NO.

BASIC DESIGN REPORT

ON

THE PROJECT FOR RURAL WATER SUPPLY

IN NUSA TENGGARA BARAT AND NUSA TENGGARA TIMUR

IN

THE REPUBLIC OF INDONESIA

DECEMBER 2003

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

NIPPON KOEI CO., LTD

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PREFACE

In response to a request from the Government of the Republic of Indonesia, the Government of Japan decided to conduct a basic design study on The Project for Rural Water Supply in Nusa Tenggara Barat and Nusa Tenggara Timur and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Indonesia a study team from June 8 to July 19, and September 16 to September 27 in 2003.

The team held discussions with the officials concerned of the Government of Indonesia, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Indonesia in order to discuss a draft basic design, and as this result, the present report was finalized.

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

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Indonesia for their close cooperation extended to the teams.

December, 2003

Kunimitsu Yoshinaga

Vice-President
Japan International Cooperation Agency

December 2003

Letter of Transmittal

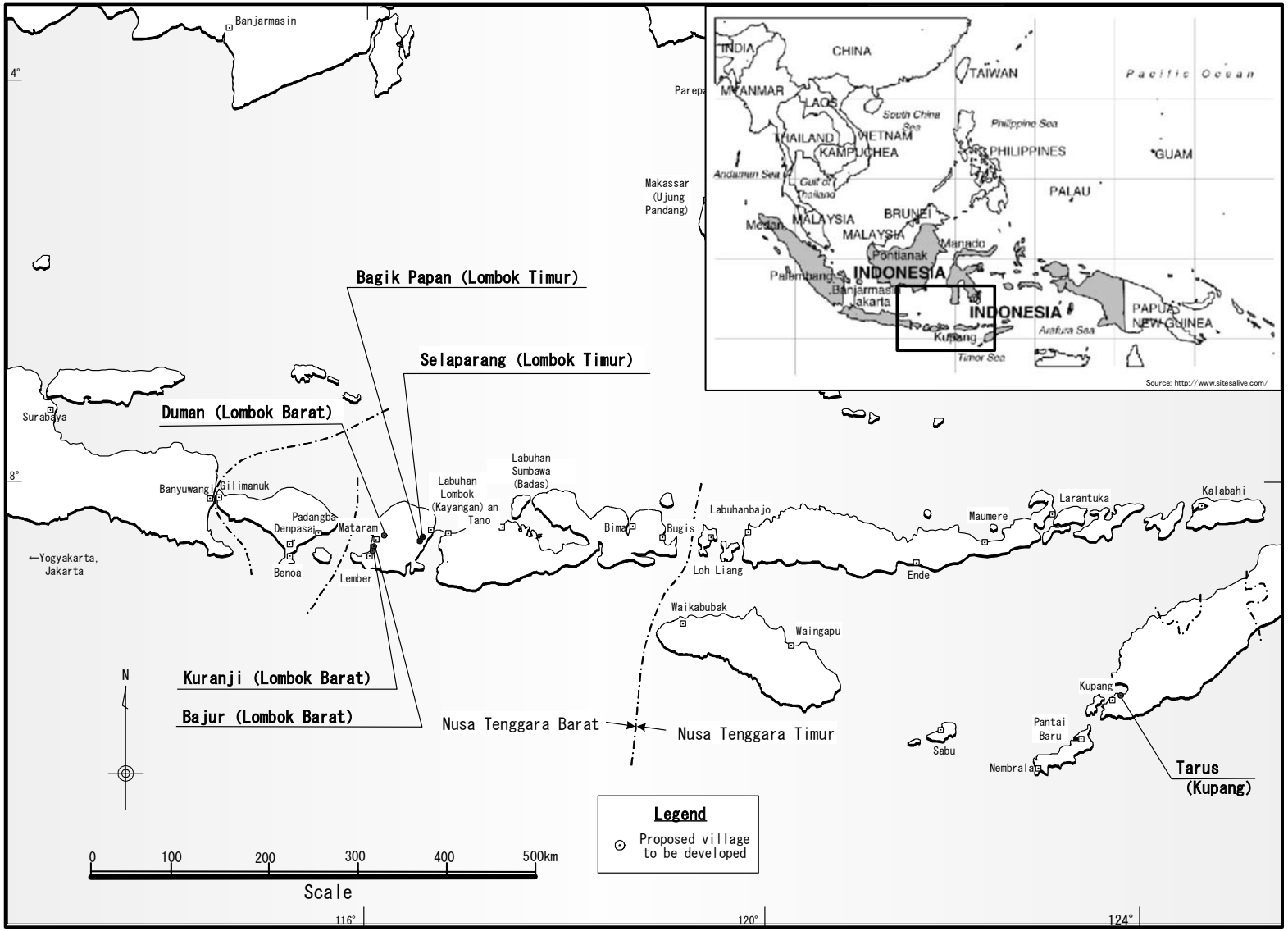
We are pleased to submit to you the basic design study report on The Project for Rural Water Supply in Nusa Tenggara Barat and Nusa Tenggara Timur in the Republic of Indonesia.

This study was conducted by Nippon Koei Co., Ltd., under a contract to JICA, during the period from June 2003 to December 2003. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Indonesia and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

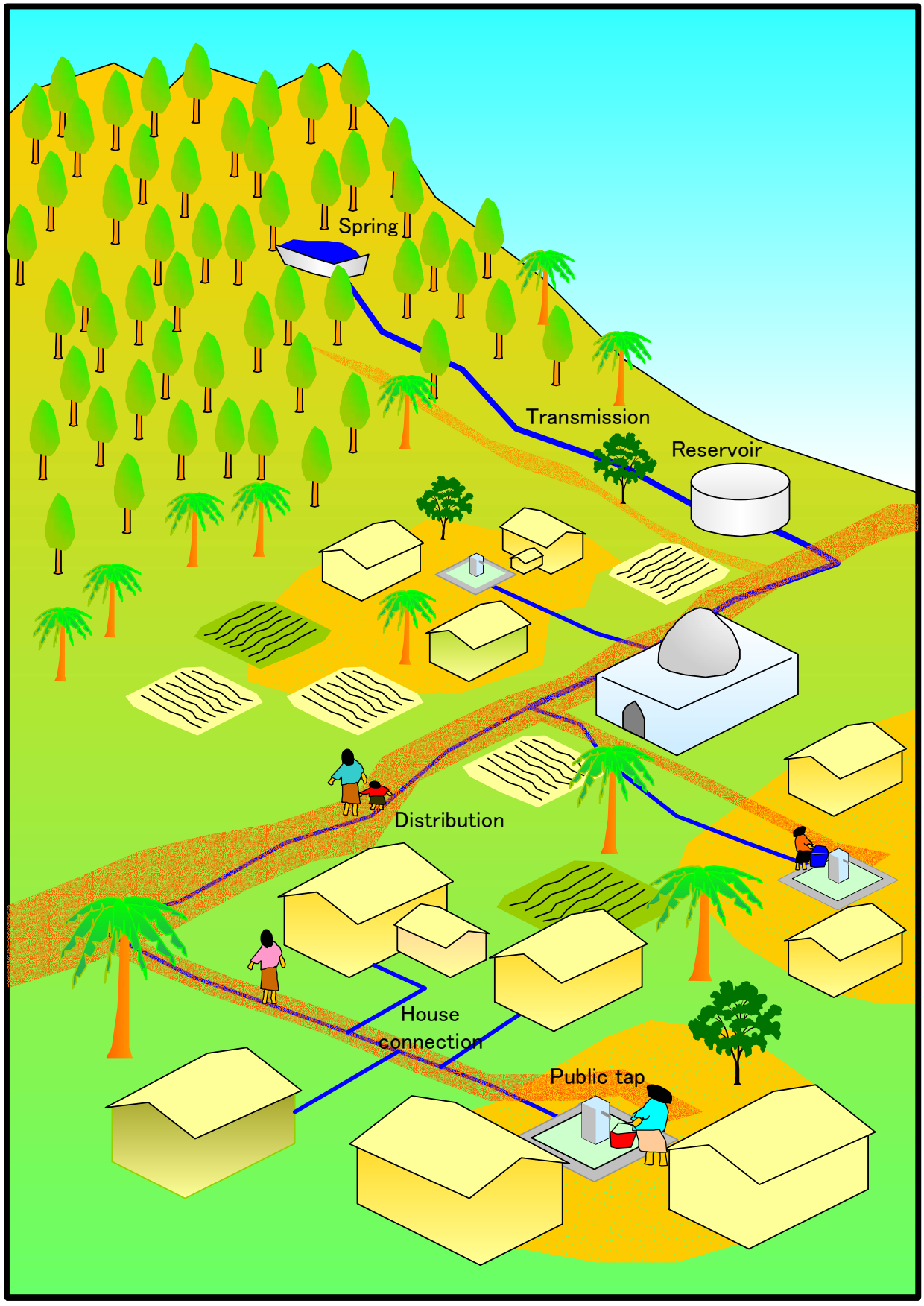
Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,

Masato Fujinami
Chief Consultant,
Basic design study team on The Project for Rural Water Supply in Nusa Tenggara Barat and Nusa Tenggara Timur
Nippon Koei Co., Ltd.



Location Map of the Study Area



Perspective

ABBREVIATIONS

ADB	Asian Development Bank
AusAID	Australian Agency for International Development
BAPPEDA	Badan Perencanaan Pembangunan Daerah Tingkat-I and Tingkat-II (Development Planning Board for Provincial and District Level)
BAPPENAS	Badan Perencanaan Pembangunan Nasional (National Development Planning Board)
BMG	Biro Meteorologi dan Geofisika (Meteorology and Geophysics Agency)
BPD	Village Representative Council
BPS	Biro Pusat Statistik (Central Bureau of Statistics)
CARE	Co-operative for Assistance and Relief Everywhere (International NGO)
CIDA	Canadian International Development Agency
Cipta Karya	Direktorat Jenderal Cipta Karya (Directorate General of Human Settlements DGHS)now restructured and integrated into Ministry of Settlement and Regional Infrastructure
GOI	Government of Indonesia
GOJ	Government of Japan
GTZ	German Technical Cooperation Agency
IBRD	International Bank for Reconstruction and Development (World Bank)
JBIC	Japan Bank For International Cooperation
JICA	Japan International Cooperation Agency
Kelompok	An unofficial committee or group of people
Kimpraswil	Permukiman dan Prasarana Wilayah (Ministry of Settlement and Regional Infrastructure)
LKMD	Lembaga Ketahanan Masyarakat Desa (Village self reliance organization, village development council)
MOH	Ministry of Health
MOHA	Ministry of Home Affairs (Dalam Negeri)
MOU	Memorandum of Understanding
NGO	Non-governmental Organization
NTB	Nusa Tenggara Barat (West Nusa Tenggara)
NTT	Nusa Tenggara Timur (East Nusa Tenggara)
OECF	The former Overseas Economic Cooperation Fund of Japan (now JBIC)
P2SP	Proyek Pengembangan Prasarana dan Sarana Permukiman (formerly P3P) (Development of Housing Settlement and Infrastructure Project)
PDAM	Perusahaan Daerah Air Minum (Regional Drinking Water Enterprise)
PEMDA	Pemerintah Daerah. Local government at any level, usually MOHA

PKK	Pembinaan Kesejahteraan Keluarga (Local Women's Welfare Organization)
PLN	Perusahaan Listrik Negara (National Electricity Enterprise)
PMD	Department of Community Empowerment
POKMAIR	Kelompok Pemakai Air (WUG)
PU	Pekerjaan Umum (Public Works)
Puskesmas	Pusat Kesehatan Masyarakat (Village Health Center)
RDWS	GOI Rural Water Supply Development Program
RWSS	Rural Water Supply and Sanitation Project (ADB program)
TP-PKK	Women's Movement Organization
UNDP	United Nations Development Program
UNICEF	United Nation Children's Fund
WSLIC-2	The Second Water and Sanitation for Low Income Communities Project (World Bank program)
WUA	Water Users' Association
WUG	Water Users' Group

UNITS

Length

mm	=	millimeter
cm	=	centimeter
m	=	meter
km	=	kilometer

Area

cm^2	=	square centimeter
m^2	=	square meter
km^2	=	square kilometer
Ha/ha	=	hectare

Volume

cm^3	=	cubic centimeter
m^3	=	cubic meter
L	=	liter
MCM	=	million cubic meter

Weight

mg	=	milligram
g	=	gram
kg	=	kilogram

Time as denominator

/s	=	per second
/min	=	per minute
/hr.	=	per hour
/d	=	per day
/month	=	per month
/yr	=	per year

Electric Measurement

V	=	Volt
A	=	Ampere
Hz	=	Hertz
W	=	Watt
kW	=	Kilowatt
MW	=	Megawatt

Others

%	=	percent
HP	=	horsepower
°C	=	degrees Celsius

Derived Measures

L/c/d	=	liter per capita per day
kWh	=	kilowatt-hour
MWh	=	megawatt-hour
kVA	=	kilovolt ampere
mg/L	=	milligram per liter
µg/L	=	microgram per liter
meq/L	=	milliequivalent per liter
mS/m	=	millisiemens per meter

Currency

US$	US Dollar
IDR	Indonesia Rupiah

Exchange Rate as of the end of July 2003

US$1 = Rp.8,655.8 = JP¥119.71

Summary

The Government of Indonesia (GOI) formulates a National Development Plan (PROPENAS) every five years to achieve the objectives of national development. This is a high priority plan for rural water supply projects with the policy for improvement in the quality of service and management concerning the infrastructure of residential quarters being described in "Chapter 9: Rural Development of 2000-2004 PROPENAS". The National Development Planning Board (BAPPENAS) formulated the "National policy 2002 of community base management concerning water supply and the hygiene environment". This was undertaken in cooperation with the Ministry of Settlement and Regional Infrastructure (Kimpraswil), Ministry of Health, and Ministry of Home Affairs for the purpose of achieving the high priority plan. The current project is being implemented with this aim.

In the provinces of Nusa Tenggara Barat (NTB) and Nusa Tenggara Timur (NTT), which include the least developed regions in Indonesia, only 50% to 60% of people have access to clean water. The remaining people obtain unclean, unreliable water from dug wells, springs, and rainwater, the latter often being insufficient in the dry season. These sources also sometimes have adverse impacts on the health of the people with, for example, the infant mortality rate of NTB and NTT Provinces being the highest and fourth highest among all provinces of Indonesia. Therefore, improvement of hygiene conditions in rural areas is required urgently.

At the request of the Government of Indonesia (GOI), the Government of Japan (GOJ) completed the “Study on Rural Water Supply Project in NTB and NTT Provinces” in May 2002. Based on the study, the GOI submitted a request to the GOJ for Grant Aid for a rural water supply project consisting of 19 systems in 17 villages evaluated in the study as high priority sites in NTB and NTT provinces. The Japan International Cooperation Agency (JICA) dispatched a preparatory study team in January 2003 to clarify the issues and ensure the early and smooth implementation of the project. The policy for the basic design study was discussed based on the results of the preparatory study. As a consequence, the GOJ finally opted to implement the basic design to cover nine systems in eight villages judged as being highly sustainable due to simplicity of the operation and maintenance systems and low costs. The basic design study on site was executed from June 8 to July 19 2003 while the draft basic design study was formulated during a subsequent phase in Japan.

The criteria for selection of villages to be included in the basic design study are outlined below:

(1) Clean water sources with sufficient volume shall be available in the nominated villages.

(2) Villagers shall be able and willing to pay.

(3) No problems must exist regarding operation and maintenance of water supply facilities.

The field survey of the nine systems in eight villages was undertaken based on these criteria. This confirmed serious water leakage and illegal connections are occurring continuously around service pipes and water meters for house connections in Labuhan Mapin in the Sumbawa district of NTB province. However, Sumbawa PDAM has no specific countermeasures and no budgetary action has been implemented to address these problems. As a result, Labuhan Mapin was excluded from the basic design. Sembung in the Lombok Barat district of NTB province was also excluded from the basic design study as "The Second Water and Sanitation for Low Income Communities Project (WSLIC-2)", financed by the World Bank, was already underway in this village. Hence, seven systems in six villages were finally adopted for the basic design. These are summarized in the following table.

Villages for Basic Design

Province	District	Village(scheme)	Note		
			Water Source	System	O&M
NTB	Lombok Barat	Kuranji	PDAM pipeline	Gravity flow	PDAM
		Bajur	PDAM pipeline	Gravity flow	PDAM
		Duman(upper)	Spring	Gravity flow	WUA
		Duman(lower)	PDAM pipeline	Gravity flow	PDAM
	Lombok Timur	Bagik Papan	Spring	Gravity flow	WUA
		Selaparang	Spring	Gravity flow	PDAM
NTT	Kupang	Tarus	Spring	Pump	PDAM

The Government of Japan dispatched a JICA Study Team to Indonesia from September 16 to 27, 2003. The team discussed the basic design with the Indonesian government officials and obtained agreement on the design parameters.

The basic plan of the project is outlined below.

- The project will be executed by the central, provincial and district governments. The central Ministry of Settlement & Regional Infrastructure (KIMPRASWIL) is the agency responsible for implementation of the project, the provincial KIMPRASWIL is the supervisory agency, while the district PU is the implementing agency.
- The goal of the project is the installation of a safe and sustainable water supply for a

population of about 24,000 in six villages by 2011. The project will comprise the construction of one water supply system in NTT province at Kupang district and six systems in NTB province, four in Lombok Barat district and two in Lombok Timur district.

- The Regional Drinking Water Enterprise (PDAM) and Water Users' Associations (WUA) in the villages will have total responsibility for all aspects of system operation and maintenance. The project team will be established by the District Public Works Department (district PU). It will provide support for operation and maintenance of the village community water supply facilities through education and sensitization of the people. The GOJ will provide the soft component plan to strengthen the capability of the project team.

The water supply system was designed taking into consideration the following points:

- A gravity distribution system must always be preferred over a pumped system to minimize operating and maintenance cost. Even if a pumped system is introduced from the economic viewpoint, the diameter of the pipe and pumping period shall be determined to minimize electricity consumption.
- A single ground level reservoir should be designed for each system. When hamlets in the system are situated some distance apart, a reservoir should be designed for each hamlet.
- A public tap will be a simple concrete standpipe. The service area for each public tap will be within a radius of 50 m from the tap. House connections will branch from a service pipe to the public tap.
- Material and equipment for the facilities should be available in the Indonesian market to minimize the construction cost. Spare parts shall be easily available in the local market.
- Water supply systems are classified into the following three types in accordance with the water source and landform.
    - Type 1: Water will be taken from a single connection point on the existing PDAM pipeline that will be supplied by gravity to the service area. No service reservoir is proposed as the supply is continuously pressurized from PDAM reservoirs.
    - Type 2: Water will be taken from at broncaptering of a spring and supplied by gravity to the service area via a service reservoir.
    - Type 3: Water will be pumped from a spring to the service reservoir and supplied

to the service area by gravity.

A summary of the proposed seven water supply systems in six villages is outlined below.

Province	District	Village (scheme)	Service population	Design flow (L/s)	Type	Power source	Trans-mission Pipe (km)	Distri-bution pipe (km)	Service reservoir
NTB	Lombok Barat	Kuranji	1,894	1.35	1	No	-	2.35	-
		Bajur	6,130	4.73	1	No	-	2.29	-
		Duman (upper)	3,978	2.63	2	No	5.56	6.99	6
		Duman (lower)	1,026	0.73	1	No	-	3.47	-
	Lombok Timur	Bagik Papan	3,182	2.10	2	No	1.43	3.86	1
		Selaparang	3,433	3.40	2	No	4.55	1.16	1
NTT	Kupan	Tarus	3,977	3.94	3	Electric power line	1.33	5.17	1

Construction work for the proposed water supply facilities, apart from house connections, will be the responsibility of the GOJ. Procurement and installation of service pipes, including water meters for house connections, will be the responsibility of the GOI.

The soft component plan for the project team will be organized by the district PU. It is planned to dispatch a Japanese consultant and two Indonesian consultants involved in community organization development and O&M management. They will assist in improving the education levels and sensitization of people on O&M services of the district PU personnel and project team members through Training of Trainers (TOT) methods. The total number of months for the implementation period is 5.5 months during the construction period. The implementation period will consist of a preparation and guidance phase (4 months) prior to and at the commencement of construction with a follow-up phase (1.5 months) before its completion.

Main activities will include 1) Preparation, 2) Trainer's manual preparation and revision, 3) Preparation of documents for education and sensitization of people, 4) Training of Trainers, 5)

Assistance for development of a monitoring plan and 6) Guidance for monitoring activities during the preparation and guidance phases. The activities in the follow-up phase will include 7) Follow-up of monitoring activities and 8) Follow-up of education and sensitization of people.

The implementation schedule is expected to be completed in the following periods:

(1) Detailed design : 3.5 months

(2) Tendering and contract : 2.5 months

(3) Construction works : 10.5 months

(4) Soft component plan : 5.5 months

The total project cost is estimated to be 238 million yen. The costs to the Japanese and Indonesian governments are estimated to be 225 million yen and 13 million yen, respectively.

About 24,000 inhabitants will be able to use sanitary and stable drinking water after construction of seven water supply systems in six villages. The impacts of construction of sanitary water supply systems in the project areas will include a decrease in the incidence of water born diseases, a reduction in the required labor of women and girls, and an improvement in environmental health.

The project team members of district PUs will receive training through the soft component plan, increasing their capacity to support operation and maintenance of facilities (peoples' education and sensitization). As a result, community households and WUA members will receive training on peoples' education and sensitization and will gain the knowledge necessary to operate and maintain water supply facilities. Following construction of the facilities, project team members will carry out monitoring regularly and strengthen the operation and maintenance system.

As a result, it is concluded that the project is suitable and viable for Japan's Grant Aid.

Furthermore, it is expected that the project will be implemented smoothly and effectively, with due consideration of the following points:

- Construction of house connection systems from the distribution pipe to faucet shall be implemented by the GOI.

- After construction of the facilities, the project team of each district PU shall continuously carry out the education and sensitization of the inhabitants of seven water supply systems in six villages who may fill the major role of operation and maintenance of the water supply facilities.
- Operation and maintenance of the management water supply system of villages of type C shall be continuously implemented by WUA.
- Operation and maintenance of PDAM's management water supply system of type A shall be continuously implemented by PDAM.
- The project team of each district PU will carry out monitoring regularly.

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