No.

Ministry of Public Works
The Republic of Indonesia

IMPLEMENTATION REVIEW STUDY REPORT
ON
THE PROJECT FOR RURAL WATER SUPPLY
IN
NUSA TENGGARA BARAT
AND
NUSA TENGGARA TIMUR
IN
THE REPUBLIC OF INDONESIA

September 2006

JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)
JAPAN TECHNO 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 implementation review 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 February 19 to March 30 in 2006.

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 final report, 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.

September, 2006

Masafumi Kuroki

Vice-President
Japan International Cooperation Agency

September 2006

Letter of Transmittal

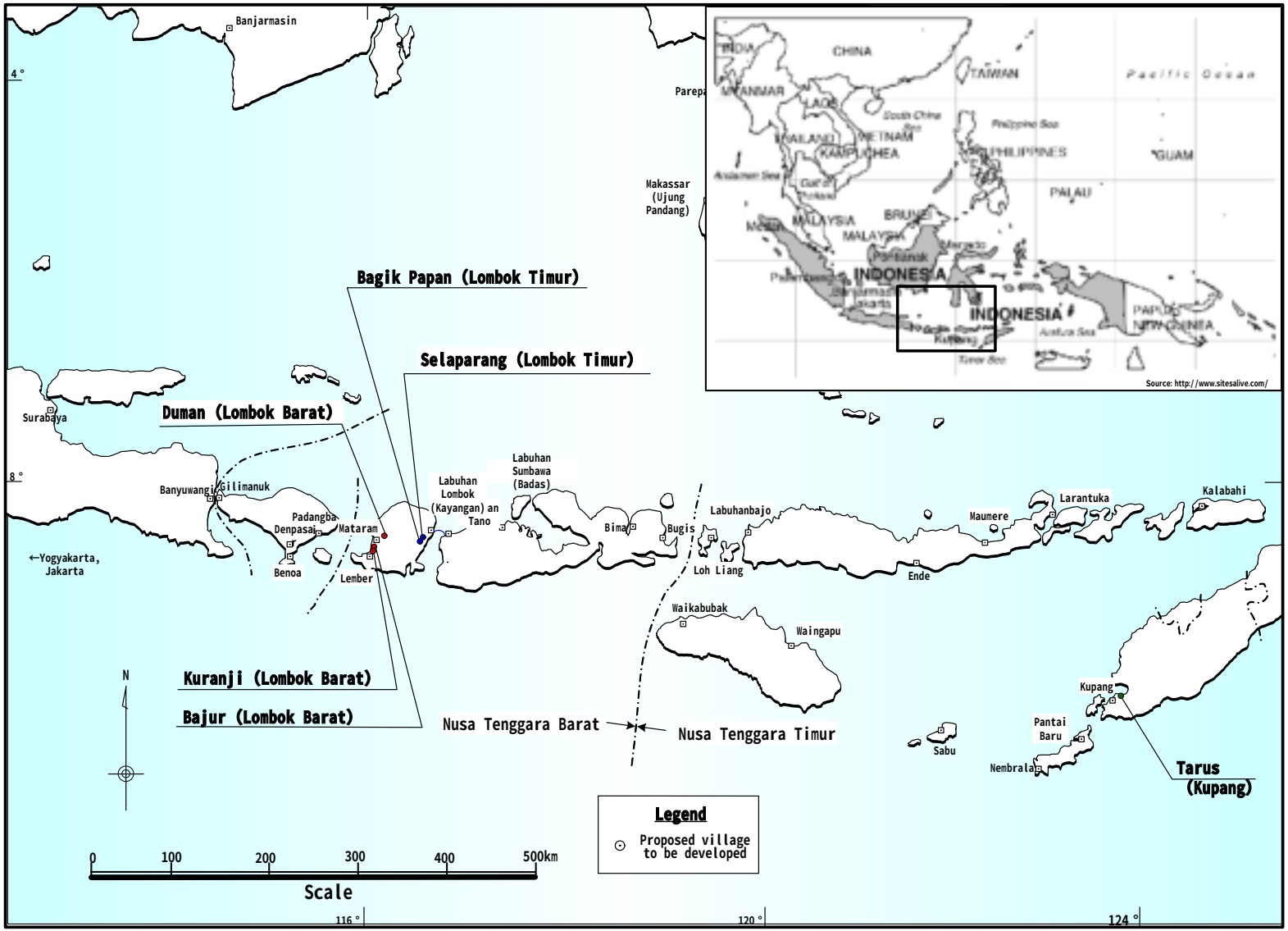
We are pleased to submit to you the implementation review study report on The Project for Rural Water Supply in Nusa Tenggara Barat and Nusa Tenggara Timur in the Republic of Indonesia.

This study was conducted by Japan Techno Co., Ltd., under a contract to JICA, during the period from February 2006 to September 2006. 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.

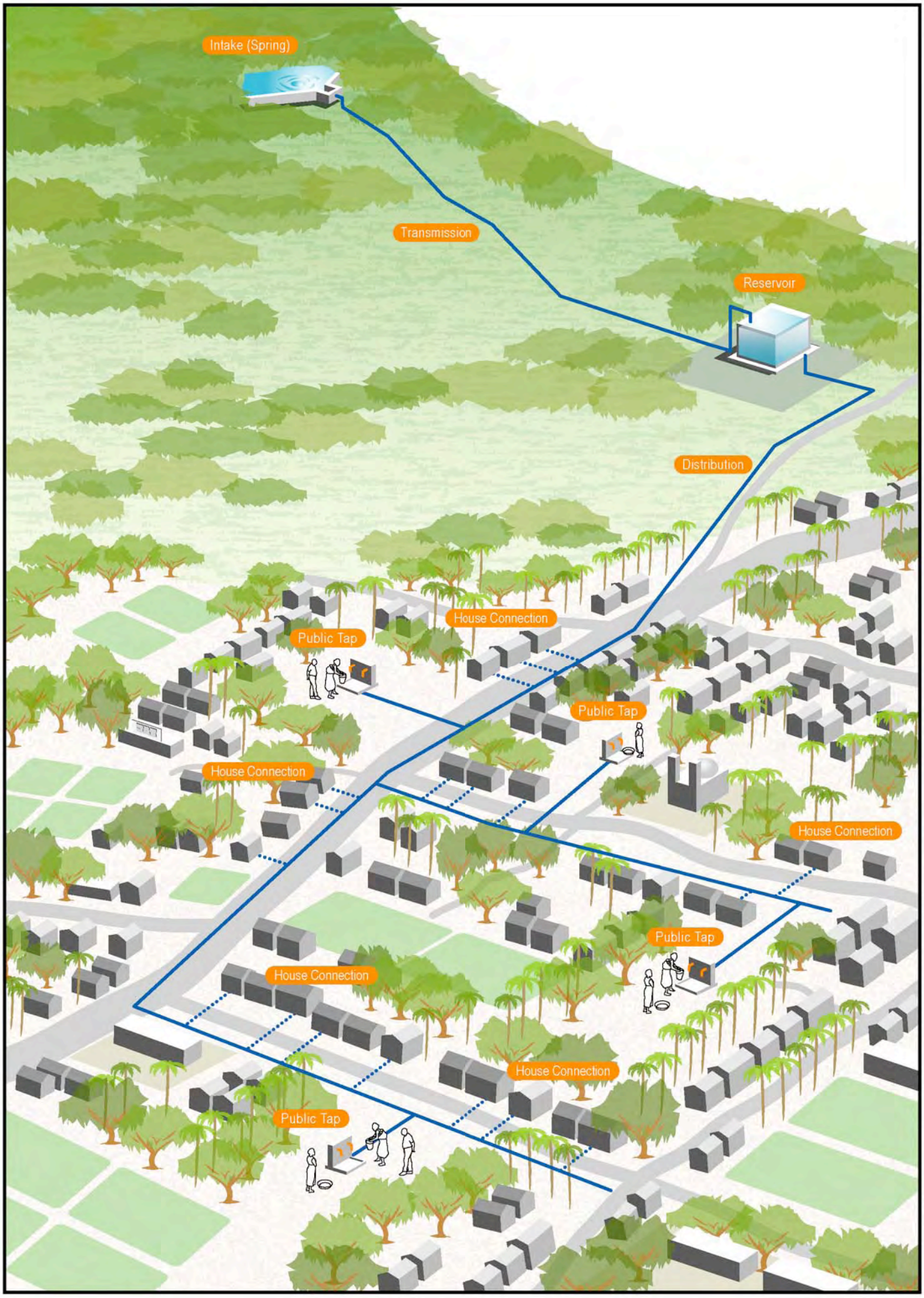
Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,

Nobuyuki Ishii
Chief Consultant,
Implementation review study team on
The Project for Rural Water Supply
in Nusa Tenggara Barat andNusa Tenggara Timur
Japan Techno 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 March 2006

US$1 = Rp.8,944.2 = JP¥117.17

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Summary

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 Japanese government is considering also the implementation of the project with At-Risk construction management (CM) method after the 2006 fiscal year. Consequently, an Implementation Review Study was conducted from February to March 2006, and the study was formulated based on the subsequent study in Japan.

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.

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 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.

Results of survey at target villages for implementation review study revealed that no significant changes from the basic design implementation plan for 5 sites of Kuranji, Bajur, Bagik Papan, Selapalang and Tarus were found, but at Upper Duman and Lower Duman, water supply facilities different from the plan for this project were already constructed by the village residents. According to analysis made in Japan after the field survey, target villages for implementation review study will be water supply systems for 6 villages excluding Upper Duman.

These are summarized in the following table.

Target Villages

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(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 basic plan of the project is outlined below.

- The project will be executed by the central, provincial and district governments. The central Ministry of Public Works (Cipta Karya) is the agency responsible for implementation of the project, the provincial Dinas PU 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 20,000 in six villages by 2011. The project will comprise the construction of one water supply system in NTT province at Kupang district and five systems in NTB province, three 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.

Pro-vince	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	-	2.31	-
		Bajur	6,130	4.73	1	No	-	2.30	-
		Duman (lower)	1,026	0.73	1	No	-	1.81	-
	Lombok Timur	Bagik Papan	3,182	2.10	2	No	2.23	3.86	1
		Selaparang	3,433	3.40	2	No	4.40	1.16	1
NTT	Kupan	Tarus	3,977	3.94	3	Electric power line	1.37	5.11	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 4.83 months during the construction period. The implementation period will consist of a preparation and guidance phase (3.33 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) Tendering and contract : 4.5 months

(2) Construction works : 10.5 months

(3) Soft component plan : 4.83 months

The total project cost is estimated to be 214 million yen. The costs to the Japanese and Indonesian governments are estimated to be 201 million yen and 13 million yen, respectively.

About 20,000 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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Chapter 1 Background of the Project

Chapter 1： BACKGROUND OF THE PROJECT

Both provinces of Nusa Tenggara Barat (NTB) and Nusa Tenggara Timur (NTT), located in eastern Indonesia, are influenced by the Australian continental climate that makes these provinces the driest areas in Indonesia.

The Government of Indonesia (GOI) has endeavored to develop the east Indonesia region. Despite such efforts of GOI, people in the region are still facing difficulties to obtain clean and safe water. In the provinces of NTB and NTT, which include the least developed regions in Indonesia, only 50–60 % of the population has access to clean water. The rest of the population have to obtain unclean and unreliable water from dug wells, springs and rainwater which often become deficit in the dry season. These sources often have adverse influence on the health of the people. For example, the infant mortality rate of NTB province is the highest among all of the provinces of Indonesia. The infant mortality rate of NTT province is the fourth highest in Indonesia. Therefore, improvement of hygiene condition in rural areas is urgently required.

Under the above circumstances, 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 made a request to the GOJ for Grant Aid for a rural water supply project consisting of 19 systems in 17 villages that were evaluated by the study as high priority sites in NTB and NTT provinces.

Japan International Cooperation Agency (JICA) dispatched a preparatory study team in January 2003 to clarify the issues for early and smooth implementation of the project. The policy for the basic design study was discussed based on the results of the preparatory study, and finally GOJ decided to implement the basic design for nine systems in eight villages that are judged as having high sustainability due to simple operation and maintenance systems with small expenditures. As a result, the basic design study in the site was executed from June 8 to July 19, 2003.

In accordance with the basic design, the Exchange of Notes was concluded in 2004, and after detailed designing, tender procedures were carried out a number of times between January and April 2005, but were all unsuccessful. Therefore, the Japanese government is

considering the implementation of the project with At-Risk construction management (CM) method after the 2006 fiscal year. Consequently, an Implementation Review Study was conducted from February to March 2006, and the study was formulated based on the subsequent study in Japan.

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Chapter 2 Construction Management

Chapter 2： CONSTRUCTION MANAGEMENT

2-1 Framework for Project Implementation

The construction management (CM) method is a facilities construction supervision system where a construction manager (CMR) is assigned to represent or assist the client, while maintaining a technically neutral position, to manage design appropriateness, schedule management, quality control, cost supervision through each stage of designing and construction.

Two CM methods are available: one is a Pure CM method, where the client (recipient country executing agency) directly concludes a construction contract, and the other is an At-Risk CM method, where the CMR contracts local sub-contractors instead of the client to carry the risks of construction. However, if the CM method is to be applied for general grant projects, in consideration of the tied conditions stipulated in the E/N, use of the Pure CM method is difficult under the Japanese grant system.

In the At-Risk CM method, the CMR does not directly sub-contract the construction works, but management of sub-contractor works is the main assignment. Therefore, the CMR does not necessarily have to be a construction company, and a consultant company which can supervise construction works can also participate in the tender. As a consequence, compared to the usual implementation structure of tenderers being limited to Japanese construction companies, the eligibility of tenderers is expanded so that implementation of this project becomes more realizable. However it shall be noted that the project implementation method considered for this project is different from the At Risk CM method utilized in countries such as U.S.A., in such that this project has already executed the basic design study and detailed design study, and the Japanese grant aid system has restrictions.

As a result of the above background (refer to Chapter 1. Project Background), this project will be implemented through the At-Risk CM method. The project implementation structure using the CM method is shown below.

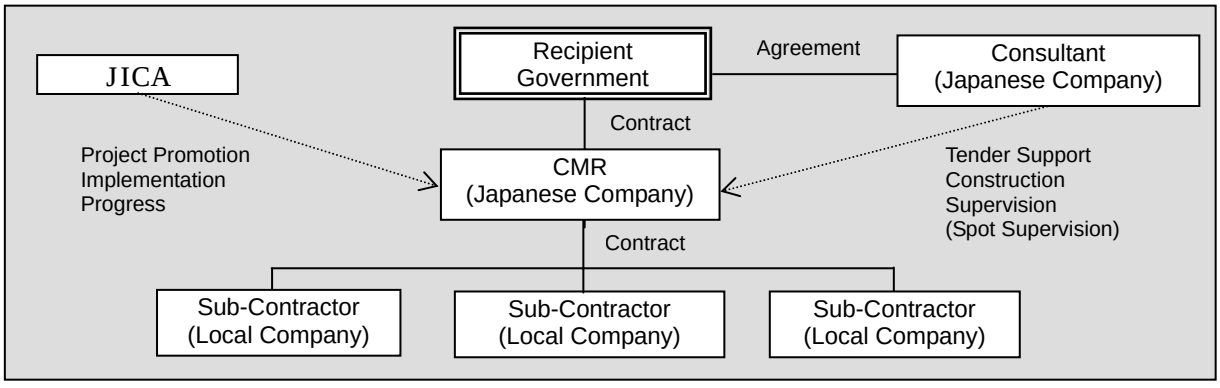

Figure 2-1 Project Implementation Structure for CM Method

2-2 Selection of CMR and Local Sub-Contractors

2-2-1 Selection Method of CMR

In the At-Risk CM method, the CMR will directly contract with local sub-contractors and be responsible for completion of the construction works. Although prequalification (PQ) for tender eligibility will be carried out, prequalification requirements need to be carefully considered to invite as much tenderers as possible. Criteria for tender qualification, their justification and evaluation criteria will be determined in consideration of the following conditions.

- The CMR must be sufficiently familiar with the local construction situation of Indonesia
- Since the CMR has responsibility for completion of the works, the CMR must have capacity for management of local sub-contractors.
- Since the CMR will contract directly with local contractors, the CMR must be financially firm to cover the risks.
- The CMR must have technical capacity necessary to supervise local sub-contractors.

To be eligible for CMR, the company must possess a construction permit, or registered as a construction consultant. Also, trading companies can participate by forming a joint venture with Japanese construction companies, but the Japanese construction company must have experience in overseas construction works.

2-2-2 Selection Method of Local Sub-contractors

(1) Evaluation of Local Sub-contractors

Construction related public works in Indonesia can be carried out only by companies registered under member groups of the national association of construction companies (LPJK). For water supply facilities construction works, only companies registered with one of the 3 groups affiliated with LPJK (Association of Major Construction Companies: AKI, Association of Rural Construction Companies: GAPENSI, and Association of Water Supply Works: AKAINDO) are eligible. Since, to register with these groups, the company must pass a specified approval examination, the registered company is legally qualified to conduct public construction works. Therefore, selection of companies for works of the Ministry of Public Works is made from companies registered under the above 3 groups since financial status, experience and capacity are confirmed.

Companies registered under the above 3 groups were surveyed on their capacity for quality control, schedule management and other factors through inquiries to central government (Ministry of Public Works) staff, public works office staff of target area, engineers of the Regional Drinking Water Corporation (PDAM) and other relevant personnel. Although the inquiry survey was made at various levels and information may not be fully confirmed, the results are compiled into an evaluation table as shown below.

Table 2-1 Evaluation of Local Construction Companies based on Inquiries to Executing Agency

Local Construction Firm / Evaluation Factor	GAPENSI Rank B and M	AKAINDO Rank B and M	AKI (Association of Major Construction Firms)		
			Governmental	Japanese	Foreign, Others
Social Reliability based on Qualification Certificate of Association	○	○	◎	◎	◎
Evaluation of Indonesian Government	○	○	○	○	○
Capacity for Quality Control	○	○	○	◎	◎
Capacity for Schedule Management	△	△	△	◎	○
Ranking by Insurance Co./Financial Institutes	△	△	○	◎	△

N.B.: Rank B and M of GAPENSI and AKAINDO refer to scale of work.
Symbols in table imply evaluation ranking through inquiry (◎=Excellent, ○=Good, △=Not always good)

From the above, Indonesian local sub-contractors can be evaluated as follows.

- Since Indonesian local contractors are at a specific stage of development, their construction capacities are judged to have no significant problems.
- However, even for high ranked companies, if problems arise in their managerial funds, works may easily stop. Therefore, risks on construction period are relatively high.

(2) Selection Method of Local Sub-Contractors

Construction of water supply facilities in this project will be carried out by local sub-contractors selected by the CMR, and the contractors will be selected through the following procedure based on evaluation of companies registered under the 3 groups affiliated with LPJK.

1) The consultant will prepare technical specifications about the selection of local sub-contractors for this project from Indonesian contractors registered under LPJK affiliated 3 groups (AKI, GAPENSI and AKAIDO).
2) The CMR will select the local sub-contractors under the full responsibility of the CMR, using technical specifications attached in the tender documents of the CMR.
3) The CMR shall make a report about local sub-contractor selection in which only company names of sub-contractors shall be written and the certificates of the selected sub-contractors about registration in a LPJK affiliated group shall be attached. The report shall be submitted to the client, the consultant and JICA.

The client cannot make any comments about the results of sub-contractors selections in case the CMR properly selects them from the short list and selected sub-contractors are duly registered in a LPJK affiliated group, because the CMR takes full responsibility of the local sub-contractor selection.

2-3 Organization for Construction Supervision under CM Method

(1) Scope of Work of CMR and Consultant

One of the major objectives of adopting the CM method is "simplification of construction organizational structure". To achieve this, of the construction supervision to be carried out by the consultant under the usual grant procedures, a part of the assignment which the CMR is capable of conducting is transferred to the CMR. The work to be assigned to the CMR is shown below.

Table 2-2 Scope of Work of CMR

Period	Main Supervision Items	Role of CMR
Pre-Construction	a) Selection of local sub-contractor	Selection of local sub-contractors. Report the results to the client, the consultant and JICA
	b) Handling of implementation plan prepared by sub-contractors	Confirmation of design drawings and site conditions. Prepare construction plans. Submission of the construction plans to the client and the consultant, if necessary
	c) Schedule management, quality control, work progress supervision, safety/ sanitation management, cost management	Compile work assignments into construction supervision manual. Submission of the construction supervision manual to the client and the consultant, if necessary
	d) Site transfer	Confirmation of site transfers and the sites.
Construction	e) Site supervision	Coordinate/handle sub-contractors. Confirm/coordinate construction plan for each work Confirm/coordinate progress of construction /payment
	f) Preparation and submission of monthly progress reports	Prepare monthly reports and submit to client, the consultant and JICA
	g) Handling of design modifications	Arrange for request letter by the client for modifications Studying of requested modifications (necessity and appropriateness) Instruct modifications to sub-contractors after approval by JICA.
	h) Implementation progress survey by grant aid supervisory expert	Make necessary arrangements and support the survey
	i) Intermediate inspections	Conduct intermediate inspections and prepare reports
Completion	j) Completion inspection	Conduct completion inspection and prepare report
Post-Completion	k) Handover ceremony	Prepare ceremony
	l) Warranty inspection	Conduct defect inspection and repair the found defects.

The field supervision responsibilities of the consultant are the spot supervisions as listed below. Also, monthly construction progress reports and design modifications prepared by the CMR will be supported from Japan by the consultant.

Table 2-3 Spot Supervision by Consultant

Main Supervision Items		Description	Spot Frequency
Pre-Construction Stage	1) Site transfer	Confirmation of site transfer.	Once
Construction Stage	3) Intermediate inspections /payment supervision	Intermediate progress (50% and 85%) inspections and confirmation of payment will be made.	Twice
Completion Period	4) Completion inspection /payment supervision	Inspection at 100% completion and its payment confirmation will be carried out.	Once
Post-Construction Stage	5) Warranty inspection	Presence for one-year warranty inspection and related services	Once
Total Spot Supervisions (Frequency of Trips)			5 times

Monthly progress reports will be prepared by the CMR with the same status as taken in the usual grant procedures. Also, design modifications will be handled through confirmation of actual field conditions by the CMR, and the necessity and technical feasibility of the modification as well as examination of costs involved in the modification will be determined by the consultant in Japan.

(2) Role of JICA

The role of JICA within the organizational structure using CM method is, as usual, “project implementation promotion” including confirmation of monthly progress through monthly reports, confirmation/comment/receipt related to design modifications, and handling of incidental matters such as accidents and disasters

(3) Completion Inspection and One-Year Warranty Inspection

Completion inspection is to be carried out by the CMR in the presence of the consultant and representative of the client. The CMR will prepare and submit a completion report including drawings, and the consultant will conduct the final payment related confirmation in relation to the completion inspection. The one-year warranty inspection will be performed by the CMR in the presence of the consultant.

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Chapter 3 Contents of the Project

Chapter 3： Contents of the Project

3-1 Basic Concept of the project

The objective of the project is the installation of safe and sustainable water supply systems for a population of target villages in the NTB and NTT provinces. To achieve this goal, the project will comprise the construction of one water supply system in NTT province in 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 the Water Users' Associations (WUA) in the villages will have total responsibility for all aspects of system operation and maintenance. The District Public Works Department (the district PU) will support the WUA to establish a system for operation and maintenance of the facilities through education and sensitization of the community.

The site survey to confirm significant changes since the basic design and detailed design studies revealed that the rural residents of Upper Duman and Lower Duman had already constructed water supply facilities. Then, as a result of discussions with the Ministry of Public Works, the project will now consist of 6 water supply systems for 6 villages excluding Upper Duman.

Furthermore, the Implementation Review Study made consideration on possibilities for implementation through the construction management (CM) method, and surveys were made on the situation of the current local construction market and availability of highly reliable local sub-contractors, in order to realize implementation of this project without delay.

Consequently, this study concluded that the project would consist of construction of water supply facilities as well as strengthening of the district PU staff through a soft component plan in order to achieve continuous assistance for WUA. By the end of the project, when new water supply facilities are functioning, it is expected that the village support ability of the district PU and the operation and maintenance capability of the WUA for water supply facilities will have improved.

The project design matrix (PDM) of this Basic Design Study is shown in Table below.

Table 3-1 Project Design Matrix

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal a) Sanitation and other living conditions of households in NTT and NTB Provinces are improved.	a) The number of households who suffer from diseases caused by bad water conditions is decreased. b) Water supply systems operate and are being used throughout the year by households in the project villages	a) Monitoring results after the project ends. b) Materials and reports issued by Department of Health.	There is no change in the basic policy and structure of the implementation bodies of the Indonesian government for operation and maintenance of the rural water supply project.
Project Purpose Sustainable provision of safe water to households	a) The population served in the villages is about 20,000. b) The collection of fees for water use and operation of the facilities has begun	a) Monitoring results after the project ends. b) Materials and reports issued by the district PU and PDAM in related districts. c) Operation records of water supply facilities of PDAM and WUA. d) Accounting report of PDAM and WUA	・ Operation and maintenance of the project by WUA and PDAM are properly implemented as planned. ・ Health and hygiene education by Department of Health in concerned districts is continuously executed.
Outputs b) Provision of water supply facilities in the project villages. c) The village support ability of the district PU improves. d) Operation and maintenance ability of WUA for water supply facilities improves.	a) New water supply facilities are functioning. b) At least 2 trainers in the district PUs are trained for supporting operation and maintenance of facilities. c) WUA members obtain knowledge necessary to operate and maintain water supply facilities before the provision of the facility.	a) Completion of drawings of facilities. b) Record of activities by trainers. c) Monitoring reports.	・ No large-scale drought occurs. ・ Supporting system for operation and maintenance of water supply facilities by District PU is continued ・ WUA functions according to schedule.
Activities **GOJ** a) Construction of water supply facilities 1. Construction of water supply facilities, except house connections. b) Support for community education and sensitization on operation and maintenance of water supply facilities to staff in each district PU. 1. Introduction of training targeting project staff. 2. Development of manuals for trainers on educational campaign. 3. Implementation of training for trainers. 4. Support for planning of monitoring **GOI** a) Installation of house connections 1. Procurement of material for house connection from water meter to faucet 2. Construction of house connection 3. Securing of land for the project. b) Formation of the project team in each district PU. c) Support for operation and maintenance in villages 1. Implementation of orientation on the project and peoples' education and sensitization of village households. 2. Support for establishment of WUA. 3. Provision of training to WUA staff. 4. Execution of Monitoring	**Inputs** **The Government of Japan (GOJ)** Human resources (Support for activities in Soft Component Plan) a) Japanese expert for operation and maintenance of water supply facilities: 5.5 man-months b)Indonesian expert for operation and maintenance of water supply facilities: 5.5 man-months c)Indonesian expert for community organization development:5.5 man-months Facilities a) Water supply facilities except house connections b) Provision of materials for house connections before water meter Project Costs 204 million yen **The Government of Indonesia (GOI)** **Human resources (Project staff in each district PU, PDAM and Department of Health)** a) 1 project manager b) 2 staff in charge of operation and maintenance. c) 2 staff in charge of construction supervision. d) 1 staff in charge of public education on water and sanitation. e) 1 staff in charge of community development **Facilities and community education and sensitization** a) House connections b) Support for operation and maintenance Project Costs 13 million yen		a) Trained staff of the district PU will not alternate in short term. **Preconditions** a) MOU between the central government, the provincial government, and the concerned district governments is signed. b) Village households' willingness for participation in the project remains unchanged. c) Safe water sources are secured.

3-2 Basic Design of the Requested Japanese Assistance

3-2-1 Design Policy

(1) Basic Concept

1) Study Area

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 requested Grant Aid from the GOJ for a rural water supply project consisting of 19 systems in 17 villages, these being evaluated by the study as high priority sites in NTB and NTT Provinces.

With considerations on various issues arising from geographical conditions of scattered islands, Japan International Cooperation Agency (JICA) dispatched a preparatory study team in January 2003 to clarify the issues for early and smooth implementation of the project. The policy for the basic design study was discussed based on the results of the preparatory study, and finally GOJ decided to implement the basic design for nine systems in eight villages that are judged as having high sustainability due to simple operation and maintenance systems with small expenditures. As a result, the basic design study covers nine systems in eight villages as shown in Table below.

Table 3-2 Basic Design Study Villages

Province	District	Village(scheme)	Note			Village for Basic Design
			Water Source	System	O&M	
NTB	Lombok Barat	Kuranji	PDAM pipeline	Gravity flow	PDAM	○
		Bajur	PDAM pipeline	Gravity flow	PDAM	○
		Sembung	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	○
		Selapalang	Spring	Gravity flow	PDAM	○
	Sumbawa	Labuhan Mapin	Spring	Gravity flow	PDAM	—
NTT	Kupang	Tarus	Spring	Pump	PDAM	○

2) Villages for Basic Design Study

Criteria set for village selection for the basic design are as follows:

a) Clean water sources with sufficient volume shall be available in nominated villages.
b) Villagers shall be able and willing to pay.
c) There are no problems on operation and maintenance of water supply facilities.

3) Villages for Implementation Review Study

Results of survey at target villages for implementation review study revealed that no significant changes from the basic design implementation plan for 5 sites of Kuranji, Bajur, Bagik Papan, Selapalang and Tarus were found, but at Upper Duman and Lower Duman, water supply facilities different from the plan for this project were already constructed by the village residents. According to analysis made in Japan after the field survey, target villages for implementation review study will be water supply systems for 6 villages excluding Upper Duman. The present conditions at each village as confirmed in the survey are listed below.

Table 3-3 Results of Present Condition Review of Target Sites

Target Site for Basic Design	Results of Present Condition Review
1) Kuranji	No significant changes from Basic Design are found..
2) Bajur	No significant changes from Basic Design are found..
3) Upper Duman	Water supply facilities such as intake, transmission/supply pipelines and public tap stands (different plan from basic design of this project) were already constructed by village residents. These facilities are operated and maintained by community-based organization.
4) Lower Duman	The transmission pipeline from Upper Duman was extended and public tap stands were constructed. However, specifications of constructed facilities differ greatly from basic design plan.
5) Bagik Papan	No significant changes from Basic Design are found..
6) Selapalang	No significant changes from Basic Design are found..
7) Tarus	No significant changes from Basic Design are found..

(2) Natural Conditions

According to the rainfall patterns of the study area as shown below, 80% to 96% of the annual rainfall is concentrated in the rainy season from November to April. Therefore, construction during the rainy season requires careful consideration. At Kupang, since a river traverse work is planned, construction work during the rainy season will be very difficult. Therefore, these works need to be carried out during the dry season.

Table 3-4 Average Annual Rain Fall (mm)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
District	Rainy Season				Dry Season						Rainy Season		
Lombok Barat	178	239	127	128	117	57	27	4	25	162	273	252	1,587
Lombok Timur	437	166	187	114	37	15	2	6	33	38	145	309	1,490
Kupang	218	426	253	49	17	15	2	0	9	56	151	327	1,557
Sumbawa	178	239	127	128	117	57	27	4	25	162	273	252	1,587

(Average : 2001 – 2005)

The geological conditions of the Lombok Island in NTB Province generally consist of volcanic rocks, or pyroclastic sediments. Therefore, the nature of soil is mostly adequate for the foundation of the facilities and pipe installation works. On the other hand, the very hard limestone that is exposed at the surface of Tarus in NTT Province makes excavation of the ground for pipe laying very difficult. Therefore, it is considered to carry out exposed piping on the ground where hard limestone crops out.

(3) Social and Economic Conditions

According to the census of 1999, the GRDPs (Gross Regional Development Products) of NTT and NTB Provinces were only 1,910,000 rupiah (equivalent to 28% of the national average) and 3,570,000 rupiah (equivalent to 55% of the national average), respectively. The ratio of the poor population in NTT Province is the 4th highest and that of NTB Province is the 6th highest among all provinces in the country. Especially, villagers suffer from poverty, and bad living conditions. This is because water supply coverage in rural areas is very low and many have depended on unsanitary water from the dug wells and/or rivers nearby.

In the results of the survey, it was found that village households wanted to use improved water supply facilities, but some households were unwilling to pay enough for water usage. This survey result leads us to the conclusion that it is important to carry out community education and sensitization to help rural community members understand the importance of safe and clean water. It is expected that if their desire for safe and clean water increases, they would be willing to pay more for it. The availability of a subsidy, which can lighten their economic burden, needs to be explained. Another approach could be the foundation and strengthening of the management system for operation and maintenance of water supply facilities. The existing hamlets have strong unity, which could be the responsible body for operation and maintenance of water supply facilities.

On the other hand, to establish and strengthen the function of WUAs, it is a key to place a village head or religious leader in the position as an advisor. For instance, a Muslim or Hindu leader in NTB Province and a leader of the Catholic Church in NTT Province could play critical roles.

(4) Basic Principle for Present Water Supply Conditions

The majority of households in the project villages have used water from dug wells, public water taps or/and rivers. Considering the fact that village inhabitants have suffered from water shortage, especially in the dry season, the project will focus on the improvement of water supply conditions. The provision of the water supply systems will help households to access safe water in a shorter time with more ease throughout the year. In order to increase awareness of households about operation and maintenance of water supply facilities, the district PU will provide community education and sensitization as socialization activities.

(5) Concept on State of Construction

Influenced by the Asian financial crisis of 1997, Indonesia suffered a financial crisis with its gross national index (GNI) dropping to -13.1%. Since then, however, due to smooth recovery, the GNI showed a stable 5% in 2005. The Indonesian construction cost index for 2004 increased 44% as compared to that of 2000. Within this predicament, the cost index for NTB increased 65.8% while the growth for NTT was only 31.3%. The share of construction cost for NTB within the whole country of Indonesia was 3.8% until 2002, but rose to 4.3% in 2004. In contrast, the share for NTT within the country was 3.3-3.4% until 2003, but decreased to 3.1% in 2004.

Table 3-5 Cost Index for Construction Works at NTB/NTT (Unit : Mil. Rp)

Year	Construction throughout Indonesia	Construction in NTB	Share (%)	Construction in NTT	Share (%)
2000	16,944,628	635,778	3.8	566,446	3.3
2001	19,086,328	733,752	3.8	643,540	3.4
2002	22,177,359	846,822	3.8	731,380	3.3
2003	20,154,199	928,797	4.6	692,990	3.4
2004	24,340,912 Growth rate 44%	1,054,186 Growth rate 65%	4.3	743,834 Growth rate 31%	3.1

Furthermore, the number of water supply facilities construction companies after 1999 in NTB is 6 companies and in NTT, 12 companies, which are respectively, 1.3% and 2.5% of the whole country. These figures are low and the number in NTB is low even compared to the

population ratio. Since rural water supply facilities for both provinces of NTB and NTT are constructed mostly by local contractors situated in the provinces, selection of experienced local contractors is possible. However, high quality construction work cannot always be anticipated, and so careful attention is required for selection and effective use of local contractors.

(6) Procurement Conditions

Construction materials can be basically procured in local markets. Lombok Island is located at an approximate distance of 1,000 km east from Jakarta. Tarus in Timor Island is located at 800 km farther east from Lombok Island. Materials are, therefore, procured in the Island as much as possible to reduce delivery period and transportation cost, with the exception of pipe material which are procured from Surabaya of East Java Province.

(7) Concept on Use of Local Contractors

The results of survey on situation of local sub-contractors revealed that, in Indonesia, construction related public works can only be executed by companies registered under member groups of the national construction association LPJK, and for water supply facilities construction works, execution is allowed only by companies registered under the 3 LPJK member groups of AKI, GAPENSI and AKAINDO. Companies registered under these 3 groups are legally recognized to satisfy conditions to implement public works. Also, registration of these companies confirms their qualifications in financial soundness, experience and capacity when selecting contractors for public works of the recipient government (Ministry of Public Works).

When local contractors are to be used, the consultant will prepare a short list of local sub-contractors (115 companies) from those registered under the 3 LPJK affiliated groups. Based on this short list, the CMR, under his own responsibility, will select sub-contractors to execute the construction works of this project through comprehensive evaluation on technical capacity, experience records, financial status, reliability, cost proposals and other requirements.

(8) Project Management by Project Implementation Agency

1) Strengthening of the district PU

KIMPRASWILL is the agency responsible for implementation of the project. The

management and supporting of rural water supply facilities in each district in Indonesia are the responsibility of the district PU. However, there were no effective services available in many community management systems in the past projects. Therefore, the GOI, in a Memorandum of Understanding (MOU) signed by the central government, the provincial government, and the district government, has determined that each district PU shall undertake the budget arrangements for the support of the rural water supply project which includes the operation and maintenance. The following items were included the MOU.

a) Planning
b) Monitoring of project activities
c) Training to WUAs
d) Water campaign to beneficiaries
e) Field survey
f) Coordination

However, the following issues are yet to be solved in each district PU.

- Responsibility of the district PU in rural water supply projects up to the present was construction and rehabilitation of water supply facilities, so that each district PU is not yet fully facilitating operation and maintenance of water supply facilities. Consequently, there are only a few experienced staff for operation and maintenance available.
- The experience on community education and sensitization to the villagers who manage the operation and maintenance of the water supply facilities is scarce.
- Cooperation in a water service project with Department of Health, which is the responsible organization for health hygiene and community education and sensitization, is inadequate.

The effective management of rural water supply projects requires strengthening of the organization and staffs of the district PU concerning the ability for community education and sensitization on operation and maintenance. Therefore, a soft component program will be planned to dispatch specialists on community organization development and O&M management during the construction stage, to try to improve the capability and activities of the district PU staffs.

2) Support to WUA (operation and maintenance system in village /PDAM)

The operation and maintenance in villages are the responsibility of the WUA. The district PU supports the establishment of the WUA from the planning stage of the project. It continuously guides the establishment of water users' organizations when the organization is formed for each village, hamlet, and public tap system. Each organization has the

responsibility for operation and maintenance of facilities. A staff member of the WUA is required to educate personnel on a basic accounting system simultaneously with the technical guidance in the village, to prevent the use of the water service incomes for other project purposes. The WUA will also be formed for every public tap system that are managed by PDAM before the construction of facilities and will receive technical training from the project team.

3) Strengthening of system for operation and maintenance through community education and sensitization

The operation and maintenance of facilities is the responsibility of the PDAM/village. The objective of community education and sensitization is to heighten awareness on health and hygiene, to enhance community members' desire for clean and safe water, and thereby motivate them to maintain the water supply facilities that are to be constructed. As a result, the people will have the willingness-to-pay for the water supply. Therefore, the project team of the district which consists of staff of PU, Department of Health and PDAM, is to facilitate and support communities with the improvement in consciousness of water use and motivation of operation and maintenance for water supply facilities by community education and sensitization.

4) Formulation of monitoring system

In order to correctly grasp the operation and maintenance activities for the water supply facilities under the project, GOI has agreed to prepare monitoring reports twice each year for five years after facilities are completed and to submit them to JICA. Each district PU is to be supported by a soft component plan during the project implementation period, so that monitoring activities can be properly performed.

(9) Selection of Construction Materials and Equipment

The water supply facilities are simply designed systems for easy maintenance and to reduce maintenance cost. For easy procurement of spare parts in the future maintenance stage, materials and equipment for the facilities should be available in the Indonesian market. As for piping material, the types of joints have been minimized for easier construction.

(10) Construction Method and Period

The construction works are carried out from Lombok Barat in the west end to the east area for minimizing cumulative travel and transport distance. Construction by manpower is employed

rather than the construction by equipment. Several fleets should be utilized at the same time to complete the works within the schedule. In the project area, the rainy season occurs from October to April, and therefore, construction work for spring intake weir should be carried out in the dry season between May and September. The siphon crossing the river at Tarus will be constructed by a multiple-stage diversion method in the dry season.

3-2-2 Basic Plan

(1) Target Villages

1) Villages for Basic Design

The field survey was undertaken for the nine systems in eight villages based on the criteria described in the basic concept. This survey confirmed there were no sites with problems regarding water sources, willingness-to-pay or affordability. However, Sembung village and Labuhan Mapin village were excluded due to the following reasons:

- Sembung in Lombok Barat District of NTB Province was excluded from the basic design plan as "The Second Water and Sanitation for Low Income Communities Project (WSLIC-2)", financed by the World Bank, is already being executed in Sembung village.
- It was confirmed that serious water leakage and illegal connections are continuously occurring around service pipes and water meters of house connections in Labuhan Mapin in Sumbawa District of NTB Province. However, the Sumbawa PDAM has no specific countermeasures and no budgetary action has been implemented to address these problems. Therefore, the system for Labuhan Mapin was also excluded from the basic design.

2) Target Villages for Implementation Review Study

As a result of confirmation of site conditions at the basic design target villages during the implementation review study, water supply facilities were already constructed by the residents in Upper Duman and Lower Duman. As a result of analysis in Japan, the following are reasons for not keeping Upper Duman as a target village.

- The scale of facilities constructed by the residents is about 60% (as ratio of pipeline extension) of the basic design plan, and the rate of achievement of benefits is comparably lower than that of this project. However, in Upper Duman, a systematic series of facilities including intake, transmission main, distribution tank and distribution pipeline is

already constructed.

- Since these water supply facilities were constructed through residents' labor contributions based on simple drawings, the construction conditions and qualities are uncertain, and field resurveys are needed to identify the overall situation. If Japan is to give further assistance, complicated assistance for modification of already constructed facilities should be avoided, and focusing on clearly definable inputs is more feasible. Consequently, facilities construction for Upper Duman is determined to be difficult.

Lower Duman is maintained as a target village for the following reasons.

- Facilities constructed in Lower Duman are greatly different from the basic design plan for an independent system, where the transmission main from the intake weir in Upper Duman is extended and one water supply system for both Upper Duman and Lower Duman was constructed. Construction of a transmission main from the PDAM branching as the source for Lower Duman, which is part of the basic design, is possible without complicated involvement with the facilities already constructed by the residents.
- By installing a gate valve in the transmission line from Upper Duman (Installation just before the supply line to Lower Duman by the Indonesian side), Upper Duman and Lower Duman can be separated as different systems. Therefore, this can contribute to increase the water supply not only to Lower Duman but also to Upper Duman through the community-constructed water supply facilities in Upper Duman.

As a result, seven systems for six villages were selected for the basic design, as outlined in Table below.

Table 3-6 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(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

(2) Overall Plan

1) Population Served

Based on the results of the development study, the population served and ratio of house

connections and public tap users are summarized in the Table below for the target year, 2011.

Table 3-7 Service Population (2011)

Village	Service Population	House Connection		Public Taps	
		(%)	Population	(%)	Population
Kuranji	1,894	30	568	70	1,326
Bajur	6,130	40	2,452	60	3,678
Duman(lower)	1,026	30	308	70	718
Bagik Papan	3,182	20	636	80	2,546
Selaparang	3,433	80	2,746	20	687
Tarus	3,977	80	3,182	20	795
Total	19,642		9,892		9,750

Table 3-8 Water Consumption (2011) (L/s)

Village	Water Consumption					Water Demand	
	Domestic Use			Public Use	Total	Daily Average	Daily Max Average
	House Con.	Public Tap	Total				
Kuranji	0.39	0.46	0.85	0.17	1.02	1.23	1.35
Bajur	1.70	1.28	2.98	0.60	3.68	4.3	4.73
Duman(lower)	0.21	0.25	0.46	0.09	0.55	0.66	0.73
Bagik Papan	0.44	0.88	1.33	0.27	1.60	1.91	2.10
Selaparang	1.91	0.24	2.15	0.43	2.58	3.09	3.40
Tarus	2.21	0.28	2.49	0.50	2.99	3.58	3.94
Total			10.25	2.06	12.31	14.77	16.25

2) Design Conditions

The facility design applied the following design conditions in accordance with the Cipta Karya's standard design for rural water supply ("*Petunjuk Teknis Pembangunan Sarana Penyediaan Air Bersih dan Penyehatan Lingkungan Pemukian Perdesaan*", December 1998.

Table 3-9 Design Conditions

Item	Guideline
1. Domestic use	1) Water demand of house connections 60 L/c/d 2) Water demand of public taps 30 L/c/d
2. Public use	20% of the domestic use
3. System loss	20% of the basic demand
4. Daily maximum demand	1.1 times the daily average demand
5. Maximum hourly demand	2 times the average hourly demand
6. House connections	5 persons per one connection
7. Public taps	Service area within a radius of 50m per public tap House connections are branched from service pipe to public tap.
8. Effective head of water distribution pipe	10m water head at end point of distribution pipe 5m water head at branch point of service pipe to house connection
9. Service reservoir	1/3 of the daily maximum demand

3) Water Supply System

The water supply system was designed taking into consideration the following points, in addition to those mentioned above:

- 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 pipe diameter 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.

Water supply systems are classified into the following three types in accordance with the water source and landform.

Type-1: Gravity supply from single connection point on the existing PDAM pipeline
Area Name: Kuranji, Bajur, Duman (Lower)

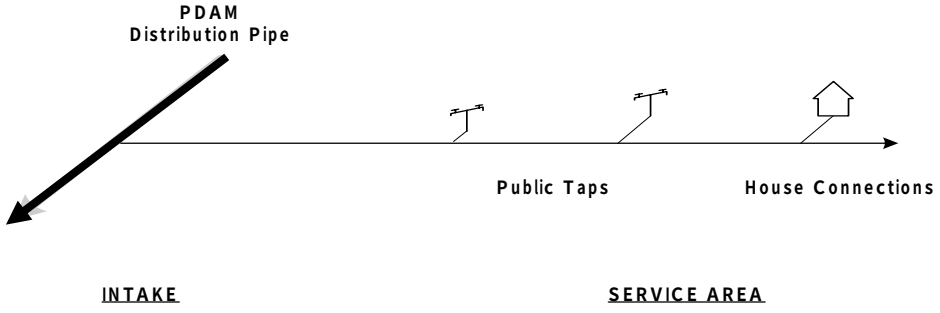


Figure 3-1 Type-1 system

Type-2: Supply from spring by gravity through reservoir
Area Name: Bagik Papan, Selaparang

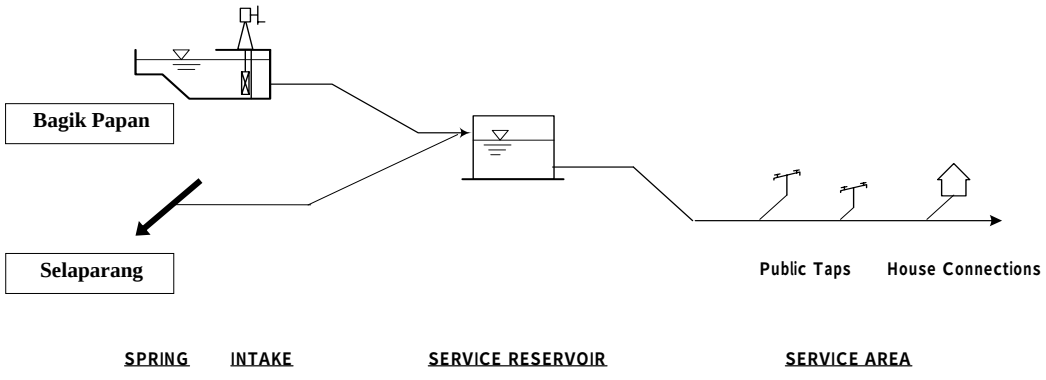


Figure 3-2 Type-2 system

Type-3: Supply from spring with uplift to reservoir by pumping then gravity distribution

Area Name: Tarus

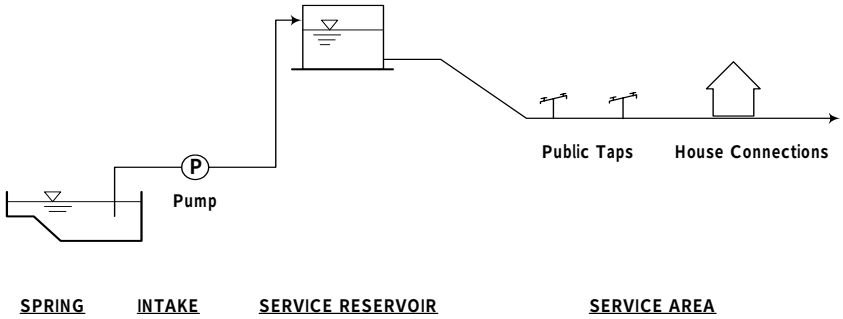


Figure 3-3 Type-3 system

4) Facility design

The facility design is summarized below.

a) Intake weir (Broncaptering)

The facility consists of an intake weir and grit chamber constructed with reinforced concrete. The intake weir is provided with a movable bar screen and stoplog slots for maintenance purposes. The sedimentation tank is provided with a sand flush gate valve and movable mesh screen to trap floating leaves.

b) Collecting channel (Broncaptering)

The collecting channel is constructed with reinforced concrete and provided with a cover wall and inspection hole.

c) Service reservoir

The service reservoir is constructed with reinforced concrete and is cylindrical in shape. The effective depth is 2 m to 3 m with a capacity equivalent to 1/3 of the daily maximum demand. A turbine type flow meter is installed at the outlet pipe for water distribution of the service reservoir. For the Duman upper system, a distribution tank functioning as water allocation for villages and a chlorine dosing tank are mounted on service reservoirs.

d) Break pressure tank (BPT)

In cases where the water pressure of the distribution pipe increases to 0.5 MPa or higher due to the local landforms, a Break Pressure Tank (BPT) is provided at a suitable location along the pipe to regulate pressure in consideration of leakage problems. The tank is constructed with reinforced concrete and installed with a float valve at the inlet pipe to maintain the water

level.

e) Transmission/Distribution pipe

Material selected for transmission and distribution pipes are rigid polyvinyl chloride pipe and galvanized steel pipe, respectively. Elbows and tees are protected against thrust force with concrete blocks. The pipe is placed 60 cm below the ground surface.

f) Public taps

The public taps are equipped with two (2) faucets, a water meter and apron with drain ditch connected to the public drain system.

g) Pumping facility

The pump selected is a single suction volute type. Pump operation is carried out by an operator on the basis of water level information from the service reservoir. The pump stops automatically under conditions of low water level in the suction pit, high water level in service reservoir and current overload of the power system.

(3) Facility Plan

The proposed facility plans for each scheme are summarized below:

1) Kuranji Scheme (Design flow: 1.35 L/s)

Facility	Specification	Quantity	Remarks
a. Intake	Source: Existing PDAM pipe	1 no.	PVC pipe 200mm dia.
			Valve, Flow meter
b. Transmission	-		
c. Distribution			
c.1 Distri. Pipe	Material: PVC		
	Dia.: 100 ~ 25 mm	2.31 km	
d. Service			
d.1 H.Connect.	Dia.: 13 mm	114 nos.	
d.2 P.Taps	Dia.: 13 mm, 2 faucet type	31 nos.	Water meter

2) Bajur Scheme (Design flow: 4.73 L/s)

Facility	Specification	Quantity	Remarks
a. Intake	Source: Existing PDAM pipe		
	- Bajur	1 no.	PVC pipe 250mm dia. Valve, Flow meter
	- Poak Dodol	1 no.	PVC pipe 200mm dia. Valve, Flow meter
b. Transmission	-		
c. Distribution			
c.1 Distri. Pipe	Material: PVC		
	- Bajur		
	Dia.: 100 ~ 25 mm	2.16km	
	- Poak Dodol		
	Dia.: 40 mm	0.14 km	
d. Service			
d.1 H.Connect.	Dia.: 13 mm		
	- Bajur	398	
	- Poak Dodol	92	
d.2 P.Taps	Dia.: 13 mm, 2 faucet type		Water meter
	- Bajur	25	
	- Poak Dodol	4	

3) Duman Lower Scheme (Design flow: 0.73 L/s)

Facility	Specification	Quantity	Remarks
a. Intake	Source: Existing PDAM pipe	1 no.	PVC pipe 150mm dia.
a.1 BPT	Reinforced concrete		
	Cap.: 5.8 m^3、 Reinforced concrete	1	Flow meter
b. Transmission	-		
c. Distribution			
c.1 Distri. Pipe	Material: PVC		
	Dia.: 75 mm	1.81 km	Valve×2
d. Service			
d.1 H.Connect.	Dia.: 13 mm	0	
d.2 P.Taps	Dia.: 13 mm, 2 faucet type	0	Water meter

4) Bagik Papan Scheme (Design flow: 2.10 L/s)

Facility	Specification	Quantity	Remarks
a. Intake	Source: Spring		
a.1 Collec. channel	Reinforced concrete	1 no.	
b. Transmission			
b.1 Trans. pipe	Material: GSP		
	Dia.: 80 mm	2.23 km	
c. Distribution			
c.1 Distri. Pipe	Material: PVC		
	Dia.: 75 ~ 25 mm	3.86 km	
c.2 S. Reservoir	Cap.: 60 m^3、 Reinforced concrete,	1	Flow meter
d. Service			
d.1 H.Connect.	Dia.: 13 mm	127	
d.2 P.Taps	Dia.: 13 mm, 2 faucet type	34	Water meter

5) Selaparang Scheme (Design flow: 3.40 L/s)

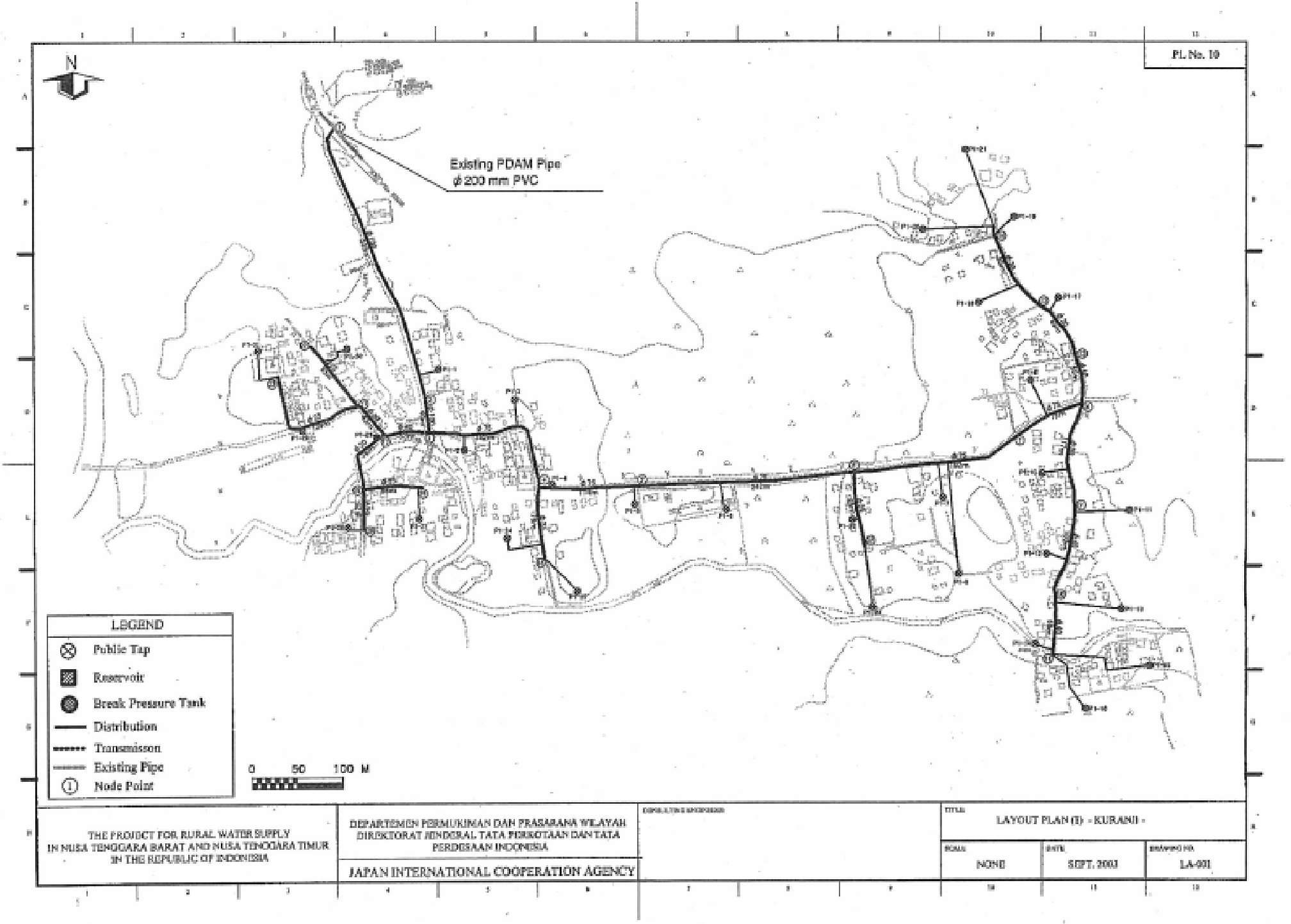
Facility	Specification	Quantity	Remarks
a. Intake	Source: Spring		PDAM existing facility
b. Transmission			
b.1 Trans. pipe	Material: PVC Dia.: 75 mm	3.35 km	Capacity of pipe:13.95 l/s
	Material: GSP Dia.: 50 mm	1.05 km	Including water supply for other villages.
c. Distribution			
c.1 Distri. Pipe	Material: PVC		
	Dia.: 100 ~ 30 mm	1.16 km	
c.2 S. Reservoir	Cap.: 100 m^3、 Reinforced concrete,	1	Flow meter
d. Service			
d.1 H.Connect.	Dia.: 13 mm	45	
d.2 P.Taps	Dia.: 13 mm, 2 faucet type	0	

6) Tarus Scheme(Design flow: 3.94 L/s)

Facility	Specification	Quantity	Remarks
a. Intake	Source: Spring		PDAM existing facility
a.1 Pump	Single suction volute pump		
	49.3～52 m x 283 l/min x 5.5～7.5 kw	2 units	Standby 1 unit
	78.0 m x 410 l/min x 15 kw	2 units	Standby 1 unit
b. Transmission			
b.1 Trans. pipe	Material: GSP		
	Dia.: 125 mm	1.37 km	
c. Distribution			
c.1 Distri. Pipe	Material: GSP Dia.: 125 ~ 100 mm	0.82 km	
	Material: PVC Dia.: 100 ~ 25 mm	4.29 km	
c.2 S. Reservoir	Reinforced concrete, cylindrical shape		
	Cap.: 120 m^3、 D7.8 x H2.65 m	1	Flow meter
d. Service			
d.1 H.Connect.	Dia.: 13 mm	636	
d.2 P.Taps	Dia.: 13 mm, 2 faucet type	93	Water meter

3-2-3 Basic Design Drawing

Basic design drawings for the 6 systems are shown in following pages.



Pl. No. 19

THE PROJECT FOR RURAL WATER SUPPLY IN NUSA TENGGARA BARAT AND NUSA TENGGARA TIMUR IN THE REPUBLIC OF INDONESIA

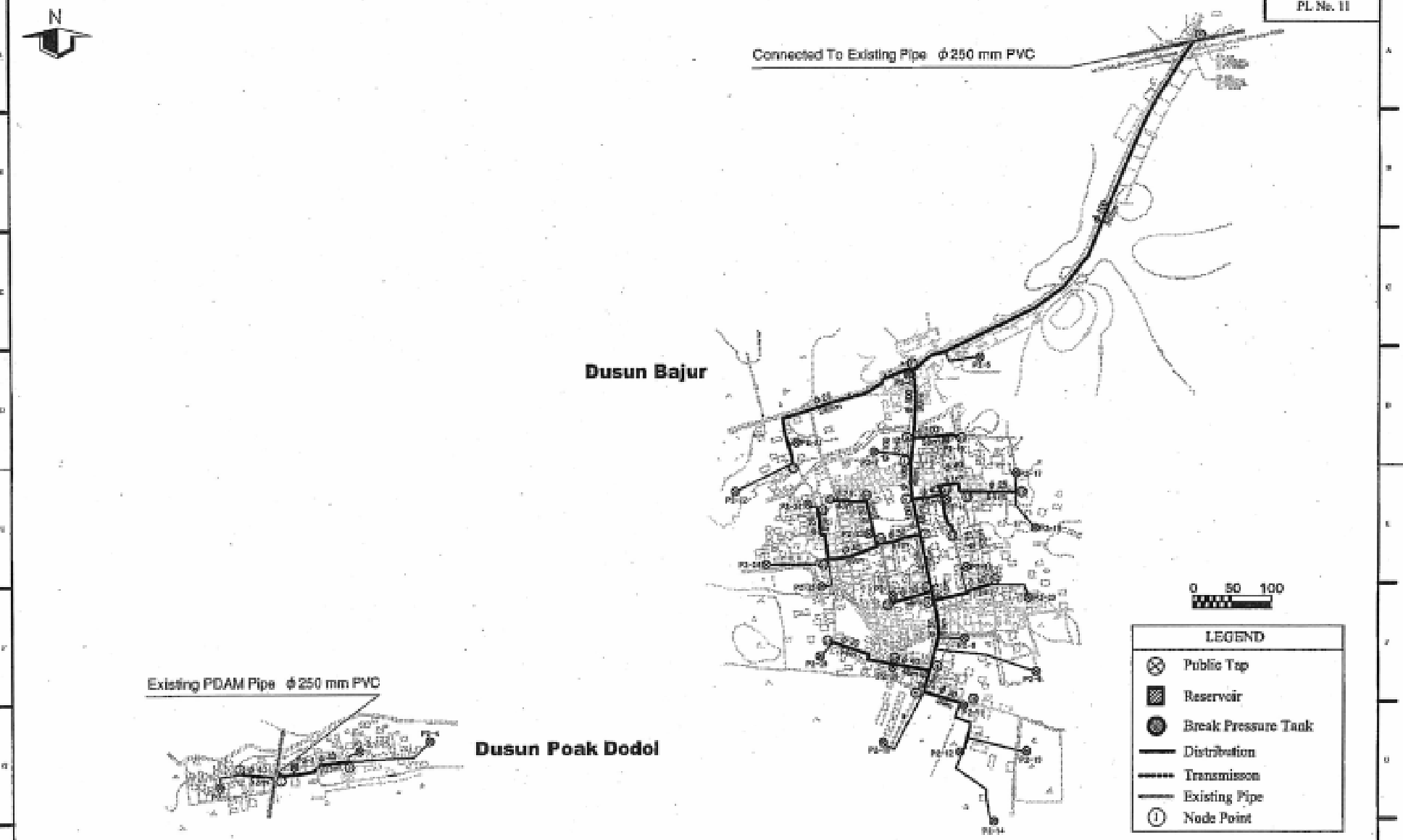
DEPARTEMEN PERMUKIMAN DAN PRASARANA WILAYAH
DIREKTORAT JENDERAL TATA PERKOTAAN DAN TATA PERDESAAN INDONESIA

JAPAN INTERNATIONAL COOPERATION AGENCY

TITLE: LAYOUT PLAN (I) - KUPANG -

SCALE	DATE	DRAWING NO.
NONE	SEPT. 2003	LA-001

PL No. 11



THE PROJECT FOR RURAL WATER SUPPLY IN NUSA TENGGARA BARAT AND NUSA TENGGARA TIMUR IN THE REPUBLIC OF INDONESIA	DEPARTEMEN PERMUKIMAN DAN PRASARANA WILAYAH DIREKTORAT JENDERAL TATA PERKOTAAN DAN TATA PERDESAAN INDONESIA JAPAN INTERNATIONAL COOPERATION AGENCY		TITLE: LAYOUT PLAN (2) - BAJUR -	
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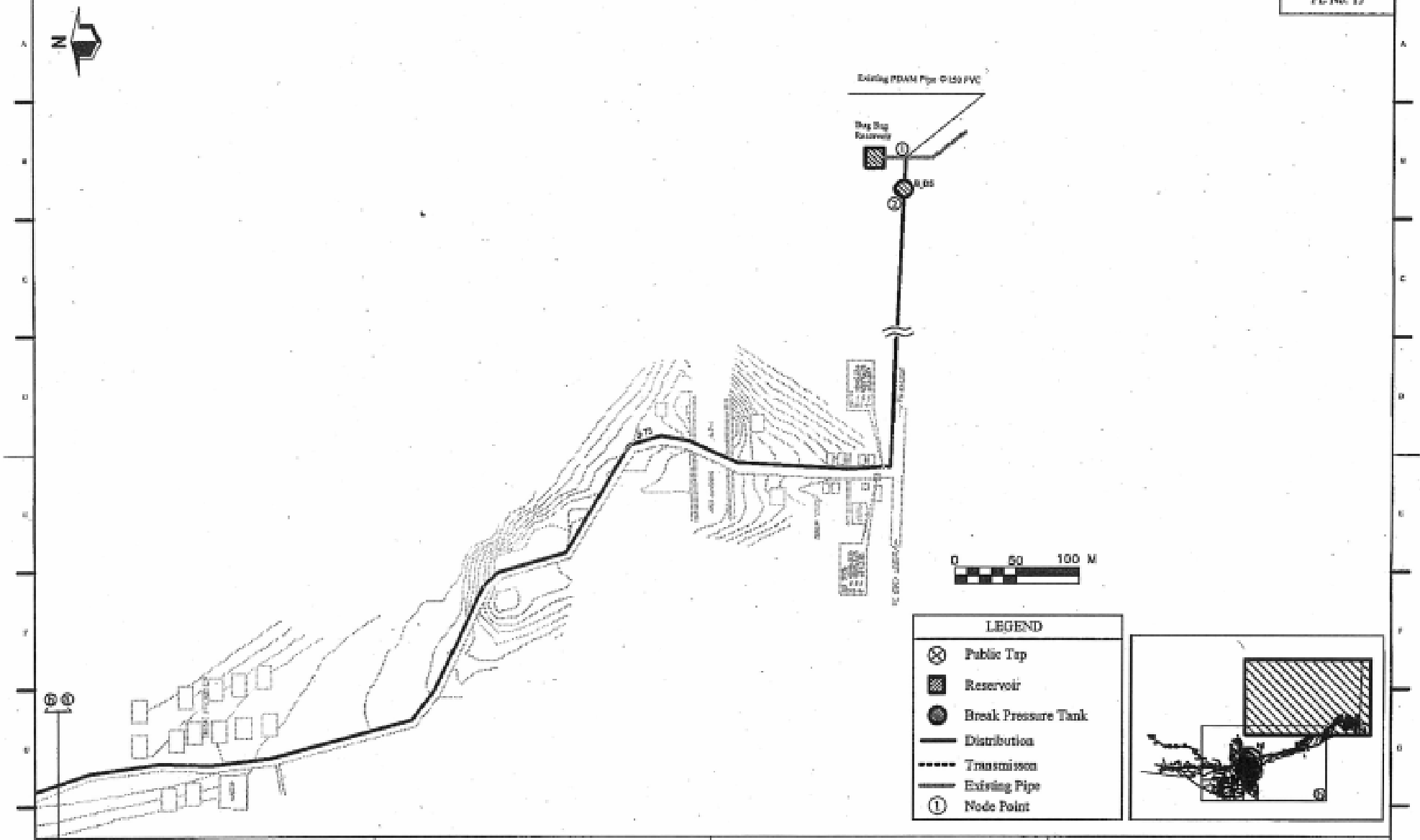
				DRAWING NO.: LA-002



THE PROJECT FOR RURAL WATER SUPPLY IN NUSA TENGGARA BARAT AND NUSA TENGGARA TIMUR IN THE REPUBLIC OF INDONESIA

DEPARTEMEN PERMUKIMAN DAN PRASARANA WILAYAH
DIREKTORAT JENDERAL TATA PERKOTAAN DAN TATA PERDESAAN INDONESIA

JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS ENGINEERING

TITLE: LAYOUT PLAN (4) - DUMAN LOWER (1/2) -

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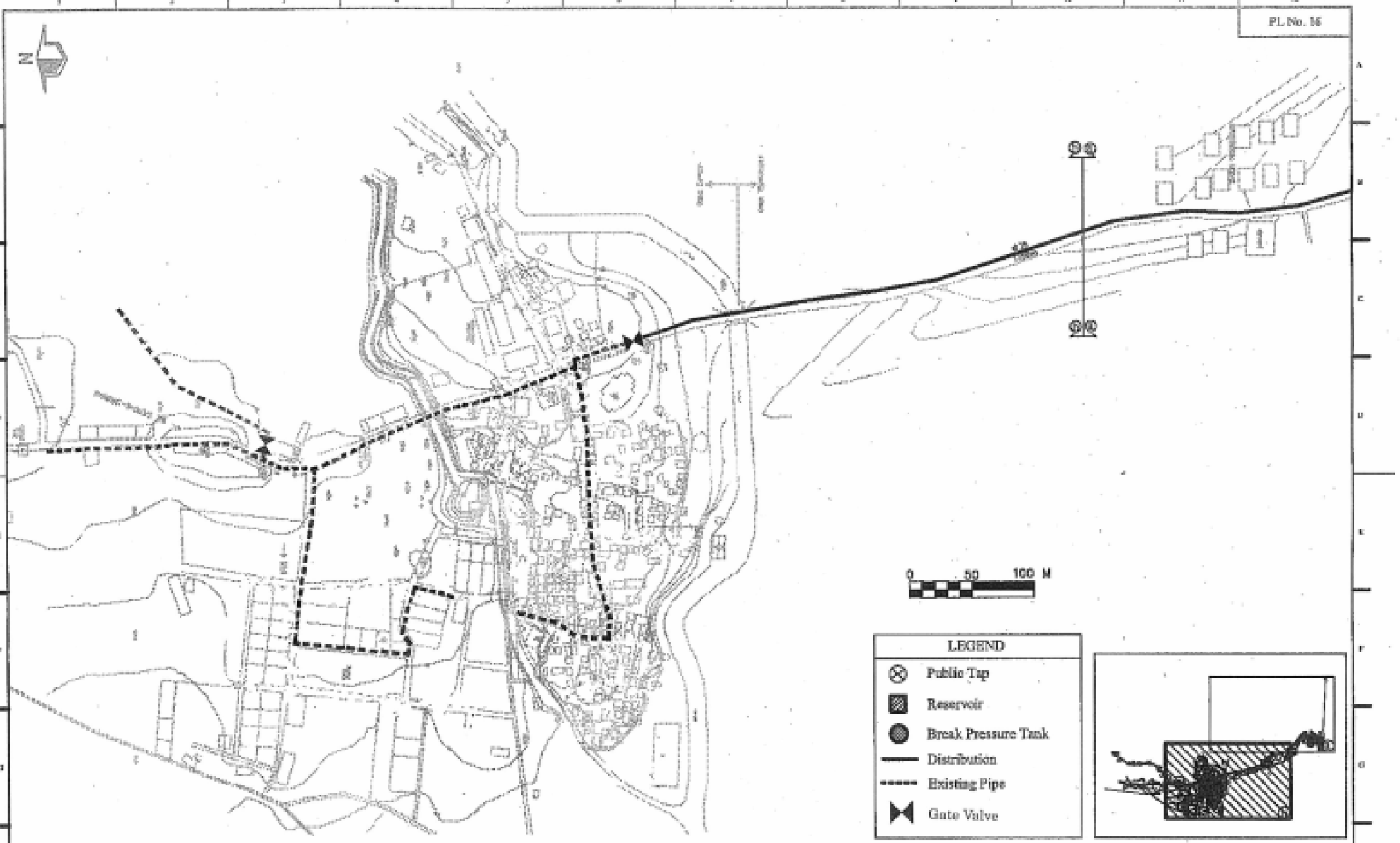
NONE	SEPT. 2003	LA-006

PL No. 16



THE PROJECT FOR RURAL WATER SUPPLY IN NUSA TENGGARA BARAT AND NUSA TENGGARA TIMUR IN THE REPUBLIC OF INDONESIA

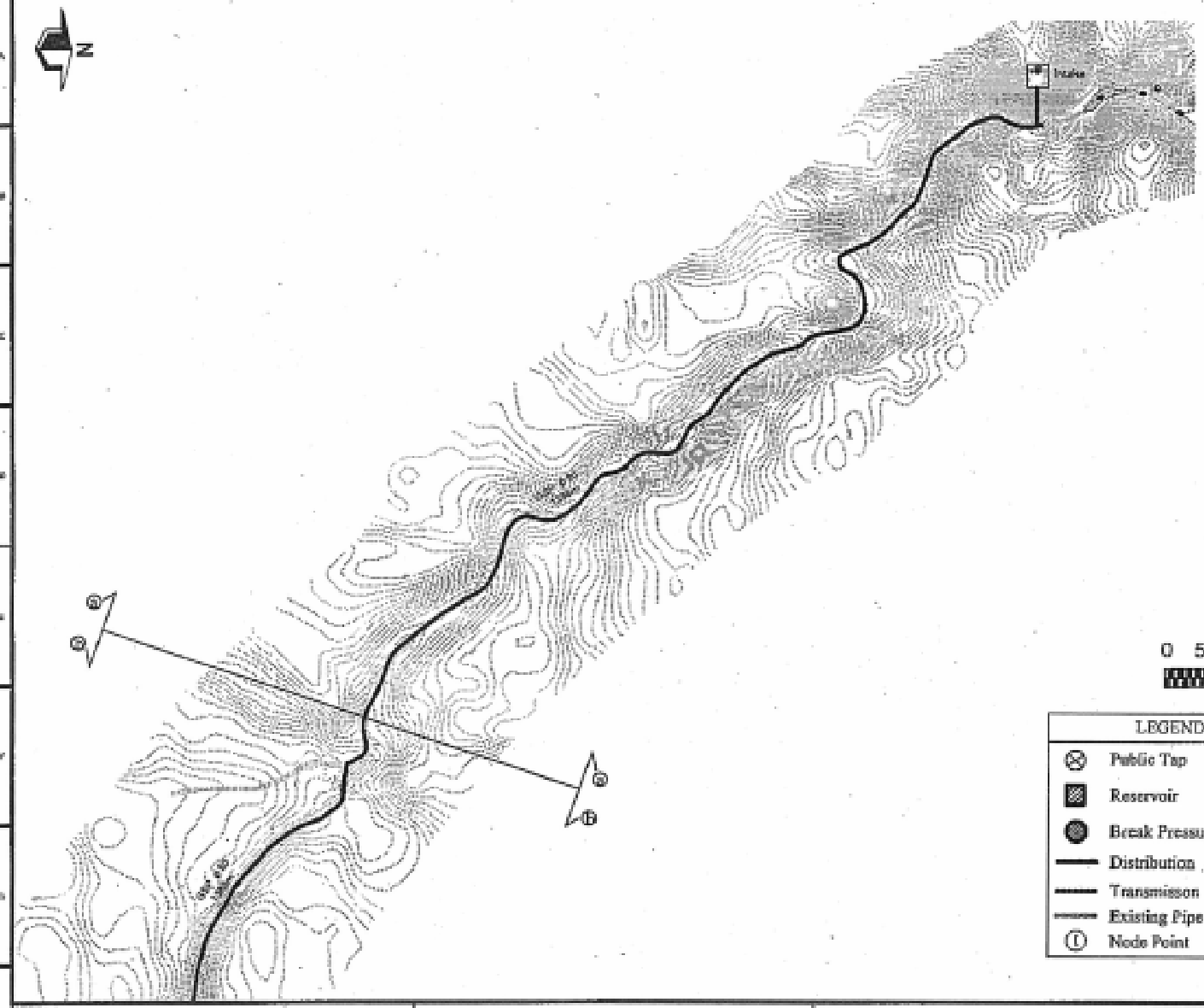
DEPARTEMEN PERMUKIMAN DAN PRASARANA WILAYAH
DIREKTORAT JENDERAL TATA PERKOTAAN DAN TATA PEDESAAN INDONESIA

JAPAN INTERNATIONAL COOPERATION AGENCY

TITLE: LAYOUT PLAN (4) - DUMAN LOWER (2/2) -

SCALE: 1/2000 | DATE: SEPT. '2 | DRAWING NO.: LA-07

PL No. 17



THE PROJECT FOR RURAL WATER SUPPLY
IN NUSA TENGGARA BARAT AND NUSA TENGGARA TIMUR
IN THE REPUBLIC OF INDONESIA

DEPARTEMEN PERMUKIMAN DAN PRASARANA WILAYAH
DIREKTORAT JENDERAL TATA PERKOTAAN DAN TATA PERDESAAN INDONESIA

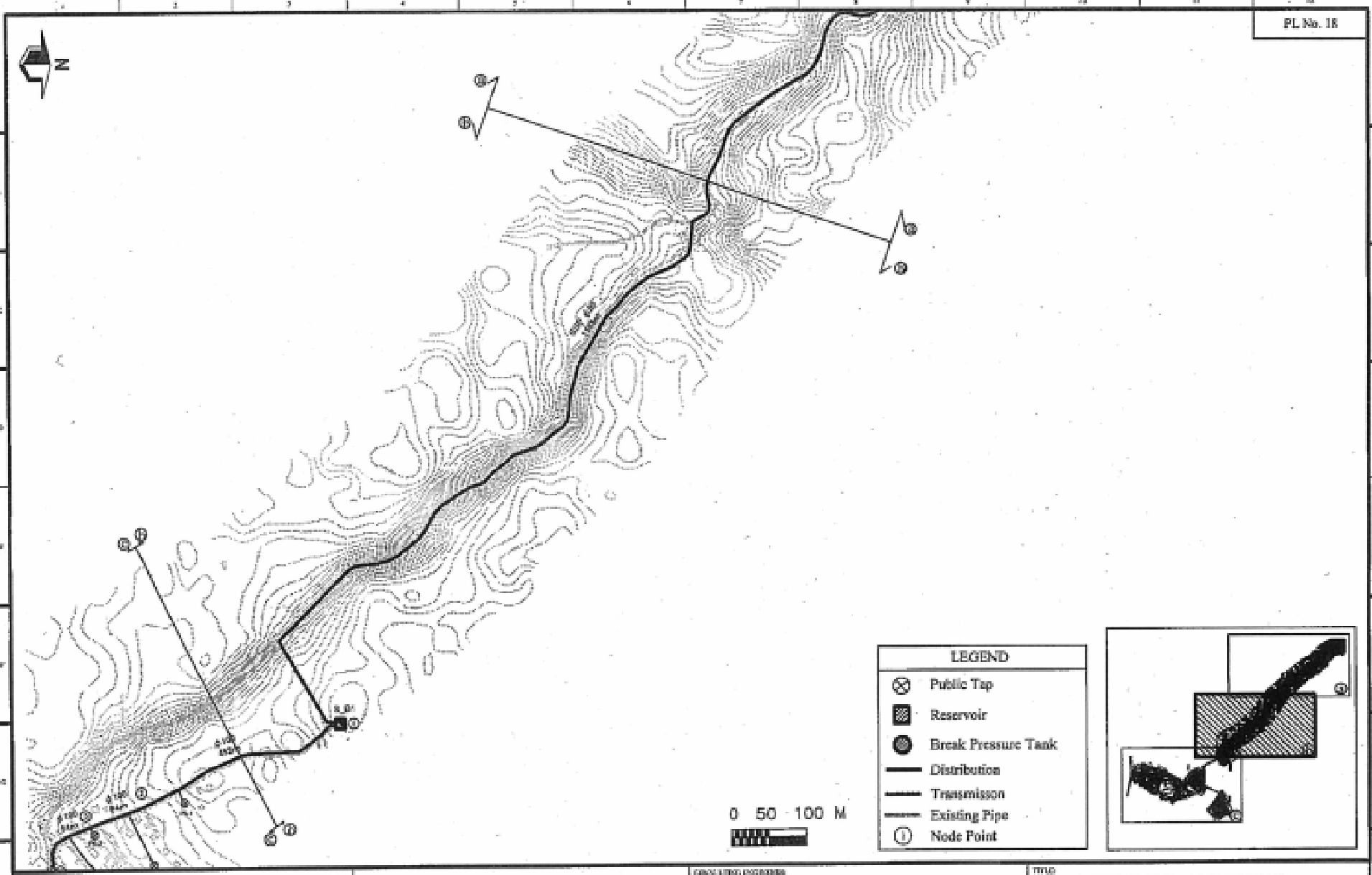
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTING ENGINEERS

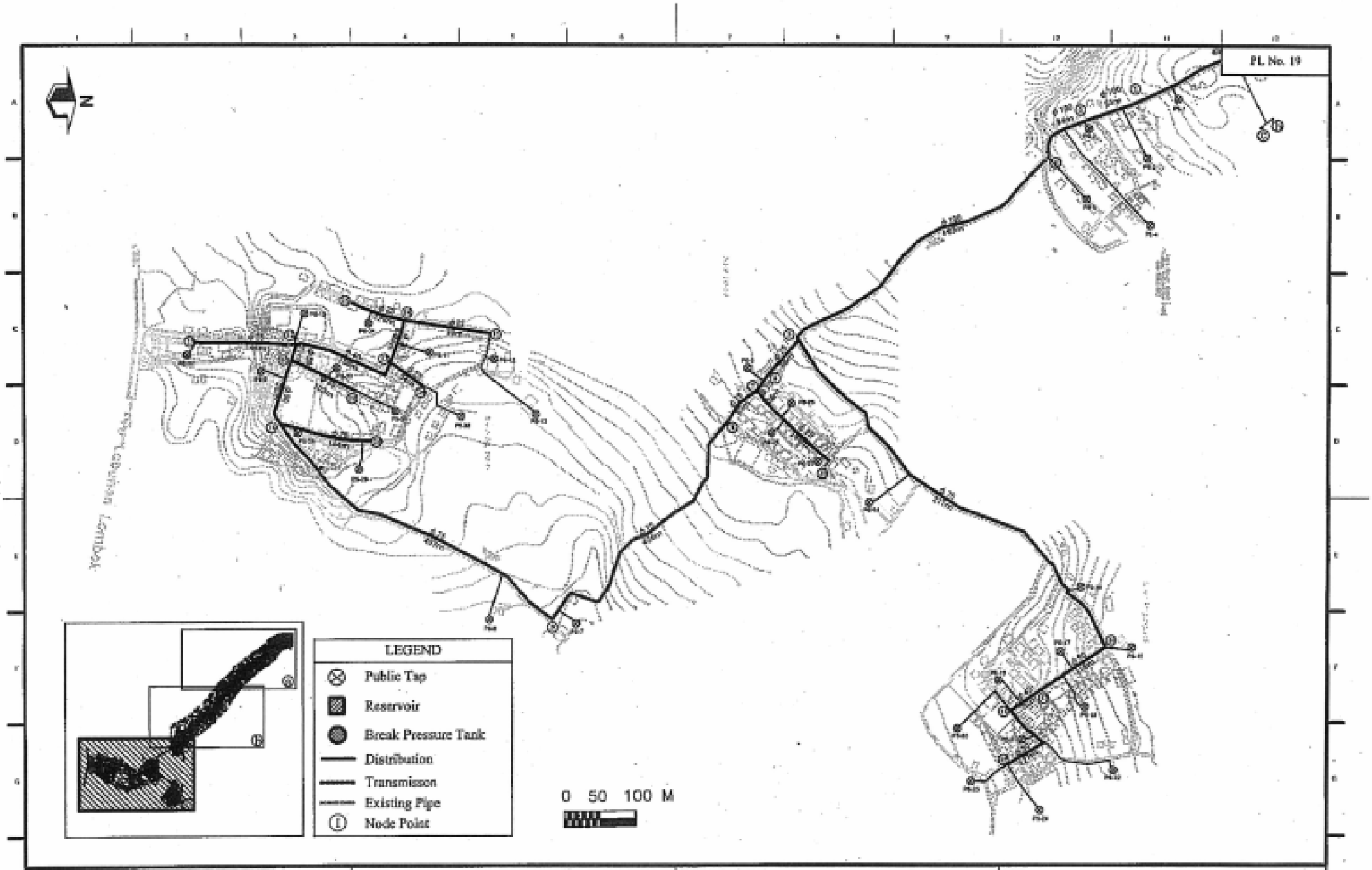
TITLE: LAYOUT PLAN (5) - BAGIKPAPAN (1/3)-

SCALE	DATE	DRAWING NO.
NONE	SEPT. 2003	LA-508

PL No. 18



THE PROJECT FOR RURAL WATER SUPPLY IN NUSA TENGGARA BARAT AND NUSA TENGGARA TIMUR IN THE REPUBLIC OF INDONESIA	DEPARTEMEN PERMUKIMAN DAN PRASARANA WILAYAH DIREKTORAT JENDERAL TATA PERKOTAAN DAN TATA PERDESAAN INDONESIA JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTING ENGINEERS	TITLE: LAYOUT PLAN (5) - BAGIKPAPAN (2/3) - -
			SCALE: NONE / DATE: SEPT. 2003 / DRAWING NO.: LA-009



THE PROJECT FOR RURAL WATER SUPPLY IN NUSA TENGGARA BARAT AND NUSA TENGGARA TIMUR IN THE REPUBLIC OF INDONESIA	DEPARTEMEN PERMUKIMAN DAN PRASARANA WILAYAH DIREKTORAT JENDERAL TATA PERKOTAAN DAN TATA PERDESAAN INDONESIA JAPAN INTERNATIONAL COOPERATION AGENCY		TITLE: LAYOUT PLAN (5) - BAGIKPAPAN (3/3) -
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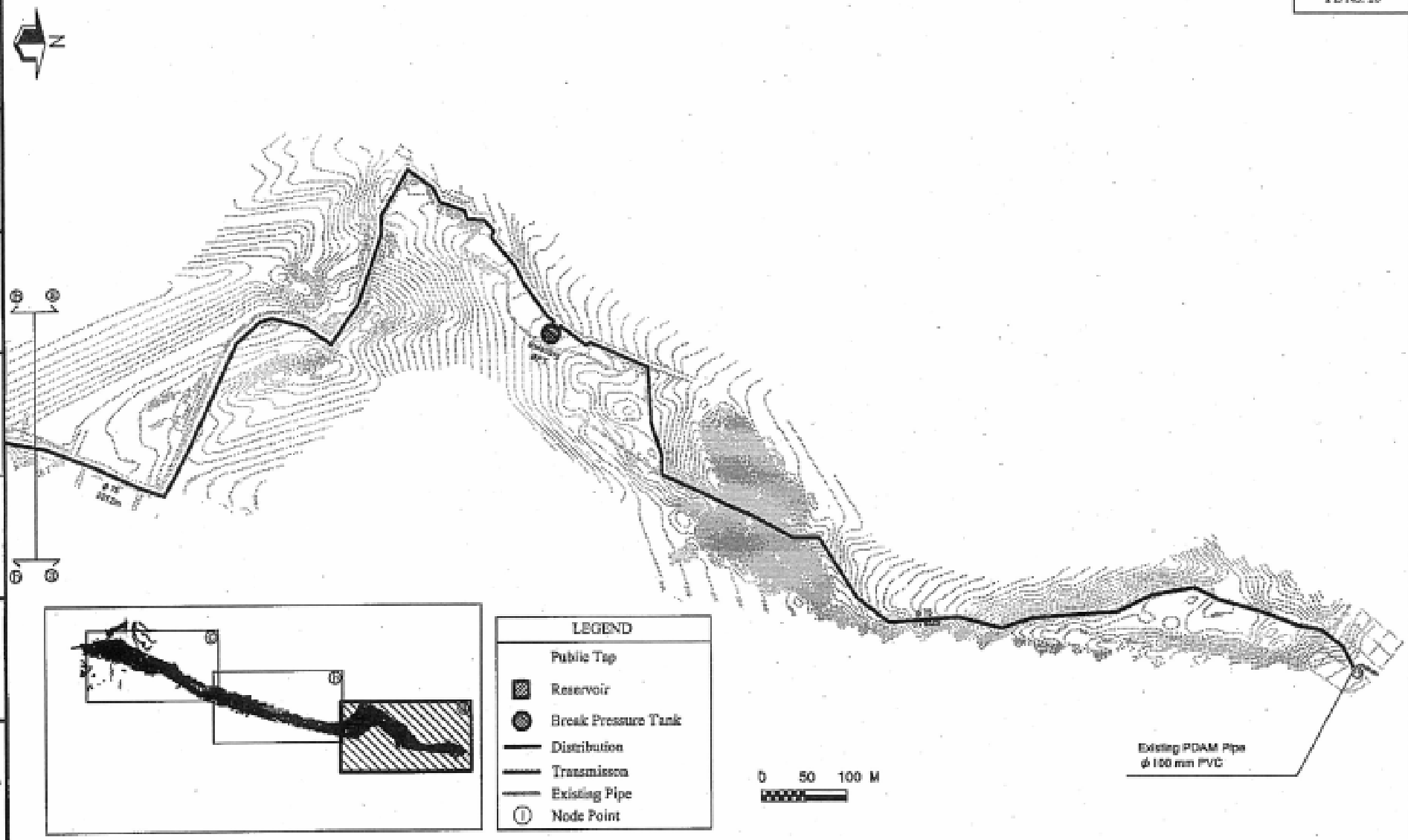
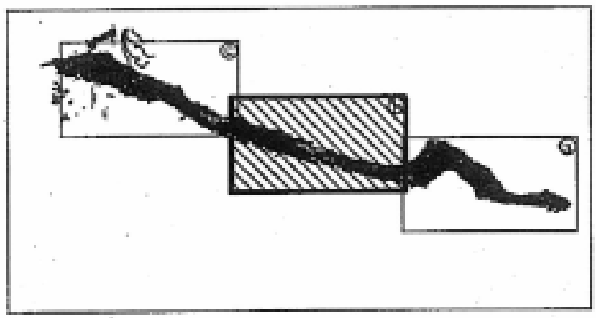


THE PROJECT FOR RURAL WATER SUPPLY IN NUSA TENGGARA BARAT AND NUSA TENGGARA TIMUR IN THE REPUBLIC OF INDONESIA	DEPARTEMEN PERMUKIMAN DAN PRASARANA WILAYAH DIREKTORAT JENDERAL TATA PERKOTAAN DAN TATA PERDESAAN INDONESIA JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTING ENGINEERS:	TITLE: LAYOUT PLAN (6) - SELAPARANG (1/3) -
			SCALE: NONE / DATE: SEPT. 2003 / DRAWING NO.: LA-011

Pl. No. 21



LEGEND

- Public Tap
- Reservoir
- Break Pressure Tank
- Distribution
- Transmission
- Existing Pipe
- ① Node Point

0 50 100 M

THE PROJECT FOR RURAL WATER SUPPLY IN NUSA TENGGARA BARAT AND NUSA TENGGARA TIMUR IN THE REPUBLIC OF INDONESIA

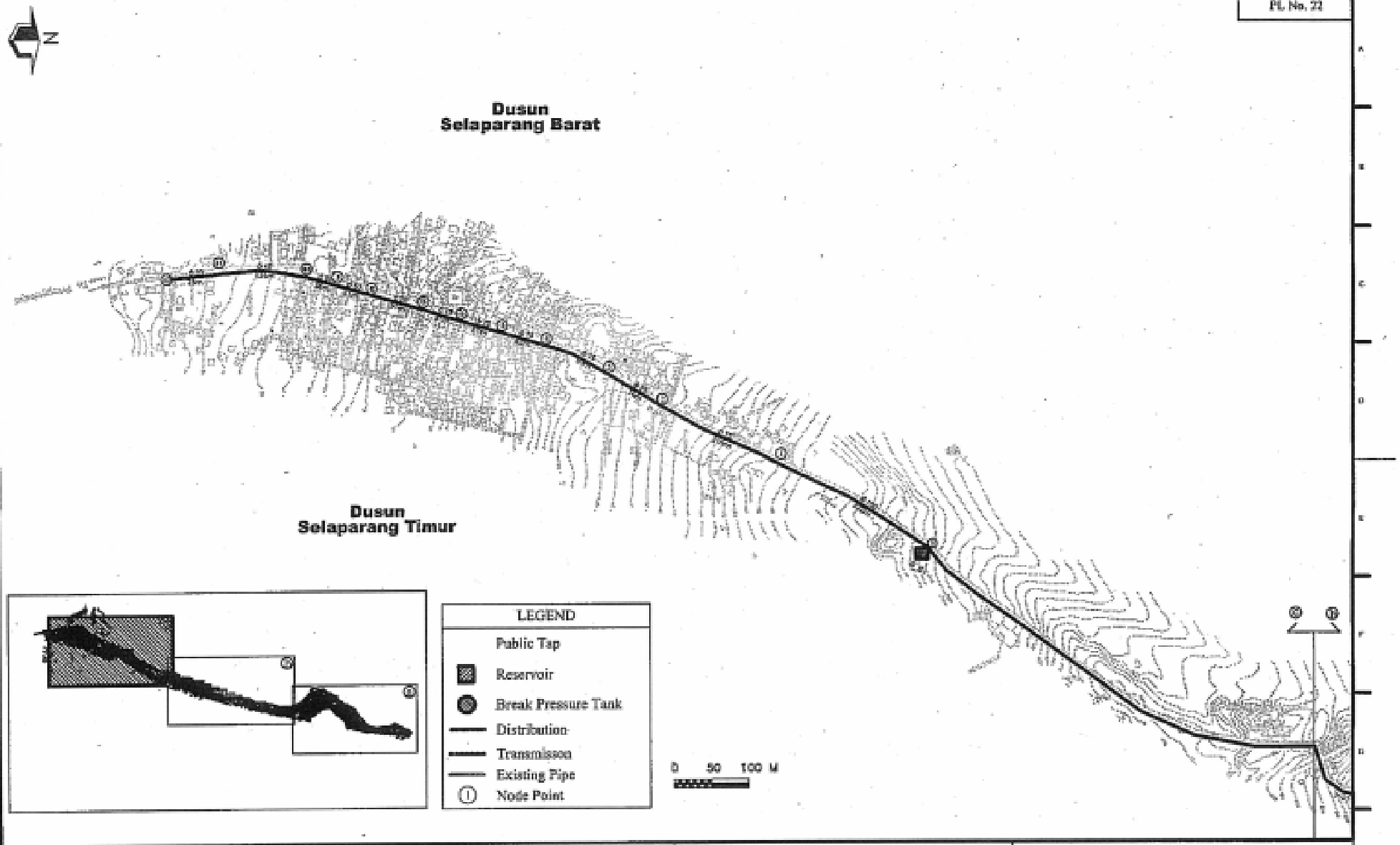
DEPARTEMEN PERMUKIMAN DAN PRASARANA WILAYAH
DIREKTORAT JENDERAL TATA PERKOTAAN DAN TATA PERDESAAN INDONESIA

JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANT (S EXPLORE)

TITLE: LAYOUT PLAN (6) - SELAPARANG (2/3) -

SCALE	DATE	DRAWING NO.
NONE	SEPT. 2003	LA-012



THE PROJECT FOR RURAL WATER SUPPLY IN NUSA TENGGARA BARAT AND NUSA TENGGARA TIMUR IN THE REPUBLIC OF INDONESIA

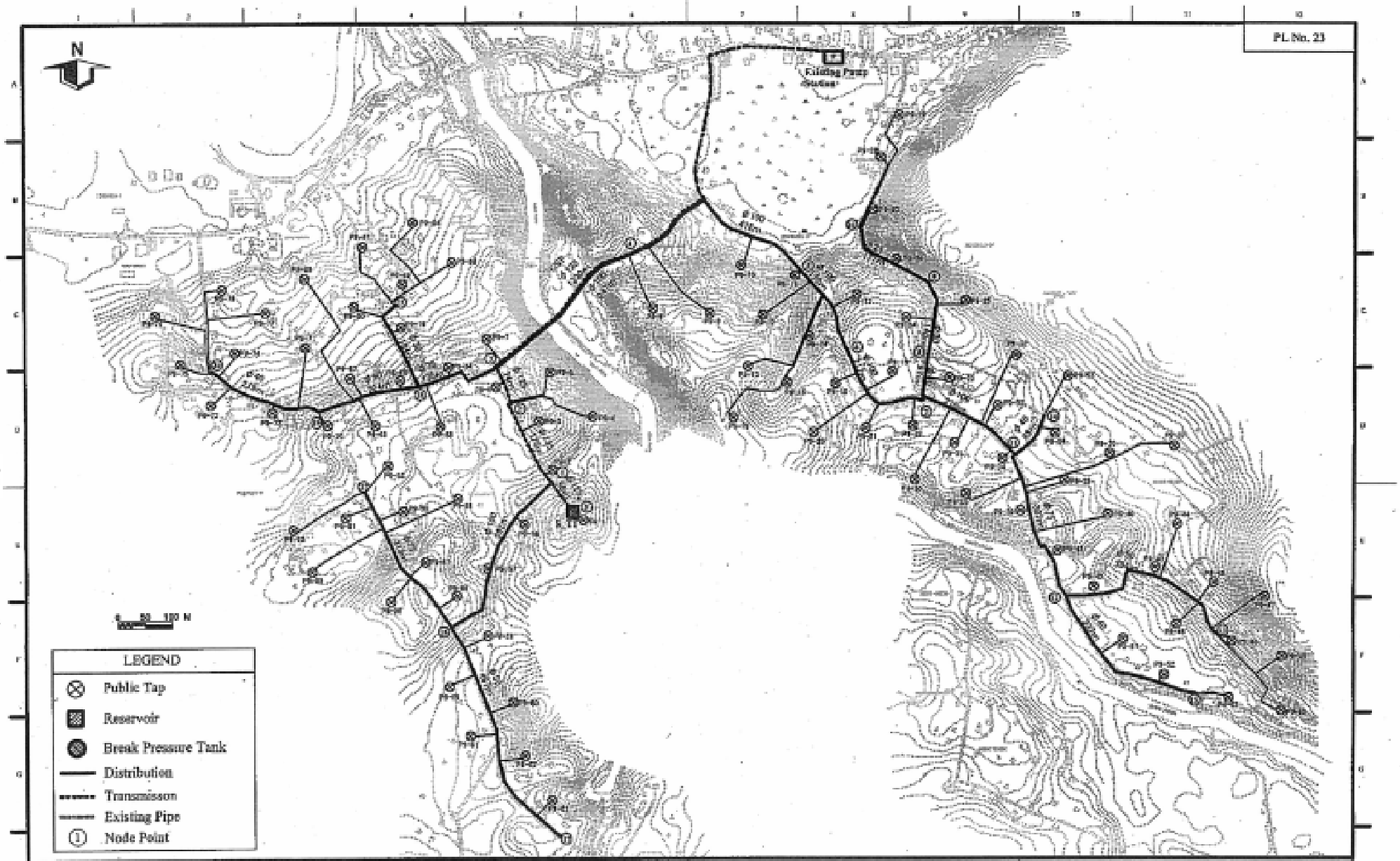
DEPARTEMEN PERMUKIMAN DAN PRASARANA WILAYAH
DIREKTORAT JENDERAL TATA PERKOTAAN DAN TATA PERDESAAN INDONESIA

JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTING ENGINEERS

TITLE: LAYOUT PLAN (6) - SELAPARANG (3/3)-

SCALE	DATE	DRAWING NO.
NONE	SEPT. 2003	LA-013



PL No. 23

THE PROJECT FOR RURAL WATER SUPPLY IN NUSA TENGGARA BARAT AND NUSA TENGGARA TIMUR IN THE REPUBLIC OF INDONESIA

DEPARTEMEN PERMUKIMAN DAN PRASARANA WILAYAH
DIREKTORAT JENDERAL TATA PERKOTAAN DAN TATA PERDESAAN INDONESIA

JAPAN INTERNATIONAL COOPERATION AGENCY

TITLE: LAYOUT PLAN (7) - TARUS -

SCALE	DATE	DRAWING NO.
NONE	SEPT. 2003	LA-014

3-2-4 Implementation Plan

3-2-4-1 Implementation Policy

The project is implemented on the basis of the following policies, under the Grant-Aid of the Japanese Government:

1) Directorate of Water Supply Development (Cipta Karia) under the Directorate General of Human Settlement in Ministry of Public Works is responsible for execution of the project. The provincial Settlement and Regional Infrastructure (Dinas) is responsible for supervision of the project. The district Public Works Department (The district PU) of Lombok Barat District, Lombok Timur District, and Kupang District are implementation agencies of the project.

2) After agreement of Exchange of Notes (E/N) for implementation of the project between Governments of Japan and Indonesia, the Cipta Karia will commence preparation works including the Dinas of NTB and NTT Provinces, and the district PUs of Lombok Barat District, Lombok Timur District, and Kupang District based on the MOU.

3) After agreement of E/N for implementation of the project between the Governments of Japan and Indonesia, a consulting firm of Japan will make an agreement for detailed design, preparation of tender documents, assisting tendering works and construction supervision for the project.

4) The Construction Manager (CMR) will make a contract for construction works with Cipta Karia. CMR takes responsibility to complete the construction works at its own risk. The task of the CMR is not only management of the construction, but also control of Local Subcontractors' works appropriately under the support of consultant from the standpoint of the client's side.

5) After completion of construction works, water supply facilities will be handed over to the Cipta Karia. The operation and maintenance on water supply facilities will be carried out by the Regional Drinking Water Enterprise (PDAM) or the Water User's Associations (WUA) in Village.

3-2-4-2 Implementation Conditions

Water supply facilities will be constructed by local sub-contractors selected by the

construction manager (CMR), but the selection will be made from local contractors registered under 3 groups (Association of Major Construction Companies: AKI, Association of Rural Construction Companies: GAPENSI and Association of Water Supply Construction Companies) who are members of the Association of National Construction Companies (LPJK). Moreover, the CMR will prepare a report on the selection process and results, and submit it to the client, JICA and the consultant.

3-2-4-3 Scope of Works

(1) Works to be executed by the Japanese government

1) Detailed design and preparation of tender documents
2) Construction works of the proposed water supply facilities except house connections.

(2) Undertakings by the Indonesian government

1) Land acquisition for construction of water supply facilities (Service reservoirs, Break pressure tanks, Public taps, etc.)
2) Cutting and compensation of trees along transmission/distribution pipeline routes
3) Procurement and installation of service pipes including water meters for house connections (see Figure 2.2.4.1)
4) Provision of necessary arrangements for tax exemption of construction material and equipment
5) Provision of necessary arrangements for permission of construction work

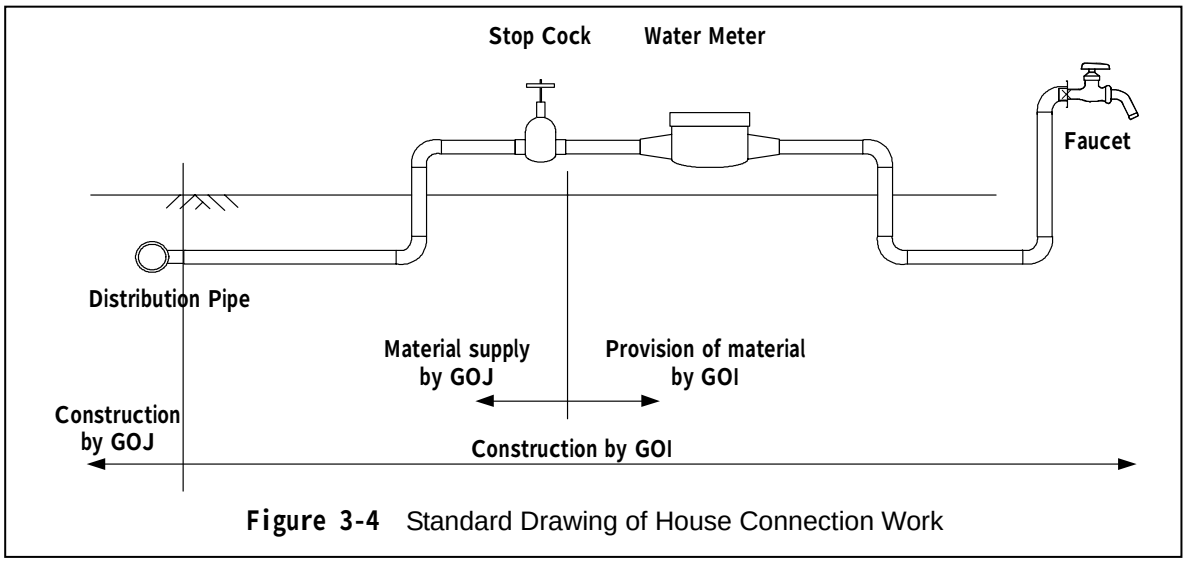


Figure 3-4 Standard Drawing of House Connection Work

3-2-4-4 Construction Supervision Plan

This project is expected to be implemented through the At-Risk CM method. From the objectives of adopting a CM method, which are avoiding overlapping of construction supervision and simplification of construction organizational structure, construction works will be supervised by the CMR under the support of the consultant. The consultant will dispatch a project manager during commencement of construction, and spot supervisions will be conducted mainly to manage and supervise payment confirmations. Also, the consultant will support the CMR on construction supervision, preparation/submission of monthly progress reports, and procedures for design modifications.

The organization of the CMR will be simultaneous construction supervision at multiple sites, since supervision engineers, of which one is responsible for structures construction and another for plumbing, will be allocated each to Mataram and Kupang

3-2-4-5 Quality Control Plan

Quality control plan for the project applies to concrete work, pipe laying work and equipment. The quality control items are shown in Table below.

Table 3-10 Quality Control Plan

Item	Test	Method
1. Concrete work	- Slump test - Compression test	- one time per 50 m^3 - ditto (7days and 28 days)
2. Pipe laying work	- Hydraulic test	- 1.5 times maximum dynamic water pressure of pipes
3. Equipment	- Shop inspection	- Witness of inspection - Check/review of test report

3-2-4-6 Procurement Plan

Available material in Indonesia will be utilized as much as possible. Major material will be procured are shown in Table below.

Table 3-11 Procurement plan

Item	Procurement place		
	Surabaya	Capital of Province (Mataram、Kupang)	Around Village
Pipes, Valves	○		
Construction Equipment and Machines	○		
Trucks		○	
Reinforcement Bars	○		
Concrete Materials		○	○

Materials for temporary works		○	
Plumbers, Concrete Workers, Operators		○	
Laborers			○

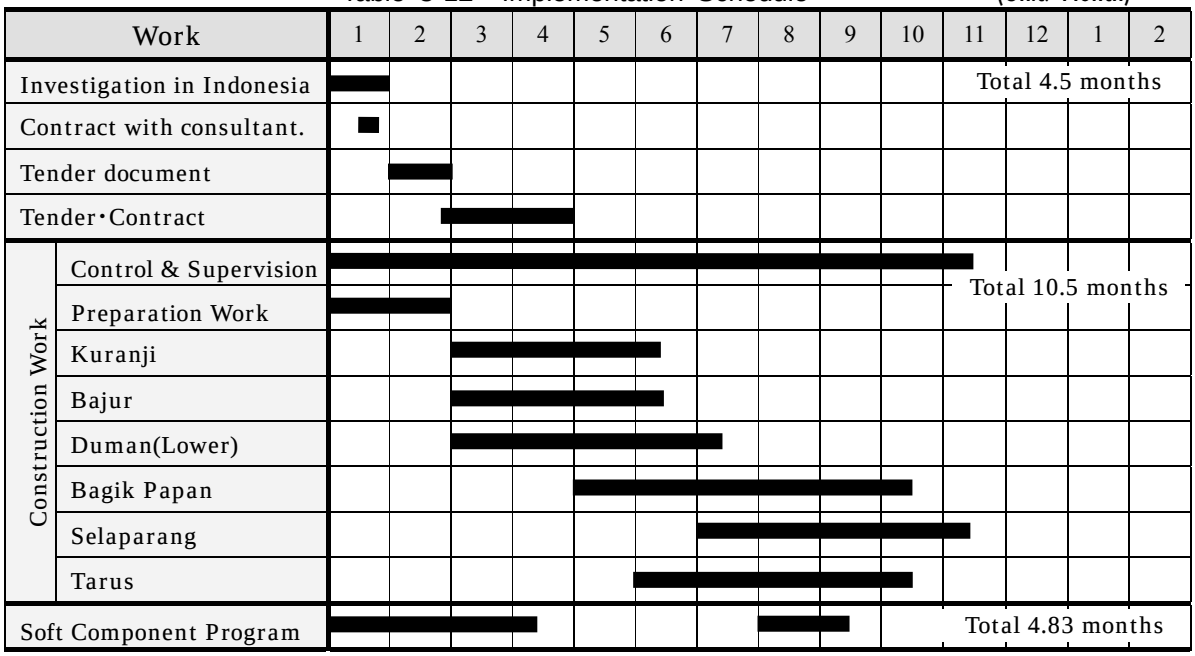
3-2-4-7 Implementation Schedule

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

(1) Construction works : 10.5 months

(2) Soft component program : 4.83 months

Table 3-12 Implementation Schedule (Unit: Month)



3-3 Obligations of recipient Country

3-3-1 Undertakings of the Government of Indonesia

(1) General work

1) Provision of data and information required for implementation of the project,

2) To secure land necessary for the sites of the project (to clear, level and reclaim the land when needed), and land for temporary work and excavated earth prior to commencement of the construction,

3) Securing of access road for site of construction works of the project,

4) Opening of an account in the name of the Government of Indonesia in an authorized foreign exchange bank in Japan, and issuance of authorization of payment,

5) Exemption of Japanese nationals from customs duties, internal taxes and other fiscal levies which would be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts,

6) Accordance of Japanese nationals, whose services may be required in connection with the supply of the products and services under the Verified contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work,

7) Ensuring all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant-Aid,

8) Application for securing permission for construction works at their own expense,

9) Use of the facilities constructed and equipment purchased under the Grant-Aid properly and effectively and assignment of staff necessary for operation and maintenance, as well as bearing all the expenses other than those covered by the Grant-Aid,

10) Operation & Maintenance of facilities and equipment after completion of the project, and

11) The burden of the expenses other than those of the Government of Japan.

(2) Physical work

1) Procurement of the construction materials and water meters for the house connections,
2) Construction of house connection systems from distribution pipe to faucet,
3) Provision of facilities for the distribution line to the pump house at Tarus, and install the main circuit breaker and transformer,
4) Provision of storage of materials for house connections provided under the Grant-Aid.
5) Monitoring of operation and maintenance for the water supply facilities to be constructed
6) Provision of counterpart personnel for execution of the soft component plan.

3-3-2 Construction Cost

The project cost for seven schemes in six villages totals 201 million yen as outlined in the Table below. This cost estimate is provisional and would be further examined by the Government of Japan for the approval of the Grant.

(1) Japanese Component

Table 3-13 Cost Attributable to Japanese Government

Items		Cost (million yen)
Construction Work	Water Supply Facilities - Pipe laying - Intake weir - Pump supply and installation - Service reservoir and break pressure tank - Piping material for house connections	174.5
Soft Component Program		14.0
Engineering Service Construction supervision		13.0
Total		201.5

(2) Indonesian Component

Table 3-14 Cost Attributable to Indonesian Government

Items		(million Rupiah)	Equiv. Yen(million yen)
Construction Cost	House connections	224	3.1
	Electric power extension	73	1.0
Material cost	Piping material and water meters	542	7.5
Community education and sensitization for WUA		101	1.4
Total		940	13.0

(3) Conditions for cost estimate

- Time of estimation : March 2006
- Exchange rate : 1 US$ = 117.17 yen = 8,944.2 rupiah (1 yen = 76.34 rupiah)
- Others : The project shall be implemented in accordance with the regulations and system of the Japanese Grant-Aid scheme.

3-4 Project Operation Plan

3-4-1 Management, Operation and Maintenance System

(1) Background

Construction of facilities for existing water supply projects in the districts has been

undertaken by each district PU, and responsibility is transferred to PDAM or village community after their construction. The fact that PDAM and the village communities have not been involved in the construction of facilities contributes to insufficient operation and maintenance of the facilities. As a result, facilities managed by the communities are often left unrepaired once they are damaged.

(2) Project Implementation Agencies

In order to solve the constraints mentioned above, the government of Indonesia, in a MOU signed by the central government, the provincial governments and the district governments, has determined that district PUs are responsible, not only for construction of facilities, but also for management of operation and maintenance. The project implementation structure is shown in Figure below;

For operation and maintenance of facilities, each district PU is mainly responsible for:

1) Supporting the village community and Water Users' Association (WUA) to establish the system for operation and maintenance of facilities through community education and sensitization activities.
2) Monitoring the situation of the operation and maintenance system after the completion of facilities and reporting the results to the provincial government.

(3) Management, Operation and Maintenance Organization

Operation and maintenance of facilities after their completion is undertaken by PDAM (5 systems in Type A) and WUA in villages (2 systems in Type C). Type A system has existing PDAM water supply system or utilizing existing PDAM pipe to distribute water. Type C system has no such existing system and it introduces gravity system with spring. Under Type A, water supply facilities will be operated and maintained by PDAM and village households will pay tariff fees for water usage to PDAM. On the other hand, under Type C, WUA in the community will be responsible for operation and maintenance of water supply facilities and households will pay O&M fees for water usage to WUA. Repair of damaged facilities will be done either by PDAM or WUA, based on its type. If necessary, however, the district PU or PDAM will provide support to complete large-scale repairs.

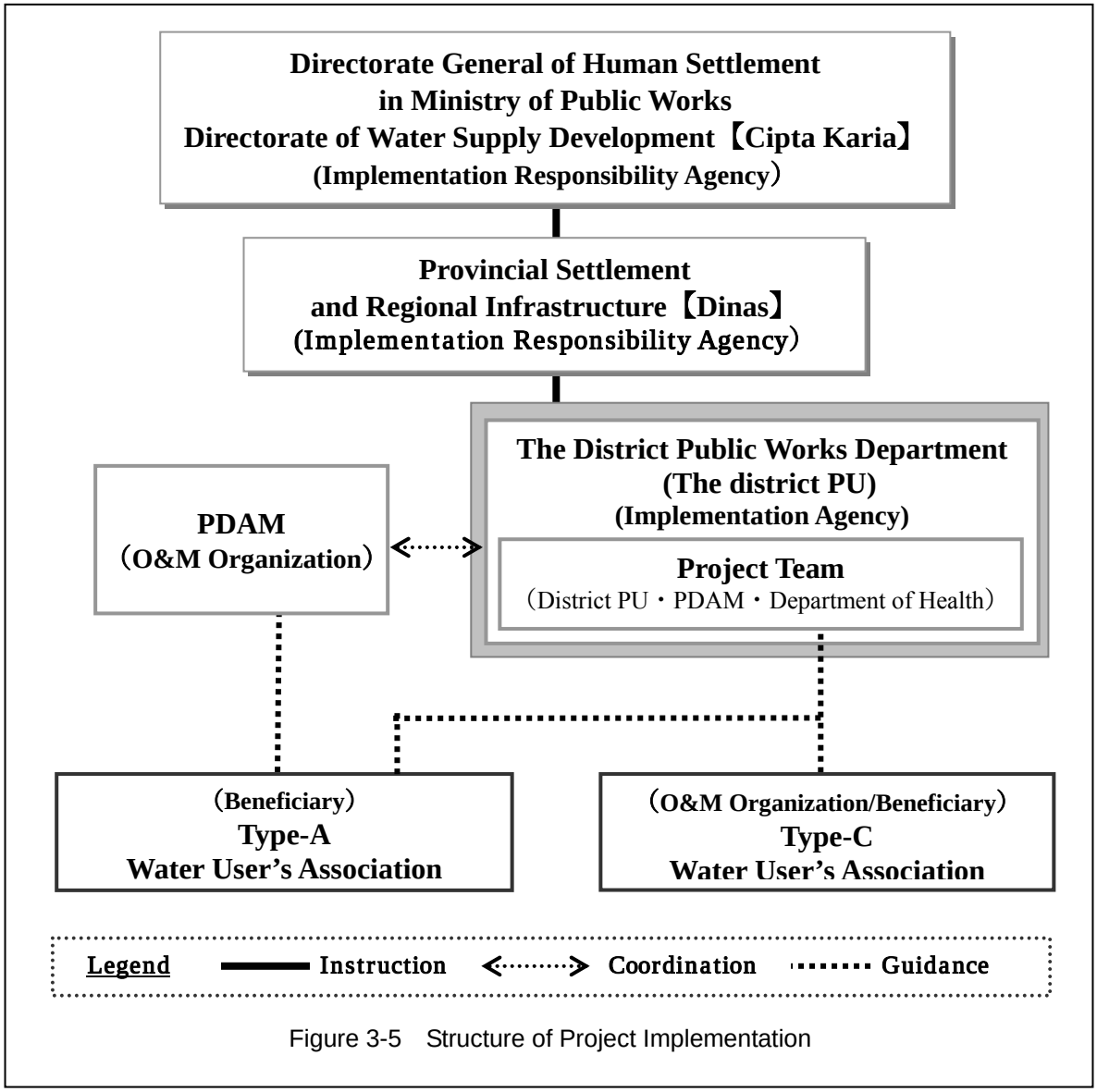


Figure 3-5 Structure of Project Implementation

3-4-2 Implementation Plan

Soon after the construction of facilities is completed, the system for management of facilities needs to be functioning. Accordingly, the system should be established prior to the construction of facilities with support from the district PU. To this end, in the first phase of the project, the Japanese side will provide the project team with support to strengthen and improve its advocacy skills, and capacity building of the implementing agency and its staff. In the second phase of the project, the Indonesian side will carry out community education and sensitization activities to households and WUA.

The Japanese government：Soft component plan

1) Discussions with related parties
2) Development of a manual on community education and sensitization activities, which will be used by trainers.
3) Implementation of training to trainers.
4) Advice on planning of monitoring.

The Indonesian government (District level)：Community education and sensitization

1) Briefing on the project to communities in the project villages and implementation of community education and sensitization.
2) Public education for water conservation and health & hygiene.
3) Foundation of WUA.
4) Training to WUA.
5) Preparation of agreement on water facilities usage in villages and determination of village regulations.
6) Launching the water campaign.
7) Implementation of study tours (field trips)
8) Implementation of monitoring project activities.

Community education and sensitization mentioned above will be carried out by project staff, with the initiative of the district PU. Expenditures for the activity will be covered by the district in accordance with the agreement in the MOU.

Like many projects implemented by other donors, to implement Type C systems, it is planned to assign two community development field workers (one to each village) for 6 months, with the main purpose of establishment of a system for facility operation and maintenance, and ownership creation/strengthening of households on facility management. The field worker will carry out community education and sensitization for health and hygiene through a Participatory Rural Appraisal (PRA) method.

3-4-3 Type-Wise Operation and Maintenance Plan

(1) Operation and maintenance Plan for Type A System (PDAM Management)

Operation and maintenance of Type A systems will be done by PDAM and will be composed of a management section and a technical section. The former will be responsible for collecting fees for water usage, and the latter will be responsible for operation and maintenance of facilities. There should be little difficulty in operation and maintenance of facilities as all facilities are gravity systems, except those in Tarus (Kupang).

In Tarus, pumping systems will be used, and PDAM Kupang has had enough experience with the management of this type of system.

To make it possible for the community to manage sustainable facilities comfortably, it would be better to establish a WUA. It is expected that the WUA, as the village-level unit, will submit requests to PDAM, solve problems related to water supply, and coordinate between PDAM staff and communities.

In addition, for the management of each public tap, it is important to form a group (Public Tap Group) that is responsible for collecting fees for water usage.

(2) Operation and Maintenance Plan for Type C System (Community Management)

WUAs in villages will be responsible for operation and maintenance of Type C systems. WUAs will be formed before the construction of facilities and will receive technical training from the project team, which leads the WUA to fulfill its responsibilities.

In Type C villages, the WUA, through discussions with the community, will prepare the regulations on water usage and management of water supply facilities. The management will proceed in accordance with the agreed regulations. Under WUA, as a representative of each village community, a Water Users' Group (WUG) will be placed at each hamlet in the village. This structure is effective for implementation of the project because the unity of a hamlet is very strong and also because the structure is the same as the administrative bodies. WUA will collect fees for management of water supply facilities, which are determined by the community, and the WUA will issue a financial report regularly and share it with the community to keep accountability.

Small-scale repairs of facilities will be done by technicians who are community members trained during the period of project implementation. When damages are severe, PDAM will provide advice or/and technical support, and its cost will be covered by fees for water usage collected from households.

(3) Monitoring Activities

For sustainable operation and maintenance of facilities, it is critical to carry out monitoring regularly and solve problems/constraints to strengthen the management system. It is

planned that a project team led by each district PU will implement monitoring twice each year for 5 years after the construction of facilities. The results of monitoring will be reported to the provincial government, which then sends the report, with its comments, to the central government. The central government will submit reports from NTB and NTT Provinces to JICA.

3-4-4 Operation and Maintenance Cost

(1) District PU

Annual costs of the project for operation and maintenance (O&M) of the District PUs are outlined in Table below.

Table 3-15 Annual Cost for O&M of District PUs

Item	Lombok Barat	Lombok Timur	Kupang	Cost (million Rupiah)
Personnel	2.0	1.0	1.0	4.0
Fuel for vehicles	0.2	0.1	0.1	0.4
Monitoring of O&M	4.5	3.0	3.0	10.5
Total	6.7	4.1	4.1	14.9

(2) Type-A system

The annual operation and maintenance cost is estimated in Table below.

Table 3-16 Annual Cost for O&M of PDAM

Village			Kuranji, Bajur Duman(Lower)	Selaparang	Tarus	Total (Million Rp)
PDAM			Menang Mataram	Lombok Timur	Kupang	
General information						
	Number of systems		3	1	1	-
	Water charge (Rp/m^3)		345	410	420	-
	Average daily water supply volume (m^3/d)		535	267	309	-
Income	Annual water charge		67.3	40.0	47.4	154.7
Annual Expenditure	Direct Cost	Disinfectant cost	0.4	0.1	1.8	2.3
		Electricity for pump	—	—	30.1	30.1
		Pump rehabilitation	—	—	1.1	1.1
		Fuel for vehicle	1.0	0.2	1.6	2.8
		Sub total	1.4	0.3	34.6	36.3
	Other Cost	Salary for PDAM staff	32.3	7.6	38.9	78.8
		Salary for public tap manager	7.0	3.5	23.4	33.9
		Sub total	39.3	11.1	62.3	112.7
	Total of expenditure		40.7	11.4	96.9	149.0
Balance of direct cost (Million Rp)			65.9	39.7	12.8	118.4
Total Balance (Million Rp)			26.6	28.6	-49.5	5.7

For the three systems managed by PDAM Menang Mataram and one system managed by PDAM Lombok Timur, income from water charges will exceed total expenditure giving a positive financial balance. However, for the PDAM Kupang system, the balance of income against direct cost will be positive but the total balance will be negative. This reflects the large staff numbers of PDAM Kupang and the resultant excess expenditure on salaries. There are, however, existing schemes in which the district governments provide a subsidy to cover these excess costs. Accordingly, similar water supply systems constructed by the current project can remain sustainable through such support schemes.

Households of Type A village pay water tariff to the PDAM directly. The total water tariff income of PDAM Menang Matarm is estimated at 67 million Rupiah from the three water supply systems of Kuranji, Bajyur, and Lower Duman. This amount is smaller than the annual affordable amount that could be paid by households in the three water supply systems. On the other hand, willingness-to-pay of households is estimated 59 million Rupiah, which is less than the annual water tariff. Therefore, intensive public education and sensitization of inhabitants is required to enhance the willingness-to-pay of inhabitants before construction of facilities can commence.

The Selaparang system is managed by PDAM East Lombok. The willingness-to-pay of households in Selaparang is estimated to be higher than the water tariff from the interview survey of CVM method, and hence collection of the water tariff is assured. However, from our experience with past projects, it will be important that PDAM East Lombok makes every effort to ensure that there is adequate operation and maintenance of the facilities to keep a steady water supply.

Tarus system is managed by PDAM Kupang. The inhabitants of Tarus have a strong desire to have continued access to safe and stable water supply facilities. The affordability and willingness-to-pay of the households are almost the same. The willingness-to-pay is estimated at 81 million Rupiah/year, which exceeds the annual water tariff income (47 million Rupiah/year), so there is no concern about the payment of the tariff for the water supply in Tarus.

(3) Type-C system

Operation and maintenance of water supply facilities for the Bagik Papan and Duman

Upper schemes is undertaken by the water user's associations (WUAs) formed by the inhabitants. Annual O&M costs, which are covered by water charges, are outlined in the Table below.

Table 3-17 Annual Cost for O&M of Water User's Association

Item	Bagik Papan	Duman Upper	Total (million Rupiah)
Operator	2.0	4.8	6.8
Bleaching powder	0.6	1.5	2.1
Reserve fund for repair	7.2	20.7	27.9
Others (maintenance service)	1.1	3.0	4.1
Total	10.9	30.0	40.9

The affordability of the households is estimated as 3% of annual income, or 190 million Rupiah in Bagik Papan and 119 million in Upper Duman. These estimates are large in comparison to the annual O&M cost. In addition, the assessed willingness-to-pay is also large for the inhabitants of both schemes relative to the annual O&M cost. Recovery of income to meet O&M costs is therefore judged to be sustainable for these schemes.

Households that opt for house connection should pay a house connection fee besides the water service fee. The Indonesian government has a subsidy system to assist poor households with the fee for house connections. Nevertheless, there are likely to be many poor households that cannot afford a house connection. In this project, therefore, to ensure reasonable access to water for all, public taps are to be provided within a radius of 50 m of each house.

3-5 Other Relevant Issues

3-5-1 Soft component plan

(1) Necessity of the Soft Component Plan

Sustainability of operation and maintenance for the water supply system is dependant on the ownership of the user, that is, payment of water cost or operation and maintenance of the system will be sustainable with strengthening of ownership of the user. The GOI understands that education and sensitization of users are essential in this regard. The District PUs are supporting not only physical construction, but also management of operation and maintenance (O&M) through the formation of a coordination team in this

project.

The district government will provide funds needed for project operation and maintenance, implementation of project administration, and supervisory activities. These will cover the activities of (a) planning, (b) monitoring, (c) training, (d) water campaigns, (e) local trips and (f) coordination.

However, it will be difficult to implement these effectively, particularly activities (b) – (e), as the experience of district PUs is inadequate in these areas. Therefore, Training of Trainers (TOT) will be performed through the soft component plan in the project. This will develop implementation methodologies and skills of trainers in order to implement ongoing assistance or advisory services. Furthermore, after the completion of the facility, the GOI should monitor the O&M activities of the project and submit monitoring reports twice per year for five years to JICA. For this purpose, preparation of monitoring planning shall be supported through the soft component plan.

(2) Issues to be Settled

The following three issues should be solved:

Issue No.1 : The district PUs lack sufficient organization to carry out community education and sensitization:

Since the main responsibility of the district PUs was once construction of water supply facilities, they lack experience and awareness concerning community sensitization activities on operation and maintenance of completed facilities. This is one of the main reasons for unclear roles and organization on sanitation education and operation/maintenance guidance, as well as low activities of awareness programs.

Issue No.2 : The water campaign by the project team cannot always provide effective community education and sensitization.

To date, activities related to community education and sensitization have only been carried out prior to and after system implementation. The activities only included verbal explanations, which are likely to be insufficient to ensure community understanding of the project.

Issue No.3 : Monitoring activities are not performed adequately.

In general, water supply projects are inadequately monitored and evaluated after their implementation because district PUs do not have responsibility to conduct compliance monitoring activities. Moreover, the responsibility for O&M was transferred to PDAM or the community after completion of the facility.

(3) Objectives of the Soft Component Plan

The following impacts are likely to be achieved through the introduction of the soft component plan:

- The methodology and contents of community education and sensitization, aimed at sustainable operation and maintenance, are improved in the district PUs.
- In each district a project team and leadership within the district PU is created. This will enable improvements in the capabilities of facilitation and O&M services.
- A monitoring plan is formulated and disseminated, ensuring its enforcement.

Furthermore, the following effects are likely through the introduction of community education and sensitization within each district.

- An understanding of the importance of sanitary water among community members, and strengthening of the concept of ownership of facilities.
- Establishment of operation and maintenance systems of WUAs and training of members.
- With implementation of health and hygiene education and appropriate access to drinking water, the health consciousness and living standards are improved. This will decrease the incidence of water borne diseases.

(4) Activities of the Soft Component Plan

It is planned to dispatch a Japanese Consultant and two Indonesian Consultants experienced in community organization development and O&M management. They will seek to improve the capability on community education and sensitization in terms of O&M services of the district PU personnel and project team members.

A summary of the organizational structure of project implementation in terms of the O&M plan for both the Indonesian and Japanese governments is shown in following Figure.

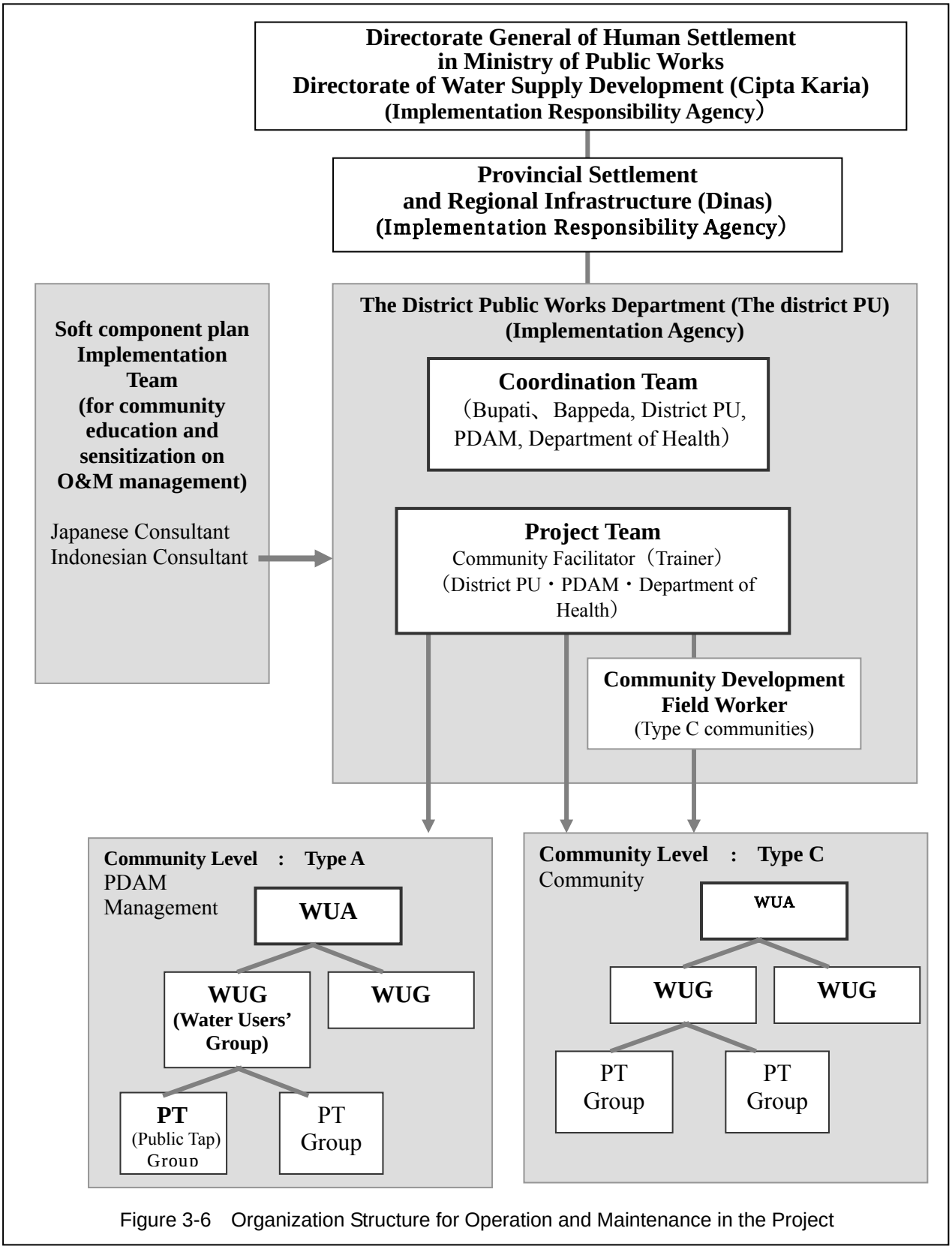


Figure 3-6 Organization Structure for Operation and Maintenance in the Project

(5) Contents of the Soft Component Plan

1) Preparation work

The soft component plan will be explained to district PUs at which time cooperation in its implementation will also be requested. Subsequently, a coordination meeting will be arranged. (12 days).

2) Supporting work

a) Trainer's manual preparation and revision.

The following manuals for the trainers of the project Team, who will actually implement community education and sensitization, will be prepared and revised.

① Manual preparation for project team

The contents of improved methodology on community education and sensitization as well as the detailed role of members will be specified. The activity plans for the water campaign or field trips shall be also included in the manual. (2.5 weeks in Lombok Barat district, and 0.5 weeks in Lombok Timur and Kupang districts)

② Manual preparation for users

The written material to be utilized by community members during community education and sensitization will be prepared. In the O&M manual, the necessary technologies for daily operations and information for WUAs will be clarified. Troubleshooting methods will also be included in the manual. Stock purchase books, village agreements, user regulations, account books, brochures on water utilization, and health and hygiene education will be developed. Furthermore, the implementation schedule for the education and sensitization process will be planned. (2 weeks in Lombok Barat district, and 0.5 weeks in Lombok Timur and Kupang districts)

b) TOT

Training of trainers for community education and sensitization activity implementation shall be undertaken based on the manuals, plans and materials developed. Trainers of the project team, staff of district PUs and community development field workers are likely participants in the TOT. A Japanese consultant and Indonesian consultants may become lecturers and training will be initiated. (1 week in each district)

c) Follow up of community education and sensitization

Actual implementation of the education and sensitization process will be undertaken through funding from the Indonesian government. Therefore, through the soft component plan, these consultants will follow up its achievements after construction of the system. After checking the progress of the education and sensitization process, these consultant teams will discuss improvements of the manual, the methodology and the activities implemented within the project. These will be summarized as lessons learned for future rural water supply projects. (1 week in each district)

3) Assistance for monitoring activity

a) Assistance for monitoring plan development

After completion of the project, monitoring will be crucial to ensure the sustainable O&M of the facilities. Therefore, project teams under the leadership of district PUs shall monitor the project twice per year for 5 years.

Likely monitoring items will include:

1) Utilization of the physical facilities by beneficiaries and administrative performance of the WUA.
2) Underlying process of how funds are collected, managed and used.
3) The project impacts, such as reduced incidence of water borne diseases.

If a problem is found in O&M activities during the monitoring, an alternative solution will be jointly discussed with WUA and PDAM. This will enable the strengthening of the O&M system. After monitoring, the project teams will prepare and submit the monitoring reports to Kimpraswil Provincial level. Provincial Kimpraswil will then hand in the monitoring reports to Kimpraswil after their collation into a single provincial report. Kimpraswil will subsequently provide a summarized report on the important issues to JICA.

In order to fulfill the above monitoring activities, the following items will be checked and revised by the soft component expert.

① Monitoring items
② Monitoring schedule
③ Format of the monitoring report

(1 week in Lombok Barat district, and 0.5 weeks in Lombok Timur and Kupang districts)

b) Guidance for monitoring activities

The improved monitoring system will be explained and the knowledge transferred to the related parties in order to become operative. (0.5 weeks in each district)

c) Follow up of monitoring activities

After completion of the facilities, the consultants will guide and confirm the implementation of the monitoring plan that should be undertaken twice per year over five years by the Project Team. If there is a Project site where a new water supply is already operating, the monitoring activities will be executed in conjunction with the project team. (1 week in each district)

(6) Personnel Input Plan

1) Japanese Consultant

A Japanese specialist in charge of soft component support who has expertise in operation/maintenance and community-based organization strengthening will be dispatched from the CMR. In the usual soft component program of general grant assistance, for the case of construction supervision directly by the consultant, a Japanese expert from the consultant company is dispatched. However, for this project where the CM method is adopted, not only is a Japanese consultant eligible to be a CMR, but a general contractor can also be a candidate.

Therefore, if a general contractor who does not have a community-based organization strengthening expert as its resource is selected as the CMR, then the CMR will provide a separate Japanese expert (a Japanese consultant specialized in operation/maintenance and community-based organization strengthening).

The Japanese expert on O&M and community organization development overseeing the soft component plan shall undertake both a preparation and follow-up stage in the process of community education and sensitization.

- **<u>Preparation Stage of Education and Sensitization of People:</u>(3.33 months)**

Preparatory work for education and sensitization of people will commence in the Lombok Barat District. Preparation of manuals, documents, and so on will take more time than for

other districts due to the large number of targeted communities and the fact that it will occur at the commencement of the project.

Following the preparatory work for the Lombok Barat district, in Lombok Timur District and Kupang District, the formation of project teams, coordination of implementation activities, manual preparation and TOT shall be carried out within one month in each district. The appropriate implementation structure and detailed activities will be discussed and determined in accordance with the situations encountered in each.

To ensure appropriate preparations for community education and sensitization, a Japanese consultant will be dispatched for 4 months.

- **Follow-up Stage in post-construction：(1.5 months)**

At the post-construction stage, follow-up activities of community education and sensitization and confirmation of monitoring activities will be undertaken by the Japanese consultant. Implementation terms of these follow-up activities will include two weeks in each district, that is a total of 6 weeks (about 1.5 months).

For the above, the assignment of the Japanese community organization development and O&M consultant overseeing the soft component plan will therefore include 4 months in the preparation stage and 1.5 months in the follow-up stage, totaling 5.5 months.

2) Indonesian Consultant

Apart from the Japanese consultant, two Indonesian consultants with in-depth knowledge of both community organization development and O&M management will be dispatched. A community organization development consultant shall be in charge of the establishment, training and development of WUAs. An O&M management consultant shall be in charge of the technical training for the O&M management of the constructed facilities.

Both Indonesian consultants will be conversant with rural water supply projects in Indonesia, and assist in smoothing the implementation of the coordination meeting through the provision of practical advice. Moreover, they will contribute to appropriate planning and manual and document preparation by analyzing existing papers prepared in the Indonesian language. During TOT, the Indonesian consultants together with Japanese consultant as instructors will offer training. Participation of the Indonesian consultants is

indispensable in these activities. Therefore, the Indonesian consultants will be dispatched for 4.83 months in close cooperation with the Japanese consultant.

3-5-2 Work Schedule and Outputs of the Soft component plan

(1) Work Schedule for the Soft Component plan

A work schedule for the soft component plan is shown in the next Table. The working plan for community education and sensitization by Japanese and Indonesian consultants based on this schedule is presented in following Table.

Table 3-18 Proposed Work Schedule for Soft Component Plan

Activities	1	2	3	4	5	6	7	8	9
1. Preparation Work . Preparation Work									
2. People's Education and Sensitization a ① Manual Preparation for Project Team									
a ② Manual Preparation for Users									
b Training of Trainers									
c Follow up of People's Education and Sensitization									
3. Assistance for Monitoring Activity a Assistance for Monitoring Plan Development									
b Guidance for Monitoring Activity									
c Follow up of Monitoring Activity									
District	Lombok Barat	Lombok Timur	Kupang						
Preparation Stage	◄	———	———	►					
Follow up Stage								◄	——— ►
Japanese consultant	———	———	———	———				———	———
Indonesian consultant	———	———	———	———				———	———
Construction		△ Commencement of Construction					Completion of Construction		△

Table 3-19 Working Plan on Soft Component Plan for Operation and Maintenance Arrangement

		Activities	Expected Outputs	Duration	Location	Target Group	Outside Assistance	Input
Preparation stage	1)	Preparation work	Share the understanding of the project plan, prepare coordination meeting with District Coordination Team.	12 days	District Office	District PU, Related Organizations	-	Consultant's vehicle, Cost of document preparation
Community education and sensitization	2) a,①	Manual preparation for project team	Prepare trainer's manual that includes contents of activities, plan of activities, water campaign plan and study tour plan.	25 days	District Office	Project team	Printing Translation	Cost of document preparation
	2) a,②	Manual Preparation for users	Prepare technical manual, village agreement, stock purchase book, account book, brochure on water utilization, and brochure on health and hygiene education.	21 days	District PU	Project team	Printing Translation	Cost of document preparation
	2) b,	Training of trainers	Train to improve the implementation skills of trainers and Community Development field workers.	21 days	District PU	Project team, Field worker	-	Cost of training implementation, vehicle
	2) c,	Follow-up of community education and sensitization	Follow up the achievement of community education and sensitization. Results are summarized as lessons learnt.	21 days	District PU	Project team	-	Cost of training implementation, vehicle
Follow-up	3) a,	Assistance for Monitoring Plan Development	Assistance in developing Monitoring Plan.	14 days	District PU	Project team	-	Cost of document preparation
	3) b,	Guidance for Monitoring Activities	Guide and assist the realization of monitoring Plan.	10 days	District PU	Project team, District PU	-	-
	3) c,	Follow-up of monitoring activities	Support and assist to ascertain the monitoring activities.	21 days	District PU	Project team	-	Vehicle, Cost of implementation

(2) Outputs of Soft Component Program

The 5 types of documents and reports on awareness activities as listed below will be the outputs of the soft component program.

- Manual for Awareness Activities (for project team)
- Documents for Awareness Activities (for village residents)
- Monitoring Report (twice a year during 5 years after facilities construction)
- Soft Component Implementation Progress Report (3 times during preparation stage and twice during evaluation stage, for a total of 5 times)
- Soft Component Completion Report (after completion of soft component support activities)

3-5-3 Key Points for Project Implementation

To ensure smooth implementation of the project, the Indonesian authorities must meet the following requirements:

(1) Establishment of a coordination team in each district
(2) Establishment of a project team and provision of sufficient staff numbers in the PU of each district
(3) Smooth implementation of education and sensitization of people
(4) Approval for project implementation and land acquisition to be undertaken in accordance with the recommended project schedule
(5) Procurement of house connection equipment
(6) Provision of costs for installation of house connections.

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Chapter 4 Project Evaluation and Recommendation

Chapter 4： PROJECT EVALUATION AND RECOMENDATION

4-1 Project Effect

The effects of the project implementation are listed as shown in Table 4-1.

Table 4-1 Effects of Project Implementation and Degree of Improvement

Current Situations and Problems	Counter Plan in the Project	Project Effects and Improvement
1. The Provinces of NTB and NTT are the least developed areas in Indonesia and the water supply service ratio is still low. Moreover, infant mortality rates are high because the majority of residents rely on unsanitary and unstable water sources.	・ Construction of 6 rural water supply facilities in 6 villages.	・ After construction of 6 water supply facilities in 6 villages, about 20,000 residents will have access to a source of sanitary and stable drinking water.
2. District PUs carry out peoples' education and socialization to WUA members who may fill major roles of operation and maintenance of the water supply facilities after their construction. However, the district PUs have limited experience in peoples' education and sensitization, and the structure of project implementation has not been organized effectively.	Soft component plan ・ Technical support for peoples' education and sensitization with the aim of sustainable operation and maintenance to project teams led by district Pus. ・ Development of manuals on peoples' education and sensitization that will be used by trainers, and material and documents necessary in each district. ・ Technical advice on monitoring planning that will be implemented to a project team in each district.	・ The project team members in district PUs will be trained and will increase their capacity to support operation and maintenance of facilities (peoples' education and sensitization). ・ Community households and WUA members will be trained on peoples' education and sensitization and they will obtain the knowledge necessary to operate and maintain water supply facilities. ・ After construction of the facilities, project team members will carry out monitoring regularly and strengthen the operation and maintenance system.

[Direct effects]

About 20,000 residents are able to have access to a sustainable source of safe water. It is anticipated that the population served by the water supply will increase.

[Indirect effects]

The construction of sanitary water supply systems in the project areas will impact by decreasing the incidence of water born disease, reduce labor of women and girls and

improve environmental health.

The water supply from the existing pipeline constructed by residents to Doman Lower becomes unnecessary by constructing transmission pipeline in Doman Lower. Therefore, the amount of the water supply to 4,000 residents of Duman Upper by the existing piping increases.

4-2 Recommendations

It is recommended that the proposed water supply systems be implemented, but only after fully taking into account the following:

- The project team of each district PU should explain the project to the inhabitants of the six villages in which the seven systems will be installed and assist the establishment of WUAs through sensitization activities. This will occur prior to constructing the water supply facilities.

  A soft component plan using the TOT method should be provided to the trainer of each district PU to assist in the sensitization activities for the operation and maintenance of the water supply system. Each project team should conduct sufficient sensitization activities to address the various problems and issues.

- The house connection facilities should be constructed by the GOI.

  It is necessary to construct house connections according to the demand of the inhabitants.

- Following the construction of the water supply facilities, the project team of each district PU should continue the training and sensitization activities associated with their operation and maintenance. These activities will be directed at the inhabitants of the six villages in which the seven systems are to be installed.

  The soft component plan based on a TOT method is to be implemented during the construction period. It is necessary that each district project team then continue the training and sensitization activities.

- WUAs should continue the operation and maintenance associated with WUA`s management water supply system.

  It is necessary that collection of the water tariff and the operation and maintenance of

facilities for the WUA`s management water supply system be continued. Hence, the project team of each district PU should continue its facilitation with the WUA.

- PDAM should continue the operation & maintenance of PDAM`s management system.
  PDAM collects the water tariff from its beneficiaries. However, some beneficiaries have neglected to pay the tariff due to dissatisfaction with operation and maintenance of water supply facilities. To improve customer satisfaction, PDAM should implement and conduct improved operation and maintenance activities. To improve inhabitants' consciousness of water use, they should establish a WUA focused on the public tap group in the PDAM management system. The project team of each district PU should continue its support of the WUA, gain a better understanding of the operation and maintenance situation of facilities and, if necessary, advise PDAM.

- The monitoring activities should be carried out twice a year for five years.
  After construction of facilities, the project team of the district PU should determine if the operation and maintenance of facilities is being appropriately undertaken at this frequency. Monitoring results should be reported to the provincial government, which will in turn forward the report with its own comments to the central government (KIMPRASWIL). The KIMPRASWIL will submit reports from NTB and NTT provinces to JICA's Indonesian office. The monitoring will be carried out with the cooperation of related organizations to ensure sharing of information. The monitoring activities will be an important factor in ensuring smooth implementation of Japan's Grant Aid and the achieving of its aims.

- CM method is effectively demonstrated for the implementation of the project.
  At-Risk CM method is promoted under system of Japan's Grant Aid project. As for securing the transparency concerning the selection of the contracture which is the merit of the CM method, more consideration is necessary for Pure CM method. The necessity of the discussion for preparation of the guideline will come out corresponding to the adoption of CM method in the future.

4-3 Project Justification

Based on the findings of the study, the project under Japan's Grant Aid scheme is judged to be significant and appropriate from the following aspects:

① The design population to be served in the six villages is estimated to increase to 20,000 by the time of project implementation in 2011.

② The objective of the project is to increase the population served. It is recognized that a safe and reliable water supply for inhabitants will contribute to satisfying this basic human need (BHN).

③ Operation and maintenance of the proposed water supply facilities can be easily undertaken by the PDAM and WUA within the limits of their human resources and incomes.

④ This project contributes to "The improvement of quality of service concerning facilities and the infrastructure of the residential area including water supply" as outlined in“Chapter 9 rural development of 2000-2004 (PROPENAS)". It therefore agrees closely with the national development policy of Indonesia.

⑤ The estimated revenue less expenditure due to direct cost of operation and maintenance of the proposed facilities is estimated to be positive. Moreover, the average income of households indicates they can afford to meet the water tariff/ O&M costs.

⑥ The negative environmental impacts due to implementation of the project will be low.

⑦ The project can be implemented under Japan's Grant Aid scheme without any difficulties.

4-4 Conclusions

The project will contribute to safe and reliable water supply for 20,000 people in six villages in the provinces of NTB and NTT, thus contributing to satisfying one of the basic human needs (BHN). In addition, the inhabitants will enjoy improved health and hygiene with lives free from water-borne diseases. Based on the positive impacts to the inhabitants, implementation of Japan’s Grant Aid scheme is considered to be viable. Moreover, the adoption of CM method in this project can aim at the expansion of the range of bidder through the simplification of the management and supervision of the project, and this method shows us one possibility to realize the implementation of the project.

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