ENVIRONMENTAL GUIDELINES FOR INFRASTRUCTURE PROJECTS

XII URBAN TRANSPORTATION DEVELOPMENT

SEPTEMBER 1992

JAPAN INTERNATIONAL COOPERATION AGENCY

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Environmental Guidelines
for Infrastructure Projects

"Environmental Guidelines for Infrastructure Projects" was prepared to enable preparatory study members to conduct screening and scoping of environmental impact studies effectively and efficiently while maintaining a dialogue with their counterparts and officials concerned in the host countries for the purpose of predicting possible environmental problems caused by the infrastructure projects and to incorporate adequate environmental consideration into the projects.

The guidelines consist of the thirteen sectors below. This volume deals with environmental consideration for "Urban Transportation Development".

Sector I	Ports and Harbors
Sector II	Airports
Sector III	Roads
Sector IV	Railways
Sector V	River and Erosion Control
Sector VI	Solid Waste Management
Sector VII	Sewerage
Sector VIII	Groundwater Development
Sector IX	Water Supply
Sector X	Regional Development
Sector XI	Tourism Development
Sector XII	Transportation Development
Sector XIII	Urban Transportation Development

Note: The guidelines for dam construction were published in February 1990 as a separate volume.

PREFACE

In order to support sustainable development in developing countries, it is of great importance to give sufficient consideration to the environment in the implementation of development programs.

The Japan International Cooperation Agency (JICA) has continually placed special emphasis on environmental technical cooperation and has taken into account pertinent environmental consideration in development studies and implementation of projects.

Based on the recognition of the importance of environmental issues, JICA has prepared the guidelines concerning screening and scoping methods of environmental impact studies for the purpose of contributing to the planning of infrastructure development projects with sufficient environmental consideration.

The guidelines are to be used by JICA study team members when conducting preparatory studies of social and economic infrastructure development projects.

JICA committed the preparation of the guidelines to the International Engineering Consultants Association and organized an advisory group headed by Mr. Michio Hashimoto, president of the Overseas Environment Cooperation Center. Designated advisors of the group were from the Ministry of Health and Welfare, the Ministry of Transportation, the Ministry of Construction, and the Environment Agency. Also, the Ministry of Foreign Affairs provided sound and useful advice to the advisory group.

To all of these organizations and the personnel involved, I wish to acknowledge their much appreciated support.

September 1992

Akira Kasai
Managing Director
Institute for International Cooperation
Japan International Cooperation Agency

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TERMINOLOGY

Environmental Consideration

To study whether a development project will have serious environmental impacts on the project site and its surrounding areas, analyze the study results, and establish necessary measures for avoiding or alleviating any adverse environmental impacts.

Environmental Impact

The undesirable effect on the existing overall conditions of air, water, soil, and living things, assets, social information and circulation of goods, which are related to human life, or on their combined structures.

Preliminary Environmental Survey

The environmental survey conducted during the preparatory study stage of a development project. This includes screening and scoping of the environmental impacts of a particular project. This survey is regarded as a component of the initial environmental examination.

Initial Environmental Examination (IEE)

The examination undertaken at the outset of the development project planning stage to determine the environmental impacts that may be created by the particular project based on existing information and data, easily accessible information relating to the particular project, and comments and judgements of specialists who are familiar with the environmental impacts of past similar projects. This examination should be carried out in a short period at a low cost.

IEE has the following two objectives : 1) to evaluate whether EIA is necessary for the project and, if so, to define its contents; 2) to examine, from an environmental viewpoint, the measures for alleviating the effects of the project which requires environmental consideration but not a full-scale environmental impact assessment.

Environmental Impact Assessment (EIA)

To study, forecast, and evaluate the environmental impacts of a development project, which is judged a detailed environmental examination, and to propose the establishment of an environmental protection standard and measures for avoiding or alleviating environmental impacts.

Environmental Management Plan

To formulate an environmental monitoring system or methods based on the environmental protection standard to monitor the project's environmental impacts on surrounding areas, aiming at adequately protecting the environment both during and after project implementation.

Screening

To evaluate whether or not it will be necessary to include an environmental consideration in a development project. Screening conducted in Japan before the preparatory study is called preliminary screening.

Scoping

To identify the important environmental impacts among those which can be caused by the implementation of a development plan or development project, and to define the study items of the IEE or EIA based on the findings.

Project Description (PD)

The major contents and features of the project. It includes the background of the project (including its upper level plan), the objectives, the executing agency, the beneficiary population, and the project scale.

Site Description (SD)

The compact description of the project site which includes the natural and social environmental conditions in the areas that may be affected by the project.

Preparatory Study (PS)

To examine the contents of the full-scale study of a requested project and to discuss the scope of work (S/W) of the full-scale study with the host country. This study is conducted at the preparatory stage of the project prior to conducting the full-scale study including the master plan and the feasibility study.

Full-scale Study

The study generally conducted continuously after the preparatory study by carrying out field surveys to prepare the study report of a development project. The study report, with its conclusions and recommendations for project realization or project implementation, is submitted to the government of the host country. The full-scale study includes the master plan study, feasibility study, detailed design study, and map preparation.

Master Plan Study (M/P)

The study for preparing the basic plans for various development projects. In general, it is sectoral, or for each project.

Feasibility Study (F/S)

The study for evaluating the possibility, adequacy, and investment efficiency of a project. In general, it attempts to objectively verify the feasibility of a project from social, technical, economic, and financial viewpoints.

F/S is the core of JICA's development studies. The study report provides the government of the host country with the information needed to decide whether or not to implement the project. It is also used by international financial institutions to evaluate the appropriateness of financing the project once the government submits its loan request.

ABBREVIATIONS

TOR (T/R) :	Terms of Reference
S/W :	Scope of Work
M/M :	Minutes of Meeting
Q/N :	Questionnaire
IC/R :	Inception Report
DF/R :	Draft Final Report
F/R :	Final Report
OECD :	Organization for Economic Cooperation and Development
DAC :	Development Assistance Committee

Use of the Guidelines

The guidelines were prepared to provide personnel involved in JICA's preparatory study (including the preparatory work in Japan) with information that can be used to prepare the preparatory study report or compile project specifications while carrying out field surveys, hearings, and holding discussions with the officials of the host country during a short-time visit.

The use of the guidelines is shown in Figure i and explained herewith.

«Preparatory work in Japan»

1) Examination of the request

After examining the request, follow the procedure given below, unless it is judged a soft-type infrastructure project, which is supposed to have no serious environmental impacts, such as the preparation of topographical maps or a telecommunication project.

2) Preliminary screening

Based on the request, collect and analyze the data and information and prepare the PD and SD in Japan, and conduct the preliminary screening by using them.

If any serious environmental impacts are suspected, the preparatory study team should include an environmental specialist.

Prepare questionnaires to the recipient government concerned and the draft of S/W including environment related items.

«Work in the host country»

3) Examination of the country's guidelines

At first, investigate the country's IEE/EIA implementing structure, the laws, and any existing guidelines (hereinafter referred to as the country's EIA guidelines). Then, it should be confirmed whether or not the project is subjected to IEE/EIA.

Case 1: If the contents of the country's EIA guidelines are sufficient, follow their guidelines.

Case 2: If the contents of the country's EIA guidelines are insufficient, follow their guidelines and add JICA's screening and scoping items.

Case 3: If the country has no EIA guidelines, follow JICA's guidelines.

4) Screening

Reexamine the PD, SD, and the contents of screening prepared in Japan, based on the findings of the field surveys and data analysis. If it is evaluated that an IEE or EIA is required for the project, scoping should then be undertaken.

5) Scoping

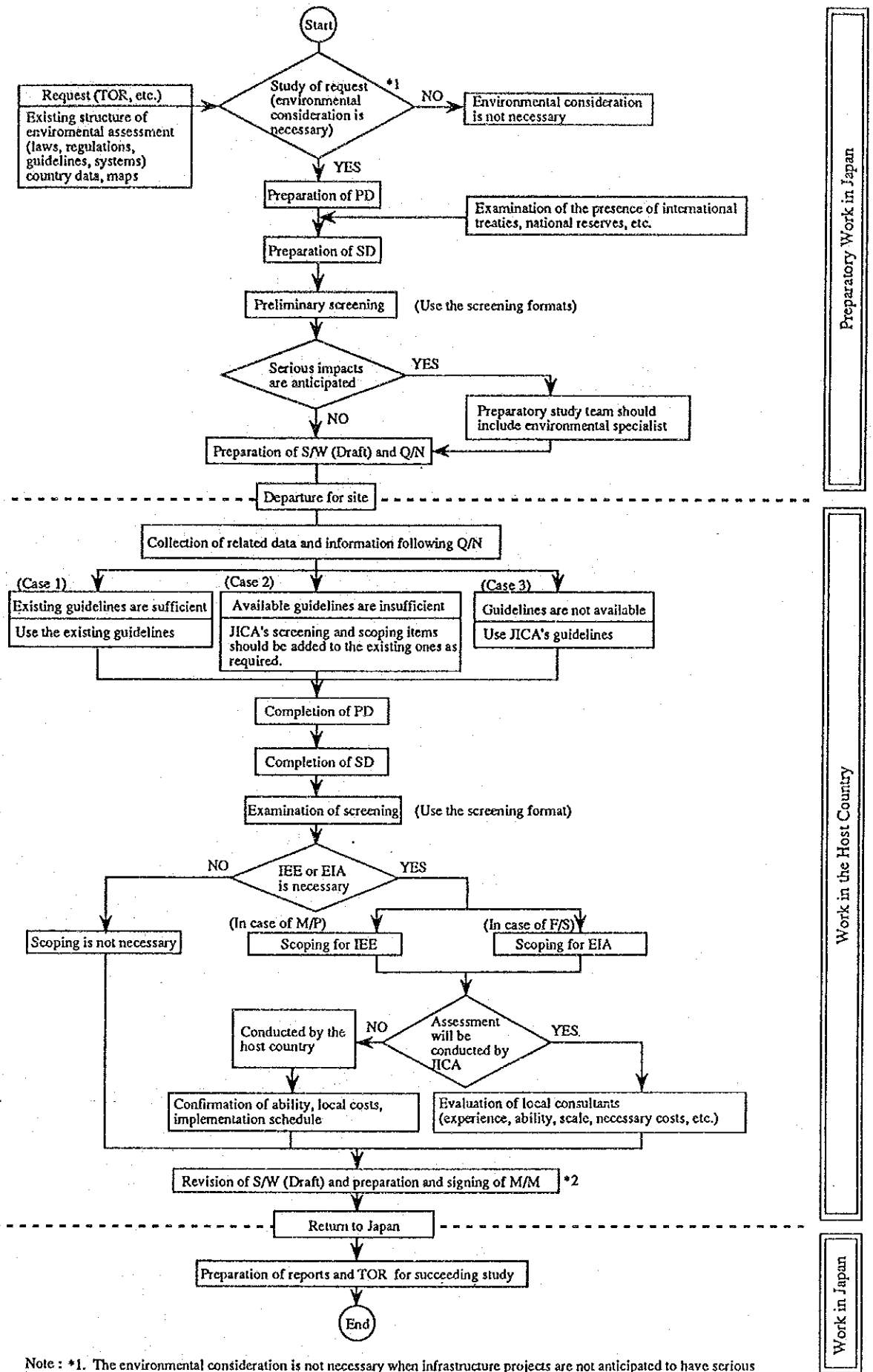
Evaluate the magnitude of impact on each environmental item, using the checklist method, to specify the items that are to be studied in IEE for M/P or EIA for F/S. In this process, making use of the explanation of items in the guidelines, try to grasp the features of possible environmental impacts. The results should be noted in the scope of work (S/W) and the minutes of meeting (M/M). When the environmental factors which may have serious impacts are not identified, it is necessary to mention in the M/M that such factors would be clarified through the full-scale study.

«Work in Japan»

6) Report preparation

Based on the above-mentioned results, compile a preparatory study report which makes it possible to carry out the appropriate IEE or EIA in the full-scale study. TOR for the succeeding study should reflect the contents of the report.

Figure i Procedure of Environmental Consideration



Note : *1. The environmental consideration is not necessary when infrastructure projects are not anticipated to have serious impacts, such as preparation of topographic maps and telecommunication projects, etc.

*2. When the environmental factors that may have serious impact are not identified, it is necesary to mention in the M/M that such items would be clarified in the full-scale study.

CHAPTER 1

OUTLINE OF ENVIRONMENTAL CONSIDERATION

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OUTLINE OF ENVIRONMENTAL CONSIDERATION

1.1 Basic Concept

JICA's aid study report "Sectoral Study for Development Assistance-Environment" published in 1988 defined that "Environmental Consideration" is to study whether a development project will have significant impacts on the environment or not, to assess the impacts and to incorporate measures to prevent or alleviate their effects, if necessary.

The premise of this definition is the understanding that development aid should not end with a one-time involvement but should be continuous and sustainable. Thus, it is believed that environmental consideration is prerequisite for securing the sustainability of the development.

For the implementation of development projects in developing countries with the cooperation of the Japanese government, a careful environmental consideration should be carried out from the early stages of project planning with a long-term perspective in order to accomplish a well-balanced development.

As such development projects are implemented in the host countries, based on the decision making process of these countries, it is necessary to conform to their laws, rules and regulations related to environmental consideration.

In some developing countries, however, such laws, rules and regulations do not exist, while in others they are not properly enforced. The policies and structures for environmental consideration vary from one country to another.

Therefore, when undertaking the environmental consideration, it is necessary to take into account of the developing country's policies and structures and to understand the country's awareness of environmental problems, while holding sufficient discussions with the people concerned in a flexible manner.

With regard to environmental consideration, JICA's basic principles are to promote sustainable development aimed at improving the living standard of the residents, and harmonize the development with a desirable environment based on the country's willingness.

If environmental consideration is not sufficiently undertaken for implementing a development project and, if careful attention is not paid to the management of the surrounding natural resources, the base of the development might be jeopardized and the development might be halted. The base of the people's livelihood or even their subsistence can be also threatened. It is necessary, therefore, to try to ensure the sustainable development by harmonizing the development project with natural resources and the base of livelihood and subsistence of the residents in the area.

The guidelines describe screening and scoping procedures at the preparatory study stage to deal with the negative impacts of a development project on the environment of the project site and its surrounding area.

The process of environmental consideration in a project cycle is shown in Figure 1-1.

A development project begins with its finding and formulation. At each stage of the cycle, a series of environmental considerations, such as a preliminary environmental survey, an initial environmental examination (IEE), environmental impact assessment (EIA), and the design of environmental protection measures take place. Environmental monitoring is then conducted with project implementation. Through this process, sustainable development can be attained.

Definition of the environmental management plan mentioned here is limited to the monitoring system which handles the environmental impacts caused by the project.

Tables 1-1 and 1-2 illustrate the time flows corresponding to the project implementation stages and the environmental consideration stages. The flows start with an environmental survey, followed by the EIA, proceed to the examination of environmental conservation measures, and then to the monitoring stage.

Figure 1-1. Flow of Environmental Considerations in Project Cycle

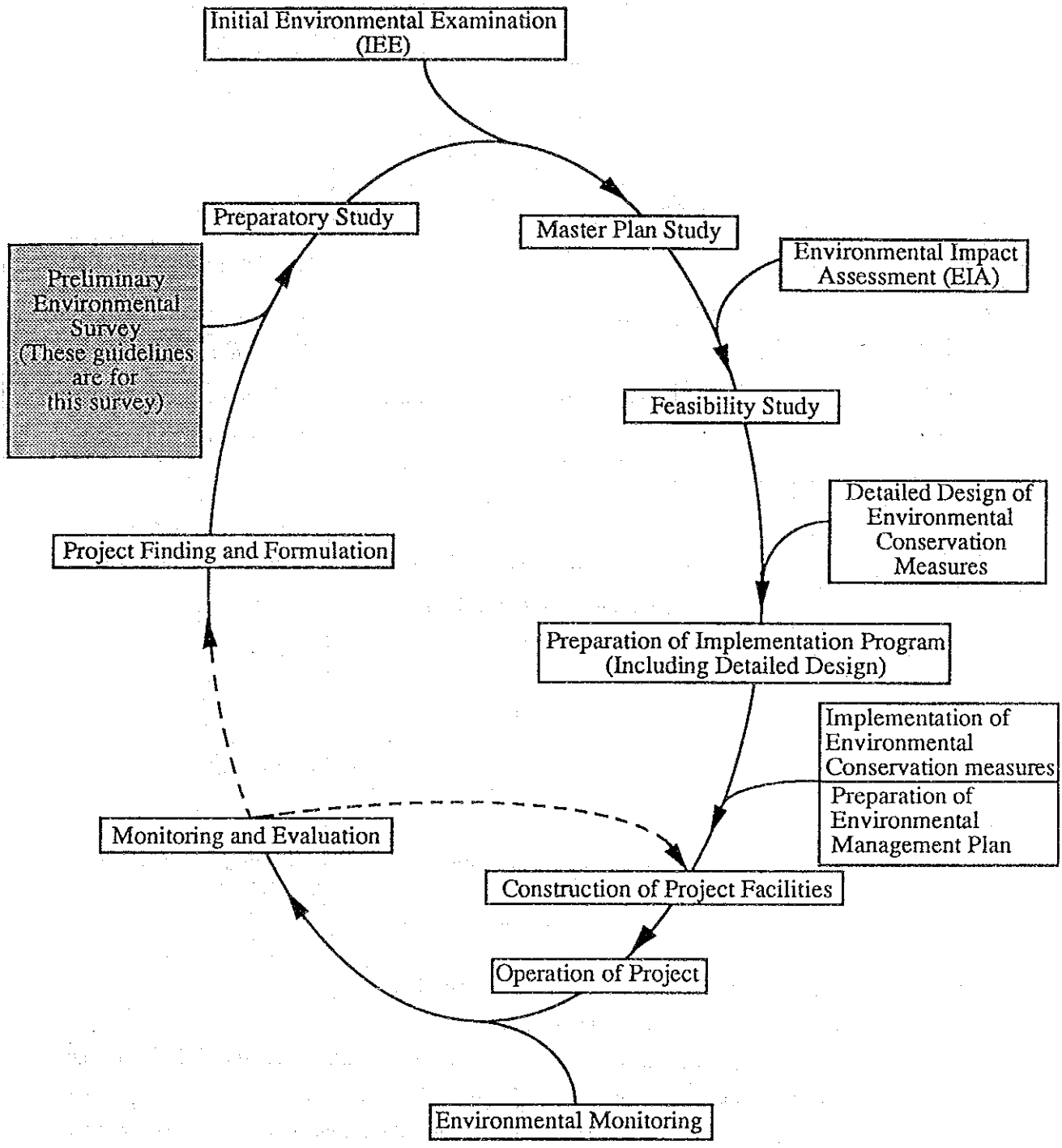

Table 1-1 Project Implementation Stages and Corresponding Environmental Consideration Stages

<table>
<tr><td colspan="4">Project Implementation Stages</td><td>Environmental Consideration Stages</td></tr>
<tr><td rowspan="3">Implementation by JICA</td><td colspan="3">Preparatory Study</td><td>Preliminary Environmental Survey</td></tr>
<tr><td rowspan="2">Full-scale Study</td><td>Master Plan Study</td><td rowspan="2">Feasibility Study</td><td>Initial Environmental Examination (IEE)</td></tr>
<tr><td>Feasibility Study</td><td>Environmental Impact Assessment (EIA)</td></tr>
<tr><td rowspan="3">Implementation by Executing Agency</td><td colspan="3">Preparation of Project Implementation Plan (Including Detailed Design)</td><td>Examination of Environmental Conservation Measures</td></tr>
<tr><td colspan="3">Project Construction</td><td>Implementation of Environmental Conservation Measures</td></tr>
<tr><td colspan="3">Project Facility Operation</td><td>Environmental Monitoring</td></tr>
</table>

Notes: 1. This table does not indicate strict correspondence.
2. Some projects do not require IEE or EIA.
3. Preparation of the project implementation plan includes the detailed design of the environmental conservation facilities and their construction.
4. The item enclosed in a separate box indicates the major boundary for the guidelines.

Table-1.2 Incorporation of Environmental Consideration into JICA's Development Studies

Study Flow		Contents and Timing Investigation	Examination Items
Project Finding	Request/Project Finding ↓ Acceptance of TOR ↓ Study on TOR	(Preliminary Screening) Judgment on necessity of IEE or EIA	The project judged to cause serious environmental impact shall be rejected.
Preparatory Study	Preparatory Study	(Screening) Review of preliminary screening (Scoping) Decision of important items for IEE or EIA Decision of work boundaries	
	Discussion and Agreement on S/W ↓ Preparation of Preparatory Study Report		(Preparation of M/M, S/W) Examine the description of agreed items on screening and scoping. (Reporting) Clarification of background and agreed items.
Selection of Consultants	Preparation of Project Specification ↓ Selection of Consultants		(Project Specification) Define the boundary and work volume of IEE or EIA to be conducted by consultants (Selection of consultants) Evaluate the appropriateness of the proposal for the project specification.
Full-scale Study	Preparation of and Discussion on IC/R ↓ Implementation of IEE or EIA ↓ Explanation of and Discussion on DF/R ↓ Preparation of F/R		(IEE or EIA) Discussion and decision on IEE/EIA items and methods based on the results of scoping. (Supervision of survey) Check whether IEE or EIA is conducted properly. (Final reporting) Clarification of IEE or EIA results and recommendations.

Source: JICA, "Sectoral Study for Development Assistance-Environment", 1988.
Note: The shaded part is mainly covered by the guidelines.

1.2 Environmental Consideration for Urban Transportation Development Plans

1.2.1 Definition of Urban Transportation Development Plans in the Guidelines

Urban transportation development plans in the guidelines deal with master plans for transportation projects in urban areas including roads, railways, subways, new transportation systems, and transportation planning and traffic control systems, such as signal systems and traffic guide systems, and traffic and freight terminals.

1.2.2 Typical Possible Impacts and the Points of Environmental Consideration

Typical impacts in urban transportation development plans are described below. Particular consideration of these impacts is necessary.

Resettlement

People living in the project site would be relocated due to land acquisition for traffic facilities construction. Loss of livelihoods of inhabitants, difficulty in social and cultural adaptation in the resettlement site may occur.

Conditions of the inhabitants to be resettled and the resettlement site should be investigated thoroughly in environmental consideration.

Economic Activities

Economic Activities would be affected by the inflow and outflow of population and commodities to/from the region after construction of traffic and freight terminals and roads .

The areas where industrial foundation is weak may need particular consideration.

Air Pollution

In the case of road projects, exhaust gas from vehicular traffic after operation would cause air pollution and the health of inhabitants would be affected.

If the present pollutant concentration is considerably high, careful consideration should be given.

Noise and Vibration

In the construction stage, operation of construction equipment and detonations would create noise and vibration. In the operational stage, running vehicles could cause noise and vibration.

Noise would affect the facilities which require particular tranquillity, such as hospitals and schools, disturb sleep at night, interfere with breeding of livestock and cause dispersion of wildlife.

In environmental consideration, attention is required to the conditions of the various facilities located near the project site.

CHAPTER 2

PROJECT DESCRIPTION AND SITE DESCRIPTION

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PROJECT DESCRIPTION AND SITE DESCRIPTION

2.1 Basic Concept

To conduct screening and scoping of the potential environmental impacts that may be caused by a development plan or project, it is essential to fully understand the "project description" and "site description" at the earliest stage.

Project description includes the contents and features of the project, such as its background, objectives, location, executing agency, number of beneficiaries, scale, structure, construction method, operation and maintenance, etc..

Site description includes the present conditions of the natural and social environment and pollution in and around the project area.

In particular, if the project site includes such areas as follow, they should receive special attention:

a) Areas requiring soil conservation (high risk areas of erosion, salinization, etc.).
b) Arid and semiarid areas subject to desertification.
c) Tropical forests.
d) Water sources.
e) Habitats of value for the protection and conservation and/or sustainable use of fish and wildlife resources (wetlands, mangrove, swamps, coral reefs, etc.)
f) Areas of unique interest (historical, archaeological, cultural, aesthetic and scientific).
g) Areas of concentrations of population or industrial activities where further industrial development or urban expansion could create significant environmental problems.
h) Areas of particular social interest to specific vulnerable population groups (e.g., nomadic people or other people with traditional life styles).

It should be borne in mind that the above items must be thoroughly studied in each project step.

2.2 Project Description and Site Description of Urban Transportation Plans

The project description and the site description should be clarified in the formats shown in Tables 2-1 and 2-2 for screening and scoping.

However, at the project finding and preparatory study stages, sufficient information for the project description and site description may not be available. Thus, during the preparatory work prior to the preparatory study in the host country, the formats of Tables 2-1 and 2-2 should be filled in as complete as possible using all available information. The additional necessary information should be supplemented during the field surveys.

Table 2-1 Format for Project Description (Urban Transportation Development)

Item		Description
Project Name		
Background		
Objectives		
Location		
Executing Agency		
Beneficiaries		
Project Components		
	Type of Plan	Transportation Facility / Traffic Control / Freight Planning / Traffic Improvement
	Transportation Facilities	Road / Railway / Subway / New Transportation System / Terminal / Common Duct / Others ( )
	Traffic control, Traffic Improvement	Signal •Traffic Control System • Improvement of Intersection / Freight Terminal / Others( )
	Scale of the Project	Number of the Facilities _____, Extension_____ km.
Others		

Note: The format should be filled in on the basis of the available existing data and information.

Table 2-2 Format for Site Description (Urban Transportation Development)

Item		Description
Project Name		
Social Environment	Inhabitants: (residents/indigenous people/their views on the project, etc.)	
	Economic Activities/ Transportation: (international or domestic freight/traffic network, terminal facilities)	
	Land Use: (residential area/hospitals and schools/religious facilities)	
Natural Environment	Topography and Geology: (weak ground/wetland/faults)	
	Groundwater, River, Climate, Landscape: (volume of water, flood, monuments)	
	Fauna and Flora: (urban park, river, green area, street trees)	
Pollution	Complaints: (pollution of the upmost concern, etc.)	
	Measures taken: (institutional measures/ compensation, etc.)	
Others		

Note: The format should be filled in on the basis of the available existing data and information.

CHAPTER 3

SCREENING

CHAPTER 3
SCREENING

3.1 Basic Concept

JICA's 1988 report, "Sectoral Study for Development Assistance-Environment," defines screening as "a process of judgement on whether a development project requires an environmental impact study or not." That is to say, screening is the first judgement in the process of environmental consideration and should commence at the initial stage of the project, such as project finding.

Screening in the guidelines is also based on the above definition. However, the evaluation of whether or not the IEE/EIA is required for a project should be based on appropriate ideas and views for harmonizing the sustainable development with the residents' livelihood and surrounding environment by taking into consideration the project features and its environment, but not on the quantitative standards.

3.2 Screening Methods

3.2.1 Outline

As for the procedures for screening in addition to the provisions detailed in the annex to the 1985 OECD council recommendations, JICA's report, "Sectoral Study for Development Assistance-Environment", describes the following cross-sectional viewpoints:

- Can the project adversely affect the sustainability of production which depends mainly on natural resources ?
- Will the project significantly affect people's health ?
- Will the project lead to a deterioration or loss of valuable living resources and their habitats ?
- Will the project have an unreasonable impact on the livelihoods and subsistence of the people concerned ?

Based on the above viewpoints, the screening method should be examined in detail.

If there are laws or regulations concerning the environmental impact assessment for the project in the host country, it is necessary to discuss with the officials concerned of the country to make better environment considerations in accordance with the laws and regulations by referring to the guidelines.

On the other hand, if there are no such laws or regulations in the host country, it may be possible to formulate a standard with respect to the project scale and the land-use conditions for evaluating whether the development project requires an environmental

impact assessment or not. However, setting up a quantitative standard for judgement is not only difficult but its effectiveness is also doubtful because Japanese development assistance is provided to various countries and their environmental characteristics are vastly different.

It is considered to be more effective, therefore, to formulate certain ideas and viewpoints with qualitative expressions for evaluating screening.

3.2.2 Screening of Urban Transportation Development Plans

Based on the above consideration, the following concepts are established in the preliminary environmental survey :

- The development project should be planned in such a way as to provide society with sufficient benefits while securing the areas' sustainable development and growth without being detrimental to the lives and existence of the residents.

- The development project should be planned in such a way as to maintain harmony with the natural environment, while avoiding significant damage to the existing environment, and preserve valuable natural environmental assets.

The examination of screening should be conducted from practical viewpoints for each environmental item based on the above concepts. The results of the examination should be clarified by using the screening format as shown in Table 3-1 and should be included in the preparatory study report.

The evaluation result of each environmental item should be noted on the format whether or not environmental impacts exist. As the overall evaluation, the conclusion and the reason for evaluating whether or not IEE/EIA is required should be described briefly on the format.

The guidelines should be applied for all environmental impacts that may be caused by the project implementation not only in the project area but also in any area that may be directly or indirectly affected during the construction and after the operation of project facilities.

Table 3-1 Format for Screening (Urban Transportation Development)

No.	Environmental Item	Description	Evaluation	Remarks (Reason)
Social Environment				
1.	Resettlement	Resettlement due to land occupancy (transfer of rights of residence/land ownership)	[Y][N][?]	
2.	Economic Activities	Loss of bases of economic activities, such as land, and change of economic structure	[Y][N][?]	
3.	Traffic and Public Facilities	Impacts on schools, hospitals and present traffic conditions such as the increase of traffic congestion and accidents	[Y][N][?]	
4.	Split of Communities	Community split due to interruption of area traffic	[Y][N][?]	
5.	Cultural Property	Damage to or loss of value of churches, temples, shrines, archaeological remains or other cultural assets	[Y][N][?]	
6.	Water Rights and Rights of Common	Obstruction of fishing rights, water rights, rights of common	[Y][N][?]	
7.	Public Health Condition	Deterioration of public health and sanitary conditions due to generation of garbage and the increase of vermin	[Y][N][?]	
8.	Waste	Generation of construction wastes, surplus soil and general wastes	[Y][N][?]	
9.	Hazards (Risk)	Increase in danger of landslides, cave-ins, etc.	[Y][N][?]	
Natural Environment				
10.	Topography and Geology	Changes of valuable topography and geology due to excavation or filling work	[Y][N][?]	
11.	Soil Erosion	Topsoil erosion by rainfall after reclamation and deforestation	[Y][N][?]	
12.	Groundwater	Contamination caused by drainage and filtrate water in excavation work and lowering of groundwater table due to overdraft	[Y][N][?]	
13.	Hydrological Situation	Changes of river discharge and riverbed condition due to landfill and drainage inflow	[Y][N][?]	
14.	Coastal Zone	Coastal erosion and change of vegetation due to coastal reclamation and coastal changes	[Y][N][?]	
15.	Fauna and Flora	Obstruction of breeding and extinction of species due to changes of habitat conditions	[Y][N][?]	
16.	Meteorology	Changes of temperature, precipitation, wind, etc. due to large-scale land reclamation and building construction	[Y][N][?]	
17.	Landscape	Change of topography and vegetation due to reclamation. Deterioration of aesthetic harmony by structures	[Y][N][?]	
Pollution				
18.	Air Pollution	Pollution caused by exhaust gas or toxic gas from vehicles	[Y][N][?]	
19.	Water Pollution	Pollution caused by inflow of silt, sand and effluent from factories, etc.	[Y][N][?]	
20.	Soil Contamination	Contamination caused by dust and asphalt emulsion	[Y][N][?]	
21.	Noise and Vibration	Noise and vibration generated by vehicles	[Y][N][?]	
22.	Land Subsidence	Deformation of land and land subsidence due to the lowering of groundwater table	[Y][N][?]	
23.	Offensive Odor	Generation of exhaust gas and offensive odor by facility construction and operations	[Y][N][?]	
Overall Evaluation: Either IEE or EIA is necessary for the project implementation?			[Y][N]	

CHAPTER 4

SCOPING

CHAPTER 4
SCOPING

4.1 Basic Concept

In JICA's 1988 report, "Sectoral Study for Development Assistance-Environment," scoping is defined as "a process of identification of the critical environmental impacts out of the possible environmental impacts of a development project. Through the scoping process, the priority fields or items of an environmental impact assessment are also identified". Further, it recommends that scoping should be carried out through discussions with the government of the host country. These discussions are to be based on discussion items prepared in advance, and by taking into account the aforementioned cross-sectional judgement provisions.

With the above definition and the methods used by various agencies, the guidelines provide material for conducting adequate scoping. The guidelines would enable even those who are not IEE and EIA specialists to understand the overall picture of the development project to conduct the sufficient scoping work during the short-term preparatory study period.

4.2 Scoping Methods

4.2.1 Outline

There are several technical methods for environmental impact assessment and its scoping. Each of them is selected in accordance with the project type, the project planning level, the features of the environmental conditions, etc. The most common methods are the checklist method, the matrix method, the overlay method, and the network method. In particular, the checklist and the matrix methods are commonly used by most agencies.

For "identification of the critical environmental impacts out of the possible impacts of a development project," as required by the definition of scoping in the "Sectoral Study for Development Assistance-Environment," it is necessary to include all environmental items which can be predicted to arise along with implementation of the project. To accomplish this, the checklist method seems to be the easiest to understand and the most useful.

Based on the above consideration, the checklist method is proposed for scoping in the guidelines.

To clarify important fields and items among those listed on the checklist, it is necessary to understand the causal relationships between the environmental items and the project related activities during the construction and the operation periods. Thus, to make it easier to understand scoping, the guidelines show typical causal relationships between development activities and environmental items by using the matrix as well as the checklist.

For reference purposes, a comprehensive matrix covering 13 sectors of social and economic infrastructure development projects is shown in Table 4-1.

4.2.2 Scoping of Urban Transportation Development Plans

The checklist for scoping of urban transportation development plans is shown in Table 4-2. The matrix for understanding the causal relationship between the development activities and the environmental items is shown in Table 4-3.

To use the checklist for scoping, the following conditions and procedures should be taken into account:

(1) Application conditions

1) Periods covered by scoping

Scoping should cover both the construction and operation periods.

2) Spatial extent of scoping

Scoping should cover the project site and surrounding area.

3) Types of Environmental Impacts

Environmental impacts subject to scoping are those having negative impacts on the existing environment.

(2) Evaluation method of important fields and items

The evaluation of each item should be rated according to the following categories:

A (serious impact is expected);

B (some impact is expected);

C (extent of impact is unknown but further examination is required because it might become clear as the study progresses);

D (no impact is foreseeable and IEE/EIA is not required).

Important fields and items for IEE/EIA should be identified with reference to "possible environmental impacts," "useful factors for evaluation," "measures," and "related subjects for study" as listed in Table 4-5.

The opinions and views of the host country should also be taken into consideration for the evaluation.

(3) Overall Evaluation

The evaluation results of each environmental item and the reasons for the evaluation should be clearly described on the checklist. The items evaluated as A, B, or C should be examined based on the screening concept to determine whether or not IEE/EIA is required, and the policies for further study of those items should be outlined. If it is possible to alleviate or avoid some environmental impacts by taking adequate measures, the contents should be described.

If, as the result of the evaluation, there are items which are evaluated as "C" or higher, some studies should be conducted for these items.

For the overall evaluation, opinions and views of the host country should be taken into consideration.

The overall evaluation form is shown in Table 4-4.

Table 4-1 Comprehensive Matrix

Environment Items \ Project Type / Sectors			Sectoral Development									Comprehensive Development			
			1. Ports and Harbors	2. Airports	3. Roads	4. Railways	5. River and Erosion Control	6. Solid Waste Management	7. Sewerage	8. Groundwater Development	9. Water Supply	10. Regional Development	11. Tourism Development	12. Transportation Development	13. Urban Transportation Development
Social Environment	1	Resettlement	◎	◎	◎	◎	◎	○	○		○	○	○	○	○
	2	Economic Activities	○	○	○	○						○	○	○	○
	3	Traffic and Public Facilities	○	○	○	○	○	○				○	○	○	○
	4	Split of Communities		○	○	○	○					○	○	○	○
	5	Cultural Property	○	○	○	○	○					○	○	○	○
	6	Water Rights/Rights of Common	◎	○	○	○	◎			○	○	○	○	○	
	7	Public Health Condition				○		○				○	○	○	
	8	Waste	○	○	○	○	○	○	○			○	○	○	○
	9	Hazards (Risk)	○	○	○	○						○	○	○	○
Natural Environment	10	Topography and Soil Condition	○	○	○	○	○					○	○	○	
	11	Soil Erosion		○	○	○						○	○	○	
	12	Groundwater			○	○		○		◎		○			
	13	Hydrological Situation	○	○	○	○	◎	○			○	○	○	○	○
	14	Coastal Zone	◎	○	○	○	○	○				○	○	○	
	15	Fauna and Flora	◎	◎	◎	◎	◎	○	○		○	○	○	○	○
	16	Meteorology										○		○	
	17	Landscape	○	○	○	○	○	○	○		○	○	○	○	○
Pollution	18	Air Pollution	○	○	◎			◎	○			○		○	○
	19	Water Pollution	○	○	○	○	○	◎	○	○	○	○	○	○	
	20	Soil Contamination	○		○			○						○	○
	21	Noise and Vibration	○	◎	◎	◎	○	○	○	○	○	○	○	○	○
	22	Ground Subsidence								◎					
	23	Offensive Odor	○					◎	○			○		○	

Note:◎ : The environmental items to which special attention has to be paid
They might cause serious impacts that may affect the project formulation depending on the magnitude of the impacts and the possibility of the measures.

○ : The environmental items which may have a significant impact depending on the scale of project and site conditions

No mark : The environmental items requiring no impact assessment since the anticipated impacts are, in general, not significant.

In case of the comprehensive development projects, all the items are classified in ○, because their studies are usually at the master planning stage and the extent of impacts are not clear.

Table 4-2 Checklist for Scoping (Urban Transportation Development)

No.	Environmental Item	Evaluation	Reason
Social Environment			
1.	Resettlement		
2.	Economic Activities		
3.	Traffic/Public Facilities		
4.	Split of Communities		
5.	Cultural Property		
6.	Water Rights and Rights of Common		
7.	Public Health Condition		
8.	Waste		
9.	Hazards (Risk)		
Natural Environment			
10.	Topography and Geology		
11.	Soil Erosion		
12.	Groundwater		
13.	Hydrological Situation		
14.	Coastal Zone		
15.	Fauna and Flora		
16.	Meteorology		
17.	Landscape		
Pollution			
18.	Air Pollution		
19.	Water Pollution		
20.	Soil Contamination		
21.	Noise and Vibration		
22.	Land Subsidence		
23.	Offensive Odor		

Note 1: Evaluation categories :

A: Serious impact is expected.
B: Some impact is expected.
C: Extent of impact is unknown (Examination is needed. Impacts may become clear as study progresses.).
D: No impact is expected. IEE/EIA is not necessary.

Note 2: The evaluation should be made with reference to the "explanation of item" (Table 4-5)

Table 4-3 Matrix for Scoping (Urban Transportation Development)

		Major Facilities / Activities	Roads and supplemental facilities / Transport planning, Traffic control system / Traffic and distribution terminal						
		Activities which may cause impacts / Environmental Items		Before Operation		After Operation			
			Overall Evaluation	Reclamation and Spatial Occupancy	Operation of Construction Equipment and Vehicles	Spatial Occupancy	Operation of Vehicles	Operation of Traffic Control System	Operation of Terminals etc.
Social Environment	1	Resettlement	○	○					
	2	Economic Activities	○						○
	3	Traffic and Public Facilities	○	○			○	○	○
	4	Split of Communities	○			○	○		
	5	Cultural Property	○	○			○		
	6	Water Rights/Rights of Common							
	7	Public Health Condition							
	8	Waste	○	○					○
	9	Hazards	○	○	○				
Natural Environment	10	Topography and Geology							
	11	Soil Erosion							
	12	Groundwater							
	13	Hydrological Situation	○	○		○			
	14	Coastal Zone							
	15	Fauna and Flora	○	○	○	○	○		
	16	Meteorology							
	17	Landscape	○	○		○	○		
Pollution	18	Air Pollution	○		○		○		
	19	Water Pollution							
	20	Soil Contamination	○				○		
	21	Noise and Vibration	○		○		○		
	22	Land Subsidence							
	23	Offensive Odor							

Note:○ : The environmental items which may have a significant impact depending on the scale of the project and site conditions

No mark : The environmental items requiring no impact assessment since the anticipated impacts are, in general, not significant.

Table 4-4 Overall Evaluation Form (Urban Transportation Development)

Environmental Item	Evaluation	Study Plan	Remarks

Note: Evaluation categories :

A: Serious impact is expected.
B: Some impact is expected.
C: Extent of impact is unknown (Examination is needed. Impacts may become clear as study progresses.).
D: No impact is expected. IEE/EIA is not necessary.

Table 4-5 Explanation of Item 1 (Urban Transportation Development)

Item	1. Resettlement
Description	Resettlement due to land occupancy (transfer of rights of residence/land ownership)

Causes of Impacts

1. Land acquisition for the construction of transportation facilities

Possible Environmental Impacts

1. Loss of living foundation of the residents to be relocated. Social and cultural unsuitability to the new resettlement area may occur.
2. Friction between permanent residents and relocated people (new settlers) due to social and economic burdens on the permanent residents
3. Deterioration of living standard after resettlement due to the poor compensation system in some countries or the status of illegal occupants

Useful Factors for Evaluation

1. Resettlement may be difficult for those who live on special environmental resources which are peculiar to the area.
2. Their resettlement may be more difficult, when the residents are currently well-off.
3. Careful attention should be paid to the resettlement where racial problems exist.
4. The resettlement may be more difficult when there is no favorable resettlement area nearby.

Measures

1. Selection of resettlement area by taking into account the wishes of the residents
2. Meetings with the inhabitants and provision of necessary information
3. Improvement of the living and economic situations in the resettlement area
4. Sufficient compensation
5. Job training and guidance

Related Subjects for Study

1. Number of inhabitants to be relocated and their economic conditions
2. Conditions of resettlement area
3. Past cases of resettlement

Table 4-5 Explanation of Item 2 (Urban Transportation Development)

Item	2. Economic Activities
Description	Loss of bases of economic activities, such as land, and changes to the economic structure

Causes of Impacts

1. Inflow and outflow of population and goods resulting from the operation of traffic and freight terminals

Possible Environmental Impacts

1. Effects on regional economy because of changes in population distribution caused by alternate land use, change of commercial activities and job opportunities
2. Inconvenience in accessing between both sides of the transportation facilities

Useful Factors for Evaluation

1. When important local industries have to be relocated, the relocation would have great effects.
2. Increase of land use value in the vicinity of transportation facilities may make it difficult for existing industries with low productivity to survive.

Measures

1. Alternate route selection
2. Sufficient compensation to the land owners
3. Securing of substitute

Related Subjects for Study

1. Local economy and local industries
2. Future development plans of surrounding areas

Table 4-5 Explanation of Item 3 (Urban Transportation Development)

Item	3. Traffic and Public Facilities
Description	Impacts on schools, hospitals and present traffic conditions, such as the increase of traffic congestion and accidents

Causes of Impacts

1. Change of transport means by the operation of roads, traffic terminals and traffic control systems
2. Emergence and/or increase of vehicular traffic, and railway traffic

Possible Environmental Impacts

1. Decline or extinction of the existing traffic and transport facilities due to the operation of new traffic terminals and mass transport by new transportation facilities
2. Creation or increase of traffic accidents, traffic congestion and other traffic problems following an increase in traffic
3. Vehicular noise and vibration may affect schools, hospitals, religious spots and other public facilities.

Useful Factors for Evaluation

1. Existing traffic and transport facilities condition, especially the condition of the access roads to the existing route, should be considered carefully.
2. The relation to other regional development plans and/or urban development plans should be examined.
3. Careful consideration should be given when there are public facilities, such as schools, hospitals and religious sites in the project area.

Measures

1. Examination of the contents of the plan
2. Installation of traffic safety facilities
3. Environmental protection measures for public facilities

Related Subjects for Study

1. Land use and traffic conditions
2. Future land use and transportation plans
3. Higher level regional development plans
4. Distribution of the public facilities

Table 4-5 Explanation of Item 4 (Urban Transportation Development)

Item	4. Split of Communities
Description	Community split due to interruption of area traffic

Causes of Impacts

1. Interruption of existing regional transportation, pedestrian traffic, and distribution of goods due to construction of new roads and railways

Possible Environmental Impacts

1. Inconvenience in the daily life of the residents and negative effects on economic activities
2. Split of communities would create detached territories or isolated areas.

Useful Factors for Evaluation

1. Measures should be taken if some areas are expected to be geographically isolated.
2. Careful consideration should be given if the access to public facilities, such as hospitals, schools and community centers, would be interrupted.

Measures

1. Sufficient compensation
2. Securing alternative routes
3. Preparation of new transportation system

Related Subjects for Study

1. Social structure in the region
2. Transportation system, distribution of goods, and regional economy
3. Higher level regional development plans

Table 4-5 Explanation of Item 5 (Urban Transportation Development Plan)

Item	5. Cultural Property
Description	Damage to or loss of value of churches, temples, shrines, archaeological remains or other cultural assets

Causes of Impacts

1. Damage to and/or loss of historical remains and cultural property by land reclamation and vibration caused by construction equipment
2. Vibration and air pollution caused by vehicles

Possible Environmental Impacts

1. Damage to or loss of unique cultures and loss of opportunity for academic research and damage to the tourism business opportunity which depends on the cultural property
2. Inhabitants' feelings would be aggravated by the loss of valuable cultural assets in the area

Useful Factors for Evaluation

1. Special attention should be paid if the cultural assets are peculiar to the area or are recognized culturally or historically important from a global viewpoint.
2. Countries with longer histories are likely to have more archaeological and cultural assets to preserve.
3. Special attention should be paid to the cultural assets specified by laws and/or regulations.
4. Careful attention should be paid to buildings and other facilities in unique communities, even if they are small.

Measures

1. Reexamination of the traffic routes and contents of the plan
2. Preservation or relocation of the archaeological or cultural assets
3. Meetings with the inhabitants and provision of necessary information

Related Subjects for Study

1. Laws and regulations related to the preservation of archaeological remains and cultural assets
2. Local history and folklore
3. Preservation or relocation project plan

Table 4-5 Explanation of Item 8 (Urban Transportation Development)

Item	8. Waste
Description	Generation of construction waste, debris and general waste

Causes of Impacts

1. Generation of debris and construction waste following the construction of transportation facilities, such as roads, railways and subways
2. Generation of general waste by the operation of the transportation facilities and economic activities

Possible Environmental Impacts

1. Exposed waste may affect aesthetic values and vegetation.
2. Expansion or construction of waste disposal sites would be needed to deal with the increase of waste from transportation facilities, such as stations.

Useful Factors for Evaluation

1. Volume of debris can be estimated from the scale of earth work.
2. A large amount of construction waste would be produced when building structures are demolished.

Measures

1. Securing of disposal sites for debris and construction waste
2. Establishment of adequate waste collection system and improvement of disposal facilities
3. Careful construction planning and management

Related Subjects for Study

1. Amount of waste, physical and chemical characteristics of the waste
2. Land ownership and land use conditions for obtaining disposal sites
3. Laws and regulations concerning waste disposal

Table 4-5 Explanation of Item 9 (Urban Transportation Development)

Item	9. Hazards (Risk)
Description	Increase in danger of landslides, cave-ins and accidents

Causes of Impacts

1. Damage to roads and buildings due to construction work of transportation facilities
2. Cut of underground pipelines of gas or water in excavation

Possible Environmental Impacts

1. Negative impacts on the lives of inhabitants and economic activities as a result of the interruption of transportation and destruction of facilities
2. Large-scale accidents may threaten the lives of inhabitants and users of transportation facilities.

Useful Factors for Evaluation

1. Careful attention should be paid to facilities constructed on the space or underground of existing roads.
2. Careful attention should be paid to areas having frequent earthquakes or other natural disasters.

Measures

1. Careful construction planning and management
2. Establishment of system for prevention of accidents and disasters

Related Subjects for Study

1. Urban planning
2. History of natural disasters
3. Topographical and geological surveys

Table 4-5 Explanation of Item 13 (Urban Transportation Development)

Item	13. Hydrological Situation
Description	Changes of river discharge and riverbed condition due to landfill and shifted construction

Causes of Impacts

1. Hydrological regime would be altered by structures, such as piers, when the route passes over lakes and rivers

Possible Environmental Impacts

1. Alteration of the hydrological regime would change habitat conditions of aquatic life and affect the utilization of water for navigation, fishery, tourism, and so on.

Useful Factors for Evaluation

1. Careful attention should be paid to the condition of valuable aquatic life.
2. Particular attention is required if the community in the area utilizes the water for navigation, fishery and tourism.

Measures

1. Alternate route selection
2. Compensation for fishery

Related Subjects for Study

1. Aquatic life
2. Water use

Table 4-5 Explanation of Item 15 (Urban Transportation Development)

Item	15. Fauna and Flora
Description	Obstruction of breeding and the extinction of species due to changes of habitat conditions

Causes of Impacts

1. Removal of vegetation and extinction of animal habitat in the project area
2. Generation of exhaust gas and noise from operating vehicles
3. Generation of exhaust gas, noise and vibration from construction equipment and vehicles

Possible Environmental Impacts

1. Greenery in urban area has a recreational value and functions to moderate urban environment. Loss of the greenery, therefore, would cause deterioration of the living environment and its amenity.

Useful Factors for Evaluation

Particular attention should be paid to the following conditions:

1. There is greenery which has a recreational value.
2. There are endangered or rare species listed in the Red Data Books of IUCN.
3. There are bilateral and/or multilateral conventions on wildlife.

Measures

1. Relocation of plants and animals
2. Creation of alternative green land
3. Careful route selection
4. Careful construction planning
5. Protection measures for plants and animals

Related Subjects for Study

1. Urban planning
2. Fauna and flora
3. Livelihood of inhabitants

Table 4-5 Explanation of Item 17 (Urban Transportation Development)

Item	17. Landscape
Description	Change of topography and vegetation due to the land reclamation. Deterioration of aesthetic harmony by the appearance of structures

Causes of Impacts

1. Change of topography by construction and appearance of transportation facilities
2. Air and water pollution

Possible Environmental Impacts

1. In case the landscape has cultural or religious importance, the change of scenery would affect the values.
2. Damage to the landscape by air and water pollution may affect tourism.

Useful Factors for Evaluation

1. Special attention should be paid to landscape having cultural values from a global viewpoint.
2. The particular meanings or roles of the landscape (religious object, tourist attraction, etc.) in the region should be studied.

Measures

1. Careful consideration on the location, scale, figure, material and color of facilities
2. Forestation using indigenous trees

Related Subjects for Study

1. Actual situation of tourism
2. Local history, folklore and livelihood of residents

Table 4-5 Explanation of Item 18 (Urban Transportation Development)

Item	18. Air Pollution
Description	Pollution caused by exhaust gas or dust from vehicles

Causes of Impacts

1. Exhaust gas and dust produced by construction equipment and vehicles
2. Exhaust gas and dust from operating vehicles

Possible Environmental Impacts

1. An increase in traffic convenience would cause a traffic flow increase which would then lead to traffic congestion and air pollution.
2. Air pollution caused by exhaust gas and dust would affect the health of residents, and plants and animals.
3. If a large amount of exhaust gas is produced, sulfur oxides in the gas may cause acid rain and carbon dioxide may contribute to global warming.

Useful Factors for Evaluation

1. Careful consideration is required if there are facilities requiring clean air, such as hospitals.
2. Traffic congestion would occur in the access area to the existing road.
3. Careful consideration is needed if pollution has already spread in the area.

Measures

1. Reexamination of the contents of the plan, especially the access to the existing roads
2. Consideration of construction methods and schedule

Related Subjects for Study

1. Air quality standard and regulations on emission of air pollutants
2. Location of public facilities (e.g., hospitals)
3. Construction planning
4. Habitats of plants and animals

Table 4-5 Explanation of Item 20 (Urban Transportation Development)

Item	20. Soil contamination
Description	Contamination of soil by dust and chemicals, such as asphalt emulsion

Causes of Impacts

1. Dispersion of paving materials, such as asphalt emulsion, during construction
2. Exhaust gas and dust from operating vehicles

Possible Environmental Impacts

1. Heavy metals in dust would be accumulated in soil and may affect the growth of plants.
2. Groundwater contaminated by infiltration would harm the health of the residents who use it.

Useful Factors for Evaluation

Careful consideration is required under the following conditions:

1. There is a green belt along the route.
2. There is groundwater use in the vicinity.

Measures

1. Development of alternative traffic measures for vehicles
2. Alternative source of drinking water

Related Subject for Study

1. Land use pattern

Table 4-5 Explanation of Item 21 (Urban Transportation Development)

Item	21. Noise and Vibration
Description	Noise and vibration caused by operating vehicles

Causes of Impacts

1. Operation of construction equipment and vehicles for construction and detonation
2. Operating vehicles or trains after facility operation

Possible Environmental Impacts

1. Hospitals and schools would be affected by the noise. Sleep would be disturbed by vehicles operating at night, and the breeding of livestock would also be affected.
2. Buildings would have cracks caused by vibration when the ground is weak.

Useful Factors for Evaluation

Serious impacts may occur under the following conditions:

1. Densely populated areas or such facilities that require a quiet atmosphere are located nearby.
2. There are cattle related industries in the area.
3. The planning area includes soft ground, such as landfills, cohesive layers, etc..

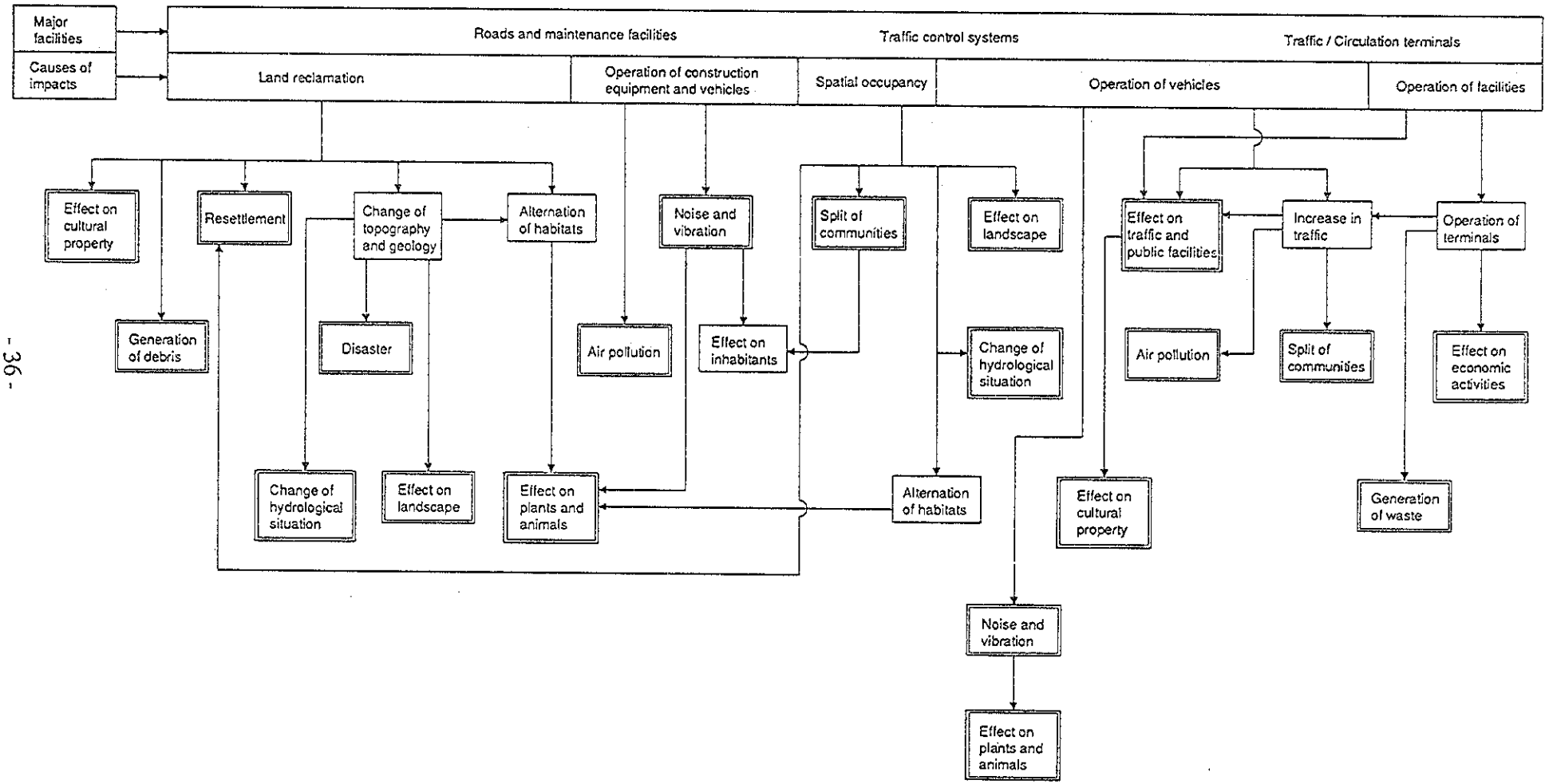
Measures

1. Reexamination of the project contents
2. Use of low-noise and vibration construction equipment
3. Examination of construction schedule and working hours, and careful construction planning and management
4. Installation of acoustic walls and buffer zones
5. Compensation for the impacts on livestock

Related Subjects for Study

1. Land use, distribution of inhabitants and public facilities, living conditions of the residents
2. Geological survey

Appendix Flowchart of the Environmental Impacts of Urban Transportation Development Plans



Note : ☐ : indicates the environmental items shown in Table 4-3.