

MINISTRY OF PUBLIC WORKS
MAMMINASATA METROPOLITAN DEVELOPMENT
COOPERATION BOARD (MMDCB)

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

THE STUDY ON IMPLEMENTATION
OF INTEGRATED SPATIAL PLAN
FOR THE MAMMINASATA METROPOLITAN AREA,
SOUTH SULAWESI PROVINCE IN INDONESIA

**INTEGRATED SPATIAL PLAN
FOR
MAMMINASATA METROPOLITAN AREA**

covering
Makassar, Gowa, Maros and Takalar

**FINAL REPORT
PRE-FEASIBILITY STUDY REPORT**

JULY 2006

KRI INTERNATIONAL CORP.
NIPPON KOEI CO., LTD.

FOREWORD

This volume of the Final Report presents the results of Pre-feasibility Study on the selected priority projects for the implementation of the Integrated Spatial Plan for the Mamminasata Metropolitan Area.

Through discussions among the Indonesian authorities, JICA office and the Study Team, it has been agreed that pre-feasibility level studies are to be conducted on the following four projects that are prioritized for implementation in view of the urgent requirement for improvements.

- (1) Improvement of Water Supply System in Maros and Takalar Regencies,
- (2) Improvement of Landfill Site for Solid Waste Management,
- (3) Substation Expansion and Distribution System Rehabilitation, and
- (4) Improvement of Perintis-Urip Road.

Since there has been a difference in the inputs to and periods of these pre-feasibility studies, as well as in the extent of available information, the level of the pre-feasibility study is somewhat different. However, the study will clarify that the improvement and rehabilitation is urgently required by the people of the Mamminasata Metropolitan Area, and that their implementation is justifiable.

Despite the different extent and level of the pre-feasibility studies, the four studies have been conducted at the same time with a hope that they could be implemented in one package for the improvement of infrastructure in order to ensure better living condition and the better environment in the metropolitan area. In fact, these projects are all in the first stage of the implementation programs proposed in respective sector under the Integrated Spatial Plan. It is believed that the improvement in water supply system, solid waste management system, electric power supply system and road transportation system could be implemented stage-wise and in an integrated form so that the improvement works could better be implemented in a harmonized manner in the Mamminasata Metropolitan Area.

PENGANTAR

Laporan Akhir ini memaparkan hasil-hasil Studi Pra-Kelayakan (Pre-F/S) tentang proyek-proyek prioritas pilihan untuk implementasi Rencana Tata Ruang Terpadu Wilayah Metropolitan Mamminasata.

Melalui rangkaian diskusi yang telah dilakukan antara pihak berwenang di Indonesia, kantor JICA dan Tim Studi, disepakati bahwa akan dilakukan studi pra-kelayakan untuk implementasi empat proyek prioritas berikut, berdasarkan pertimbangan kebutuhan yang mendesak.

- (1) Peningkatan Sistem Penyediaan Air bersih di Kabupaten Maros dan Takalar,
- (2) Pengembangan TPA untuk Pengelolaan Limbah Padat,
- (3) Peningkatan Kapasitas Gardu Induk dan Rehabilitasi Sistem Distribusi tenaga listrik, dan
- (4) Peningkatan Jalan Perintis-Urip

Adanya perbedaan dalam hal input dan periode, termasuk ketersediaan informasi, menyebabkan level studi pra-kelayakan ini agak berbeda. Meski demikian, studi ini akan memperjelas bahwa masyarakat di wilayah Metropolitan Mamminasata sangat membutuhkan peningkatan dan rehabilitasi, dan bahwa pelaksanaan studi-studi pra-kelayakan ini dapat dipertanggung-jawabkan.

Meskipun terdapat perbedaan lingkup dan level dari masing-masing studi pra-kelayakan ini, keempatnya dilaksanakan pada saat bersamaan dengan harapan bahwa studi-studi ini dapat dilaksanakan dalam satu paket peningkatan prasarana untuk menciptakan dan membangun kondisi kehidupan dan lingkungan yang lebih baik di wilayah metropolitan. Pada kenyataannya, proyek-proyek tersebut berada pada tahap awal program implementasi yang diusulkan oleh masing-masing sektor dalam Rencana Tata Ruang Terpadu. Diyakini bahwa peningkatan sistem penyediaan air, sistem pengolahan limbah padat, sistem penyediaan tenaga listrik, dan sistem transportasi jalan dapat dilaksanakan secara bertahap dan terpadu sehingga program tersebut dapat terlaksana secara lebih selaras dalam wilayah Metropolitan Mamminasata.

PRE-FEASIBILITY STUDY

- (1) Improvement of Water Supply System in Maros and Takalar Regencies**
Peningkatan Sistem Penyediaan Air bersih di Kabupaten Maros dan Takalar

- (2) Improvement of Landfill Site for Solid Waste Management**
Pengembangan TPA untuk Pengelolaan Limbah Padat

- (3) Substation Expansion and Distribution System Rehabilitation**
Peningkatan Kapasitas Gardu Induk dan Rehabilitasi Sistem Distribusi tenaga listrik

- (4) Improvement of Perintis-Urip Road**
Peningkatan Jalan Perintis-Urip

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INTEGRATED SPATIAL PLAN
FOR
THE MAMMINASATA METROPOLITAN AREA

**IMPROVEMENT OF WATER SUPPLY SYSTEM
IN
MAROS AND TAKALAR REGENCIES**

Pre-Feasibility Study (1)

July 2006

KRI INTERNATIONAL CORP.
NIPPON KOEI Co., Ltd.

Exchange Equivalents

US\$ 1 = IDR 8,760 = ¥ 114.00

(As of May 2006)

**IMPROVEMENT OF WATER SUPPLY SYSTEM
IN
MAROS AND TAKALAR REGENCIES**

Pre-feasibility Study (1)

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ABBREVIATIONS

BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
EC	Electric Conductivity
DO	Dissolved Oxygen
Desa	Village
GDP	Gross Domestic Product
GNI	Gross National Income
IKK	Kechamatan Center
ISO	International Standard Organization
Kechamatan	Division
MDGs	Millennium Development Goals
MMA	Mamminasata Metropolitan Area
NTU	Nephelometric Turbidity Unit
NGO	Non-Governmental Organisation
PE Pipe	Polyethylene Pipe
PDAM	Perusahaan Daerah Air Minum, Regional Drinking Water Supply Company
SS	Suspended Solid
UFW	Unaccounted for Water
uPVC	Unplasticized Polyvinyl Chloride
TDS	Total Dissolved Solid
WHO	World Health Organization

PREAMBLE

The Integrated Spatial Plan for the Mamminasata Metropolitan Area (the MMA Master Plan) has been worked out as presented in the Main Report. This paper presents the results of a pre-feasibility level study on the Improvement of the Water Supply System in Maros and Takalar regencies.

As clarified in the Main Report, Chapter 8.2, the people in the Mamminasata metropolitan area are still suffering from an acute shortage of drinking water supply. The spatial plan study revealed that the households in Mamminasata served with a piped water supply amount to only 42 % of total households, on average. While 70 % of the Makassar people are served with piped water (100 % in the service area), the service ratio is as low as 9.7 % in Maros (11.7 % in the target area) and 4.0 % in Takalar (4.2 % in Kecamatan Polombangkeng Utara). Such levels of water supply are absolutely low if compared with the Millennium Development Goals (MDGs).

Through the discussions with stakeholders and counterpart agencies, it has been decided to carry out a pre-feasibility level study on the improvement of water supply systems in Maros and Takalar regencies, so that the improvement plan could be considered as part of the packaged programs for the improvement of the living environment and infrastructure in the Mamminasata metropolitan area.

The water supply system in Gowa regency, on the other hand, is also insufficient with a service ratio of 11.0 % (4.2 % in the service area). The improvement of water supply services in Gowa will be separately planned together with the expansion of the existing Somba Opu water treatment plant, which is currently serving Makassar city. In the event that the Somba Opu plant is expanded from the current 1,000 lit/sec. to 3,000 lit/sec. in its treatment capacity, a major part of Sungguminasa and other districts in Gowa regency could be served with the Somba Opu water.

The input and period of time allocated for this study on the improvement of the water supply systems in Maros and Takalar has been quite limited, but the study will reveal that the proposed improvement project would greatly contribute to the expansion of the water supply services, to a level of nearly 54.0 % (61.0 % in the target area) of the population in Maros and 11.7 % (50.0 % in Kecamatan Polombangkeng Utara) in Takalar, in a short period and with a relatively small amount of investment.

Part-A of this pre-feasibility study report presents the water supply system improvement in Maros, with particular attaints to the first stage implementation. Part-B of this report presents the proposed improvement of water supply facilities in Takalar.

In Part-C, the proposed improvement in water supply in Maros and Takalar are evaluated preliminarily, together with the additional studies and designs to be required in the subsequent phase of the implementation.

PART-A IMPROVEMENT OF WATER SUPPLY SYSTEM IN MAROS

1. OVERVIEW OF WATER SUPPLY IN MAROS

1.1 Background

The status and condition of the water supply in Maros has been aggravated by an increasing water demand as a result of population growth, increased living standards, and the expansion of the housing area. The coverage of the piped treated water in the supply area in Maros regency was 9.7 % in 2004. At the same time, the unaccounted for water (UFW) ratio was about 50 % and it becomes more serious every year. Consumption of PDAM piped water in Maros regency is limited by the capacity of clean water production, and by the technical and non-technical water losses as well as the lack of distribution networks and tertiary pipes. In general, water pressures throughout the system are low, especially at the edge of pipeline network, demand is suppressed, and the quality of water at the existing water treatment plant does not meet Indonesian standards for drinking water.

PDAM Maros has set a target that the water service ratio should be increased by 80 % in the urban area and 60 % in the rural area by the year 2015. To help achieve this, a Pre-Feasibility Study on the Improvement of the Water Supply System in Maros has been conducted in connection with the MMA Master Plan.

The priority area is set in ten kechamatans out of fourteen kechamatans located in the western parts in Maros regency. Four kechamatans namely Marawa, Camba, Cenrana and Tompobulu have been excluded from the Study area.

Since Marawa and Camba kechamatans are out of the Mamminasata metropolitan area, and Cenrana and Tompobulu kechamatans have alternative water sources, such as small springs and shallow wells.

As a result of the Pre-Feasibility Study, two water resources namely Jamaloh spring and Lkopancing canal have been identified and they are reliable to utilize for drinking water use. Two water sources are located in the center of Maros regency and the south-west respectively. The improvement of the water



Figure-1.1 Priority Area

supply system in Maros is proposed as a staged expansion based on the location of the water sources.

Stage-1 includes development of the Jamaloh Spring to serve clean water to six kechamatans located in the north-west area (in the period from 2008 to 2010), which have a serious water shortage.

Stage-2 includes expansion of the Pattontongang existing water treatment plant to serve four kechamatans (in the period from 2011 to 2015).

Taking into account the significance and urgency to solve problems which the PDAM Maros are encountering, Stage-1 has been selected as the first priority project. Stage-1 aims to meet the target water coverage ratio set by PDAM Maros, and includes the following:

- (i) New construction of water treatment facilities and distribution network.
- (ii) Procurement of operation and maintenance equipment.
- (iii) Reducing unaccounted for water by controlling technical and non-technical losses.
- (iv) Improving operation and human resources development.

1.2 Project Objectives

The objective of PDAM water supply improvement in Stage-1 with the spring water available at Bantimurung will include the following:

- To increase treated water production and water supply coverage
- To improve the existing water supply system and service levels, and
- To improve the performance of PDAM Maros through capacity development

By achieving these objectives, the Development of Jamaloh Spring at Bantimurung (Stage-1) will enable PDAM Maros to expand and improve the coverage, water and system quality of their treated water supplies, thereby supporting economic and social development and improving health profiles in Maros regency.

This Pre-Feasibility Study aims at providing a preliminary assessment of the technical, economic and financial viability of the priority project for implementation of the expansion of piped water under Stage-1 using the spring water available at Jamaloh in Maros under the Integrated Spatial Plan for the Mamminasata Metropolitan Area. The staged improvement work for the Maros water supply system has been defined in the following manner.

Table-1.1 PDAM Maros Water Supply Improvement

Period	Item	Description
2007-2010	Immediate works (Stage-1)	<ul style="list-style-type: none"> • Construction of a new intake and intake pumping station. • Construction of new water treatment plant. • Expansion with new distribution systems in six target Kecamatan. • Rehabilitation of the old pipe line. • Undertaking a UFW Program, including a UFW taskforce, PDAM staff training, bulk meter calibration and repair, leak detection and repair, and non-technical loss reduction in both Stage 1 and Stage 2 areas. • A PDAM capacity development program and WTP operation and maintenance, distribution system management, corporate management, capital works program management, and customer relations.
2011-2015	Mid term works (Stage-2)	<ul style="list-style-type: none"> • Expansion of Pattontongang Water Treatment Plant • Expansion with new distribution systems in four target Kecamatan. • Continue UFW Program

2. EXISTING CONDITIONS IN MAROS

2.1 Socio - economic Conditions

2.1.1 Administration and Population

Maros regency is located in the western part of South Sulawesi between 40-45' to 50' in south latitude and between 109-20' and 129-12' in east longitude, surrounded by Pangkep Regency, Makassar Municipality, Gowa Regency, Bone Regency and the Makassar Strait. The total area is 1,420.3 km². Administration is achieved through 14 kecamatans and 103 desa/kelurahan. The total population of this area was 313,400 in 2005, growing at the rate of approximately 1.83 %. The administrative boundaries and Population are shown in the following figure.



Figure-2.1 Administrative Boundaries and Population in Maros Regency

2.1.2 Land Use

Urban physical development is a manifestation of the population growth and the development of an urban economy, which become the main components for land utilization. In urban planning it is important to acknowledge the spaces for each land use component, building condition and trend of urban physical development besides the activity spaces. It is also important to understand the potential and urban space physical obstacles in order to accommodate future development.

The basic shape of Maros city is a town which has built up in the downtown area and outside the delineated area, following the main road route which leads out of the town. This can be seen from the shape of the built up area and the road network system. Maros downtown is covered by Kecamatan Maros Baru, which is the center of all urban-scaled service facilities. Outside the downtown area in the suburban direction, groups of villages are sprawled. Settlement is concentrated around the downtown area. Outside the downtown area, it is sprawled along the main road out of town. As analyzed in the following table, the urban area is only 1.2 % of the total area and the green area and agricultural area accounts for about 80 %.

Table-2.1 Land Use of Maros Regency in 2004

Land Use	Year 2004	
	Area (ha)	%
Urban Area	1,280	1.2
Agricultural Area	36,900	35.2
Green Area	46,610	44.6
Water	8,760	8.4
Others (dry land, sand dune, open space)	11,030	10.6

Source: The MMA Master Plan

Note : This figure is not included Camba and Mallawa, since they are out of the MMA area.

2.2 Water Resource

The Project Area is located on the northern part of Mamminasata metropolitan area. Major water sources pass into the Study Area, namely Maros River and Bantimurung River, and these are utilized as raw water sources for the existing water supply.

2.2.1 Available Water Sources

Jamalah spring and Lekopancing canal were proposed by PDAM Maros as raw water sources. The Jamalah spring forms part of the tributary of Bantimurung River and supplies about 10 % of the average river flow. Lekopancing canal is directly connected to Lekopancing weir located in the south-eastern parts of Maros and mainly delivers the river water to Panaikang water treatment plant in Makassar. Detailed information on the existing water sources in Maros is summarized below:

Table-2.2 Proposed Water Sources in Maros

Proposed Water Sources	Jamalah Spring	Lekopancing Canal
Holder of Water Rights	Maros Regency	Lekopancing : PSDA Canal : PDAM Makassar
Management of Water Sources	Maros Regency	PDAM Makassar
Permitted Intake Volume (l/sec)	300	Wet Season : 1,500 Dry Season : 900
Required Volume (l/sec)	150 - 200	100
Permitted Volume Use for PDAM Maros (l/sec)	300	50
Estimated Water Flow (l/sec)	av. 800 (Confirmed by PDAM Maros)	Wet Season : > 1,500 Dry Season : 900
Condition	None	It would be possible for PDAM Maros to utilize another 50 l/s, if the community were to reduce the use of irrigation water during the dry season.
Remarks	Based on the preliminary water flow measuring result conducted by the Study team, this spring flow rate was 500 l/s.	Design capacity of the canal is 2,500 l/s, however the canal loses more than 40% of its distribution quantity due to illegal connections and leakages.

Source: PDAM Maros and PDAM Makassar

2.2.2 Water Quality for Water Sources

Generally, in the wet season, the turbidity of river water increases remarkably due to the intensive rainfall, whereas in the dry season the levels of BOD and COD tend to increase due to the low discharge. Maros river basin has less influence on industrial and residential development, and an extensive natural forest area exists in the upper reaches, while Bantimurung river basin is within the national park. Taking account of these conditions, both rivers indicate a possibility for the purpose of treatment and use.

The proposed water source of Jamalah spring is within this national park. The result of raw water quality analysis indicates that the water is suitable for treatment.

Table-2.3 Raw Water Quality Test at Jamaloh Spring, Bantimurung/Maros Rivers

No.	Parameters	Unit	Jamalah Spring	Bantimurung River	Maros River
1	Total Dissolved Solid (TDS)	mg/l	-	192	88
2	Turbidity	NTU	17	38	77
3	Temperature	°C	28	29	29
4	PH	mg/l	7.1	7.1	6.8
5	BDO	mg/l		-	4.2*, 8.8**
6	COD	mg/l		-	8.0*, 22.4**
7	SS	mg/l		-	23*, 28**
8	DO	mg/l	Nil	-	7.4*, 7.4**
9	Chloride	mg/l	17	7.4	1.86
10	Sulphate (SO ₄)	mg/l		3.8	1.8
11	Nitrite (NO ₂)	mg/l	Nil	0.2	0.7
12	Iron (Fe)	mg/l	Nil	0.9	2.0
13	Lead (Pb)	mg/l	-	0.05	0.36

Sources: PDAM Maros

Notes: * During Dry Season, ** Wet season

2.3 Existing Water Supply and Facilities

Batu Bassi Water Treatment Plant and Pattontongang Water Treatment Plant have capacities of 40 l/sec and 50 l/sec respectively, serving approximately 28,500 population (or 9 % of the total population in 2004) partially covering eight out of fourteen kechamatans. However, PDAM water does not reach to four kechamatans located in the coastal area due to water shortage.

The description of PDAM Maros water supply in the following paragraph is mainly based on information from PDAM Maros and/or site observation.

2.3.1 Existing Water Supply Facilities

(1) Overview

The present water supply for Maros is operated and maintained by PDAM Maros (Perusahaan Daerah Air Minum, Regional Drinking Water Supply Company).

PDAM Maros operates two water treatment plants with three intakes. Batu Bassi water treatment plant was first built in 1989 with an intake (“Bantimurung Upstream Intake”) on Bantimurung River. The treatment plant is located in Bats Bassi village in Kechamatan Bantimurung and is composed of one treatment unit with a capacity of 20

l/sec. In addition to this, one filtration unit (capacity 20 l/sec) with another intake (“Bantimurung Downstream Intake”) on Bantimurung River was constructed in 1995.

The second water treatment plant equipped with one treatment unit (capacity 50 l/sec) was built in 2003 at Pattontongang village in Kecamatan Mandai with an intake facility (“Lekopancing Canal Intake”) at Lekopancing canal.

The distribution network is divided into two zones. A booster pump in Batu Bassi Water Treatment Plant supplies the water to the northern area including central Maros. The southern area in Maros is supplied from Pattontongang Water Treatment Plant by booster pump.



Source: JICA Study Team

Note: Kecamatan Tanlalili has 53 connections with a limited supply area, so the above map excluded this Kecamatan from the water supply area.

Figure-2.2 Location of Existing Water Supply Facilities and Water Supply Area