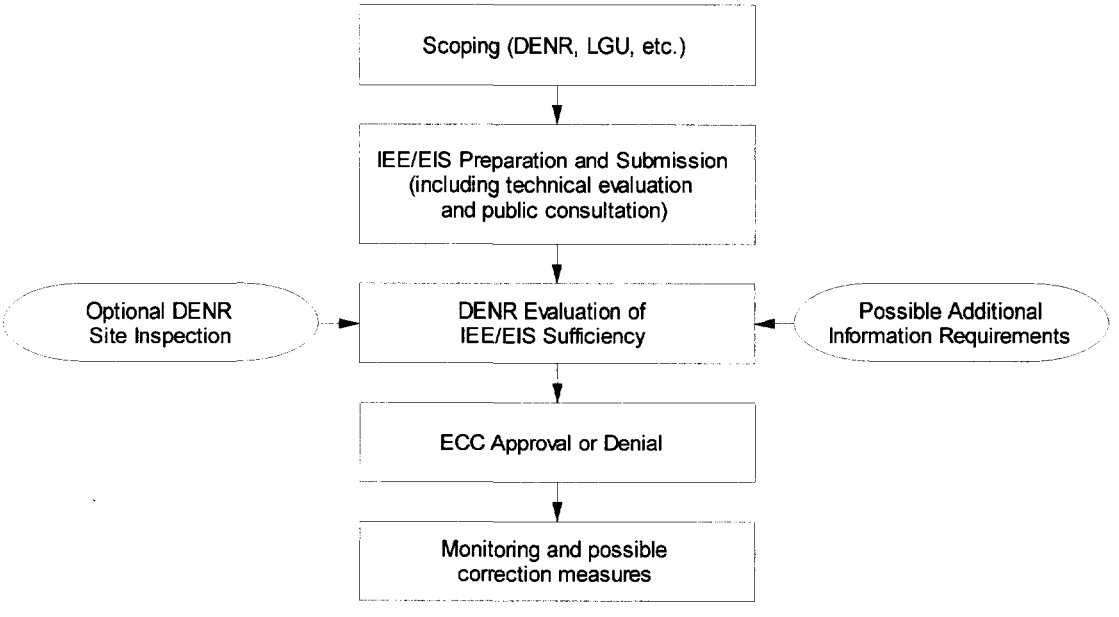
The process of public participation should be documented and annexed to the IEE (see section 2.3.3). Also, proof of social acceptability based on the results of the public consultations should be annexed to the IEE (see section 2.3.4).

2 FORMAL PROCEDURES

2.1 Introduction

Implementation of the individual LGU projects can only start after the clearance by DENR/RO. Upon the satisfactory incorporation and mitigation of environmental concerns in the project (i.e. IEE document), DENR will issue a required ECC. Figure 2 illustrates the different steps and procedures in the IEE preparation process, as instructed by DENR. Further monitoring of the actions and agreements in the ECC will be required during the construction and operational phase.

Figure 2 Flowchart for the formal IEE preparation procedures



Although it is not anticipated that the size and impacts of the proposed interventions will require the preparation of the more extensive Environmental Impact Statement, in some case the DENR or the World Bank may request additional information. Details on possible additional requirements are elaborated in section 2.5.

2.2 Mandatory IEE/EA contents

The proposed contents of the IEE model for each town will include at least:

- Table of Contents
- Executive Summary (brief description of substantive content)
- The substantive report, including project description, methodology for data gathering, description of environmental setting, impact identification and assessment, Environmental Management Plan, and Recommendations;
- References/Bibliography.

Furthermore, as elaborated in section 2.3, administrative annexes and requirements should at least include the following items:

- List of IEE Preparers and their respective expertise area in the IEE;
- Sworn Accountability Statements of key IEE Preparers (section 2.3.1);
- Sworn Accountability Statement of Project Proponent (section 2.3.2);
- Process Documentation (section 2.3.3);
- Proof of Social Acceptability (section 2.3.4);

The proposed Table of Contents of an IEE is given in Figure 3. Sample IEEs prepared during the first batch are attached is included in Appendix A. However, it should be realized that the proposal is only indicative, as certain conditions may require additional data or information to be incorporated in the IEE. The procedures for the preparation of the substantive report are elaborated in Chapter 3.

Figure 3 Proposed Table of Contents

Executive Summary
1 INTRODUCTION
2 PROJECT DESCRIPTION
3 DESCRIPTION OF THE ENVIRONMENT
4 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES
5 RECOMMENDED ENVIRONMENTAL MANAGEMENT AND MITIGATION PLAN
6 ENVIRONMENTAL MONITORING PLAN
7 ENVIRONMENTAL MANAGEMENT AND TRAINING
8 RECOMMENDATIONS
9 CONCLUSION
References

List of Annexes
Annex 1 List of EA preparers
Annex 2 Sworn accountability statement of project proponent
Annex 3 Sworn accountability statements of key IEE preparers
Annex 4 Process documentation
Annex 5 Proof of social acceptability

2.3 Administrative requirements

2.3.1 Accountability statements of the project proponents

In accordance with the provisions of DAO 96-37, the role and responsibilities within the EIS system of the proponent include:

- To conducts an EA in accordance with prescribed guidelines;
- To submit an accurate IEE along with an accountability statement (a standard form of an accountability statement is included in Annex A. IX);
- To be jointly responsible with the preparer for the veracity of the EIS;
- To prepare and submits periodic compliance reports to the EMPAS/EMB as required (see section 5);
- To Comply with the standards and guidelines on public participation and social acceptability.

The Mayor of the LGU will be the formal proponent for each separate project, and has to sign the required accountability statement. The proponent should be backed by a signed resolution of the SB, approving the LGUs support to participate in and agree to the condition of the project prior to the signing of the Subsidiary Loan Agreement (SLA).

2.3.2 Accountability statement of the Accredited preparer

To maintain the integrity of the EIS system, the DENR is implementing a system of accreditation to screen individuals and professionals who are eligible to actually prepare an EIS/IEE. DENR-ROs can accredit Environmental Associates based on the EMB accreditation criteria. An individual or organization (e.g. single proprietorship, partnerships, firms, environmental units) can apply for accreditation as an eligible EIS/IEE preparer. At the minimum, any individual who has attained a Bachelor's degree in engineering, natural, physical or social sciences can apply for accreditation.

The proponent/project preparers have mainly two choices in selecting the accredited IEE preparer, which could be different for each subproject or IEE submission. These include:

- The proponent, in cooperation with DILG/PMO, contracts or designate an accredited Consultant for preparation and submission of the IEE;
- DILG/WSSPMO takes over the responsibility for the IEE submission. In this case, DILG/WSSPMO should arrange for the accreditation of the organization. Procedures for non-individual accreditation are included in Annex A. XI.

As annex to the IEE, an accountability statement of the IEE preparer has to be included. An example of the accountability statement is included in Annex A. X.

2.3.3 Documentation of the EA Process

The EA process of scoping, public hearings and, if applicable, dispute/conflict resolution (see section 2.3.4) has to be documented and annexed to the IEE. The EA Process Documentation is a brief summary of the applied methodology and activities, including:

- Representation of participants;
- The issues, concerns, and interests addressed;
- The sequence of significant activities undertaken or issues addressed;
- The process by which agreements or resolutions were arrived at;
- The stakeholders and key players who most actively participated, those who were present but were quiet, those who were not represented;
- The outcome of the activity or undertaking.

The environmental analysis and participation will be fully integrated into the process of the formulation and evaluation of technical alternatives. Accordingly, public consultations on environmental issues will be conducted during the multiple public hearings organized during the technical assessment, feasibility study and design, and the documented process of the overall public hearings and consultations will be used as the EA Process documentation. Part of the EA process documentation may already have been included in the IEE section on data collection.

2.3.4 Proof of Social Acceptability

Social acceptability is the result of a process that is mutually agreed upon by the DENR, the stakeholders and the proponent to ensure that the concerns of stakeholders, including affected communities, are fully considered and/or resolved in the decision-making process for granting or denying the issuance of an ECC[6]. Social acceptability compels the consideration of a broad spectrum of environmental factors. It also means the proponent is able to identify the relevant and valid issues and match them with corresponding mitigative/enhancement measures together with the available resources to implement the measures and the corresponding agreements and guarantees for the fulfillment of such measures.

Evidence of social acceptability may be manifested, among others, through the following:

- Agreements with the affected communities on proposed mitigation and enhancement measures duly recorded during public consultations;
- Project endorsements/resolutions of community leaders/local governments;
- Absence of oppositions during consultations;
- Assurances/guarantees provided by the proponent addressing specific issues/impacts raised by the stakeholders; and
- Proof of public consultation/public participation in the IEE process.

Such proofs of social acceptability shall be duly documented and summarized together with the EMP matrix. Further details on DENR guidelines for public participation and social acceptability are described in the DENR DAO 96-37 Procedural Manual.

As described in the DENR EIS procedural guidelines, the DENR will facilitate the resolution of possible conflicts that affect environmental quality. Iterative negotiation procedures shall be utilized until a consensus is arrived at in cases where there are outstanding disagreements, conflicts and outright opposition to the project or certain elements of it. If after all measures to resolve conflicts have been exhausted and still no common agreement has been reached, then social acceptability has not been achieved. Examples of proof include:

- Memorandum of Understanding between the disputing or conflicting parties;
- Negotiated agreements on conflicts should be firmed up through a MOA between the proponent, the DENR, LGU and legitimate stakeholders.
- Resettlement and Compensation Plan, if applicable;
- Social Development Program (not necessary a full program, but it should contain measures that should address socio-economic impacts).

[6] Social acceptability can be achieved only if:

- the decision is informed;
- the process of decision-making is agreed upon through a democratic process;
- the stakeholders have been empowered to decide for themselves; and
- those who know about the project understand the risks and related responsibilities and accept them

2.4 IEE Submission

2.4.1 Documentation

It will be necessary to forward 10 legible copies of the IEE to the Environmental Management and Protection Areas Sector (EMPAS) of the DENR Regional Office for review. The proponent shall also submit to EMPAS, along with the hard copy reports, one set of a complete electronic file of the IEE in computer diskettes. The following are required for the computer file:

- file to be copied in 3.5 high density diskettes formatted in DOS Version 5.0 or Window-based and readable using IBM or equivalent compatible PCs;
- a written listing of filenames and their contents;
- indicate computer software and versions used for word processing (such as Word Perfect Version 3 or Microsoft Word version 3) and quantitative analyses/tables (such as Lotus 123 release 3, Excel or Quattro Pro).

If the water source or construction activities are located in a DENR protected area (i.e. NIPAS), DENR has to obtain approval of the project by the Protected Area Management Board (PAMB) before issuing the ECC.

2.4.2 Filing costs

All project proponents shall be required to pay the following fees[7] to DENR Regional Offices upon submission of the IEE:

- Filing Fee : 310.00 pesos
- Processing Fee : 1,750.00 pesos
- Legal & Research Fee : 70.00 pesos

In addition to the fees required, the DENR has also transferred the responsibility of shouldering possible costs attendant to the review of a project's IEE/EIA to its proponent[8]. The determination of additional costs to be borne by the proponent for the review is subject to guidelines set by DENR. The expenses attendant to the review process may include the following items:

- honoraria of EIA Review Committee members
- site visit expenses of core review team and DENR staff
- supplies/materials for data validation of the review team
- logistical support for EIARC meetings
- public hearing

[7] In Pesos as per October 1997.

[8] It is uncertain how these regulations are and will be applied. As stated in the DENR procedural manual, expenses for honoraria of EIARC and logistical support for the review including committee meetings/deliberations will apply to all proponents submitting EIS. However, costs of site visit, data validation and public hearing are subject to the requirements as determined by the EIARC/EMPAS in the course of the review. Depending on the sufficiency and substantive content of the IEE/EIS report submitted, the EIARC/EMPAS may decide to forego or undertake any or all the required validation activities.

2.4.3 Future express lane for IEE/EIS review

A DENR proposal has been made to include a possibility to speed up the review process. However, a study still has to be undertaken to determine the feasibility of this proposal. The "*Express Lane*" has been recommended to be set-up at EMB/DENR-RO to specifically review EIS and process ECC at a much shorter period for proponents who demand such services and are willing to pay the added expenses. There are proponents who are more than willing to pay a premium amount if only to further fast track the EIS review of their projects in order to meet their construction schedules and/or commitments.

2.5 Possible additional requirements

Depending on the sufficiency and completeness of the IEE, the DENR-RO may require additional information from the proponent. Also, the proponent may be obliged to proceed to the preparation of a full Environmental Impact Statement (EIS), depending on the size of the project, fragility of the project site, project components and production process; and to some extent, capital investment. The main formal additional requirements for an EIS may include:

- The preparation and approval of a formal scoping report;
- Public hearing instead of public consultation.

The specific additional requested documentation would have to be discussed with the DENR authorities during the submittal and evaluation process.

3 MAIN COMPONENTS OF THE IEE/EA REPORTS

3.1 General

The main components of the IEE should cover all possible environmental issues and mitigation measures to be taken, as agreed upon with the LGU. As such, it should:

- Identify all potential environmental issues/ impacts associated with the project type relative to the ECA location;
- Identify all significant environmental impacts (SEIs);
- Resolve all significant environmental impacts within the scope of the IEE; and
- Recommend additional studies and/or an EIS to resolve outstanding issues/ impacts.

Based on the experiences in the first batch of the LGU-UWSS project, the technical report could consist between 6 to 10 pages (annexes excluded). A brief executive summary (max. 1 page) should be included to give the reader a quick overview on the objectives, activities and findings of the Environmental Assessment.

Steps in the preparation of the substantive (technical) IEE report include:

- Inventory of the environmental baseline conditions (see section 3.2);
- Systematic environmental comparison of alternative investments, sites, technologies and designs, including all the significant adverse environmental impacts that are anticipated (see section 3.3);
- Mitigation or environmental management plan, including a Monitoring plan (see section 3.4);
- Conclusions and recommendations (see section 3.5).

3.2 Assessment of environmental baseline conditions

Data should be collected during field visits and desk studies. Because the required IEE is not a full-scale assessment, information may come primarily from existing reports/studies supplemented by some field data and consultations with affected stakeholders. A checklist of the most relevant issues[9] is given in Table 1. A listing of consulted documents and reports should be included as an Annex.

Field visits should mainly focus on an initial field inspection of the concerned area and consultations with the LGU administration. Initial environmental concerns of both the LGU administration and the IEE preparer should be discussed and possible mitigation requirements should be identified.

[9] More elaborated examples of checklists for Urban Environmental Assessment can be found in Leitman (1994): Rapid Urban Assessment. Lessons from Cities in the Developing World (WB Urban Management Program, 2 volumes).

Table 1 Checklist for assessment of environmental baseline conditions

Environmental Conditions	To be checked
Condition of watershed / catchment / groundwater (GW) aquifer recharge area	• Check for adequacy of management and protection • Identify existing or potential threats to quality and quantity (=sustainability) of source of supply • Gather available data on past trend of water quality and yield
Levels and quality of shallow GW	• Take samples and check for Fecal Coliform (FC), Nitrates, Iron and salinity • Gather available data on trends of GW quality and yield
Surface drainage system including water courses	• Assess adequacy and proper functioning • Identify deficiencies, such as lack of drains, stagnant / ponding water, clogged drains, undersized culverts and bridges • Take water samples and check for FC and BOD • Assess demand for drainage improvements (through consultation)
On-site sanitation systems	• Determine percentage of coverage by type / category • Estimate percentage of systems functioning adequately • Estimate percentage of households without adequate systems • Assess demand for individual or community systems, affordability and willingness-to-pay (through consultation)
Solid Waste Management	• Assess general cleanliness of urban area • Check existing arrangements for garbage • Check availability of adequate disposal site, and disposal procedures • Assess demand for improved garbage collection
Gather available public health statistics	• Check for history of waterborne diseases • Outbreak of epidemics • Morbidity and mortality rates • Historic water quality data of existing water supply system (if any)

An important step during the data collection is a (or multiple) '*Scoping*' visit(s) to the DENR main or regional office. Although scoping is not officially mandatory by the DENR in the preparation, it is strongly advised to introduce the project to the DENR officials and to explain the range of actions to be undertaken and alternative and impacts to be examined.

A map of the project location should be prepared, including delineation and mapping of project site relative to political jurisdiction/boundaries (barangay, municipality, province, region). If existing, the location of Environmental Critical Areas and National Integrated Protected Areas should be indicated or included as separate maps. Maps indicating ECAs and NIPA can be obtained from the DENR Regional Office.

During the IEE preparation, a close cooperation with the Engineering Consultant will be required. As the Engineering Consultant will carry out an extensive survey in the towns, information will be obtained among others on socioeconomic conditions, public health, water resources, and sanitary conditions. These data should be incorporated in the

Environmental Assessment. Also, environmental issues and concerns will have to be included in the public consultations (see section 1.4), in the selection of alternatives (see section 3.3.3), and discussed and agreed upon with the LGUs (see 3.4.2).

3.3 Analysis and comparison of potential environmental impacts

3.3.1 Prediction of general environmental impacts

In the WB Environmental Assessment Sourcebook no separate detailed section on environmental impacts of water supply development is included. As a reference on environmental impacts, the reader is referred to the Chapters on Land and Water Resources Management, Wastewater collection, Treatment, Reuse and Disposal system, and Oil and Gas pipelines.

A distinction is made between general environmental impacts, independent from the selected water source, and water source specific impacts. General impacts are described in the current section. Impacts that are specifically related to the selection and usage of springs, groundwater and surface water are elaborated in sections 4.2.2, 4.2.1, and 4.2.3, respectively. However, it should be noted that the overviews may not be complete and additional issues and impacts could be considered relevant.

Table 2 summarizes in random order possible general impacts, including an overview of possible mitigation measures. Selected issues on wastewater, land acquisition and compensation are elaborated below. More detailed technical guidelines for the various project components are described in Chapter 4.

Table 2 Overview of general potential impacts and mitigation measures

Phase	Potential Negative Impact	Possible Mitigation measures
Pre-construction	Lack of control of water source	• Acquire land directly around the water source • Obtain water permit from NWRB (see Annex A. VII)
	Conflicting interests of water users	• Check sufficient availability of water • Secure proper compensation arrangements
	Land acquisition and resettlement (see also below)	• Usage of public grounds (e.g. roads, etc.) • Provision of proper compensation
	Disturbance of land use and economic activities (see also below)	• Usage of public owned areas • Provision of proper compensation
Construction	Disturbance of the land use	• Minimize impacts and provide proper compensation for economic losses • Restore
	Los of natural vegetation	• Replanting of areas
	Disturbance of stream channels, aquatic plant and animal habitats	• Erosion/sedimentation control during construction
	Soil and water contamination	• Control (collection, disposal) of waste
	Hindrance (noise, air pollution, traffic, etc) due to construction activities	• Minimize hindrance to local population • Engage and Provide labor for local population • Usage of main roads where possible.
	Soil erosion and compaction	• Proper runoff and erosion control through land protection and drainage channels • Heavy traffic restrictions
	Safety hazards	• Application of proper safety and warning measures • Provision of temporary crossings and bridges • Public information campaign
Operation	Increase of public health hazards due to increase of wastewater (see also below)	• Secure the construction of proper on-site sanitary facilities if still lacking; • Construct on-site soakaways for waste water and sullage • Maintain and/or improve storm water drainage system for sullage
	Contamination of stream channels	• Assure that inflow is relatively small compared to receiving river discharge • No routing of sewer lines directly in stream channels
	Water logging and salinization	• Maintain and/or improve storm water drainage system
	Soil erosion	• Proper runoff and erosion control through land protection and drainage channels

3.3.2 Land acquisition, compensation and resettlement

Land acquisition will be required for the protection of the immediate surroundings of the water source, allowing only activities related to water supply. No official guidelines on the size of protected areas around water sources exist yet in the Philippines. Therefore, based on international experience, an estimate is made on the area to be acquired, both for location within and outside residential zones (Table 3). These estimates should provide enough immediate protection against contamination of the drinking water source due to accidents and improper land use. Specific additional protection requirements for groundwater and spring sources are elaborated in sections 4.2.1 and 4.2.2, respectively.

Table 3 Guidelines for the minimum land acquisition for water sources protection

Water Source	Minimum land acquisition requirements outside residential areas	Minimum land acquisition requirements within residential areas	Remarks
Spring	20-50 m around the spring box	Not advisable	Additional protection of the watershed is mandatory (see section 4.2.2)
Deep well	10-20 m around the well	30-50m around the well	Additional protection measures for the recharge area is recommended (see section 4.2.1)
Surface water intake	Size of the intake and treatment plant	Size of the intake and treatment plant	Extensive upstream water quality monitoring will be necessary to allow for control of polluters
Sludge disposal	1000 - 2000 m^2	Not acceptable	-

The content and level of details for plans on land acquisition, compensation and resettlement to be incorporated into the EMPs will vary with circumstances and the magnitude of resettlement. If minor impacts or measures will be required, the purpose and size of the required land acquisition should be indicated. If major impacts or measures will be required, separate resettlements plans will be required according to the WB OD 4.30 (Annex B. IV). Implementation of these requirements is further elaborated in the separate chapter of the Operational Manual on Compensation and Resettlement.

3.3.3 Comparison and selection of alternatives

A first comparison of the main identified and feasible alternatives can be carried out in the form of a summary matrix of alternatives (see Table 4). Such analysis briefly indicates the main environmental issues and possible impacts of all the alternatives. A sub-division for the pre-construction, construction, and operation phase has to be included. To provide a complete comparison of possible environmental degradation and/or improvements, the "*no-project*" alternative should be included. This enables to include and highlight also positive impacts brought by the project.

Rating of impacts in the summary matrix will be generally qualitative only, as quantitative analyses will in most cases be beyond the scope of the IEE preparation. However, available quantitative/numerical data could be included in the matrix or further elaborated in the mitigation and monitoring plans.

Table 4 Example of a summary matrix of Environmental Issues/Impacts

Phase	Environmental parameter	"No project" Alternative	Alternative 1: Spring water supply	Alternative 2: Deep well water supply	Alternative 3: etc...
Pre-construction	Reliability of water availability	-	-	+	
	Reliability of water quality	--	-	+	
	Land acquisition and resettlement	0	--	0	
	Disturbance of land use and economic activities	0	--	0	
Construction	Disturbance of the land use	0	0	0	
	Los of natural vegetation	0	0	0	
	Disturbance of stream channels, aquatic plant and animal habitats	0	-	0	
	Soil and water contamination	0	-	-	
	Hindrance (noise, air pollution, traffic, etc) due to construction activities	0	0	-	
	Soil erosion and compaction	0	-	-	
Operation	Public health	--	+	+	
	Contamination of stream channels	0	-	-	
	Water logging and salinization	0	0	0	
	Soil erosion	0	0	0	

Legend: -- Significant negative environmental impact
- Moderate negative environmental impact
0 None or insignificant environmental impact
+ Beneficial environmental impact
n.a. Not applicable

Close cooperation with the other consultants should be maintained during the selection process to obtain an acceptable compromise between social, economic/financial, technical and environmental criteria's. The goal of this "*multi-criteria*" selection process is to balance development and environmental protection, not to consider them as conflicting problems only (i.e. "*trade-offs*"). However, although environmental considerations are not the only decisive factors for the selection, negative environmental impacts should receive ample attention and proper mitigation measures should be secured.

3.4 Drafting of an Environmental Management Plan

3.4.1 General

An Environmental Management Plan will be prepared for the selected alternative (see section 3.3.3). The EMP consists in principle of three main components:

- An environmental Mitigation Plan (see section 3.4.2);
- An environmental Monitoring Plan (see section 3.4.3);
- Overview of the implementation arrangements (see section 3.4.4).

Both the Environmental Mitigation and the Monitoring plans can be presented in the form of a summary matrix.

Quarterly compliance reports on both the Mitigation and Monitoring plans will be prepared by the water system operator/LGU (see section 5) and submitted to the DENR and the GFI/PMO.

3.4.2 Mitigation Plan

A project's mitigation plan (MiP) consists of the set of measures to be taken during implementation and operation to eliminate, offset, or reduce adverse environmental impacts to acceptable levels. Limited mitigation[10] plans alone suffice for many category B projects (see Annex B. I). The mitigation plan should include, if applicable, the following items:

- Identification and summary of all the significant adverse environmental impacts that are anticipated;
- Brief description of each possible mitigation measure;
- Institutional arrangements and the assignment of the various responsibilities for carrying out the mitigatory measures (e.g. responsibilities which involve operation, supervision, enforcement, monitoring of implementation, remedial action, reporting, and staff training).

In Table 5 an example of a proposed Environmental Mitigation Plan is presented. Examples of mitigation measures are given for the main environmental impacts listed in section 3.3.1. A sub-division in for the pre-construction, construction, and operation phase[11] has to be included. When impacts are considered not significant, no mitigation measures are necessary.

[10] Full mitigation plans are essential elements for World Bank category A projects.
[11] A DENR proposed "*abandonment phase*" is considered as non-relevant for the current water supply systems and can be left out.

Table 5 Layout and example of an environmental Mitigation Plan (MiP) for a deep well system

Phase	Identification of Environmental Impact	Possible mitigation/actions	Responsibility	Implementation schedule	Remarks
Pre-construction	Lack of control of water source	• Acquire land directly around water source	LGU, through coordination of the MPDC	Upon signing of SLA	
	Disturbance of land use and economic activities	• Usage of public areas • Provision of proper compensation	LGU, through coordination of the MPDC	Before start of construction	
Construction	Disturbance of the land use due to drilling and construction activities	• Minimize impacts • Restore damages	Contractor, with supervision of the LGU ME	Before operation	
	Los of natural vegetation	• Replanting of areas	Contractor, with supervision of the LGU ME	Before operation	
	Disturbance of stream channels, aquatic plant and animal habitats	• Erosion/sedimentation control during construction	Contractor, with supervision of the LGU ME	During construction	
	Soil and water contamination (e.g. spilling of oil products)	• Control (collection, disposal) of waste	Contractor, with supervision of the LGU ME	During construction	
	Hindrance (noise, air pollution, traffic, etc) due to drilling and construction activities	• Minimize hindrance to local population • Engage and Provide labor for local population • Usage of main roads where possible	Contractor, with supervision of the LGU ME	During construction	
	Soil erosion and compaction	• Proper runoff and erosion control through land protection and drainage channels • Heavy traffic restrictions	Contractor, with supervision of the LGU ME	During construction	
	Safety hazards	• Application of proper safety and warning measures • Provision of temporary crossings and bridges • Public information campaign	Contractor, with supervision of the LGU ME and MHO	During construction	

Phase	Identification of Environmental Impact	Possible mitigation/actions	Responsibility	Implementation schedule	Remarks
Operation	Increase of public health hazards due to increase of wastewater (see also below)	• Secure the construction of proper on-site sanitary facilities if still lacking • Additional training of Sanitary Inspectors (through DOH training course); • Maintain and/or improve storm water drainage system for sullage	LGU, through coordination of SI	Upon signing of SLA	
	Contamination of stream channels	• Assure that inflow is relatively small compared to receiving river discharge • No routing of sewer lines directly in stream channels	LGU, with assistance of Consultants	Pre-feasibility study	
	Water logging and salinization	• Maintain and/or improve and storm water drainage system	LGU, through coordination of SI	Simultaneous with construction activities	
	Contamination of the groundwater source	• Acquire and fence a protection zone directly around the well; • Regulate potential polluting activities in recharge zone; • Monitor water level and groundwater abstraction;	LGU, through coordination of MPDC and ME	During operation	
	Lowered groundwater table	• Calculate safe yield (abstraction) • Locate the location for a new well should be sited in an area • Assure/proof that other water users are not affected	LGU (ME), with assistance of Consultants	During design and construction	
	Reduction in artesian flow (see also below)	• Locate the well in an area where other water users are not affected	LGU, with assistance of Consultants	During pre-feasibility study	
	Increase of noise	• Usage of electrical submersible pumps • Construction of proper pumping house	Contractor, with supervision of LGU ME	During detailed design and construction	

The decision to proceed with a project, and the World Bank's decision to support it, will be in part predicated on the expectation that the mitigation plan will be executed effectively. Consequently, it is important to integrate the plan into the project's overall planning, design, budget, and implementation. Such integration should be achieved by establishing the mitigation plan as an essential component of the project. This precaution ensures that the plan will receive funding and supervision along with the other investment components.

3.4.3 Environmental Monitoring Plan

Monitoring of environmental parameters and compliance to the EMP should be carried out during both the construction and operational phase. A simple monitoring plan, developed according to the example in Table 6, should be discussed and formulated with the LGU, including the following elements:

- Activities/parameters to be monitored ("*monitoring objectives*");
- Specific areas to be monitored;
- Manner of monitoring;
- Frequency and cost of monitoring; and
- Institutional responsibilities for monitoring and data management.

The frequency and level of sophistication of the sampling depends in part on the size of the system and the nature of its treatment processes. Monitoring is expensive; it requires laboratory facilities, equipment and technicians. Hence, as a general principle, include in the monitoring plans only what is necessary for protecting the environment, managing the system, and safeguarding its staff and equipment.

3.4.4 Implementation arrangements

The proposed protection and enhancement measures in the environmental mitigation and monitoring plans should provide enough information on when and how the measures at the various stages of the project should be implemented. However, in certain cases, additional information may be elaborated for the more important impacts or institutional constraints. For example:

- Implementation schedule for measures that must be designed as part of the project, showing phasing and coordination with overall project implementation plans;
- Monitoring and reporting procedures to (i) ensure early detection of conditions that necessitate particular mitigation measures, and (ii) provide information on the progress and results of the compliance monitoring;
- Integration into the total project cost tables of the cost estimates and sources of funds for both the initial investments and the recurring expenses for implementing the mitigation and monitoring plan.
- Programs to strengthen environmental management capability in the LGU/Operators may include training/technical assistance programs, staff development, procurement of equipment and supplies, and/or organizational changes.

Table 6 Layout and example of an Environmental Monitoring Plan (MoP)

Phase	Environmental parameters	Monitoring requirements	Manner and frequency	Responsibility	Implementation arrangements
Construction	Hindrance to local population	• Noise • Air pollution (odor, TSP, fume emissions) • Land damage • Traffic	Regular through supervision	LGU (ME)	To be reported if inappropriate
	EMP compliance of contractors	• Erosion control • Vegetation protection • Soil and water contamination	Regular through supervision	LGU (ME)	To be reported if inappropriate
	Safety precautions of contractors	Conform professional standards	Regular through supervision	LGU (ME)	To be reported if inappropriate
	Sanitary control	• Proper construction of on-site facilities • Proper construction of sullage drainage system	Continuous	LGU (SI)	Reported in completion reports
Operational	Quality of distributed water	• Microbiology • Standards parameters • Heavy metals • Pesticides	Conform official standard procedures (DOH, NWRB, LWUA, DPWH)	Water utility, supervised by LGU	In monitoring reports (see section 5.3) and data readily available in database or files
	Springs	• Protection of area around the spring	Annual	Water utility, supervised by LGU	In monitoring reports (see section 5.3)
		• Development activities in watershed	Annual	Water utility, supervised by LGU	In monitoring reports (see section 5.3)
		• Discharge	2 x per month	Water utility, supervised by LGU	In monitoring reports (see section 5.3) and data readily available in database or files
	Groundwater	• Water level	2 x per month (after pumping recovery period)	Water utility, supervised by LGU	In monitoring reports (see section 5.3) and data readily available in database or files
		• Operation of pumps (abstraction)	Continuous	Water utility, supervised by LGU	In monitoring reports (see section 5.3) and data readily available in database or files
	Surface water	• Water level	Daily	Water utility, supervised by LGU	In monitoring reports (see section 5.3) and data readily available in database or files
		• Protection of the watershed	Annual	Water utility, supervised by LGU	In monitoring reports (see section 5.3)
		• Upstream water quality	Daily, conform professional procedures (DENR, NWRB)	Water utility, supervised by LGU	For early warning/detection of pollution hazards
		• Downstream water quality (BOD, TDS, NO_3, Phosphate, etc)	1 x month, conform professional procedures (DENR, NWRB)	DENR	Monitoring of impacts

Experiences with the previous batches of LGUs showed that the current capacity of the LGU administration in environmental regulation and monitoring is considered insufficient to guarantee the proper implementation of the proposed water supply and sanitation facilities. Further training of LGU staff will be required to implement the Environmental Management Plan and hence comply with the ECC. Specific training requirements will be analyzed and programs will be developed accordingly in cooperation with the Environmental Health Service of DOH and DENR. These could include the construction and supervision of sanitary facilities and environmental monitoring. Implementation of the training will have to be discussed with the LGUs and DENR/DOH.

3.5 Conclusions and recommendations

The conclusions and recommendations should brief and punctual, summarizing:

- The list of resolved issues;
- The list of partially resolved issues;
- The new issues arising from the IEE that have been resolved.
- Additional required studies.

4 SPECIFIC TECHNICAL GUIDELINES

4.1 General

The following sections provide additional technical guidelines on the environmental assessment of most probable technology options for the different components that can be offered within the LGU-UWSSP. As most environmental impacts of the different components are related, the assessment should address possible impacts and mitigation measures in an integrated manner. The offered service options include the provision and/or rehabilitation of:

- Water supply systems (section 4.2);
- Sanitation and wastewater collection and disposal (section 4.3), including on-site sanitation, improved storm drainage, or, although unlikely, off-site sanitation options;

Further detailed descriptions of possible project components are included in separate components of the Operational Manual. The technical guidelines are subject to review end hence possible changes, based on the experiences of the current and other project experiences.

4.2 Water Supply Systems

4.2.1 Development of groundwater

Deep groundwater wells are widely used for piped water supply in the Philippines, especially for larger towns and cities. In general, advantages of groundwater compared to springs and surface water include:

- The reservoir character of groundwater enables better water resources management and control;
- Lower vulnerability to water pollution (i.e. better protection of the water resources)
- Greater flexibility in the selection of the well location.

Disadvantages of groundwater compared to springs include the pumping requirements, increasing the O&M cost, and reported problems with natural water quality. Especially in volcanic areas (or volcanic sediments) the groundwater may have high iron and/or manganese contents, requiring additional treatment.

In Table 7 an overview is given of potential environmental impacts and possible mitigation measures specifically related to the development of deeper groundwater. The listing, which may not be fully complete, is additional to and has to be combined with the described general environmental impacts, as summarized in Table 2.

Table 7 Potential impacts and mitigation measures related to the development of groundwater

Phase	Potential Negative Impact	Possible Mitigation measures
Pre-construction	Sustainability and protection of groundwater resources (see also below)	• Analyze feasibility of acquiring land directly around the well; • Assure that no people are negative affected by land acquisition, i.e. provide proper compensation for losses of land and income; • Assure that no potential pollution sources are present in the recharge area
	Conflicting interests of water users	• Prediction of insignificant draw-down in surrounding wells (see below)
	Existing groundwater contaminated	• Check groundwater on organic and inorganic components, metals (Iron, Manganese !)
Construction	Disturbance of the land surface due to drilling activities	• Minimize impacts and provide proper compensation for economic losses
	Soil and water contamination by spilling of oil products	• Control (collection, disposal) of oil spillage
	Hindrance (noise, traffic, etc) due to drilling activities	• Minimize hindrance to local population • Provide labor and engage local population in drilling activities
Operation	Contamination of the groundwater source	• Acquire and fence a protection zone directly around the well; • Regulate potential polluting activities in recharge zone; • Monitor water level and groundwater abstraction;
	Lowered groundwater table	• Calculate safe yield (abstraction) • Apply sufficient spacing between deep wells (NWRB standards, see below) • Assure/proof that other water users are not affected
	Reduction in artesian flow (see also below)	• Locate the well in an area where other water users are not affected
	Intrusion of saline water	• Locate the well at sufficient distance from the sea • Determine and monitor draw-down and safe yield
	Decreasing discharge of surface water streams	• Assure that quantity pumped is relatively limited compared to stream discharge
	Increase of noise	• Usage of electrical submersible pumps • Construction of proper pumping house

Well protection

The Water Code of the Philippines and the accompanying implementing rules and regulations of the NWRB specify general design and construction requirements for deep wells (see Annex A. VII). Upon evaluation and approval of the design by the NWRB, a water permit can be obtained. Additional details on the technical specifications and procedures are elaborated in the Operational Manual on the technical design.

To avoid overexploitation of the groundwater resources, the Philippine Water Code specifies the minimum well spacing for well deeper then 30m (Table 8). Besides the minimum well spacing, operation of the well should comply with the following requirements:

- The calculated safe yield shall not be exceeded;
- No well shall cause more then 2 meters of additional draw-down to any existing well;
- Groundwater mining may be allowed provided that the life of the groundwater reservoir system is maintained for at least 50 years.

Table 8 Spacing requirements for deep wells (< 30m)

Rate of withdrawal (l/s)	Minimum distance between wells (m)
2-10	200
More then 10 –20	400
More then 20 - 40	600
More then 40	1000

Additionally, the establishment of larger protection zones for groundwater abstraction for drinking water supply would be advisable for securing the quality of the groundwater. These protection zones would cover parts of the recharge areas where different levels of agricultural and industrial activities would be regulated. The various methods used to delineate these protective zones largely reflect each area's unique combination of hydrogeological characteristics, potential sources of contamination and the available institutional capabilities to manage those sources.

However, the establishment and regulation of official groundwater protection zones is beyond the capability of the LGUs. Therefore, an adapted approach should be applied in the selection of the location of a deep well:

1. A first step in the selection process should be the determination of the groundwater flow pattern. If clear indications of a dominant groundwater flow direction can be determined or suspected (e.g. on or near a mountain slope), the well should be located upstream of the residential or other potential contamination sources.
2. If no prominent flow direction can be determined, general guidelines and common sense should be applied in the selection of the location of the well(s). As an example of sound practices, Table 9 shows a system of guidelines as adapted from the guidelines in Germany and The Netherlands. The system applies to porous permeable aquifers.

The introduction of groundwater protection zones could include the design of a proper simple monitoring network for existing and potential pollution sources, especially in vulnerable areas. As it will be impossible to fully control or restrict potential pollution

activities in the recharge area, monitoring can detect possible problems in advance and appropriate protection and/or rehabilitation actions can be taken.

Table 9 Guidelines for groundwater protection zones (porous permeable aquifers)

	Direct catchment area	Protection area	Remaining recharge area
Delay time or distance to well field	60 days and greater then 30 meter	10 and 25 years or 2 kilometer	
Protection measures	Protection against pathogenic bacteria and viruses, chemical pollution sources	Protection against hardly degradable chemicals	Rules and act on soil and groundwater protection
Admissible activities	Only activities in relation to water supply	Not admissible as a rule: • Transport and storage of dangerous goods • Industries • Waste-sites • Building • Military activities • Intensive agricultural and cattle breeding • Ground-sand or limestone pits • Wastewater	

Reduction in artesian flow

In areas where artesian wells for local water supply purposes are present, pumping of deep groundwater may reduce the discharge of the artesian wells. Therefore, the location of the well should be selected so that minimum effects are expected. If possible negative effects cannot be avoided, the issue should be addressed and clearly explained during the public consultations.

Reduction in artesian flow can also bring positive impacts in waterlogged areas. In areas where the natural vertical flow to canals and drains is not sufficient, deep wells are sometimes used as drainage system ("*vertical drainage*"). The pumped water could in some case be re-used for irrigation purposes, increasing however the risk for salinization of the soil and surface of the area. Special hydrogeological studies may be recommended to determine the salt balance.

4.2.2 Development of springs

Spring development is often used for water supply because of their easy management and low operational costs. In many cases water can be provided by gravity and only limited treatment (chlorination) is required[12]. However, a big disadvantage of the use of springs is the lack of control of the water flow and quality, unlike for surface water and groundwater. Discharge fluctuations, directly dependant on watershed conditions,

[12] As a rule of thumb, if differences in water temperature occur during the day and night, the water quality is suspect.

become critical external factors in the reliability and sustainability of the water supply system (e.g. watershed protection, see below). Water exceeding the reservoir capacity overflows and cannot be conserved. Therefore, an assessment of the discharge and seasonal variation in flow is needed to confirm that the concerned spring is not directly influenced by climatological changes (i.e. a "*deep system*").

An overview of potential environmental impacts and possible mitigation measures specifically related to the development of springs is given in Table 10. The listing, which may not be fully complete, is additional to and has to be combined with the described general environmental impacts, as summarized in Table 2.

Table 10 Potential impacts and mitigation measures related to the development of springs

Phase	Potential Negative Impact	Possible Mitigation measures
Pre-construction	Spring sustainability and protection (see also below!)	• Acquire and fence land directly around the spring; • Assure that no people are negative affected by land acquisition, i.e. provide proper compensation for losses of land and income; • Analyze feasibility of controlling upstream watershed • Assure that no potential pollution sources are present in upstream watershed • Assurance/proof that other water users are not affected • Assess spring discharge and seasonal fluctuations
	Conflicting interests of water users	• Check current usage of spring water • Check sufficient availability of water • Secure proper compensation arrangements
	Existing spring contaminated	• Assure water quality on bacteriological quality, organic and inorganic components, pesticides, metals.
Construction	Los of natural vegetation	• Replanting of areas
	Soil and water contamination by spilling of construction products	• Control (collection, disposal) of spillage
	Hindrance (noise, traffic, etc) due to construction activities	• Minimize hindrance to local population • Provide labor and engage local population in construction activities
Operation	Reduced surface water flow due to the captation of springs	• Assure that spring discharge is relatively small compared to receiving stream flow

Watershed protection
Protection of springs is a very critical issue. If the spring discharge diminishes, for example due to upstream cutting of vegetation, water availability may become insufficient and new water sources have to be developed. As often large investments are required for tapping of springs (transmission pipelines), risks in developing and exploitation of springs are relatively high. It is therefore of utmost importance to implement and secure a very strict protection framework of the upstream watershed.

The DENR National Integrated Protected Area System (NIPAS) is considered to be the only proper guarantee for securing watershed protection. This well-established national system of regulation requires among others the setting-up of a Protected Area Management Board (PAMB) for designated environmentally sensitive areas, ensuring:

- The preparation of General Management Planning Strategy (GMPS), outlining planning, resource protection and general administration of the area;
- Implementation and compliance according to the GMPS;
- Monitoring and evaluation of the performance of protected area personnel.

Details are given in the NIPAS implementing rules and regulations (Annex A. IV). In the case that the spring or other construction activities are located in a DENR protected area, approval of the PAMB has to be obtained by DENR before issuing an ECC (see also section 2.4.1). Maps of protected area boundaries can be obtained from DENR regional offices.

For securing the sustainability of the water source, it is not considered necessary that the spring itself is directly located in the protected area. However, it should be confirmed and demonstrated in the IEE (e.g. by a map) that the main part of the recharge area of the spring is located in the protected area, and no other potential pollution source will have any effect on the quality of the spring.

4.2.3 Intake of surface water

It is unlikely that surface water will be a feasible water source for the towns participating in the project. Surface water sources need extensive treatment and high investment costs, and water availability may be subject to large seasonal fluctuations. However, if no other alternatives are available, the surface water options may have to be considered.

An overview of potential environmental impacts and possible mitigation measures specifically related to the construction of surface water intakes is given in Table 11. The listing, which may not be fully complete, is additional to and has to be combined with the described general environmental impacts, as summarized in Table 2.

Table 11 Potential impacts and mitigation measures related to the intake of surface water

Phase	Potential Negative Impact	Possible Mitigation measures
Pre-construction	Sustainability of surface water	• Analyze feasibility of acquiring land for intake and treatment plant; • Assure that no people are negative affected by land acquisition, i.e. provide proper compensation for losses of land and income; • Analyze feasibility of controlling upstream watershed (check current and planned development projects on logging, mining, agricultural development, road construction, etc.) • Assure that no polluters are discharging upstream in the river. • Assure that no increase of potential polluters can be reasonably expected.
	Feasibility of treatment and sludge disposal.	• Assure that treatment of surface water will provide safe drinking water quality; • Assure that proper sludge disposal can be arranged.
	Existing river contaminated	• Assure quality of surface water can be properly treated for bacteriological quality, organic and inorganic components, pesticides, metals
	Violation of minimum acceptable flow	• Measure and analyze surface water discharge
Construction	Disturbance of stream channels, aquatic plant and animal habitats	• Erosion/sedimentation control during construction
	Soil and water contamination by spilling of construction products	• Control (collection, disposal) of spillage
	Hindrance (noise, traffic, etc) due to construction activities	• Minimize hindrance to local population • Provide labor and engage local population in construction activities.
Operation	Reduced surface water flow *due to surface water intake*	• Assure that intake is small compared to river discharge • Control for compliance to minimum acceptable flow
	Reduction in or change of regime of surface water flow	• Monitor and regulate development projects in the upstream watershed (logging, mining, agricultural development, road construction, etc.)
	Temporary river pollution	• Arrange for basic water quality monitoring upstream as an "early warning" system
	Production of sludge	• *Arrange for proper disposal facilities for sludge residue*

4.3 Sanitation and wastewater collection disposal

4.3.1 Introduction

Improving water supply requires addressing problems of increased amounts of wastewater. As a rule of thumb, an estimated 80 to 90% of the delivered water supply will has to be disposed of as wastewater[13]. The provision of sanitary facilities to collect and dispose of human excreta poses a serious challenge to urban poor communities and to environmental sanitation planners of the government. Most urban centers in the Philippines rely on individual septic tank systems for the treatment and disposal of wastewater from domestic and commercial buildings. However, the design for such systems is often inadequate. Facilities for land disposal of effluents from the septic tanks are generally absent. Hence the partially treated septic tank effluents flow directly into storm drainage systems and other receiving bodies of water, thereby exacerbating an already grave pollution situation.

Where water quality problems are severe, as is the case in many densely populated urban areas, individual wastewater projects may be executed as increments of long-term pollution control programs whose ultimate objectives realistically may take 10 to 20 years or more to achieve. Water pollution control programs often include significant institution building and national water pollution control policy formulation components.

This section describes the relevant environmental aspects to consider for project components and mitigation/rehabilitation activities involving:

- A general summary of potential environmental impacts (section 4.3.2);
- A variety of small-scale on-site sanitation systems for rural and urban areas (section 4.3.3);
- Although unlikely to be included, conduits for collection and conveyance of wastewater, pumping stations, conventional and innovative treatment works, wastewater reclamation and reuse projects, ocean outfalls, wastewater treatment, and sludge management facilities (section 4.3.4); and
- Urban storm water drainage projects (section 4.3.5).

The overcrowding and lack of space in many urban poor communities pose a severe constraint in improving toilet facilities, whether individual or public. The EA process should ascertain the demand among residents for the facilities, present to them the relevant technological options with their respective price tags. The selection between on-site and off-site facilities should be made by the communities based on feasible choices.

4.3.2 General overview of potential environmental impacts

The pollutants in municipal wastewater are suspended and dissolved solids consisting of inorganic and organic matter, nutrients, oil and grease, toxic substances, and pathogenic microorganisms. Urban storm water can contain the same pollutants, sometimes in surprisingly high concentrations. Human wastes that are not properly treated and are disposed of at the point of origin or are collected and carried away pose risks of parasitic infections (through direct contact with fecal material) and hepatitis and

[13] A distinction should be made between wastewater and waste from toilets (excreta: faeces and urine) and sullage, the non-toilet wastewater generated by a household (i.e. the wastewater from kitchen, bath and laundry, not containing excreta).

various gastrointestinal diseases including cholera and typhoid (through contamination of water supplies and food).

When wastewater is collected but not treated properly before disposal or reuse, the same public health hazards exist at the point of discharge. If such discharge is to receiving water, additional harmful effects will occur. For example, accumulated solids may impair habitat for aquatic and marine life; oxygen is depleted by decomposition of organic material; and aquatic and marine organisms may be further harmed by toxic substances, which may spread to higher organisms through bioaccumulation in food chains. If the discharge enters confined waters such as a lake or bay, its nutrient content can cause eutrophication, with nuisance plant growth, which can disrupt fisheries and recreation. Solid waste generated in wastewater treatment (grit, screenings and primary and secondary sludge) can pollute soil and groundwater if not properly handled.

Wastewater projects are executed in order to prevent or alleviate the effects of the pollutants described above on the human and natural environments. When properly carried out, their overall environmental impact is positive. Direct impacts include abatement of nuisances and public health hazards in the serviced area, improvement in receiving water quality, and increases in the beneficial uses of receiving waters. In addition, installation of a wastewater collection and treatment system provides an opportunity for more effective control of industrial wastewater through pretreatment and connection to public sewers and offers the potential for beneficial reuse of treated effluent and sludge. Indirect impacts include the provision of serviced sites for development, increased fishery productivity and revenues, increased tourist and recreational activity and revenues, increased agricultural and silvicultural productivity and/or reduced chemical fertilizer requirements if treated effluent and sludge are reused, and reduced demands on other water sources as a result of effluent reuse.

A number of these potential positive impacts lend themselves to measurement and thus can be incorporated quantitatively into analyses of the costs and benefits of various alternatives when planning wastewater projects. Human health benefits can be measured, for example, by estimating avoided costs in the form of health care expenditures and lost workdays, which would result from poor sanitation. Reduced drinking and industrial water treatment costs and increased fishery, tourism and recreation revenues can serve as partial measures of the benefits of improved receiving water quality. In a region where demand for housing is high, the benefits of providing serviced lots may be reflected in part by the cost differential between installing the infrastructure in advance or retrofitting unplanned communities.

Systems in which treated wastewater or sludge are reused may be more expensive to construct and operate than those in which the sludge is disposed of as a waste product. In evaluating alternatives involving reuse, however, it is important to include such benefits as increased water availability to support development in the region, the opportunity to diminish irrigation demands on potential public water supply sources, reduced need for chemical fertilizers, incremental improvements in crop and timber production, and low-cost means to re-vegetate marginal soils or reclaim them for agriculture or silvi-culture. These too can often be measured, most of them by calculating avoided costs.

Unless they are correctly planned, sited, designed, constructed, operated and maintained, waste-water projects are likely to have a negative impact overall, failing to yield the full benefits for which the investment was made and adversely affecting other aspects of the environment besides. The individual items listed are self-explanatory, for the most part, and will not be discussed in detail in the text. However, there are several characteristics common to many of the potential impacts and mitigating measures, which should be emphasized as special issues throughout project preparation, assessment and implementation. These are:

- The importance of sound and comprehensive wastewater system planning;
- The fundamental dependence of wastewater projects on proper operation and maintenance (and thus on strong institutional support for both);
- Selection of appropriate technology;
- The necessity for an effective industrial wastewater pretreatment program in any municipal system serving industrial customers; and
- The need to consider a number of potential socio-cultural impacts, which are sometimes ignored in project preparation.

4.3.3 On-site sanitation

Poor construction practices and disposal of the effluent and sludge of the septic tanks are main environmental concerns. Contamination of the surface (drainage) water poses a serious risk for public health. As the size and economic capacity of most target LGUs may not allow for an extensive sewerage system with treatment facilities, the selection of low-cost on-site sanitary solutions is preferred. Appropriate technology options are available, whether water for flushing is available or not.

There are several possible options for addressing this problem, including improving the design of the septic tank system with the installation of soil absorption systems. Households discharging septic tank effluent (or other human wastewater effluent) directly into the storm drainage system may be required by the LGU to add a proper leaching field, leaching well or soak-away pit, preferably twin pits / fields to allow regular switching and regeneration. Therefore, priority must be given by the LGUs to address the problem of discharge of partially treated effluent from septic tanks into the drainage system.

Some of these technologies were developed in the last two decades starting with the International Drinking Water Supply and Sanitation Decade of the 1980s. Most were developed for the rural areas like the pour-flush toilets promoted by the EHS using the more hygienic plastic or fiberglass toilet bowls. The well-tried sanitation alternatives that exist are not only cheaper than conventional sewerage, but may also be able to deliver the same health benefits if properly installed and operated and offer the opportunity for community participation and reduce costs. However, it may be possible to modify these rural sanitation technologies and try their appropriateness for the urban poor communities.

NEDA Board resolution 12 (see Annex A. III) and Chapter XVII of the Sanitary Code (Annex A. VI) outlines the approved types of toilet facilities in the Philippines:

- Facilities requiring non or small amounts of water to wash excreta into the receiving space/pit (e.g. VIP latrine, sanitary pit privy, pour-flush toilets);

- Water carriage type having a pour-flush or flush type toilet facility and a septic vault/tank as the disposal facility;
- Water carriage type with pour-flush or flush type toilet facilities connected to septic tanks and/or to a sewerage system or treatment plant (e.g. flush, pour-flush, ventilated improved pit, and sanitary pit privy).

In the target LGUs, most of the houses have pour-flush water sealed toilets (generally estimated at 85%), connected to a pit. At present, only around 5 % of the households may have a flush type toilet and/or real septic tanks. The Department of Health (DOH) supported intensively the construction of on-site sanitary facilities by providing free ceramic bowls. The beneficiaries have to buy the other construction materials and build the facility. Most of the LGUs participate(d) in this successful program, although sometimes the availability of free bowls is insufficient for the demand.

4.3.4 Off-site sanitation

A summary of potential impacts and mitigation measures for the construction and operation of off-site sewerage and drainage systems is provided in Table 12. Although the Table focuses on sewerage and drainage systems, parts are general and can be applied for on-site sanitation as well.

Table 12 Potential impacts and mitigation measures related to the construction of sewerage and drainage infrastructure

PHASE	POTENTIAL IMPACT & RISKS	POSSIBLE MITIGATION MEASURES
Pre-construction	Dislocation of residents by plant siting	• Assist with resettlement
	Unplanned development induced or facilitated by infrastructure	• Coordinate installation of sewerage with land use planning • Strengthen land use control regulation and institutions • Integrate planning for infrastructure in urban development projects
	Regional solid waste management problems exacerbated by sludge	• Incorporate sludge, excreta and septage in regional solid waste management planning and in wastewater system feasibility studies and technology selection • Implement industrial waste pretreatment program
	Loss of fisheries productivity	• Evaluate importance of receiving water in local and regional fisheries • Implement mitigating measures for direct impacts
	Reduction of tourist or recreational activity	• Give special attention to real or perceived nuisances and aesthetic impacts in selecting site and technology. • Implement mitigating measures for direct impacts
Construction	Disturbance of stream channels, aquatic plant and animal habitat, and spawning and nursing areas during construction	• Do not route sewer lines in stream channels • Require erosion/sedimentation controls during construction
	Worker accidents during construction and operation, especially in deep trenching operations.	• Enforce adherence to safety procedures
	Accidental destruction of archaeological sites during excavation	• Include notification and protection procedures for cultural properties in construction contract documents
Operation	Alterations in watershed hydrologic balance when wastewater is exported by collection in large upstream areas and discharge downstream	• Consider sub-regional and small community systems in water-short areas. • Take full advantage of opportunities for wastewater reclamation/reuse, especially in water-short areas.
	Degradation of neighborhoods or receiving water quality from sewer overflows, treatment works bypasses, or treatment process failure.	• Phase construction of collector systems and treatment works to avoid raw wastewater discharges. • Select appropriate technology. • Design for reliability, ease of maintenance. • Implement management and training recommendations, monitoring program, and industrial waste pre-treatment program
	Degradation of receiving water quality despite normal system operation	• Site and design treatment works and disposal or reuse systems on the basis of adequate data on the characteristics of the wastewater and the assimilative capacity of the receiving water body. • Use mathematical models for siting surface water discharges and determining required level of treatment, and for siting and designing ocean outfalls. • Take full advantage of appropriate land application alternatives, especially in water-short areas. • Implement monitoring program and industrial waste pre-treatment program

PHASE	POTENTIAL IMPACT & RISKS	POSSIBLE MITIGATION MEASURES
	Public health hazards in vicinity of discharges or reuse sites during normal operation of system.	• Select appropriate technology. • Ensure pre-application treatment and operating guidelines for land application and other water reuse systems are adequate to safeguard health of humans and livestock. • Restrict access to wastewater or sludge disposal sites where health hazards are unavoidable.
	Contamination at land application sites: • soil and crops by toxic substances and pathogens • groundwater by toxic substances and nitrogen	• Site and design treatment works and disposal or reuse systems on the basis of adequate data on the characteristics of the wastewater and land application site. • Implement monitoring program and effective industrial waste pre-treatment program (see text for guidelines). • Ensure pre-application treatment and operating guidelines for land application and other wastewater reuse systems are adequate.
	Failure to achieve desired beneficial uses of receiving waters despite normal system operation.	• Establish realistic use objective and select water quality criteria consistent with desired uses. • Establish system performance standards by modeling or other means which will result in meeting criteria.
	Odors and noise from treatment process or sludge disposal operations.	• Site treatment works only near compatible land uses. • Select appropriate technology. • Include odor control and low-noise equipment in design. • Implement management and training recommendations
	Emissions of volatile organic compounds from treatment process.	• Establish effective industrial waste pre-treatment program.
	Soil, crop or groundwater contamination and disease vector breeding or feeding at sludge storage, reuse or disposal sites.	• Incorporate sludge management in system feasibility studies, technology selection, design, staffing, training, budgeting and start-up plan. • Implement effective industrial waste pretreatment program. • Ensure pre-application treatment and operating guidelines for land application and other reuse or disposal systems are adequate to safeguard health of humans and livestock. • Inspect for compliance with operating guidelines.
	Worker accidents caused by gas accumulation in sewers and other confined spaces or by hazardous materials discharged into sewers.	• Emphasize safety education and training for system staff. • Implement effective industrial waste pretreatment program. • Provide appropriate safety equipment and monitoring instruments. • Enforce adherence to safety procedures.
	Serious public and worker health hazard from chlorine accidents	• Incorporate safety provisions in design, operating procedures, and training. • Prepare contingency plan for accident response.
	Nuisance and public health hazard from sewer overflows and backups.	• Routinely insect sewers for illegal connections and obstructions. Clean sewers as necessary. • Provide monitoring system with alarms for pump station failure. • Provide alternate power supply at critical pump stations. • Educate public to prevent disposal of solid waste in sewers.
	Failure to achieve public health improvement in serviced area	• Conduct sanitation and hygiene education program
	Perceived or actual nuisances and adverse aesthetic impacts in neighborhood of treatment plant	• Incorporate neighborhood improvements and useful public facilities in project

Sewerage collection

General off-site sewerage collection technologies, which could be considered, include:

- individual holding tanks with truck collection
- small-diameter gravity, pressure or vacuum sewers
- shallow sewers
- flat sewers
- simplified sewerage systems
- conventional gravity sewers and force mains
- regional collection systems
- community or sub-regional systems

The most environmentally sound alternative for the problem of discharging effluent of septic tanks that may be cost-effective and captures economies of scale is to connect individual properties directly to a sewerage system for the collection, treatment and disposal of the urban wastes. Especially if the poblacion of a LGU is relatively urbanized (i.e. higher population densities), the construction of a simplified sewerage system may be required.

Wastewater treatment, disposal and management

Appropriate technology

A variety of siting and technological alternatives exists for wastewater collection, treatment and disposal, and sludge management. Several will be applicable in every situation. A general summary of technologies is presented in Table 13.

Table 13 General listing of wastewater treatment, disposal and sludge management technology (after WB EA Sourcebook)

WASTEWATER TREATMENT	WASTEWATER DISPOSAL	SLUDGE MANAGEMENT
• community on-site systems • oxidation ditches • stabilization ponds • aerated lagoons • artificial wetlands (or constructed wetlands) • land treatment • conventional biological treatment • physical-chemical treatment • preliminary or primary treatment with ocean disposal	• reuse in agriculture, silviculture, aquaculture, landscaping • reuse for groundwater recharge • rapid infiltration • underground injection • reuse in industrial applications • ocean outfall • surface water discharge • nightsoil treatment plants	• composting • co-composting with municipal refuse • reuse in agriculture or silviculture • reclamation of marginal land for reforestation, cultivation • energy recovery (methanization) • incineration • landfill • ocean disposal

The concept of appropriate technology in wastewater systems has technical, institutional, social and economic dimensions. From a technical and institutional standpoint, selection of inappropriate technology has already been named as a primary cause of system failure. The wastewater environment is a hostile one for electronic, electrical and mechanical equipment. Maintenance is a never-ending process, and it requires support - spare parts, laboratories, trained technicians, specialized technical assistance, and adequate budgets. Even in developed countries, it is the simpler Systems, selected and designed with maintenance in mind, which provide more reliable service. In developing countries, where some of the ingredients for a successful maintenance program may be lacking, this should be the first consideration in choosing treatment plant and pumping station technology.

Level of treatment - the magnitude of pollutant removal a treatment process must achieve -depends on the performance standards, which apply to the system. These are usually expressed as limitations on the concentrations of regulated substances permitted in the treated effluent. In the case of effluents, which are to be applied to crops or otherwise used on land, the standards are set to prevent crop and groundwater contamination. National standards for effluent reuse may already exist; if they do not, they can be based on World Health Organization or World Bank guidelines or derived from the standards of other countries in which land application practiced.

Wastewater disposal

For discharges to surface waters, the process of setting standards often begins with classification of receiving waters based on the intended or desired uses. Receiving water quality standards can then be established on the basis of the scientific literature to provide for the uses in each classification. Classification of waters should be done with consideration for what is economically and technically realistic; requiring drinking water quality in a busy harbor, for instance, is not a sound use of pollution control resources.

Ideally, effluent limitations for wastewater discharges should be determined by a mathematical modeling process, which takes into account the existing quality and flow characteristics of the receiving water body. The maximum load of each pollutant which can be assimilated in each segment or zone under a specified statistical condition of dry-season stream flow (e.g., the minimum monthly flow in a five-year period) without causing the standards to be violated can be calculated, and the load among all discharges allocated. Such models require seasonal data on receiving water quality,

volume and concentration of all discharges, and a long enough record of hydrologic data to show seasonal flow averages and permit calculation of the dry-season flow.

In practice, national effluent limitations are often established to correspond to the various receiving water classes, to simplify the process of preparing discharge permits or establishing base/minimum levels of treatment. Modeling is reserved for situations in which adherence to those limits will not result in attainment of water quality standards and more stringent requirements must be applied (or where projects are being planned in countries without water quality or discharge regulations).

Limitations on discharges to marine waters are usually simpler; they focus on preventing discoloration of the water and pollution by oil and grease, floating debris, and bacteria (in shellfish harvesting and recreational waters). The major planning task is to identify an acceptable location for the submerged outfall, where the effluent will not degrade significant water areas or contaminate shellfish beds and beaches.

Sludge management

Wastewater treatment generates sludge and other solid waste, such as grit, and grease screenings. Finding locations for waste dump or incineration, or outlets for recycling, is often difficult. However, if solutions are not found, a portion of the pollutants removed from the wastewater will become pollutants of the land. Sludge management should be part of wastewater system planning.

Planning

In many cases, it is cost-effective to construct treatment works in a modular fashion, adding additional capacity as the collector system is extended and new connections are made. Phasing wastewater investments may be the only realistic way to make progress toward ultimate water quality objectives in densely populated, highly polluted areas, where a single project would exhaust all resources available for public works and physically disrupt the region. The level of treatment can be phased in a single project or as part of sector strategy. This approach is helpful when environmental improvement is urgently needed but local financial resources are limited or the scientific data to determine exactly the extent of pollutant removal required has not been collected. It is important in any phased approach to reserve space for future expansion when acquiring sites and designing facilities.

Treatment facilities require land; siting them can lead to involuntary resettlement. Moreover, treatment and disposal works can cause nuisances in the immediate vicinity, at least occasionally. Often, the lands and neighborhoods selected are those of "vulnerable groups" who can least afford the costs of dislocation and whose living environment is already impaired. Care should be taken to site treatment and disposal facilities where odors or noise will not disturb residents or other users of the area, to manage resettlement with sensitivity, and to include in the project mitigation plan provisions to mitigate or offset adverse impacts on the human environment. If these considerations are not included in project planning, there is substantial risk of solving one community's environmental problem by transferring it to another.

Monitoring

The frequency and level of sophistication of sampling depends in part on the size of the system and the nature of its treatment processes. Monitoring is expensive; it requires laboratory facilities, equipment, and technicians. As a general principle, measure only parameters necessary for managing the system, safeguarding its staff and equipment, and protecting the environment (see also section 3.4.3: Environmental Monitoring Plan).

4.3.5 Improvement of storm drainage and wastewater disposal

Introduction
A problem in many slums and squatter settlements is the presence of stagnant water that becomes the breeding place of mosquitoes. Most of these areas are undeveloped lands, hence, the absence of internal drainage canals leading to the drainage mains along most city streets. The unplanned and uncontrolled construction of houses usually results in difficulties in properly constructing drainage canals along straight lines with proper slopes.

During the rainy season, many of these areas are flooded after heavy rains. The absence of proper drainage results in very slow removal of trapped rainwater in low-lying areas. In addition to rainwater, sullage and currently also the effluent from toilets and septic tanks are household wastes that need to be conveyed out of the community to prevent the breeding of mosquitoes, flies and rats in the community.

While drainage and flood control is the responsibility of the Department of Public Works and Highways (DPWH), internal drainage in settlements and housing subdivisions is the collective responsibility of the homeowners. Proper conveyance of wastewater within the areas can be solved by community action as was done in the early 1980s in Barangay Escopa in Quezon City under a United Nations Environmental Program (UNEP) - assisted project.

Environmental aspects
In many barangays (particularly in low-income areas) secondary and tertiary drains are the responsibility of barangays and local residents. The unplanned nature of most slum and squatter settlements, in particular, has often affected the natural drainage of storm water and wastewater. The construction of neighborhood drains will be included in this sub-component.

Disposal of sullage could be implemented through a hydraulically well-designed storm water drain or an on-site sullage soakaway[14] (simple 1-2m deep pit filled with rocks). The storm water drains should be able to carry the sullage flow also in dry weather periods. Especially in flat areas where natural drainage problems and water logging occur, emphasis should be given to regular cleaning and maintenance of the drainage system[15].

Discharge of sullage to marine environments is usually simpler then to surface waters. Main requirements include the discoloration of the water, and absence of pollution by oil and grease, floating debris, and bacteria (in shellfish and recreational waters).

[14] Wherever possible, on-site solutions for sullage discharge are recommended, but the feasibility of this approach still has to be tested.
[15] Drainage improvements within the project, if requested or considered necessary, are restricted to the storm water drainage system in the town. Flood protection is the responsibility of the Provincial Government, and should be addressed through other appropriate channels.

As the environmental impacts are comparable or less then the impacts of the construction and operation of a sewerage system, the reader is referred to Table 12.

5 MONITORING AND FOLLOW-UP

5.1 General requirements

All projects covered by the EIS System are subject to periodic compliance monitoring by the DENR and the proponent. The primary purpose of compliance monitoring is to ensure the implementation of sound and standard environmental procedures as defined during the project preparation. Specifically, it aims to:

- Monitor project compliance with the conditions set in the ECC;
- Monitor compliance with the EMP and applicable laws, rules and regulations; and
- Provide a basis for timely decision-making and effective planning and management of environmental measures through the monitoring of actual project impacts vis-a-vis the predicted impacts in the EIS.

The need for compliance monitoring is established at the time an ECC is issued. The ECC sets the conditions for monitoring the activities to be monitored and the monitoring schedule. As a minimum requirement in compliance monitoring, the activities to be monitored by DENR should correspond to the conditions in the ECC. In addition, the ECC conditions may also require the proponent to undertake industry self-monitoring and submit the required reports.

5.2 DENR procedures

For ECCs issued pursuant to an IEE, the DENR Regional Office shall be tasked to monitor proponent's compliance. Based on the Monitoring Plan incorporated in the EMP and the approved ECC, the Compliance-Monitoring plan will validate:

- *Coverage of Monitoring*;
- Frequency of Monitoring;
- Standard procedures/methods of monitoring (e.g. labeling, transport and handling of samples) and laboratory analysis;
- Selection of sampling stations;
- Manpower requirements; and
- Logistics.

Upon the request of the DENR, a Multi-partite Monitoring Team (MMT) may have to be organized to undertake compliance monitoring. The primary purpose for organizing a multi-partite monitoring team (MMT) is to achieve broader participation, greater vigilance and appropriate check and balance in the monitoring of project implementation. The MMT shall be organized within two months from the date the ECC is issued[16]. If requested, the proponent shall initiate the preparation of a Memorandum of Agreement (MOA) which will be approved and signed based on negotiations and agreements made by the parties concerned. The MOA shall contain the following:

- The parties composing the MMT;
- Roles and responsibilities of the parties involved;
- Systems and procedures for monitoring.

[16] Details of the organization and operation of the MMT are given in the DENR Procedural Guidelines.

5.3 Internal implementation and monitoring of the EMP

The water supply system operator and the LGU, with the assistance of GFI and consultants, will monitor compliance with the ECC and carry out the requisite data collection during both the construction and operational phases (see section 3.4.3). Quarterly monitoring reports will be submitted to DENR/EMB and the GFI, including:

- Presentation of the collected data;
- Discussion on the compliance or non-compliance to the EMP and ECC;
- Conclusions and recommendations.

Example of simple monitoring forms of the DBP are given in Annex C. II.

The GFI is requested to summarize the finding of the quarterly monitoring reports and submit a annual compliance report to the World Bank.

6 MAIN REFERENCES AND BACKGROUND DOCUMENTATION

Bernstein, Janis D., 1993. Alternative Approaches to Pollution Control and Waste Management. Regulatory and Economic instruments. UNDP/UNCHS/World Bank Urban Management Program Discussion Paper No. 3.

DENR, 1992. National Integrated Protected Areas System (NIPAS). Act. R.A. No. 7586 and Implementing Rules and Regulation DAO 25, S 1992.

DENR, 1996. Administrative order No. 96-37: Revising DENR administrative order No.21, series of 1992, to further strengthen the implementation of the Environmental Impact Statement (EIS) system.

DENR, 1997. DAO 96-37 Procedural Manual (electronic copy).

Department of Health, 1993. Philippine National Standards for Drinking Water.

Department of Health, 1995. Implementing rules and regulations of Chapter II – "Water Supply" of the Code of Sanitation of the Philippines (P.D. 856).

Department of Health, 1995. Implementing rules and regulations of Chapter XVII – "Sewage collection and disposal, excreta disposal and drainage" of the Code of Sanitation of the Philippines (P.D. 856).

Development Bank of the Philippines (DBP), 1999. Manuals on Pollution Abatement. Environmental Infrastructure Support Credit Program (EISCP).

Development Bank of the Philippines (DBP), 1999. Handbook of Environmental Standards. Environmental Infrastructure Support Credit Program (EISCP).

Development Bank of the Philippines (DBP), 1999. Manual on Environmental Due Diligence in Project Evaluation. Volumes I and II. Environmental Infrastructure Support Credit Program (EISCP).

Development Bank of the Philippines (DBP), 1999. Manual on Environmental Performance Monitoring. Environmental Infrastructure Support Credit Program (EISCP).

Development Bank of the Philippines (DBP), 1999. Waste Minimization Manual. Environmental Infrastructure Support Credit Program (EISCP).

Leitmann, Josef, 1994. Rapid Urban Assessment. Lessons from Cities in the Developing World; Volume 1. Methodology and Preliminary Findings. UNDP/UNCHS/World Bank Urban Management Program Discussion Paper No. 15.

Leitmann, Josef, 1994. Rapid Urban Assessment. Lessons from Cities in the Developing World; Volume 2. Tools and Outputs. UNDP/UNCHS/World Bank Urban Management Program Discussion Paper No. 15.

Mara, D. 1995. Low-cost urban sanitation.

Matthes, G., S.S.D. Foster and A. Ch. Skinner, 1985. Theoretical background, hydrogeology and practice of groundwater protection zones. International Contributions to Hydrogeology, Volume 6; International Association of Hydrogeologists.

NEDA, 1994. NEDA Board resolution No. 5: Approving the recommendation of the Infrastructure Committee (INFRACOM) on the National Policy, strategy and action plan for urban sewerage (liquid waste) and sanitation).

NEDA, 1995. NEDA Board resolution No. 12: Approving the common definition of terms relative to water supply, sewerage and sanitation.

National Water Resources Board, 1979. Water Code of the Philippines and the implementing rules and regulations, P.D. 1067.

National Water Resources Board, -. Instructions for water permit applications.

World Bank, 1990. Operational Directive 4.30: Involuntary Resettlement.

World Bank, 1999. Operational Policy 4.01: Environmental Assessment.

World Bank, 1999. Good Practices 4.01: Environmental Assessment.

World Bank, 1999. Bank Procedures 4.01: Environmental Assessment.

World Bank, 1991. Environmental Assessment Sourcebook; Volume I: Policies, Procedures, and Cross-sectoral Issues. WB Technical Paper 139.

World Bank, 1991. Environmental Assessment Sourcebook; Volume I: Sectoral Guidelines. WB Technical Paper 140.

Annexes

Annex A. I Administrative order No. 96-37: Revising DENR administrative order No.21, series of 1992, to further strengthen the implementation of the Environmental Impact Statement (EIS) system (DENR, 1996).

Annex A. II NEDA Board resolution No. 5 (1994): Approving the recommendation of the Infrastructure Committee (INFRACOM) on the National Policy, strategy and action plan for urban sewerage (liquid waste) and sanitation).

Annex A. III NEDA Board resolution No. 12: Approving the common definition of terms relative to water supply, sewerage and sanitation (1995).

Annex A. IV National Integrated Protected Areas System (NIPAS). Act. R.A. No. 7586 and Implementing Rules and Regulation DAO 25, S 1992 (DENR, 1992).

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