

# PATTAYA



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### A. Introduction

This report summarizes the results of a comprehensive master plan and feasibility study conducted by a study team of the Japan International Cooperation Agency (JICA), which are presented in this volume of the Report entitled "DEVELOPMENT PLAN AND FEASIBILITY STUDY ON PROVINCIAL WATER SUPPLY PROJECTS IN THE KINGDOM OF THAILAND, PATTAYA".

The study area covers Pattaya City, Nong Preo Sanitary District, and Ban Rong Po located approximately 150 km southeast of Bangkok. Pattaya is one of the premier beach resorts in Southeast Asia where more than 700,000 tourists visit a year.

The combined population of Pattaya City, Nong Preo Sanitary District and Ban Rong Po is projected to increase from 58,740 in 1985 to 114,010 by 2010, the target year of the current project.

The current project purports expansion of the capacity of production-distribution facilities to meet such rapid increase in water demand, as well as to improve the service ratio from 34 % at present to 76 % in 2010.

In view of the uncertainties in the future development of the study area as well as of the internal administrative reasons of PWA, project implementation is planned to be divided into two stages, i.e., Stage I up to the year 2000 and Stage II through 2010.

The existing facilities are suffering from deterioration, which is reducing operation efficiency and increasing the unaccounted-for ratio. To cope with this situation, the Development Plan proposes an improvement program to rehabilitate the existing system, together with modification works to increase the production-supply capacity of the existing facilities. These immediate actions are required to be carried out prior to the Stage I expansion program, or as part of its initial phase.

### B. Strategies to the Targets

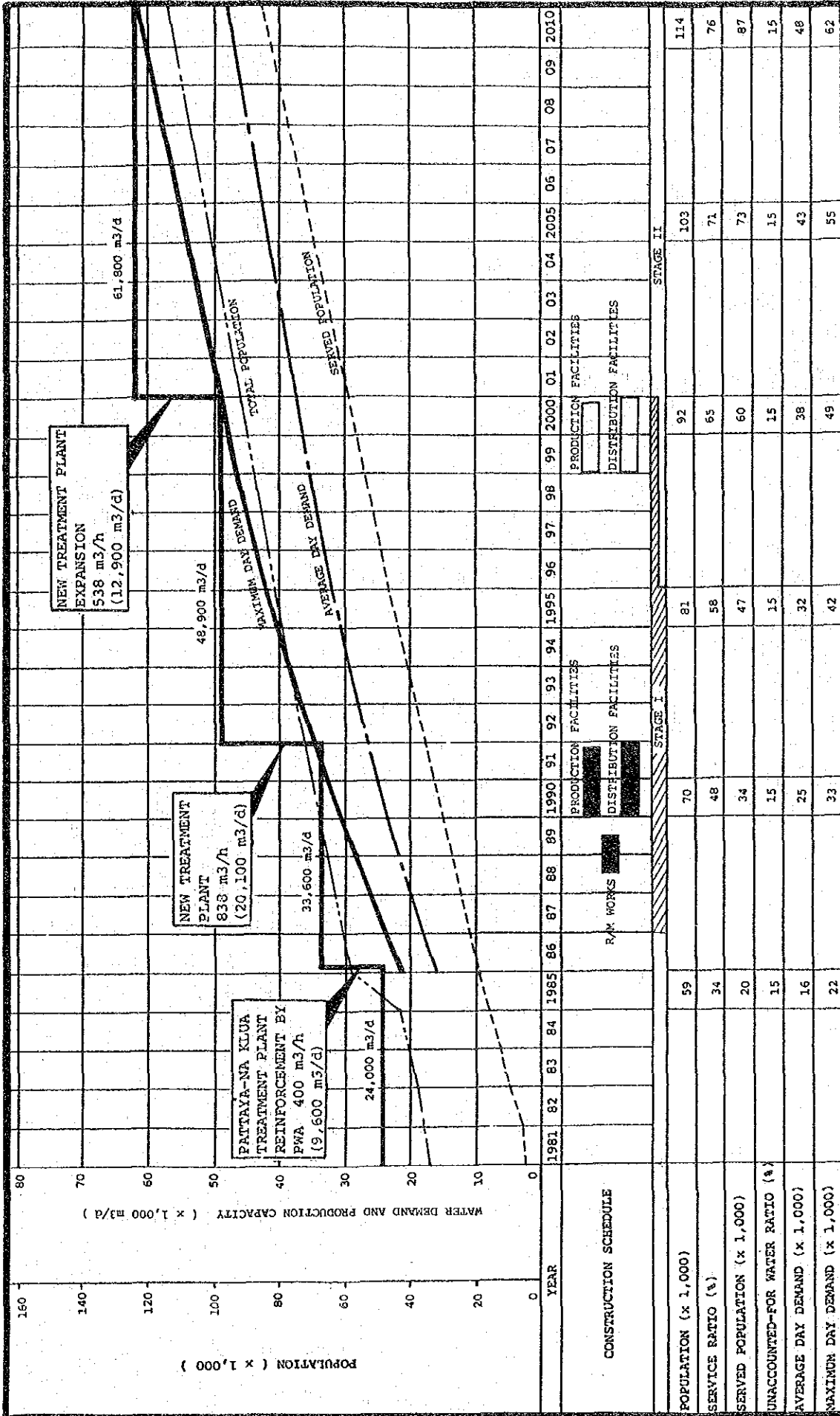
Water consumption in the study area is projected to grow more than two times as large as the present level from 13,810 cu m/day in 1985 to 31,890 cu m/day in 2000, and further to 40,640 cu m/day in 2010, reflecting the increasing numbers of both tourists and domestic population. Domestic water consumption will increase with growth in population and per-capita consumption (from 148 lpcd in 1985 to 210 lpcd in 2000). Tourist water consumption will increase with increases in the number of tourists, though per tourist water consumption is expected to stay almost unchanged. Public and commercial water consumption is projected to increase proportionally to the growth of domestic and tourism water consumption.

Strategic plans are illustrated in Fig-ES.1, and the estimated costs for implementing them are summarized in Table-ES.1.

Table-ES.1 TOTAL COST FOR MASTER PLAN

Unit:1,000 Baht

Item	Stage I		Stage II	Total
	Rehabili. and Modifi.	Expansion	(2000-2010) Expansion	Stages I and II
Land and Facilities	25,700	250,700	117,500	393,900
Engineering Service	2,800	27,600	13,600	44,000
Administration Cost	300	2,800	1,300	4,400
Physical Contingencies	2,000	19,700	9,300	31,000
Price Contingencies	3,600	45,600	74,400	123,600
<b>Total</b>	<b>34,400</b>	<b>346,400</b>	<b>216,100</b>	<b>596,900</b>



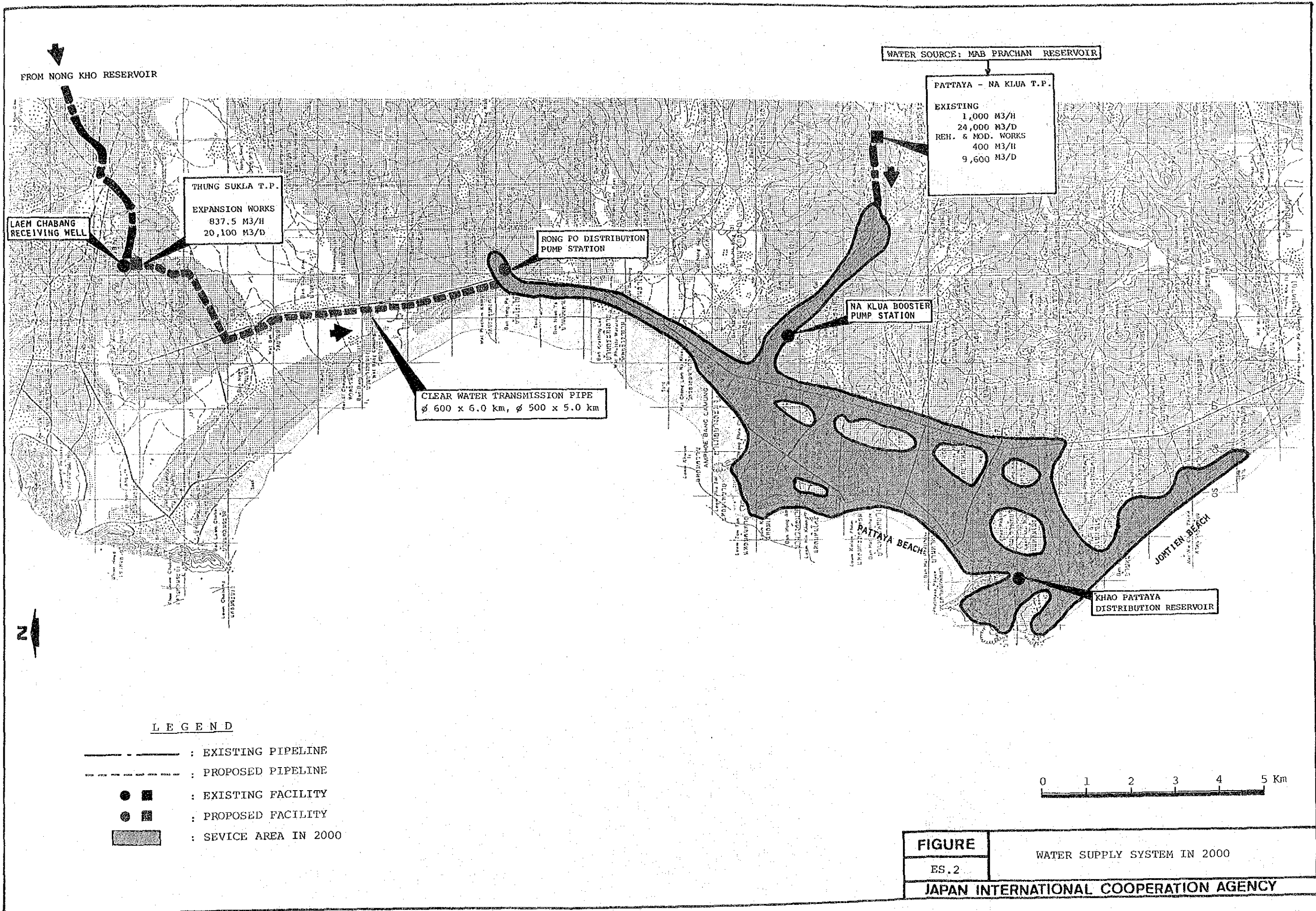
**FIGURE**  
 ES.1  
 WATER SUPPLY PLAN TO YEAR 2010  
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### C. Proposed Water Supply, 1987-2000

The proposed water supply system for Stage I will cover the service area shown in Fig-ES.2. The rehabilitation and modification works will provide needed improvement of existing facilities. The Stage I Expansion is designed to meet projected maximum day demand of 48,900 cu m/d, to serve 59,800 people by 2000, and to expand the service area to 2,700 ha. Additional 78 km distribution pipelines will be installed, with approximately 5,150 service connections.

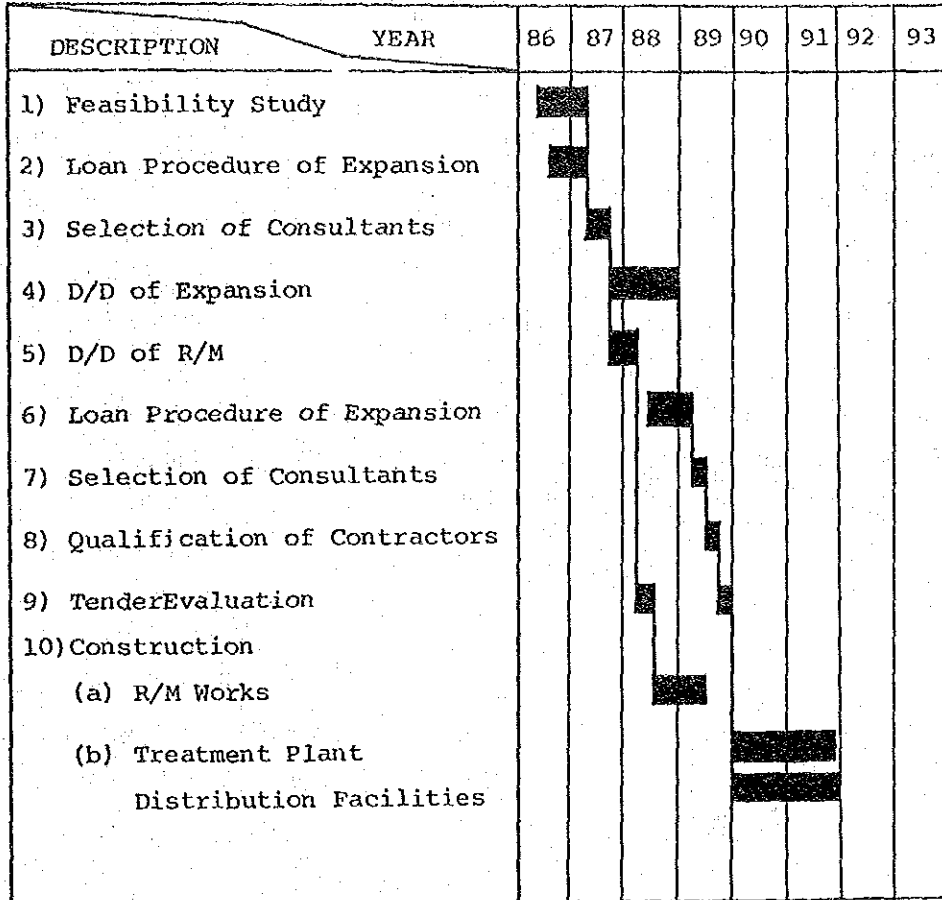
The future water supply system endowed with enough capacity to meet future water demand will need steady raw water sources. It should however be noted that the capacity of the Mab Prachan Reservoir, the existing water source of the Pattaya-Na Klua Treatment Plant, will not be suffice to meet future raw water requirements. Study of all available data and reports as well as site investigations by the Study Team on a number of alternative water sources have concluded that the Nong Kho Reservoir water through Laem Chabang Receiving Well which is under detailed design work as a part of Nong Kho-Laem Chabang Pipeline Project should be the best and final selection from both technical and financial viewpoints. In addition, construction of a new Thung Sukla Treatment Plant near the receiving well is proposed, instead of expanding the existing treatment plant. Implementation is proposed to proceed as Fig-ES.3.

The proposed project and its costs are summarized in Table-ES.2. The estimated capital investment cost of the project, totaling 380,800 thousand Baht at current prices allowing for price increases of 3.3 percent per annum is realistic, based on preliminary designs plus an allowance of 7 % for physical contingencies.









NOTE : D/D Detailed Design  
 R/M Rehabilitation and Modification

FIGURE	IMPLEMENTATION SCHEDULE
ES.3	
JAPAN INTERNATIONAL COOPERATION AGENCY	

Table-ES.2 ESTIMATED PROJECT COSTS FOR STAGE I IMPLEMENTATION  
(x 1,000 Baht)

A. Rehabilitation and Modification	25,700
Land Acquisition	-
Intake and Raw Water Transmission Pipeline	600
Pattaya-Na Klua Treatment Plant	4,950
Distribution Facilities	20,150
B. Expansion	250,700
Land Acquisition	2,100
Intake and Raw Water Transmission Pipeline	2,500
Thung Sukla Treatment Plant	52,900
Clear Water Transmission Pipeline	80,500
Distribution Facilities	112,700
C. Engineering Services	30,400
D. Administration Cost	3,100
E. Physical Contingencies	21,700
F. Price Contingencies	49,200
Total	380,800

The tentative financing plan, summarized in Table-ES.3, assumes loans from foreign financial institutions such as OECF totaling 304,700 thousand Baht, or 80 % of capital expenditure, and local loans totaling 76,200 thousand Baht, or 20 % of capital expenditure. The total fund requirement through the project period is projected to amount to 689,200 thousand Baht, on a cash-flow basis, of which 44.7 % will be covered by internal cash generation and the rest (55.3 %) will be financed with foreign and local loans, and with no internal financial help of PWA.

Table-ES.3 TENTATIVE FINANCING PLAN FOR STAGE I IMPLEMENTATION  
 [PATTAYA] x 1,000 Baht

Item	Before Depreciation	% of Total
1. Sources of Funds		
Internal Cash Generation	308,300	44.7%
Outside Sources:		
- Foreign Financial Institution	304,700	44.2%
- Local Financial Institution	76,200	11.1%
Total	689,200	100.0%
2. Application of Funds		
Capital Expenditure	380,800	55.3%
Debt Service	308,300	44.7%
Depreciation		
Total	689,200	100.0%

These financial condition, together with the Financial Internal Rate of Return of 5.56 % and the Economic Internal Rate of Return of 11.4 %, demonstrate financial and economic justification of the project, in view of the terms of finance applicable to the project and the prevailing cost of capital in Thailand.

Several key actions are necessary if the project is to succeed.

1. PWA should make necessary arrangements with Government agencies concerned for the entitlement of PWA's use of Nong Kho Reservoir water, inclusive of arrangement for appropriate raw water charges for the PWA use of the water.
2. Financing for project implementation must be confirmed. This confirmation includes the checking of a possibility of obtaining Government subsidies for project capital investment, which is now being suspended temporarily for Government budgetary reasons. Such subsidy will reduce the capital cost of the project.
3. Changes in structure of PWA's water tariff, as recommended in the Main Report, are needed, together with periodic increases in tariffs (to cover the effects of price escalation).
4. PWA should secure the land proposed as a site for the new treatment plant and distribution pump station which are located in Ban Thung Sukla and Ban Rong Po respectively.
5. A leakage survey team should be formed in the waterworks to pursue a program of reducing water leakage in accordance with the Framework prepared by JICA Team.

The project is technically feasible and provides the least cost solution for providing water supply as needed in the project area through the year 2000. The project is also significant to improve the existing facilities which are deteriorating. Implementation of the project will significantly improve the water supply and other environmental situation and health of the people in Pattaya.



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