2.6 CONSTRUCTION PLAN

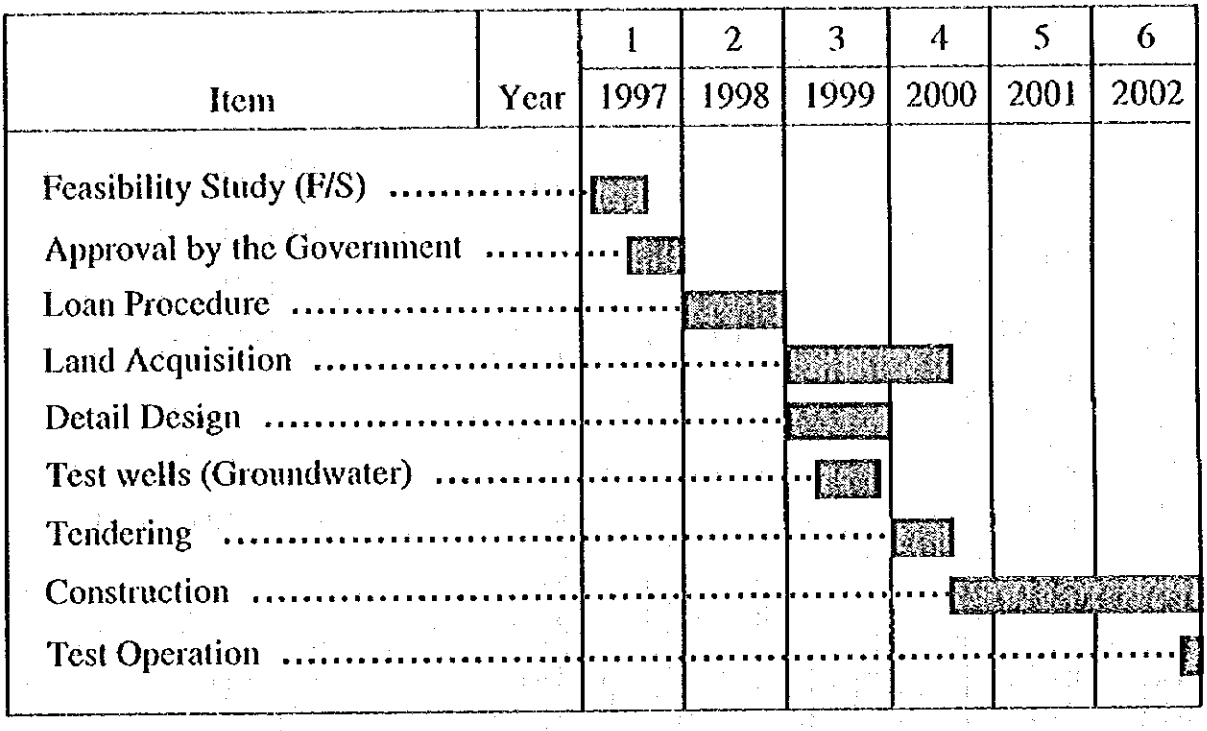
2.6.1 Implementation Schedule

The construction work is schedule to be done during year of 2000-2002, as shown in a chart of "Implementation Schedule".

Before the construction work, various administrative procedures and preparatory activities will be required, as follows:

1) Approval and decision of the project implementation by the Government of Vietnam	By the end of 1997
2) Loan procedure including application to an international lending agency	In 1998
3) Detail design including construction of test wells for groundwater	Jan.1999 - Dec. 1999 (12 months)
4) Land acquisition or land use negotiation/ approval	Jan. 1999 - June 2000 (18 months)
5) International tendering (From tender call to award of the Contractor)	Jan. 2000 - June 2000 (6 months)
6) Construction work	July 2000 - Dec. 2002 (30 months)
7) Commencement of operation and maintenance	Early 2003

Implementation Schedule of the Priority Project



Implementation Schedule
(Priority Project)

2.6.2 Investment Schedule

Project cost, consisting of cost for facilities construction, pipelines construction, land use, and engineering services is estimated in the section of "Cost estimation". The cost estimated is the price level of the year 1997. However, the project will be implemented in years of 1999-2002; accordingly, the cost will be increased due to price escalation (inflation). Therefore, the inflation cost shall be considered for the purpose of finance preparation.

The price inflation rates predicted are 2.0% per annum for foreign currency component and 9.0% for local one, for coming future years.

The cost including price escalation will be disbursed in the manner presented in the Table of "Investment Schedule (Summary)" which corresponds to the "Implementation Schedule".

That is:

Year				
1999	83,726	million VND	(= 7.61	million US$)
2000	103,840	million VND	(= 9.44	million US$)
2001	195,419	million VND	(= 17.77	million US$)
2002	204,563	million VND	(= 18.60	million US$)
Total =	587,548	million VND	(= 53.42	million US$)

Investment Schedule (Summary)

(Unit: Million VND)

Item	Year / Component	1999 F/C	1999 L/C	2000 F/C	2000 L/C	2001 F/C	2001 L/C	2002 F/C	2002 L/C
① Construction cost		-	-	36,892	14,882	95,768	44,420	95,768	44,420
Cost = 332,150 mil VND		-		51,774		140,188		140,188	
② Land cost		-	52,000	-	26,000	-	-	-	-
Cost = 78,000 mil VND		52,000		26,000		-		-	
③ Engineering		11,874	6,394	2,790	1,860	5,580	3,720	5,580	3,720
Cost = 41,518 mil VND		18,268		4,650		9,300		9,300	
④ Base cost (① + ② + ③)		11,874	58,394	39,682	42,742	101,348	48,140	101,348	48,140
Cost = 451,668 mil VND		70,268		82,424		149,488		149,488	
= 41.06 mil US$									
⑤ Physical contingentcy		1,187	639	3,968	1,674	10,135	4,814	10,135	4,814
Cost = 37,366 mil VND		1,826		5,642		14,949		14,949	
⑥ Total cost (④ + ⑤)		13,061	59,033	43,650	44,416	111,483	52,954	111,483	52,954
Cost = 489,034 mil VND		72,094 mil VND		88,066 mil VND		164,437 mil VND		164,437 mil VND	
=44.46 mil US$		= 6.55 mil US$		= 8.01 mil UD$		= 14.95 mil US$		= 14.95 mil US$	
⑦ Price contigentcy		528	11,104	2,671	13,103	9,186	21,796	11,605	28,521
Cost = 98,514 mil VND		11,632		15,774		30,982		40,126	
⑧ Total financing required (⑥ + ⑦)		13,589	70,137	46,321	57,519	120,669	74,750	123,088	81,475
Cost = 587,548 mil VND		83,726 mil VND		103,840 mil VND		195,419 mil VND		204,563 mil VND	
= 53.42 mil US$		= 7.61 mil US$		= 9.44 mil US$		= 17.77 mil US$		= 18.60 mil US$	

Note:

- Cost: 1997 year price level
- Exchange rate: US$1.00 = VND11,000
- F/C = Foreign component and L/C = Local component
- ① "Construction cost" consists of costs for procurement of materials, freight charge (international ocean freight and island transportation), insurance and construction/ installation; however, does not include import duties for imported materials.
- ③ "Engineering" consists of costs for detail design and construction supervision.
- ⑦ "Price contigency" is for future price escalation (inflation).

Price inflation factor: 2% per annum for F/C
9% " " for L/C

Future Price Index (%, Base year: 1997 =100)

Year	1997	1998	1999	2000	2001	2002	2003
For F/C	100.00	102.00	104.04	108.24	106.12	110.41	112.62
For L/C	100.00	109.00	118.81	129.50	141.16	153.86	167.71

Investment Schedule (Breakdown (1): Water Source and Treatment Plant Construction Work)

(Unit: Million VND)

Item	Year	1999		2000		2001		2002	
	Component	F/C	L/C	F/C	L/C	F/C	L/C	F/C	L/C
① Facilities construction		-	-	8,793	5,862	39,570	26,380	39,570	26,380
Cost = 146,555 mil VND		-		14,655		65,950		65,950	
② Detail design		5,239	2,821	-	-	-	-	-	-
Cost = 8,060 mil VND		8,060		-		-		-	
③ Construction supervision		-	-	1,231	820	2,462	1,642	2,462	1,642
Cost = 10,259 mil VND		-		2,051		4,104		4,104	
④ Physical contingency		524	282	1,002	669	4,203	2,802	4,203	2,802
Cost = 16,487 mil VND		806		1,671		7,005		7,005	
⑤ Total (① + ② + ③ + ④)		5,763	3,103	11,026	7,351	46,235	30,824	46,235	30,824
Cost = 181,361 mil VND		8,866		18,377		77,059		77,059	

Note:

- Cost: Year 1997 price level
- F/C: Foreign component
- L/C: Local component
- ① "Facilities construction" consits of construction costs for water source facilities and treatment plant facilities.

Investment Schedule (Breakdown (2): Pipeline Construction Work)

(Unit: Million VND)

Item	Year / Component	1999 F/C	1999 L/C	2000 F/C	2000 L/C	2001 F/C	2001 L/C	2002 F/C	2002 L/C
① Pipelines and networks		-	-	28,099	9,020	56,198	18,040	56,198	18,040
Cost = 185,595 mil VND		-		37,119		74,238		74,238	
② Detail Design		6,635	3,573	-	-	-	-	-	-
Cost = 10,208 mil VND		10,208		-		-		-	
③ Construction supervision		-	-	1,559	1,040	3,118	2,078	3,118	2,078
Cost = 12,991 mil VND		-		2,599		5,196		5,196	
④ Physical contigency		663	357	2,966	1,007	5,932	2,011	5,932	2,011
Cost = 20,879 mil VND		1,020		3,973		7,943		7,943	
⑤ Total (① + ② + ③ + ④)		7,298	3,930	32,624	11,067	65,248	22,129	65,248	22,129
Cost = 229,673 mil VND		11,228		43,691		87,377		87,377	

Investment Schedule (Breakdown (3): Land Cost)

(Unit: Million VND)

Item	Year / Component	1999 F/C	1999 L/C	2000 F/C	2000 L/C	2001 F/C	2001 L/C	2002 F/C	2002 L/C
① Land cost		-	52,000	-	26,000	-	-	-	-
= 78,000 mil VND		52,000		26,000		-		-	

2.6.3 Method of Construction and Tendering

The construction work is to be carried out by the construction company/s (contractor), and the contractor will be selected and awarded through the international tender. The tenderers will be foreign companies which are capable of facilities construction of water supply projects, as well as local companies, or including local companies. Local companies may participate in the tender either independently or in the joint with a foreign company/s.

The tendering will be made in either one package or plural packages as suggested below :

Case 1 : One package (including all works)

Case 2 : Two packages

Package 1 = Facilities construction (treatment plant and water source)
Package 2 = Pipelines construction (raw water pipelines, distribution mains and distribution networks)

Case 3 : Three packages (1)

Package 1 = Construction of treatment plant (60,000m3/day)
Package 2 = Construction of water source (22 well stations)
Package 3 = Pipelines construction

Case 4 : Three packages (2)

Package 1 = Facilities construction (treatment plant and water source)
Package 2 = Raw water pipelines and distribution mains
Package 3 = Distribution networks

Case 5 : Four packages

Package 1 = Construction of treatment plant
Package 2 = Construction of water source
Package 3 = Raw water pipelines and distribution mains
Package 4 = Distribution networks

Case 6 : Five packages

Package 1 = Construction of treatment plant
Package 2 = Construction of water source
Package 3 = Raw water pipelines
Package 4 = Distribution mains
Package 5 = Distribution networks

Any case of the above is considered feasible and the decision will be made at the stage of detail design and preparation of tender documents. However, it shall be noted that any tender consist of procurement of materials and construction work. Separation of procurement and construction work will not be recommended.

CHAPTER 3 MANAGERIAL APPROACH AND ECONOMIC ANALYSIS

3 MANAGERIAL APPROACH AND ECONOMIC ANALYSIS

3.1 POSSIBLE ORGANIZATION STRUCTURE

(1) The priority project area should have one water plant and one water business enterprise in the near future (Fig.3.1-1). This is useful in order to carry out the efficient operation in production and marketing. Water plants and business enterprises should be redefined as different internal profit units because of motivating workers to reduce water leakage and increase collecting water charges. In this situation, the water plant in the priority project area should get revenue by wholesaling water to the business enterprise at the internal tariff. This tariff should be consisted of production unit cost and transmission unit cost and small profit margin. As a result, the future tariff structure should be reviewed to meet the financial objectives of HWBC.

(2) The business enterprise in this area will have the following three types of the sales transaction.

A. Retailing to the household in the project service area.

The retail tariff should be set up to the level to cover its costs which include the internal tariff, the transmission (=distribution main) unit cost, the distribution (=network) unit cost and small profit margin. The lower levels of consumption should be charged at levels in line with the full costs. On the other side the higher levels of consumption should be charged at levels higher above the full costs, with excessive consumption or wastage discouraged by charging tariff. Therefore, the progressive tariff structure should be introduced for demand management. There may be many variations but basically tariff increases in successive steps as consumption rises.

B. Wholesaling to Mai Dich water plant for supplement.

The wholesale tariff should be set up to the level to cover its costs which include the internal tariff, the transmission unit cost and the small profit margin. The distribution unit cost should not be included owing to the wholesale transaction.

C. Bulk retailing to the new development area

The new development area is composed of large-sized customers such as factories and firms including foreign investment. The bulk retailing tariff should be set up to the level to get the good revenue which includes the internal tariff, the transmission unit cost and the sufficient profit margin. The bulk retailing tariff is an important source of fund in order to provide cross-subsidy to the small-sized customers in the project service area and get external funds in the midst of reducing the subsidies from HPC.

The internal tariff could be approved by Hanoi People's Committee for in the future. On the other side, the retail tariff, the wholesale tariff and the bulk retailing tariff could be approved by Hanoi People's Council.

The benchmark of adequate profit of the water plant and the water business enterprise in the priority project area should be at 5% of total costs, which is indicated by ADB and the World Bank.

In the new development area, the administration agency will be established on behalf of residential companies. The water business enterprise should provide the operation and maintenance service based on the agreement with the administration agency in the new development area.

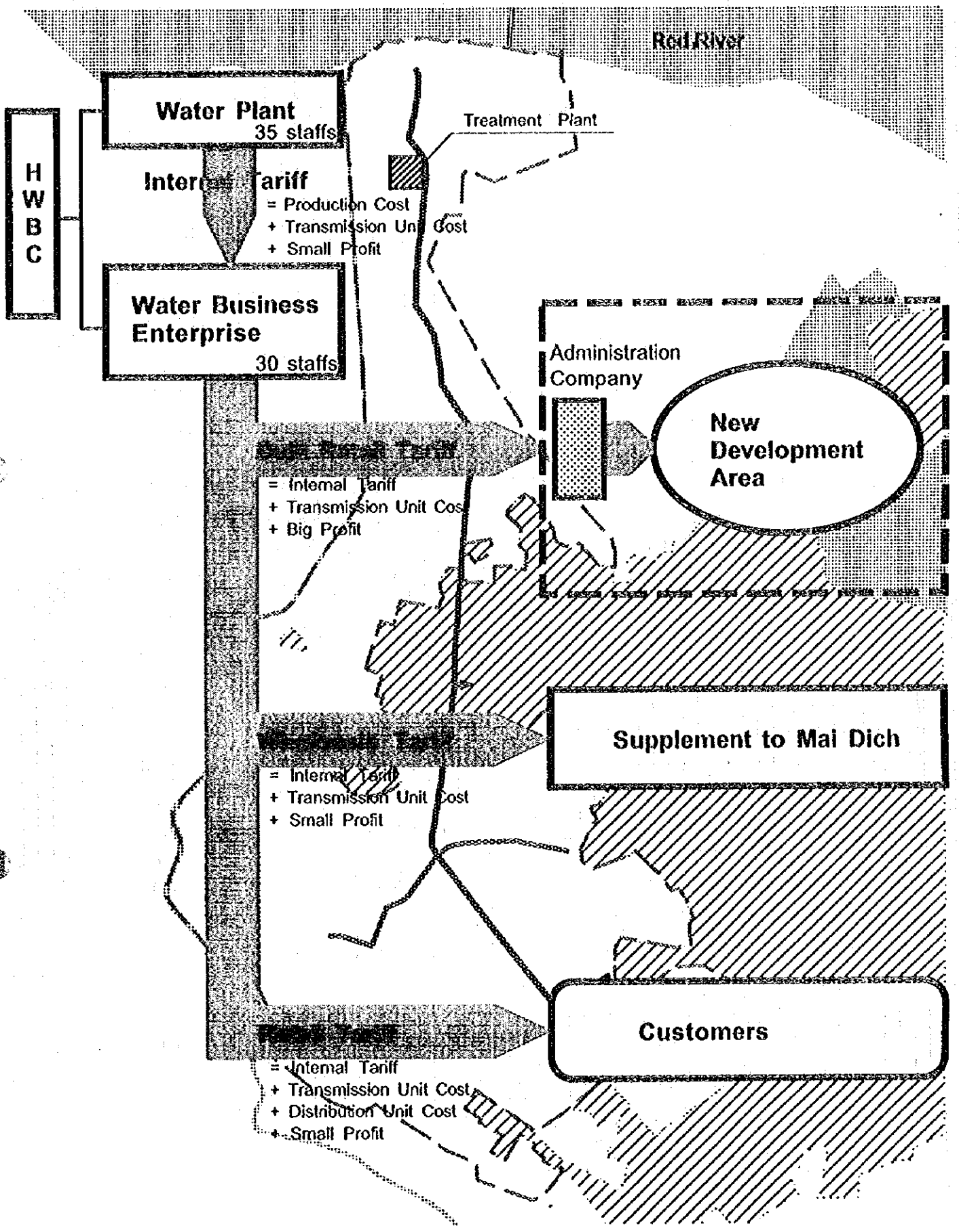


Fig. 3.1-1 Future Business Transaction (Year 2005)

3.2 WORK FORCE PLANNING

(1) For the proposed facility which has the treatment capacity of 60,000 m3/d, the work force engaged in the priority project area is assumed at 35 staff at the water plant and 30 staff at the business enterprise. This assumption is based on the following calculation.

1) Water Plant

HWBC has about 450 staff per 340,000 m3/d raw water intake capacity in 1995, which means 1 staff for 765 m3/d. On the other hand, Ho Chi Minh City Water Supply Company has about 390 staff per 675,000 m3/d raw water intake capacity in 1995, which means 1 staff for 1730 m3/d. This implies that Ho Chi Minh City Water Supply Company has the 2.3 times efficiency in the water plant work force compared with that of HWBC. According to estimation, 60,000 m3/d intake capacity will be needed in the year 2005 at the priority project area of Cau Giay in Hanoi. When we take the efficiency of work force, for example, in Ho Chi Minh City into account, 60,000 m3/d will need 35 staff at water plant.

2) Water Business Enterprise

HWBC has 727 marketing and maintenance staff per 1,275,000 people in the piped water supply area in 1995, which means 1 staff for 1,753 people. On the other hand, Ho Chi Minh City Water Supply Company has 864 marketing and maintenance staff per 2,450,000 people in the piped water supply area in the same year, which means 1 staff for 2,835. This implies that Ho Chi Minh City Water Supply Company has the 3.3 times efficiency in the work force of the water business enterprise compared with that of HWBC. According to estimation, 68,000 people will inhabit in the year 2005 at the project service area. When we take the efficiency of work force, for example, in Ho Chi Minh City into account, 68,000 people will need 25 staffs for the retail sale operation and additional five staffs for the bulk sale and wholesale operation.

3.3 DETERMINATION OF THE PROJECT COST

3.3.1 Key Assumptions and Calculations

(1) O&M Cost

In addition to the Construction (Investment) Related Costs explained in Chapter 2.5, there are Operational and Maintenance (O&M) Costs incurred in the project.

Considering the nature of operation, same analysis method in the Mater Plan can be applied. Meaning three types of O&M Costs are to be involved. Namely, (a) O&M Costs born in the new Water Plant of 60,000 m3/d capacity (Plant O&M), (b) O&M Costs accrued for the new Water Business Enterprise in the priority project area (WBE O&M) and (c) O&M Costs allocated to the HWBC Head Office (Head Office O&M).

(a) Plant O&M

Plant O&M Costs (VND/year) is to be calculated as :

[Plant O&M Cost per Production (VND/m3)] x [Average Daily Production (m3/day)] x 365(days/year)

Plant O&M Cost consists of (a1) Staff Cost, (a2) Chemical Cost, (a3) Electric Cost, (a4) Repair Cost and (a5) Other Cost.

(for the current price level of 1997 i.e. *growth* means real term growth)

(a1) Staff Cost

[Number of Staffs : 35 (persons)] x [Staff Salary : 760,000 (VND/month/person)] x 12 (months/year)

≪10%p.a. growth until 2010, 5%p.a. growth until 2020, 3%p.a. growth until 2030≫
(Assumption sources : HWBC Finance Department, Estimated Financial Plan by HWBC, JICA Study Team)

(a2) Chemical Cost

Chlorine

[Average Daily Consumption : 301(kg/day)] x [Unit Cost : 4,900 (VND/kg)] x 365 (days/year)

Alum

[Average Daily Consumption : 4 (kg/day)] x [Unit Cost : 2,000 (VND/kg)] x 365 (days/year)

(Assumption sources : HWBC, JICA Study Team)

(a3) Electric Cost

[Daily Maximum Electric Consumption : 30,400 (kWh/day)] x ([Average Daily Production : 50,200] / [Daily Maximum Production : 60,000]) x [Electric Cost per kWh : 600 (VND/kWh)] x 365 (days/year)

《5%p.a. growth until 2010, 2%p.a. growth after 2011》
(Assumption sources : HPC, JICA Study Team, World Bank Electric Sector Review)

(a4) Repair Cost

[Construction Cost] x [Physical Contingency : 1.1] x 1%

(Assumption sources : HWBC, JICA Study Team)

(a5) Other Cost

[Total of the Above Cost (a1)+(a2)+(a3)+(a4)] x 15%

(Assumption sources : HWBC, JICA Study Team)

Based on the above, Plant O&M Cost per Production is calculated as :

[Plant O&M per Production] = [Total O&M Costs] / [Average Daily Production] / [AFW ratio : 0.7] x 365 (days/year)

(b) WBE O&M

As explained in Chapter 3.1, a new Water Business Enterprise shall be established to cover the marketing of the project service area, which naturally incurs O&M costs. However, because internal unit cost accounting has not yet been applied in HWBC, there is no statistical data available on the proportion of the WBE O&M costs to the total HWBC O&M costs.

For calculation purpose, 15% of plant O&M is assumed for WBE O&M based on the historical data in Japan given the anticipated scale of the new WBE.

(c) Head Office O&M

Even for the brand new project, HWBC Head Office should play an important role especially in the administrative matters, and incremental work burden costs by the new project shall be born by the project itself.

Due to the same reason of WBE O&M Costs, 10 % of Plant O&M Cost is allocated to the Head Office O&M Costs.

Table 3.3-1 O&M Cost of the Priority Project

(million VND)

	Plant O&M								WBE O&M	HO O&M	Total O&M
	Staff Cost	Chemical Cost	Electric Cost	Repair Cost	Other Cost	Total	O&M per Production	Plant O&M			
2003	565	608	7,465	4,890	2,029	15,558	1,213	17,836	2,675	1,784	22,294
2004	622	608	7,838	4,890	2,094	16,052	1,252	20,270	3,041	2,027	25,338
2005	684	608	8,230	4,890	2,162	16,574	1,292	23,677	3,552	2,368	29,597
2006	753	608	8,641	4,890	2,234	17,126	1,335	24,466	3,670	2,447	30,582
2007	828	608	9,073	4,890	2,310	17,709	1,381	25,299	3,795	2,530	31,624
2008	911	608	9,527	4,890	2,390	18,326	1,429	26,180	3,927	2,618	32,726
2009	1,002	608	10,003	4,890	2,476	18,979	1,480	27,113	4,067	2,711	33,891
2010	1,102	608	10,503	4,890	2,566	19,669	1,534	28,099	4,215	2,810	35,124
2011	1,157	608	10,819	4,890	2,621	20,095	1,567	28,707	4,306	2,871	35,884
2012	1,215	608	11,143	4,890	2,678	20,535	1,601	29,335	4,400	2,934	36,669
2013	1,276	608	11,477	4,890	2,738	20,989	1,636	29,984	4,498	2,998	37,480
2014	1,339	608	11,822	4,890	2,799	21,458	1,673	30,655	4,598	3,065	38,319
2015	1,406	608	12,176	4,890	2,862	21,943	1,711	31,348	4,702	3,135	39,184
2016	1,477	608	12,542	4,890	2,928	22,444	1,750	32,063	4,809	3,206	40,079
2017	1,551	608	12,918	4,890	2,995	22,962	1,790	32,803	4,920	3,280	41,003
2018	1,628	608	13,305	4,890	3,065	23,497	1,832	33,567	5,035	3,357	41,958
2019	1,710	608	13,705	4,890	3,137	24,049	1,875	34,356	5,153	3,436	42,945
2020	1,795	608	14,116	4,890	3,211	24,620	1,920	35,172	5,276	3,517	43,965
2021	1,849	608	14,539	4,890	3,283	25,169	1,962	35,956	5,393	3,596	44,945
2022	1,904	608	14,975	4,890	3,357	25,735	2,006	36,764	5,515	3,676	45,955
2023	1,961	608	15,425	4,890	3,433	26,317	2,052	37,596	5,639	3,760	46,995
2024	2,020	608	15,887	4,890	3,511	26,917	2,099	38,453	5,768	3,845	48,066
2025	2,081	608	16,364	4,890	3,591	27,535	2,147	39,335	5,900	3,934	49,169
2026	2,143	608	16,855	4,890	3,674	28,171	2,196	40,244	6,037	4,024	50,305
2027	2,208	608	17,361	4,890	3,760	28,826	2,247	41,181	6,177	4,118	51,476
2028	2,274	608	17,881	4,890	3,848	29,502	2,300	42,145	6,322	4,215	52,681
2029	2,342	608	18,418	4,890	3,939	30,197	2,354	43,138	6,471	4,314	53,923
2030	2,412	608	18,970	4,890	3,941	30,214	2,356	43,163	6,474	4,316	53,953

(Notes)

Plant O&M : New Plant O&M

WBE O&M : Water Business Enterprise O&M (15% of [Plant O&M])

HO O&M : Head Office O&M (10% of [Plant O&M])

[Plant O&M per Production] = [Total O&M Costs] / [Average Daily Production] / [AFW ratio : 0.7] x 365 (days/year)

[Plant O&M] = [Plant O&M per Production] x [Average Daily Production]

[Total O&M] = [Plant O&M] + [WBE O&M] + [HO O&M]

3.3.2 Funding Source

Given the Vietnam's national policy of self-financing for Water Business Companies, at least O&M Costs should be covered by the water charges. However, it is apparent financing from outside HWBC is necessary to carry out the project. Investment (Construction) related costs are presented in Chapter 2.5, and total financing amount required turns out to be 587,548 million VND (US$ 53.4 million).

Due to the current financial strain in Vietnam at both National and Municipal level in Vietnam, it is reasonable to assume that funding of the project shall be basically provided from outside the country. There are two possible methods of outside funding for this project. Namely, (a) Commercial Loan and (b) Official Loan.

(a) As regards the commercial loan, given the present status of the London Club negotiation led by ANZ Bank and Bank of Tokyo-Mitsubishi, it is unlikely for foreign financial institutions extend loan directly to this project under the name of TUPWS or even HPC.

(b) In case of official loan, availability and lowest cost should be carefully considered. Taking other water project activities in Vietnam by the World Bank/UNDP, Asian Development Bank, and FINNIDA into account, bilateral loan from the Japanese Government has the largest potentiality. At this stage, OECF (The Overseas Economic Cooperation Fund) is positive to provide Yen Loan to this project. The terms of Yen Loan to the Government of Vietnam is quite generous as below.

Tenor	:	30 years (grace period 10 years)
Repayment	:	semi-annual installment
Interest Rate	:	2.3 % p.a.

It should be noted that according to the OECF guidance, funding cap of projects is 85% of total costs. This implies 15% or 88,132 million VND (US$8.0 million) equivalent of equity should be contributed from the Vietnam side. Therefore in this report, the rest amount of 499,416 million VND (US$45.4 million) funded by the OECF Loan is assumed.

3.4 DETERMINATION OF THE WATER TARIFF

3.4.1 Water Tariffs of Three Types

Tariff separation shall be made in accordance with the operation type.

A. Retail Tariff

In the project service area, customers are composed of domestic and non-domestic ones, and the latter can be broken down to state enterprises / public services, private businesses and foreigners. This is same as the present HWBC's customer portfolio, which means application of the Retail Tariff for this area.

B. Wholesale Tariff

For the supplement to Mai Dich, an internal tariff shall be applied. The WBE covering Mai Dich purchases water at this tariff and sell off to retail customers in the area. This internal tariff can be called Wholesale Tariff.

C. Bulk Retail Tariff

For the new development area, another internal tariff will be introduced. As explained in Chapter 3.1, it is assumed that an administration company shall be established in the area and the company sell water to the customers. The company enters into an O&M contract with HWBC where HWBC undertakes O&M of the new development area. So the administration company buys water at Bulk Retail Tariff from HWBC.

3.4.2 Calculation Base – Annualized Water Price

(1) Annualized Water Price

In this report, Annualized Water Prices (VND/m3) are to be used for the basis of water tariff calculation. Annualized Water Prices mean unit water prices for each year to cover the all project related costs given O&M Costs per AFW figures presented in Chapter 3.3.1.

Main assumptions are:

(a) Depreciation	Lifetime 20 years for all Constructions Straight Line Method Assumption source : a Big Six Accounting Firm, Water Supply Law in Japan
(b) Loan Repayment	30 years installments (Starting 1999) Although OECF Loans have 10 years grace period, this paper assumes the Loan to TUPWS/HWBC from the Vietnamese governmental financial institution set no grace period
(c) Interest Payment	2.3 % p.a. (Starting 1999)
(d) Regulated Profit	5% of Total O&M Costs Assumption source : National Water Tariff Policy Study by ADB

(2) Annualized Retail Price for the Project Service Area

Calculation of the annualized retail price for the project service area is shown below :

[Annualized Retail Price (VND/m3)] = [O&M Cost (Plant + WBE + HO)]
+ [Debt Services (Principal + Interest)]
+ [Regulated Profit : 5%]

(Note)
[Debt Services (VND/m3)] = [Annual Repayment Amount (Principle and Interest) (VND/year)]
/ [Accounted for Water (m3/day)] / 365 (days/year).

(3) Annualized Wholesale Price for Mai Dich Supplement

For Mai Dich supplement, there are no need of WBE and network construction. Therefore, Annualized Wholesale Price is considered Annualized Retail Price minus O&M costs incurred by the new Water Business Enterprise minus Debt Services owing to the network construction (estimated 23.5% of total construction costs).

[Annualized Wholesale Price (VND/m3)] = [Annualized Retail Price]
– [WBE O&M]
– [Network Related Debt Service]

(4) Annualized Bulk Retail Price for the New Development Area

For the new development area, there is no need of network construction, however, as stated before, WBE is needed to take care of Operation and Maintenance. As such, Annualized Bulk Retail Price shall be Annualized Retail Price deducted by Network Related Debt Services.

[Annualized Wholesale Price (VND/m3)] = [Annualized Retail Price]
– [Network Related Debt Service]

3.4.3 Tariff Setting

It should be noted that the above price calculation does not consider the two factors.

(a) The operation will start as late as year 2003 only. Thus, beforehand no water revenue will be accrued, although the annualized prices imply debt services starts right after the loan draw down.

(b) The time value of money is not considered in the calculation. This project has big amount of up-front disbursement, which has negative impact on the net present value of cash flows.

Because of these reasons, the future water tariffs should be higher than the Annualized Water Prices to cover all project costs and achieve adequate IRR.

Another element to be considered is the big price level gap between the present tariff table and the costs to be covered for the project. As described in Chapter 2.3, the present water tariffs are set irrelevant to the costs for water production and too low to cover, not to say this new project. But for social purposes, it is desirable to increase the Water Tariffs gradually every year instead of sudden jump up.

The above justifies trial application of the tariff table presented in the Master Plan. For financial calculations, the M/P water tariffs are applied as the basis of the Retail Water Tariffs for the project service area.

3.5 FINANCIAL ANALYSIS

3.5.1 Revenue Forecast

(1) Water Tariffs

Table 3.5-1 presents suggested water tariffs for the priority project based on the Mater Plan Tariff Table.

In accordance with the water consumption forecast by category, the weighted average of the M/P tariff is calculated as the Retail Water Tariff. Wholesale Tariffs and Bulk Retail Tariffs are estimated at 82% and 86% of the Retail Tariffs respectively for each year.

Table 3.5-1 Water Tariff by Categories

(VND/m3)

Year	Project Service Area				Mai Dich Supplement	New Development Area
	Retail Tariff				Wholesale Tariff	Bulk Retail Tariff
	Domestic	Sate & Public	Private & Foreign	Weighted Average		
1997	1,375	2,750	5,500	2,338	1,917	2,010
1998	1,650	3,300	6,000	2,697	2,212	2,319
1999	2,000	4,000	6,750	3,175	2,604	2,731
2000	2,425	4,850	8,000	3,817	3,130	3,282
2001	2,775	5,550	8,400	4,232	3,470	3,639
2002	3,050	6,100	9,200	4,645	3,809	3,995
2003	3,350	6,700	10,000	5,083	4,168	4,371
2004	3,625	7,750	10,800	5,577	4,573	4,796
2005	3,750	8,135	11,340	5,818	4,771	5,003
2006	3,900	8,550	11,900	6,084	4,989	5,232
2007	4,100	8,970	12,500	6,391	5,241	5,496
2008	4,300	9,420	13,120	6,707	5,500	5,768
2009	4,500	9,900	13,790	7,036	5,770	6,051
2010	4,700	10,390	14,470	7,369	6,043	6,337
↓						
2030	4,700	10,390	14,470	7,369	6,043	6,337

(Notes)
From year 2010 until 2030, water tariffs are assumed remain the same for calculation purpose.
[Retail Tariff] : The weighted average of the M/P tariff
[Wholesale Tariff] : [Retail Tariff] x 82%
[Bulk Retail Tariff] : [Retail Tariff] x 86%

(2) Revenue Forecast

Revenue forecast in the priority project is illustrated in Table 3.5-2.

Table 3.5-2 Revenue Forecast

(VND/m3)

Year	Project Area				Mai Dich Supplement	New Development Area	Total Revenue
	Domestic	State	Private	Project Area Total			
2003	8,943	3,774	842	13,559	30,426	10,290	54,276
2004	10,336	4,664	971	15,971	33,383	16,936	66,290
2005	11,393	5,221	1,087	17,702	34,828	23,557	76,087
2006	11,849	5,487	1,141	18,478	36,420	24,635	79,533
2007	12,457	5,757	1,199	19,412	38,259	25,878	83,549
2008	13,065	6,045	1,258	20,368	40,150	27,159	87,677
2009	13,672	6,354	1,322	21,348	42,121	28,491	91,960
2010	14,280	6,668	1,388	22,335	44,114	29,838	96,287
↓							
2030	14,280	6,668	1,388	22,335	44,114	29,838	96,287

(Note)
As both Tariffs (price) and Accounted for Water Distribution (quantity, due to full capacity operation) are assumed constant after year 2010, Grand Total Revenue figures will be same until year 2030.

3.5.2 Cost Estimation

(1) Investment Costs

Construction (Investment) Related Costs for the priority project are estimated in Chapter 2.5. Investment Costs from 1999 to 2002 are shown in Table 3.5-3.

(2) O&M Costs

The same assumptions in Chapter 3.3.1 shall be used.

3.5.3 Financial Analysis

Given the calculations in 3.5.1 and 3.5.2, Table 3.5-3 demonstrates the Free Cash Flows until year 2030 and resulted IRR of moderate 9.03 % as a base case.

Table 3.5-3 Free Cash Flows of the Project

(million VND)

Year	Cash In Flow	Cash Out Flow		Free Cash Flow
	Total Revenue	Investment	O&M	
1999		72,094		-72,094
2000		88,066		-88,066
2001		164,437		-164,437
2002		164,437		-164,437
2003	54,276		22,294	31,982
2004	66,290		25,338	40,952
2005	76,087		29,597	46,490
2006	79,533		30,582	48,951
2007	83,549		31,624	51,925
2008	87,677		32,726	54,951
2009	91,960		33,891	58,069
2010	96,287		35,124	61,163
2011	96,287		35,124	61,163
2012	96,287		35,124	61,163
2013	96,287		35,124	61,163
2014	96,287		35,124	61,163
2015	96,287		35,124	61,163
2016	96,287		35,124	61,163
2017	96,287		35,124	61,163
2018	96,287		35,124	61,163
2019	96,287		35,124	61,163
2020	96,287		35,124	61,163
2021	96,287		35,124	61,163
2022	96,287		35,124	61,163
2023	96,287		35,124	61,163
2024	96,287		35,124	61,163
2025	96,287		35,124	61,163
2026	96,287		35,124	61,163
2027	96,287		35,124	61,163
2028	96,287		35,124	61,163
2029	96,287		35,124	61,163
2030	96,287		35,124	61,163
			IRR=	9.03%

This is the another justifiable proof of the suggested water tariffs presented in the Master Plan.

Therefore, substantial increase in water tariffs from the present level such as 13.4% p.a. for domestic customers, 9.5% p.a. for private businesses and foreigners until year 2005 is recommended.

At this point, two issues are noteworthy.

(a) Considering the commercial nature of the new development area, it could be relatively easy to charge ' higher than cost cover i.e. profitable ' level tariffs in this special area. Sample calculation shows if succeeding in charging some 6,500 (VND/m3) instead of some 4,800 (VND/m3) shown above in 2005 for the area whereas should Tariffs for other two areas remain same , IRR shall reach 10%.

(b) According to own political consideration, HPC could cross-subsidize the project service area tariffs by imposing higher than cost tariff for the new development area although the affordability study shows the suggested cost covering Tariff Table are well feasible in the project service area. This is possible because HPC now has a substantial autonomy in determining the water tariffs in Hanoi..

3.5.4 Financial Evaluation

(1) Profit & Loss Projection

Table3.5-4 presents the Profit & Loss statement of the priority project until year 2030 based on the assumptions explained above. The result shows break-even point is estimated year 2004, quite early given the operation start year 2003.

Table3.5-4 Profit & Loss Statement

(million VND)

Year	Revenue	O&M Costs	Depreciation	Interest Costs	Profit & Loss
1999			3,605	13,514	-17,119
2000			8,008	13,064	-21,072
2001			16,230	12,613	-28,843
2002			24,452	12,163	-36,615
2003	54,276	22,294	24,452	11,712	-4,182
2004	66,290	25,338	24,452	11,262	5,238
2005	76,087	29,597	24,452	10,811	11,227
2006	79,533	30,582	24,452	10,361	14,138
2007	83,549	31,624	24,452	9,910	17,563
2008	87,677	32,726	24,452	9,460	21,039
2009	91,960	33,891	24,452	9,009	24,608
2010	96,287	35,124	24,452	8,559	28,152
2011	96,287	35,884	24,452	8,108	27,843
2012	96,287	36,669	24,452	7,658	27,508
2013	96,287	37,480	24,452	7,207	27,148
2014	96,287	38,319	24,452	6,757	26,759
2015	96,287	39,184	24,452	6,307	26,344
2016	96,287	40,079	24,452	5,856	25,900
2017	96,287	41,003	24,452	5,406	25,426
2018	96,287	41,958	24,452	4,955	24,922
2019	96,287	42,945	20,847	4,505	27,990
2020	96,287	43,965	16,444	4,054	31,824
2021	96,287	44,945	8,222	3,604	39,516
2022	96,287	45,955	3,605	3,153	43,574
2023	96,287	46,995	8,008	2,703	38,581
2024	96,287	48,066	16,230	2,252	29,739
2025	96,287	49,169	24,452	1,802	20,864
2026	96,287	50,305	24,452	1,351	20,179
2027	96,287	51,476	24,452	901	19,458
2028	96,287	52,681	24,452	450	18,704
2029	96,287	53,923	24,452	13,514	4,398
2030	96,287	53,953	24,452	13,064	4,818

(2) Fund Applications & Sources Projection

Table3.5-5 demonstrates the applications and sources of funds until year 2030. Overall, the table implies smooth cash flows. During the period of 2002 - 2005, there will be small negative cash positions, however, it can be easily covered by various manners such as repayment grace to the Governmental Financial Institution.

Table 3.5-5 The Applications and Sources of Funds

(million VND)

Year	Application				Source			Net Cash Position
	Total O&M Costs	Investment	Interest Costs	Loan Repayment	Cash Position from the Previous Year	Water Revenue	Loan Advance	
1999		72,094	13,514	19,585	0		587,548	482,355
2000		88,066	13,064	19,585	482,355		0	361,640
2001		164,437	12,613	19,585	361,640		0	165,005
2002		164,437	12,163	19,585	165,005		0	-31,180
2003	22,294		11,712	19,585	-31,180	54,276	0	-30,495
2004	25,338		11,262	19,585	-30,495	66,290	0	-20,390
2005	29,597		10,811	19,585	-20,390	76,087	0	-4,296
2006	30,582		10,361	19,585	-4,296	79,533	0	14,709
2007	31,624		9,910	19,585	14,709	83,549	0	37,139
2008	32,726		9,460	19,585	37,139	87,677	0	63,045
2009	33,891		9,009	19,585	63,045	91,960	0	92,520
2010	35,124		8,559	19,585	92,520	96,287	0	125,539
2011	35,884		8,108	19,585	125,539	96,287	0	158,249
2012	36,669		7,658	19,585	158,249	96,287	0	190,624
2013	37,480		7,207	19,585	190,624	96,287	0	222,639
2014	38,319		6,757	19,585	222,639	96,287	0	254,265
2015	39,184		6,307	19,585	254,265	96,287	0	285,476
2016	40,079		5,856	19,585	285,476	96,287	0	316,243
2017	41,003		5,406	19,585	316,243	96,287	0	346,536
2018	41,958		4,955	19,585	346,536	96,287	0	376,325
2019	42,945		4,505	19,585	376,325	96,287	0	405,577
2020	43,965		4,054	19,585	405,577	96,287	0	434,260
2021	44,945		3,604	19,585	434,260	96,287	0	462,413
2022	45,955		3,153	19,585	462,413	96,287	0	490,007
2023	46,995		2,703	19,585	490,007	96,287	0	517,011
2024	48,066		2,252	19,585	517,011	96,287	0	543,395
2025	49,169		1,802	19,585	543,395	96,287	0	569,126
2026	50,305		1,351	19,585	569,126	96,287	0	594,172
2027	51,476		901	19,585	594,172	96,287	0	618,497
2028	52,681		450	19,585	618,497	96,287	0	642,068
2029	53,923	72,094	13,514	19,585	642,068	96,287	587,548	1,166,787
2030	53,953	88,066	13,064	19,585	1,166,787	96,287	0	1,088,406

(3) Affordability Consideration

As for affordability of the customers against the suggested Water Tariffs, Affordability
Analysis in the Master Plan proves that even Low Income Household will be able to pay the suggested charges until year 2010.

(4) Sensitivity Analysis

Regarding items to be reviewed, (a)O&M Costs, (b)UFW and (c)Water Tariffs are selected as the most influential parameter.

Table 3.5-6 shows the calculation outcomes. Naturally, Water Tariff change has the biggest impact on IRR of the project. The table points out that in order to achieve high IRR, drastic jump up of Water Tariff is required.

Table 3.5-6 Sensitivity Analysis

O & M Costs

Factor	IRR(%)
0.90	10.04
0.95	9.47
1.00	9.03
1.05	7.95
1.10	6.70

UFW

Factor	IRR(%)
0.80	10.46
0.90	9.70
1.00	9.03
1.10	8.26
1.20	7.54

Tariffs

Factor	IRR(%)
1.20	13.64
1.10	11.45
1.00	9.03
0.90	6.58
0.80	4.01

(5) Conclusion

(a) The proposed priority project will have moderate Financial IRR (FIRR) of 9.03%, which is higher than the suggested funding cost and is higher than the prevailing long-term interest rate in Vietnam.
(b) The repayment of the loan principal and interest can be covered by the anticipated free cash flows.
(c) The suggested water tariff table is within the affordability target.

Therefore, from the view point of financial analysis, the priority project is feasible.

3.6 ECONOMICAL ANALYSIS

3.6.1 Introduction

For the project evaluation from the economic aspect, Economic Internal Rate of Return (EIRR) shall be calculated for the period until 2030, same as the calculation on FIRR.

For economic costs, Investment Cost and O&M Costs calculated in the financial analysis in Chapter 3.5 will be utilized.

In this study, regarding the economic evaluation, solely direct economic benefits to the priority project area shall be considered. Indirect quadratic benefits to Hanoi City such as facilitation of CBD development and cubic benefits to Countrywide such as multiplier effect of construction component purchases are rather difficult to be quantified due to lack of sufficient information.

3.6.2 Economic Benefits

(1) General

By installing the new water supply system in the priority project area, the following economic benefits can be expected :

(a) Reduction of waterborne diseases contraction
(b) Reduction of the infant mortality
(c) Land value hike
(d) Improvement of living standard
(e) Contribution to tourism promotion

However, improvement of living standard like facilitation of washing cloths/dishes, and bath taking are not suitable for quantification. And tourism statistics for this area is not available as of June 1997.

Therefore, benefits (a), (b) and (c) shall be focused to determine the quantified economic benefits.

(2) Reduction of Waterborne Diseases Contraction

It is not easy to define which diseases are waterborne that can be reduced by the newly supplied fresh water. In this analysis, Diarrhea and Dysentery are considered to fall in that category based on the recommendation by the officers in the Ministry of Health and the UNDP Hanoi office.

According to the statistical data given by the Department of Health in HPC, Contraction Rate for Diarrhea and Dysentery for the year 1996 is 1.1% and 0.07% respectively in Hanoi.

Ministry of Health believes the contraction rate of these diseases can be drastically reduced as much as 50% by the new clean water supply. For conservative calculation purpose, 40% improvement shall be assumed.

Opportunity medical cost per patient is composed of opportunity income and medical expense. Income projection coincides with the affordability study in the M/P which means 1,755,000 VND/month/household in 2003, 1,930,000 VND in 2004, and 2,123,000 VND in 2005 respectively. Average sick period is projected seven days and medical expense per patient is assumed US$30 flat based on the data of Ministry of Health. By those assumptions, opportunity medical cost per patient in 2003 will be (1,755,000/4.5/11,000/4)+30 = US$39. Same calculation applies for the years 2004 and 2005, which results in the unit opportunity cost of US$40 and US$41.

As such, economic benefit from the reduction of waterborne diseases is calculated as follows :

[Population (persons)] x [Contraction Rate : 0.0117] x [Opportunity Medical Cost (US$)] x [Reduction Rate : 0.4] x 11,000 (VND/US$)

(3) Reduction of Infant Mortality

There are no clear rules to determine how much of infant mortality reduction can be attributed to the newly supplied clean water. A HPC official claimed at least 20% improvement can be expected from the proposed water system, whereas 15% reduction applied in this analysis.

According to the Minimum Health Data Set 1993-1996 issued by the Ministry of Health, infant mortality rate (less than 5 years old) in the Red River delta area is 4.4% in 1996.

For calculation of opportunity lifetime income, affordability study in the M/P shall be applied. This implies monthly income of US$35/capita in 2003, US$39 in 2004, and US$43 in 2005. Average working lifetime is estimated 30 years. This leads to the present value of opportunity lifetime income per person US$3,959 in 2003, US$4,412 in 2004, and US$4,864 in 2005 (Discount Rate 10.0% : based on the real term GDP growth forecast by the State Bank of Vietnam)

Based on the above, economic benefit from the reduction of infant mortality shall be;

[Population (persons)] x [Mortality Rate : 0.044] x [PV of Opportunity Lifetime Income per Person (US$)] x [Reduction Rate : 0.15] x 11,000 (VND/US$)

(4) Land Value Hike

The value of land (to be precise, value of land usage) shall be increased if new water supply system is provided. For this calculation, assumptions made in the Study on Wastewater Disposal System in Hanoi are taken into consideration.

(a) Project service area is 2,342 ha.
(b) Current land value of urban area is US$400/m2.
(c) Expected increase in value will be 2.0%p.a. until year 2010, more conservative than 5.0% of the wastewater study.

3.6.3 Cost – Benefit Analysis

Table 3.6-1 demonstrates quantified economic Cost - Benefit Analysis for the priority project area. The bottom line shows medium level EIRR of 9.60%.

Table 3.6-1 Economic Cost - Benefit Analysis

(million VND)

	Benefit			Cash Out Flow		Net Benefit
	Diseases Reduction	Mortality Reduction	Land Value Increase	Investment	O&M	
1999				72,094		-72,094
2000				88,066		-88,066
2001				164,437		-164,437
2002				164,437		-164,437
2003	127	18,209	51,524		22,294	47,566
2004	135	20,958	52,554		25,338	48,309
2005	142	23,840	53,606		29,597	47,991
2006	148	26,224	54,678		30,582	50,468
2007	152	28,846	55,771		31,624	53,145
2008	155	31,731	56,887		32,726	56,047
2009	159	34,904	58,024		33,891	59,196
2010	162	38,395	59,185		35,124	62,618
2011	162	38,395	59,185		35,124	62,618
2012	162	38,395	59,185		35,124	62,618
2013	162	38,395	59,185		35,124	62,618
2014	162	38,395	59,185		35,124	62,618
2015	162	38,395	59,185		35,124	62,618
2016	162	38,395	59,185		35,124	62,618
2017	162	38,395	59,185		35,124	62,618
2018	162	38,395	59,185		35,124	62,618
2019	162	38,395	59,185		35,124	62,618
2020	162	38,395	59,185		35,124	62,618
2021	162	38,395	59,185		35,124	62,618
2022	162	38,395	59,185		35,124	62,618
2023	162	38,395	59,185		35,124	62,618
2024	162	38,395	59,185		35,124	62,618
2025	162	38,395	59,185		35,124	62,618
2026	162	38,395	59,185		35,124	62,618
2027	162	38,395	59,185		35,124	62,618
2028	162	38,395	59,185		35,124	62,618
2029	162	38,395	59,185		35,124	62,618
2030	162	38,395	59,185		35,124	62,618

EIRR =	9.60%

3.6.4 Conclusions

The calculated EIRR is not so high at best. However, considering the 'said to be' around 10% opportunity cost of capital in Vietnam and the urgent social purpose of the project, this figure is within the acceptable level.

Therefore, from the view point of economic analysis, the priority project is feasible.

CHAPTER 4 ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

4 ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

As for the priority project to be examined in detail in the phase of the feasibility study, methodology of environmental impact assessment (EIA) were considered and consulted with the Vietnamese authorities.

4.1 ENVIRONMENTAL SITUATION OF THE PROJECT AREA

(1) Natural Environment

The priority project area is quite flat and slightly undulated elevation ranging from 6.2m to 8.9m which maintains almost in a flat condition with sloping up from the southeast to the northwest. The priority project area is situated on the upper part of the Red River delta and is about 100km from the sea. Almost all the project area belong to the alluvial flat lowland of the delta with an elevation of around 10m. The Red River flows from the northwest to the southeast along the northern side of the project area.

The project area is located in the drainage basin of the Nhue River which consists of small size basin: Co Nhue, My Dinh; and To Lich River under a planning for urban drainage in Hanoi City. Lakes and ponds in the project area cover an area of 0.42km2 which occupies 1.3% of the total area.

There are several irrigation canals flowing through the project area, the main function of those canals is for irrigation and drainage. During a rainy season, when heavy rain comes in the basin of Nhue River, the pumping station can not work with full capacity then flood situation happen.

(2) Socioeconomic Environment

The priority project area consists of nine (9) communes. Thuy Phuong, Dong Ngac, Co Nhue, Me Tri, and My Dinh communes belong to Tu Liem district. Mai Dich, Dich Vong, Trung Hoa and Yen Hoa communes belong to Cau Giay district newly established in December 1996.

According to the survey in May 1995, Tu Liem district had 29 villages and five (5) towns with total population of 264,900 (male:129,426, female:135,475). The number of labor force is 32,967 which corresponds to 30% of total population of the district, and the population growth rate is 1.65% per annum. Population and number of households in those communes are as follows.

Name of Communes	Population	Population Growth Rate	Number of Households
Thuy Phuong	6,800	1.50%	1,118
Dong Ngac	15,800	1.40%	3,400
Co Nhue	12,437	4.05%	2,758
Mai Dich	13,279	1.28%	3,200
Dich Vong	9,257	4.88%	2,378
Me Tri	13,437	-	2,782
My Dinh	8,102	2.16%	1,781
Trung Hoa & Yen Hoa	11,576	1.65%	4,126
Total	90,688	-	21,543

Tu Liem district is an agricultural area, providing food, foodstuff and green vegetables for the whole capital city. In the recent years, the average food grain production in the whole district has reached 32,000 tons of rice per year. Green vegetables and fruits have mounted to 2,000~3,000 tons/year. In general, one hectare of cultivated land is valued at 30 million VND. In the project area, the average paddy productivity is about 4 tons/ha and the average vegetable productivity is 19 tons/ha. The average agricultural income per capita is 203,000 VND/person. In recent years, the cultivated land has been considered for sharing with urban infrastructure, enterprises, schools and so on, therefore the farmers have to give up mono-culture and change rice into other plants like fruits, vegetables, or flowers.

In the past few years, commercial and service network has rapidly grown up in the project area, and many shops have been mushrooming along the main roads, inside the towns, living quarters and even in the deep and narrow alleys. Small industries

and handicrafts have also developed.

Industrial facilities and production are scattered in the project area. Most of them are located in Chem (the south of Thang Long Bridge) industrial zone. Main industries are engineering, chemistry, building materials, textile mill with small scale. Chem industrial zone has five state-owned enterprises. This zone concentrates all kind of small industries, connecting with the Cau Dien - Nghia Do industrial zone. This zone employs 2,000 labors.

Land use in the project area is as follows.

(ha)

Name of Commune	Total Area	Agricultural Land	Industrial Land	Dwelling Land	Cultivated Land	Others
Thuy Phuong	249	97	-	94	58	-
Dong Ngac	362	81	-	107	174	-
Co Nhue	570	99.2	2.2	346	116	7
Mai Dich	208	90	-	38	72	8
Dich Vong	400	60	-	205	41	94
Me Tri	700	231	-	104	192	173
My Dinh	440	123	-	119	68	130
Trung Hoa & Yen Hoa	449	89	80	232	42	6
Total	3,378	870	82	1,245	763	418

Currently water supply in these nine communes is not sufficient in comparison with demand from offices, enterprises, and people because of insufficient or outdated pipeline network. Therefore, most part of the project area are using water from the wells dug by themselves. In villages, people are still using rainwater or groundwater from their own shallow wells.

Within the project area, scattered in communes are offices, enterprises, military camps, research institutes, schools and blocks of flats. Most of the above organizations have no wastewater drainage system. Untreated wastewater finds its way to lakes, ponds and low places affecting the living environment and public health. Some office buildings, enterprises and hotels have their own wastewater drainage systems. Wastewater is preliminary treated through septic tank then flows to the storm water drainage systems before discharging into lakes or rivers. Living quarters of Mai Dich installs underground drainage systems for wastewater and storm water.

The project area is located in the northwest of Hanoi urban area and is a convergence place of inter-provincial transportation routes.

It can be seen that the project area is bounded with two routes paralleling the north-south axis, namely, South Thang Long route (stretching 5.9km from Mai Dich to the Thang Long bridge crossing the National Road No.32) and the city's ring road II (from Cau Giay to Nhat Tan crossing with the length of 6.3km). These two routes are considered as the main land routes in the west and the east of the project area. The route of Road No.32 from Cau Gial to Mai Dich crossing 2.4km and the Red River's dike route from Nhat Tan crossing to the South Thang Long are considered as the main land routes in the north and the south of the project area. The South Thang Long route is the "gate" route linking the Noi Bai International Airport to Hanoi urban area. Through this route, land transportation can also meet the National Road No.2 to Tuyen Quang or the National Road No.3 to Thai Nguyen. The South Thang Long route will be developed southwards in the future from the departure site of Mai Dich crossing to the National Road No.6 in Thanh Xuan, National Road No.1 in Phap Van to form the Ring Road III. This ring road is expected to cross the Red River with the Thanh Tri bridge and meet the National Road No.5 in Sai Dong.

A river route departing from Dong Ngac, bounding the West of the project area and flowing southwards is the Nhue River. This route can be regarded as a "regional" one and transportation capacity is negligible.

Tu Liem district has close historical relationship with Thang Long. The history of Tu Liem is lasting for thousands of years. Tu Liem has 192 cultural vestiges, including 82 famous historical vestiges. There are several pagodas, temples, communal houses to worship national heroes. Thuy Phuong has a temple and grave of General Ly Ong Trong. Mai Dich cemetery is a big cemetery of the city. It is located along the National Road No.32.

4.2 IMPACT OF THE PROJECT IMPLEMENTATION TO THE ENVIRONMENT

(1) Preconstruction stage

The plan of safe and stable water supply to the area would bring beneficial effects on social environment, namely it would strongly lead residential, industrial and commercial development of the area.

The facilities are proposed in the area where they will never cross the reserved/restricted area, never divide the existing communities, or never affect the existing transportation systems.

The exploitation discharge of groundwater proposed in the project is about 50,000 m^3/day, which falls within the limited exploitable capacity in the area. Therefore, the groundwater exploitation would never cause land subsidence and never damage the existing structure. On the other hand, a part of exploited water in this area will transferred to the existing Mai Dich water supply system as a supplementary support and will help the system to reduce discharge volume from its wellfield, which would contribute to recover severely depressed groundwater level in the Mai Dich wellfield. The wellfield is proposed at the sites sufficiently distant from the river bank, according to the Vietnamese Law of Dike.

Wellfield and water treatment plant are planned in the existing rice paddies and transmission mains are planned to be laid under the existing roads. Therefore, no houses will be demolished or no people will be displaced by this project, though about six (6) hectares of site acquisition will reduce an agricultural productivity and the farmers' earnings to some extent.

The sites for facilities proposed by the project are in the existing rice paddies and the extent of site clearing and demolition will be limited to about six (6) hectares. Therefore, the project would not affect topography, geology, soil or wildlife.

(2) Construction stage

Drilling wells will be operated under the ordinary control not to disturb hydraulic condition in the ground, which would never contaminate groundwater or never disturb the water use in the surrounding area. The work will generate noise and vibration to some extent, however its impact to the surrounding area would be limited because there scarcely exist houses around the proposed wellfield.

Raw water taken from the proposed wellfield on the west side of the Nhue River will be transmitted to the proposed water treatment plant. A transmission pipe will cross the Nhue River through a pipe-bridge and it will never damage the river structures. It will run underground before/after crossing the Nhue River, and its construction works would temporarily damage a few house lots on the east side of the river. It would also cause noise and interfere the traffic on the both sides. However those impacts would be quite slight and temporary. Because the number of houses and the traffic volume affected by the construction works would be limited and the construction sites will be restored to its former state after laying a pipe in the ground.

Construction works of water treatment plant will increase traffic volume on the surrounding roads to carry construction materials. However present traffic volume on the roads is very few, and the impact would not so serious as a traffic jam would happen. The works would generate noise and vibration and affect inhabitants or institutes in the adjacent area to some extent.

Construction works of distribution mains would interfere the traffic on the narrow road running through the existing settlement such as Co Nhue. The works would also generate noise and vibration to some extent, however its impact to the surrounding area would be limited. Because, the construction site will move at an ordinary pace of about 30 meters per day and the working time will be limited only in the daytime of weekdays. All construction sites will be restored to its former state after laying a pipe in the ground.

(3) Operation Stage

Excessive groundwater discharge would lower the groundwater level seriously which would result in land subsidence and increase of inundation risk, if the operation will be poorly managed.

New water supply system proposed by the project will increase sewage volume in proportion to the increase of supplied water. It would affect the quality of water bodies in the area, if the sewage will not be properly treated.

Water will be continuously supplied to customers with enough pressure at least twice as much as the existing water supply systems in Hanoi. Therefore not only the existing risk of using polluted water drawn from shallow wells but also the risk of being polluted by wastewater due to insufficient water pressure will be avoided even at the end of service area. It would undoubtedly improve hygienic condition in the area.

(4) Summary of Negative Impacts

The estimated negative impacts are summarized as below :

Summary of the Negative Impacts

Stage	Viewpoints	Negative Impacts
Preconstruction Stage	Scio-Economy	A loss of agricultural productivity and earnings
Construction Stage	Noise and Vibration	Noise and Vibration by construction work
	Traffic Interruption	Traffic interruption by construction work
Operation Stage	Sewage	Increase of Sewage

4.3 MEASURES AGAINST THE NEGATIVE IMPACT

Monitoring level and quality of groundwater around the proposed wellfield is recommended to take all possible measures against land subsidence and deterioration of water quality, even if a risk of such environmental impacts is not predicted. At the beginning stage of the project implementation, test well survey should be implemented to hydrogeological conditions at the wellfield which will be used for a groundwater simulation using the existing model developed by the Vietnamese authority. After that, the wells would be utilized to monitor the groundwater level and quality periodically.

As for the acquired land of about six hectares and the persons who will lose earnings gotten from the agricultural activities at the land, an appropriate compensation will be made. The land and the persons to be affected temporarily by the construction will be also compensated.

During the construction period of laying pipes under the roads, watchmen will be put at the site and control the traffic. Construction wastes will be dumped to a landfill. As a general rule, construction works will not be done in the nighttime nor on a holiday not to cause a problem of noise and vibration.

The proposed water treatment plant will install sludge treatment process and backwash water will be never discharged directly to a drain. At the sludge drying bed, water in sludge will be filtered and discharged to a drain. Remained sludge will be dried and dumped to a landfill. Facilities which are tall or generate noise/odor will be constructed at an enough distance from adjacent houses or institutes.

4.4 GENERAL ASSESSMENT

Even if this water supply project would not be implemented, the area would be rapidly urbanized and its environmental conditions would change so much because of its high potential. Under such conditions, commercial or industrial users would exploit groundwater uncontrollably which might cause land subsidence, or domestic users would draw water from a shallow well or install a private water tank which might cause hygienic problems. The area would not be able to realize a sound urban development without safe and stable water supply systems.

In general, most impacts caused by the project are considered to be positive. Negative impacts are predicted to be small. Therefore the project is feasible from the viewpoint of environmental consideration if the aforementioned negative impacts will be carefully taken into consideration and necessary mitigating measures will be implemented.

CHAPTER 5 SOCIAL ANALYSIS

5 SOCIAL ANALYSIS IN THE PROJECT

The study team has selected the priority project area for the city water supply project. The location of the priority project area consists of 9 communes : Thuy Phuong, Dong Ngac, Co Nhue, My Dinh and Me Tri in the Tu Liem District (5 communes), and Mai Dich, Dich Vong, Yen Hoa and Trung Hoa in the Cau Giay District (4 communes).

5.1 OBJECTIVES OF SOCIAL ANALYSIS

The objectives of the social analysis are to obtain information on the present situation of the proposed priority area, and to feed back the findings to the feasibility study which will be made balanced in the implementation plan of priority projects in the future.

5.2 METHOD OF ANALYSIS

The method of social analysis consists of the following three activities :

(1) questionnaire survey,
(2) group discussion in the workshop and
(3) site reconnaissance

5.2.1 Questionnaire Survey

According to the above objectives, the questionnaire survey for social analysis was done at the stage of the Master Plan as the "Survey on Water Usage" in April 1996. This survey was targeted at all water users in Hanoi which are divided into "domestic users" and "non-domestic users". The random sampling method was applied to 100 samples for each urban district, and 50 samples for each suburban district which consists of DID areas and rural areas.

The survey objectives have been set forth as follows :

- to examine domestic and non-domestic water consumption
- to research actual conditions of water use in Hanoi
- to research affordability to piped-water-supplied households and willingness to connect and pay for non-piped-water-supplied households
- to research water leakage inside households

The random sampling method was applied so as to sample uniformly from the populations. The sampling procedures and area definitions are described below;

(1) For Urban Districts

Prior to interview, 100 samples for each district were selected from the water consumers of HWBC. Four hundred (400) consumers were selected in total.

(2) For Suburban Districts

Every interviewee was selected by the interviewer at site in conformity to the instruction that 50 samples for each district should be selected. Two hundred and fifty (250) consumers were selected in total.

(3) Area Definition

In accordance with the level of urbanization, the following three areas are defined :

- Urban area : existing four urban areas (except Tay Ho district)
- DID area : densely inhabited districts in every suburban district
- Rural area : all suburban districts except DID areas.

(4) Results of the Survey

1) Daily Water Consumption

Based on the survey, the average daily water consumption per capita is concluded to be as follows:

- Urban area : 93 liters/capita/day
- DID area : 70 liters/capita/day
- Rural area : 60 liters/capita/day

2) Water Use Condition

In terms of bathing facilities, it is apparent that shower facilities reach 24% in Urban areas, 11% in DID areas, 5% in Rural areas but only 5% are equipped with bathtubs in Urban areas.

In terms of toilet facilities, individual toilets are more popular in Rural areas than Urban and DID areas. However, the rate of flush toilets is 58% in Urban, 55% in DID and 23% in Rural areas, in short, they spread according to the rate of urbanization.

3) Willingness and Affordability

Based on the willingness survey for city water supply, it is proved that the 93% of households have a willingness to connect and to pay for piped water. Meanwhile, other 7% have no willingness for that. Two kinds of reasons are identified, one is that adequate water is available from their own wells, another is that they can not afford to pay the water charge.

By the results, the acceptable monthly water charge per household is concluded to be VND 16,000.-.

The interview area with number of respondents and details of the survey results are reported in the main chapter of survey report.

5.2.2 Group Discussion on the Workshop

In the feasibility study stage, the study team several times visited the proposed priority project area and organized workshops for direct survey instead of the former questionnaire survey. In the workshop, the team held preliminary meetings with officers of a local people's committee and visited local residents to get direct information and for purposes of physical survey concerning social analysis especially on conditions of daily water usage.

The workshop was held on March 25, 1997 and its framework was:
- Name of commune : Co Nhue / Tu Liem District
- Place of conference : Office of People's Committee
- Number of attendants: 25 persons (19 women and 6 men)
- Average age of attendants : women - 49 years and men - 52 years
- Average family size of attendants: 5.5 p/family (smallest 4 to biggest 9)

Scene of the Workshop

Major request of the residents is for the necessity of improving the living environments in terms of both the water supply and sanitary disposal system. The road network system must also be improved together with the drainage system.

The major discussion items at the workshop are mentioned below :

Constraints on Daily Water Usage

- poor volume of water in shallow wells in the dry season
  - when lacking water, people share water from deep-well among neighbors or get water from rain (category of well: shallow well = 10~15m, deep well = 30~40m)
  - low quality of wellwater (but potable after boiling);
  - polluted water is mixed if the well is located near a sanitary pit

- affordability of piped water supply
  - limited budget to spend for water charges: the answers were VND 600 to 1,000 /day/family (equal to 18,000 to VND 30,000 /month/family) in 1997.
    * Reference: acceptable monthly water charge per household is concluded to be VND 16,000 by the questionnaire survey (in the case of 5 persons per family: 5p x 70lit. x 30days = 10.5m3/month/family, VND 16,000/ 10.5m3 = VND 1,524/m3) in 1997.

- to request to the HWBC (if connecting piped water by HWBC)
- to purchasing water at a reasonable price
- to receive a sufficient and constant volume of water and receive 24-hours' water supply.

5.2.3 Site Reconnaissance

In the course of survey, by recognizing that the direction of urbanization is on a predominant axis running in a western direction from the existing urbanized area, where the land is predominantly used for residences, commercial concerns, small industry, multi-storied educational buildings and public facilities. The commune Co Nhue is a typical rapidly-expanding area in the western part of Hanoi. Moreover, the construction of a new highway connecting planned Hoa Lac New Town to the central Hanoi through the project site is encouraging urbanization activities. Due to agricultural activities and the topographic background, the surrounding Co Nhue DID area is a mostly paddy fields over the Nhue River.

One advantageous characteristic of the land is minimal flood area which was learned by hearing on site. There exist huge number of natural ponds in the area, which are utilized on the daily life for washing clothes etc. by the residents. It may be considered that the existing natural ponds and canals solve flooding to some extent by the retention function of these ponds.

The present situation of the project site is shown on the following map. Many water areas were recognized in the map.

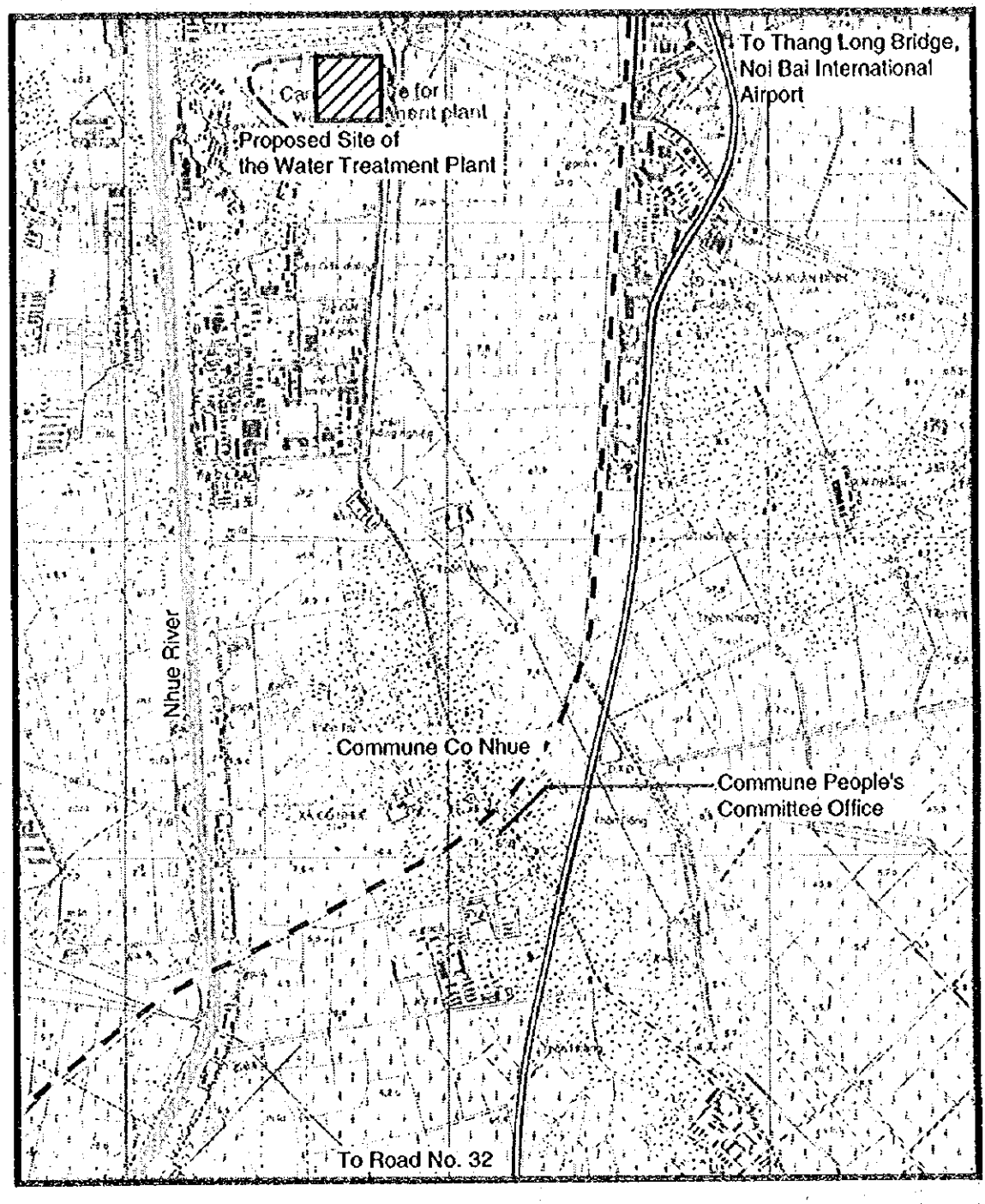


Fig. 5.2-1 Present Situation of Site Reconnaissance

5.3 RESULTS OF SOCIAL ANALYSIS

5.3.1 Beneficiaries and Advantageousness by the Priority Project

The priority project will cover 140 thousands beneficiaries in total by the year 2005. In detail, 68,000 residents will newly receive piped water, plus 72,000 residents will receive water through the existing Mai Dich water treatment plant. This population is calculated by supply volume 20,000 m3 per day / 279 liters (domestic use + non-domestic use) per person per day.

Moreover, 200ha of future commercial area also will receive benefits by these projects.

Actual benefits on the beneficiaries are as follows :

(1) Improvement of Health

According to data from the economical analysis, in quantifying the economic benefit of the hygienic aspect by the projected water supply, two elements shall be considered, namely, reduction of waterborne diseases and reduction of infant mortality.

(2) Improvement of Convenience

According to the questionnaire survey on non piped-water service area, 76% of housewives in DID and rural areas have the duty for taking water in total of DID and Rural areas, 43% spend 20 - 40 minutes, 25% spend 40 - 60 minutes to take water every day.

After construction of a piped-water supply system, most women will be free from this hard work duty.

5.3.2 Disadvantages to Residents by the Priority Project

According to the IEE study, there is no restricted area for development project in the project area. The facilities are proposed in the area where they will have no effect on the reserved/restricted area, no effect on existing communities, or no effect on the existing transportation systems. But there are several small negative impacts during each stage of pre-construction, construction and operation.

Therefore the project is advantageous from viewpoint of environmental consideration if some small negative impacts will be carefully taken into consideration and necessary mitigating measures will be implemented. Details of environmental impact by implementation of the project are referred to in the chapter on environmental aspects.

5.3.3 Fairness of Effects of the Project

The water charge must be designated to meet affordability of all income groups including low income.

Based on the income data obtained from the interviews, annual income per household is tabulated in the frequency distribution which class-interval is VND 2 million. Both of the value of 8.9 million VND in average and 8.0 million VND in mean are situated in the range from 7 to 9 million VND.

Based on the questionnaire survey and discussion in the workshop, affordable water price is 16,000 VND /family/month and on the other hand, projected water tariff for domestic customers is 3,350 VND/m3 (year 2003) to 3,750/m3 (= 3.75 VND/liter) (2005).

In the case of 2005, per capita water demand for Group U is 165 liters/day and per capita GDP is 466 US$/year in case of Variant-1 which was simulated by the State Bank of Vietnam (equivalent to 5,126,000 VND /year ≒ 14,000 VND/day).

- 165 liters/day x 3.75 VND/liter = 619 VND/day
- 619 VND / 14,000 VND = 0.044 = 4.4%

The result showed the average percentage of the water charge to income. It is about 4% of income.

5.3.4 Residents Participation for the Project

Based on the survey in the workshop, the residents have ambitious to participate in the project. Their activities, for examples, are to check water leakage inside houses and notify the Water Business Company. Campaign for saving water should be participated in by local residents.

5.3.5 Practical Use of the Resources in the Project Area

Permission for taking groundwater is executed by the Ministry of Industry. At the initial stage of the project implementation, test wells will be drilled to confirm hydrological conditions at the well field which will be used for groundwater simulation using the existing model developed by the Vietnamese authorities.

Well fields and water treatment plants are planned in the existing cultivation lands and transmission mains are planned to be laid under the existing roads. Therefore, no houses will be demolished or people displaced by this project. Under this situation it project coordination is necessary for the land use and acquired land among the related government agencies.

Under the execution of projects, negative impacts on the right to use of groundwater resources and land are predicted to be small as stated in Chapter 4 (EIA). Therefore, most impacts caused by the project are considered to be positive.

5.3.6 Receptivity on the Cultural Background

After implementation of the project, social customs and behavior on the daily water usage will be changed positively. The typical customary for the consideration of these impacts are listed below.

Items	Present condition	By piped-water supply
Drink unboiled water	Not to do but Often causing infectious disease	Not to do Decrease an infectious diseases
Frequency of taking bath or shower	Often	More often
Place for washing clothes	Well, River, Pond	House tap
Source for washing car, bike, etc.	Well, River, Pond	House tap
Type of toilet	Earth closet	Water closet

Their change of water use by house connections may produce surplus time, that can be used for other activities. Instead of it, their relationship through housewives' gossips that have been taken place everyday may become weaker. But benefit by saving time is more important than such housewives' gossips because their relations can be well kept by occasional meetings such as meetings at the peoples' committee, etc..

In conclusion, execution of this project will be receptive to residents in cultural behavior and retain permanency of the project.

5.4 EVALUATION AND RECOMMENDATIONS OF SOCIAL ANALYSIS

Evaluation of the social analysis is summarized in Table 5.4-1.

Table 5.4-1 Summary for Evaluation of Social Analysis

Items	Evaluation	Remarks
Beneficiaries and advantages	A	Improvement of health condition & convenience
Disadvantageousness residents	A	Nothing remove the existing communities
Fairness of effects	B	Affordable water charges to be considered
Residents participation	A	Residents have positive opinion on cooperation for maintain of the supply system and save-water campaign
Practical use of resources	A	To coordinate rights to use of groundwater and land
Receptivity on the cultural background	A	Project will be receptive by the residents with traditional customs

(Note)
A : No affect, B : Small affect, C : Causing affect

Results from the above-mentioned evaluation, if small affects are carefully taken into consideration and mitigating measures are implemented, most impacts caused by the project to be positive. Especially, clean water supply will make healthy living condition and convenience for daily life of bathing, washing and sanitation. And there are no conflict for relocation of the residents, and traditional customs on the religious and their own lifestyle.

Therefore the project is recommendable from the viewpoint of social analysis.

SUPPORTING REPORT D

RECOMMENDATIONS

SUPPORTING REPORT D RECOMMENDATIONS

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CHAPTER 1 RECOMMENDATIONS FOR THE MASTER PLAN

1 RECOMENDATIONS FOR THE MASTER PLAN

(1) Periodical Review of the Master Plan

The Master Plan for the public water supply systems in this report was formulated at the time of the middle of 1996. It is based on the growth of population and water demand as well as development of economical activities and public infrastructures to be constructed according to future city planning. However, they would tend sometime to be changed year by year. It is necessary to review and revise the water supply master plan taking actual status of the city into account. It is therefore recommended that the master plan be revised to be updated periodically, every three to five years, reflecting the actual development of the city and actual increase of population and water demand.

(2) Promotion of Rural Water Supply Systems

In order to realize construction of the water supply systems in the rural areas, strong assistance by Hanoi Peoples Committee with finance (for example: subsidy for construction cost to rural communes) would be necessary. Propaganda or campaign for promotion of the public water supply systems also would be required.

(3) Control of Groundwater

Laws and regulations related to the development of the water resources, particularly from the viewpoint of water resources protection, have not been enacted yet. Therefore, at present, there is no actual control of the development of the water resources.

In water resources development, particularly in the groundwater development through the private wells, it is required to be controlled theoretically from the view point of hydrogeology, in order to avoid serious environment impacts. Therefore, immediate enactment and effect of the laws and regulations are recommended.

(4) Water Resources Development

1) Groundwater

A. South Hanoi

In South Hanoi, a computerized groundwater model has been established and it enables to simulate groundwater conditions in future using the regularly monitored data through the established network of observation wells. As described in the "Water Master Plan" of FINNIDA in 1993, exploitable groundwater of 700,000 m^3/d is estimated with the simulation.

Although present water use in the South Hanoi is within the approval of the State (700,000 m^3/d), some extent of environment problem such as land subsidence, which seems to be caused with the excessive groundwater exploitation, is seen partially. Therefore, continuous observation of the groundwater level, groundwater quality and land subsidence through the existing monitoring network are required. The inspection or revise, if necessary, of the groundwater model should be carried out using new observation data.

B. North Hanoi

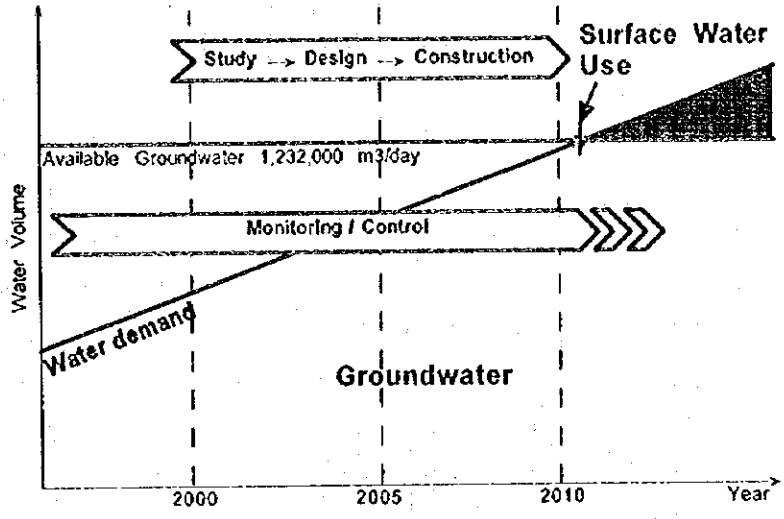
In this study, exploitable groundwater in the North Hanoi in future is estimated through the analysis based on the results of the simulation study in the South Hanoi mentioned above.

According to the Hydrogeological Division K2 of the Geological Survey of Vietnam, a computerized groundwater model has been established already also in the North Hanoi. A sufficient network of observation wells, however, has not been established yet in the North Hanoi, therefore, the groundwater model has not been calibrated enough.

Immediate establishment of the network of observation wells and data collection through them are desired. The confirmation of the estimated exploitable groundwater in the North Hanoi with sufficient calibration using the collected data is recommended.

2) Surface Water

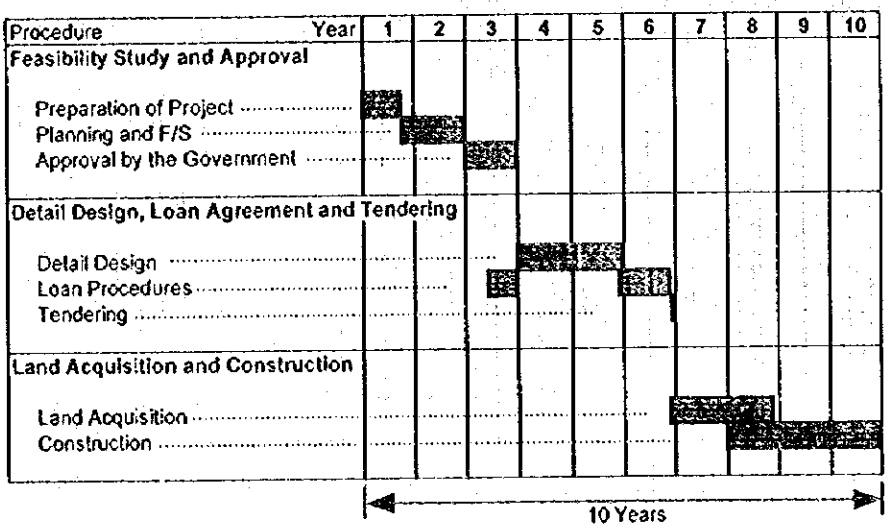
Up to the year 2010, the groundwater can be available for the source of the water supply system in the whole Hanoi. However, as the budget of the groundwater will reach its limit soon after 2010 (See Figure below).



Water Sources Development

The implementation of the surface water intake project would take more or less seven-eight years or so, including detailed study and feasibility study period, in addition to construction period (see Table below: Implementation Schedule). Therefore, commencement of the study for the surface water use at the early time, in the year 2000 at the latest, is recommended. The earlier commencement of the study is recognized better.

Implementation Schedule



(5) Monitoring of Water Quality

For the present, groundwater is safer, cheaper and more convenient water source than surface water. However, a contamination risk caused by insufficient control of wastewater and solid waste seems to increase endangering the aquifer. It is recommended to continue the systematic groundwater monitoring of water quality as well as water level and to supplement monitoring items which can show a contamination by human activities.

Existing monitoring data and the survey results of river water quality show high concentration values of arsenic, lead, phenol and organophosphate compared with the water quality criteria. These data were obtained from occasional samplings and from monthly samplings for only one year. Therefore, further consecutive monitoring of river water is recommended for more reliable conclusions.

(6) Necessary Measures for Utilizing River Water

It is predicted that it would be necessary to use surface water after the year 2010, because the total volume of exploitable groundwater will become insufficient for the rapidly growing needs. Therefore, it is strongly recommended to take necessary measures against water pollution before utilizing the rivers for water supply, if sufficient monitoring data will conclude water pollution of the Red River, the Da River and the Cau River.

Firstly, it is needed to analyze the mechanisms of river water pollution and to identify the pollution sources. Secondly, a goal of water quality to be maintained should be clarified according to the criteria for water supply. Thirdly, it is needed to identify effective and feasible measures including legal controls. Finally, all measures should be urgently commenced and water quality of the rivers should meet the requirements for water supply at latest by the year 2010.

(7) Preparation of Drainage Systems

Development of water supply systems will result in an increase of corresponding volume of wastewater. If the wastewater will be never properly drained or treated, it will percolate into aquifers and a contamination risk of groundwater will increase.

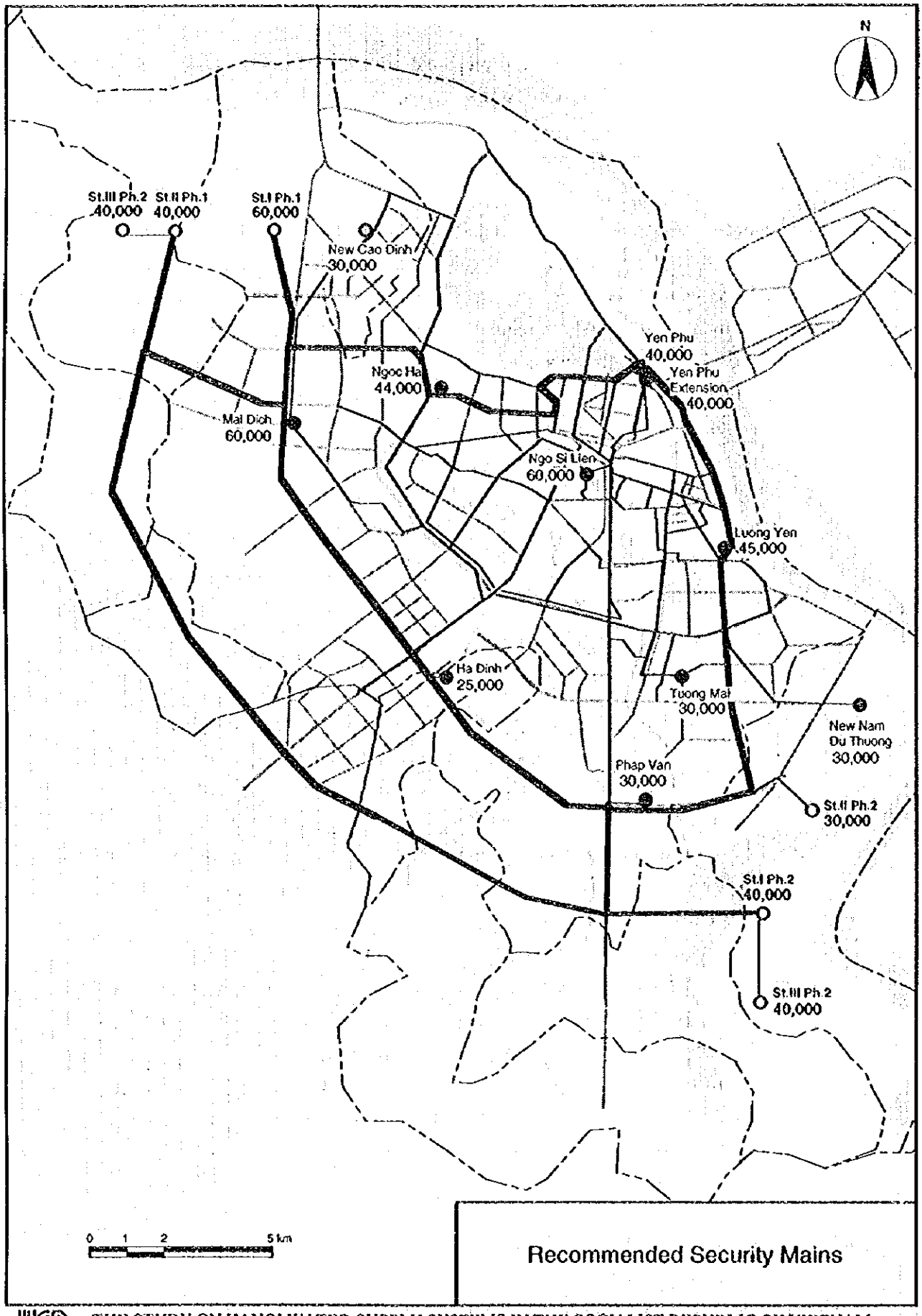
Therefore, it is recommended to prepare drainage or sewerage systems in parallel with the development of water supply systems.

(8) Increase of Reservoir Capacity

According to the design criteria, the capacity of a distribution reservoir is 20%-volume, or 4.80 hours' equivalent volume, of the daily maximum production. This capacity seems to be rather small comparing with other countries' standards. The reservoir is a storage which regulates hourly-fluctuation of water use. The storage function has currently depended on consumers' private tanks, since most houses have their own water tanks for storage purpose. In the future when service level of water supply is much improved, consumers would rely on the waterworks and they would not feel necessity for storage by their private tanks. Such situation would be welcome. On the other hand, HWBC shall prepare enough storage capacity in reservoirs to be placed in treatment plants. Generally, capacity of the reservoir is 40 – 50% volume: that is about two times than the present capacity. It is therefore recommended to construct large-volume reservoirs.

(9) Construction of Looped Security Mains in West-South Area

So far, so called "security main" which connects two treatment plants have been constructed; for example, between Mai Dich and Ngo Si Lien plants and Loung Yen and Mai Dich plants. These security mains might contribute to emergency operation at the time of water shortage happened in a particular area. They, however, exist in the central and north-eastern parts in the central Hanoi, and do not connect necessarily the west-south area directly. In the future, service area will be expanded to the west-south part of Hanoi proper. This area also will require such security mains. Therefore, construction of additional security mains in the west-south area is recommended, which connect treatment plants of Mai Dich, Ha Dinh, Phap Van and Luong Yen, so as to form a loop in the west-south outer fringe of Hanoi as shown in the figure of the following page. If public traffic roads would be newly constructed in this area in the future, it would be a suitable chance for construction of the new security mains which should be installed simultaneously with construction of new roads.


N
St.III Ph.2
40,000
St.II Ph.1
40,000
St.I Ph.1
60,000
New Cao Dinh
30,000
Yen Phu
40,000
Yen Phu
Extension
40,000
Ngoc Ha
44,000
Mai Dich
60,000
Ngo Si Lien
60,000
Luong Yen
45,000
Ha Dinh
25,000
Tuong Mai
30,000
New Nam
Du Thuong
30,000
Phap Van
30,000
St.II Ph.2
30,000
St.I Ph.2
40,000
St.III Ph.2
40,000
0 1 2 5 km
Recommended Security Mains

(10) Assistance for Rural Water Supply Systems

Some rural communes might have insufficient ability to manage the whole water supply systems independently. In such cases, HPC should give assistance to them. It is recommended that HPC establish a special board under TUPWS to coordinate and adjust water supply development plans proposed by the rural communes. The board should also assist the rural communes to make their financial plans and to take necessary procedures for subsidies.

(11) Restructuring

HWBCs should restructure the working staff and increase the operational efficiency at least to the same level that the company in Ho Chi Minh city has. The restructuring to such extent would result in slightly increase of work force by 10% from 1995 till 2010 and great expansion of water distribution capacity three times as much as the present one. However, restructuring should be carried out not in the manner of mass dismissal of employees, but in the manner of rearranging the work forces reinforced through training and education.

(12) Accounting System following IAS

In order to use foreign funds in the future, SHWBC and NHWBC will need to establish a strong balance sheet, sufficient cash flows, and to obtain a good rate of return. In addition to this sound financial condition, SHWBC and NHWBC will need to provide adequate financial statement to lenders, financial institutions. Financial statements must be prepared in accordance with international accounting standards. It is necessary that fixed assets should be re-valuated and under-estimation of depreciation cost should be corrected. It is not sufficient for SHWBC and NHWBC to provide its financial statements audited and certified by a government internal auditor. Financial statements should be audited each year by competent, independent auditors.

(13) Development of Human Resources

In order to keep the work forces required for the proposed future water supply systems, both rationalization and employment of staff will be needed. At the same time, training and education for the staff would be necessary to maintain and develop the water supply systems. Training and education courses are strongly recommended for managing staff, water supply engineer, staff in charge of construction and maintenance of facilities, staff in charge of business and public relations and staff in charge of finance and accounting.

CHAPTER 2 RECOMMENDATIONS FOR IMPLEMENTATION OF THE PRIORITY PROJECT

2 RECOMENDATIONS FOR IMPLEMENTATION OF THE PRIORITY PROJECT

(1) Managerial Aspect

In order to carry out the efficient operation in the water business, it is recommended to establish new organizations, namely, one water plant and one water business enterprise.

(2) Tariff Setting

In tariff setting, two contradictory objectives must be achieved. Water tariff should cover all the relating costs to make the companies financially sound, yet at the same time, the tariff should be kept within the affordable level for all customers.

(3) Environment

Development of water supply systems will result in an increase of corresponding volume of wastewater. If the wastewater is never properly drained or treated, it would deteriorate the quality of water bodies such as aquifer, lakes or river. Drainage or sewerage systems are not included in this project, because its development has been already taken into consideration by the existing master plan for drainage and sewerage. Although sewerage project in the priority project area will be implemented after the year 2005 according to the schedule, earlier implementation is strongly expected in parallel with the development of water supply systems.