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PUTRAJAYA ENVIRONMENTAL MANAGEMENT GUIDE

CHAPTER

CHAPTER 1

INTRODUCTION TO GUIDE

INTRODUCTION TO GUIDE

1.1 BACKGROUND

Putrajaya was declared a Federal Territory on the 1st of February 2001 and serves as the Federal Government Administrative Centre. Putrajaya is a well planned city equipped with high standard infrastructure and facilities. The development is guided by a visionary Master Plan with Garden City concept that embraces harmony between natural environment, built environment and the community. True to its concept as a Garden City, Putrajaya is enveloped by pristine lakes, parks, open spaces and recreational areas.

Evolving from Garden City, Putrajaya moves on to be a model Green City – a city that is continuously committed towards quality of life, ensuring its built and natural environment co-exist.

The Master Plan for Putrajaya (see Fig. 1.1) has grouped the development areas into four components as follows:

- Putrajaya Lake and Wetlands
- A green network parks and gardens
- Core Area Precincts
- Peripheral Area Precincts

Administratively, Putrajaya is divided into twenty (20) Precincts. Five (5) of the precincts are located in the Core Area, linked by a 100m wide, 4.2km long Putrajaya Boulevard. They are:

- Government Precinct
- Mix Development Precinct
- Civic & Cultural Precinct
- Commercial Precinct
- Sport & Recreation Precinct

See Appendix 1 for Additional Background Information on Putrajaya.

INTRODUCTION TO GUIDE

1.2 OBJECTIVE OF THE GUIDE

Perbadanan Putrajaya was established under the provisions of the Perbadanan Putrajaya Act 1995, for the purpose of managing and administering the Federal Territory of Putrajaya as well as exercises the functions of a local planning authority by virtue of powers delegated through:

- Federal Territory of Putrajaya (Modification of Local Government Act 1976) Order 2002
- Federal Territory of Putrajaya (Modification of Street, Drainage and Building Act 1974) Order 2002
- Federal Territory of Putrajaya (Modification of Town and Country Planning Act 1976) Order 2010

Perbadanan Putrajaya also has the authority over certain matters pertaining to the environment, as per the provisions delegating authority contained in the Environmental Quality (Delegation of Powers) (Perbadanan Putrajaya) 2002.

Perbadanan Putrajaya is committed to ensure that all stakeholders in Putrajaya comply with the legislative and environmental requirements to achieve the Garden City and Green City vision.

As such, an Environmental Management Guide is prepared to assist and facilitate planning and development of Putrajaya, including but not limited to all stages of planning, design, construction and operation.

This Guide is divided into six (6) chapters:

- Chapter 1 : Introduction to Guide
- Chapter 2 : Environmental Administration and Quality Objectives in Putrajaya
- Chapter 3 : Environmental Legislation
- Chapter 4 : Environmental Requirements in Putrajaya
- Chapter 5 : Planning Procedure in Putrajaya
- Chapter 6 : Environmental Management System in Putrajaya

1.3 ENVIRONMENTAL POLICY OF PUTRAJAYA

The environmental policy of Putrajaya is based on Putrajaya's vision and mission; and shared values.

- Putrajaya is committed towards the incorporation of effective and efficient environmental protection measures in all aspects of its developments towards realizing a well-managed, vibrant and prosperous Federal Administrative Capital that fulfils the socio-economic, recreational and spiritual needs of (its) residents, workers and visitors.
- Putrajaya will continue to uphold excellence in environmental management for the preservation of the environment and well-being of the present and future community and society as a whole.

INTRODUCTION TO GUIDE

1.4 ENVIRONMENTAL STRATEGY OF PUTRAJAYA

To ensure that the above environmental policies are complied the following strategies have been adopted:

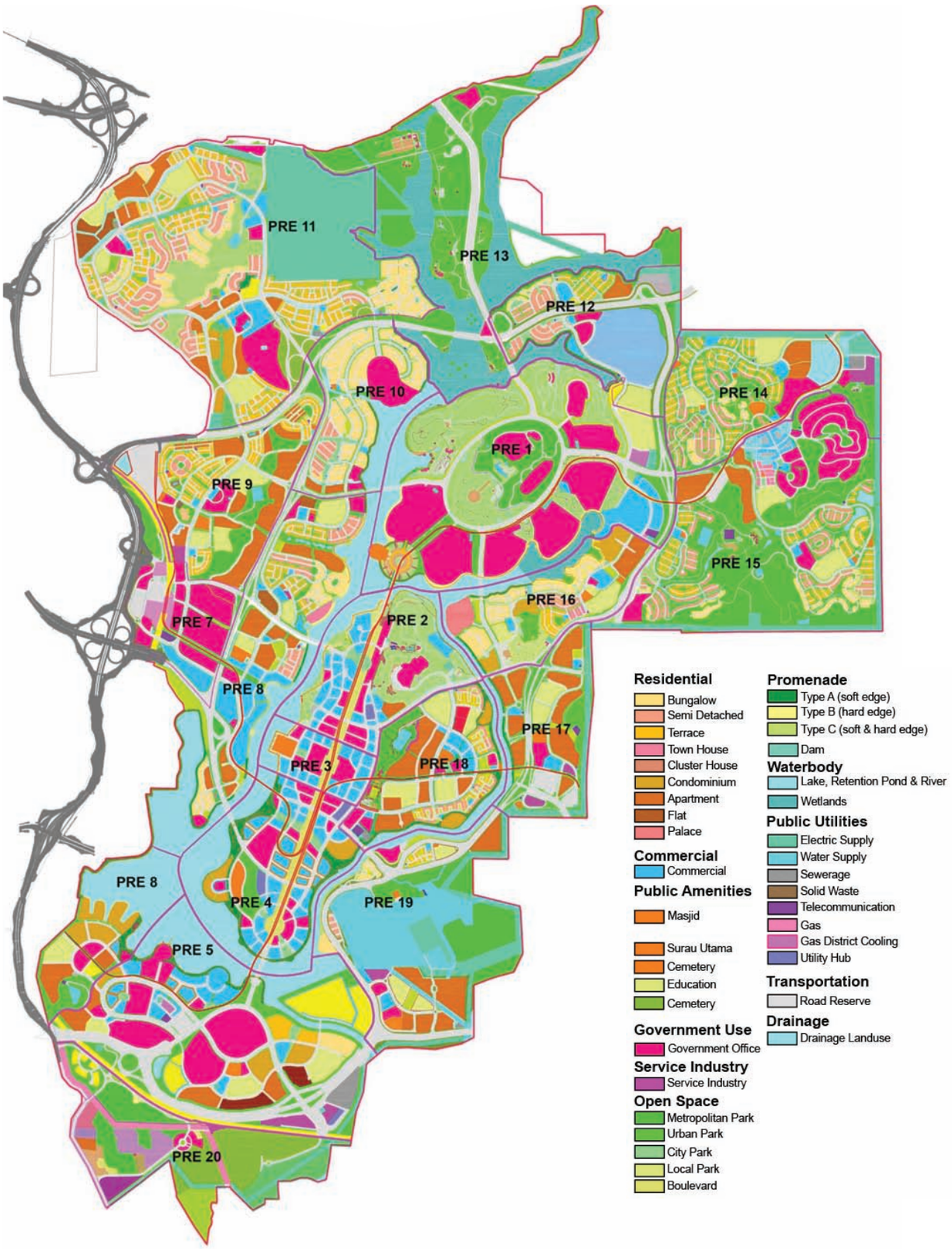
- Environmental management and control measures shall be incorporated in all development stages.
- Environmental monitoring procedures, which are pragmatic, auditable and comply with the DOE's EIA Approval Conditions shall be developed and implemented.
- A framework for the review of activities from the perspective of management shall be developed.
- Identification of chains of command and assignment of responsibilities for environmental controls and initiatives shall be carried out.
- Manuals of best practices, checklists and other working forms to aid information gathering shall be developed, the purpose of which will be to:
  - ✓ Provide an early warning system for the occurrence of negative environmental impacts and incidences of non-compliance.
  - ✓ Chart the environmental successes of a project.
- Development and implementation of programs to promote environmental awareness among all stakeholders in Putrajaya, which includes the staff of the Perbadanan Putrajaya, all project proponents, their consultants and contractors, and the residents of Putrajaya.
- Development and promotion of research projects to support the management and preservation of Putrajaya's environment. They include projects to support the management of Putrajaya Lake and its associated wetlands, Taman Wetland and the Botanical Garden.
- This EMG shall apply to activities subject to determination by Perbadanan Putrajaya in accordance to existing regulatory measures in place, taking consideration factors such as location, size, scale and type of activity.

INTRODUCTION TO GUIDE

1.5 MOVING PUTRAJAYA TOWARDS GREEN CITY

Sustainable Putrajaya 2025 which is the Structure Plan for Putrajaya stated that by 2025, Putrajaya the Garden City, will be transformed into a Green City via the following initiatives:

- Enhance ecology, water body and bio-diversity
- Application of green technology, infrastructure and practices in city planning and management
- Adopting Sustainable Building Practices
- Establish model green community committed to reduction of carbon footprint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Town House
Cluster House
Condominium
Apartment
Flat
Palace
Commercial
Commercial
Public Amenities
Masjid
Surau Utama
Cemetery
Education
Cemetery
Government Use
Government Office
Service Industry
Service Industry
Open Space
Metropolitan Park
Urban Park
City Park
Local Park
Boulevard
Promenade
Type A (soft edge)
Type B (hard edge)
Type C (soft & hard edge)
Dam
Waterbody
Lake, Retention Pond & River
Wetlands
Public Utilities
Electric Supply
Water Supply
Sewerage
Solid Waste
Telecommunication
Gas
Gas District Cooling
Utility Hub
Transportation
Road Reserve
Drainage
Drainage Landuse

CHAPTER 2

ENVIRONMENTAL ADMINISTRATION AND QUALITY OBJECTIVES IN PUTRAJAYA

ENVIRONMENTAL ADMINISTRATION AND QUALITY OBJECTIVES IN PUTRAJAYA

2.1 PERBADANAN PUTRAJAYA

Perbadanan Putrajaya was incorporated on March 1, 1996 under the Perbadanan Putrajaya Act, 1995, as a corporate body to administer and manage the Putrajaya on behalf of the Federal Authority.

In 2001, after the declaration of Putrajaya as a Federal Territory, Perbadanan Putrajaya was entrusted with powers to function as a local authority and local planning authority by virtue of powers delegated through:

- Federal Territory of Putrajaya (Modification of Local Government Act 1976) Order 2002
- Federal Territory of Putrajaya (Modification of Street, Drainage and Building Act 1974) Order 2002
- Federal Territory of Putrajaya (Modification of Town and Country Planning Act 1976) Order 2010

Perbadanan Putrajaya also has the authority over certain matters pertaining to the environment, as per the provisions delegating authority contained in the Environmental Quality (Delegation of Powers) (Perbadanan Putrajaya) 2002.

The Perbadanan can exercise all the powers of a local authority, such as the powers to regulate and promote orderly development of land within Putrajaya. Among the laws that apply include the Local Government Act 1976, Town and Country Planning Act 1975, Environmental Quality Act 1974, Street, Drainage and Building Act 1974, Road Transport Act 1987, Housing Developers Act 1966.

CHAPTER 2

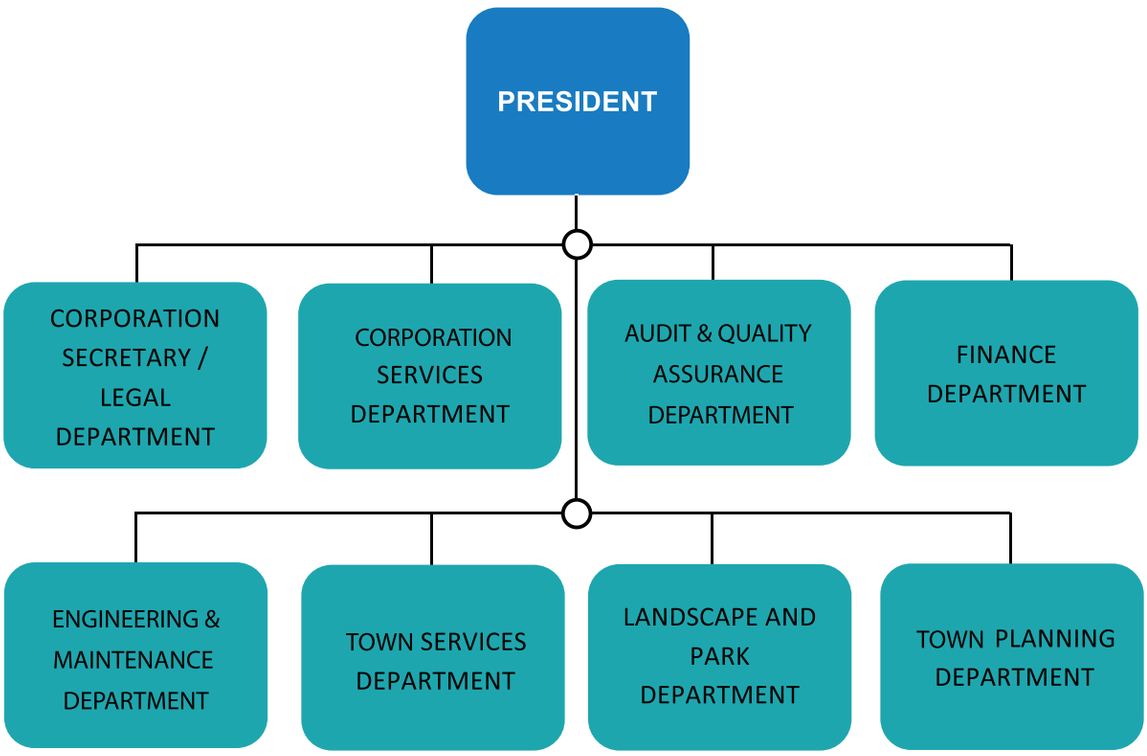
ENVIRONMENTAL ADMINISTRATION AND QUALITY OBJECTIVES IN PUTRAJAYA!

The organizational structure of the Perbadanan is listed below and shown in Fig. 2.1.

- Corporation Secretary Department / Legal Department
- Audit & Quality Assurance Department
- Corporation Services Department
- Town Services Department
- Finance Department
- Engineering & Maintenance Department
- Landscape and Park Department
- Town Planning Department

ENVIRONMENTAL ADMINISTRATION AND QUALITY OBJECTIVES IN PUTRAJAYA

Fig. 2.1 Organisation Chart of Perbadanan Putrajaya



ENVIRONMENTAL ADMINISTRATION AND QUALITY OBJECTIVES IN PUTRAJAYA

2.2 TOWN PLANNING DEPARTMENT

The Town Planning Department has the responsibility to ensure that all projects in Putrajaya are planned and implemented, in accordance with all legislative requirements, and compliance with the Putrajaya Master Plan.

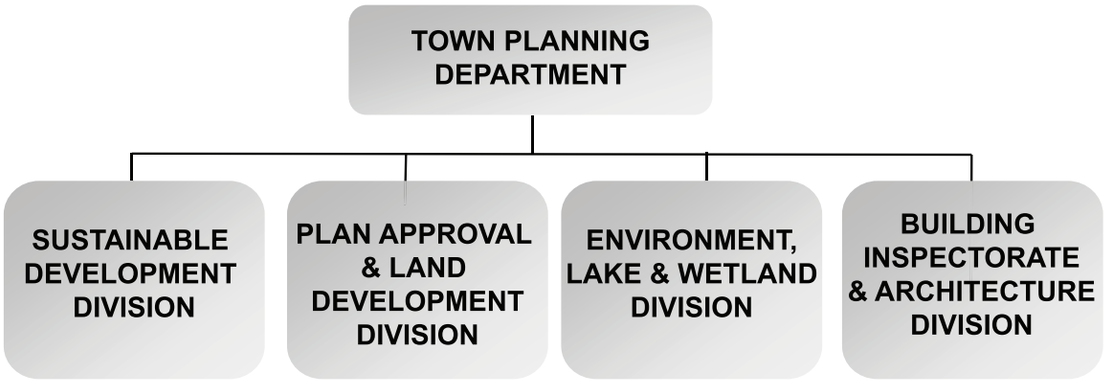
The organization chart of the Department is given in Fig. 2.2. The Department comprises of 4 Divisions. They are:

- Sustainable Development Division
- Plan Approval & Land Development Division
- Environment, Lakes and Wetland Division
- Building Inspectorate & Architecture Division

The Environment, Lakes and Wetland Division is responsible for all functions and activities related to the management of the physical features of the city's environment, landscape, parks and Putrajaya lake.

ENVIRONMENTAL ADMINISTRATION AND QUALITY OBJECTIVES IN PUTRAJAYA

Fig. 2.2 Organization Chart of the Town Planning Department



The contact details of the Department are as follows:

Town Planning Department
Perbadanan Putrajaya
Kompleks Perbadanan Putrajaya
24, Persiaran Perdana
Precinct 3, 62675 PUTRAJAYA
Malaysia

Tel: 603-8000-8000
Fax: 603-8887-5003

ENVIRONMENTAL ADMINISTRATION AND QUALITY OBJECTIVES IN PUTRAJAYA

2.2.1 Environment, Lakes and Wetland Division

The functions of the Environment, Lakes and Wetland Division are carried out by three (3) Units. They are the Environment Unit, Hydrology Unit and Lakes & Wetlands Management Unit.

The Environment Unit (EU) is responsible for all the environmental planning and management in Putrajaya. It shall be responsible for the following:

- Approving all the environmental management plans and reports (EMP and EMR) at the planning stage.
- Approving the Environmental Management Compliance Plan (EMCP) during the construction stage.
- Approving the Project Abandonment Plan (PAP) and Project Closure Plan (PCP) during the construction stage.
- Conducting environmental audit of a project contractor's site during the construction and operation stage.
- Ensuring that all environmental requirements in Putrajaya are complied through enforcement of all pertinent legislation, if required.

The Hydrology Unit is responsible for all the engineering issues related to water management and drainage in Putrajaya.

The Lake and Wetland Management Unit is responsible for monitoring and managing the water quality, flora and fauna in all the wetlands of Putrajaya Lake.

The Lake Usage Control Unit is responsible for control lake activities and enforcement

ENVIRONMENTAL ADMINISTRATION AND QUALITY OBJECTIVES IN PUTRAJAYA

2.3 PUTRAJAYA HOLDINGS SDN. BHD.

Putrajaya Holdings Sdn. Bhd. (PHSB) is the main project proponent in Putrajaya. PHSB is responsible to ensure that all the EIA Approval Conditions for Putrajaya (see Appendix 2) are complied.

PHSB has setup an Environmental Department (ED) to undertake the responsibility for environmental management in Putrajaya. The contact details are:

Environmental Department, HSE Division
Putrajaya Holdings Sdn. Bhd . (PHSB),
Menara PjH,
No.2, Jalan Tun Abdul Razak,
Precinct 2, 62100 PUTRAJAYA

Tel: 603-8883-8888
Fax: 603-8889-4929

The Environmental Department (PHSB) has been given certain administrative responsibilities for environmental management in this Guide, during the planning and construction stages of a project, to ensure that it can undertake its responsibilities to the DOE effectively.

All projects proponents, their consultants and contractors under PHSB's project are required to comply with the E nvironmental Department (PHSB)'s instructions, where pertinent, during the planning and construction stages of their projects.

In particular, all project proponents are required to ensure that they introduce the following clause in all their consultancy service agreements and works contracts.

"The consultant/contractor is required to comply with all pertinent administrative, planning and environmental requirements as described in the latest version of the Putrajaya Environmental Management Guide. They include complying with all pertinent instructions from the Perbadanan Putrajaya and the Environmental Department of Putrajaya Holdings Sdn. Bhd."

ENVIRONMENTAL ADMINISTRATION AND QUALITY OBJECTIVES IN PUTRAJAYA

2.4 ENVIRONMENTAL QUALITY OBJECTIVES IN PUTRAJAYA

To attain the harmonious and refreshing environment envisioned for Putrajaya it is necessary to define the environmental quality objectives for the following parameters defining the environmental quality in Putrajaya.

- Quality of Living and Urban Environment
- Lake Water Quality
- Inland Water Quality
- Air Quality
- Noise Levels

2.4.1 Quality of Living and Urban Environment

The urban built form in Putrajaya should enhance and reinforce the primary objective of Putrajaya, that is, the creation of a “city within a park”.

Thus, in the planning of any projects in Putrajaya the following perspectives should be met.

- Aesthetics
- Appropriate development scale
- Appropriate block massing, building height and site coverage
- Compatible land and building usage
- Adequate and quality landscape and streetscape treatment
- Adequate provision of community, public facilities and amenities
- Appropriate siting of service industries
- Enhancement of the quality
- A positive relationship with the rest of Putrajaya

Guidelines to facilitate the incorporation of the above perspective in a project are given in the Detailed Urban Design, Urban Design Guideline, Putrajaya Structure Plan and Local Plan; and related guidelines.

ENVIRONMENTAL ADMINISTRATION AND QUALITY OBJECTIVES IN PUTRAJAYA

2.5 LAKE WATER QUALITY

Putrajaya Lake is an important environmental component of Putrajaya. It provides the setting for a significant enhancement to the quality of the living environment in Putrajaya.

The water quality in the Lake should be able to support water contact sports and recreation activities within it. Thus, the ambient water quality of Putrajaya Lake shall meet the requirements of the Putrajaya Lake Water Quality Standard (Appendix 3).

See Appendix 3 Putrajaya Lake Water Quality Standards and relevant orders for lake

To ensure that the desired ambient water quality of Putrajaya Lake is preserved and protected the Perbadanan has prepared the following guidelines for the management of the Lake and the design of the drainage facilities flowing into it:

- Putrajaya Lake Management Guide
- Putrajaya Stormwater Management Design Guide
- Putrajaya Lake Use and Navigation Master Plan and Lake and Wetland Emergency Response Plan
- Catchment Development and Management Plan for Putrajaya Lake

To preserve the ambient water quality in Putrajaya Lake from deterioration due to uncontrolled activities in the Lake the Perbadanan is in the process of preparing the necessary legislation to control the following activities in it:

- Swimming
- Non-motorised boating, such as sail boating, windsurfing and row boating
- Motorized boating, such as speed boating, jet skiing and all other forms of motorized boating
- Fishing, such as hook & line, nets and traps
- Floating restaurants and other structures within the lake
- Other activities, such as introduction of undesirable plants and animal species

ENVIRONMENTAL ADMINISTRATION AND QUALITY OBJECTIVES IN PUTRAJAYA

2.6 INLAND WATER QUALITY

To ensure that the water quality in Putrajaya Lake are preserved and protected at the desired high standards there is a need to ensure that the water quality in all inland waters discharging into the Lake are also maintained at a high standard.

Thus, the ambient water quality of all inland waters, excluding Putrajaya Lake, shall meet the requirements of Class IIB of the National Water Quality Standards for Malaysia (Appendix 4).

See Appendix 4 National Water Quality Standards for Malaysia.

2.7 AIR QUALITY

The ambient air quality in Putrajaya shall meet the requirements of the Malaysian Ambient Air Quality Guidelines (Appendix 5), recommended by the DOE and which is applicable nationally.

See Appendix 5 Malaysian Ambient Air Quality Guidelines and New Orders related to air

To ensure that the desired air quality in Putrajaya is preserved and maintained the following policies have been adopted in Putrajaya:

- Promotion of use of public transport facilities and the restriction on the use of cars
- Promotion of use of motor vehicles with low carbon emission

2.8 NOISE AND VIBRATION LEVELS

The ambient noise levels in Putrajaya shall be in harmony with the high environmental quality set for the other environmental quality parameters in Putrajaya.

Perbadanan will adopt guidelines from Department of Environment, Malaysia as listed below:

- The Planning Guidelines for Environmental Noise Limits and Control (Appendix 6)

ENVIRONMENTAL ADMINISTRATION AND QUALITY OBJECTIVES IN PUTRAJAYA

- The Planning Guidelines for Environmental Noise Labeling and Emission Limits of Outdoor Sources (Appendix 7)
- The Planning Guidelines for Vibration Limits and Control in the Environment (Appendix 8)

CHAPTER 3

ENVIRONMENTAL LEGISLATION

ENVIRONMENTAL LEGISLATION

3.1 ENVIRONMENTAL RELATED LEGISLATION AND IMPLEMENTING AGENCIES

The environmental standards and acceptable limits for the protection of the environment are defined in various legislations, applicable to and those enforced by Perbadanan Putrajaya specifically, other local authorities, as well as federal agencies.

It is important that all project proponents and contractors are familiar with and understand the requirements of the environmental related legislation and the way in which they affect them in the implementation of their project.

Perbadanan Putrajaya requires that all the provisions of the environmental related legislation are met when a project is planned and implemented. The list of applicable environmental related legislations and guidelines is included in Appendix 9, which will address the following key areas:

- Air Quality
- Noise Levels and Vibration
- Environmental Planning
- Land Use and Land Conservation
- Natural Resources Protection and Management
- Solid Waste Management
- Toxic or Hazardous Substances/ Activities
- Lake Water Quality and Wetlands Management
- Erosion and Sediment Control Plan
- Water Bodies

3.2 LEGISLATIVE CONTROL FOR POLLUTION ABATEMENT

A variety of project related activities will be implemented in the course of the developments within Putrajaya. These activities may impose negative effects on the environment. Thus, in order for the impacts or pollution to be reduced to acceptable levels, relevant legislative requirements have to be complied.

ENVIRONMENTAL LEGISLATION

The areas of environmental concern include but not limited to:

- Dust and/ or Black Smoke
- Odorous Gases
- Gaseous Emissions
- Noise and Vibration
- Silt and Sediment
- Suspended Solids, Oils and Grease, Organics and Inorganic
- Solid Wastes
- Scheduled Wastes
- Safety
- Aesthetics

3.3 ENVIRONMENTAL QUALITY STANDARDS FOR COMPLIANCE

Both ambient and emission/discharge standards have been legally specified for the protection of the environment.

3.3.1 Ambient Quality Standards

Ambient quality standards have been recommended as desirable standards for ensuring a healthy environment for the protection of human health as well as the protection of living and natural resources. The pertinent ambient quality standards for Putrajaya have been defined in Chapter 2 of this Guide, as the environmental quality objectives of Putrajaya.

3.3.2 Emission/Discharge Standards

Standards or limits as well as management measures have been provided for in several legislative provisions as well as ensuing guidelines as shown in Appendix 9, and the standards or limits and management measures applicable shall be determined by Perbadanan Putrajaya in accordance to the activity type and scale, location and frequency.

ENVIRONMENTAL LEGISLATION

In the preparation of their EMP all project proponents have to ensure that they comply with the following standards for:

- Gaseous and Air Emission
- Noise and Vibration
- Sewage, Industrial Effluent and Leachate Discharge
- Scheduled Wastes

3.3.3 Gaseous and Air Emission Standards

The standards or limits of emissions from various sources and activities, both existing and planned shall be in accordance set by the related statutory provisions as in Appendix 9.

3.3.4 Noise and Vibration

The standards or limits of noise and vibration emitting from various sources and activities, both existing and planned shall be in accordance set by the related statutory provisions in Appendix 9. Perbadanan Putrajaya will determine, based on the types of activities, scale, location and frequency; the provisions to be complied with, and the proponents are to seek the approval of authorities concerned for provisions enforced by authorities other than Perbadanan Putrajaya within Putrajaya.

3.3.5 Sewage, Industrial Effluent and Leachate Discharge

Sewage, industrial effluent and leachate discharge limits and standards shall be in accordance to limits and standards set out in the list of regulatory measures applicable in Putrajaya in Appendix 9.

3.3.6 Scheduled Wastes

The management of scheduled wastes shall be in accordance to regulatory measures and guidelines applicable to Putrajaya, following the cradle to grave principle, and may cover generation, storage, transport,treatment and disposal, subject to determination

See Appendix 9 List of Legislation

CHAPTER 4

ENVIRONMENTAL REQUIREMENTS IN PUTRAJAYA

ENVIRONMENTAL REQUIREMENTS IN PUTRAJAYA

4.1 INTRODUCTION

All project proponents, consultants, contractors and project operators are required to comply with the environmental requirements in Putrajaya in the course of the development and operations of their projects. The environmental requirements are discussed based on the following stages of the development:

- Planning
- Construction
- Operations

The requirements were compiled from the Department of Environmental (DOE) EIA Approval Conditions, the Putrajaya Environmental Urban Design Guidelines and other environmental requirements specified by the Perbadanan.

See Appendix 2 EIA Approval Conditions for Putrajaya
See Appendix 10 Putrajaya Design & Management Guidelines

4.2 ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

To attain the environmental quality objectives of Putrajaya, as defined in Chapter 2, there is a need to develop and implement an environmental management system governing the activities of all project stakeholders in Putrajaya. A model for developing such a system can be found in the ISO14001 Standard for Environmental Management System (EMS).

The ISO14001 EMS Standard is a widely accepted official international standard for environmental management systems. Using the 17 elements in the Standard as a guide it is possible for any organization to develop a specific EMS for improving its environmental performance. Appendix 11 gives a brief overview of the 17 elements included in the ISO14001 EMS Standard.

See Appendix 11 The 17 Elements in the ISO14001 EMS

All project proponents, operators and contractors in Putrajaya are encouraged to develop an EMS, based on the ISO14001 model, to support the environmental performance of their organization.

An interim approach towards that objective is to implement pertinent elements of the Standard, wherever possible. This is the approach that the Perbadanan has adopted in the development of the EMS in Putrajaya as described in Chapter 6.

One of the requirements of the EMS in Putrajaya is that all contractors are required to develop and implement the basic elements of an EMS to support their environmental performance during the construction activities.

To facilitate compliance to this requirement the Perbadanan requires an Environmental Management Compliance Plan (EMCP) to be prepared, by the contractor, prior to the start of any construction work. The EMCP shall describe the basic “EMS” that the contractor has developed for its particular project.

4.3 APPROACHES TO ENVIRONMENTAL MANAGEMENT

Perbadanan adopts the partnership approach to environmental management rather than the traditional confrontational approach. All project stakeholders (project proponent, consultants, contractor, project operator and the regulatory authorities) are required to be familiar and subscribe to the 6 principles given below, which provide a common basis for the partnership.

Perbadanan, as one of the regulatory authorities, shall set realistic and achievable environmental requirements to be attained by the project stakeholders.

The project stakeholders are expected to be familiar with and implement the environmental requirements set by the regulatory authorities. They are expected to adopt a pro-active and self-regulatory approach and provide sufficient resources for the environmental management of their project.

The 6 principles underlying the partnership approach to environmental management are:

[1] Understanding of project constraints
[2] Appreciation of environmental requirements
[3] Pro-active implementation of pollution control measures
[4] Consistent utilization of pollution control measures

ENVIRONMENTAL REQUIREMENTS IN PUTRAJAYA

[5] Monitoring and performance evaluation

[6] Rapid response to inadequacies

[1] Understanding of project constraints

The constraints on a project have a direct influence on the ability of project stakeholders to comply with the environmental requirements in Putrajaya. The Perbadanan recognizes this fact and will take them into consideration in the evaluation of the mandatory reports that have to be submitted to it for approval, at the various stages of a project. Project stakeholders are required to highlight and discuss the constraints in their reports.

The constraints may cover physical, ecological as well as contractual issues, such as:

- Size of construction site and available right-of-way set aside for construction activities.
- Catchment area and climatic characteristics
- Project budget, milestones and completion date
- Maintenance and/or relocation of existing services and infrastructure
- Existing condition of the environment and the ability of the site to recover following the completion of the project
- Construction methods

[2] Appreciation of environmental requirements

It is important that all project stakeholders have a clear appreciation of the following:

- Environmental requirements in Putrajaya
- Basis for the requirements
- Achievability of the requirements for a specific project
- Means to demonstrate compliance with them
- Regulatory requirements

Key management staff should be familiar with the relevant environmental legislation and requirements.

The legislative requirements should be incorporated into the EMP for each project activity that has an impact on the environment.

[3] Pro-active implementation of pollution control measures

Perbadanan requires an EMP or an EMR to be prepared at the planning stage of a project and an EMCP at the construction stage. They are mandatory requirements to ensure that the project stakeholders, at the planning and construction stages of a project, have or will implement the necessary measures to mitigate the impact or control the pollution to the environment due to their project activities.

In the preparation of the EMP or EMR and the EMCP, a systematic assessment of the environmental risk associated with each of the project activities are to be carried out and the necessary pollution control measures identified. The risk assessment should identify both the likely scenarios associated with each given activity and the appropriate course of action and contingency plan for each of the scenarios.

For effective implementation of the pollution control measures there is a need to ensure that the pertinent environmental management responsibilities are properly communicated to the assigned personnel and that the staff are adequately trained to handle the responsibilities.

For high-risk activities it may be appropriate to have specific briefing to the staff involved on the likely scenarios and the appropriate measures, prior to the commencement of the activity. Routine activities on the other hand may only require reminders of good environmental management practices at regular intervals.

[4] Consistent utilization of pollution control measures

There is a need for a consistent utilization of pollution control measures throughout the course of a project. Frequently, within a large project, the lack of widespread communication or appreciation of the need to apply such measures

ENVIRONMENTAL REQUIREMENTS IN PUTRAJAYA

amongst the many personnel involved results in inconsistencies in the environmental management methods.

There is a need to promote a cultural shift amongst all project personnel towards better management of the impact of their activities on the environment and to heighten their awareness of the role of pollution control measures. Thus, regular communication and reaffirmation of the project stakeholder's commitment to good environmental management is a key strategy towards promoting consistency in the utilization of the appropriate pollution control measures throughout the course of the project.

[5] Monitoring and performance evaluation

To ensure that project stakeholder's implement effectively and continuously the pollution control measures described in their EMP or EMR and the EMCP the Perbadanan requires that adequate and regular environmental monitoring and compliance audit be carried out of their projects.

To ensure compliance to this requirement the Perbadanan requires the contractor to conduct and submit fortnightly Environmental Monitoring and Audit Reports (EMAR) to the ED (PHSB) during the construction stage of a project.

For the successful implementation of the monitoring and audit program it is necessary that all personnel be made aware of the environmental requirements, role and significance of the pollution control measures assigned to them. This is necessary to promote a sense of responsibility for the measures among the personnel and to ensure a sustainable, high level commitment towards the program throughout the duration of the project.

[6] Rapid response to inadequacies

There is a need to ensure that the feedback mechanisms (monitoring and audit program) are able to respond rapidly to institute corrective measures for any inadequacies in the pollution control measures.

The rate of response to any inadequacies depends on the relative significance of the impacts on the environment due to the inadequacies and can be derived from the ranking of the priorities arising from the risk assessment of the project activities.

ENVIRONMENTAL REQUIREMENTS IN PUTRAJAYA

4.4 PLANNING AND DESIGN STAGE

4.4.1 Administrative Requirements

All project proponents are required to prepare and submit an EMP, EMR and/or Self-Compliance Form for approval by Perbadanan as part of their applications for planning approval for their projects.

Project proponents are required to prepare and submit EMP or EMR for any project that Perbadanan considered has a major environmental impact such as petrol station, sewerage pump house, solid waste plant, temporary batching plant, temporary crushing plant, gas district cooling plant or etc.

A project proponent is required to ensure that the specified construction-stage Environmental Pollution Control Table and Environmental Audit Table in its approved project EMP, are included in the works contract for a pertinent project component.

A project proponent has to ensure that the Conditions of Contract for its project are properly amended to ensure that its contractor will comply with all the environmental management requirements specified in its contract. In particular, the project proponent is required to insert in its contract the following clause:

“The consultant/contractor is required to comply with all pertinent administrative, planning and environmental requirements as described in the latest version of the Putrajaya Environmental Management Guide. They include complying with all

pertinent instructions from the Perbadanan Putrajaya and the Environmental Department of Putrajaya Holdings Sdn. Bhd.”

4.4.2 Planning Design Requirements

Project proponents are required to indicate their compliance to the pertinent planning design requirements, described in this Section, in the environmental Planning Compliance Table of the EMP.

ENVIRONMENTAL REQUIREMENTS IN PUTRAJAYA

The requirements are organized under the following subjects:

[1] Planning, Design and Management Guides
[2] Land-use
[3] Energy Conservation
[4] Geological impacts
[5] Topographical impacts
[6] Air quality impacts
[7] Noise impacts
[8] Water quality impacts
[9] Visual impacts
[10] Flora impacts
[11] Fauna impacts

[1] Planning, Design and Management Guides

A series of planning, design and management Guides for Putrajaya have been prepared to ensure consistency in the planning, design and management of projects in Putrajaya. In addition to this Guide, the following Guides have been prepared:

- Putrajaya Core Area Detailed Urban Design
- Putrajaya Urban Design Guidelines
- Putrajaya Stormwater Management Design Guide
- Utility Masterplan Review Study for Putrajaya
- Putrajaya Transport Design Guide
- Putrajaya Lake Management Guide
- Catchment Development and Management Plan for Putrajaya Lake
- Putrajaya Lake Use and Navigation Master Plan and Lake and Wetland Emergency Response Plan

ENVIRONMENTAL REQUIREMENTS IN PUTRAJAYA

Project proponent's consultants are expected to be familiar with the requirements in the Guides and to comply with them where pertinent. They are required to indicate the pertinent environmental-related requirements in the Guides, that has been or will be complied by them, by listing them under the appropriate subject and topical titles in the Environmental Planning Compliance Table.

Appendix 10 provides an overview of the contents in the Guides listed above. A brief description of each of them is given below.

i. **Putrajaya Urban Design Guidelines –** A set of Urban Design Guidelines (UDG) have been prepared as a follow-up to the Putrajaya Masterplan. The UDG provides the planning and development guidelines for the development of the different precincts in Putrajaya. It is used to guides the development of the local plans for the different precincts. In the planning of their projects all project proponents are advised to check with the Perbadanan on the latest version of the UDG or local plans for the precinct where their projects are located.

ii. **Putrajaya Stormwater Management Design Guide –** To ensure that the drainage concepts and systems defined in the UDG are properly implemented during the engineering design phase a Stormwater Management Design Guide has been prepared.

iii. **Utility Masterplan Review Study for Putrajaya –** Due to the changes to the land-use as the Putrajaya masterplan is translated into the UDG, and subsequently into the Detail Layout Plan, the utility masterplan has also changed. Thus, a review of the Utility Masterplan was carried out for the land-use status up till November, 1996.

   The information contained in the Utility Masterplan Review Study Report is essential for the proper planning, design and implementation of the details engineering of the utility systems for the individual projects in Putrajaya.

ENVIRONMENTAL REQUIREMENTS IN PUTRAJAYA

iv. **Putrajaya Transport Design Guide –** To ensure that the transportation concepts and systems defined in the UDG are properly implemented during the engineering design phase a Transport Design Guide has been prepared.

v. **Putrajaya Lake Management Guide** - To ensure that Putrajaya Lake and its associated wetlands are properly managed a Management Guide for the Lake has been developed.

vi. **Catchment Development and Management Plan for Putrajaya Lake** - The Catchment Development and Management Plan for Putrajaya Lake is a comprehensive plan which includes the Land-use Masterplan, Drainage Masterplan and Sewerage Masterplan, aimed at achieving and maintaining a high water quality objective set for the Putrajaya Lake. For this purpose, point pollutant sources as well as non-point pollutant sources are identified. There are eight major land parcels identified in the catchment area outside Putrajaya and a land-use masterplan has been prepared to ensure that developments in the identified areas are in line with the catchment's objectives. A drainage masterplan is also developed for Putrajaya. This is to integrate the existing, committed and future drainage plans in the catchment areas outside Putrajaya, with the Putrajaya drainage masterplan. The plan comprises drainage planning and design guidelines, with specific recommendations for upgrading the drainage systems in five of the major land parcels outside Putrajaya (which are UPM, MARDI, IOI, West Country Berhad and Cyberjaya Flagship Zone) so as to integrate them into the Putrajaya drainage masterplan. Similarly, a sewerage masterplan consisting of sewerage planning and design guidelines and specific recommendations for the management of sewage effluent discharge is developed for MARDI, UPM, IOI and Cyberjaya.

vii. **Putrajaya Lake Use and Navigation Master Plan and Lake and Wetland Emergency Response Plan** - The Putrajaya Lake Use and Navigation Master Plan and Wetland Emergency Response Plan are formulated for the design, planning and management of the manmade Putrajaya Lake. Based on the lake use potential analysis, activities appropriate to the Putrajaya Lake are designated into their respective

Management Zone as proposed in the modified Lake Use Management Zoning Plan. The integration of lake use and foreshore activities with various commercial centres is also formulated in this plan with specific development concepts ranging from waterfront commercial development and international standard course for rowing to recreational centre and foreshore fishing areas.

Lake management, maintenance and emergency response centres are strategically sited in order to adequately define their land area requirements and for guidance in future stages of detailed design. Navigational use of the lake which includes the use of a variety of motorized watercraft would need to satisfy the objectives of this plan, particularly in aspects of public safety, noise disturbances, effects of boat wake on other lake users and the shoreline, motor exhaust emissions, and water pollution. A comprehensive and integrated Lake Management and Emergency Response Plan have also been outlined in this plan to ensure that the activities in and around the lake are regulated and managed in order to protect the lake environment as a whole.

[2] Land-Use

All land-use activities in Putrajaya are governed by a “Use-Class Order” list, as given in Appendix 12.

See Appendix 12 Land Use-Class Order List in Putrajaya

The alignment of roads and rail networks must take into consideration the impacts on the following during the operational phase:

- Safety of pedestrians and cyclists
- Noise levels due to traffic
- Air quality due to traffic emissions

The transportation system within a development should promote the use of public rather than private transport. To achieve this objective a plan to integrate rail, bus and public transport modes within a development should be made.

Public facilities such as mosques, cemeteries, recreational and commercial areas should have facilities such as walkways and bicycle paths.

[3] Energy Conservation

In the design and layouts of buildings attention should be given the possibilities of increased usage of natural elements for energy efficiency. For example, consideration of natural ventilation and daylight.

Consultants should consider the energy efficiency and the maximization of energy utilization in their design, in particular regarding electrical usage and air conditioning systems.

Careful consideration should be given to the selection of the types of materials used, which should have lower energy demands. Examples are energy saving lights.

Detailed energy utilization and management plans should be drawn up to ensure reduction of energy usage, in particular, in relation to public amenities, like street lighting, public facilities, parks and walkways.

The day to day management of buildings and public amenities should incorporate energy conservation issues to ensure the maximization of energy efficiency.

Chains of responsibility have to be defined in the energy reduction plans to ensure cost effectiveness and proper maintenance of facilities.

[4] Geological Impacts

The developments around the lake edges shall be of low density. This is because it has been identified in the EIA report that the geology around the lake side is unsuitable for high-rise buildings.

Developments on high risk slopes should be in accordance with the Development Guidelines for Building on Hill Lands, 1995, prepared by the Jabatan Perancangan Bandar dan Desa, Selangor.

A geotechnical investigation is required for all projects on hill slopes, irrespective of the gradient.

[5] Topographical Impacts

Road alignment shall be designed, as far as possible, to minimize earth cutting and filling and thus reduce the potential for slope failure and soil erosion.

The planning and design of project and its utilities shall take into consideration existing topography, as far as possible, so as to minimize earth cutting and filling.

All earthworks activities are to comply with the requirements of the Earthworks (Perbadanan Putrajaya) By-Laws 1996. To facilitate compliance an earthworks checklist has been prepared by the City Development Department, Perbadanan Putrajaya.

An erosion and Sediment Control Plan (ESCP) shall be submitted to the City Development Department, Perbadanan Putrajaya for endorsement prior to start of earthwork. The ESCP must be prepared by a Professional Engineer and Certified Professional in Erosion and Sediment Control (CPESC).

The permit to extract, remove and transport of rock material will be subjected to the provisions contained in the Federal Territory of Putrajaya Land Rules 2002 and to any such legislative provision in relation to all aspects of extraction, removal and transportation of rock material that is in force.

[6] Air Quality Impacts

The siting and alignment of buildings should take into account air flows and currents. This is to ensure that the air quality, together with the macro and micro climate, do not deteriorate due to inappropriate massing and alignment of buildings.

The planning of roads shall take into account the air quality impacts arising from the road traffic on the community during the operation phase of the development. This is to ensure that air quality does not deteriorate due to inappropriate location and alignment of roads.

The planning design shall promote the use of public transport systems. This is to ensure that air quality does not deteriorate due to excessive emissions from vehicular traffic on the roads.

ENVIRONMENTAL REQUIREMENTS IN PUTRAJAYA

The installation of combustion engines, such as generators, requires the prior approval of the Director-General of the DOE. All projects proponents are required to submit the necessary approval documents together with their EMP.

[7] Noise Impacts and Vibration

The siting and orientation of residential housing should take into account their proximity to road systems and commercial centers. This is to minimize the noise impacts arising from the road traffic and commercial activities.

The planning of roads shall take into account the noise impacts arising from the road traffic on the community during the operation phase of the development.

Setbacks and/or buffer zones should be used to mitigate noise levels by ensuring a distance is put between sensitive receptors and noise sources.

A list of the likely sources of noise and vibration arising from the project construction and operational activities and the likely parties that may be affected by it should be prepared. The proposed mitigation measures should also be specified.

[8] Water Quality Impacts

All domestic wastewater are to be connected to the central wastewater sewerage system. No discharges into the stormwater drainage system are allowed. This is to ensure that the ambient water quality of all inland waters and Putrajaya Lake are preserved at their high standards.

All sewers are to be fully enclosed and connected to the central sewerage system. No individual sewerage systems are allowed.

[9] Visual Impacts

The visual inter-relationships between land-use boundaries must be compatible with the developments in terms of visual effects. This is to minimize the negative visual impacts arising from incompatible developments.

The visual impacts of any developments should create a balance between the built-environment and the natural environment, when viewed from visual sensitive receptors and from within each development. This is to ensure that the visual effects emphasize the harmony and balance between “man and nature”.

In the alignment of roads consideration should be given to their visual impacts on the overall development, form multiple perspectives. This is to ensure that the negative visual impacts of the road alignment on the development are minimized, as far as possible.

The visual amenity within and surrounding a development project area shall be preserved, as far as possible, through sensitive planning designs. Example, an existing stream can be enhanced and integrated into a development rather than being filled-up or converted into a concrete open channel.

Building frontage adjacent to lakeside are to be constructed facing the lakeside.

[10] Flora Impacts

The trees and vegetation in designated green zones are to be preserved during the development. This is to minimize soil erosion.

[11] Fauna Impacts

An inventory of the fauna in a proposed development area has to be carried out and selected fauna relocated. This is to minimize the impacts on any existing fauna.

ENVIRONMENTAL REQUIREMENTS IN PUTRAJAYA

4.5 CONSTRUCTION STAGE

4.5.1 Administrative Requirements

All contractors are required to prepare an Environmental Management Compliance Plan (EMCP) for approval by the Environmental Unit (EU) of Perbadanan Putrajaya before they are allowed to commence work on site. Details are described in Section 4.5.2.

All contractors are required to prepare a PAP for approval by the Perbadanan before long-term work stoppage or complete abandonment of work on site.

All contractors are required to prepare a PCP for approval by the Perbadanan before the closure of a project on site.

To facilitate the preparation of PAP and PCP a checklist of the items to be considered in the preparation of the plans is given in Appendix 13.

All contractors have to conduct the specified monitoring for their projects, in accordance with the specifications in the EMP or EMR, and submit their monitoring results, monthly, to the EU (Perbadanan) as part of the EMAR. No workers camps are allowed on site

Appendix 14 provides the monitoring guidelines for the contractor.

See Appendix 13 PAP/PCP Checklist
See Appendix 14 Environmental Monitoring Guide for Contractors

4.5.2 Environmental Management Compliance Plan (EMCP)

An Environmental Management Compliance Plan (EMCP) has to be prepared by the contractor and approved by the EU (Perbadanan), prior to the start of any construction work, for any approved project or its component in Putrajaya. Appendix 15 gives the recommended format for the EMCP. Fig 4.1a and 4.1b show the for flowchart submission of EMCP during Pre-construction stage.

See Appendix 15 Recommended EMCP Format

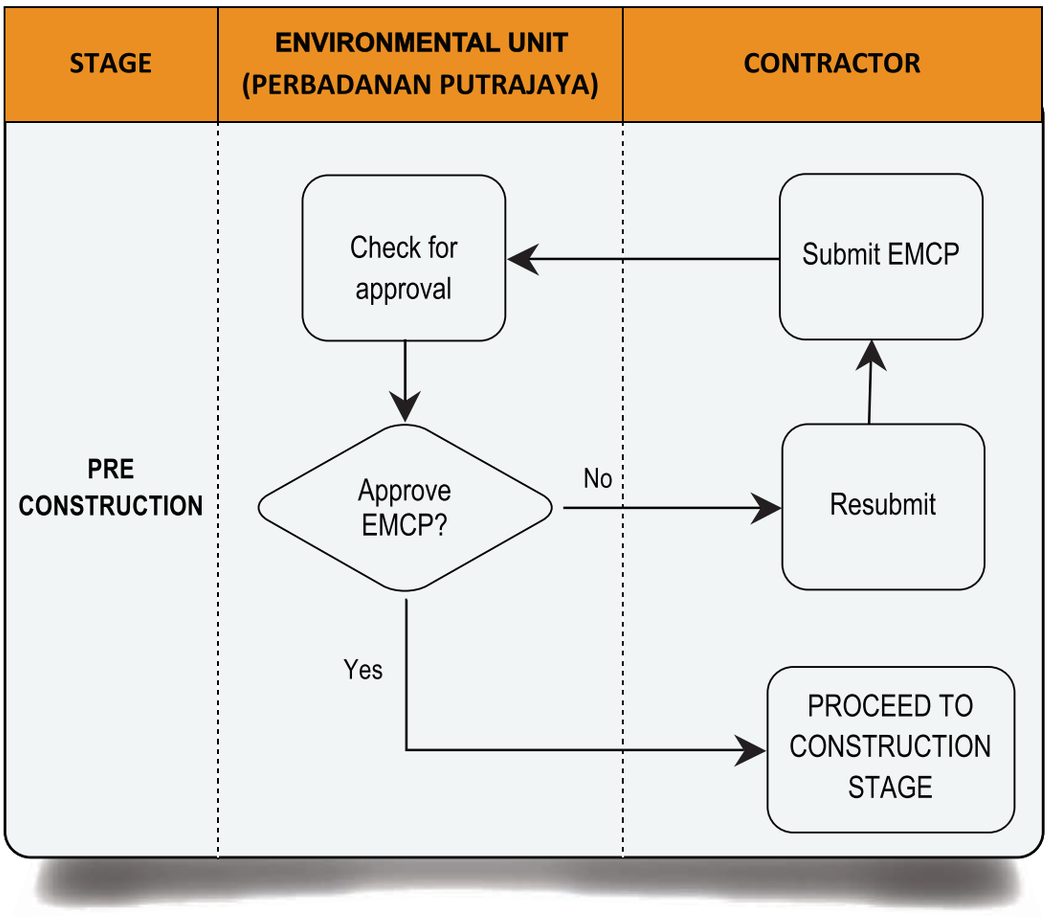
ENVIRONMENTAL REQUIREMENTS IN PUTRAJAYA

The EMCP shall comprise of 9 Chapters. They are:

[1] Introduction
[2] Compliance Requirements
[3] Pollution Control
[4] Emergency Preparedness and Response
[5] Monitoring and Audit
[6] Reporting
[7] Records
[8] Roles and Responsibilities
[9] Appendices

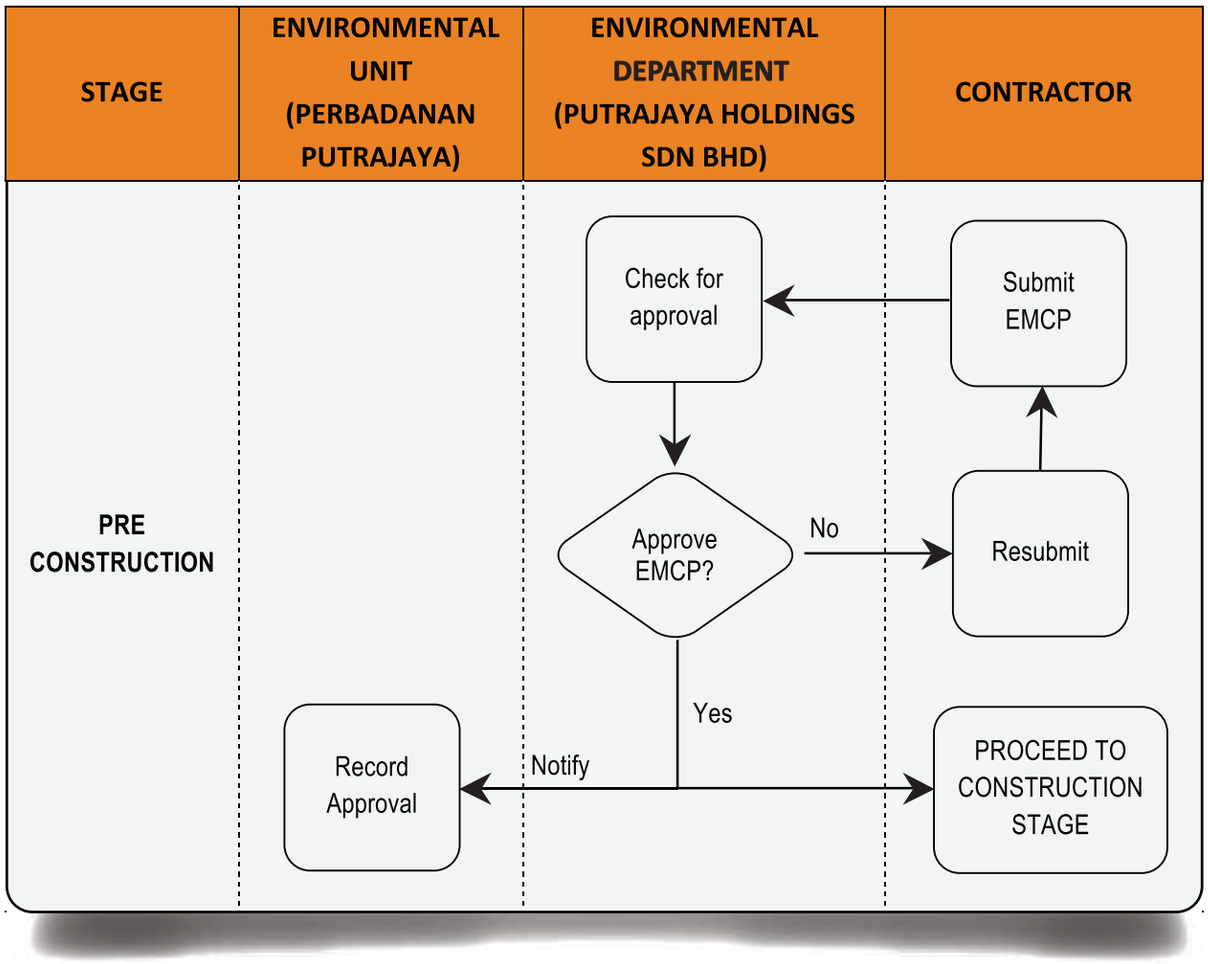
ENVIRONMENTAL REQUIREMENTS IN PUTRAJAYA

Fig 4.1a Flowchart for Submission of EMCP during Pre-construction Stage



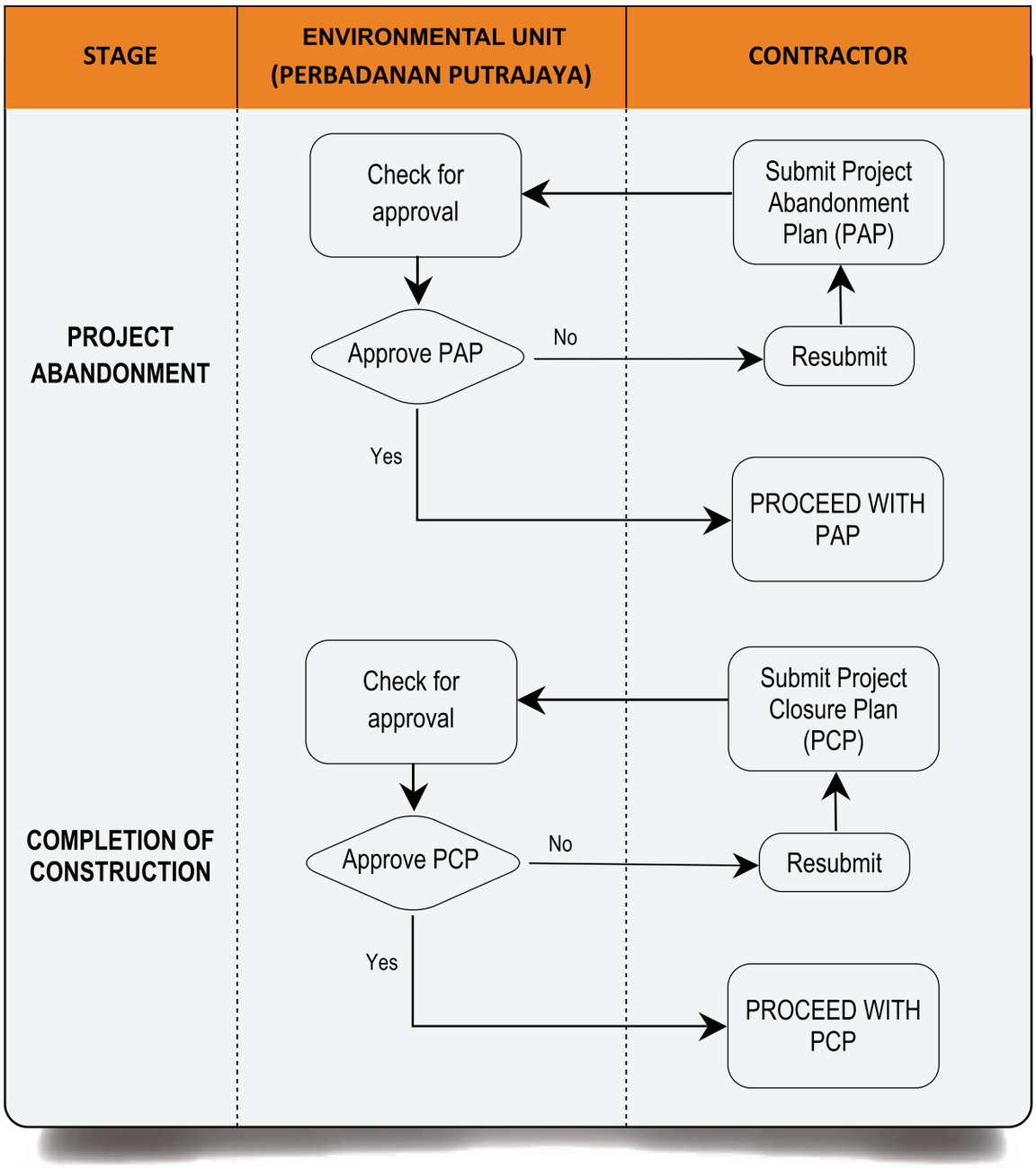
ENVIRONMENTAL REQUIREMENTS IN PUTRAJAYA

Fig 4.1b Flowchart for Submission of EMCP during Pre-construction Stage for Putrajaya Holding Sdn Bhd



ENVIRONMENTAL REQUIREMENTS IN PUTRAJAYA

Fig 4.2 Flowchart for Submission of PAP and PCP



4.5.3 Environmental Monitoring and Audit Report (EMAR)

Throughout the period of construction of a project the contractor is required to conduct fortnightly audit and monitoring of its project site. Based on the audit and the monitoring the contractor is required to submit to the EU (Perbadanan) monthly Environmental Monitoring and Audit Reports (EMAR) of its site. Fig 4.3a and 4.3b show that the flowchart for Submission of EMAR during Construction Stage. The EMAR is advisable submitted to the EU (Perbadanan) in digital form.

See Appendix 16 Recommended EMAR Format

The contractor is required to rectify, as soon as possible, any non-compliance items on the audit checklist identified by its environmental manager during the fortnightly site audit. The identified non-compliance items should be reported in the monthly EMAR submitted to the EU (Perbadanan).

The EU (Perbadanan) shall note the non-compliance items in the contractor's EMAR and verify that they are complied during its monthly audit of the contractor's site.

If any non-compliance items were identified by the EU (Perbadanan) during its monthly audit the EU (Perbadanan) shall issue Site Order and *Compliance Order* to the contractor, depending on the severity or regularity of occurrence of the non-compliance items. The contractor shall rectify, as soon as possible, the areas of non-compliance identified in the *Site Order* and Compliance Order.

The EU (Perbadanan) shall be notified of any serious or persistent non-compliance by any contractor. It shall conduct its own audit and monitoring, and shall take further actions, if necessary.

The EMAR consists of 3 parts. They are:

[1] Compliance audit checklist
[2] Monitoring results and copies of documents/ records
[3] Non-Compliance Report

ENVIRONMENTAL REQUIREMENTS IN PUTRAJAYA

[1] Compliance audit checklist

The contractor's environmental manager is required to indicate, on the compliance audit checklist, those items that the contractor's site staff has not complied during the site audit.

[2] Monitoring results and copies of document/records

The contractor's environmental manager is required to submit the following items to indicate the contractor's compliance with the requirements in the EMCP:

- Monitoring results for the project
- Copies of changes in the contractor's EMS document (if any)
- Copies of receipts (such as waste disposal receipts, etc) and audit checklist pertinent to the items in the compliance audit checklist.
- Six selected photos to indicate the visual conditions of the site during the fortnightly period of audit.

[3] *Non-Compliance Report*

- The contractor's environmental manager is required to prepare a list of the current non-compliance items as indicated in the audit checklist. The list should give the non-compliance audit items, an NCR reference number and the date of issue of the NCR.
- The NCR reference number is made up of the audit report number and a running serial number.
- A chronological list indicating all previous NCR issued should also be given.
- For every non-compliance identified during the pertinent audit event, an NCR has to be prepared in accordance with the format given in Appendix 17. The NCR should describe the areas of non-compliance for

the audited items and the actions to be taken. It should also indicate the date for actions to be taken and the date of actual compliance, where pertinent.

See Appendix 17 Non-Compliance Report

4.5.4 Environmental Control Requirements

Project proponents are required to indicate the environmental control requirements, during the construction stage, in the Environmental Pollution Control Table (See Table B in Appendix 18) of the EMP. The requirements are organized under the following subjects:

[1] Earthworks
[2] Erosion, Sedimentation and Food
[3] Water Pollution
[4] Air Pollution
[5] Noise Pollution
[6] Solid wastes
[7] Schedule Wastes
[8] Agrochemicals
[9] Public Health

[1] Earthworks

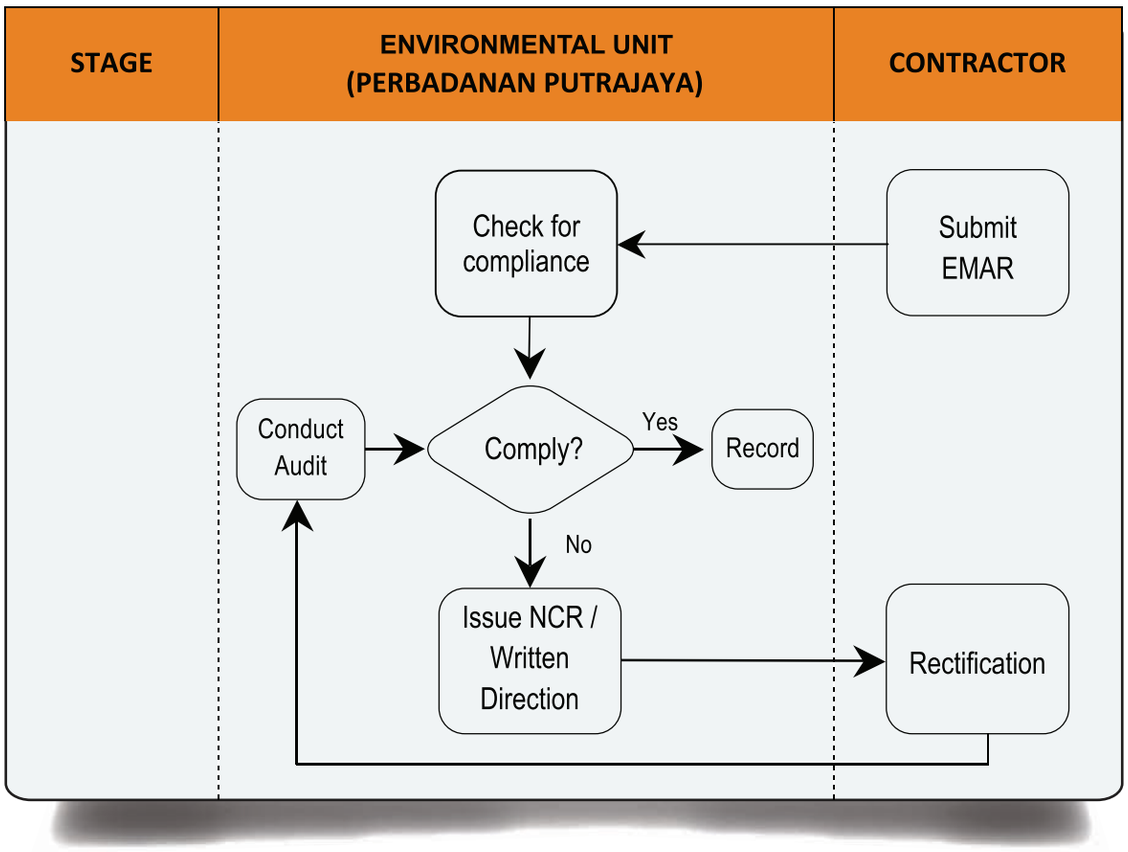
Large scale land-clearing for earthworks is prohibited. Project proponents are required to phase their land-clearing and earthworks activities in parcels, in accordance with the development schedules for the land parcel.

The overlapping of construction phasing should be avoided as this will lead to cumulative significant environmental impacts. Phasing overlaps within catchment should also be provided.

No excess earth from earthworks activities is to be disposed outside the Putrajaya site.

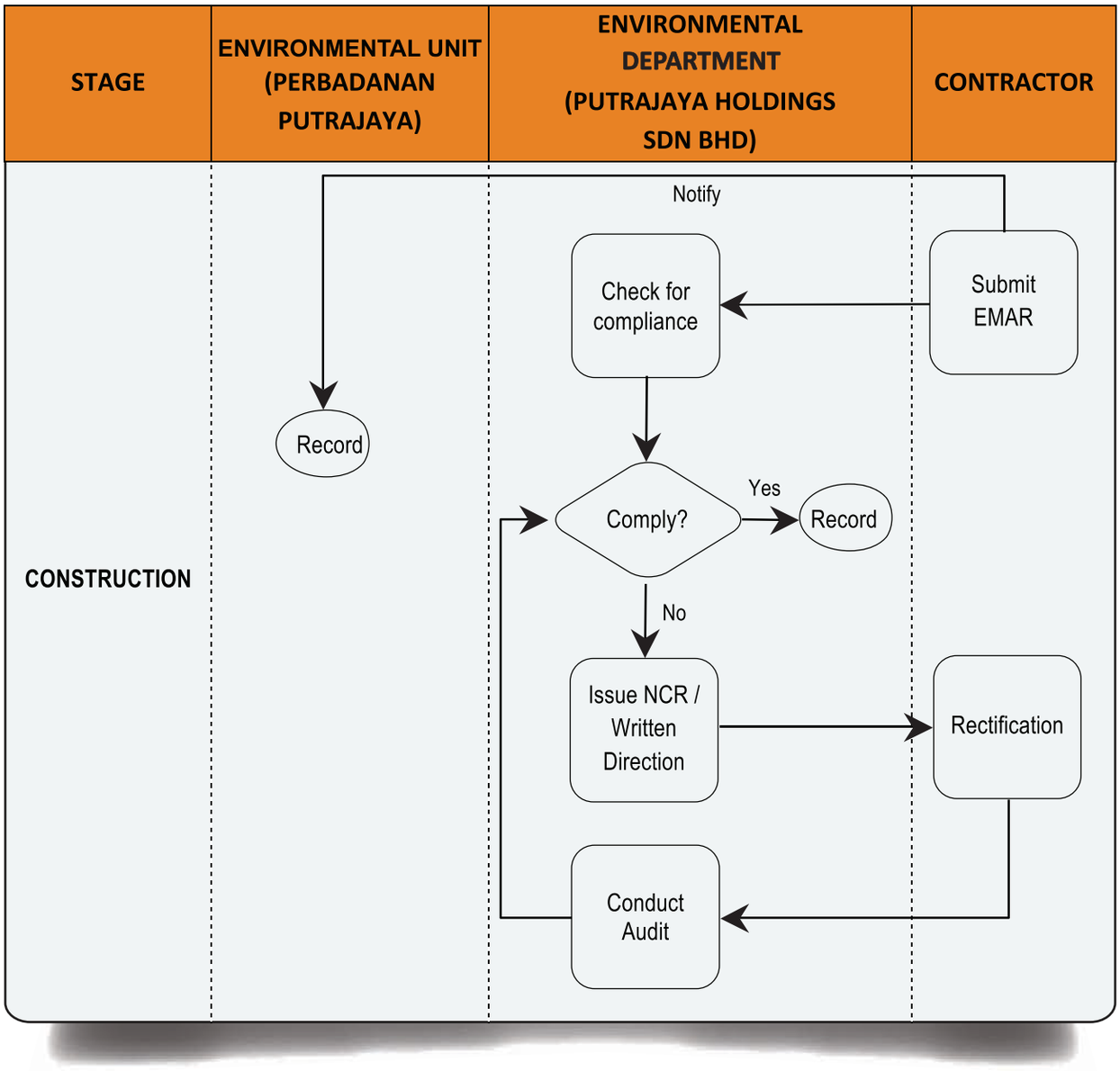
ENVIRONMENTAL REQUIREMENTS IN PUTRAJAYA

Fig 4.3a Flowchart for Submission of EMAR during Construction Stage



ENVIRONMENTAL REQUIREMENTS IN PUTRAJAYA

Fig 4.3b Flowchart for Submission of EMAR during Construction Stage for Putrajaya Holding Sdn Bhd



No open burning of vegetation is allowed during site clearing. All cut vegetation are to be collected for composting at the Putrajaya Bio-Mass Centre.

All exposed slopes and open areas, should be stabilized by the turfing and hydroseeding methods, as soon as the cut and fill for the slope formation and platform level is complete.

Vegetated buffer zones should be provided, as far as possible, during the earthworks to screen the earthworks activities form sensitive environmental zones such as rivers, houses, par lands and wet lands.

[2] Erosion, Sedimentation and Flood

Earthworks and construction activities, should as far as possible, be carried out during the dry season to reduce erosion and sedimentation.

An Erosion and Sediment Control Plan (ESCP), pertinent to the needs of a project has to be prepared. Guidelines for the preparation of the ESCP are given in the DOE's "Guidelines for Prevention and Control of Soil Erosion and Siltation".

Where pertinent, a Flood Control Plan (FCP) for a project has to be prepared.

Discharges from silt traps must not exceed 50 mg/l.

[3] Water Pollution

No discharge of any sewage or wastewater into the drainage system is allowed. All wastewater are to be connected to the site temporary toilet system.

[4] Air Pollution

All roads within the project site, including the access roads to public roads have to be paved before the start of work. The roads have to be continually maintained to be clean and free from dust.

The wetting of the grounds within a project site, especially the areas of movement of construction vehicle, should be carried out to minimize dust. Enough water should be provided for this purpose.

The wheels of earthworks machine and vehicles should be cleaned before being allowed to go onto public roads.

Lorries transporting goods should be covered.

The installation of combustion engines, such as generators, requires the prior approval of the Director-General of the DOE.

[5] Noise Pollution and Vibration

A detailed plan for noise and vibration control has to be prepared as part of the EMCP, where pertinent, based on the list likely noise sources arising from the project construction activities and the proposed mitigation measures highlighted in the EMP. Requirement to be fulfilled is stated in The Planning Guidelines for Environmental Noise Limit and Control (Book 1 of 3), Planning Guidelines for Environmental Noise Labelling and Emission Limits of Outdoor Sources (Book 2 of 3) and The Planning Guidelines for Vibration Limits and Control in the Environment (Book 3 of 3) published by Department of Environment, Ministry of Natural Resources and Environment Malaysia (Appendix 6).

All contractors have to ensure that their vehicles and construction plants are well-maintained to prevent excessive noise.

Heavy vehicle movement should be planned so as to reduce nuisance to surrounding communities and on public roads. Traffic movements in residential areas should be reduced wherever possible.

Pilling works should use methods that do not create excessive noise, vibration and air pollution. Diesel piling is prohibited from use within the project site.

[6] Solid Wastes

No open burning of construction materials or any other solid wastes are allowed in Putrajaya. All construction solid waste are to be sorted on site into two types – those that can be recycled and those that are to be disposed.

The disposal of scheduled wastes should be at Local Authority Approved disposal sites. Record of the disposal and supporting documentary evidence are to be kept for audit purposes.

ENVIRONMENTAL REQUIREMENTS IN PUTRAJAYA

A detailed solid waste management plan is to be drawn-up as part of the EMCP. The solid waste management plan should:

- Identify the types of solid waste that will be generated by all the project activities,
- Classify them into recyclable and non-recyclable categories,
- Define in a flowchart, for each of the identified solid waste, the handling process from the time it is generated at its source to the time of its disposal,
- Include details on the recycling and disposal contractors,
- Include details on the project staff responsible for ensuring that the plan is carried out and their specific responsibilities,
- Include details on the administrative procedures, related documents and forms to be completed, which are necessary for compliance audit checking purposes.

[7] Scheduled Wastes

All project proponents are required to identify the likely scheduled waste that will be generated during the construction phase of the project in the EMP.

All contractors are required to notify the DOE if there is generation of any scheduled wastes. This is in accordance with:

- Environmental Quality (Scheduled Waste) Regulations, 2005
- Environmental Quality (Prescribed Conveyance) (Scheduled Wastes) Order 2005
- Environmental Quality (Prescribed Premises) (Scheduled Waste Treatment and Disposal Facilities) Regulations 1989

The contractor is required to developed procedures to handle the scheduled wastes on site until its collection for treatment and disposal by an approved company.

[8] Agrochemicals

The use of pesticides shall be in accordance with Department of Agriculture guidelines and manufacturers recommendations.

Only organic, slow release and readily degradable fertilizers are to be used in Putrajaya.

[9] Public Health

Contractors are required to identify the possible waterborne diseases and their vectors that may arise from their project construction activities, and the measures for their control in their EMCP.

The EMCP shall describe the methods and detail procedures on how to control the identified possible waterborne diseases and their vectors during construction. The methods shall be implemented in accordance with the Malaysian Ministry of Health (MOH) requirements.

4.6 OPERATION STAGE

4.6.1 Administrative Requirements

All project operators are required to submit an EMP for operation prior to operation stage.

See Appendix 19 EMP Format for Operation Stage

All project operators are required to develop an Emergency Response Plan (ERP), if their project operations will be hazardous to the public in the event of an emergency. A list of likely emergencies at the operational stage for each project component shall be included in the EMP to facilitate the project operators in the preparation of the ERP.

All project operators are required to submit EMR, in accordance with the specifications in the EMP, and submit their monitoring and audit results to the Perbadanan on yearly basis (first quarter). The Guidelines for the monitoring are given in Appendix 14.

See Appendix 14 Environmental Monitoring Guide for Contractor

ENVIRONMENTAL REQUIREMENTS IN PUTRAJAYA

4.6.2 Environmental Control Requirements

Project proponents are required to indicate the environmental control requirements, during the operation stage, in the Environmental Pollution Control Table (See Table B in Appendix 18) of the EMP. The requirements are organized under the following subjects:

[1] Water Pollution
[2] Air Pollution
[3] Noise and Vibration
[4] Solid wastes
[5] Scheduled Wastes
[6] Agrochemicals
[7] Public Health

[1] Water Pollution

No discharge of any sewage or wastewater into the drainage system is allowed. All wastewater are to be connected to the central sewerage system. The drainage system is only to be used for the removal of surface runoff form rainfall.

All toilets, domestic and commercial wastewater are to be connected to the central sewerage system. No individual sewerage system is allowed in Putrajaya.

[2] Air Pollution

The installation of combustion engines, such as generators, requires the prior approval of the Director-General of the DOE. All projects proponents are required to get the necessary approval documents from the DOE for submission together with their EMP.

[3] Noise and Vibration

The Perbadanan may require project operators to prepare a noise and vibration control plan for its approval, prior to the granting of approval to operate the project, if their project operations will result in excessive noise.

The plan shall indicate the likely sources of noise and vibration arising from the project operational activities. It shall also indicate the likely parties that may be affected by the noise and the mitigation measures to be implemented.

[4] Solid Wastes

No open burning solid wastes are allowed in Putrajaya.

All solid waste are recommended to be sorted on site into two types – those that can be recycled and those that can be disposed.

[5] Scheduled Wastes

All project proponents are required to identify the likely scheduled waste that will be generated during the operation phase of the project in the EMP.

All project operators are required to notify the DOE if there is generation of any scheduled wastes in their operation. This is in accordance with the Environmental Quality (Scheduled Wastes) Regulations, 2005.

Project operators are required to developed procedures to handle the scheduled wastes until its collection for treatment and disposal by an approved company.

[6] Agrochemicals

The use of pesticides shall be in accordance with Department of Agriculture guidelines and manufacturers recommendations.

Only organic, slow release and readily degradable fertilizers are to be used in Putrajaya.

ENVIRONMENTAL REQUIREMENTS IN PUTRAJAYA

[7] Public Health

Project operators are required to identify the possible waterborne diseases and their vectors that may arise from their project operations, and the measures for their control.

The methods shall be implemented in accordance with the Malaysian Ministry of Health (MOH) requirements. In June 2012, DOE has published a Guidance Document on Health Impact Assessment (HIA).

CHAPTER 5

PLANNING PROCEDURE IN PUTRAJAYA

PLANNING PROCEDURE IN PUTRAJAYA

5.1 PLANNING SUBMISSION APPROVAL AND COMPLIANCE

5.1.1 Planning Submission and Approval Process

In accordance with Section 19 of the TCPA, 1976 (Amended 1995), all project proponents have to submit an application for planning permission to Perbadanan with respect to any proposed development projects in Putrajaya. The application has to comply with the format specified by Perbadanan, as prescribed under Section 21 of the Act, and shall be accompanied by all the required documents, plans and fees. All project proponents are required to refer to City Planning Department, Perbadanan Putrajaya for planning submission requirements.

To facilitate the evaluation of the planning permission applications the Perbadanan has classified the development project plan submission into 4 categories. They are:

- Layout Plan
  The Layout Plans submissions involve applications for approval for the layouts of the infrastructures and plot sizes for any proposed land-conversion development projects.

- Building Erection Plan
  The Building Erection Plan submissions involve project proposal for the erection of any buildings on the approved Layout Plans.

- Temporary Building Erection Plan
  The Temporary Building Erection Plan submissions involve project proposals for the erection of any temporary buildings in Putrajaya.

- Other Types of Development Plan
  The “Other Types of Development Plan” submissions involve any development project proposals that does not fall into any of the above 3 categories, such as highways, bridges, laying of trunk utilities, etc

For application checklists, project proponents must refer to the City Planning Department, Perbadanan Putrajaya.

5.1.2 Compliance to Planning Permission Conditions

In accordance with Section 20 of the Town and Country Planning Act, 1976 (Amended 1995), all project proponents granted planning permission shall carry out

PLANNING PROCEDURE IN PUTRAJAYA

their development in conformity with the planning permission granted, together with all the conditions attached to it.

The preservation and protection of the environment in Putrajaya is very important. Thus, one of the conditions attached to all planning permissions granted in Putrajaya is that all project proponents are required to implement and comply with all the environmental management requirements specified in this Guide during the planning and construction stage of a project.

To facilitate compliance at each stage of a project, Perbadanan requires the project proponent or its contractor to submit specified environmental related plans and reports for approval at each stage of a project. The details of the reports to be submitted are described below.

Perbadanan would like to draw the attention of all project proponents to the penalty for non-compliance to the conditions attached to the planning permission granted for a project. According to Section 28 of the Town and Country Planning Act, 1976 (Amended 1995), provides for the service of a notice of discontinue development on the project proponent until it complies with the planning permission conditions.

If the project proponent continues with the project development, after being served a notice to discontinue, an offence is deemed to have been committed under the Act and the project proponent can be liable, on conviction, to a fine not exceeding RM50,000 and a further fine of RM1,000 for each day during which the development is carried out after the first conviction.

Under Section 25 of the Act, Perbadanan can also order to be modified or revoke an approved planning permission, if it appears to be in the public interest.

It is an offence under Section 26 of the Act for a person to commence or allow any development in contravention of Section 19 or 20 of the Act, or to continue with a development once the planning permission approval has been revoked.

An offence committed under this Section of the Act can result in the person, on conviction, to a fine not exceeding RM 100,000 and a further fine of RM1,000 for each day during which the offence continues after the first conviction for the offence.

PLANNING PROCEDURE IN PUTRAJAYA

5.2 LAYOUT AND BUILDING ERECTION PLANNING APPROVAL SUBMISSION REQUIREMENTS

5.2.1 Development Proposal Report

For the submission of Layout Planning Approval and Building Erection Planning Approval, a Development Proposal Report is required to be submitted to the City Planning Department, Perbadanan Putrajaya.

An important component of the Development Proposal Report is the Environmental Management Plan (EMP) or an Environmental Management Report (EMR). All project proponents are required to ensure that a comprehensive EMP is prepared by a DOE EIA Registered Consultant while EMR is prepared by competent professionals with adequate knowledge and experience in environmental management.

5.2.2 Environmental Management Plan (EMP)

The EMP is a mandatory requirement for the submission for planning permission approval for any Layout Plan.

The EMP is a comprehensive document, specifying all the environmental management requirements during the planning, construction and operation stages of a project. It has to be prepared by DOE registered consultant.

The EMP shall comprise of 9 chapters. They are:

[1] Introduction
[2] Environmental Policy and Implementation Budget
[3] Roles and Responsibilities
[4] Environmental Requirements
[5] Environmental Monitoring and Auditing Program
[6] Significant Impacts and Pollution Control Measures
[7] Environmental Contingency Plan
[8] Conclusion
[9] Appendices

See Appendix 18 Recommended EMP Format

PLANNING PROCEDURE IN PUTRAJAYA

An EMP is required if a building project will have major negative environmental impacts during the construction or operation stage. Otherwise, submission of EMR is sufficient.

For building project with minor negative environmental impacts during the construction and operation stage, an EMR has to be prepared by competent professionals with adequate knowledge and experience in environmental management.

Project proponents are advised to contact Environment Unit of the Environment, Lakes & Wetland Division, and the City Planning Department, to seek its advice on the necessity of an EMP for their projects.

5.2.3 Environmental Management Report (EMR)

Preparation of an EMR is required if the project does not pose major or significant environment impacts.

The EMR is required to be prepared by competent professionals with adequate knowledge and experience in environmental management.

The EMR shall comprise of 7 Chapters. They are:

[1] Introduction
[2] Conditions of Layout Plan Approval
[3] Environmental Planning
[4] Environmental Management – Construction Stage
[5] Environmental Management – Operation Stage
[6] Environmental Monitoring and Audit
[7] Appendices

See Appendix 20 Recommended EMR Format

5.2.4 Self-Compliance Form (SCF)

Contractors may be exempted from submitting EMP and EMR for project with minor environmental impact. Instead, they are required to submit a Self-Compliance Form. Brief information about the project must be attached together with the Self-Compliance Form. **Notwithstanding an approve of Self-Compliance Form is**

on Perbadanan consideration The Self-Compliance Form, the project criteria and the information required are included in Appendix 21.

See Appendix 21 Self-Compliance Form

Fig. 5.1a, Fig. 5.1b and Fig. 5.2 show the flowchart for the submission of the EMP, EMR and Self-Compliance Form during the planning stage. It highlights the actions to be taken by the project proponent, the EMU (PHSB) and the EU (Perbadanan), and the interfacing between them at the various stages of the submission and approval process.

5.2.5 Environmental Monitoring and Audit

As part of the submission requirements for layout planning and building erection approval, the project proponent is required to submit the Environmental Monitoring and Audit Programme to be under taken during the construction and operation phase.

The proposed Environmental Audit and Monitoring Programme shall be incorporated in the EMP or EMR.

They should comply with all the compliance audit and monitoring requirements specified by the Perbadanan in this Guide.

The monitoring programs shall be implemented by the successful contractor and project operator later. The audit requirements for the construction stage will be used by:

- The successful contractor to conduct a self-audit of its site, and by
- The EMU (PHSB) to conduct independent compliance audits of the contractor's site.

The audit requirements for the operation stage will be used by the Perbadanan to conduct compliance audits of the project's operation by the project operator.

PLANNING PROCEDURE IN PUTRAJAYA

i. Environmental Monitoring

An evaluation of the environmental receptors that will be impacted by the project should be carried out. Based on the evaluation pertinent monitoring programs should be developed for the water quality, air

quality and noise associated with the proposed project for the construction and operation stage. A monitoring program for any silt trap discharges should also be carried out for the construction stage.

For each of the program the quality standards to be maintained, monitoring frequency and submission requirements have to be provided. A monitoring location plan shall also be provided.

The results of the monitoring programs during the construction stage shall be submitted by the contractor to the EMU (PHSB) every fortnightly.

The results of the monitoring programs during the operation sage shall be submitted by the project operator to the Perbadanan, as and when required by the Perbadanan.

ii. Environmental Audit

For each of the project component the project proponent is required to identify the audit items, applicable to the project component, on a copy of the Environmental Audit Checklist given in Appendix 22.

See Appendix 22 Environmental Audit Checklist

The project proponent is also required to prepare a 3-column table (Table C in Appendix 18) with the following headings: Audit items, Compliance Reference and Compliance Requirements. It is required to:

- List down all the audit items applicable to the project component,
- Highlight the section reference in this Guide where compliance requirements is specified, and
- Describe the specific compliance requirements for each of the audit items.

Where pertinent, detailed description for each of the audit items should be provided as appendices to the plan and be referenced from the appropriate cells in the table.

For the purpose of EMP, the project proponent is required to specify only the audit requirements, for the construction and operation stage.

During the construction stage, for each project component, the contractor is required to conduct and submit, to the EMU (PHSB), fortnightly audit reports of its site based on the applicable items in the audit checklist identified in this Chapter.

5.3 TEMPORARY BUILDING ERECTION AND OTHER TYPES OF DEVELOPMENT PLANNING APPROVAL SUBMISSION REQUIREMENTS

For Temporary Building Erection and Other Types of Development Planning Approval submission, Development Proposal Summary Report must be submitted to the City Planning Department, Perbadanan Putrajaya.

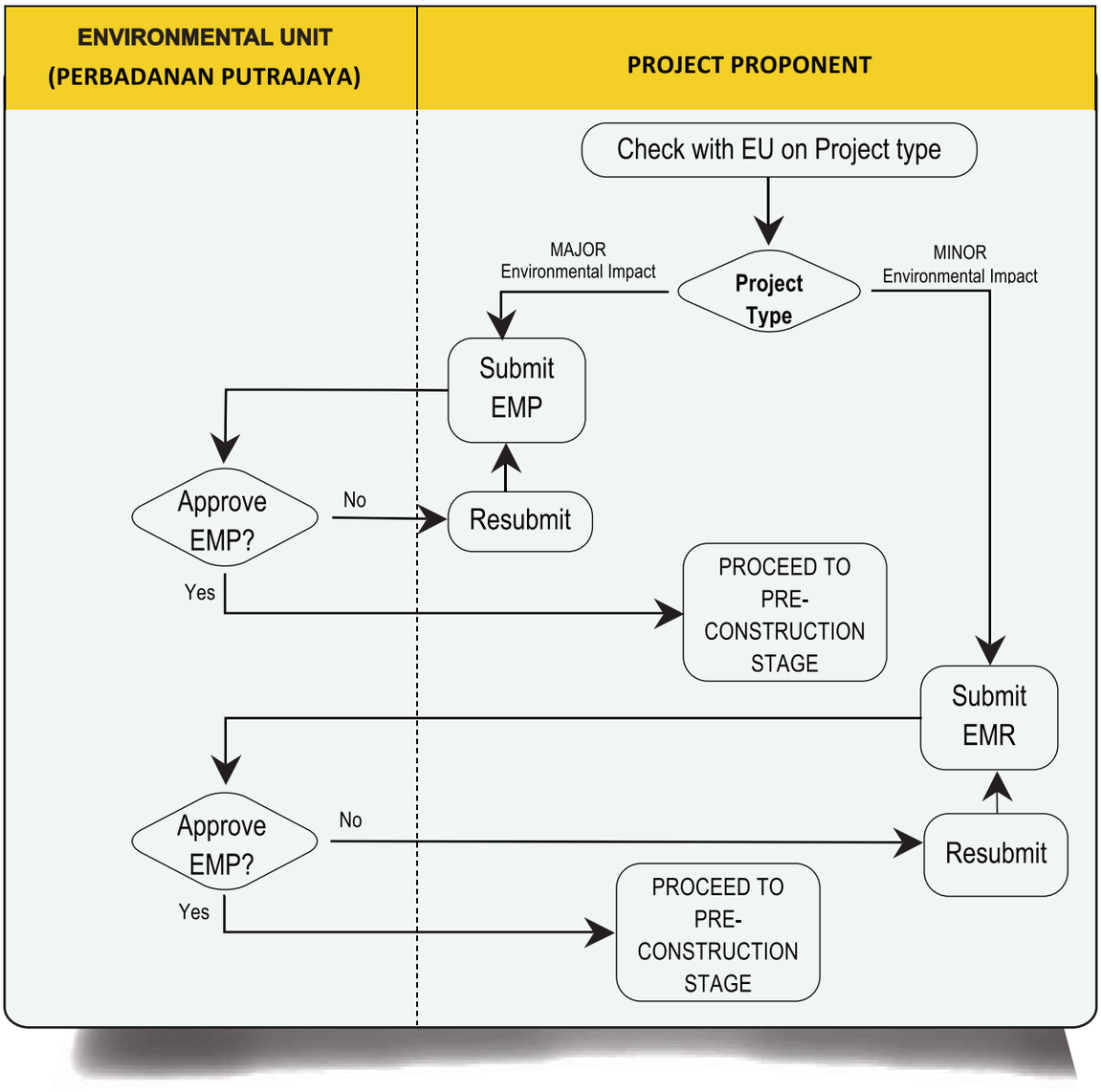
For Temporary Building Erection Planning Approval submission of the Development Proposal Summary Report must consist the EMR.

An EMP is required for Other Types of Development Planning Approval submission if the project will have major environmental impacts during the construction or operation stage. Otherwise, submission of EMR is sufficient.

Submission of EMR is also required for the application to extract, remove and transport of rock material. An Erosion and Sediment Control Plan must be included in the EMR as part of the pollution control.

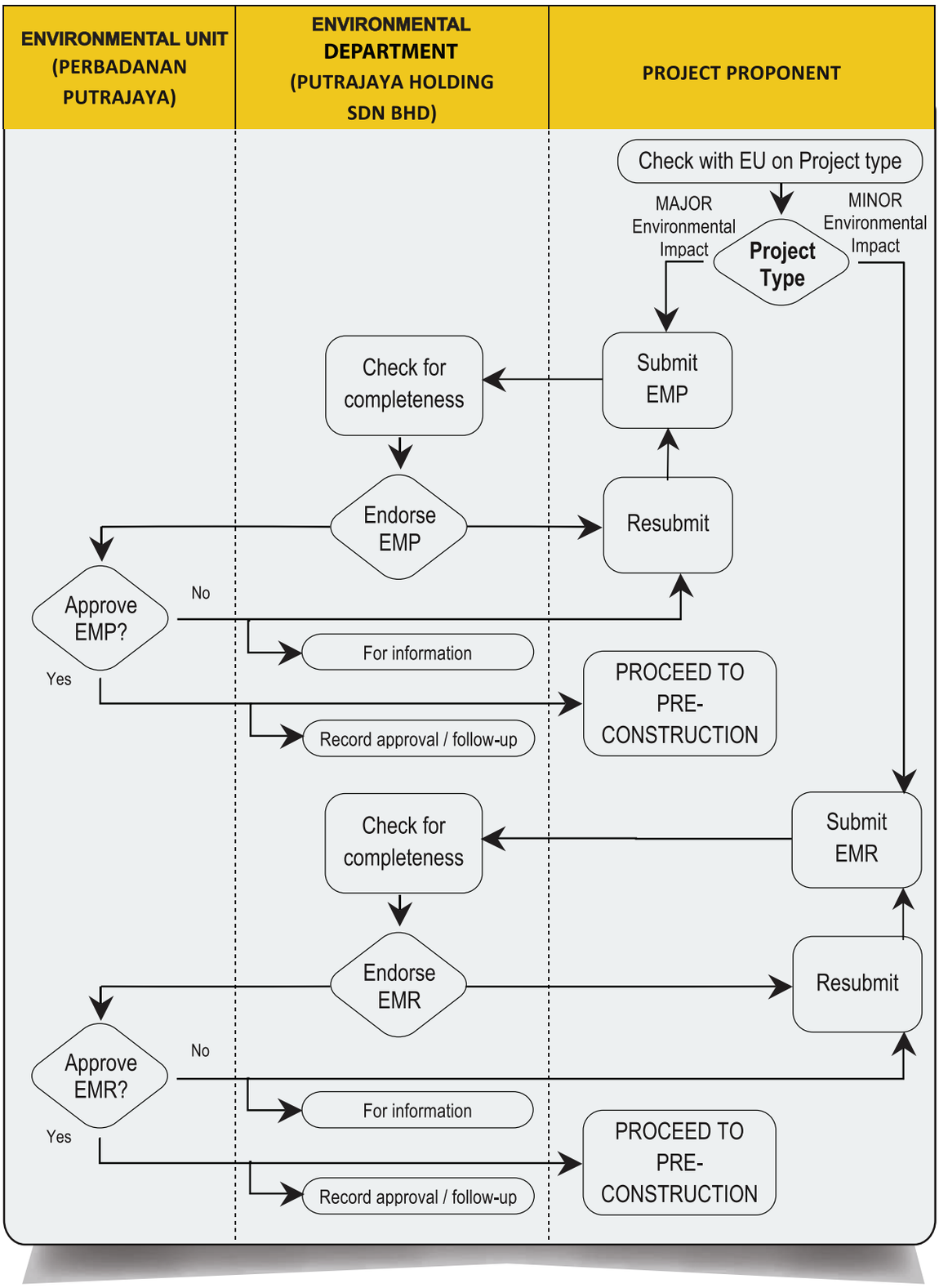
PLANNING PROCEDURE IN PUTRAJAYA

Fig. 5.1a Flowchart for Submission of EMP and EMR during the Planning Stage



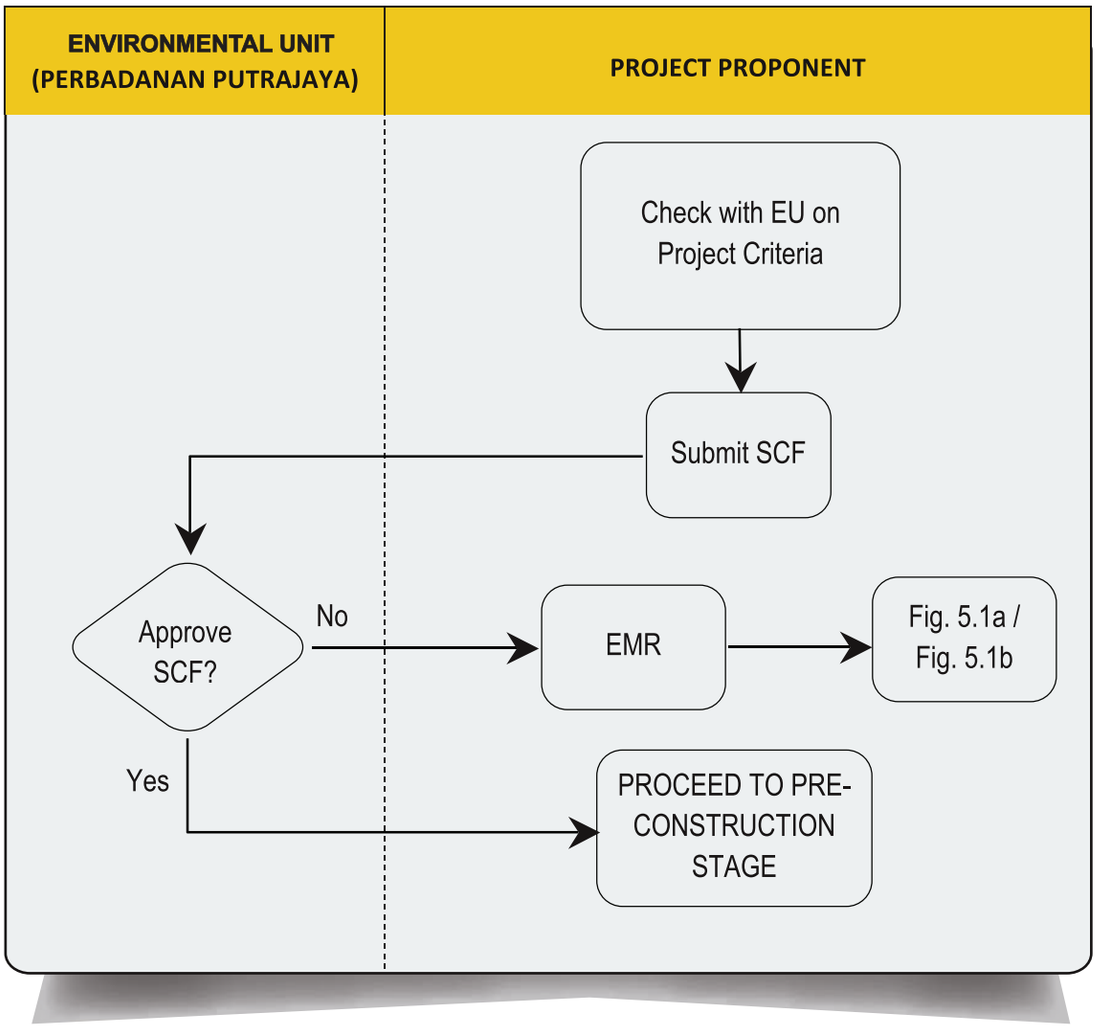
PLANNING PROCEDURE IN PUTRAJAYA

Fig. 5.1b **Flowchart for Submission of EMP and EMR during the Planning Stage for Putrajaya Holding Sdn Bhd**



PLANNING PROCEDURE IN PUTRAJAYA

Fig. 5.2 Flowchart for Submission of Self Gompliance Form during the Planning Stage



CHAPTER 6

ENVIRONMENTAL MANAGEMENT SYSTEM IN PUTRAJAYA

ENVIRONMENTAL MANAGEMENT SYSTEM IN PUTRAJAYA

6.1 INTRODUCTION

To attain the environmental quality objectives of Putrajaya, as defined in Chapter 3, there is a need to develop and implement an Environmental Management System (EMS) governing the activities of all project stakeholders in Putrajaya. A model for developing such a system is the ISO14001 EMS Standard, which is a widely accepted official international standard for EMS.

The Perbadanan intends to develop an EMS for the environmental management in Putrajaya. It has adopted the ISO14001 EMS model for the system. The Perbadanan recognizes that the path to full compliance to the ISO14001 EMS Standard is a long one. Thus, it has adopted a pragmatic and interim approach towards that objective by implementing, wherever possible, pertinent elements of the Standard. The preparation of this Guide and its implementation in Putrajaya are the results of such an approach.

The aim of this Chapter is to present the current EMS in Putrajaya, which is described in the earlier 5 Chapters of this Guide, within the framework of the 17 elements of the ISO14001 EMS Standards as given in Appendix 11.

See Appendix 11 The 17 Elements in the ISO14001 EMS

6.2 ENVIRONMENTAL POLICY

The Perbadanan's environmental policy is described in Section 1.3 of this Guide.

Arising from the policy the Perbadanan has formulated and adopted a number of strategies to comply with the policy. The strategies are described in Section 1.4.

6.3 ENVIRONMENTAL ASPECTS

The Perbadanan, as the corporate body responsible for the local government in Putrajaya, has the responsibility to minimize the environmental impacts of all development and operational activities in Putrajaya.

It recognizes that as an emerging new city the activities that will create the most significant impacts on the environment are those related to the development projects

that are being proposed and constructed within Putrajaya. Thus, the primary objective of the interim EMS that has been developed and presented in this Guide is

ENVIRONMENTAL MANAGEMENT SYSTEM IN PUTRAJAYA

focused on managing and mitigating the negative environmental impacts arising from the development project activities.

6.4 LEGAL AND OTHER REQUIREMENTS

As a local government authority the Perbadanan can exercise all the legislative powers of a local government to ensure that its environmental objectives are met. Details on the Perbadanan, its Town Planning Department and the Environment, Lakes & Wetland Division are given in Section 2.1 to 2.2.

In addition to its own legislative powers the Perbadanan can also engaged the support of other government agencies, responsible for regulating and controlling other activities, to help it meet its environmental objectives.

To facilitate compliance by all project proponents and contractors to the environmental-related legislative requirements and guidelines the Perbadanan has compiled some applicable environmental related legislation and guidelines in Chapter 3 of this Guide.

All project proponents and contractors in Putrajaya are required to be familiar with the details of the legislative requirements given in Chapter 3 of this Guide.

6.5 OBJECTIVES AND TARGETS

In line with its environmental policy the Perbadanan has defined a number of environmental quality objectives to be attained in Putrajaya. They are given in Chapter 2 of this Guide.

6.6 ENVIRONMENTAL MANAGEMENT PROGRAM

To achieve its environmental objectives the Perbadanan has prepared a number of guidelines as given in Appendix 10, including this Guide, to guide its staff, project proponents, their consultants and contractors on the requirement for various aspects of the development in Putrajaya.

See Appendix 10 Putrajaya Design and Management Guides

ENVIRONMENTAL MANAGEMENT SYSTEM IN PUTRAJAYA

The Perbadanan has also developed an environmental administrative system that is fully integrated with the project planning approval system in Putrajaya. Details are described in Chapter 5 of this Guide.

The System requires an EMP or EMR to be prepared at the planning stage, an EMCP to be prepared at the pre-construction stage, and a PAP or PCP to be prepared before any project abandonment or project closure. It also specifies a 3-level chain of responsibility for environmental monitoring and audit during the construction stage of a project together with their associated reporting requirements, in the form of EMAR and NCR.

To facilitate compliance by project proponents, contractors and project operators the environmental requirements for the planning and design, construction and operation stages of a project are also compiled in Chapter 5 of this Guide.

6.7 STRUCTURE AND RESPONSIBILITY

The organizational structure of the Perbadanan is given in Fig. 2.1. The functions of the eight Departments in the Perbadanan and the parties responsible for environmental administration in Putrajaya are described in Section 2.1.

Since Putrajaya is an emerging new city the Town Planning Department has the primary responsibility o ensure that the development projects are planned and carried out in line with the environmental policy in Putrajaya. Details on the Department are described in Section 2.2.

The Environment, Lakes and Wetland Division in the Town Planning Department has been given the responsibility of ensuring that the physical landscape and environmental quality of Putrajaya are protected and maintained. Thus, it is responsible for evaluating all landscape and environmental management plans during the planning stage of any proposed project, and for ensuring that during the construction and operation stage the physical landscape and environment are protected and maintained. Details on the Division are described in Section 2.3.1.

The Environment Unit in the Division has the responsibility to ensure that all the environmental planning, construction and operational requirements in Putrajaya, are complied by all project proponents, contractors and project operators.

ENVIRONMENTAL MANAGEMENT SYSTEM IN PUTRAJAYA

Putrajaya Holdings Sdn. Bhd. (PHSB) is the main project proponent in Putrajaya and is responsible to the DOE for complying with all the EIA Approval Conditions for Putrajaya during the planning and construction stage. Thus, it has set-up an

Environmental Department (ED) to discharge this responsibility. Details on the company are given in Section 2.3.2.

The schematic outlines of the ED (PHSB)'s responsibilities for environmental management in Putrajaya are indicated in Fig. 4.1b, 4.3b and 5.1b. A list of its main responsibilities is given in Appendix 23.

See Appendix 23 ED (PHSB)'s Main Responsibilities

All project proponents are required to do the following:

i. Ensure that the environmental management requirements in the approval EMP or EMR are included in the contract documents for all work packages of their projects.

ii. Ensure that adequate budgets are allocated for the implementation of the environmental management requirements by the contractor, through the specific inclusion of the environmental management related items in the bill quantities for the pertinent work packages.

All contractors are required to do the following:

i. Ensure that an EMS is set-up to support the environmental management needs for their projects. The EMS does not need to be complicated, as long as it can meet the requirements of the Perbadanan as defined in this Guide.

ii. Ensure that they appoint an environmental manager/officer to be responsible for the overall environmental management of their site, and for the implementation and maintenance of their site EMS. Alternatively, they may assign a competent staff or consultant to be responsible for discharging the duties of the environmental manager/officer.

All project operators are required to ensure that they implement and comply with all the environmental pollution control measures and monitoring requirements of their projects during the operation stage, as identified in the approved EMP or EMR of their projects.

ENVIRONMENTAL MANAGEMENT SYSTEM IN PUTRAJAYA

6.8 TRAINING, AWARENESS AND COMPETENCY

All the staff in the Perbadanan and the ED (PHSB) are trained and capable of carrying out their environmental responsibilities.

All EMP are required to be prepared by EIA Consultant registered with the Department of Environment Malaysia.

All EMR and EMCP are required to be prepared by competent professionals with adequate knowledge and experience in environmental management.

All contractors are required to have or assign a management staff/consultant, with adequate knowledge and experience in environmental management, to be the environmental manager/officer for their project.

All project operators are required to ensure that competent and well-trained staffs are assigned to operate their projects.

All contractors are encouraged to conduct regular environmental awareness programs to promote good environmental practices in their sites.

All project operators are encouraged to conduct regular environmental awareness programs to promote good environmental practices amongst its operation staff.

The Perbadanan will also organize regular environmental awareness programs to promote good environmental practices among all stakeholders in Putrajaya. It shall produce and disseminate information leaflets to educate all residents in Putrajaya on their responsibilities to protect and preserve the high quality environment in Putrajaya. It shall also conduct forums to educate all project proponents, consultants, contractors and project operators on their important roles in environmental protection and management in Putrajaya.

6.9 COMMUNICATION

To ensure compliance by all project proponents, contractors and project operators to the environmental requirements in Putrajaya the Perbadanan has prepared this Guide to facilitate communication of its environmental policy and requirements to external parties.

ENVIRONMENTAL MANAGEMENT SYSTEM IN PUTRAJAYA

The Perbadanan has also set-up an internal system for the communications among its staff on environmental management issues.

6.10 EMS DOCUMENTATION

The Perbadanan intends to maintain the information on its EMS as contained in this Guide and the related guidelines by reviewing and updating them, on a regular basis.

6.11 DOCUMENT CONTROL

The Perbadanan intends to maintain an effective system for the management of all its EMS documents.

6.12 OPERATIONAL CONTROL

The Perbadanan will identify, plan and manage all its operation and activities in line with its environmental policy and objectives.

6.13 EMERGENCY PREPAREDNESS AND RESPONSE

The Perbadanan has made it a requirement in the EMP/EMR and EMCP for all project proponents and contractors to identify and prepare plans, respectively, to respond to any emergencies during the course of the planning and construction of a project.

Project operators are also required to prepare emergency response plans for the emergencies identified in the EMP or EMR of their projects.

6.14 MONITORING AND MEASUREMENT

The Perbadanan has made it a requirement in the EMP and EMR to identify all monitoring requirements for any proposed project in Putrajaya. The identified monitoring requirements will be implemented by the project contractors and fortnightly monitoring results has to be submitted to the ED (PHSB) as part of the EMAR. The monitoring guidelines have to comply with those given in Appendix 15.

See Appendix 15 Environmental Monitoring Guidelines for Contractors

The ED (PHSB) is also required to conduct its own monitoring for the whole Putrajaya development. It shall compile all the monitoring results, including those submitted by the contractors, as part of its quarterly report to the Perbadanan and the

DOE on the overall status of the environmental management in Putrajaya during the quarter. A format for the content of the report is given in Appendix 24. The report should cover all the topics listed there.

See Appendix 24 Format of EMU (PHSB)'s Quarterly Report to the Perbadanan and DOE.

6.15 NON-COMPLIANCE, CORRECTIVE AND PREVENTIVE ACTION

The contractor's environmental management/officer has to conduct fortnightly environmental audit of its site. If there is any non-compliance it has to prepare a non-compliance report and ensure that corrective and preventive actions are taken.

The ED (PHSB) is also required to conduct a monthly environmental compliance inspection of a contractor's site. If there is any non-compliance report and the ED (PHSB) will have to ensure that corrective and preventive actions are carried out by the contractor.

The EU (Perbadanan) will also conduct surprise environmental compliance audit of a contractor's site. If there is any non-compliance it will issue a non-compliance report and the ED (PHSB) will have to ensure that corrective and preventive actions are carried out by the contractor.

The EU (Perbadanan) will also conduct surprise environmental compliance audit of a project operator's site. If there is any non-compliance it will issue a non-compliance report and require the project operator to ensure that corrective and preventive actions are carried out.

6.16 RECORDS

The project operator, contractor, ED (PHSB) and the EU (Perbadanan) shall ensure that an adequate system is established for the keeping and retrieval of all

records, pertinent to the discharge of their environmental responsibilities, within the framework of the EMS in Putrajaya.

6.17 EMS AUDIT

The contractor environmental manager/ officer has to conduct fortnightly environmental audit of its site.

The ED (PHSB) is required to conduct monthly environmental inspection of a contractor's site.

The EU (Perbadanan) will conduct surprise environmental inspection of a contractor's and project operator's site.

6.18 MANAGEMENT REVIEW

The Perbadanan will continually review its EMS with a view towards its continual improvement.

APPENDICES

APPENDICES

APPENDIX 1

ADDITIONAL BACKGROUND INFORMATION ON PUTRAJAYA

1.0 Introduction

The additional background information on Putrajaya are organised under the following topics:

- Original Masterplan
- EIA Report
- Masterplan Review
- Conceptual Overview of Project
- Implementation Schedule

2.0 Original Masterplan

The original masterplan for Putrajaya was drawn-up in a collaborative effort between a consortium of master planners and government authorities. It was approved by the Government on 22 February 1995.

See"Perancangan Pembangunan Pusat Pentadbiran Persekutuan Putrajaya"

3.0 EIA Report

In accordance with the requirements of the subsidiary legislation of the Environmental Quality Act, 1974, (Prescribed Activities) Environmental Impact Assessment Order, 1987, an EIA report on the project was prepared in July 1995.

See "Laporan Penilaian Kesan Alam Sekitar Projek Pembangunan Pusat Pentadbiran Persekutuan Putrajaya di Daerah Sepang, Selangor Darul Ehsan"

APPENDIX 1

ADDITIONAL BACKGROUND INFORMATION ON PUTRAJAYA

4.0 Masterplan Review

Subsequently, in order to minimise destabilisation to the environment and to reduce cut and fill, a formal review of the original masterplan was carried out.

See "Putrajaya – Review of the Masterplan"

5.0 Conceptual Overview of Project

A booklet giving a conceptual overview of the project has been produced by Perbadanan Putrajaya in July 1997. The booklet describes the vision for the City and gives a summary of the main points related to the development.

See "Putrajaya – The Federal Government Administrative Centre"

6.0 Implementation Schedule

The development for Putrajaya is planned to be carried out in three phases (Phase 1A – 1998, Phase 1B – 2000, Phase 2 – 2005). Phase 1A covering approximately 1300 hectares is planned to be completed by end of 1998. It involves the development of the Government Precinct, some residential and commercial areas, the Putrajaya Wetlands, construction of a temporary dam to create the Northern part of Putrajaya Lake, adjacent to the Government Precinct, and all supporting infrastructures.

APPENDIX 2

EIA APPROVAL CONDITIONS FOR PUTRAJAYA

CONDITIONS	ANALYSIS	COMPLIANCE BY
I. PLANNING AND DESIGN STAGE		
A. Planning Issues		
1. Adequate set backs between road reserves and building lots should be in accordance with Planning Guidelines as specified by the Jabatan Perancang Bandar dan Desa. No buildings are allowed to be constructed within the set back areas.	Superceded by Putrajaya's Transport Design Guidelines	PP
2. Set backs of at least 50m between expressways and the nearest building lot. The set back are to be landscaped and no buildings are allowed to be constructed within them.	Superceeded by Putrajaya Transport Design Guideline. (Refer to Table P3/2.5.1 and Table 2.6). The following are the set backs required for the road system within Putrajaya:- - Primary distributor – 10 m - Secondary distributor – 10 m - Local Distributor – 10 m - Spine road – 4 m - Local road – 2.5 m - Access road – Not required - Cul-de-sac – Not required	PP
3. A buffer zone of at least 20m between any existing building and the central waste treatment facility is to be allowed for. The zone is to be landscaped and no permanent buildings are allowed to be constructed within it.	Superceded by UDG (Refer to Volume 3 – Part 4: Service Industry, Transport & Public Utilities, Section 3.4.2) The following are the buffer zone required in Putrajaya:- - 30 m surround for residential and commercial development. - 20 m surround for industrial development - 10 m surround for fully enclosed plants	PJH
4. Public facilities such as mosques, cemeteries, recreational and	Applicable	PP

APPENDIX 2

EIA APPROVAL CONDITIONS FOR PUTRAJAYA

CONDITIONS	ANALYSIS	COMPLIANCE BY
commercial areas should have facilities such as walkways and bicycle paths.		
5. Buildings frontage adjacent to lakeside should be constructed facing the lakeside.	Applicable	PP
6. The alignment of buildings and roads should take into consideration existing topography and selected trees identified for preservation, as far as possible.	Partly applicable Only selected zones of trees are preserved as buffer	PP
7. Development on high risk slopes (>20 degrees) should be in accordance with the Development Guidelines for Buildings on hill Lands, 1995, prepared by the Jabatan Perancang Bandar dan Desa, Selangor.	Applicable All projects are required to submit geotechnical report to Perbadanan, irrespective of the gradient of the site.	PP
8. Separate surface runoff and effluent drainage system are to be provided.	Applicable	PP
9. A central wastewater treatment system should be implemented for the project.	Applicable	PP
10. Entry of vehicles with internal combustion engines (ICE) to the development should be limited to 17,000 units/day.	Applicable The transportation policy of Putrajaya encourages the use of policy transport.	Perbadanan /PJH
B. Design Issues		
1. Effective design for transportation, drainage and sewerage systems have to be prepared before commencement of construction work.	Applicable	PP
2. The stability of slopes should be ensured in the earthworks design and during construction	Applicable	PP
3. Silt traps, surface drains, detention and sedimentation ponds should be prepared prior to earthworks. Discharges from silt traps etc. must not exceed 50 mg/l. The silt traps are to be properly maintained.	Applicable	PP

APPENDIX 2

EIA APPROVAL CONDITIONS FOR PUTRAJAYA

	CONDITIONS	ANALYSIS	COMPLIANCE BY
	The design and plan of the silt trap has to be submitted to be submitted to the drainage and Irrigation Department (DID) for its approval, with a copy sent to the DOE, Selangor.	According to Perbadanan's Earthwork B -law the design plans of silt trap have to be submitted to Perbadanan for its approval.	PP
4.	Surface run-off from the site to the flood detention ponds and tributaries of Sungai Langat should be controlled to prevent the occurrence of flooding downstream of the project site.	Applicable	PJH
5.	Detention ponds have to be prepared in parallel with all earthworks activities for every phase. The locations of the ponds have to take into account the flood records of the area.	Applicable	PP
	The design of the detention ponds have to be approved by the Department of Irrigation and Drainange (DID). An area of 5% of the total project area has to be aside for the above purpose.	Superceded by the Perbadanan's requirement. Design plans have to be submitted to Perbadanan for approval	PP
6.	A central wastewater treatment system should be implemented for the project. All effluent discharge, including sullage, must be treatead to meet Standard A of the Third Schedule, EQA (Domestic and Industrial Effluents) 1979.	Applicable	PJH
7.	The design and maintenance of the artificial wetlands have to fulfill their objective of treating the point and non-point sources of pollutants.	Applicable	PJH
8.	Approval from the Director-General of the DOE should be obtained before the installation of the combustion engines e.g. generators, etc. in accordance with the Environmental Quality (Clean Air) Regulations, 1978.	Applicable Approval has to be obtained for fuel burning equipment that is rated to consume pulverized fuel or any solid fuel at 30 kg or liquid/gaseous matter more than 15 kg/hr.	PP

APPENDIX 2

EIA APPROVAL CONDITIONS FOR PUTRAJAYA

CONDITIONS	ANALYSIS	COMPLIANCE BY
II. CONSTRUCTION STAGE		
A. Site Clearing		
1. The developer has to submit 3 copies of the latest layout plan, that includes all the conditions of the approval of the State Authorities, including thet of the DOE, to the DOE, Selangor, before commencement of site clearing works.	Applicable	PJH
2. Construction should proceed according to phases and site clearing for a new phase should on be carried out on the completion of the earlier phase.	Applicable	PP
3. Clearing of vegetation and earthworks are to be restricted to only areas where site preparations are needed.	Applicable	PP
4. Site clearing should proceed from cleared area towards the forested or planted areas so as to allow the escape of wild animals. A wildlife corridor has to be provided to connect isolated forested areas.	Applicable	PP
5. All cleared land that will not be worked on immediately after clearing are to be covered with turf as soon as possible.	Applicable	PP
6. Open burning of vegetation and construction materials is prohibited.	Applicable Cut vegetation is to be disposed at the designated bio-mass dump site provided by PJH. Construction waste is to be disposed at an approved dump site outside Putrajaya.	PP
7. Cut vegetation should be collected for composting. They should be stored in non-peaty areas, far away from drainage areas.	Applicable Cut vegetation is to be disposed at the designated bio-mass dump site provided by PJH. All PP have to liaise with PJH on this matter.	PP

APPENDIX 2

EIA APPROVAL CONDITIONS FOR PUTRAJAYA

CONDITIONS	ANALYSIS	COMPLIANCE BY
II. CONSTRUCTION STAGE		
B. Earthworks		
1. The name of the project manager, main contractor, consultant and resident engineer, together with 2 copies of the earthworks construction plan have to be submitted to the DOE, Selangor, before the commencement of any earthworks.	Applicable PJH is responsible for the submission to DOE. Under the Perbadanan 's By-law all PP are required to make necessary submission to Perbadanan.	PP
2. The stability of slopes should be ensured in the earthworks design and during construction. Work to stabilize slopes should be carried out as soon as possible. The method of turfing and hydroseeding should be carried out for any exposed slopes and open areas as soon as the cut and fill for the slope formation is complete.	Applicable	PP
3. Silt traps, surface drains, detention and sedimentation ponds should be prepared prior to earthworks. Discharge from silt traps etc. must not exceed 50 mg/l. The silt traps are to be properly maintained. Monthly laboratory analysis reports on the silt trap discharges have to be submitted to the DOE, Selangor commencing from the date of the start earthworks. The laboratory analysis should be carried out, as far as possible by a SIRIM accredited laboratory.	Applicable	PP
4. Earthworks and construction activities, should as far as possible, be carried out during the dry season . to reduce erosion and sedimentation	Applicable	PP
5. The disposal of any excess earth from the Putrajaya site is prohibited. All excess earth should be compacted and properly landscaped within Putrajaya project site.	Applicable PP will liaise with PJH who is also responsible for the coordination of the disposal of the excess earth to the designated areas within Putrajaya.	PP

APPENDIX 2

EIA APPROVAL CONDITIONS FOR PUTRAJAYA

CONDITIONS	ANALYSIS	COMPLIANCE BY
6. All roads within the project site, including the access roads to public roads have to paved before start of work. The roads have to be continually maintained to be clean and free from dust.	Applicable	PP
7. The wetting of the grounds within a project site, especially the area of movement of construction vehicle, should be carried out to minimize dust. Enough water should be provided for this purpose.	Applicable	PP
8. The wheels of the earthworks machine and vehicles should be cleaned before being allowed to go onto publics roads.	Applicable	PP
II. CONSTRUCTION STAGE		
C. Construction Management		
1. A copy of the EIA Approval Conditions, together with a copy of any document that forms part of approval condition s have to be displayed in a suitable place within the project site and be clearly seen.	Applicable	PJH
2. Monitoring of water quality of main rivers should be undertaken at both upstream and downstream locations of the project site, including in the lake. The monitoring should be conducted for both the construction and operational phases of the project. The parameter which will require monitoring are: Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Suspended Solids (SS), Oil and Grease, Ammoniacal-nitrogen (AN), pesticides, nitrate, phosphates, E.coli and pH. The monitoring program, stations location plan, sampling method and	Applicable	PJH (construction stage)/ Perbadanan (operation stage)

APPENDIX 2

EIA APPROVAL CONDITIONS FOR PUTRAJAYA

	CONDITIONS	ANALYSIS	COMPLIANCE BY
	sampling frequency has to be submitted to the DOE before the commencement of earthworks. The water quality data of the rivers have to be submitted to the DOE, Selangor every month. Starting from the time of the commencement of earthworks, together with a statement on the work progress to date. The water quality analysis has to be carried out by a SIRIM accredited laboratory. Heavy vehicle movement should be planned sa as to reduce uisance to surroundings communities and on main public roads. Traffic movements in residential area should be reduced wherever possible.		
3.	Lorries transporting good should be covered	Applicable	PP
4.	Piling works should be use methods that do not create excessive noise and air pollution. Diesel piling is prohibited from use within the project site.	Applicable	PP
5.	During construction, noise levels at the site boundary should not exceed 65 dB(A) in the daytime and 55 dB(A) during the night.	Applicable	PP
6.	Vehicles and construction plant should be maintained to prevent excessive noise levels.	Applicable	PP
7.	A solid waste management plan should be formulated. Non-scheduled waste should be disposed at Local Authority Approved disposal sites.	Applicable	PP
8.	Temporary toilet built to the specifications of Jabatan Perkhidmatan Pembentungan should be prepared for any temporary site quarters, and in the workers camp, prior to the commencement of any construction works.	Applicable	PP

APPENDIX 2

EIA APPROVAL CONDITIONS FOR PUTRAJAYA

CONDITIONS	ANALYSIS	COMPLIANCE BY
II. CONSTRUCTION STAGE		
D. Lake and Wetland Construction		
1. The river maintenance flow or minimum flow from Sg.Chua and Sg. Langat should be maintained throughtout the period of filling the lake.	Applicable	PJH
2. The use and management of pesticides should be in accordance with the Department of Agriculture (DOA) Guideline. Dosages and usage should be in accordance with that recommended by the manufacturers. The pesticides used should be selected for the target pest species, organic and biodegradable in character.	Applicable	PJH (construction stage) /Perbadanan (operation stage)
III. CONSTRUCTION STAGE		
1. Approval from the Director-General of the DOE should be obtained before the installation of combustion engines e.g. generators, etc. in accordance with the Environmental Quality (Clean Air) Regulations, 1978.	Applicable Approval has to be obtained for fuel burning equipment that is rated to consume pulverized fuel or any solid fuel at 30 kg or liquid/gaseous matter more than 15 kh/hr.	PO
2. All effluent discharge, including sullage, must be treated to meet Standard A of the Third Schedule, EQA (Domestic and Industrial Effluents) 1979. Monthly report on the effluent discharge quality has to be submitted to the DOE, Selangor, starting from the time of the operation of the wastewater treatment system. The laboratory analysis of the effluent should be carried out by a SIRIM accredited laboratory.	Applicable	PO
3. The water quality of the lake and its discharege into Sg. Langat must be maintained at Class II of the Malaysian National Interim Water Quality Standard and Criteria.	Superceded by Perbadanan's requirement. The lake water quality has to meet the standard imposed by Perbadanan's By-law.	Perbadanan

APPENDIX 2

EIA APPROVAL CONDITIONS FOR PUTRAJAYA

CONDITIONS	ANALYSIS	COMPLIANCE BY
4. Monitoring of water quality of the main rivers should be undertaken at both upstream and downstream locations of the project site, including the lake.	Applicable	Perbadanan
5. Scheduled wastes, such as discarded oils from boat maintenance works are prohibited from disposal into any drainage channels or lakes. Instead they should be disposed off in accordance with the methods stated in the Environmental Quality (Scheduled Waste) Regulations, 1989.	Applicable	PO
6. An inventory of insect and vectors for waterbone disease should be carried out after the development of the lake and wetland.	Applicable	Perbadanan
7. Method to control waterborne disease and their vectors should be implemented in accordance with the requirement of the Ministry of Health (MOH), Malaysia.	Applicable	Perbadanan
8. The control of pest or aquatic weed should use the concept of integrated pest management, that involves the use of biological control.	Applicable	Perbadanan
9. The use and management of pesticides should be in accordance with the Department of Agriculture (DOA) Guidelines. Dosages and usage should be in accordance with that recommended by manufacturers. The pesticides used should be selected for the target pest species , organic and biodegradable in character.	Applicable	Perbadanan
I. PLANNING AND DESIGN STAGE		
C. Project Management and Monitoring		
1. A unit responsible for environmental management has to be set-up within the organizational structure of the administrative body responsible for	Applicable	PJH (development stage) Perbadanan

APPENDIX 2

EIA APPROVAL CONDITIONS FOR PUTRAJAYA

CONDITIONS	ANALYSIS	COMPLIANCE BY
the Putrajaya Federal Administrative Centre.		(operation stage)
2. An Environmental Management Plan (EMP) has to be prepared. One copy has to be submitted to the Department of Environment (DOE), Selangor and another to DOE Headquarters.	Applicable PJH is responsible for submission of a master EMP to DOE. PP is responsible for submission of EMP to Perbadanan for the individual project as part of LCP submission.	PJH/PP
3. The EMP has to be in accordancewith the needs of the project and hasto contain among others the followingtems :		
(a) Before site clearing for the project action plan to protect,save or relocate the flora and fauna that has intrinsic value in the project area has to beprepared and implemented, in consultation with the pertinent experts in the Jabatan Perlindungan Hidupan Liardan Taman Negara(PERLIHITAN), Forest Research Institute of Malaysia (FRIM) and the Forestry Department.	Applicable. PJH is responsible for submission of a master EMP to DOE. PP is responsible for submission of EMP to Perbadanan for the individual project as part of the LCP submission.	Perbadanan Perbadanan
(b) Lake Management Plan to control activities that will have negative impact on the water quality in the lake, including from the surrounding areas like from the existing Semenyih Water Treatment Plant.	Applicable in the master EMP only.	PJH
(c) An environmental audit report has to be prepared stating the stages of completion of the project and the steps taken to ensure the effective implementation of the requirements of the EMP.The audit report has to be	Applicable PJH is responsible for the submission of master audit report to DOE. PP is responsible for submission of audit report for individual project to PJH.	PJH (construction stage)

APPENDIX 2

EIA APPROVAL CONDITIONS FOR PUTRAJAYA

CONDITIONS	ANALYSIS	COMPLIANCE BY
An environmental audit report has to be prepared stating the stages of completion of the project and the steps taken toensure the effective implementation of the requirements of the EMP.The audit report has to be		
(d) An "Emergency Response Plan (ERP)" has to be prepared to respond to any accident or emergency during the course of the project, such as dam break or accidental spillage of dangerous substance. The plan should take into account ways to evacuate affected persons and should be prepared in consultation with Jabatan Polis, Jabatan Perkhidmatan Bomba, Local Authority and lands adjacent to the dam site.	Applicable PJH is responsible for the submission of master audit report to DOE. PP is responsible for submission of audit report for individual project to PJH.	PJH
(e) A project abandonment plan, including a plan to rehabilitate the project site and stabilize any slopes has to be prepared and submitted to the DOE, Selangor, with a copy sent to the DOE, Headquarters, not later than 6 months before stopping work on project site.	Applicable	PJH
(f) A safe management plan to ensure the structural integrity of the dam has to be prepared and submitted tothe JKR, with a copy submitted to the DOE,Selangor.	(A copy of the approved plan has to be submitted to the Perbadanan).	PJH
4. An inventory of insect and vectors for waterborne disease should be carried out before the development of the lake and wetlands.	Applicable	PJH

APPENDIX 2

EIA APPROVAL CONDITIONS FOR PUTRAJAYA

CONDITIONS	ANALYSIS	COMPLIANCE BY
5. An area 10m x 10m should be provided for area air quality monitoring by the DOE. A signboard stating the use of the monitoring site should be erected. The criteria for the selection of the site are : (a) The site should be located not less than 5m from the roadside. (b) No structure that will inhibit air movement is allowed within 3m of the borders of the site. (c) The site should be located in an open area with no restrictions at 120 degrees angle from above. (d) The site should be located near a power source, preferably a TNB substation.	Applicable	PJH
6. The DOE, Selangor, has to be informed of the actual date of commencement of the project and date of expected completion of the project not later than 14 days after the start of the project. The developer is also required to inform the DOE , Selangor, the actual date of completion of project not later 14 days after the completion of the project.	Applicable	PJH
7. The developer has to inform in writing the DOE, Selangor, with a copy to the DOE, Headquarters, any changes in ownership of land or its management.	Applicable	PJH
8. All the mitigation and control measures described in the EIA Report for the Putrajaya Federal Administrative Centre has to be complied with.	Applicable	PP
9. The developer has to include all the EIA Approval Conditions and the recommendations made in the EIA report into all tender and contract documents for works during the construction and operation phase of the project.	Applicable In a certain issues, Perbadanan may have imposed a higher requirement.	PP

APPENDIX 2

EIA APPROVAL CONDITIONS FOR PUTRAJAYA

CONDITIONS	ANALYSIS	COMPLIANCE BY
10. The developer has to submit to the DOE, Selangor, regular compliance report to the EIA Approval Conditions, in accordance with Section, 34A(7),Environmental Quality Act, 1974.	Applicable	PJH
11. The developer has to comply with all the directive of the DOE, concerning any issues that may arise concerning the implementation of the project.	Applicable	PP
12. All the conditions above has to be fully complied with. Failure to do so may result in the developer not complying with Section 34A, Environmental Quality Act, 1974 and may result in a fine not exceeding RM10,000.00 or a jail term not exceeding 2 years, or both, and an fine of RM1,000.00 for every day that the non-compliance is continued.	Applicable Amendment to the EQA in 1996 have increased the fine to RM100,000.00 and jail term to 5 years.	PJH

Key:

Perbadanan	:	Perbadanan Putrajaya
PJH	:	Putrajaya Holdings Sdn Bhd
PP	:	Project Proponent
PO	:	Project Operator

APPENDIX 3

PUTRAJAYA LAKE WATER QUALITY STANDARDS

LAKE WATER QUALITY PARAMETER	UNIT	PUTRAJAYA AMBIENT LAKE WATER QUALITY STANDARDS
Aluminium	mg/l	<0.05 if pH<6.5 <0.1 if pH>6.5
Ammoniacal Nitrogen	mg/l	0.3
Ammonia	mg/l	0.02 – 0.03
Arsenic	mg/l	0.05
Antimony	mg/l	0.03
Barium	mg/l	1
Beryllium	mg/l	0.004
Boron	mg/l	1
Cadmium	mg/l	0.002
Free Chlorine	mg/l	1.5
Chromium, Total	mg/l	0.05
Copper	mg/l	0.02
Cyanide	mg/l	0.02
Flourine	mg/l	1.5
Iron	mg/l	1
Lead	mg/l	0.05
Manganese	mg/l	0.1
Mercury	mg/l	0.0001
Nickel	mg/l	0.02
Nitrate (NO3-N)	mg/l	7
Nitrite (NO2-N)	mg/l	0.04
Total Phosphorus	mg/l	0.05
Silica	mg/l	50
Selenium	mg/l	0.01

APPENDIX 3

PUTRAJAYA LAKE WATER QUALITY STANDARDS

LAKE WATER QUALITY PARAMETER	UNIT	PUTRAJAYA AMBIENT LAKE WATER QUALITY STANDARDS
Silver	mg/l	0.05
Sulphur	mg/l	0.05
Sulphate	mg/l	250
Zinc	mg/l	5
BOD	mg/l	3
COD	mg/l	25
Colour	TUC	150
Conductivity	uS/cm	1000
Salinity	ppt	1
Total suspended solids	mg/l	50
Turbidity	NTU	50
Transparency (Secchi)	m	0.6
Hardness	mg/l	250
Taste		No Objectionable Taste
Dissolved Oxygen	mg/l	5-7
Odour		No Objectionable Odour
pH		6.5-9.0
Temperature	^{o}C	Normal ±2
Oil & Grease	mg/l	1.5
Chlorophyll a	mg/l	0.7
Floatables		No Visible Floatables
MICROBIOLOGICAL CONSTITUENTS		
Feacal coliform	Counts/100 ml	100
Total coliform	Counts/100 ml	5000
Salmonella	Counts/1	0
Enteroviruses	PFU/1	0

APPENDIX 3

PUTRAJAYA LAKE WATER QUALITY STANDARDS

LAKE WATER QUALITY PARAMETER	UNIT	PUTRAJAYA AMBIENT LAKE WATER QUALITY STANDARDS
RADIOACTIVITY		
Gross-alpha	Bq/1	0.1
Gross-Beta	Bq/1	1
Radium-226	Bq/1	<0.1
Strontium-90	Bq/1	<1
ORGANICS		
Carbon Chloroform Extract	ug/l	500
MBAS/BAS	ug/l	500
Oil & Grease (mineral)	ug/l	40,NF
Oil & Grease (emulsified edible)	ug/l	7000,NF
PCB	ug/l	0.1
Phenol	ug/l	10
Aldrin/Dieldrin	ug/l	0.02
BHC	ug/l	2
Chlordane	ug/l	0.08
t-DDT	ug/l	0.1
Endosulfan	ug/l	10
Heptachlor/Epoxide	ug/l	0.05
Lindane	ug/l	2
2,4-D	ug/l	70
2,4,5-T	ug/l	10
2,4,5-TP	ug/l	4
Paraquat	ug/l	10

APPENDIX 4

NATIONAL WATER QUALITY STANDARD MALAYSIA

PARAMETER	UNIT	CLASS				
		I	IIA/IIB	III#	IV	V
Al	mg/l	▲	-	(0.06)	0.5	
As	mg/l		0.05	0.4(0.05)	0.1	▲
Ba	mg/l		1	-	-	
Cd	mg/l		0.01	0.01*(0.001)	0.01	
Cr (IV)	mg/l		0.05	1.4(0.05)	0.1	
Cr (III)	mg/l		-	2.5	-	
Cu	mg/l		0.02	-	0.2	
Hardness	mg/l		250	-	-	
Ca	mg/l		-	-	-	
Mg	mg/l		-	-	-	
Na	mg/l		-	-	3 SAR	
K	mg/l		-	-	-	
Fe	mg/l		1	1	1 (Leaf) 5 (Others)	
Pb	mg/l		0.05	0.02*(0.01)	5	
Mn	mg/l	N	0.1	0.1	0.2	
Hg	mg/l	A	0.001	0.004(0.0001)	0.002	
Ni	mg/l	T	0.05	0.09*	0.2	
Se	mg/l	U	0.01	0.25(0.04)	0.02	
Ag	mg/l	R	0.05	0.0002	-	
Sn	mg/l	A	-	0.004	-	
U	mg/l	L	-	-	-	
Zn	mg/l		5	0.4*	2	
B	mg/l	L	1	(3.4)	0.8	
Cl	mg/l	E	200	-	80	
Cl_2	mg/l	V	-	(0.02)	-	
CN	mg/l	E	0.02	0.06(0.02)	-	IV
F	mg/l	L	1.5	10	1	
NO_2	mg/l	S	0.4	0.4(0.03)	-	
NO^3	mg/l		7	-	5	
P	mg/l	O	0.2	0.1	-	
Silica	mg/l	R	50	-	-	
SO_4	mg/l		250	-	-	
S	mg/l	A	0.05	(0.001)	-	
CO_2	mg/l	B	-	α -	-	
Gross –	Bq/l	S	0.1	β -	-	
Gross –	Bq/l	E	1	-	-	
Ra-226	Bq/l	N	<0.1	-	-	
Sr-90	Bq/l	T	<1	-	-	
µCCE	g/l		500	-	-	▼
µMBAS/BAS	g/l		500	5000(200)	-	
µO & G (Mineral)	g/l	▲	40; N	N	-	
µO & G (Emulsified Edible)	g/l		7000: N	N	-	
µPCB	g/l		0.1	6(0.05)	-	
µPhenol	g/l		10	-	-	
µAldrin/Dieldrin	g/l		0.02	0.2(0.01)	-	
µBHC	g/l		2	9(0.1)	-	
µChlordane	g/l		0.08	2(0.02)	-	
µt-DDT	g/l		0.1	(1)	-	
µEndosulfan	g/l		10	-	-	
µHeptachlor/Epoxide	g/l		0.05	0.9(0.06)	-	
µLindane	g/l		2	3(0.4)	-	
µ2,4-D	g/l	▼	70	450	-	
µ2,4,5-T	g/l		10	160	-	
µ2,4,5,-TP	g/l		4	850	-	
µParaquat	g/l		10	1800	-	

Notes:

* = At hardness 50 mg/l $CaCO_3$
\# = Maximum (unbracketed) and 24-hour average (bracketed) concentration
N = Free from visible film sheen, discolouration and deposits

APPENDIX 4

NATIONAL WATER QUALITY STANDARD MALAYSIA

PARAMETER	UNIT	CLASS					
		I	IIA	IIB	III	IV	V
Ammoniacal Nitrogen	mg/l	0.1	0.3	0.3	0.9	2.7	> 2.7
Biochemical Oxygen Demand	mg/l	1	3	3	6	12	> 12
Chemical Oxygen Demand	mg/l	10	25	25	50	100	> 100
Dissolved Oxygen	mg/l	7	5 - 7	5 - 7	3 - 5	< 3	< 1
pH	-	6.5 - 8.5	6 - 9	6 - 9	5 - 9	5 - 9	-
Colour	TCU	15	150	150	-	-	-
Electrical Conductivity*	µS/cm	1000	1000	-	-	6000	
Floatables	-	N	N	N	-	-	-
Odour	-	N	N	N	-	-	-
Salinity	%	0.5	1	-	-	2	-
Taste	-	N	N	N	-	-	-
Total Dissolved Solid	mg/l	500	1000	-	-	4000	-
Total Suspended Solid	mg/l	25	50	50	150	300	300
Temperature	oC	-	Normal + 2 ºC	-	Normal + 2 ºC	-	-
Turbidity	NTU	5	50	50	-	-	-
Faecal Coliform**	count/ 100 ml	10	100	400	5000 (20000)[a]	5000 (20000)[a]	-
Total Coliform	count/ 100 ml	100	5000	5000	50000	50000	> 50000

Notes :
N : No visible floatable materials or debris, no objectional odour or no objectional taste
* : Related parameters, only one recommended for use
** : Geometric mean
a : Maximum not to be exceeded

WATER CLASSES AND USES

CLASS	USES
Class I	Conservation of natural environment. Water Supply I – Practically no treatment necessary. Fishery I – Very sensitive aquatic species
Class IIA	Water Supply II – Conventional treatment required. Fishery II – Sensitive aquatic species.
Class IIB	Recreational use with body contact
Class III	Water Supply III – Extensive treatment required. Fishery III – Common, of economic value and tolerant species; livestock drinking.
Class IV	Irrigation
Class V	None of the above.

APPENDIX 4

DOE WATER QUALITY CLASSIFICATION BASED ON WATER QUALITY INDEX

SUB INDEX & WATER QUALITY INDEX	INDEX RANGE		
	CLEAN	SLIGHTLY POLLUTED	POLLUTED
Biochemical Oxygen Demand (BOD)	91 – 100	80 – 90	0 – 79
Ammoniacal Nitrogen (NH3-N)	92 – 100	71 – 91	0 – 70
Suspended Solids (SS)	78 – 100	70 – 75	0 – 69
Water Quality Index (WQI)	81 - 100	60 - 80	0 - 59

DOE WATER QUALITY INDEX CLASSIFICATION

PARAMETER	UNIT	CLASS				
		I	II	III	VI	V
Ammoniacal Nitrogen	mg/	<0.1	0.1 – 0.3	0.9 – 0.9	0.9 – 2.7	>2.7
Biochemical Oxygen Demand	mg/	<1	1 – 3	3 – 6	6 – 12	>12
Chemical Oxygen Demand	mg/	<10	10 – 25	25 – 50	50 – 100	>100
Dissolved Oxygen	mg/	>7	5 – 7	3 – 5	1 – 3	<1
pH	-	>7.0	6.0 – 7.0	5.0 – 6.0	<5.0	>5.0
Total Suspended Solid	mg/	<25	25 – 50	50 – 150	150 – 300	>300
Water Quality Index (WQI)	mg/	>92.7	76.5 – 92.7	51.9 – 76.5	31.0 – 51.9	<31.0

APPENDIX 5

MALAYSIA AMBIENT AIR QUALITY GUIDELINES

Pollutant	Averaging Time	Malaysia Guidelines	
		ppm	($\mu g/m^3$)
Ozone	1 hour 8 hour	0.10 0.06	200.0 120.0
Carbon Monoxide (CO) **	1 hour 8 hour	30.0 9.0	35** 10**
Nitrogen Dioxide (NO_2)	1 hour 24 hour	0.17 0.04	320.0
Sulphur Dioxide (SO_2)	1 hour 24 hour	0.13 0.04	350.0 105.0
Particulate Matter (PM_{10})	24 hour 12 month	-	150.0 50.0
Total Suspended Particulate	24 hour 12 month	-	-
Lead (Pb)	3 month	-	1.5

Note : ** mg/m^3

: Source – Malaysia Environmental Quality Report 2012, Department of Environment

APPENDIX 6

THE PLANNING GUIDELINES FOR ENVIRONMENTAL NOISE LIMIT AND CONTROL

The Planning Guidelines for Environmental Noise Limit and Control (Book 1 of 3) published by Department of Environment, Ministry of Natural Resources and Environment Malaysia.

The guideline provides an overview as listed below:

1. Scope
2. Purpose
3. Legislative Background
4. Noise Limits
5. Noise Measurements
6. Monitoring Point(s)
7. Noise Severity and Impact Assessment
8. Noise and Planning
9. Noise Control

Annaxes:

1. Schedule of Permissible Sound Levels
2. Procedures for Measurement of Noise Immission Level
3. Procedures for Assessment of Community Annoyance Response
4. Code of Practice to Minimize Noise Disturbance
5. Statutory Instruments, Standards and Other Guidance

THE PLANNING GUIDELINES FOR

BOOK 1 OF 3

Environmental Noise Limits and Control

Department of Environment
Ministry of Natural Resources and Environment
Malaysia

FOREWORD

The Department of Environment hereby published 3 sets of documents to provide guidance on acceptable noise limits for various types of land use and human activities. ***The Planning Guidelines for Environmental Noise Limits and Control*** provide noise acceptance criteria for quantitative assessment of noise to define disturbance or otherwise. ***The Guidelines for Noise Labeling and Emission Limits of Outdoor Sources*** prescribes comprehensive methodology to measure and report noise emission from outdoor sources. ***The Planning Guidelines for Vibration Limits and Control*** gives vibration acceptance criteria for quantitative assessment of vibration.

It is hoped that these document could serve as useful guide to planners and decision makers at the state and local level as well as other organization, bodies and agencies involved or having responsibilities in the design and/or approval of town planing, infrastructure development, etc. so as to reduce the potential impact of noise affecting public health or causing annoyance or disturbance. Continuing efforts to improve the content and structures of these guidelines based upon feedback from users will be made from time to time.

In the publication of these documents, I would like with sincere appreciation to acknowledge the valuable expert contribution of the University of Technology Malaysia, in particular Prof. Dr. Mohd Salman Leong Bin Abdullah, the relevant agencies and all individuals in providing the necessary and relevant inputs, comments and recommendations towards the successful completion of the documents.

DATO' HAJAH ROSNANI IBARAHIM
Director General
Department of Environment,
Malaysia

Department of Environment Malaysia

THE PLANNING GUIDELINES FOR ENVIRONMENTAL NOISE LIMITS AND CONTROL

TABLE OF CONTENTS

LIST OF ANNEXES

1.0 Scope

1.1 This document presents guidance and recommendations for

(a) specifying noise limits in the environment for the protection of the public from excessive noise;

(b) procedures on environmental noise measurements and impact assessment;

(c) noise parameters for the assessment of different noise sources; and

(d) noise abatement through planning and control.

1.2 For the purpose of these guidelines, definitions used are consistent with those given in ISO 1996/1, BS 661, and BS 3015. A glossary of definitions is also included in this document.

1.3 These guidelines present noise acceptance criteria upon which a quantitative assessment of noise could be made. This eliminates subjective judgment of parties involved, ambiguity in defining a disturbance, and places the assessment of a noise source on a measurement basis.

2.0 Purpose

2.1 The purposes of these guidelines are:

(a) for planning purposes, typically by project proponents, local authorities, and consultants;

(b) to be used in noise impact assessments, and pre- and post EIA compliance verification;

(c) in quantifying a noise disturbance on a quantitative manner; and

(d) to offer an introductory treatise in environmental noise control.

3.0 Legislative Background

3.1 Section 23 under The Environmental Quality Act 1974 stipulates that : "No person shall, unless licensed, emit or cause or permit to be emitted any noise greater in volume, intensity or quality in contravention of the acceptable conditions specified under section 21."

3.2 Approval of projects subjected to Environmental Impact Assessment (EIA) procedures and requirements usually include maximum permissible noise limits at the affected areas that must be complied with during the construction phase and/or operation of the project.

3.3 The Department of Environment in these guidelines present recommendations upon which acceptable noise limits could be specified. In instances of new noise sources or projects, compliance to these limits may be made mandatory using legislative instruments available to the Department of Environment, and other authorities (Local Authorities, City Halls, etc).

3.4 Prior to these guidelines as presented here, acceptable limits had been set based on "Guidelines for Sitting and Zoning of Industries", and "Guidelines an Application for Permission to Install Generator Sets". These current guidelines supercedes noise limits set in the above documents; and presents a comprehensive and unambiguous manner upon which noise could be measured and assessed against the prescribed standards for all applications.

4.0 Noise Limits

4.1 Noise limits may be set based on either of the following, depending on circumstances:

(a) an absolute limit based on the average level of noise which should not be exceeded in a specified time period;

(b) a relative limit based on the permitted increase in noise level with respect to the background level.

4.2 These limits may either be a single value over the relevant time periods, or different values for day and night. It may also be appropriate to set an evening value where the noise source lends itself to such control. The setting of an absolute limit is often desirable, but would require care in noise monitoring and assessment to ensure that unrelated or extraneous noises (which will increase the measured noise level) do not influence the assessment.

4.3 Relative limits in general are not appropriate where the permitted increase in noise over background is substantial, for example 15 dB or more. Because background noise varies during the day, the background noise level determined should be representative of a typical quiet period during the working day.

4.4 Acceptance limits for noise should be consistent with the environmental noise climate that currently exists at a location -such that an adverse impact on the environment and affected property are avoided, and at the same time maintain a reasonable balance with physical development and/or activities.

4.5 Recommended maximum permissible sound levels as measured at the real property boundary, and assessed under the respective land use, are given in Annex A.

4.6 Under normal circumstances, these sound levels shall apply to outdoor locations at the real property boundary of the receiver (typically residential areas, or other noise sensitive area). This shall include assessment of sound levels from road traffic, railways and other noise source(s). In instances of industrial noise sources in an industrial zone, the sound level shall be at the property boundary of the industrial site or plant under assessment.

4.7 Schedule 1 of Annex A prescribes maximum permissible sound level (L_{Aeq}) by receiving land use for planning purposes and new development. These limits should be used for new industrial, commercial or housing areas; and/or development affecting such areas. Such limits are deemed to be a requisite in protecting public health and welfare with an adequate margin of safety.

4.8 For new development (industrial, transportation: roads, rails) in areas of existing high environmental noise climate, the maximum permissible sound level (L_{Aeq}) at the receiver locations should not be higher than noise limits prescribed in Schedule 2. This schedule presents an absolute limit for the noise level L_{Aeq} based on the existing ambient percentile index L_{90} plus an allowable noise increment.

4.9 In instances where the existing noise climate (L_{Aeq}) is higher than the planning values of Schedule1; or when the noise limits ($L_{Aeq} = L_{90}$ + Factor) prescribed in Schedule 2 are lower than the existing noise climate, an acceptance criteria based on maintaining a noise level similar to the existing noise climate (existing L_{Aeq}) may be more appropriate. This acceptance criterion is tabulated in Schedule 3.

4.10 Recommended limiting sound levels (L_{Aeq}) from road traffic for proposed new roads and/or redevelopment of existing roads are given in Schedule 4.

4.11 Recommended limiting sound levels (L_{Aeq}) from railways including transit trains for new development or re-alignments are given in Schedule 5. A maximum permissible instantaneous maximum sound pressure levels for the transient pass-by noise is also stipulated. This is the single event maximum instantaneous noise limit permissible for the entire measurement duration.

4.12 Due to the intrusive but temporal nature of construction noise, maximum permissible sound levels (statistical centile L_{90}, L_{10}, and maximum instantaneous sound pressure level) for construction, maintenance and demolition works should be observed. These limits are stipulated in Schedule 6. Assessment of the L_{10} and L_{max} levels are generally intended for impulsive or fluctuating noise sources (for example piling, pneumatic tools, etc).

5.0 Noise Measurements

5.1 Measurements of noise levels are often necessary for any of the following purpose:

(a) assessing the existing noise climate.

(b) assessing compliance to noise limits for noise limits for noise source(s) and/or project development.

(c) assessing environmental impact and potential community response.

5.2 Noise measurements usually include the following:

(a) background (ambient) sound pressure levels at a receiver location(s) and/or at the real property boundary of a noise source(s). These may be undertaken at a location(s) prior to a project development. It could also be undertaken in the absence of the noise source(s) (example with a plant or facility not operating).

(b) sound pressure levels at a receiver location (s) and/or at the real property boundary of a noise source with the plant or facility operating and/or completion and operation of a project (highway, transit trains, industrial plant, etc.).

(c) sound pressure levels of each noise source as may be required to evaluate the contribution of each source.

5.3 Noise measured indoors may also be undertaken, but is usually not desirable for environmental impact assessments of project development or noise source(s) unless otherwise required by prior conditions or assessment requirements. Measurement indoors is governed by the severity of noise source, the sound insulation properties of the building, and acoustic characteristics of the interior space.

5.4 Procedures for measurement of sound levels in the environment and noise source(s) severity assessment as described in Annex B should be used. Guidance on the use and selection of an appropriate noise measurement parameter (indices) and sampling methods are also given in Annex B.

5.5 Because noise vary over time and have different characteristics, several indices are available to describe noise levels. The equivalent continuous noise level over a time period T ($L_{Aeq,T}$) is the preferred general purpose index for environmental noise. For road traffic noise $L_{A10,\ 18h}$ is still widely used; and to describe background noise $L_{A90,T}$ is appropriate.

5.6 To describe the sound insulation of a component of a building envelope (e.g. window) the acoustic rating R_w (BS 5821: Part 3: 1984) is appropriate. It is more difficult to specify the insulation of the whole building envelope because the value depends on different insulation values for the various building elements such as windows, walls and roof structure, as well as the type of noise source and its location.

6.0 Monitoring point(s)

6.1 Normally the noise assessment will be at the nearest noise-sensitive premises and the best position for the monitoring point(s) will often be outside the sensitive premises at the real property boundary. This however does not mean that the monitoring point must always be close to the premises. Noise assessment at times may refer only to noise from the source under consideration and not to the total measured value which may include, for example, traffic noise.

6.2 In situations when extraneous noise makes monitoring difficult it may be easier to monitor a suitably adjusted level at the boundary of the site instead of outside the premises to be protected. This approach requires that the noise level at the boundary monitoring point is a reliable indicator of the level at the building to be protected and this may not be the case if the noise source is mobile. Monitoring points should be accessible to all parties concerned.

7.0 Noise Severity and Impact Assessment

7.1 Noise could be assessed against an absolute numerical noise limit (as proposed in Annex A), or alternatively assessed based on the relative increase of the noise levels with respect to a background noise level.

7.2 Assessment of noise levels against a noise limit is fairly straight forward, as it merely requires comparison of the measured noise level against the permissible sound pressure levels. Assessment of the impact of a noise level in the environment, and the anticipated community response to the noise could also be made by evaluating the magnitude by which the assessed noise level exceeds the existing ambient sound level.

7.3 The use of ISO-R 1996 Acoustics – "Assessment of Noise with Respect to Community Response" are recommended for community annoyance response evaluation. Procedures as adopted from ISO-R 1996 are described in Annex C.

8.0 Noise and Planning

8.1 The impact of noise should be considered in the planning of a project development, and in general be guided by these Guidelines.

8.2 For the purpose of the consideration of noise in planning, the following information may reasonably require:

(i) the existing daytime and night-time (L_{Aeq}) equivalent sound levels for a representative sample of locations, existing noise zones; identification of the major sources of sound;

(ii) any projected or proposed new or expanded sources of sound which may affect exposure of the site during three years following completion of the project and the projected future daytime and night-time (L_{Aeq}) equivalent sound levels; projected noise contours; and changes to existing noise zones at the site resulting from these new or expanded sources;

(iii) where applicable, plans for noise attenuation measures on the site and/or of the structure proposed to be built, and the amount of sound attenuation anticipated as a result of these measures.

8.3 The Project Proponent and any other Person(s) who would operate or cause to operate equipment, plant, process or activity with noise generation should undertake all reasonable measures to control the source of, or limit exposure to, noise. Such measures should be proportionate and reasonable, and may include one or more of the following:

(a) land use compatibility: proposed operations shall be compatible with designated land use;

(b) layout : adequate distance between source and noise-sensitive neighbours, building or area; the usage and designation of buffer zones shall be in accordance to Planning Guidelines issued by the Department of Environment from time to time; screening by barriers, (natural, man-made or otherwise) and other buildings;

(c) engineering measures: reduction of sound at point of generation, containment of noise generated by adequate design of building envelope, and protection of adjacent noise-sensitive buildings by sound insulation or screening of the buildings;

(d) administrative measures: limiting the operating time of noise source(s); restricting the activities and ensuring acceptable sound emission limits of noise source.

8.4 In instances where noise would be potential concern, the Project Proponent and/or parties responsible for the noise source or emissions should undertake sound propagation predictions to the environment using acoustic modelling techniques and/or algorithms such that the impact of noise could be assessed. The parameters used in the analysis shall include but are not limited to sound power level emissions (actual or estimated), directivity factors, ground effects, distance, meteorological influences, and transmission path

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9.0 Noise Control

9.1. The Project Proponent, and/or any other occupier of any industrial or trade premises, construction sites, and/or person(s) responsible for excessive sound generation should use the "best practical means" to minimise the sound generation and reduce its propagation to the environment.

9.2 Excessive sound generation is deemed to occur when noise levels above the noise limits prescribed in these Guidelines are exceeded. "Best practical means" in the context of these guidelines, shall include but not limited to:-

(i) the size, design and inherent operation characteristics of the plant, equipment, process or activity;

(ii) the adjustment of operational parameters to limit the intensity of sound emissions,

(iii) the selection and usage of low sound power levels equipment;

(iv) the provision if necessary, and appropriate use of sound attenuators, acoustic plenum, and other acoustic filtering devices;

(v) the provision if necessary, and appropriate use of acoustic enclosures and other sound enclosing devices;

(vi) the provision if necessary, and appropriate use of screening barriers (man-made, natural or otherwise);

(vii) the proper conduct and adequate supervision of operation; and

(viii) regular and efficient maintenance of plant and control equipment.

9.3 In instances of high noise severity, the Department of Environment at its discretion may make it mandatory for the Project Proponent and/or noise source originator or person(s) responsible for the excessive sound generation to institute measures for reducing sound levels to comply with limits as prescribed in these Guidelines.

ANNEX A
SCHEDULE OF PERMISSIBLE SOUND LEVELS

SCHEDULE 1

MAXIMUM PERMISSIBLE SOUND LEVEL (L_{Aeq}) BY RECEIVING LAND USE FOR PLANNING AND NEW DEVELOPMENT

Receiving Land Use Category	Day Time 7.00 am - 10.00 pm	Night Time 10.00 pm - 7.00 am
Noise Sensitive Areas, Low Density Residential, Institutional (School, Hospital), Worship Areas.	50 dBA	40 dBA
Suburban Residential (Medium Density) Areas, Public Spaces, Parks, Recreational Areas.	55dBA	45 dBA
Urban Residential (High Density) Areas, Designated Mixed Development Areas (Residential - Commercial).	60 dBA	50 dBA
Commercial Business Zones	65 dBA	55 dBA
Designated Industrial Zones	70 dBA	60 dBA

SCHEDULE 2

MAXIMUM PERMISSIBLE SOUND LEVEL (L_{Aeq}) OF NEW DEVELOPMENT (ROADS, RAILS, INDUSTRIAL) IN AREAS OF EXISTING HIGH ENVIRONMENTAL NOISE CLIMATE

Receiving Land Use Category	Day Time 7.00 am - 10.00 pm	Night Time 10.00 pm -7.00am
Noise Sensitive Areas, Low Density Residential	L_{90} + 10 dBA	L_{90} + 5 dBA
Suburban and Urban Residential Areas	L_{90} + 10 dBA	L_{90} + 10 dBA
Commercial, Business	L_{90} + 10 dBA	L_{90} + 10 dBA
Industrial	L_{90} + 10 dBA	L_{90} + 10 dBA

L_{90} is the measured ninety percentile sound level for the respective time period of the existing areas of interest in the absence of the proposed new development.

SCHEDULE 3

MAXIMUM PERMISSIBLE SOUND LEVEL (L_{Aeq}) TO BE MAINTAINED AT THE EXISTING NOISE CLIMATE

Existing Levels	New Desirable Levels	Maximum Permissible Levels
L_{Aeq}	L_{Aeq}	L_{Aeq} + 3 dBA

SCHEDULE 4

LIMITING SOUND LEVEL (L_{Aeq}) FROM ROAD TRAFFIC (FOR PROPOSED NEW ROADS AND/OR REDEVELOPMENT OF EXISTING ROADS)

Receiving Land Use Category	Day Time 7.00 am - 10.00 pm	Night Time 10.00 pm - 7.00 am
Noise Sensitive Areas Low Density Residential Areas	55 dBA	50 dBA
Suburban Residential (Medium Density)	60 dBA	55 dBA
Urban Residential (High Density)	65 dBA	60 dBA
Commercial, Business	70 dBA	60 dBA
Industrial	75 dBA	65 dBA

SCHEDULE 5

LIMITING SOUND LEVEL (L_{Aeq}) FOR RAILWAYS INCLUDING TRANSITS (FOR NEW DEVELOPMENT AND RE-ALIGNMENTS)

Receiving Land Use Category	Day Time 7.00 am - 10.00 pm	Night Time 10.00 pm - 7.00 am	L_{max} (Day & Night)
Noise Sensitive Areas Low Density Residential Areas	60 dBA	50 dBA	75 dBA
Suburban and Urban Residential Areas	65 dBA	60 dBA	80 dBA
Commercial, Business	70 dBA	65 dBA	80 dBA
Industrial	75 dBA	65 dBA	NA

SCHEDULE 6

MAXIMUM PERMISSIBLE SOUND LEVELS (PERCENTILE L_N AND L_{MAX}) OF CONSTRUCTION, MAINTENANCE AND DEMOLITION WORK BY RECEIVING LAND USE

Receiving Land Use Category	Noise Parameter	Day Time 7.00 am - 7.00 pm	Evening 7.00 pm - 10.00 pm	Night Time 10.00 pm - 7.00 am
Residential (Note 2 **)	L_{90}	60 dBA	55 dBA	* (Note 1)
	L_{10}	75 dBA	70 dBA	*
	L_{max}	90 dBA	85 dBA	*
Commercial (Note 2 **)	L_{90}	65 dBA	60 dBA	NA
	L_{10}	75 dBA	70 dBA	NA
Industrial	L_{90}	70 dBA	NA	NA
	L_{10}	80 dBA	NA	NA

NOTES

**1. At these times the maximum permissible levels as stipulated in the Schedule 1 for the respective residential density type shall apply. This may mean that no noisy construction work can take place during these hours.*

***2. A reduction of these levels in the vicinity of certain institutions such as schools, hospitals mosque and noise sensitive premises (apartments, residential dwellings, hotel) may be exercised by the local authority or Department of Environment.*

Where the affected premises are noise sensitive, the limits of the Schedule 1 shall apply.

3. In the event that the existing ambient sound level (L_{90}) without construction, maintenance and demolition worksis higher than the L_{90} limit of the above Schedule, the higher measured ambient L_{90} sound level shall prevail. In this case, the maximum permissible L_{10} sound level shall not exceed the Ambient L_{90} level + 10 dBA, or the above Schedule L_{10} whichever is the higher.

4. NA = Not Applicable.

ANNEX B

PROCEDURES FOR MEASUREMENT OF NOISE IMMISSION LEVELS

1.0 Measurement equipment.

1.1 The measurement shall be made with a precision sound level meter which complies with the requirements of the IEC Publications 60651, 60804 and 61672 or thereafter, for the type of meters in Class 1.

1.2 The "A" weighting network, and "fast" time weighting response shall be used for sound pressure level measurements for equivalent Leq and statistical centile readings.

1.3 Measurement for statistical centile levels (L_{10} , L_{90}) and maximum instantaneous level (L_{max}) shall be made using a sound level meter installed with statistical analysis functions, or alternatively computed from continuously monitored instantaneous sound pressure levels using data acquisition system for the stipulated time period.

1.4 Measurement for blasting and other explosion related activities shall be made using linear weighting network (dB Linear) for a peak value ("peak" time constant setting) with a "maximum hold" function of the sound level meter.

1.5 Other supplementary measurement(s) of impulsive sound, for the purpose of reporting and record keeping, shall be measured using an "impulse" time weighting response.

1.6 If a graphic level recorder is used the recorder shall be set with a writing speed which most closely approximates the "fast" time weighting response (for example, a writing speed of 100mm/s for a chart width of 50 mm).

1.7 The calibration of sound level meter shall be checked and adjusted according to the manufacturer's instructions or with a standard sound source (for example a pistonphone) at the beginning and at the end of each series of measurements. If the errors of the sound level meter obtained from these calibrations deviates by more than 1dB during a series of measurements, the measured result shall be considered invalid.

1.8 A wind shield approved by the microphone manufacturer shall be used. Measurements cannot normally be made if the wind speed exceeds 5m/s at the microphone position. For continuous remote monitoring, the wind speed shall be monitored concurrently with the sound levels.

2.0 Measurement locations.

2.1 Measurements for noise immision as propagated to the environment by a sound source shall be made at locations along or adjacent the real property boundary of the sound source, and/or at the receiver location.

2.2 Measurements shall be made at all strategic locations representative of the entire real property boundary, and at all locations affecting the community. These shall include but are not limited to locations at closest proximity to the sound source(s) affected by the noise of these source(s).

2.3 Measurements shall be made outdoors at 1.2 to 1.5 m above the ground and, practical, at least 3.5m from walls, buildings or other sound reflecting structures. When circumstances dictate, measurements may be made at greater heights and closer to the wall (for example 0.5 m in front of an open window) and these special conditions indicated in the measurement records.

2.4 Care shall be taken to avoid influence on the result from other unwanted sound signals, for example noise from wind on the microphone of the measuring equipment, noise from electrical interference or noise from extraneous sources.

2.5 When the noise source is distant, the measured sound level may depend significantly on the climatic conditions. It is recommended that extreme climatic conditions be avoided. A typical value and an indication of the range of variation shall be obtained.

3.0 Measurement methods and parameters

3.1 Various methods of noise measurements and noise parameters are described in the annex. The method to be selected in a particular case will depend on the temporal variations of noise level, on the resources available and on the time period over which the noise is to be measured.

3.2 Sampling methods can be divided into three broad categories; and the selection of the method deemed most appropriate is dependent on the purpose and accuracy required of the monitoring.

(a) Continuous day night sampling

This procedure involves the continuous sampling of instantaneous sound pressure level for the entire duration of a day (0700 to 2200 hours) and/or night (2200 to 0700 hours) to obtain the day time $L_{Aeq\ day,\ 15h}$ and night time $L_{Aeq\ night,\ 9h}$.

Data sampling can be undertaken in a continuous mode (non-stop) for the entire day/night time period using an integrated sound level meter, or sampled continuously on an hourly basis and repeated continuously over the hours to obtain the $L_{Aeq,\ 1h}$ levels, and the L_{Aeq} day and L_{Aeq} night computed from the hourly $L_{Aeq,\ 1h}$ noise levelstime profile.

This procedure can be undertaken with a permanent monitoring station (but requires care to ensure that extraneous noise source unrelated to the events monitored do not influence the results); or undertaken manually.

(b) Regular sampling repeated over a hourly basis

This procedure involves the continuous sampling of instantaneous sound pressure level over a designated duration (for example 5 to 20 minutes) repeated over every hour. This procedure in essence limits data sampling over a shorter period of time per hour, thereby permitting measurements to be undertaken at more positions. Uncertainty and errors in the L_{Aeq} values are therefore inevitable.

(c) A single sample

This procedure is useful when it is only possible to visit the site for a limited period. The reliability of this technique can be improved by avoiding periods when the site is not operating normally (e.g. meal breaks).

3.3 The size of possible errors in estimates of L_{Aeq} values obtained by sampling will depend on the type of sampling technique adopted, the length of time for which the noise is sampled and the pattern of noise emitted by the site. The Table below provides some guidance on typical ranges of errors likely to be encountered when various sampling strategies are used. The figures quoted in the table are based on measurements at a number of building sites but may not be applicable for large sites where there are very wide fluctuations in noise level (e.g. for some types of piling).

Estimation of daily L_{Aeq} according to sampling technique

Sampling techniques	*Daily L_{Aeq} estimated within (95%) confidence*
	dB(A)
5 min every 1h	±2.5
20 min every 1h	±1.5
Single 20 min sample	±5*
Single 60 min sample	±3*

Source: BS 5228 Part 1: 1984

** These figures assume that measurements are only taken when the site is working normally (e.g. not during meal breaks).*

3.4 For compliance verification and record keeping, the sampling period should be continuous to cover the entire twenty four hour day cycle to obtain the respective day time, evening and night time noise levels.

3.5 For preliminary EIA and/or evaluation of continuous sound sources, a sampling period of not less than 20 minutes for each hour period to be repeated hourly over the day/evening/night to obtain an hourly profile, and thereafter the computed L_{eq}, is acceptable. This approximation is not acceptable for transient impulsive sound source(s) typical in construction sites or activities.

3.6 Measurements for equivalent sound levels (L_{eq}) and statistical centile levels (L_{10}, L_{90}, and including L_{max}) shall be undertaken with continuous sampling for the entire time period of interest, i.e. day time, evening, and night time.

4.0 Number and duration of measurements

4.1 At least three measurements should be carried out at each measuring location.

For continuous monitoring over a complete 24 hours cycle (for day and night time L_{Aeq}) a single continuous 24 hours measurement per measuring location is often acceptable if the noise source generation at the day of measurement is deemed representative of the source(s).

4.2 The measurements shall be considered valid if the range of three measurements made immediately one after the other is not greater than 2 dB for steady state noise.

The arithmetic mean value given by these measurements shall constitute the result.

4.3 For transient or impulsive noise, the highest L_{max} value as obtained shall be taken as the maximum instantaneous level occurring over the period of measurement. It is however recommended that repeat measurements be undertaken where feasible to confirm repeatability of this reading.

4.4 For compliance verification and record keeping the measurements should be undertaken by the Project Proponent for every day for a minimum of two weeks.

4.5 In the interest of protection of public, including abatement for community annoyance response, the Department of Environment may at its discretion require permanent or semi-permanent long term monitoring for sound to be undertaken by person(s) responsible for excessive noise generation consistent with the period or duration the sound source(s) may be in operation or anticipated to be a nuisance.

5.0 Noise mapping

5.1 For the purpose of assessment and planning approval, noise mapping in the form of noise zones is usually required. Noise zones should clearly show sound level with respect to the location of the site and sound source(s).

5.2 Noise zones may be obtained and presented in sound level ranges of 5 dBA L_{Aeq} increment (for example 40-45 dBA, 45-50 dBA, etc.).

5.3 The mapping of noise zones without the influence of the noise source(s) under evaluation should be obtained, and compared with noise zones with the subsequent contribution of the above said noise source(s).

5.4 Detailed noise contours for further assessment may be required as and when necessary.

6.0 Record keeping

6.1 The following information should be recorded and kept for record purposes.

(a) The measured values of L_{Aeq} and, where appropriate $L_{pA,\ max}$ or $L_{10,}$ $L_{90,}$ together with details of the appropriate time periods.

(b) Details of the instrumentation and measurement methods used, including details of any sampling techniques, position of microphone(s) in relation to the site and system calibration data.

(c) Any factors that may have adversely affected the reliability or accuracy of the measurements.

(d) Plans of the site and neighbourhood showing position of plant, associated buildings and notes of site activities during monitoring period(s).

(e) Notes on weather conditions, including, where possible, wind speed/direction, temperature, relative humidity, presence of precipitation, etc.

ANNEX C

PROCEDURES FOR ASSESSMENT OF COMMUNITY ANNOYANCE RESPONSE

1.0 These procedures as prescribed herein are intended to assess sound with respect to community annoyance response, and are in general guided by the International Organisation for Standardisation ISO R 1996 Acoustics - "Assessment of Noise with Respect to Community Response".

2.0 The sound level of the offending sound source(s) shall be measured (or estimated as the case may be for a new project development, process or activity). The equivalent "A" weighted fast response sound level (L_{eq}) shall be used for quantifying the sound emission of the source. Normalisation for peak factor associated with impulsive sound, spectrum character for tonal content of the sound, and duration of the Table 1 shall be undertaken. The normalised sound level (as corrected for the characteristic features of the sound) yields the rating sound level (L_r).

3.0 The noise criterion of the receiver (community) shall be taken as the existing ambient sound level at the real property boundary of interest in the absence of the offending sound source(s) but shall include prevailing environmental noise sources prior to the introduction of the new sound source(s). The existing ambient sound level is defined as the mean minimum sound level at this location and time (in the absence of the noise which is alleged to be offending), and shall be taken as the ninety percentile (L_{90}) "A" weighted fast response level. The L_{90} levels for day time, night time (and evening time) period shall be so quantified.

4.0 Exceedance of the rating sound level (L_r) above the noise criterion (L_{90}) is computed as L_r-L_{90} dBA. This exceedance quantifies anticipated impact and community reaction to the offending sound source(s), and is tabulated in Table 2.

TABLE 1 - Corrections to the measured (or predicted) sound level in dB (A)

Characteristic features of the sound		**Correction dB(A)**
Peak factor	Impulsive noise (e.g. from piling)	+5
Spectrum character	Audible tone components present (e.g. whine)	+5
Duration of the sound as a percentage of the relevant time period	Between : 100 and 56 56 and 18 18 and 6 6 and 1.8 1.8 and 0.6 0.6 and 0.2 Less than 0.2	0 -5 -10 -15 -20 -25 -30

TABLE 2 - Anticipated community response to noise

Amount in dB(A) by which the rating sound level Lr exceeds the noise criterion	**Anticipated community response**	
	Impact	**Description**
0	None	No observed reaction
5	Little	Sporadic complaints
10	Medium	Widespread complaints
15	Strong	Threats of community action
20	Very Strong	Vigorous community action

ANNEX D

CODE OF PRACTICE TO MINIMISE NOISE DISTURBANCE

1.0 No person should unreasonably make, continue, or cause to be made or continued, any noise disturbance. Lawful non-commercial public speaking and public assembly activities conducted on any public space or public right-of-way are exempted.

2.0 In the context of these Guidelines, noise disturbance shall mean any sound which:

(i) endangers or injures the safety or health of human or animals; or

(ii) annoys or disturbs a reasonable person of normal sensitivities; or

(iii) endangers or intrudes onto personal or real property boundary; or

(iv) exceeds the existing ambient equivalent A-weighted sound level (L_{Aeq}) by 10 dBA during the day time, and/or 5 dBA during the night time; or

(v) exceeds the sound level limits as prescribed herein in these Guidelines.

3.0 Construction

Project Proponents or any other Person(s) should not operate or permit the operation of any tools or equipment used in construction, maintenance, or demolition work:

(a) Between the hours of 10.00 p.m. and 7.00 a.m. the following day on weekdays or at any time on weekends or public holidays, such that the sound therefrom creates a noise disturbance across a residential real property boundary or within a noise sensitive zone, except for emergency work of public service, and utilities.

(b) At any other time such that the sound level at or across real property boundary exceeds the stipulated maximum permissible sound levels as defined in the Second Schedule of Annex A for the daily period of operation.

(c) The use of low noise (and vibration) generation equipment, process or activity shall be required in noise sensitive areas.

(d) Procedures for noise control in accordance to BS 5228: Part 1 (Noise Control on Construction and Open Sites: Part 1 Code of Practice for Basic Information and Procedures for Noise Control) should be used.

4.0 Industrial Sites

(a) Project Proponents and any other Person(s) should not operate or permit the operation of equipment or facilities in an industrial site such that noise levels exceed the maximum permissible limits as prescribed in the Guidelines.

(b) Equipments or facilities located outdoor, exhaust, discharge vents, ventilation openings which generate excessive noise should be fitted with sound attenuators, enclosures or barriers as deemed appropriate.

5.0 Transportation

(a) Project Proponents of new highways, road re-development or expansion, and rail or transit trains system(s) should minimize noise intrusion to residential areas and noise sensitive premises with alignments offering the maximum possible buffer zones and/or natural shielding.

(b) In urban or suburban areas where a meaningful buffer zone is not possible, or/and when noise immission to affected receivers exceed maximum permissible limits as prescribed in the Guidelines the use of shielding (man made or natural barriers) may be required. Man made barriers should be aesthetically compatible with the surroundings.

6.0 Loudspeakers and Sound Reinforcement Systems

(a) Sound amplified system, public address system, or similar device should not be used between the hours of 10:00 p.m. and 7:00 a.m. the following day, such that the sound therefrom creates a noise disturbance across a residential real property boundary or within a noise sensitive zone.

(b) Sound amplified systems used in conjunction with mosques and other places of religious worship shall be exempted.

7.0 Radios, television sets, musical instruments and other devices

The operation or playing of any radio, television, phonograph, musical instrument, sound amplifier, or similar device which produces, reproduces, or amplifies sound should not be:

(a) in such a manner as to create a noise disturbance across a real property boundary or within a noise sensitive zone, except for activities open to the public and for which a permit has been issued by the appropriate licensing authority;

(b) in such a manner as to create a noise disturbance at 15 meters from such device, when operated in or on a motor vehicle on a public right-of-way or public space, or in a boat on public waters;

(c) in such a manner as to create a noise disturbance to any person other than the operator of the device, when operated by any passenger on a common carrier.

8.0 Entertainment noise

Person(s) who organise, or operate a business or permit the hosting of activities, within their private property or public right of way, should ensure that these activities would not create a noise disturbance from their entertainment and recreational activities which result in sound levels exceeding maximum permissible limits as prescribed in these Guidelines.

9.0 Street Vendors

The offer for sale, to purchase or sell anything by shouting or outcry within any residential or commercial area when licensed by the appropriate licensing authority should not be between the hours of 7.00 a.m. and 10.00 p.m., or in such a manner as to cause a noise disturbance.

10.0 Loading and unloading

Person(s) when licensed by the local authority should not load, unload, open, close or engage in activities related to other handling of goods, cargo, boxes, crates, containers, building materials, garbage or similar objects between the hours of 10.00 p.m. and 7.00 a.m. the following day, or in such a manner as not to cause a noise disturbance across a residential real property boundary or within a noise sensitive zone.

11.0 Stationary non-emergency signaling devices

(a) The sounding of any electronically-amplified signal from any stationary bell, chime, siren, whistle, or similar device, intended primarily for non-emergency purposes, from any place, should not be more than 5 minutes in any hourly period.

(b) Devices used in conjunction with places of religious worship are exempted.

12.0 Emergency signaling devices

(a) The sounding the outdoors of any fire, burglar, or civil defense alarm, siren, whistle or similar stationary emergency signaling device for testing, except for emergency purposes, should occur at the same time of day each time such a test is performed, but not before 8.00 a.m. or after 10.00 p.m. Any such testing should use only the minimum cycle test time. In no case should such test time exceed 60 seconds.

(b) The sounding of any exterior burglar or fire alarm or any motor vehicle burglar alarm should automatically terminate within 5 minutes of activation.

13.0 Explosives, firearms, and similar devices

Person(s) unless duly authorised by law or carrying out legitimate duties as an armed personnel should not use or fire explosives, firearms, or similar devices which create impulsive sound so as to cause a noise disturbance across a real property boundary or on a public space or right-of-way.

14.0 Domestic power tools

The operation of any mechanically powered, or otherwise, saw, drill, sander, grinder, lawn or garden tool, or similar device used outdoors in residential areas should not be between the hours of 10.00 p.m. and 7.00 a.m. the following day, or cause a noise disturbance across a residential real property boundary.

15.0 Vehicle or motorboat repairs and testing

Activities relating to the repair, rebuilding, modification or testing any motor vehicle, motorcycle, or motorboat should not cause a noise disturbance across a residential real property boundary or within a noise sensitive zone.

16.0 Low frequency noise

(a) Project Proponent or industrial plant operators should not operate or cause to be operated on private property any source of sound in such a manner as to create a low frequency noise disturbance.

(b) A low frequency noise disturbance is deemed to occur if the sound immission level measured at the real property boundary with a linear (non-weighted) scale exceeds the "A"-weighted scale level by 30 dB or more.

ANNEX E

STATUTORY INSTRUMENTS, STANDARDS AND OTHER GUIDANCE

1.0 The Environmental Quality Act

Under the Environmental Quality Act, 1974 (Amendment), 1985, there are several provisions that could be utilized to control and abate the noise pollution problems. The following are statements of the Environmental Quality Act, 1974.

(a) Section 21

The Minister, after consultation with the Council, may specify the acceptable conditions for the emission of noise into any area, segment or element of the environment and may set aside any area, segment or element of the environment within which the emission is prohibited or restricted.

(b) Section 23

1. No person shall, unless licensed, emit or cause or permit to be emittedany noise greater in volume, intensity or quality in contravention of the acceptable conditions specified under section 21.

2. Any person who contravenes subsection (1) shall be guilty of an offence and shall be liable to a fine not exceeding five thousand ringgit or to imprisonment for a period not exceeding one year or to both and to a further fine not exceeding five hundred ringgit a day for everyday that the offences is continued after a notice by the Director General requiring him to cease the act specified therein has been served upon him.

(c) Section 48A

The Director General or any other officer duly authorized by him, has the power to test and prohibit use of vehicle.

(d) Section 51

The Minister after consultation with the Council may make regulations for or with respect to:

(f) prohibiting the use of any equipment, facility, vehicle, or ship capable of causing pollution or regulating the construction, installation or operation thereof so as to prevent or minimize pollution, and

(j) defining objectionable noise and prescribing standards for tolerable noise.

(e) Environmental Quality (Motor Vehicle Noise) Regulation, 1987

This regulation stipulates permissible noise emission from motor vehicles as measured in accordance to procedures stated here in the regulations.

2.0 Guidelines for Siting and Zoning of Industries by Department of Environment Malaysia

The existing guidelines only give daytime and night-time noise limits based on maximum sound levels according to category of industries. This is insufficient because internationally accepted noise indices being used worldwide are based on A-weighted continuous equivalent sound level, L_{Aeq}.

3.0 Local Government Act 1976

The Local Government Act 1976 and the various Town Board Enactment also contain provisions enabling due action to be taken against, including prosecution of owners or occupiers of premises, whether public or private, emitting noise that are deemed to be a nuisance. For the purpose of quantifying the acceptable noise levels, limits based on the best judgment of these Authorities had been used. Noise limits to be used by these Authorities could now be base on these Guidelines.

4.0 Minor Offences Ordinance 1953

Minor Offences Ordinance 1953 prohibits noise after 11.00 p.m., and the police are empowered to act forthwith on complains. Annoyance and nuisance could be assessed based on procedures presented in this guideline.

5.0 Civil Aviation Act 1969

Under the Civil Aviation Act, aircraft and airport authorities are absolved from paying compensation for nuisance noise only if the aircraft and airport authorities are operated in conformance with international civil aviation procedures.

6.0 The Factories and Machinery (Noise Exposure) Regulations 1989

The Regulations came into force on February 1, 1989. It was formulated under the Factories and Machinery Act, 1967, aimed at minimizing workers exposure to noise in their working environment. These Regulations stipulate maximum allowable noise limits in the workplace, and worker's allowable noise exposure dosage.

7.0 ISO 1996 – Assessment of Environmental Noise

7.1 ISO 1996 "Acoustics – Description and Measurement of Environmental Noise" is a central standard within environmental noise assessment, acting as a reference work on the subject. It is divided into 3 parts:

(i) ISO 1996 Part 1 1982: Basic quantities and procedures

(ii) ISO 1996 Part 2 1987: Acquisition of data pertinent to land use (amended 1998)

(iii) ISO 1996 Part 3 1987: Application to noise limits

7.2 It defines the basic terminology including the central Rating Level parameter and describes best practices for assessing environmental noise.

8.0 ISO 9613 – Prediction of Environmental Noise

8.1 ISO 9613 "Acoustics – Attenuation of Sound during Propagation Outdoors" is divided into 2 parts:

(i) ISO 9613 Part 1 1993: Calculation of the absorption of sound by the atmosphere

(ii) ISO 9613 Part 2 1996: General method of calculation

8.2 It defines an octave-based calculation method based on point sources with a defined sound power level. Line sources can be built up with point sources.

9.0 BS 5228: Part 1 1984

9.1 Noise control on construction and open sites. Part 1: Code of practice for basic information and procedures for noise control.

9.2 BS 5228 Part 1 gives recommendations for basic methods of noise control relating to construction sites and other open sites where having work activities and operation are carried out.

GLOSSARY

"commercial area/zone" means designated area/zone as approved or gazetted by the local authority under the relevant act, regulations, rules and by-laws made thereunder for the purpose of business, trading, financial, commercial and other similar activities.

"community" means the body of people gathered or living in the same locality.

"construction" means any site preparation, assembly, erection, substantial repair, alteration, refurbishment, renovation or similar action, but excluding demolition, for or of public or private rights of-way, structures, utilities or similar property.

"dB (A)" means the decibel unit of measurement of sound level corrected to the "A" weighted scale.

"decibel (dB)" means a unit of measurement of sound level equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure of 20 micropascals.

"demolition" means any dismantling, intentional destruction or removal of structures, utilities, public or private right-of-way surfaces, or similar property.

"emergency work" means any work performed for the purpose of preventing or alleviating the physical trauma or property damage threatened or caused by an emergency.

"equivalent A-weighted sound level (L_{Aeq})" means the constant sound level that, in a given situation and time period, conveys the same sound energy as the actual time-varying A-weighted sound. For the purpose of these Guidelines, the day time L_{Aeq} is the equivalent A-weighted sound level for the day time period of 7.00 am to 10.00 pm (0700 to 2200 hours) and the night time L_{Aeq} is the equivalent A-weighted sound level for the night time period of 10.00 pm to 7.00 am (2200 to 0700 hours).

"impulsive sound" means sound of short duration, usually less than one second, with an abrupt onset and rapid decay. Examples of sources of impulsive sound are explosions, drop hammer or driven impacts, and the discharge of firearms.

"industrial area" means a designated area as approved or gazetted by the local authority for the purpose of sitingindustrial, manufacturing or processing plants, factories or facilities.

"licensing authority" means the local authority or state agencies or agents of the State that grants licence, approval or similar permission for a specific activity.

"local authority" means the local planning authorities, agencies, or agents of the State as defined in the Town and Country Planning Act, 1976 and such rules, regulations and by-laws made thereunder. These include City Halls, City Councils, Municipal Councils, Town Council and District Councils.

"mixed development area" means designated area as approved or gazetted by the local authority under the relevant act, regulations, rules and by-laws made thereunder, permitting business, commercial, trading or similar activities, together with residential uses.

"noise sensitive area or zone" means low density residential areas, schools, hospitals, and nursing homes, places of worship, religious buildings and courts of law.

"pure tone" means any sound which can be distinctly heard as a single pitch or a set of single pitches. A pure tone exist if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the sound pressure levels of the two contiguous one-third octave bands by 5 dB for centre frequencies of 500 Hz and above, and by 8 dB for centre frequencies between 160 and 400 Hz, and by 15 dB for centre frequencies less than or equal to 125 Hz.

"real property boundary" means an imaginary line along the ground surface, and its vertical extension, which separates the real property owned by one person from that owned by another person, but not including intra-building real property divisions, as delineated in the land title appearing in the Certificate of Title.

"residential area" means a designated area as approved or gazetted by the local authority for the purpose of human dwellings and residence. "low density residential areas" is defined as areas with a population of less than 75 persons per acre;"suburban residential (medium density) areas" is defined as areas with a population of 75 to 200 persons per acre; and "urban residential (highdensity) areas" is defined as areas with a population exceeding 200 persons per acre.

"rms sound pressure" means the square root of the time averaged square of the sound pressure, denoted as P_{rms}.

"sound attenuator" or **"sound dissipative device"** means an acoustic filtering device for the attenuation of sound energy for airborne sound as transmitted to the atmosphere or surroundings of an equipment or sound source; such as muffler as used for engines exhausts, and silencer for air distribution equipment or enclosures.

"sound emission" means sound as emitted or discharged from a sound source(s).

"sound immission" means sound as propagated onto and received by a receiver from source(s) external to the receiver or real property boundary.

"sound level" means the weighted sound pressure level obtained by the use of a sound level meter and frequency weighting network, such as A, B, or C as specified for sound level meters. If the frequency weighting employed is not indicated, the linear non-weighting level shall apply.

"sound pressure level" means 20 times the logarithm to the base 10 of the ratio of the RMS sound pressure to the reference pressure of 20 micropascals. The sound pressure level is denoted Lp or SPL and is expressed in decibels.

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APPENDIX 7

GUIDELINES FOR NOISE LABELING AND EMISSION LIMITS OF OUTDOOR SOURCES

Guidelines for Noise Labeling and Emission Limits of Outdoor Sources (Book 2 of 3) published by Department of Environment, Ministry of Natural Resources and Environment Malaysia.

The guideline provides an overview as listed below:

1. Scope
2. Purpose
3. Legislative Background
4. Use of Noise Labeling Information
5. Noise Emission Limits
6. Noise Labeling
7. Measurement Procedures

Annaxes :

1. Schedule of Permissible Sound Emission Levels
2. Noise Label Stating the Sound Power Aand Sound Pressure Level
3. Supplementary Notes on Measurement Conditions for Specific Machines
4. Method to Determine Airborne Sound Emission of Outdoor Noise Sources (Piling Operations and Sound Reinforcement Systems)
5. Statutory Instruments, Standards and Other Guidance

GUIDELINES
FOR

BOOK 2 OF 3

Noise Labeling and Emission Limits of Outdoor Sources

Department of Environment
Ministry of Natural Resources and Environment
Malaysia

APPENDIX 7

FOREWORD

The Department of Environment hereby published 3 sets of documents to provide guidance on acceptable noise limits for various types of land use and human activities. ***The Planning Guidelines for Environmental Noise Limits and Control*** provide noise acceptance criteria for quantitative assessment of noise to define disturbance or otherwise. ***The Guidelines for Noise Labeling and Emission Limits of Outdoor Sources*** prescribes comprehensive methodology to measure and report noise emission from outdoor sources. ***The Planning Guidelines for Vibration Limits and Control*** gives vibration acceptance criteria for quantitative assessment of vibration.

It is hoped that these document could serve as useful guide to planners and decision makers at the state and local level as well as other organization, bodies and agencies involved or having responsibilities in the design and/or approval of town planing, infrastructure development, etc. so as to reduce the potential impact of noise affecting public health or causing annoyance or disturbance. Continuing efforts to improve the content and structures of these guidelines based upon feedback from users will be made from time to time.

In the publication of these documents, I would like with sincere appreciation to acknowledge the valuable expert contribution of the University of Technology Malaysia, in particular Prof. Dr. Mohd Salman Leong Bin Abdullah, the relevant agencies and all individuals in providing the necessary and relevant inputs, comments and recommendations towards the successful completion of the documents.

DATO' HAJAH ROSNANI IBARAHIM
Director General
Department of Environment,
Malaysia

Department of Environment Malaysia

THE GUIDELINES FOR NOISE LABELING AND EMISSION LIMITS OF OUTDOOR SOURCES

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LIST OF ANNEXES

1.0 Scope

1.1 This document presents guidance and recommendations for

(a) specifying noise emission levels and noise labeling requirements;

(b) procedures for measurement and labeling of noise emission of outdoor noise sources; and

(c) noise parameters for the description of noise emission of outdoor noise sources.

1.2 For the purpose of these Guidelines, definitions used are consistent with those given in ISO 3740:1980, ISO 3746: 1979, ISO 3744: 1994, ISO 7574-3: 1985, and the European Community Council Directives on noise labeling. A glossary of definitions is also included in this document.

1.3 These Guidelines present a comprehensive and unambiguous manner upon which noise emission from outdoor noise sources could be measured and reported.

2.0 Purpose

2.1 The purposes of these guidelines are:

(a) to present a uniform method in the measurement and labeling of outdoor noise sources; and

(b) to prescribe recommended maximum permissible sound emission levels for a variety of outdoor noise sources for the protection of the public from excessive noise.

3.0 Legislative Background

3.1 Section 23 under the Environmental Quality Act 1974 stipulates that: *"No person shall, unless licensed, emit or cause or permit to be emitted any noise greater in volume, intensity or quality in contravention of the acceptable conditions specified under Section 21."*

3.2 The Environmental Quality (Motor Vehicle Noise) Regulation 1987 of the Environmental Quality Act 1974 stipulates permissible noise emission from motor vehicles, and procedures for the measurement of such noise emission.

3.3 The Department of Environment in these Guidelines present recommendations upon which acceptable noise emission limits and noise labeling could be specified for outdoor noise sources. These noise sources are for construction and industrial equipment commonly used outdoors. Sound emission from outdoor sound systems is also included. Noise emission from motor vehicles are however not included here as this is enforced under the Motor Vehicle Noise Regulation 1987.

3.4 Prior to the guidelines as presented here, acceptable noise limits at the property boundary are recommended for generator sets in the "Guidelines an Application for Permission to Install Generator Sets". These Guidelines herein, and the Planning Guidelines For Environmental Noise Limits and Control supercede noise limits set in the above document.

4.0 Use of Noise Labeling Information

4.1 Noise labeling information is used to:

(i) caution project proponents and/or users and purchasers about the noise emission level of equipment and outdoor work activities, and help them to compare or select quieter machines;

(ii) enable project proponents and users of machines or originator of activities to plan noise control strategies including plant layout, to protect the general public and workers against exposure to excessive noise;

(iii) give advance notice to project proponent and users of machine that noise level in the environment should be monitored when new machines or equipment are introduced; and

(iv) warn machines operators that they may be exposed to excessive noise, and hence should wear hearing protectors.

4.2 The intention of defining an acceptable noise emission limit is to:

(i) control excessive noise generation at source for the protection of the public from excessive noise pollution;

(ii) encourage the use of quieter machines and/or implement noise reduction measures on outdoor noise source.

5.0 Noise Emission Limits

5.1 Noise emission limits may be set based on either of the following, depending on the type of noise source:

(a) an absolute limit based on the sound power levels of the machine or equipment;

(b) an absolute limit based on the sound pressure levels of the activity or work process measured at a receptor location.

5.2 The recommended maximum permissible sound emission levels for various noise sources are given in Annex A.

5.3 The recommended maximum sound power level of airborne noise for power generators, as measured in accordance to procedures set out in these Guidelines should not exceed levels as prescribed in Schedule 1.

5.4 The recommended maximum sound power level of airborne noise for excavators, dozers and loaders, as measured in accordance to procedures set out in these Guidelines should not exceed levels as prescribed in Schedule 2.

5.5 The recommended maximum sound power level of airborne noise for powered hand held concrete breakers and picks, as measured in accordance to procedures set out in these Guidelines should not exceed levels as prescribed in Schedule 3.

5.6 The recommended maximum sound power level of airborne noise for compressors, as measured in accordance to procedures set out in these Guidelines should not exceed levels as prescribed in Schedule 4.

5.7 The recommended maximum sound power level of airborne noise for tower cranes, as measured in accordance to procedures set out in these Guidelines should not exceed levels as prescribed in Schedule 5.

5.8 The recommended maximum sound power level of airborne noise for welding generators, as measured in accordance to procedures set out in these Guidelines should not exceed levels as prescribed in Schedule 6.

5.9 The recommended maximum sound power level of airborne noise for cooling towers, as measured in accordance to procedures set out in these Guidelines should not exceed levels as prescribed in Schedule 7.

5.10 The recommended maximum sound pressure level of airborne noise for piling operations as measured in accordance to procedures set out in these Guidelines should not exceed environmental noise levels as prescribed in Schedule 8.

5.11 The maximum permissible sound pressure levels for sound reinforcement systems operated outdoors, typically for outdoor concerts, cultural or musical performances, stage shows and theme parks as measured under the conditions set out in these Guidelines should not exceed levels as prescribed in Schedule 9 at the stipulated measurement locations.

5.12 Sound power levels of equipment, not stipulated herein in these Guidelines under Schedule 1 to 8 used outdoors in residential or noise sensitive areas should not result in sound pressure levels at the real property boundary exceeding the recommended maximum permissible levels given in the Planning Guidelines for Environmental Noise Limits and Control.

5.13 This in particular relates to all types of industrial and domestic fans, blowers, air conditioning, and condensing units. Lawn mowers and other household appliances are exempted from these Guidelines.

6.0 Noise Labeling

6.1 Machine tested in accordance with the guidelines prescribed herein should bear a clear and permanent mark (label) indicating the sound power level, in dB (A) referenced to 1 pW, guaranteed by the manufacturer, assembler, distributor and supplier of the machine. An example of a suitable and recommended label is given in Annex B.

6.2 The Department of Environment strongly encourages person(s) manufacturing, assembling, distributing, selling and hiring construction and industrial equipment, and any other machines used outdoors to conduct sound emission measurements, and to label the sound emission in accordance to these Guidelines.

6.3 The Department of Environment under its condition of the EIA Approval may at its sole discretion require project proponents and/or person(s) using construction and industrial equipment, and other machines used outdoors to comply with maximum permissible sound emission levels as recommended in the Guideline.

6.4 The Department of Environment may also require that such sound emission measurements be carried out by an independent testing authority at the costs of project proponent or person(s) responsible.

6.5 Local authority may require organizers, promoters or owners of concerts, outdoor performances, theme parks and other outdoor activities with sound reinforcement systems, as a condition in its granting of license(s) for such activities, to comply with maximum permissible sound pressure levels as recommended in Schedule 9. The local Authority may further require these organizers, promoters or owners to conduct sound emission measurements at their own costs by an independent testing authority.

7.0 Measurement Procedures

7.1 The determination of sound power levels, as required in the noise labeling, shall in general be undertaken in accordance to recommendations of:

a) ISO 3740: 1980 Acoustics – Determination of sound power levels of noise sources – Guidelines for the use of basic standards and for the preparation of noise test codes.

b) ISO 3744: 1994 Acoustics – Determination of sound power levels of noise sources using sound pressure – Engineering method in an essentially free field over a reflecting plane.

c) ISO 3746: 1995 Acoustics – Determination of sound power levels of noise sources using sound pressure – Survey method using an enveloping measurement surface over a reflecting plane.

7.2 Sound power levels determination in accordance to ISO 3744 (engineering method) is recommended for noise labeling purpose. Sound power levels determined in accordance to ISO 3745 (precision method) is equally acceptable.

7.3 The verification of sound power levels at site may be undertaken in accordance to ISO 3746 (survey method).

7.4 Further guidance and reference to any other available ISO standards that are specific for selected machines and equipment may be necessary. A list of such current ISO standards (relating to outdoor or industrial noise sources) is listed in Annex E.

7.5 Additional supplementary notes on operating conditions and references to European Community Council Directives for specific machines or equipment are given in Annex C.

7.6 Sound measurement instrumentations, acoustic qualification tests of the testing environment, and accuracy of test results shall be guided by the relevant ISO Acoustic Standards as listed in Paragraph 25 above.

7.7 Sound pressure level measurements for piling operations shall be undertaken in accordance procedures given in Annex D, and supplementary notes attached therein.

7.8 Sound pressure level measurements for sound reinforcement systems applicable for outdoor concerts, performance, stage and theme parks shall be undertaken in accordance to procedures given in Annex D, and supplementary notes attached therein.

ANNEX A
SCHEDULE OF PERMISSIBLE SOUND EMISSION LEVELS

SCHEDULE 1

MAXIMUM PERMISSIBLE SOUND POWER LEVELS OF POWER GENERATORS

Electric power (kVA)	Sound power level in dB (A)/1 pW
P ≤ 2 kVA	102
2 kVA < P ≤ 8 kVA	100
8 kVA < P ≤ 240 kVA	100
P > 240 kVA	100

SCHEDULE 2

MAXIMUM PERMISSIBLE SOUND POWER LEVELS OF EXCAVATORS, DOZERS AND LOADERS

Net installed power in kW	Sound-power level in dB (A)/1pW
≤ 70	106
> 70 ≤ 160	108
>160 ≤ 350	
>350	118
- hydraulic and rope-operated excavators	112
- other earth-moving machines	113

SCHEDULE 3

MAXIMUM PERMISSIBLE SOUND POWER LEVELS OF POWERED HAND HELD CONCRETE BREAKERS AND PICKS

Mass of appliance (m) in kg	Sound-power level in dB (A)/1pW
m < 20 kg	108
20 kg ≤ m ≤ 35 kg	111
m > 35 kg	114
and appliance with an internal-combustion engine incorporated	

SCHEDULE 4

MAXIMUM PERMISSIBLE SOUND POWER LEVELS OF COMPRESSORS

Standardised nominal air flow Q in m^3/min	Sound-power level in dB (A)/1pW
Q ≤ 5 kg	100
5 < Q ≤ 10	100
10 < Q ≤ 30	102
Q > 30	104

SCHEDULE 5

MAXIMUM PERMISSIBLE SOUND POWER LEVELS OF TOWER CRANES

	Sound-power level in dB (A)/1pW
Lifting mechanism	100
Energy generator	See Schedule 1 (power generators according to the power generated)
Assembly comprising lifting mechanism and energy generator	Highest values of the two components

SCHEDULE 6

MAXIMUM PERMISSIBLE SOUND POWER LEVELS OF WELDING GENERATORS

Nominal maximum welding current in amps (A)	Sound-power level in dB (A)/1pW
Not greater than 200 A	101
Greater than 200 A	100

SCHEDULE 7

MAXIMUM PERMISSIBLE SOUND POWER LEVELS OF COOLING TOWERS

Fan Power in kW	Sound-power level in dB(A)/1pW
< 60 kW	105
> 60 kW	108

SCHEDULE 8

MAXIMUM PERMISSIBLE SOUND PRESSURE LEVELS FROM PILING OPERATIONS

At Real Property Boundary. For Receiving Land Use Category	Noise Parameter	Sound Pressure Level (dBA)
Residential	L_{90}	60
	L_{10}	75
	L_{max}	90
Commercial	L_{90}	65
	L_{10}	75
Industrial	L_{90}	70
	L_{10}	80

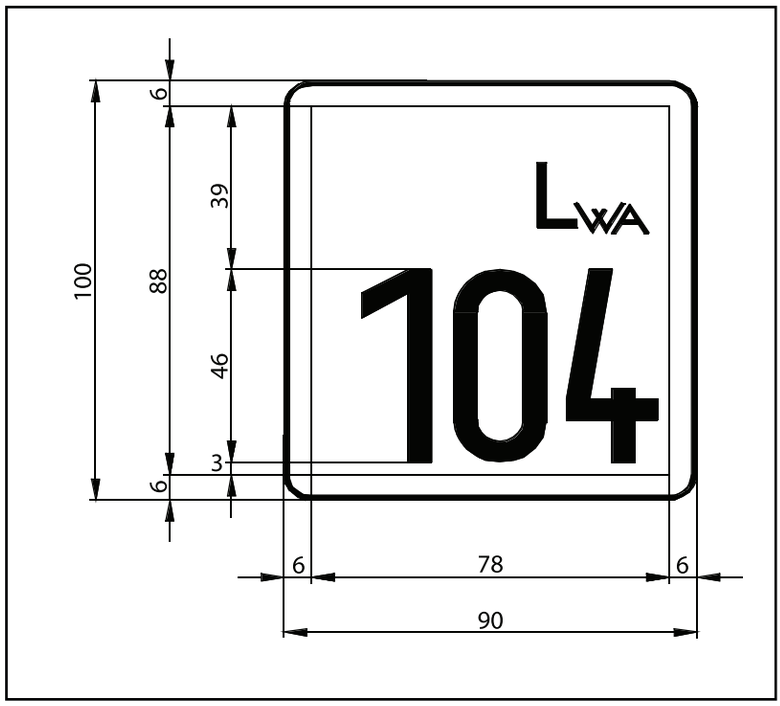
SCHEDULE 9

MAXIMUM PERMISSIBLE SOUND PRESSURE LEVELS FOR SOUND REINFORCEMENT SYSTEMS (APPLICABLE FOR OUTDOOR CONCERTS, PERFORMANCE, STAGE AND THEME PARKS)

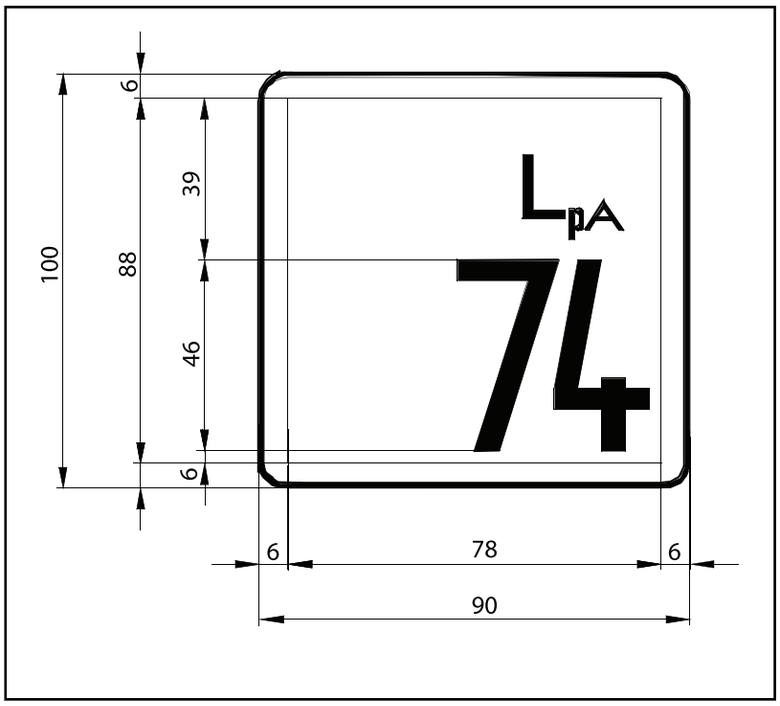
Location	Noise Parameter, dB (A)			
	L_{eq}	L_{10}	L_{90}	L_{max}
At Stage, Pavilion (At Source)	95	98	90	105
At Audience	85	88	80	95

ANNEX B

NOISE LABEL STATING THE SOUND POWER AND SOUND PRESSURE LEVEL



(a)Sound Power Level, dB (A)



(b)Sound Pressure Level, dB (A) at Machine Operator's position

ANNEX C

SUPPLEMENTARY NOTES ON MEASUREMENT CONDITIONS FOR SPECIFIC MACHINES

The acoustic parameter describing airborne sound emission of machines in these Guidelines is basically based on sound power levels. The determination of sound power levels shall generally be based on procedures laid out in the ISO standards, and in particular ISO 3740, ISO 3744 and ISO 3746. Supplementary procedures and/or provisions unique to specific machines may be appropriate to ensure uniformity of operating conditions upon which the sound power levels are rated. These procedures and/or provisions are described herein.

1.0 Power generators

(a) The power generator shall operate at a steady speed, with a current flow through a non-inductive resistance equal to three-quarters of the unit power load in kW defined on the basis of the nominal power in kVA, taking into account the power factor ($\cos \phi$).

Skid-mounted power generators shall be placed on supports 0.40m high, unless otherwise required by the manufacturer's conditions of installations.

(b) Additional guidance is given in the European Community Council Directive84/536/EEC.

2.0 Excavators, dozers, loaders

(a) Sound power determination of earth moving equipment shall be guided by ISO 6393, ISO 6394 and ISO 6395, and the European Community Council Directive 86/662/EEC.

(b) In the event that airborne noise emissions under conventional working conditions are required, the dynamic test method of measurements is preferred (ISO 6395, ISO 6396, and Annex II of Directive 86/662/EEC).

3.0 Powered hand held concrete breakers and picks

(a) The concrete breakers and picks shall be fitted out for normal use coupled during the test to a tool embedded in a cube-shaped concrete block placed in a concretepit sunk into the ground. This concrete test block characteristics, supports of the concrete breakers and picks shall be in accordance to Annex 1 of Directive 84/537/EEC.

The compressor supplying compressed air to the concrete breakers and picks shall be acoustically shielded; and the noise emission of the compressor separately rated as prescribed in this regulation (see Item 4(a) of this Section below).

(b) Additional guidance is given in European Community Council Directive 84/537/EEC.

4.0 Compressors

(a) During testing, no tools shall be coupled to the compressor At each measuring point, the noise level of release and escape of air from the external lines coupled to the air outlet valves of compressors shall be more than 10 dB lower than the noise level of the compressor.

(b) Air volume flow rate of the compressor shall be measured by means of circular air venturi nozzles under critical flow conditions as prescribed in Annex 1 of Directive 84/533/EC. Alternative air volume flow rate measurement methods with a ± 2.5% accuracy are also acceptable.

(c) Additional guidance is given in European Community Council Directive 84/533/EEC.

5.0 Tower Cranes

(a) Measurements shall be carried out at ground level. The measuring surface to be used for the ground-level test shall be a hemisphere. The centre of the hemisphere shall be the vertical projection on the flat reflecting surface of the geometric centre of the frame of the lifting mechanism of the energy generator or of the two combined.

(b) Additional guidance is given in European Community Council Directive 84/534/EEC.

6.0 Welding generators

(a) The welding generator shall operate in accordance to manufacturer's recommendations and recommendation laid down is ISO/R700-1968 at its nominal speed producing the nominal welding current through a resistance.

(b) Additional guidance is given in European Community Council Directive 84/535/EEC.

7.0 Cooling towers

(a) The measurement surface for sound power determination of cooling towers shall include measurement points for air intake and discharge.

(b) The cooling tower shall operate in accordance to manufacturer's recommendations at rated capacity of the cooling tower under load.

ANNEX D

METHOD TO DETERMINE AIRBORNE SOUND EMISSION OF OUTDOOR NOISE SOURCES (PILING OPERATIONS AND SOUND REINFORCEMENT SYSTEMS)

1.0 Purpose

The purpose of this procedure is to determine the sound emitted from piling operations and from all categories of sound reinforcement systems used outdoors.

2.0 Scope

(a) This method is applicable to any type of piling operations in construction sites, etc., and from sound electronically amplified or reproduced from musical instruments, human voice and other sound reproduction materials.

(b) Due to the diversely different nature of the above noise sources, supplementary notes are given for measuring conditions specific for the noise source.

3.0 Measuring instruments

3.1 Measuring apparatus

(a) The measurement shall be made with a precision sound level meter which comply with the requirements of the IEC Publication 651, first edition 1979 or thereafter, for the type of meters in Class 1.

(b) If, for any measurement, instruments other than a precision sound level meter or combinations of instruments, such as integrators are used, all the specifications of such instruments shall comply with the relevant requirements of IEC Publication 651, first edition 1979. Use of a microphone with cable shall comply with IEC Publication 651, first edition 1979, and calibrated for free field measurement.

3.2 Inspection of the measuring apparatus

(a) Before the tests, the acoustic properties of the entire apparatus (measuring instruments including microphone and cable) shall be checked by means of calibrated sound source with an accuracy of at least 0.5 dB (e.g. a piston phone). The apparatus shall be checked again immediately after each series measurements.

3.3 Weighting network

(a) Use shall be made of an A-weighting network meeting the requirements of IEC publication 179, 1973, second edition, or thereafter.

(b) The above on-the-spot checks shall be supplemented by more thorough calibrations to be carried out at least once a year in a specially equipped laboratory or standards institution (e.g. SIRIM).

3.4 Statistical analysis

The sound level meter or combinations of instruments, such as real time analysers, shall be fitted with statistical analysis functions to derive statistical centile sound pressure levels (ten percentile level L_{10}, ninety percentile level L_{90}), the maximum instantaneous sound pressure level L_{max}, and equivalent sound pressure level L_{Aeq} over the prescribed measuring time period.

4.0 Measuring condition for sound emissions from piling operations

4.1 Piling operations

(a) Measurements shall be undertaken for the duration of the piling operation of a single pile length under worst case conditions of ground penetration rated at the operational impact energy per blow fitted with the operational dolly.

(b) Measurements shall be repeated to cover different soil conditions and/or source receiver distances.

4.2 Measurement site

Measurements for operations from piling machines shall be carried out at ground level at the real property boundary of the receiver.

5.0 Measuring conditions for sound emission from sound reinforcement systems

5.1 Operation of all loudspeakers and sound amplification equipment

(a) With an intent of evaluating actual operational conditions, all sound amplification equipment shall be operational, and all loudspeakers activated (i.e. patched into the sound reinforcement system).

(b) The entire sound reinforcement system(s) which forms the integral sound sources to be tested shall be operated with the actual operation media of sound reproduction or reinforcement (i.e. live band music, human voice, pre-recorded media, etc. as the case may be).

(c) All electronic gain control settings (sound intensity, volume control etc.) of the power amplifiers, mixing consoles, line outputs, etc. shall be at the full operational levels.

(d) The sound sources (loudspeakers clusters, stage frontal loudspeakers, monitor speakers, etc.) shall be installed in its normal operational location and orientation on site.

(e) The results of a measurement shall be valid only for the combination tested.

5.2 Measurement locations

Measurements shall be undertaken at the stage, pavilion and source location, including main loudspeaker clusters (at distance not less 3 metre); and at the audience or public areas (as the case may be).

6.0 Measurement

6.1 Measurement of the acoustic properties of the measuring site

The environment conditions at the measuring site shall be checked before measurements are carried out. The following factors shall be checked:

(a) extraneous and other activity noise unrelated to the noise source of interest;

(b) wind interference;

(c) operating conditions such as temperature, humidity, barometric pressure.

Corrections for extraneous noise shall be undertaken if and only if this noise is deemed not representative of the site (for example construction activities).

6.2 Measurement of sound pressure levels (L_{Aeq}, L_{max}, L_{10}, L_{90})

(a) Continuous noise monitoring of the sound emissions of the noise source over the complete duration of the sound source generation shall be undertaken. For practical convenience, monitoring in regular time period segments (e.g. hourly segments repeated over different time period) is also acceptable.

(b) Statistical analysis of the instantaneous sound pressure levels over the monitoring period shall be undertaken to obtain the statistical centile levels of L_{10} (ten percentile level) and L_{90} (ninety percentile level). The maximum instantaneous level L_{max} over the monitoring period shall also be noted.

(c) The equivalent A weighted sound pressure level L_{Aeq} over the monitoring time period shall also be measured.

7.0 Data to be reported

The following information shall be compiled and recorded in a report concerning all measurements made with respect to these Guidelines.

7.1 Sound sources under test

(a) Piling operations
-Description of piling method or system, and/or type of piles;
-Pile depth(s) for which noise levels were measured; and
-Soil condition.

(b) Sound Reinforcement System
-Description of the sound reinforcement system under test, including rated power output of sound amplification devices, and loudspeaker ratings;
-Operating conditions of the sound reinforcement systems (gain control settings, line inputs - voice, music, live band, etc.);
-Location and elevation of sound sources (loudspeakers, including remote distributed loudspeakers) and its proximity to adjoining properties.

7.2 Acoustic environment

(a) Description of the measuring site; diagram showing the location of sound sources and any reflecting or screening surfaces on the measuring site;

(b) Meteorological conditions.

7.3 Instrumentation

(a) Equipment used for the measurements, including the name of the equipment, type, serial number and name of manufacturer;

(b) Method used to calibrate the measuring equipment in accordance with 3.2.

7.4 Acoustic data

(a) Equivalent "A" weighted sound pressure level (L_{Aeq}) for the time period of measurement;

(b) A-weighted statistical centile levels L_{10} and L_{90} the time period of measurement;

(c) Maximum instantaneous sound pressure level (L_{max}) for the time period of measurement;

(d) Measurement time duration.

ANNEX E

STATUTORY INSTRUMENTS, STANDARDS AND OTHER GUIDANCE

1.0 Statutory instruments

Environmental Quality Act 1974.

2.0 ISO Standards

(a) ISO 1680–1:1986 Acoustics – Test code for the measurement of airborne noise emitted by rotating electrical machinery – Part 1: Engineering method for free-field conditions over a reflecting plane

(b) ISO 1680–2:1986 Acoustics – Test code for the measurement of airborne noise emitted by rotating electrical machinery – Part 2: Survey method

(c) ISO 2151:1972 Measurement of airborne noise emitted by compressor/prime mover-units intended for outdoor use (To be replaced by future ISO 3989 of TC 43)

(d) ISO 4412–1:1991 Hydraulic fluid power – Test code for determination of airborne noise levels – Part 1: Pumps

(e) ISO 4412-2: 1991 Hydraulic fluid power – Test code for determination of airborne noise levels – Part 2: Motors

(f) ISO 4412-3: 1991 Hydraulic fluid power – Test code for determination of airborne noise levels – Part 3: Pumps – Method using a parallelepiped microphone array

(g) ISO 4872:1978 Acoustics – Measurement of airborne noise emitted by construction equipment intended for outdoor use – Method for determining compliance with noise limits

(h) ISO 5131:1983 Acoustics – Tractors and machinery for agriculture and forestry – Measurement of noise at the operator's position – Survey method

(i) ISO/DIS 5131 Acoustics – Tractors and machinery for agriculture and forestry – Measurement of noise at the operator's position – Survey method (Revision of ISO 5131:1982)

(j) ISO 6191:1988 Acoustics – Measurement of sound pressure levels of gas turbine installations for evaluating environmental noise – Survey method

(k) ISO 6393:1985 Acoustics – Measurement of airborne noise emitted by earth-moving machinery – Method for determining compliance with limits for exterior noise – Stationary test condition

(l) ISO 6394:1985 Acoustics – Measurement of airborne noise emitted by earth-moving machinery – Operator's position – Stationary test condition

(m) ISO/DIS 6394 Acoustics – Measurement at the operator's position of noise emitted by earth-moving machinery – Stationary test conditions

(n) ISO 6395:1988 Acoustics – Measurement of exterior noise emitted by earth-moving machinery – Dynamic test conditions

(o) ISO 6396:1992 Acoustics – Measurement at the operator's position of noise emitted by earth-moving machinery – Dynamic test conditions

(p) ISO 6798:1995 Reciprocating internal combustion engines – Measurement of emitted airborne noise – Engineering method and survey method

(q) ISO 7182:1984 Acoustics – Measurement at the operator's position of airborne noise emitted by chain saws

(r) ISO 7216:1992 Acoustics – Agricultural and forestry wheeled tractors and self-propelled machines – Measurement of noise emitted when in motion

(s) ISO 7917:1987 Acoustics – Measurement at the operator's position of airborne noise emitted by brush saws.

(t) ISO/DIS 8528 – 10 Reciprocating internal combustion engine driven alternating current generating sets – Part 10: measurement of airborne noise by the enveloping surface method

(u) ISO 9207:1995 Manually portable chain-saws with internal combustion engine – Determination of sound levels – Engineering method (grade 2)

(v) ISO/DIS 10302 Acoustics – Method for the measurement of airborne noise emitted by small air-moving devices

(w) ISO 10494:1993 Gas turbines and gas turbines sets – Measurement of emitted airborne noise – Engineering/survey method

(x) ISO 10884:1995 Manually portable brush-cutters and grass-trimmers with internal combustion engine – Determination of sound power levels – Engineering method (Grade 2)

(y) ISO 11094:1991 – Acoustics – Test code for the measurement of airborne noise emitted by power lawn movers, lawn tractors, lawn and garden tractors, professional mowers and lawn and garden tractors with mowing attachments]

3.0 EEC DIRECTIVES

(a) Council directive 78/1015/EEC of 19 December 1978 on the approximation of the laws of the Member States relating to the determination of the noise emission of construction plant and equipment.

(b) Council Directive 84/533/EEC of 17 September 1984 on the approximation of the laws of the Member States relating to the permissible sound power level of compressors.

(c) Council Directive 84/534/EEC of 17 September 1984 on the approximation of the laws of the Member States relating to the permissible sound power level of tower cranes.

(d) Council Directive 84/535/EEC of 17 September 1984 on the approximation of the laws of the Member States relating to the permissible sound power level of welding generators.

(e) Council Directive 84/536/EEC of 17 September 1984 on the approximation of the laws of the Members States relating to the permissible sound power level of power generators.

(f) Council Directive 84/537/EEC of 17 September 1984 on the approximation of the laws of the Member States relating to the permissible sound power level of powered hand-held concrete-breakers and picks.

(g) Council Directive 84/538/EEC of 17 September 1984 on the approximation of the laws of the Member States relating to the permissible sound power level of lawnmowers.

(h) Council Directive 86/594/EEC of 1 December 1986 on airborne noise emitted by household appliances.

(i) Council Directive 86/662/EEC of 22 December 1986 on the limitation of noise emitted by hydraulic excavators, rope-operated excavators, dozers, loaders and excavator-loaders.

GLOSSARY

"airborne noise emission"
means the "A"-weighted sound power level, L_{WA}, or SWL, emitted by the noise source expressed in decibels (dB) with reference to the sound power of one picowatt (1pW), and transmitted by the air.

"background noise"
means any noise recorded at the measuring points which are not generated by the sound source.

"compressor"
means any motor-driven device for circulating and compressing air other than the following two categories of device: fans, i.e. devices producing air circulation at a positive pressure of not more than 1.1 atmospheric pressure; and vacuum pumps, i.e. devices or appliances for extracting air from an enclosed space at a pressure not exceeding atmospheric pressure.

"dozers"
means self-propelled wheeled or crawler machines fitted in front with a blade which serves primarily to displace or spread materials.

"equivalent A-weighted sound level (L_{Aeq})"
means the constant sound level that, in a given situation and time period, conveys the same sound energy as the actual time-varying A-weighted sound.

"excavator"
(hydraulic or rope-operated) means machine combining a self-propelled undercarriage with an upper structure which can swivel through more than 360°. The machine excavates lifts, carries and dumps material by moving a boom, an arm and bucket (as is the case with a face shovel or a backhoe) or a bucket controlled by the winding gear (as is the case with a drag-line or a clamshell).

"excavator-loader"
means self-propelled wheeled or crawler machine, designed to be fitted with a loading bucket at the front and an excavating arm at the rear as original equipment. The loading bucket loads, raises, transports and dumps material by combining its own movements with those of the machine. The excavating arm excavates raises and dumps material by movements of the boom, arm and bucket.

"extraneous noise"
means the noise resulting from background noise and parasitic noise.

"household appliance"
means any machine, portion of a machine or installation manufactured principally for use in dwellings, including cellars, garages and other outbuildings, in particular household appliances for upkeep, cleaning purposes, preparation and storage of foodstuffs, production and distribution of heat and cold, air conditioning, and other appliances used for non-commercial purposes;

"impulsive sound"
means sound of short duration, usually less than one second, with an abrupt onset and rapid decay. Without prejudice to the foregoing, examples of sources of impulsive sound shall include but not limited to pile drivers, drop hammer or driven impacts and explosions.

"lawnmower"
means all motorised equipment appropriate for the upkeep by cutting, by whatever method, of areas under grass used for recreational, decorative or similar purposes.

"loader"
means self-propelled wheeled or crawler machine fitted in front with a bucket. The machine loads, raises, transports and dumps material by combining its own movements and those of the bucket.

"machine"
means device, equipment or parts of equipment and installation, mechanically or electrically driven or otherwise, as used for any forms of work. This includes construction plant equipment, and all forms of equipment used outdoors.

"measuring surface"
means a hypothetical surface surrounding the sound source and on which sound measurement points are arranged.

"person"
means any individual, association, partnership, firm, society or corporation, and includes any officer, employee, department, agency or instrumentality of a State.

"power generator"
means any device comprising a motor unit driving a rotary generator producing continuous electrical power.

"real property boundary"
means an imaginary line along the ground surface, and its vertical extension, which separates the real property owned by one person from that owned by another person, but not including intra-building real property divisions, as delineated in the land title appearing in the Certificate of Title.

"sound or noise emission"
means sound as emitted or discharged from a sound source(s).

"sound immission"
means sound as propagated onto and received by a receiver from source(s) external to the receiver or real property.

"sound power"
means the acoustic energy emission radiated by a sound source, expressed in unit of Watts (W).

"sound power level"
means 10 times the logarithm to the base 10 of the ratio of the sound power to the reference power of 1 pW. The sound power level is denoted L_W or SWL and is expressed in decibels. The sound power level expressed in dB (A) is denoted as L_{WA} or SWL (A).

"sound pressure"
means the instantaneous difference between the actual pressure and the average or barometric pressure at a given point in space, as produced by sound energy.

"sound pressure level"
means 20 times the logarithm to the base 10 of the ratio of the RMS sound pressure to the reference pressure of 20 micropascals. The sound pressure level is denoted Lp or SPL, and is expressed in decibels.

"sound reinforcement systems"
means any electronic or similar devices which produces, reproduces or amplifies sound.

"sound source"
means the machine, equipment, installation including its sub-components, sound reinforcement systems including loudspeakers, and other sources from which sound originates.

"tower crane"
means a power-driven lifting appliance which when in use, consists of a vertical tower with a jib fitted to the upper part; is equipped with means for raising and lowering suspended loads and for horizontal movement of such loads by variation of load-lifting radius and/or by slewing and/or by traveling of the complete appliance; is designed to be able to be removed when the work for which it was erected has been completed.

"welding generator"
means any rotary device which produces a welding current.

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APPENDIX 8

THE PLANNING GUIDELINES FOR VIBRATION LIMITS AND CONTROL IN THE ENVIRONMENT

The Planning Guidelines for Vibration Limits and Control in the Environment (Book 3 of 3) published by Department of Environment, Ministry of Natural Resources and Environment Malaysia.

The guideline provides an overview as listed below:

1. Scope
2. Purpose
3. Legislative Background
4. Vibration Limits
5. Vibration Measurements
6. Monitoring Point(s)
7. Vibration Severity and Impact Assessment
8. Vibration and Planning
9. Vibration Reduction

Annaxes:

1. Schedule of Recommended Vibration Limits
2. Procedures For Measurement of Vibration
3. Code of Practice to Minimize Vibration Disturbance
4. Statutory Instruments, Standards and Other Guidance

THE PLANNING GUIDELINES FOR

Book 3 of 3

Vibration Limits and Control in the Environment

Department of Environment
Ministry of Natural Resources and Environment
Malaysia

FOREWORD

The Department of Environment hereby published 3 sets of documents to provide guidance on acceptable noise limits for various types of land use and human activities. ***The Planning Guidelines for Environmental Noise Limits and Control*** provide noise acceptance criteria for quantitative assessment of noise to define disturbance or otherwise. ***The Guidelines for Noise Labeling and Emission Limits of Outdoor Sources*** prescribes comprehensive methodology to measure and report noise emission from outdoor sources. ***The Planning Guidelines for Vibration Limits and Control*** gives vibration acceptance criteria for quantitative assessment of vibration.

It is hoped that these document could serve as useful guide to planners and decision makers at the state and local level as well as other organization, bodies and agencies involved or having responsibilities in the design and/or approval of town planing, infrastructure development, etc. so as to reduce the potential impact of noise affecting public health or causing annoyance or disturbance. Continuing efforts to improve the content and structures of these guidelines based upon feedback from users will be made from time to time.

In the publication of these documents, I would like with sincere appreciation to acknowledge the valuable expert contribution of the University of Technology Malaysia, in particular Prof. Dr. Mohd Salman Leong Bin Abdullah, the relevant agencies and all individuals in providing the necessary and relevant inputs, comments and recommendations towards the successful completion of the documents.

DATO' HAJAH ROSNANI IBARAHIM
Director General
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Department of Environment Malaysia

THE PLANNING GUIDELINES FOR VIBRATION LIMITS AND CONTROL IN THE ENVIRONMENT

TABLE OF CONTENTS

LIST OF ANNEXES

1.0 Scope

1.1 This document presents guidance and recommendations for:

(a) specifying vibration limits in the environment, including buildings, for the protection of the public from excessive vibration;

(b) procedures for environmental vibration measurements and impact assessment;

(c) vibration parameters for the assessment of different vibration sources; and

(d) abatement of excessive vibration through planning and control.

1.2 For the purpose of these Guidelines, definitions used are consistent with those given in ISO 2631, BS 6472 and DIN 4150. A glossary of definitions is also included in this document.

1.3 These guidelines present vibration acceptance criteria upon which a quantitative assessment of vibration could be made. This eliminates subjective judgment of parties involved, ambiguity in defining a disturbance, and places the assessment of a vibration source on a measurement basis.

2.0 Purpose

2.1 The purposes of these guidelines are:

(a) for planning purposes, typically by project proponents, local authorities, and consultants;

(b) to be used in vibration impact assessments, and pre- and post EIA compliance verification;

(c) in quantifying a vibration disturbance on a quantitative manner; and

(d) to offer an introductory treatise in environmental vibration control.

3.0 Legislative Background

3.1 Approval of projects subjected to EIA procedures and requirements usually include maximum permissible vibration limits at affected receptors that must be complied with during the construction phase and/or operation of the project.

3.2 The Department of Environment in these guidelines present recommendations upon which acceptable vibration limits could be specified. In instances of new vibration sources or projects, compliance to these limits may be made mandatory using legislative instruments available to the Department of Environment, and other authorities (Local Authorities, City Halls, etc).

3.3 There are no prior guidelines for vibration stipulated by the Department of Environment. These Guidelines are intended to present a comprehensive and unambiguous manner upon which vibration could be measured and assessed against the prescribed standards for all applications.

4.0 Vibration Limits

4.1 Vibration limits may be set based on either of the following vibration parameter:

(a) an absolute limit based on the vibration in a particular designated direction which should not be exceeded;

(b) an absolute limit based on the vectorial sum of instantaneous vibration in three orthogonal axes (termed the peak particle velocity of the vibration) which should not be exceeded.

4.2 The governing limits are depended on the repetitive nature and duration of the vibration (continuous, short term or single event).

4.3 For human response and annoyance evaluation, limits may be set for different period of the day (day and night).

4.4 It is often necessary to establish by measurements the existing ambient vibration levels in the absence of the offending source; and the contribution and severity of the offending source could be assessed with certainty against the existing ambient conditions.

4.5 Vibration acceptance could be assessed against the following criteria:

(a) potential structural damage in buildings;

(b) human response and annoyance; and

(c) re-radiated structure-borne noise.

4.6 Recommended vibration limits to minimize structural damage risk in buildings, and for human response and annoyance assessment are given in Annex A of these Guidelines.

4.7 Structural damage from vibration are inter-related and inter-dependent on numerous factors. These include, but are not limited to, factors related to structural design and integrity of the building, materials, quality of construction and workmanship, age of building, forcing frequency content, duration and amplitude of the vibration source. There is a statistical probability relating to potential structural damage. The recommended limits do not guarantee absence of damage, but reduce its probability of occurrence. The vibration limits as prescribed in these Guidelines are therefore offered as guidance only.

4.8 Schedule 1 prescribes recommended limits (vibration velocity peak levels in the frequency range 10 to 100 Hz) for potential structural damage in buildings from steady state vibrations.

4.9 Under normal circumstances, steady state vibration should not exceed the upper limit defined as "caution level" in Schedule 1.

4.10 Vibration level exceeding limits for "major damage" as prescribed in Schedule 1 is usually an issue of serious concern where structural damage may be likely.

4.11 Recommended limits for short-term vibrations (as measured at foundation or plane of floor slabs), as classified in accordance to the type of structure are given in Schedule 2.

4.12 Recommended limits for peak particle velocity for ground vibration from single event impulsive excitation (such as blasting and explosion) not exceeding 3 occurrences per day are given in Schedule 3.

4.13 Schedule 4 stipulates acceptable road traffic induced vibration in buildings, based on types of building foundation.

4.14 Recommended vibration limits for human response and annoyance for steady state continuous vibration and short-term within building are given in Schedule 5, and Schedule 6 respectively. These limits are categorised according to receiving land use and period of the day. These limits are based on multipliers of the human perception threshold (designated as "Curve 1" as defined in ISO 2631 and BS 6472).

5.0 Vibration Measurements

5.1 Measurements of vibration are often necessary for any of the following purpose:

(a) assessing the existing vibration climate;

(b) assessing compliance to vibration limits for vibration generation source(s) and/or project development; or

(c) assessing environmental impact and potential community response.

5.2 Vibration measurements shall usually include the following:

(a) background (ambient) vibration levels at a receiver location(s) and/or at the real property boundary of a source(s). These may be undertaken at locations prior to a project development. It could also be undertaken in the absence of the source(s) operating (for example with a plant not operating, or without construction activities).

(b) vibration levels at a receiver location(s) and/or at the real property boundary of a source with the plant operating, construction in progress, and/or completion and operation of a project (transit trains, industrial plant, etc.).

(c) vibration characteristics of each source as may be required to evaluate the contribution of each source.

5.3 Vibration measured indoors may be undertaken outdoors or indoors on building floor slabs or foundation as the case may be.

5.4 Procedures for measurement of vibration in the environment and vibration source(s) severity assessment as described in Annex B shall be used. Guidance on the use and selection of an appropriate vibration measurement parameter and sampling methods are also given in Annex B.

6.0 Monitoring point(s)

6.1 The vibration assessment should normally be at the nearest building and/or locations; and the best position for the monitoring point(s) would often be on the floor slab or foundation. Monitoring points should be accessible to all parties concerned.

7.0 Vibration Severity and Impact Assessment

7.1 Vibration could be assessed against an absolute numerical vibration limit (as proposed in the Schedules of Annex A), and/or assessed based on the increase of the vibration levels with respect to the ambient level without the offending source.

7.2 Assessment of vibration levels against an acceptance limit is fairly straight forward, as it merely requires comparison of the measured level against the permissible levels.

7.3 Further guidance is given in BS 6472: 1992 (Appendix A) on human response and annoyance for different receivers and duration of vibration exposure.

7.4 Buildings which exhibit evidence of threshold damage (defined as visible cracking in non-structural members) as a result of excessive vibration should be investigated. These could include building structural inspection, and vibration monitoring if this damage is suspected to be vibration induced.

7.5 In the event of vibration levels exceeding the minor or major damage limits for potential structural damage to buildings as prescribed in Schedule 1 of Annex A, further investigations, which include the determination and evaluation of stresses in building structural members, and long term structural integrity monitoring, should be undertaken. The reduction of the vibration generation or origin at source may also be necessary.

8.0 Vibration and Planning

8.1 The impact of vibration should be considered in the planning of a project development; and in general be guided by these Guidelines.

8.2 For the purpose of the consideration of vibration in planning, the following information may reasonably require:

(i) the existing vibration levels in the community, including identification of the major sources of vibration generation.

(ii) any projected or proposed new or expanded sources of vibration which may affect exposure of the site.

(iii) where applicable, plans for vibration reduction measures.

8.3 The Project Proponent and any other Person(s) who would operate or cause to operate equipment, plant, process or activity with vibration generation should undertake all reasonable measures to control the source of, or limit exposure to vibration. Such measures should be proportionate and reasonable, and may include one or more of the following:

(a) Layout: adequate distance between source and vibration-sensitive neighbours, building or area. The usage and designation of buffer zones shall be in accordance to guidelines issued by the Department of Environment from time to time;

(b) Engineering measures: reduction of vibration at point of generation with the use of alternative methods, reduction of energy input for impactive activities, containment of vibration generated, and protection of adjacent vibration sensitive buildings by appropriate engineering measures; and

(c) Administrative measures: limiting the operating time of vibration source(s); restricting the activities and ensuring acceptable vibration generation limits of vibration source.

8.4 The Project Proponent and/or parties who undertakes construction, piling, drilling, excavation, demolition works, blasting and other construction related activities shall be required to inform the local authority in good time the nature of the proposed works and method statements to ensure that excessive vibration are not generated.

8.5 Person(s) responsible for the development, and operations of roads and highways should undertake all reasonable precautionary mitigation measures such that road traffic induced vibrations within buildings are not to exceed acceptable levels as prescribed in Schedule 4 of Annex A.

9.0 Vibration Reduction

9.1 The Project Proponent, and/or occupier of any industrial or construction sites, and/or person(s) responsible for excessive vibration generation should use the "best practical means" to minimise the vibration generation and reduce its propagation to the environment.

9.2 Excessive vibration generation is deemed to occur when vibration levels above the recommended vibration limits as prescribed in these Guidelines are exceeded. "Best practical means" in the context of these Guidelines, should include but not limited to:

(i) the size, design and inherent operation characteristics of the device, plant, process or activity;

(ii) the adjustment of operational parameters including reduction of energy input (per blow or cycle for piling for example) to limit the intensity of vibration generation;

(iii) the selection and usage of alternative methods with low vibration generation;

(iv) the provision of and appropriate use of vibration isolators, and attenuation dampers;

(v) the provision if necessary and appropriate use of vibration transmission structural breaks;

(vi) the proper conduct and adequate supervision of operation; and

(vii) regular and efficient maintenance of plant and control equipment.

9.3 In instances of excessive vibration severity, the Department of Environment at its discretion may make it mandatory for the Project Proponent and/or vibration source originator or person(s) responsible for the excessive vibration generation to institute measures for reducing vibration levels to comply with recommended limits as prescribed in these Guidelines.

ANNEX A
SCHEDULE OF RECOMMENDED VIBRATION LIMITS

SCHEDULE 1

RECOMMENDED LIMITS FOR DAMAGE RISK IN BUILDINGS FROM STEADY STATE VIBRATION

Damage Description	**Vertical Vibration Peak Velocity v_{max}, [mm/s] (0 to Peak) (10 - 100 Hz)**
Safe	Less Than 3
Caution Level (Damage Not Necessary Inevitable)	3 to 5
Minor Damage	5 to 30
Major Damage	More Than 30

(Source: ISO DP 4688: 1975)

SCHEDULE 2

RECOMMENDED LIMITS FOR DAMAGE RISK IN BUILDINGS FROM SHORT TERM VIBRATION

Type of Structure	**Vibration Velocity v_i [mm/s] at foundation (as defined by the respective rating curves of Figure 1)**	**Vibration Velocity v_i [mm/s] at plane of floor of uppermost full storey (all frequencies)**
Industrial buildings and buildings of similar design	Curve C	40
Commercial building, dwelling and buildings of similar design and/or use	Curve B	15
Structures that, because of their particular sensitivity to vibration, do not correspond to those listed above, or of great intrinsic value (e.g. residential houses, or buildings that are under preservation order)	Curve A	8

(Source: DIN 4150/3)

SCHEDULE 3

*RECOMMENDED LIMITS FOR DAMAGE RISK IN BUILDINGS FROM SINGLE EVENT IMPULSIVE EXCITATION **

Type of Structure	Ground Vibration Peak Particle Velocity v_{max} [mm/s]	
	At low frequency < 40 Hz	**At high frequency >40 HZ**
Industrial buildings and buildings of similar design	40	50
Commercial building, dwelling and buildings of similar design and/or use	20	50
Structures that, because of their particular sensitivity to vibration, do not correspond to those listed above, or of great intrinsic value (e.g. residential buildings, or buildings that are under preservation order)	12	50

* *Single event impulsive excitation not exceeding 3 occurrences per day.*

(Adapted from DIN 4150/3, and Swiss Standard for Vibration Damage to Buildings).

SCHEDULE 4

ACCEPTABLE ROAD TRAFFIC INDUCED VIBRATIONS IN BUILDINGS

Type of Building and Foundation	Recommended Vertical Velocity Limit, v_{max} [mm/s]
- Especially sensitive buildings, and buildings of cultural and historical value	1
- Newly built buildings, and/or foundation of a foot plate (spread footings)	2
- Buildings on cohesion piles	3
- Building on bearing piles or friction piles	5

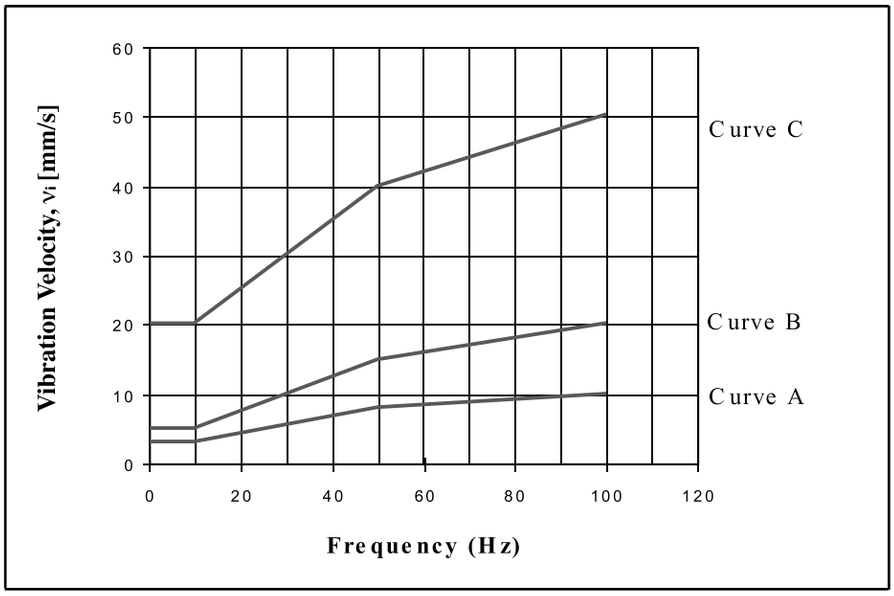

FIGURE 1
Foundation Vibration Velocity Limiting Values for Vectorial Sum of Vibration Levels in Three Orthogonal Axes.

SCHEDULE 5

RECOMMENDED LIMITS FOR HUMAN RESPONSE AND ANNOYANCE FROM STEADY STATE VIBRATIONS

Receiving Land Use Category	Day Time 7.00 am - 10.00 pm	Night Time 10.00 pm - 7.00 am
Vibration Sensitive Areas	Curve 1	Curve 1
Residential	Curve 2 to Curve 4	Curve 2
Commercial, Business	Curve 4 to Curve 8	Curve 4
Industrial	Curve 8 to Curve 16	Curve 8 to Curve 16

SCHEDULE 6

RECOMMENDED LIMITS FOR HUMAN RESPONSE AND ANNOYANCE FROM SHORT TERM VIBRATIONS

Receiving Land Use Category	Day Time 7.00 am - 10.00 pm	Night Time 10.00 pm - 7.00 am
Vibration Sensitive Areas	Curve 1	Curve 1
Residential	Curve 8 to Curve 16	Curve 4
Commercial, Business	Curve 16 to Curve 20	Curve 16 to Curve 20
Industrial	Curve 32	Curve 32

The above stipulated curves are defined in Figure 2 and 3. The base Curve 1 is based on the vibration perception threshold for human response as defined by BS 6472:1992 and ISO 2631. The designated numbers of subsequent curves are multiplying factors of the base curve.
(Source: ISO 2631 and BS 6472)

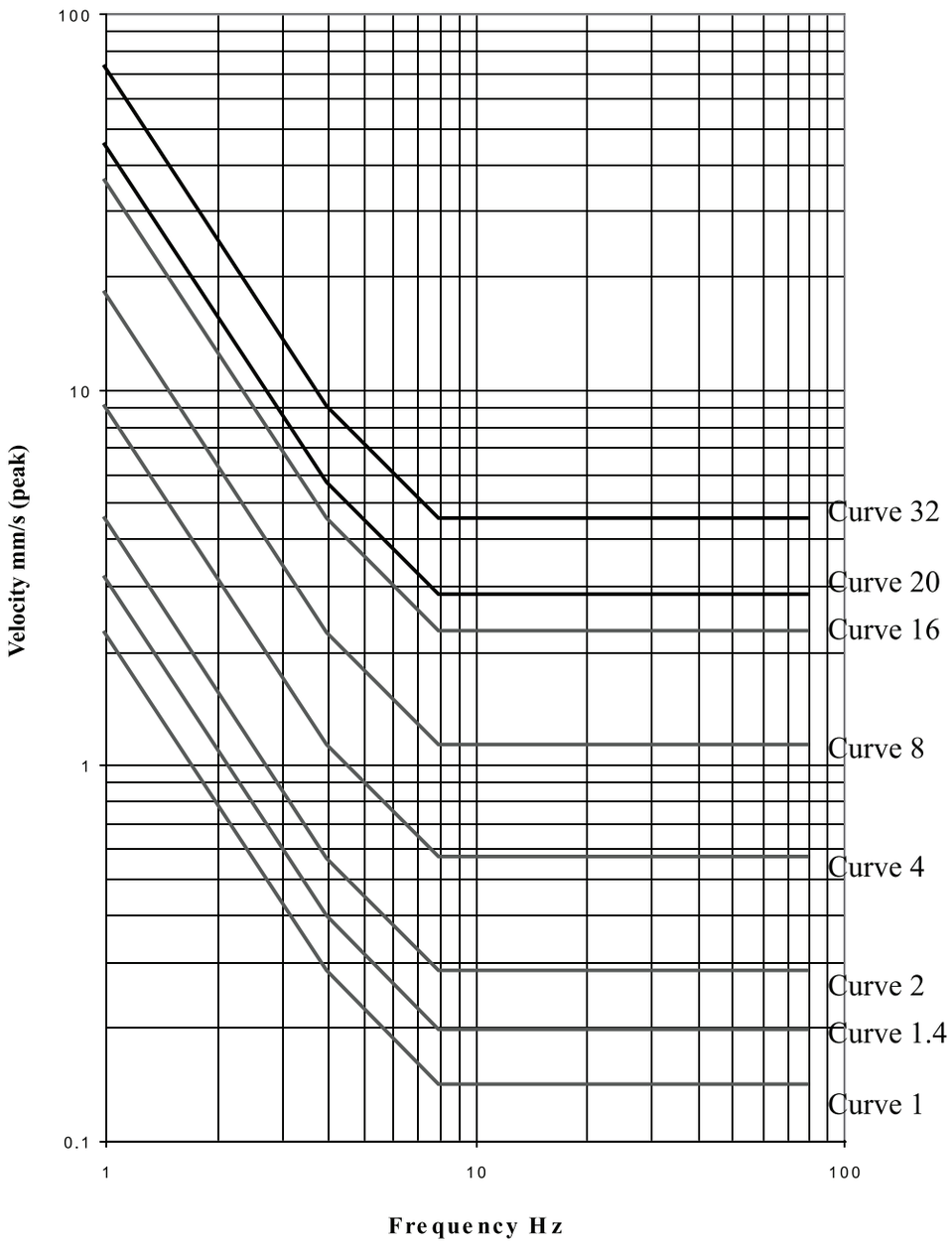

FIGURE 2. Building vibration z-axis curves for peak velocity

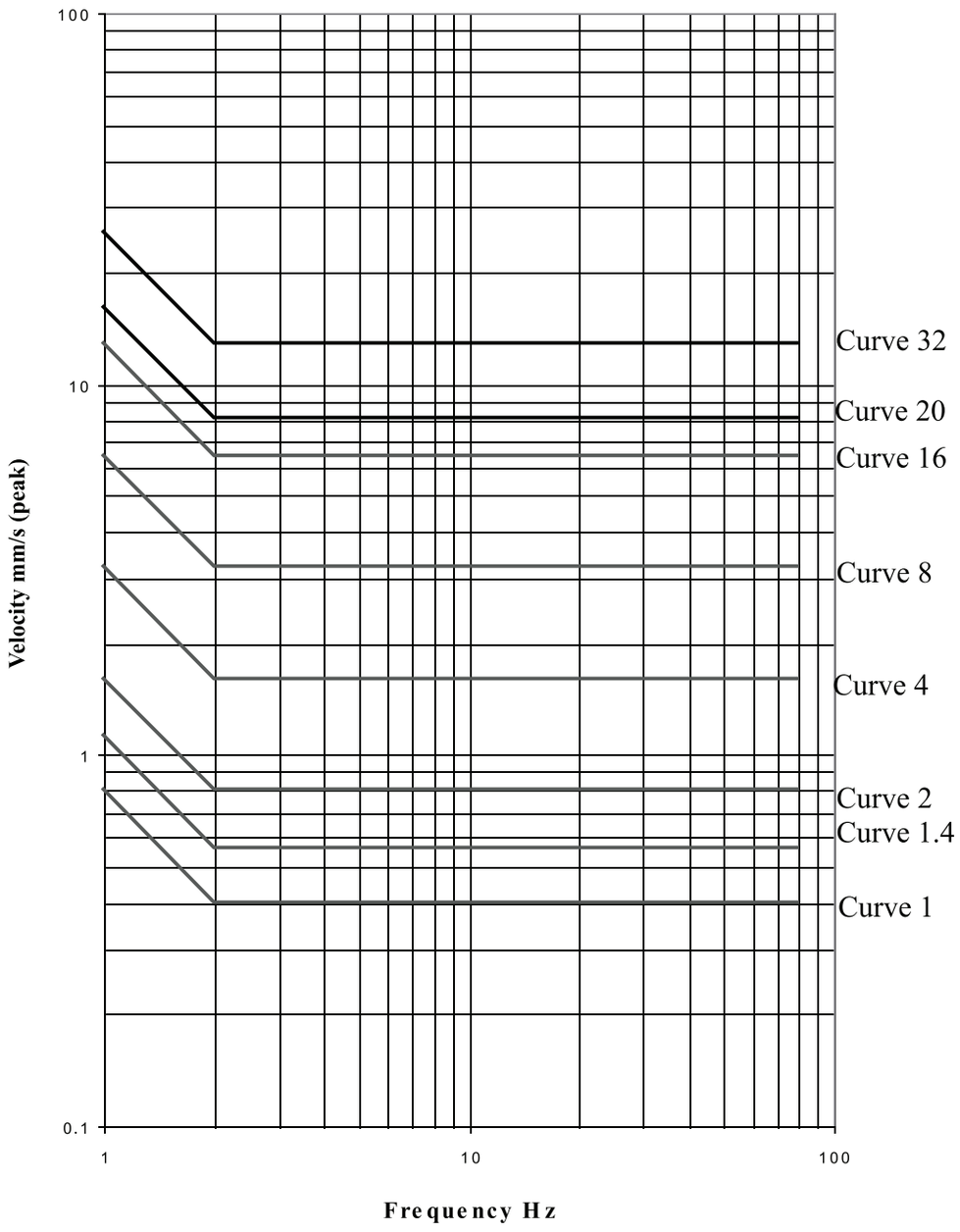

FIGURE 3. Building vibration x- and y-axis curves for peak velocity

ANNEX B

PROCEDURES FOR THE MEASUREMENT OF VIBRATION IN THE ENVIRONMENT

1.0 Measurement equipment

1.1 Vibration measuring equipment shall consist of the following parts: a transducer or pick-up sensor, an amplifying device, an amplitude or level indicator or recorder, and/or signal analyser. Where appropriate, filters (low pass, high pass) should be included to limit the frequency range of the equipment and to apply the recommended filters to the input signal.

1.2 Vibration transducers shall be in compliance to IEC Publication 184, and auxiliary equipment (amplifiers, frequency selective equipment and carrier systems) in compliance to IEC Publication 222.

1.3 Vibration frequency analysers or signal analysers (of either type based on instrumentation hardware, or software digital signal processor) with one third octave filter sets or narrow band FFT (fast Fourier transform) bandwidth, shall be used for vibration frequency analysis in the frequency range 1 to 100 Hz minimum.

1.4 Proprietary specialist instrumentation for single or multiple event impulsive vibration excitation monitoring and data recording with equivalent accuracy to vibration measurement equipment as stipulated herein may also be used. Such equipment shall be used in accordance to the manufacturer's instructions.

1.5 All vibration measuring equipment shall be properly calibrated in accordance with current standards and thereafter, or recommendations governing the calibration of such equipment in accordance to the equipment manufacturer's instructions.

2.0 Measurement locations

2.1 Measurements of vibration in general shall normally be taken on a building structural surface supporting a human body; and in instances of ground vibration or measurements at a real property boundary, may have to be made outside the structure, or on some surface other than points of entry to the human subject.

2.2 When measuring vibration at the foundation, the transducers for the three axes of vibration shall be placed close to one another in the lowest storey of the building under investigation, either on the foundation of the outer wall or in the outer wall, or in recesses in the outer wall. For buildings having no basement, the point of measurement shall lie no more than 0.5 m above ground level. Measuring points shall preferably be located on the side of the building facing the source of excitation. Vibration as a function of time shall be measured for the x, y and z directions, with one direction of measurement being parallel to one of the side walls of the building. In the case of buildings of large ground area, measurements shall be taken simultaneously at several points.

2.3 In addition to measurements taken at the foundation and to those at the uppermost storey, the vertical axis vibration of floors, where necessary measured approximately at the centre of the floor area, shall be included in the evaluation.

2.4 When measuring the x and y axes vibration of the floor of the uppermost full storey, the transducers shall be placed in, or close to, the outer masonry. They shall be set up in the x and y directions; one direction of measurement shall be parallel to one of the side walls of the building.

2.5 Measurement for blasting and other explosions related impulsive vibration excitation, if measured outside buildings, shall preferably be measured on a hard surface on ground as close to the property of interest or at real property boundary as the case may be. Transducers may be buried in the ground if no such hard surface is available.

3.0 Measurement Type and Parameters

3.1 Building vibration, and measurements for assessment of human response and annoyance shall be measured in vibration velocity or acceleration terms. The recommended vibration limits as given in these Guidelines are based on vibration velocity.

3.2 Single event impulsive vibration excitation shall be measured in terms of peak particle velocity. Peak particle velocity should preferably be measured simultaneously in the three orthogonal x, y, z axes; and the vectorial sum vi computed based on the instantaneous values v_x, v_y, and v_z. When a multiple channel analyzer is not available, a conservative estimate of the vectorial sum vi may be computed from single (or dual) channel measurements of v_x, v_y, and v_z. Such an assumption should be reported accordingly.

3.3 The maximum value v_{max} is measured in a designated single direction, and shall be in a direction normal to a wall or a particular plane of interest.

3.4 Real time frequency domain measurements (in one third octaves or narrow bandwidth) may be undertaken to obtain the vibration frequency spectrum for evaluation in accordance to these Guidelines.

3.5 Measurements and/or data recording of unfiltered time histories of vibration may also be undertaken from which any desired data reduction for frequency analysis and the rms total value may be determined.

3.6 Vibration measurements shall be undertaken within a frequency range of 1 Hz to 100 Hz minimum.

(a) In the event of any occurrence of vibration response at frequency higher than 100 Hz, supplementary measurements up to at least the second harmonics of these higher order frequencies shall be undertaken.

(b) In the event that extraneous signal noise (such as cable or electrical noise) unrelated to the vibration measurement is deemed to influence the measurements, a high-pass filter with a value greater than 1 Hz but not more than 10 Hz may be used. In this instance the person undertaking the measurement and analysis must conclusively validate no vibration response components of significance up to this cut-off frequency of the high pass filter.

3.7 Measurements for steady state vibration shall be measured with peak or rms-weighted averaging over the duration of measurement period of interest, and with an averaging sample until such time the vibration readings are repeatable to within 95% confidence limits.

3.8 Measurements for short-term vibrations and single event impulsive vibration excitation shall be measured on peak hold levels over the duration of measurement period of interest.

4.0 Period of measurement

4.1 Measurements in general shall be undertaken over the duration of operation of the device(s), process or activity which results in vibration generation to obtain a fair representation and record keeping of actual vibrations generated.

4.2 In instances of vibration monitoring for potential structure damage concern in buildings, and for compliance record keeping arising from construction, maintenance, demolition or excavation works, and blasting, the measurement should be continuous or reported over regular period the entire duration of these activities. A time chart recording for this period is recommended. Monitoring prior to the commencement of these activities is also required to establish existing ambient levels.

4.3 Hourly measurements of not less than 20 minutes sampling repeated over the entire day (daytime and night time) for human annoyance and response shall be acceptable for initial screening of vibration annoyance. The sampling must however include period(s) of vibration generation activities. Continuous monitoring over a complete 24-hour cycle may be required in the event that human annoyance and response are of concern, and for confirmation of compliance to these Guidelines.

ANNEX C

CODE OF PRACTICE TO MINIMISE VIBRATION DISTURBANCE

1.0 Vibration Disturbance

Under normal circumstances, Project Proponent, and/or any other Person(s) who would operate or cause to operate equipment, plant process or activity should not unreasonably make, continue, or cause to be made or continued, any vibration disturbance. In the context of these Guidelines, vibration disturbance shall mean any vibration which:

(i) endangers or injures the safety or health of human or animals; or

(ii) annoys or disturbs a reasonable person of normal sensitivities; or

(iii) endangers personal or public property; or

(vi) exceeds the vibration limits as prescribed herein in these Guidelines.

2.0 Construction

Project Proponent and/or other Person(s) should not operate or permit the operation of any tools or equipment used in construction, maintenance, or demolition work:

(a) Between the hours of 10.00 p.m. and 7.00 a.m. the following day on weekdays or at any time on weekends or public holidays, that creates a vibration disturbance across aresidential real property boundary or within a vibration sensitive zone, except for emergency work of public service, and utilities.

(b) At any other time, the vibration levels resulting from construction work activities or equipment, plant or process at or across real property boundary should not exceed the recommended acceptable vibration limits as defined in the respective Schedules of Annex A for the daily period of operation.

(c) The use of low vibration (and vibration) generation equipment, process or activity shall be required in vibration sensitive areas.

(d) The use of low impact piling methods and/or alternative piling methods (bore piles, micropiles for example) are preferred over conventional impact hammer piling methods.

(e) Recommendations for vibration control in accordance to BS 5228: 1992 (Noise Control on Construction and Open Sites: Part 4 Code of Practice for Noise and Vibration Control Applicable to Piling Operations) shall be used.

3.0 Industrial Sites

(a) Project Proponent and/or other Person(s) should not operate or permit the operation of equipment or facilities in an industrial site such that vibration propagated to the adjacent community results in vibration levels exceeding the maximum recommended limits as prescribed in the Guidelines.

4.0 Transportation

(a) Project Proponents of new highways, road re-development or expansion, and rail or transit trains system(s) should minimize vibration intrusion to residential areas and vibration sensitive premises, and with alignments offering the maximum possible buffer zones, and natural or man-made attenuation.

(b) In urban or suburban areas where a meaningful buffer zone is not possible, or/and when vibration immission to affected receivers exceed maximum recommended limits as prescribed in the Guidelines, the use of vibration attenuating or isolation materials, or structural breaks shall be required.

(c) For railway tracks (trains of all type: LRT, commuter, electric rail, passenger, cargo, etc) that are located in close vicinity or adjacent residential, or built up areas and/or any vibration sensitive areas, the use of tracks vibration isolation are recommended. These include floating track slabs, ballast mats, undersleeper pads, and resilient track fasteners.

5.0 Explosions

No person unless duly authorized by law or carrying out legitimate duties shall use explosives, or results in an explosion which create a vibration disturbance across a real property boundary or on a public space or right-of-way.

6.0 Buildings

(a) All reasonable and precautionary measures for the safe occupancy of a building must be taken by the Person(s) responsible for or in control of the building, and/or other Person(s) responsible or permit the operation of any equipment, plant, process or work activity within the building.

(b) All mechanical and electrical equipment (building services equipment, manufacturing or production equipment, and any other rotating or reciprocating equipment), or any other facilities with rotation or reciprocating dynamic motion that results in moderate to significant dynamic excitation or motion of structures, including floor slabs, when installed within buildings should be mounted with suitable vibration isolation systems or devices. Such systems or devices include elastomeric or rubber pads, steel spring isolators, or pneumatic isolators. The use of matching inertia blocks is recommended.

7.0 Low frequency vibration

(a) Industrial plants or process that result in low frequency noise, and consequently perceivable as low frequency vibration and/or resulting in vibration of lightweight building elements or structures, should be located away from noise and vibration sensitive areas.

(b) The design and implementation of appropriate attenuating elements or devices within the discharge or emission points (exhaust stacks, blowout points, etc) of the low frequency noise source should be included in all new or retrofitted installation in proximity to residential and noise and vibration sensitive areas.

ANNEX D

STATUTORY INSTRUMENTS, STANDARDS AND OTHER GUIDANCE

1.0 Statutory instruments

Environmental Quality Act 1974.

2.0 Standards

(a) ISO 2631-1: 1985 – Evaluation of human exposure to whole-body vibration-Part 1: General requirements.

(b) ISO 2631-2: 1989 – Evaluation of human exposure to whole-body vibration – Part 2: Continuous and shock-induced vibrations in buildings (1 to 80 Hz).

(c) ISO 2631-3: 1985 – Evaluation of human exposure to whole-body vibration – Part 3: Evaluation of exposure to whole-body z-axis vertical vibration in the frequency range 0.1 to 0.63 Hz.

(d) ISO 8041: 1990 – Human response to vibration – Measuring instrumentation.

(e) BS 6472: 1992 – Guide to Evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz).

(f) BS 5228: 1992 – Noise control on construction and open sites – Part 4: Code of practice for noise and vibration control applicable to piling operations.

(g) DIN 4150 – Part 3: Structural vibration in buildings.

(h) ANSI S3.29: 1983 – Guide to the evaluation of human exposure to vibration in buildings.

GLOSSARY

"community"
means the body of people gathered or living in the same locality.

"impulsive vibration excitation"
means vibration which has a rapid build-up to a peak followed by a damped decay which may or may not involve several cycle of vibration, and is generally associated with single event occurrence such as blasting and explosions.

"local authority"
means the local planning authorities or agents of the State as defined in the Town and Country Planning Act, 1976 and such rules, regulations and by-laws made there under. For the purpose of these Regulations, this shall include City Halls, City Councils, Municipal Councils, Town Councils and District Councils.

"major damage"
means serious weakening of the structure with large cracks or shifting of foundations, bearing walls, or major settlement resulting in distortion or weakening of the superstructure.

"real property boundary"
means an imaginary line along the ground surface, and its vertical extension, which separates the real property owned by one person from that owned by another person, but not including intra-building real property divisions, as delineated in the land title appearing in the Certificate of Title.

"residential area"
means a designated area as gazetted by the local authority for the purpose of human dwellings and residence.

"short term vibration"
means a vibration which is impulsive or transient in nature but are repeated periodically (but not necessarily at equal time period) over a duration of time, and is generally associated with repetitive impactive events such as piling and hammer blows.

"steady state vibration"
means a vibration which continues uninterrupted for a period of time of assessment.

"threshold damage"
means visible cracking in non-structural members such as partitions, facings and plaster walls.

"vibration"
means an oscillatory motion of solid bodies of deterministic or random nature described by displacement, velocity, or acceleration with respect to a given reference point.

"vibration perception threshold"
means the minimum ground-or structure-borne vibrational motion necessary to cause a normal person to be aware of the vibration by such direct means as, but not limited, sensation by touch or visual observation of moving objects.

"vibration sensitive area"
means area where the absence of vibration is deemed necessary for the functional usage of the space, with requirements for the vibration level to be significantly below the human vibration perception threshold. These spaces include but are not limited to hospitals, operating theatres, precision laboratories, residential dwellings.

"vibration velocity v_i"
means the vectorial sum of the instantaneous values of the vibration velocity in the three axis (x, y, z). This is computed from $v_i = \sqrt{(v_x^2+v_y^2+v_z^2)}$.

"x axis"
means the orthogonal axis in the forward facing direction of a building or standing person.

"y axis"
means the orthogonal axis in the transverse direction (at right angle to the x axis) of a building or standing person.

"z axis"
means the orthogonal axis in the vertical direction (orthogonal to the floor plane containing the x and y axes) of a building or standing person.

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LIST OF REGULATIONS

LAWS APPLICABLE TO PUTRAJAYA

i. Perbadanan Putrajaya Act 1995
ii. Constitution (Amendment) Act 2001
iii. Environmental Quality Act 1974
iv. Fire Services Act 1988
v. Housing Developers Act 1966 as amended by the Housing Development (Control and Licensing) Amendment Act 2007
vi. Local Government Act 1976
vii. National Land Code 1965
viii. Road Transport Act 1987
ix. Solid Waste and Public Cleansing Management Corporation Act 2007
x. Solid Waste and Public Cleansing Management act 2007
xi. Street, Drainage and Building Act 1974
xii. Town and Country Planning Act 1975

Rules, Regulations, Orders and By-Laws

Local Government matters

i. Federal Territory of Putrajaya (Modification of Local Government Act 1976) Order 2002
ii. Federal Territory of Putrajaya (Modification of Street, Drainage and Building Act 1974) Order 2002
iii. Federal Territory of Putrajaya (Modification of the Town and Country Planning 1976) Order 2010

Land and Property

i. Federal Territory of Putrajaya Land Rules 2002
ii. Strata Title (Federal Territory of Putrajaya) Rules 2003
iii. Licensing of Private Car Parks (Federal Territory of Putrajaya) By-Laws 2002

Commercial activities

i. Advertisements (Federal territory of Putrajaya) By-Laws 2002
ii. Market (Federal Territory of Putrajaya) By-Laws 2003
iii. Licensing of Premise, Trade, Business and Industrial (Perbadanan Putrajaya) By-Laws 1999
iv. Laundries (Perbadana Putrajaya) By-Laws 1999

Road Transport

i. Road Transport (Compounding of Offences) (Perbadanan Putrajaya) Rules 2003

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Environmental Related:

i. Environmental Quality (Delegation of Powers) (Perbadanan Putrajaya) Order 2002

Planning

i. Development Plans (Structure and Local Plans) Rules 1984
ii. Guidelines & Geometric Standards On Road Network System
iii. *Piawaian Perancangan Pembangunan Taman Atas Bumbung*
iv. *Garis Panduan Kawasan Kolam Takungan Sebagai Sebahagian Tanah Lapang*
v. *Piawaian Perancangan dan Pembangunan Padang Golf*
vi. *Garis Panduan Perancangan Tempat Ibadat Islam*
vii. *Garis Panduan Perancangan Tapak Pelupusan Sisa Toksid dan Sisa Pepejal*
viii. *Piawaian Perancangan Tapak Pencawang Elektrik*
ix. *Garis Panduan Perancangan Tapak* Incinerator
x. *Garis Panduan Perancangan Kemudahan Masyarakat*
xi. *Piawaian Perancangan Kawasan Perdagangan*
xii. *Piawaian Perancangan Kawasan Perindustrian*
xiii. *Garis Panduan Perancangan Taman Tema*
xiv. *Garis Panduan Pemeliharaan Topografi Semulajadi Dalam Perancangan & Pembangunan Fizikal*
xv. *Garis Panduan Perancangan Tanah Perkuburan*
xvi. *Garis Panduan Perancangan Kemudahan Masyarakat*
xvii. *Garis Panduan Laluan Kemudahan Utiliti*
xviii. *Garis Panduan Perancangan Tanah Lapang Dan Rekreasi*
xix. *Garis Panduan Perancangan & Pembangunan Sejagat*
xx. *Garis Panduan Laporan Cadangan Pemajuan*
xxi. *Garis Panduan Perintah Pemeliharaan Pokok*
xxii. *Piawaian Kemudahan Golongan Kurang Upaya*
xxiii. *Piawaian Perancangan Kawasan Tasik*
xxiv. Physical Planning Guidelines for the MSC – Putrajaya

Air and Gaseous Emissions

i. Environmental Quality (Clean Air) Regulations 1978
ii. Environmental Quality (Clean Air) (Amendment) Regulations 2000
iii. Environmental Quality (Control of Emission From Diesel Engines) Regulations 1996
iv. Environmental Quality (Control of Emission From Motorcycles) Regulations 2003
v. Environmental Quality (Control of Emission From Petrol Engines) Regulations 1996

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vi. Environmental Quality (Declared Activities) (Open Burning) Order 2003

vii. Environmental Quality (Delegation of Powers) (Investigation of Open Burning) Order 2000

viii. Malaysian Air Ambient Quality Guidelines (Ambient Standards)

Water and Lakes

i. Federal Territory of Putrajaya (Licensing And Registration of Activities on the Lake) Regulations 2004

ii. Control of Activities on the Lake (Federal Territory of Putrajaya) By-Laws 2004

Waste and Scheduled Waste Management

i. Solid Waste and Public Cleansing Management (Manner of Appeal) Regulations 2011

ii. Solid Waste and Public Cleansing Management (Prescribed Solid Waste Management Facilities and Approval for the Construction, Alteration and Closure of Facilities) Regulations 2011

iii. Solid Waste and Public Cleansing Management (Compounding of Offences) Regulations 2011

iv. Solid Waste and Public Cleansing Management (Licensing) (Management or Operation of Prescribed Solid Waste Management Facilities)) Regulations 2011

v. Solid Waste and Public Cleansing Management (Licensing) (Undertaking or Provision of Collection Services for Household Solid Waste, Public Solid Waste, Public Institutional Solid Waste and Solid Waste Similar to Household Waste)) Regulations 2011

vi. Solid Waste and Public Cleansing Management (Licensing) (Undertaking or Provision of Transportation Services by Long Haulage) Regulations 2011

vii. Solid Waste and Public Cleansing Management (Licensing) (Undertaking or Provision of Public Cleansing Management Services) Regulations 2011

viii. Solid Waste and Public Cleansing Management (Scheme for Household Solid Waste and Solid Waste Similar to Household Waste) Regulations 2011

ix. Environmental Quality (Scheduled Waste) Regulations 2005

x. Environmental Quality (Prescribed Conveyance) (Scheduled Waste) Order 2005

xi. Environmental Quality (Prescribed Premises) (Scheduled Waste Treatment and Disposal Facilities) Regulations 1989

Sewage, Effluent, Industrial Effluent and Leachate Discharge

i. Environmental Quality (Sewage) Regulations 2009

ii. Guidelines for Developers: Sewerage Treatment Vol IV Second Edition (for sewerage systems before 1999)

iii. Environmental Quality (Industrial Effluents) Regulations 2009

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iv. Environmental Quality (Control of Pollution from Solid Waste Transfer Station and Landfill) Regulations 2009

Noise

i. Planning Guideline for Environmental Noise Limits and Control 2007

ii. Planning Guidelines for Vibration Limits and Control in the Environment 2007

iii. Guidelines for Noise Labelling and Emission Limits from Outdoor Sources, 2007

Street, Drainage and Building

i. Earthworks (Perbadanan Putrajaya) By-Laws 1996

ii. Street, Drainage and Building (Compounding of Offences) (Federal Territory of Putrajaya) By-Laws 2003

Overall List of All Rules, Regulations and Orders issued by the Department of Environment Malaysia in force up till 1st June 2013.

RULES

i. Environmental Quality (Compounding of Offences) (Amendment) Rules 1999

ii. Environmental Quality (Compounding of Offences) (Open Burning) Rules 2000

iii. Environmental Quality (Compounding of Offences) Rules 1978

REGULATIONS

i. Environmental Quality (Appeal Board) Regulations 2003

ii. Environmental Quality (Clean Air) (Amendment) Regulations 2000

iii. Environmental Quality (Clean Air) Regulations 1978

iv. Environmental Quality (Control of Emission From Diesel Engines) (Amendment) Regulations 2000

v. Environmental Quality (Control of Emission From Diesel Engines) Regulations 1996

vi. Environmental Quality (Control of Emission From Motorcycles) Regulations 2003

vii. Environmental Quality (Control of Emission From Petrol Engines) Regulations 1996

viii. Environmental Quality (Control of Lead Concentration In Motor Gasoline) Regulations 1985

ix. Environmental Quality (Control of Petrol and Diesel Properties) Regulations 2007

x. Environmental Quality (Control of Pollution From Solid Waste Transfer Station and Landfill) Regulations 2009

xi. Environmental Quality (Dioxin and Furan) Regulations 2004 Environmental Quality (Halon Management) Regulations 1999

xii. Environmental Quality (Industrial Effluent) Regulations 2009 Environmental Quality (Licensing) Regulations 1977

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xiii. Environmental Quality (Motor Vehicle Noise) Regulations 1987

xiv. Environmental Quality (Prescribed Premises Scheduled Wastes Treatment And Disposal Facilities) (Amendment) Regulations 2006

xv. Environmental Quality (Prescribed Premises) (Crude Palm Oil) (Amendment) Regulations 1982

xvi. Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations 1977

xvii. Environmental Quality (Prescribed Premises) (Raw Natural Rubber) (Amendment) Regulations 1980

xviii. Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations 1978

xix. Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment And Disposal Facilities) Regulations 1989

xx. Environmental Quality (Refrigerant Management) (Amendment) Regulations 2004

xxi. Environmental Quality (Refrigerant Management) Regulations 1999

xxii. Environmental Quality (Scheduled Wastes) (Amendment) Regulations 2007

xxiii. Environmental Quality (Scheduled Wastes) Regulations 1989 (Revoked)

xxiv. Environmental Quality (Scheduled Wastes) Regulations 2005

xxv. Environmental Quality (Sewage And Industrial Effluents) (Amendment) Regulations 1997 (Revoked)

xxvi. Environmental Quality (Sewage And Industrial Effluents) (Amendment) Regulations 2000 (Revoked)

xxvii. Environmental Quality (Sewage And Industrial Effluents) Regulations 1979

ORDERS

i. Environmental Quality (Declared Activities) (Open Burning) Order 2003

ii. Environmental Quality (Delegation of Powers Halon Management) Order 2000

iii. Environmental Quality (Delegation of Powers on Marine Pollution Control) (Amendment) Order 1994

iv. Environmental Quality (Delegation of Powers on Marine Pollution Control) Order 1993

v. Environmental Quality (Delegation of Powers on Marine Pollution Control) Order 1994

vi. Environmental Quality (Delegation of Powers) (Investigation of Open Burning) Order 2000

vii. Environmental Quality (Delegation of Powers) (Perbadanan Putrajaya) Order 2002

viii. Environmental Quality (Delegation of Powers) Order 1999 (Revoked)

ix. Environmental Quality (Delegation of Powers) Order 2005 Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) (Amendment) Order 1995

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x. Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) (Amendment) Order 1996

xi. Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) (Amendment) Order 2000

xii. Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987

xiii. Environmental Quality (Prescribed Activities) (Open Burning) Order 2000 (Revoked)

xiv. Environmental Quality (Prescribed Conveyance) (Scheduled Wastes) Order 2005

xv. Environmental Quality (Prescribed Premises) (Crude Palm Oil) Order 1977

xvi. Environmental Quality (Prescribed Premises) (Raw Natural Rubber) (Amendment) Order 1978

xvii. Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Order 1978

xviii. Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities Order) 1989

xix. Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) (Amendment) Order 2006

xx. Environmental Quality (Prohibition on The Use of Chlorofluorocarbons and Other Gases As Propellants And Blowing Agents) Order 1993

xxi. Environmental Quality (Prohibition on the Use of Controlled Substance in Soap, Synthetic Detergent and Other Cleaning Agents) Order 1995

APPENDIX 10

PUTRAJAYA DESIGN AND MANAGEMENT GUIDES

1.0 Putrajaya Stormwater Management Design Guide

1.1 Introduction

To ensure that the drainage concepts and system defined in the UDG are properly implemented during the engineering design phase a Stormwater Management Design Guide (SMDG) has been prepared. The objective of the Guide is to provide guidance on the development and implementation of the best practice in stormwater management in Putrajaya.

The Guide is not prescriptive as the formulation of an integrated urban stormwater management strategy involves the matching of appropriate structural and non-structural management measures to the actual site conditions and management objectives, including public safety, drainage economics and water quality standards.

The SMDG comprises of the following subject Chapters:

- Developing stormwater management strategies
- Design Checklist
- Designing stormwater drainage systems
- Design of stormwater gross pollutant traps
- Design of stormwater oil, grease and grit traps
- Design of stormwater retarding basins
- Design of stormwater sedimentation ponds and constructed wetlands
- Best practice in environmental management of construction activities

1.2 Stormwater Management Strategies

This Chapter of the SMDG provides a broad discussion on the approaches to developing stormwater management strategies and selection of design standards.

1.3 Drainage Design Checklist

This Chapter of the SMDG provides a checklist for the design of stormwater drainage systems.

1.4 Drainage System Design

This Chapter of the SMDG provides an explanation of the theoretical basis behind hydrological and hydraulic procedures for computing design flows and the behavior of hydraulic structures.

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1.5 Gross Pollutant Traps (GPT) Design

This Chapter of the SMDG provides information on the function of the Gross Pollutant Traps (GPT), their design considerations and their appropriate application. To facilitate the maintenance of the GPT a number of standard GPT designs have been recommended. Worked design examples for the GPT were also presented.

1.6 Oil, Grit and Grease Traps (OGGT) Design

This Chapter of the SMDG provides information on the function of the Oil, Grit and Grease Traps (OGGT), their design considerations and their appropriate application. To facilitate the maintenance of the OGGT a number of standard OGGT designs have been recommended. Worked design examples for the OGGT were also presented.

1.7 Retarding Basins Design

This Chapter of the SMDG provides information on the function of the retarding basins, their design considerations and their appropriate application. To facilitate the maintenance of the retarding basins a number of standard retarding basins designs have been recommended. Worked design examples for the retarding basins were also presented.

1.8 Sedimentation Ponds and Constructed Wetlands

This Chapter of the SMDG provides information on the function of the sedimentation ponds and constructed wetlands, their design considerations and their appropriate application. To facilitate the maintenance of the sedimentation ponds and constructed wetlands a number of standard ponds designs have been recommended. Worked design examples for the pond design were also presented.

1.9 Best Management Practice of Construction Activities

This Chapter of the SMDG provides information on the Best Management Practice (BMP) of construction activities. It presents a framework for the formulation of an Environmental Management Plan (EMP) as part of the project construction plan. It also contains an appendix of the BMP (i.e. non-structural and structural measures) proposed for the construction industry.

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2.0 Utility Masterplan Review Study for Putrajaya

2.1 Introduction

Due to the changes to the land-use as the Putrajaya Masterplan is translated into the UDG, and subsequently into the Detail Layout Plan, the Utility Masterplan has also changed. Thus, a review of the Utility Masterplan was carried out for the land-use status up till 23 October, 1996. The information contained in the Utility Masterplan Review Study Report is essential for the proper planning, design and implementation of the detail engineering of the utility systems for the individual projects in Putrajaya.

2.2 Scope of Review

Master plans and commercial proposals prepared by utility consultants and potential concessionaires have been reviewed for their suitability of application to the Putrajaya development. Various options and alternatives were discussed and investigated for the different utilities. The full extent of the results of the review were not reported.

Instead, the report concentrates on the conceptual design for each utility which the review consultant recommends to be developed in detail prior to implementation.

2.3 Utilities Reviewed

The utilities reviewed in the report are as follows:

- Water Supply
- Drainage
- Wastewater
- Solid Waste
- Electricity
- Telecommunications
- Gas Supply
- District Cooling

2.4 Main Points Addressed for Each Utility

The main points which have been addresses for each utility are:

- the requirements for each utility
- the estimated loads
- the design and its criteria for each service

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- the provision of an adequate and reliable back-up system
- the proposed routing of transmission and distribution systems
- the number, size and location of utility buildings and ancillary items
- the phasing implications of the utilities with respect to the development programme

3.0 Putrajaya Transport Design Guide

3.1 Introduction

To ensure that the transportation concepts and systems defined in the UDG are properly implemented during the engineering design phase a Transport Design Guide has been prepared. The Guide is aimed at those involved in the development of any transport-related facility in Putrajaya.

3.2 Scope of Guide

The Guide is intended to:

- Define the transport policies adopted for Putrajaya
- Provide project proponents with specific guidelines and standards
- Illustrated what the Perbadanan expects to see in terms of good design
- Highlight the need for comprehensiveness and integration of travel by all modes
- Explain what is required of project proponents in making their submissions to the Perbadanan

4.0 Putrajaya Lake Management Guide

4.1 Introduction

To ensure that Putrajaya Lake is properly managed a Management Guide for the Lake has been developed. It is intended to support the work of the Lake Management and Wetlands Management Units in the Perbadanan. The following are the subject Chapters in the Guide:

- Lake Quality Management Policy

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- Lake Quality Management Strategy
- Lake Administration
- Lake System
- Operation and Maintenance
- Lake Monitoring Programme
- Data Management and Reporting
- Research and Development

4.2. Lake Quality Management Policy

This Chapter of the Guide provides information on the public perception of the Lake and defines the policy objective for the management of the Lake.

4.3 Lake Quality Management Strategy

This Chapter of the Guide provides information on the Lake Water Quality Targets and Standards. It also defines the water quality targets expected for the external catchment sources, such as from the catchments upstream of the Wetlands (UPM, MARDI and IOI Resorts). It also outlines, briefly, the management measures for the control of water quality from the internal catchment sources. The water quality targets for the Wetland sources are also defined and a discussion on how to involve the public in the management of the Lake is also discussed.

4.4 Lake Administration

This Chapter of the Guide provides information on the responsibilities of the various parties involved in the management of the Lake and their interfacing requirements.

4.5 Lake System

This Chapter of the Guide provides information on the physical layout of the Lake, the function and modeling of the Putrajaya Wetlands, the hydrological inputs and the likely pollutant inputs into the Lake.

4.6 Operation and Maintenance

This Chapter of the Guide outlines the criteria to be used in the operation and maintenance of the integrity of the lake system. It is largely based on the lake design and modeling assumptions and shall be revised as more information on the lake performance are collected over time.

APPENDIX 10

PUTRAJAYA DESIGN AND MANAGEMENT GUIDES

4.7 Lake Monitoring Programme

This Chapter of the Guide provides information on the monitoring requirements for the surface runoff water, groundwater and lake water. It defines the monitoring stations, sampling depths, frequency and sampling parameters and analysis required.

4.8 Data Management and Reporting

This Chapter of the Guide provides information on the management of the data collected from the monitoring programme and their reporting requirements.

4.9 Research and Development

This Chapter discusses the development and research needs to support decision making on the management of the lake system.

APPENDIX 11

THE 17 ELEMENTS IN THE ISO 140001 EMS

1. **Environmental Policy**

   An organisation has to develop a policy statement of its commitment to the environment. The statement is then used as a framework for planning and action.

2. **Environmental Aspects**

   An organisation has to identify the environmental attributes of its products, activities and services. They are then assessed to determine those tat could have significant impacts on the environment.

3. **Legal and Other Requirements**

   An organisation has to identify and ensure access to the relevant laws and regulations that it has to comply.

4. **Objectives and Targets**

   An organisation has to establish environmental goals in line with its policy, environmental impacts, views of interested parties and other factors.

5. **Environmental Management Program**

   An organisation has to plan actions to achieve its environmental objectives and targets.

6. **Structure and Responsibility**

   An organisation has to establish roles and responsibility for its staff and provide resources to support its environmental management system.

7. **Training, Awareness and Competence**

   An organisation has to ensure that its staff are trained and capable of carrying out their environmental responsibilities.

8. **Communication**

   An organisation has to establish processes for its internal and external communications on environmental management issues.

APPENDIX 11

THE 17 ELEMENTS IN THE ISO 14001 EMS

9. EMS Documentation

An organisation has to maintain information on its EMS and related documents.

10. Document Control

An organisation has to ensure effective management of procedures and other system documents.

11. Operational Control

An organisation has to identify, plan and manage its operations and activities in line with its policy, objectives and targets.

12. Emergency Preparedness and Response

An organisation has to identify potential emergencies and develop procedures for preventing and responding to them.

13. Monitoring and Measurement

An organisation has to monitor key activities and track its environmental performance.

14. Non-compliance, Corrective and Preventive Action

An organisation has to identify and correct problems to prevent recurrences.

15. Records

An organisation has to keep adequate records of its EMS performance.

16. EMS Audit

An organisation has to periodically verify that its EMS is operating as intended.

17. Management Review

An organisation has to periodically review its EMS with an eye to continual improvement.

APPENDIX 12

LAND USE CLASS ORDER IN PUTRAJAYA

LIST OF LAND USE CLASSIFICATION FOR PUTRAJAYA LOCAL PLAN:

CLASS I : RESIDENTIAL
CLASS II : GOVERNMENT / INSTITUTIONAL
CLASS III : OPEN SPACE AND RECREATIONAL
CLASS IV : COMMERCIAL
CLASS V : SERVICE INDUSTRY
CLASS VI : UTILITIES AND INFRASTRUCTURE
CLASS VII : PUBLIC UTILITIES
CLASS VIII : SPECIAL USE

DETAILED CLASSIFICATION OF LAND USE FOR PUTRAJAYA LOCAL PLAN

CLASS I: RESIDENTIAL		
CLASS LAND USE	MAJOR LAND USE	ACTIVITIES
CLASS I (A)	LOW DENSITY RESIDENTIAL (1-8 UNITS / ACRE)	1. Bungalow 2. Semi Detached 3. Terrace 4. Landed Strata
CLASS I (B)	MEDIUM DENSITY RESIDENTIAL (9 – 24 UNITS / ACRE)	1. Semi Detached 2. Terrace 3. Town House 4. Condominium 5. Landed Strata 6. Mix Strata
CLASS I (C)	MEDIUM HIGH DENSITY RESIDENTIAL (25-50 UNITS / ACRE)	1. Condominium 2. Apartments 3. Strata Landed 4. Mix Strata 5. Town House
CLASS I (D)	HIGH DENSITY RESIDENTIAL (51-100 UNITS / ACRE)	1. Condominium 2. Apartments 3. Affordable Houses / Low-Cost Houses

APPENDIX 12

LAND USE CLASS ORDER IN PUTRAJAYA

CLASS II: GOVERNMENT / INSTITUTIONAL		
CLASS LAND USE	MAJOR LAND USE	ACTIVITIES
CLASS II (A)	GOVERNMENT USE	1. Government Office 2. Semi-Government Office 3. Corporation Office 4. Gallery 5. Convention & Exhibition Centre 6. Complex / Sport Academy Sports & Exercise 7. Maritime Centre 8. Museum 9. Prime Minister's Residence / TPM 10. Court / Magistrate 11. Community Organisation / Non-Government 12. Club House 13. Palace 14. Government Rest House 15. Other Government Use

CLASS III : OPEN SPACE AND RECREATIONAL		
CLASS LAND USE	MAJOR LAND USE	ACTIVITIES
CLASS III (A)	METROPOLITAN PARK	1. Public Open Spaces 2. Active Sports & Recreation Area 3. Passive Recreation Area 4. Playground 5. Nature Education (EE) 6. Research & Development (R&D) 7. Nursery / Garden 8. Wakaf 9. Parking Lot 10. Public Toilet 11. Kiosk 12. Garden Maintenance Services 13. Eco Tourism 14. Catchment Pond 15. Balancing Pond 16. Amphitheatre 17. Visitors Centre 18. River Reserve

APPENDIX 12

LAND USE CLASS ORDER IN PUTRAJAYA

CLASS III (B)	CITY PARK	1. Public Open Spaces 2. Active Sports & Recreation Area 3. Passive Recreation Area 4. Playground 5. Amphitheatres 6. Equestrian Activity Area 7. Sanctuary 8. Wakaf 9. Parking Lots 10. Public Toilet 11. Kiosk 12. Nature Education (EE) 13. Eco Tourism 14. Catchment Pond 15. Balancing Pond 16. Plaza (Hardscape)
CLASS III (C)	LOCAL PARKS/ NEIGHBOUR-HOOD PARKS / GAMES PARK	1. Public Open Spaces 2. Active Sports & Recreation Area 3. Passive Recreation Area 4. Catchment Pond 5. Balancing Pond 6. Riverside / Lakeside Area 7. Playground 8. Wakaf 9. Kiosk 10. Nature Education (EE) 11. Recreation Activity (Learning) 12. Go-Kart Circuit 13. Games / Soccer/ Kickabout Area 14. Fitness / Exercise Station
CLASS III (D)	GREEN AREA BY THE LAKE (20M BUFFER) / GREEN CORRIDOR	1. Passive Recreation Area 2. Pedestrian, Bicycle & Jogging Path 3. Drainage 4. Pocket Park 5. Green Corridor in Back Lane 6. Agriculture Land / Garden Community 7. Swimming Pool 8. Grand Stand 9. Deck / Tower 10. Wakaf 11. Playground 12. Alfresco Dining 13. Monument 14. Picnic Area 15. Games Court (Volleyball, Lawn Bowl etc.) 16. Exercise Area

APPENDIX 12

LAND USE CLASS ORDER IN PUTRAJAYA

		17. Jogging Path
CLASS III (E)	PROMENADE	1. Pedestrian & Bicycle Path 2. Deck 3. Alfresco Dining 4. Sea Beach 5. Kiosk / Push Cart 6. Fishing Area 7. Exercise Area 8. Jogging Path 9. Remote Control Model 10. Skating (Skates)
CLASS III (F)	BUFFER ZONE	1. Pedestrian 2. Bicycle Lanes 3. Green Corridor 4. Agriculture Land / Garden Community 5. Playground 6. Exercise & Fitness Station
CLASS III (G)	WATER BODY	1. Water Body Zone 1 (All Wetland Cells in Upper East, Upper West, Upper North & Upper South except Central Wetland) ✓ Passive Recreational Activities Permitted with Controlled access ✓ Wetlands ✓ Catchment Pond & Riparian Pond ✓ Research Sites ✓ Pumping for Irrigation 2. Water Body Zone 2 (Central Wetland) ✓ Controlled Water Access ✓ Uses For Boat Model (Controlled, Clean Fuel, Electric Power) ✓ Water Crafting ✓ Canoeing & Kayaking, Rafting, Paddle Boats, Sampan & Electric Boats ✓ Fishing Activities at the Lake Boundary & on Boat ✓ Floating Chalet (Controlled) ✓ Pumping for Irrigation 3. Water Body Zone 3 ✓ Water Sports (Controlled) ✓ Visit & Sightseeing with Boat ✓ Fishing Events at the Lake Boundary ✓ Canoeing, Kayaking, Paddle Boating (Controlled) ✓ Boat Maintenance ✓ Water Taxi

APPENDIX 12

LAND USE CLASS ORDER IN PUTRAJAYA

CLASS III (G)	WATER BODY	4. Water Body Zone (East): Water Canal ✓ Water Sports Events & Training ✓ Powered Leisure Boating & Small Powered Hire Boating ✓ Fishing Event ✓ Light & Sound Presentation ✓ Rhythmic Fountains ✓ Canoeing, Kayaking, Paddle Boating ✓ Jet Ski for Specific Event ✓ Boat Maintainer Lake ✓ Water Taxi ✓ Advertising ✓ Pumping for Irrigation 5. Water Body Zone 4 (West): Near Al-Mirzan Mosque ✓ Events & Training Water Sports ✓ Remote Control Boats ✓ Cruise ✓ Sailing at the Designated Area ✓ Canoeing, Kayaking, & Paddle Boating ✓ Advertising ✓ Water Display Features, Water Screen ✓ Fishing Event ✓ Boat Maintenance ✓ Water Taxi ✓ Floating Restaurant ✓ Aquaria ✓ Boat Rental ✓ Research Area ✓ Decorated Boat Event ✓ Floating Stage (For Shows) ✓ Water Extraction for Drinking ✓ Pumping for Irrigation 6. Water Body Zone 5 ✓ Water Sports Training & Events ✓ Remote Control Boats ✓ Cruise ✓ Sailing at the Designated Area ✓ Canoeing, Kayaking & Paddle Boating ✓ Water Ski at the Designated Area ✓ Parasailing at the Designated Area ✓ Jet Ski (Dam Area) ✓ Advertising ✓ Water Display Features, Water Screen ✓ Marina ✓ Fishing Event ✓ Boat Maintenance

APPENDIX 12

LAND USE CLASS ORDER IN PUTRAJAYA

CLASS III (G)	WATER BODY	✓ Water Taxi ✓ Floating Restaurant ✓ Aquaria ✓ Boat Rental ✓ Floating Swimming Pool ✓ Research Area ✓ Decorated Boat Event ✓ Floating Stage (For Shows) ✓ Water Extraction for Drinking ✓ Pumping for Irrigation 7. Water Body Zone 6 ✓ Public Access & Recreation Activities is prohibited in the area designated as Fish Habitat ✓ Canoeing, Rafting, Paddle Boats, Sampan & Electric Boats ✓ Sports Training for Pedalling & Rowing ✓ Water Ski Training ✓ Low Powered Boat Rental ✓ Powered Leisure Boating ✓ Fishing Activity at Lake Boundary & on Boats ✓ Boat Maintenance ✓ Remote Control Boat (Controlled, Clean Fuel, Electric Power) ✓ Pumping For Irrigation 8. Badan Sair - "Spillway" ✓ Passive activity ✓ Sanctuary for Kelah ✓ Fishing (Control) ✓ Research Area ✓ Water Extraction for Drinking ✓ Pumping for Irrigation
CLASS III (H)	BOULEVARD	1. Public Open Spaces 2. Active Recreation Area 3. Passive Recreation Area 4. Shelter Area 5. Public Toilets 6. Kiosk 7. Entertainment & Culture 8. Parade & Rally 9. Expo 10. Temporary Structure

APPENDIX 12

LAND USE CLASS ORDER IN PUTRAJAYA

CLASS III (I)	NURSERY	1. Plant Breeding Sites 2. Nursery 3. Life Asset Storage (Plants) 4. Garden 5. Pond 6. Expo Area 7. Open Sales Area 8. Related Training Center

CLASS IV : COMMERCIAL		
CLASS LAND USE	MAJOR LAND USE	ACTIVITIES
CLASS IV (A)	MAJOR COMMERCIAL (PRESINT 2,3 & 4)	1. Grocery Store / Convenience Store ✓ Dry Goods ✓ Wet Goods ✓ Home & Office Products ✓ Learning & Educational Products ✓ Motor / Cars Goods Sales & Exhibition Rooms ✓ Rubber / Plastic Product (Retail) ✓ Artificial Body Products 2. Shopping / Business Complex 3. Food center ✓ Restaurant ✓ Cafeteria, Coffee Shop & Restaurant ✓ Outdoor café / Al-Fresco ✓ 'Fast Food Outlet' ✓ Food Court ✓ Food Kiosk 4. Financial Institutions, Banks, Insurance & Properties 5. Professional Services & Consultancy 6. Personal & Household Services 7. Entertainment Service ✓ Cinema & Theatre ✓ Family Entertainment Center ✓ Video Arcade / Console Game ✓ Karaoke

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LAND USE CLASS ORDER IN PUTRAJAYA

CLASS IV (A)	MAIN COMMERCIAL (PRESINT 2,3 & 4)	✓ Snooker & Billiard ✓ Bowling Center ✓ Theme Park / Water Theme Park ✓ Ice Skating Ring / Roller Blade 8. Cyber Centre / Internet Services 9. Health Services ✓ Health Business Center ✓ Fitness Center ✓ Physiotherapy Centre ✓ Dialysis Center ✓ Meditation Centre ✓ Complimentary Traditional Medical Center ✓ Spa ✓ Reflexology 10. Private Institution of Higher Learning ✓ Private Colleges ✓ Tuition Center ✓ Mind Development Centre ✓ Cultural Class (Dance / Singing / Aerobic) 11. Conference & Exhibition Facilities 12. Corporate Office 13. SOHO 14. Private Recreation Club 15. Bicycle Sales & Repair 16. Hotel & Services Accommodation ✓ Hotel ✓ Service Apartment ✓ Chalet 17. Medical Centre / Private Hospital 18. Kiosk 19. Expo Lot / Factory Outlet 20. Bazar 21. Video Recording Centre 22. Household Goods Rental 23. Duty Free Shop
		1. Retail Business / Convenience store ✓ Dry goods ✓ Wet goods ✓ Home & Office Products ✓ Education & Learning Needs ✓ Motor / Car Sales & Exhibition Rooms ✓ Vehicle Equipment ✓ Agricultural Equipment ✓ Rubber / Plastic (Retail) ✓ Artificial Limbs Products

APPENDIX 12

LAND USE CLASS ORDER IN PUTRAJAYA

CLASS IV (B)	SEMI-COMMERCIAL CENTRE	2. Business & Shopping Complex 3. Food Center ✓ Restaurant ✓ Cafeteria, Coffee Shop & Food Shop ✓ Outdoor café / Al-Fresco ✓ Fast Food Outlet ✓ Food Court ✓ Food Kiosk 4. Financial Institutions, Banking, Insurance & Properties 5. Professional & Consultancy Services 6. Personal & Household Services 7. Entertainment Services ✓ Cinema & Theatre ✓ Family Entertainment Centre ✓ Video Arcade/ Console Game ✓ Karaoke ✓ Snooker & Billiard ✓ Bowling Centre ✓ Theme Park / Water Theme Park ✓ Ice Skating Ring / Roller Blade 8. Cyber Centre / Internet Services 9. Health Service ✓ Health Care Centre ✓ Fitness Centre ✓ Physiotherapy Centre ✓ Dialysis Centre ✓ Meditation Centre ✓ Traditional Medicine Centre (Complimentary) ✓ Spa ✓ Reflexology 10. Private Institution of Higher Learning ✓ Private Colleges ✓ Private Universities ✓ Private Schools ✓ Tuition Centre ✓ Mind Development Centre ✓ Cultural Class (Dance / Singing / Aerobic) 11. Conference & Exhibition Facilities 12. Corporate Office
CLASS IV (B)	SEMI-COMMERCIAL CENTRE	

APPENDIX 12

LAND USE CLASS ORDER IN PUTRAJAYA

		13. SOHO 14. Private Recreational Club 15. Bicycle Sales & Repairs 16. Hotel & Services Accommodation ✓ Hotel ✓ Service Apartment ✓ Chalet 17. Medical Centre / Private Hospital 18. Kiosk 19. Expo / Factory Outlet 20. Coffins / Associated Goods Sales 21. '3S' & '4S' (Show Room, Sales, Service, Spare Parts) 22. Bazar 23. Video Recording Centre / Music / Studio 24. Household Goods Rental 25. Duty Free Shop
CLASS IV (C)	COMMERCIAL CENTRE NEIGHBOUR-HOOD	1. Miscellaneous Retail Sales / Convenience Stores ✓ Dry goods ✓ Wet goods ✓ Household Goods, Kitchen, Pottery, Glass, ✓ Decoration ✓ Electrical & Non-Electrical /Electronic ✓ Furniture ✓ Clothing ✓ Shoe Stores ✓ Cosmetics, Self-Care & Accessories & Medicine ✓ Stationery ✓ Clock Shop ✓ Sales & Repair Eye Glasses & Optical instruments ✓ Aquarium & Pet Shop ✓ Souvenirs
CLASS IV (C)	COMMERCIAL CENTRE NEIGHBOUR-HOOD	✓ Hardware goods ✓ Jewellery 2. Mini Market 3. Restaurant ✓ Restaurant ✓ Cafeteria

APPENDIX 12

LAND USE CLASS ORDER IN PUTRAJAYA

		✓ Outdoor café / Al-Fresco ✓ Food Court ✓ Food Kiosk 4. Bicycle Sales & Repair 5. Personal & Household Services ✓ Laundry & Dry Cleaning
CLASS IV (D)	LOCAL COMMERCIAL CENTRE	1. Retail Sales Miscellaneous / Convenience stores ✓ Dry goods ✓ Wet goods 2. Household Services ✓ Books, Stationery, Newspapers Agent & Magazine 3. Personal Service ✓ Barber Shops ✓ Hair Saloon ✓ Laundry & Dry Cleaning ✓ Pharmacies / Medicine Stores ✓ Tailor Shop ✓ Install / Sale / Repair Equipment ✓ Computer 4. Professional Services & Consultancy ✓ Medical Services (Private Clinic) 5. Restaurant ✓ Restaurant ✓ Cafeteria ✓ Outdoor café / Al-Fresco ✓ Food Kiosk 6. Bicycle Sales & Repair 7. Private Education Services / Tuition Centre 8. Cyber Centre / Internet Services 9. Kiosk 10.Mini Post 11.Private Care Services Centre: ✓ Elderly Care Center ✓ Disabled Care Centre ✓ Charity Care Centre Orphanage ✓ Student Transit Centre 12.Bazar
CLASS IV (D)	LOCAL COMMERCIAL CENTRE	
		1.Miscellaneous Retail

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LAND USE CLASS ORDER IN PUTRAJAYA

CLASS IV (E)	MIXED USE	✓ Dry goods ✓ Wet goods 2. Shopping Centre / Shopping Complex 3. Restaurant ✓ Restaurant ✓ Cafeteria ✓ Outdoor café / Al-Fresco ✓ Food Kiosk 4. Financial Institution, Banking, Insurance & Properties 5. Professional Services & Consultancy 6. Sales & Services for Personal & Household 7. Housing ✓ Medium Density Residential ✓ Medium High Density Residential ✓ High Density Residential
CLASS IV (F)	BUSINESS SUPPORT WITHIN APARTMENT	1. Retail Stores 2. Books, Stationery, Newspapers & Magazines 3. Laundry 4. Barber Shop & Beauty Salon 5. Tuition Classes 6. Sewing Classes 7. Limited Cafe 8. Bread & Cake Shop 9. Flower Shop 10. Guidance Class 11. Other Limited Business Support (For Apartments)

CLASS IV : SERVICE INDUSTRY		
CLASS LAND USE	MAJOR LAND USE	ACTIVITIES
CLASS V (A)	MOTOR REPAIR AND SERVICES	1. Motor Vehicle Equipment, Accessories & Spare Part (Sales & Installation) 2. Vehicle Workshop 3. Battery (Charge & Repair 4. Boat (Sales, Storage & Repair) 5. Car Wash & Polish (Services)

APPENDIX 12

LAND USE CLASS ORDER IN PUTRAJAYA

		6. Tyre Services Centre 7. Tyre - Includes Balancing & Tyre Alignment (Sales & Storage) 8. Workshop for Car, Motorcycle & Machinery 9. Installation of Air Conditioners to Motor 10. Vehicles 11. Bicycle Sales & Repair
CLASS V (B)	INSTALLATION	1. Furniture (Installation, Sales & Storage) 2. Rattan Store (Sales & Storage) 3. Frame (Sales, Storage & Manufacture) 4. Glass Cutting & Photo Framing
CLASS V (C)	FOOD AND BEVERAGE MANUFACTUR-ING	1. Bread Manufacturing (Large Scale) 2. Biscuit Industry 3. Water Bottling 4. Food Processing Industry 5. Other Activities: Food & Beverage 6. Production
CLASS V (D)	SERVICES	1. Printing (Small Scale) 2. Bus Station / Taxi / Monorail 3. Dry Cleaning 4. Electrical Appliances: Repair (Services) 5. Pest Control (Services) 6. Plumbing Services 7. Metallic Materials Sales & Repair 8. Scientific Instrument (Repair) 9. Tiles, Marble Slabs & Other Related Item 10. 'Point' & Related Materials 11. Sales & Storage 12. Welding Works
CLASS V (E)	FURNITURE PRODUCTION FOR EXHIBITION AND HOUSEHOLD	1. Furniture: Manufacture, Sales & Exhibition Centre 2. Rattan Furniture: Manufacture, Sales & Exhibition Centre
CLASS V (F)	WAREHOUSING AND STORAGE	1. Acetylene, Oxygen & LPG (Sales & Storage) 2. Amalgam, Alloy & Other Metals (Sales & Storage) 3. Manure (Sales & Storage) 4. Animal Feed (Sales & Storage) 5. Cables & Wires (Sales & Storage) 6. Charcoal, Coal & Other Related Materials (Sales & Storage) 7. Detergent, Cleaning Products & Other Related Matters (Sales & Storage)

APPENDIX 12

LAND USE CLASS ORDER IN PUTRAJAYA

		8. Embroidery Works (Sales & Storage) 9. Fiberglass Products (Sales & Storage) 10. Flammable Gas (Sales & Storage) 11. Godowns (Sales & Storage) 12. Hardware& Construction Products (Sales & Storage) 13. Agricultural Chemicals (Pesticides) (Sales & Storage) 14. Plywood (Sales & Storage)
CLASS V (G)	CUSTOMER SERVICE	1. Advertising Boards Services 2. Printing & Book Binding Services 3. Laundry Services 4. Electrical Appliances Repair Services 5. Pest Control Services 6. Plumbing Services 7. Tailoring Services 8. Leather Goods Products Services
CLASS V (H)	OTHER SERVICES	1. Construction Material / Hardware (Sales) 2. Tiles, Marbles Slabs & Other Related Matters (Sales & Storage) 3. Welding Works

APPENDIX 12

LAND USE CLASS ORDER IN PUTRAJAYA

CLASS VI: INFRASTRUCTURE AND UTILITIES		
CLASS LAND USE	MAJOR LAND USE	ACTIVITIES
CLASS VI (A)	ELECTRICITY	1. TNB Transformation Line 2. Main Intake Substations (PMU) 3. Substation Main Divider (PPU) 4. Electrical Substation (PE) 5. Feeder Pillar 6. Compact Sub Station 7. Gas Turbine TNB
CLASS VI (B)	WATER SUPPLY	1. Water Tank 2. Water Pump Station 3. Water Treatment Plant 4. Reserve Water Pipes
CLASS VI (C)	SEWERAGE	1. Sewerage Pump Station 2. Sewerage Treatment Plant
CLASS VI (D)	TELE-COMMUNICA-TION	1. Telecom Substation 2. Telecommunication Tower 3. Fibre Distribution House (FDH)
CLASS VI (E)	SOLID WASTE	1. Bin House 2. Recycling Centre (Collection) 3. Recycling Centre
CLASS VI (F)	GAS SUPPLY	1. Reserve Petronas Gas Pipeline 2. Reserve Multi Product Pipeline 3. District Gas Station 4. Area Gas Station
CLASS VI (G)	GAS DISTRICT COOLING (GDC)	1. District Cooling Centre
CLASS VI (H)	DRAINAGE	1. Drainage 2. Gross Pollutant Trap (GPT) 3. Oil & Grease Trap (OGT) 4. Water Catchment Pond
CLASS VI (I)	TRANSPORTA-TION	1. Monorail routes 2. Monorail Reserve / ERL 3. Monorail Station 4. Park & Ride 5. Bus station

APPENDIX 12

LAND USE CLASS ORDER IN PUTRAJAYA

CLASS VI (I)	TRANSPORTA-TION	6. Taxis Station 7. Bus & Taxi Lay-By 8. Parking Lots 9. Casual Berth / Jetty / Pontoon / Marina 10. Ferry Terminal
CLASS VI (J)	ROAD	1. Road Reserve 2. Emergency Lanes 3. Roundabout / Cul-De-Sac 4. Bridges 5. Maintenance Lane 6. Pass Over
CLASS VI (K)	COMMON UTILITY TUNNEL (CUT)	1. Cut 2. Cut Local Action Centre 3. Cut Ventilation Ducts
CLASS VI (L)	IRRIGATION	1. Irrigation Pump Station 2. Irrigation Pipe

CLASS VII : PUBLIC UTILITIES		
CLASS LAND USE	MAJOR LAND USE	ACTIVITIES
CLASS VII (A)	EDUCATION	1. Nursery (Taska) 2. Kindergarten / Pre-School 3. Primary School 4. Secondary School 5. School Complex (Primary & Secondary) 6. Sekolah Menengah Agama (SMA) 7. Sekolah Rendah Agama (SRA) 8. Public Colleges 9. Public Universities
CLASS VII (B)	HEALTH	1. Hospital 2. Community Clinic 3. Health Centre 4. OKU Centre (Government / Private) 5. Recovery Hospital 6. National Institute of Cancer

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LAND USE CLASS ORDER IN PUTRAJAYA

CLASS VII (C)	EMERGENCY & SAFETY SERVICES	1. Police Headquarters 2. Police Station 3. Police Posts 4. Police Beat 5. Fire Station 6. Marine Police 7. Calvary Units 8. Volunteer Booth 9. Neighbourhood Watch
CLASS VII (D)	RELIGIOS FACILITIES	1. Mosque 2. Surau 3. Other Religion 4. Mosque Complex & SRA 5. Surau Complex & SRA
CLASS VII (E)	OTHER FACILITIES	1. Community Halls 2. Library 3. Information Centre / Training 4. Civic & Culture Amenities 5. Public Toilets 6. Market 7. Food Court 8. Neighbourhood Complex 9. Pasar Malam / Pasar Tani Sites 10. Mini Sport Complex 11. Public Recreation Club (Swimming Pool, Gymnasium etc.) 12. Post Office 13. One-Stop Payment Centre 14. Vehicle Wash Centre 15. Reading Room 16. Administration Office 17. Maintenance Office 18. Swimming Pool 19. Kiosk 20. Recreation / Sport Centre 21. Water Recreation Centre 22. Piazza / Plaza 23. Facilities of Kites Area 24. Remote Control Model Facilities 25. Care Service Centre □ Child Care Centre □ Transit Centre Youth / Students □ Elderly Care Centre □ OKU Care Centre 26. Expo Area 27. Hostel

APPENDIX 12

LAND USE CLASS ORDER IN PUTRAJAYA

		28. Other Facilities
CLASS VII (F)	CEMETERY	1. Muslim 2. Non-Muslim 3. Funeral Facility 4. Crematorium 5. National Cemetery
CLASS VII (G)	URBAN SECVIVE CENTRE	1. Water Recreation Facilities 2. City & Art Gallery 3. Pasar Malam / Pasar Tani Area 4. Neighbourhood Complex 5. Bazar / Food Court 6. Information / Visitor Centre 7. Library 8. Office (Urban Service & Related) 9. Parking Lots Complex 10. Putrajaya Corporation Rest House 11. Exhibition Centre 12. Arcade 13. Training Centre 14. Putrajaya Corporation Depot 15. Putrajaya Corporation Warehouse / Store 16. One-Stop Payment Centre 17. Reading Room 18. Kiosk / Counter 19. Expo Area 20. Piazza / Plaza 21. Vocational Learning Centre & Incubator
CLASS VII (G)	URBAN SECVIVE CENTRE	

CLASS VIII : SPECIAL USE		
CLASS LAND USE	MAJOR LAND USE	ACTIVITIES
CLASS VIII (A)	TRANSPORTATION TERMINAL	1. Terminal Building for ERL, Monorail, 2. Bus & Taxi 3. Office & Retail Space 4. Budget Hotel 5. Parking / Station Park & Ride 6. Kiosk 7. Café
CLASS VIII (B)	PETROL STATION	1. Petrol, Diesel, NGV Sales 2. The Mart (Convenience Shop) / Café 3. Car Service Centre 4. Washing & Polishing Vehicle 5. Tire Service Centre

APPENDIX 12

LAND USE CLASS ORDER IN PUTRAJAYA

CLASS VIII (C)	SPORT & RECREATION CENTRE (PRESINT 7)	1. Recreation Park - Active & Passive Activities 2. In Line Skate skiing activities 3. Ease of Remote Control Model (Cars) 4. Go-Kart Centre 5. Open Fair & Expo Centre 6. Restaurant / Food Court 7. Gift Shop 8. Office of Management 9. Parking Lot 10. Driving Range 11. Circuit Traffic & Road Safety (Decare) 12. Mini Bike
CLASS VIII (D)	EDUCATION CENTRE	1. Private Colleges 2. Private University 3. Private School 4. Private Special Schools 5. International School 6. Private Kindergarten / Nursery Private
CLASS VIII (E)	EMBASSY	1. Embassy Office / Chancery 2. Embassy Residential 3. Visitor Centre
CLASS VIII (F)	DEPOT	1. Monorail Depot 2. Bus Depot 3. Multipurpose Depot 4. Kiosk 5. Café

APPENDIX 13

PAP/PCP CHECKLIST

SUBJECT	MARK (√) WHERE APPLICABLE
EROSION, SEDIMENT AND FLOOD CONTROL	
Silt traps……	
Silt Fence……	
Detention ponds……	
Catch drains……	
Earth bund……	
Slope protection……	
Open area protection……	
WASTE MANAGEMENT	
Biomass waste……	
Builders waste……	
Domestic waste……	
Scheduled (toxic) waste……	
Site toilet waste……	
Effluent waste……	
AESTHETICS	
Landscaping……	
Barrier Erection……	
Signboards……	
Cleanliness of site……	

APPENDIX 14

ENVIRONMENTAL MONITORING GUIDELINES FOR CONTRACTORS

The Environmental Monitoring Guidelines for Contractors are prepared to provide the general guidelines on the monitoring parameters and methodologies to be used by contractors for EMP, EMR, EMCP and EMAR requirements.

1.0. NOISE

1.1. Parameters

Construction noise levels shall be measured in terms of the A-weighted equivalent continuous sound pressure level (L_{Aeq}). L_{Aeq} (24 hours) shall be used as the monitoring parameter for the time period of construction activity in any one day. This procedure involves the continuous sampling of instantaneous sound pressure level for the entire duration of a day (0700 to 2200 hours) and/or night (2200 to 0700 hours) to obtain the day time L_{Aeq} day, 15h and night time L_{Aeq} night, 9h.

The statistical centile levels (L_{10},L_{90} and L_{max}) shall also be undertaken with continuous sampling for the entire period of interest.

1.2. Monitoring Equipment

The measurement shall be made with a precision sound level meter which complies with the requirements of the IEC Publications 60651, 60804 and 61672 or thereafter, for the type of meters in Class 1. The “A” weighting network, and “fast” time weighting response shall be used for sound pressure level measurements for equivalent Leq and statistical centile readings.

Measurement for statistical centile levels (L_{10} , L_{90}) and maximum instantaneous level (L_{max}) shall be made using a sound level meter installed with statistical analysis functions, or alternatively computed from continuously monitored instantaneous sound pressure levels using data acquisition system for the stipulated time period.

Measurement for blasting and other explosion related activities shall be made using linear weighting network (dB Linear) for a peak value (“peak” time constant setting) with a “maximum hold” function of the sound level meter.

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ENVIRONMENTAL MONITORING GUIDELINES FOR CONTRACTORS

Other supplementary measurement(s) of impulsive sound, for the purpose of reporting and record keeping, shall be measured using an “impulse” time weighting response.

If a graphic level recorder is used the recorder shall be set with a writing speed which most closely approximates the “fast” time weighting response (for example, a writing speed of 100mm/s for a chart width of 50 mm).

The calibration of sound level meter shall be checked and adjusted according to the manufacturer’s instructions or with a standard sound source (for example a pistonphone) at the beginning and at the end of each series of measurements. If the errors of the sound level meter obtained from these calibrations deviates by more than 1dB during a series of measurements, the measured result shall be considered invalid.

A wind shield approved by the microphone manufacturer shall be used. Measurements cannot normally be made if the wind speed exceeds 5m/s at the microphone position. For continuous remote monitoring, the wind speed shall be monitored concurrently with the sound levels.

1.3. Monitoring Locations

According to The Planning Guidelines for Environmental Noise Limits and Control published by Department of Environmental (DOE), measurement shall be made at all strategic locations representative of the entire real property boundary, at all locations affecting the community. These shall include but are not limited to locations at closest proximity to the sound source(s) affected by the noise of these source(s).

Readings should also be taken at each site located adjacent to sensitive receptors (residential areas, roads, schools, any place where people congregate for business, pleasure or other purpose).

If there is a problem with access to the normal monitoring position, an alternative position may be chosen, and a correction to the measurement shall be made. For reference, a correction of +3 dB(A) shall be made to the free field measurements.

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1.4. Baseline Monitoring

The Contractor shall carry out a baseline noise monitoring prior to the commencement of the construction work. A schedule on the baseline monitoring shall be included in the EMP or EMR during the planning stage. There shall be no construction activities in the vicinity of the stations during the baseline monitoring.

The monitoring results shall be included in the EMCP which must be submitted prior to construction.

1.5. Noise Monitoring During Construction

Noise monitoring shall be carried out on monthly basis during the construction period. Monitoring duration when noise generating activities are underway is one set of measurements for the entire duration of a day (0700 to 2200 hours) and/or night (2200 to 0700 hours).

Sampling should be conducted as stated in The Planning Guidelines for Environmental Noise Limits and Control (DOE).

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ENVIRONMENTAL MONITORING GUIDELINES FOR CONTRACTORS

2.0 VIBRATION

2.1 Parameters

Vibration measurements are often necessary either to assess the existing vibration climate, to assess the vibration compliance limit for vibration generation source(s) and/or project development or to assess the environmental impact and potential community response.

There are 3 parameters to measure vibration:

- x direction – forward facing direction
- y direction – transverse direction
- z direction vertical direction of a building or person

Measurement length was suggested between 20min to 30min either for steady or short term vibrations. Continuous monitoring over a complete 24-hour cycle may be required in the event that human annoyance and response are of concern.

2.2 Monitoring Equipment

Transducer used in vibration monitoring shall be in compliance to IEC Publication 184, and auxiliary equipment incompliance to IEC Publication 222.

Vibration frequency analyser or signal analyser shall be used for vibration frequency analysis in the frequency range 1 to 100 Hz minimum.

All vibration measuring equipment shall be properly calibrated in accordance with current standards and thereafter, or recommendations governing the calibration of such equipment in accordance to the equipment manufacturer's instructions.

2.3 Monitoring Locations

The vibration assessment should normally be at the nearest building and/or locations; and the best position for the monitoring point(s) would often be on the floor slab or foundation. Monitoring points should be accessible to all parties concerned.

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2.4 Baseline Monitoring

The Contractor shall carry out a baseline vibration monitoring prior to the commencement of the construction works. A schedule on the baseline monitoring shall be included in the EMP or EMR during the planning stage. The vibration measurements must be included in the EMCP which must be submitted prior to construction.

The baseline (ambient) vibration levels should be undertaken in the absence of the source(s) operating (for example with a plant not operating, or without construction activities).

2.5 Vibration Monitoring During Construction

Vibration monitoring shall be carried out on monthly basis during the construction period. Monitoring duration when noise generating activities are underway is 20 min to 30 min of measurements during construction.

Sampling should be conducted as per DOE requirements.

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ENVIRONMENTAL MONITORING GUIDELINES FOR CONTRACTORS

3.0 AIR QUALITY MONITORING

3.1 Parameters

Air quality monitoring parameters which include particulate matter (PM_{10}), carbon monoxide (CO), total suspended particulates (TSP), nitrogen oxides (NO_x) and sulphur oxides (SO_x) shall be measured to ensure that any significant deterioration in air quality is readily detected and action shall be taken to rectify the situation.

All relevant data including temperature, pressure, weather conditions, elapsed time meter reading for the start and stop of the sampler, identification and weight of the filter paper, construction activities being undertaken and other special phenomena shall also be reported.

3.2 Monitoring Equipment

High volume samplers (HVS) shall be used. Sufficient number must be available depending on the number of monitoring locations. The HVSs shall be equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals.

Initial calibration of dust monitoring shall be conducted upon installation and thereafter at fortnightly intervals. The calibration data shall be properly documented for future reference. All data shall be converted into standard temperature pressure condition.

The flow rate of the sampler before and after the sampling exercise with the filter in position shall be verified to be constant and be recorded.

3.3 Laboratory Analysis

A clean laboratory with constant temperature and humidity control, and equipped with the necessary measuring and conditioning instruments, to handle the samples collected, shall be available for sample analysis, equipment calibration and maintenance.

Twenty four (24)-hour TSP amounts shall be measured to indicate the impacts of construction dust on air quality. TSP monitoring methodology shall be measured

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using a standard high volume sampler and concentrations determined using the standard specification APHA 111.1-01-70T. NO_x and SO_x shall be monitored using an air sampling pump with pollutant analysis capability while their concentrations shall be determined using the standard specification APHA 42603-01-70T and APHA 42401-01-69T respectively.

Sample collection and analysis shall be conducted by the laboratory(s) chosen to undertake the monitoring and approved by the ED . The laboratory must be accredited by SAMM.

All collected samples shall be kept in good condition for 1 month before disposal.

3.4 Monitoring Locations

Generally, monitoring locations must be selected based on the following criteria:

1. At the site boundary or locations that are close to the major pollutant source
2. Close to the identified sensitive receptors.
3. Take into account the prevailing meteorological conditions,

When positioning the samplers, the following factors shall be observed:

1. A horizontal platform with appropriate support to secure the samplers;
2. No two samplers shall be placed less than 2 meters apart;
3. The distance between a sampler and an obstacle must be at least twice the height that the obstacle protrudes above the sampler;
4. Airflow around the sampler is unrestricted.

3.5 Baseline Sampling

The Contractor shall carry out the baseline air quality monitoring prior to the commencement of the construction works. The baseline monitoring details shall be included in the EMP or EMR prior to construction work. The ambient air measurement must be included in the EMCP.

There shall be no construction activities in the vicinity of the stations during the baseline monitoring.

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3.6 Air Quality Monitoring During Construction Stage

Air quality monitoring shall be carried out on monthly basis throughout the construction period. The monitoring frequency shall depend on the scale of the construction activities. Standard air quality monitoring for TSP and PM_{10} is 24 hours, CO shall be carried out on 8-hour average while SO_x and NO_x shall be carried out on an hourly basis.

The specific time to start and stop monitoring shall be clearly defined for each location and be strictly followed by the operator.

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4.0 WATER QUALITY MONITORING

4.1 Parameters

4.1.1 Baseline (Ambient) Water Quality Monitoring

Prior to construction, the following water quality parameters are to be collected and included in the EMCP.

In-situ

- pH
- Temperature
- Dissolved oxygen (DO)
- Turbidity
- Salinity
- Water Flow

Lab Analysis

- Biochemical Oxygen Demand (BOD_5 at 20^0C)
- Chemical Oxygen Demand
- Total Suspended Solids
- Oil & Grease
- Total Coliform
- *E. Coli*
- Ammoniacal Nitrogen
- Arsenic
- Boron
- Cadmium
- Chromium, Hexavalent
- Chromium, Trivalent
- Cyanide
- Copper
- Free Chlorine
- Iron
- Lead

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- Manganese
- Mercury
- Nickel
- Phenol
- Sulphide
- Tin
- Zinc
- Organochlorine Pesticides

The sampling should be repeated on a six monthly basis if the construction period is more than six months and these shall be reported in the EMAR.

4.1.2 Construction Phase

The water quality parameters to be monitored during construction phase on a monthly basis are as listed below:

In-situ

- pH
- Temperature
- Dissolved oxygen (DO)
- Turbidity
- Salinity
- Water Flow

Lab Analysis

- Biochemical Oxygen Demand
- Chemical Oxygen Demand
- Total Suspended Solids
- Oil & Grease
- Total Coliform
- *E.Coli*
- Ammoniacal Nitrogen
- Nitrogen
- Phosphorus

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- Potassium
- Organochlorine Pesticides

Water samples must also be collected on a fortnightly basis at silt traps discharge outlets to test for Total Suspended Solids (TSS). The discharge from the silt traps must not contain TSS exceeding 50mg/l.

4.2 Monitoring Equipment

All *in-situ* monitoring instrument shall be checked, calibrated and certified by laboratories accredited under SAMM before use, and subsequently re-calibrated at 3 monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes should be checked with certified standards solutions before use. Wet bulb calibration for DO meters shall be carried out before measurement at each monitoring location.

Sufficient stocks of spare parts should be maintained for replacements when necessary. Backup monitoring equipment shall also be made available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration, etc.

The EMU/EU will review proposals for the use of monitoring equipment to ensure that they are suitable. Monitoring equipment proposals must be accepted by ED/EU prior to commencement of the monitoring programme.

All samples must be labelled; a sampling collection and a chain of custody schedule shall be designed for use.

Dissolved oxygen and temperature measuring equipment:

The instrument should be portable. Weatherproof and complete with cable, sensor, comprehensive operation manuals and use of a DC power source. It should be capable of measuring;

a) a dissolved oxygen level in the range of 0-20 mg/l and 0-200% saturation, and

b) a temperature of 0-45^{0}C

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It should have a membrane electrode with automatic temperature compensation complete with a cable. Sufficient stocks of spare electrodes and cables should be available for replacement where necessary (eg. YSI model 59 meter, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument).

Water Sampler

A water sampler shall be used for water quality sampling comprises of a transparent PVC cylinder with a capacity not less than 2 litres, and can be effectively sealed with latex cups at both ends. The sampler shall have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth (eg. Kahlsico Water Sampler or an approved similar instrument).

Water Depth detector

A portable battery-operated echo sounder should be used for the determination of water depth at each designated monitoring station. This unit can either be handheld or affixed to the bottom of the work boat, if the same vessel is to used throughout the monitoring programme.

4.3 Laboratory Analysis

The laboratory must be accredited by Skim Akreditasi Makmal Malaysia (SAMM), the Laboratory Accreditation Scheme of Malaysia. Analytical protocols should be conducted in accordance with the *"Standard Methods for the Examination of Water and Wastewater"* published jointly with the American Public Health Association, the American Water Works Association and the Water Pollution Control Federation of the United States, or *"Code of Federal Regulations"* published by the Office of the Federal Register, National Archives and Records Administration, United States of America, in accordance with the Fourth Schedule of the Environment Quality (Industrial Effluents) Regulations, 2009 and Environmental Quality (Sewage) Regulations 2009.

Analysis protocols should be included in the EMP or EMR during the Planning Stage.

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If a site laboratory is to be set-up for carrying out the laboratory analysis, the laboratory equipment, analytical procedures, and quality control shall be approved by the DOE prior to commencement of monitoring programme. If in-house or non-standard methods are proposed, the details of the method verification may also be required to submit to DOE. In any circumstances, the sample testing should have comprehensive quality assurance and quality control programme. The laboratory should be prepared to demonstrate the programme to ED/EU when requested.

4.4 Monitoring Locations

Control stations shall be located within the site as the impact monitoring stations but should be outside the area of influence of the works and, as far as practicable, not affected by any other works.

Water should be taken at mid-depth level.

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5.0 GROUNDWATER MONITORING

Groundwater monitoring is required for projects that have the potentials to contaminate groundwater for example petrol station.

5.1 Parameters

The parameters selected for analysis should reflect the nature of the investigation and/or the former, current, and proposed future use of the site. Consideration should also be given to baseline or natural groundwater quality and its variation. Elevated concentrations can already be present in the environment being investigated as a result of natural sources of contamination.

Groundwater monitoring samples will be analysed for the following parameters and compared to the National Guidelines for Raw Drinking Water Quality (Ministry of Health, 2000):

Parameter	Symbol	Unit	Benchmark
Sulphate	SO4-	mg/l	250
Hardness	CaCO3	mg/l	500
Nitrate	NO3-	mg/l	10
Coliform	–	–	Must not be detected in any 100 ml sample
Manganese	Mn	mg/l	0.1
Chromium	Cr	mg/l	0.05
Zinc	Zn	mg/l	3
Arsenic	As	mg/l	0.01
Selenium	Se	mg/l	0.01
Chloride	Cl	mg/l	250
Phenolics	–	mg/l	0.002
TDS	–	mg/l	1000

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Iron	Fe	mg/l	0.3
Copper	Cu	mg/l	1.0
Lead	Pb	mg/l	0.01
Cadmium	Cd	mg/l	0.003
Mercury	Hg	mg/l	0.001

5.2 Monitoring Equipment

Groundwater monitoring wells should be constructed of inert material; typically polyvinyl chloride (PVC). Conventional solvent glues should not be used because they could introduce chemicals into the water and would affect interpretation of sampling results. Instead, mechanical screw fittings should be used on all casing and screen joints. If necessary, screen and casing should be adequately cleaned to remove trace contaminants.

Screen lengths and slot size should be determined on site, under the supervision of qualified geologist or hydro geologist, after drilling has established the location of the water-bearing zone. Slot sizes should be selected based on the geology at the site. The slots should be small enough to prevent subsurface material from entering the well yet large enough to not impede groundwater or product flow.

In general, a nominal slot width of 0.5 mm with 2 rows of slots per screen length and average spacing of 5 mm and between slots is adequate. The slots should be machined and the machines cutting removed before the screen is employed. A minimum of 0.5 m of unslotted casing with a well end cap should be provided below each screen, to act as a sump for collection of any fines that may pass through the screen.

5.3 Monitoring Locations

The number and location of groundwater monitoring wells will depend on the assessment plan. The placing of wells and well design should be performed under the supervision of a registered Environmental Site Assessor or Registered Contaminated Land Manager. Consideration must be given to:-

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- Potential or known sources (e.g Tanks, piping, etc.)
- Confidence in Conceptual Site Model (e.g Flow Direction)
- Potential upstream sources (necessity background monitoring)
- Anticipated spread of contamination
- Bore separation to determine hydraulic gradient

Well locations and completion depth should be selected to ensure that all probable contaminant flow paths are monitored.

5.4 Baseline Monitoring

Groundwater purging and sampling will be undertaken at the newly installed wells 48 hours after the installation. Prior to the commencement of purging and sampling activities, all monitoring wells will be gauged for groundwater levels and the presence of phase-separated hydrocarbon (PSH) using an oil-water interface probe capable of measuring to ± 1 mm.

Prior to collection of samples, groundwater in all monitoring wells will be purged. Purging is considered complete once the field parameters (temperature, pH, redox potential, EC) have stabilized or until the wells are fully purged dry, whichever is achieved first. Stabilization is considered to be achieved when three consecutive measurements yielded readings which are within a range of ± 10%. However in the event when the readings do not stabilize, purging will cease after a maximum of five well volumes have been purged before proceeding to collect the sample.

Where purging results in a well becoming dry, the well will be left to recover prior to collecting water. One disposable bailer for each well will be used for purging and sample collection to prevent cross-contamination between the wells.

Samples for dissolved metals will be pre-filtered in the field using a 0.45 µm filter unit. All bottles will be labelled, placed in ice and dispatched immediately to the laboratory under a chain-of-custody (COC) form for analysis.

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5.5 Laboratory Analysis

The types of analyses to be performed on groundwater samples collected at impacted sites are based on the objectives of the assessment and should be performed in accordance with recognized method such as United States Environmental Protection Agency (USEPA) Test Methods and American Public Health Association Standard (APHA) Methods.

6.0 SOIL SAMPLING

Soil sampling is required for projects that have the potentials to contaminate the soil such as petrol station.

6.1 Parameters

Parameters for soil sampling are divided into 3 types of test. There are:-

Classification:

Moisture Content
Atterberg Limits
Particle Size Distribution
Bulk Density

Chemical Test:

pH Value
Sulphate Content
Total Sulphate Content
Organic Matter
Cloride Content

Strength Test:

UU Triaxial Compression
CU Triaxial Compression
One Dimensional Consolidation

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6.2 Monitoring Equipment

Soil samples may be recovered using a variety of methods and equipment, depending on the portion of the soil profile required, the type of sample required and the soil type.

Soil is collected directly using a hand-held device such as hand scoop, auger or a post hole digger, or indirectly using a power activated device such as power augers, back hoes or drill rigs (USEPA, Field Sampling Guidance Document).

6.3 Monitoring Locations

Typically, sampling locations will be placed at the area suspected with subsurface contamination or at down gradient locations to the suspected contaminated area. It is also recommended to consider placing of sampling location at both gradient and down gradient of the site to determine the background level of contaminants concentrations and the boundary concentrations for comparison purposes.

6.4 Soil Boring Technique

All the procedures will adhere to the standard practice. All boreholes will be drilled manually using a hand auger to approximately 1 to 2 m below ground surface (bgs) to ensure each drilling location is clear of underground cables and pipelines.

In order to perform this task, professional driller will be engaged for the environmental drilling works.

6.5 Laboratory Analysis

The types of analyses to be performed on soil samples collected at impacted sites are based on the objectives of the assessment and should be performed in accordance with recognized method such as United States Environmental Protection Agency (USEPA) Test Methods and American Public Health Association Standard (APHA) Methods.

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RECOMMENDED EMCP FORMAT

1. INTRODUCTION

1.1 Environmental Project Manager/Officer
1.2 Project Description
1.3 Construction Programme

2. COMPLIANCE REQUIREMENTS

2.1 List of Environmental Compliance Requirements
2.2 Environmental Pollution Control Table for the Project

3. POLLUTION CONTROL

3.1 Title of each Specific Implementation Procedure

4. EMERGENCY PREPAREDNESS AND RESPONSE

4.1 List of Likely Emergencies
4.2 Title of each Specific Emergency Procedure
4.3

5. ENVIRONMENTAL MONITORING AND AUDIT

5.1 Monitoring Programs
  5.1.1 Water Quality (if applicable)
  5.1.2 Air Quality (if applicable)
  5.1.3 Noise Levels (if applicable)
5.2 Audit Checklists for the Project
5.3 Audit Compliance Table for the Project
5.4 Title of each Specific Audit Requirement

6. REPORTING

6.1 External Reports
6.2 Internal Reports

7. RECORDS

7.1 Records Management System

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RECOMMENDED EMCP FORMAT

8. ROLES AND RESPONSIBILITIES

8.1 Organisation Chart
8.2 Project Manager
8.3 Environmental Project Manager/Officer
8.4 Other Supervisory Staff

9. LIST OF APPENDICES

9.1 Site and Location Plan
9.2 Construction Programme
9.3 Monitoring Location Plant

APPENDIX 16

RECOMMENDED EMAR FORMAT

Project Proponent : _____
Project Name : _____
Project Location
(Precint No.) : _____
Project Contractor : _____
Report No.
(Month/Year-Serial No)
e.g. 5/98-5 : _____
Audit Date/Time
e.g. 18.5.98/10am : _____
Submitted by
(Name of officer) : _____

I. Compliance Audit Checklist

SUBJECT		Please Mark √			
		Comply	Not Comply		Not Relevant
			Minor	*Major*	
1.0	**ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)**				
1.1	Changes in the EMS				
1.2	Effective discharge of environmental monitoring responsibilities				
1.3	Compliance with reporting requirements				
1.4	Compliance with record-keeping requirements				
2.0	**EROSION, SEDIMENT AND FLOOD CONTROL**				
2.1	Silt traps maintenance				
2.2	Silt fence maintenance				
2.3	Detention ponds maintenance				
2.4	Catch drains maintenance				
2.5	Earth bund maintenance				
2.6	Slope protection				
2.7	Open area protection				
3.0	**TRAFFIC CONTROL**				
3.1	Traffic management system				
3.2	Conditions of roads leading to site				
3.3	Conditions of roads leading out of site				
3.4	Vehicle maintenance – noise and air pollution control				
3.5	Vehicle operations – wheel cleaning, effective cover and proper operations				
3.6	Wash trough maintenance				

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4.0	**WASTE MANAGEMENT**				
4.1	Biomass management system				
4.2	Builders waste management system				
4.3	Domestic waste management system				
4.4	Scheduled (toxic) waste management system				
4.5	Site toilet waste management system				
4.6	Effluent waste management system				
5.0	**SITE HOUSE-KEEPING**				
5.1	Earth stockpile				
5.2	Liquids stockpile				
5.3	Building materials stockpile				
5.4	Canteen/Site Office				
5.5	Working area				
6.0	**WATER QUALITY CONTROL**				
6.1	Silt trap discharge				
7.0	**AIR QUALITY /CONTROL**				
7.1	Vehicle e mission				
7.2	Machinery emission				
8.0	**NOISE LEVELS CONTROL**				
8.1	Vehicle noise				
8.2	Machinery noise				
8.3	Human activities noise				

II. Monitoring Results and Copies of Documents/Records

1. Monitoring Results
   (a) Water Quality
   (b) Air Quality
   (c) Noise Levels

2. Copies of Documents/Records
   (a) Changes in EMS. If there are changes, the appropriate revised documents should be submitted.
   (b) Copies of receipts (such as waste disposal receipts, etc) and self audit checklists pertinent to the items in the compliance audit checklists.

3. Photo Records
   Provide 6 selected colour photos (2 photos per A4 page), with appropriate captions. The photos should indicate the site conditions for selected items in the compliance audit checklist.

APPENDIX 16

RECOMMENDED EMAR FORMAT

III. Non-Compliance Reports (NCR)

1. List of Non-Compliance Reports
   For every non-compliance indicated in the checklist above a non-compliance report has to be prepared. A list of the non-compliance for the current audit and a chronology list previous non-compliance should be prepared as indicated below.

No.	Audit Item	NCR No.	Date issued
1.	Silt traps maintenance	NCR 5/98-5(17)	18.5.98
….			
….			
5.	Machinery Noise	NCR /98-(21)	18.5.98
….			
1.	Record keeping compliance	NCR 2/98-2(1)	13.2.98
…. ….			
13.	Vehicle Noise	NCR 4/98-4(13)	14.4.98
….			

2. Compilation of current NCR
   For every non-compliance an NCR has to be prepared in accordance with the recommended NCR format given in Appendix 18. The NCR should be compiled here and submitted as part or the EMAR.

APPENDIX 17

RECOMMENDED NON-COMPLIANCE REPORT FORMAT

NON-CONFORMANCE REPORT (NCR)	
NCR REF: *NCR 5/98-5(7)*	**Date Issued:** *23 May 1998*
Name of Contractor: ABC Construction Sdn Bhd	
Site Location : Precinct 16	
Audit Area : Silt Traps Maintenance	
Description of Non-Compliance: *1. Silt trap riser clogged* *2. Silt trap needs desilting* Issued by:	Acknowledged by:
Corrective Actions (CA): *1. To unclog riser* *2. To desilt silt-trap* CA Agreed by:	Target Completion Date:
Follow-Up/Verification of CA: Verified by:	Date:

APPENDIX 18

RECOMMENDED EMP FORMAT

1. INTRODUCTION

1.1 Project Background

2. ROLES AND RESPONSIBILITIES

2.1 Environmental Management Team
2.2 Roles and Responsibilities of Key Parties
2.3 Communication
2.4 Training

3. ENVIRONMENTAL REQUIREMENTS

3.1 EIA Approval Conditions
3.2 EMP Approval Conditions
3.3 Environmental Legislation and Requirements
3.4 Environmental Auditing and Review
3.5 Reports
3.6 Written Approval

4. ENVIRONMENTAL MONITORING AND AUDITING PROGRAMME

4.1 Water Quality Monitoring
4.2 Air Quality Monitoring
4.3 Noise Monitoring
4.4 Groundwater Monitoring
4.5 Environmental Auditing

5. SIGNIFICANT IMPACTS AND POLLUTION CONTROL MEASURES

5.1 Air Quality
5.2 Noise Emission
5.3 Water Quality
5.4 Solid Waste Management
5.5 Scheduled Waste Management
5.6 Traffic and Transportation
5.7 Health and Safety & Risk Management
5.8 Project Closure (Abandonment)
5.9 Administration

6. ENVIRONMENTAL CONTINGENCY PLAN

6.1 Fire Outbreak
6.2 Road/Traffic Accident
6.3 Worst Case Spills Scenario
6.4 Post Spill Procedure

APPENDIX 18

RECOMMENDED EMP FORMAT

7. CONCLUSION

8. LIST OF APPENDICES

8.1 Earthwork Planning Plan
8.2 Environmental Mitigation Plan
8.3 Supported Letter From

There are 3 related tables in EMP which are:

TABLE	ACTION / RESPONSIBILITY
A	TYPICAL ENVIRONMENTAL PLANNING COMPLIANCE TABLE FOR EACH PROJECT COMPONENT
B	TYPICAL ENVIRONMENTAL POLLUTION CONTROL TABLE FOR EACH PROJECT COMPONENT
C	TYPICAL ENVIRONMENTAL AUDIT TABLE FOR EACH PROJECT COMPONENT

TABLE A

TYPICAL ENVIRONMENTAL PLANNING COMPLIANCE TABLE FOR EACH PROJECT COMPONENT

ENVIRONMENTAL CONCERNS	COMPLIANCE REFERNCE	COMPLIANCE MEASURES
A. IMPACT ON PHISICAL ENVIRONMENTAL 1. Land Structure (a) ..... (b) ..... 2. Topography (a) ..... (b) ..... 3. Natural streams/ground water (a) ..... 4. Flora (a)		

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(b) ..... 5. Fauna (a)		
B. IMPACT ON AIR QUALITY 1. ..... 2. ..... 3.		
C. IMPACT ON WATER QUALITY 1. ..... 2.		

TABLE B

TYPICAL ENVIRONMENTAL POLLUTION CONTROL TABLE FOR EACH PROJECT COMPONENT

PROJECT ACTIVITIES	COMPLIANCES REFERENCE	CONTROL MEASURES
1. Earthworks (a) ..... (b) ..... 2. Erosion, sedimentation and flood (a) ..... (b) ..... 3. Water pollution (a) ..... (b) ..... 4. Air pollution (a) ..... (b) ..... 5. Noise pollution (a) ..... 6. Liquid waste (non-scheduled) (a) ..... 7. Solid wastes (non-scheduled) (a)		

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(a) ..... 8. Agrochemicals (a) ..... 9. Health (a)		

TABLE C

TYPICAL ENVIRONMENTAL AUDIT TABLE FOR EACH PROJECT COMPONENT

AUDIT ITEMS	COMPLIANCE REFERENCE	COMPLIANCE REQUIREMENTS
A. CONTRUCTION STAGE 1. Environmental Management System (a) ..... (b) ..... 2. Erosion, Sediment and Flood Control (a) ..... (b) ..... 3. Traffic Control (a) ..... (b) ..... 4. Waste Management (a) ..... (b) ..... 5. Site House-keeping (a) ..... 6. Water Quality Control (a) ..... (b) ..... 7. Air Quality Control (a) ..... (b) ..... 8. Noise Levels Control (a)		
B. OPERATION STAGE 1. Environmental Management System (a)		

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(b) ..... (c) ..... 2. Waste Management (a) ..... (b) ..... 3. Water Quality (a) ..... (b) ..... 4. Air Quality (a) ..... (b) ..... 5. Noise Levels (a)		

APPENDIX 19

EMP FORMAT FOR OPERATION STAGE

1 **INTRODUCTION**

1.1 Project Background

2. ENVIRONMENTAL POLICY

3. ROLES AND RESPONSIBILITIES

3.1 Environmental Management Team
3.2 Roles and Responsibilities of Key Parties
3.3 Communication
3.4 Training

4. ENVIRONMENTAL REQUIREMENTS

4.1 EIA Approval Conditions
4.2 EMP Approval Conditions
4.3 Environmental Legislation and Requirements
4.4 Environmental Auditing and Review
4.5 Reports
4.6 Written Approval

5. ENVIRONMENTAL MONITORING AND AUDITING PROGRAMME

5.1 Water Quality Monitoring
5.2 Air Quality Monitoring
5.3 Noise Monitoring
5.4 Groundwater Monitoring
5.5 Environmental Auditing

6. SIGNIFICANT IMPACTS AND POLLUTION CONTROL MEASURES

6.1 Air Quality
6.2 Noise Emission
6.3 Water Quality
6.4 Solid Waste Management
6.5 Scheduled Waste Management
6.6 Traffic and Transportation
6.7 Health and Safety & Risk Management
6.10 Project Closure (Abandonment)
6.11 Administration

APPENDIX 19

EMP FORMAT FOR OPERATION STAGE

ENVIRONMENTAL CONTINGENCY PLAN

7.1 Fire Outbreak
7.2 Road/Traffic Accident
7.3 Worst Case Spills Scenario
7.4 Post Spill Procedure

8. CONCLUSION

APPENDIX 20

RECOMMENDED EMR FORMAT

1. INTRODUCTION

1.1 Project Description
1.2 Existing Environment that may be affected

2. CONDITIONS OF LAYOUT PLAN APPROVAL

2.1 List of Conditions Approval

3. ENVIRONMENTAL PLANNING

3.1 Project Components (based on contract work packages)
3.2 Environmental Planning Compliance Tables (see Table A, Appendix 18)

4. ENVIRONMENTAL MANAGEMENT-CONSTRUCTION STAGE

4.1 Environmental Pollution Control Tables – Construction Stage (see Table B, Appendix 18)
4.2 List of likely emergencies (for each project component)

5. ENVIRONMENTAL MANAGEMENT – OPERATION STAGE

5.1 Environmental Pollution Control Tables – Operation Stage (similar to Tables B, Appendix 18)
5.2 List of likely emergencies (for each project component)

6. ENVIRONMENTAL MONITORING AND AUDIT

6.1 Monitoring Programs
- 6.1.1. Water Quality (If applicable)
- 6.1.2. Air Quality (If applicable)
- 6.1.3. Noise Levels (If applicable)

6.2 Audit Checklists
6.3 Audit Compliance Tables (see Table C, Appendix 18)

7. LIST OF APPENDICES

7.1 Earthwork Planning Plan
- 7.3.1. Existing contour
- 7.3.2. Proposed contour
- 7.3.3. Proposed cut & fill
- 7.3.4. Final level
- 7.3.5. Final slope
- 7.3.6. Source of reclamation
- 7.3.7. Volume of cut & fill
- 7.3.8. Stockpile location
- 7.3.9. Permanent / temporary drainage system
- 7.3.10. Silt trap, silt fence and reservoir
- 7.3.11. Retaining wall

APPENDIX 20

RECOMMENDED EMR FORMAT

7.2 Environmental Mitigation Plan
- 7.3.1. Location of receptor and monitoring station (water, air and noise)
- 7.3.2. Logistic route plan and location of wash trough
- 7.3.3. Location of grass/hydroseed
- 7.3.4. Location of oil and grease trap
- 7.3.5. Location of river and related water body/ies
- 7.3.6. Location of service and diesel storage
- 7.3.7. Zone and phases plan (If related)

7.3 Letter of approval from related agencies
- 7.3.1. Department of Environmental
- 7.3.2. Endorsement letter
- 7.3.3. Others

APPENDIX 21

SELF-COMPLIANCE FORM

ENVIRONMENT, LAKES AND WETLAND DIVISION

SELF - COMPLIANCE FORM

Project : ……

……

……

Sir / Madam,

I hereby certify that I will take all pollution control measures and "Best Management Practices' to ensure that the development under my surveillance would not cause pollution to the environment. I accept full responsibility for the development under my surveilance.

Acknowledged by:

Signature	:	……..
Name	:	……
Designation	:	……
Identification Number	:	……
Professional Identification Number	:	……
Active Address	:	……..
		……..
		……..
Date of Submission	:	..... / …… / ……

APPENDIX 21

SELF-COMPLIANCE FORM

1. A minimum requirement to submit Self-Compliance Form are:

   a. Projects of less than or equivalent to 0.5 acre or equivalent to three (3) storey. However this exemption is not applicable to projects adjacent to or in proximity promenade to the Putrajaya Lake and Wetland and projects on slope of greater than 35º (Table A)

Table A : Allowable Slope by Department of Town and Country Planning

Class	Allowable Slope	Consideration
I	<15º	Can be considered for all types of development subject to Perbadanan approval
II	15 º – 25 º	Allow to only : - High density residential (40 – 80 unit/acre) - Tier commercial (Plot ratio : 1:2) - Free standing office (Plot ratio : 1:5) - Tourism (Hotel (Plot ratio : 1:5), Chalet (Plot ratio : 1:0.5)) - Training institute (Plot ratio : 1:0.5) - Public Institutional which is based on requirement and catchment
III	25º – 35 º	Allow to only : - Medium density residential (7 – 39 unit/acre) - Tier commercial (Plot ratio : 1:2) - Free standing office (Plot ratio : 1:2) - Tourism (Hotel (Plot ratio : 1:2), Chalet (Plot ratio : 1:0.5)) - Training institute (Plot ratio : 1:0.5) - Public Institutional which based on requirement and catchment
IV	> 35 º	Will not be considered for any development except for the infrastructure construction of low intensity.

Source : Department of Town and Country Planning, Ministry of Urban Wellbeing, Housing and Local Government

   b. Linear projects which involve underground installation of less than 0.5 km such as electric cables, telecommunication, gas piping, irrigation and drainage, sewerage, cable for streetlamps and public telephone.!

APPENDIX 21

SELF-COMPLIANCE FORM

2. List of supporting document for Self-Compliance Form

	Available	Not Related
a. Project Information		
b. Earthwork Information		
✓ Earthwork plan		
✓ Earth stockpile management schematic drawing location plan and approval letter for the proposed designated dumpsite		
c. Erosion, Sedimentation and Flood Control		
✓ Erosion/siltation control plan		
✓ Silt trap / silt fence / retention ponds designs		
d. Air And Noise Pollution Control		
✓ Dust control plan		
✓ Noise control plan in relation to the sensitive receptor		
e. Waste Management Plan		
✓ Copy of registration certificate / letter / license from DOE for licensed collection and disposal contractor		
✓ Copy of approval letter on the dumpsite from relevant local council for construction and domestic waste		
f. Sanitary / Health / Sewage Management		
✓ Locate the location in layout plan		
g. Temporary Material Storage at Site		
✓ Locate the location in layout plan		
h. Route Logistic Plan!		
i. Related Information!		
✓ Specify :		

APPENDIX 22

ENVIRONMENTAL AUDIT CHECKLIST

(To be prepared for each project component)

I. CONSTRUCTION STAGE

	SUBJECT	Mark √ where applicable
1.0	**ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)**	
1.1	Changes in the EMS	
1.2	Effective discharge of environmental monitoring responsibilities	
1.3	Compliance with reporting requirements	
1.4	Compliance with record-keeping requirements	
2.0	**EROSION, SEDIMENT AND FLOOD CONTROL**	
2.1	Silt traps maintenance	
2.2	Silt fence maintenance	
2.3	Detention ponds maintenance	
2.4	Catch drains maintenance	
2.5	Earth bund maintenance	
2.6	Slope protection	
2.7	Open area protection	
3.0	**TRAFFIC CONTROL**	
3.1	Traffic management system	
3.2	Conditions of roads leading to site	
3.3	Conditions of roads leading out of site	
3.4	Vehicle maintenance – noise and air pollution control	
3.5	Vehicle operations – wheel cleaning, effective cover and proper operations	
3.6	Wash trough maintenance	
4.0	**WASTE MANAGEMENT**	
4.1	Biomass management systenm	
4.2	Builders waste management system	

APPENDIX 22

ENVIRONMENTAL AUDIT CHECKLIST

4.3	Domestic waste management system	
4.4	Scheduled (toxic) waste management system	
4.5	Site toilet waste management system	
4.6	Effluent waste management system	
5.0	**SITE HOUSE-KEEPING**	
5.1	Earth stockpile	
5.2	Liquids stockpile	
5.3	Building materials stockpile	
5.4	Canteen/Site Office	
5.5	Working area	
6.0	**WATER QUALITY CONTROL**	
6.1	Silt trap discharge	
7.0	**AIR QUALITY /CONTROL**	
7.1	Vehicle e mission	
7.2	Machinery emission	
8.0	**NOISE LEVELS CONTROL**	
8.1	Vehicle noise	
8.2	Machinery noise	
8.3	Human activities noise	

II. OPERATION STAGE

	SUBJECT	**Mark √ where applicable**
1.0	**ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)**	
1.1	Changes in the EMS	
1.2	Effective discharge of environmental monitoring responsibilities	
1.3	Compliance with reporting requirements	
1.4	Compliance with record-keeping requirements	

APPENDIX 22

ENVIRONMENTAL AUDIT CHECKLIST

2.0	**WASTE MANAGEMENT**	
2.1	Biomass management system	☐
2.2	Solid waste management system	☐
2.3	Scheduled (toxic) waste management system	☐
2.4	Effluent waste management system	☐
3.0	**WATER QUALITY**	
3.1	Effluent discharge	☐
4.0	**AIR QUALITY**	
4.1	Vehicle emission	☐
4.2	Machinery emission	☐
5.0	**NOISE LEVELS**	
5.1	Vehicle noise	☐
5.2	Machinery noise	☐
5.3	Human activities noise	☐

APPENDIX 23

ENVIRONMENTAL DEPARTMENT (PHSB)'S MAIN RESPONSIBILITIES

The following is a list of the main responsibilities of the ED (PHSB) for environmental management in Putrajaya for project under PHSB:

- ✓ To review and endorse a project proponent's EMP to ensure its compliance to all pertinent environmental legislation and environmental management requirements in Putrajaya, including the EIA Approval Condition.
- ✓ To review and approve a contractor's EMCP to ensure that its implementation procedures and plans meet with the environmental pollution control measures, monitoring and auditing requirements specified in the project's EMP.
- ✓ To review a contractor's PAP to ensure that they are adequate for the project.
- ✓ To review a contractor's PCP to ensure that they are adequate for the project.
- ✓ To conduct the required environmental monitoring, record keeping and report submission to the DOE and the Perbadanan.
- ✓ To conduct monthly environmental inspection to ensure a contractor's compliance to the implementation plans and procedures described in its EMCP.
- ✓ To submit a quarterly report to the Perbadanan on the environmental management activities that has been carried out during quarter in the prescribed format given in Appendix 14.
- ✓ To ensure that the necessary corrective measures related to any non-compliance detected during the environmental inspections are implemented.
- ✓ To investigate, follow-up with all pertinent parties and document all environment-related complaints arising from any project activities with Putrajaya.

APPENDIX 24

FORMAT OF THE ED (PHSB) QUARTERLY REPORT TO THE PERBADANAN AND THE DOE

The following is the recommended format for the content of the EMU (PHSB0's quarterly report to the Perbadanan and the DOE.

Table of Contents

List of Tables

List of Figures

List Abbreviations

1.0 UPDATE OF CONSTRUCTION PROGRESS

- ED (PHSB) is to provide a list of all the projects in Putrajaya and give an update on the progress of work for each of them.

2.0 ENVIRONMENTAL MONITORING

- ED (PHSB) is to provide an update on the environmental monitoring carried out for the quarter, for every monitoring stations within Putrajaya. The report should be organised under the following topics:

2.1 Air Quality

2.2 Noise Levels

2.2 Water Quality

2.2.1 Silt Trap Monitoring

2.2.2 River Water Monitoring

3.0 ENVIRONMENTAL AUDIT

- ED (PHSB) is to provide a brief update on the environmental audit carried out for the quarter, for every project within Putrajaya. The report should be organised under the following topics:

3.1 Project Title No.1

3.1.1 Overall Observations

3.1.2 Non-Compliance and rectification

.....

APPENDIX 24

FORMAT OF THE ED (PHSB) QUARTERLY REPORT TO THE PERBADANAN AND THE DOE

3.5 Project Title No.5

3.5.1 Overall Observations

3.5.2 Non-Compliance and rectification

……..

4.0 OVERALL ENVIRONMENTAL MANAGEMENT STATUS

- ED (PHSB) is to provide an update on the environmental management status for the quarter, for the following topics:

4.1 Silt Traps

- Provide a list of all silt traps together with location maps. The report should provide an update on the maintenance status of the silt traps.

4.2 Site Clearance and Turfing

- Provide a list of all project areas together with location maps. The report should provide an update on the site clearance, earthworks status, building erection status or project closure/abandonment status. It should also report on the turfing status to date for any cleared area.

4.3 Solid Waste Management

- Provide an update on the overall solid waste management issues during the quarter, if any.

4.4 Scheduled Waste Management

- Provide an update on the overall management of scheduled waste for all project sites within Putrajaya.

4.5 Wastewater Management

- Provide an update on the overall wastewater management for all project sites within Putrajaya.

5.0 CONCLUSIONS

6.0 APPENDICES