付属資料－１　要請書

資料1.　要請書

No. 4(105)ODA/20
GOVERNMENT OF PAKISTAN
MINISTRY OF FINANCE AND ECONOMIC AFFAIRS
(ECONOMIC AFFAIRS DIVISION)

Deputy Secretary
PH: 9201520

Islamabad, the October 8, 2004

Subject: - JAPAN'S ECONOMIC POLICY, ONGOING PROJECT REVIEW, AND NEW REQUEST SURVEY.

Dear Mr. Matsunaga

Please refer to letter No. JEG/109-2004/R dated June 15, 2004 on the captioned subject.

2. The Embassy of Japan is requested to favourably consider the following projects/proposals for extending grant aid under the Japanese ODA Assistance Programme. A detailed list of the Projects / Proposals and Request Survey Forms received from the executing agencies are enclosed:-

1.	Rehabilitation of Existing Rural Access Roads 1000 KM
2.	Construction of Rural Access Roads 470 KM
3.	Supply of Construction of Steel Bridges 49751 Rft.
4	Repair & Maintenance of Existing Roads in Balochistan Procurement of Machinery
5.	Low cost Water Supply Sanitation and Hygiene Education Program
6	Provision of Civic Amenities in 33 under developed and un-developed tehsil Municipal Administration in Balochistan Province.
7.	Improvement of Drinking Water Supply in Kohat and Karak Districts of NWFP
8.	Deep Drilling of tube wells in Districts Kohat and Kurk.
9.	Water Supply Scheme to Peshawar from Warsak Dam Peshawar

資料1-1

10.	Proposal for an expert, i.e. Senior Water Supply Engineer to Study, survey and investigate gravity water supply scheme Peshawar from Warsak Dam. (for the above scheme reflected at S.No. 462 in ADP 2004-05 costing Rs. 400 million.
11	Rehabilitation / Rebuilding of Crawler Tractors
12.	Land resources Development, for the Up-Lift of Farming Community with the help of Bulldozers through Japanese Grant.
13.	Greater Karachi Water Supply Master Plan Study
14.	Establishment of Environmental Monitoring System in Pakistan
15	Establishment of Hi-Tech Institute at Nust

With regards,

Yours sincerely,

(NAJMA SIDDIQI)

Mr. T. Matsunaga,
Head of Economic & Development Section
Embassy of Japan
Islamabad

資料1-2

APPLICATION FORM FOR JAPAN'S "TECHNICAL COOPERATION", "DEVELOPMENT STUDY" AND "GRANT AID GENERAL AND FISHERIES"

1. Project Title #

Development Study for Karachi Wastewater Master Plan

2. Procedural status in Pakistan Government #

☐ Approved (☑ Concept Clearance Paper ☐ PC-I ☐ PC-II)

☐ Under preparation of CCP

☐ Part of the approved project (☐ Listed in PSDP or ☐ not listed in PSDP).
(Project name:

☑ Part of the 5 / 10 Year Plan

☐ Small and no need CCP / PC-I / PC-II

3. Site location #

Karachi

4. Background of the Project:

(1) Current condition of the sector #

A major investment in sewerage and wastewater treatment facilities is needed to improve the level of environmental conditions and health in areas of the city where insanitary conditions exists, to reduce pollution and improve the general ambience of the city, its rivers and coastal waters.

Currently only 40% of the City's wastewater pollution load is removed by treatment and 50% of the City's population of 12 million are not served by sewerage network. Further, a growth rate of about 5% (by birth and migration), situation will become untenable to extremely severe without positive action.

The most urgent need is to improve the effectiveness of the existing sewerage to contain the sewage to the sewers and to increase the sewage treatment capacity.

資料1-3

APPLICATION FORM FOR JAPAN'S "TECHNICAL COOPERATION", "DEVELOPMENT STUDY" AND "GRANT AID GENERAL AND FISHERIES"

1. Project Title #

Development Study for Karachi Water Supply Master Plan

2. Procedural status in Pakistan Government #

☐ Approved (☑ Concept Clearance Paper ☐ PC-I ☐ PC-II)

☐ Under preparation of CCP

☐ Part of the approved project (☐ Listed in PSDP or ☐ not listed in PSDP)
(Project name:

☑ Part of the 5 / 10 Year Plan

☐ Small and no need CCP / PC-I / PC-II

3. Site location #

Karachi

4. Background of the Project:

(1) Current condition of the sector #

The Karachi Water Supply and Sewerage Board (KWSB) is the organisation responsible for provision of water and sewerage services to the City of Karachi. It has recently been transferred to become part of the Karachi city district organisation, but has been retained as an autonomous unit.

Planning studies for water supply development in Karachi were carried out in 1985 to a planning horizon at year 2000. The 1985 plans provided the rationale and framework for detailed planning, design and implementation of the main water supply projects that have been completed in subsequent years.

Further developments of the water supply system are required including water resources and production capacity increases, treatment and distribution improvements, and expansion of the system.

Urbanisation in the greater Karachi area has placed enormous pressure on water supply services and the need for urgent improvements and development of the systems including equitable distribution of water to 18 towns. Existing water supply systems are illustrated in Figure 1.

In 1982 the total bulk supply of about 340 mgd was thought to be in balance with the needs of the population of 5.5 million, but the population has since nearly doubled to about 10 million according to the 1998 census and when projected to 2004 it is over 12 million.. Reliance on the smaller Hub supply is also problematic in dry years. Current supplies are over 500 mgd, with Hub source providing water to KWSB.

Some of the main issues affecting water supplies are:

- Inadequate bulk water supply and the inevitably very high capital cost of providing additional supplies due to Karachi's physical location.
- A considerable proportion of the bulk water that does currently reach Karachi does not reach customers due to system losses, both physical and non-physical.
- Imperfect water treatment facilities.
- Sewage is undoubtedly leaking into un-pressurised water mains due to leaking mains and due to the lack of a 24-hour supply, causing further water quality problems.
- Bulk water supply and water distribution are not measured effectively because of a lack of working flow meters.
- The distribution network and service connections are generally known to be in poor condition, because there has been little success in improving workmanship and introducing a planned replacement/maintenance/leakage control programme.
- High power consumption and electricity costs for pumping (especially at Dhabeji).
- Partly due to the current inefficient and low tariff structure, KWSB does not collect enough revenue from customers to support its development programme.
- Weaknesses in management of the water supply services have resulted in lack of efficiency improvements. Managers appear to have been unable to sustain corporate or personal commitment to improving the performance of KWSB and services to customers.
- Lack of adequate system maintenance and associated sustainability of assets.
- Poor levels of system data in terms of system mapping, asset condition and key operational data such as measurement of system water flows.

(2) Issues and problem to be solved

Development of Options

- To achieve water balance between existing production capacity and forecast demands
- Identify water resources development options required to meet future demands.
- Prepare proposals for increasing treated water production
- Determine required raw and treated water storage, distribution network development and rehabilitation needs.

- Prepare a capital investment programme including an Immediate Action Plan, covering the first two years of master plan implementation (2005-2006), a First Phase Plan covering the second period (2007-2015), and a Second Phase Plan covering third period (2016-2025).
- Prepare a sustainable management development plan dealing with organisation aspects, network operations streamlining, staffing levels, labour relations, training, public relations and customer care.
- Carry out a financial analysis of KWSB including the future investments, future tariff requirements and affordability.
- Investigate the options for private sector participation in the delivery of services required by the KWSB and in relation to out-sourcing.
- Prepare a funding plan including assumptions of terms and conditions of funding.

(3) Related Government's policy #
(National / Provincial Development Plan & Sector Development Plan)
The physical planning of water and sanitation sector of the five year plan aims to enhance the coverage of population for availability of water and sewerage services.

(4) Other relevant projects or activities for solving said issues and problem #

a) K-III Project:
Currently under execution. Aims to enhance potable water supply by adding additional 100 mgd for the city of Karachi.

b) Water Loss reduction and system strengthening.
To reduce water losses by plugging leakages, rehabilitation of mains, installation of meters and valves etc.

c) K-IV
To cope with the growing water demand arising from rapid population growth. The project to bring additional water fro the city of Karachi.

d) Desalination
In pipe-line

e) Ground water Resources
Study in progress.

f) Tameer-e-Karachi.
Includes 4 billion Rupees for rehabilitation and to overcome the shortcomings of the existing water supply system.

5. Outline of the Project:

(1) Overall Goal / Long term objective

- Water supply asset condition.

- Maintenance provisions and sustainability of assets
- Water supply service coverage and levels of service.
- Resource Development.
- Customer perception and satisfaction with present service.
- Institutional and regulatory aspects.
- Financial performance.
- Develop or formalise general design criteria, including per capita water use (based on type of service provided), percentage passed to wastewater flows, infiltration rates to sewers, discharge standards etc.
- Prepare updated demographic and water demand forecasts.
- Determine future UFW targets and control programmes to meet these targets.
- Develop forecast of population to be served preferably District / Town wise development.
- Review system maintenance requirements to ensure future sustainability in terms of system durability and to obtain full benefits from the system.
- Carry out initial financial analysis of KWSB to determine affordability limits on capital investment programmes
- Develop technical targets and customer service standards
- Prepare water balance between existing production capacity and forecast demands
- Identify water resources development options required to meet future demands.
- Prepare proposals for increasing treated water production
- Determine required raw and treated water storage, distribution network development and rehabilitation needs.
- Prepare a capital investment programme including an Immediate Action Plan, covering the first two years of master plan implementation (2005-2006), a First Phase Plan covering the second period (2007-2015), and a Second Phase Plan covering third period (2016-2025).
- Prepare a sustainable management development plan dealing with organisation aspects, network operations streamlining, staffing levels, labour relations, training, public relations and customer care.
- Carry out a financial analysis of KWSB including the future investments, future tariff requirements and affordability.
- Investigate the options for private sector participation in the delivery of services required by the KWSB and in relation to out-sourcing.
- Prepare a funding plan including assumptions of terms and conditions of funding.

(2) Project Purpose / Short term objective

The objective of this assignment is to develop a master plan for the development of water supply services that meets the needs of the city and is economically, environmentally and socially sustainable. The master plan will serve as a basis for developing the short-term improvement programme for the water supply system, and

also for obtaining international funding for the improvements. It must therefore be consistent with the requirements of IFIs such as the World Bank, the ADB and JBIC.

The future development planning needs to address all aspects of the provision of water supply services, including technical, institutional, managerial and social aspects.

One of the prime objectives will be to maximise the use of existing assets and to generate continuous measurable improvements in the efficiency of delivery of water services. This requires the creation of a set of ***performance indicators***, which will include reasonable and achievable ***technical targets*** and ***customer service standards***. An agreement on technical targets and customer service standards will be required between KWSB and the town administration (and may also be required with potential donors). The technical targets will be set for each year up to 2025 with gradually increasing values to reflect the level of investment and the efficiency improvements that are demanded of the Karachi Water and Sewerage Board.

The Master Plan will assess priority needs, estimate implementation costs and propose an implementation programme for physical works development to meet the performance indicators. This programme should be consistent with the availability of funds for investment, and the ability of the city to pay for such improvements and maintain the new and existing assets through an affordable tariff structure.

(3) Output #

- The Master Plan Report shall incorporate all the study investigations, findings and recommendations. It will focus on the immediate works required in the short term, but will also contain outline plans for the future development of KWSB to 2025. Terms of reference for further more detailed studies, including GIS mapping of the water systems, are to be incorporated in the Report.
- The Master Plan shall address all relevant aspects of the development of water resources and potable water needs for the city of Karachi, including but not limited to all the issues raised in the Terms of Reference document.

(4) Project Activities #
The project activities include
Survey
Data collection
Review of previous Master Plan studies
Generation alternatives
Selection of appropriate technologies and options
Formulation of Master plan.

(5) Beneficiaries #
Population for which positive changes are intended directly and indirectly by implementing the project.

Target population for whom positive changes are envisaged are over 12 million population.

(6) Related Activities (Other donors and NGOs #

None

(7) Input from the Pakistan side #

To be decided by the Government of Pakistan as per policy for such grants.

Counterpart personnel and support staff attached to the project

- Number
- Position

Consultant & KW&SB engineers would assist the development study.

Available office space, vehicles, equipment and etc.

Available

Running expenses (allocation in PSDP or ADP)

Nil

** Available data, information, documents, maps etc.

Master Plan of 1985 and other relevant record/data is available.

* Cost of equipment purchase or facility construction (cost. Breakdown)

Nil

(8) Input from the Japanese side (= request) #

Study cost to be met from Japan as grant-in-aid.

Experts (Number, Field and qualification)

In case that the input is only expert(s), please attached the A1 form.

Not applicable

Training, seminars and workshops (Expected participants and numbers)

1) In country

To be identified during study phase

2) In Japan or third countries

In case that the input in only individual training in Japan, please attach the A2-3 form.

To be identified during study phase

Outline of equipment

In case that the assistance is only equipment (the scale does not amount to a Grant Aid Project), please attach the A4 form.

Not applicable

1) Site address to be installed (* This information is necessary)

Karachi Water & Sewerage Board

2) Function (* This information is necessary)

N/A

3) Name of main equipment (* This information is necessary)

N/A

4) Cost of purchase (Cost breakdown) (* This information is necessary)

N/A

5) Specifications, the quantity, and unit price (if available)

N/A

6) Invoice (if available)
Please attach to this format.

N /A

7) How to operate and maintain the facility, including the staff and technical level of the responsible organization. (* This information is necessary)

N/A

Facilities

1) Site address (* This information is necessary)

Karachi Water & Sewerage Board, Block-D 9th Mile Karsaz, Shahra-e-Faisal, Karachi

2) Rationale for the selected site (* This information is necessary)
Please specify the priority of the candidate sites.

Entire Karachi

3) The number and the size of the facility (* This information is necessary)

About 2600 sq.km

4) Cost of construction (Cost breakdown) (* This information is necessary)

N/A

5) Layout plan (if available)

ATTACHED

6) Specifications of construction materials (if available)

N/A

7) How to operate and maintain the facility, including the staff and technical level of the responsible organization(* This information is necessary)

N/A

* Request amount of the project (check box)

☑ Less than US $ 5,000,000

☐ Between US $ 5,000,000 and US $ 10,000,000

☐ More than US $ 10,000,000

(9) Other

None

* The project's priority in the National Development Plan:

Priority assigned to water sector

* Expected funding source and / or assistance (including external organization) for the Project

JICA - JAPAN

6. Implementation Schedule

18 Months

7. Implementing Agency

Karachi Water & Sewerage Board

Annual budget

N/A

Staffing (on a category basis)

Identified as in Annexure-I

8. Security Conditions

Satisfactory

9. Gender Consideration

N/A

10. Environment and Social Considerations

The development study will identify the sustainable development action plan that will improve the public health and socio economic conditions of the city population

11. Undertakings for the Study

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13. Others

None

(4) Other relevant projects or activities for solving said issues and problem #
Works worth around 9 billion Rupees are identified for considering/ execution underTameee-e-Karachi Karachi Package which is to funded locally.

5. Outline of the Project:

(1) Overall Goal / Long term objective

Formulation of Master Plan

All relevant existing information and baseline planning data will be studied and reviewed. Such information and data include, at least, the following:

i) Statistics and reports based on the population census-1991, regarding population distribution and projected growths, income distribution, present and proposed land use, organisational and financial arrangements of authorities and agencies responsible for sewerage and wastewater disposal in the study area.

ii) Previously prepared master plan and available data / records / maps / plans for the sewerage systems of Karachi together with any available city base maps and aerial photography.

iii) Development plans for ongoing and future land and infrastructure (residential, institutional, commercial, and industrial).

iv) The quantity, quality and nature and of wastewater generation from all sources, within the study area.

v) Hydrological data, water course profiles, soil characteristics, development densities and topography of the various catchment areas of the city (to be identified)

(2) Project Purpose / Short term objective #

- The Sewerage Master Plan study is necessary to update the existing Master Plan, which was prepared under World Bank funding in 1988, due to rapid expansion of population in last 16 years.

- The study will establish a development programme for municipal and industrial wastewater management in Greater Karachi covering the period upto the year 2025 to permit preparation of a technically sound, financially and economically sustainable long-term investment strategy.

- The consultants will consolidate findings of previous studies, work implemented under the ADB funded Karachi Sanitation Programme, and the proposals for new works under the Tameer-e-Karachi Programme, and supplement these findings with surveys, investigations and planning proposals, and prepare

The treatment system costs are very sensitive to land values, and high land values favour the use of types of intensive treatment systems. If Karachi is to obtain sewage treatment system at least cost, suitable land in Government ownership should be transferred to KW&SB at reasonable cost. Further, KW&SB is already in possession of government land at Korangi for Sewage treatment Plant which was given at a very nomial cost for the treatment purpose.

The complete programme should offer a low cost, practical and technically acceptable solution to the sanitary problems of the city to the upto the year 2025. It should provide for piped sewerage for every property by 2025 with treatment of all wastewaters to the standard proposed by Federal Government (or better where necessary), and wherever possible, employ low energy systems and simple technologies. The benefits from reuse of treated sewage and its potential to relieve the shortage of potable water should be considered.

(2) Issues and problem to be solved #

The sewerage Master Plan study is necessary to update the existing Master Plan, which was prepared under World Bank funding in 1988, due to rapid expansion of population during the last 16 years.

The study will establish a development programme for municipal and industrial wastewater management in Greater Karachi covering the period upto the year 2025 to allow preparation of a technically sound, financially and economically viable and sustainable long-term investment strategy.

The consultants will consolidate findings of previous studies, work implemented under the ADB funded Karachi Sanitation Programme, and the proposals for new works under the Tameer-e-Karachi Programme, and supplement these findings with surveys, investigations, planning proposals, prepare development strategies and a phased investment plan identifying both long-term and medium term programmes.

The study will include preparation of base mapping suitable for GIS. This will include incorporation of existing KW&SB sewerage and treatment plant assets and will form the basis with which future investment proposals will be identified.

The proposed investment projects will ensure improved health and social conditions to promote economic development.

(3) Related Government's policy #
(National / Provincial Development Plan & Sector Development Plan)

The physical planning of water and sanitation sector of the five year plan aims to enhance the coverage of population for availability of water and sewerage services.

recommended development strategies and a phased investment plan identifying both long-term and medium term programmes.

- The study will include preparation of base mapping suitable for GIS. This will include incorporation of existing KW&SB sewerage and treatment plant assets and will form the basis with which future investment proposals are identified.

- The proposed investment projects will ensure improved health and social conditions and promote economic development.

(3) Output #

- The Master Plan Report shall incorporate all the study investigations, findings and recommendations. It will focus on the immediate works required in the short term, but will also contain outline plans for the future development of KWSB to 2025. Terms of reference for further more detailed studies, including GIS mapping of the wastewater systems, are to be incorporated in the Report.

The Master Plan shall address all relevant aspects of the development of wastewater collection and treatment services for the city of Karachi, including but not limited to all the issues raised in the Terms of Reference document.

(4) Project Activities #

The project activities include:
Survey
Data collection
Review of previuous Master Plan studies
Generation alternatives
Selection of appropriate technologies and options
Formulation of Master plan.

(5) Beneficiaries #
Population for which positive changes are intended directly and indirectly by implementing the project.

Target population for whom positive changes are envisaged are over 12 million population.

(6) Related Activities (Other donors and NGOs #

None

(7) Input from the Pakistan side #

To be decided by the Government of Pakistan as per policy for such grants.

資料1-15

Counterpart personnel and support staff attached to the project

- Number
- Position

Consultant & KW&SB engineers would assist the development study.

Available office space, vehicles, equipment and etc.

Available

Running expenses (allocation in PSDP or ADP)

NIL

** Available data, information, documents, maps etc.

Master Plan of 1988 and other relevant record / data is available

* Cost of equipment purchase or facility construction (cost. Breakdown)

NIL

(8) Input from the Japanese side (= request) #

Study cost to be met from Japan as grant-in-aid.

Experts (Number, Field and qualification)

In case that the input is only expert(s), please attached the A1 form.

Not applicable

Training, seminars and workshops (Expected participants and numbers)

1) In country

To be identified during study phase

2) In Japan or third countries

In case that the input in only individual training in Japan, please attach the A2-3 form.

To be identified during study phase

Outline of equipment

In case that the assistance is only equipment (the scale does not amount to a Grant Aid Project), please attach the A4 form.

Not applicable

1) Site address to be installed (* This information is necessary)

Karachi Water & Sewerage Board

資料1-16

2) Function (* This information is necessary)

N/A

3) Name of main equipment (* This information is necessary)

N/A

4) Cost of purchase (Cost breakdown) (* This information is necessary)

N/A

5) Specifications, the quantity, and unit price (if available)

N/A

6) Invoice (if available)
Please attach to this format.

N /A

7) How to operate and maintain the facility, including the staff and technical level of the responsible organization. (* This information is necessary)

N/A

Facilities

1) Site address (* This information is necessary)

Karachi Water & Sewerage Board, Block-D 9th Mile Karsaz, Shahra-e-Faisal, Karachi

2) Rationale for the selected site (* This information is necessary)
Please specify the priority of the candidate sites.

Entire Karachi

3) The number and the size of the facility (* This information is necessary)

About 2600 Sq. Kms

4) Cost of construction (Cost breakdown) (* This information is necessary)

N/A

5) Layout plan (if available)

Attached

6) Specifications of construction materials (if available)

N/A

7) How to operate and maintain the facility, including the staff and technical level of the responsible organization(* This information is necessary)

N/A

* Request amount of the project (check box)

☑ Less than US $ 5,000,000

☐ Between US $ 5,000,000 and US $ 10,000,000

☐ More than US $ 10,000,000

(9) Other

None

* The project's priority in the National Development Plan:

Priority assigned to Sanitation Sector

* Expected funding source and / or assistance (including external organization) for the Project

JICA - JAPAN

6. Implementation Schedule

18 Months

7. Implementing Agency

Karachi Water & Sewerage Board

Annual budget

N/A

資料1-18

Staffing (on a category basis)

Identified as in Annexure-I

8. Security Conditions

Satisfactory

9. Gender Consideration

N/A

10. Environment and Social Considerations

The development study will identify the sustainable development action plan that will improve the public health and socio economic conditions of the city population

11. Undertakings for the Study

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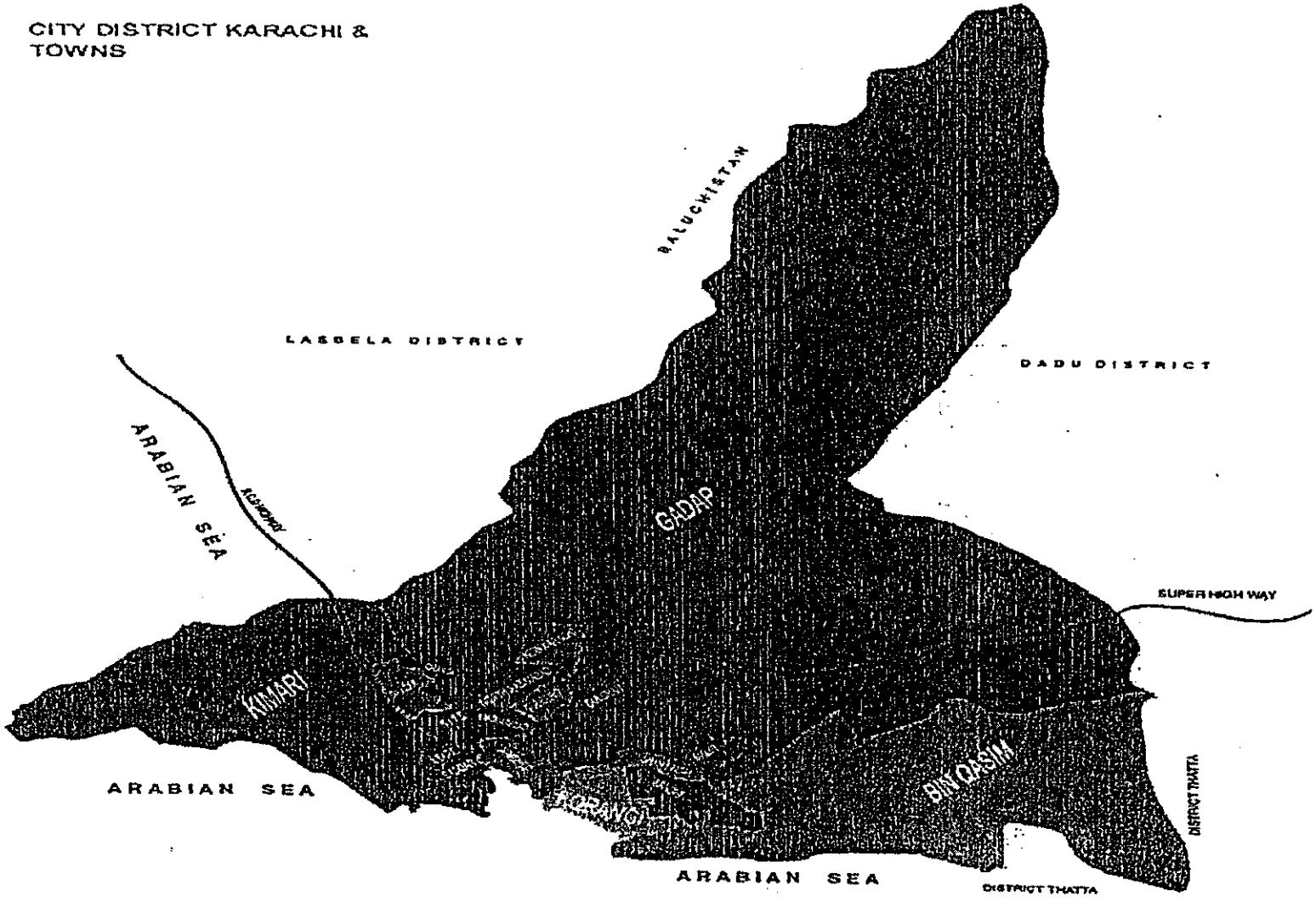
13. Others

None

MAP OF KARACHI DISTRICT SHOWING 18 TOWNS



SEWERAGE SERVICE

COMPASS OF RESPONSIBILITY

- AREA OF KARACHI DISTRICT — 2600 SQ. KM
- POPULATION — 12 MILLION
- WATER SOURCE — 150 KM (INDUS BASIN)

ASSETS MANAGEMENT

WATER		
-	BULK MAINS	264 KM
-	DISTRIBUTION MAINS	5376 KM
		5640 KM
PUMPING STATIONS		
-	BULK	15 NOS.
-	WATER DISTRIBUTION	150 NOS.
-	WATER SUPPLY FILTER PLANTS	08 NOS.
SEWER		
-	TRUNK & SUB TRUNK SEWER	1120 KM
-	LATERALS	4550 KM
		5670 KM
-	PUMPING STATIONS	38 NOS.
-	SEWERAGE TREATMENT PLANTS	03 NOS.

INTEGRATED SEWERAGE NETWORK OF KARACHI CITY
TREATMENT PLANT - 1
TREATMENT PLANT - 2
TREATMENT PLANT - 3
TREATMENT PLANT - 4
(PROPOSED)
PUMPING STATION
RISING MAIN

資料1-23

SEWERAGE SYSTEM

• SEWERAGE GENERATED IN CITY (70% OF WATER SUPPLIED)	315 MGD
• SEWAGE UNTREATED	225 MGD
• OPTIMUM DESIGN CAPACITY OF SEWERAGE TREATMENT PLANTS	151 MGD
• QUANTITY OF SEWAGE TREATED	90 MGD
• SHORTFALL IN SEWAGE TREATMENT CAPACITY	164 MGD

資料1-24

SEWAGE TREATMENT PLANT

Sewage Treatment Plant	Optimum Design Capacity (mgd)	Actual treatment (mgd)
Sewage Treatment Plant-I SITE	51.00 mgd	20 mgd
Sewage Treatment Plant-II Mehmoodabad	46.50 mgd	30 mgd
Sewage Treatment-III Mauripur	54.00 mgd	40 mgd
TOTAL	**151.50 mgd**	**90 mgd**

SEWAGE TREATMENT REQUIREMENT
(70% OF WATER DEMAND)

Year		Sewage Generation
2002	:	315 mgd
2005	:	476 mgd
2010	:	551 mgd
2015	:	640 mgd
2020	:	756 mgd
2025	:	870 mgd

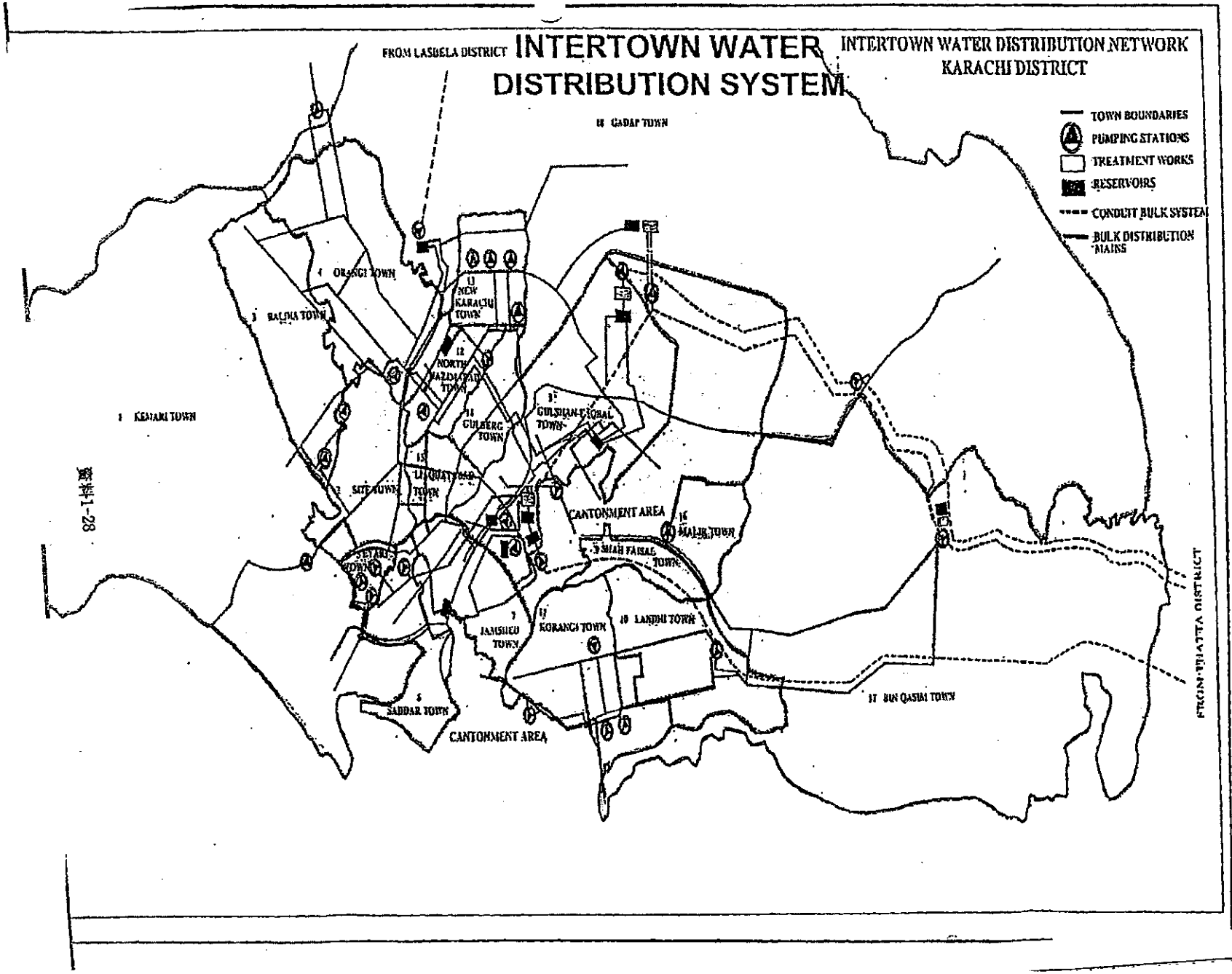
GAP BETWEEN DEMAND AND SUPPLY OF WATER

Population Projection and Water Demand upto 2025

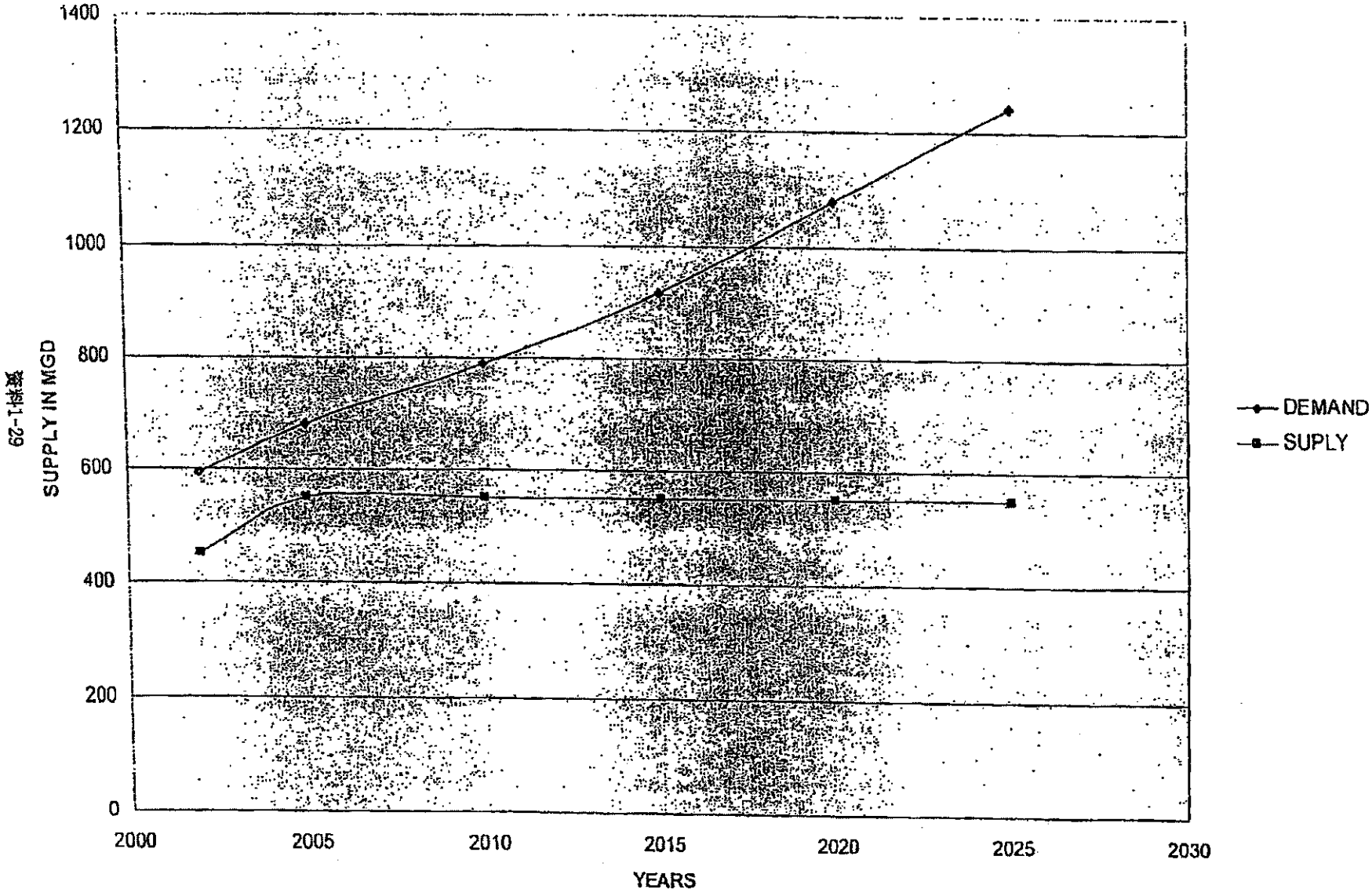
Year	Population million	Total Demand mgd	1/Supply mgd	Shortfall mgd
2000	11	594	463	130
2005	12.59	680	650	30
2010	14.6	768	650	138
2015	17	918	650	268
2020	20	1080	650	430
2025	23	1242	650	592

[By 2005 allocation of 1200 cusecs would be fully consumed and another 1200 cusecs required to meet demand by 2025]

1/ Assuring no addition after K-III project.


INTERTOWN WATER DISTRIBUTION SYSTEM
INTERTOWN WATER DISTRIBUTION NETWORK
KARACHI DISTRICT
FROM LASBELA DISTRICT
TOWN BOUNDARIES
PUMPING STATIONS
TREATMENT WORKS
RESERVOIRS
CONDUIT BULK SYSTEM
BULK DISTRIBUTION MAINS
GADAP TOWN
ORANGI TOWN
BALDIA TOWN
KEAMARI TOWN
SITE TOWN
NEW KARACHI TOWN
NORTH NAZIMABAD TOWN
GULBERG TOWN
GULSHAN-E-IQBAL TOWN
LIAQUATABAD TOWN
CANTONMENT AREA
MALIR TOWN
SHAH FAISAL TOWN
KORANGI TOWN
LANDHI TOWN
JAMSHED TOWN
SADDAR TOWN
CANTONMENT AREA
BIN QASIM TOWN
FROM THATTA DISTRICT

DEMAND AND SUPPLY CURVE



資料1-25

PRESENT WATER SUPPLY POSITION

INDUS SOURCE

- GREATER KARACHI WATER SUPPLY SYSTEM
- GHARO
- 40 MGD ADDL. WATER SUPPLY
- K-II 100 MGD SCHEME

} 450 MGD

HUB SOURCE

- HUB — 90 MGD
- DUMLOTTEE — 2 MGD

TOTAL : 542 MGD

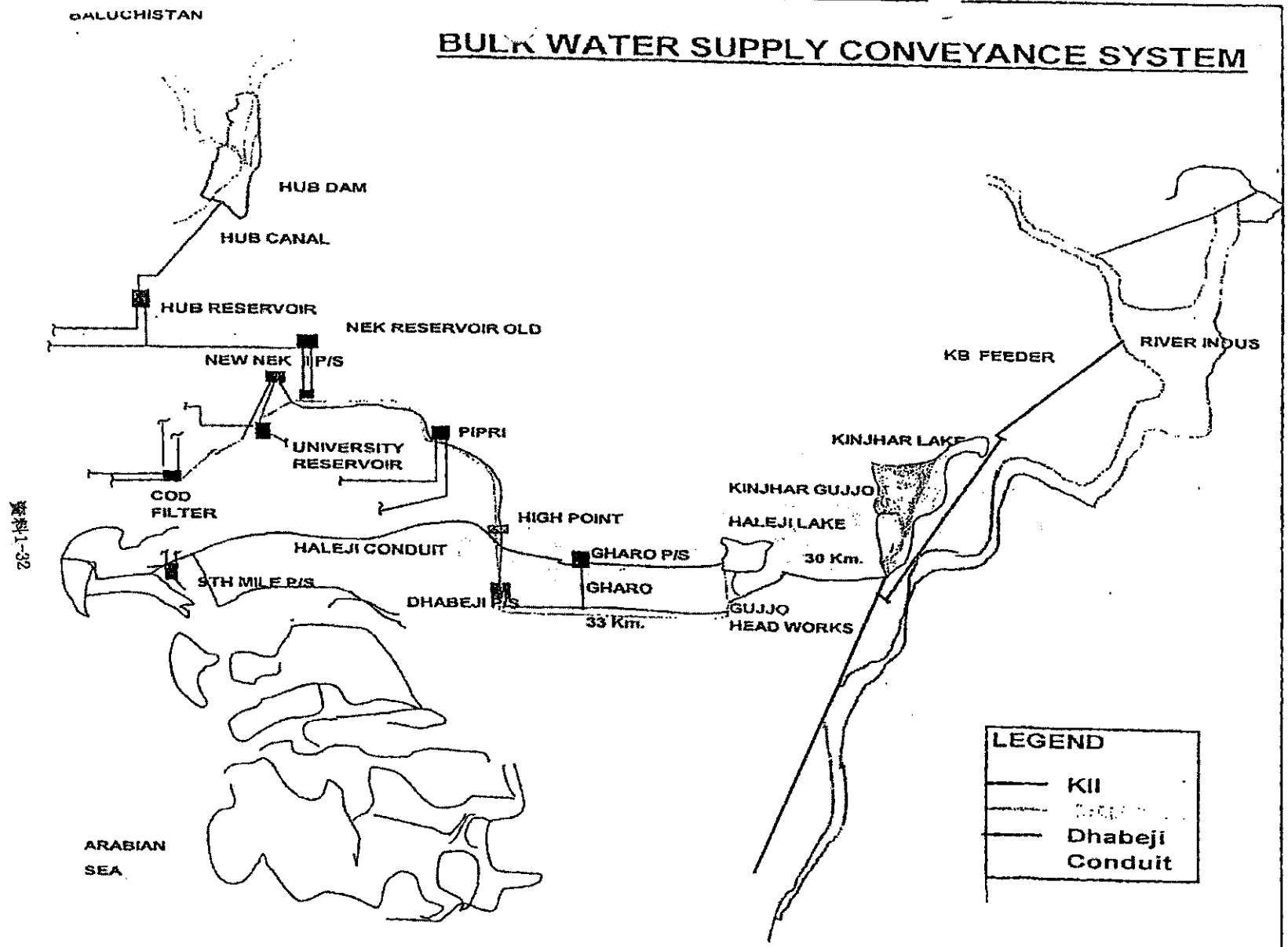
NET SUPPLY TO THE CITY 383 MGD AFTER ACCOUNTING FOR 30% LOSSES

- PORT QASIM AUTHORITY & STEEL MILLS — 25 MGD

Note : Supply from Hub source has been reduced upto 60 mgd w.e.f. 01-1-2004 for the lining of one rising mains lines and lining work will be competed with in a period of 08 weeks.

WATER RESOURCE ALLOCATION TO KARACHI
ALLOCATION FROM INDUS SOURCE 1200 CUSECS
ALLOCATION OF WATER FROM HUB SOURCE IS 100 MGD

資料1-31


BALUCHISTAN
BULK WATER SUPPLY CONVEYANCE SYSTEM
HUB DAM
HUB CANAL
HUB RESERVOIR
NEK RESERVOIR OLD
NEW NEK P/S
PIPRI
UNIVERSITY RESERVOIR
COD FILTER
HIGH POINT
HALEJI CONDUIT
GHARO P/S
9TH MILE P/S
DHABEJI P/S
GHARO
33 Km.
GUJJO HEAD WORKS
30 Km.
HALEJI LAKE
KINJHAR GUJJO
KINJHAR LAKE
KB FEEDER
RIVER INDUS
ARABIAN SEA
LEGEND
KII
Dhabeji Conduit

WATER SUPPLY

Water for all

資料1-33

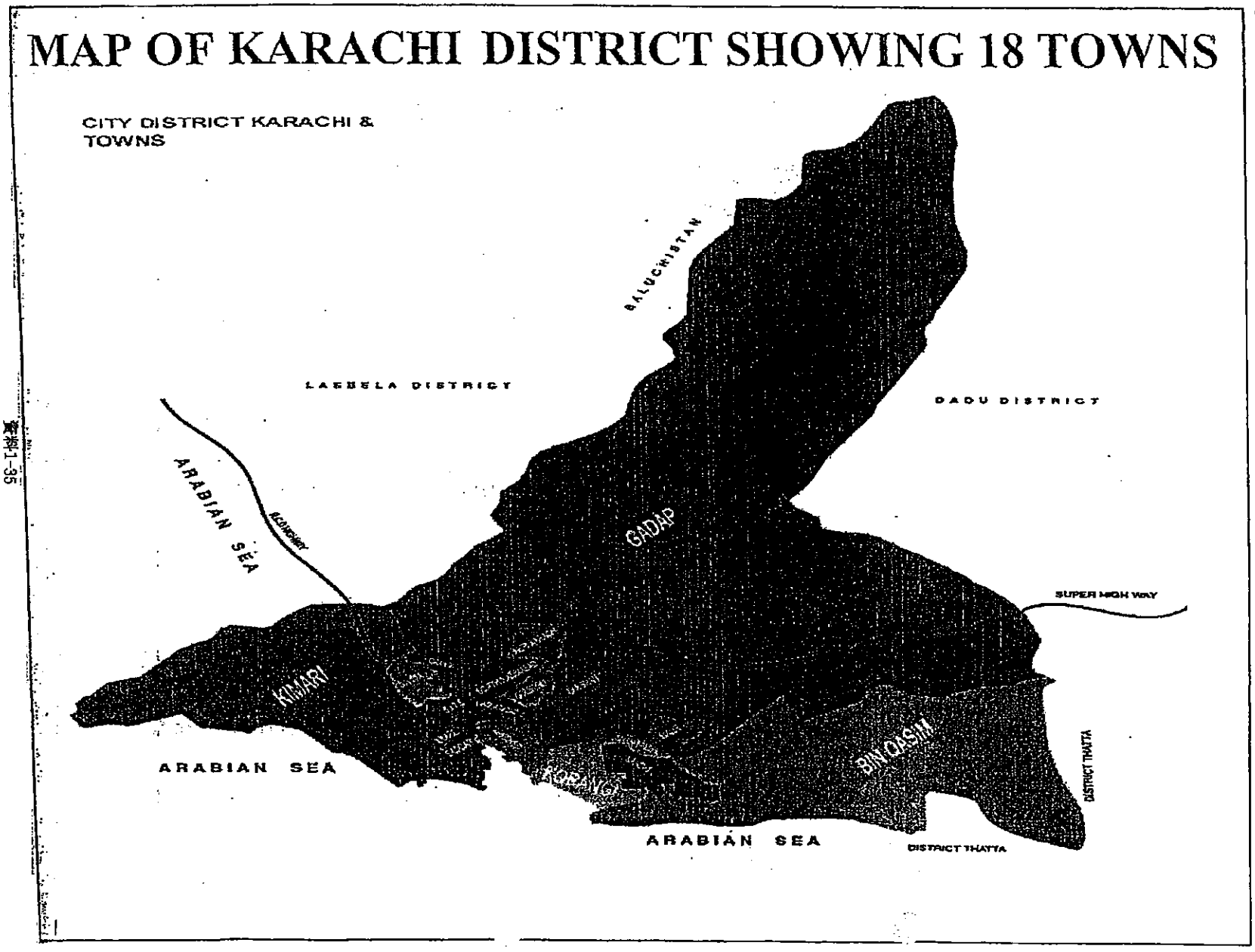
COMPASS OF RESPONSIBILITY

• AREA OF KARACHI DISTRICT	2600 SQ. KM
• POPULATION	12 MILLION
• WATER SOURCE	150 KM (INDUS BASIN)

ASSETS MANAGEMENT

WATER	
- BULK MAINS	264 KM
- DISTRIBUTION MAINS	5376 KM
	5640 KM
PUMPING STATIONS	
- BULK	15 NOS.
- WATER DISTRIBUTION	150 NOS.
- WATER SUPPLY FILTER PLANTS	08 NOS.
SEWER	
- TRUNK & SUB TRUNK SEWER	1120 KM
- LATERALS	4550 KM
	5670 KM
- PUMPING STATIONS	38 NOS.
- SEWERAGE TREATMENT PLANTS	03 NOS.

MAP OF KARACHI DISTRICT SHOWING 18 TOWNS



資料1-35

Karachi Water & Sewerage Board

MANAGING DIRECTOR

No.MD/KW&SB/04/163
Dated: 20-07-2004

The Additional Chief Secretary,
Local Government,
Government of Sindh,
Karachi

SUB: **DEVELOPMENT STUDY FOR KARACHI WATER SUPPLY AND WASTE WATER MASTER PLAN, KARACHI**

A) **Greater Karachi Water Supply Master Plan Study.**
B) **Greater Karachi Sewerage Master Plan Study.**

With reference to PDWP Meeting held on 17-07-2004 in P&D Department, Govt. of Sindh, please find enclosed herewith modified Concept Clearance, as per format of Planning Commission, Govt. of Pakistan, Islamabad for forwarding the same to Planning & Development Department, GOS for onward transmission to the Planning & Development Division, Govt. of Pakistan for consideration by CDWP.

(BRIG. IFTIKHAR HAIDER)
Managing Director KW&SB /
EDO (Water & San.) CDGK

Encl: Concept Clearance (2 Nos)

Copy forwarded to:
- Additional Chief Secretary (Dev.), P&D Department, GOS.
  (Attention AC (Dev.) alongwith 30 copies of Concept Clearance (each) with the request to forward the same to P&D, GOP, Islamabad).

Copy for information to: (alongwith Concept Clearance)
1. City Nazim, CDGK / Chairman, KW&SB.
2. District Coordination Officer, CDGK.
3. Chief (Foreign Aid), P&D Deptt. GOS.
4. Chief (PP&H), P&D Deptt. GOS.
5. Dr.Naila Azhar, JBIC Islamabad.

BLOCK-D, 9Th MILE, KARSAZ, SHAHRA-E-FAISAL, KARACHI-75350, PAKISTAN
TEL : (92-21) 9231882 & 9231883, PBX No. 9231885-6, FAX: (92-21) 9231814.

PAKISTAN PLANNING COMMISSION

PROJECT CONCEPT CLEARANCE PROPOSAL FOR FOREIGN ASSISTANCE

PART-I (To be filled in by the Sponsoring Agency)

Sector:		**Physical Planning and Housing**
Sub-Sector:		**Aid to Local Bodies**
Name of the Project:		**Greater Karachi Water Supply Master Plan Study**
1.	Sponsoring Agency:	**Local Government Department, GOS**
2.	Executing Agency:	**Karachi Water & Sewerage Board**
3.	Location:	**Karachi**
4.	Brief Description and Scope:	**Attached as Annexure-I**
5.	Period of Implementation:	**18 Months**
6.	Planned Commencement Date:	**August 2004 (Start Study)**
7.	Cost (in Million US$)	**2.73** (Eqv. Pak Rs.159.7 million - Exchange Rate= Rs.58.5/- USD
8.	Financing Plan:	
	a) Government Contribution:	**NIL**
	b) Through budgetary resources:	
	i) Federal PSDP:	**NIL**
	ii) Provincial PSDP:	**NIL**
	iii) SDP	**NIL**
	c) Foreign Contribution:	
	i) Amount of Technical Assistance (Grant)	**2.73 Million US$** (Eqv. Pak Rs.159.7 million - Exchange Rate= Rs.58.5/- USD
	ii) Amount of Capital Assistance (Grant):	-
	iii) (Specify whether grant or Loan):	Grant
	iv) Total (a+b)	**2.73 Million US$**

資料1-37

	v) % of Total Cost:	-
	d) Name of Possible donor agency / country. (Indicate whether any contract already established):	JICA - JAPAN
9.	Requirements:	
	a) Equipment (Indicate major items and estimated value:	-
	b) Material (Specify Items alongwith value):	-
	c) Training (Indicate: (i) Field, Duration, (iii) Local / Foreign).	-
	d) Foreign / Local experts (in man-months alongwith proposed remunerations).	a) Out of Pocket Expenses (Contingencies) 0.45 b) Staff Cost 2.285 i) Foreign Component (Man Month = 55) 0.5 ii) Local Component (Man Month = 1324) 1.785 **c. Total Cost (a+b)** **2.73** (Eqv. Pak Rs.159.7 million - Exchange Rate= Rs.58.5/- USD **Attached as Annexure-II**
	(figures in Million US$)	
	e) Books & Journals	-
10.	Whether included in the current Ten Year Plan?	
	a) If Yes, (i) Priority	**Yes included as Water and Sewerage Sector Development**
	(ii) Allocation made:	-
	b) If no, please justify its need / Urgency.	
11.	Whether Feasibility Study carried out / Proposed to be carried:	**Proposed to be carried out by Japanese Grant.**
12.	Status of PC-I / PC-II	**After clearance of concept clearance, PC-II will be prepared followed by PC-I, as per findings of the study.**
13.	Recommendation:	**Greater Karachi Water Supply Master Plan Study concept may please be approved to approach Japanese Embassy for JICA Grant Assistance.**

Greater Karachi Water Supply Master Plan Study

Prepared by:

(SYED HASAN EJAZ KAZMI)
EXECUTIVE ENGINEER (E&M)
K-III PROJECT, PW-KW&SB

Checked by:

(AMJAD HABIB)
PROJECT MANAGER (E&M)
PROJECTS WING - KW&SB

(MASHKOOR-UL-HASNAIN)
CHIEF ENGINEER (PROJECTS)
PROJECTS WING - KW&SB

(SHAHID SALEEM)
Dy. Managing Director(Planning)
KW&SB

APPROVED AND CLEARED FOR ONWARD TRANSMISSION TO THE GOVERNMENT OF SINDH FOR APPROVAL

(Brig.IFTIKHAR HAIDER)
Managing Director, KW&SB

資料1-39

Islamic Republic of Pakistan Greater Karachi Water Supply Master Plan

1 Introduction

The Karachi Water Supply and Sewerage Board (KWSB) is the organisation responsible for provision of water and sewerage services to the City of Karachi. It has recently been transferred to become part of the Karachi city district organisation, but has been retained as an autonomous unit.

Planning studies for water supply development in Karachi were carried out in 1985 to a planning horizon at year 2000. The 1985 plans provided the rationale and framework for detailed planning, design and implementation of the main water supply projects that have been completed in subsequent years.

Further developments of the water supply system are required including water resources and production capacity increases, treatment and distribution improvements, and expansion of the system.

2 Master Plan Objectives

The objective of this assignment is to develop a master plan for the development of water supply services that meets the needs of the city and is economically, environmentally and socially sustainable. The master plan will serve as a basis for developing the short-term improvement programme for the water supply system, and also for obtaining international funding for the improvements. It must therefore be consistent with the requirements of IFIs such as the World Bank, the ADB and JBIC.

The future development planning needs to address all aspects of the provision of water supply services, including technical, institutional, managerial and social aspects.

One of the prime objectives will be to maximise the use of existing assets and to generate continuous measurable improvements in the efficiency of delivery of water services. This requires the creation of a set of ***performance indicators***, which will include reasonable and achievable ***technical targets*** and ***customer service standards***. An agreement on technical targets and customer service standards will be required between KWSB and the town administration (and may also be required with potential donors). The technical targets will be set for each year up to 2025 with gradually increasing values to reflect the level of investment and the efficiency improvements that are demanded of the Karachi Water and Sewerage Board.

The Master Plan will assess priority needs, estimate implementation costs and propose an implementation programme for physical works development to meet the performance indicators. This programme should be consistent with the availability of funds for investment, and the ability of the city to pay for such improvements and maintain the new and existing assets through an affordable tariff structure.

3 Funding

A mixture of local, national and international funding may be needed to implement the works proposed in the master plan. The requirements of the national agencies responsible for approval and allocation of funds need to be taken into account during the preparation of development plans, as well as the IFIs. This is particularly in regard to the need for clear statements of need, justification of proposed solutions, reliability of cost estimates and expected benefits, environmental management and social inclusion.

4 Institutions Responsible for Planning

At the time of the previous water supply planning the Karachi Development Authority (KDA) was the co-ordinating agency responsible to the Government of Sindh (GOS) and KWSB for urban infrastructure development in Karachi. In 1990 the KDA issued an urban development Master Plan which provided for anticipated developments to year 2000. Today, the key agencies are the municipal administrations for the 18 towns within the greater Karachi area and the GOS. The preparation of a new water supply master plan will

need to address the concerns and future aspirations of these municipalities and help create a coherent planning framework that responds to the differing needs of the municipalities.

Other agencies that will need to be consulted include GOS on demographic aspects, WAPDA and I & P GOS on water resources availability, KESC on electric power supplies, and GOS on funding.

5 Corporate Development and Regulatory Framework Improvements

A vital component of the longer-term investment process will be the achievement of KWSB goals. The KWSB goals will need to be more fully defined as part of the Corporate Development planning work but may be expected in general terms to include the aim of transforming KWSB itself into a self-financing organisation, able to provide its customers with reliable, cost-effective and high quality water services.

Business planning, involving the preparation and publication of a Corporate Development Plan, will help to focus KWSB efforts on the achievement of their goals.

Restructuring of the KWSB organisation is required to improve efficiency.

The regulatory framework within which KWSB operates also needs to be reviewed as well as a fundamental review of current management practices.

6 Water Supply System

6.1 Assessment of Present Conditions

Urbanisation in the greater Karachi area has placed enormous pressure on water supply services and the need for urgent improvements and development of the systems including equitable distribution of water to 18 towns. Existing water supply systems are illustrated in Figure 1.

In 1982 the total bulk supply of about 340 mgd was thought to be in balance with the needs of the population of 5.5 million, but the population has since nearly doubled to about 10 million according to the 1998 census and when projected to 2004 it is over 12 million. whilst bulk supplies have probably increased by less than 30%. Reliance on the smaller Hub supply is also problematic in dry years. Current supplies are over 500 mgd, with Hub source providing water to KWSB.

Some of the main issues affecting water supplies are:

- Inadequate bulk water supply and the inevitably very high capital cost of providing additional supplies due to Karachi's physical location.
- A considerable proportion of the bulk water that does currently reach Karachi does not reach customers due to system losses, both physical and non-physical.
- Imperfect water treatment facilities.
- Sewage is undoubtedly leaking into un-pressurised water mains due to leaking mains and due to the lack of a 24-hour supply, causing further water quality problems.
- Bulk water supply and water distribution are not measured effectively because of a lack of working flow meters.
- The distribution network and service connections are generally known to be in poor condition, because there has been little success in improving workmanship and introducing a planned replacement/maintenance/leakage control programme.
- High power consumption and electricity costs for pumping (especially at Dhabeji).
- Partly due to the current inefficient and low tariff structure, KWSB does not collect enough revenue from customers to support its development programme.
- Weaknesses in management of the water supply services have resulted in lack of efficiency improvements. Managers appear to have been unable to sustain corporate or personal commitment to improving the performance of KWSB and services to customers.

- Lack of adequate system maintenance and associated sustainability of assets.
- Poor levels of system data in terms of system mapping, asset condition and key operational data such as measurement of system water flows.

6.2 Technical Targets – Water Supply

The selection of water supply technical targets is to be carried out within the framework of the Master Plan. Typically, the technical targets will be defined on an annual basis and include:

- Water production and sales
- Billings collection ratio
- Attendance time to burst mains
- Time to carry out routine repairs related to interruption in distribution networks
- Number of district metering zones established with defined hydraulic boundaries
- Unaccounted for water reduction
- Number of new connections
- Growth in service cover ratio (the proportion of population supplied with piped water services in districts of Karachi).
- Staff per 1000 connections

6.3 Customer Service Standards

The selection of customer service standards will also be required to emerge from the proposed water supply master plan. However, an understanding of the customers' perceived needs and opinions on the present level of service shall be obtained and used as a planning platform. A survey of customer opinions will therefore be included as one of the preliminary master planning activities. Typically, customer service standards would include:

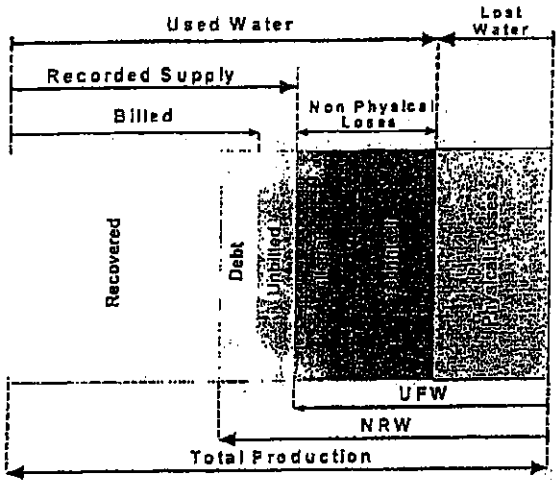
- Reliability of supply to customers, measured by number of hours continuous supply and duration of interruptions
- Pressure of water supplied at connections, based on an agreed measurement and sampling procedure
- Quality of water supplied to customers assessed on the basis of an agreed sampling procedure
- Response time to customer query or complaint, for initial response and for resolution of issue.
- Attendance time to 'no water' complaint
- Time to complete connection in areas with developed distribution network after customer has completed payment and all necessary application documents.

The levels of service implied in the customer service standards will be set so that, over time, real and measurable improvements in service provided by KWSB will be achieved and demonstrated to the public and customers.

6.4 UFW/NRW Control

UFW (unaccounted for water) control is one of the most important and difficult aspects of water supply services performance improvement for water utilities. Physical leakage and non-physical losses make up UFW and the addition of administrative losses gives NRW (non revenue water). All these need to be addressed. The make up of these losses in Karachi is illustrated in Figure 2.

Figure 2 – Physical and Non-physical Water Losses



7 Outline Scope of Master Plan

The selection of technical targets and customer service standards cannot be completed without a sound analysis of current problems and definition of a realistic programme of requirements for asset improvements and new asset construction. The preparation of the water supply Master Plan will deal with these requirements.

The overall scope of the Master Plan will include the following:

7.1 Review Phase

The Consultant will collect relevant data and review the following aspects of KWSB's systems and operations:

- Water supply asset condition.
- Maintenance provisions and sustainability of assets
- Water supply service coverage and levels of service.
- Resource Development.
- Customer perception and satisfaction with present service.
- Institutional and regulatory aspects.
- Financial performance.

7.2 Development of design criteria

In order to ensure that the development of options proceeds on an agreed basis, the Consultant will:

- Develop or formalise general design criteria, including per capita water use (based on type of service provided), percentage passed to wastewater flows, infiltration rates to sewers, discharge standards etc.
- Prepare updated demographic and water demand forecasts.
- Determine future UFW targets and control programmes to meet these targets.
- Investigate alternatives to centralised sewerage systems in Katchi Abadi and other areas
- Develop forecast of population to be served preferably District / Town wise developmen..

Review system maintenance requirements to ensure future sustainability in terms of system durability and to obtain full benefits from the system.

- Carry out initial financial analysis of KWSB to determine affordability limits on capital investment programmes
- Develop technical targets and customer service standards

7.3 Development of Options

- Prepare water balance between existing production capacity and forecast demands
- Identify water resources development options required to meet future demands.
- Prepare proposals for increasing treated water production
- Determine required raw and treated water storage. distribution network development and rehabilitation needs.
- Prepare a capital investment programme including an Immediate Action Plan, covering the first two years of master plan implementation (2005-2006), a First Phase Plan covering the second period (2007-2015), and a Second Phase Plan covering third period (2016-2025).
- Prepare a sustainable management development plan dealing with organisation aspects, network operations streamlining, staffing levels, labour relations, training, public relations and customer care.
- Carry out a financial analysis of KWSB including the future investments, future tariff requirements and affordability.
- Investigate the options for private sector participation in the delivery of services required by the KWSB and in relation to out-sourcing.
- Prepare a funding plan including assumptions of terms and conditions of funding.

8 Detailed Terms of Reference

8.1 Technical - Water Supply Component

The sections below deal with the different technical components of the water supply systems expected to be included in the Master Plan. The Consultant will focus on the short-term improvement projects, which will be presented as described in Section (v).

(I) Review of Existing Assets and Services

The Consultant will undertake an initial review of the current situation within KWSB, in terms of physical system condition and coverage, management structure, financial performance and external perceptions, as discussed below.

The Consultant will review all currently available reports and records and list principal assets in terms of physical condition, suitability for rehabilitation or refurbishment, operational status, capacity adequacy, both now and in the future, and estimated useful life. He will develop priorities for stabilising and optimising performance of existing useful assets.

A survey of customer opinions will be carried out at the outset of the project to assess the perceived quality of service, including:

- Perceived quality of water received;
- Connection time in hours connected, and storage facilities available;
- Accuracy of billing and ease of payment methods;
- Response time to call outs for bursts or 'no water' situations;

- Response to complaints by telephone or by direct contact, and
- Response time to requests for new connections.

There is an existing outline computer model of the city distribution system last updated by Mott MacDonald International Limited as part of the Water Loss and System Strengthening Project in 1996, from which data can be obtained and used, after adding subsequent system and demand developments. The model will not be capable of being calibrated but may be used as a basic planning tool. It is not expected that a new model will be developed.

From KWSB records, the data collected for the model and the customer perception study the Consultant will determine the distribution coverage and record levels of service (continuity of supply, water pressure and water quality) in each area of the city.

A review of KWSB technical capability in the areas of planning, operations management, reactive capability to bursts and breakdowns, together with the local procedures and performance levels will be carried out.

The Consultant will review the financial performance of KWSB, including water production, water sales, billings and receivables, procedures for dealing with non-payment, operating costs and procedures for minimising these, and the present tariff structures. A financial model of the existing situation will be prepared covering production, sales revenue, operational costs, maintenance costs and loan servicing commitments.

(ii) Demand Forecasting

Using all available data the Consultant shall prepare demand forecasts for the period 2005 until 2025 for the different areas of the city. The level of services on which to base the demand forecast will be based on the service standards agreed with KWSB. The demand will be assessed in terms of domestic, non-domestic and unaccounted for water. Where prudent the use of recycled wastewater to replace potable supplies for appropriate purposes will be considered and taken into account.

The last population census was carried out for Karachi in 1998 and realistic population growth forecasts thereafter shall be determined for demand prediction purposes.

The Consultant will work with the relevant agencies to assess future commercial and housing development in Karachi in terms of anticipated locations and extent of these developments, to the relevant planning horizons.

A balance between water resources availability, production capacity and demand will be prepared to the specified design horizons.

(iii) Water Resource Development and Treatment

Current supplies come from Hub reservoir (notionally 100 MGD), the Indus (notionally 640 MGD on completion of KIII) and Dumlottee (1.6 MGD and reducing). The Hub and Indus supplies are surface water and Dumlottee is groundwater. Over recent dry years the supply from Hub has declined until it is currently nil, and a recent yield study has been carried out on the Hub Dam by Mott MacDonald International Limited, in 2001. On completion of KIII the license to extract water from the Indus will be fully utilised. Dumlottee has slowly reduced in yield from 8 MGD to 1.6 MGD.

A fundamental review of the existing and potential surface and groundwater is required, and new bulk sources to be considered shall include (but not be limited to):

- A new increased extraction license and potential new bulk supply options from the Indus
- The pumping of the 'dead' storage from Hub under emergency conditions
- Desalination options

The consultant shall also investigate the possibilities of additional surface water supplies from the Malir River, and possible short term development of small localised groundwater sources.

The Consultant shall review the options in terms of:

- Capacity
- Transmission and treatment requirements, including both additional facilities and infrastructure and rehabilitation requirements
- Licensing requirements for additional bulk supplies
- Security of supply, particularly vulnerability to sabotage or other man-made events.
- Development timescales
- Capital and operating costs, including power consumption costs.
- Standby/independent power generation facilities

The Consultant shall also investigate and prepare recommendations regarding sharing of available Hub Dam water between Baluchistan and Sindh.

(iv) Distribution Network

Development and Rehabilitation

The Consultant shall investigate and review the options for development in terms of:

- New pipelines required for network development and reinforcement
- Pipelines requiring rehabilitation and recommendations for rehabilitation methodologies
- Identification of district metering zones, to be established with defined hydraulic boundaries
- Water tanker operations and water hydrants
- Leakage reduction and control requirements (see below)
- Water metering requirements
- Water conservation by consumers
- Supplies to Katchi Abadies
- Requirements to achieve equitable water distribution to consumers city-wide
- Requirements to rationalise and improve the operating efficiency of existing distribution pumping stations

The specific proposals contained in the Water Loss and System Strengthening Project by Mott MacDonald International Limited in 1996 are also to be reviewed.

Unaccounted for Water/Non-Revenue Water Programme

The Consultant shall review the options for UFW/NRW reduction and control, and shall include consideration of:

- Methodologies to reduce and control physical system losses
- Consumer meter errors
- Illegal connections
- Billing errors and revenue collection levels.

KWSB's current actions regarding system strengthening and leakage control are to be reviewed, and the detailed recommendations made in the Water Loss and System Strengthening Project by Mott MacDonald International Limited in 1996 are also to be reviewed and updated.

(v) Immediate Action plan

The Consultant will prepare an Immediate Action Plan, detailing the works required to improve the water supply systems to meet the required short term service improvements. The action plan will include:

- Outline drawings of proposed new and rehabilitated works, including treatment plants, pipelines, reservoirs and pumping stations.
- Descriptive details of the proposed facilities, including capacities, processes to be used etc.
- Cost estimates for the proposed works
- Justifications of the works, in terms of benefits vs. costs.
- Proposed contract packaging and procurement schedules.
- Detailed Terms of Reference for comprehensive mapping of the existing water distribution system using GIS

8.2 Environmental Impact Assessment

The Consultant shall assess the environmental impacts associated with identified new initiatives and projects, identify all negative impacts, and develop criteria for establishing a project benefit monitoring and evaluation system.

8.3 Implementation Programme

The Consultant shall determine and make recommendations for an implementation programme for the actions recommended in the Master Plan, utilising realistic timescales and milestones for the various activities. The Programme shall incorporate the Immediate Action Plan, First Phase Plan, and Second Phase Plan to 2025.

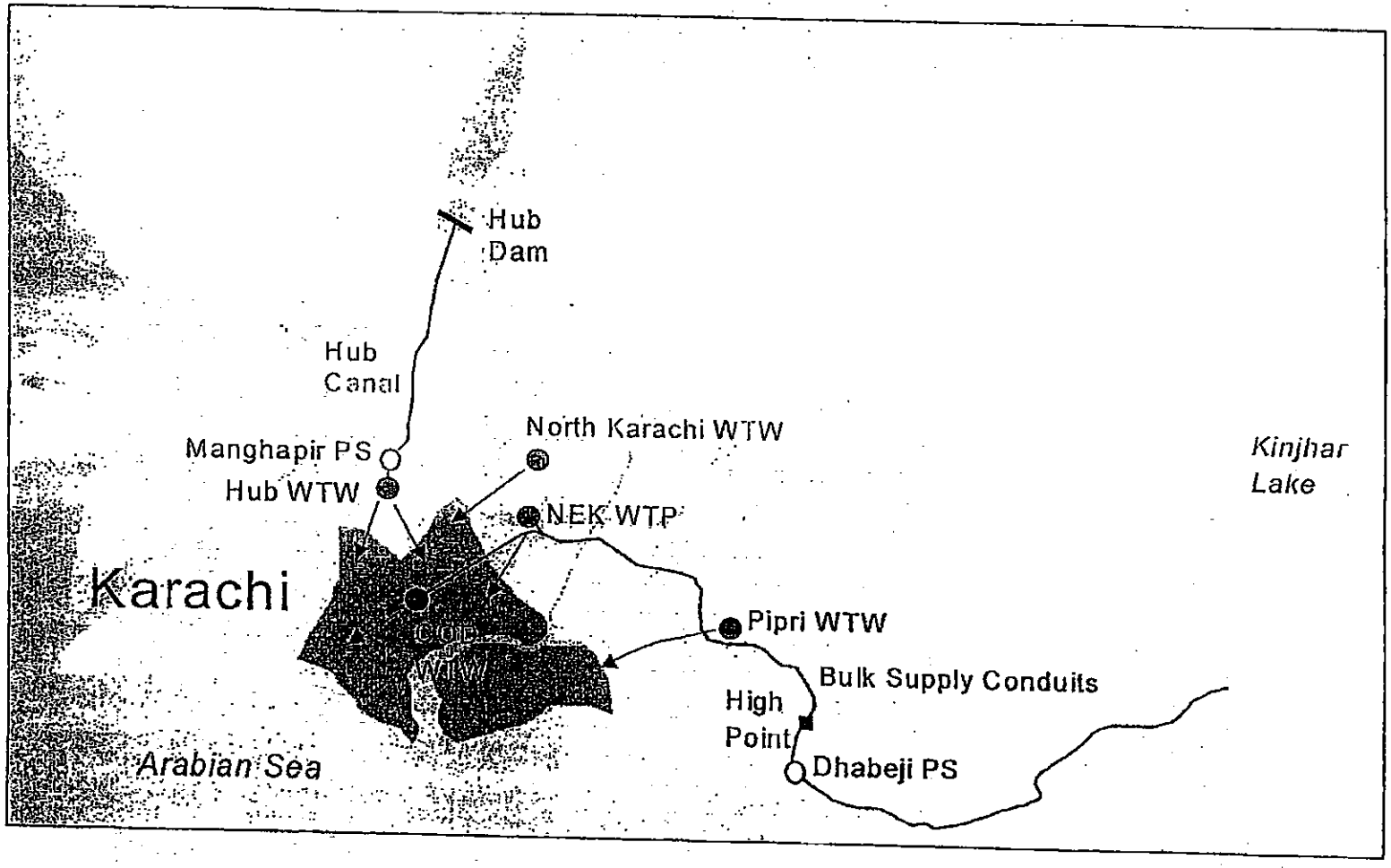
8.4 Reporting and Outputs

The Consultant shall prepare and submit the following reports

- An inception report, outlining the current situation, data collected to date and the programme and inputs for the remainder of the study, shall be submitted six weeks after the commencement of the assignment.
- Progress reports shall be submitted at monthly intervals commencing at the end of Month 3.
- The draft Master Plan Report shall be submitted nine months after commencement of the assignment. This report shall incorporate all the study investigations, findings and recommendations. It will focus on the immediate works required in the short term, but will also contain outline plans for the future development of KWSB to 2025. Terms of reference for further more detailed studies, including GIS mapping of the water and wastewater systems, are to be incorporated in the Report.
- The final Master Plan Report will be submitted one month after receipt of KWSB's comments on the draft report.

The Master Plan shall address all relevant aspects of the development of water resources and potable water needs for the city of Karachi, including but not limited to all the issues raised in this Terms of Reference document.

Figure 1 – Principal Water Supply Facilities in Karachi



GREATER KARACHI WATER SUPPLY MASTER PLAN STUDY

Summary of Man Month

Expatriate Staff Man-Month						
Designation	No.	MM	Total MM	Salary Per Month in USD	Total Cost in USD	Total Cost in PRs
Team Leader / Sr.Water Engineer	1	18	18	10000	180,000	10,530,000
Water Engineer / Network Moduller	1	12	12	8000	96,000	5,616,000
Economist / Financial Analyst	1	6	6	10000	60,000	3,510,000
Water Resources Specialist	1	5	5	8000	40,000	2,340,000
Hydrologist	1	4	4	8000	32,000	1,872,000
Process / Desalination Consultant	1	4	4	10000	40,000	2,340,000
Water Treatment Engineer	1	3	3	8000	24,000	1,404,000
Mechnical / Electrical Consultant	1	3	3	10000	30,000	1,755,000
Total			**55**		502,000	29,367,000
Local Staff Man-Month						
Designation	No.	MM	Total MM	Salary Per Month in USD	Total Cost in USD	Total Cost in PRs
Dy. Team Leader	1	18	18	2000	36,000	2,106,000
Economist	1	12	12	1800	21,600	1,263,600
Principal Demographer	1	10	10	1500	15,000	877,500
Water Engineers	6	15	90	1500	135,000	7,897,500
Water Resource Engineer	6	15	90	1500	135,000	7,897,500
GIS Specialist	3	12	36	1500	54,000	3,159,000
Geotechnical Expert	3	12	36	1500	54,000	3,159,000
Ground water Specialist	4	12	48	1500	72,000	4,212,000
Hydrologist	6	12	72	1500	108,000	6,318,000
Financial Analyst	2	12	24	1500	36,000	2,106,000
Electrical / Mechanical Engineers	8	12	96	1500	144,000	8,424,000
Structural Engineer	8	12	96	1500	144,000	8,424,000
Support Engineers	15	18	270	1500	405,000	23,692,500
Surveyors	12	18	216	1000	216,000	12,636,000
Quality Surveyors	8	15	120	1000	120,000	7,020,000
CAD Technicians	6	15	90	1000	90,000	5,265,000
Total			**1324**		1,785,600	104,457,600

Note: Duplication of experts both for Water Supply & Sewerage Studies, where found will be addressed at the time of framing PC-II.

PAKISTAN PLANNING COMMISSION

PROJECT CONCEPT CLEARANCE PROPOSAL FOR FOREIGN ASSISTANCE

PART-I (To be filled in by the Sponsoring Agency) Sector:		**Physical Planning and Housing**
Sub-Sector:		**Aid to Local Bodies**
Name of the Project:		**Greater Karachi Sewerage Master Plan Study**
1.	Sponsoring Agency:	**Local Government Department, GOS**
2.	Executing Agency:	**Karachi Water & Sewerage Board**
3.	Location:	**Karachi**
4.	Brief Description and Scope:	**Attached as Annexure-I**
5.	Period of Implementation:	**18 Months**
6.	Planned Commencement Date:	**August 2004 (Start Study)**
7.	Cost (in Million US$)	**1.83** (Eqv. Pak Rs.107 million - Exchange Rate= Rs.58.5/- USD
8.	Financing Plan:	
	a) Government Contribution:	**NIL**
	b) Through budgetary resources:	
	i) Federal PSDP:	**NIL**
	ii) Provincial PSDP:	**NIL**
	iii) SDP	**NIL**
	c) Foreign Contribution:	
	i) Amount of Technical Assistance (Grant)	**1.83 Million US$** (Eqv. Pak Rs.107 million - Exchange Rate= Rs.58.5/- USD
	ii) Amount of Capital Assistance (Grant):	-
	iii). (Specify whether grant or Loan):	**Grant**
	iv) Total (a+b)	**1.83 Million US$**

資料1-50

	v) % of Total Cost:	-
	d) Name of Possible donor agency / country. (Indicate whether any contract already established):	JICA - JAPAN
9.	Requirements:	
	a) Equipment (Indicate major items and estimated value:	-
	b) Material (Specify Items alongwith value):	-
	c) Training (Indicate: (i) Field, Duration, (iii) Local / Foreign).	-
	d) Foreign / Local experts (in man-months alongwith proposed remunerations).	a) Out of Pocket Expenses (Contingencies) 0.30 b) Staff Cost 1.527
	(figures in Million US$)	i) Foreign Component (Man Month = 36) 0.337 ii) Local Component (Man Month = 968) 1.19 **c. Total Cost (a+b) 1.83** (Eqv. Pak Rs.107 million - Exchange Rate= Rs.58.5/- USD **Attached as Annexure-II**
	e) Books & Journals	-
10.	Whether included in the current Ten Year Plan?	
	a) If Yes, (i) Priority	**Yes included as Water and Sewerage Sector Development**
	(ii) Allocation made:	-
	b) If no, please justify its need / Urgency.	
11.	Whether Feasibility Study carried out / Proposed to be carried:	**Proposed to be carried out by Japanese Grant.**
12.	Status of PC-I / PC-II	**After clearance of concept clearance, PC-II will be prepared followed by PC-I, as per findings of the study.**
13.	Recommendation:	**Greater Karachi Sewerage Master Plan study concept may please be approved to approach Japanese Embassy for JICA Grant Assistance.**

資料1-51

Greater Karachi Sewerage Master Plan Study

Prepared by:

(SYED HASAN EJAZ KAZMI)
EXECUTIVE ENGINEER (E&M)
K-III PROJECT, PW-KW&SB

Checked by:

(AMJAD HABIB)
PROJECT MANAGER (E&M)
PROJECTS WING - KW&SB

(MASHKOOR-UL-HASNAIN)
CHIEF ENGINEER (PROJECTS)
PROJECTS WING - KW&SB

(SHAHID SALEEM)
Dy. Managing Director(Planning)
KW&SB

(Brig.IFTIKHAR HAIDER)
Managing Director, KW&SB

APPROVED AND CLEARED FOR ONWARD TRANSMISSION TO THE GOVERNMENT OF SINDH FOR APPROVAL

資料1-52

- to introduced appropriate and low cost sewage treatment and processes.

- to cope with increasing sewage generation, 07 new sewage treatment plants were proposed corresponding to the increase in water supply of the city:

    i. Salt Beds
    ii. Korangi
    iii. Pipri
    iv. Taiser Town
    v. Halkani Town
    vi. Hawkes Bay
    vii. Baldia

- to enhance the treatment capacity of existing sewage treatment plants.

- to construct following trunk sewers:

    i. Construction of interceptor in Lyari river bed from North Karachi upto Lyari area terminating at Mauripur Treatment Plant
    ii. Orangi Trunk Sewer
    iii. Qasba Trunk Sewer
    iv. Malir Trunk Sewer

- to repair and clean existing sewers

The programme also required KW&SB to introduce a number of regulatory, administrative and financial reforms:-

- Prepare and implement sewage Bye-Laws to control and monitor industrial and domestic effluent.

- To commission a mechanized trunk sewer maintenance division.

- Develop a formal training programme to emphasize on-the-job training through the use of experienced operators

To conduct feasibility study on:-

- Re-use of effluent for non-potable uses.

Implementation by KW&SB on Master Plan Proposals:

KW&SB adopted the sewerage master plan (1988 – 2003), but targets specified in the sewerage master plan could not be fully achieved mainly due to resource constraints. Nevertheless following steps were taken to meet the requirements of the Master Plan:-

Annexure-I

Need for Wastewater Master Plan upto Year 2025

The sewerage Master Plan study is necessary to update the existing Master Plan, which was prepared under World Bank funding in 1988, due to rapid expansion of population during the last 16 years.

The study will establish a development programme for municipal and industrial wastewater management in Greater Karachi covering the period upto the year 2025 to allow preparation of a technically sound, financially and economically viable and sustainable long-term investment strategy.

The consultants will consolidate findings of previous studies, work implemented under the ADB funded Karachi Sanitation Programme, and the proposals for new works under the Tameer-e-Karachi Programme, and supplement these findings with surveys, investigations, planning proposals, prepare development strategies and a phased investment plan identifying both long-term and medium term programmes.

The study will include preparation of base mapping suitable for GIS. This will include incorporation of existing KW&SB sewerage and treatment plant assets and will form the basis with which future investment proposals will be identified.

The proposed investment projects will ensure improved health and social conditions to promote economic development.

Some of the major recommendations made in the Master Plan (1988 – 2003) are as follows:-

- to establish a Sewerage and Wastewater Treatment Department with its own Chief Engineer and an independent department to deal with new projects related to sewage treatment and its disposal.
- to establish a dedicated trunk sewer maintenance unit.
- to carry out a systematic sewer cleaning operation and repair programme.
- to prepare comprehensive sewer maps as a record of all sewerage network in the city.
- to provide on-the-job training at all levels.
- to replace, duplicate at least 50 Km of the existing trunk sewers within a period of 15 years.

- Rehabilitation and upgradation of existing Sewage Treatment Plants No.I & II,
- Construction of new Sewage Pumping Station at Clifton.
- Construction of offsite sewers for TP-I & TP-II
- Construction of Baldia Trunk & Secondary Sewers.
- Construction of Lyari Trunk Sewer (12 KM).
- Construction of Mauripur Sewage Treatment Plant (54 mgd).

資料1-55

TERMS OF REFERENCE (TORs)
FOR
KARACHI WASTE WATER MANAGEMENT MASTER PLAN UPDATE
(2003 - 2025)

Formulation of Master Plan

All relevant existing information and baseline planning data will be studied and reviewed. Such information and data include, at least, the following:

i) Statistics and reports based on the population census-1991, regarding population distribution and projected growths, income distribution, present and proposed land use, organisational and financial arrangements of authorities and agencies responsible for sewerage and wastewater disposal in the study area.

ii) Previously prepared master plan and available data / records / maps / plans for the sewerage systems of Karachi together with any available city base maps and aerial photography.

iii) Development plans for ongoing and future land and infrastructure (residential, institutional, commercial, and industrial).

iv) The quantity, quality and nature and of wastewater generation from all sources, within the study area.

v) Hydrological data, water course profiles, soil characteristics, development densities and topography of the various catchment areas of the city (to be identified)

vi) The following reports shall be prepared and submitted:

a) Inception Report

Thirty (30) copies of the report shall be prepared and submitted at the commencement of the Study. It shall describe the study schedule and the basic methodology to be adopted in the Study.

b) Progress Report (1)

Thirty (30) copies of the report shall be prepared and submitted within a period of five (5) months after the commencement of the Study. It shall present the idea of the Integrated Plan.

c) Interim Report

Thirty (30) copies of the report shall be prepared and submitted within a period of nine (9) months after the commencement of the Study. It shall contain the results of the Phase-1 Study.

資料1-56

d) **Progress Report (2)**

Thirty (30) copies of the report shall be prepared and submitted within a period of twelve (12) months after the commencement of the Study. It shall present the results of the Phase-2 Study.

e) **Draft Final Report**

Thirty (30) copies of the report shall be prepared and submitted within a period of sixteen (16) months after the commencement of the Study. It shall contain the results of the whole Study for comment of the Executing Agency.

f) **Final Report**

Sixty (60) copies of the report shall be Prepared and submitted within a period of One (1) month after the receipt of the Comment of the Executing Agency on the Draft Final Report. An Executive Summary Shall be prepared and submitted in Separate volume.

Annexure II

GREATER KARACHI SEWRAGE MASTER PLANT STUDY

Summary of Man Month

Expatriate Staff Man-Month						
Designation	No.	MM	Total MM	Salary Per Month in USD	Total Cost in USD	Total Cost in PRs
Team Leader / Sewerage Planner	1	18	18	10000	180,000	10,530,000
Sewerage & Drainage Specialist	1	4	4	8000	32,000	1,872,000
Sewage Treatment Specialist	1	4	4	8500	34,000	1,989,000
Economist / Financial Analyst	1	4	4	10000	40,000	2,340,000
Mechanical/Electrical/Instrumentation Specialist	1	3	3	8500	25,500	1,491,750
Industrial Waste Specialist	1	3	3	8500	25,500	1,491,750
Total			**36**		337,000	19,714,500
Local Staff Man-Month						
Designation	No.	MM	Total MM	Salary Per Month in USD	Total Cost in USD	Total Cost in PRs
Dy. Team Leader / Chief Sewerage Engineer	1	18	18	2000	36,000	2,106,000
Economist	1	6	6	1800	10,800	631,800
Principal Demographer	1	6	6	1200	7,200	421,200
Sewerage Engineer / Drainage Engineer	6	15	90	1500	135,000	7,897,500
GIS Specialist	2	10	20	1200	24,000	1,404,000
Geotechnical Expert	2	10	20	1500	30,000	1,755,000
Hydrologist	2	12	24	1200	28,800	1,684,800
Financial Analyst	1	12	12	1500	18,000	1,053,000
Electrical / Mechanical Engineers	10	12	120	1500	180,000	10,530,000
Structural Engineer	6	10	60	1200	72,000	4,212,000
Sewage Treatment Specialist	5	10	50	1600	80,000	4,680,000
Support Engineers	12	15	180	1200	216,000	12,636,000
Surveyors	12	12	144	800	115,200	6,739,200
Quantity Surveyors	12	8	96	800	76,800	4,492,800
CAD Technician	6	9	54	800	43,200	2,527,200
Industiral Waste Expert	1	9	9	1800	16,200	947,700
Environmentalist	3	9	27	1800	48,600	2,843,100
Socioligist	2	8	16	1500	24,000	1,404,000
Solid Waste Expert	2	8	16	1800	28,800	1,684,800
Total			**968**		1,190,600	69,650,100

Note: Duplication of experts both for Water Supply & Sewerage Studies, where found will be ac...essed at the time of framing PC-II.

資料2.　S/W及びM/M

SCOPE OF WORK
FOR
THE STUDY
ON
WATER SUPPLY AND SEWERAGE SYSTEM IN KARACHI
IN
THE ISLAMIC REPUBLIC OF PAKISTAN
AGREED UPON BETWEEN
CDGK/KW&SB
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

Karachi, 13 July, 2005

Brigadier Iftikhar Haider
Managing Director
Karachi Water and Sewerage Board

Mr. Adachi Itsu
Leader of the Preparatory Study Team
Japan International Cooperation Agency

Mr.Fazlur Rehman
Care Taker/District Coordination Officer
City District Government Karachi

Ms. Yasmin Masood
Deputy Secretary
Economic Affairs Division
Ministry of Finance, Economic Affairs & Statistics
Government of Pakistan

CDGK: City District Government Karachi
KW&SB: Karachi Water & Sewerage Board

I. INTRODUCTION

In response to the official request of the Government of Islamic Republic of Pakistan (herein after referred to as "the Government of Pakistan"), the Government of Japan decided to conduct the Study on Water Supply and Sewerage System in Karachi (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations enforced in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of the Government of Pakistan.

The present document sets forth the Scope of Work with regard to the Study and will be valid after notification of approval by JICA Headquarters through JICA Pakistan office to the Pakistani side.

II. OBJECTIVES OF THE STUDY

The objectives of the Study are as follows:

(1) to formulate a master plan for improving water supply and sewerage system for the Karachi City to the target year of 2025,
(2) to conduct a feasibility study for the priority project(s) selected in the master plan, and
(3) to pursue technology transfer to the Pakistani counterpart personnel in the course of the Study.

III. STUDY AREA

The Study Area shall be limited to the Karachi City District comprising 18 Towns as shown in the Location Map plus areas for raw water sources and their conveyance routes to the Karachi City (see Appendix 1).

IV. STUDY ORGANIZATION

Karachi Water and Sewerage Board (hereinafter referred to as "KW&SB") shall act as a counterpart agency to the Japanese Study Team (hereinafter referred to as "the Study Team") and also as a coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the Study.

V. SCOPE OF THE STUDY

In order to achieve the objectives mentioned above, the Scope of Work for the Study shall cover the following items:

Phase 1: Basic Study

1. Review of the Master Plan formulated in 1985 and 1988

資料2-2

2. Collection and analysis of the existing data and information related to the Study
3. Field reconnaissance and survey on existing water supply facilities and water sources
4. Field reconnaissance and survey on existing sewerage and drainage facilities
5. Water quality analysis
6. Survey on area development plan, land utilization and socio-economic conditions
7. Survey on natural and environmental conditions
8. Survey on public perception
9. Survey on laws, policies and administration system related to water supply, sewerage and drainage
10. Institutional and management capacity assessment of the study organization
11. Review and analysis of the plans and projects related to the Study
12. Evaluation of present water supply, sewerage and drainage conditions and identification of problems
13. Identification of quick impact programme(s)

Phase 2: Master Plan

1. Pre-feasibility study of quick impact programme, if necessary
2. Water demand forecast
3. Forecast of the quality and quantity of wastewater
4. Formulation of comprehensive planning framework and establishment of basic development policies, goals and strategies
5. Plan for optimization and up-gradation of the existing networks of both water supply and sewerage system
6. Plan for equitable water distribution including the valve operation for water supply based on zoning, water carrying ability of the system and water availability
7. Plan of the bulk water source and conveyance system for the Karachi City in line to city's Development Plan.
8. Plan of energy saving to reduce the operational cost
9. Plan of water quality improvement
10. Schematic lay-out plan of the facilities
11. Support for Initial Environmental Examination (IEE)
12. Plan for improvement of management system
    a. Reorganization of KW&SB
    b. Improvement of financial management of the KW&SB
    c. Reduction of the non revenue water
    d. Improvement of tariff collection system
    e. Establishment of data management system and GIS with the feature of continuous updating
    f. Establishment of consumer services center and the system to improve and speed up the effective response to the public complaints

g. Revision of laws and regulations

h. Human resources development

13. Plan for strengthening institutional capacity
14. Preliminary cost estimation
15. Phasing implementation plan
16. Evaluation of the revised master plan
17. Selection of priority projects

Phase 3: Feasibility Study

1. Supplemental data collection and analysis
2. Preliminary design of the facilities
3. Operation, maintenance, management and human resources development plan in the priority projects
4. Construction and procurement plan
5. Cost estimation and financial analysis
6. Formulation of financial plan
7. Support for Environmental Impact Assessment (EIA), if necessary
8. Project evaluation
9. Formulation of implementation schedule

VI. SCHEDULE OF THE STUDY

The Study will be carried out in accordance with the tentative schedule shown in the attached sheet of Appendix 2. The schedule is tentative and subject to modification if such necessity should arise during the course of the Study and is mutually agreed by both parties.

VII. REPORTS

JICA shall prepare and submit the following reports in English to Pakistani side.

1. Inception Report
   Thirty (30) copies at the commencement of the Study
2. Progress Report
   Thirty (30) copies at the end of Phase 1
3. Interim Report
   Thirty (30) copies at the end of Phase 2
4. Draft Final Report
   Forty (40) copies at the end of the Study
   Pakistani side shall submit their comments within one (1) month after the receipt of the Draft Final Report.

資料2-4

5. Final Report

Fifty (50) copies within one (1) month after the receipt of the comments on the Draft Final Report

VIII. UNDERTAKINGS OF THE GOVERNMENT OF PAKISTAN

1. The Government of Pakistan shall accord privileges, exemptions and other benefits to the Study Team in accordance with the Agreement on technical cooperation between the Government of Japan and the Government of Pakistan signed on April 30, 2005.

2. The Government of Pakistan shall bear claims, if any arises, against the members of the Team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Study, except when such claims arise from grass negligence or willful misconduct on the part of the Team.

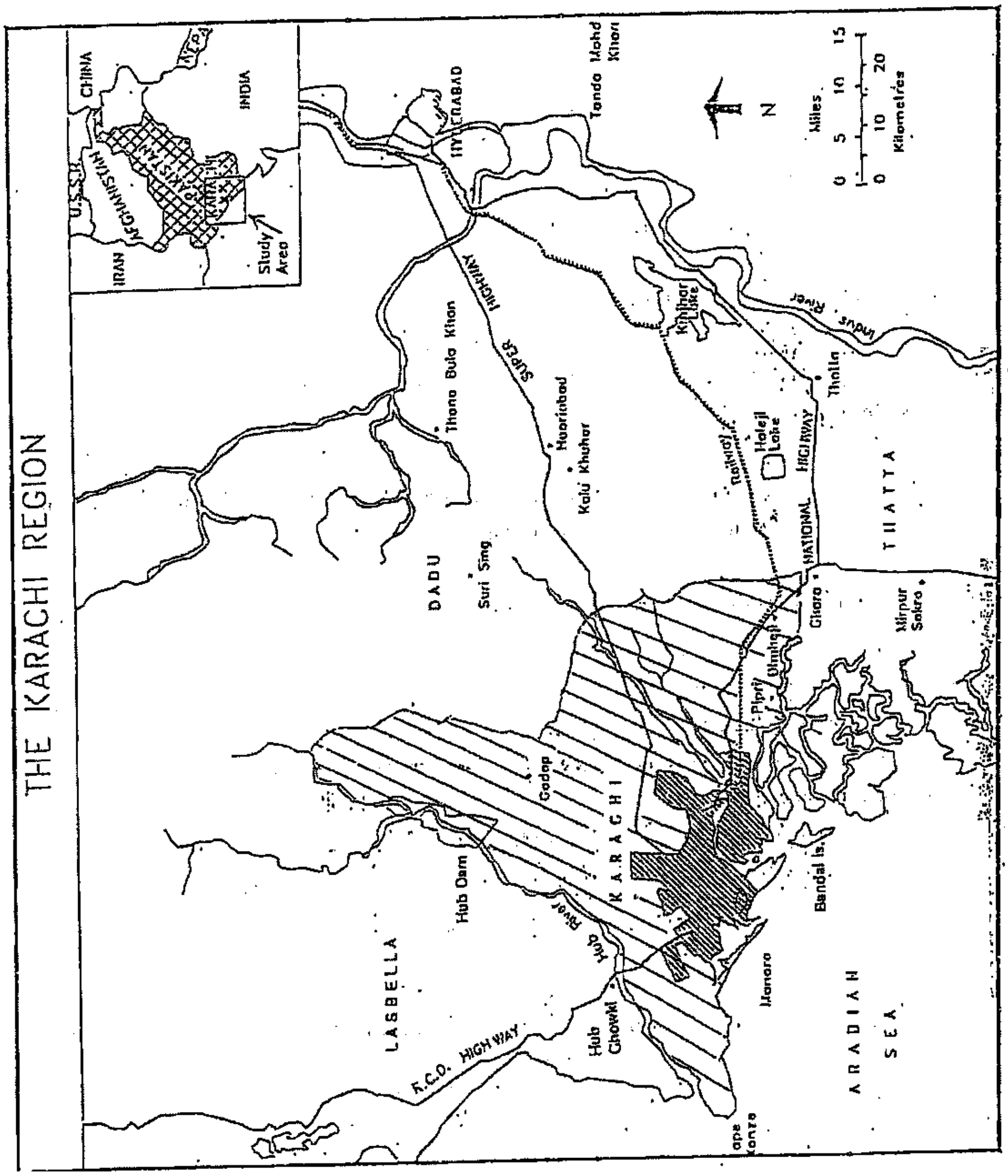
3. KW&SB shall be the executing agency and coordinating body in relations with other governmental and non-governmental organizations for smooth implementation of the Study.

4. KW&SB shall at its own expense, provide the Study Team with the following, in cooperation with other organizations concerned;

(1) Security-related information on as well as measures to ensure the safety of the Team;
(2) Information on as well as support in obtaining medical service;
(3) Available data (including maps and photographs) and information related to the Study;
(4) Counterpart personnel;
(5) Suitable office space with necessary equipment; and
(6) Credentials or identification cards.

IX . CONSULTATION

JICA and KW&SB shall consult with each other in respect of any matter that may arise from or in connection with the Study.


THE KARACHI REGION
CHINA
U.S.S.R.
AFGHANISTAN
IRAN
PAKISTAN
KARACHI
INDIA
Study Area
Tando Mohd Khan
N
Miles
0 5 10 15
0 10 20
Kilometres
Indus River
Kinjhar Lake
Thatta
SUPER HIGHWAY
Thana Bula Khan
Nooriabad
Kalu Khuhar
Railway
Haleji Lake
NATIONAL HIGHWAY
DADU
Suri Sing
THATTA
Gharo
Mirpur Sakro
Dhabeji
Pipri
Gadap
KARACHI
Bundal Is.
Hub Dam
Hub River
LASBELLA
Hub Chowki
R.C.D. HIGHWAY
Manora
ARABIAN SEA
ape Monze

資料2-6

Appendix 2

Tentative Study Schedule

	2005		2006												2007											
	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Schedule					Phase 1										Phase 2						Phase 3					
Report	IC										PR							IT				PR		DF		FR

IC: Inception Report
PR: Progress Report
IT: Interim Report
DF: Draft Final Report
FR: Final Report

MINUTES OF MEETING
ON
SCOPE OF WORK
FOR
THE STUDY
ON
WATER SUPPLY AND SEWERAGE SYSTEM IN KARACHI
IN
THE ISLAMIC REPUBLIC OF PAKISTAN
AGREED UPON BETWEEN
GOS/CDGK/KW&SB
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

Karachi, 13 July, 2005

Brigadier Iftikhar Haider
Managing Director
Karachi Water and Sewerage Board

Mr. Adachi Itsu
Leader of the Preparatory Study Team
Japan International Cooperation Agency

Mr.Fazlur Rehman
Care Taker/District Coordination Officer
City District Government Karachi

Mr. Muhammad Ishaque Lashari
Special Secretary (Local Government)
Local Government, Katchi Abadis and
Rural Development Department
Government of Sindh

Mr. Muhammad Ali Khaskheli
Chief Economist
Planning & Development Department
Government of Sindh

Ms. Yasmin Masood
Deputy Secretary
Economic Affairs Division
Ministry of Finance, Economic Affairs & Statistics
Government of Pakistan

GOS: Government of Sindh
CDGK: City District Government Karachi
KW&SB: Karachi Water & Sewerage Board

資料2-8

In response to the official request of the Government of Islamic Republic of Pakistan (hereinafter referred to as "the Government of Pakistan"), the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Preparatory Study Team, headed by Mr. Itsu Adachi (hereinafter referred to as "the Team"), to Pakistan from July 4 to July 28, 2005 to discuss and determine the Scope of Work (hereinafter referred to as "S/W") for the Study on the Water Supply and Sewerage System in Karachi (hereinafter referred to as "the Study").

During its stay in Pakistan, the Team carried out field surveys in the study area, and held a series of discussion with the officials of Economic Affairs Division, Ministry of Finance (EAD), Planning Commission, Government of Sindh, City District Government Karachi, Karachi Water and Sewerage Board (KW&SB) and other authorities concerned about the Study.

As a result of the discussion, both sides came to an agreement on the S/W, which was signed on July 13, 2005 (the list of officials attending the discussion is attached as Appendix).

In the course of finalizing the S/W, both sides agreed and confirmed the following points for the smooth implementation and part of the study.

1. TITLE OF THE STUDY

Both Pakistani side and the Team agreed that the title of the study would be "the Study on the Water Supply and Sewerage System in Karachi" as described in the S/W.

2. TARGET YEAR

Both sides agreed that the target year of the Master Plan is designed to be 2025.

3. STUDY AREAS

Both sides agreed that the Study area is shown in the S/W.

4. STUDY PERIOD

The Study period is approximately 24 months.

5. POSSIBILITY OF ALTERNATIVE OF WATER RESOURCES

Both sides agreed that the possibility of alternative water resources including storage, desalination, reuse of wastewater and other options will be examined using the existing relevant data and reports.

6. LINKAGE WITH MASTER PLAN OF KARACHI CITY

Both sides agreed that the linkage between the Study and the overall Master Plan of Karachi City which has been initiated by CDGK should be assured ,incorporating new areas of development into water supply and sewerage system.

12/8

資料2-9

7. LESSONS FROM THE FORMER MASTER PLANS IMPLEMENTATION

Both sides agreed that the reasons for partial implementation of the former Master Plans (Karachi Development Plan 2000, Water Supply M/P in 1985 and Sewerage M/P in 1988) will be identified in Phase 1 of the Study.

8. PUBLIC PRIVATE PARTNERSHIP (PPP)

Both sides agreed that the PPP should also be considered in institutional and management capacity assessment of KW&SB.

9. AREA BASED MANAGEMENT

Both sides agreed that area based management system should be considered as one of the management tools in both water supply and sewerage system.

10. INTEGRATION OF WATER SUPPLY AND SEWERAGE SYSTEM AMONG STAKEHOLDERS

Both sides recognized that the necessity of integration of water supply demands and sewage treatment plans of other autonomous, semi-autonomous, Federal & Provincial Government bodies and institutions with the overall forecast of water & sewerage services of KW&SB.

11. CORPORATIZATION OF THE KW&SB

Both sides agreed to consider the possibility of corporatization of the KW&SB within the existing higher management framework to improve its economic viability.

12. ON-GOING AND PIPE LINE PROJECTS

Both sides agreed to integrate the on-going and pipe line projects in the field of water supply and sewerage system into the Master Plan.

13. SEWAGE TREATMENT

Both sides agreed to consider a sewage treatment plan to save the coast line from becoming a sewage pool, and to assess the possibility of segregation of the domestic and industrial waste, its treatment, usage and disposal.

14. INTEGRATED PLAN OF DRAINAGE AND SEWERAGE SYSTEM

Pakistani side requested Japanese side to consider the integrated plan of drainage and sewerage system.

15. COUNTERPART TEAM

資料2-10

Counterpart team headed by MD of KW&SB will jointly work at all times with the Study team as core facilitators and focal points. Members of the team are required to be assigned from senior members of KW&SB, in advance of the commencement of the Study.

16. COORDINATION MECHANISM OF THE STUDY

Both sides agreed that Pakistani side will set up a Steering Committee before the commencement of the Study. The committee will be called by the Chairman periodically.

Also, both sides agreed that the Chairman of the Steering Committee would report the progress and result of the Study to the Coordinating Committee on Development and Management of Large Cities for the smooth implementation of the Study.

17. ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

The Team explained JICA's Guidelines for Environmental and Social Considerations, and that it will be applied to the Study. KW&SB understood the policy of JICA guidelines, and agreed in principle to the following responsibilities and requirements.

(1) Based on the guidelines, KW&SB shall be responsible for conducting Initial Environmental Examination (IEE) in collaboration with the Study Team. The Study Team shall provide KW&SB with technical support in order to conduct IEE.
(2) The information disclosure such as study reports shall be made in order to ensure the participation and dialogues with various stakeholders, and achieve appropriate environmental and social considerations.
(3) The above-mentioned responsibilities and requirements will also be applied when Environmental Impact Assessment (EIA) is necessary.
(4) In the course of implementation of the Study, public consultation with communities and stakeholders shall be included if necessary.
(5) In case resettlement is inevitable from the result of the Study, KW&SB shall be responsible for making resettlement action plan in collaboration with CDGK.

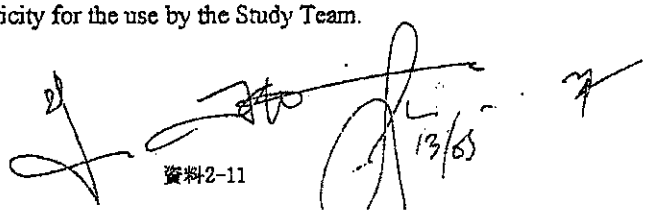
18. SEMINARS AND/OR WORKSHOPS

Seminars and/or workshops will be jointly held by KW&SB and the Japanese Study Team to provide opportunities of dialogue with stakeholders and transfer the technology to the Pakistani counterparts.

Both sides agreed that the subjects would be discussed and settled during the Study period.

19. UNDERTAKING OF THE GOVERNMENT OF PAKISTAN

1. Pakistani agreed to provide the Study Team with all available data (including geographical maps and photographs) and information related to the Study.
2. Pakistani side agreed to provide office space in KW&SB with office furniture, air-conditioning, telephone lines and electricity for the use by the Study Team.



資料2-11

20. APPROVAL OF PCII

The Team promised to inform the estimation of inputs from Japanese side necessary for PCII by September, 2005 and Pakistani side promised to get approval of PCII and inform JICA Pakistan Office of the progress before the commencement of the Study.

21. REPORTS

Both sides agreed that the result of the Study would be open to the public in order to achieve maximum use of the Study results.

13/05

資料2-12

APPENDIX

List of Attendants

(A. Pakistani Side)

Federal Government

Dr. Akram Sheikh	Deputy Chairman, Planning Commission
Mr. Malik Muhammed Saeed Khan	Additional Secretary, P&D Division
Mr. Shahid Iqbal Rana	Chief, PP&H, P&D Division
Mr. Mazhar Iqbal	Section Officer, EAD

Government of Sindh, GOS

< Planning & Development Department>	
Mr.Anzar Hussain Zaidi	Acting Additional Chief Secretary,
Ms.Rehana G. Ali Memon	Special Secretary,
Mr. Hassan Ali Din Muhammad	Chief, Foreign Aid
Mr. Abbas Ali	Planning Officer, Foreign Aid Section
< Local Government, Katchi Abadis and Rural Development Department>	
Mr. Muhammad Saleem Khan	Additional Chief Secretary
Mr. Muhammad Ali Khaskheły	Chief Economist
Mr. Muhammad Ishaque Lashari	Special Secretary
Mr. G. Arif Khan	Additional Secretary
Mr. Riaz Ahmad Junejo	Director, Monitoring and Evaluation Cell
<Finance Department>	
Dr. Zulfiqar Ali Shallwani	Deputy Secretary, Finance Department

City District Government Karachi, CDGK

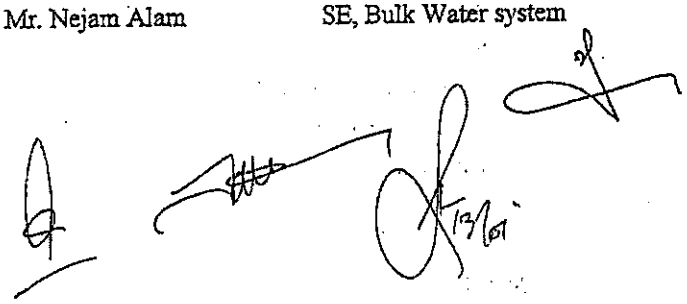
Mr. Fazlur Rehman	District Coordination Officer (DCO)
Mr. Raeesuddin Paracha	Executive District Officer (EDO), Enterprises& Investment Promotion
Mr. Nisar Ahmad Sario	District Officer (PA&E) & Project Manager, Tameer-e-Karachi Programme
Mr. Bilal Ahmed Memon	Deputy District Officer, DCO Secretariat

Karachi Water and Sewerage Board, KW&SB

Brigadier Iftikhar Haider	Managing Director & EDO(W&S) CDGK
Mr. Shahid Saleem	Deputy Managing Director (DMD), Planning
Mr. Asrar Zaidi	DMD, Services
Mr. Amjad Habib	Project Manager (Electrical & Mechanical), Project Wing

資料2-13

Mr. Ali Mohammed Palijo	Chief Engineer (CE), Bulk Water Transmission
Mr. Mashkoorul Hasnain	CE, Project
Mr. Asad Omar	CE, Water Distribution
Mr. Farid Ahmed Soomro	CE, Sewerage
Mr. Nejam Alam	SE, Bulk Water system



資料2-14

(B. Japanese Side)

Preparatory Study Team

Mr.Adachi Itsu	Leader
Ms.Kamata Hiroko	Sewerage and Drainage
Mr.Oyama Satoshii	Water Supply / Sewerage and Drainage
Mr.Taguchi Masayuki	Water Supply
Mr.Sata Shohei	Sewerage and Drainage / Environmental and Social Considerations
Mr. Kageyama Tadashi	Study Planning/Project Evaluation

JICA Pakistan Office

Mr.Mahmood A. Jilani	Deputy Resident Representative / Chief Programme Officer
Mr.Takahashi Makoto	Deputy Resident Representative

JICA Karachi Project Office

Mr.Tamaki Kokyo	Project Formulation Advisor
Mr.Shaikh Talib Fatah	Project Coordinator

JBIC Islamabad Office

Dr.Naila Azhar	Social Sector Specialist

資料2-15

資料3.　質問表

STUDY ON WATER SUPPLY AND SEWERAGE SYSTEM IN KARACHI

QUESTIONNAIRE

The team has taken over all the documents/papers collected during the previous survey for Project Formation on Karachi Water Supply and Wastewater conducted in March 2005. The team intends to update information by inquiring in accordance with this "Questionnaire". The members in charge of water supply planning and sewerage & drainage planning will collect answers to the questionnaire. Please prepare all the answers in English.

1. Basic Data and Information

1.1 Meteorological Data

a. Rainfall intensity data have already been in our hand

b. Other weather information such as temperatures, winds, humidities, etc. have already been collected.

1.2 Topographical Data

General information were already made available, but more detailed data as to ground elevations will be necessary particularly for sewer design.

1.3 Geological Data

If available, some typical vertical profiles of soil strata showing variations of properties with depth.

1.4 Brief Description of Chronology of Development of Karachi City

Some information has been already collected.

1.5 Demographic Information

a. Census data in 1951, 1961, 1972, 1981 (The team already has the copy of the data in 1998).

b. Other survey data if available

1.6 City Development Plan

a. Time schedule and scope of the new study on Master Plan of development of metropolis Karachi 2020 (The team has a copy of 2000 KDA Development Plan.)

b. Present Land Use Map of metropolis Karachi

1.7 Map of City

Map covered entire city showing each town or municipal boundary

1.8 Topographic Map

Topographic maps with a scale of 1/50000, 1/100,000, or other scale, indicating ground elevations at major points, locations of streets and major surface and underground structures

1.9 Socio-economic Data

Additional data, if available, will be useful, while some data were already collected.

a. Production by industries

b. Employment

c. Family income

d. Education

e. Health

f. Infrastructures

1.10 Chronology of Water Supply and Sewerage Development

Information indicating name of scheme, year of construction, design and present capacity of major facilities

1.11 Reports on Past and On-going Studies

a. 1996 Loss Reduction and System Strengthening Project

b. Feasibility Study to Explore Groundwater Source in Karachi

c. Other Studies

(The team has copies of report of "1985 Water Supply Master Plan" and "1988 Sewerage Master Plan")

1.12 Organizational Chart of Karachi District Government

Organization chart and number of staff in respective department/division

1.13 Organizational Chart of KW&SB with Staffing

a. Number of staff in the related department/division

b. Distribution of staff by age and degree of graduate

c. Brief explanation of the duty/work of each department/division

1.14 Water Quality Management

Any additional information, if available, will be useful for the study, while some of these were already collected.

a. National strategy for water quality management

b. Major laws and regulations related to waters

c. Water quality standards

- Coastal and marine
- Surface waters (rivers, lakes and reservoirs)
- Groundwater

d. Effluent standards

- Industrial wastewater
- Municipal wastewater

1.15 Water Quality Monitoring (WQM) System

a. Organizations which mandates the WQM

- Organization chart
- Roles and Activities of the WQM organization
- Staff, numbers and qualifications
- Annual budgets and financial sources
- Present problems

b. Present water quality monitoring activity in Karachi District

- Sampling points
- Sampling frequency
- Measurement parameters
- Laboratory analyses
- Data analysis and interpretation
- Reporting and information dissemination

c. Organizations or institutions that mandates water quality analysis

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-Name, the address, telephone number

-Parameters to be tested and cost for analysis

1.16 Environmental Issues

Most of the information has already been colleted. Any additional information will be useful for the study.

a. National policy on the environmental issues

b. Laws, regulations and guideline for the respective environmental issue

c. Environmental Impact Assessment (EIA) (Already collected)

- Responsible Ministry and Organizations
- Guidelines
- Procedures

1.17 Water Right

a. Organization which mandates the water right

b. Organization which has the water right of each present water sources

1.18 Design Manual/Standard/Guideline of Facilities for Water Supply and Sanitation

2. Water Supply System

2.1 Service Area (Town Wise or Supply Zone Wise)

a. Boundary of service area (Please attach the map.)

b. Served population (through connection/public hydrant/tanker)

c. Number of service connections by categories of users

d. Water supply and demand

e. Service conditions (supply pressure, supply hours per day/supply frequency)

2.2 Water Sources with design and Present Capacity

a. Indus River (water right from Indus River, allocation among other water uses such as agricultural use)

b. Hub River/Dam (allocation between Baluchistan Province)

c. Damlottee Well Field

d. Other sources if there are or presently considered

2.3 Layout of Water Supply Facilities (from Intake up to Trunk Distribution Mains)(Please attach the map.)

2.4 Major Water Supply Facilities with the Capacity and Related Drawings

a. Intake facilities

b. Transmission facilities (Raw water and treated water)

- Dimensions
- Profile
- Year of construction

c. Water treatment plant

- Type of treatment
- Layout of each facility
- Hydraulic profile and flow diagram
- Single line diagram and instrumentation diagram

d. Reservoir

- Dimension
- Water level
- Service area or zone to be covered

e. Pump station
- Function of pump station (Booster for transmission/distribution)
- Number of units, type and dimensions
- Single line diagram and Instrumentation diagram

f. Distribution facilities
- Definition of distribution pipeline by size
- Function of distribution pipeline by size
- Inventory of pipelines by size, type (or materials), year of installation and length
- Layout of distribution network

2.5 Water Quality

a. Drinking water standards
b. Raw water quality of each water resource
c. Treated water quality at each purification plant
d. Tap water quality

2.6 Operation and Maintenance System

a. Staffing of each facility mentioned above
b. Distribution of staff by age and degree of graduate
c. Daily working hour, shift
d. Financial balance sheet for the last 5 years
e. Installation rate of individual water meter by category
f. Water tariff
g. Billing system
h. Penalty system against arrears of payment

2.7 Desalination Project

a, Number of plants
b. Location
c. Capacity
d. Start of operation
e. Investment cost
f. Operation and maintenance cost
g. Finance

2.8 Future Plan and On-going Projects besides above-mentioned desalination project

3. Sewerage System

3.1 Basic data

a. Boundary of service area by municipality or sewer district (Please attach the map.)
b. Served population (town wise, treatment district zone wise)
c. Wastewater generation estimates by user categories such as domestic, commercial, institutional and industrial users in each treatment district
d. Pollution load estimates

3.2 General Map (Please attach the map.)

General map showing the locations of existing major sewerage facilities such as sewer mains, pumping stations, and wastewater treatment plants, including sludge disposal sites if any in the study area

3.3 Existing Major Sewerage Facilities

a. Branch/Lateral sewers

Inventory by diameter, pipe material, length, and year of construction

b. Sewer mains (Trunk sewers)

- Inventory by diameter, pipe material, length, gravity/pressured and year of construction
- Capacity calculation sheets
- Layout
- Profiles

c. Pumping stations

- Lift stations
- Design and present capacity (the number of pump units, types and dimensions)
- Single line diagram and instrumental diagram

d. Wastewater treatment plants

- Design and present flow
- Design and present treatment capacity
- Design and present wastewater quality (Influent and effluent) such as BOD, COD, and SS
- Wastewater treatment process
- Sludge treatment and disposal process
- Size and type of each treatment facility
- Layout (Please attach the map.)
- Hydraulic profiles and flow diagrams
- Single line diagrams for control and instrumentation

e. Present technical problems and causes in operation and maintenance of existing sewerage facilities

3.4 Operation and Maintenance of the Existing Sewerage Facilities

a. Present activity of sewer cleaning and repair

b. Equipment for sewer cleaning

c. Present activity of water quality analysis, including latest monthly records

d. O/M staff training program

e. Present technical problems of existing facilities

3.5 Industrial Wastewater

a. Outline of the industrial zone

Surface area, factory number, major activity, water consumption, amount of wastewater

b. Organization which mandates the wastewater quality monitoring system

c. Community treatment system in Korangi industrial zone

Capacity, treatment process, investment and O&M cost, finance, start of operation

3.6 Project of Reusing the Effluent in the Wastewater Treatment Plant

a. Target facilities for reusing the effluent

b. Location

資料3-5

c. Capacity
d. Water quality for reuse
e. Start of operation
f. Investment cost
g. Operation and maintenance cost
h. Finance

3.7 Future Plans and On-going Projects, if any

4. Sanitation System

4.1 Basic Data

a. Population having access to appropriate sanitation system
b. Wastewater generation estimates
c. Pollution load generation estimates

4.2 On-site Sanitation Facilities

a. Type of on-site sanitation facilities
b. Population by type of on-site sanitation facility
c. Typical designs of facilities
d. Recommended on-site sanitation facilities if any

4.3 Community Sanitation Facilities

a. Type of community sanitation facilities
b. Population served by the type of community sanitation facilities
c. General layout of the wastewater collection system
d. Sludge disposal practice
e. Present management activity

5. Drainage System

5.1 Flooded and Inundated Records

a. Frequently flooded areas
b. Records of flood damages

5.2 Major Existing Drainage Facilities

a. General map, showing the drainage service districts and the locations of existing major storm-water drainage facilities such as storm sewer, storm-water reservoir, storm-water pumping stations, and outfall sewers
b. Inventory of the existing storm-water drainage facilities by
- Type, dimensions, and year of construction
- Capacity calculation sheet
- Profiles

5.3 Future Drainage Plans, if Any

6. Cost Survey

6.1Construction Materials/Works and Other Survey

a. Raw material

Cement, sulphur resistant cement, mild steel bars, hard grade steel products, sand, gravel, stone, timber, sewer pipe by diameter; e.g., R.C. pipes of 150mm, 200mm, 250mm, up to 2000mm diameter

b. Excavation, backfill, pipe laying, road pavement, shuttering, cement plaster 1:3, structural concrete, masonry, blockwork.

c. Labour costs per day; unskilled labour, skilled craftsman

d. Electricity, diesel oil, gas

e. Water analysis

f. Geological survey

g. Topography survey

6.2 Availability and personnel expense of Pakistani Consultants in the following field

a. Planning and design of water supply, sewerage and drainage systems

b. Environmental Impact Assessment

添付資料－４　資料収集リスト

資料4.　資料収集リスト

資料-4　資料リスト(■/収集資料/□専門家作成資料)

主管部長	文書管理課長	主管課長	情報管理課長	技術審査課長	技術審査入力者

		プロジェクトID		調査団番号			
地域	カラチ市	調査団名又は専門家氏名	カラチ市上下水道整備計画	調査の種類又は指導科目	開発調査(事前調査)	担当部課	
国名	パキスタン国	配属機関名	カラチ市上下水道局	現地調査期間又は派遣期間	平成17年7月4日～7月29日	担当者氏名	影山　正

番号	資料の名称	形態(図書、ビデオ、地図、写真等)	収集資料	専門家作成資料	JICA作成資料	テキスト	発行機関	取扱区分
	A. 統計資料・法令・基準							
A-1	Guidelines for Public Consultation	コピー	*				Pakistan Environmental Protection	■R・CR(　)・SC
							Agency, October 1997	
A-2	Sectoral Guidelines for Environmental Reports-	コピー	*				Pakistan Environmental Protection Agency	■R・CR(　)・SC
	Major Sewerage Schemes						November 1997	
A-3	Ministry of Defense, Military Engineering	オリジナル	*				Ministry of Defense, Pakistan	■R・CR(　)・SC
	Services, Schedule of Rates-2000							
A-4	Economic Survey 2004-2005	コピー	*				Ministry of Statistics, Pakistan	■R・CR(　)・SC
A-5	Socio-economic and Demographic Profile of Sindh, Nov '04	コピー	*				Pakistan Institute of Development	■R・CR(　)・SC
							Economics	
	B. 報告書・技術資料							
B-1	Korangi Sewerage & Wastewater Management	コピー	*				Karachi Water & Sewerage Board,	■R・CR(　)・SC
	Project (kWM-Project), PC-1 October, 1998.						Sewerage Components	
B-2	Project Directorate, Progress Report, upto	コピー	*				City District Government, Karachi,	■R・CR(　)・SC
	30 June 2005						Tameer-e-Karachi Programme	
B-3	Portfolio, Mid-Term Development Framework	コピー	*				City District Government, Karachi,	■R・CR(　)・SC
	2005-10, Urban Development							
B-4	Orangi Pilot Project, Institution and Programs	コピー	*				OPP and OPP Society; OPP-RTI,	■R・CR(　)・SC
	101st Quarterly Report, Jan. to March 2005						KASDA, OCT, RDT	
B-5	Katchi Abadis of Karachi, A Survey of 334	コピー	*	Guidelines			Perween Rahman	■R・CR(　)・SC
	Katchi Abadis, 2004							
B-6	From the Lane to the City	コピー	*				A WaterAid Report by Akber Zaidi	■R・CR(　)・SC
B-7	The Development in Pakistan and the Economic	コピー	*				Orangi Pilot Project-Research & Training	■R・CR(　)・SC
	and Social Changes Associated with it						Institute, Arif Hasan	
B-8	Proposal for a Sewage Disposal System for Karachi	コピー	*				Orangi Pilot Project-Research & Training	■R・CR(　)・SC
							Institute, Karachi, 1998	
B-9	Project Performance Audit Report on the Karachi	コピー	*				Asian Development Bank, November 2001	■R・CR(　)・SC
	Sewerage Project (Loans 1001and 1002-Pak[SF]							
	in Pakistan							
B-10	Karachi Vitalization Scenario Final Report,	コピー	*				JBIC	■R・CR(　)・SC
	November 30, 2004.							
B-11	Pakistan Environmental Agency , EIA Guidelines-	コピー	*				Pakistan Environmental Agency	■R・CR(　)・SC
	An Overview.							
B-12	Karachi, The Business Capital of Pakistan	コピー	*				Karachi Municipal Corporation	■R・CR(　)・SC
B-13	Water Loss Reduction and System strengthening Project PA-PK	コピー	*				Mott Macdonald International LTD.	■R・CR(　)・SC
	10519, Project Preparation, Draft Final Report. Vol.1, Main Report							
	April 1996							
B-14	Feasibility Study to Explore Groundwater Sources in Karachi	コピー	*				KWSB	■R・CR(　)・SC
	District, Draft Final Report, 2005							
B-15	Basic Fact 2002-2003	コピー	*				KWSB	■R・CR(　)・SC
B-16	Gulshan Town小配水区内配管網図2葉、Block6、7、14	オリジナル	*				KWSB	■R・CR(　)・SC
B-17	カラチ市水道料金請求書、書式	オリジナル					KWSB	■R・CR(　)・SC
B-18	4.1Final Statement 1997-98 to 2003-4	コピー	*					
B-19	Tameer-E-Karachi Programme, Project Directorate,	コピー	*				CDGK	■R・CR(　)・SC
	Progress Report upto June 2005							
B-20	Presentation on Tameer-E-Karachi Programme to Japanese	コピー	*				CDGK	■R・CR(　)・SC
	Delegation, 8th July 2005							
B-21	Appointment of Consultants for Formulation of Master	コピー	*				CDGK	■R・CR(　)・SC

資料4.　資料収集リスト

番号	資料の名称	報告書、ﾃﾞｰﾀ、地図、写真等)	収集資料	専門家作成資料	JICA作成資料	テキスト	発行機関	取扱区分
	Plan-2020 for the Development of Karachi							
B-22	Appointment of Consultants for the Development of Precise	ｺﾋﾟｰ	*				CDGK	ⓇR･CR(　)･SC
	Digital Base Map and Road Conditions, Transportation							
	Network & Revenue GISs for the Karachi Metropolis							
B-23	Flow Sheet of Karachi Bulk Water Supply	ｺﾋﾟｰ	*				KWSB	ⓇR･CR(　)･SC
B-24	Working Paper, Incressing Demand of Drinking Water for	ｺﾋﾟｰ	*				Irrigation & Power Department,	ⓇR･CR(　)･SC
	Karachi City						Government of Sindh	
B-25	Long Term Requirement Assuring Drinking Water Supply	ｺﾋﾟｰ	*				KWSB, Irrigation & Power Department	ⓇR･CR(　)･SC
	for Karachi upto 2025, (2400 Cusecs), 2002 October							
	本文の抜粋							
B-26	Programme Concept Note & TOR, Supporting Institutional	ｺﾋﾟｰ	*				World Bank	ⓇR･CR(　)･SC
	Reforms to Improve WSS Services in Karachi							
B-27	KWSB 職員研修センター関連資料	ｺﾋﾟｰ	*				KWSB	ⓇR･CR(　)･SC
	C.図面・地図		*					
C-1	Existing and Proposed Sewerage System A-0	ｺﾋﾟｰ	*				KWSB	ⓇR･CR(　)･SC
C-2	Existing Sewerage System with Pipe Sizes A-0	ｺﾋﾟｰ	*				KWSB	ⓇR･CR(　)･SC
C-3	カラチ市行政区分図	ｺﾋﾟｰ	*					ⓇR･CR(　)･SC

付属資料－５　物価調査表

資料5.　物価調査表

＜資料＞ パキスタン国カラチ市上下水道整備計画調査
物価調査表

(1) 一般経費・工事費　　(2005年7月末現在　交換レート:　1US$=Rs 60、 1US$=110円)

項　　目	単 位	金額 (Rs)	備考(仕様、納期等)
1.　事務所			
1) 事務所借上げ	平米／月	500	床面積200m^2、借用期間2年、電気・ガス・水道込み
2) 事務机	1卓	6 000	中級袖机付、1.8m　x　0.9m　程度
3) 椅子	1脚	1 500	
4) 本棚	1式	6 000	W1.8 x H1.8 鋼板製
5) キャビネット	1式	7 500	W1.8 x H1.9 鋼板製
6) スタンドライト	1台	2 500	
7) 扇風機	1台	1 500	
8) エアコン	1台	30 000	
9) エアコン取付費	1式	1 500	
10) 電話機	1セット	1 500	取付費込み
11) 携帯電話	1セット	6 000	
12) 電話加入料金	1回線	1 300	取付1回分費用
13) ファクシミリ	1台	20 000	付属品・設置費共
14) コピー機(リース)	1台・月	12 000	A3拡大・縮小機能付
15) コピー機(購入)	1台	115 000	A3拡大・縮小機能付
16) コピー料金(、モノクロ)	1枚	10	A4サイズ
17) コピー料金（カラー)	1枚	-	A4サイズ
18) パソコン、ディスプレー共	1台	30 000	ﾍﾟﾝﾃｨｱ4IV, HD-80G、ﾒﾓﾘｰ256MB、ﾓﾆﾀｰ17"
19) プリンター	1台	4 500	インクジェット、1440dpi以上
20) スキャナー	1台	4 000	
21) ソフトウェア		15 000	マイクロソフト・オフィス等
22) CD-RW	1枚	40～75	
23) CD-R	1枚	25～35	
24) 電気料金	kWh	9	1回線
25) A4コピー用紙		200	1袋500シート
26) 電圧安定器	1台	5 000	
27) 電気冷蔵庫	1台	17 000	300L程度
2. 雇人			
1) 技術者　1	1人・月	30 000	経験10年以下
2) 技術者　2	1人・月	45 000	経験15年以下
3) 技術者　3	1人・月	50 000	経験16年以上
4) 建築士　1	1人・月	100 000	経験20年以上
5) 建築士　2	1人・月	72 000	経験15年以上
6) 測量士	1人・月	40 000	
7) 測量助手	1人・月	27 000	
8) 事務職員	1人・月	18 500	

資料5.　物価調査表

項　　目	単 位	金額 (Rs)	備考(仕様、納期等)
9) 会計士	1人・月	25,000	
10) セクレタリー	1人・月	12,000～15,000	
11) タイピスト	1人・月	15,000	
12) ドラフトマン	1人・月	60,000	
13) ドライバー	1人・月	16,500	
14) オフィスボーイ	1人・月	15,000	
15) 一般工事監督者	1日	800	720～1070
16) 熟練労働者	1日	560	540～600
17) 未熟練労働者	1日	450	430～540
18) 重機オペレータ	1日	800	
19) 型枠大工	1日	650	600～710
20) 塗装工	1日	700	600～800
21) 機械工	1日	950	950～1000
22) 電工	1日	1,000	900～1000
23) 配管工	1日	950	750～950
24) 警備員	1日	14,500	
3. 車両			
1) 借上費(セダン)	1台・日	1,800	5人乗り(1500cc) 程度
2) 借上費(セダン)	1台・月	30,000	同上
3) 借上費(4WD)	1台・日	6,000	Land cruiser class
4) 借上費(4WD)	1台・月	35,000	同上
5) 購入費(セダン)	1台	＞1,000,000	5人乗り(1500cc) 程度
6) 購入費(4WD)	1台	＞4,500,000	Land cruiser class
7) ガソリン	1リットル	50	Rs225/gal.
8) ディーゼル・オイル	1リットル	31	Rs140/gal.
9) 軽油	1リットル	30	Rs135/gal.
10) エンジン・オイル		155	Rs700/gal.
4. 資機材			
1) 空送費（東京～カラチ）	1 kg	1,700	
2) ファイバーセメント管　ø200 mm	1ft	124.4	ゴムリング、敷設手間共
3) ファイバーセメント管　ø250 mm		183.7	
4) ファイバーセメント管　ø300 mm	1ft	237.0	〃
5) ファイバーセメント管　ø350 mm	1ft	296.3	〃
6) ファイバーセメント管　ø400 mm	1ft	353.1	〃
7) ファイバーセメント管　ø450 mm	1ft	385.1	〃
8) ファイバーセメント管　ø500 mm	1ft	450.3	〃
9) ファイバーセメント管　ø600 mm	1ft	622.1	〃
10) ファイバーセメント管　ø700 mm	1ft	853.2	〃
11) ファイバーセメント管　ø800 mm	1ft	1,125.8	〃
12) ファイバーセメント管　ø1000 mm	1ft	1,896.0	〃
13) 鉄筋コンクリート管　ø200 mm	1ft	136.6	ASTM-C-76 に準拠、ゴムリング、敷設手間共

資料5-2

資料5.　物価調査表

項　　目	単 位	金額 (Rs)	備考(仕様、納期等)
14) 鉄筋コンクリート管　ø225 mm	1ft	152.5	〃
15) 鉄筋コンクリート管　ø300 mm	1ft	231.8	〃
16) 鉄筋コンクリート管　ø375 mm	1ft	311.1	〃
17) 鉄筋コンクリート管　ø450 mm	1ft	341.6	〃
18) 鉄筋コンクリート管　ø600 mm	1ft	427.0	〃
19) 鉄筋コンクリート管　ø675 mm	1ft	624.6	〃
20) 鉄筋コンクリート管　ø750 mm	1ft	732.0	〃
21) 鉄筋コンクリート管　ø825 mm	1ft	1,021.1	〃
22) 鉄筋コンクリート管　ø900 mm	1ft	1,128.5	〃
23) 鉄筋コンクリート管　ø1050 mm	1ft	1,403.0	〃
24) 水道亜鉛めっき鋼管　ø200 mm	1m	2,435.4	材料費のみ
25) 水道亜鉛めっき鋼管　ø100 mm	1m	1,377.0	〃
26) 水道亜鉛めっき鋼管　ø50 mm	1m	661.8	〃
27) 水道亜鉛めっき鋼管　ø25 mm	1m	319.8	〃
28) 水道亜鉛めっき鋼管　ø20 mm	1m	234.6	〃
29) スルースバルブ　ø50 mm	1個	2,511.0	〃
30) スルースバルブ　ø25 mm	1個	1,527.6	〃
31) スルースバルブ　ø20 mm	1個	1,055.4	〃
32) PVC管　ø200 mm	1m	1,131.6	〃
33) PVC管　ø100 mm	1m	448.8	〃
34) PVC管　ø50 mm	1m	268.2	〃
35) PVC管　ø25 mm	1m	133.8	〃
36) マンホール(600mm)	1ケ所	9,180	〃
37) 水道ダクタイル鋳鉄管ø400 mm	1本	56,000	モルタルライニング　L=6m　付属品込み
38) 水道ダクタイル鋳鉄管ø500 mm	1本	79,000	モルタルライニング　L=6m　付属品込み
39) 水道ダクタイル鋳鉄管ø600 mm	1本	109,000	モルタルライニング　L=6m　付属品込み
40) 水道ダクタイル鋳鉄管ø700 mm	1本	133,000	モルタルライニング　L=6m　付属品込み
41) 水道ダクタイル鋳鉄管ø800 mm	1本	163,000	モルタルライニング　L=6m　付属品込み
42) 水道ダクタイル鋳鉄管ø900 mm	1本	201,000	モルタルライニング　L=6m　付属品込み
43) 水道ダクタイル鋳鉄管ø1000 mm	1本	250,000	モルタルライニング　L=6m　付属品込み
44) 水道ダクタイル鋳鉄管ø1100 mm	1本	293,000	モルタルライニング　L=6m　付属品込み
45) 水道ダクタイル鋳鉄管ø1200 mm	1本	349,000	モルタルライニング　L=6m　付属品込み
46) 水道ダクタイル鋳鉄管ø1500 mm	1本	525,000	モルタルライニング　L=6m　付属品込み
47) 舗装取り壊しと撤去	100ft^3	294.4	
48) ポンプ排水工(3日間)	1日当り	600.0	
49) 掘削工(深さ 0m から 1.5m)	100ft^3	2,250.6	
50) 掘削工(深さ1.5m から 2.4m)	100ft^3	2,514.6	
51) 埋め戻し工　15cm厚転圧	100ft^3	1,343.0	
52) 鉄筋	t	48,000.0	
53) 砂	1m^3	660.0	
54) 砂利	1m^3	1,380.0	
55) ポルトランド・セメント	kg	6.6	1袋　50kg
56) 構造用コンクリート工	1m^3	5,400.0	

資料5-3

資料5.　物価調査表

項　　目	単 位	金額 (Rs)	備考(仕様、納期等)
57) 基礎コンクリート工	$1m^3$	4,200.0	
58) 床モルタル工	$1m^2$	420.0	
4. セミナー・会議費			
1) ワークショップ/セミナー会場使用	1日	150,000	200人程度、コーヒー・ブレーク、昼食サービス費込み
2) ワークショップ/セミナー会場使用	半日	50,000	200人程度、コーヒー・ブレーク費込み

資料5.　物価調査表

＜資料＞　パキスタン国カラチ市上下水道整備計画調査
物価調査表

（2）測量費　　（2005年7月末現在　交換レート：1US$=Rs 60、 1US$=110円）

項　　目	単　位	金額 (Rs)	備考 （仕様、納期等）
1. 地形測量			
1）住居地区（高密度地区）	1ha	48,000	縮尺1:500 等高線1m 程度
2）住居地区（中密度地区）	1ha	43,200	〃
3）住居地区（低密度地区）	1ha	38,400	〃
4）農耕地	1ha	18,000	〃
2. 縦断測量			
1）平地	1km	6,000	縮尺1:500程度
2）丘陵	1km	7,200	〃
3）上下水道施設図面作成	1km	30,000	〃
3. 河川横断測量			
1）河川幅員　20～30m	1 断面	4,800	縮尺　1:200程度
2）河川幅員　50m	1 断面	6,000	〃
3）河川幅員　200m	1 断面	18,000	〃

（3）地質・土質調査費

項　　目	単　位	金額(Rs)	備考（仕様、納期等）
1. ボーリング費			
1）Φ66 粘性土、ｼﾙﾄ（軟弱土）	m	1,500	N<5
2）Φ66 砂質土	m	1,500	N<20
3）Φ66 砂質土	m	2,100	N<50
4）Φ88 砂質土	m	2,100	N>50
5）Φ88 粘性土、ｼﾙﾄ（軟弱土）	m	1,800	N<5
6）Φ88 砂質土	m	1,800	N<20
7）Φ88 砂質土	m	3,000	N<50
8）Φ88 砂質土	m	3,000	N>50
9）ｻﾝﾌﾟﾘﾝｸﾞ費	m	3,600	
2. 標準貫入試験			
1）ｼﾙﾄ	回	1,800	
2）砂質土	回	2,400	
3）固結ｼﾙﾄ	回	3,000	
3. 室内試験			
1）土の含水量試験	1試料	600	1試料につき3個
2）土粒子の比重試験	1試料	3,000	〃
3）土の粒度試験（粘土）	1試料	6,000	
4）土の透水試験	1試料	10,800	1試料につき１個
5）土の突固め試験（乾燥法）	1試料	7,200	
6）一軸圧縮試験	1試料	5,400	1資料につき2供試体
7）三軸圧縮試験	1試料	12,000	

資料5.　物価調査表

(4)　水質調査費（EPA Monitoring Laboratoryの利用）

項目	単位	金額(Rs)	備考（仕様、納期等）
1) pH	1資料	125	
2) Temperature	1資料	-	Free of charge
3) BOD	1資料	650	
4) COD	1資料	550	
5) TSS	1資料	125	
6) TDS	1資料	125	
7) Grease & Oil	1資料	400	
8) Phenolic compounds (as Phenol)	1資料	600	
9) Choride (as Cl)	1資料	250	
10) Cyanide (as CN)	1資料	400	
11) Sulphate	1資料	325	
12) Ammonia	1資料	300	
13) Fluoride (as F)	1資料	350	
14) Sulphide	1資料	300	
15) Anionic detergent (as MBAS)	1資料	450	
16) Pesticides, herbicides, fungicides	1資料	-	現在、この項目の解析は行わない。
and insecticides			
17) Cadminium	1資料	450	
18) Chromium (Trivalent and Heavale	1資料	275	
19) Copper	1資料	275	
20) Nickel	1資料	450	
21) Zinc	1資料	300	
22) Iron	1資料	275	
23) Lead	1資料	600	
24) Mercury	1資料	1500	
25) Selenium	1資料	600	
26) Silver	1資料	350	
27) Total toxic materials	1資料	-	
28) Arsenic	1資料	1300	
29) Manganese	1資料	275	
30) Barium	1資料	300	
31) Chlorine	1資料	150	
32) Boron	1資料	350	
33) Total phosphorous	1資料	600	
34) Colour	1資料	100	
35) Turbidity	1資料	125	
36) Alkalinity	1資料	200	
37) Phosphate	1資料	250	
38) Total hardness	1資料	300	
39) Calcium	1資料	200	
40) Maganesium	1資料	200	
41) Total coliforms	1資料	200	
42) Fecal coliforms	1資料	300	
43) Noise level determination	1ヶ所	400	
44) Particulate matter examaination	1ヶ所	500	
45) Stack gas analysis	1ヶ所	2,500	SOx, NOx, CO, CO_2, O_2, stack temperature
46) Transportation	1式	1,000	
47) Service	1式	1,000	

資料5.　物価調査表

(5) 報告書作成費

項　　目	単　位	金額 (Rs)	備考 (仕様、納期等)
1) A-4 サイズ報告書(50ﾍﾟｰｼﾞ)	1冊	250	ｺﾋﾟｰ　簡易製本費含む
2) A-4 サイズ報告書(100ﾍﾟｰｼﾞ)	1冊	450	ｺﾋﾟｰ　簡易製本費含む

(6) 資料収集・データ解析費

項　　目	単　位	金額 (Rs)	備考 (仕様・納期等)
1) 気象資料収集・降雨資料解析	一式	30,000	降雨資料 (20年程度の降雨記録紙)
			の購入、解析
2) 環境関連資料収集	一式	6,000	環境関連報告書等10冊程度購入・コピー代
3) 都市計画、上下水道関連資料収集	一式	30,000	都市計画関連、排水施設計画図
			(約100枚程度) 購入

付属資料－６　ローカルコンサルタント・リスト

資料6. ローカルコンサルタント・リスト

ローカルコンサルタント・リスト

1. Engineering Associates (Karachi)

項　　目	内　　容
1. 企業名	Engineering Associates
2. 責任者名	Mr.A.H.Siddiqui/Mr.Ahsan Siddiqui
3. 所在地	AL-9, 15th Lane, Off Khayaban-e-Hilal, Phase VII, D.H.A., Karachi-75500, Pakistan.
4. 電話番号	Telephone: 021-5841821-24,5841637.
5. ファックス番号	Fax: 021-5841825
6. メールアドレス等	E-mail: info@eaworld.com Web-site: www.eaworld.com
7. 創立年	1981
8. 従事専門家数	500 人以上
9. 業務タイプ	海外関連業務
10. 業務分野・経歴等:	環境経済解析、環境計画・プロジェクト準備、プロジェクト内外の大気汚染・騒音・振動の測定、環境評価、社会経済・環境調査、環境評価と報告書作成、パキスタン国内の法制と法律上の構造にかかる助言、環境に係る主要な国際的書類作成/会議の準備等。
11.その他	

2. Engineering Systems (Karachi)

項　　目	内　　容
1. 企業名	Engineering Systems
2. 責任者名	Mr.Azhar Siddiqui/Mr.Ahsan Siddiqui
3. 所在地	AL-9, 15th Lane, Off Khayaban-e-Hilal, Phase VII, D.H.A., Karachi-75500, Pakistan.
4. 電話番号	Telephone: 021-5841638-39, 5841825.
5. ファックス番号	Fax: 021-215841825
6. メールアドレス等	E-mail: info@eaworld.com Web-site: www.eaworld.com
7. 創立年	1996
8. 従事専門家数	41 人
9. 業務タイプ	国際／国内関連業務
10. 業務分野・経歴等:	地理学的情報システム（GIS）、記録とマルチメデイア解析
11.その他	

3. National Environmental Consulting (Pvt) Limited (Karachi, Lahore)

項　　目	内　　容
1. 企業名	National Environmental Consulting (Pvt) Limited
2. 責任者名	Mr.Azhar Uddin Khan
3. 所在地	Karachi: Plot No.39 and 41C, 22nd Commercial Street, Off Khayaban-e-Iteehad, Phase II Extension, Defence Housing Authority, Karachi, Pakistan. Lahore: Plot No 16, Perfect SITE, 22-KM, Rohi Nullah, Gajju Matta Ferozepur Road, Lahore, Pakistan.
4. 電話番号	Karachi: 021-589334142, Lahore: 042 –5274527-30.
5. フアックス番号	Karachi: 021-5893340, Lahore: 042-5274526.
6. メールアドレス等	E-mail: necpvt@wol.net.pk Web-site: www.nec.com.pk
7. 創立年	1993
8. 従事専門家数	50 人
9. 業務タイプ	国内業務
10. 業務分野・経歴等:	環境アセスメント、環境計画、環境審査、健康・安全問題を含む審査、環境リスク解析、環境モニタリングと制御、災害対処計画策定、環境に関わるトレーニング実施、プロセス技術と施設設計（上水道と水処理、汚水／汚泥処理、公共・工業廃棄物の処分、大気汚染防止、騒音防止、品質管理等）。パイロット施設の計画、クローム回収工場と飲料水処理技術。
11. その他	

4. Quality Concerns (Karachi)

項　　目	内　　容
1. 企業名	Qualiy Concerns
2. 責任者名	Mr.Naeem Sadiq
3. 所在地	F-15-2, 4th Gizri St. DHA. Karachi, Pakistan.
4. 電話番号	Telephone: 021-5831008.
5. フアックス番号	Fax: 021-5831099.
6. メールアドレス等	E-mail: help@qualityconcerns.com Web-site: www.qualityconcerns.com
7. 創立年	1995
8. 従事専門家数	4 人
9. 業務タイプ	国内業務
10. 業務分野・経歴等:	ISO14000 基準に基づく環境関連コンサルタント業務、レーニング実施、及び環境影響評価。
11.その他	

5. Quality International Consultants (Pvt.) Ltd. (Karachi)

項　目	内　容
1. 企業名	Quality International Consultants (Pvt.)
2. 責任者名	Mr.Sanaul Haque
3. 所在地	P.O.Box No. 2111, 3-F-16-9, Nazimabad , Karachi, Pakistan.
4. 電話番号	Telephone: 021-6619638.
5. フアックス番号	Fax: 021-6620284
6. メールアドレス等	E-mail: sana9000@khi.paknet.com.pk
7. 創立年	1997
8. 従事専門家数	6人
9. 業務タイプ	国内業務
10. 業務分野・経歴等:	ISO 9000, ISO 14000, OHSAS 18001, SA 8000, CE Marking, UL 証明、TQM 等。主要な環境関連業務としては皮革、自動車、繊維等を含む。
11.その他	

6. Raasta Development Consultants (Karachi)

項　目	内　容
1. 企業名	Raasta Development Consultants.
2. 責任者名	Mr.Simi Kamal (Chief Executive)
3. 所在地	3-C, Commercial Lane 2, Zamzama Boulevard Clifton, Karachi-75600, Pakistan
4. 電話番号	Telephone: 021-5870735, 5375654
5. フアックス番号	Fax: 021-5865305
6. メールアドレス等	E-mail: staff@raasta.com Web-site: www.raasta.com
7. 創立年	1989
8. 従事専門家数	12人
9. 業務タイプ	国内／海外業務
10. 業務分野・経歴等:	定性的・定量的な解析、測量、評価。能力開発と組織開発。
11.その他	

7. SGS Pakistan (Pvt.) Limited.(Karachi)

項　　目	内　　容
1. 企業名	SGS Pakistan (Pvt.) Limited
2. 責任者名	Ms.Tasneem Ilyas
3. 所在地	22/D, Block-06, PECHS Karachi, Pakistan.
4. 電話番号	Telephone: 021-4540260-65
5. フアックス番号	Fax: 021-4523491
6. メールアドレス等	E-mail: tasneem_ilyas@sgs.com Web-site: www.sgspak.com.pk
7. 創立年	1952
8. 従事専門家数	200 人
9. 業務タイプ	国際業務
10. 業務分野・経歴等:	1. 外業：適地選定と適合性の調査・検討；煙突排気モニタリング；制御システムの効率検討；騒音・照明に係るモニタリング、工業廃水に係る統計的設計に基づいた処理場排水、地下水と飲料水、土性、汚泥サンプル等の採取と準備。 2. 試験室業務：採取資料の環境パラメターに基づく現地での分析、適正な工場処理方式選定のための解析、国内外の規制に基づいた排水の分析、飲料水の分析、灌漑施設の土質分析、汚染地域回復の調査・解析、石油工業汚泥分析、畜産に関わる樹木・草植物類の毒性試験、煙突排気ガスモニタリング。 3. コンサルタント・サービス：環境影響評価、環境法制、危険科学物質貯蔵リスク評価、環境方針策定、プロジェクトのポスト・モニタリング、試験室設置と危険廃棄物処分地の調査等のコンサルタント業務。 一般的な環境に係るトレーニング、環境管理システムの構築、さらに、ISO　14000 に基づく認定。
11.その他	

8. MM Pakistan (Pvt) Ltd.

項　　目	内　　容
1. 企業名	MM Pakistan (Pvt) Ltd.
2. 責任者名	Mr. Khalid Munir, Manager, Business Development Division.
3. 所在地	Dolmen Estate, 1st Floor, 18C, Block 7-8, Union Commercial Area, Shaheed-e-Millat Road, Karachi-75350, Pakistan.
4. 電話番号	Telephone: +92-21-4543944, 4380518
5. フアックス番号	Fax: Fax: +92-21-4524819
6. メールアドレス等	E-mail: mmp@cyber.net.pk
7. 創立年	1986
8. 従事専門家数	263 人
9. 業務タイプ	国内業務
10. 業務分野・経歴等:	環境アセスメント、汚濁防止プロジェクト、廃棄物処理・管理、汚染土壌処理・調査、用途地域計画、景観計画、エコロジー、水資源管理、危険リスク評価、農業、経済計画、エネルギー計画。
11.その他	カラチ市上下水道に係る業務実績あり。

9. Engineering Consultants International (Pvt) Ltd.

項　　目	内　　容
1. 企業名	Engineering Consultants International (Pvt) Ltd.
2. 責任者名	Mr. A.F.Babar Sani, General Manager, Geospatial Technologies.
3. 所在地	29Block 7/8, Darul Aman Housing Society, Sharae Faisal, Karachi-75360.
4. 電話番号	Tel:+92(21)454-2290 (4 lines)
5. フアックス番号	Fax: +92(21)454-5255
6. メールアドレス等	E-mail: info@ecil.com　URL: http//www.ecil.com
7. 創立年	-
8. 従事専門家数	-
9. 業務タイプ	国内、国際業務
10. 業務分野・経歴等:	地図作成、都市計画、社会調査、環境評価、GIS。
11.その他	カラチ市都市計画マスタープラン、GIS 構築に係る実績あり。

出典: 現地での聴聞、 *Ministry of Environment, Government of Pakistan, "National Directory of Environmental Consulting Firms, May 2004."*

資料6-5

付属資料－７　事前評価表

資料7. 事前評価表

事業事前評価表（開発調査）

作成日：平成 17 年 8 月 26 日
担当グループ：地球環境部第 3 グループ

１．案件名
パキスタン国「カラチ市上下水道整備計画」
２．協力概要
（１）　事業の目的 2025 年を目標年次としたカラチ市の上下水道システム改善に係るマスタープランが策定され、優先事業に係るフィージビリティ調査が実施される。また、調査全体を通じ、先方実施機関の人材育成・技術移転が行われる。 （２）調査期間　2005 年 12 月から 2007 年 12 月（24 ヶ月） （３）総調査費用　3.65 億円 （４）協力相手先機関　カラチ市上下水道局（Karachi Water and Sewerage Board: KWSB） （５）計画の対象（対象分野、対象規模等） 対象分野：上下水道 対象地域：カラチ市全域（人口約 1,300 万人）及び同市への水源及び導水ルート
３．協力の必要性・位置付け
（１）　現状及び問題点 パキスタン国の経済産業の中心的役割を担うカラチ市は人口約 1300 万人を擁する最大の都市である。年間人口増加率が年 4～5%と大きいため、水需要の増加に水道水源の確保、導水施設の拡張、配水管網の整備等の水道整備が追いつかないため、給水サービスも 3～6 日の隔日に 2～3 時間等と厳しい状況を強いられている。また、配水管が整備されていない地域等では、民間の給水車から高い料金を払って水を確保するような不公平な給水も一般化している。一方、下水道は現在 30%程度の普及と言われているが、下水配管の整備不良、水路や河川の水質悪化、膨大なごみ投棄による水路の閉塞、幹線管路の未接続による処理場の低稼働率等の問題を抱えている。 カラチ市では 85 年には上水道の、88 年には下水道のマスタープランが策定され、これらの結果を踏まえて整備が実施されてきているものの、既に 20 年近くの年月が過ぎ、市を取り巻く社会環境の変化から計画内容が乖離してきている。そのため、抜本的な見直しを行い、将来の上下水道の施設整備、運営方法の合理化、技術の向上等のソフト面を含めた総合的な上下水道整備の戦略が必要とされている。 （２）　相手国政府国家政策上の位置づけ 連邦政府では、2025 年を目標とした「パキスタン水分野戦略（Pakistan Water Sector Strategy）」（2002 年 10 月）を策定し、水資源、上下水道（都市部、村落部）工業用水と廃水処理、灌漑と排水、水力発電、環境、洪水制御の各セクターに対し、2005～2011 年の中期戦略、2025 年までの長期戦略を定めている。このうち、都市の上下水道分野は、水道普及率 96%、下水道普及率 80%の達成、財政の強化、水質の向上、情報管理の向上等を目標とし、そのため約 51 億ドルの予算を計上している。 一方、大統領や首相のイニシアティヴにより、同国の大都市の総合的な都市開発を目的に「メガシティ開発調整委員会」が設置され、対象都市の一つであるカラチ市に対し、連邦、州、カラチ市、関連ドナー等が参画し、統一的な取り組みを図ることが期待され

ている。上下水道の整備は都市基盤の重要な分野であり、本調査に対して期待が寄せられている。

（３） 他国機関の関連事業との整合性

カラチ市における上下水道施設の整備は、これまで ADB、世銀等の支援によって実施されてきた。ADB は本年、都市基盤の開発手法の策定、市当局と関連機関の組織改革と技術力の向上、緊急プロジェクトの選定、財政力の強化等を対象に技術協力ローンによる調査を実施しており、同調査の結果は、将来の支援に結びつけられる予定。また、世銀は本年 7 月から 3 年間の予定で KWSB の組織改善に関する支援プログラムを実施している。

ADB や世銀とは本開発調査のプロセスの中で、密にコンタクトを取り、意見交換を行うことで重複を避け、効果・効率的な支援ができるように努める。特に ADB との協力のデマケについては、ADB の今後の支援内容が明確になった時点で検討を行うこととする。

（４） 我が国援助政策との関連、JICA 国別事業実施計画上の位置づけ

我が国は、対パキスタン国別援助計画に明らかであるようにカラチ市活性化支援の重要性を認識し、2005 年から「カラチ市活性化シナリオ調査（JBIC）」などを実施してきており、これらのスタンスは ADB やパ国とも共有を図ってきている（なお、パキスタンに関しては現時点において JICA 国別事業実施計画は未完成）。また、JBIC が 1994 年に「カラチ上水道改善事業（Karachi Water Supply Improvement Project）」 ローンを開始しており、本事業は 2006 年まで継続される予定である。本事業では、JBIC はカラチ市への給水水源のひとつであるハブダムから引かれた浄水場とポンプ場の建設、インダス川から引かれたピプリ浄水場の改善を行うための資金についての融資を行っている。

なお、本開発調査の結果を踏まえた事業化について、有償資金協力の可能性も考えられ、本調査プロセスにおいては JBIC を常に巻き込んでおく必要がある。

４．協力の枠組み

（１）調査項目

（ａ）【フェーズ１】基礎調査：以下に関する情報収集・分析

- 既存のマスタープランのレビュー
- 既存資料及び情報の収集・分析
- 水源・上水道施設現況調査
- 下水・排水施設現況調査
- 水質調査
- 地域開発計画、土地利用、社会経済状況
- 自然、環境条件
- 住民意識調査
- 上下水道に関する法制度、政策、行政システム
- 実施機関の組織、運営面での評価
- 関連する計画、プロジェクトのレビュー及び分析
- 上下水道に係る課題の抽出
- 緊急プログラムの選定

（ｂ）【フェーズ２】マスタープラン作成

- 緊急プログラムに係るプレ・フィージビリティ・スタディ実施（必要に応じて実施）
- 水需要量予測の設定

・廃水の質・量予測の設定
・包括的計画枠組の形成、基本方針、目標、戦略の設定
・既存上下水道システムの最適化・改善に係る計画
・公平な配水計画
・カラチ市都市開発計画と整合の取れた水源及び導水システムの計画
・運営費削減のためのエネルギー削減方策に係る計画
・水質改善に係る計画
・施設整備計画
・初期環境影響評価（IEE)支援
・経営改善に係る計画
・組織育成に係る提言
・概算事業費の算定
・段階的整備計画の策定
・事業評価と優先プロジェクトの選定

（c）【フェーズ3】優先プロジェクトに関するフィージビリティ・スタディ
・補足実測調査（土質調査・地形測量）
・上下水道施設の概略設計
・施設運転・維持管理計画、人材育成計画
・施工計画・機材調達計画
・概算工事費の積算
・財務計画の策定
・環境影響評価（EIA)支援（必要に応じて実施）
・プロジェクトの総合評価及び提言
・実施スケジュールの策定

（2）アウトプット（成果）
（a）カラチ市上下水道整備マスタープランの策定
（b）優先プロジェクトの特定及びフィージビリティ・スタディ

（3）インプット（投入）：以下の投入による調査の実施
（a）コンサルタント（分野／人数）

分野	人数	分野	人数
総括/上水道計画	1	下水道計画	1
上水道施設計画	1	下水道施設計画	1
上水道管路計画	1	水利用実態調査/社会分析	1
機械、電気設備	1	施工計画/事業費積算	1
水文/水理	1	組織/維持管理	1
水質	1	財務・経済分析	1
無収水低減計画	1	環境配慮	1
		GIS データ-ベース構築	1

資料7-3

（b）その他／研修員受入れ
上下水道分野について以下を実施する。
- C/P 研修（平成 17 年度は 2 名の受入予定）
- 技術移転セミナーの実施

5．協力終了後に達成が期待される目標

（1）提案計画の活用目標
- 当該 M/P がカラチ市の都市開発計画に反映される
- 策定された計画が順次実施される（目標年次 2025 年）

（2）活用による達成目標
- カラチ市の上下水道環境が改善される

6．外部要因

（1）協力相手国内の事情
（a）政策的要因：政権交代等により提案事業の優先度が低下しない。
（b）行政的要因：当該分野に対する予算が適切に配分される。
（c）経済的要因：対外債務の増大、失業率の上昇等がなく、経済状況変化による整備資金が不足しない。
（d）社会的要因：対象地域の治安が悪化しない。

（2）関連プロジェクトの遅れ
特になし。

7．貧困・ジェンダー・環境等への配慮（注）
- 大規模な取水量の増加に伴い、導水路、幹線路を市街地へ埋設する場合、民有地の入手や周辺住民の移転を要する可能性があるため、それらの住民の経済・社会的影響に配慮する。
- 住宅地に隣接して浄水場や処理場を建設する場合には、騒音、臭気等の拡散に配慮する。

8．過去の類似案件からの教訓の活用（注）
- 1997 年 9 月に ADB 借款が決定したコランギ・ランディ地区の下水管路と処理場建設計画は、地元 NGO が、下水管路の整備計画の内容等に対し、強い反対運動を起こし、これにより中止されたまま今日に至っている。現地には依然として、同 NGO が活動しており、本 M/P で策定されるプロジェクトの実現化にも、活動を展開する可能性が高い。前回の経験を活かし、NGO、市民団体、他ドナー等の関係組織と事前に十分に協議し、対応する必要がある。
- 過去に実施されたマスタープランを初め各種調査があり、これらの多くは実施段階で財政的問題や関係機関間の調整不足等の各種要因のために実施が遅れたり、変更・中断したケースがある。これら計画をレビューし、問題点、障害、解決の方法等、今回の M/P で教訓とすべき事項等を十分に把握し活かすことが肝要である。

9．今後の評価計画

（1）事後評価に用いる指標
（a）活用の進捗度
- 本調査結果に基づく、JICA、JBIC、他ドナー等による事業化の状況。
- カラチ市都市計画への本調査結果の反映の状況。
- パキスタン側が本調査にて提案された優先プロジェクトの実施を計画し、そのための予算措置の状況。

（b）活用による達成目標の指標
・水道普及率、下水道普及率、上下水道料金回収率

（2） 上記（a）および（b）を評価する方法および時期
・ 調査終了後5年後、10年後の評価
・ 目標年次である2025年

資料7-5