

5. Environmental Regulations and Standards

5. Environmental Regulations and Standards

5.1. Environmental Standards Related to the Plant

5.1.1. Emission and Atmospheric Limitation

(1) Cambodian Standards

On 10 July 2000, the draft sub-decree on air pollution and noise control was signed by the Prime Minister and entered into force. The sub-decree (a) sets limits on emissions of air polluting substances and noise from stationary and mobile sources, (b) sets standards for pollutant and noise levels in ambient air and (c) sets standards for polluting substances in fuels.

Selected emission limits that are presented without reference to allowable quantities of excess oxygen (that in World Bank guidelines are 15 % for gas turbines) and pressure/temperature conditions for volume, are the following:

Parameter	Allowable Emission
NO _x	1000 mg/m ³
SO _x	By separate substance
SO ₂	500 mg/m ³
SO ₃	35 mg/m ³
H ₂ SO ₄	35 mg/m ³
Dust (SiO ₂)	100 mg/m ³
VOC	By separate substance
CO	1000 mg/m ³

Selected ambient air quality standards are the following:

Parameter	1-hr average mg/m ³	8-hr average mg/m ³	24-hr average mg/m ³	1-yr average mg/m ³
NO ₂	0.3	-	0.1	-
SO ₂	0.5	-	0.3	0.1
TSP	-	-	0.33	0.1
CO	40	20	-	-
Ozone	0.2	-	-	-
VOC (one by one)				

The standard for maximum allowable concentration of sulfur in diesel oil is 0.2 percent. However, according to advice from the Director of the Air Pollution Control Department of the Ministry of Environment, this standard can be relaxed if emissions can be controlled to the levels specified above.

(2) Other International Standards of Possible Interest

The World Bank's position on emission guidelines for new thermal power plants of 50 MWe or larger is stated as follows in the "Pollution Prevention and Abatement Handbook, Thermal Power: Guidelines for New Plants" beginning on page 416:

"Emission levels for the design and operation of each project must be established through the EA process on the basis of country legislation and the Pollution Prevention and Abatement Handbook, as applied to local conditions. The emission levels selected must be justified in the EA and acceptable to the World Bank Group....

"In general, for low-sulfur (less than 1 % S), high-calorific-value fuels, specific controls may not be required....

"The maximum emissions levels given here can be consistently achieved by well-designed, well-operated, and well-maintained pollutions control systems...The maximum emissions levels are expressed as concentrations to facilitate monitoring. Dilution of air emissions to achieve these guidelines is unacceptable. Compliance with ambient air quality guidelines should be assessed on the basis of good engineering practice (GEP) recommendations...Plants should not use stack heights less than the GEP recommended values unless air quality impact analysis has taken into account building downwash effects...Normally GEP stack height = $H + 1.5L$, where H is the height of nearby structures and L is the lesser dimension of either height or projected width of nearby structures....

"The guidelines presented in...[the following table] are to be used only for carrying out an environmental assessment in the absence of local ambient standards. They were constructed as consensus values taking particular ac-

count of WHO, USEPA, and EU standards and guidelines. *They do not in any way substitute for a country's own ambient air quality standards.*

Particulate matter (PM). “For all plants or units, PM emissions (all sizes) should not exceed 50 mg/Nm³. The EA should pay specific attention to particulates smaller than 10 µm in aerodynamic diameter (PM10) in the airshed, since these are inhaled into the lungs and are associated with the most serious effects on human health. Where possible, ambient levels of fine particulates (less than 2.5 µm in diameter) should be measured.”

Sulfur dioxide. “Total sulfur dioxide emissions from the power plant or unit should be less than 0.20 metric tons per day (tpd) per MWe of capacity for the first 500 MWe, plus 0.10 tpd for each additional MWe of capacity over 500 MWe. In addition, the concentration of sulfur dioxide in flue gases should not exceed 2,000 mg/Nm³...(For oil, flue gas dry 3 % excess oxygen – assumes 270 Nm³/GJ. The oxygen level in engine exhausts and combustion turbines is assumed to be 15 % dry.), with a maximum emissions level of 500 tpd.”

Nitrogen oxides. “The specific emissions limits for nitrogen oxides are...460 mg/Nm³...[or 130 nanograms per joule (ng/J), or 225 parts per million parts (ppm)] for an oil-fired plant....For combustion turbine units, the maximum NOx emissions levels are 125 mg/Nm³ (dry at 15 % oxygen) for gas, 165 mg/Nm³ (dry at 15 % oxygen) for diesel (No. 2 oil); and 300 mg/Nm³ (dry at 15 % oxygen) for fuel oil (No. 6 and others)...Where there are technical difficulties, such as scarcity of water available for water injection, an emissions variance allowing a maximum emissions level of up to 400 mg/Nm³ dry (at 15 % oxygen) is considered acceptable, provided there are no significant environmental concerns associated with ambient levels of ozone or nitrogen dioxide.”

Monitoring and reporting. “Maintaining the combustion temperature and the excess oxygen level within the optimal band in which particulate matter and NOx emissions are minimized simultaneously ensures the greatest energy efficiency and the most economic plant operation. Monitoring should therefore aim at achieving this optimal performance as consistently as possi-

ble. Systems of continuous monitoring of particulate matter, sulfur oxides, and nitrogen oxides in the stack exhaust can be installed and are desirable whenever their maintenance and calibration can be ensured. Alternatively, surrogate performance monitoring should be performed on the basis of initial calibration...” and supported direct measurements to validate surrogate monitoring results. Automatic air quality monitoring systems measuring PM10, SOx and NOx should be installed outside the plant boundary where maximum ambient concentrations are expected or where there are sensitive receptors.

As part of the Framework Convention Climate Change, countries should estimate their emissions of greenhouse gases (GHG) on the basis of chemical composition of the fuel (or by direct measurement)

There are special limitations (including offset requirements) for plants in degraded airsheds, plants larger than 500 MW and areas where long-range transport of acid pollutants is concern. These limitations do not appear to be applicable to the proposed project.

In the General Environmental Guidelines chapter of the Pollution Prevention and Abatement Handbook, the World Bank states that “to ensure that ambient air conditions are not compromised, concentrations of contaminants, measured immediately outside the project property boundary [for projects in general] should not exceed the limits shown in the following table:

Pollutant	Concentration ($\mu\text{g}/\text{m}^3$)
Particulate matter	
Annual arithmetic mean	50
Maximum 24-hour average	70
Nitrogen oxides	
Maximum 24-hour average	150
Sulfur oxides	
Annual arithmetic mean	50
Maximum 24-hour average	125

More specific standards for ambient ground-level concentrations of pollutants associated with power plant projects (e.g., particulates, SO_x, NO_x, and ozone) are not established by World Bank. Instead, the Bank cites reference values of other organizations such as WHO, European Union and USEPA; and recommends that “trigger values” (i.e., threshold level concentrations) be agreed on by the country and the World Bank prior to the carrying out of the environmental assessment. A trigger value should be lower than the county’s ambient standard and should not be exceeded as a result of the project. If it is predicted to be exceeded as a result of project implementation, then mitigation alternatives must be sought on a regional or sectoral basis (e.g., through tradeoffs). Initial expectations are that trigger values for ambient air quality will not be a problem for the proposed project because of its clean fuel, small size and expected good design as well as the scarcity of other major air pollution sources in the region.

5.1.2. Liquid Effluent Limitation

(1) Cambodia Standards

Cambodian general standards for liquid effluent discharges and for ambient conditions are set forth in an April 6, 1999 Sub-Decree on Water Pollution Control. Special standards for protected areas are promised in a subsequent guideline to be produced by the Ministry of Environment.

The Sub-Decree prohibits the discharge of untreated sewage, solid waste, garbage or hazardous substances into public waters or drainage systems.

The Sub-Decree lists industries for which permits are required for the discharge or transport of wastewater and power plants are included on that list. However, it appears from Article 12 that new sources that have an approved EIA report are exempt from the permitting process.

The Sub-Decree lists hazardous substances. Oil and petroleum are included on the list in two ways; (i) as persistent mineral oil and hydrocarbons of petroleum origin and (ii) as non-persistent mineral oils and hydrocarbons of petroleum origin.

Discharge limits for selected substances that are applicable to the proposed project are summarized in the following table:

Parameters	Units	Allowable Limits for Pollutant Substance Discharging to	
		Protected Public Water Area	Public Water Area And Sewer
Temperature	°C	< 45	< 45
PH		6-9	5-9
BOD5	mg/l	< 30	< 80
COD	mg/l	< 50	< 100
Total Suspended Solids	mg/l	< 50	< 80
Total Dissolved Solids	mg/l	< 1000	< 2000
Grease and Oil	mg/l	< 5.0	< 15
Detergents	mg/l	< 5.0	< 15
Nitrate	mg/l	< 10	< 20
Chlorine (free)	mg/l	< 1.0	< 2.0
Chloride (ion)	mg/l	< 500	< 700
Sulfate (as SO ₄)	mg/l	< 300	< 500
Phosphate (PO ₄)	mg/l	< 3.0	< 6.0
Iron (Fe)	mg/l	< 1.0	< 20
Chromium (Cr ⁺³)	mg/l	< 0.2	< 1.0
Chromium (Cr ⁺⁶)	mg/l	< 0.05	< 0.5
Copper (Cu)	mg/l	< 0.2	< 1.0
Lead (Pb)	mg/l	< 0.1	< 1.0
Nickel (Ni)	mg/l	< 0.2	< 1.0
Zinc (Zn)	mg/l	< 1.0	< 3.0
Ammonia (NH ₃)	mg/l	< 5.0	< 7.0
Dissolved oxygen (DO)	mg/l	> 2.0	>1.0

Ambient water quality standards for public water areas and for bio-diversity conservation that are relevant for the proposed project are presented in the following tables:

a) River

Parameters	Units	Standard Value
PH		6.5 – 8.5
BOD ₅	mg/l	1 – 10
Suspended Solids	mg/l	25 – 100
Dissolved Oxygen (DO)	mg/l	2.0 – 7.5
Coliform bacteria	MPN/100 ml	<5000

b) Lakes and Reservoirs

Parameters	Units	Standard Value
PH		6.5 – 8.5
COD	mg/l	1 – 8
Suspended Solids	mg/l	1 – 15
Dissolved Oxygen (DO)	mg/l	2.0 – 7.5
Coliform bacteria	MPN/100 ml	<1000
Total Nitrogen	mg/l	0.1 – 0.6
Total Phosphorus	mg/l	0.005 – 0.05

c) Coastal Water

Parameters	Units	Standard Value
PH		7.0 – 8.3
COD	mg/l	2 – 8
Dissolved Oxygen (DO)	mg/l	2.0 – 7.5
Coliform bacteria	MPN/100 ml	<5000
Oil content	mg/l	0
Total Nitrogen	mg/l	0.2 – 1.0
Total Phosphorus	mg/l	0.02 – 0.09

Selected water quality standards in public water areas for public health protection include the following substances, which could be relevant for the project:

Parameters	Units	Standard Value
Lead	µg/l	< 10
Chromium (Cr ⁺⁶)	µg/l	< 50

(2) Other International Standards of Possible Interest

The World Bank’s effluent limitations for power plants are set forth on page 419 of the aforementioned Pollution Prevention and Abatement Handbook as follows:

Parameters	Units	Standard Value
PH		6 – 9
TSS	mg/l	50
Oil and grease	mg/l	10
Total residual chlorine	mg/l	0.2
Chromium (total)	mg/l	0.5
Copper	mg/l	0.5
Iron	mg/l	1.0
Zinc	mg/l	1.0
Temperature increase	° C	≤ 3

“Chlorine shocking may be preferable [to continuous chlorination] in certain circumstances. This involves using high chlorine levels for a few seconds rather than a continuous low-level release. The maximum value is 2 mg/l for up to 2 hours, not to be repeated more frequently than once in 24 hours, with a 24-hour average of 0.2 mg/l. (The same limits apply to bromine and flourine.)

“The effluent temperature should result in a temperature increase of no more than 3°C at the edge of the zone where initial mixing and dilution take place. Where the zone is not defined, use 100 meters from the point of discharge when there are no sensitive aquatic ecosystems within this distance.

“The pH and temperature of the wastewater discharges should be monitored continuously. Levels of suspended solids, oil and grease, and residual chlorine should be measured daily, and heavy metals and other pollutants in wastewater discharges should be measured monthly if treatment is provided.”

5.1.3. Solid Waste Disposal Limitation

(1) Cambodia Standards

Cambodian general guidelines on solid waste management are set forth in an April 27, 1999 Sub-Decree on Solid Waste Management. The sub decree specifies that:

- Hazardous waste materials include "oil waste from oil refinery, used of lubrication oils, washing oils", "acid waste", "alkali waste", "combustion residues from coal-fired power plants" and "soot and dust waste from incineration facilities, treating exhaust gas".
- Hazardous wastes shall be stored, transported and disposed of separately from household wastes.
- The owner of the hazardous wastes shall be responsible for (i) temporary storage in proper technique and safe manner; (ii) submitting quarterly reports of the waste under storage; (iii) cooperating with authorities to monitor the waste; and (iv) paying the analytical costs of the monitoring.
- Guidelines on the management of hazardous waste (and other solid wastes) shall be established by the Ministry of Environment. However, such guidelines are not included in the sub-decree and apparently do not yet exist.

(2) Other International Standards of Possible Interest

The World Bank's position on solid wastes from power plants is set forth on page 419 of the aforementioned Pollution Prevention and Abatement Handbook as follows:

“Solid wastes, including ash and FGD sludges that do not leach toxic substances or other contaminants of concern to the environment may be disposed in landfills or other disposal sites provided that they do not impact nearby water bodies. Where toxics or other contaminants are expected to leach out, they should be treated by, for example, stabilization before disposal.”

5.1.4. Noise Limitation

(1) Cambodia Standards

Cambodian noise standards are included in the draft sub-decree on air pollution and noise that was describe above in Section 5.1.1.

The sub-decree does not propose standards for stationary sources.

For limits on vehicles, all permissible levels are between 80 and 91 decibels (dB(A)). Cars for less than 12 passengers are 80 decibels. Cars for more than 12 passengers are 85 decibels. Motorcycles are between 85 and 90 decibels. All trucks are between 85 and 91 decibels.

Ambient noise levels are proposed for daytime, evening and nighttime as follows:

Area	Period of Time		
	06:00-18:00	18:00-22:00	22:00-06:00
Quiet areas - Hospitals - Libraries - School - Kindergarten	45	40	35
Residential areas - Hotels - Administrative Offices - Houses	60	50	45
Commercial / service areas	70	65	50
Small industrial factories Intermingling in residential Areas	75	70	50

Noise control standards for workshops, factories and industries are proposed as follows for noise levels and time intervals:

Noise Level (dB(A))	Maximum Period of Time (Hours)	Level for Protective Equipment
75	32	In areas with levels above 80 (dB(A))
80	16	
85	8	
90	4	
95	2	
100	1	
105	0.5	
110	0.25	
115	0.125	

(2) Other International Standards of Possible Interest

The World Bank’s position of noise control for power plants is set forth on page 419 of the aforementioned Pollution Prevention and Abatement Handbook as follows:

“Noise abatement measures should achieve either the levels given below or a maximum increase in background levels of 3 decibels (measured on the A scale) [dB(A)]. Measurements are to be taken at noise receptors located outside the projected property boundary.

Receptor	Maximum allowable log equivalent (hourly measurements, in dB(A))	
	Day 07:00 – 22:00	Night 22:00 – 07:00
Residential, institutional, educational	55	45
Industrial, commercial	70	70

5.2. Environmental Standards Applied to the Plant

(1) Emission and Atmospheric Limitation

The following Cambodian standards will be applied to the Plant.

Parameter	Allowable Emission	Comparisons
NO _x	1000 mg/m ³ *	IBRD = 125 mg/Nm ³ for gas fuel, 165 mg/Nm ³ for diesel oil dry at 15% oxygen
Sox	By separate substance*	IBRD = 2,000 mg / Nm ³ & 0.20 tpd / MWe
SO ₂	500 mg/m ³ *	
SO ₃	35 mg/m ³ *	
H ₂ SO ₄	35 mg/m ³ *	
Dust (SiO ₂)	100 mg/m ³ *	IBRD total PM = 50 mg/Nm ³
VOC	By separate substance*	
CO	1000 mg/m ³ *	

* Dry at 15 % oxygen, 1.013 bar and 0 °C will be used although it is not specified

For ambient air quality the following Cambodian standards will also be applied, with IBRD guideline values compared below in brackets:

Parameter	1-hr average mg/m ³	8-hr average mg/m ³	24-hr average mg/m ³	1-yr average mg/m ³
NO ₂	0.3	-	0.1	-
SO ₂	0.5	-	0.3	0.1
TSP	-	-	0.33	0.1
CO	40	20	-	-
Ozone	0.2	-	-	-
VOC (one by one)				

Comparison using IBRD guideline values

NO _x	-	-	[0.150]	-
SO _x	-	-	[0.125]	[0.050]
TSP	-	-	[0.070]	[0.050]

Stack height minimum requirements to be applied, unless air quality simulations demonstrate that plume downwash effects can be avoided with shorter stacks, are World Bank's good engineering practice (GEP) for minimum stack height. GEP stack height = $H + 1.5 L$ where H is the height of nearby structures and L is the lesser dimension of either height or projected width of nearby structures. For the present project description, H = 15 m, L = 15 m and GEP stack height would be 37.5 m.

(2) Liquid Effluent Limitation

The following Cambodian standards will be applied to the Plant.

Parameters	Units	Allowable Limits	
		Public Water Area and Sewer	Comparisons
Temperature	°C	< 45	IBRD = change ≤ 3
PH		5-9	IBRD = 6-9
BOD5	mg/l	< 80	-
COD	mg/l	< 100	-
Total Suspended Solids	mg/l	< 80	IBRD = 50
Total Dissolved Solids	mg/l	< 2000	-
Grease and Oil	mg/l	< 15.0	IBRD = 10
Detergents	mg/l	< 15.0	-
Nitrate	mg/l	< 20	-
Chlorine (free)	mg/l	< 2.0	IBRD = 0.2
Chloride (ion)	mg/l	< 700	-
Sulfate (as SO ₄)	mg/l	< 500	-
Phosphate (PO ₄)	mg/l	< 6.0	-
Iron (Fe)	mg/l	< 20.0	IBRD = 1
Chromium (Cr ⁺³)	mg/l	< 1.0	IBRD = 0.5 total
Chromium (Cr ⁺⁶)	mg/l	< 0.5	
Copper (Cu)	mg/l	< 1.0	IBRD = 0.5
Lead (Pb)	mg/l	< 1.0	-
Nickel (Ni)	mg/l	< 1.0	-
Zinc (Zn)	mg/l	< 3.0	IBRD = 1.0
Ammonia (NH ₃)	mg/l	< 7.0	-
Dissolved oxygen (DO)	mg/l	> 1.0	-

Discharge to waste water to Prey Treng Pond should be avoided. Ambient water quality standards to be applied to coastal receiving waters are the following:

Coastal Water

Parameters and Units	Standard	Comparisons
PH	7.0 – 8.3	-
COD (mg/l)	2 – 8	-
Dissolved Oxygen (DO) (mg/l)	2.0 – 7.5	-
Coliform bacteria (MPN/100 ml)	<5000	-
Oil content (mg/l)	0	-
Total Nitrogen (mg/l)	0.2 – 1.0	-
Total Phosphorus (mg/l)	0.02 – 0.09	-

The size of the mixing zone for the thermal plume of the cooling water should follow the recommendation of IBRD, so that the area of 3 ° C temperature rise should not extend more than 100 m from the point of discharge of the cooling water.

Chlorination of the cooling water should proceed as intermittent shocking rather than continuous chlorination, unless shocking is demonstrated to be inadequate for the Sihanoukville marine environment. With shocking, chlorine concentrations of up to 2 mg/l are allowable for up to 2 hrs/day, with a maximum allowable 24-hour average concentration of 0.2 mg/l. With continuous chlorination, the chlorine is applied continuously at the concentration of 0.2 mg/l.

(3) Solid Waste Disposal Limitation

Cambodian guidelines for solid waste disposal remain to be developed. In the absence of these guidelines the following general approaches should be applied to the project.

Efforts should be made to reduce the volume of solid waste requiring disposal by sorting, salvaging and selling potential waste materials as much as possible. Examples of such materials are wood removed from the site by clearing and grubbing, scrap metal, wooden form work, cement bags, and tires.

Further efforts should be made to reduce the volume of solid wastes by incinerating as much non-salvageable material as possible.

Solid waste that cannot be salvaged or incinerated should be sorted on the basis of physical and chemical stability and risk of generating toxic leachates after disposal. Stable material should be landfilled without treatment. Materials likely to generate toxic leachates (for example, unused cement additives or spent resin cartridges) should be separated on the basis of treatment requirement and chemically stabilized before disposal in a landfill, to reduce the risk of leaching.

(4) Noise Limitation

Cambodian standards for noise limitation do not address noise emissions from stationary sources. Standards for ambient noise levels are very similar to World Bank guidelines, and are applied to the project as follows:

At site boundaries and in adjacent areas that are dedicated to commercial and industrial uses, project-induced sound levels should not exceed 70 dB(A) at any time of the day.

At the house that is nearest to the site boundary, project-induced sound levels should not exceed 50 dB(A) between 22:00 and 6:00, 70 dB(A) between 18:00 and 22:00 and 75 dB(A) between 06:00 and 18:00.

There are no quiet areas such as hospitals, schools or libraries near the project site.

5.3. Environmental Guidelines Applied to EIA Preparation

The legal framework and specific mandates for carrying out environmental impact assessment studies and reports in Cambodia are specified in the Ministry of Environment's August 11, 1999 Sub-Decree on Environmental Impact Assessment Process. The following provisions of the sub-decree should be addressed in the EIA and mitigation and monitoring plans:

- The sub-decree has three objectives. (Article 1)

One of these is “to encourage public participation in the environmental assessment process in recognition that their [the public’s] concerns should be considered in the project decision making process.” The other objectives involve defining the projects to which EIA applies and determining that EIAs are approved by MoE before projects are submitted to the Royal Government for decision.

- The sub-decree requires an EIA for power plants of 5 MW or larger. (Annex)

- The project owner is required to prepare an Initial Environmental Impact Assessment (IEIA) and submit an Environmental Application, with the pre-feasibility study and IEIA, to MoE. (Articles 6 and 7)
A copy is to be provided to the Investment Approval Institution. (Article 14)

- For projects with serious impact, the owner is required to prepare an Environmental Impact Assessment (EIA) and submit an Environmental Application, with the feasibility study and EIA, to MoE at the same time that the investment application is submitted to the Investment Approval Institution. (Articles 8, 9 and 16)

- MoE has responsibility to “evaluate and review the environmental impact assessment reports in collaboration with other government ministries and agencies concerned” and to take action to ensure that the Environmental Management Plan is implemented during project construction, operation and closure. (Article 3)

- The project will be implemented by the project owner only after the receipt of the IEIA or a full-scale EIA report approved by MoE. (Article 20).

- The Approval Institution shall give instructions to the project owner for the implementation of the Environmental Management Plan. (Article 27)

- MoE shall cooperate with relevant agencies to stop the activity of those projects which fail to implement the Environmental Management Plan contained in the approved EIA report. (Article 28)

- Guidelines for IEIA and EIA will be developed by MoE. (Article 10)

- The project owner is required to submit a fee for reviewing EIA reports and monitoring project implementation. The amount of the fee is specified by the Ministry of Economy and Finance according to the proposal of the MoE. (Article 11)
- The project owner is required to make a contribution to the Environmental Endowment Fund. (Article 12)

Flow diagrams of the EIA approval process for existing and proposed projects have been prepared by the Director of the EIA Department. The diagrams for proposed projects are presented in Figures 4.3-1 through 4.3-3. A copy of the Environmental Examination Application that must be submitted along with the EIA is presented in Figure 4.3-4.

A draft guideline for the table of contents of an EIA (Table 5.3-1) report has been prepared by the EIA Department, but remains to be approved.

Guidelines for payment of fees for reviewing EIA reports, monitoring project implementation and contributing to the Environmental Endowment Fund remain to be developed.

Table 5.3-1 Annotated Table of Contents for EIA Reports

(as specified by the Ministry of Environment draft guideline that was available in June 2001)

1. Executive Summary [called “Project Summary” in Cambodia guideline]

The project’s owner should describe in short form with identification of project’s goals and main objectives, methodologies and key measures for reduction of environmental impacts in the EIA Report.

2. Introduction

- Type, size and location of the project
- Background of the project’s location
- Within the framework of national and international laws and legislation standards

3. Purpose of the Project

Project’s owner should clearly explain about purpose of the project for present and future.

4. Project Description.

- Briefing alternatives: size, location, time frame (stages of project construction, project operation, and project abandon or closure) and sources of labor forces.
- The production process: sources and quantity of raw materials to be used and finished products.
- Machinery requirement to run the project.
- Methodologies wastes disposals in order to determine any environmental impacts.
- Descriptions about the quantity and quality of solid and liquid waste to be disposed and discharged, sources of noise and vibration resulting from the process of this project (construction, operation) and the emission of particles into the atmosphere.
- Project planning

5. Description of the Environment

This part should be described all environmental resources needed such as:

Table 5.3-1 Annotated Table of Contents for EIA Reports (continued)

5.1 Physical Resources

- Air (speed, quality, regime, climate, meteorology)
- Water (groundwater, surface water, water quality, water quantity, currents).
- Land (soil quality, relief, geology)

5.2 Ecological Resources

- Biodiversity
- Fauna
- Flora
- Forests, etc.

5.3 Socio-Economic Resources

- Population and settlements
- Infrastructure
- Land use
- Public health and welfare
- Economic conditions [livelihood, profession and community]
- Custom, tradition and other group ethnic, etc.

6. Public Participation

All opinion given by the public in EIA process should be addressed for all of which can be contributed to the decision making process. Public participation includes:

- Local authorities and institutions involved
- Opinion of the public towards the development project
- Consultation
- Company interpretation

7. Evaluation of Environmental Impact

All significant environmental impacts resulting from the project should be described in this part which include:

Table 5.3-1 Annotated Table of Contents for EIA Reports (continued)

7.1 Methodologies to identify the scope of the Environmental Impacts (by using the matrix table)

7.2 Construction Stage Impacts

- Physical
- Biological
- Socio-Economic

7.3 Operation Stage Impacts

- Physical
- Biological
- Socio-Economic

7.4 Impacts of Decommissioning

- Physical
- Biological
- Socio-Economic

7.5 Extent and Type of Significant and Cumulative Environmental Impacts

8. Environmental Impact Mitigation Measures

Of the all environmental impacts stated above should be assessed by the project's owner in order to define a specific environmental impact mitigation measures.

- Construction Stage
- Operation Stage

9. Economic Analysis and the Environmental Value

10. Environmental Management Plan

The environmental management plan is an important program implemented by the project's owner and other institutions involved. These plans include:

Table 5.3-1 Annotated Table of Contents for EIA Reports (continued)

10.1 Mitigation Program

- Construction stage
- Operation stage
- Decommissioning

10.2 Monitoring Program

- Construction stage
- Operation stage
- Decommissioning

10.3 Training Program

11. Institutional Capacity

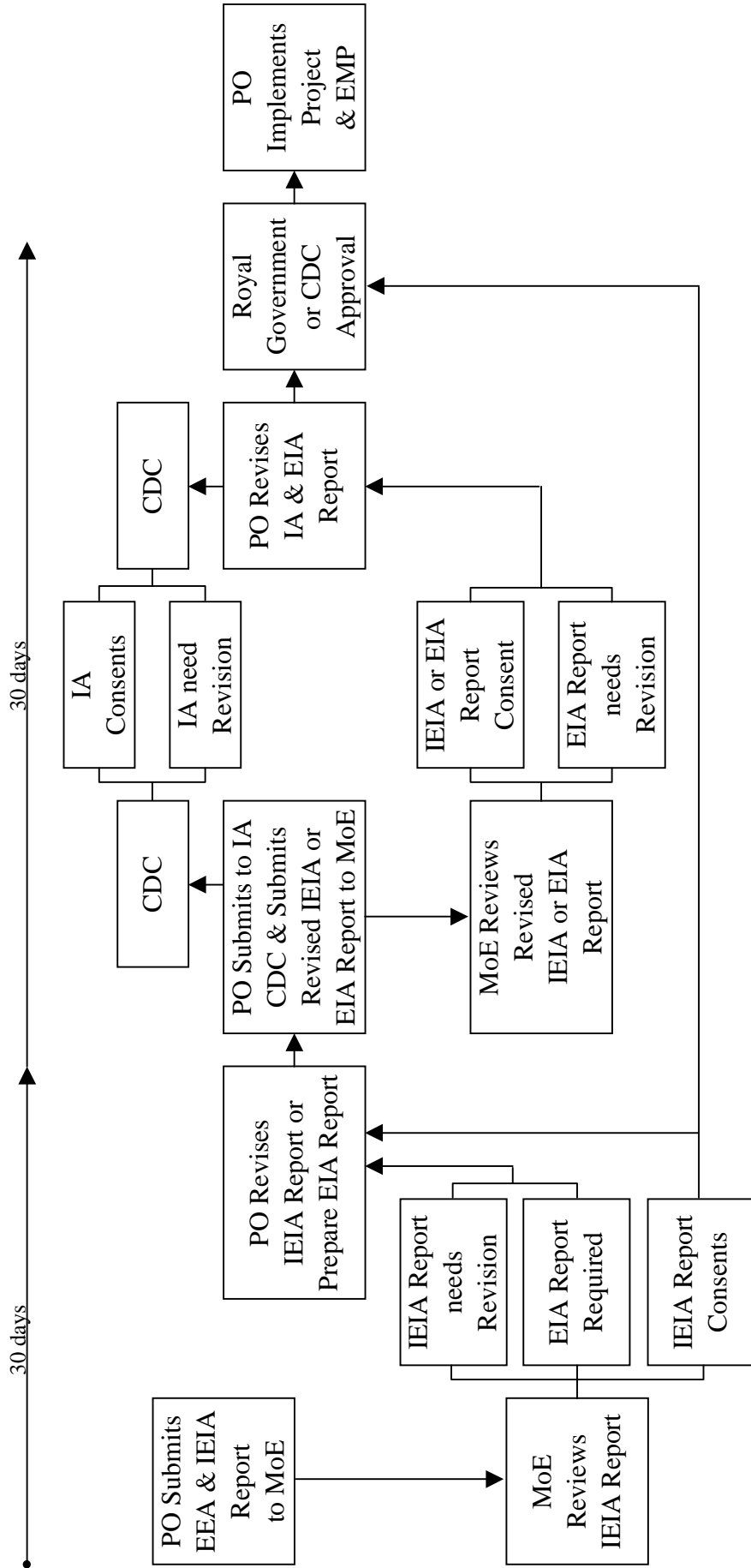
In this part, the project's owner should demonstrate that he has the institutional capacity to carry out the work associated with the execution of the EIA, and the implementation of the mitigation measures such as:

- Organization structure
- Budget / Schedule
- Staff skills
- Methodological tools and equipment

12. Conclusions and Recommendations

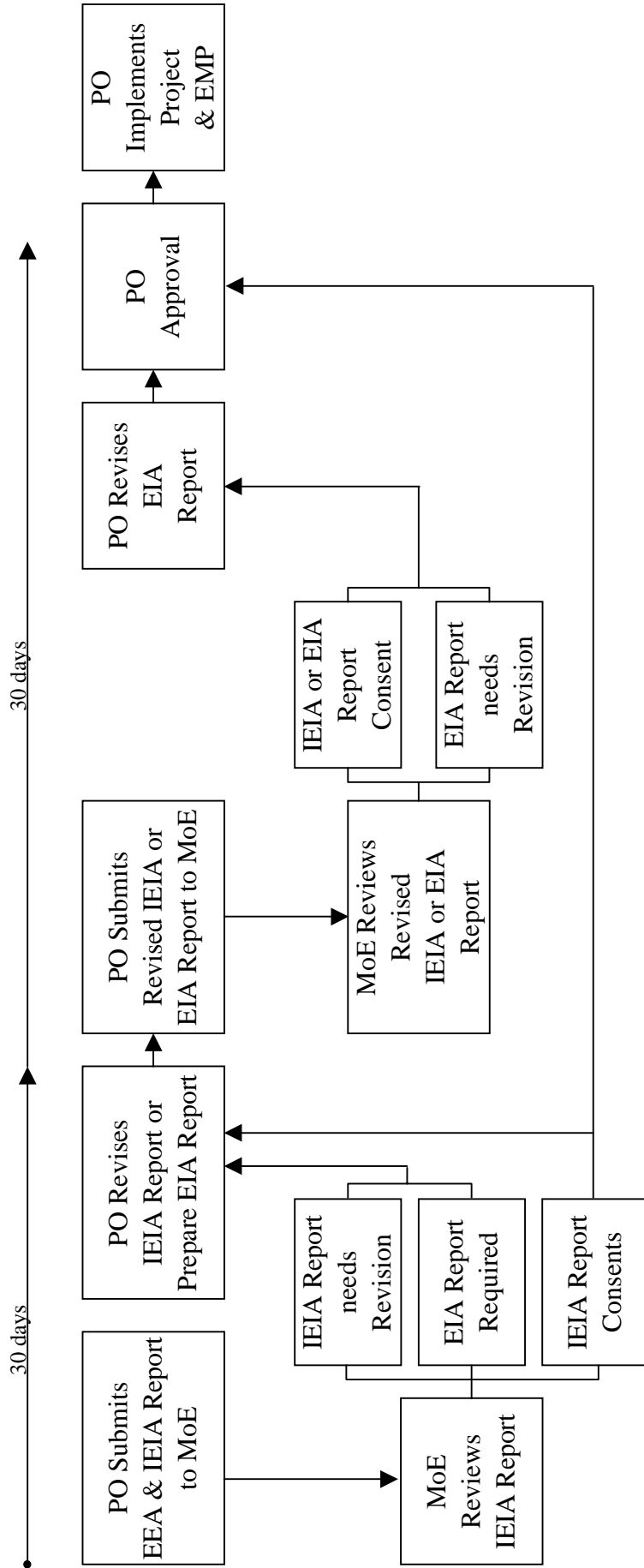
In this part, the project's owner has to include over the assessment of environmental impacts both positive and negative aspects with full accountability and responsibility in the process of reporting the EIA as well as addressing some possible suggestions implicated in the project.

13. References



Prepared by : Dr. Tea Chup, Director EIA Department, Ministry of Environment

Fig.5.3-1 EIA Process for Proposed Project Approved by Royal Government or CDC

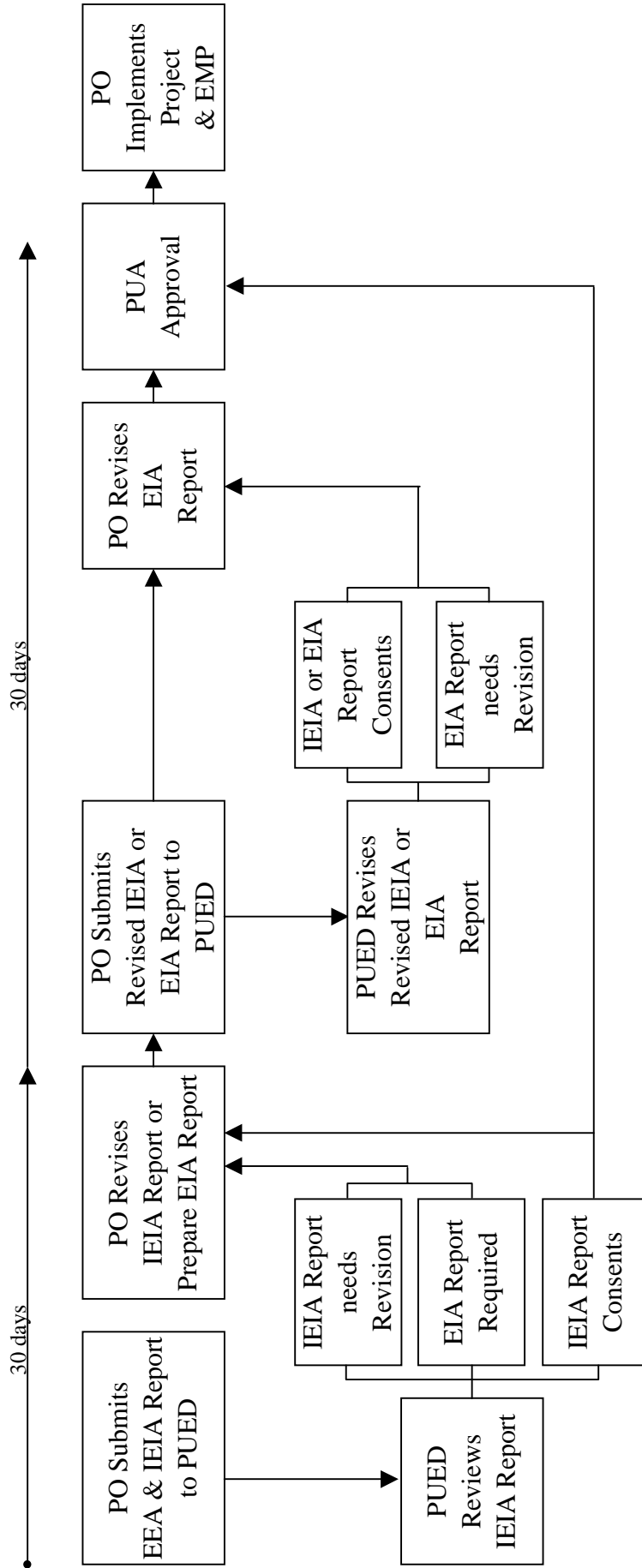


Note :

- PO : Project's Owner
- EIA : Environmental Impact Assessment
- IEIA : Initial Environmental Impact Assessment
- EMP : Environmental Management Plan
- EEA : Environmental Examination Application
- MoE : Ministry of Environment

Prepared by : Dr. Tea Chup, Director EIA Department, Ministry of Environment

Fig.5.3-2 EIA Process for Proposed Project Approved by Project's Owner as Ministry and Institution



Note :

- PO : Project's Owner
- EEA : Environmental Examination Application
- IEIA : Initial Environmental Impact Assessment
- EIA : Environmental Impact Assessment
- EMP : Environmental Management Plan
- PUA : Provincial Urban Authorities
- PUED : Provincial Urban Environmental Department

Prepared by : Dr. Tea Chup, Director EIA Department, Ministry of Environment

Fig.5.3-3 EIA Process for Proposed Project Approved by Provincial-Urban Authorities

ព្រះរាជាណាចក្រកម្ពុជា
ជាតិ សាសនា ព្រះមហាក្សត្រ
២២ * ២២

ក្រសួងបរិស្ថាន
នាយកដ្ឋាន អនុវត្ត ពិនិត្យ
ការងារយន្តការបរិស្ថាន

ពាក្យសុំពិនិត្យបញ្ជាក់បរិស្ថាន
ENVIRONMENTAL EXAMINATION APPLICATION

ម្ចាស់គម្រោងឈ្មោះ : សញ្ជាតិ :
Name of project owner Nationality

អាសយដ្ឋាន :
Address

អត្តសញ្ញាណប័ណ្ណ ឬ លិខិតឆ្លងដែន :
Identity card or Passport

ឈ្មោះរបស់ក្រុមហ៊ុន :
Company Name

លេខទូរស័ព្ទ : ទូរសារ :
Phone number Fax number

តើគម្រោងសាធារណៈ ឯកជន ឬ ឯកជនចំណុះរដ្ឋ ?
Is the project public, private or joint-venture ?

តើផែនការទុនវិនិយោគមានចំនួនប៉ុន្មានដុល្លារអាមេរិក ?
How much capital in your investment plan (\$US.D) ?

តើស្ថាប័នណាជាអ្នកអនុម័តគម្រោង ?
Which institution who approves the project ?

Fig.5.3-4 (1/5) Environmental Examination Application Form

ទីតាំងរបស់គម្រោង :
 Project site :
 ទ្វីបលេខ Lot N° : ផ្លូវ Street :
 ក្រុម Group : ភូមិ Village :
 ឃុំ/សង្កាត់ Commune/Quarter : ស្រុក/ខ័ណ្ឌ District/Khan :
 ខេត្ត/ក្រុង Province City :

វិស័យ និង ប្រភេទរបស់គម្រោង :
 Section and type of project
 ១. ប្រភេទគម្រោង Type of project :
 ២. វិស័យ Section :

ទំហំគម្រោង :
 Size of project :
 (ឧទាហរណ៍ : ១. ចំងាយផ្លូវជាគ.ម ដែលត្រូវកសាង ឬ ជួសជុល
 ២. ទំហំផ្ទៃដីជាហិកតាចំនួនគម្រោងសាងសង់ ឬ ធ្វើកសិកម្ម
 ៣. បរិមាណ វត្ថុធាតុដើម និងផលិតផលសំរេចជាគោលដៅសំរាប់គម្រោងផលិតកម្ម)
 ៤. ចំនួនបន្ទប់ ឬ កៅអីសំរាប់សណ្ឋាគារ ឬ ភោជនីយដ្ឋាន

- (Ex
1. Road distance to be constructed or rehabilitated (km)
 2. Land area (ha) to be constructed or cultivated
 3. Quantity of raw materials for productive process of the project and its productivity)
 4. Quantity of rooms and chairs for hotel and restaurant

តើរយៈពេលប៉ុន្មាន ដែលបានគ្រោងទុក ?
 How long does the project take ?
 ១. សំរាប់ការសាងសង់ For construction :

Fig.5.3-4 (2/5) Environmental Examination Application Form

២. សំរាប់ការប្រតិបត្តិ For operation :

៣. សំរាប់ការបញ្ចប់ ឬការបិទគំរោង For abandon or closure :

តើការទឹកជញ្ជូនវត្ថុធាតុដើម និងផលិតផលសំរេចចេញ-ចូលទឹកនៃគំរោងត្រូវធ្វើយ៉ាងដូចម្តេច ?

How the transportation of raw materials and productivity in-out premises to be done ?

.....

.....

.....

ធ្វើការប៉ាន់ស្មានបរិមាណទឹកប្រើប្រាស់ សំណល់រាវ សំណល់រឹង និង ឧស្ម័នដែលត្រូវបញ្ចេញចោលមាន

ប៉ុន្មានក្នុងមួយថ្ងៃ ?

Estimate the quantity of the used water, liquid waste, solid waste to be discharged and CO₂ to be emitted per day ?

.....

.....

.....

ធ្វើតារាងការប៉ាន់ស្មាននៃកំហាប់ក្នុង :

Tabulate estimation of concentration of

១. ដំណើរនៃការបញ្ចេញទឹកស្អុយ :

1 Process of waste water discharging :

- pH :
- អាម៉ូញាក់ Ammonia (NH₃) :
- នីត្រាតអាស៊ីត Nitrate Nitrogen :
- លោហៈធ្ងន់ Heavy metal :
- ផេណុល Phenol (C₆H₅OH) :
- ប្រេង និង ខ្លាញ់ Oil and Grease :
- ភាពល្អក់ Turbidity :
- ភាពចម្រង់អគ្គីសនី Conductivity :
- ចំនួនសរុបនៃសារធាតុរឹងដែលអណ្តែតក្នុងទឹក :

Fig.5.3-4 (3/5) Environmental Examination Application Form

Total of suspended solid

- ចំនួនសរុបនៃសារធាតុរឹងដែលរងកករចុះទៅក្នុងទឹក :

Total of sediment

1. ការបំបែកប្រេងឥន្ធនៈក្នុងប្រព័ន្ធធាតុរឹងទៅក្នុងខ្សែចង្រ្កា :

2. Radiation of carbon dioxide's particles into ambience

- កាបូនម៉ូណូអុកស៊ីត Carbon mono-oxide :.....
- អាសូតឌីអុកស៊ីត Nitrogen dioxide :.....
- អុកស៊ីតស៊ុលផួរិក Sulfur Oxide :.....
- អូសូន Ozone :.....
- សំណា Lead :.....

តើទីកន្លែងណាដែលគ្រោងនឹងបោះបង់សំណល់រឹង បង្ហូរសំណល់រាវ និងការបញ្ចេញខ្លួន ?

Where the solid waste, liquid waste, carbon dioxide can be disposed , discharged and emitted ?

.....

.....

.....

តើប្រភពណាដែលបណ្តាលឱ្យមានសំឡេងខ្លាំង និង ភាពរំញ័រខ្លាំងកើតឡើងដោយសារគម្រោង ?

Which source causing high vibration and noise by the project ?

.....

.....

.....

គេគំរោងត្រូវការសាងសង់ថ្មី ឬ មានស្រាប់ ?

New proposed or existing project ?

.....

.....

ប្រសិនបើមានការពាក់ព័ន្ធនៅទីដីធ្លី ធ្វើការប៉ាន់ស្មានទំហំផ្ទៃដីដែលនឹងគ្របដណ្តប់ដោយសារគម្រោង (ការ
 ចាក់បំពេញដី ការឈូសឆាយ និង ការរាតត្បាត)

If it's relevant to land, estimate the land area to be covered by the project (Including land filling, clearing and new land encroachment) .

Fig.5.3-4 (4/5) Environmental Examination Application Form

តើចំនួនកម្លាំងការងារត្រូវបានប្រើប្រាស់សម្រាប់ដំណាក់កាលសាងសង់ និងប្រតិបត្តិការ ៖

How many labor powers need be used for the phase of project construction and operation ?

១. សំរាប់ការសាងសង់ For construction :

- ក្នុងស្រុក Local :..... ពីបរទេស Oversea :.....

២. សំរាប់ការប្រតិបត្តិ For operation :

- ក្នុងស្រុក Local :..... ពីបរទេស Oversea :.....

រៀបរាប់ពីស្ថានភាពស្នាក់នៅរបស់បុគ្គលិក-កម្មករ ៖

Describe about status of staffs, workers staying in your project site :

- ការផ្គត់ផ្គង់ទឹកស្អាត :.....
Water supply
- សុខភាព និងសុវត្ថិភាព :.....
Health and safety
- អនាម័យ :.....
Sanitation
- ការគ្រប់គ្រងសំណល់រឹង :.....
Solid waste management

សេចក្តីបញ្ជាក់ : ខ្ញុំបាទ/នាងខ្ញុំតាងនាមម្ចាស់គំរោង សូមបញ្ជាក់ថា ពាក្យសុំដែលបានរៀបរាប់ខាងលើនេះ

គឺជាការពិតគត់ក្នុងបន្ត ។

Confirmation : On behalf of I'm a representative of a project owner, I would like to ensure that all information in my application mentioned above are the real one .

ហត្ថលេខា :..... កាលបរិច្ឆេទ :.....

Signature Date

ឈ្មោះអ្នកចុះហត្ថលេខា :.....

Name of signatory

តួនាទី និងមុខងាររបស់អ្នកចុះហត្ថលេខា :.....

Role and function of signatory

Fig.5.3-4 (5/5) Environmental Examination Application Form