

## 1. パプアニューギニア国からの要請書



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INDEPENDENT STATE OF PAPUA NEW GUINEA

NATIONAL CAPITAL DISTRICT COMMISSION

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REQUEST FOR PORT MORESBY SEWERAGE MASTER PLAN  
REVIEW AND FEASIBILITY STUDIES

NATIONAL CAPITAL DISTRICT

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APPLICANT : The Government of the Independent State of Papua  
New Guinea.

PROJECT TITLE : Port Moresby Sewerage Master Plan Review and  
Feasibility Study.

ECONOMIC SECTORS : Infrastructure - Sewerage

PROJECT TYPE : Technical Assistance

TOTAL PROJECT COST : One Million Kina (K1,000,000)

RESPONSIBLE MINISTRY : Ministry of Provincial Affairs

IMPLEMENTATION AGENCY : National Capital District Commission

## I. PROJECT DESCRIPTION

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### 1.0 BACKGROUND

#### 1.1 Current Situation of the Sector:

The last comprehensive sewerage study for the city of Port Moresby was done in 1980. Since then a review has not been done to assess the implementation of the study recommendations and the upgrading of the network and the treatment facilities to cater for the developments and the growth of the city.

Amongst many other reasons, proper implementation of the 1980 study was not thoroughly carried out due to conflicts as to who was to administer the Water Supply and Sewerage operations of the National Capital District. Until recently a clear political stand was announced by the present Government, thus enabling the National Capital District Commission the responsibilities to manage the services and therefore it now faces up with the a bigger task of augmenting the network services that had been lagging.

At present the Water Supply Study is being carried out by the JICA Study Team and when network operations are improved the sewer system must have sufficient capacity to carry the Waste Water or else the overflows of sewerage will pollute the environment and create unhygienic conditions for human habitation.

To avoid any future sewerage pollution crisis a sewerage master plan is absolutely necessary to rehabilitate and expand the system for the National Capital District. There are two distinctive sewerage catchment areas of the city. There is the inland catchment area and the coastal catchment area both separated by a ridge of hills running parallel with the coastline.

Raw sewerage is discharged at the outfalls along the coastline which is creating environmental pollution to the marine life and its ecosystem. It is important that the sewage is treated before it is discharged into the sea.

The Sewerage Sector in the last few years has gradually deteriorated and with the impacts on the Economic and Social Sectors, the National Government of PNG has recognized the importance and has shown concern to improve the situation. One of the causes of the problem leading to the deterioration of the delivery of service has been inadequate funds to expand and develop the system.



1.2 Problems to be solved in the sector:

Port Moresby is the National Capital and is the largest city in Papua New Guinea. It has a population of approximately 200,000 and is the center of Administration and Economy of the country.

Some major problems to solve are;

- (i) To upgrade and augment the existing trunk mains and the minor reticulation mains throughout the network currently over loaded.
- (ii) To upgrade sewage treatment facilities.
- (iii) To construct new sewage treatment plants at the sea outfalls prior to discharging into the sea.

1.3 Necessity and importance of improvement in the sector:

In an urban environment the combination of water supply and sewage gives a sanitary and healthy environment for human life by reducing water-borne diseases. The inadequacy of such services hinders development which then indirectly affect the country's economy in many ways.

1.4 Relations between the sector and the project:

The proposed Project is to rehabilitate the Port Moresby Sewerage System which will directly improve the present service capacity of the NCD and to strengthen the management base to optimize the level of performance which is vital for economic progress and social development.

1.5 Reasons why Japan's aid is requested:

Japan has been one of the major donor Countries that has been assisting Papua New Guinea to improve its Social Sector and Economy. In its endeavor to do so Japan Government through JICA has given its assistance in the Water Supply Sector to conduct the Port Moresby Water Supply Development Plan Study.

We are therefore seeking a similar assistance for the sewerage infrastructure after the Urban Development and Services Study funded by the World Bank is accomplished.

Basically the goals anticipated to achieve through the study are:-

- Improved Organization Efficiency
- Increased Revenue and Cost Recovery
- Improve sanitation facilities and to reduce environmental pollution.

The Strategy for this approach is seen to be necessary as it will greatly assist the Implementation Agency in a more orderly form and thus improve its capability for self supporting and sufficiency gradually enabling the NCDC to be financially capable in developing an environmentally friendly pollution free sewerage system.

## 2.0 TERMS OF REFERENCE

### 2.1 Objective of the Study

To comprehensively review the Master Plan formulated under the World Bank Urban Development and Services Study and conduct Feasibility Studies for the rehabilitation and expansion of the sewerage system in the National Capital District for the next twenty years.

#### (i) Short Term Objectives

- To augment and upgrade under capacity sewer mains surcharging causing overflow into open stormwater drains thus creating pollution to the environment.
- To locate small treatment plants at various sea outfalls to prevent pollution by direct raw sewage discharge into the sea.

#### (ii) Medium and Long Term Objectives

- To review the sewerage master plan and carry out feasibility studies to program implementation stage by state in line with development.
- To improve large scale sewerage treatment facilities.

- To improve the efficiency of the organization to be self reliant and self supporting and efficient in its operations.
- (iii) The relationship between the project and objectives, and how the project will contribute to the accomplishment of the objectives.
- The review of the Master Plan that will be produced under the Urban Development and Services Study funded by the World Bank and enable feasibility studies to be carried out to identify projects to be implemented over the next 10 -15 years.
  - Technical assistance will help improve the efficiency of operation and management of the system so that the organization and administration will be self supporting.

*Note: The proposed Urban Development and Services Study mentioned above is funded by the World Bank. The scope of works that will be covered in the study are;*

- i) *To create an Urban Development Plans;*
- ii) *To create Urban Services Master Plan;*
- iii) *To look into the Institutional and Financial strengthening of the Organization.*

*It is envisaged that the Urban Development and Services Study will identify projects under the Urban Development and Services Master Plans which will require prioritization through economic evaluations and feasibility studies to be conducted to strategically organize investments over the planning horizon*

*The status of this study at present is that the Consultants were invited and have submitted technical proposals and are being evaluated.*

## 2.2 Scope of the Study

### Phase I

To make a comprehensive review of the World Bank funded Urban Services Study Master Plan recommendations describing the immediate measures for augmentation of the network and the treatment facilities.

Phase II

- Prioritized projects and make preliminary engineering plans to be sufficiently accurate and complete to indicate the location, arrangement, evaluation and principal features of the project, which will serve the basis for sound cost estimates, including drawings, design criteria and analysis, all sufficiently detailed to define the project.
- Prepare costs estimates for the engineering, construction, operation and maintenance of the projects recommended. Each of the cost items shall be defined in terms of local and foreign exchanges.
- Prepare financial analysis and economic analysis of the project with due account to social costs and benefits and determine consumer's ability to pay in terms of sewerage and water supply tariffs.
- Prepare a financial plan based on the required investment of the recommended project, indicating source of funds and timing of the existing and projected financial operation including yearly estimate of revenue, operating expenditure, borrowing etc., and its effects on water and sewerage rates increase and expected prices escalation.

2.3 Training Component/Technical Transfer

(i) Training of National Engineers.

- National Engineers from NCDC are all qualified, however there is still a need for further training by working with JICA experts in this study.
- The national counterparts should be involved in all aspects of the study from Phase I and II.

(ii) Technical Transfer

- Should some technical transfer from the JICA experts will be required outside of PNG, Papua New Guinea counterparts should be sent to Japan to work with the experts and gain the knowledge required.

Some aspects of the existing system that may be proposed for upgrading and/or replacing are of high technology, and therefore our national engineers need to be trained and visit similar systems to appreciate the technology.

2.4 Outline of the Project and Cost Estimates

- (i) The project basically covers the review of the Master Plan whereby the projects will be identified and prioritized after feasibility studies are made, so that implementation can take place strategically.
- (ii) The cost estimates are based on the 1993 rates to carry out the study and monitoring system - Westpac Exchange rate dated - June 29, 1993  
K1.00 = US \$1.0165.

2.5 Location of Plan

- (i) The area will cover the build up areas of the National Capital District which will include other areas that are recommended to be developed but require the upgrading of the sewerage services for further development.
- (ii) The Sewerage study will be subject to the World Bank funded Urban Development and Services Study for the National Capital District and its recommendations and findings.

3.0 **BENEFIT, EFFECT AND PUBLICITY OF THE PROJECT**

3.1 Population that will benefit directly from the project:

- Approximately 250,000 in 1995 from population projections.

3.2 Population that will benefit indirectly from the project:

- Approximately 60,000 covering some fringe settlements and villages in the hinter land.

3.3 Area that will benefit from the project:

- The total area of the National Capital District, covering 248 km<sup>2</sup> and other parts of the Central Province including villages 90km along Magi Highway, particularly those who commute daily to work into the city. See map attached.

### 3.4 Economic and social effects of the area:

#### (i) Current Situation

According to the JICA Study, about 30% of the city's population have been suffering from low pressures of the supply system. Some high elevated areas have been without water for months or only get the supply during off-peak periods.

When the Water Supply problems are restored for the city the Sewerage problems will worsen.

With a lot of mining projects underway in PNG the City is experiencing a lot of economic activities and the influx of people into the city is steadily increasing creating substantial burden on the existing services.

#### (ii) Expected Effect of the Project

- a) Create more economic activities resulting in job employment opportunities.
- b) More residential developments to decrease the housing problem being faced now.
- c) People will enjoy better and efficient services with minimum amount of pollution to the environment.
- d) Healthy environment will heavily reduce chances of people having water-borne diseases.

#### (iii) Publicity

At present the National Government on PNG and the residents of the city are aware that the Japan Government has financed the Port Moresby Water Supply Development Plan Study as a Grant-In-Aid Project. This has been publicized in the National TV, News and the continued efforts to support the Implementation Phase will win the respect for the Government of

Japan with its efforts to improve the needs in the Social Sector particularly its concern for basic human need of water.

In the same token the sewerage study will show that the Government of Japan is also heavily concerned about safety and pollution free environment.

#### 4.0 REQUEST TO OTHER DONORS

4.1 Is there any request made to other donors for assistance closely related to this project?

Yes

4.2 If yes, please fill in below

(i) Name of the donors;

The World Bank

(ii) Title and outline of the assistance;

Urban Development and Services Study - Technical Assistance

(iii) Possibilities that the donor will extend the assistance requested;

The World Bank has extended assistance to fund the study. We are currently evaluating proposals and the study will hopefully commence in September/October 1993.

(iv) In the case where other donors do not extend assistance, please describe in detail appropriateness and effectiveness of this project.

N/A

(v) In the case where other donors extend loans, please describe the reason why Japan's Grant Aid is requested for the project.

The Scope of the Urban Development and Services Study only covers the Development Plan and Master Plan of Services to identify the needs. After the Master Plans of services are made through the World Bank Study

then the projects will have to be prioritized. This will require feasibility studies and detail design for implementation.) For that reason we are requesting Japan Grant In Aid to conduct the studies for the sewerage services and possibly finance urgent projects for implementation.

## 5.0 PRIORITY

5.1 This is the only submission under the development survey scheme.

## 6.0 MINISTRY AND AGENCY IN CHARGE OF THE PROJECT

### 6.1 Outline of implementing agency:

#### (i) Implementing Agency

NATIONAL CAPITAL DISTRICT COMMISSION  
P O BOX 7270  
BOROKO, NCD  
PAPUA NEW GUINEA

#### (ii) Outline

The National Capital District Commission was established in 1990 after the NCDC Act 1990 was passed in Parliament. As a Municipal Authority one of the functions is to provide service infrastructure including water supply and sewerage.

#### (iii) Organization Chart of NCDC

SEE APPENDIX A.

#### (iv) Authority and Functions of the Agency

SEE APPENDIX B

#### (v) Personnel

REFER TO APPENDIX A



(vi) Budget (Revenue and Expenditure) for 1990/1991

REFER TO CLAUSE 10.2

6.2 Outline of supervising Ministry (Please describe in detail):

DEPARTMENT OF PROVINCIAL AFFAIRS UNDER THE MINISTRY OF PROVINCIAL AFFAIRS.

(i) Organization Chart of the Ministry (in general)

REFER TO APPENDIX C

(Please mark the responsible department and division in charge of the project and implementing agency)

REFER TO APPENDIX C

(Please attach detailed organization chart pointing out the responsible department, division, and sections in charge of the project and implementing agency)

(ii) Authorities and duties of the Ministry

NOT AVAILABLE

(iii) Personnel (Please mention the number of staff, workers and employees of the Ministry and the responsible department, division and section)

NOT AVAILABLE

(iv) Budget (Revenue and Expenditure)

(If mentioned in local currency, please state the latest foreign exchange rate of the currency to the U.S. dollar or the Japanese yen)

REFER TO APPENDIX D

*Note: Due to the changes in the Government and it's Goals to make changes in the Ministry of Provincial Affairs, a firm outline and structure can not be provided in detail.*

## 7.0 PREPARATION

### 7.1 Project Site (Please attach photographs and maps of the site with the various scales including that of 10,000:1):

- (i) (a) Address of the Site

Not Applicable

- (b) Total Area of the Site

Area = 248 km<sup>2</sup>, see map attached.

- (ii) Land Preparation

- (a) To which extent has the land been expropriated for the project?

NOT APPLICABLE

- (b) When will the expropriation of the land be completed?

NOT APPLICABLE

(Please attach the laws and procedures concerning expropriation of land)

### 7.2 Electricity, Water Supply, Telephone, Drainage and Other Facilities:

Electricity and telephone facilities are well advanced in terms of the latest technology and quite capable of meeting the city demand. The facilities are manned by qualified staff.

Water supply, drainage sewerage and road work are still lagging behind in terms of proper planning and qualified people have to be recruited and/or trained to improve and upgrade the system to acceptable standards.

(Please describe the extent to which above mentioned incidental facilities have been prepared)

7.3 Is there any information, statistics and data regarding geographical, geological, meteorological, oceanographical situations, etc:

(If any, please attach those information)

8.0 CAPABILITIES OF THE IMPLEMENTING AGENCY

(Please describe the capabilities of the agency to manage, sustain, and operate the project)

8.1 Current situation:

Water and Sewerage Division of the NCDC is capable of maintaining, sustaining and operating the projects. The current operation is totally manned by all National Staff.

The present staff of the NCDC Water Supply and Sewerage Division are not been properly trained to take on the daily tasks assigned. It has been found that the day to day operations are not properly recorded and that the Accounting System is quite complex and therefore information can not be easily extracted when required.

8.2 Problems of the agency:

- a) Proper planning is lacking.
- b) Limited finance to only operate and maintain the system.
- c) Remuneration to attract good qualified national staff is not attractive to manage, maintain, operate and monitor the system.
- d) There is a big gap between the unskilled, semi skilled and professional staff.

8.3 Improvement Plan (If any, please describe in detail the contents of such a plan that will enable the Agency to handle the project more effectively and efficiently):

- (i) Tariffs have been increased and the new tariffs have been enforced straight after the NCDC 1993 Budget was Gazetted.

Port Moresby Sewerage Master Plan Review and Feasibility Studies

(ii) NCDC Corporate Plan - 1991 - 1995 for Public Health and Safety, Section 4.3.10 Sewerage Disposal.

See Appendix E.

9.0 OPERATIONAL AND MANAGEMENT OF THE PROJECT

9.1 Personnel (Please fill in the number of personnel):

	Current	When the Project is completed
Ministry	N/A	N/A
Implementing agency	1005	1020
Responsible Personnel	3	6

(In the case of hospital, research institutes, training centres, please attach the functional personnel charts).

(In the case where necessary personnel are not yet secured, when and how this is to be done)

NOT AVAILABLE

Port Moresby Sewerage Master Plan Review and Feasibility Studies

- 9.2 **Budget** (Please fill in the budget in the table below):  
 (If mentioned in local currency, please refer to the latest foreign exchange rate of the currency to the US dollar or Japanese yen).

(Kina Million)

	2 years ago (1991)	1 year ago (1992)	Now (1993)	When the Project will be completed (1995)
Supervising Ministry	N/A	N/A	N/A	N/A
Agency	1.66	1.66	1.86	1.86
Budget of the Project	N/A	N/A	N/A	

Exchange Rate : 29 June 1993: K1.00 = US \$1.0165

(In the case where additional budgetary allocations is needed for the implementation of the project, please answer the following question).

- (i) Has the additional budget been already allocated?

NO

- (ii) If no, how and when will the additional budget be allocated?

From the NCDC Internal Budget and will be allowed if and when specific projects are identified for implementation.

9.3 **Technical Abilities of Local Staff:**

- (i) Please describe technical abilities of local staff operating the project.

The Local Staff on the Professional Level are qualified to operate the project, however additional skills and some Overseas training is required to fully understand and operate the project.

Port Moresby Sewerage Master Plan Review and Feasibility Studies

(ii) Please describe in detail educational background of those who are in charge of the operation and management of the facilities and equipment.

POSITION	EDUCATION BACKGROUND	ADDITIONAL TRAINING	WORK EXPERIENCE
a) Manager (Water & Sewerage)	Degree in Civil Engineering	Water & Sewerage Management  Supervisory Training  Basic Computer Training	11 Years
b) Water & Sewerage Engineer	Degree in Civil Engineering  Management Introduction	Project Planning	14 years
c) Manager Treatment Plant	Qualified Tradesmen (Fitter & Turner)		22 years

10. LIST OF RELATED PROJECTS

(Please fill in below if there is a project executed by another donor country or international organization in related areas).

10.1 Name of donor:

NEW ZEALAND GOVERNMENT

10.2 Project Title:

KOKI SEWERAGE STAGE 1

10.3 Project Outline:

CONSTRUCTION OF PUMPING STATIONS, RISING MAIN, GRAVITY SEWERS AND SEA OUTFALL

## Port Moresby Sewerage Master Plan Review and Feasibility Studies

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### 10.4 Type of Assistance (grant, loan, technical assistance, etc.):

GRANT

### 10.5 Project Period:

8 MONTHS

### 10.6 Relations with this Project:

PART AND PARCEL OF THE PROPOSED JOYCE BAY TRUNK SEWER AND SEA OUTFALL

If there are many projects, please attach a list of those projects explained in the same way

NOT APPLICABLE

## 11.0 TECHNICAL ASSISTANCE

### 11.1 Has technical assistance been extended to this project?

NO

### 11.2 Is technical assistance needed for the implementation of this project:

YES

### 11.3 If no, please describe the reasons why technical assistance is not needed:

### 11.4 If yes, please fill in below:

- (i) Short-term experts (2 persons) (Sector: Water, Sewerage)
- (ii) Long-term experts (1 person) (Sector: Water, Sewerage)
- (iii) Acceptance of trainees (1 person) (Course: Civil Engineering Design and Project Supervision/Management)

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## II. GENERAL DEVELOPMENT PLAN

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1. TITLE OF THE PLAN

(Please attach the whole volume of the latest general development plan).

PUBLIC INVESTMENT PROGRAMME

2. ECONOMIC AND SOCIAL SITUATION

(Please mention the basic statics of economic fundamentals).

2.1 GNP 233 million kina (1990):

2.2 National Income, Sector by Sector (1989):

Mining	12%
Agriculture	33%
Subsistence Agriculture	14%
Industry	13%
Services	38%

2.3 Unemployment Rate:

Not Available

2.4 Inflation Rate:

7.0% (1990)

2.5 Growth Rate - GDP:

- 3.7% (1989)

2.6 Balance of International Payments:

Surplus of Kina 30 million (1990)

2.7 Labour Population (as a whole, and sector by sector):

REFER TO APPENDIX F



2.8 Debt Service Ratio:

26% (1990)

31% (1989)

2.9 Outstanding Debts:

Not Available

2.10 Major Items of Exports and Imports and their value:

REFER TO APPENDIX F

2.11 Major Trading Partner:

REFER TO APPENDIX F

2.12 Population and its Growth Rate:

3.7 million (1988 estimates) 2.7 Growth Rate (1980-88 estimates)

2.13 Average Life Expectancy (Male and Female):

Average Males/Females 54 years

2.14 Death Rate and Birth Rate:

Crude D/R (per 1000) 13.0%

Crude B/R (per 1000) 37.0%

2.15 Medical Structure:

Approximately 11,700 per physician

247 person per hospital bed

2.16 Ten Diseases most affecting the Nation:

Pneumonia, prenatal, diarrhoea, malaria, meningitis, tuberculosis, dermatopathy, subcutaneous, STD.

2.17 Illiteracy Rate (or Literacy Rate):

32%

2.18 Other Data:

Not Available

3. OUTLINE OF PLAN

3.1 Most Important Sectors in the Plan:

- Economic Sector
- Social Services
- Law and Order

3.2 Basic Objectives of the Plan:

- To increase the proportion of Government expenditure which is allocated to investment, and increase its impact on economic growth and rural employment by promoting investment in the non-mining private sector;
- To increase Government investment by a judicious use of aid finance and technical assistance, and by resource transfers from non-essential recurrent activities; and
- To concentrate public resources on improvement of health, education, law and order, infrastructural development and the promotion of smallholder-related activities which the private sector cannot adequately undertake.

3.3 How will the above-mentioned objectives be achieved?

The Public Investment Programme lists ongoing development programmes and projects receiving donor and/or Government financial support during the project and implementation period. A large portion of the Public Investment Programme is funded by donors with counterpart financing. The remainder is funded from internal revenue.

3.4 When will the plan be executed and completed?

The Public Investment Programme is a rolling five year plan updated each year.

3.5 Relations between this project and the general development plan:

This project is a component of the third point mentioned above relating to the basic objectives of the plan.

3.6 Is there any assistance that other donors have extended/will extend to the projects and/or programme listed in the general plan?

No

3.7 If yes, please give basic information on the assistance:

(a) Name of donor:  
Not Applicable

(b) Project Title:  
Not Applicable

(c) Project Cost:  
Not Applicable

(d) Type of Assistance (Grant, Loan, Technical Assistance, etc.):  
Not Applicable

(e) Project Outline:  
Not Applicable



## 2. S/W及びM/M



2. S/W及UM/M

SCOPE OF WORK  
FOR  
THE STUDY  
ON  
SEWERAGE SYSTEM  
OF  
PORT MORESBY  
IN  
PAPUA NEW GUINEA

AGREED UPON BETWEEN

NATIONAL CAPITAL DISTRICT WATER & SEWERAGE PTY. LIMITED  
(TRADING AS EDA RANU)

AND

THE JAPAN INTERNATIONAL COOPERATION AGENCY

Port Moresby, December, 10, 1996



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Mr. Shem Pake  
Managing Director,  
National Capital District Water & Sewerage Pty. Limited  
(trading as EDA RANU)



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Mr. Kila Ai  
Director,  
National Planning Office



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Mr. Takashi Dairaku  
Leader, Preparatory Study Team,  
Japan International Cooperation  
Agency

## I. INTRODUCTION

In response to the request of the Government of Papua New Guinea (hereinafter referred to as "the Government of PNG"), the Government of Japan decided to conduct the Study on Sewerage System of Port Moresby in Papua New Guinea (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force 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 PNG.

The present document sets forth the Scope of Work with regard to the Study.

## II. OBJECTIVES OF THE STUDY

The objectives of the Study are:

1. to formulate a master plan for improvement of wastewater management that contributes to the upgrading of sanitary and environment conditions and operation and maintenance in Port Moresby for the target year 2015, with reviewing existing plans; and
2. to conduct a feasibility study on the priority project(s) selected from the master plan, and
3. to transfer technology on planning methods and skills to counterpart personnel in the course of the Study.

## III. STUDY AREA

The Study will cover National Capital District.

## IV. SCOPE OF THE STUDY

### Phase I Master Plan

1. Collection and analysis of existing data and information of Port Moresby :
  - a) physical conditions (meteorology, topography, geology, etc)
  - b) socio-economic conditions and trends (population, industries, land use, social infrastructure, economic condition, awareness of the citizens on environmental sanitation, etc)
  - c) financial conditions
  - d) land usage conditions
  - e) legislation and regulations concerned with wastewater management
  - f) world bank project,
  - g) other relevant plans, and
  - h) environmental conditions (public health and hygiene, drinking water quality, environmental quality standards, environmental laws and regulations, etc)





2. Understanding of the present conditions in Port Moresby, such as :
  - a) existing network of sewer and sewage treatment plants
  - b) sanitation area
  - c) conditions of wastewater management (physical, operational, institutional, financial, human development aspects)
  - d) other infrastructure (water supply system)
  
3. Field survey, such as :
  - a) quality and quantity of current wastewater
  - b) quality of receiving public water body
  - c) initial environment evaluation (IEE)
  - d) awareness of the citizens on environmental protection and their willingness and affordability to pay
  - e) topographic survey
  
4. Evaluation of present conditions of wastewater management and identification of problems and issues with emphasis on :
  - a) physical aspects
  - b) operational aspects
  - c) legal and institutional aspects
  - d) financial aspects
  - e) socio-economic aspects
  - f) environmental aspects
  - g) relevant plans
  
5. Formulation of planning framework, forecasting :
  - a) population growth and urbanization
  - b) economic growth and changes in living conditions
  - c) industrial growth
  - d) trends in meteo-hydrology
  - e) changes of quality and quantity of wastewater
  
6. Establishment of goals and strategies, including :
  - a) sewerage / sanitation facility
  - b) wastewater treatment method
  - c) operation and management of organization
  - d) regulation
  - e) environment / hygiene education
  
7. Establishment of basic criteria, including :
  - a) quantity of wastewater
  - b) quality of wastewater
  
8. Formulation of master plan, including :
  - a) target year, area, population and wastewater quantity
  - b) sewerage district and subdistrict
  - c) preliminary design of facilities
  - d) operation and management plan
  - e) cost estimation
  - f) staging implementation plan



9. Evaluation of master plan, including :

- a) technical aspects
- b) financial aspects
- c) economic aspects
- d) social aspects
- e) environmental aspects

10. Selection of priority project(s) with emphasis on :

- a) financial aspects
- b) urgent necessity
- c) hygiene aspects
- d) other aspects

Phase II Feasibility study on the priority project(s)

1. In-depth survey and supplementary data collection, such as :

- a) topography
- b) geology
- c) hydrology
- d) meteorology, and
- e) environment impact assessment(EIA)

2. Establishment of basic policies about feasibility study

3. Preliminary design of facilities

4. Construction plan, including :

- a) equipment procurement plan

5. Operation and maintenance plans, including :

- a) guidelines for proper operation
- b) preventive maintenance
- c) rehabilitative maintenance
- d) operation and maintenance capability

6. Organization and institution and human resource development plans, including :

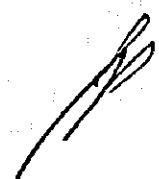
- a) organizational structure
- b) staffing and manpower development
- c) public education
- d) administrative capability

7. Financial plan, including :

- a) target level of cost recovery
- b) policy on mobilizing financial resources for investment
- c) tariff policy

8. Cost estimation

9. Implementation plan



10. Comprehensive project evaluation, including :
  - a) technical aspects (appropriate technology)
  - b) legal and institutional aspects
  - c) financial aspects
  - d) social aspects
  - e) economic aspects
  - f) environmental aspects

11. Conduct of technical transfer seminar

## V. SCHEDULE OF THE STUDY

The Study will be carried out in accordance with the tentative schedule as attached herewith. The schedule is tentative and subject to be modified when both parties agree upon any necessity that will arise during the course of the Study.

## VI. REPORTS

JICA shall prepare and submit the following reports in English to the Government of PNG.

1. Inception Report:

Twenty (20) copies at the commencement of the first work in Papua New Guinea.

2. Progress Report (1):

Twenty (20) copies at the end of the first work in Papua New Guinea.

3. Interim Report:

Twenty (20) copies at the commencement of the second work in Papua New Guinea.

4. Progress Report (2):

Twenty (20) copies at the end of the second work in Papua New Guinea.

5. Draft Final Report:

Twenty (20) copies at the commencement of the third work in Papua New Guinea.  
The Government of PNG shall submit its comments within one (1) month after JICA's receipt of the Draft Final Report.

6. Final Report:

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

## VII. UNDERTAKINGS OF THE GOVERNMENT OF PAPUA NEW GUINEA

1. To facilitate the smooth conduct of the Study, the Government of PNG will take necessary measures:
  - (1) to secure the safety of the Japanese study team (hereinafter referred to as "the Team")
  - (2) to permit the members of the Team to enter, leave and sojourn in Papua New Guinea for the duration of their assignment therein, and exempt them from foreign registration requirements and consular fees,
  - (3) to exempt the members of the Team from taxes, duties, fees and any other charges on equipment, vehicles, and other materials brought into Papua New Guinea for the conduct of the Study,
  - (4) to exempt the members of the Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Team for their services in connection with the implementation of the Study,
  - (5) to provide necessary facilities to the Team for the remittances as well as the utilization of the funds introduced into Papua New Guinea from Japan in connection with the implementation of the Study,
  - (6) to secure permission for the Team to enter into private properties or restricted areas for the implementation of the Study,
  - (7) to secure permission for the Team to take all data and documents including photographs and maps related to the Study out of Papua New Guinea to Japan, and
  - (8) to provide medical services in case of necessity. Its expenses will be chargeable to the members of the Team.
2. The Government of PNG 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 gross negligence or willful misconduct on the part of the member of the Team.
3. EDA RANU shall act as a counterpart agency to the Team and also as a coordinating body in relation with other governmental and non-governmental organizations for the smooth implementation of the Study.
4. EDA RANU shall at its own expense, provide the Team with the followings, in cooperation with other organizations concerned:
  - (1) available data and information related to the Study,
  - (2) additional survey related to the Study, if necessary,
  - (3) counterpart personnel and supporting staff,
  - (4) suitable office space with necessary equipment in Port Moresby

(5) credentials or identification card.

#### VIII. UNDERTAKINGS OF JICA

For the implementation of the Study, JICA shall take the following measures:

1. to dispatch, at its own expense, the Team to Papua New Guinea, and
2. to pursue technology transfer to counterparts personnel in the course of the Study.

#### IX. CONSULTATION

JICA and EDA RANU will consult with each other in respect of any matter that may arise from or in connection with the Study.

TENTATIVE SCHEDULE

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Work in PNG															
Work in Japan															
Report	IC/R			PR/R <1>		IT/R			PR/R <2>			DF/R			F/R

IC/R: Inception Report  
 PR/R: Progress Report  
 IT/R: Interim Report  
 DF/R: Draft Final Report  
 F/R : Final Report

MINUTES OF MEETING

FOR

THE STUDY

ON

SEWERAGE SYSTEM

OF

PORT MORESBY

IN

PAPUA NEW GUINEA

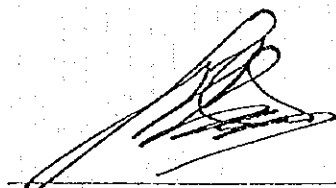
AGREED UPON BETWEEN

NATIONAL CAPITAL DISTRICT WATER & SEWERAGE PTY. LIMITED  
(TRADING AS EDA RANU)

AND

THE JAPAN INTERNATIONAL COOPERATION AGENCY

Port Moresby, December, 10, 1996



Mr. Shem Pake  
Managing Director,  
National Capital District Water & Sewerage Pty. Limited  
(trading as EDA RANU)



Mr. Takashi Dairaku  
Leader, Preparatory Study Team,  
Japan International Cooperation  
Agency



Mr. Kila Ai  
Director,  
National Planning Office

In response to the official request of the Government of the Papua New Guinea (hereinafter referred to as "the Government of PNG"), the Japan International Cooperation Agency (hereinafter referred to as "JICA"), dispatched the Preparatory Study Team, headed by Mr. Takashi DAIRAKU (hereinafter referred to as "the Team"), to Papua New Guinea from December 2nd to 12th, 1996 to discuss the Scope of Work for the Study on Sewerage System of Port Moresby in Papua New Guinea (hereinafter referred to as "the Study"). During the stay in Papua New Guinea, the Team held a series of meetings with National Capital District Water & Sewerage Pty. Limited (trading as EDA RANU) (hereinafter referred to as EDA RANU), National Planning Office (hereinafter referred to as NPO) and other authorities concerned with the Government of PNG and conducted a reconnaissance on the Study area. The list of those who attended these meetings is shown in the APPENDIX 1.

The main items which were discussed and agreed by both sides are as follows;

1) The Study area

Both the Team and the Government of PNG agreed that geographical area of the Study will be area of National Capital District. In the case that the proposed sewage treatment facility site/s be out of National Capital District, such site/s shall also be included in the Study area.

2) The title of the Study

Both side agreed that the title of the Study will be "The Study on Sewerage System of Port Moresby in Papua New Guinea". In the Study, the World Bank study of "Urban Development and Services Study" shall be reviewed.

3) Steering committee

Both sides agreed that NPO shall organize "Steering Committee" which shall be empowered to make decisions and take responsibilities for the recommendation of the Study. It shall include, at least, EDA RANU, National Capital District Commission (NCDC) and the Department of Environment and Conservation. The members of the Steering Committee will be assigned by the end of March, 1997.

4) World Bank study

Both sides agreed that NPO shall be a coordinating body between World Bank study of "Urban Development and Services Study" and the Study to avoid the interference.



5) Industrial wastewater

Both sides agreed to include the management of industrial wastewater in the Study.

6) Stormwater

Both sides agreed that stormwater will not be included in the Study, because of that it has already been studied by the World Bank. If necessary, it will be confined as a review in the Study.

7) Possible site/s for sewage treatment facility

Both sides agreed that EDA RANU has the responsibility to acquire the neighboring consensus and the agency permit for smooth implementation of topographic and geological survey and environmental study on the possible site/s for sewage treatment facility, and EDA RANU takes necessary measures to acquire the land for future sewage treatment facility.

8) Counterpart team

EDA RANU shall organize "Counterpart Team" which will cooperate with the Study Team. The members of the counterpart team shall consist, at least, of those who are responsible for the following fields.

- a) Sewerage planning and design
- b) Sewerage system operation
- c) Organization and management
- d) Accounting
- f) Sanitation and environment education

The members of the counterpart team will be assigned by the end of March, 1997.

9) Monitoring data

Both sides agreed that long term hydrological and meteorological data will be utilized from those which are acquired in Papua New Guinea.

10) Available data, information, office and vehicles for the Study

The Team requested EDA RANU to provide available data and information, appropriate number of vehicles with drivers, a suitable office space with furniture, telephone and access to a facsimile machine for the team of the Study. EDA RANU confirmed the following equipment and facilities will be made available:

- a) Available data and information concerned
- b) At least 2 vehicles with drivers
- c) Office space with furniture

d) Telephone services and access to a facsimile machine for local communication

11) Counterpart training

EDA RANU side requested that the transfer of technology would be realized also through training in Japan. The Team convey the request through NPO to the JICA Headquarters.

12) Technology transfer seminar

The Team suggested that it would be necessary to organize a technology transfer seminar in the course of the Study. EDA RANU agreed to the suggestion and would request JICA to perform the seminar at an appropriate time.

13) Environment Impact Assessment(EIA)

Both sides agreed that in the Study, EIA will be limited to provision of sewage treatment and disposal facilities. In the study, EIA doesn't include wider aspects. EDA RANU will coordinate discussions between parties concerned. Also, EIA will be carried out based on the requirements of the Department of Environment and Conservation.

14) Protection of inland and marine environments

Both sides agreed that it would be necessary for consultations to be held between the Study Team, EDA RANU and the Department of Environment and Conservation to determine the effluent quality standards to protect the inland and marine environments.

APPENDIX 1

ATTENDANCE LIST

Papua New Guinea Side :

- \* National Planning Office (NPO)
  - Mr. Kila Ai                      Director
  - Mr. Kelly Matoli              Assistant Director
  - Ms. Nosing Zanggo          Principal Planning Officer
  - Mr. Joe Kenken                Senior Programmes Officer
  - Ms. Nancy Ebbes              Assistant Secretary
  - Mr. Masayoshi Ono          JICA Adviser
  
- \* National Capital District Water & Sewerage Pty. Limited.  
(trading as EDA RANU)
  - Mr. Brian Hull                 Executive Chairman
  - Mr. Shem Pake                 Managing Director
  - Mr. Billy Imar                 Acting Chief Engineer
  - Mr. Renato Crisostomo      Manager, Sewerage Operation
  - Mr. Joseph Jangett          Acting Works & Planning Engineer
  - Mr. John Rose                 Engineering Adviser

Japanese Side:

- \* Japanese Embassy
  - Mr. Yukiharu Kobayashi      Second Secretary
  
- \* Japan International Cooperation Agency (JICA PNG Office)
  - Mr. Masahiro Kobayashi      Representative Officer
  
- \* JICA Mission
  - Mr. Takashi Dairaku          Leader, Sewerage Planning,  
Kyoto Municipal Government
  - Mr. Toshiya Satoh             Study Planning Officer (Project Officer),  
Second Social Development Study  
Division, JICA
  - Mr. Hiroshi Tsujihara         Sewerage Treatment Planning,  
Dept. of Sewerage Planning Division,  
Ministry of Construction
  - Mr. Hajime Sakurai            Sewerage Facility Design,  
Nihon Suido Consultant Co., Ltd.
  - Mr. Kiyoshi Hasegawa         Water Quality/Environment,  
Sumiko Consultants Co., Ltd.
  - Mr. Yoshito Nakamura         Organization/Management, Asahi & Co.



### 3. 質 問 状



### 3. 質問状

## Questionnaires for the Project

1. General Information
2. Environmental Data
3. Water Supply
4. Sewerage
5. Ground Water Pollution
6. Solid Waste Management
7. Others

**Note:**

If you have related data as indicated in following pages, please mark in the "Yes" column. If not, please mark in the "No" column. Here is the sample.

NO.	Item	Description	Yes	No
1. 1. 1	Latest Socio-economic indices	(1) GNP and GDP	*	
		(2) Population	*	
		(3) Past and future population growth rate		*

And in the case of marking in the "Yes" column, please fill in "Where materials are available", and "Name of materials", as following.

	Yes	No	where materials are available	Name of Materials
(1) GNP and GDP	*		"A" University, Faculty of Economy	National Statistics
(2) Population	*		-ditto-	-ditto-

Where enough spaces are not available for your descriptions in the following tables, please write on other sheets referring the numbers of this questionnaire.

We also appreciate it very much if you can collect described available data and information before our arrival (2 Dec 1996) in PNG. Thank you.

1. General Information			
No.	Item	Description	Yes No
1.1	Socio-Economic		
1.1.1	Latest Socio-economic indices	<p>(1) GNP and GDP (trend and growth data)</p> <p>(2) Population (country and city)</p> <p>(3) Past and future population growth rate</p> <p>(4) Industrial, agricultural and mining products (by item)</p> <p>(5) Foreign trade (quantity and value)</p> <p>(6) Price level (Public and Private)</p> <p>(7) Public health condition</p> <p>(8) Disaster (including soil erosion/land slide, etc)</p> <p>(9) Others</p>	
1.1.2	Existing development plans and reports	<p>(1) Economic development plans</p> <p>(2) Transportation development plan</p> <p>(3) Industrial development plan</p> <p>(4) Mining and agricultural development plan</p> <p>(5) Other development plan</p>	
1.1.3	Budget, Expenditure and Organization Structure	<p>(1) Country level</p> <p>(2) Port Moresby City level</p>	
			where materials are available
			Name of materials



No.	Item	Description	Yes	No	Name of materials
1.1.4	Existing and on-going Water Supply and Sewerage development plans	Design, implementation schedule and current project status			
1.2	Maps to be used for field survey covering the City	Scale: 1/2,000-1/50,000			
1.3	Geological data (1) Geological maps, covering the study area				
1.4	Meteorological data (1) Monthly rainfall data (2) Temperature (3) Stream-flow records (4) Others				
1.5	Ecological data (1) Flora (2) Fauna (3) Others (National Parks/Sanctuary				
1.6	Seismological data				



No.	Item	Description	Yes	No	where materials are available	Name of materials
	(3) Resettlement policy with execution plan					
	(4) Location of environmental vulnerable areas such as mangrove forest/wetland/tideland/Coral reef and island					
2. 2	Authority/Organization	Organization structure Chart				
2. 2. 1	National level responsible authority					
2. 2. 2	Authority in charge of planning					
2. 2. 3	Local level responsible authority					
2. 2. 4	Water analysis laboratory					
2. 2. 5	Budget and expenditure for the environmental protection					
2. 3	Water quality data	Annual data pollutants				
2. 3. 1	Ground water quality	-Min. Max. Average Table of standard				

No.	Item	Description	Yes	No	where materials are available	Name of materials
2.3.2	Surface water quality (river, lake, swamp, marsh, reservoir, etc)					
2.3.3	Coastal water quality					
2.3.4	Water quality standard (Public water)					
2.4	Assistance by another countries/agents	List of studies/projects -Name of studies/project -Name of donors -Components of study/project				
2.4.1	Proposed study/project	-Implementation year				
2.4.2	On-going study/project	-Grant or loan				
2.4.3	Complete study/project					

3. Water Supply		Item	Description	Yes	No	where materials are available	Name of materials
No.							
3.1	Plans		List of plan -Name -Effective year				
3.1.1	National level plan						
3.1.2	Land use plan						
3.2	Water supply organization		Organization structure chart				
3.2.1	Authority						
3.2.2	Organization plan						
3.2.3	Budget of organization						
3.3	Water resources organization		Organization structure chart				
3.3.1	Authority in charge of ground water						
3.3.2	Authority in charge of surface water						
3.3.3	Authority in charge of geological map						
3.4	Water supply system in the district (present & future plan)						
3.4.1	Supplied area						
3.4.2	Supplied population						

No.	Item	Description	Yes	No	where materials are available	Name of materials
3.4.3	Supplied amount					
3.4.4	General description of water supply facility	General drawings				
3.4.5	General description of pipe line networks	General drawings				
3.4.6	Financial situation	Financial statements				
3.4.7	Drinking water quality standard	Table of standard				
3.4.8	Water supply record	Annual data of standard items				
3.5	Assistance by another countries/agencies	-Min, Max, Average				
3.5.1	Proposed study/project					
3.5.2	On-going study/project					
3.5.3	Complete study/project					

4. Sewerage		Item	Description	Yes	No	where materials are available	Name of materials
No.							
4.1		Plans					
4.1.1		National level plan					
4.1.2		Port Moresby					
4.2		Authorities/Organizations	Organization Structure Chart				
4.2.1		National level responsible authority (1) About NATIONAL CAPITAL DISTRICT commission	The NCDC Act 1990				
4.2.2		Authority in charge of planning					
4.2.3		Authority in charge of budget					
4.2.4		Authority in charge of construction					
4.2.5		Authority in charge of Operation and Maintenance					
4.2.6		Authority in charge of Discharged Water Control					
4.2.7		Authority in charge of Industrial Wastewater Control					

No.	Item	Description	Yes	No	where materials are available	Name of materials
4.3	Sewerage plan (present, future)					
4.3.1	Sewered Area					
4.3.2	Sewered population					
4.3.3	General Description of Sewerage Facility					
4.3.4	General Description of Pipe Line networks	General Drawing of Sewerage facilities				
4.3.5	Financial situations and cash flow situation					
4.3.6	Financial operation including yearly estimate of revenue					
4.3.7	Treated Water Standard	Table of Standard				
4.3.8	Date of Water Analysis (Raw water and Treated water)	Annual data -Min, Max, Average				
4.3.9	Consumer's ability to pay of sewerage tariff					
4.4	Assistance by another					
4.4.1	Countries/Agencies					



No.	Item	Description	Yes	No	where materials are available	Name of materials
4.4.2	Proposed Study/Project					
4.4.3	On-going Study/Project					
4.4.4	Complete Study/Project					
4.5	Maps showing existing sewerage/drainage system layout plans	Scale 1:2,000 - 20,000				
4.6	Flow monitoring and sampling in the existing sewers					
4.7	Design basis and operation maintenance system of existing sewerage facilities and o/m records					
4.8	Costs of materials, equipment, labors and land acquisition for sewerage system					
4.9	Qualities and quantities of commercial and industrial wastewaters produced in the project area					

5. Ground water pollution

No.	Item	Description	Yes	No	where materials are available	Name of materials
5.1	Authority/Organization	Organization Structure Chart				
5.1.1	National Level Responsible Authorities					
5.2	Ground Water Pollution Study	List of Study -Name -Executed year				
5.3	Assistance by another Countries/Agencies					
5.3.1	Proposed Study/Project					
5.3.2	On-going Study/Project					
5.3.3	Complete Study/Project					

6. Solid Waste Management No.	Item	Description	Yes	No	Name of materials where materials are available
6.1	Authorities/Organization	Organization Structure Chart			
6.1.1	National Level Responsible Authority	Organization Structure Chart			
6.1.2	Local Level Responsible Authority	Organization Structure Chart			
6.2	Present Situation of Solid Waste Management	Description of present situation			
6.2.1	Present Situation of Solid Waste Discharge				
6.2.2	Present Status of Solid Waste Discharge				
6.2.4	Present Status of Solid Waste Treatment				
6.2.5	Present Status of Solid Waste Disposal				
6.3	Present Situation of Counter Measure	List of countermeasure -Name of countermeasure -Executed year			
6.3.2	Urgently Required Area				
6.4	Cavass of significant industry to determinate type and amount of wastes				

7. Others

No.	Item	Description	Yes	No	where materials are available	Name of materials
7.1	Local Consultants					
7.1.1	Water supply and sewerage					
7.1.2	Environmental Engineering					
7.1.3	Water quality analysis					
7.1.4	Topographic survey					
7.1.5	Geological survey (incl/ boring)					
7.1.6	Economic Survey and Analysis					

No.	Item	Description	Yes	No	where materials are available	Name of materials
6. 4. 1	Industrial Pollution (1) Air Pollution (2) Water Pollution (3) Soil Contamination					
6. 4. 2	Toilet system, individual excretra disposal systems	Effluent qualities, sludge collection and disposal methods				
6. 4. 3	Public health condition	Water-born disease patients, hospital, health care system				



## 4. 面談者リスト





#### 4. 面談者リスト

##### 主要面会者リスト

氏名	職務
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##### 日本大使館

小林 雪治	2等書記官
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##### PNG JICA事務所

小林 正博	所長
岩上 憲三	所員

##### 国家計画局 (National Planning Office)

Mr. Kila Ai	Director
Mr. Joe Kenken	Senior Programmes Officer
Mr. Kelly Matoli	Assistant Director, Foreign Aid Management Division
Mr. Frank Agaru	Assistant Director, Bilateral Programmes
Mr. Masayoshi Ono	JICA Adviser, Foreign Aid Management Division
Ms. Nancy Ebbes	Assistant Secretary, Development Planning Division
Ms. Nosing Zanggo	Principal Planning Officer, Develop Planning Division
Mr. John Kol	Assistant Programmes Officer

##### 首都圏庁 (National Capital District Commission)

Mr. Gerard Poigeno	Deputy City Manager, Finance and Administration
Mr. Bernard Kipit	Manager, Planning and Research

##### 首都圏上下水道公社 (NCD Water & Sewerage Pty. Ltd. : EDA RANU)

Mr. Brian Hull	Executive Chairman
Mr. Shem Pake	Managing Director
Mr. Billy Imar	Chief Engineer
Mr. Renato Crisostomo	Manager, Sewerage Operations
Mr. Allan Nema	Manager, Water Operations
Mr. Joseph Jangett	Acting Works & Planning Engineer

氏 名	職 務
-----	-----

環境保全省 (Department of Environment and Conservation)

Mr. John Douglas	Technical Adviser
Mr. Michael Wau	Principal Water Resources Officer, Bureau of Water Resources
Mr. John Wilmot	Science Adviser and Acting Assistant Secretary, Finance and Administration
Mr. Wagi Genorupa	Senior Conservation Planner, Conservation Division
Mr. Robert Norombe	Assistant Secretary, Environment Division
Mr. Gunther Joku	Principal Environment Protection Officer Environment Division

保健衛生省 (Department of Health)

Mr. Andrew Posong	Assistant Secretary, Policy and Planning Division
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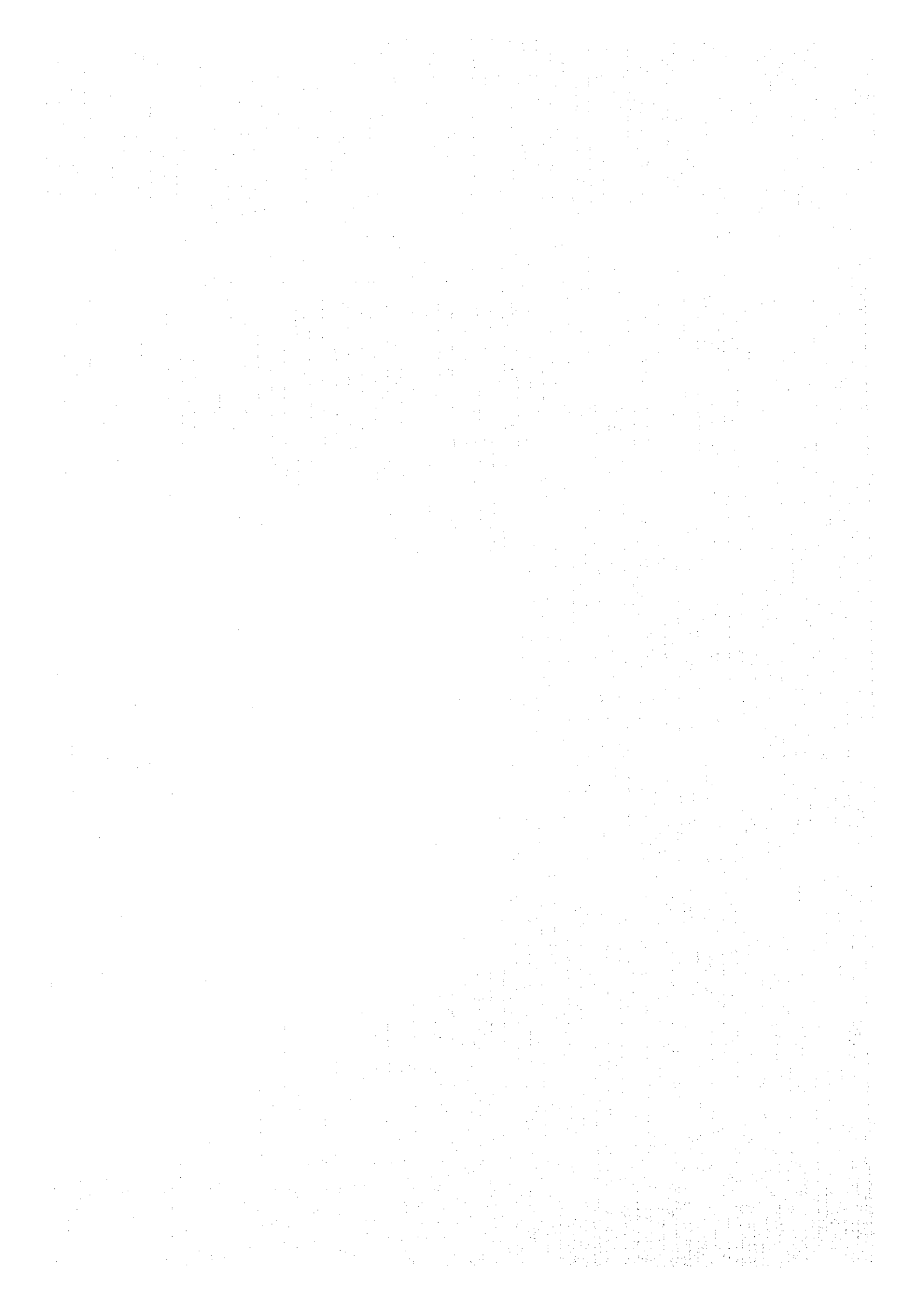
世界銀行 PNG 連絡事務所

Mr. Adhemar Byl	Sr. Economist, East Asian Pacific Infrastructure Division
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J C -- K R T A Consulting Group (PNG) Pty. Ltd.

Mr. John Rose	Operation Manager
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## 5. 収集資料リスト



5. 収集資料リスト

収集資料リスト

地図

番号	資料名	発行年月	サイズ	プロジェクト	入手先又は発行先	備考
M1	1/50,000 地形図、20m 間隔等高線 (2 枚)	1977,93 年	A 1	プロジェクト	National Mapping Bureau	
M2	1/100,000 地形図、40m 間隔等高線 (5 枚)	1978-94 年	A 1	プロジェクト	National Mapping Bureau	
M3	1/2,500,000 PNG 全図	1996 年	A 1	プロジェクト	National Mapping Bureau	
M4	1/12,500 住居図、ホ・トリスビ - 地区 (2 枚)	1996 年	A 1	プロジェクト	National Mapping Bureau	
M5	1/10,000ホ・トリスビ - 市内道路図 (2 枚)	1990 年	A 1	プロジェクト	National Mapping Bureau	
M6	約 1/20,000ホ・トリスビ - 市内航空写真(カラ)	1992 年	A 1	プロジェクト	National Mapping Bureau	
M7	約 1/20,000ホ・トリスビ - 市内航空写真(白黒 4 枚)	1994 年	A 1	プロジェクト	National Mapping Bureau	
M8	1/2,000 地形図、1m 間隔等高線 (9 枚)	1976-80 年	A 1	プロジェクト	National Mapping Bureau	7枚は PNG JICA 事務所
M9	1/50,000 ガイド図(1/2,000 図のガイド)	1976 年	A 1	プロジェクト	National Mapping Bureau	
M10	1/4,000 既設下水道管図 (20 枚) Sewerage Master Plan	1974 年	A 1	プロジェクト	Eda Ranu/Australian Dept. of Housing and Construction	
M11	Sewerage Augmentation Gordons Trunk Sewer (Key Plan と詳細図 1/250)計 5 枚	1980 年 12 月	A 1	プロジェクト	Dept. of Works & Supply (Binnie & Partners PNG)	
M12	General Layout Plan- Waigani Sewage Lagoons Desludging 1/2,000	1991 年	A 1	プロジェクト	National Capital District Commission (Beca Gure PNG)	
M13	The Digital Cadastral Database (Digital map)	1996 年	A 4	プロジェクト	National Mapping Bureau	
M14	Maps Price List	1996 年 5 月	A 4	プロジェクト	National Mapping Bureau	
M15	Maps Range of Products	1995 年	A 4	プロジェクト	National Mapping Bureau	

収集資料リスト

下水道関係

番号	資料名	発行年月	サイズ	ページ数	入手先又は発行先	備考
S1	Urban Development and Services Study for the National Capital District Draft Report (Vol #1 - #5)	1996年5月	A4	4	National Capital District/ World Bank (Wilbur Smith Assoc./Frame Harvey West & Maso)	
S2	Urban Development and Services Study for the National Capital District Working Paper (No #9, #10, #14, #20, )	1995年10月	A4	4	National Capital District/ World Bank (Wilbur Smith Assoc./Frame Harvey West & Maso)	Internal Review 用に 準備されたレポート
S3	Water Supply and Sanitation Sector Study Papua New Guinea, Vol. #1, #2	1996年3月	A4	4	アジア開発銀行 (KPMG Peat Marwick, Beca Gure)	PNG全国対象
S4	Study of Foul Water Sewerage for Waigani City Centre-Final Report	1984年9月	A4	4	National Capital Interim Commission (Beca Gure PNG) Pty Ltd	
S5	Port Moresby Trade Waste Policy Draft Report	1990年11月	A4	4	National Capital Development Interim Commission (PPK Babbage Consultants)	
S6	Hanuabada Village Feasibility Study Storm-water Drainage and Sewerage	1990年10月	A4	4	National Capital Interim Commission (Scott Furphy)	

収集資料リスト

下水道関係

番号	資料名	発行年月	サイズ	ホジナル・コピー	入手先又は発行先	備考
S7	Geological and Geophysical Survey of a proposed Outfall at Joyce Bay	1989年5月	A4	コピー	ICOD, ESCAP/UNDP Department of Mineral and Energy, M. Drechsler	
S8	Joyce Bay Sewerage Outfall Marine Survey Port Moresby Vol #1 (Geological Survey)	1989年2月	A4	コピー	The Waterboard (E88309) M. Drechsler	
S9	Environmental Plan Joyce Bay Sewerage outfall Study Vol #1 (2冊)	1988年6月 1987年6月	A4	コピー	The Waterboard	同じレポートでも 処理場予定地等が 異なる
S10	Engineering Assessment of the Options Available for Treating Sewage from Koki/Badili/Joyce Bay, Port Moresby	1987年7月	A4	コピー	The Waterboard (AM0931T) A. Mark, Project Engineer	
S11	Koki Sewerage Stage 1-Design Report (Draft)	1987年	A4	コピー	National Capital Interim Commission (Willing and Partners)	
S12	Port Moresby Sewerage - Paga Point Pumping Station Sewerage Outfall (Design Report)	1981年	A4	コピー	Public Health Engineering Section, Department of Works and Supply	
S13	Investigation and Concept Design Waigani Sewerage Treatment Augmentation	1981年12月	A4	コピー	Public Health Engineering Section, Department of Works and Supply	

収集資料リスト

下水道関係

番号	資料名	発行年月	サイズ	ホジカ・ジ・	入手先又は発行先	備考
S14	Port Moresby Sewerage Augmentation Boroko Stage 1/Tokarara	1981年12月	A4	ジ・	The Department of Works (Beca Carter Hollings & Ferner) PNG	
S15	Preliminary Report on Investigations for Waigani Sewerage Treatment Lagoons Augmentation	1981年10月	A4	ジ・	Public Health Engineering Section, Department of Works and Supply	
S16	Report-Port Moresby Sewerage Lagoons	1981年3月	A4	ジ・	Department of Works and Supply(Camp Scott Furphy)	
S17	Port Moresby Sewerage Study Final Report	1980年1月	A4	ジ・	Port Moresby City Council (Camp Scott Furphy Consulting Engineers)	
S18	パプアニューギニア・モレスビー市下水道整備計画 情報収集調査報告書	1990年6月	A4	ジ・	(社) 国際建設技術協会	
S19	Request for Port Moresby sewerage Master Plan Review and Feasibility Studies		A4	ジ・	National Capital District Commission(Gerard Poigeno)	案件要請書 TOR
S20	Port Moresby Urban Stormwater Management Study Main Report (Vol#1)	1995年6月	A4	ジ・	National Capital District Commission/World Bank	







収集資料リスト

組織・経済

番号	資料名	発行年月	サイズ	収録形式	入手先又は発行先	備考
E1	Public Investment Programme 1995-1999 Vol. #1. #3	1995年3月	A 4	収録形式	The Ministry of Finance and Planning	
E2	Report on the 1990 National Population and Housing Census in PNG	1994年8月	A 4	収録形式	National Statistical Office	
E3	Report on the 1990 National Population and Housing Census in National Capital District	1994年9月	A 4	収録形式	National Statistical Office	
E4	Quarterly Economic Bulletin Vol. XXIV #1	1996年3月	A 4	収録形式	Bank of Papua New Guinea	
E5	Quarterly Economic Bulletin Vol. XXIV #2	1996年6月	A 4	収録形式	Bank of Papua New Guinea	
E6	Country Report- Pacific Islands (PNG, etc.) 4th quarter 1996	1996年9月	A 4	収録形式	The Economic Intelligence Unit, U.K.	
E7	People Count-a Summary of the 1990 Population and Housing Census in PNG	1995年3月	A 4	収録形式	National Statistical Office	
E8	National Capital District Commission 1994 Annual Budget		A 4	収録形式	National Capital District Commission	
E9	Economic Indicators	1996年2月	A 4	収録形式	National Statistical Office	
E10	Abstract of Statistics	1996年3月	A 4	収録形式	National Statistical Office	
E11	Periodical Publications Catalogue	1996年	A 4	収録形式	National Statistical Office	
E12	Gross Domestic Product and Expenditure 1987-1991	1992年	A 4	収録形式	National Statistical Office	







## 6. ローカルコンサルタントリスト





## 6. ローカルコンサルタントリスト

### 別紙1 ローカルコンサルタントの紹介

以下にローカルコンサルタント会社の概要を紹介する。これらのコンサルタント会社は、測量、ボーリング、環境調査、住民意識調査等幅広く実施してきた実績を有している。

#### 1) Kinhill Kramer Pty Ltd.

Corner Islander Drive and Wards Road, Port Moresby, Papua New Guinea

P.O.Box 1948, BOROKO, NCD, PNG,

Tel: 675 325 6033, Fax: 675 325 0091,

1978年7月に総合コンサルタント会社として設立、PNGの本社をはじめ、Australia, Solomon Islands, Vanuatu, Fijiに事務所を持つ。技術者1,200人、専門家80人を擁する。スタッフは土木、海洋、地下水、地質、構造、水理、電気、鉱物、環境解析、都市計画、社会計画、経済など幅広い人材で構成されている。このため、業務内容は多岐にわたっており、鉄道、道路、橋梁、港湾、空港等の環境影響調査、旅客調査、経済調査、建設に関連する管理、監督等も請負っている。その他、鉱業、石油、都市開発、農業開発、水産養殖等の調査開発にも進出している。これらの業務に伴って、土地情報データの収集、CADによる図面作成なども提供している。

#### 2) FRANCIS KAUPA & ASSOCIATES Pty Ltd

P.O.Box 6516, BOROKO, NCD, Papua New Guinea,

Tel: 657 321 3692, Fax: 657 321 1783,

1990年4月に設立された総合コンサルタント会社である。事業内容としては、道路、橋梁等土木の調査、設計、工事監督。都市計画の設計。水道システム、下水処理・処分の調査、設計及び工事監督。事業に伴う経済効果の評価や補償算定、土地所有者との交渉なども行っている。受注契約には2通りの方法が選定でき、交渉による一括請負方式とPNGコンサルタント協会統一レートを基にした方法である。後者の契約方法では、実費に12.5%のマージンを加算するようになっている。支払は請求日から30日以内とし、それ以降は月2%のInterestが課せられる。

#### 3) CARDNO & DAVIES PNG Pty Ltd.

P.O.Box 319, BOROKO, NCD, PNG

Tel: 675 325 2322, Fax: 675 325 0951

1963年に設立されて以来成長を続けている総合コンサルタント会社である。業務内容は、道路、橋梁、水理解析、ダムと安定解析、上下水道の計画・設計、地質調査、経済調査、都市開発など多岐にわたっている。技術者の内容は土木(2人)、地質(1)、橋梁(2)、排水(1)、構造(1)、主任監督(1)、現場監督(2)、土壌(1)、測量(1)、コンピューター技術者(1)など計26名である。

#### 4) SMEC-Engineering Geology Pty Ltd (EGL)

PNG Survey Haus, Varahe Street, Gordon

P.O.Box 4468, BOROKO, NCD, PNG

Tel:675 325 1822, Fax:675 325 3780

SMEC-EGLは30年以上PNGにおいて、水力発電、送電、配電、水資源開発、道路、地域開発、上水道、灌漑、排水・洪水制御、トンネル、排水処理、都市計画、環境計画と環境管理、保健・教育セクター建設など幅広い分野での調査、設計、現場監督などに参画してきた。スタッフは、約390人、その内、土木、電気、機械、道路、運輸、水理、灌漑、地質、鉱物などの技術者は250人、専門家14人、照査、検査、監督などのスタッフが70人となっている。

JICA