

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

DIRECTORATE GENERAL OF HUMAN SETTLEMENTS (DIPATARYA)
MINISTRY OF PUBLIC WORKS (PUPUK)
GOVERNMENT OF INDONESIA

MASTER PLAN AND FEASIBILITY STUDY
ON
WASTEWATER AND SOLID WASTE MANAGEMENT
FOR
THE CITY OF UJUNG PANDANG
IN
THE REPUBLIC OF INDONESIA

FINAL REPORT

SUPPORTING REPORT

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MARCH 1996

PACIFIC CONSULTANTS INTERNATIONAL, TOKYO
YACHIYO ENGINEERING CO., LTD., TOKYO

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In this report project cost is estimated at June 1995 price
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ABBREVIATIONS AND ACRONYMS

(in alphabetical order)

1. ADIPURA : Evaluation system of the city cleanliness
2. AMDAL : Environmental impact assessment process
3. ANDAL : Environmental impact assessment study
4. APBD : Annual local government development budget
5. APBN : Annual central government development budget
6. BANDES : Village aid plan
7. BAPEDAL : Environmental impact control agency
8. BAPPEDA : Local development planning agency
9. BAPPENAS : National development planning agency
10. DIP : Budget proposal for project
11. DK : Dinas Kebersihan (Cleansing department)
12. IUIDP : Integrated Urban Infrastructure Development Program
13. KANWIL : Provincial branch of department of central government
14. KIP : Kampung Improvement Program
15. KMUP : The Municipality (city) of Ujung Pandang
16. LKMD : Village social activity group
17. MINASAMAUPA : Ujung Pandang, Maros and Gowa metropolitan area
18. PERUMNAS : Public housing authority
19. PD : Regional enterprise
20. PDAM : Local government water supply enterprise
21. PKK : Woman's education plan

- 22. PLN : State electricity enterprise
- 23. PLP : Environmental sanitation division
- 24. PU : (Ministry of) Public works
- 25. PUSKESMAS : Public Health Center
- 26. RDTRK : Land arrangement plan
- 27. REPELITA : Five-year development plan
- 28. SLA : Subsidiary Loan Agreement
- 29. SOP : Standard Operation Procedure
- 30. SWM : Solid Waste Management
- 31. TPA : Final disposal site
- 32. TPS : Temporary disposal site
- 34. UNHAS : Hasanuddin University
- 35. WWM : Wastewater Management

DEFINITION OF TECHNICAL TERMS

A. Wastewater Management

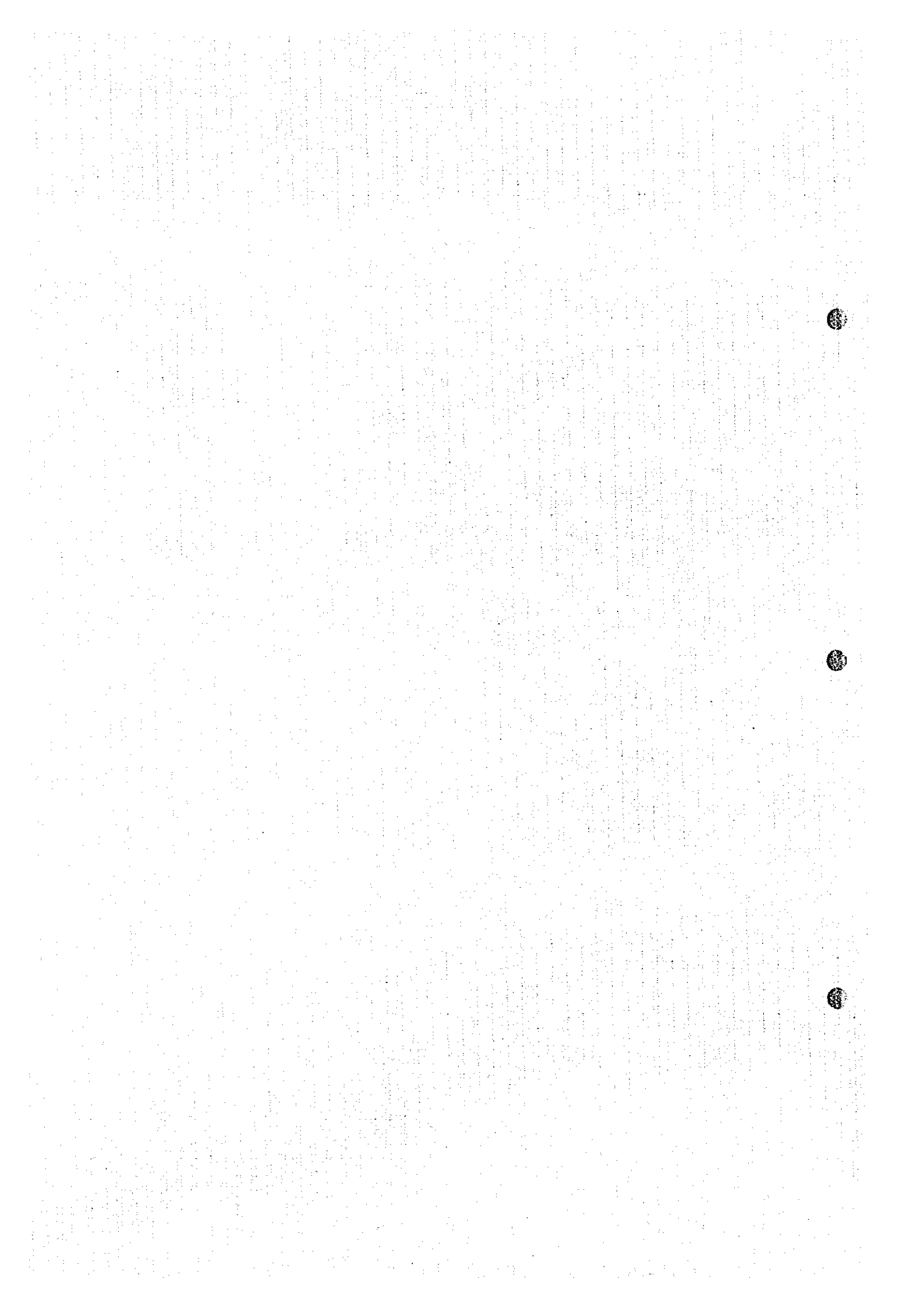
1. On-site System : The system treating wastewater within each building lot.
2. Off-site System : The system collecting and treating wastewater from multiple number of building lots.
3. Package Wastewater Treatment Plant (PWTP) : The compact blackwater and graywater treatment system which can obtain high BOD removal efficiency. The popular treatment processes of this system are an anaerobic filter-contact aeration process and separate contact aeration process.
4. Small Modular System (B) : The system consisting of collection system, septic tank and leaching bed to collect and treat black water from about 20 households.
5. Small Modular System (B/G) : The off-site system that serves about 1 RT (250 people) with collection and treatment system for both blackwater and graywater. The treatment system will be abandoned after integration into conventional sewerage system.
6. Large Modular System : The off-site system that serves about 10,000 ~ 50,000 people with collection and treatment system for both blackwater and graywater. The treatment system will be abandoned after integration into conventional sewerage system.

- 7. Developer Modular System : The off-site system with collection and treatment system for both blackwater and graywater covering a housing complex constructed by developer.
- 8. Small Scale Sewer : The separate collection system from each household to main sewer constructed under foot path or housing lot at a shallow depth less than 1.0 m.
- 9. Interceptor Sewer : The collection system that receives gray water from road side ditch during dry weather.

B. Solid Waste Management

- 1. Primary Collection : Solid waste collection from houses and transport to communal stations or TPS using hand cart or small satellite vehicle.
- 2. Secondary Collection : Solid waste collection from communal stations and generator premises and transport to final disposal site or intermediate treatment facilities.
- 3. Semi-sanitary Landfill : The solid waste disposal system which requires leachate collection, re-circulation and pre-treatment (aeration) facility and gas removal facility in addition to the necessary facilities of control landfill.

I URBAN PLANNING



I URBAN PLANNING

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I URBAN PLANNING

1 Existing Conditions of the Urban Development

1.1 Outline of the City of Ujung Pandang

1.1.1 Administration and area of the city

The city of Ujung Pandang is functions as;

- a. the municipality of the Ujung Pandang,
- b. the capital city of the South Sulawesi Province,
- c. the growth center of Eastern Indonesia, and
- d. one of the metropolitan cities in Indonesia

The total area of the city is 175.77 km², consists of;

- a. 11 units of Kecamatan,
- b. 142 units (62 definitive and 80 preparation) of Kelurahan
- c. 788 units of RW, and
- d. 4,228 units of RT

The *Fig. 1.1* shows the administrative boundary of the city of Ujung Pandang

1.1.2 Present population and land use

(1) Population

The population of the city was 944,372 persons at 1990 Census, and 1,019,948 in 1993. Recently, the population has increased rapidly since 1980 (2.92% between 1980 and 1990) and especially during 1985 to 1990 at an annual increase ratio of 4.65% (See *Fig. 1.2*). The population is concentrated in the central part of the city (central parts) and dispersed in the suburban part of the city (suburbs) as follows;

- a. average population density of the city is 58 persons/ha
- b. higher density of 225 persons/ha in the central parts (7 Kecamatan)
- c. lower density of 36 persons/ha in the suburbs (4 Kecamatan)

There is a tendency of population decrease in the central parts, while the population in the suburbs has increased very rapidly as shown in *Fig. 1.3*. It is noted that recent increase of the population is caused by both factors of natural increase and social increase.

(2) Existing land use

With the rapid increase of the population, the urban area (Built-up area) has considerably expanded to 7,130 ha or 41% of the total area with an annual average increase ratio of nearly 10 % since 1979 and the non-urban area (Non built-up area) has decreased to 10,450 ha, or 59 % of the total area at present as shown below;

year	1979*a)	1989*a)	1994*b)
urban area	2,142 ha (12%)	6,824 ha (39%)	7,128 ha (41%)
non-urban area	15,435 ha (88%)	10,753 ha (61%)	10,449 ha (59%)

Source: *a) Buku Repelita KMUP 1989/90-1993/94
*b) estimated by the JICA Study Team

Note; Built-up area involves residential, commercial, industrial, urban openspace and road and Non-built-up area involves vacant land, dry field, paddy field, swamp, fish pond, and river.

The predominant use of the land in the built-up area are as follows;

- a. residential area : 4,400 ha (25 % of the total city area), including housing areas of PERUMNAS (400 ha) and the private developers/BTN (350 ha).
- b. institutional area : 1,030 ha (6 %), including 250 ha of military, 120 ha of UNHAS (University of Hasanuddin).
- c. industrial area : 360 ha (2 %), including 120 ha of KIMA and 36 ha of the Makassar harbour.
- d. commercial area : 300 ha (2 %), including 80 ha of CBD (Central Business District) in Kecamatan Wajo and Ujung Pandang.

The most of the Non-built-up area are used for agriculture and fishery as follows;

- a. paddy field : 4,470 ha (25 %) for rice
- b. dry field : 2,450 ha (14 %) with major products of cassava, sweet potato, maize, vegetables, etc.
- c. fish pond : 1,430 ha (8 %) for fish and shrimp culture

Fig. 1.4 and Table 1.1 show the present conditions of the land use of the city.

1.2 Major Urban Development Issues and On-going Plans/Programs

1.2.1 Major urban development issues

(1) Major problems for urban development

- a. very rapid growth and uneven distribution of the population
- b. large slum areas
- c. lack of urban infrastructure such as road, bridge, transportation facilities, water supply, sanitation, solid waste, education, medical, cultural facilities.
- d. lack of regional revenue as financial source of development
- e. poor coordination in development implementation with overlapping between sector/area projects and other projects
- f. insufficient manpower of regional government to manage the city development

(2) Development programs and projects

BAPPEDA II has prepared the Master Plan of the city of Ujung Pandang in 1984 and revised it in 1992 and now preparing the development plan (POLADAS II and REPELITADA) and spatial plan (RUTRK) for the period of REPELITA IV (1994/95-1998/99). According to the draft plan, the outline of the priority programs, development programs and projects can be summarized as below;

(3) Overall priority programs

Nine (9) priority programs are prepared as follows;

- a. development of the KIMA industrial estate and the wood processing zone
- b. development of cargo terminal and Makassar harbour, and expansion of the Hassanuddine airport.
- c. development of road network, drainage and the Jeneberang River project
- d. increasing of serving capacity of transportation for both goods and passengers
- e. up-grading of human resources through manpower/labour development
- f. encouraging of economic growth by investment in the trading/commercial sector and increasing of the cooperative activities
- g. promotion of tourism development
- h. improvement of communication and telecommunication facilities
- i. expansion of social and cultural facilities such as religious, educational, science and technology, social, cultural, medical, youth and housing

(4) Overall development programs

1) Agricultural sector :

To give priority to increase the productivity through intensification for food crop, and improve facilities for fish pond and to develop slaughter house (RPH) for livestock sub-sector. The target (annual increase ratio for REPELITA VI) are as follows;

- crop production (ton)	1.8 %
- livestock production (ton)	1.4 %
- fishery production (ton)	1.1 %

2) Industrial sector :

To expand the KIMA area and establish an Export Processing Zone (bonded warehouse) within the area, and to develop the Wood Processing Zone for increasing of industrial products and employment opportunities. The target (annual increase ratio for REPELITA VI) are as follows;

- number of factories	1.7 %
- number of employment	3.7 %
- investment cost	1.2 %
- production (Rp.)	19.5 %

3) Mining and energy sector :

To continue the orientation to mine Type-C (gravel, clay soil) for mining sub-sector, and to enlarge and improve the electricity network in addition to install facilities to increase the capacity for new development and settlement areas for energy sub-sector.

4) Communication and tourism sector :

To develop highways network, toll road, cargo and bus terminals and improve and maintain the existing roads, bridges and drainage, and to supply and maintain traffic sign/signal for the land communication sub-sector. The major projects for REPELITA VI are as follows;

- artery roads (Jln. Urip Sumoharjo, Sultan Abaddin and Prof. Sutami)
- toll road
- secondary artery road
- Makassar harbour
- Hasanuddine airport

- tourism/urban development in Tanjung Bunga

5) Trading and cooperative sector :

To develop and improve markets, warehouse and new shopping centers for trading sub-sector and to establish/promote self-sustaining cooperatives for cooperative sub-sector.

6) Education, health/demography and cultural/youth sectors :

To increase schools, teachers and non-formal education service for the education sub-sector, to increase medical facilities, tools and equipment for health sector, to control migrants flow especially to the already high dense areas for demography sector and to develop sports center for youth at Sudiang for cultural/youth sector.

7) Environmental sectors :

To improve the environmental conditions of the city through;

- maintenance and improvement of housing environment
- encouragement of community participation
- increasing of green space for the inhabitants
- development of wastewater treatment plant for each factory and industrial estate

1.2.2 Solid waste management

(1) Framework of master plan

The future population of KMUP is estimated to be 2.2 million in the year 2015. Target of collection service ratio is set to provide 95% of total population providing the service to the area that have population density more than 50 person/ha.

Solid waste amount is estimated based on future population and unit generation rate obtained in this study. Solid waste amount in 2015 is estimated to be 1,640 ton/day including industry waste and around three (3) times of present amount. Also solid waste amount collected in Maros and Gowa will be 82.3 ton/day (service population 152,400) and 85.5 ton/day (service population 158,400) respectively.

Future solid waste composition is predicted based on general tendency of change. Characteristics of solid waste in Ujung Pandang are:

- i. High content of putrescible matter

- ii. Low non-combustible content such as metal and glass
- iii. High moisture content specially in wet season
- iv. Low lower calorific value specially in wet season

(2) Target and strategies

The level of environmental improvement concerning solid waste management are set at the following three (3) levels.

- i. **ML (Minimum level)**
To collect solid waste within a service area on a regular basis (at least once a week) and disposal at control landfill site
- ii. **CL (Comfortable level)**
To collect solid waste within a service area on a regular basis (more than twice a week) and disposal at sanitary landfill site
- iii. **AI (Amenity level)**
To collect solid waste within the city area on a regular basis and to treat adequately than dispose of.

This master plan set the target level at CL because environmental improvement is require not only in solid waste management sector but also in the waste water management sector and this improvement shall be achieved within financial constrains. Following should be basic policy for solid waste management.

- i. Expanded and more efficient collection service
- ii. Prohibition of open dumping and disposal by sanitary landfill method
- iii. Promotion of solid waste volume reduction
- iv. Strengthening responsible organization; Dinas Kebersihan
- v. Sustain a solid waste management financial base
- vi. Strengthen public education and citizens participation concerning solid waste management
- vii. Introduction and promotion of private sector participation

(3) Alternatives studies and selected

Type of collection vehicle to be used and collection system to be employed in KMUP is compared considering location of final disposal site at present and future. Proposed system in the Master Plan summarized as follows.

Item	Phase I (up to year 2005)	Phase II (2006-2015)
Collection vehicle to be used	a. Arm-roll truck 6cu.m b. Dump truck 6cu.m	a. Arm-roll truck 6cu.m b. Dump truck 6cu.m c. Compactor truck 10cu.m
Collection system	a. Hauled container system (with/without handcart) b. Door to door and calling system c. Station (packed waste) and TPS	a. Hauled container system (with/without handcart) b. Door to door and calling system c. Station (packed waste)
Discharge	Packed by plastic bin or bag (door to door, calling and open station system) Unpacked (hauled container system)	Packed by plastic bin or bag (door to door, calling and open station system) Unpacked (hauled container system)

KMUP, Maros and Gowa have a concept of Minasamaupa as an greater municipality. Intermediate treatment and final disposal system of this area is studied because land acquisition of future final disposal site is difficult within KMUP. It is proposed to have at least two final disposal site in this area to avoid heavy burden of transportation cost. Than following six (6) alternative of intermediate treatment and final disposal of solid waste in 2015 were studied including the case of introduction of transfer \emptyset station and incineration plant.

After comparison of six (6) alternatives, Alternative 1 that all collected waste shall be disposal of in Gowa is selected because it is most economical alternative. Therefore, solid waste management of Minasamaupa will have two (2) final disposal site, one in Gowa as an inter-municipal disposal site and another on in Maros. System to be employed in Gowa shall be sanitary landfill but Marso may be control landfill system.

(4) Implementation program of Master Plan

The Master plan period is divided into two (2) phases and each phase is further divided into two (2) 5-year period stages. Implementation program to achieve the Target of Master Plan is shown in *Table 1.22*.

1.3 Major On-going Projects/Plans Related to the Study

1.3.1 Housing and settlement development programs

(1) Development policy

The basic policy of this sector is to increase the number of housing units to provide dwellings to all the people with adequate water supply and environmental sanitation

through "BERSINAR (clean, healthy, beautiful, peaceful and orderly) City Program", improvement of the slum areas, renovation of the city by development of flat/apartment, development of various type of housing and settlement by the PERUMNAS and the private developers, development of city greening and city park, and preparation of trash disposal facilities (TPS).

(2) Past achievement and assumptions of the future housing development

During REPELITA IV to V (1984-1993), approximately 28,400 units of housing which is 18 % of the existing housing units (160,000 units in 1990 Census) in the city were supplied by PERUMNAS and the private developers.

The *Table 1.2* shows the number of housing units, number of inhabitants and required areas for the housing development which will be supplied by PERUMNAS, the private developers and self-building by the community/cooperatives assumed by the JICA Study Team, based on the past achievement and discussions with PERUMNAS, BAPPEDA II and other related agencies with the following conditions;

Annual increase ratio	PERUMNAS	Private*1)	Self*2)
REPELITA VI-V	5 %	7 %	4 %
Until 2015	4 %	5 %	3 %

Note ; *1) Private developers and *2) Self-building

The number of the future housing units which will be supplied by the PERUMNAS and the private developers were assumed as follows;

	1984 - 1993 (existing)	1994 - 2015 (new units)	In 2015 (total units)
1) PERUMNAS	16,600	+72,000	88,600
2) Private developers	11,800	+62,000	73,800
No. of units (Total)	28,400	+134,000	162,400

(3) PERUMNAS housing areas

The extension programs of the Antang and Tamalanrea PERUMNAS housing areas are under process as follows;

- a. Antang PERUMNAS
 - 100 ha to the east of the existing Antang PERUMNAS area
 - around 4,500 units of housing for low and middle income group
- b. Tamalanrea PERUMNAS
 - 200 ha to the east and south of the existing Tamalanrea PERUMNAS area
 - around 6,000 units of housing especially for middle income group

The JICA Study Team made several discussions with the staff of PERM Ujung Pandang office on the possibility for introducing a communal system of wastewater management to the expansion areas in Antang and Tamalanrea.

The key points of the discussions are as follows;

- Because of the less knowledge of the communal system and its importance for the environment point of view, the majority of the people live in, they are mostly low and middle income groups, it seems that they don't want pay regular charge for the sewer service. (the most of the people satisfied to use the existing system of septic tank or leaching pit with desludging service by DK).
- Because of no organization exist for operation and maintenance of such new system at present, and the PERM is responsible for construction of housing estate and not for operation and maintenance of the housing area, it is question who will handle it.
- The JICA Study Team recommends to the PERM to improve the existing situation of the individual sanitary system into a communal system for the extension areas as proposed in the guideline for the installation of applicable system for wastewater management.

(4) New housing areas by the private developers

The Fig. 1.5 shows the location of new housing areas. The extent of new housing areas which includes already developed/settled, under construction and planned to construct are as follows;

- Total new housing area; 1,500 ha (at the end of 1994)
- Existing area; 400 ha
- Existing private housing area; 350 ha
- Extension plan area of; 300 ha
- Areas under construction and proposed area by private developers; 450 ha

It is estimated that around 70% of the area e. above, i.e. 320 ha is located within the proposed sewerage off-site area and the rest, i.e. 130 ha in the proposed on-site area.

It is recommended that the new housing areas implemented by private developers should be equipped a new system for the wastewater management according to the guideline of the proposed communal system which is mentioned in the report, Chapter 5, as described in the section of housing above.

(5) Slum areas

The slum areas can be found at all Kelurahan, especially in the fringe of the central parts and some in the other lowland and remote areas in the suburbs. The total area of the slum is more than 800 ha and number of households and population in those areas are 19,000 households and 114,000 persons that is around 11 % of the total population of the city. The population density of the slum area is quite high and living conditions is very bad.

Considerable efforts on improvement of the slum area have been made since 1984 by KIP program in Urban III and V and continuous improvement program is under process with the IUIDP mentioned below and other programs such as HKSN (Supply of low cost housing), PPWT (Integrated Regional development program), PKT (Integrated zone development), and the Urban Renovation program, etc. *Fig. 1.6* shows the KIP by Urban III, V and IUIDP programs.

1.3.2 Highway network development

The first priority of the implementation of the highway road construction was determined by the local government of Tk I and II as follows;

- (1) The inner ring road between Jbt. Toll Tallo and Jln. Sumiharjo (scheduled to open at August 1995)**
- (2) The middle ring road between Jln. Perintis Kemerdekaan and the central radial road (until 1997)**
- (3) The inner road between Jbt. Toll Tallo and the Makassar harbour (until 1998)**
- (4) The central radial road between Jln. Veteran and Jln. Lingkar Tengah (until 1999)**

The long-term highway development of the inner, middle and outer ring roads, and central radial road are scheduled to be implemented as follows;

- 1) Inner ring road (REPELITA VI-VII, up to 2003/04)
- 2) Middle ring road (PELITA VI-VII, up to 2001/02)
- 3) Outer ring road (REPELITA VII-VIII, up to 2006/07)
 - First segment between Jln. U. Sumiharjo and the cross point to the middle ring road at Antang (From 1999/2000 until 2003/9904)
- 4) Central radial road (REPELITA VI-VII, up to 2000/01)
- 5) The artery road between Jbt. S. Jeneberang and Palanga and Inside of Barombong (REPELITA VII-VIII, up to 2008/09)
 - First segment between Jbt. S. Jeneberang and Palanga (From 2004/05 until 2006/07)

1.3.3 Other infrastructure development programs

(1) IUIDP

IUIDP that has started in 1992/93 is one of the key program for development of integrated urban infrastructure involving urban road, drainage, solid waste, sanitation and KIP. The Batch II of the program is now in the appraisal stage and the major components in the Batch I of the program are as mentioned below;

- 1) urban road: construction of new roads such as Middle and Outer Ring roads and rehabilitation/maintenance of the existing road and provision of equipment such as road rollers and asphalt sprayers.
- 2) drainage: improvement/rehabilitation of the existing drainage in the old urban area (1,500 ha) and development of drainage to new areas (4,700 ha) to expand the service areas up to around 6,200 ha in total. The primary channels of Panampu, Jongaya and Sinri Jaya have already constructed in 1992 and construction of Pampang River channel is now under process as well as development of secondary/tertiary channels.
- 3) solid waste: the existing TPA is located in Tamangapa with an area of 5 ha. It is planned to provide appropriate equipment and to expand the area to cope with the increasing demand of solid waste disposal and at the same time the Municipality is looking for new TPA potential sites for long-term requirement of solid waste management.
- 4) sanitation: continue program to increase installation of MCK and other sanitary

facilities are under process and concurrently the introduction of off-site system and other alternative systems for wastewater management are under consideration.

- 5) KIP: 21 locations of the existing slum areas, covering a total area of around 700 ha, are planned to improve their living conditions by development of access roads, drainage, MCK, TPS, etc. during REPELITA VI through IUIDP program.

- (2) Water supply (PDAM)

PDAM is planned to increase the capacity by construction of Bili-Bili dam in the upstream of Jeneberang River in Gowa and installation of Somba Opu water treatment plant that are under construction and the project will complete its first stage in 1998/99. After completion of the project, the total capacity will be increased up to 2,070 lt./sec. in 1998 and planned to increase up to 4,070 lt./sec. until 2004 that will be able to cover 80% of the total city area.

- (3) Flood control

The Jeneberang and Tallo rivers are the main sources of flooding of the city. The management of flood control of the Jeneberang river is carried out by dredging (Package I), building Bili-Bili dam, river bank protection (Package II) and development of drainage (Package III). the Bili-Bili dam is planned to implement not only for flood control, but also for hydroelectric plant, irrigation, water supply as multipurpose dam.

- (4) Tallo river development project

The idea for the development of the lowland along the Tallo river is raised by the municipality, however the written proposal is not available at present. The idea is to develop the area where the most of the area are lowland swamp area at present into residential and recreational area according to the municipal staff and there are no further information at the moment.

- (5) GMTDC project

The Gowa Makassar Tourism Development Corporation (GMTDC) was established with the participation of the Governor of the South Sulawesi, the Mayor of Ujung Pandang, the Bupati of Gowa Regency and several private enterprises in 1991 for creating the tourism compound at the Tanjung Bunga area. The development concept of the area has been changed its original image of tourism-oriented to urban-oriented which they called NTIT (New Town In Town) that

provide large-scale housing estate with business and commercial, hotel, shopping, convention, cultural and recreational facilities close to the existing city centre of Ujung Pandang.

According to one of the member of GMTDC, the development area covers around 1,000 ha for long-term plan and the major components of the phase-1 development area (100 ha) are planned as follows;

- a. 25 ha of town centre including hotel, apartment, shopping centre, business offices and others (total floor area is around 150,000 m²)
- b. 25 ha for residential (600 or 1,900 housing units)
- c. 50 ha for infrastructure and open space for garden, recreation and cultural facilities

Note; 10 % of the total investment will be allocated to the sanitary facilities.

The land acquisition is now underway and the town centre will be completed in 1998 and residential and other areas will be developed until 2000. The conceptual design is currently in progress by the American consultants and Dutch consultants, which is to complete in August 1995.

The key issue on the GMTDC project and JICA Study is wastewater management of the GMTDC area whether the proposed off-site system by JICA should be involved the GMTDC area or how to integrate their system into the JICA proposed system. However the scheme of the GMTDC area is in the conceptual stage, while the JICA study is in the end stage, so that it is required further coordination in the later stage when their scheme becomes concrete.

(6) Other tourism and recreational areas

Other tourism and recreational development projects are underway at Lae Lae Island and Balang Tonjong, Kel. Antang in Kec. Panakkukang as follows;

1) Lae Lae Island for marine recreation development (planning in 1996/97)

The planning study of the Lae Lae island is underway by the municipality and within the study, the relocation plan for the fishermen in Lae Lae is studying to prepare the new settlement area in Biringkanaya.

2) Balang Tonjong area for lakeside recreation development (planning in 1995/96)

The location of the area is north of the Antang housing site and the total

development area of the Balaig Tonjong is around 5 ha to facilitate fishing ponds for the first stage. The second and further development will involve restaurant, rest house, park, etc. The first stage construction will be commenced in 1995/96, managed by the Dinas Pariwisata, KMUP with own finance of APBD.

(7) Renewal of the Panampu and its surrounding area

For the construction of the toll road segment between Makassar Harbour to the Tallo Toll gate, the area in Panampu is required to rearrange its urban structure. The PU Cipta Karya Tk. I made surveys to formulate the renewal plan of the living conditions for the area of Panampu and its surrounding area where is one of the area placing many slum areas in the city. The population density of the area is very high with 624 persons/ha and 108 buildings/ha, and the 74 % of the buildings are semi-permanent or temporal. The survey area is 20.1 ha with number of the existing population of 12,543 persons or 2,362 households at present.

The concept of the development is to build the storied-house (4 floors) after clearance of the existing structure according to the plan as follows;

- a. Build new 3,363 housing units of 4-stories building after demolishing the existing buildings with an adequate infrastructure system.
- b. Resettle existing inhabitants to the new housing units (2,362 units)
- c. Sell surplus housing units (1,001 units) and areas for commercial uses (7 ha)
- d. Improvement of the infrastructure system of the area such as road, drainage, sanitary, electricity, water supply, public facilities, park, etc.

The study concluded that the project is feasible. (The IRR was estimated as 16 %, NPV was 2.2 billion Rp. and BCR was 1.31 according to the study)

The implementation of the project is already initiated by the local government in 1994/95, and the government promote the investment from the private sector, however, the renewal and construction of the 4-stories building were not yet done because of the disagreement of the inhabitants and other reasons. The sub-components of the projects which were already executed in 1994/95 and is going to implemented in 1995/96 are as follows;

- a. Sub-components in 1994/95
 - Public campaign
 - Detail survey and design
 - Improvement of access roads (total length; around 2,500 m)

- Tertiary drainage (1,000 m)
- Tertiary water supply (1,600 m)
- Hand carts (80 units)
- Rehabilitation of the existing houses

b. Sub-components in 1995/96

- Public campaign
- Public facilities (Camat/Lurah offices, Clinic, primary school)
- Access road (6,000 m)
- Secondary drainage and improvement of small drainage (1,000 m)
- Tertiary water supply (1,600 m)
- MCK
- Septic tanks
- TPS, hand carts
- Community park

(8) Market and commercial area development projects

The market improvements in the areas of Butun, Baru, Pa Baeng², Teron, Daya and Kerung² are planned, however the detail information of the plans is not yet prepared. The PU has a different programs (P2P) to improve the living environment with facilitating the basic infrastructure such as access road, drainage, MCK etc. in the market areas of Teron and Kerung².

(9) Master plan of the Sungguminasa urban area and Gowa Kabupaten

The current master plan for the Sungguminasa urban area is now reviewing based on the first master plan of RIK that was formulated in 1985. The IUIDP was also prepared for the period of 1995/96-1999/2000 (Batch-II) to improve the infrastructure systems of the urban area. The existing urban planning area with 1,285 ha will expand to 5,316 ha in the year of 2005

The proposed site of TPA in the Kelurahan Samata is located around 6 km east from the centre of the Sungguminasa urban area and fringe the urban area in 2005.

The major development programs related to the location of the proposed TPA in the Sungguminasa urban area as follows;

1) Road widening between Pacinongan and Bontomarani

The provincial road of the above segment is now widening to increase the capacity

of traffic flow and to encourage the development of industrial corridor along the road.

2) Housing development

More than 30 project sites are proposed for housing development by the private developers and PERM with the total area of 950 ha. The locations of those sites are mostly within the existing urban planning area and still far from the proposed TPA site.

3) Irrigation project

The proposed TPA site is located on the proposed irrigation area of Jeneberang river, so that the development of TPA requires careful coordination with the irrigation project. Fortunately, there are no technical improvement program within the TPA site, because the TPA site stands in lowland flood area. The influence to the surrounding paddy fields should be minimized in the TPA development process.

4) Total irrigation area; 2,415 ha

- Kajenjeng area; 523 ha
- Implementation period; 1998-2002

5) Industrial Estate

- Located in Kec. Bontomaranu
- Total area; 1,000 ha

The locations of the above projects are shown in the *Fig.1.7*.

2. Population Forecast of the City of Ujung Pandang

2.1 Population Trend

2.1.1 Rapid growth in recent years

During 1980 to 1990, the total population in Indonesia has increased from 151 million to 181 million at an average growth rate of 1.8 % and also urban population of Indonesia has reached 52 million, or 29 % of the total population at a growth rate of 4.5 %. in the same period, although the population of the South Sulawesi has increased from 6 mil. to 7 mil. at a growth rate of 1.4 %, less than that of the national average, the population of the city of Ujung Pandang has increased from 708,500 to 944,400 at an average growth rate of 2.9 %.

It is observed that the urbanization in population is rapidly increasing at the national level and the share of population in the city of Ujung Pandang (the most of the population in the city is classified as urban population) to the total population of the South Sulawesi is expanding rapidly.

The key figures of the population trend in the recent years are shown below;

a. total pop. in Indonesia (annual increase ratio 1980-'90)	1.8% (151 to 181 mil.)
b. total population in South Sulawesi (")	1.4% (6.1 to 7.0 mil.)
c. urban population in Indonesia (")	4.5% (52 mil. in 1990)
d. urban population in Eastern Indonesia (")	5.4% (2.6 to 4.5 mil.)
e. total pop. in the KMUP (")	2.9% (0.71 to 0.94 mil.)
f. total pop. in the KMUP (" 1985-1990)	4.7% (0.75 to 0.94 mil.)
g. share of urban population in Indonesia	28.7% in 1990
h. share of urban pop in Eastern Indonesia	24.5% in 1990
i. no. of migrants in the KMUP (1985-'90)	-1,600 per. in the central parts + 5,000 per. in the suburbs

2.1.2 Population projections in the related studies

There are several projections of the future population of the city of Ujung Pandang which are examined in the related plans and studies as follows;

- 1,310,000 persons in 2004 (Ujung Pandang Master Plan in 1984)
- 1,800,000 persons in 2010 (MINASAMAUPA Plan in 1992)
- 2,700,000 persons in 2018/19 (BAPPENAS Long-term Projection in 1993)

d. 1,920,000 persons in 2015 (Water Supply Study in 1992)

2.2 Population Projection

The population projection of the city of Ujung Pandang was made by JICA Study Team using the Age Cohort Component Method with the assumptions of fertility and mortality factors for the natural increase and assumption of migration factor for the social increase. (See Fig. 1.8)

2.2.1 Natural increase

The population projection for the natural increase was based on the assumptions of TFR (Total Fertility Rate) for fertility level and Life Expectancy for mortality level as shown in the table below;

(1) TFR (Total fertility rate)

The fertility assumptions are based on the trend in the past five years period and the socio-economic conditions of each Kecamatan. The data was obtained from the Family Planning Office, South Sulawesi (Kantor BKKBN) that TFR of the city of Ujung Pandang declined from 3.6 in 1985 to 3.4 in 1990, or about 5.5 % during the period.

since the data of TFR of each Kecamatan is not available, the JICA Study Team assumed that the TFR in 1990 was the same for all Kecamatan in the city and in the future, the declining curb will be faster in the central parts and slower in the suburbs as follows;

	1985	1990	2005	2015
1) central parts	3.6	3.4	2.9	2.6
2) suburbs	3.6	3.4	3.2	3.0

TFR=No. of children born to a female in reproduction age cohort (15-49)

(2) Life Expectancy (average for males and females)

The mortality level is estimated based on the trend in life expectancy. The Bureau of Statistics estimated that the life expectancy at birth of population in the city of Ujung Pandang increased from 56.2 years in 1985 to 58.3 years in 1990 for males, and from 58.5 years in 1985 to 60.0 years in 1990 for females. The life expectancy in the future is assumed as shown in the table below;

For male	1985	1990	2005	2015
1) central parts	56.2	58.3	65.6	70.9
2) suburbs	56.2	58.3	67.5	74.4

For female	1985	1990	2005	2015
1) central parts	58.5	60.0	67.5	73.0
2) suburbs	58.5	60.0	69.5	76.6

(3) Estimation of natural increase

The number of the future population by natural increase of the city at the JICA target years are as follows;

- a. 1,363,000 (year 2005)
- b. 1,613,000 (year 2015)

2.2.2 Social increase

(1) Migration assumption

The pattern of migration flow are different by Kecamatan. It is obvious that the Kecamatan in the central parts are dominated by net out-migration, while Kecamatan in the suburbs are dominated by net in-migration. The increase ratio of the number of net migrants between 1985 to 1990 in the city was as follows;

- a. central parts -12.5 %
- b. suburbs +19.1 %

In addition to the already high population density in the central parts and inherent with rapid growth of economic activities, there will be a rapid increase of the commercial and service facilities reducing space for settlement and making it difficult to obtain land for housing within the central part. But in the suburbs, a quite large of the areas are open to new settlement and there are still large rooms for the expansion for settlement and provide living space for migrants to the suburbs from the central parts and also from the outside of the city of Ujung Pandang.

This factor will encourage many people lived in the central parts to move their living areas either to the suburbs or the other hinterland regions of Ujung Pandang, such as Kabupaten Gowa and Moros (MINASAMAUPA region). Based on the factor, it is assumed that the central parts will be more dominated by net out-

migration, while the suburbs will be more dominated net in-migration in the future. The alternative patterns were made as follows;

(2) High migration pattern

This assumption is based on that the high migration pattern during the previous years will be continued to the future, at least up to the year 2005 and the trend will be moderated afterwards. The characteristic of the assumption is "high increase of out-migration in the central parts and high increase of in-migration in the suburbs".

(3) Low migration pattern

This assumption is based on that the past trend of migration pattern was the special cases and it seems too high for a base for assumption, so that the trend will be moderated soon and declined to the future. The characteristic of the assumption is "low increase of in and out-migration in the suburbs and even in the central parts".

(4) Number of total migrants

The number of migrants estimated with the above conditions are as follows;

	up to 2005	up to 2015
High migration	+ 250,000	+ 802,000
Low migration	+ 69,000	+ 378,000

2.2.3 Total population increase (natural + social increase)

On the basis of the above assumptions, the total population of the city of Ujung Pandang in the JICA target years are estimated as follows;

	2005	2015
High migration	1,614,000	2,415,000
Low migration	1,433,000	1,990,000
Medium (JICA projection)	1,520,000	2,200,000

The future population for the JICA Study could be based on the medium projection that is an average figure between the projections with high migration and low migration. (see Fig. 1.9)

3 Forecast of Future Land Use

3.1 Basis for Building Future Land Use Frame of the City of Ujung Pandang

The followings are the basis for building land use frame for the future.

- (1) Compatible with the City Master Plan 2004 (RIK/RUTRK and RDTK), MINASAMAUPA Concept and the other related plans and programs
- (2) Number of the future population up to the year of 2015 is based on the JICA projection mentioned above
- (3) Most of the current on-going plans and projects will be implemented and completed until the year of 2015
- (4) Conditions of the development trends in the past will be continued up to the year of 2005 and alter its vector more preferable way in the long term. (such as more preferable population density, more higher standard of infrastructure and public services, more balanced land use composition, etc.)

3.2 Physical Development Frame Stated in the Related Plans and Programs

The orientations of the physical development of the city which is stated in the City Master Plan, MINASAMAUPA Concept and others are summarized below;

- (1) Expand the urban area up to around 80% of the total area of the city
- (2) Promote the development towards the east area
- (3) Develop new areas along two axes which are;
 - 1) industrial/economic axis along Jln. Prof. Sutami artery road with the development of Makassar Port, Hasanuddin Airport, KIMA, Wood Processing Zone and Cargo Terminals
 - 2) settlement/social service axis along Jln. Urip Samoharjo artery road and Jln. A. Petterani with the development of sub-city centers and housing development by and the real estates

- (4) Develop the major road network, consist of three ring roads and three radial roads which has been proposed in the JICA Highway Study

Fig. 1.10 shows the concept of spatial development plan of the city.

3.3 On-going Plans/Projects and Future Development Area

The *Table 1.3* shows the present on-going plans ad projects in which some are under construction, some are already scheduled to implement and some are still in planning stage. The implementation schedule of the projects in the planning stage is assumed by the BAPPEDA II and JICA Study Team. The location of the major on-going plans and projects are shown in the *Fig. 1.11*.

3.4 Land Availability and Population Absorption

3.4.1 Land availability

As the geographic conditions of the city is relatively plain, the most of the land of the city can be utilised as an urban area except the following areas;

- flood area (except planned area of drainage/flood control development)
- wet soil, in which comprises fish pond and paddy field and dry land with higher productivity
- special areas, such as military area

(1) Available land in the central parts

- a. some residential areas are still in low density and have rooms to be more higher density
- b. more intensive use of the space will be possible in some commercial and institutional areas by mixed and effective use with residential.
- c. there are some areas using for agricultural area

(2) Available land in the suburbs

- a. most of the paddy fields and dry fields are not so productive comparing with the productivity of the agricultural areas in the neighbouring Kabupaten
- b. some fish pond and swamp areas can be used for urban development
- c. some residential areas are still in very low density and have rooms to be more higher density

3.4.2 Population absorption

It is estimated that "How many population can be absorbed in the city of Ujung Pandang from spatial point of view" based on the assumed available land as follows;

(1) Number of population can be absorbed in the city

The total population absorption will be as follows;

- a. 621,000 persons in the central parts (143 % of the existing population)
- b. 1,879,000 persons in the suburbs (332 %)
- c. 2,500,000 persons in the city of Ujung Pandang (250 %)

(2) Number of population that can be absorbed by Kecamatan

Half of Kecamatan has a capacity to absorb the projected number of population and remainders are over the capacity. It should be considered on this point for the final distribution of the population.

See *Fig. 1.12* and *1.13*.

3.5 Future Land Use Plan

The future land use plan is formulated based on the City Master Plan with considering the following points;

3.5.1 Optimization of land use

(1) Lighten the density in the heavy populated areas

In line with the even distribution of the population and improvement of the living environment, the densely populated areas such as slum areas, central city area, and fringe areas will be lightened their density through KIP and the other living environmental improvement projects/programs toward the future.

(2) Zoning of land use

In order to encourage the economic activities of industry, commerce, agriculture, etc. and to have the territorial identity of the areas by type of land use, an appropriate zoning plan is required to guide and control the future urban development activities. (see *Fig. 1.14*)

(3) Provision of required area for public facilities

The PU issued "Urban Planning Standard", indicating the development standards for infrastructure and public and social facilities such as road, drainage, sanitary, commercial, educational, medical facilities. The present conditions of the development level of such facilities in the city of Ujung Pandang are still far from the above standards.

The future land use should aim to level up and optimize to more preferable level from this aspect. The *Table 1.4* shows the number of units and site areas of public and social facilities required for the city of Ujung Pandang at the year of 2015. It is assumed that the proposed land use aims to level up to 80 % (65 % at present) of the standard level in terms of provision of areas for public and social facilities.

3.5.2 Proposed population distribution

The *Fig. 1.15* shows the result of population distribution by Kecamatan 1980-2015 and *Fig. 1.16 - 18* show the distribution of the population density by Kelurahan at present (as of 1993) and the JICA target years of 2005 and 2015.

3.5.3 Future land use plan 2015

The *Fig. 1.19* shows the proposed scheme of the future land use in 2015 and the *Table 1.5* shows the future land use in 2015 by Kecamatan.

4 Urban Development in the Surrounding Areas

The integrated approach to develop the urban area covering Ujung Pandang, Maros and Gowa as a metropolitan area that is called MINASAMAUPA Concept has been formulated and initiated by Cipta Karya to attempt to involve all related sectors and all levels of governmental offices relating to the development of the area. The study was concluded in the form of "Review of MINASAMAUPA Metropolitan General Plan" in 1992. The orientation and policy of the urban development of the surrounding areas in the plan are summarize as follows;

According to the MINASAMAUPA Concept, the future population of the Maros and Gowa are projected as follows;

4.1 Outline of the Concept

The area of MINASAMAUPA is 162,420 ha, composed of;

- a. Ujung Pandang 17,577 ha (all Kecamatan)
- b. Maros 113,543 ha (3 Kecamatan)
- c. Gowa 31,300 ha (5 Kecamatan)

Note; the part of Kabupaten Takalar may be involved in the MINASAMAUPA area in the future.

Major functions for each area are designated as;

- a. Ujung Pandang (trade, commercial, finance, information, administration, high education, recreation/tourism centers)
- b. Maros (new settlement, trade, small-scale industry, research center for food plants, education and recreation)
- c. Gowa (new settlement, trade, cultural and transportation)

4.2 Urban Development Policies for the Cities of Maros and Sungguminasa

(1) Maros

- a. activity center of regional development
- b. products collection and distribution center of Maros Kabupaten
- c. public service center
- d. economic activity center
- e. fishery research center

Banta Ase area is designated as

- a. settlement area

- b. transit place of goods, passengers and distribution of services
- c. government center at Kelurahan level

(2) Sungguminasa

- a. government center in Gowa kabupaten
- b. service/business center (primary trade)
- c. cultural development center in the South Sulawesi
- d. agricultural investigation center

4.3 Population Frame of the Neighbouring Areas

According to the MINASAMAUPA concept, the future population of Maros and Gowa are projected as follows;

Total population

	1990	1995	2000	2005	2010	2015*a)
Maros	209,886	238,978	272,099	309,813	352,753	401,600
Gowa	202,121	230,136	262,032	298,351	339,702	386,800

Source : Review of MINASAMAUPA Metropolitan General Plan (Final Report)

*a) estimated by JICA with same increase ratio of projection (2.63 % annual) 1995 - 2010

Urban population

	1990	1995	2000	2005	2010	2015*b)
Maros*c)	46,240	52,649	59,946	68,255	92,715	126,000
Sungguminasa	53,820	61,280	69,773	79,444	90,455	122,900

Source: Review of MINASAMAUPA Metropolitan General Plan (Final Report)

*b) estimated by JICA with same increase ratio of projection (6.32 % annual) 2005 - 2010

*c) includes Maros and Banta Ase areas

5 Supplemental Information for Urban Planning

The followings are the supplemental information on the allocation of land use, land acquisition and development permission process, and building regulations related to the JICA Study.

The F/S areas and sites which are proposed for wastewater and solid waste management by the JICA Study Team are shown in the *Fig. 1.20*.

5.1 Allocation of Land Use and Its Acquisition Process

5.1.1 City development plan and allocation of land use

The land use allocation must be identified in the legal spatial plan of the city area and the other detail spatial plans of the municipality.

The legal spatial plans of the municipality are composed of;

(1) RUTRK (Rencana Umum Tata Ruang Kota=Master Plan of the City Area)

The latest plan was made in 1991/92 that is revision of RIK (Rencana Induk Kota) in 1987, and the present plan will be reviewed in 1996/97 (Scale of the plan is 1:25,000)

(2) RDTRK (Rencana Detail Tata Ruang Kota=Detail Plan of the City Area)

The city is divided into 13 blocks, of which 10 blocks of RDTRK have been prepared. (Scale of the plan is 1:5,000)

(3) RTK (Rencana Teknik Khusus=Technical Plan of the Special Area)

There are 4 locations of RTK as follows;

- KIMA
- Wood processing zone
- Tanjung Bunga
- Antang
- Sudiang

The total area of the above is around 4,000 ha (Scale of the plan is 1:1,000)

Those spatial plans are to be prepared by the mayor according to the national regulation of Permendagri No. 2/1987*1) and Kepmendagri No. 84/1992*2).

*1) Permendagri (Peraturan Menteri Dalam Negeri=Regulation of Ministry of Home Affair)

*2) Kepmendagri (Keputusan Menteri Dalam Negeri=Degree of Ministry of Home Affair)

The Law of the Republic of Indonesia Number 24, 1992 on Space Arrangement (Undang-Undang Republic Indonesia Nomor 24 Tahun 1992 Tentang Penataan Ruang), Cipta Karya, PU states the definition of the spatial plan of the Regency/Municipality.

- 1) The spatial plans of the Regency/Municipality territory carry out by the Bupati/Mayor. If in the implementation of space arrangement contain certain thing that can not be completed in the Regency/Municipality, then the consideration and agreement of the Governor are required.
- 2) The spatial plan of the Regency/Municipality territory is targeted for the 10 year's period.
- 3) The spatial plan of the Regency/Municipality needs to be reviewed and or be perfected as the result of the province territory spatial plan description and the development dynamic.
- 4) The necessary review and/or perfection to achieve the space using implementation strategy that is regulated on the 10 year's basis is carried out at least once in 5 years.
- 5) The spatial plan of the Regency/Municipality territory is described into the 5-years space using program according to the Five Years Development Program (PELITA) of the related Regency/Municipality. The space using program is described into the yearly development activity according to the fiscal year.
- 6) The territorial map of the Municipality with the minimal detailed level of 1:50,000 scale (For Regency 1:100,000)

5.1.2 The land use regulation

The land use of the city area is regulated based on the present spatial plan that classified the city area into the type of land use such as residential, commercial, industrial, institutional, agricultural area, etc. However, the control of the land use is not working well because of several reasons. The one of the reasons is caused by a lack of detailed plans that have to be shown the definitive demarcation of the area and occasional changes of the policy for the allocation of land use.

5.2 The Process of Building and Development Permission

The large scale land development projects are required to get the development permission as follows; (refer to Permendagri 3/1987)

If the area for development is;

- a. less than 2,000 m² (Permission by only Tata Kota and WASBANG)
- b. 2,000 m² to 15 ha (Approval of Mayor or Bupati)
- c. 15 ha to 200 ha (Approval of Governor)
- d. more than 200 ha (Approval of Minister of Home Affair)

The basic process to get development permission is as follows (Mayor case)

5.2.1 Step-1: Principal License

- (1) Developer shall propose the project with the following documents to the mayor
 - Proposal to the mayor
 - Location map with identification of land
 - Perspective picture
- (2) The mayor organize the Study Team (PPTB) for the evaluation of the proposal
- (3) The team makes study and reports to the mayor
- (4) The mayor issues the principal license to the developer if it is OK

5.2.2 Step-2: Location License

- (1) Developer shall submit the following documents to the BPN
 - Proposal to BPN
 - Principal license (described in Step-1)
 - Location map
 - Site Plan
 - Company identification (brochure, investment, membership, etc.)
 - Administrative requirements (tax, identity card, AMDAL)
 - Presentation of planning

- (2) The BPN issues the location license to the developer if it is OK

5.2.3 Step-3: Construction License

- (1) Developer shall proceed the following actions
 - Prepare detail site plans and detail building design drawings
 - Land acquisition (refer to the next description 2.1.3)
 - Paying tax for land and building for getting construction license
 - Agreement on hand-over the public facilities, land and infrastructure.
- (2) The mayor organizes the Verification Team headed by BAPPEDA to examine the plan
- (3) The team examines the plans from technical aspect and recommends to the mayor
 - Land use (BAPPEDA)
 - Site Plan (Tata Kota-Site plan and detail land use)
 - Building (WASBANG; Pengawasan Pembangunan-Building)
 - Infrastructure (PU)
- (4) The mayor issues the construction license to the developer if it is OK.

5.2.4 Step-4: During and after construction

- (1) Supervise on implementation of the plan by the related technical organizations during the construction stage
 - *Provision of land (40 % of the total area), building and infrastructure facilities is duty of developer
- (2) The Team Verification take-over the right of public land, facilities and infrastructure from the developer

5.3 The Land Acquisition Process

For the acquisition of the land for the public use must follow the process as mentioned below; (in the case of TPA in Gowa Regency)

- (1) Preparation of the identification of land (by Kep. Daerah and BPN=Badan Pertanahan National)
- (2) KMUP shall propose to the Governor SULSEL to invite Gowa Government for making MOU (Memorandum of Understanding)
 - *MOU shall clearly describe the purpose, term, right of land, other conditions, etc.

- (3) KMUP and Gowa make agreement on the MOU
- (4) The Governor issues letter of committee for land acquisition based on the Kepress No. 55, 1993, article 7.
- (5) The land compensation process through Gowa Government

5.4 Building Regulation Related to the Study

5.4.1 General

Each building must be in conformity to the national building regulation (Peraturan Bangunan Nasional) issued by the Investigation and Development Board of PU. The local government has own building regulation that is prepared based on the national regulation.

(1) Set-back line and installation of wastewater disposal equipment

The building wall shall be set-back from the front boundary of the property in a certain distance according to the length of the road (ROW).

The wall of the building to the wall of next building shall be kept 1 m distance at minimum. The other set-back regulations such as rear yard, side yards are not established yet.

In relation to the wastewater management study, the location of the septic tank or leaching pit is not specified at present, so that the people install this equipment according to the floor plan, the distance from the neighbouring well and sometimes without any consideration. Accordingly, say 65% of the existing houses have the equipment in the rear yard and the rest in the front yard. The JICA Study Team recommends to the municipality to make a new regulation that states "the location of the septic tank or leaching pit must be placed on the front yard for the new building" because of the following reasons;

- a. Set-back in the front yard is well controlled at present
- b. Basiness of desludging service
- c. Basiness for installation of equipment and collection of wastewater by the proposed communal system in the future see *Fig. 1.21*

(2) BCR (building coverage ratio)

The municipal regulation states that the BCR of each building shall not exceed 80%. The detailed distributions of BCR by types of building and environment are examining by the municipality. The FAR (Floor Area Ratio) is also subject to study for the municipality. Those regulations will be effective in the future.

5.4.2 Sanitary equipment

According to the above regulation, the followings are the items related to the sanitary system;

(1) Sewerage

- 1) All wastewater from toilet, kitchen, bath and washing must be properly treated and discharged to the public system according to the technical regulation
- 2) Basically, wastewater from toilet (black water) or grey water must be discharged to public sewer
- 3) If it is not possible, because of no public sewer or other reasons, wastewater must be processed or infiltration (ex. using septic tank), as public health is not disturbed

(2) Bathroom/Toilet

- 1) Each new building or expanding building that uses for home of staying (ordinary house, hotel, inn, etc.) must be equipped at least one bathroom and one toilet at minimum case.
- 2) Each new building or expanding building that uses for home of staying (ordinary house, hotel, inn, etc.) must be equipped with adequate space for the open or closed washing space.

(3) Drainage

- 1) Wastewater channel from kitchen, bath, washing, etc.
 - The material of the channel must be adequate for the usage as characteristic wastewater can be discharged
 - It must be equipped under the regulation, stated in PUBB-NI.3
- 2) Human wastewater (black water) channel
 - Toilet shall not directly connected to ditch

- It must be equipped under the regulation, stated in PUBB-N1.3

Note; PUBB-N1.3 describes detail enforcement regulation of septic tank, leaching pit and drainage channels

In this connection, although the Tata Kota and the WASBANG are the responsible organizations for checking the sanitary equipment of the building, actually they certify the sanitary equipment at the submission of construction permission, but they sometimes do not inspect whether the sanitary equipment is installed in an appropriate way after the construction. The JICA Study Team recommends that with reinforcing the organizational capability of the Tata Kota and the WASBANG together with BAPPEDA, PU and the related agencies, the inspection system for the sanitary equipment should be strengthened.

(4) Solid waste

- a. Each house must have a waste bin at a proper place
- b. In the urban area with DK service, close the cover on waste bin
- c. In the rural area without DK service, the waste should be burn

There are many concrete bins on the streets especially on the sidewalk in the urban area at present and it makes difficult for the pedestrian to walk. In this point, the JICA Study Team recommends to add the description the word "A proper place" in the item a. above, that a proper place should be convenient place for DK collection service and it should not be obstacle for the public transport, especially for the pedestrian or the structure of the waste bin should be movable one.

Table 1.1: Existing Land Use of KMUP

Name of Kecamatan	total area	Type of Land Use													Built-up area (14)	Non built-up area (15)
		residential (2)	commercial (3)	industry (4)	institution (5)	openspace (6)	road (7)	vacant land (8)	dry field (9)	paddy field (10)	swamp (11)	fish pond (12)	river/canal (13)			
Mariso	area(ha)	182.0	67.9	9.8	8.8	38.4	2.0	24.3	0.0	0.0	6.0	2.0	15.0	7.8	151.2	30.8
	share(%)	100%	37%	5%	5%	21%	1%	13%	0%	0%	3%	1%	8%	4%	83%	17%
Mamajang	area(ha)	225.0	128.6	11.3	10.8	27.1	2.6	33.8	0.0	0.0	0.0	7.0	0.0	3.8	214.2	10.8
	share(%)	100%	57%	5%	5%	12%	1%	15%	0%	0%	0%	3%	0%	2%	95%	5%
Makassar	area(ha)	252.0	120.6	23.9	4.7	34.0	30.4	35.3	0.0	0.0	0.0	0.0	0.0	3.1	248.9	3.1
	share(%)	100%	48%	9%	2%	13%	12%	14%	0%	0%	0%	0%	0%	1%	99%	1%
Ujung Pandang	area(ha)	263.0	86.1	21.0	6.5	62.3	45.0	42.1	0.0	0.0	0.0	0.0	0.0	0.0	263.0	0.0
	share(%)	100%	33%	8%	2%	24%	17%	16%	0%	0%	0%	0%	0%	0%	100%	0%
Wajo	area(ha)	199.0	39.0	79.8	9.0	37.3	0.1	33.8	0.0	0.0	0.0	0.0	0.0	0.0	199.0	0.0
	share(%)	100%	20%	40%	5%	19%	0%	17%	0%	0%	0%	0%	0%	0%	100%	0%
Bontotata	area(ha)	210.0	113.1	23.6	5.2	27.4	5.4	29.6	0.0	0.0	0.0	4.0	0.0	1.7	204.3	5.7
	share(%)	100%	54%	11%	2%	13%	3%	14%	0%	0%	0%	2%	0%	1%	97%	3%
Tallo	area(ha)	583.0	204.0	13.1	29.7	33.2	5.2	55.0	0.0	15.1	0.0	5.0	125.0	97.7	340.2	242.8
	share(%)	100%	35%	2%	5%	6%	1%	9%	0%	3%	0%	1%	21%	17%	58%	42%
Ujung Tanah	area(ha)	594.0	366.0	22.0	5.9	45.7	10.8	66.6	25.0	50.0	0.0	0.0	0.0	2.0	517.0	77.0
	share(%)	100%	62%	4%	1%	8%	2%	11%	4%	8%	0%	0%	0%	0%	87%	13%
Pangkajene	area(ha)	4,119.0	1,704.0	25.1	34.0	128.9	106.7	135.2	40.5	579.8	987.5	37.0	63.9	276.4	2,133.9	1,985.1
	share(%)	100%	41%	1%	1%	3%	3%	3%	1%	14%	24%	1%	2%	7%	52%	48%
Tamalate	area(ha)	2,944.0	251.7	53.8	55.8	190.4	64.5	125.1	343.0	190.9	1,164.8	15.0	311.0	178.0	741.3	2,202.7
	share(%)	100%	9%	2%	2%	6%	2%	4%	12%	6%	40%	1%	11%	6%	25%	75%
Siringkanaya	area(ha)	8,006.0	1,314.0	12.7	188.4	400.7	100.4	99.0	241.9	1,614.2	2,311.7	400.0	913.6	409.4	2,115.2	5,890.8
	share(%)	100%	16%	0%	2%	5%	1%	1%	3%	20%	20%	5%	11%	5%	26%	74%
Central parts	area(ha)	1,925.0	921.3	191.4	50.9	272.2	96.3	265.5	25.0	50.0	6.0	13.0	15.0	18.4	1,797.6	127.4
	share(%)	100%	48%	10%	3%	14%	5%	14%	1%	3%	0%	1%	1%	1%	93%	7%
Suburbs	area(ha)	15,652.0	3,473.7	104.7	307.9	753.2	276.8	414.3	625.4	2,400.0	4,464.0	457.0	1,413.5	961.5	5,330.6	10,321.4
	share(%)	100%	22%	1%	2%	5%	2%	3%	4%	15%	29%	3%	9%	6%	34%	66%
KMUP Total	area(ha)	17,577.0	4,395.0	296.1	358.8	1,025.4	373.1	679.8	650.4	2,450.0	4,470.0	470.0	1,428.5	979.9	7,123.2	10,443.8
	share(%)	100%	25%	2%	2%	6%	2%	4%	4%	14%	25%	3%	8%	6%	41%	59%

Sources: Land use map and data at BAPPEDA II and site visits by JICA Study Team in 1994

Notes: (14) Built-up area consists of (2)-(7) and (15) Non built-up area consists of (9)-(13). (4) includes industrial estate and Makassar Harbor and (5) includes education, medical, governmental and military are

Table 1.2: Housing Development Frame Assumed by JICA Study Team

A: Number of Units by Each REPELITA Period(dwelling units)

Period	PEPUMNAS	Real Estate	Self-building	Total	Accumulation	remarks
1) REPELITA IV*a)	7,286	4,898	12,236	24,420	24,420	annual increase ratio of
2) REPELITA V*a)	9,292	6,897	14,940	31,129	55,549	total no. of units=5 %
3) REPELITA VI	11,305	8,803	17,320	37,427	92,976	assumed annual
4) REPELITA VII	13,754	11,234	20,078	45,067	138,043	increase ratio;
5) REPELITA VIII	16,734	14,338	23,276	54,349	192,392	PERUMNAS=4%
6) REPELITA IX	20,360	18,300	26,983	65,643	258,035	Real Estate=5%
7) REPELITA X	24,771	23,358	31,281	79,408	337,443	Self-building=3%

B: Number of Units by JICA Target Years(dwelling units):

Period	PEPUMNAS	Real Estate	Self-building	Total	Accumulation	remarks
1) 1984-1993(10 yrs)	16,578	11,795	27,176	55,549	55,549	annual increase ratio of
2) share at present	29.8%	21.2%	48.9%	100.0%		total no. of units=5 %
3) 1994-2000(7 yrs)	16,807	13,296	25,351	55,454	111,003	assumed annual
4) 2001-2005(5 yrs)	14,946	12,476	21,357	48,780	159,783	increase ratio;
5) 2006-2010(5 yrs)	18,185	15,923	24,759	58,866	218,649	PERUMNAS=4%
6) 2011-2015(5 yrs)	22,124	20,322	28,702	71,149	289,798	Real Estate=5%
7) 1994-2005(12 yrs)	31,753	25,772	46,708	104,234		Self-building=3%
8) 1994-2015(22 yrs)	72,062	62,017	100,169	234,249		
9) 1984-2015	88,640	73,812	127,345	289,798		
10) share in 2015	30.6%	25.5%	43.9%	100.0%		

C: Number of Inhabitants(persons)

Period	PEPUMNAS	Real Estate	Self-building	Total	Accumulation	remarks
1) 1984-1993(10 yrs)	99,468	70,770	163,056	333,294	333,294	average family size
2) share at present	29.8%	21.2%	48.9%	100.0%		6 persons/household
3) 1994-2000(7 yrs)	92,438	73,130	139,429	304,997	638,291	5.6 persons/hh
4) 2001-2005(5 yrs)	74,732	62,380	106,786	243,899	882,190	5 persons/hh
5) 2006-2010(5 yrs)	90,923	79,615	123,795	294,332	1,176,522	5 persons/hh
6) 2011-2015(5 yrs)	99,559	91,450	129,161	320,170	1,496,692	4.5 persons/hh
7) 1994-2005(12 yrs)	167,170	135,510	246,216	548,896		
8) 1994-2015(22 yrs)	357,652	308,574	499,171	1,163,398		
9) 1984-2015	457,120	377,344	662,227	1,496,692		
10) share in 2015	30.5%	25.2%	44.2%	100.0%		

D: Area Required(ha)

Period	PEPUMNAS	Real Estate	Self-building	Total	Accumulation	remarks
1) 1984-1993(10 yrs)	398	354	815	1,567	1,567	
2) share at present	25.4%	22.6%	52.0%	100.0%		
3) 1994-2000(7 yrs)	370	366	697	1,433	3,000	assumed average
4) 2001-2005(5 yrs)	299	312	634	1,145	4,144	population density
5) 2006-2010(5 yrs)	364	398	619	1,381	5,525	PERUMNAS=250 p/ha
6) 2011-2015(5 yrs)	398	457	646	1,501	7,026	Real Estate=200 p/ha
7) 1994-2005(12 yrs)	669	678	1,231	2,577		Self-building=200 p/ha
8) 1994-2015(22 yrs)	1,431	1,533	2,496	5,459		
9) 1984-2015	1,828	1,887	3,311	7,026		
10) share in 2015	26.0%	26.9%	47.1%	100.0%		

Source: *a) Rencana Pembangunan Lima Tahun ke Lima 1989/90-1993/94 KMUP and Penjabaran Operasional REPELITA V KMUP

Table 1.3: LIST OF ON-GOING PLANS AND PROJECTS

Name of projects	Outline of the project	Progress	Existing area (ha)	Planned area (ha)	1995 - 1999 REPELITA V	2000 - 2003 REPELITA VI	2004 - 2008 REPELITA VII	2009 - 2013 REPELITA IX	2014 - 2016 REPELITA X	major responsible agencies	major financial sources
1) Communication/Industry/Trade/Tourism/Agriculture											
a) Makassar Harbor	expansion/development of harbor area to improve container yard and other facilities	under construction	33 ha	65 ha						Port authority	APBN/Loan
b) Hasanudin Airport	improvement of airport facilities and expansion of existing airport area to accommodate Boeing 747 (part of the area belong to KUMIP)	under planning	0 ha	25 ha						Kanwil Airport	APBN/Loan
c) KIMA	expansion of the KIMA industrial area and preparation of bonded warehouse area as an Export Processing Zone (EPZ)	under preparation	200 ha	723 ha						KIMA Authority	APBN/ Corporation
d) Industrial Zone	development of Wood Processing Zone and preparation of land and infrastructure for industrial development by both sectors	under preparation	5 ha	400 ha						Kanwil Industry	APBN
e) Cargo Terminal	development/improvement of 2 cargo terminals/trade centers for distribution, storage, sorting and packing of goods	under planning	15.0 ha	35.9 ha						Kanwil Land Communication	APBN
f) Bus Terminal	development of the northern terminal for passengers and goods distribution in Daya	under planning	5.3 ha	12.3 ha						Kanwil Land Communicability LAJA	APBN
g) Tourism/recreation	development of resort complex in Tanjung Bunga with hotels, shopping areas, market, parks, cultural, sports facilities, etc.	under planning	10 ha	1,000 ha						GMTDC	Corporatory Private
h) Livestock RPH	development of goat market, slaughter house and other facilities in Aring	under planning	5 ha	100 ha							
2) Housing/Education/Spsons/Youm											
a) PERUMAS	development of housing in the Suburbs	continue to implement	400 ha	1,000 ha						PERUMAS	APBN/Authority
b) Real Estate/STN	development of housing in the Suburbs	continue to implement	350 ha	1,900 ha							Private Developers
c) UNHAS	expansion of campus and integration with the other educational and other facilities	under planning	120 ha	220 ha						UNHAS	APBN
d) Sport and Youth Center	development of stadium, swimming pool, sports courts, parks, cottage, in Suloang	under planning	0 ha	80 ha						Provincial Government	APBD I

Name of projects	Outline of the project	Progress	Existing area(ha)	Planned area(ha)	1989 - 1993 REPELITA V	1994 - 1996 REPELITA VI	2000 - 2003 REPELITA VII	2004 - 2008 REPELITA VIII	2009 - 2013 REPELITA IX	2014 - 2018 REPELITA X	major responsible agencies	major financial sources
3) Highway Network Development												
a) Inner Ring Road	construction of new road (Segment 1/2/3)	under construction	7.0 km	10.0 km							DPU Bina Marga /Jasa Marga/KMUP	APBN/Prihaty/ APBD
b) Artery Road(south)	widening of U. Suroboyo road (Seg.13/14)	under planning	27.0 km	27.0 km							DPU Bina Marga	APBN
c) Artery Road(north)	widening of Prof. Subem road (Segment 17)	under planning	14.3 km	14.3 km							DPU Bina Marga	APBN/APBD
d) Artery Road(to Gowa)	widening of St. Abadina road (Seg.15/16)	under planning	6.6 km	6.6 km							DPU Bina Marga	APBN
e) South Radial Road	construction of new road (Segment 12)	under planning	0 km	5.7 km							KMUP	APBN/APSO
f) Middle Ring Road	construction of new road (Segment 4/5/6)	under planning	0 km	12.9 km							DPU Bina Marga	APBN/APBD
g) Outer Ring Road	construction of new road (Segment 7/8/9)	under planning	0 km	17.1 km							DPU Bina Marga	APBN/APBD
h) Center Radial Road	construction of new road (Segment 10/11)	under planning	0 km	8.8 km							DPU Bina Marga	APBN/APBD
i) Jemb. Sapinda-Patenan	construction of new road/bridge	under planning	0 km	2.0 km							DPU Bina Marga	APBN/APSO

4) IUDIP/PSKT 1997/02 - 1998/06 (revised Urban Improvement Development Programs)												
Urban Road	improvement/ construction of urban roads	keep going since Urban V							(will be continued)		DPU CK	APBN/APBD
b) DRIP (Drainage Improvement)	improvement and construction of drainage	keep going since Urban V	1,500 ha	4,700 ha							PFLP	APBN/Loan
c) KIP (Kampung Improvement)	improvement of slum areas	keep going since Urban II	800 ha	700 ha							DPU CK	APBN/BLN
d) SWIF (Solid Waste)	improvement and development of TPA	keep going since Urban V	TPA in Arzing								PFLP/CK	APBN/Loan/ KINUP
e) Sanitation	installation of sanitary facilities	keep going since Urban V									PFLP	APBN/Loan
f) MIP (Market Improvement)	improvement/development of market	not yet planned										
(will be continued)												
g) Improvement of Pempang River	development of channels and road/bankment for flood control	on-going		45.5 km ²								
6) Water Supply (PDAM)	development of Bili-Bili dam and installation of Somba Opu to serve 80 % of the city	on-going		142.2 km ²							PDAM	PDAM/ APBN/ OECF
7) Other Sectors Development	Various Projects in Post/telecommunication, Electricity, Agricultural, Fishery/Mining, Trade/cooperative, Industrial, Education, Medical, Religious, Culture, Governmental, Defense, Environmental, etc.	on-going									KMA Authority	APBN/Authority
(will be continued)												

Table 1.4: Required Number of Units and Site Areas of Public Facilities in 2015 (based on the Urban Development Standard prepared by PU)

		year		1992		2005		2015			
		population		1,000,000		1,520,000		2,200,000			
Administrative units											
RT		250		=(ave.240)4,228		=(ave.250)8,800		=(ave.250)8,800			
RW		2,500		=800-1,700(ave.1,250)788		=(ave.1,900)800		=(ave.2,500)880			
Kelurahan		30,000		=3,500-18,000(ave.7,000)142		=2,000-44,000(ave.10,000)152		=2,000-96,000(ave.10,000)220			
Kecamatan		120,000		=40,000-220,000(ave.81,000)11		=44,000-390,000(ave.120,000)13		=39,000-570,000(ave.120,000)18			
FACILITIES AREA in 2015											
Facilities		RT	Lingkungan(RW)	Kelurahan	Kecamatan	Sub city	City	Radius(m)			
		250	2,000	5,000	30,000	600,000	2,000,000				
		8,800	880	220	18	3	1				
I	EDUCATION										
1)	Kindergarten		800					500			
2)	Primary School		2,400					1,000			
3)	Junior High School			1,800				1,000			
4)	Senior High School			1,800				1,500			
5)	College				500,000						
6)	University				500,000						
	Total required area(he)		704,000	792,000			2,200,000				
II	KESEHATAN										
1)	Clinic			150				1,500			
2)	Supporting Med.Center			500				1,500			
3)	Mother and Baby Hospital			1,600				2,000			
4)	Chemist			350				1,500			
5)	Public Medical Center				650			3,000			
6)	Salvation Army			300				1,000			
7)	Hospital							3,000			
8)	Other medical							3,000			
	Total required area(he)			286,000	11,700		500,000				
III	COMMERCIAL										
1)	Shop		100					500,000			
2)	Shopping Area			1,200							
3)	Market							3,000			
4)	Supermarket							3,000			
5)	Street shops							750,000			
6)	Commercial/business Zone							1,500,000			
7)	Commercial/business Center							1,500,000			
	Total required area(he)		800,000	1,056,000			2,250,000				
IV	GOVERNMENT OFFICES & PUBLIC SERVICES										
1)	Meeting Hall & Civil Security			350				1,000			
2)	Community office							1,000			
3)	Kelurahan Office			500				1,500			
4)	Kecamatan Office				500			2,500			

5) Kotamadya Offices	Kantor Kotamadya	units													750,000
6) Provincial Offices	Kantor Provinsi	units													750,000
7) State Offices	Kantor Wilayah Pusat	units													750,000
8) Military		units													2,500,000
9) Mailing Box	Box Surat	units	5												500
10) Supporting Post Office	Kantor Pos Pembantu	units							100						1,000
11) Branch post Office	Kantor Pos Cabang	units											500		2,000
12) Main Post Office	Kantor Pos Utama	units													500
13) Police Station	Pos Polisi	units											200		2,000
14) Fire Station	Pemadai Kebakaran	units													500
15) Telephone Booth	Telepon Umum	units											5		1,000
16) Telecommunication Depo	Waral	units													3,000
17) Telephone Office	Kantor Telpon	units													3,000
18) Electricity Station	Gardu listrik	units													500
19) Bath/washroom + parking	MCK(mandi, cuci, kakus+parkir)	units	100												
	Total required area(ha)	area(m2)	396,000	110,000						18,090	53,100				4,750,000
	537		44,000												
IV CULTURE & RECREATION															
KEBUDAYAAN & REKREASI															
1) Youth Center	Gedung Setia Guna Ling.	units								1,000					1,000
2) Theater	Gedung Blokop	units													2,000
3) City Cultural Hall	Kebudayaan Kecamatan	units													2,000
4) City Cultural Hall/area	Kebudayaan Kotamadya	units													10,000
	Total required area(ha)	area(m2)		440,000					18,000	54,000	6,000				1,510,000
V RELIGIOUS FACILITIES															
PERIBADATAN															
1) Small Mosque	Langgar	units													500
2) Mosque	Masjid Lingkungan	units													1,000
3) Great Mosque	Masjid Raya	units							1,750						3,000
4) Church	Gereja	units													3,000
5) Temple	Pura	units													3,000
6) Chinese B. Building	Klenteng	units													5,000
	Total required area(ha)	area(m2)			284,000	66,000			31,500	36,000	30,000				75,000
VI OPENSOURCE & SPORTS															
PERBADATAN															
1) Play Ground	Tempat Bermain	units													200
2) Park/sports area	Taman/Olah Raga	units							9,000						2,000
3) Sports Square	Lapangan Olah Raga(RM)	units													500
4) Public Parking	Parkir Umum	units													1,000
5) Sports Area(Sub-district)	Lapangan Olah Raga(Kel.)	units								24,000					3,000
6) Park(Sub-district)	Taman(Kel.)	units								2,000					
7) Sports Area(District)	Lapangan Olah Raga(Kec.)	units													10,000
8) Park(District)	Taman(Kec.)	units													3,000
9) Sub City Park	Taman(Sub Kota)	units													30,000
10) City Sports Park	Lapangan Olah Raga(Sub Kota)	units													50,000
11) City Park	Taman	units													1,757,700
12) Green belt		units													1% of T.area
	Total required area(ha)	area(m2)		1,100,000		1,232,000		180,000	906,000	90,000					1,837,700
	731		2,200,000												

Table 1.5: Future Land Use of KMUP(2015)

Name of Kecamatan	Type of Land Use														
	Total area (1)	residential (2)	commercial (3)	industry (4)	institution (5)	openspace (6)	road (7)	vacant land (8)	dry field (9)	paddy field (10)	swamp (11)	fish pond (12)	river/canal (13)	Urban use (14)	Rural use (15)
Mariso	182.0	84.1	13.7	5.0	41.2	4.5	25.7	0.0	0.0	0.0	0.0	0.0	7.8	174.2	7.8
	share(%)	46%	8%	3%	23%	2%	14%	0%	0%	0%	0%	0%	4%	96%	4%
Manajang	225.0	130.6	12.7	6.6	29.8	5.3	36.2	0.0	0.0	0.0	0.0	0.0	3.8	221.2	3.8
	share(%)	58%	6%	3%	13%	2%	16%	0%	0%	0%	0%	0%	2%	98%	2%
Makassar	252.0	115.6	23.9	1.8	35.1	34.7	37.8	0.0	0.0	0.0	0.0	0.0	3.1	248.9	3.1
	share(%)	46%	9%	1%	14%	14%	15%	0%	0%	0%	0%	0%	1%	99%	1%
Ujung Pandang	263.0	81.1	22.3	0.2	67.5	47.6	44.3	0.0	0.0	0.0	0.0	0.0	0.0	263.0	0.0
	share(%)	31%	8%	0%	26%	18%	17%	0%	0%	0%	0%	0%	0%	100%	0%
Wajo	199.0	28.9	88.8	7.2	37.3	1.6	35.2	0.0	0.0	0.0	0.0	0.0	0.0	199.0	0.0
	share(%)	15%	45%	4%	19%	1%	18%	0%	0%	0%	0%	0%	0%	100%	0%
Bontolala	210.0	113.1	23.6	3.2	29.1	7.7	31.6	0.0	0.0	0.0	0.0	0.0	1.7	208.3	1.7
	share(%)	54%	11%	2%	14%	4%	15%	0%	0%	0%	0%	0%	1%	99%	1%
Tallo	583.0	246.2	31.2	34.6	41.5	13.5	62.5	0.0	0.8	0.0	5.0	50.0	97.7	429.5	153.5
	share(%)	42%	5%	6%	7%	2%	11%	0%	0%	0%	1%	9%	17%	74%	26%
Ujung Tanah	594.0	383.4	33.0	4.7	50.3	16.6	99.9	1.4	2.7	0.0	0.0	0.0	2.0	587.9	6.1
	share(%)	65%	6%	1%	8%	3%	17%	0%	0%	0%	0%	0%	0%	99%	1%
Panakkukang	4,119.0	2,487.7	130.5	42.8	223.4	181.5	377.6	2.3	30.8	296.0	30.0	40.0	276.4	3,443.5	675.5
	share(%)	60%	3%	1%	5%	4%	9%	0%	1%	7%	1%	1%	7%	84%	16%
Tamalate	2,944.0	1,409.1	163.2	44.6	286.6	111.0	253.9	17.5	10.1	351.0	10.0	109.0	173.0	2,268.4	675.6
	share(%)	48%	6%	2%	10%	4%	9%	1%	0%	12%	0%	4%	6%	77%	23%
Biringkanaya	8,006.0	3,920.2	157.1	849.3	458.2	216.0	395.3	15.8	85.6	693.0	285.0	521.0	409.5	5,996.1	2,009.9
	share(%)	49%	2%	11%	6%	3%	5%	0%	1%	9%	4%	7%	5%	75%	25%
Central parts	1,925.0	936.8	218.0	28.7	290.3	118.0	310.7	1.4	2.7	0.0	0.0	0.0	18.4	1,902.5	22.5
	share(%)	49%	11%	1%	15%	6%	16%	0%	0%	0%	0%	0%	1%	99%	1%
Suburbs	15,652.0	8,063.2	482.0	971.3	1,009.7	522.0	1,089.3	35.6	127.3	1,340.0	330.0	720.0	961.6	12,137.5	3,514.5
	share(%)	52%	3%	6%	6%	3%	7%	0%	1%	9%	2%	5%	6%	78%	22%
KMUP Total	17,577.0	9,000.0	700.0	1,000.0	1,300.0	640.0	1,400.0	37.0	130.0	1,340.0	330.0	720.0	980.0	14,040.0	3,537.0
	share(%)	51%	4%	6%	7%	4%	8%	0%	1%	8%	2%	4%	6%	80%	20%

Source: JICA Study Team

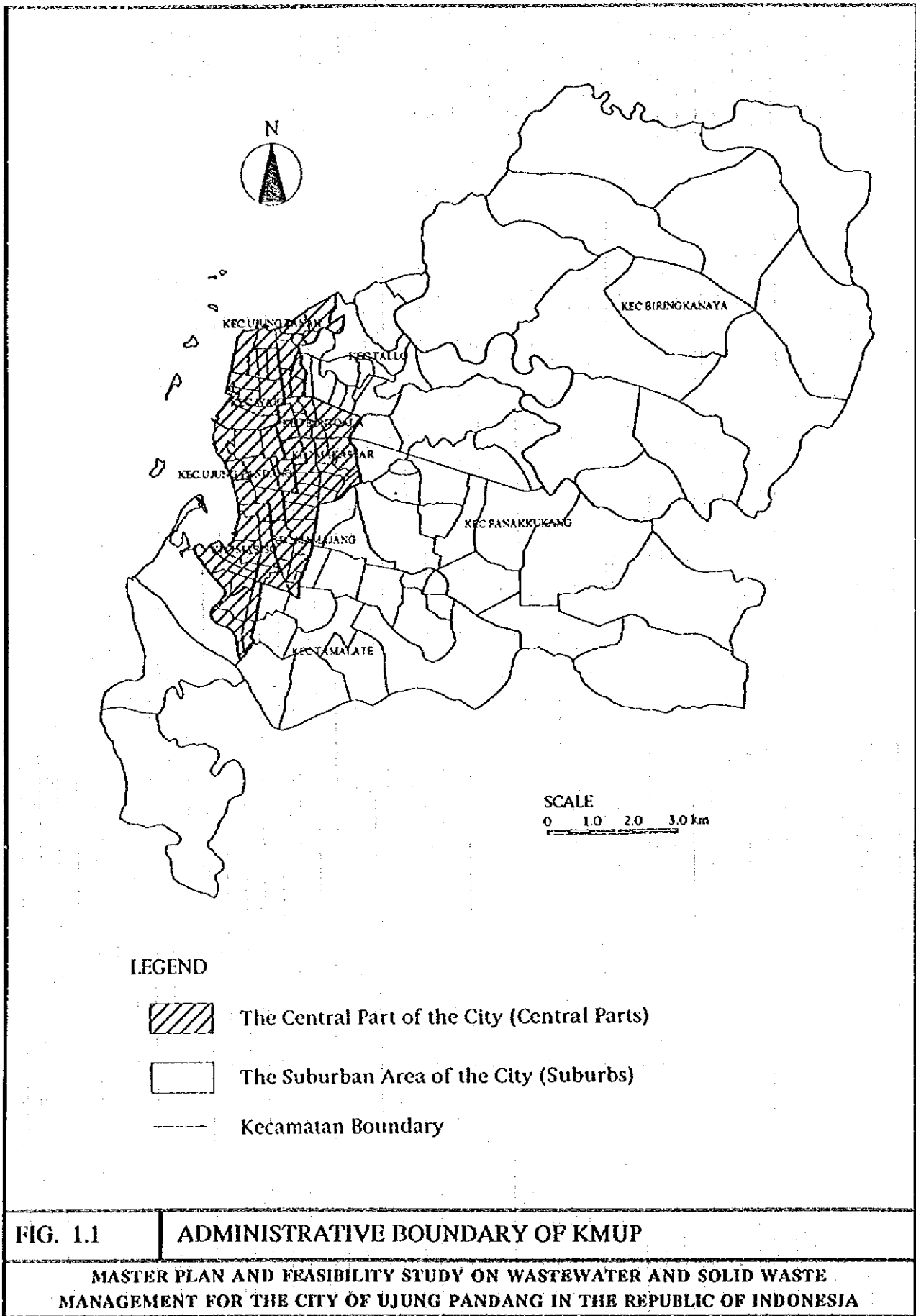
Notes: (14) Built-up area consists of (2)-(7) and (15) Non built-up area consists of (8)-(13). (4) includes industrial estate and Makassar Harbor and (5) includes education, medical, governmental and military area

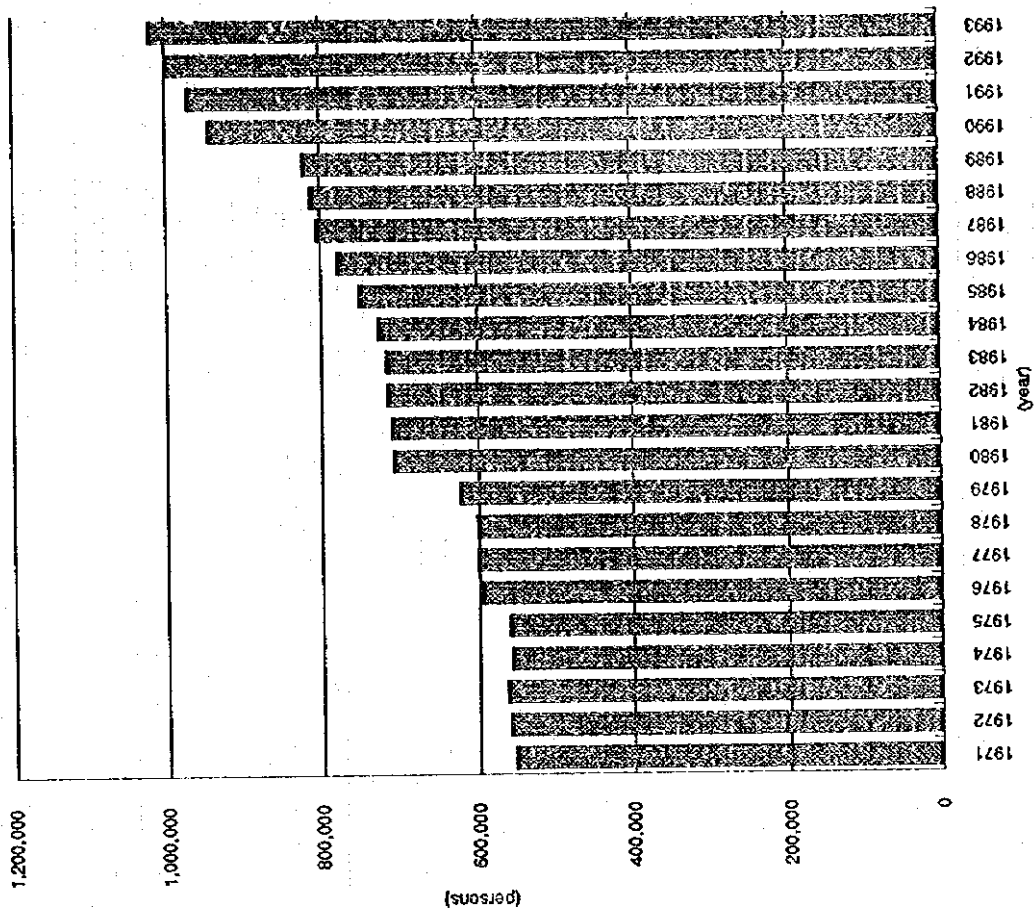
Table 1.6: The Urban Planning Frame of the Wastewater Management Area

	Study area (KMUP)	Off-site area	On-site area	Priority area	Proposed Development Areas			
					Total of 3 areas	North.	Cent'l	South.
Area(ha)	17,577	5,564	12,013	2,520	676	88	426	162
Population in 1993(persons)	1,019,948	866,572	153,376	586,501	192,819	30,488	104,692	57,639
Population in 2005(persons)	1,520,000	1,163,443	356,557	720,224	231,877	32,775	128,297	70,805
Population in 2015(persons)	2,200,000	1,342,040	857,960	768,447	237,375	35,112	130,415	71,848
Population Density in 1993(p/ha)	58	156	13	233	285	346	246	356
Population Density in 2005(p/ha)	86	209	30	286	343	372	301	437
Population Density in 2015(p/ha)	125	241	71	305	351	399	306	444
Built-up Ratio in 1993	41%	69%	28%	90%	93%	82%	99%	82%
Built-up Ratio in 2005	55%	83%	42%	94%	96%	89%	100%	91%
Built-up Ratio in 2015	80%	90%	75%	97%	99%	98%	100%	96%
Ratio of residential in 1993*1)	25%	41%	18%	48%	39%	45%	36%	41%
Ratio of com'l/ins'l in 1993*2)	8%	14%	5%	21%	30%	21%	34%	22%

Notes: *1) the ratio of the residential area in the total area and *2) the ratio of the commercial and institutional areas in the total area

Source; JICA Study Team





Year	Population (persons)	a.i.r. 1 year	a.i.r. 5 year	a.i.r. 10 year
1971	554,271	-		
1972	561,328	1.27%		
1973	564,482	0.56%		
1974	558,672	-1.03%		
1975	561,501	0.51%	0.32%	
1976	596,876	6.30%		
1977	602,422	0.93%		
1978	602,916	0.08%		
1979	623,985	3.49%		
1980	708,465	13.54%	4.76%	2.76%
1981	712,219	0.53%		
1982	717,585	0.75%		
1983	718,159	0.08%		
1984	728,611	1.46%		
1985	752,362	3.26%	1.21%	
1986	778,593	3.49%		
1987	806,129	3.54%		
1988	812,967	0.85%		
1989	822,013	1.11%		
1990	944,372	14.89%	4.65%	2.92%
1991	972,447	2.97%		
1992	1,000,328	2.87%		
1993	1,019,948	1.96%		2.60% for 3 years

Source: Kantor Statistik KMUP. Note: a.i.r.=annual increase ratio

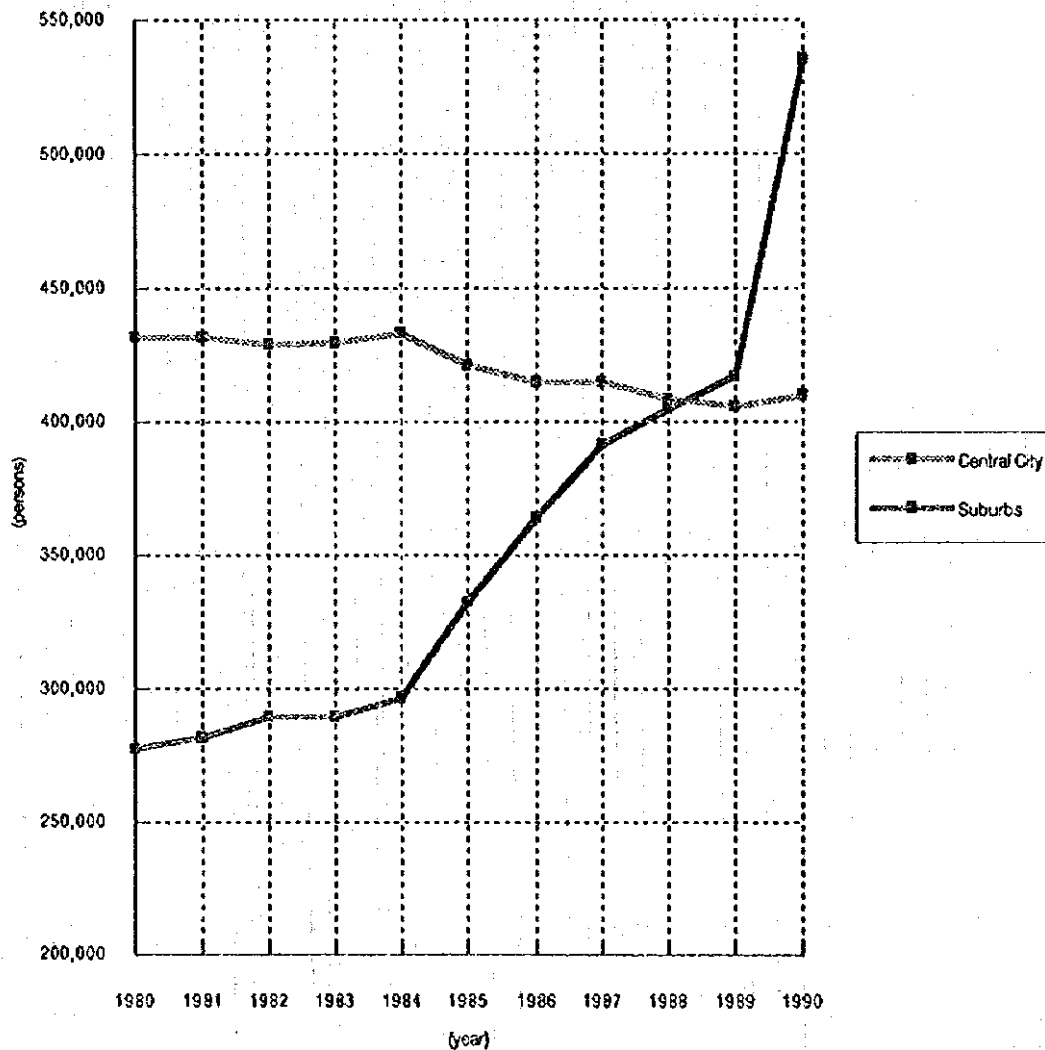
FIG. 1.2 NUMBER OF POPULATION OF THE CITY OF UJUNG PANDANG

MASTER PLAN AND FEASIBILITY STUDY ON WASTEWATER AND SOLID WASTE MANAGEMENT FOR THE CITY OF UJUNG PANDANG IN THE REPUBLIC OF INDONESIA



A.D.1995

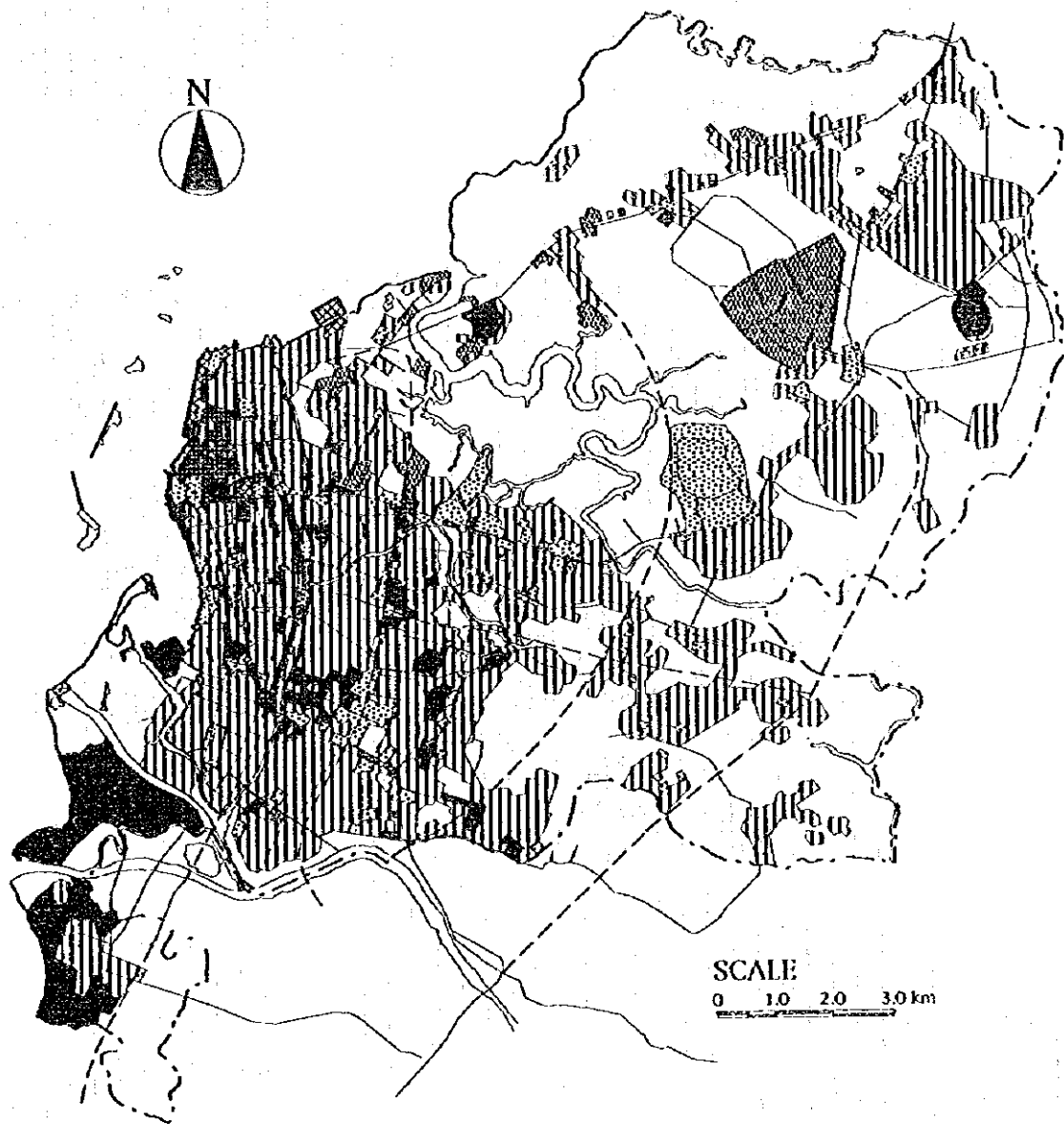
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Central City annual increase ratio	431,093	431,115	428,537	428,985	432,592	420,933	414,794	414,537	408,175	405,290	409,421
Suburbs annual increase ratio	-	0.01%	-0.60%	0.10%	0.84%	-2.70%	-1.46%	-0.06%	-1.53%	-0.71%	1.02%
Total KMUP annual increase ratio	277,372	281,104	289,048	289,174	296,019	332,429	363,799	391,592	404,782	416,723	534,951
	-	1.35%	2.83%	0.04%	2.37%	12.30%	9.44%	7.64%	3.37%	2.95%	28.37%
	708,465	712,219	717,585	718,159	728,611	753,362	778,593	806,129	812,957	822,013	944,372
	-	0.53%	0.75%	0.08%	1.46%	3.40%	3.35%	3.54%	0.85%	1.11%	14.89%



Source: Kantor Statistik, KMUP

FIG. 1.3 POPULATION INCREASE OF KMUP 1980 - 1990

MASTER PLAN AND FEASIBILITY STUDY ON WASTEWATER AND SOLID WASTE
MANAGEMENT FOR THE CITY OF UJUNG PANDANG IN THE REPUBLIC OF INDONESIA



LEGEND

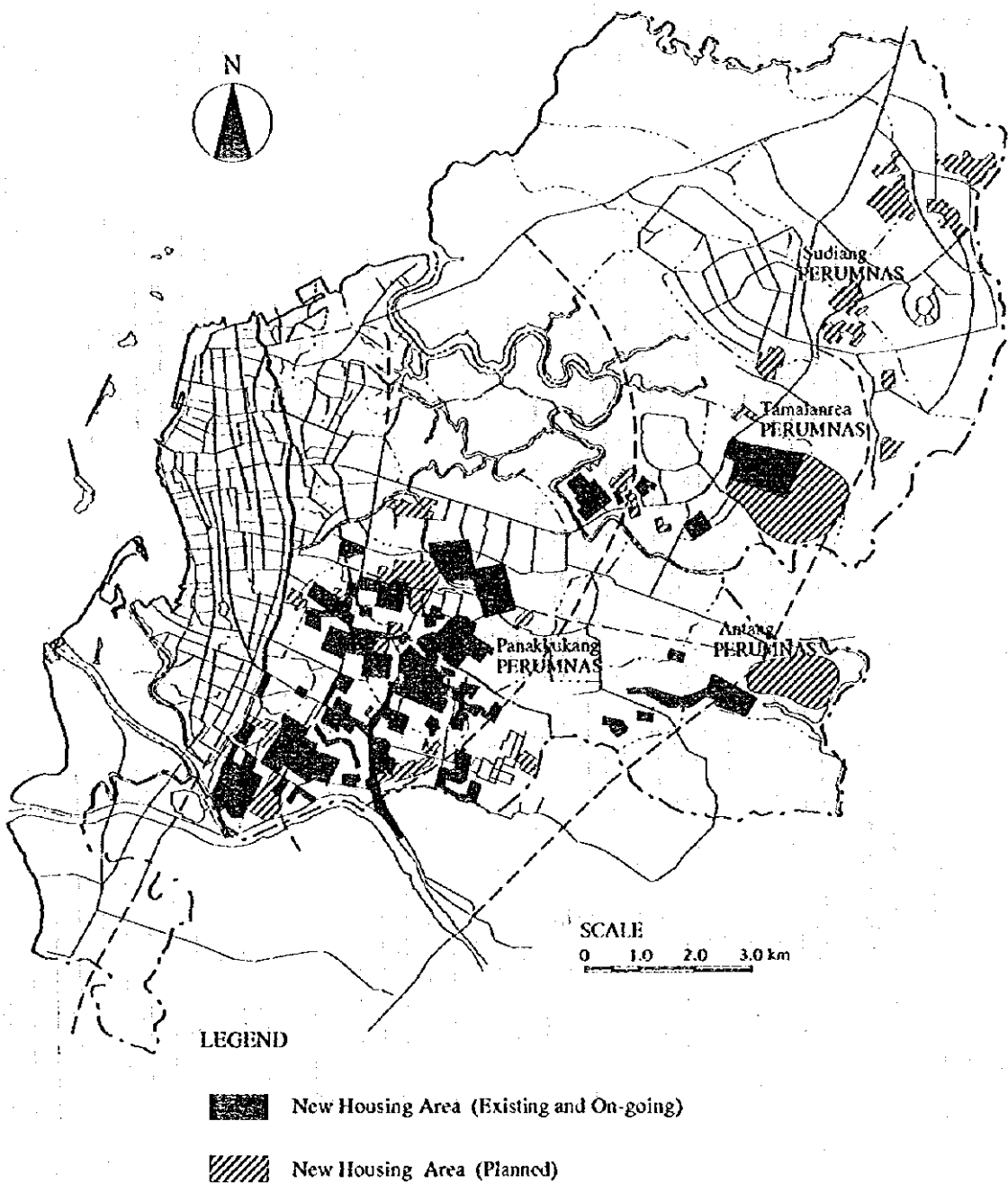
- | | |
|------------------------------|---------------------|
| Residential Area | Transportation Area |
| Commercial Area | Vacant Area |
| Institutional / Service Area | Non Urban Area |
| Industrial Area | |

(Source : JICA Study 1994)

FIG. 1.4

Existing Land Use

MASTER PLAN AND FEASIBILITY STUDY ON WASTEWATER AND SOLID WASTE MANAGEMENT FOR THE CITY OF UJUNG PANDANG IN THE REPUBLIC OF INDONESIA



Source : JICA Study Team

FIG. 1.5

New Housing Areas

MASTER PLAN AND FEASIBILITY STUDY ON WASTEWATER AND SOLID WASTE MANAGEMENT FOR THE CITY OF UJUNG PANDANG IN THE REPUBLIC OF INDONESIA

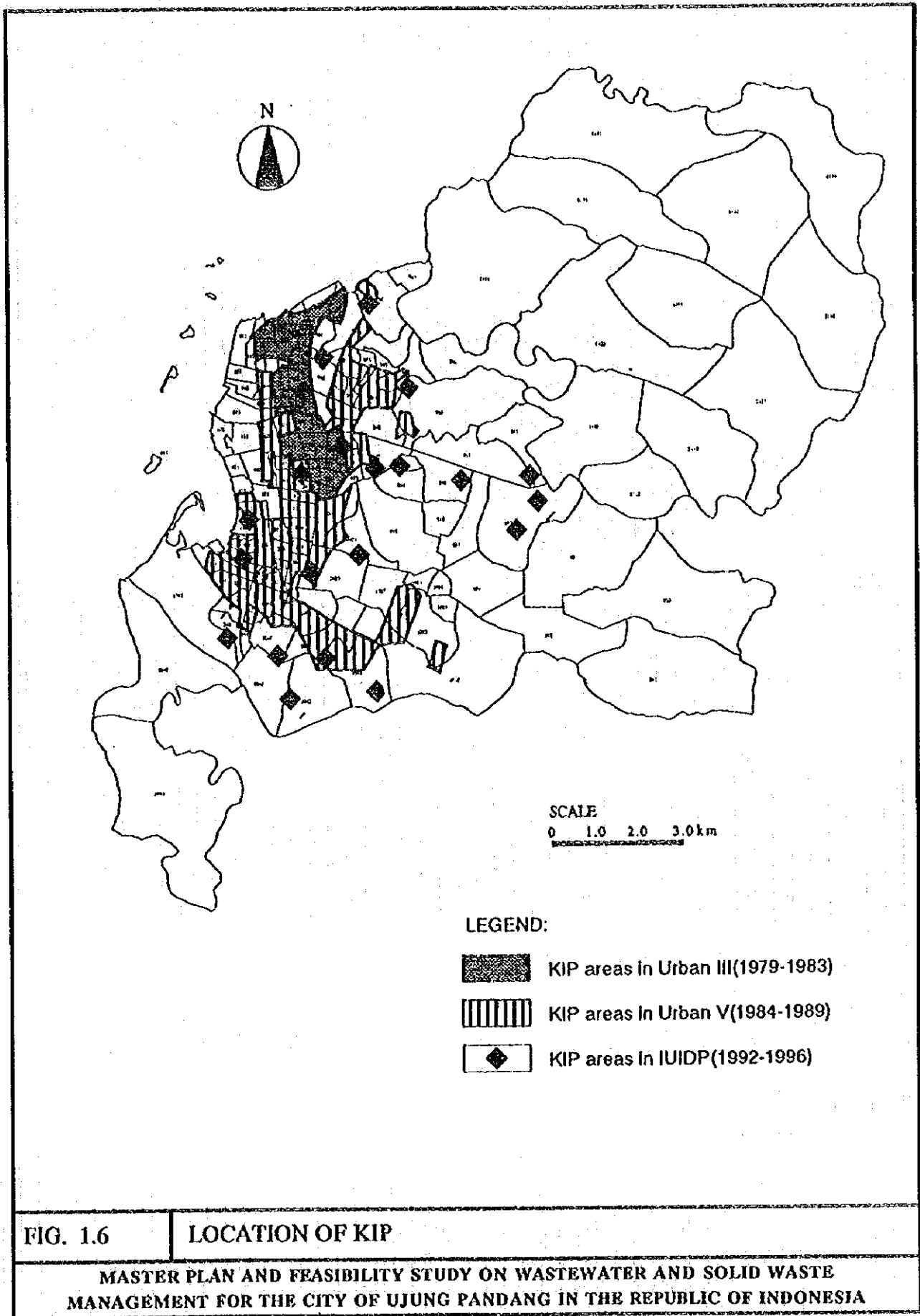
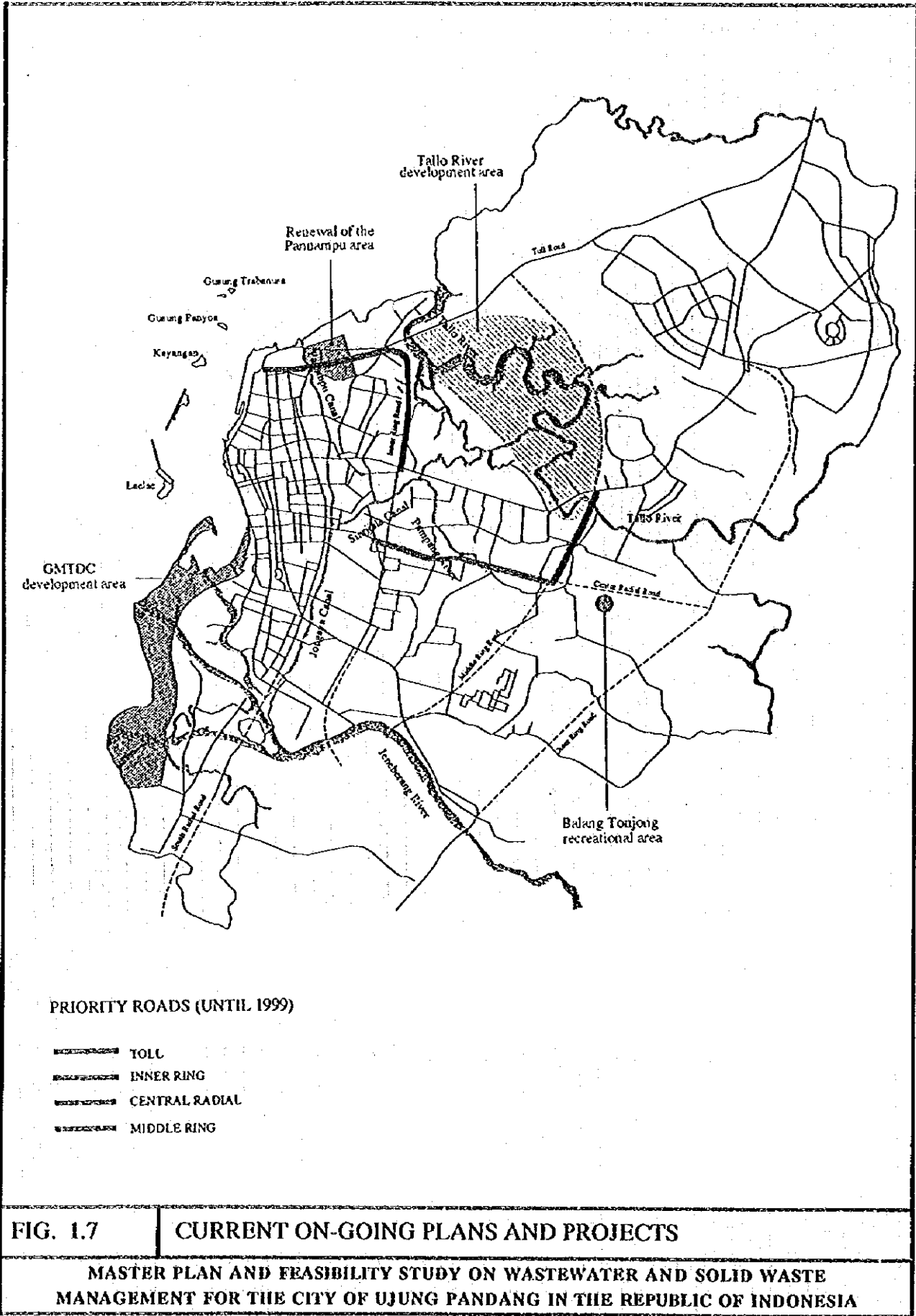


FIG. 1.6

LOCATION OF KIP

MASTER PLAN AND FEASIBILITY STUDY ON WASTEWATER AND SOLID WASTE MANAGEMENT FOR THE CITY OF UJUNG PANDANG IN THE REPUBLIC OF INDONESIA



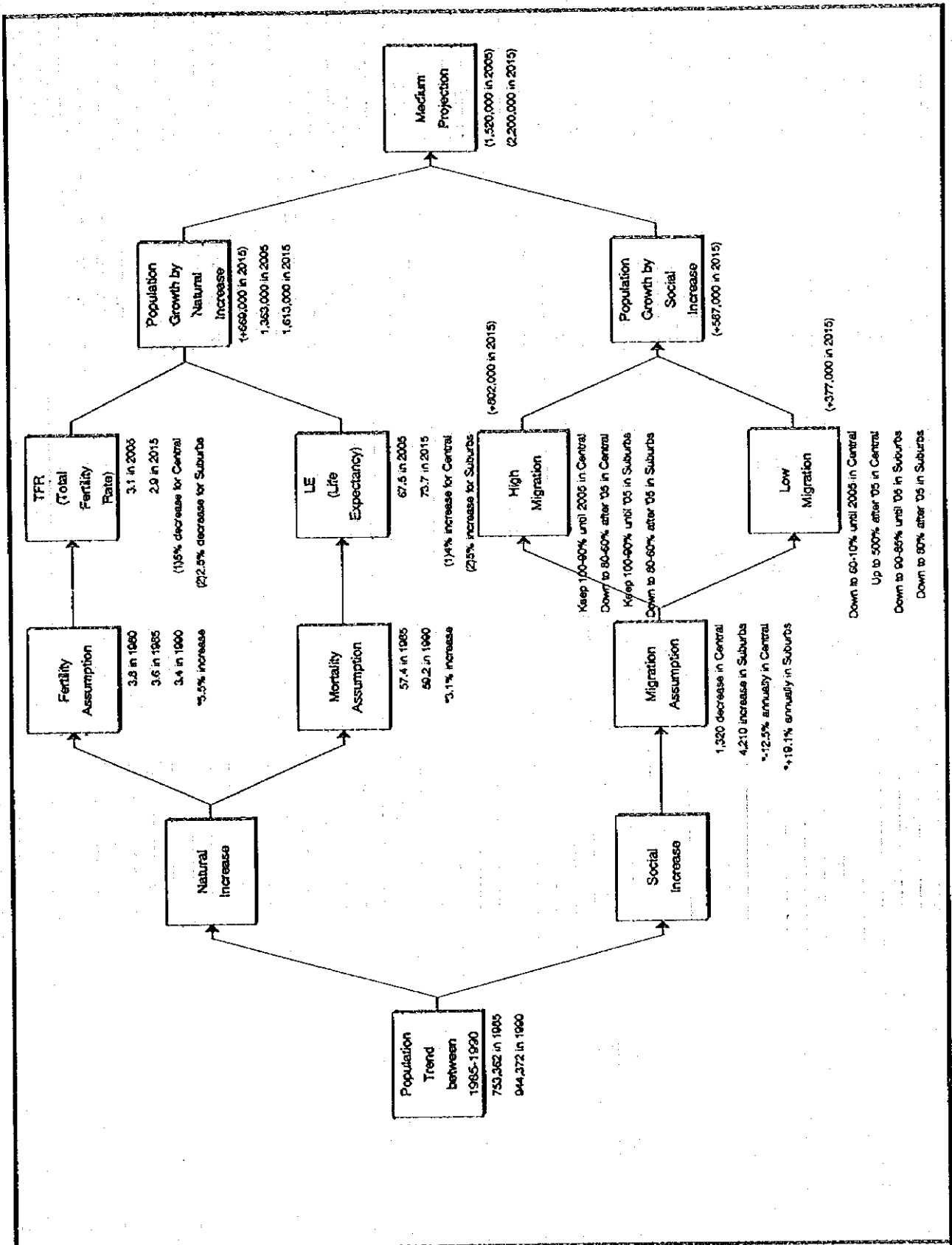


FIG. 1.8

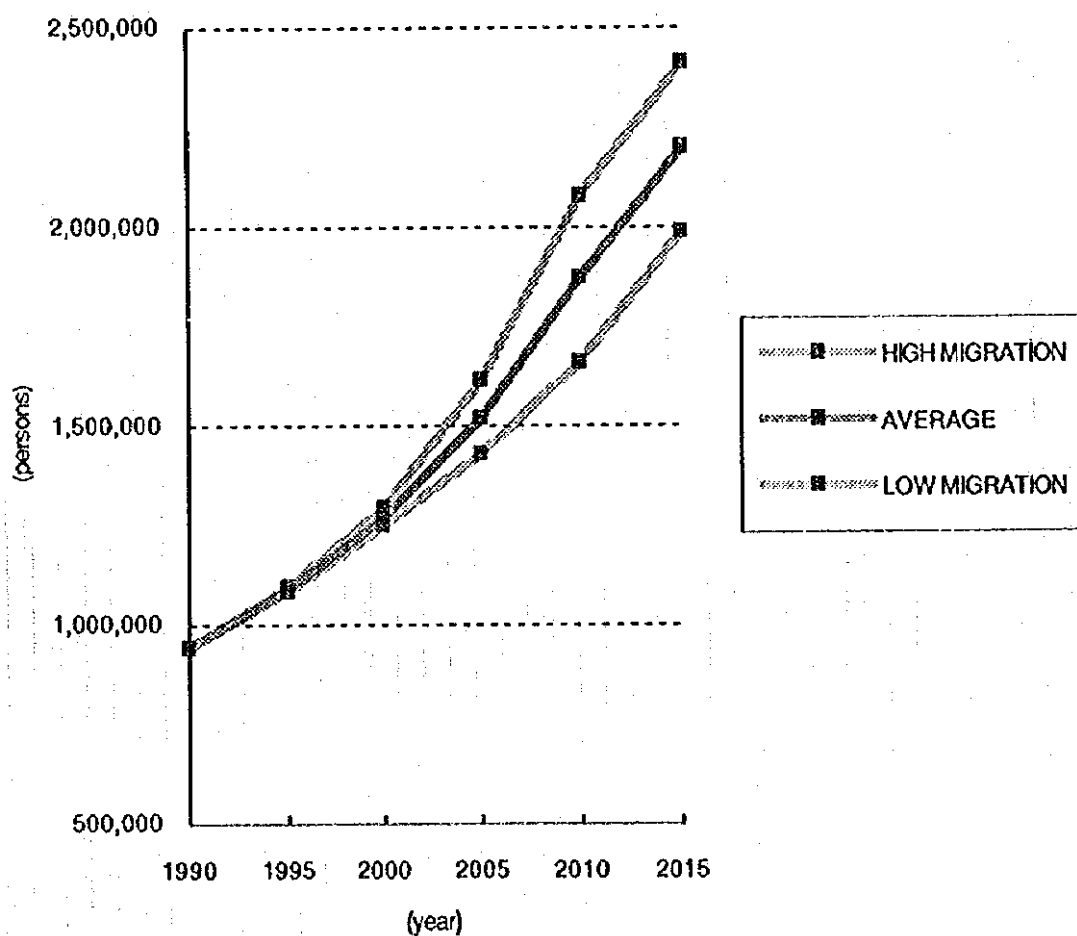
STUDY FLOW OF JICA POPULATION PROJECTION

MASTER PLAN AND FEASIBILITY STUDY ON WASTEWATER AND SOLID WASTE MANAGEMENT FOR THE CITY OF UJUNG PANDANG IN THE REPUBLIC OF INDONESIA



A.D.1995

Alternatives	1990	1995	2000	2005	2010	2015
HIGH MIGRATION	944,372	1,098,063	1,297,867	1,613,676	2,079,887	2,414,611
annual increase ratio	-	3.06%	3.40%	4.45%	5.21%	3.03%
AVERAGE	944,372	1,090,000	1,270,000	1,520,000	1,870,000	2,200,000
annual increase ratio	-	2.91%	3.10%	3.66%	4.23%	3.30%
LOW MIGRATION	944,372	1,081,937	1,248,414	1,432,523	1,659,715	1,990,441
annual increase ratio	-	2.76%	2.90%	2.79%	2.99%	3.70%



Source: JICA Study team

FIG. 1.9

ALTERNATIVE POPULATION PROJECTIONS

MASTER PLAN AND FEASIBILITY STUDY ON WASTEWATER AND SOLID WASTE MANAGEMENT FOR THE CITY OF UJUNG PANDANG IN THE REPUBLIC OF INDONESIA

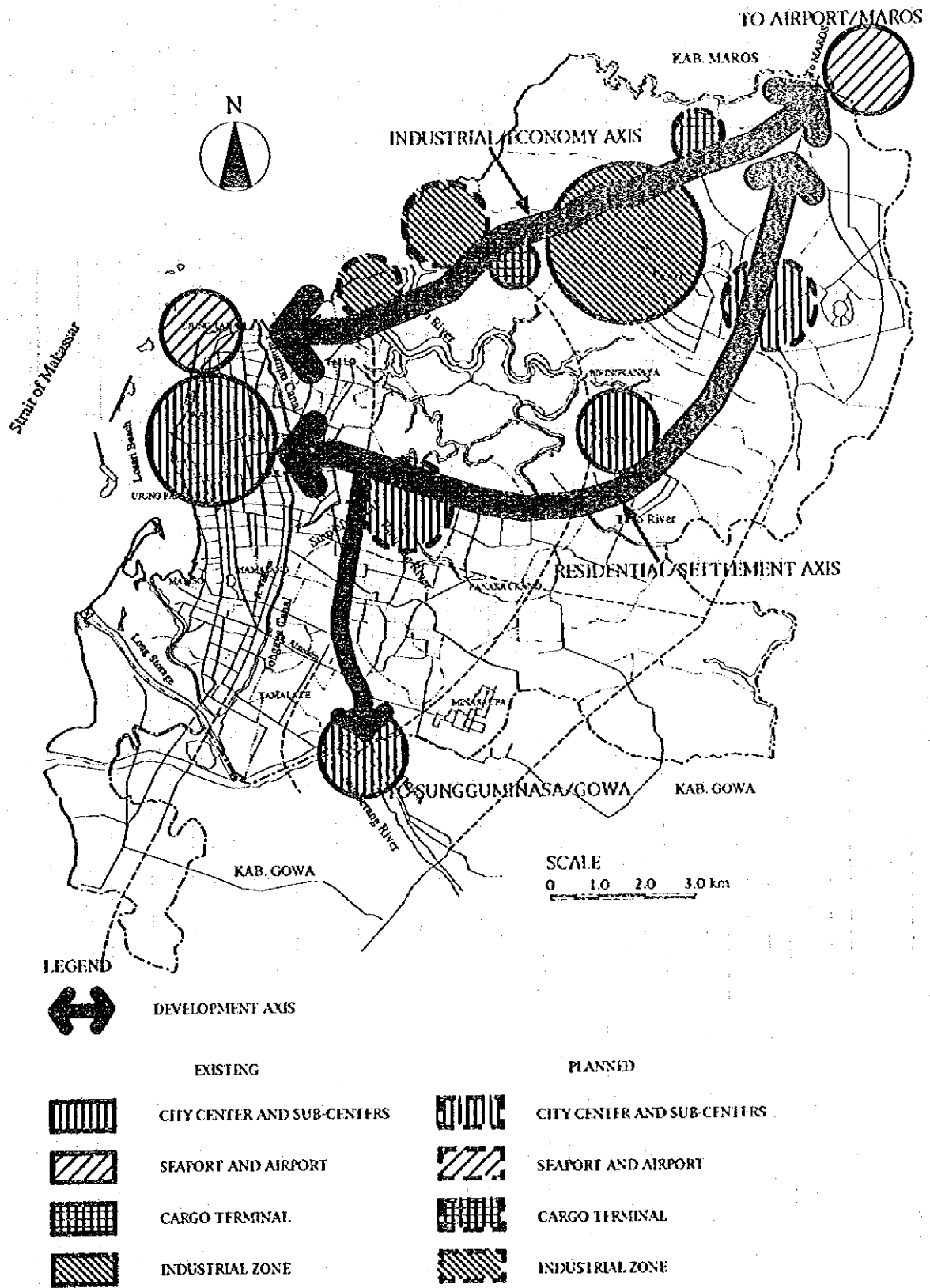
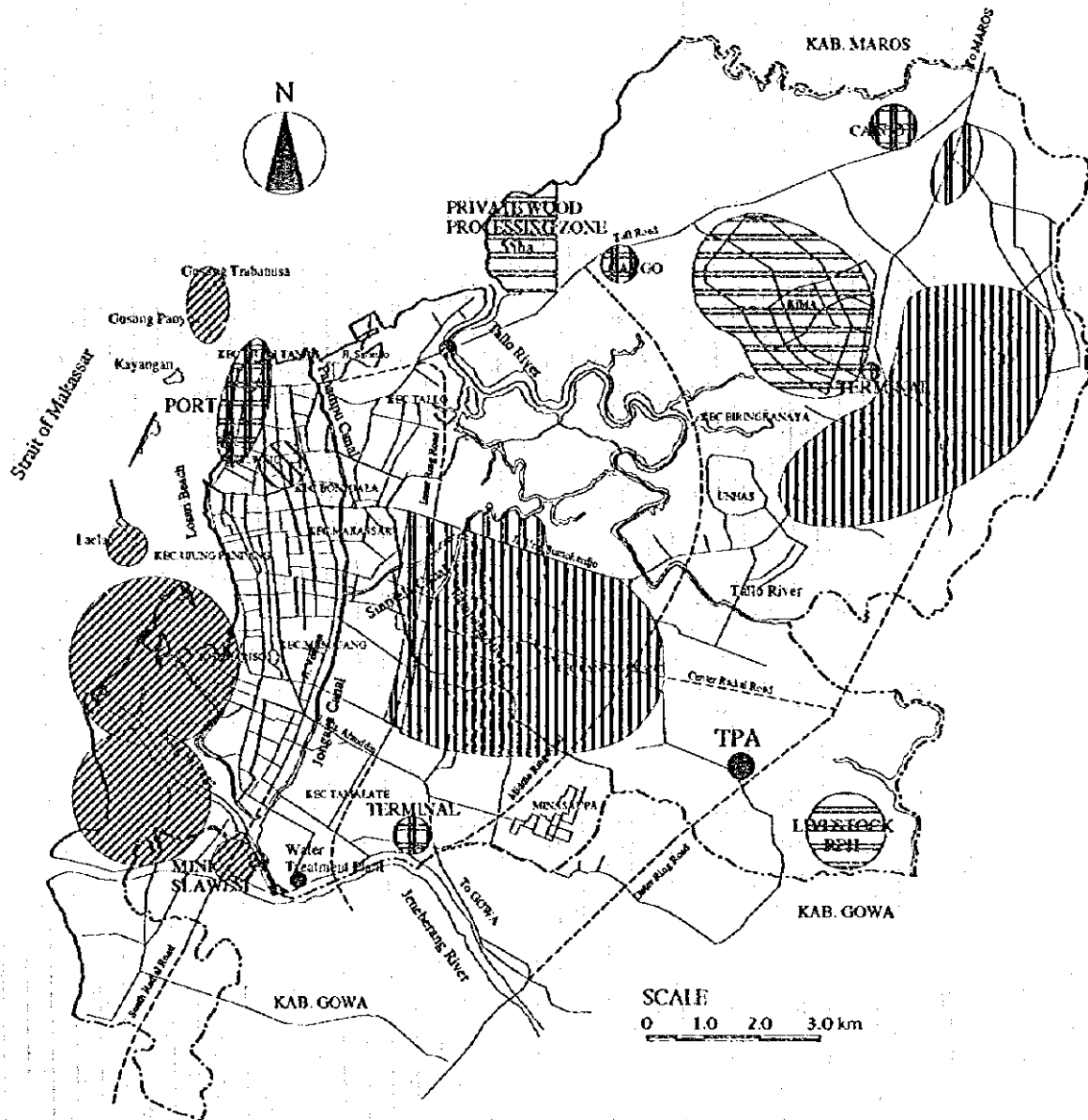


FIG. 1.10

Concept of Spatial Development Plan of KMUP

MASTER PLAN AND FEASIBILITY STUDY ON WASTEWATER AND SOLID WASTE MANAGEMENT FOR THE CITY OF UJUNG PANDANG IN THE REPUBLIC OF INDONESIA



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




-  Settlement
-  Recreation
-  Transportation
-  Industry
-  Government
-  CBD
-  TPA and Water Treatment
-  Planned Arterial Road

FIG. 1.11

On-going Plans and Projects

MASTER PLAN AND FEASIBILITY STUDY ON WASTEWATER AND SOLID WASTE MANAGEMENT FOR THE CITY OF UJUNG PANDANG IN THE REPUBLIC OF INDONESIA

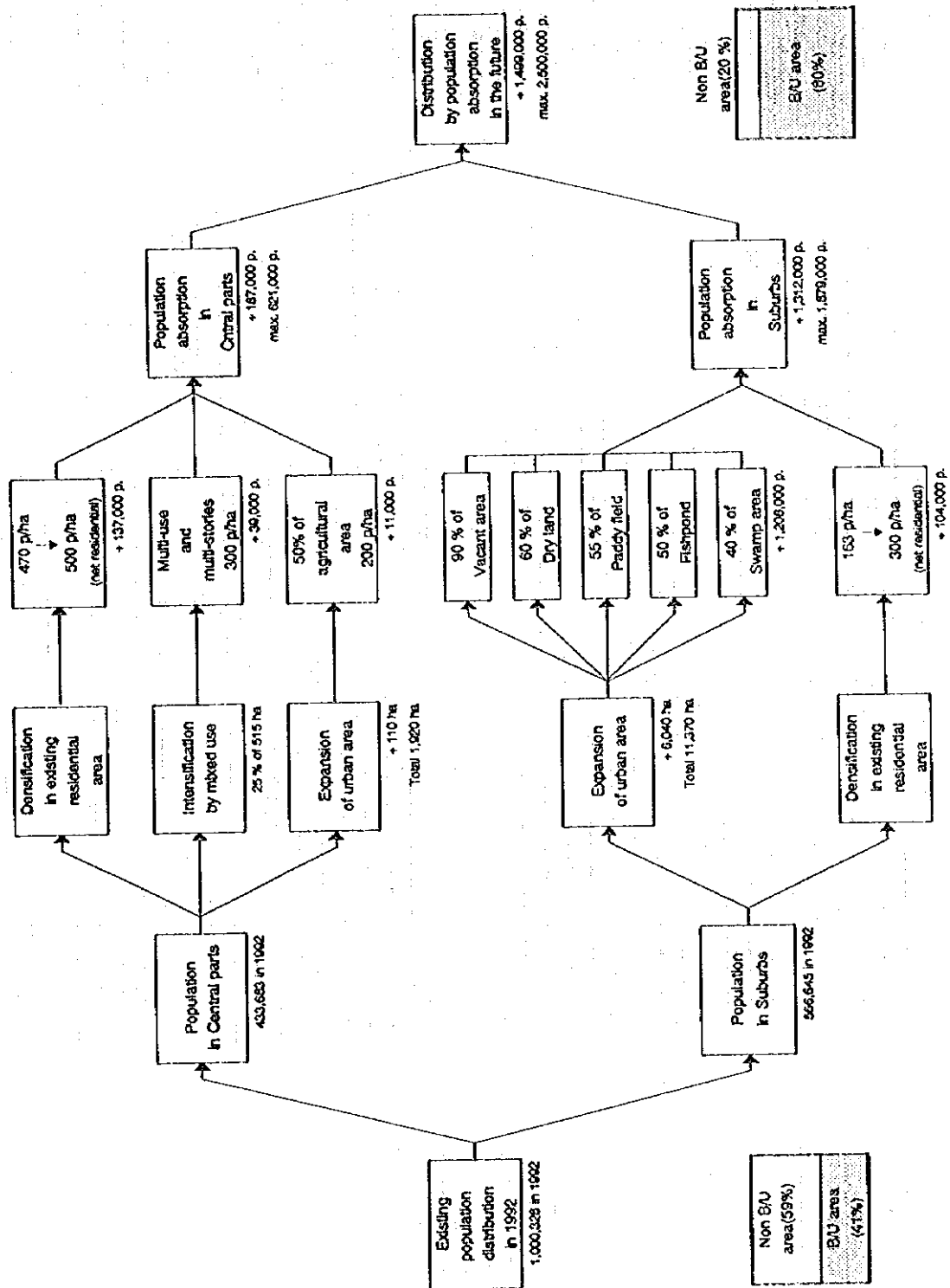


FIG. 1.12

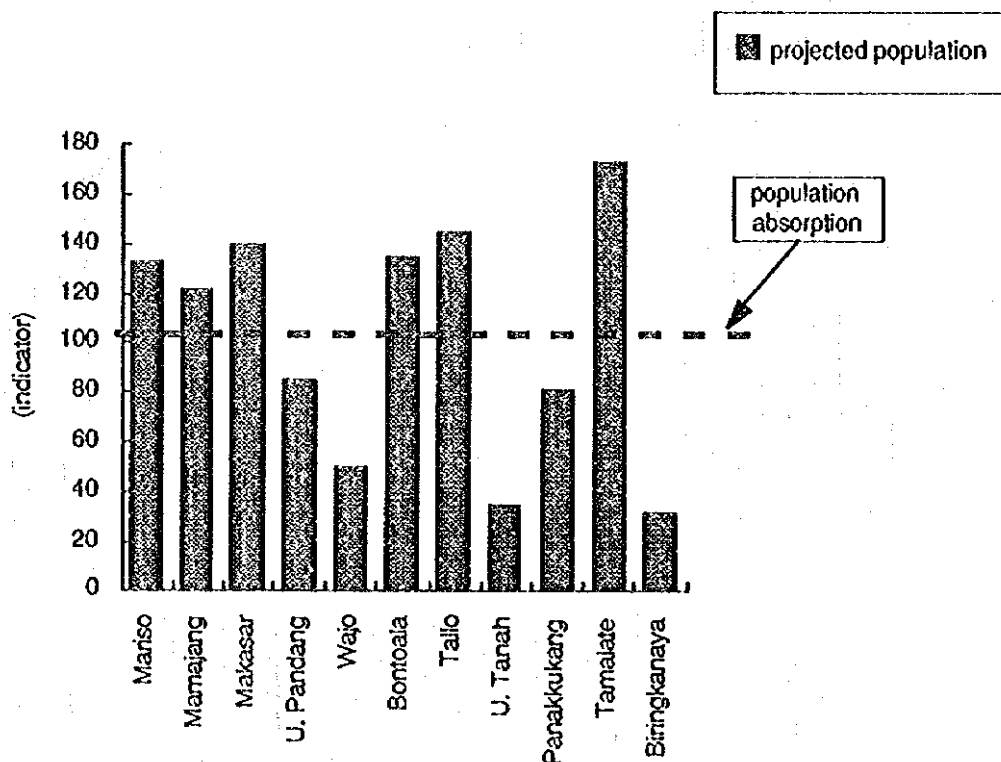
STUDY FLOW OF POPULATION ABSORPTION

MASTER PLAN AND FEASIBILITY STUDY ON WASTEWATER AND SOLID WASTE MANAGEMENT FOR THE CITY OF UJUNG PANDANG IN THE REPUBLIC OF INDONESIA



A.D.1995

	Kecamatan	projected population in 2015	absorption capacity	balance (2)-(1)	indicator (2)/(1)
		(1)	(2)	(3)	(4)
1)	Mariso	87,009	65,476	-21,533	133
2)	Mamajang	92,766	76,344	-16,422	122
3)	Makassar	145,265	103,750	-41,515	140
4)	Ujung Pandang	42,190	49,785	7,595	85
5)	Wajo	27,984	56,481	28,497	50
6)	Bontoala	98,017	73,003	-25,014	134
7)	Tallo	194,852	134,425	-60,427	145
8)	Ujung Tanah	68,760	196,020	127,260	35
9)	Panakkukang	350,404	433,657	83,253	81
10)	Tamalate	828,373	479,216	-349,157	173
11)	Biringkanaya	264,380	842,731	578,351	31
12)	Total KMUP	2,200,000	2,510,888	310,888	88



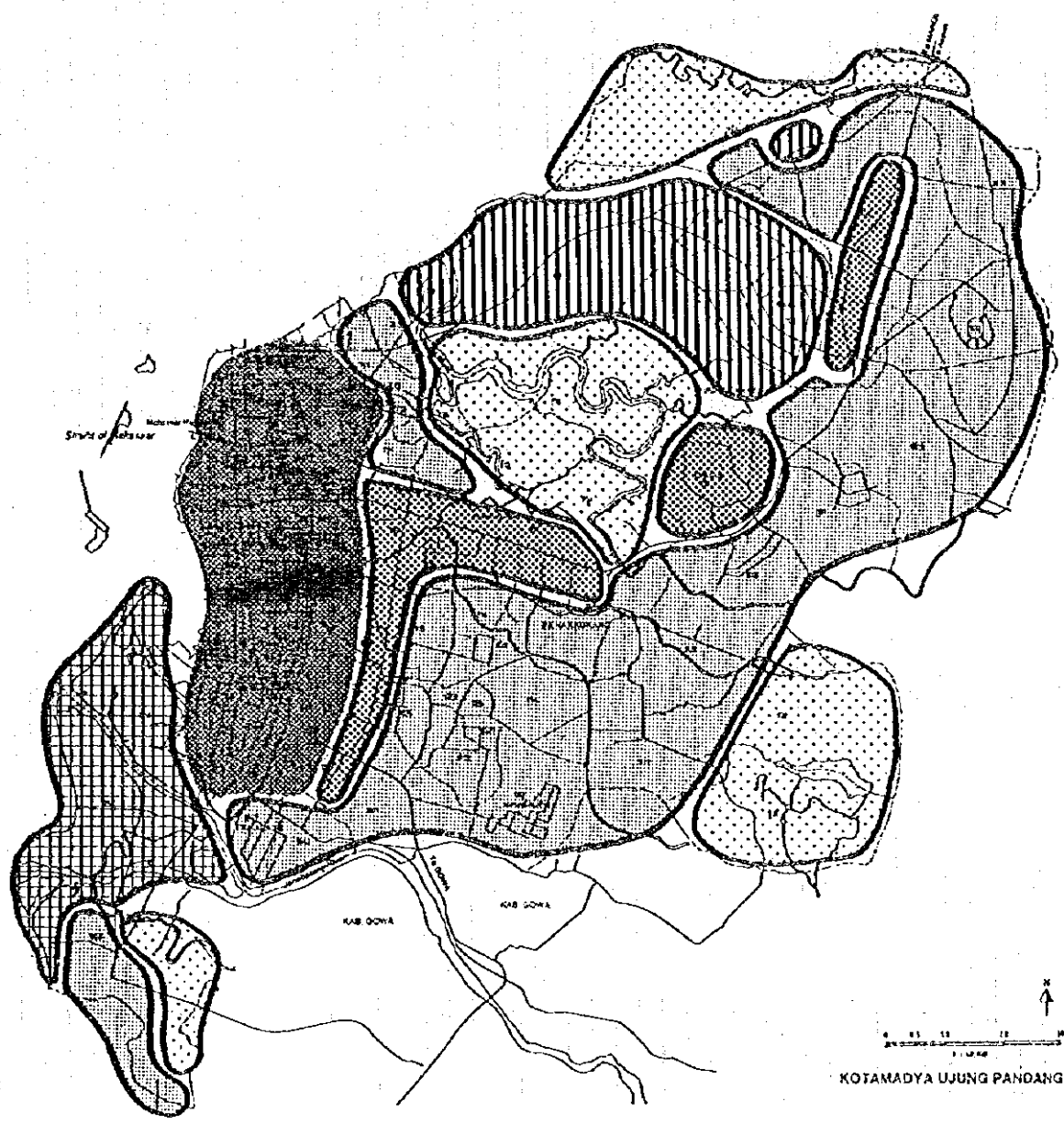
Source: JICA Study Team

Notes: (1) refer to JICA Population Projection by Kecamatan

FIG. 1.13

PROJECTED POPULATION AND ABSORPTION CAPACITY

MASTER PLAN AND FEASIBILITY STUDY ON WASTEWATER AND SOLID WASTE
MANAGEMENT FOR THE CITY OF UJUNG PANDANG IN THE REPUBLIC OF INDONESIA



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



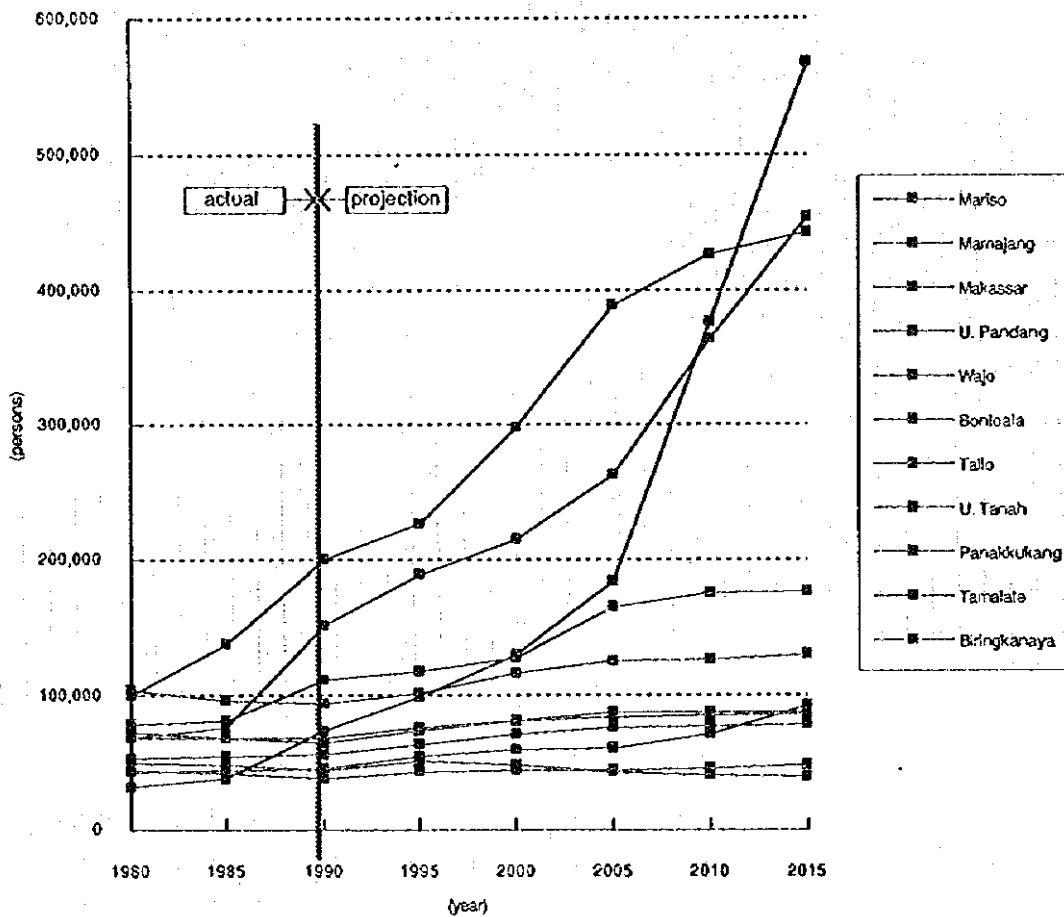
	Existing Built-up Zone		Residential/Housing Zone
	Natural and Agrirultural Zone		Industrial Zone
	Institutional/Public Service Zone		Tourism & Recreation Zone

FIG. 1.14 **ZONING MAP**

MASTER PLAN AND FEASIBILITY STUDY ON WASTEWATER AND SOLID WASTE MANAGEMENT FOR THE CITY OF UJUNG PANDANG IN THE REPUBLIC OF INDONESIA

	Kecamatan	1980 (1)	1985 (2)	1990 (3)	1995 (4)	2000 (5)	2005 (6)	2010 (7)	2015 (8)
1)	Mariso	52,685	54,892	55,607	62,833	70,887	76,106	76,483	77,912
2)	Mamajang	71,560	68,325	67,929	75,269	81,012	83,515	84,029	85,677
3)	Makassar	102,973	96,065	93,513	101,412	115,606	125,175	125,744	129,225
4)	U. Pandang	44,102	41,729	38,192	43,885	44,245	44,316	45,533	48,469
5)	Wajo	49,186	47,514	44,391	50,142	47,796	43,538	40,695	39,387
6)	Bontoala	68,073	68,511	64,560	72,729	81,299	86,617	86,701	86,796
7)	Tallo	78,193	80,845	111,182	118,490	126,755	164,811	175,196	175,865
8)	U. Tanah	42,514	43,897	45,229	54,230	59,155	60,733	70,814	92,534
9)	Panakkukang	68,022	76,118	150,758	188,744	215,285	262,647	362,820	453,560
10)	Tamalate	99,502	137,466	199,650	226,821	298,251	388,526	426,098	442,592
11)	Biringkanaya	31,655	39,000	73,361	97,945	129,708	184,016	375,886	567,983
12)	Total	708,465	753,362	944,372	1,090,000	1,270,000	1,520,000	1,870,000	2,200,000
13)	annual increase ratio		1.24%	4.62%	2.91%	3.10%	3.66%	4.23%	3.30%
14)	Central parts	431,093	420,933	409,421	460,000	500,000	520,000	530,000	560,000
15)	Suburbs	277,372	332,429	534,951	630,000	770,000	1,000,000	1,340,000	1,640,000



Source: JICA Study Team

FIG. 1.15

POPULATION DISTRIBUTION BY KECAMATAN 1985-2015

MASTER PLAN AND FEASIBILITY STUDY ON WASTEWATER AND SOLID WASTE
MANAGEMENT FOR THE CITY OF UJUNG PANDANG IN THE REPUBLIC OF INDONESIA

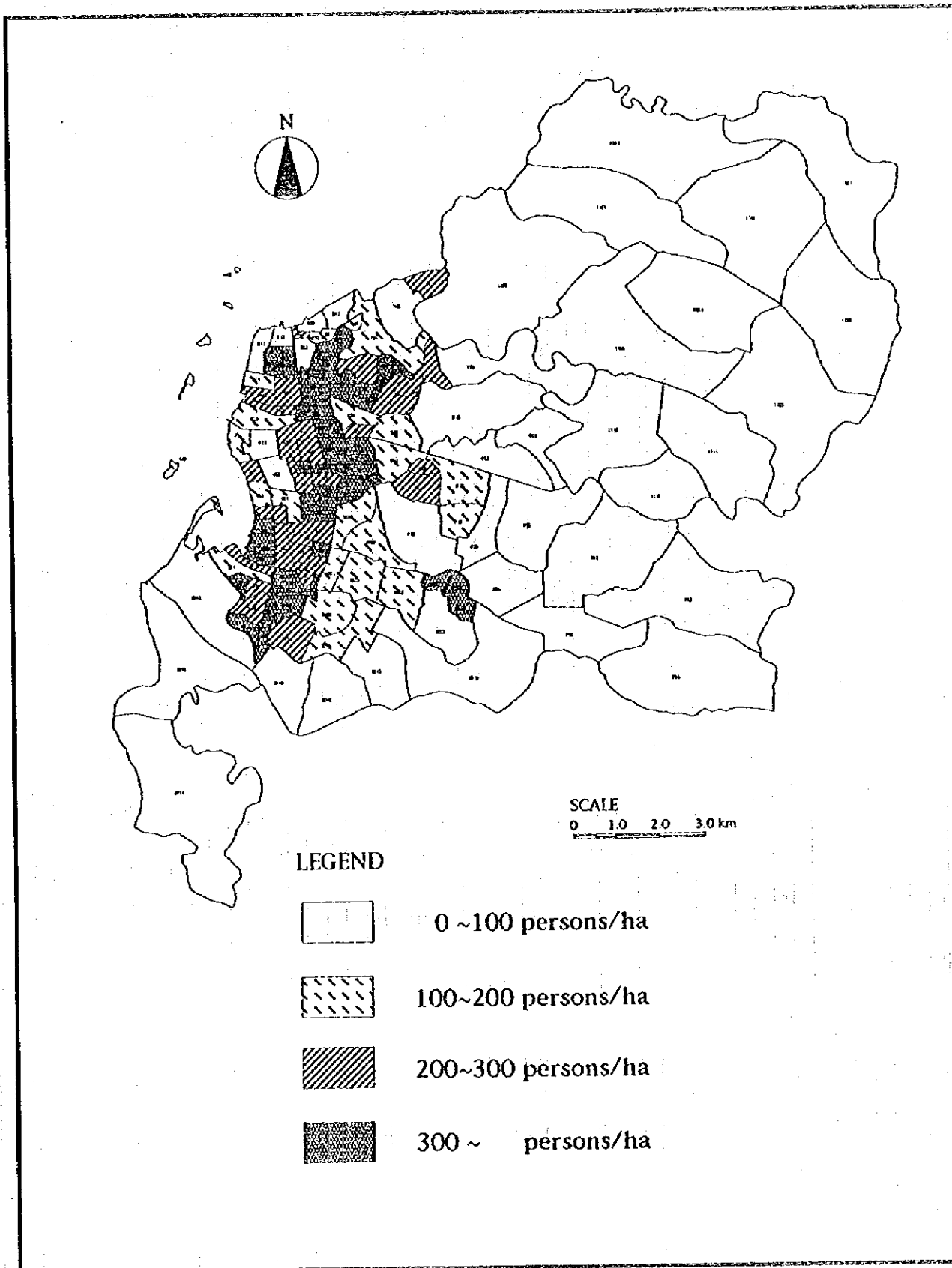


FIG. 1.16 **DISTRIBUTION OF POPULATION DENSITY IN 1993**

MASTER PLAN AND FEASIBILITY STUDY ON WASTEWATER AND SOLID WASTE MANAGEMENT FOR THE CITY OF UJUNG PANDANG IN THE REPUBLIC OF INDONESIA

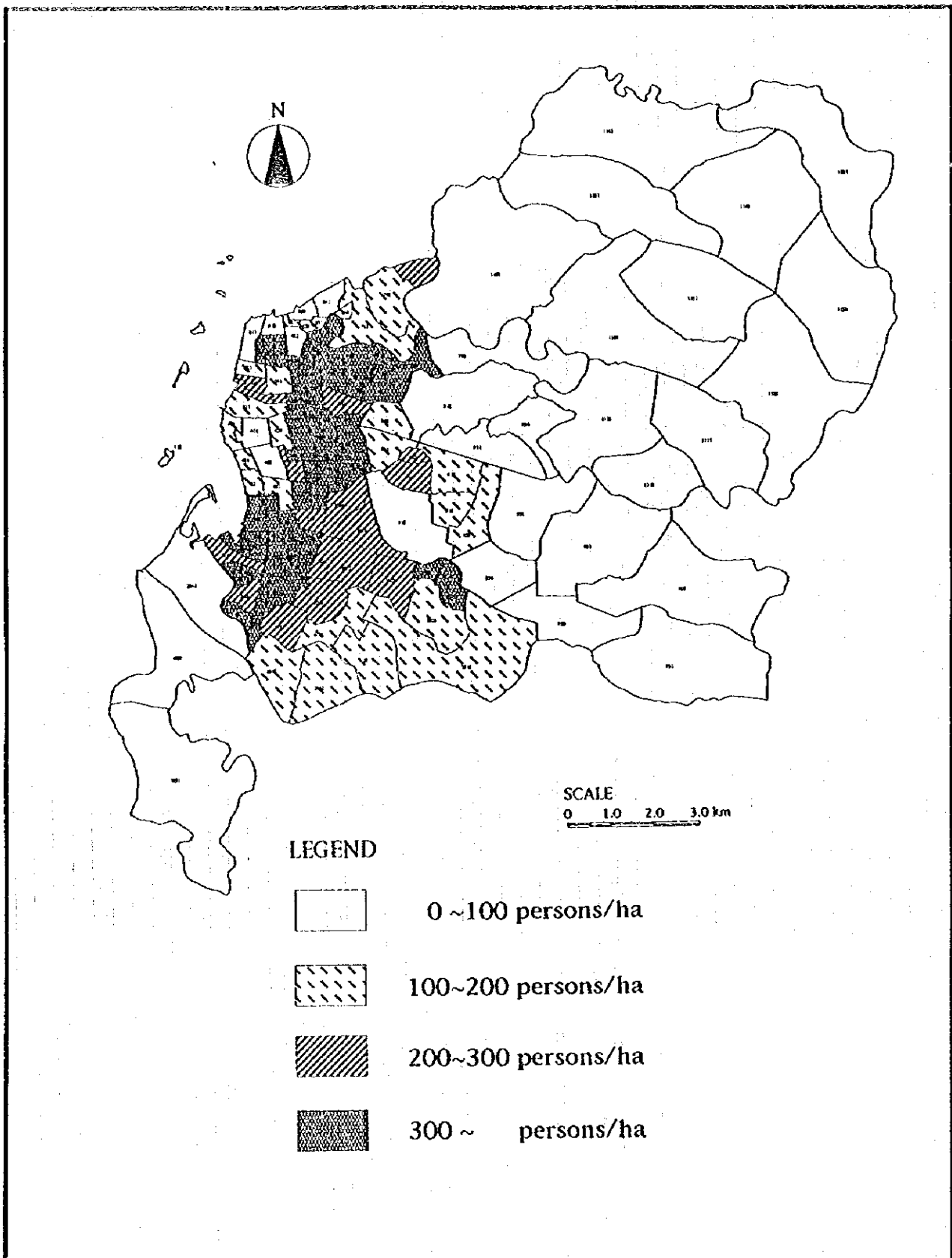


FIG. 1.17

DISTRIBUTION OF POPULATION DENSITY IN 2005

MASTER PLAN AND FEASIBILITY STUDY ON WASTEWATER AND SOLID WASTE
MANAGEMENT FOR THE CITY OF UJUNG PANDANG IN THE REPUBLIC OF INDONESIA

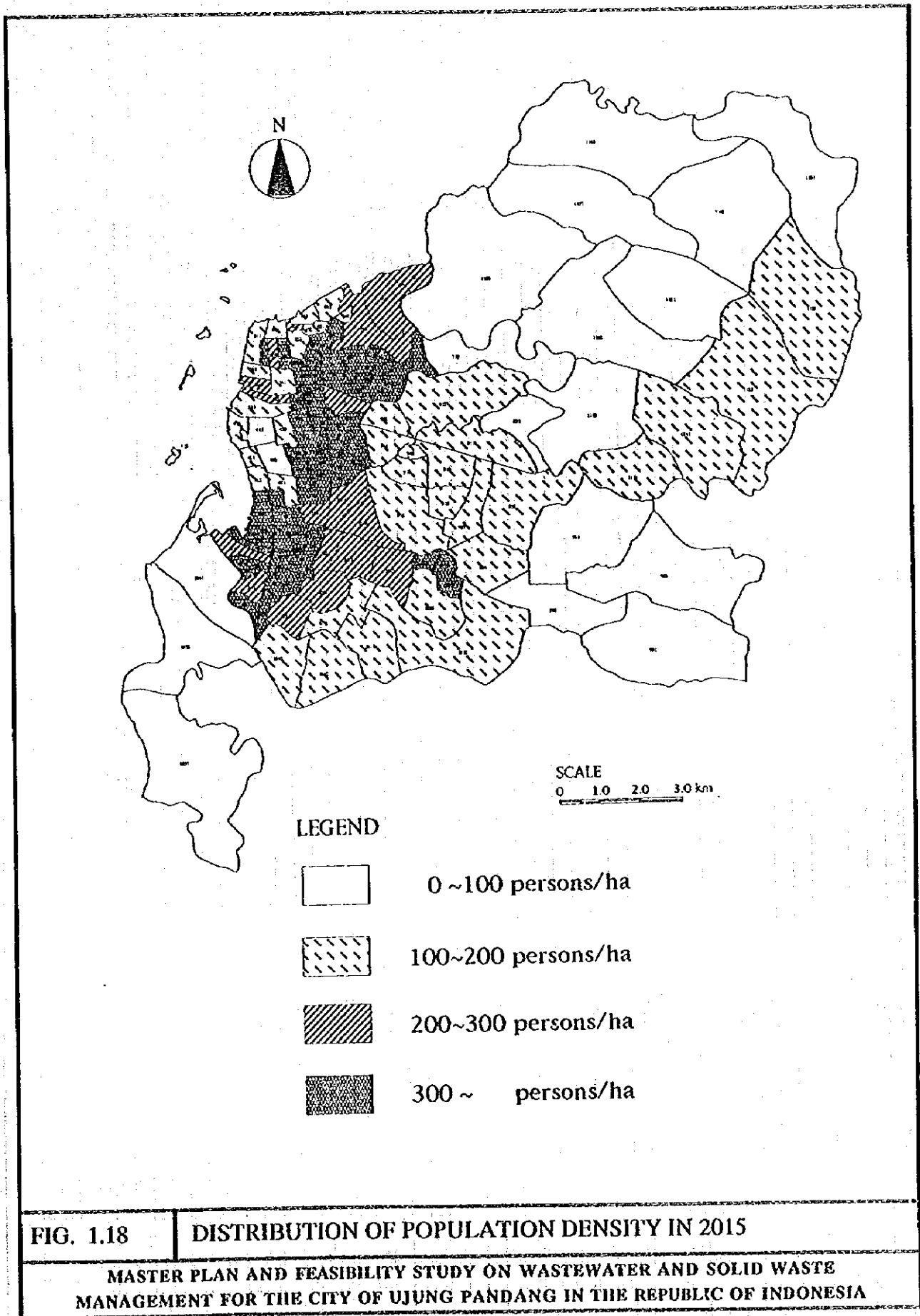
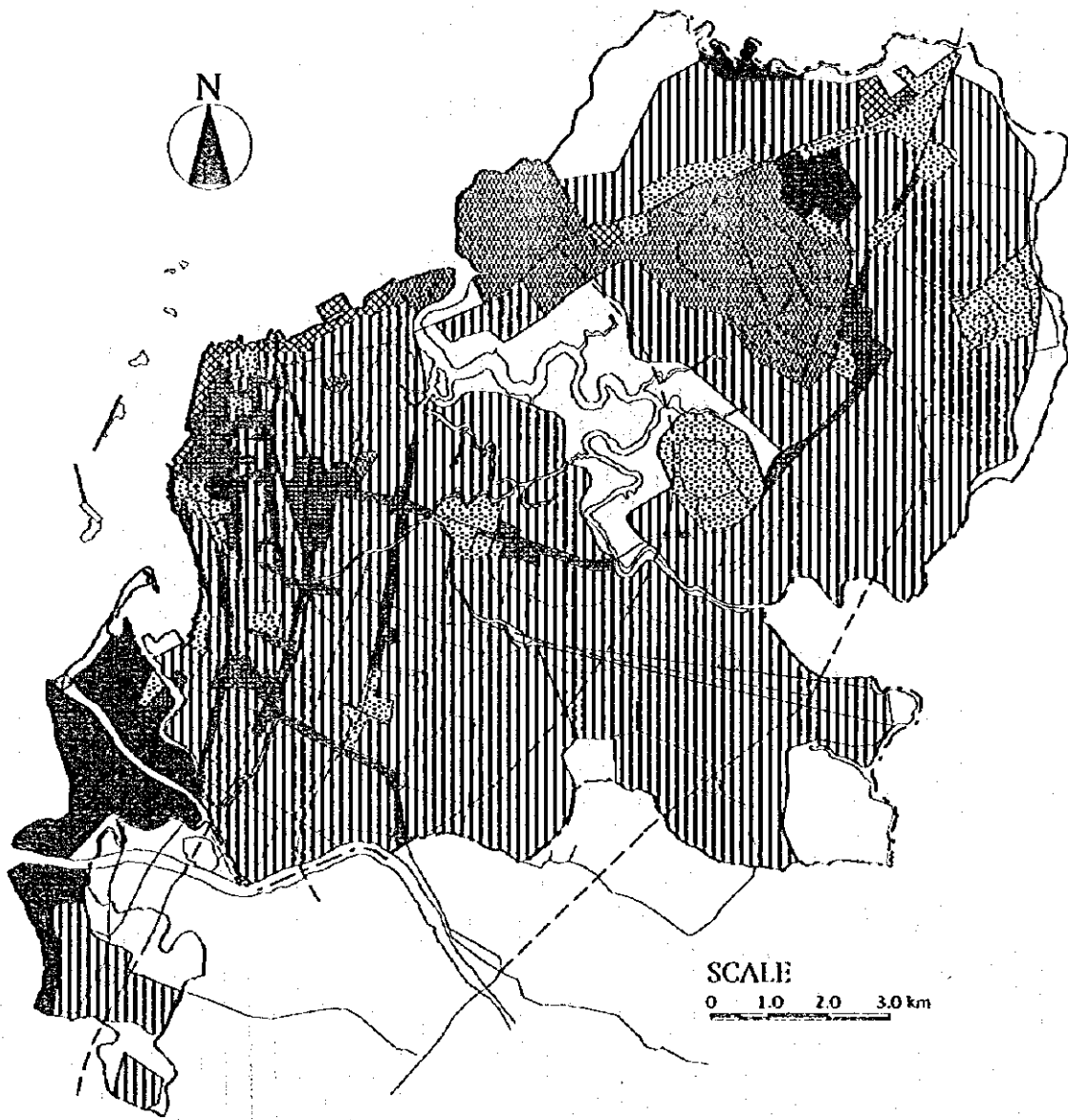


FIG. 1.18

DISTRIBUTION OF POPULATION DENSITY IN 2015

MASTER PLAN AND FEASIBILITY STUDY ON WASTEWATER AND SOLID WASTE MANAGEMENT FOR THE CITY OF UJUNG PANDANG IN THE REPUBLIC OF INDONESIA



LEGEND

- | | |
|------------------------------|--------------------------------|
| Residential Area | Transportation Area |
| Commercial Area | Vacant Area /Recreational Area |
| Institutional / Service Area | Non Urban Area |
| Industrial Area | Community Center |

Source : JICA Study

FIG. 1.19

Future Land Use of KMUP in 2015

MASTER PLAN AND FEASIBILITY STUDY ON WASTEWATER AND SOLID WASTE MANAGEMENT FOR THE CITY OF UJUNG PANDANG IN THE REPUBLIC OF INDONESIA

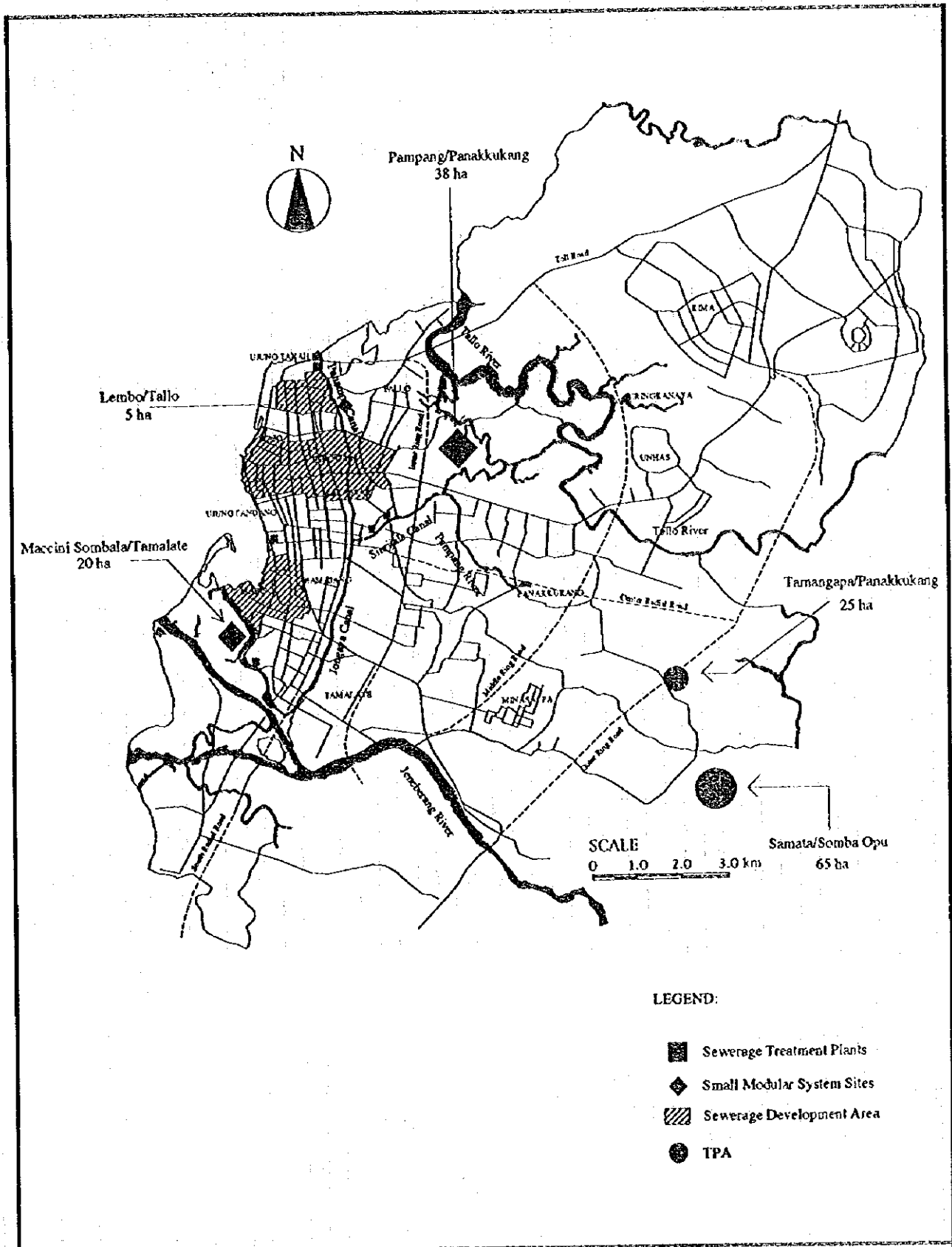


FIG. 1.20

JICA F/S PROJECT SITES

MASTER PLAN AND FEASIBILITY STUDY ON WASTEWATER AND SOLID WASTE MANAGEMENT FOR THE CITY OF UJUNG PANDANG IN THE REPUBLIC OF INDONESIA



A.D.1995

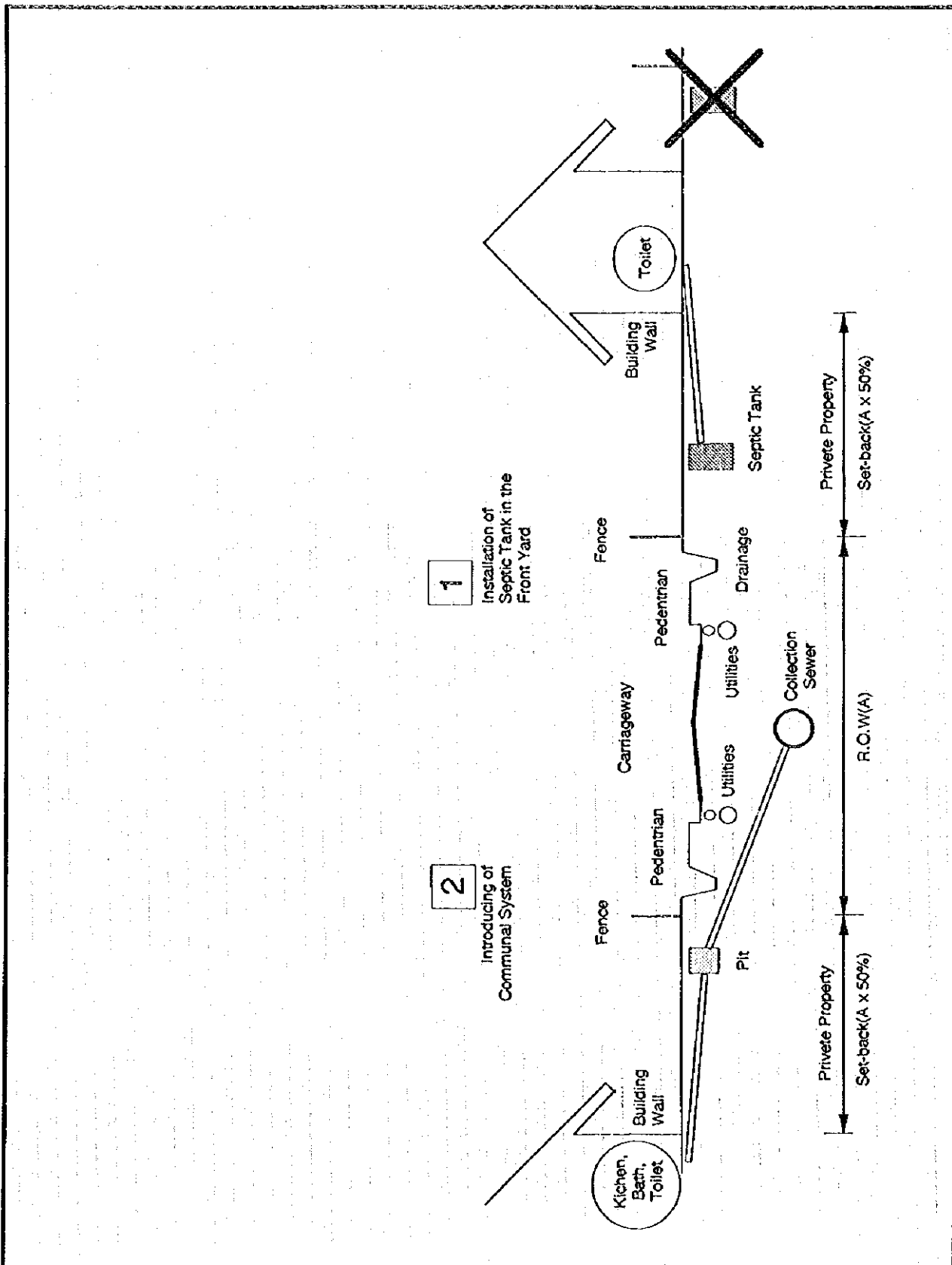


FIG. 1.21

RECOMMENDED LOCATION OF SEPTIC TANK

MASTER PLAN AND FEASIBILITY STUDY ON WASTEWATER AND SOLID WASTE MANAGEMENT FOR THE CITY OF UJUNG PANDANG IN THE REPUBLIC OF INDONESIA