

CHAPTER 7 FINANCIAL REQUIREMENT AND AFFORDABILITY OF EMP

7.1 Implementation and Financial Requirement of EMP

(1) Overall Requirement

The overall financial requirement for the implementation of EMP for environmental management and environment-related services, is shown in Table 7-1 and summarized below.

Capital and Recurrent Costs for EMP

Unit: US\$ 1,000

	2000 - 2010	2011 - 2020	Total
Projects for Sanitary Water			
- Capital Cost	335,626	59,411	395,037
- Recurrent	2,913	14,091	17,004
Projects for Clean Water			
- Capital Cost	275,577	396,921	672,498
- Recurrent	17,403	45,186	62,589
Projects for Sanitary Water & Sanitary Water (Reform of HSDC)			
- Capital Cost	4,415	1,310	5,725
- Recurrent	5,816	9,355	15,171
Projects for Clean City			
- Capital Cost	85,020	49,105	134,125
- Recurrent	38,158	97,283	135,441
Sub-Total			
- Capital Cost	700,638	506,747	1,207,385
- Recurrent	64,290	165,915	230,205
Projects for Institutional			
	9,172	7,682	16,855
Grand Total	774,100	680,345	1,454,445

As shown above, US\$1,454 million would be required in total for the implementation of the recommended projects and measures for EMP for the period of 21 years from 2000 through 2020, which comprises the capital cost of about US\$1,207 million and about US\$247 million for institutional project cost and incremental recurrent costs including O&M and personnel costs.

(2) Implementation Schedule and Financial Requirement for the Urgent and Priority Projects

Among the recommended projects, preparatory works should be started as soon as possible for the urgent project and construction should be commenced in 2002 to be completed around the beginning of 2004, aiming at receiving the solid wastes after using up the existing landfill capacity. Construction schedules of the structural type priority projects are set considering:

- a) Urgency of the projects
- b) Continuation of the ongoing previous stages/phases
- c) Time required for pre-construction works including financing and design works

Accordingly, all the recommended priority projects of structural type will be started before 2005 and completed in 2010 at the latest.

Total initial investment cost will amount to about US\$514 million as summarized below.

Initial Investment Cost

(US\$1,000)

Urgent/Priority Projects	Period	Investment Cost
Nam Son Landfill/Transfer System	2002-2005	45,848
To Lich River Drainage Project, Stage 2	2002-2006	153,941
Public Sewerage for Old City Center	2002-2010	219,039
West Lake Water Quality Improvement	2000-2003	36,421
Main City Lakes Improvement	2002-2005	10,258
Primary Waste Collection	2000-2010	32,980
Septage Collection & Disposal	2000-2010	16,000
Total		514,487

Considering the urgent need, reinforcement of the Hanoi DOSTE should be started from 2000 in particular the upgrading of the Environmental Management Division of Hanoi DOSTE to an agency under DOSTE. In order to upgrade the current activities as well as to prepare for the development of the new facility recommended in EMP, institutional and organizational type priority projects are recommended to be started in 2000.

7.2 Affordability of Implementation

In the reality, capital costs will be financed through various fund sources including general revenue of HPC and the Government, international financial organizations, bi-lateral official development aid, etc. Financing costs varies according to the sources. Specific fund sources and their conditions are yet to be known at this moment. Considering the characteristics of the EMP projects as well as the fund sources in the past and possible international finance assistance in the future, in this JICA Study, the total cost is capitalized, assuming 25 year repayment period with 5 % interest rate.

Affordability of EMP costs or its implementability was checked by the capitalized cost of EMP added with all the recurrent costs including the current against the total revenue of HPC and GRP of the city. It is assumed that HPC revenue grows at the same rate as that for GRP.

Two cases of economic growth are assumed, high and low cases. The calculated ratios for 2010 and 2020 are given below for the two cases.

Range of Ratios of EMP Costs to HPC Revenue and GRP

	2010	2020
Environmental Cost		
- Amortized capital cost + Recurrent cost (US\$ million)	76.5	118.4
High Case		
- HPC revenue (US\$ million)	1,089	4,406
- GRP (US\$ million)	8,025	32,481
- Ratio to HPC revenue (%)	7.0	2.7
- Ratio to GRP (%)	1.0	0.4
Low Case		
- HPC revenue (US\$ million)	453	935
- GRP (US\$ million)	3,341	6,887
- Ratio to HPC revenue (%)	16.9	12.7
- Ratio to GRP (%)	2.3	1.7

For the High Case, the ratios are considered in the reasonable range. In the Low Case, the ratios become much higher but are considered to be within the acceptable range. By these analysis, EMP is judged to be affordable and therefore financially implementable.

7.3 Fund Raising for the Implementation of EMP

Though all the projects and measures recommended for EMP should serve for the common purpose of the preservation and improvement of the environment, their characteristic varies according to the project. Namely, some would serve for the city population as a whole, others serve for particular population. Some projects would necessitate large outlay of capital while some need small budget for implementation. Some projects need big capital cost but small O&M cost while some need relatively small outlay but big annual O&M. Though EMP should serve for the city of Hanoi, Hanoi being the capital of the country and its environmental improvement might serve for the State's interest by upgrading the image and impression of the country.

Characteristics of the recommended projects are shown below.

Characteristics of the recommended projects

Purpose/Sector	Whole City	Particular Beneficiaries
Sanitary Water - Drainage	B	B
Clean Water - Public sewerage - Lake conservation	B B	A A
Clean City - Solid waste management	B	A
Institutional & Organizational - Environmental management - Service providers	A C	C A

Remarks: A Strong relevance, B Limited relevance, C Not relevant

Funding facility conceivable comprise the following:

- a) Hanoi City budget
- b) Government budget
- c) Own fund of the companies or service providers
- d) Concessionary term loans by Official Development Aids (ODA) or international financing organizations
- e) Grants by ODA

Considering these project characteristics, the following application of funding can be conceivable.

Various Application of Funding

Fund Sources	Drainage	Sewerage	Lake	SWM	EM
Hanoi City budget	A	A	A	A	A
Government budget	B	C	C	C	C
Own funds	C	B	C	A	C
Concessionary loans	A	A	A	A	C
Grants by ODA	C	C	C	A	C

Remarks: A Strong relevance/possibility, B Limited relevance/possibility,

C No relevance/possibility

It should be noted that concessionary loans are extended through the Government or Hanoi City and are components of the budgets.

CHAPTER 8 SUBSEQUENT ACTIONS RECOMMENDED FOR MATERIALIZING EMP

Following the completion and submission of this JICA EMP, it is recommended that actions be taken to bring the recommendations into reality including the following.

8.1 Recommended Actions for the Finalization and Authorization of EMP

After the completion and submission of JICA EMP, appraisal committee which includes not only HPC members but also Ministries and Central bodies concerned with the environment in the Hanoi City, should be set up for the evaluation and finalization of the EMP. EMP thus prepared should be approved at national level like the case of Hanoi Urban Master Plan for 2020, considering the status of the Hanoi City as the state capital.

8.2 Recommended Actions for Solving the Urgent Problem of Solid Waste Management

Considering the urgency of the waste disposal in the urban districts of the city, detailed design of the recommended urgent project of Nam Son Landfill/Waste Transfer System should be carried out as soon as possible. Financing arrangement should also be started. Efforts should be continued for securing the cooperation of the residents in and around the Nam Son landfill site.

Location of the waste transfer station should be finalized in consideration of the JICA Study recommendation, and arrangements for land acquisition and compensation should be started.

Detailed design should be carried out for the recommended priority project of Primary Collection of Solid Waste that includes expansion of garages and building new one, which is eventually an integral part of the whole waste management system from collection up to disposal. Procurement of the vehicles should be started at the earliest timing and land acquisition arrangement for the new garage construction, should be started in plenty of time.

8.3 Recommended Actions for Sanitary Water Environment

Detailed design for the To Lich Drainage Project Stage 2 should be carried out considering the progress of the ongoing Stage 1, desirably in 2002 together with the financial arrangement.

8.4 Recommended Actions for Clean Water Environment

It may be advisable to carefully study the possible impacts of water diversion from the Red River to the West Lake in order to avoid the adverse impact on the ecology of the lake for supporting the planning of the water quality improvement of the lake.

Feasibility study for the proposed Public Sewerage Development Project for the Old City Center should be started at the earliest timing.

8.5 Recommended Actions for Clean Air and Quiet City Environment

Traffic is the major cause both for air pollution and noise. Especially in the urbanized area, road network as well as traffic regulation and management affects the urban living environment. These environmental consideration should be incorporated in the transport planning and traffic management.

Tables

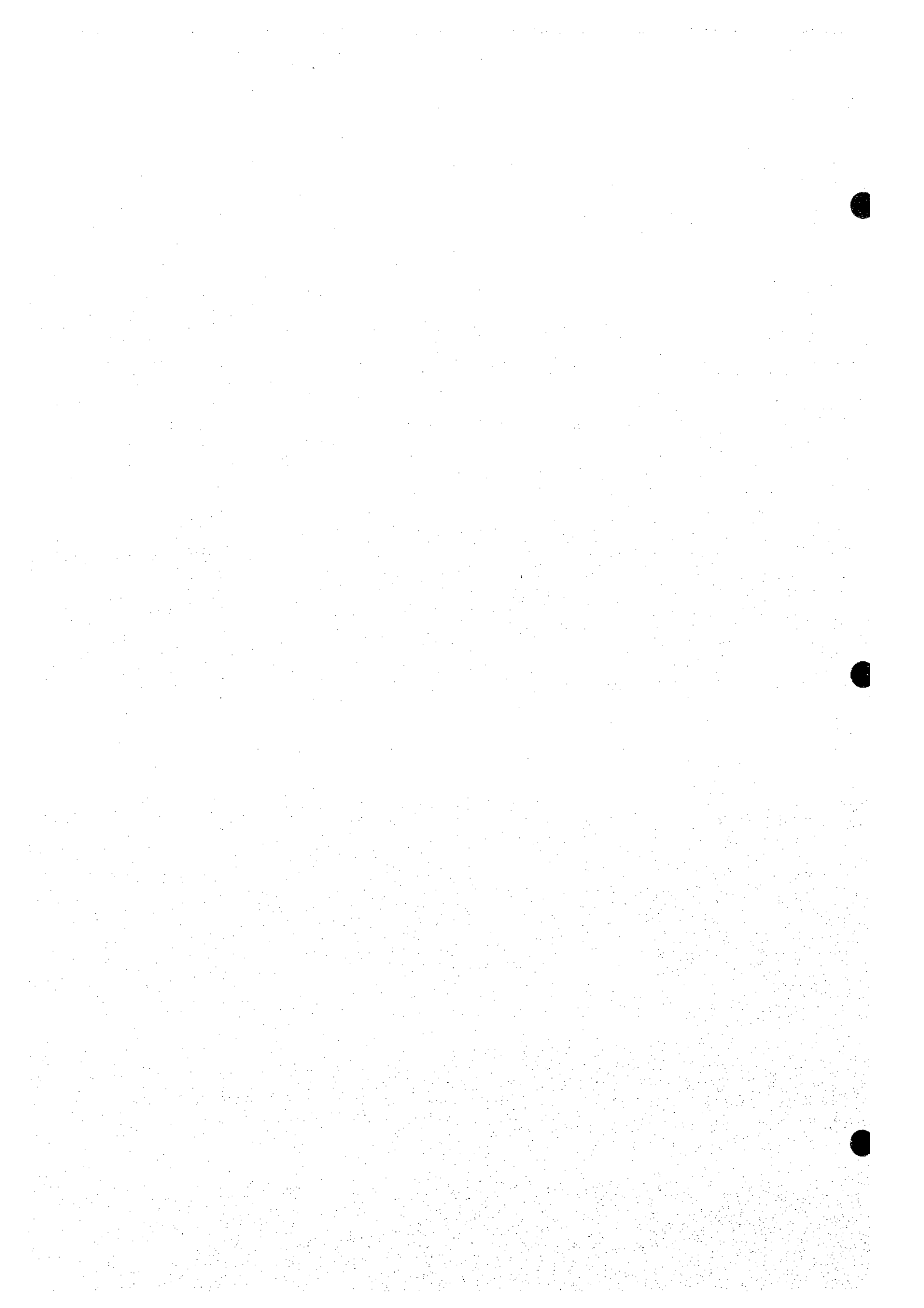


Table 2-1 Future Land Use by Development Area of Hanoi Jurisdiction in 2020

Land Use Area	a		b		c				d		e		f		g		h		i		j		Remarks (Planned pop.)
	Agri-culture	Forest/Green	Indry.	Building Cmm.	Public	Building Total	Residential	Trans-port	Defence/Security	River/Lake	Other	Nature (a+b+g)	Total (ha)	Remarks									
Development Restricted	0	160	32	640	560	1,232	1,120	490	114	379	4	539	3,499	800,000									
	0%	4.6%	0.9%	18.3%	16.0%	35.2%	32.0%	14.0%	3.3%	10.8%	0.1%	15.4%	100.0%										
Development Extended	0	910	451	560	490	1,501	1,820	1,680	556	2,155	74	3,065	8,696	700,000									
	0%	10.5%	5.2%	6.4%	5.6%	17.3%	20.9%	19.3%	6.4%	24.8%	0.9%	35.2%	100.0%										
New Development	250	1,800	985	1,000	900	2,885	2,800	2,400	462	2,204	19	4,254	12,820	1,000,000									
	2.0%	14.0%	7.7%	7.8%	7.0%	22.5%	21.8%	18.7%	3.6%	17.2%	0.1%	33.2%	100.0%										
Central City TOTAL ①	250	2,870	1,468	2,200	1,950	5,618	5,740	4,570	1,132	4,737	97	7,857	25,014	2,500,000									
	1.0%	11.5%	5.9%	8.8%	7.8%	22.5%	22.9%	18.3%	4.5%	18.9%	0.4%	31.4%	100.0%										
Soc Son Urban	234	117	430	187	163	780	606	443	6	112	21	463	2,319	233,166									
Thanh Tri Urban	221	131	77	63	50	190	200	157	4	259	95	611	1,257	62,609									
Other Urban	455	248	507	249	213	969	807	600	10	371	116	1,074	3,576	295,775									
TOTAL ②	12.7%	6.9%	14.2%	7.0%	6.0%	27.1%	22.6%	16.8%	0.3%	10.4%	3.2%	30.0%	100.0%										
Sub-urban	38,303	6,757	10	425	30	465	4,420	1,360	826	7,661	2,290	52,701	62,062	0.7 - 0.8 mil.									
TOTAL ③	61.7%	10.9%	0.0%	0.7%	0.0%	0.7%	7.1%	2.2%	1.3%	12.3%	3.7%	84.9%	100.0%										
Hanoi Jurisdiction GRAND TOTAL (①+②+③)	39,008	9,855	1,985	2,874	2,193	7,052	10,967	6,530	1,968	12,769	2,503	61,632	90,652	3.5 - 3.6 mil.									
	43.0%	10.9%	2.2%	3.2%	2.4%	7.8%	12.1%	7.2%	2.2%	14.1%	2.8%	68.0%	100.0%										

**Table 2-2 Future Cleanliness in terms of Solid Waste Uncollected
without Counter-measures**

	1998	2010	2020
1. Urban Districts	407 (25%)	1,689 (58%)	2,943 (71%)
2. Sub Urban Districts			
2.1 Soc Son	68 (75%)	92 (80%)	118 (84%)
2.2 Dong Anh	77 (81%)	153 (89%)	288 (94%)
2.3 Gia Lam	77 (63%)	151 (77%)	218 (83%)
2.4 Tu Liem	47 (71%)	76 (80%)	108 (85%)
2.5 Thanh Tri	62 (76%)	96 (83%)	136 (88%)
2.6 Total of Sub Urban Districts	332 (73%)	568 (82%)	868 (88%)
3. Total of Hanoi city	739 (35%)	2,257 (63%)	3,811 (74%)

Note1: "Without counter-measures" means that waste collection capacity of HPC would remain same as the current level without increases.

Note2: Figures in parenthesis are ratios of uncollected waste to generation amount without countermeasures.

**Table 2-3 Noise Pollution for the Present, 2010 and 2020
without Counter-measures**

Environmental Zones		Present	2010	2020
1, Old City Center	Morning	P	P	P
	Daytime	P		
	Nighttime	P		
2, Red River Right Bank North- West	Morning	P	P	P
	Daytime	P		
	Nighttime	P		
3, Red River Right Bank South	Morning	P	P	P
	Daytime	P		
	Nighttime	P		
4, Dong Anh urban area	Morning	U	P	P
	Daytime	P		
	Nighttime	U		
5, Gia Lam urban area	Morning	P	P	P
	Daytime	P		
	Nighttime	U		
6, Sub-urban Area	Morning	P	P	P
	Daytime	P		
	Nighttime	U		
7, Ho Tay Area	Morning	P	P	P
	Daytime	P		
	Nighttime	P		

Note: P: Polluted U: Unpolluted

**Table 2-4 Future Conditions of Nature and Amenity
without Counter-measures**

Environmental Zones	Present	2010	2020
1. Old City Center	B	C	C
2. Red River Right Bank North- West	B	B	C
3. Red River Right Bank South	B	B	C
4. Dong Anh urban area	B	B	C
5. Gia Lam urban area	B	B	C
6. Sub-urban Area	A	B	B
7. Ho Tay Area	B	C	C

Note: A: Fully satisfied, B: Partially satisfied, C: Not satisfied

Table 2-5 Future Conditions of Cultural & Historical Assets without Counter-measures

Environmental Zones	Present	2010	2020
1, Old City Center	B	C	C
2, Red River Right Bank North- West	-	-	-
3, Red River Right Bank South	-	-	-
4, Dong Anh urban area	-	-	-
5, Gia Lam urban area	-	-	-
6, Sub-urban Area	-	-	-
7, Ho Tay Area	B	C	C

Note: A: Fully satisfied, B: Partially satisfied, C: Not satisfied

Table 5-1 Definition of Target Satisfaction Levels

Sanitary Water Environment

Effective Area	Protection Level		
	less than 5-year return period	Between 5-year and 10-year return period	more than 10-year return period
Less than 50 %	0	0	1+
Between 50% and 75 %	0	1+	2+
More than 75 %	0	2+	3+

Clean Water Environment

Effective Area	Water Pollution Level		
	Polluted	Slightly-Polluted	Un-Polluted
Less than 50 %	0	0	1+
Between 50% and 75 %	0	1+	2+
More than 75 %	0	2+	3+

Clean City: Waste collection service coverage in terms of population (%)

Coverage Area	Collection Level
100	3+
Between 50 to 100	2+
Less than 50	1+

Green

Effective Area	Area of Green Park		
	Less than 10 m ² per capita	10 m ² or more than 10 m ² per capita	20 m ² or more than 20 m ² per capita
Less than 50 %	0	0	1+
Between 50% and 75 %	0	1+	2+
More than 75 %	0	2+	3+

Friendly Water

Recreation Area	Water Front		
	Polluted Water Bodies	Slightly-Polluted Water Bodies	Un-Polluted Water Bodies
without Recreation Area	0	1+	2+
with Recreation Area	1+	2+	3+

Table 5-2 Target Satisfaction Levels by Sector

Priority Project	Zone	Sanitary Water Environment	Clean Water Environment	Clean City	Green	Friendly Water
To Lich River Basin Drainage Project	1	3+	0	0	0	0
	2	1+	0	0	0	0
	3	3+	0	0	0	0
	4	0	0	0	0	0
	5	0	0	0	0	0
	6	1+	0	0	0	0
	7	3+	0	0	0	0
	8					
Waste Lake Water Quality Improvement Project	1	0	2+	0	0	0
	2	0	0	0	0	0
	3	0	0	0	0	0
	4	0	0	0	0	0
	5	0	0	0	0	0
	6	0	0	0	0	0
	7	0	3+	0	0	3+
	8					
Main City Lakes Improvement Project	1	1+	0	0	1+	1+
	2	0	0	0	0	0
	3	0	0	0	0	0
	4	0	0	0	0	0
	5	0	0	0	0	0
	6	0	0	0	0	0
	7	0	0	0	1+	1+
	8					
Public Sewerage Development for Old City Center	1	0	3+	0	0	2+
	2	0	0	0	0	0
	3	0	2+	0	0	1+
	4	0	0	0	0	0
	5	0	0	0	0	0
	6	0	0	0	0	0
	7	0	0	0	0	0
	8					
Improvement of the Primary Collection System of Solid Waste	1	0	1+	3+	0	0
	2	0	1+	3+	0	0
	3	0	1+	3+	0	0
	4	0	0	0	0	0
	5	0	0	0	0	0
	6	0	0	0	0	0
	7	0	1+	3+	0	0
	8					
Establishment of Septage Collection and Disposal System	1	0	1+	0	0	0
	2	0	1+	0	0	0
	3	0	1+	0	0	0
	4	0	1+	0	0	0
	5	0	1+	0	0	0
	6	0	0	0	0	0
	7	0	1+	0	0	0
	8					

Table 5-3 Benefits of Structural Priority Project

Priority Project	Target	Area	Number of Beneficiaries in 2020	Other Tangible Benefits
To Lich River Basin Drainage Project	<ul style="list-style-type: none"> Sanitary Water 	75.4 km ² (To Lich River)	1,085,895	<ul style="list-style-type: none"> The project will ensure the average protection level corresponding to 10 year return period storm water. Enhanced economic activities and reduction of interruption of traffic Enhancement of land value and securing the urban development
West Lake Water Quality Improvement Project	<ul style="list-style-type: none"> Clean Water Friendly Water 	39.1 km ² (EZ 1 & 7)	854,090	<ul style="list-style-type: none"> Provision of suitable waterfront on West Lake with total 520 ha water surface and 12 km shoreline Water pollution generation load of BOD 6,432 kg/day in 2010 is to be treated properly by the sewerage system to be constructed by the project, Water quality of the Lake is to be improved to Un-polluted level.
Main City Lakes Improvement Project	<ul style="list-style-type: none"> Sanitary Water Friendly Water 	39.1 km ² (EZ 1 & 7)	854,090	<ul style="list-style-type: none"> Provision of suitable waterfront on 14 lakes with total 83.7 ha water surface and 13.5 km shorelines, Activating tourist industry in Hanoi, especially in EZ 1 & 7 Sustaining the living environment and amenity for residents in EZ 1 & 7 Reduce the flood damages, Improvement of welfare and social security.
Public Sewerage Development for Old City Center	<ul style="list-style-type: none"> Clean Water Friendly Water 	28.8 km ²	712,493	<ul style="list-style-type: none"> Water pollution load of BOD 74,700 kg/day in 2010 is to be treated properly by the sewerage system of the project Improvement of water quality in urban rivers in Environmental Zone 1 & 3 by way of the above treatment is as shown below. Improvement of the living environment and health with reduction in disease contraction in EZ 1, Tourism promotion due to preparing clean water environment in Hanoi, Improvement of water resources, such as lakes and groundwater, and Securing the agriculture and fishery activities in EZ 1 and 3, Sustaining the living environment and amenity for residents EZ 1
Improvement of the Primary Collection System of Solid Waste	<ul style="list-style-type: none"> Clean City 	84.1 km ² (7 urban district)	1,433,861	<ul style="list-style-type: none"> Preparation of clean city area of 84.1 km² Improvement of water environment by way of free from uncollected garbage
Establishment of Septage Collection and Disposal System	<ul style="list-style-type: none"> Clean Water Clean City 	250.3 km ²	648,972	<ul style="list-style-type: none"> Improvement of the living environment and health condition with reduction in disease contraction, Improvement of water environmental condition of rivers, lakes and groundwater, and securing the agriculture and fishery activities,

Table 5-4 Cost Effectiveness

	Investment Cost up to 2010 (US\$1,000)	Cost per Beneficiary (US\$)
1) To Lich Basin Drainage Project Stage 2	153,941	10.6
2) City Lake Conservation (14 Lakes)	10,128	0.9
3) Waste Lake Conservation	36,421	3.3
4) Public Sewarage	223,563	24.7
5) Septage	16,000	3.0
6) Waste Primary Collection	32,980	4.5
7) Nam Son Landfill/transfer System	52,040	4.2
Total	525,073	-

Table 5-5 Relationship between priority projects

Priority Project Selected for Implementation	To → From												
	Structural						Non-structural						
	1	2	3	4	5	6	7	8	9	10	11	12	13
Structural													
1: To Lich River Basin Drainage Project	○	○	○	○	○	○	○	○	○	○	○	○	○
2: West Lake Water Quality Improvement	○	○	○	○	○	○	○	○	○	○	○	○	○
3: Main City Lakes Improvement	○	○	○	○	○	○	○	○	○	○	○	○	○
4: Public Sewerage Development	●	○	○	○	○	○	○	○	○	○	○	○	○
5: Improved Primary Collection System for Solid Waste	○	○	○	○	○	○	○	○	○	○	○	○	○
6: Septage Collection and Disposal	○	○	○	○	○	○	○	○	○	○	○	○	○
Non-structural													
7: Establish and reinforce environmental monitoring system													
8: Establish Environmental Coordination Committee													
9: Reinforce Hanoi DOSTE													
10: Strengthen Env. Management at District Level													
11: Reform HSDC													
12: Reform URENCO and other SWM organizations													
13: Establish Environmental Fund													

Degree of dependency

● dependent ○ partially dependent ○ independent

Complementary Projects - Other priority projects whose implementation increases the benefits and/or likelihood of success and sustainable implementation of a given priority project.



Figures

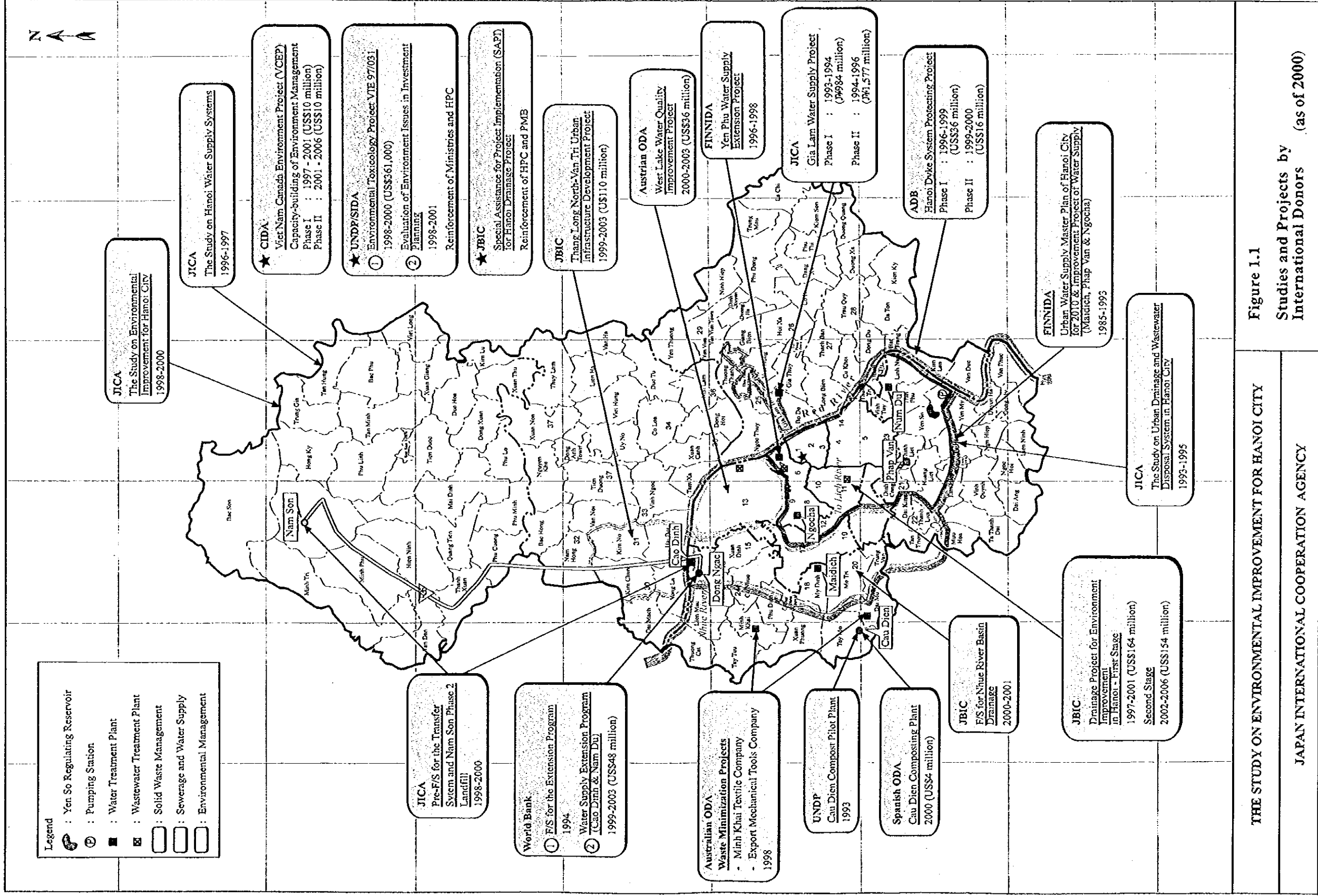
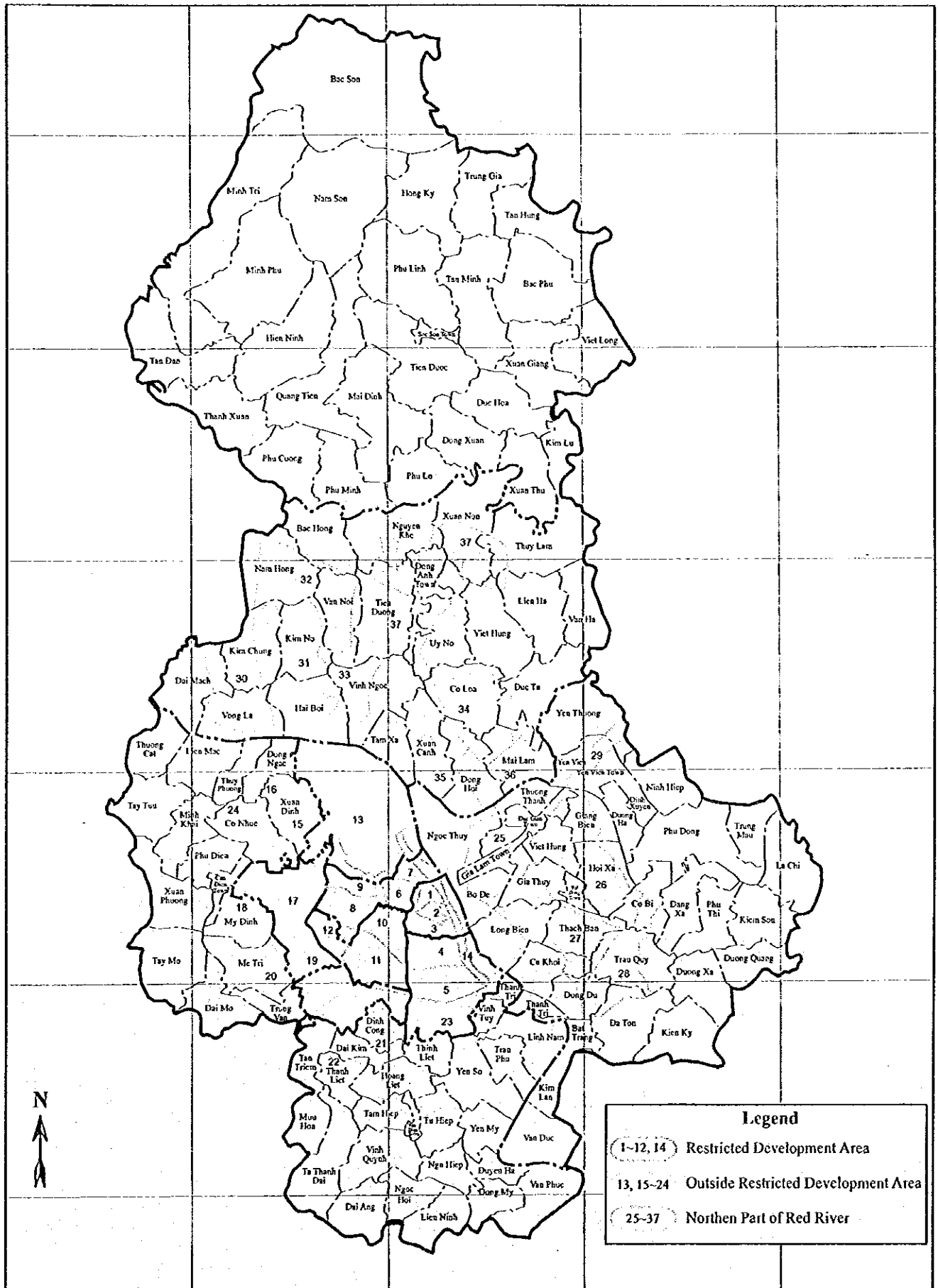


Figure 1.1
Studies and Projects by
International Donors (as of 2000)

THE STUDY ON ENVIRONMENTAL IMPROVEMENT FOR HANOI CITY
JAPAN INTERNATIONAL COOPERATION AGENCY

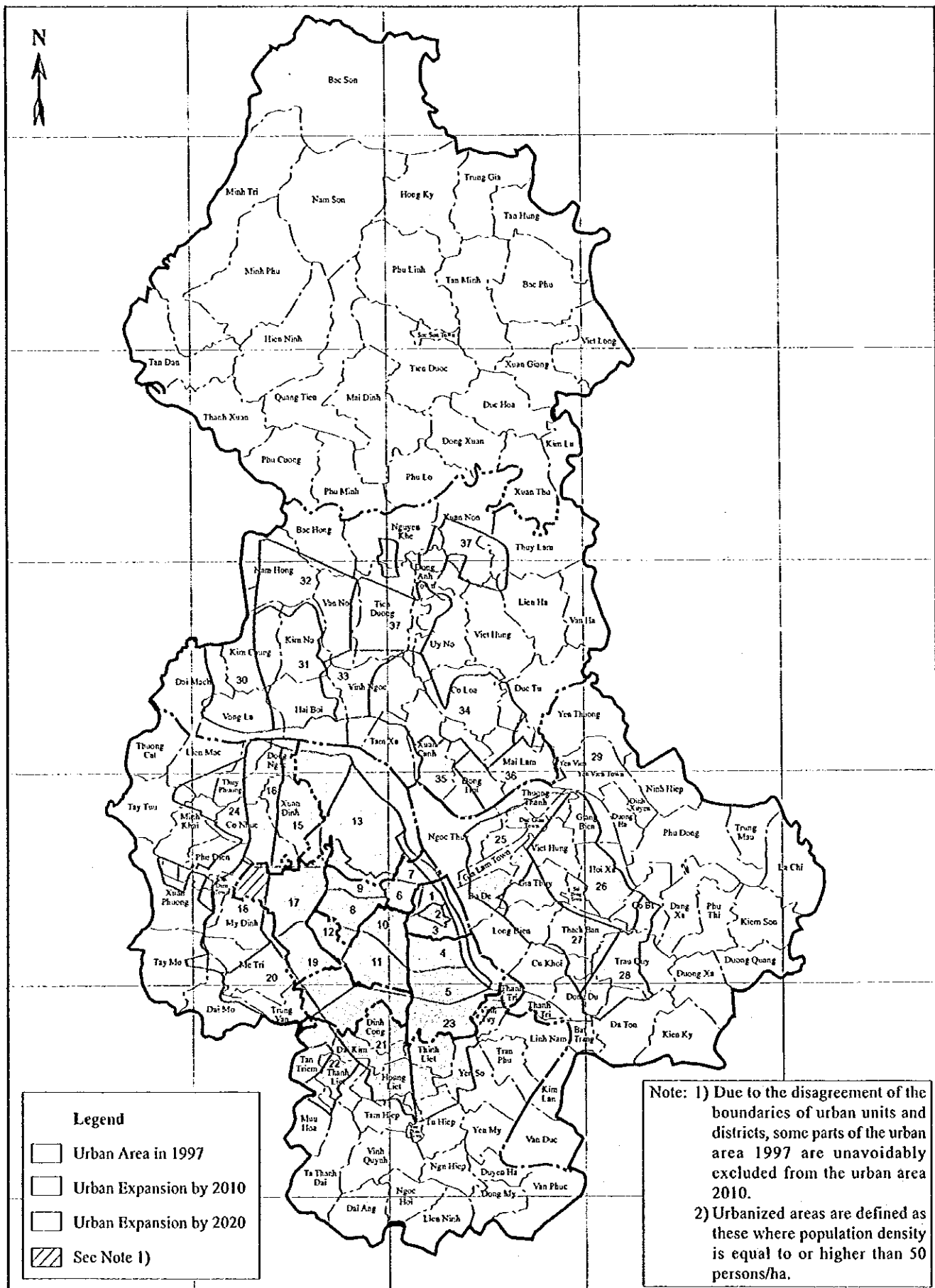


THE STUDY ON ENVIRONMENTAL IMPROVEMENT FOR HANOI CITY

Figure 2-1

JAPAN INTERNATIONAL COOPERATION AGENCY

37 Urban Development Units for 2020

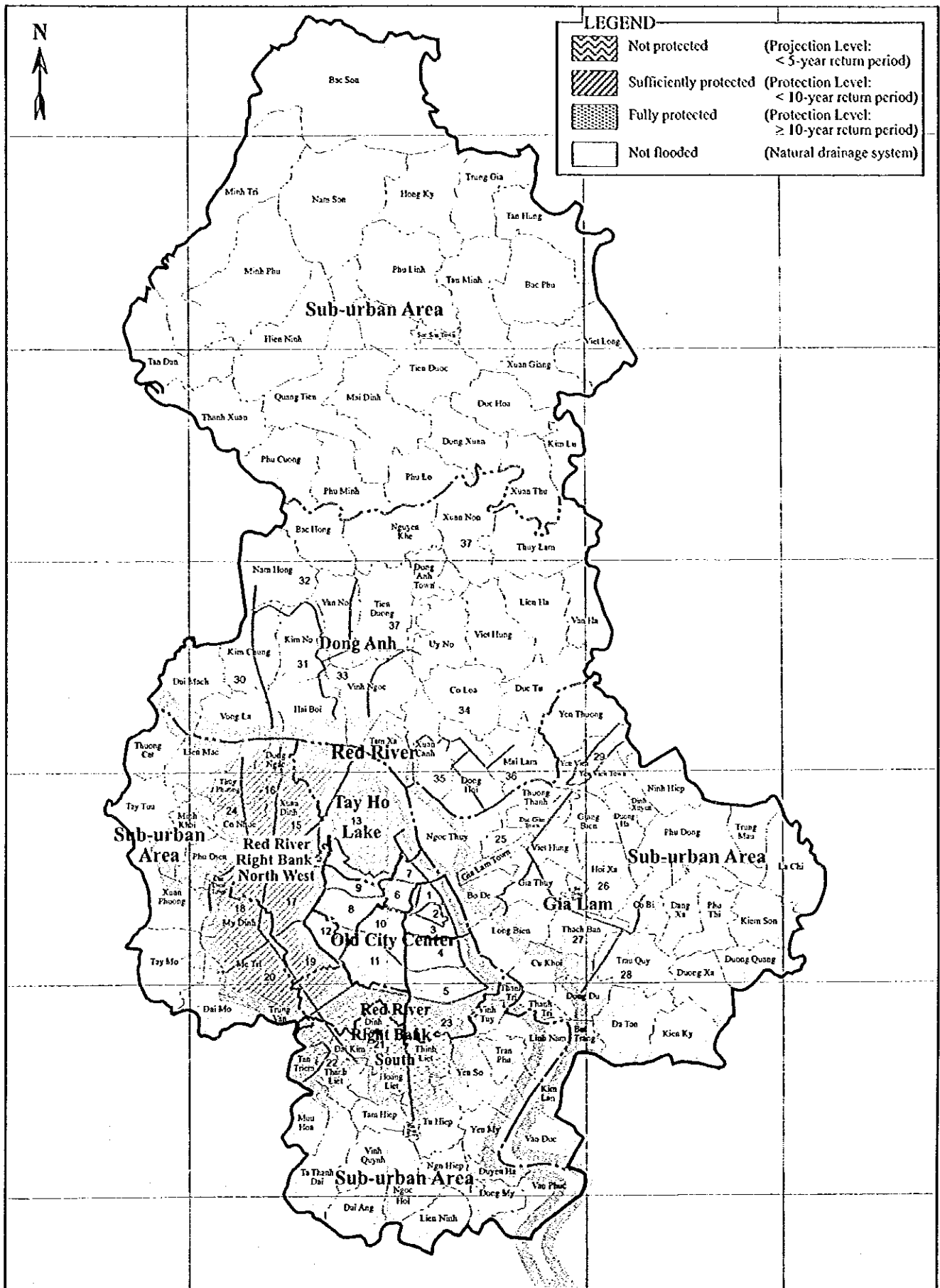


THE STUDY ON ENVIRONMENTAL IMPROVEMENT FOR HANOI CITY

JAPAN INTERNATIONAL COOPERATION AGENCY

Figure 2-2

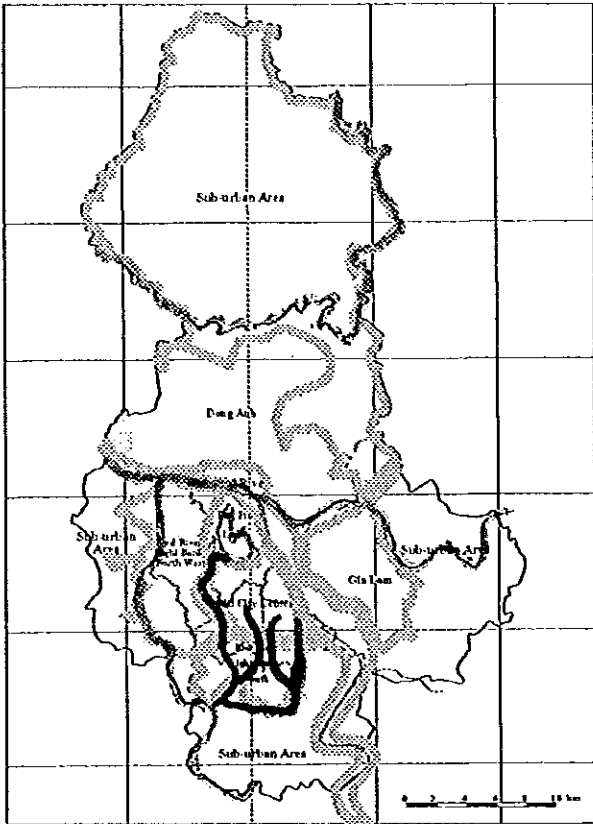
Urban Expansion by 2020



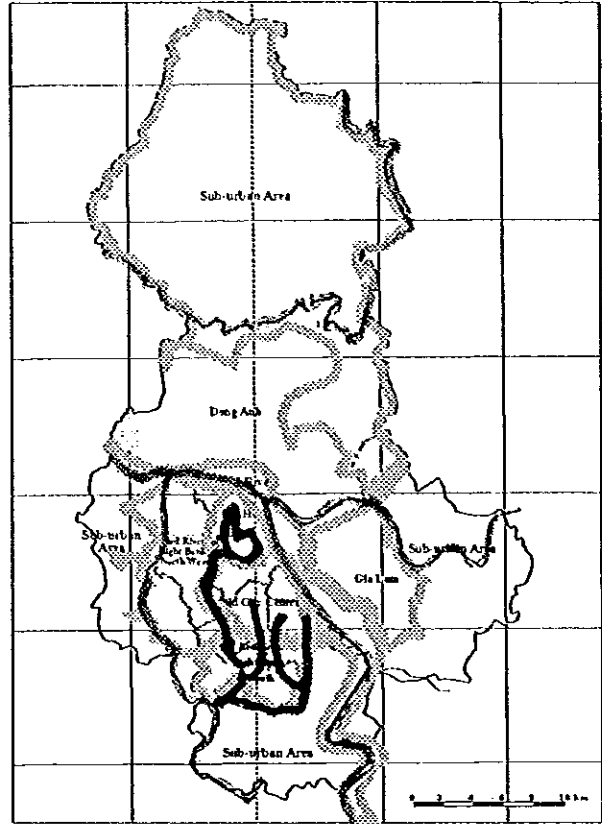
THE STUDY ON ENVIRONMENTAL IMPROVEMENT FOR HANOI CITY

JAPAN INTERNATIONAL COOPERATION AGENCY

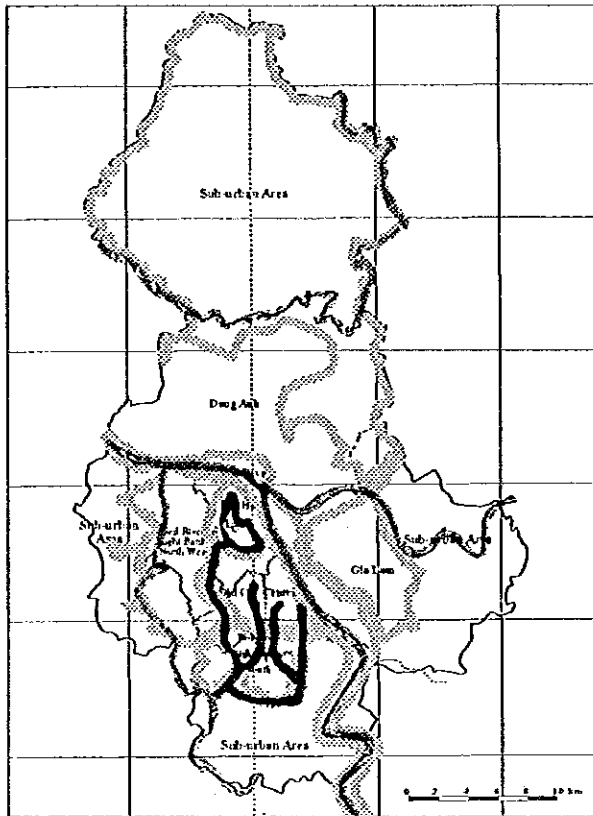
Figure 2-3
Water-related Sanitary Conditions
Without Countermeasures
(Present, 2010, 2020)



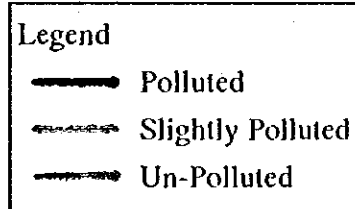
Present

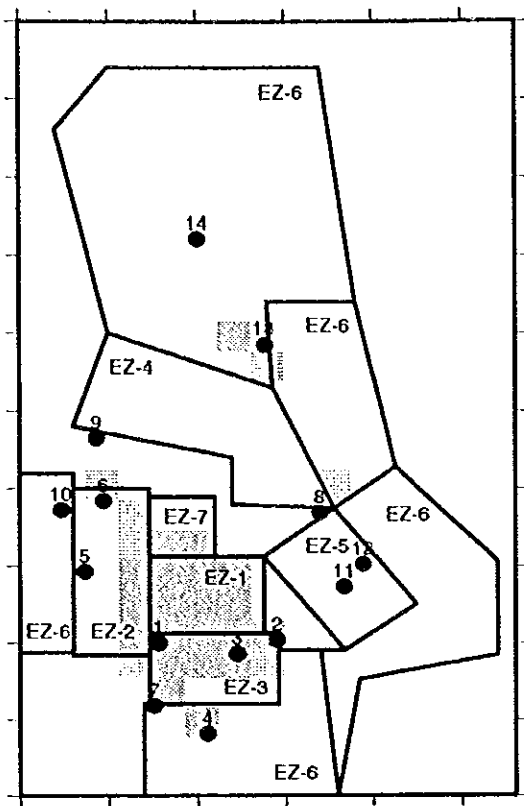


Year 2010

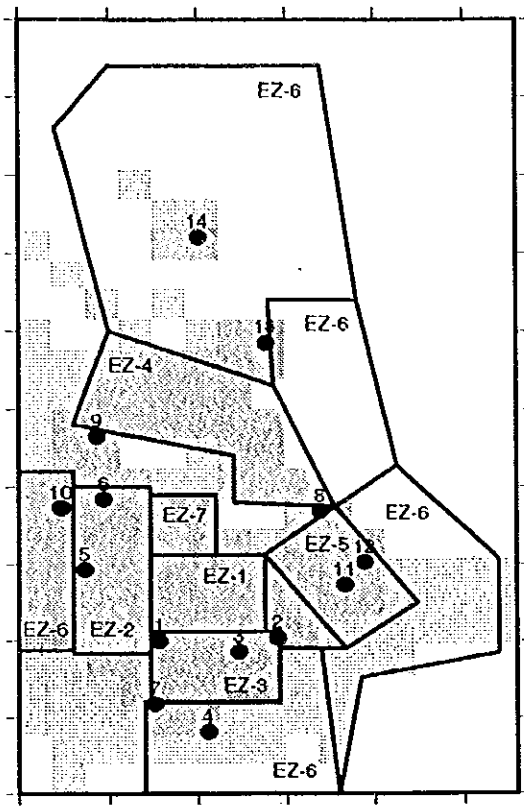


Year 2020

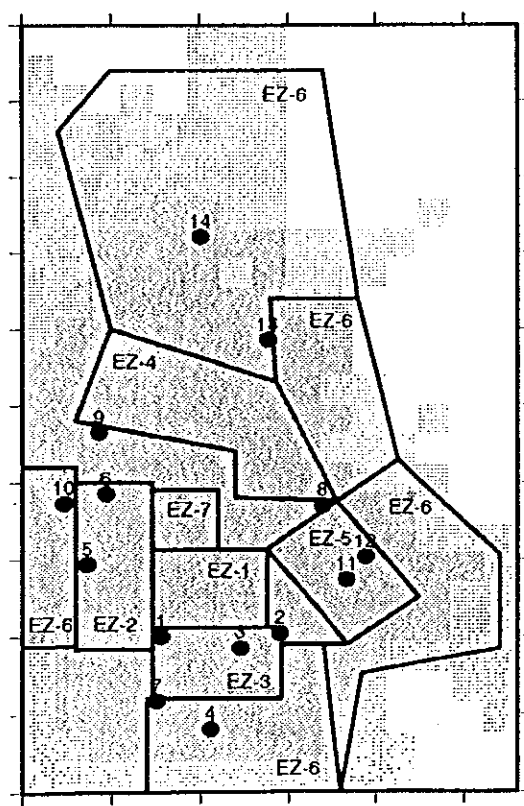




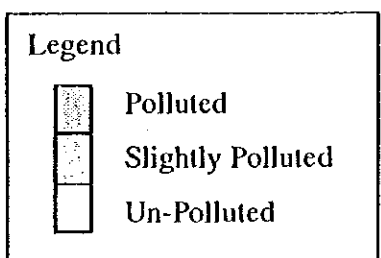
Present



Year 2010

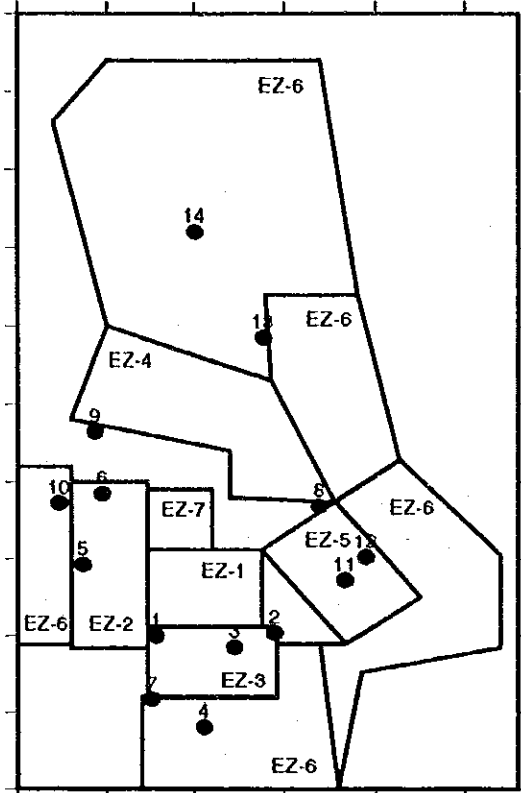


Year 2020

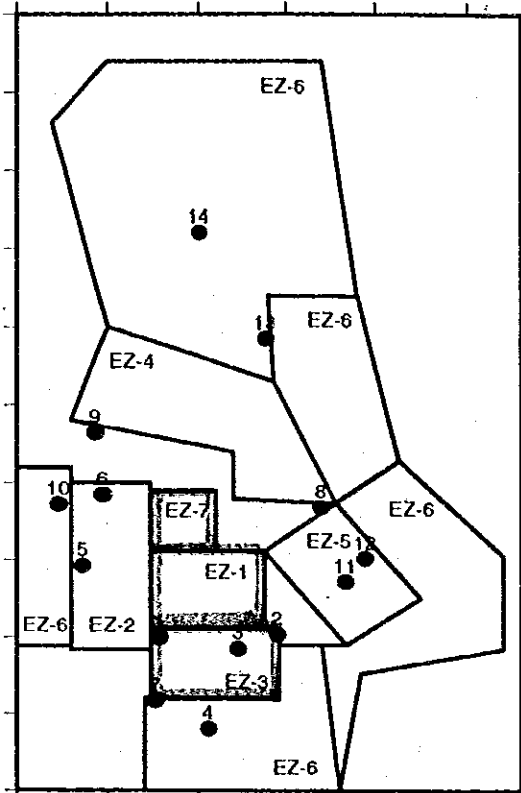


Number	Industrial Zone
1	Thuong Dinh
2	Minh Khai - Vinh Tuy
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4	Van Dien - Phap Van
5	Cau Dien - Mai Dich
6	Chem
7	Cau Buou
8	Duc Giang - Gia Lam - Yen Vien
9	North Thang Long
10	South Thang Long
11	Sai Dong A
12	Sai Dong B
13	Dong Anh
14	Soc Son

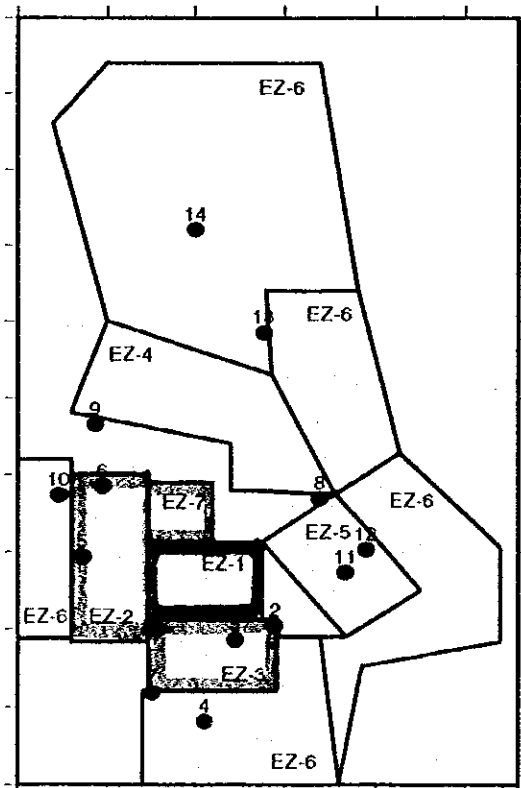
Figure 2-5
Air Pollution Condition (TSP)
without Countermeasures



Present



Year 2010

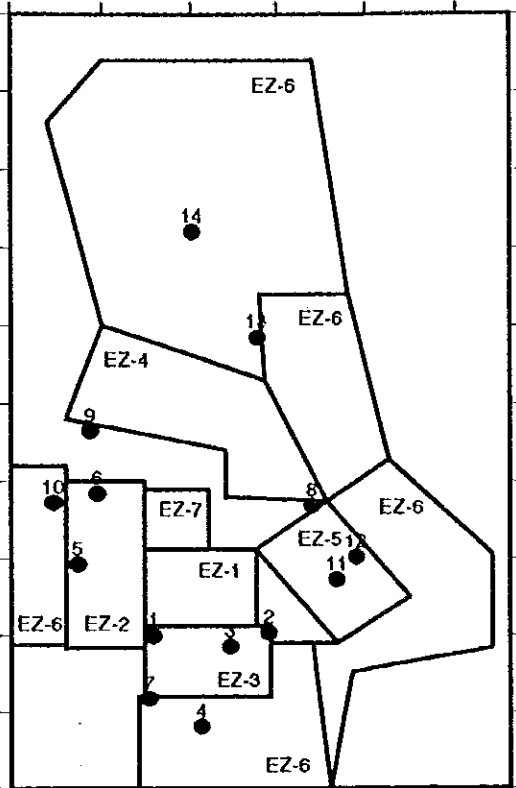


Year 2020

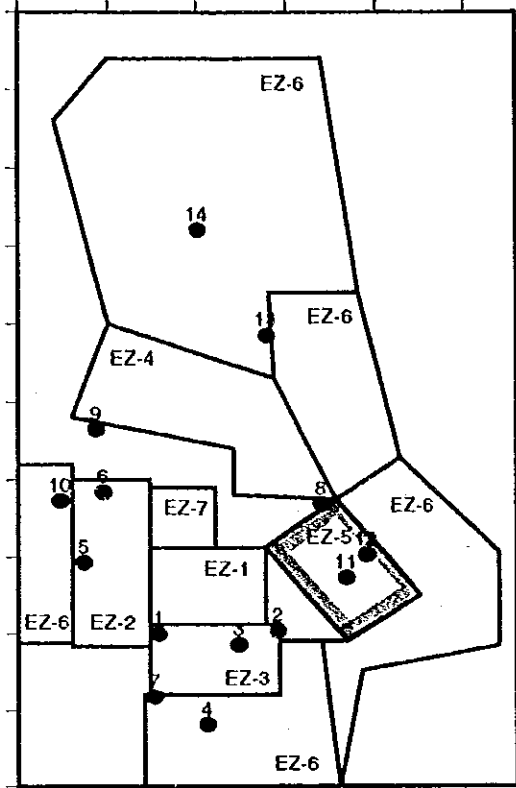
Legend

- Polluted
- Slightly Polluted
- Un-Polluted

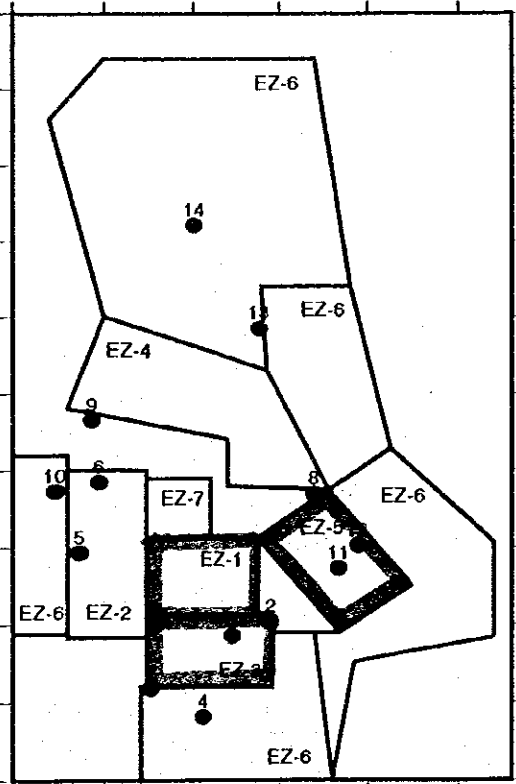
Number	Industrial Zone
1	Thuong Dinh
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3	Truong Dinh - Hoang Mai
4	Van Dien - Phap Van
5	Cau Dien - Mai Dich
6	Chem
7	Cau Buou
8	Duc Giang - Gia Lam - Yen Vien
9	North Thang Long
10	South Thang Long
11	Sal Dong A
12	Sal Dong B
13	Dong Anh
14	Soc Son



Present



Year 2010



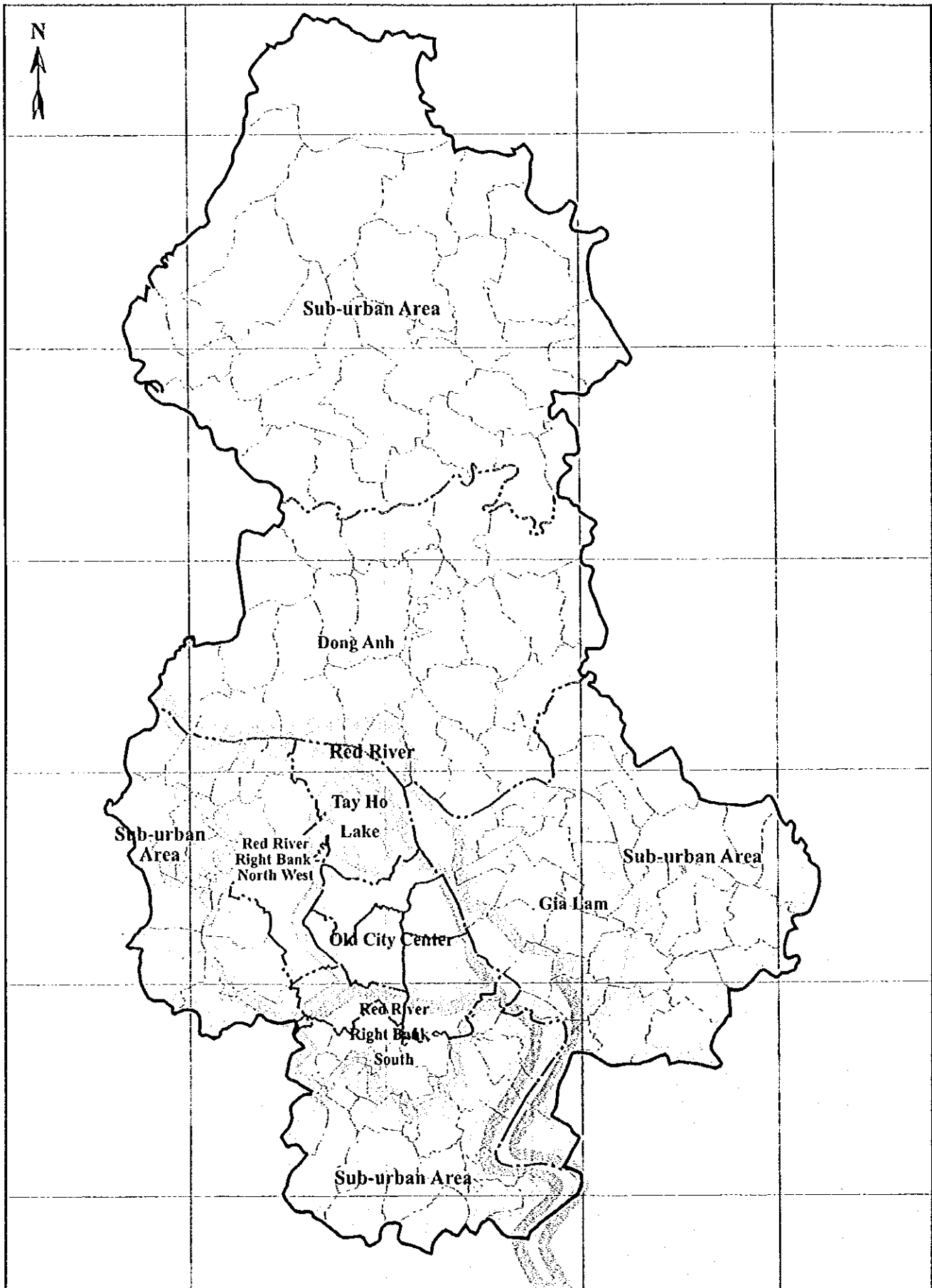
Year 2020

Legend

- Polluted
- - - Slightly Polluted
- · · Un-Polluted

Number	Industrial Zone
1	Thuong Dinh
2	Minh Khai - Vinh Tuy
3	Truong Dinh - Hoang Mai
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10	South Thang Long
11	Sai Dong A
12	Sai Dong B
13	Dong Anh
14	Soc Son

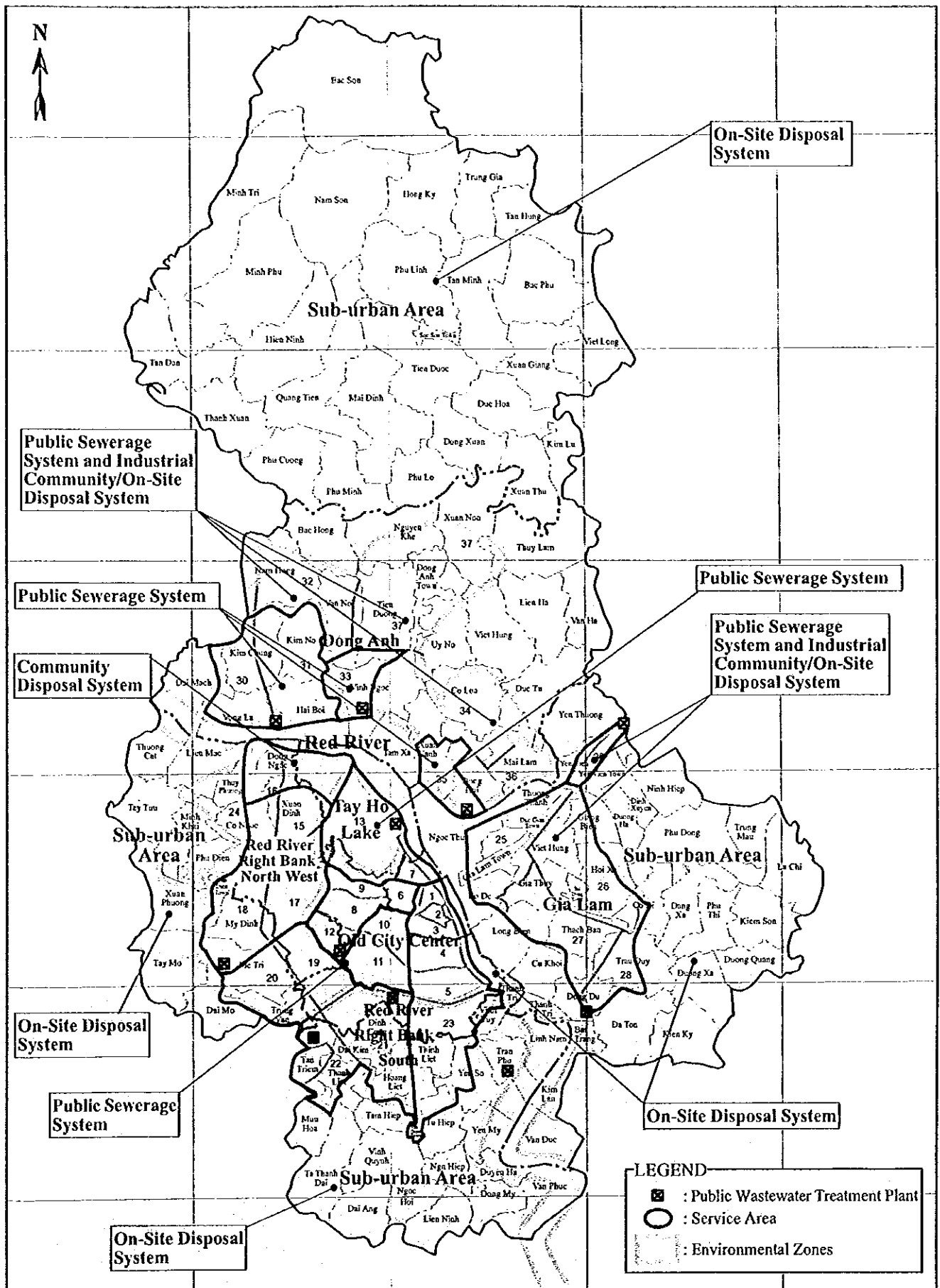
Figure 2-7
Air Pollution Condition (SOx)
without Countermeasures



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JAPAN INTERNATIONAL COOPERATION AGENCY

Figure 3-1
Environmental Zoning

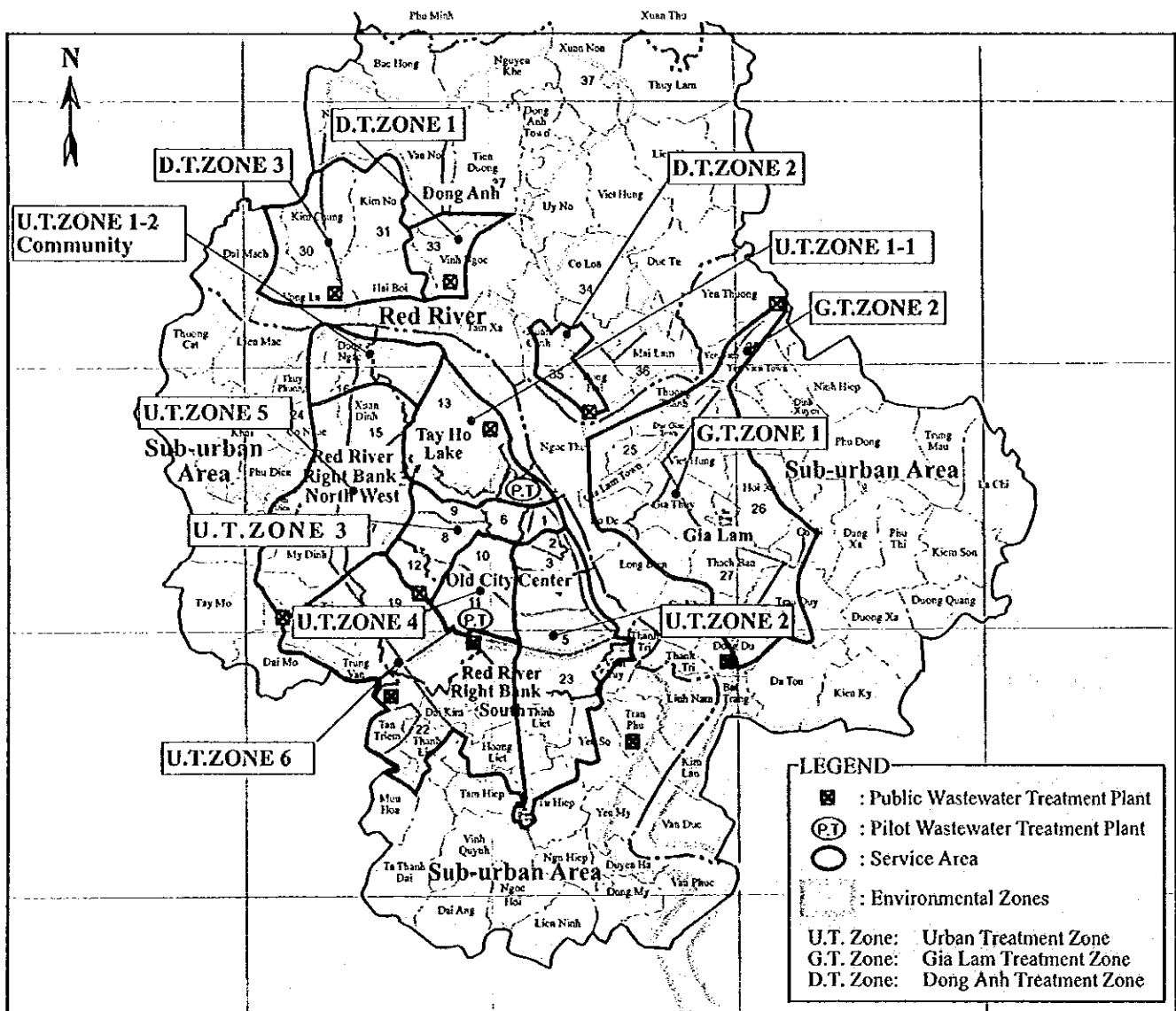


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Figure 4-1

Sewerage and Sanitation
Development Plan

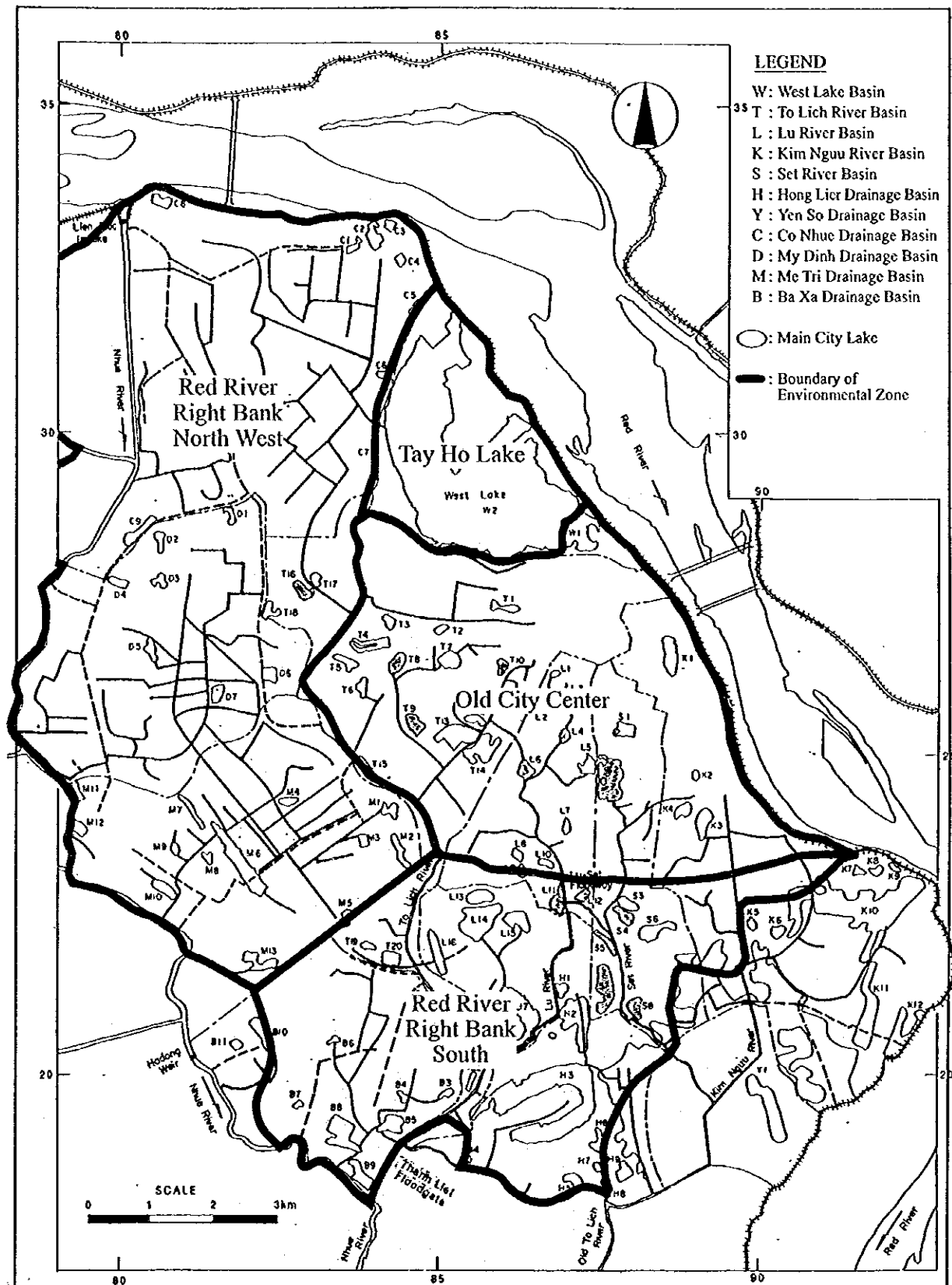


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Figure 4-2

JAPAN INTERNATIONAL COOPERATION AGENCY

Zoning Plan for Public Sewerage Development



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FOR HANOI CITY

JAPAN INTERNATIONAL COOPERATION AGENCY

Figure 4-3
Main City Lakes Improvement

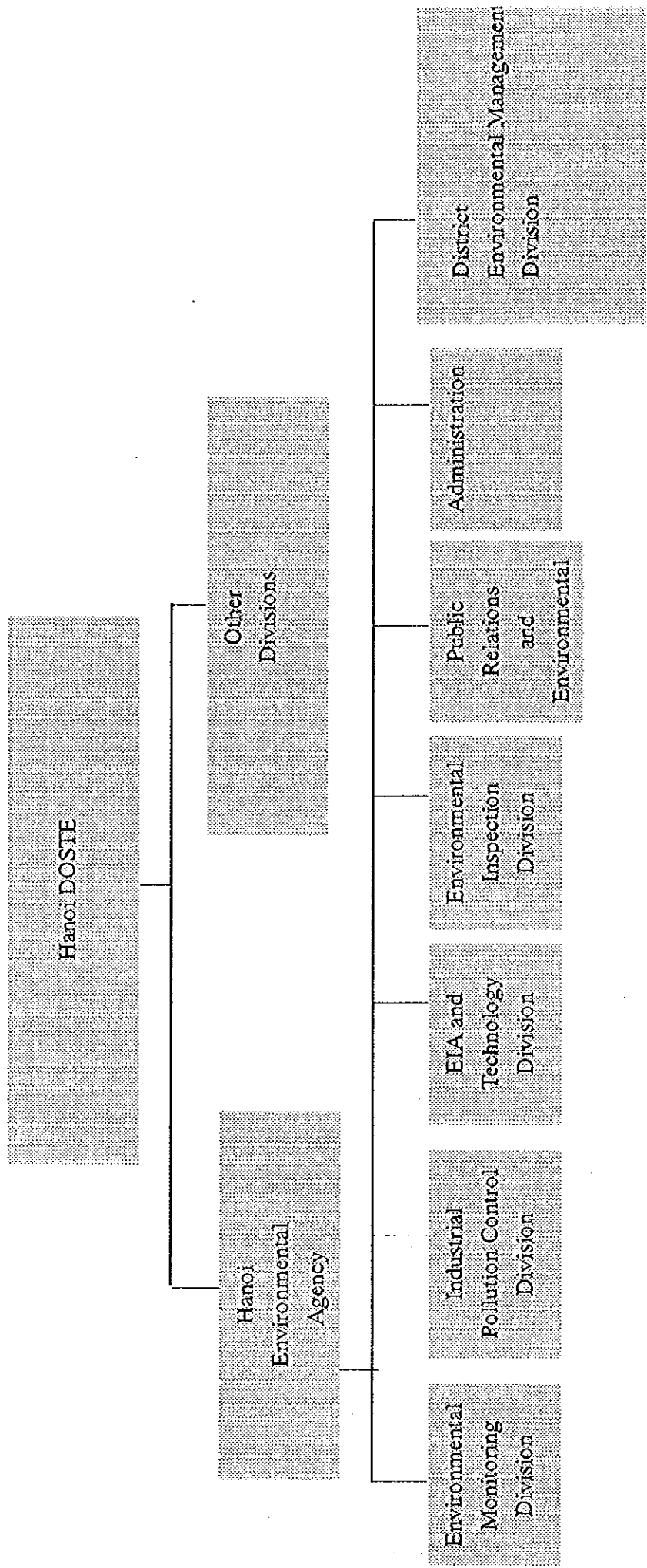


Figure 4-4 Hanoi Environmental Agency

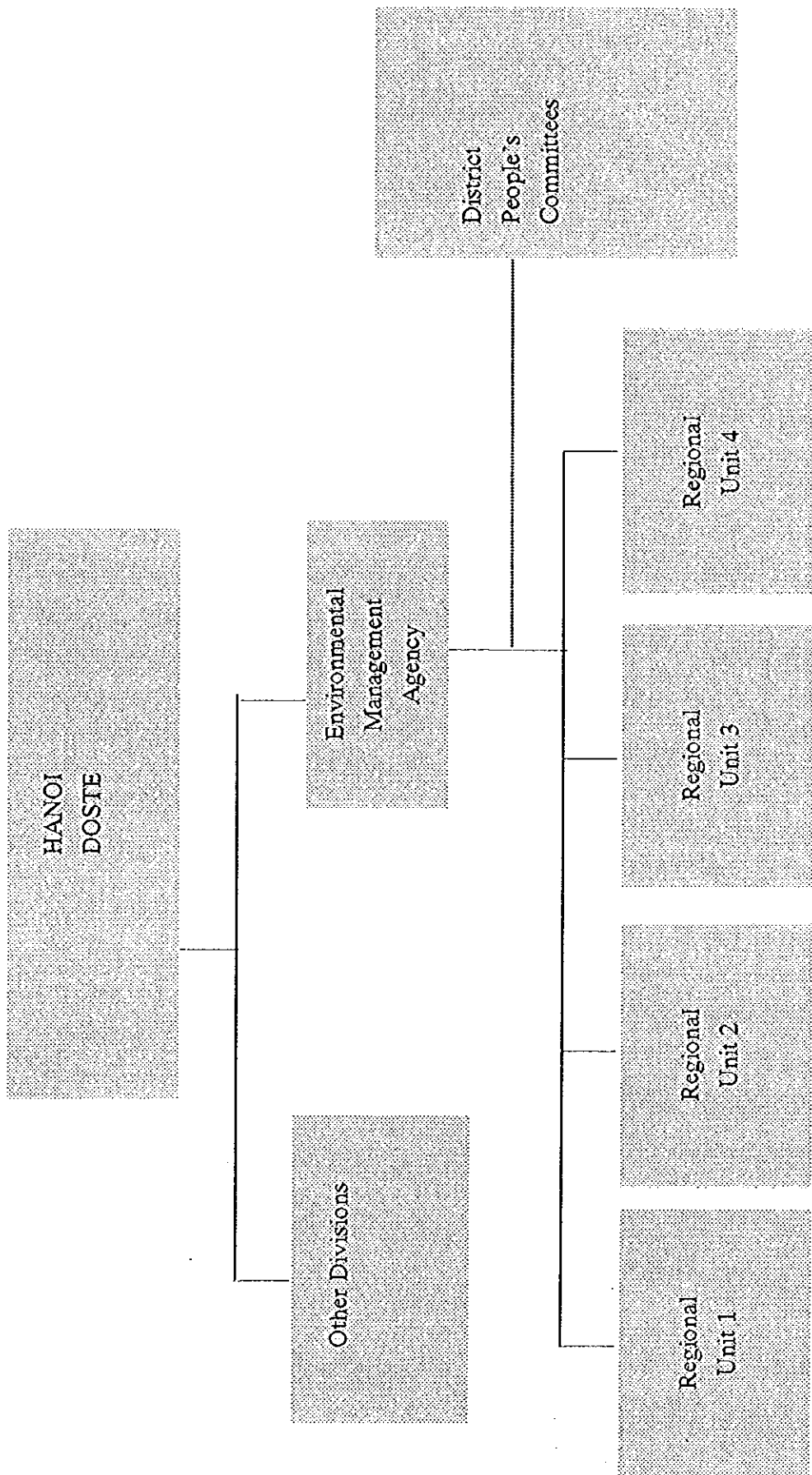
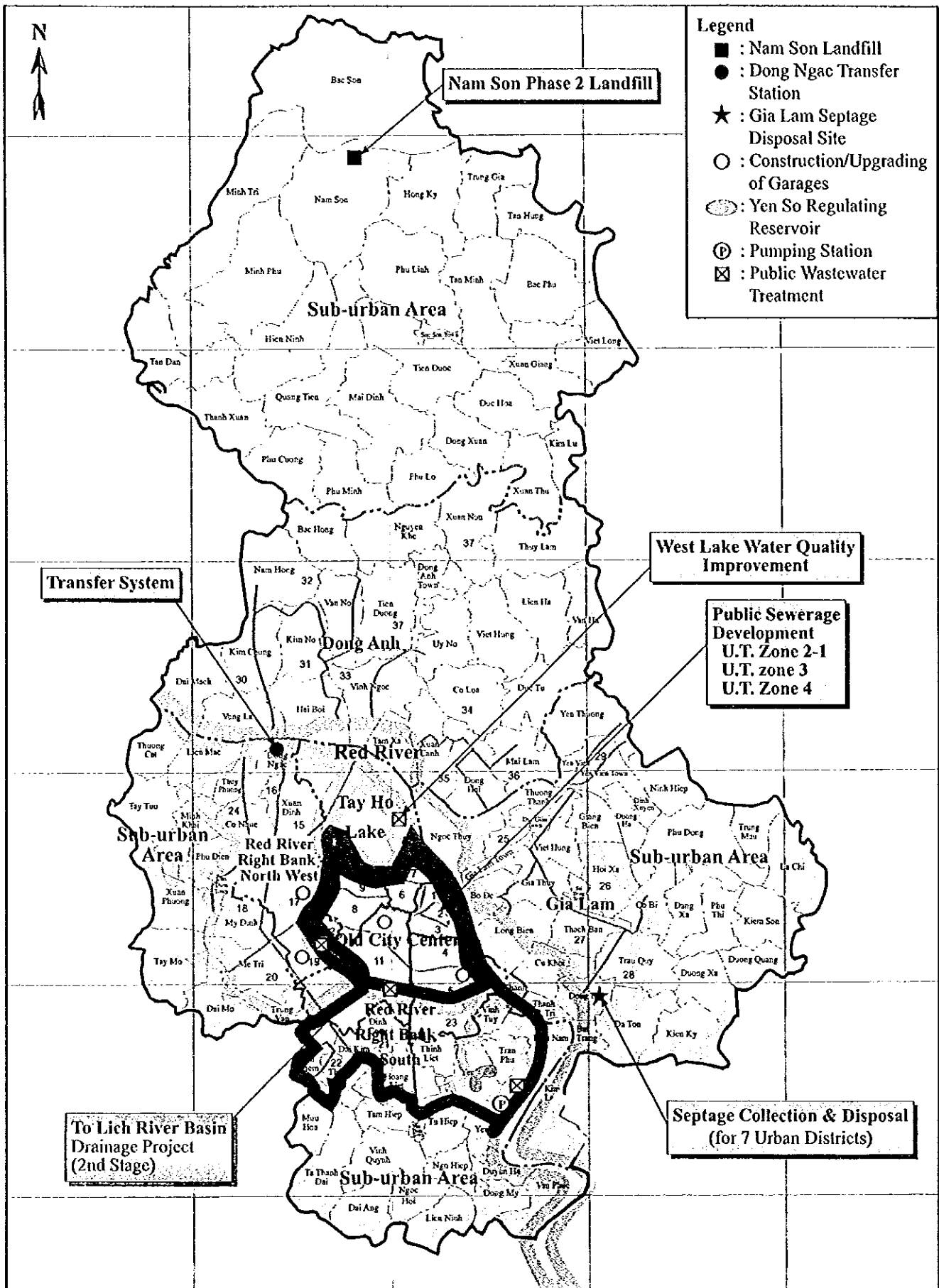


Figure 4-5 District Environmental Management Responsibility in Regional Unit in EMA



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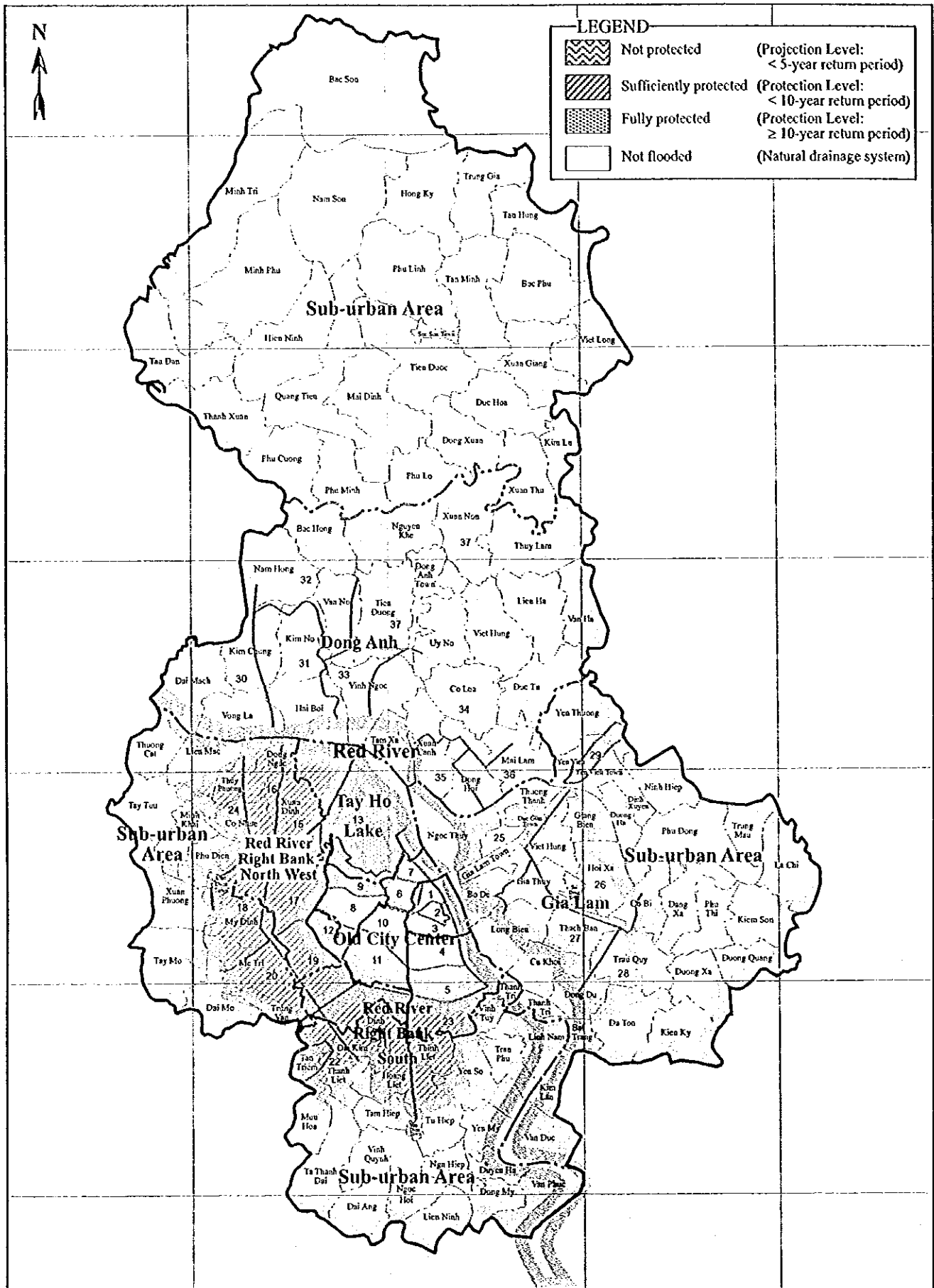
Figure 5-1

Development Plan of
Priority Project

Figure 5-2 Implementation Schedule of Priority Projects

No.	Priority Project	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
1	TO LICH RIVER BASIN DRAINAGE PROJECT (The 2nd Stage Project) (1) Yeo So Pump Station (4.5m ³ /s) (2) Regulating Reservoir (132ha) (3) Drainage Channel Improvement (31km) (4) Lake Dredging (14 main lakes) (5) Lakeshore Protection Works (11 lakes) (6) Rehabilitation of existing stormwater sewers (7) Installation of new stormwater sewers																					
	(Linh Dam/Dinh Cong Lakes)																					
2	PUBLIC SEWERAGE DEVELOPMENT PROJECT Urban Treatment Zone 2-1 (1) Treatment Plant (66,300 m ³ /d) (2) Sewerage (Area: 1,033 ha) Urban Treatment Zone 3 (1) Treatment Plant (27,700 m ³ /d) (2) Sewerage (Area: 1,350 ha) Urban Treatment Zone 4 (1) Treatment Plant (35,300 m ³ /d) (2) Sewerage (Area: 500 ha)																					
	(Individual house connection works)																					
	(Individual house connection works)																					
	(Individual house connection works)																					
	(Individual house connection works)																					
	(Individual house connection works)																					
3	LAKE CONSERVATION PROJECT West Lake Water Quality Improvement Main City Lake Improvement (14 lakes)																					
	(75 by Australian Aid)																					
5	IMPROVEMENT OF WASTE COLLECTION & PRIMARY TRANSPORT Procurement of Vehicles (1) Phase I (2) Phase II Construction & Upgrading of Garages (1) Upgrading & expansion of 3 garages (2) Construction of new garages Procurement of Maintenance equipment for the Central workshop																					
6	SEPTAGE COLLECTION & DISPOSAL (1) Gin Lam (4-5 ha) (2) Vehicle Procurement																					
7	TRANSFER SYSTEM & NAM SON PHASE 2 LANDFILL (1) Nam Son Phase 2 Landfill (2) Waste Transfer System (3) Upgrading of Road and Bridges																					

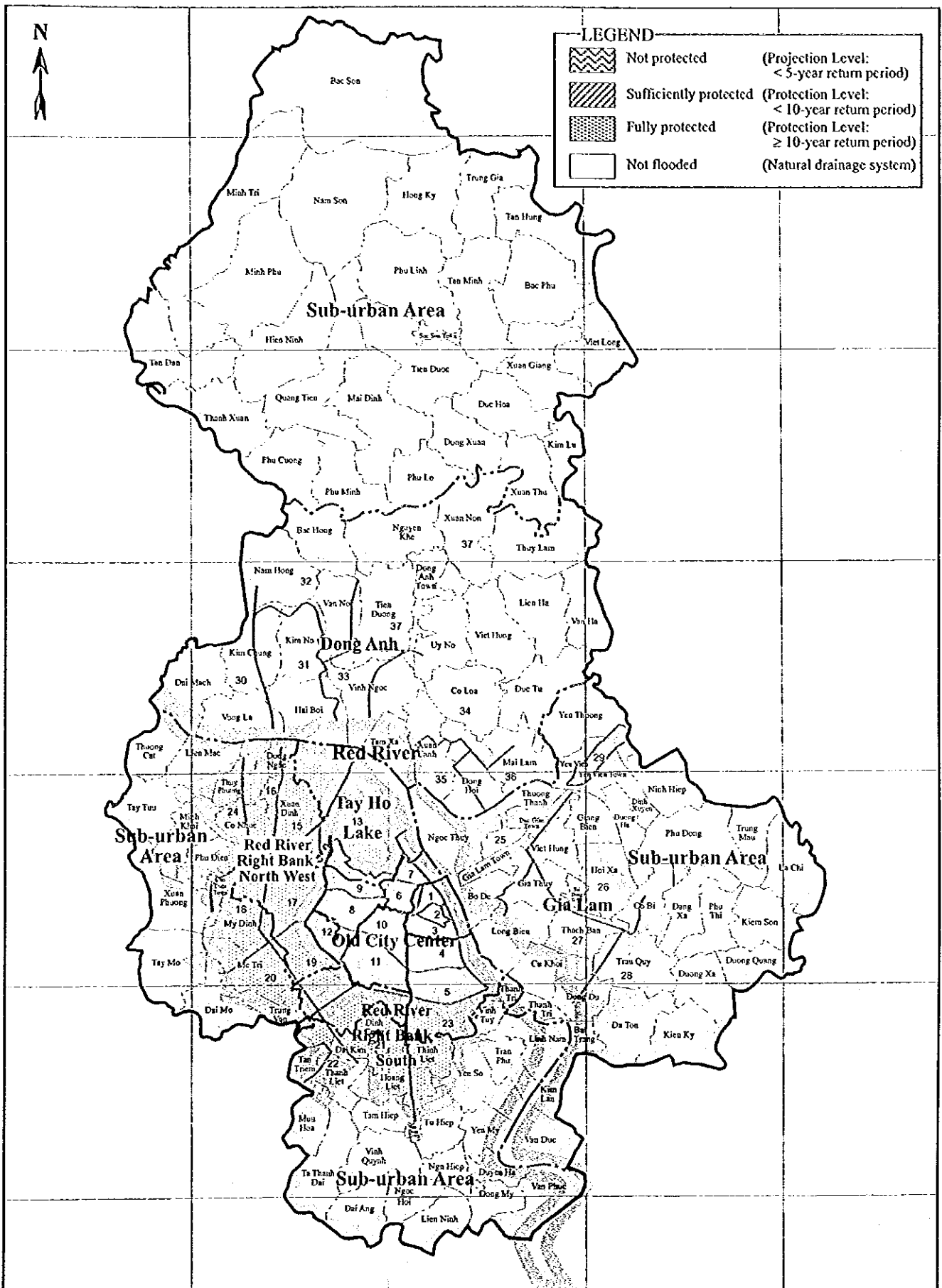




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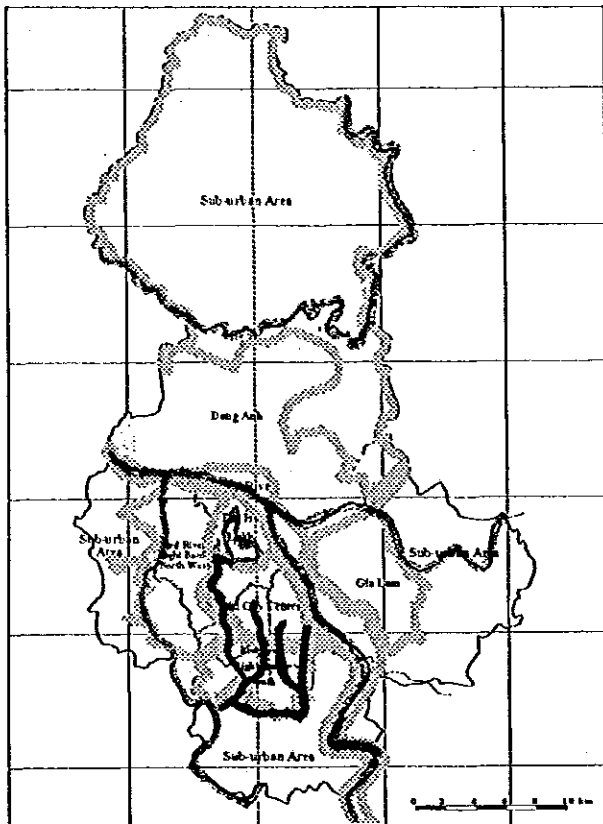
Figure 6-1
 Water-related Sanitary Conditions
 With Countermeasures (2010)



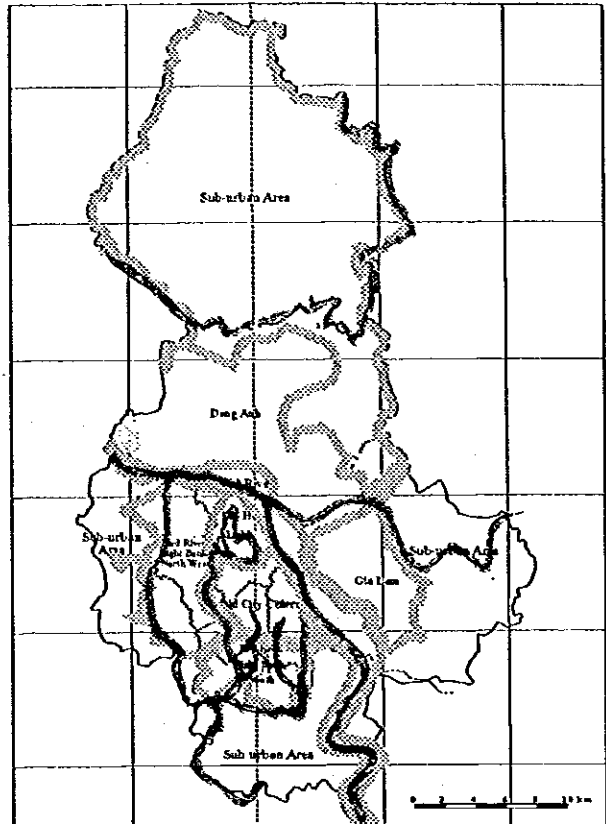
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JAPAN INTERNATIONAL COOPERATION AGENCY

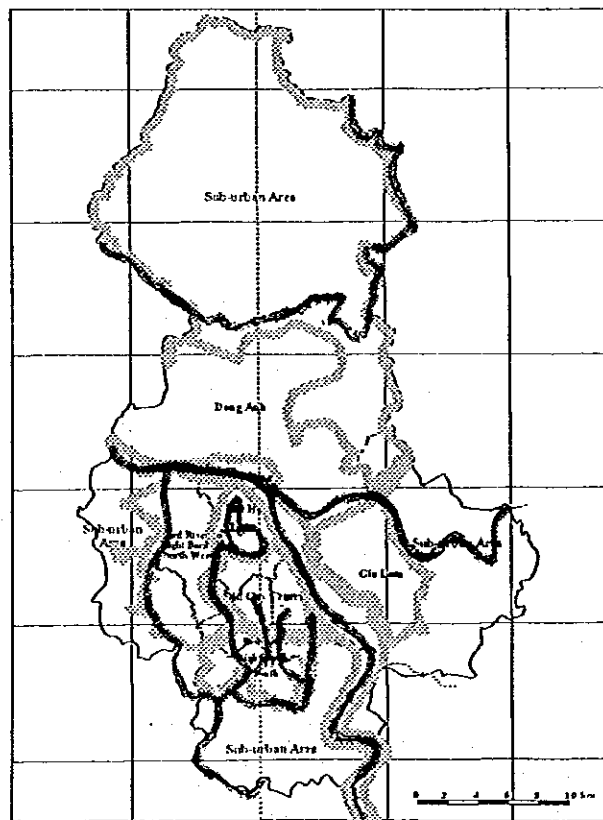
Figure 6-2
Water-related Sanitary Conditions
With Countermeasures (2020)



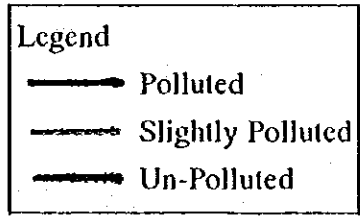
Present

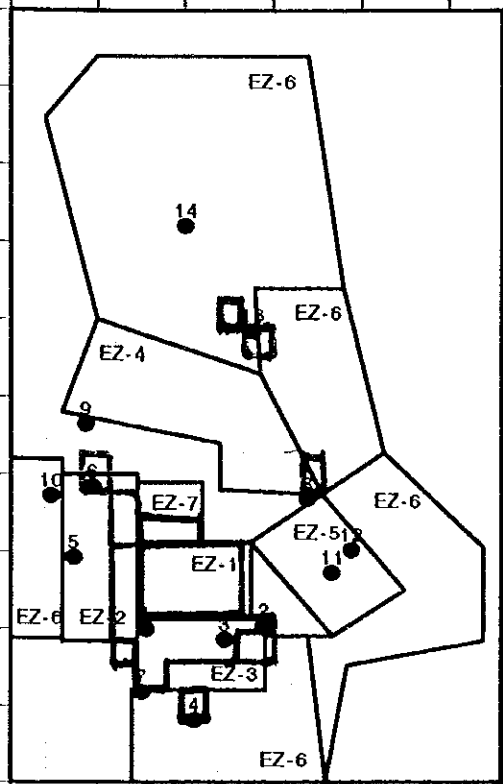


Year 2010

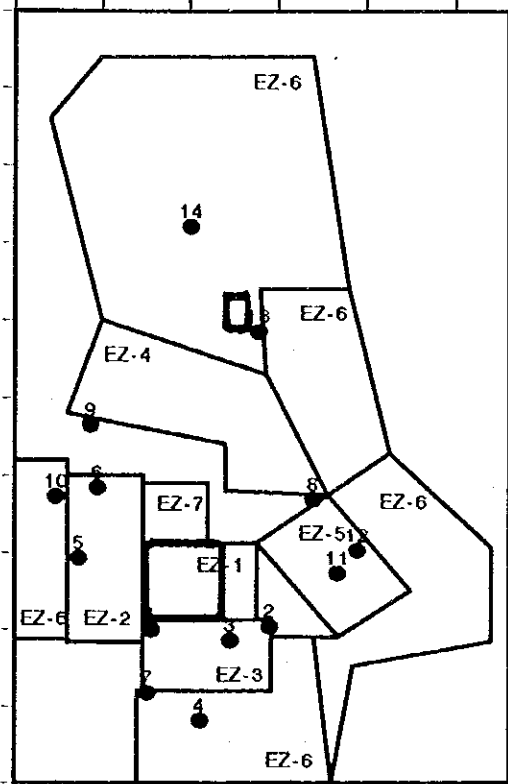


Year 2020

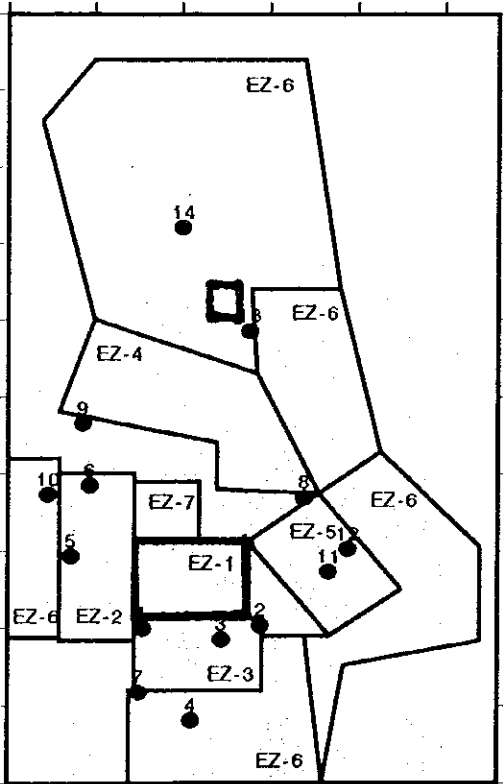




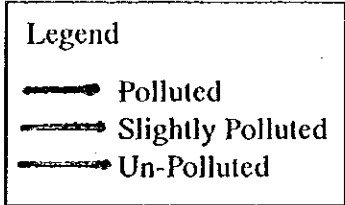
Present



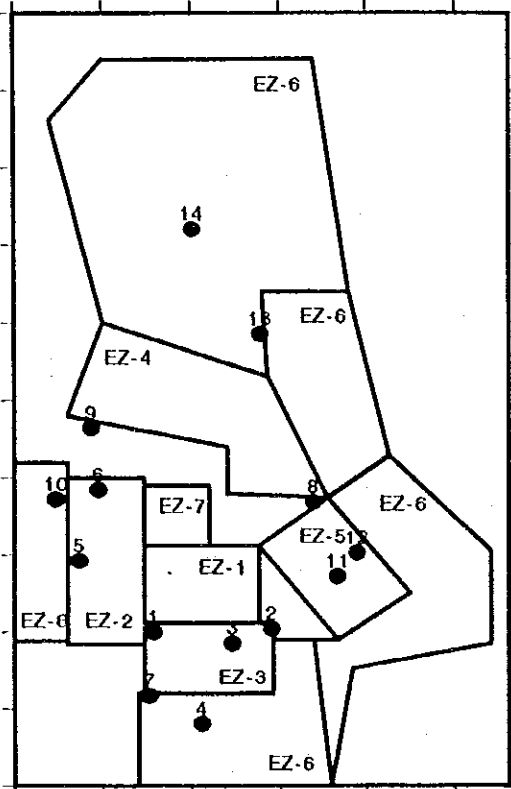
Year 2010



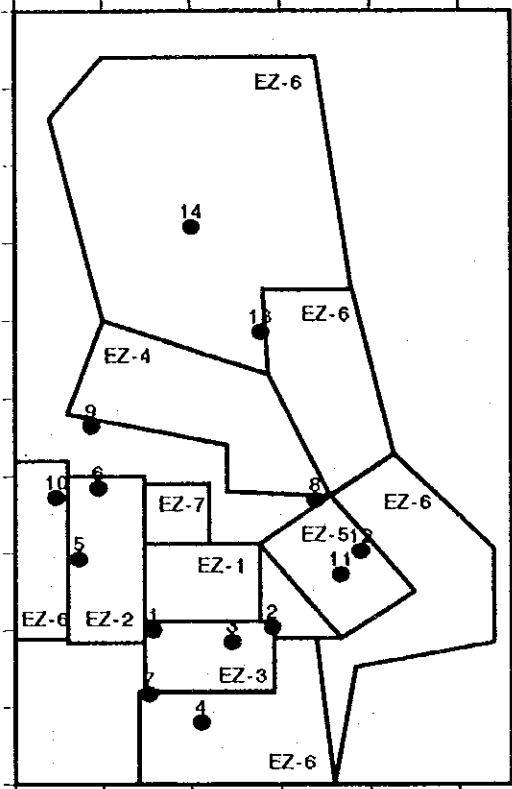
Year 2020



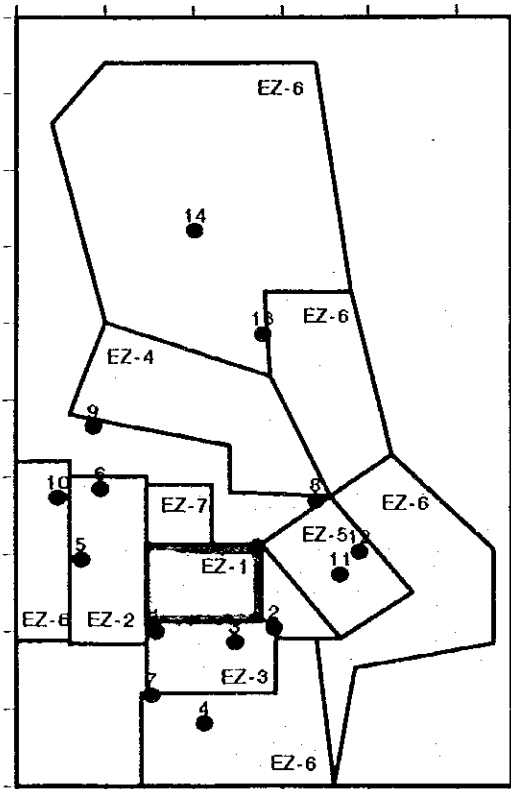
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Present



Year 2010



Year 2020

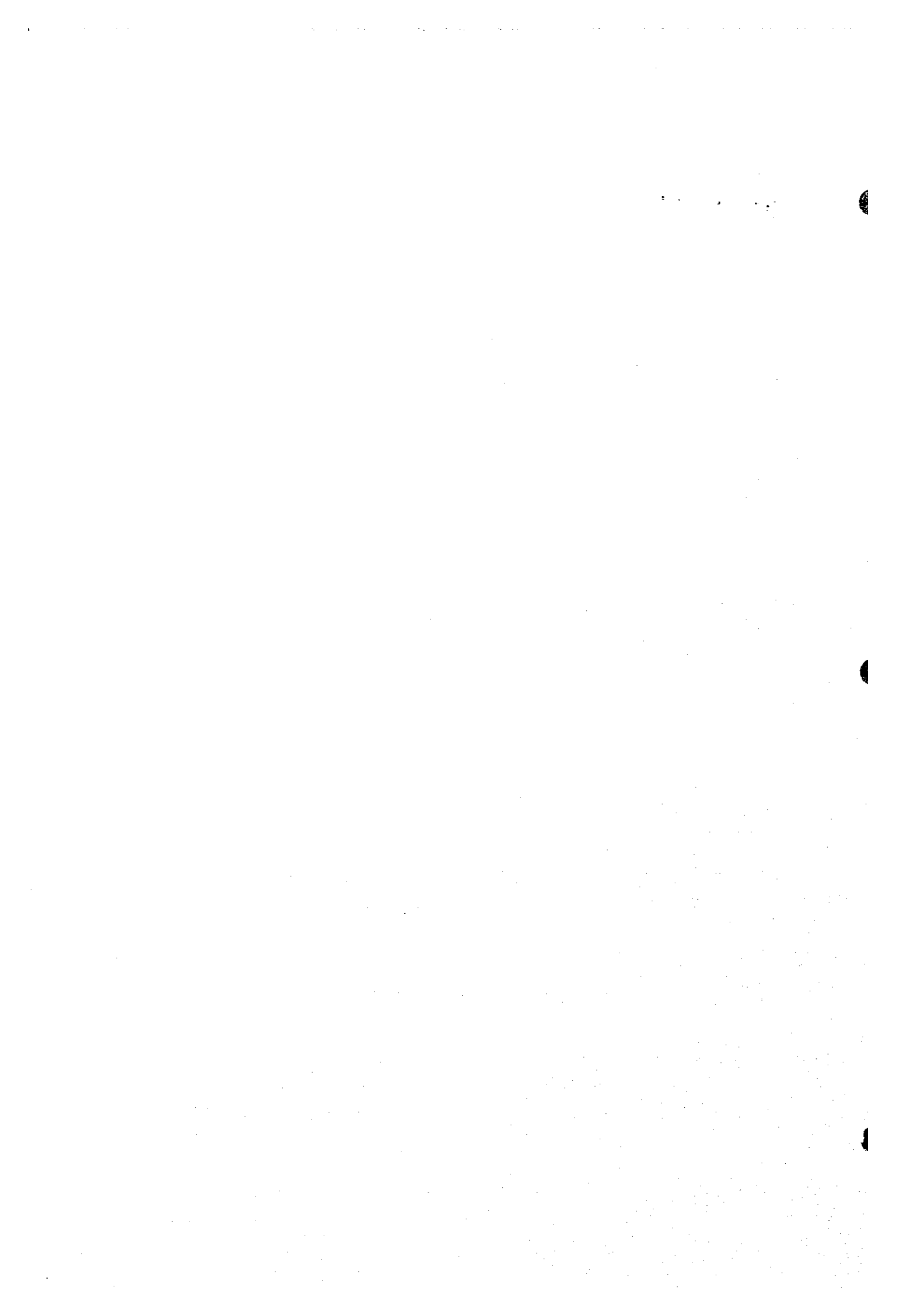
Legend

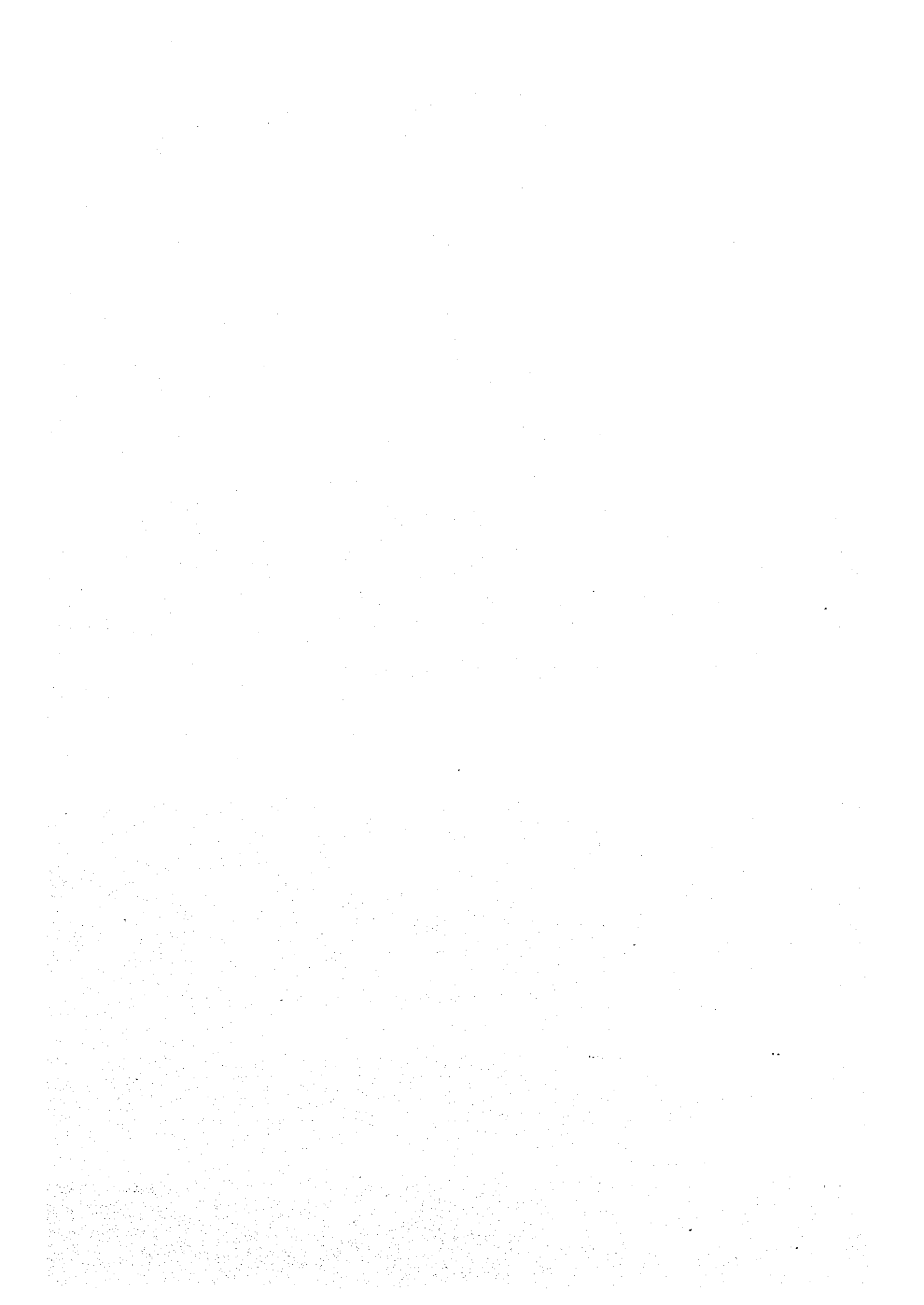
- Polluted
- Slightly Polluted
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Number | Industrial Zone

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