

**Japan International Cooperation Agency(JICA)
Water Supply Authority,
Department of Housing and Urban Planning,
Ministry of Communication, Transport,
Post and Construction, Lao PDR**

**The Study
on
Vientiane Water Supply Development Project
in
Lao People's Democratic Republic**

Final Report

**Volume II
Main Report: Master Plan**

January 2004

Nihon Suido Consultants Co., Ltd.

Exchange Rate Applied
1 US Dollar = Yen 119 as of April 30, 2003
1 US Dollar = Lao Kip 10,720 as of April 30, 2003

PREFACE

In response to a request from the Lao People's Democratic Republic, the Government of Japan decided to conduct the Study on Vientiane Water Supply Development Project and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr. Takemasa MAMIYA of NIHON SUIDO CONSULTANTS CO., LTD. to the Lao People's Democratic Republic between March 2003 and November 2003. In addition, JICA set up an advisory committee headed by Mr. Yoshiki OMURA, Senior Advisor, Institute for International Cooperation JICA, between March 2003 and November 2003, which examined the study from specialist and technical point of view.

The team held discussions with the officials concerned of the Lao People's Democratic Republic and conducted field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of this project and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of Lao People's Democratic Republic for their close cooperation extended to the team.

January, 2004

Kazuhisa MATSUOKA
Vice-President
Japan International Cooperation Agency

January, 2004

Mr. Kazuhisa Matsuoka
Vice-President
Japan International Cooperation Agency

Letter of Transmittal

Dear Sir,

We are pleased to submit this Final Report on the Study on Vientiane Water Supply Development Project in Lao People's Democratic Republic. This report incorporates the views and suggestions of the authorities concerned of the Government of Japan, including your Japan International Cooperation Agency (JICA). It also includes the comments made by Water Supply Authority (WASA), Department of Housing and Urban Planning (DHUP), Ministry of Communication, Transport, Post and Construction (MCTPC), Water Supply Company of the Vientiane Capital City (NPVC), Vientiane Capital City and other government agencies concerned in the Lao People's Democratic Republic during the meeting in Vientiane where the Draft Final Report was discussed.

The Final Report comprises a total of five volumes as listed below.

- | | |
|------------|----------------------------------|
| Volume I | : Executive Summary |
| Volume II | : Main Report, Master Plan |
| Volume III | : Main Report, Feasibility Study |
| Volume IV | : Annex for Master Plan |
| Volume V | : Annex for Feasibility Study |

This report contains the Study Team's findings, conclusions and recommendations derived from the three phases. The main objective of the Phase I was to conduct a reconnaissance survey. That of Phase II was to formulate a long term master plan and to identify priority projects, whilst that of the Phase III was to examine the feasibility of the priority project which had previously been identified in Master Plan during the course of the Phase II.

We wish to take this opportunity to express our sincere gratitude to your Agency (JICA), the Ministry of Foreign Affairs and the Ministry of Health, Labour and Welfare of the Government of Japan for their valuable advice and suggestions. We would also like to express our deep appreciation to the relevant offices for Water Supply Authority (WASA), Department of Housing and Urban Planning (DHUP), Ministry of Communication, Transport, Post and Construction (MCTPC), Water Supply Company of the Vientiane Capital City (NPVC), and other agencies of the Lao People's Democratic Republic for their cooperation and assistance extended to us throughout our Study.

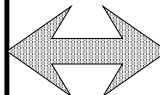
Very truly yours,

Takemasa Mamiya, Team Leader
The Study on Vientiane Water Supply
Development Project in Lao People's
Democratic Republic

Volume I	
Executive Summary	
1.	Introduction
2.	Development Plan of Vientiane Capital City
3.	Existing Conditions
4.	Master Plan
5.	Feasibility Study
6.	Conclusions and Recommendations

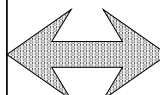
Structure of the Final Report

Volume II	
Main Report: Master Plan	
1.	Introduction
2.	General Condition of the Study Area
3.	The Existing Condition of the Vientiane Water Supply System
4.	Master Plan
5.	Selection of Priority Projects
6.	Initial Environmental Examination (IEE)
7.	Evaluation of the Master Plan and Recommendations
8.	Technology Transfer During the Study



Volume IV	
Annex for Master Plan	
A1.	Minutes of Meetings
A2.	Member List of the JICA Study Team
A3.	List of Counterparts
A4.	Socio-economic Conditions
A5.	Village Population in Vientiane Capital City
A6.	Village in The Service Area by NPVC Sub-Zone
A7.	Record of Water Level of the Mekong River and the Nam Ngum River
A8.	Results of Water Quality Analysis of Nam Ngum Dam and River
A9.	Details of Treatment Plants
A10.	Results of 24 Hour Flow Survey
A11.	Results of Network Analysis on Existing Pipe Network
A12.	Forms and Results of Questionnaire Survey
A13.	Population and Served Population of Villages in Vientiane Capital City
A14.	Facility Planning for Alternative Study
A15.	Network Analysis for Alternative Study
A16.	Comparative Study of Alternatives
A17.	Reduction of Unaccounted-for Water
A18.	Economic and Financial Evaluation
A19.	Initial Environmental Examination (IEE)
A20.	Influence by the Delay of Distribution System Improvement: Analysis and Measures
A21.	Network Analysis for Identification on Minimum Requirements of Distribution Pipes
A22.	Options for the 2nd Stage Project Scale
A23.	PCM Workshop for Technology Transfer

Volume III	
Main Report: Feasibility Study	
1.	Introduction
2.	Framework of the Feasibility Study
3.	Preliminary Design of the Priority Projects
4.	Strengthening of Institutional Capacity
5.	Preliminary Cost Estimates for the 1st Stage Project
6.	Project Implementation and Disbursement Schedule
7.	Economic and Financial Analysis
8.	Environmental Impact Assessment
9.	Project Evaluation
10.	Conclusions and Recommendations



Volume V	
Annex for Feasibility Study	
A24.	Served Population and Water Demand of Respective Villages Covered by the Priority Projects
A25.	Details of Preliminary Design
A26.	Analysis on Non-Domestic Water Consumption
A27.	NPVC Challenges for Water Conservation/ Water Demand Management (WC/WDM)
A28.	Economic and Financial Analysis
A29.	Drawings