

Chapter 1 BACKGROUND OF THE PROJECT

Both, provinces of Nusa Tenggara Barat (NTB) and Nusa Tenggara Timur (NTT), located in the 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 have still faced 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 people have access to clean water. The rest of the people have to obtain unclean and unreliable water from dug wells, springs, rainwater that often falls into shortage 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, the 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 at nine systems in eight villages that are judged as 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, the basic design study was formulated based on the subsequent study in Japan.

Chapter 2 CONTENTS OF THE PROJECT

2-1 Basic Concept of the Project

The Government of Indonesia (GOI) places a high priority on accelerating poverty alleviation and satisfying basic social needs. The National Development Policy (PROPENAS) 2000-2004 states that clean water supply to the people in both rural and urban areas is one of the most important development priorities in improving the sanitary environment for the people. The National Development Planning Board (BAPPENAS) formulated the "National policy 2002 of community base management concerning water supply and the hygiene environment" in cooperation with the Ministry of Settlement and Regional Infrastructure (Kimpraswil), Ministry of Health, and Ministry of Home Affairs to achieve the high priority plan. The improvement of water supply systems to obtain safe and stable potable water was recommended.

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 the education and sensitization of people.

Consequently, this study concluded that the project would consist of construction of the 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 2.1.0.1 below.

Table 2.1.0.1 Project Design Matrix

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p><u>Overall Goal</u></p> <p>a) The sanitation and other living conditions of households of NTT and NTB Provinces are improved.</p>	<p>a) The number of households who suffer from diseases caused by bad water conditions is decreased.</p> <p>b) Water supply systems operate and are being used throughout the year by households in the project villages</p>	<p>a) Monitoring results after the project ends.</p> <p>b) Materials and reports issued by Department of Health.</p>	<p>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.</p>
<p><u>Project Purpose</u></p> <p>Sustainable provision of safe water to households</p>	<p>a) The population served in the villages is about 24,000.</p> <p>b) The collection of fees for water use and operation of the facilities has begun</p>	<p>a) Monitoring results after the project ends.</p> <p>b) Materials and reports issued by the district PU and PDAM in related districts.</p> <p>c) Operation records of water supply facilities of PDAM and WUA.</p> <p>d) Accounting report of PDAM and WUA</p>	<ul style="list-style-type: none"> • 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.
<p><u>Outputs</u></p> <p>a) Provision of water supply facilities in the project villages.</p> <p>b) The village support ability of the district PU improves.</p> <p>c) Operation and maintenance ability of WUA for water supply facilities improves.</p>	<p>a) New water supply facilities are functioning.</p> <p>b) At least 2 trainers in the district PUs are trained for supporting operation and maintenance of facilities.</p> <p>c) WUA members obtain knowledge necessary to operate and maintain water supply facilities before the provision of the facility.</p>	<p>a) Completion of drawings of facilities.</p> <p>b) Record of activities by trainers.</p> <p>c) Monitoring reports.</p>	<ul style="list-style-type: none"> • 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.
<p><u>Activities</u></p> <p><u>GOJ</u></p> <p>a) <u>Construction of water supply facilities</u></p> <ol style="list-style-type: none"> 1. Construction of water supply facilities, except house connections. <p>b) <u>Support for people's education and sensitization on operation and maintenance of water supply facilities to staff in each district PU.</u></p> <ol style="list-style-type: none"> 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 <p><u>GOI</u></p> <p>a) <u>Installation of house connections</u></p> <ol style="list-style-type: none"> 1. Procurement of material for house connection from water meter to faucet 2. Construction of house connection 3. Securing of land for the project. <p>b) <u>Formation of the project team in each district PU.</u></p> <p>c) <u>Support for operation and maintenance in villages</u></p> <ol style="list-style-type: none"> 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 	<p><u>Inputs</u></p> <p><u>The Government of Japan (GOJ)</u></p> <p><u>Human resources (Support for activities in Soft Component Plan)</u></p> <p>a) Japanese expert for operation and maintenance of water supply facilities: 5.5 man-months</p> <p>b) Indonesian expert for operation and maintenance of water supply facilities: 5.5 man-months</p> <p>c) Indonesian expert for community organization development: 5.5 man-months</p> <p><u>Facilities</u></p> <p>a) Water supply facilities except house connections</p> <p>b) Provision of materials for house connections before water meter</p> <p><u>Project Costs</u></p> <p>225 million yen</p>	<p><u>The Government of Indonesia (GOI)</u></p> <p><u>Human resources (Project staff in each district PU, PDAM and Department of Health)</u></p> <ol style="list-style-type: none"> 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 <p><u>Facilities and peoples' education and sensitization</u></p> <ol style="list-style-type: none"> a) House connections b) Support for operation and maintenance <p><u>Project Costs</u></p> <p>13 million yen</p>	<p>a) Trained staff of the district PU will not alternate in short term.</p> <p><u>Preconditions</u></p> <ol style="list-style-type: none"> 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.

2-2 Basic Design of the Requested Japanese Assistance

2-2-1 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 at nine systems in eight villages that are judged as 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 2.2.1.1.

Table 2.2.1.1 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	○
		Sambung	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

The Criteria set for the village selected 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.

(2) Natural Conditions

Average rainfalls in the study areas are shown in the Table 2.2.1.2.

The table shows that more than 80 % of annual rainfall precipitates in the wet season prevailing from November to April. In the wet season special attentions will be required for smooth execution of construction works.

In particular for Duman (Upper) and Labuhan Mapin, as the water sources are located in/close to streams, construction works in wet seasons will be difficult. As for Kupang, the transmission line is designed across a relatively large river where construction works will also be difficult in wet seasons. It is recommended that construction works in such locations shall be executed in the dry seasons.

Table 2.2.1.2 Average Annual Rain Fall : (mm)

Month	J	F	M	A	M	J	J	A	S	O	N	D	Annual
District	Wet Season				Dry Season						Wet Season		
Lombok Barat	174	260	213	139	129	46	84	8	29	209	245	201	1,738
Lombok Timur	234	300	218	149	66	54	44	17	19	159	227	149	1,635
Kupang	371	473	278	97	16	6	1	1	2	8	128	226	1,606
Sumbawa	270	319	217	115	34	6	13	3	10	63	114	225	1,390

(Average : 1991 – 2000)

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

(3) Social and Economic Conditions

According to the census in 1999, the GRDP (Gross Regional Development Product) of NTT and NTB Provinces was 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 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 few households in poor villages have used water sources and many others have depended on 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 that 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 people's education and sensitization to help 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 lightens their economic burden needs to be explained. Another approach could be the foundation and strengthening of the management system of 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 leader of Muslim or Hindu in NTB Province and a leader of 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 system will help households get access to safe water in a shorter time more easily throughout the year. In order to increase awareness of households about operation and maintenance of water supply facilities, the district PU will provide people's education and sensitization as socialization activities.

(5) General Conditions in the Construction Sector

Existing water supply facilities in NTB and NTT Provinces are constructed by local contractors in the areas. The construction works of water supply facilities under the project will be sublet to such experienced local contractors by a prime Japanese contractor. And the works will be supervised for the control of progress and quality by the Japanese contractor.

(6) Procurement Conditions

Construction material is 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. The material is, therefore, procured in the Island as much as possible to reduce delivery period and transportation cost, except pipe material from Surabaya of East Jawa Province.

(7) Local Contractors

The local contractors that have experience in construction of water supply facilities are registered with the provincial governments and district PUs. It is possible to procure such registered local contractors as sub-contractors.

(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 shown in the following items.

- a) Plan
- b) Monitoring of project activities
- c) Training to WUAs
- d) Water campaign for beneficiaries

- e) Field trip
- f) Coordination

However, there are the following issues in the each district PU.

- The responsibility of the district PU in rural water supply projects up to the present was construction and rehabilitation of water supply facilities, so that the each district PU is not yet fully facilitating operating and maintenance of water supply facilities. Consequently, there are only a few experienced staff of operation and maintenance available.
- The experience of the people's 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 responsibility organization of the health hygiene and the people's education and sensitization is inadequate.

The effective management of rural water supply project requires strengthening of the organization and staffs of the district PU concerning the ability of the people's education and sensitization to the operation and maintenance. Therefore, soft component plans will be planned to dispatch the specialists of community organization development and O&M management during 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 of Type C systems 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 of type C systems, to prevent the use of the water service incomes for other project purposes. The WUA will also be formed for every public tap system of Type A systems that are managed by PDAM before the construction of facilities and will receive technical training from the project team.

3) Strengthening of system of operation and maintenance by the people's education and sensitization

The operation and maintenance of facilities is the responsibility of the PDAM/village. The objective of the people's education and sensitization is to heighten awareness of 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 the people's 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 a monitoring report twice each year for five years after facilities are completed and to submit it to JICA. Each district PU is to be supported by a soft component plan during the project implementation period, so that monitoring activity can be properly performed.

(9) Selection of Construction Material 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, material 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 it is the rainy season from October to April. The construction work of the 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.

2-2-2 Basic Plan

(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 (Chapter 2-2-1 (1)). 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.

As a result, seven systems in six villages were selected for the basic design, as outlined in Table 2.2.2.1.

Table 2.2.2.1 Villages for Basic Design

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

(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 2.2.2.2 for the target year, 2011.

Table 2.2.2.2 Population Served and Water Consumption

Service Area	Service Population					Water Consumption				Water Demand		
	House Connections		Public Taps			Domestic Use (L/s)			Public Use	Amount	Daily Ave.	Daily Max.
	(%)	Population	(%)	Population	House Con.	Public Taps	Total	(L/s)	(L/s)	(L/s)	(L/s)	
Kuranji	1,894	30	568	70	1,326	0.39	0.46	0.85	0.17	1.02	1.23	1.35
Bajur	6,130	40	2,452	60	3,678	1.70	1.28	2.98	0.60	3.58	4.30	4.73
Duman(Upper)	3,978	20	796	80	3,182	0.55	1.10	1.66	0.33	1.99	2.39	2.63
Duman(Lower)	1,026	30	308	70	718	0.21	0.25	0.46	0.09	0.55	0.66	0.73
Bagik Papan	3,182	20	636	80	2,546	0.44	0.88	1.33	0.27	1.60	1.91	2.10
Selaparang	3,433	80	2,746	20	687	1.91	0.24	2.15	0.43	2.58	3.09	3.40
Tarus	3,977	80	3,182	20	795	2.21	0.28	2.49	0.50	2.99	3.58	3.94
Total	23,620		10,688		12,932			11.91	2.39	14.30	17.16	18.88

Note : Daily average demand includes system loss.

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 Pemukiman Perdesaan"*, December 1998(See Table 2.2.2.3)).

Table 2.2.2.3 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 (See Figure 2.2.2.1~2.2.2.3).

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

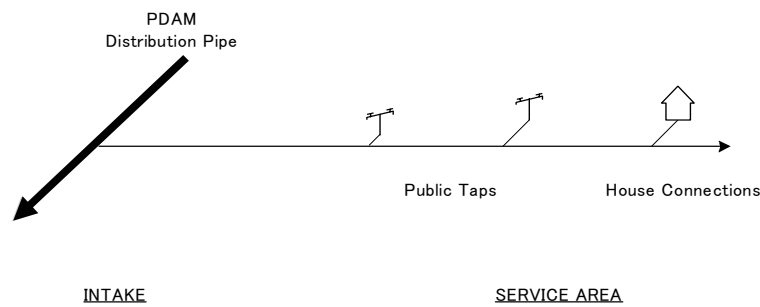


Figure 2.2.2.1 Type-1 system

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

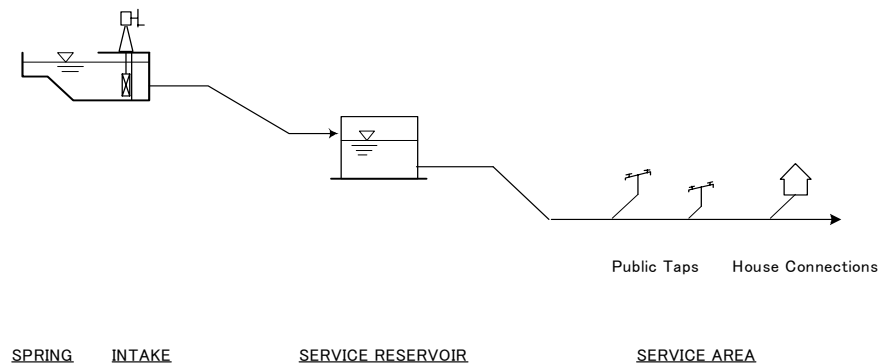


Figure 2.2.2.2 Type-2 system

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

Area Name: Tarus

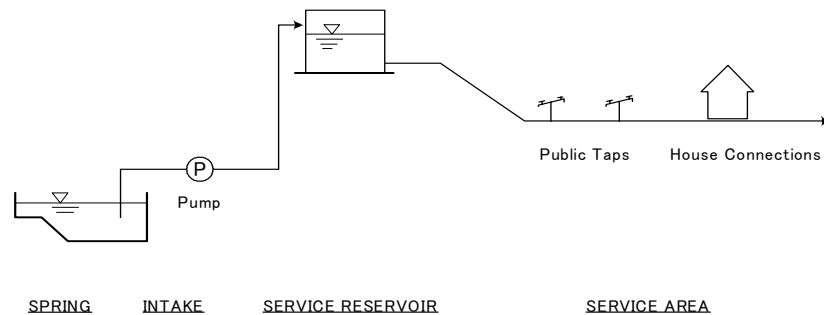


Figure 2.2.2.3 Type-3 system

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

The material selected for the transmission and distribution pipes are rigid polyvinyl chloride pipe and galvanized steel pipe, respectively. Bends 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	2.35 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	2.14 km	
	- Poak Dodol		
	Dia.: 40 mm	0.15 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 Scheme (Upper) (Design flow: 2.63 L/s)

Facility	Specification	Quantity	Remarks
a. Intake	Source: Spring		
a.1 Intake weir	Reinforced concrete	1 no.	Grit chamber, screen
b. Transmission			
b.1 Raw water Pipe	Material: GSP Dia.: 80 ~ 40 mm	2.48 km	
b.2 Trans. pipe	Material: PVC Dia.: 75 ~ 30 mm	5.08 km	
c. Distribution			
c.1 Distri. Pipe	Material: PVC Dia.: 75 ~ 25 mm	6.99 km	
c.2 S. Reservoir	Reinforced concrete, cylindrical shape		With distribution weir
	Cap.: 10 m ³ , D2.5 x H2.65 m	1	Flow meter
	Cap.: 14 m ³ , D3.0 x H2.65 m	4	Flow meter
	Cap.: 18 m ³ , D3.0 x H3.65 m	1	Flow meter
c.3 BPT	Reinforced concrete Cap.: 3.2 m ³	4	
d. Service			
d.1 H.Connect.	Dia.: 13 mm	159	
d.2 P.Taps	Dia.: 13 mm, 2 faucet type	49	Water meter

4) Duman Scheme(Lower) (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 , L1.2 x W1.2 x H3.5 m	1	Flow meter
b. Transmission	-		
c. Distribution			
c.1 Distri. Pipe	Material: PVC Dia.: 75 ~ 25 mm	3.47 km	
d. Service			
d.1 H.Connect.	Dia.: 13 mm	62	
d.2 P.Taps	Dia.: 13 mm, 2 faucet type	27	Water meter

5) 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	1.43 km	
c. Distribution			
c.1 Distri. Pipe	Material: PVC Dia.: 75 ~ 25 mm	3.86 km	
c.2 S. Reservoir	Reinforced concrete, cylindrical shape Cap.: 60 m ³ , D5.5 x H3.15 m	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

6) 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 ~ 50 mm	4.55 km	Capacity of pipe:13.95 l/s 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	Reinforced concrete, cylindrical shape Cap.: 100 m ³ , D7.2 x H3.15 m	1	Flow meter
d. Service			
d.1 H.Connect.	Dia.: 13 mm	45	
d.2 P.Taps	Dia.: 13 mm, 2 faucet type	0	

7) 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 m x 283 l/min x 5.5 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	1.33 km	
c. Distribution			
c.1 Distri. Pipe	Material: PVC		
	Dia.: 125 ~ 25 mm	5.17 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

2-2-3 Basic Design Drawing

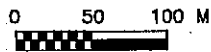
Basic design drawings for the seven systems are shown in following pages.



Existing PDAM Pipe
 ϕ 200 mm PVC

LEGEND

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



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 PERDESAAN INDONESIA

JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTING ENGINEERS:



NIPPON KOEI CO., LTD.

TITLE:

LAYOUT PLAN (1) - KURANJI -

SCALE
 NONE

DATE
 SEPT. 2003

DRAWING NO.
 LA-001

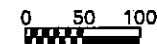


Connected To Existing Pipe ϕ 250 mm PVC

Dusun Bujur

Existing PDAM Pipe ϕ 250 mm PVC

Dusun Poak Dodol



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

CONSULTING ENGINEERS:



NIPPON KOEI CO., LTD.

TITLE

LAYOUT PLAN (2) - BAJUR -

SCALE

NONE

DATE

SEPT. 2003

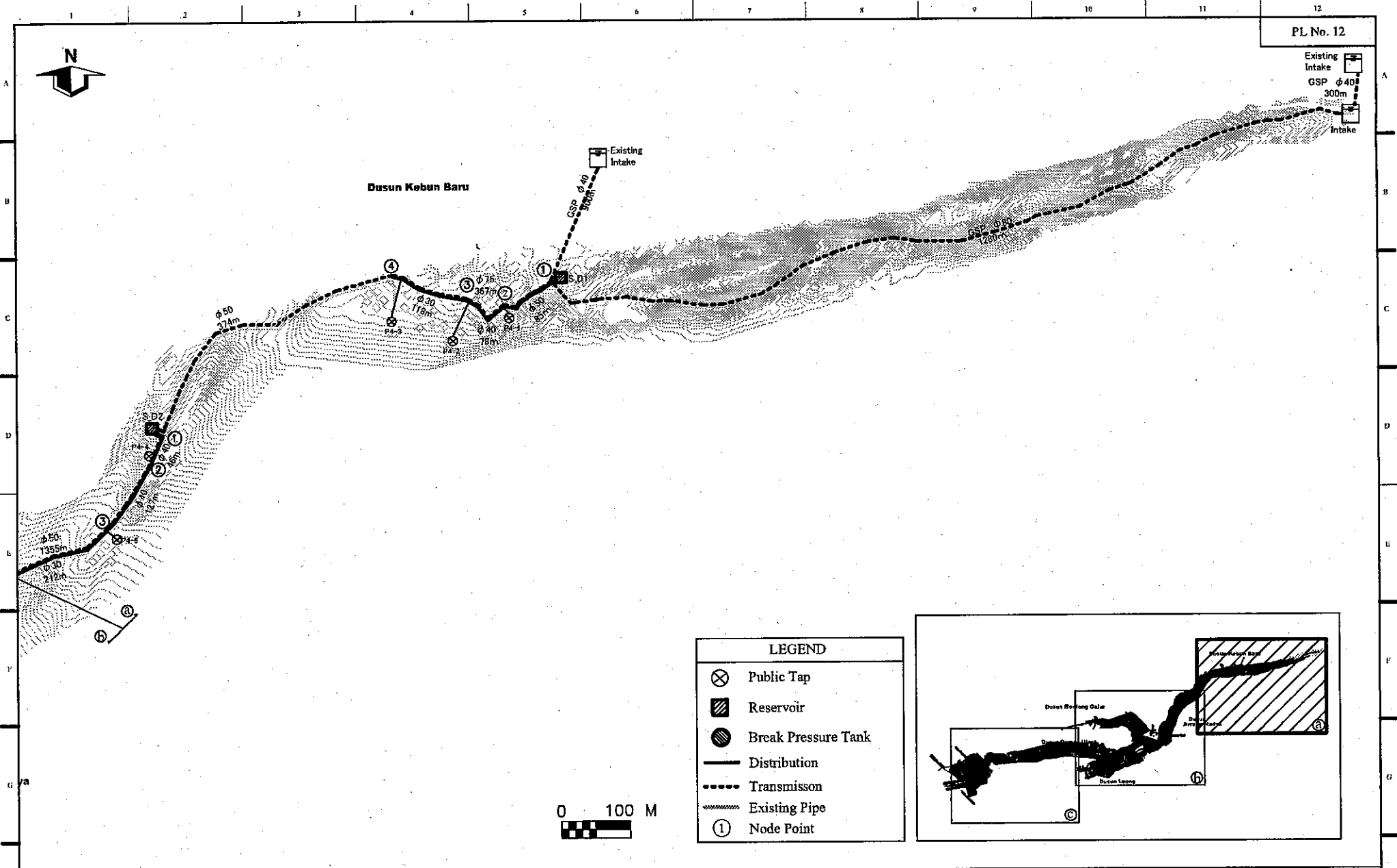
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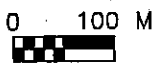
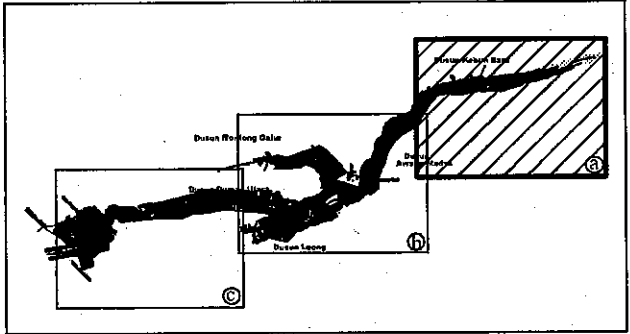
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LEGEND	
	Public Tap
	Reservoir
	Break Pressure Tank
	Distribution
	Transmission
	Existing Pipe
	Node Point



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NIPPON KOEI CO., LTD.

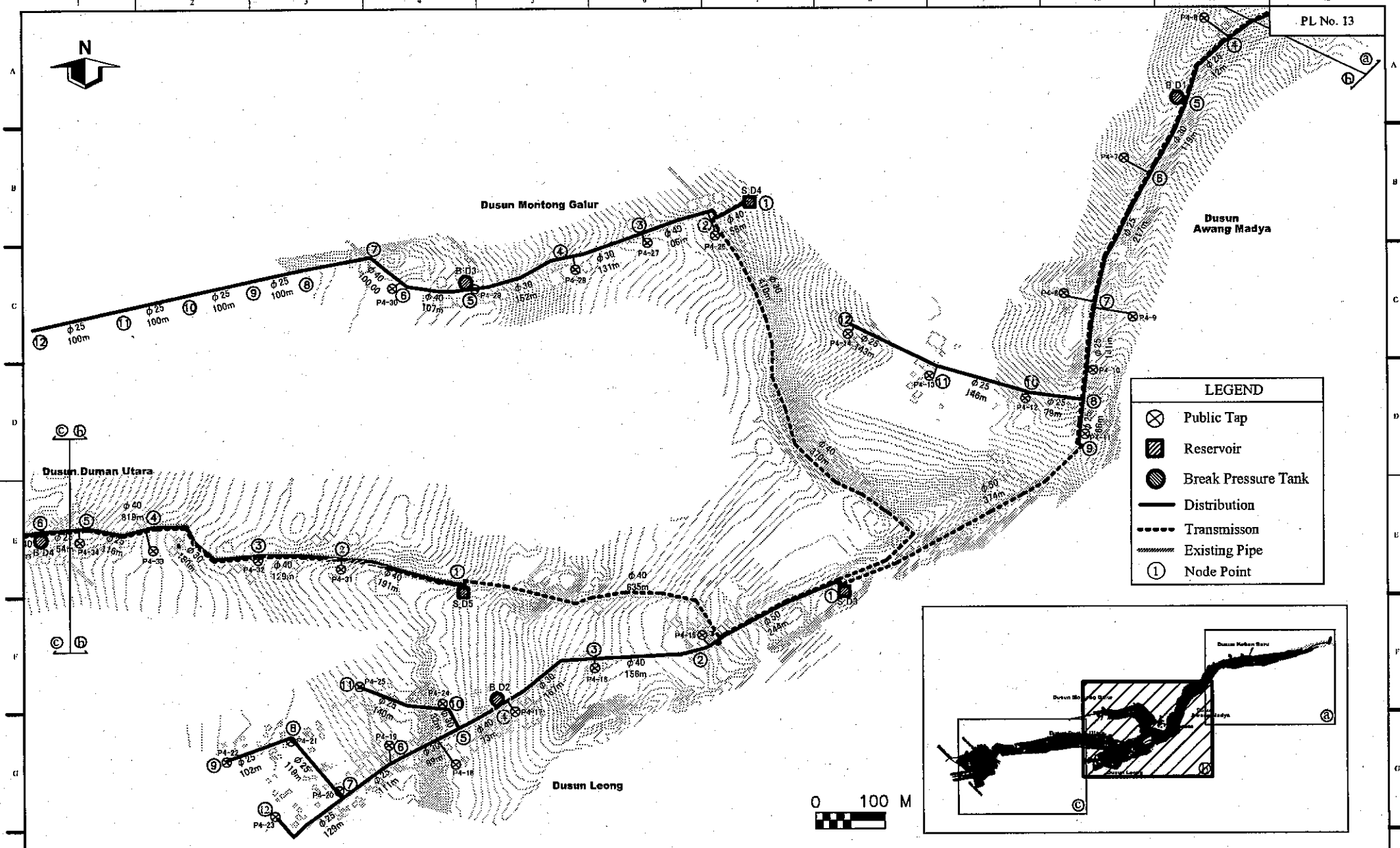
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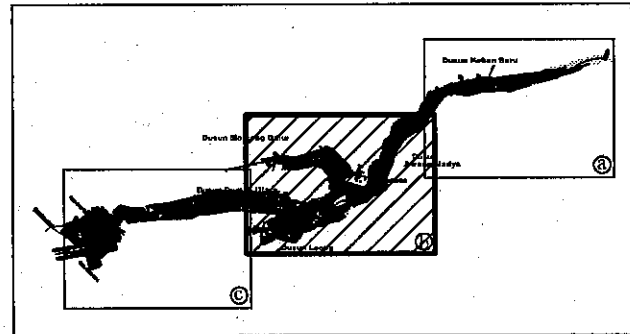
SCALE
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DATE
SEPT. 2003

DRAWING NO.
LA-003



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



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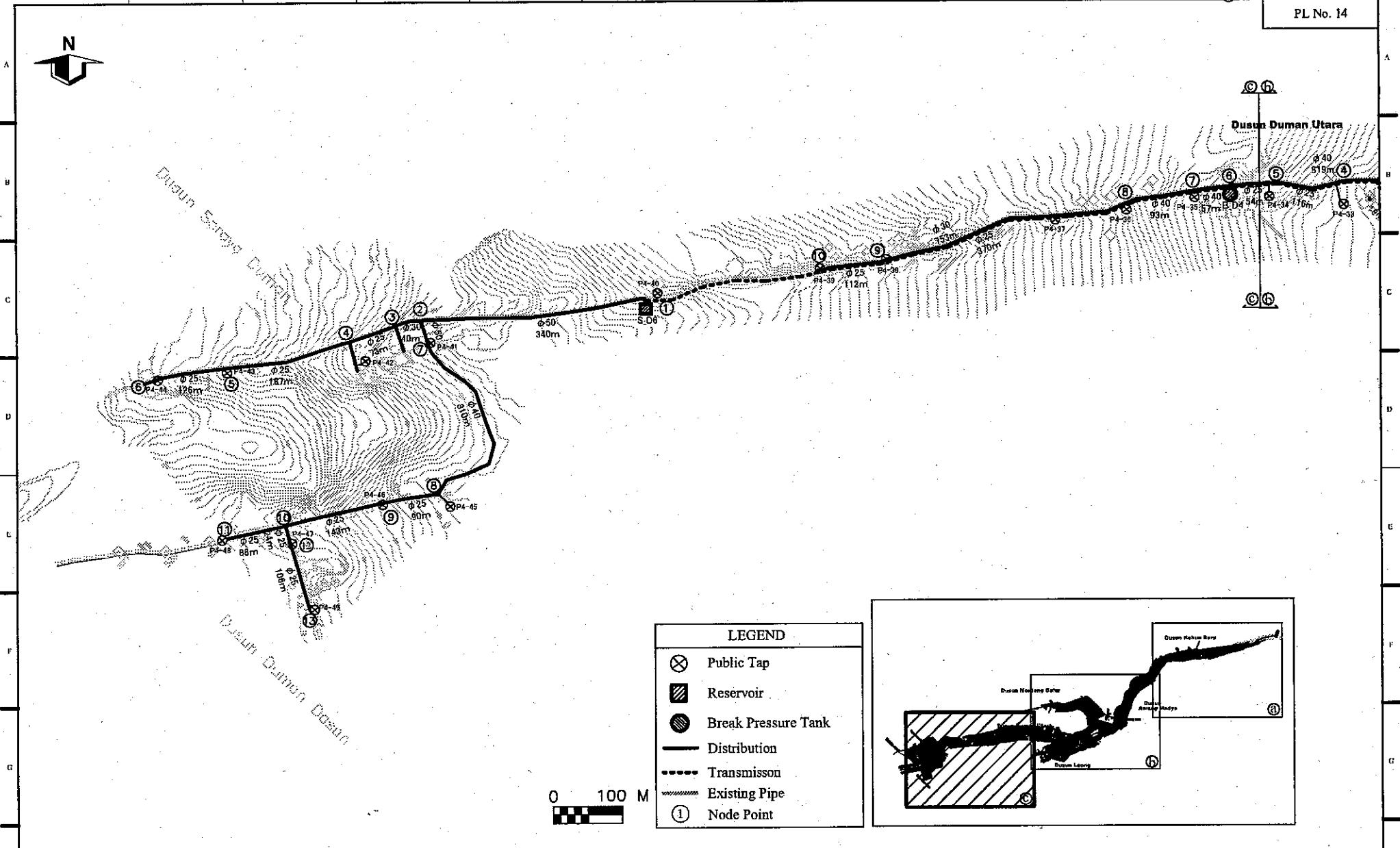
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CONSULTING ENGINEERS:



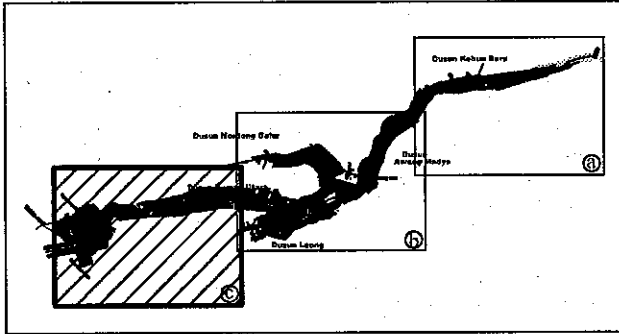
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SCALE: NONE	DATE: SEPT. 2003	DRAWING NO. LA-004



LEGEND

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



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DATE:

SEPT. 2003

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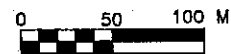
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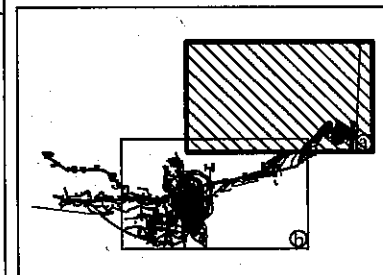
Existing PDAM Pipe Φ 150 PVC

Bug Bug Reservoir

B.D5



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



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CONSULTING ENGINEERS:



NIPPON KOEI CO., LTD.

TITLE:

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SCALE:

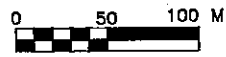
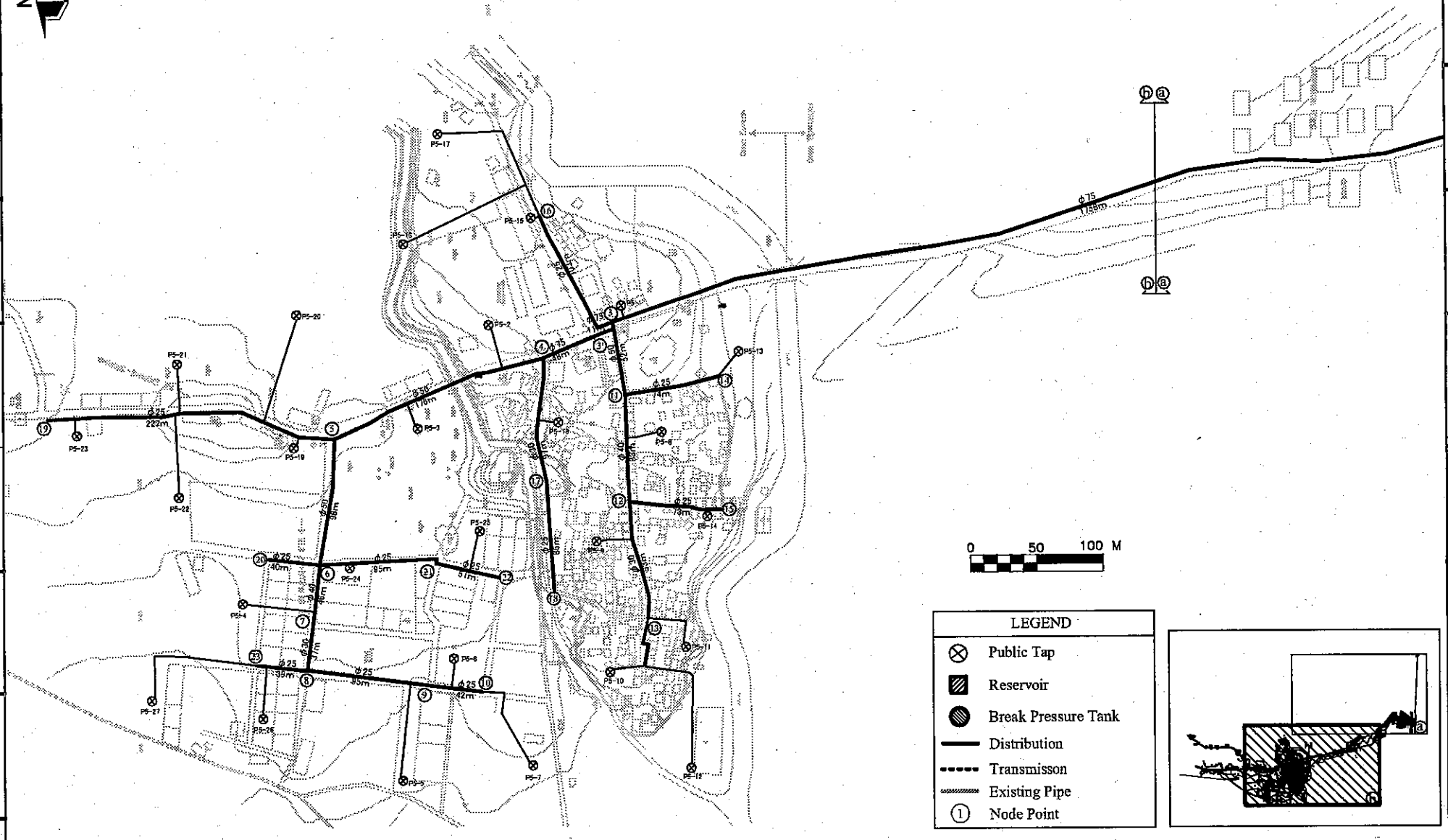
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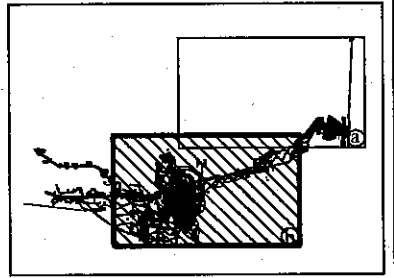
SEPT. 2003

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LA-006



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



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PERDESAAN INDONESIA

JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTING ENGINEERS:

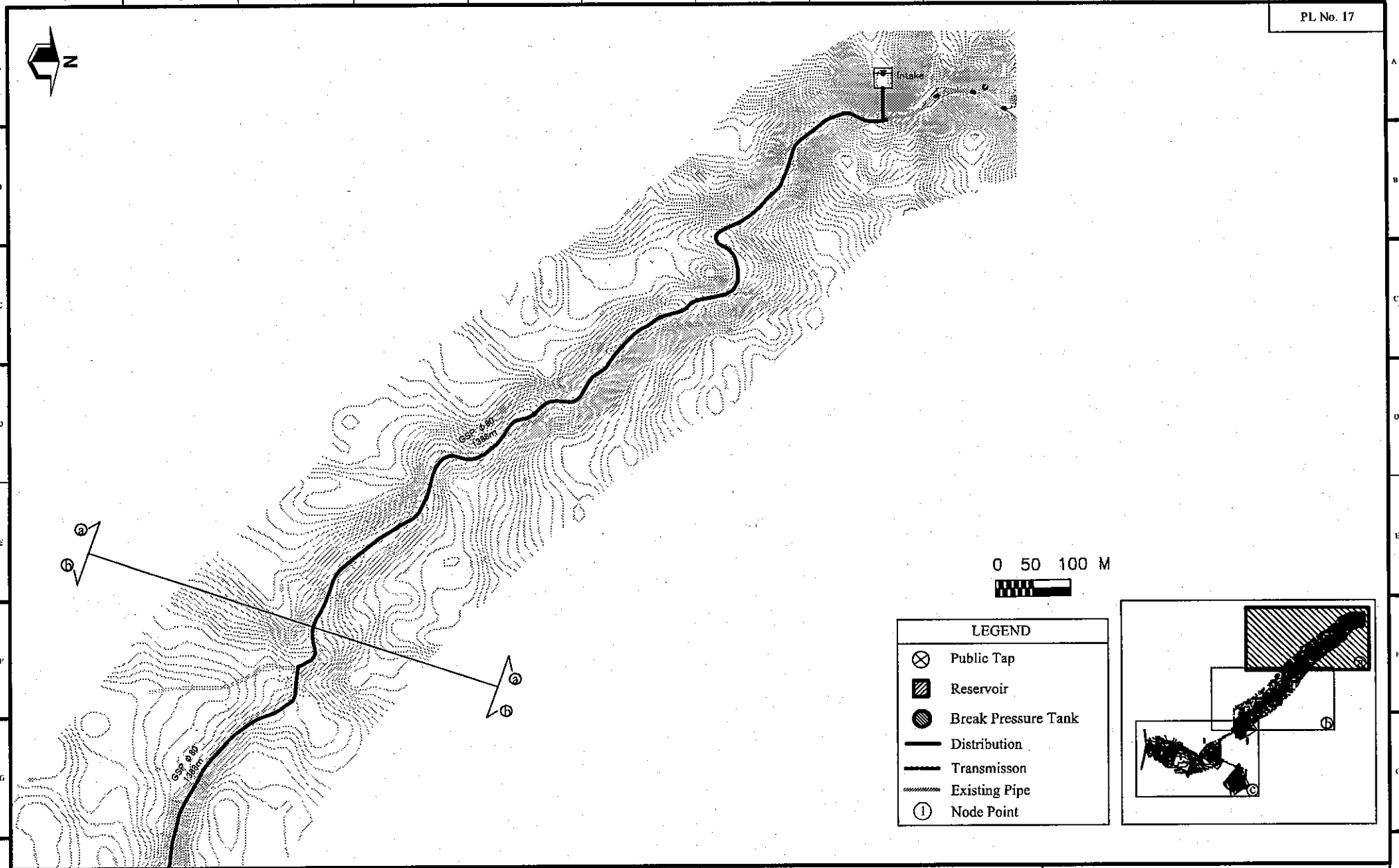


NIPPON KOEI CO., LTD.

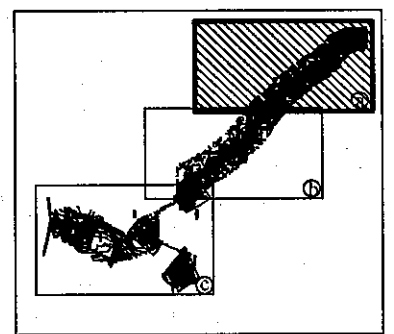
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SCALE NONE	DATE SEPT. 2003	DRAWING NO. LA-007

261

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



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TITLE:

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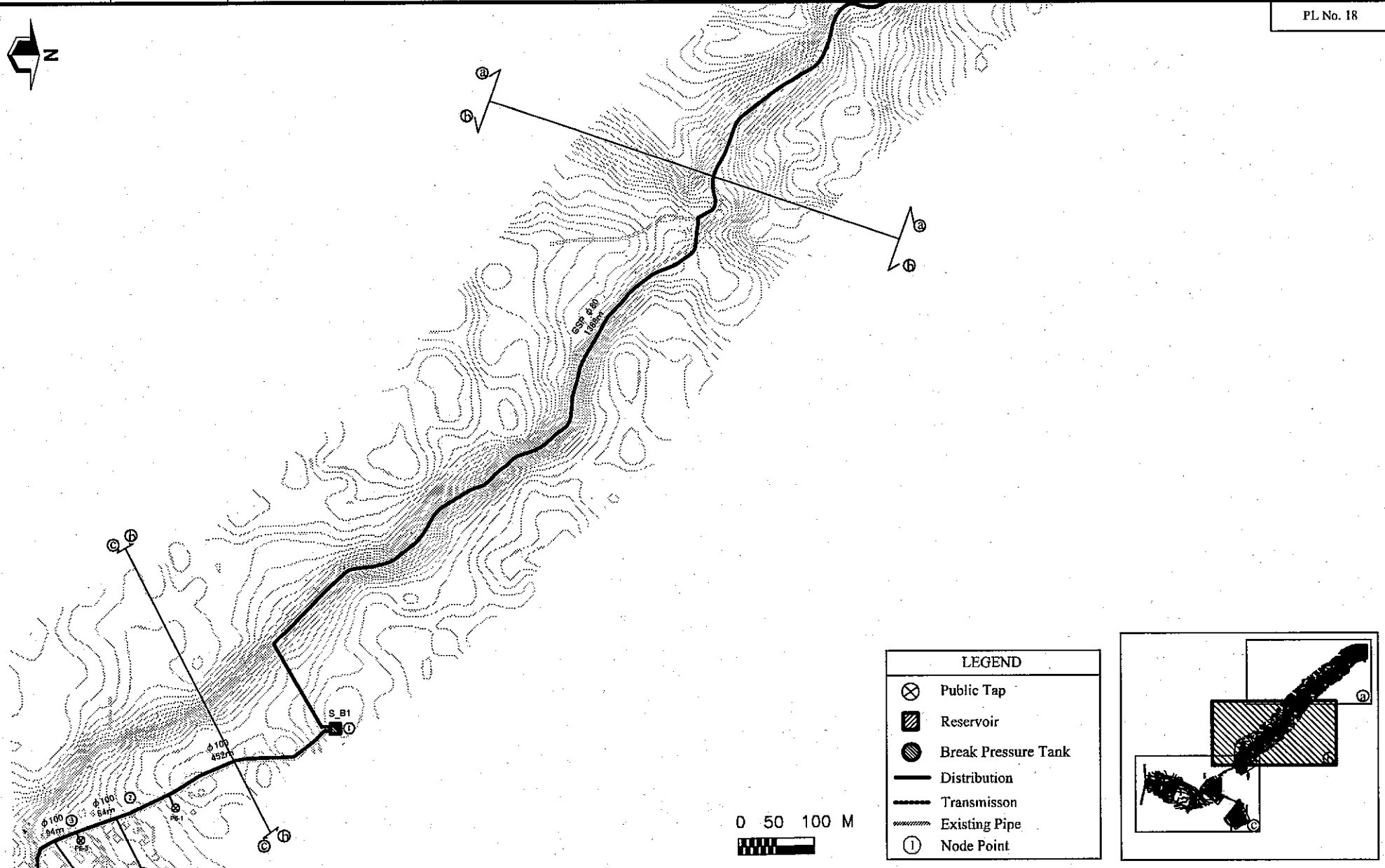
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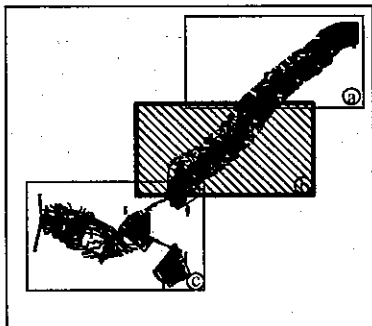
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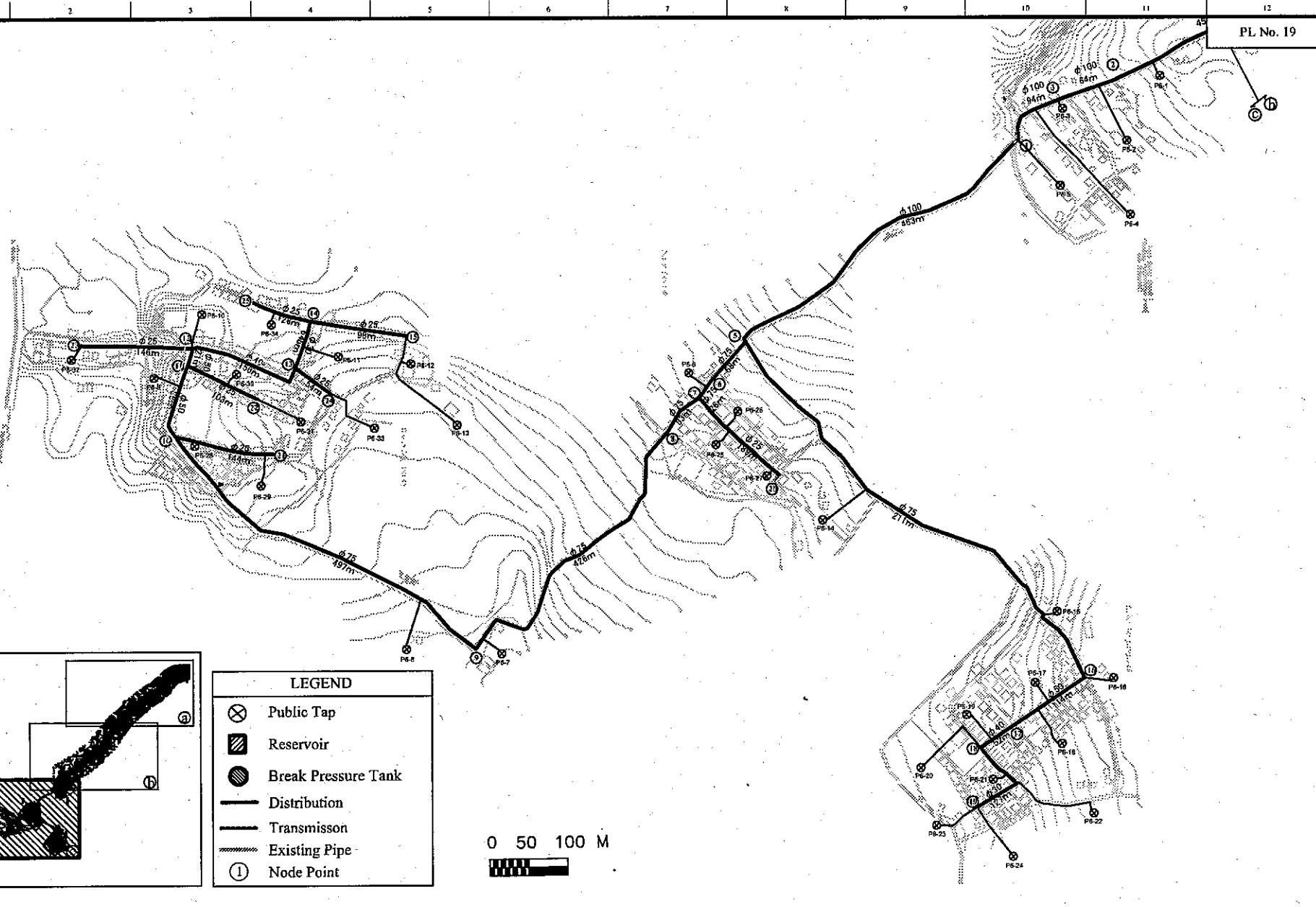
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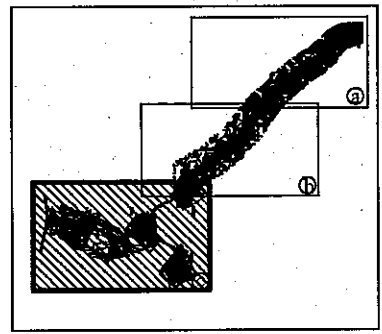
LEGEND	
	Public Tap
	Reservoir
	Break Pressure Tank
	Distribution
	Transmission
	Existing Pipe
	Node Point



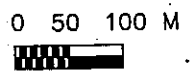
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	JAPAN INTERNATIONAL COOPERATION AGENCY		SCALE: NONE	DATE: SEPT. 2003	DRAWING NO. LA-009



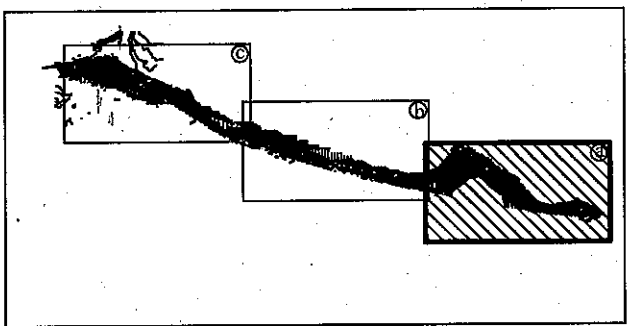
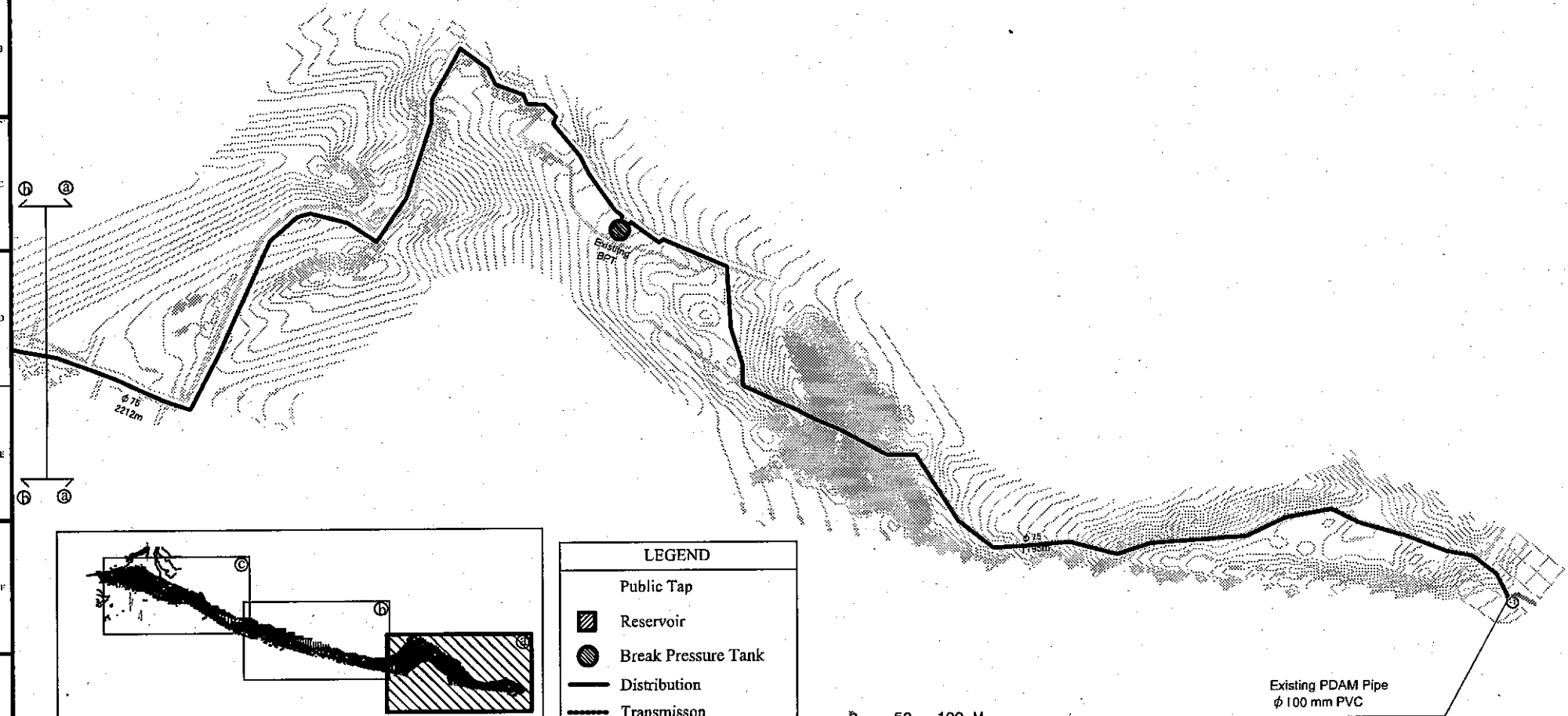
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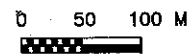
LEGEND	
	Public Tap
	Reservoir
	Break Pressure Tank
	Distribution
	Transmission
	Existing Pipe
	Node Point



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	CONSULTING ENGINEERS NIPPON KOEI CO., LTD.	TITLE: LAYOUT PLAN (5) - BAGIKPAPAN (3/3) -
	JAPAN INTERNATIONAL COOPERATION AGENCY		SCALE: NONE DATE: SEPT. 2003 DRAWING NO. LA-010



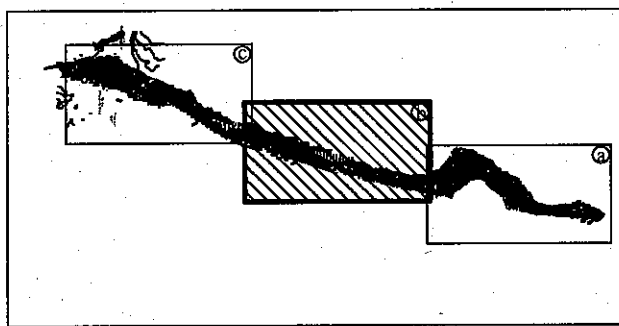
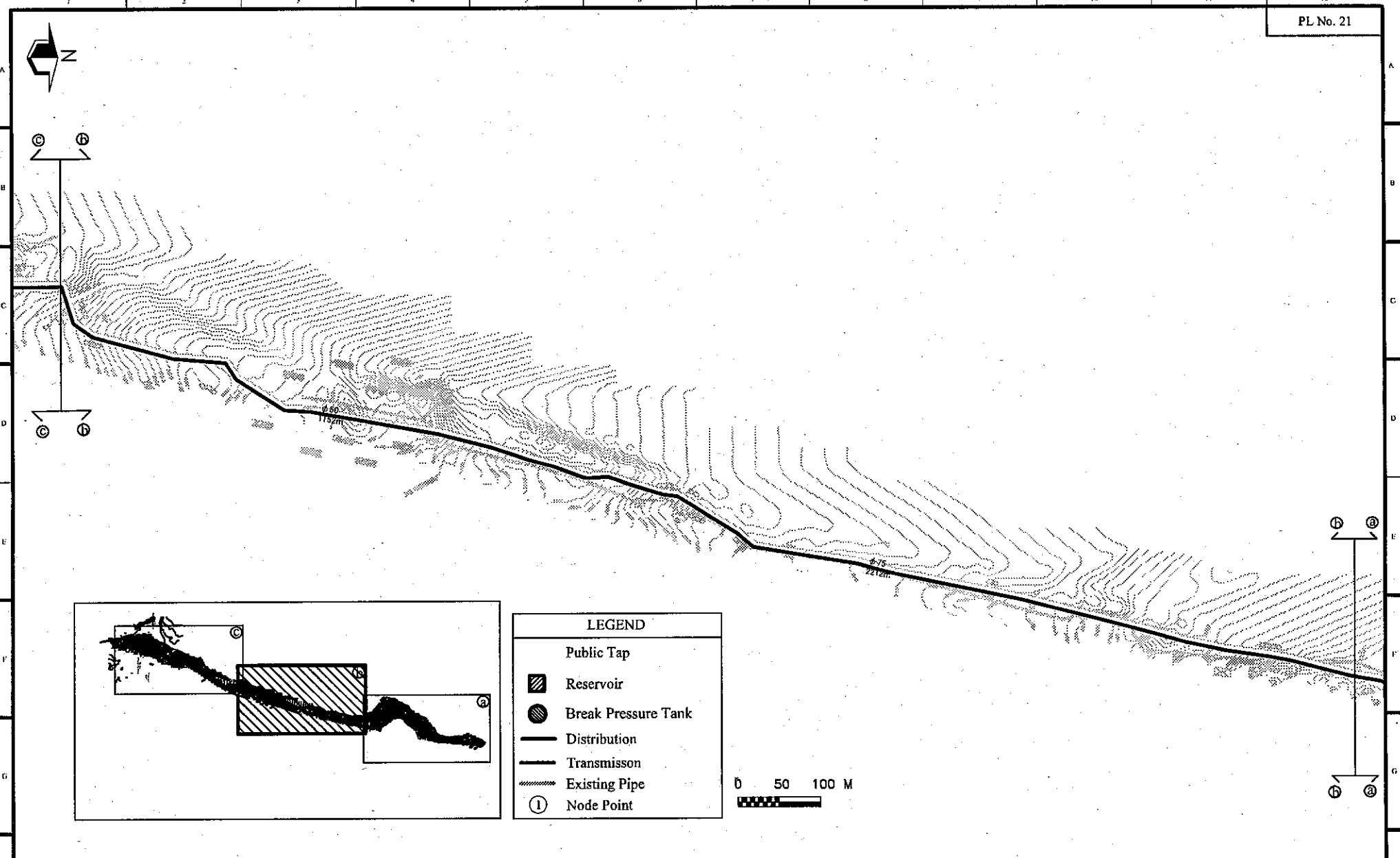
LEGEND	
	Public Tap
	Reservoir
	Break Pressure Tank
	Distribution
	Transmission
	Existing Pipe
	Node Point



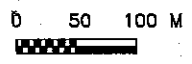
Existing PDAM Pipe
φ 100 mm PVC

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	CONSULTING ENGINEERS NIPPON KOEI CO., LTD.	TITLE: LAYOUT PLAN (6) - SELAPARANG (1/3) -	
	JAPAN INTERNATIONAL COOPERATION AGENCY		SCALE: NONE	DATE: SEPT. 2003

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LEGEND	
	Public Tap
	Reservoir
	Break Pressure Tank
	Distribution
	Transmisson
	Existing Pipe
	Node Point




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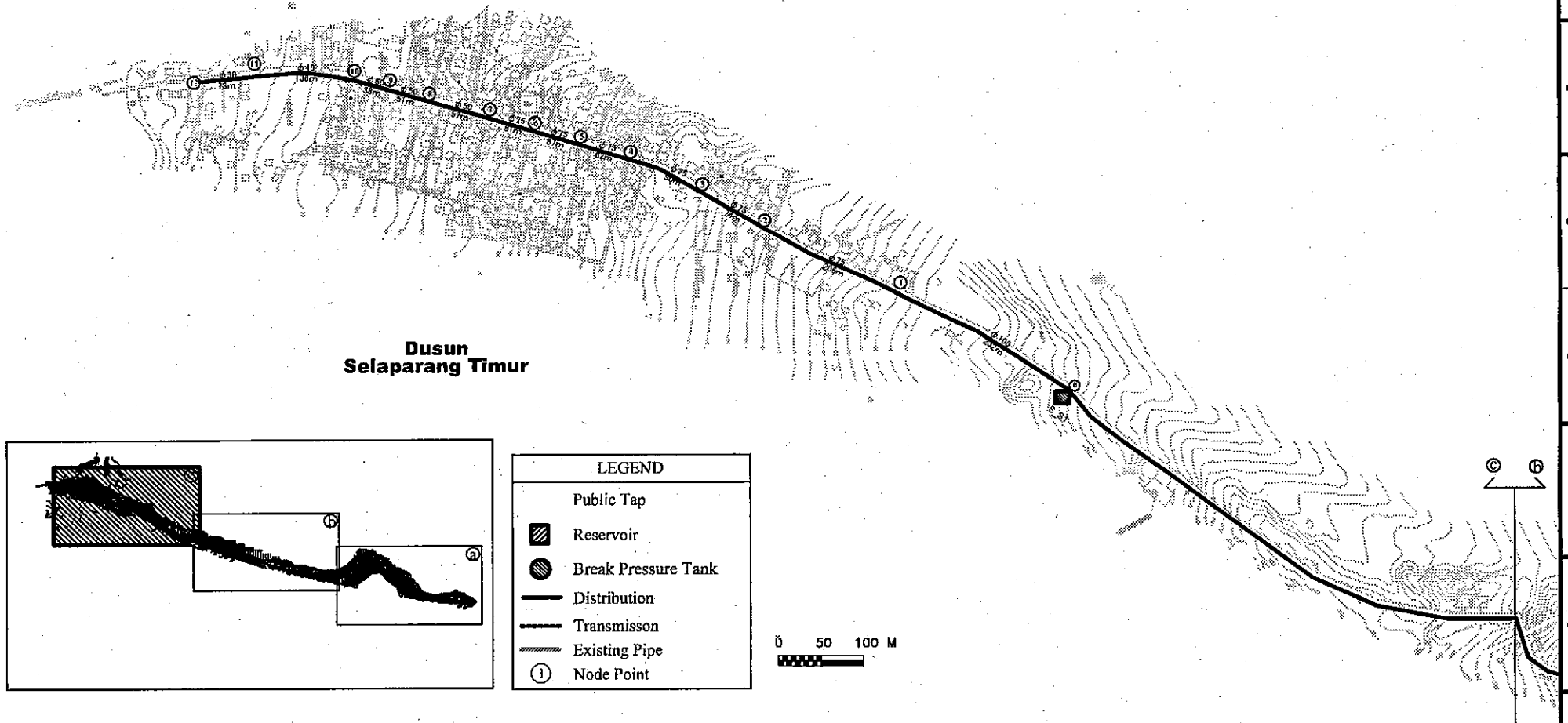
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



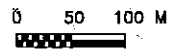
**Dusun
Selaparang Barat**

**Dusun
Selaparang Timur**




LEGEND

-  Reservoir
-  Break Pressure Tank
-  Distribution
-  Transmisson
-  Existing Pipe
-  Node Point

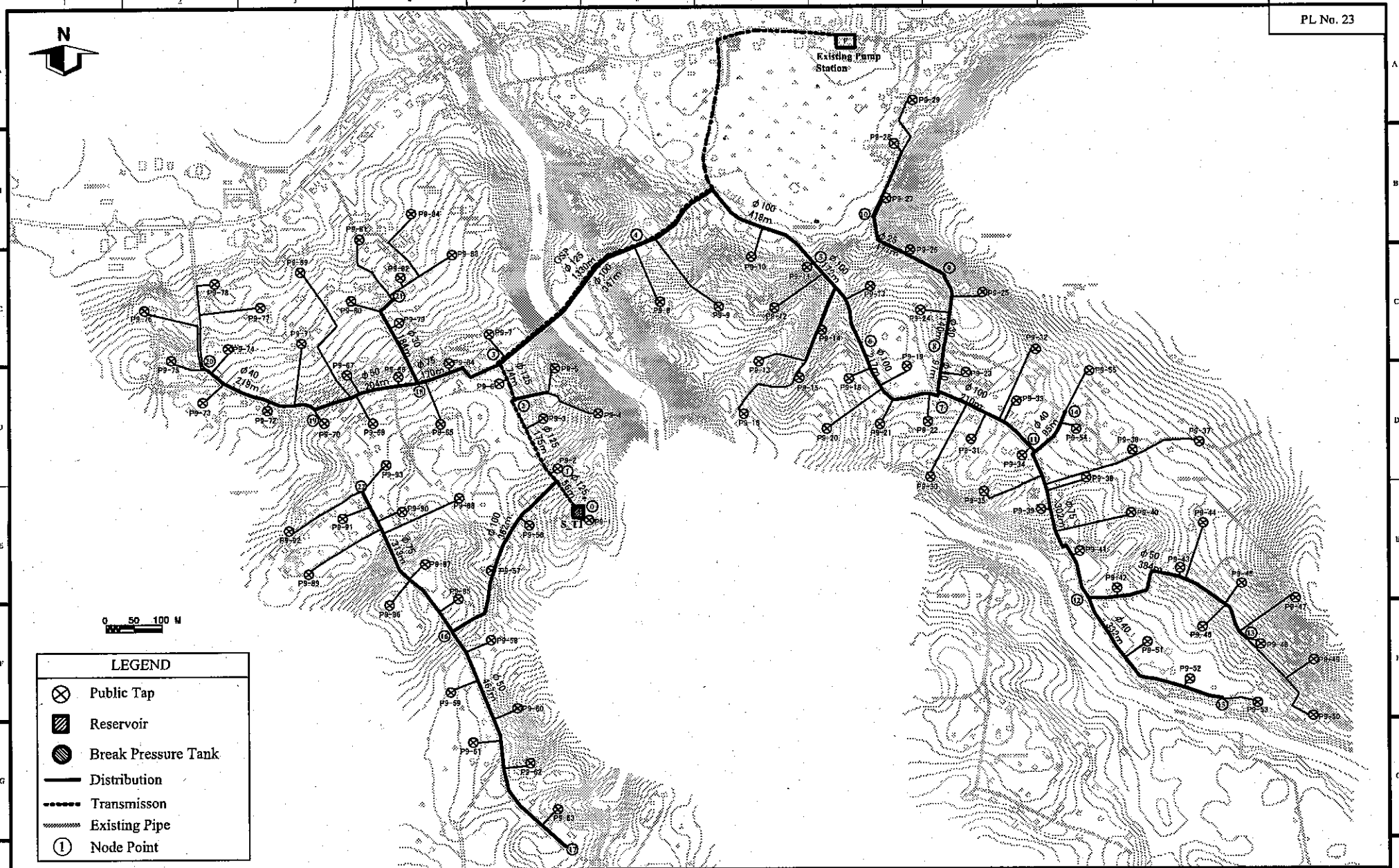


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TITLE: LAYOUT PLAN (6) - SELAPARANG (3/3) -		
SCALE: NONE	DATE: SEPT. 2003	DRAWING NO. LA-013



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

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TITLE		
LAYOUT PLAN (7) - TARUS -		
SCALE	DATE	DRAWING NO.
NONE	SEPT. 2003	LA-014

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2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

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

- 1) KIMPRASWIL is responsible for execution of the project. The provincial KIMPRASWIL is responsible for supervision of the project. 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 Note (E/N) for implementation of the project between Governments of Japan and Indonesia, the KIMPRASWIL will commence preparation works including the PUs 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 a contract for detailed design, preparation of tender documents, assisting tendering works and construction supervision for the project.
- 4) The Japanese general contractor will make a contract for construction works with the KIMPRASWIL, and the Japanese consultant will supervise construction works.
- 5) After completion of construction works, water supply facilities will be handed over to the KIMPRASWIL. The operation and maintenance on water supply facilities will be carried out by the PDAM or WUA in Village.

2-2-4-2 Implementation Conditions

The Japanese contractor executing this project, consisting of civil and pipeline works, plans to employ Indonesian contractors as sub-contractors. The Provincial and District governments have qualified contractors by preparing a registration system of those contractors with type and scale of contracts. Therefore, the Japanese contractor will select the qualified sub-contractor with the type and scale of contracts among registered contractors.

2-2-4-3 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 expect house connections.
- (2) Undertaking 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

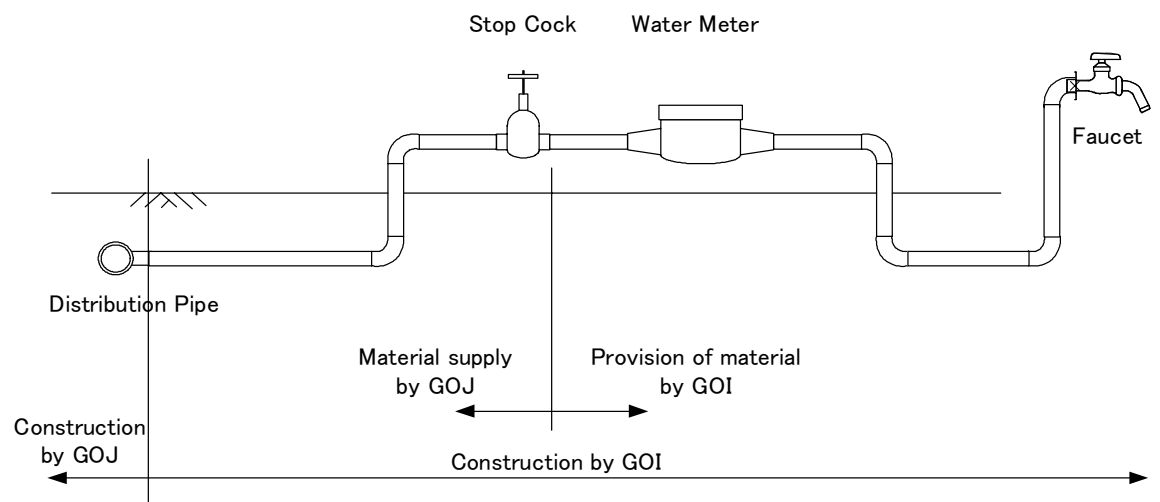


Figure 2.2.4.1 Standard Drawing of House Connection Work

2-2-4-4 Consultant Supervision

The consultant will dispatch a Japanese resident engineer to supervise the construction work and a chief consultant at the time of commencement of construction work and completion of facilities. A site office is to be set up at Mataram City in Lombok Island. Either the resident engineer or Indonesian consultant attends the construction work periodically for supervision of various schemes. During the construction period of the Tarus scheme, the resident engineer flies between Mataram and Kupan for supervision work.

The following are the major items of supervision works.

- 1) Check/review and approval of drawings : Construction drawings, permission of construction works, samples of construction materials, and specification of machinery submitted by the contractor
- 2) Supervision of construction works : Instruction for construction schedule, grasping the progress of works
- 3) Approval for payment : Issuance of certificate for payment and completion of works, and
- 4) Defect liability inspection : Inspection of the constructed facilities at the end of defect liability period

2-2-4-5 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 2.2.4.1.

Table 2.2.4.1 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

2-2-4-6 Procurement Plan

Available material in Indonesia will be utilized as much as possible. Major material will be procured are shown in Table 2.2.4.2.

Table 2.2.4.2 Procurement plan

Material	Procurement place		
	Surabaya	Capital of Province (Mataram, Kupan)	Around Village
Pipes, Valves	○		
Construction Equipment and Machines	○		
Trucks		○	
Reinforcement Bar	○		
Concrete Material		○	○
Material for temporary works		○	
Fitters, Concreters, Operators		○	
Laborers			○

2-2-4-7 Soft component plan

(1) Necessity of the Soft Component Plan

Sustainability of operating and maintenance for the water supply system is dependant on the ownership of the user, that is payment of water cost or operating 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 the education and sensitization of people:

The district PUs have limited interest in education and sensitization of people as it does not form part of their general tasks. It is therefore seldom taken seriously. Moreover, as PU staff members receive insufficient training in the area of social behaviour or encouragement of the community, participation of the community in this process is not enforced .

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

To date, activities related to the education and sensitization of people 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 people's 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 peoples' 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 the education and sensitization of people 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 born 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 of the education and sensitization of people 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 Figure 2.2.4.2.

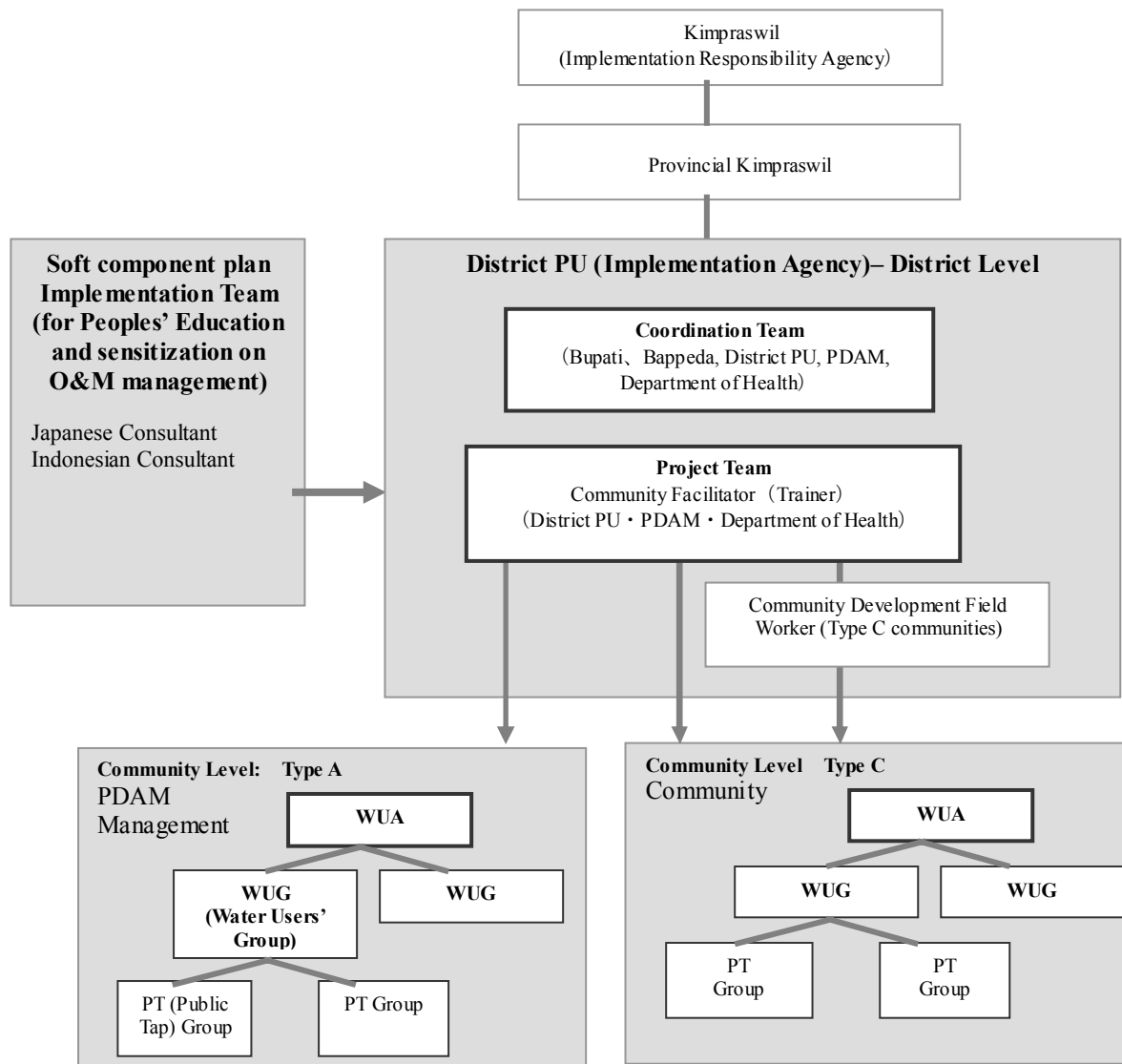


Figure 2.2.4.2 Organizational Structure for Operation and Maintenance in the Project

(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. (1 week in each district).

2) Supporting work

a) Trainer's manual preparation and revision.

The following manuals for the trainers of the project Team, who will actually implement

education and sensitization of people in communities, will be prepared and revised.

① Manual preparation for project team

The contents of improved methodology on peoples' 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 peoples' 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 be 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 people's 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 peoples' 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 item 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 born 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

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

Preparation Stage of Education and Sensitization of People:(4 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 full preparations are in place for education and sensitization of people, 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 education and sensitization of people 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 5.5 months in close cooperation with the Japanese consultant.

A work schedule for the soft component plan is shown in Table 2.2.4.3. The working plan for the education and sensitization of people based on Japanese and Indonesian consultants based on this schedule is presented in Table 2.2.4.4.

Table 2.2.4.3 Proposed Work Schedule for Soft Component Plan

(Unit: month)

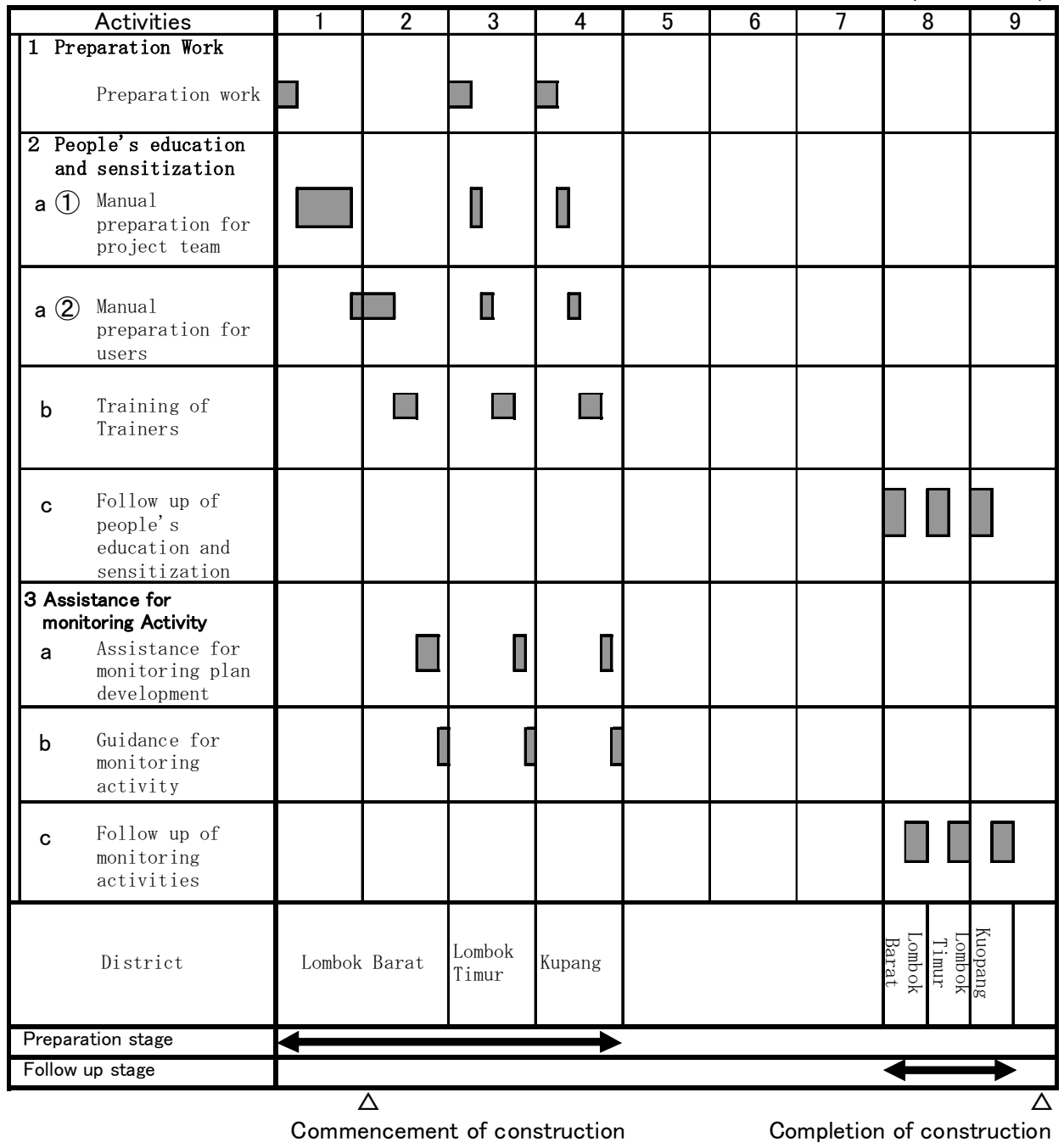


Table 2.2.4.4 Working Plan on Soft Component Plan for Operation and Maintenance Arrangement

		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.	3 weeks	District Office	District PU, Related Organizations	-	Consultant's vehicle, Cost of document preparation
People's education and sensitization	2) a, □	Manual preparation for project team	Prepare trainer's manual that includes contents of activities, plan of activities, water campaign plan and study tour plan.	3.5 weeks	District Office	Project team	Printing Translation	Cost of document preparation
	2) a, □	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.	3 weeks	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.	3 weeks	District PU	Project team, Field worker	-	Cost of training implementation, vehicle
	2) c,	Follow-up of people's education and sensitization	Follow up the achievement of the people's education and sensitization. Results are summarized as lessons learnt.	3 weeks	District PU	Project team	-	Cost of training implementation, vehicle
Follow-up	3) a,	Assistance for Monitoring Plan Development	Assistance in developing Monitoring Plan.	2 weeks	District PU	Project team	-	Cost of document preparation
	3) b,	Guidance for Monitoring Activities	Guide and assist the realization of monitoring Plan.	1.5 weeks	District PU	Project team, District PU	-	-
	3) c,	Follow-up of monitoring activities	Support and assist to ascertain the monitoring activities.	3 weeks	District PU	Project team	-	Vehicle, Cost of implementation

2-2-4-8 Implementation Schedule

The implementation schedule is expected to be completed in the following periods; (See Table 2.2.4.5).

- (1) Detailed design : 3.5 months
- (2) Tendering and contract : 2.5 months
- (3) Construction works : 10.5 months
- (4) Soft component plan : 5.5 months

Table 2.2.4.5 Implementation Schedule

(Unit: Month)

WORK	1	2	3	4	5	6	7	8	9	10	11	12
Detailed Design	■ (Field Investigation)											
		■ (Preparation of Tender Document)										
			■ (Approval of Tender Document)							(Total 6.0 months)		
				■ (Tender, Evaluation and Contract)								
Construction Works	■ (Preparation Work)											
			■ (Kuranji Scheme)							(Total 10.5		
			■ (Bajur Scheme)									
			■ (Duman Upper Scheme)									
			■ (Duman Lower Scheme)									
				■ (Bagik Papan Scheme)								
					■ (Selaparang Scheme)							
						■ (Tarus Scheme)						
Soft Component Program	■							■				
									(Total 5.5 months)			

2-3 Obligations of Recipient Country

Undertakings of the Government of Indonesia are drafted as follows:

- (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 and 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.

2-4 Operation and Maintenance Plan of the Project

2-4-1 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 unprepared 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 structure of project implementation is shown in Figure 2.4.1.1 below;

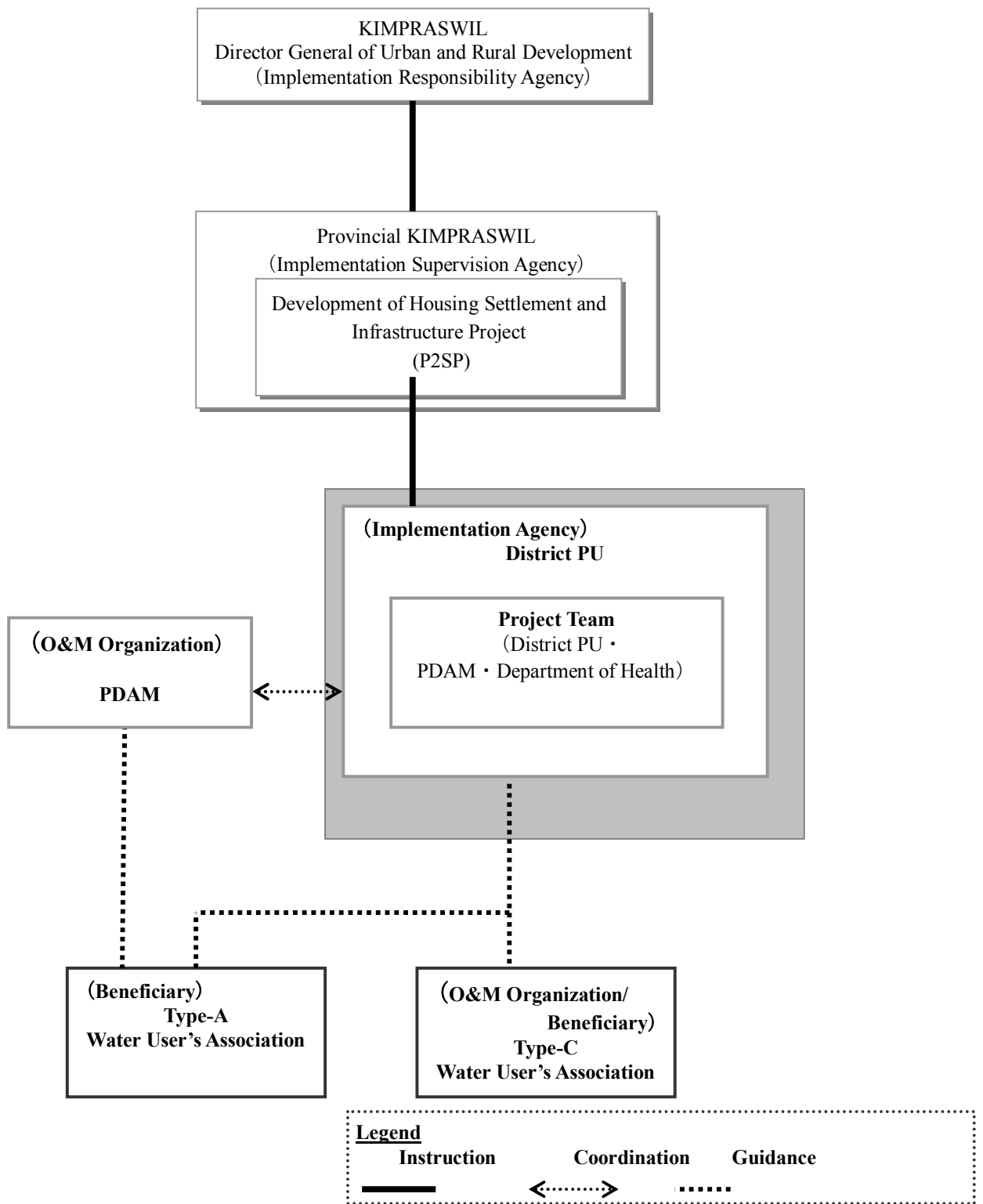


Figure 2.4.1.1 Structure of Project Implementation

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 socialization 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 its 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 a existing system and it introduce 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.

2-4-2 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 socialization activities to households and WUA.

The Japanese government : Soft component plan

- 1) Discussions with related parties
- 2) Development of a manual on socialization activities, which will be used by trainers.
- 3) Implementation of training to trainers.

- 4) Advice on planning of monitoring.

The Indonesian government (District level) : People's education and sensitization

- 1) Briefing on the project to communities in the project villages and implementation of people's 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 trip)
- 8) Implementation of monitoring project activities.

People's 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 create/strengthen ownership of households on facility management. The field worker will carry out people's education and sensitization for health and hygiene through a Participatory Rural Appraisal (PRA) method.

2-4-3 Operation and Maintenance Plan for Village Level

- (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, Water Users' Group (WUG) will be placed at each hamlet in the village. This structure is effective for the 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 community, and the WUA will issue a financial report regularly and share it with the community to keep accountability.

Small-scale repair 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.

2-5 Project Cost

2-5-1 Construction Cost

The project cost for seven schemes in six villages totals 238 million yen as outlined in the Table 2.5.1.1 and 2.5.1.2. 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 2.5.1.1 Cost Attributable to Japanese Government

Item		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	144
Engineering Service	Detailed design, construction supervision and soft component plan	81
Total		225

(2) Indonesian Component

Table 2.5.1.2 Cost Attributable to Indonesian Government

Item		Cost	
		(million rupiah)	Equiv. Yen (million yen)
Construction Cost	House connections	224	3.1
	Electric power	73	1.0
Material cost	Piping material and water meters	542	7.5
People's education and sensitization for WUA		101	1.4
Total		940	13.0

(3) Conditions for cost estimate

- Time of estimation : July 2003
- Exchange rate : 1 US\$ = 119.71 yen = 8,655.8 rupiah (1 yen = 72.3 rupiah)
- Others : The project shall be implemented in accordance with the regulations and systems of the Japanese Grant-Aid scheme.

2-5-2 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 2.5.2.1.

Table 2.5.2.1 Annual Cost for O&M of District PUs

Item	Lombok Barat	Lombok Timur	Kupan	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-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 2.5.2.2.

Table 2.5.2.2 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 Duman (Upper). 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.

(3) Type-A system

The annual operation and maintenance cost is estimated in Table 2.5.2.3.

Table 2.5.2.3 Annual Cost for O&M of PDAM

Village	Kuranji, Bajur Doman(Lower)	Selaparang	Tarus			
PDAM	Menang Mataram	Lombok Timur	Kupang	Total (Million Rp)		
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, 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, Bajjur, and Duman (Lower). 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, 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, 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.

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.

2-6 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.

Chapter 3 PROJECT EVALUATION AND RECOMMENDATION

3-1 Project Effect

The effects of the project implementation are listed as shown in Table 3.1.0.1.

Table 3.1.0.1 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.	<ul style="list-style-type: none"> • Construction of 7 rural water supply facilities in 6 villages. 	<ul style="list-style-type: none"> • After construction of 7 water supply facilities in 6 villages, about 24,000 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.	<p>Soft component plan</p> <ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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 24,000 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.

3-2 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 and 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.

3-3 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 24,000 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.

3-4 Conclusions

The project will contribute to safe and reliable water supply for 24,000 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.