CHAPTER 8 CONCLUSIONS AND RECOMMENDATIONS

8-1 CONCLUSIONS

Improvement of electricity supply reliability and change of the frequency are absolutely essential to the stable supply of electricity and economical management thereof. This Project is to realize the above-mentioned requirements at the same time. In this context, it is judged that the contents of this Project will be the most appropriate in consideration of the aspects of demand for electricity and of technical needs.

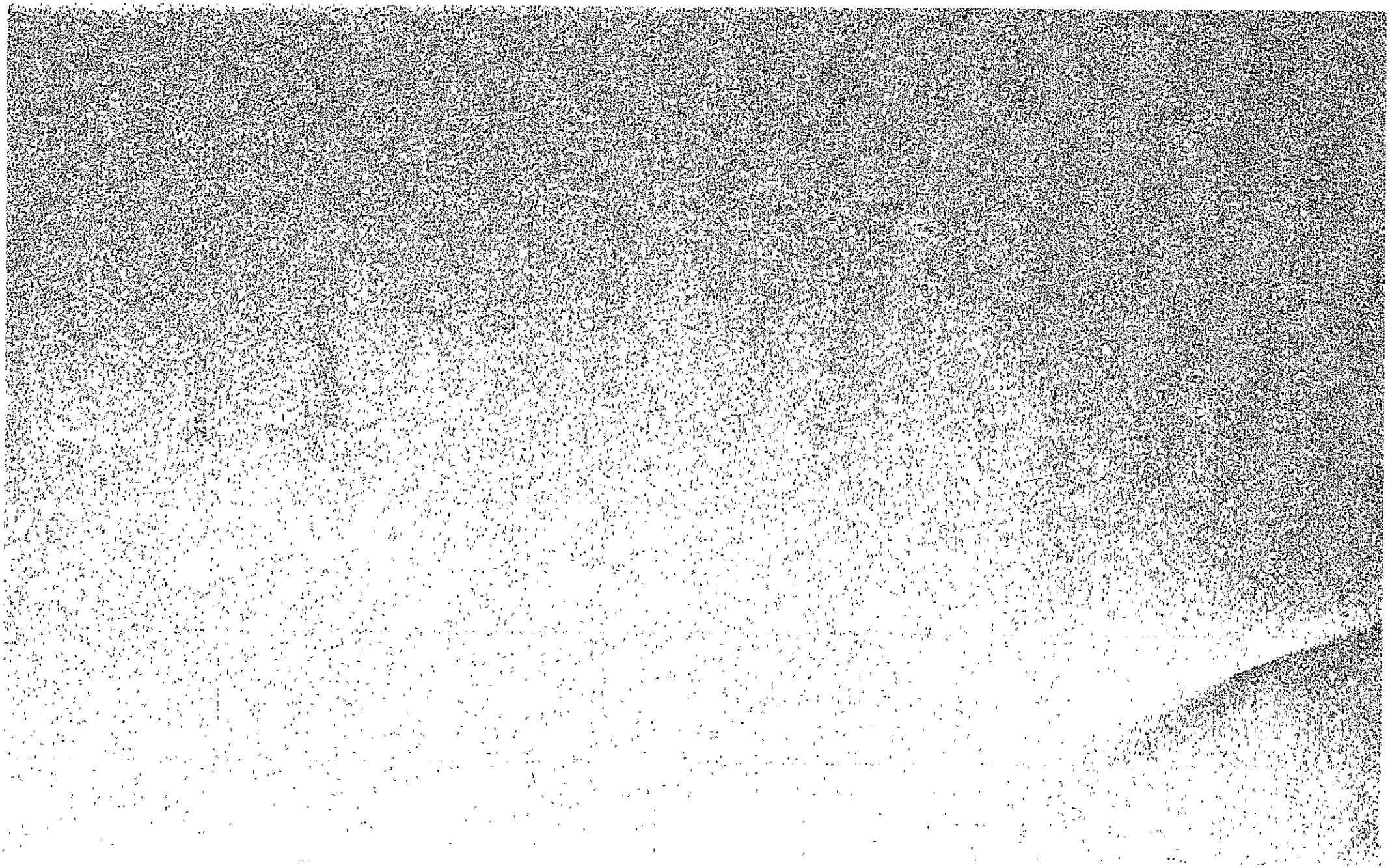
The effects to be generated by the completion of this Project that may get rid of the social dislocation, inconvenience and irritation from the west Demerara area are considered tremendously great. In this sense it can be said that the implementation of this Project will be quite meaningful and justifiable in view of the nature of Japanese Grant Aid.

8-2 RECOMMENDATIONS

Generating facilities to be installed under Japanese Grant Aid for the Project will be able to fulfil their functions satisfactorily upon completion of GEC's frequency standardization work. It is recommended that GEC complete the said work as soon as possible, overcoming various obstacles including economic constraints to be encountered.

It is also suggested that GEC arrange for its personnel expected to be engaged in the operatin and maintenance of Versailles Power Station upon completion of this Project to be able to participate in the installation work of the power station as much as possible in order that they may acquire necessary techniques for the said purpose from a consultant and supervisors to be dispatched by Japanese manufacturer(s).

APPENDIX



APPENDIX

1. Key Personnel with Whom Survey Team Met, Survey Team Members and Authorities Concerned of Guyana
2. Itinerary
3. Minutes of Discussions
4. Population and GNP
5. Organization Chart of Guyana Electricity Corporation
6. Supply Areas
7. Outline of GEC-Owned Generating Facilities
8. Electric Power System
9. Times of Load Shedding
10. Meteorological Data

KEY PERSONNEL WITH WHOM SURVEY TEAM MET, SURVEY TEAM MEMBERS AND AUTHORITIES CONCERNED OF GUYANA

I. Key Personnel with whom Survey Team Met

(1) Embassy of Japan in Venezuela

His Excellency Takeshi Naito	Ambassador to Venezuela
Mr. Hiroshi Hirota	First Secretary
Mr. Nobuhisa Kuriyama	Second Secretary

(2) Government of Guyana

Ministry of Economic Planning and Finance

Cde L. E. B. Johnson	Permanent Secretary
Cde Winston S. Murray	Head, Department of International Economic Co-operation
Cde Gina Farnum	Head of Section (Far East Asia) Department of International Economic Co-operation
Cde Ormond Grant	Desk Officer Department of International Economic Co-operation

Ministry of Energy and Mines

Cde Harun Rashid	Minister
Cde Henry Bovell	Permanent Secretary
Cde Doorga Persaud	Economist

Guyana National Energy Authority

Cde Kaman Singh	Vice Chairman

Guyana State Corporation (GUYSTAC)

Cde Roy McArthur	Vice President (Administration)

Guyana Electricity Corporation (GEC)

Cde Joseph Holder	General Manager
Cde Neville Barnwell	Engineering Manager (Designate)
Cde Lloyd Rose	Manager, Diesel Generation Department
Cde Monte Alexander	Manager (ag.), Systems Control Department
Cde Philip Bobb-Semple	Power Station Engineer
Cde David Gomes	Planning and Development Engineer
Cde Victor Forsythe	Systems Operation Engineer
Cde Winston Wills	Protection and Instrumentation Engineer

II. Survey Team

Mr. Tetsuo Amagai	Team Leader (Japan International Cooperation Agency)
Mr. Moriichi Hisano	Power System Planning Engineer (EPDC International Limited)
Mr. Tetsuya Fukuda	Power Economist (EPDC International Limited)

III. Authorities Concerned of Guyana

Name of Organization	Address
Ministry of Economic Planning and Finance	Homestretch Avenue D'Urban Park Georgetown, Guyana P.O. Box 10748 Georgetown Telephone: 64971
Ministry of Energy and Mines	41 Brickclam & Boyle Place Georgetown, Guyana P.O. Box 1074, Georgetown Telephone: 66549 Telex : 2285

Name of Organization	Address
Guyana National Energy Authority	295 Murray Street, Georgetown, Guyana P.O. Box 903, Georgetown Telex : 2253
Guyana State Corporation	45-47 Water Street, Georgetown, Guyana P.O. Box 1020, Georgetown Telephone: 61032 Telex : 2214
Guyana Electricity Corporation	40 Main Street, Georgetown, Guyana P.O. Box 10390, Georgetown Telephone: 59141 Telex : GELECOR P
Honorary Consul of Japan Mr. Hams W. Barrow	125 Carmichael Street, South Cummingsburg, Georgetown, Guyana P.O. Box 10750, Georgetown Telephone: 67261 Telex : 2289 GYINS BROK

ITINERARY

Date	Day of Week	Description	Attendants
Sept. 4	Sun	Leave Tokyo and arrive in New York	
Sept. 5	Mon.	Leave New York and arrive in Caracas	
Sept. 6	Tue.	Courtesy Call at Embassy of Japan	
		Briefing of Inception Report	His Excellency Naito, Ambassador and Mr. Hirota, First Secretary
		Request for Data Collection regarding Electricity Supply Situation in Venezuela	
Sept. 7	Wed.	Leave Caracas and arrive in Georgetown via Port of Spain	
Sept. 8	Thu.	Schedule Meeting at Ministry of Economic Planning and Finance	(Attendants from Ministry Economic Planning and Finance, Ministry of Energy and Mines, Guyana National Energy Authority and Guyana Electricity Corporation)
		Briefing of Inception Report	
		Discussion on Survey Schedule	
		Briefing of Questionnaire	Cde L.E.B. Johnson Cde Gina Farnum Cde Ormond Grant Cde Doorga Persaud Cde Kaman Singh Cde Neville Barnwell Cde Lloyd Rose
		Site Survey	
		Sophia Convertor Station	Cde Doorga Persaud Cde Monte Alexander Cde Victor Forsythe Cde Winston Wills
		Observation of Facilities Power Dispatching Center	

Date	Day of Week	Description	Attendants
Sept. 8 (cont.)		Collection of data on Power Systems and Investigation of Electric Current Flow Observation of Dispatching Facilities and Apparatus	
Sept. 9	Fri.	Detailed Explanations of Requirements of Questionnaire Data Collection (at Guyana Electricity Corporation)	Cde Doorga Persaud Cde Lloyd Rose Cde David Gomes
Sept. 10	Sat.	Briefing of Inception Report to Vice President of Guyana State Corporation (Chairman of Guyana Electricity Corporation) at Offices of GUYSTAC Data Collection at Guyana Electricity Corporation	Cde Roy McArthur Cde Neville Barnwell Cde Lloyd Rose Cde Doorga Persaud Cde Doorga Persaud Cde David Gomes
Sept. 11	Sun.	Observation of Versailles Power Station Observation of Actual Condition of Diesel Engine Generators and Associated Devices Observation of Existing Concrete Foundations Observation of Supply Areas of the Power Station Data Collection Mr. Amagai, Team Leader, arrives in Georgetown	Cde Doorga Persaud Cde Lloyd Rose Cde Philip Bobb-Semple

Date	Day of Week	Description	Attendants
Sept. 12	Mon.	Courtesy Call on Minister for Energy and Mines	Cde Harun Rashid Cde Henry Bovell Cde Ormond Grant Cde Doorga Persaud Cde Joseph Holder Cde Neville Barnwell
		Briefing of Inception Report	
		Briefing of Japanese Grant Aid System and Necessary Formalities	
		Discussion with Guyana Electricity Corporation regarding:	
		Present Situation in the Project Area and Expected Social Benefits	
		Data Collection at Guyana Electricity Corporation	Cde Doorga Persaud Cde David Gomes
Sept. 13	Tue.	Study of Contents of the Project and Request for Submission of Data and Information which have not yet been made available	Cde Joseph Holder Cde Neville Barnwell
		Data Collection	Cde Doorga Persaud Cde David Gomes
Sept. 14	Wed.	Joint Meeting with Authorities Concerned regarding Uncollected Data and Information	Cde Winston S. Murray Cde Gina Farnum Cde Ormond Grant Cde Henry Bovell Cde Joseph Holder Cde Neville Barnwell Cde David Gomes
		Explanations of Japanese Grant Aid System	
		Discussion on Equipment & Devices to be Procured under Grant Aid	
		Preparation of Minutes of Discussions in Draft Form	

Date	Day of Week	Description	Attendants
Sept. 15	Thu.	Screening of Minutes of Discussions in Draft Form Delivery of (Final Draft) Minutes of Discussions to Authorities Concerned for Screening thereof	Cde Ormond Grant Cde Doorga Persaud Cde Joseph Holder Cde Neville Barnwell Cde David Gomes
Sept. 16	Fri.	Joint Meeting for Confirmation of Wordings and Contents of Minutes of Discussions (Final Draft) Preparation of Minutes of Discussions	Cde Winston S. Murray Cde Gina Farnum Cde Ormond Grant Cde Doorga Persaud Cde Joseph Holder Cde Neville Barnwell Cde David Gomes
Sept. 17	Sat.	Final Confirmation of Minutes of Discussions Signing of Minutes of Discussions at 14:30 hours Reconfirmation of Versailles Power Station and Adjacent Places Leave Georgetown and arrive in Port of Spain	Mr. Hans W. Barrow Cde L.E.B. Johnson Cde Winston S. Murray Cde Gina Farnum Cde Ormond Grant Cde Henry Bovell Cde Doorga Persaud Cde Joseph Holder Cde Neville Barnwell Cde David Gomes Cde Joseph Holder
Sept. 18	Sun.	Leave Port of Spain and arrive in Caracas Report to Embassy of Japan the Outline of Site Surveys and the Results of Discussions with Authorities Concerned of Guyana	His Excellency Naito, Ambassador and Mr. Kuriyama, Second Secretary

Date	Day of Week	Description	Attendants
Sept. 19	Mon.	Detailed Explanations of Site Surveys and Results of Discussions with Authorities Concerned of Guyana	Mr. Hirota, First Secretary and Mr. Kuriyama, Second Secretary
Sept. 20	Tue.	Leave Caracas for Chicago	
Sept. 22	Thu.	Arrive in Tokyo	

MINUTES OF DISCUSSIONS

ON

DIESEL POWER GENERATOR SUPPLY PROJECT

IN

THE CO-OPERATIVE REPUBLIC OF GUYANA

SEPTEMBER 17, 1983

MINUTES OF DISCUSSIONS
ON
DIESEL POWER GENERATOR SUPPLY PROJECT
IN
THE CO-OPERATIVE REPUBLIC OF GUYANA

In response to the request made by the Government of the Co-operative Republic of Guyana for Diesel Power Generator Supply Project (hereinafter referred to as "the Project"), the Government of Japan has dispatched a mission headed by Mr. Tetsuo Amagai for the sole purpose of conducting a basic design study required for the Project from September 8, 1983 to September 16, 1983 through the Japan International Cooperation Agency (hereinafter referred to as "JICA"). The Japanese mission has carried out a field survey and held a series of discussions through which the Japanese mission exchanged views with the Guyanese authorities concerned with the Project.

Based upon the field survey and a series of discussions, the Japanese mission and the Guyanese authorities concerned with the Project have agreed to recommend to their respective Governments examination of the outline of the basic design study attached herewith towards the realization of the Project.

Georgetown, Guyana
September 17, 1983

Mr. Tetsuo Amagai
Team Leader

L.E.B. Johnson
Permanent Secretary
Ministry of Economic Planning.

The Japanese Basic Design Study Team
Japan International Cooperation Agency.

ATTACHMENT I - LIST OF ATTENDANTS IN MEETINGS

JICA Mission dispatched by the GOVERNMENT OF JAPAN

Mr Tetsuo Amagai	Team Leader
Mr Moriichi Hisano	Power System Planning Engineer
Mr Tetsuya Fukuda	Power Economist

GOVERNMENT OF GUYANA

Ministry of Economic Planning

Cde L E B. Johnson	Permanent Secretary
Cde Winston S Murray	Head, Department of International Economic Co-operation
Cde Gina Farnum	Head of Section (Far East Asia) Department of International Economic Co-operation
Cde Ormond Grant	Desk Officer Department of International Economic Co-operation

Ministry of Energy and Mines

Cde Harun Rashid	Minister
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Guyana National Energy Authority

Cde Kaman Singh	Vice Chairman

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Cde Roy McArthur	Vice President (Administration)

Guyana Electricity Corporation (GEC)

Cde Joseph Holder	General Manager
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Cde Lloyd Rose	Manager, Diesel Generation Department
Cde Monte Alexander	Manager (ag.), Systems Control Department
Cde Philip Bobb-Semple	Power Station Engineer
Cde David Gomes	Planning and Development Engineer
Cde Victor Forsythe	Systems Operation Engineer
Cde Winston Wills	Protection and Instrumentation Engineer

ATTACHMENT II - BACKGROUND OF THE PROJECT

SEE ANNEX I.

ATTACHMENT III - Outline Of The Proposed Project

1. Purpose

The Guyana Electricity Corporation (GEC) is a public utility established under the Electricity Act of Guyana and is under the jurisdiction and control of the Ministry of Energy and Mines and the Guyana State Corporation.

Due to the difficulties confronting Guyana in respect of importing materials, equipment and supplies including spare parts on account of deterioration in the international balance of payments, it has become quite difficult for GEC to operate and maintain GEC's thermal power stations without load shedding and voltage drops.

Twelve (12) out of thirty (30) generating units are not operational because of the shortage of imported spare parts, and are awaiting systematic refurbishment and repair. This situation greatly affects the social life of inhabitants in GEC's power system areas.

A power station named "Versailles Power Station" belongs to GEC's Georgetown Interconnected System which supplies electricity mainly to Georgetown City and neighbouring areas. The said power station has four (4) units of diesel generators with a total installed capacity of eight (8) Megawatts.

Of these units, only two (2) units are in operation as of September 1983, producing a maximum of one decimal eight (1.8) Megawatts. At the present time, the electricity supply in the service areas around the said power station is characterized by load shedding and regular interruptions in all sections and voltage drops in the areas distant from the power station.

In order to overcome this difficulty and inconvenience in these areas, GEC through the Government of Guyana has requested the procurement and installation of equipment and devices, necessary spare parts thereof as enumerated in Section 6 under Japanese Grant Aid for the purpose of alleviating the system overload in Georgetown Interconnected Power System.

2. Objectives

2.1 Technical Improvement Expected from The Project.

It is considered that this Project will contribute to the promotion of frequency conversion from 50 to 60Hz and to the implementation of rehabilitation programmes of GEC's generating facilities.

2.2 Social Benefits Of The Project

The main social benefit of the project is that it will end load shedding in the West Demerara Area with all the social dislocation, inconvenience and irritation that load shedding causes. In particular the everyday load shedding of the area between Windsor Forest and Lookout on the West Coast when there is only one machine operating in the Versailles Power Station will end. Reliable electrical power in the West Demerara Area will mean reliable operation of the proposed drainage pumping station and avoidance of flooding of farms, homes and workplaces. In particular small farmers who grow vegetables for the city will benefit. The services of the new West Demerara Hospital will be improved and its expansion guaranteed. Security of premises will be improved. The Government of Guyana has agreed to send to the Ministry of Foreign Affairs and JICA through the Embassy of Japan in Venezuela the quantitative data and information evidencing the description of social benefits not later than the middle of October 1983.

3. Project Site

The Project Site is as shown in Annex II.

4. Existing Facilities in Project Area

The Versailles Power Station supplies electricity to the West Bank and West Coast of Demerara. There are about 11,000 acres of rice lands, and 35,000 acres of sugar cane lands in this area. In addition there are silo centers for storage of unmilled rice and significant acreages of vegetable and livestock farms. The population is estimated at 50,000 persons and more than fifteen (15) water supply facilities are in operation for pumping water to communities in the said area.

There are two (2) hospitals in the area - a regional and a cottage hospital. These are dependent on the pure water supply system for medical services to patients. There are seventy one (71) schools in this area.

5. Present electricity supply situation in the area

See Annex III.

6. List of Equipment and Devices to be procured from Japan

In line with the guidelines for procurement of Japanese products and services under Japanese Grant Aid, it is confirmed that the equipment and devices together with spare parts thereof will be procured from Japan.

7. List Of Equipment and Devices, etc.

A list of the equipment, devices, spare parts thereof, etc., is as per Annex IV.

8. Installation

It is confirmed that the term "Installation" necessary for this Project is defined as the erection of the major equipment on the existing foundations at Versailles Power Station, and foundation and erection works required for the devices at the said Power Station.

It is confirmed that repair of the existing building for the generating units will be done by the Government of Guyana at its expense if necessary, and that this cost is not included in the amount of Grant Aid.

It is confirmed that three (3) existing generating sets will be removed by the Government of Guyana at its expense, and that this cost is not included in the amount of Grant Aid.

It is confirmed that installation, and commissioning of equipment and devices will be performed by a Japanese contractor on his overall responsibility with the use of mutually acceptable Guyanese sub-contractor(s).

9. Executing Organisation of the Project

The executing organisation of the Project is as shown in Annex V.

10. Demarcation of Works Between The Government of Guyana and the Government of Japan.

No.	Description	Covered by Grant Aid	Covered by Government of Guyana
1	To remove the defunct diesel engine generators from Versailles Power Station		O
2	To repair if necessary the building in which equipment and devices procured under Japanese Grant Aid will be installed		O
3	To prepare for replacement of distribution transformers and consumers' apparata due to the frequency conversion from 50 to 60Hz		O
4	To bear the following commissions to the foreign exchange bank for the banking service upon the B/A		
	i) Advising commission of A/P		O
	ii) Payment commission		O
5	To ensure unloading and customs clearance at port of disembarkation in Guyana		
	i) Marine transportation of the equipment and devices from Japan to Guyana	O	
	ii) Tax exemption and customs clearance of the equipment and devices at the port of disembarkation		O
	iii) Inland transportation from the port of disembarkation to project site.	O	
6.	Installation	O	

No.	Description	Covered by Grant Aid	Covered by Government of Guyana
7	i) To accord Japanese nationals whose services may be required in connection with the supply of equipment and devices and the services under the verified contract such facilities as may be required for their entry into Guyana and stay therein for the performance of their work.		O
	ii) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies imposed in Guyana with respect to the supply of equipment, devices and services under the Contracts to be executed for the project.		O
8	To maintain and use properly and effectively the facilities procured and installed under the Grant Aid.		O
9	To bear all the expenses other than those to be borne by the Grant, necessary for the execution of the project.		O

The Japan International Co-operation Agency (JICA) will send twenty (20) copies of the basic design report to the Government of Guyana.

Both sides will implement this project in confirmity with the Japanese Grant Aid System.

BACKGROUND OF THE PROJECT

1. DEVELOPMENT PERSPECTIVE AND STRATEGY

1. The Government of Guyana is committed to the establishment of co-operative socialism, an income distribution that permits the satisfaction of basic human needs and the continuing creation of new employment opportunities through increased levels of public and private investment and the fullest possible development of human resources. The Government is equally committed to an income distributional profile that is consistent with its social objectives and with the level of morale on which the programmes are based. Furthermore, the Government is committed to the provision of adequate recreational and social amenities so that the motivation for pursuing the charted development path can be present to ensure the achievement of stated development targets. Within this framework, the development strategy aims at reducing the country's vulnerability to fluctuations in international prices and demand at a creating higher employment opportunities through the expansion and diversification of exports and the development of efficient import substitution, and at achieving self-sufficiency in food and producing surpluses for regional consumption.

2. The structural changes associated with this development effort will require considerable investment for their achievement. In the phasing of the process by which changes in the structure will be effected, priority will be given to the restoration of activities to their former levels and to the fuller utilization of capital investments already made in Guyana. Even the achievement of this limited and more immediate target will require substantial assistance in the short-term to sustain living standards, which have been affected, in part, by substantial declines in the terms of trade.

3. For the longer term, the major elements of structural change on which attention will be focused are as follows:

(a) A sharp expansion in the production base to include in the longer run the smelting of aluminium using local supply of hydroelectric power.

(b) Sustained growth in the intermediate period and thereafter in the production of agricultural commodities, of mining output, of fishing and forestry products, and of non-traditional manufacturers leading to a consequential reduction in the relative importance of services sectors by simultaneous restraint in the rate of growth of services in the government sector.

(c) Diversification of the output of the productive sectors by the introduction of new activities and by the increased processing of the products at present produced as raw materials, such as timber, ground provisions, etc.

(d) Substitution of the present huge imports of fossil fuels by the eventual installation of hydroelectric power as indicated above but also by the use of a wide range of measures to utilize more efficiently the existing availability of local and imported sources of energy.

(e) As a derivative of the above approaches, the dependence on external sources of supply will be reduced. In addition to the expansion of exports from the growth in production, the reduced dependence on fuel imports will lead to an improvement in the external balance and to a reduction in the gap on current account of the balance of payments to proportions that are more manageable in terms of their financing needs.

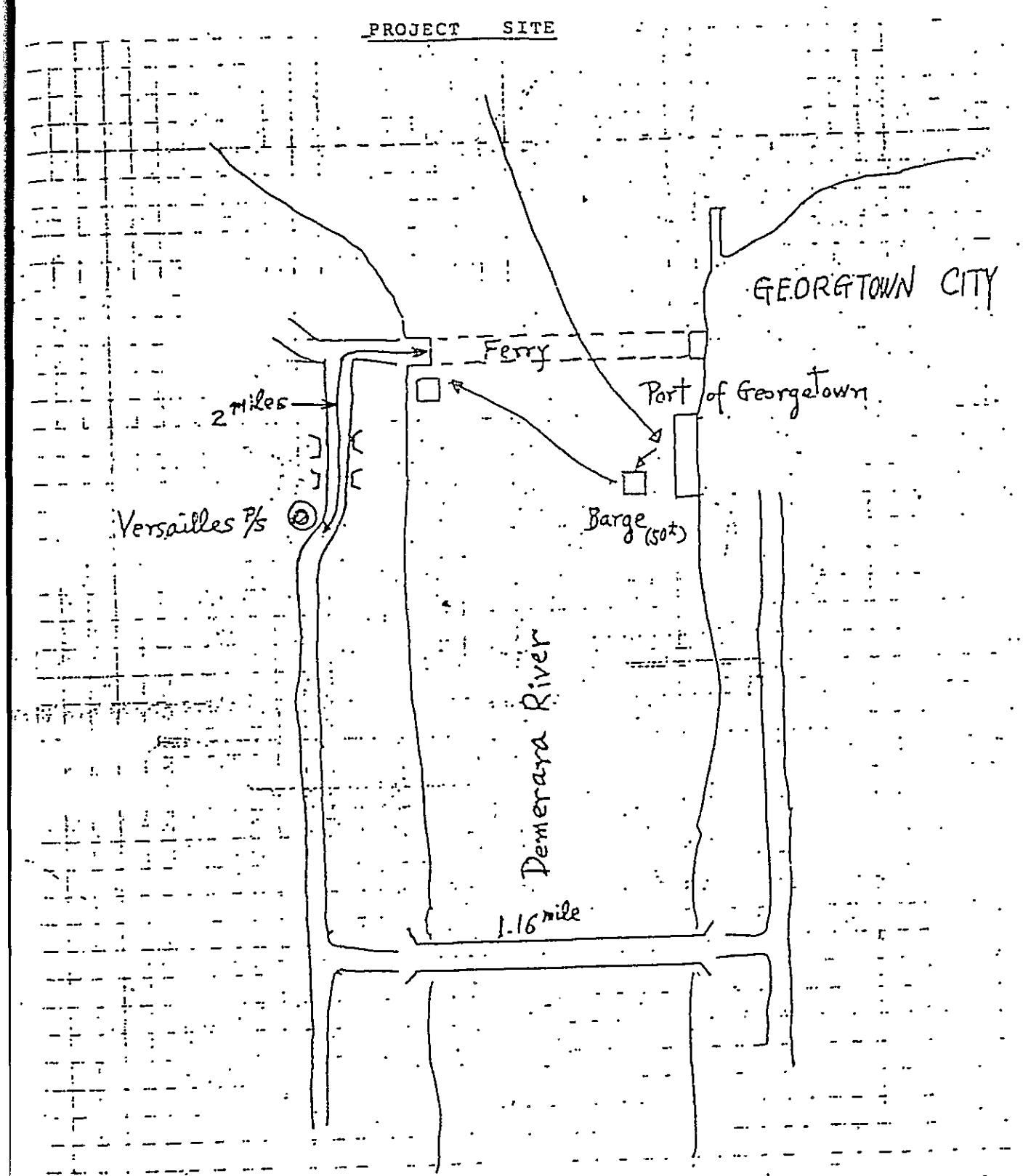
4. In order to proceed with the programme of structural adjustment as outlined above, the Government is committed to the removal of a number of pressing constraints. These relate, at first, to the critical balance of payments weakness which has affected the economy very severely in recent years. The second is the wide range of allocational inefficiencies reflected in prices and tariffs that are in evident need of adjustment. The

third is the inadequate spatial distribution of activities that leads to inefficiency in production and to an imblance between urban, rural and hinterland areas. The fourth is the weakness in systems of management that are required for smooth co-ordination of structural changes and the shortage of skills necessary for the development and administration of public and private enterprises.

2. Guyana Electricity Corporation's Measures

The National Development Plans involve increase in the supply of electricity and an increase in the reliability of that supply. The supply of electricity from the existing GEC system is unreliable and cannot meet the demands let alone the requirements of the National Development Plans. GEC has to therefore rehabilitate and develop its own systems to improve the supply of electricity to agriculture, commercial, industrial, governmental and domestic users if the objectives of the National Development Plan are to be realized. This involves rehabilitation of our generation plant and rehabilitation and development of our transmission and distribution system. It is expected that the development on the generating side shall be executed by agencies other than GEC using indigenous sources of energy. When these fail GEC will still be required to function reliably. For maximum reliability and benefit GEC intends, as far as possible to-inter connect all the main power stations by a national grid.

PROJECT SITE



The Present Electricity Supply Situation In the Area

The Versailles Power Station was originally built in 1972 as an 8 MW (4 x 2 MW) Station intended to operate as an isolated station to serve the needs of the West Demerara Area from Vriesland on the West Bank to Lookout on the West Coast a total distance of 35 miles.

With the advent of the oil crisis in 1974, foreign exchange became increasingly scarce and as machines at all stations including Versailles developed faults, they were consciously taken out of service pending the availability of foreign exchange to buy necessary replacement parts.

The production record of the Versailles Station (1972-1983) attached is self-explanatory.

At present Versailles is reduced to an unreliable two machine station and although it forms part of the interconnected system, load shedding on the West Coast at peak periods must be introduced in accordance with the typical load shedding schedule attached (areas 24 and 25) especially when only one machine is operational. The reason being that the length of the line on the West Coast causes severe voltage drops and since the one 2 MW (ECR 1.76 MW) cannot supply the MVAR's and the useful power (MW), load shedding usually takes place by opening a switch located at Windsor Forest a distance of approx. 6 miles from the Station. Therefore, residents from that point to Lookout a distance of approx. 20 miles are without power especially at nights from 19:00 hours (7.00 p.m.) to 22:00 hours (10.00 p.m.) when the demand increases to about 3.1 MW on the West Coast Feeder, with the West Bank at approx. 1.3 MW and the total demand on the Station being approx. 4.4 MW.

Of the two machines available, one produces approx. 1.0 MW and the other produces approx. 0.8 MW.

The maximum demand during the daytime on the West Coast Feeder alone is approx. 1.4MW, so that when there is only one machine working in Versailles Power Station between 0.5 and 0.7 MW of load has to be shed.

In Guyana there is no policy which constrains Governmental or non Governmental agencies from constructing or enlarging buildings because of an inadequacy of power. Buildings are usually erected and connected to the system and receive electricity as and when it is available.

ECR = Economic Continuous rating.

The social impact of load shedding in the West Demerara Area.

On Education

School Radio Programmes which are normally broadcast for the benefit of the children cannot be heard. Audio visual aids which are used in schools for the benefit of students cannot be effected. On cloudy or heavily overcast days, classes have to be abandoned, and at nights, children cannot prepare home-work for submission to their class teacher on the following day.

On Health

Since the power supply is unreliable, hospitals and health centres are normally advised to install standby generating sets. Where these are not installed or are out of order, doctors and nurses are reluctant to perform surgical operations by gas or candle light and would prefer to wait until the power is restored.

In any event standby generators in some cases cater only for emergency lighting and not for the operating theatre or X-ray rooms.

On Potable Water Supply

In the West Demerara Area, potable water is delivered to homes from wells by means of electric pumps. Since there is either limited or no storage facilities for gravity feeding, when the power is switched off, no water could be received in the home. This disrupts the normal household routine. Some shift workers are therefore not able to have a bath before proceeding to work. This makes them irritable and uncooperative.

On Drainage

The West Demerara area is below sea level at high tide. This means that when the tide is high gravity drainage is not possible. This leads to the flooding of yards, homes and work places, affecting workers at work and going to and coming from work, and children going to and from school. In addition farms are flooded and crops are adversely affected. Because of the latter, the Ministry of Agriculture plans to construct a 350 horse power drainage pump station in the West Demerara area in 1984 to alleviate this problem. Guyana Electricity Corporation will not prevent the Ministry of Agriculture from building this pump station but will advise the Ministry that its operations will be adversely affected by the inadequacy of the Versailles Power Station.

On Security

Load shedding in the West Demerara area at nights means greatly reduced levels of lighting. This causes greater security problems as stealing from homes, farms and work places increases. Stealing from small farms discourages small farmers and adversely affects the production of vegetables.

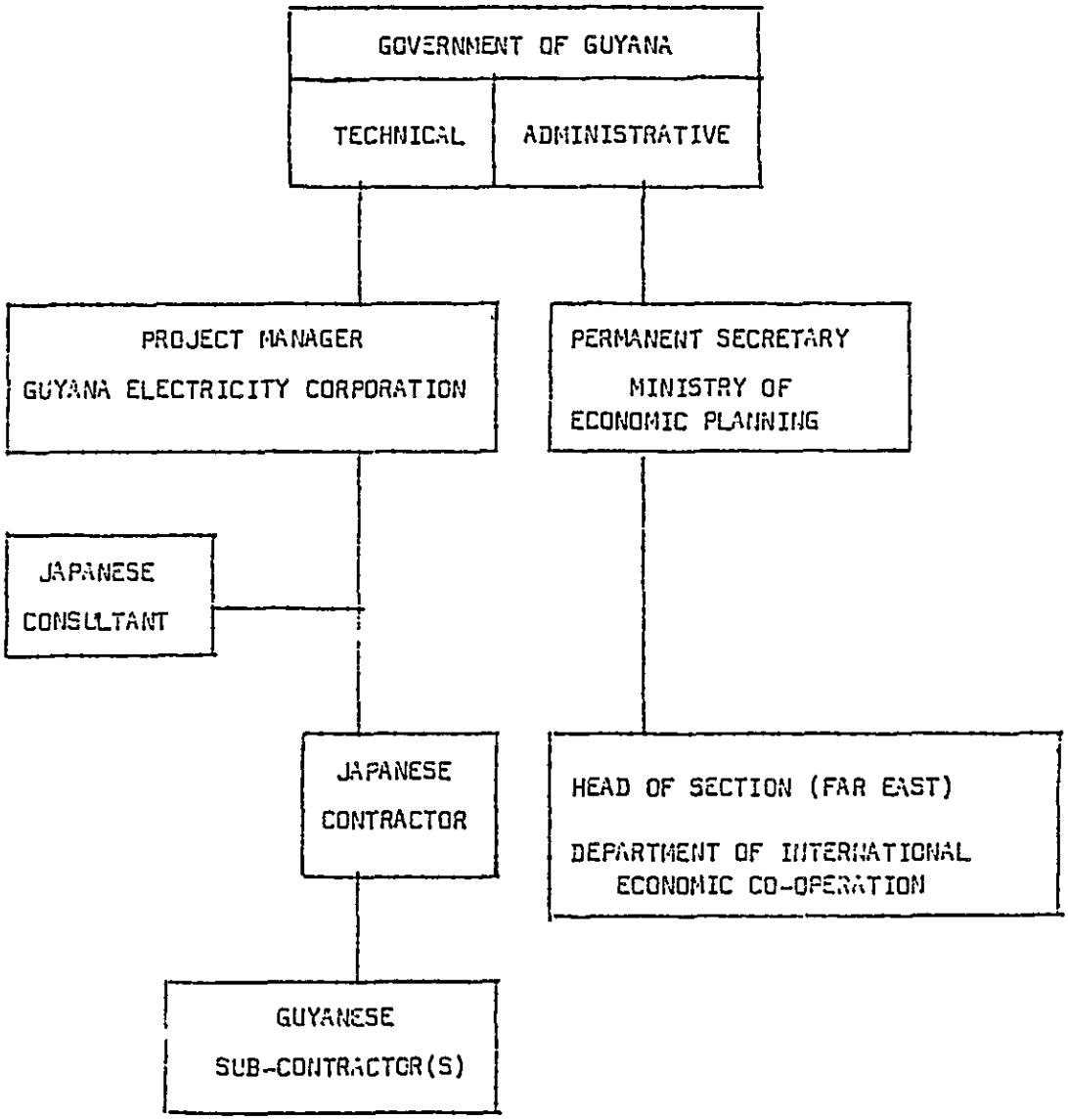
In summary, load shedding makes life very miserable for the people in the West Demerara area since apart from affecting production in industry and children's education, it is also an irritant to housewives who have to carry out their household chores when power is available.

ANNEX IV

List of Equipment And Devices

	Description	Quantity
1.	Generator 11/13.8KV, 50/60HZ 2,000KW (60HZ) P.F. 0.8, Brushless Exciter	3 Sets
2.	Diesel Engine Continuous Use Two Speed Fuel Oil Service Tank	3 Sets
3.	Control Panel Metering Instruments Protection Relays Indicators	3 Sets
4.	Station Service Transformer	2 Sets
5.	Circuit Breaker	7 Sets
6.	Other Necessary Devices	1 Lot
7	Spare Parts (To be agreed with GEC)	For 3 Years

ANNEX V


GOVERNMENT OF GUYANA
TECHNICAL
ADMINISTRATIVE
PROJECT MANAGER
GUYANA ELECTRICITY CORPORATION
PERMANENT SECRETARY
MINISTRY OF
ECONOMIC PLANNING
JAPANESE
CONSULTANT
JAPANESE
CONTRACTOR
HEAD OF SECTION (FAR EAST)
DEPARTMENT OF INTERNATIONAL
ECONOMIC CO-OPERATION
GUYANESE
SUB-CONTRACTOR(S)

POPULATION AND GNP

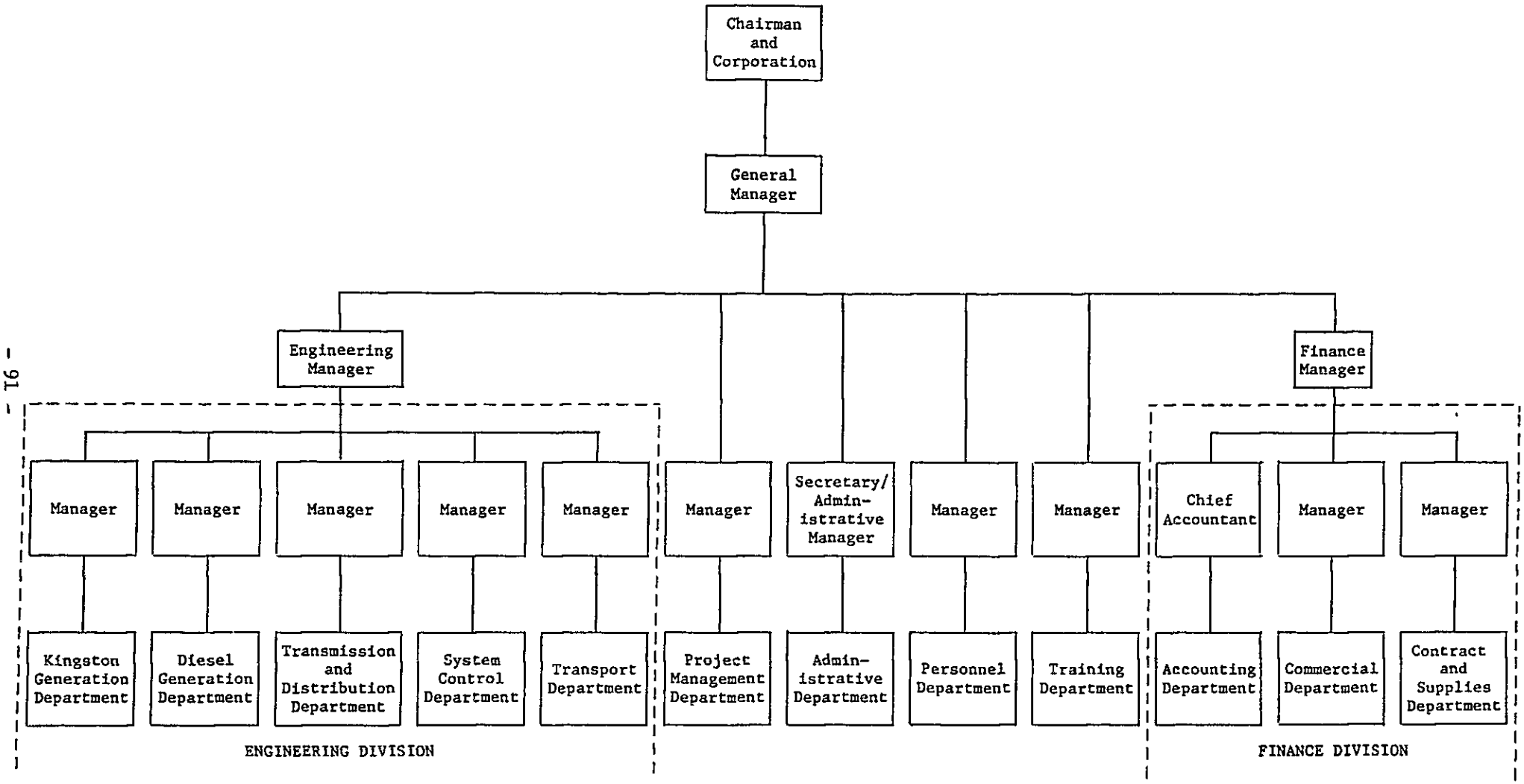
Year	Population (000)	GNP at Constant Price 10^6 Guyana Dollars	Note
1970	716	854	Actual
1971	729	884	- " -
1972	740	852	- " -
1973	750	872	- " -
1974	757	941	- " -
1975	766	1032	- " -
1976	775	1050	- " -
1977	783	1019	- " -
1978	786	990	- " -
1979	790	976	- " -
1980	793	994	- " -
1981	795	989	- " -
1982	797	886	- " -
1983	799	804	Projected
1984	815	n.a.	- " -
1985	831	n.a.	- " -

Note : In the case of the GNP shown above, 1977 is the base year.

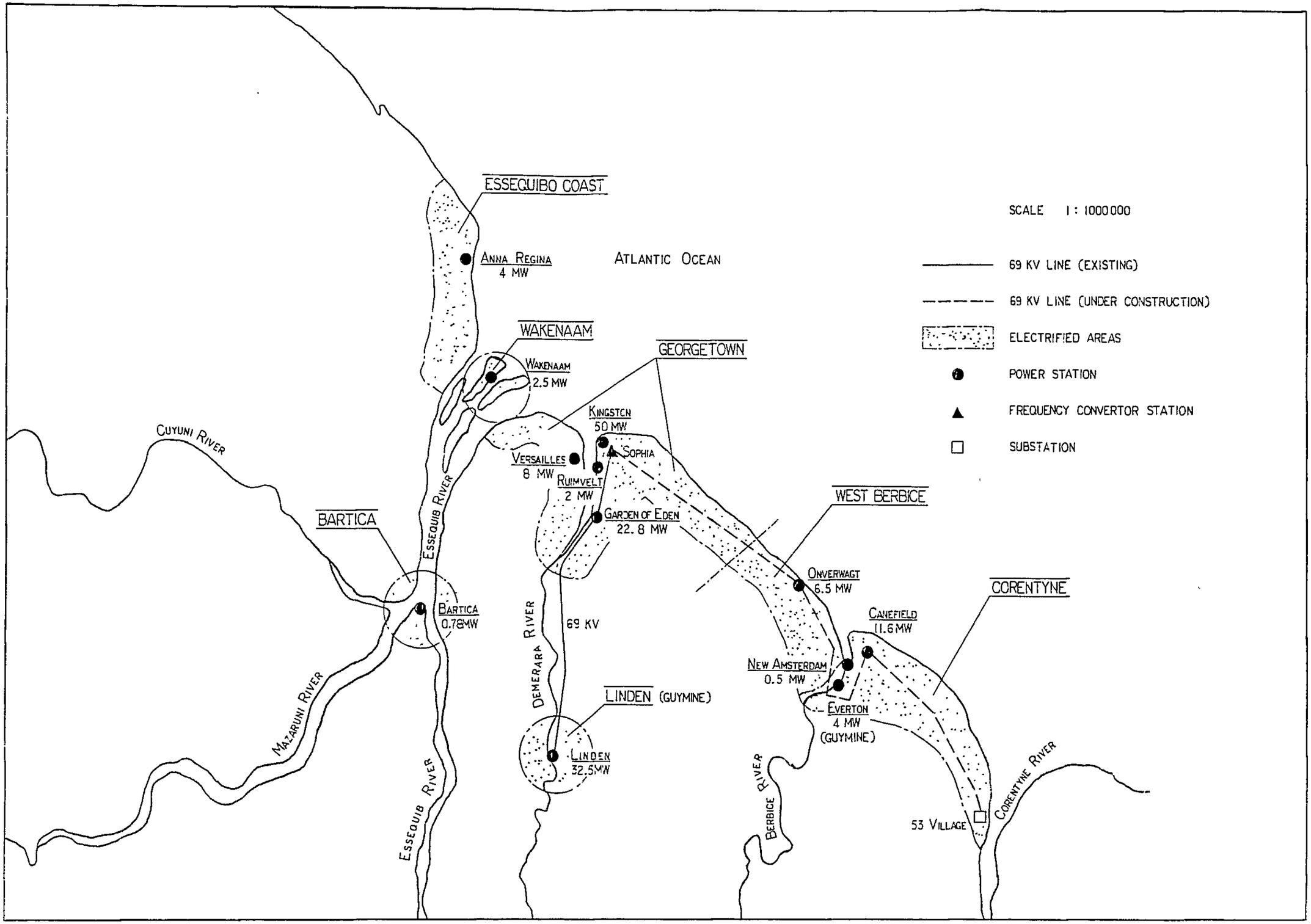
Source: Ministry of Economic Planning & Statistical Bureau

ORGANIZATION CHART OF GUYANA ELECTRICITY CORPORATION

EFFECTIVE AS OF SEPTEMBER 14, 1983



POWER SUPPLY AREAS

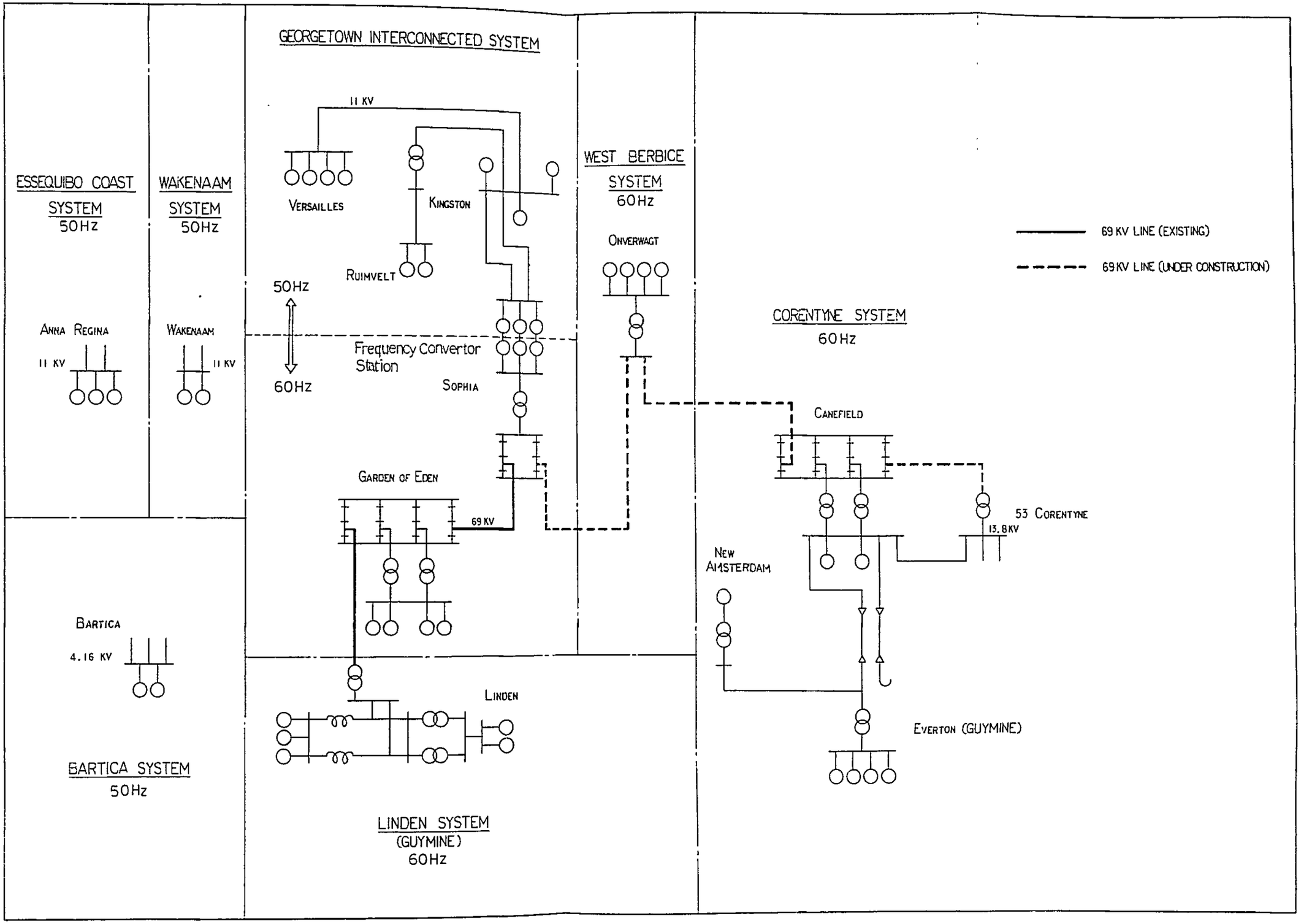


OUTLINE OF GEC-OWNED GENERATING FACILITIES

(As of September 1983)

Name of System	Power Plant	No.of Unit	Frequency (HZ)	Rated Capacity (MW)	Type	Commission-ing Year	Max. Capacity (MW)	Remarks
Georgetown Interconnected System	Kingston B	1	50	10.0	Steam	1963	9.0	
		2	50	10.0	Steam	1963	-	Out of Order
		3	50	10.0	Steam	1963	9.0	
		1	50	10.0	Gas	1978	-	Out of Order
		2	50	10.0	Gas	1978	-	Out of Order
	Ruimveldt	1	50	1.0	Diesel	1959	-	Out of Order
		2	50	1.0	Diesel	1959	0.9	
	Versailles	1	50	2.0	Diesel	1972	-	Out of Order
		2	50	2.0	Diesel	1972	-	Out of Order
		3	50	2.0	Diesel	1972	1.0	
		4	50	2.0	Diesel	1972	0.8	
	Garden of Eden	2	60	5.7	Diesel	1975	4.0	
		3	60	5.7	Diesel	1975	4.0	
		4	60	5.7	Diesel	1976	-	Out of Order
		5	60	5.7	Diesel	1976	4.0	
Total of Interconnected System				82.8			32.7	
West Berbice System	Onverwagt	1	60	1.0	Diesel	1973	-	Out of Order
		2	60	1.0	Diesel	1973	0.75	
		3	60	1.0	Diesel	1973	0.75	
		4	60	1.0	Diesel	1980	0.75	
		5	60	2.5	Diesel	1980	2.0	
Corentyne System	New Amsterdam		60	0.5	Diesel	1960	-	Out of Order
	Canefield	3	60	5.8	Diesel	1978	-	Out of Order
		4	60	5.8	Diesel	1978	5.0	
Essequibo System	Anna Regina	1	50	1.0	Diesel	1972	0.78	
		2	50	1.0	Diesel	1972	-	Out of Order
		3	50	2.0	Diesel	1975	1.5	
Bartica System	Bartica	1	50	0.395	Diesel	1978	0.35	
		2	50	0.395	Diesel	1978	0.35	
Wakenaam System	Wakenaam	1	50	2.0	Diesel	1972	-	Out of Order
		2	50	0.5	Diesel	1952	0.5	
Total of Isolated Systems				25.89			12.73	
Grand-Total				108.69			45.43	

GUYANA POWER SYSTEM



TIMES OF LOAD SHEDDING

	MONDAY			TUESDAY			WEDNESDAY			THURSDAY			FRIDAY			SATURDAY			SUNDAY		
	83-09-12			83-09-13			83-09-14			83-09-15			83-09-16			83-09-17			83-09-18		
AREA	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
1																					
2						X		X			X							X			
3								X					X								
4																					
5		X					X					X									X
6		X					X					X									
7																					
8					X					X											X
9					X					X				X							X
10					X					X				X							X
11																					
12			X						X						X						
13				X							X							X			
14																					
15						X									X						
16	X					X		X							X						
17																					
18			X						X		X		X								
19	X													X							
20																					
21				X								X						X			
22																					
23	X			X																	
(24)						X							X								
(25)			X						X						X						
26																					

X — INDICATES A PERIOD OF LOAD SHEDDING

1. Cummings Street, Croal.
2. East & West La Penitence, East & West Ruimveldt, Albouystown, Charlestown (part), Alexander Village.
3. East Bank Public Road from Sussex Street to Rahaman's Turn.
4. Woolford Avenue, Vlissengen Road, Home Stretch Avenue.
5. Belair Park, Campbellville, Newtown (part) Sophia, Prashad Nagar, Subryanville, Belair Village Belvour Court, Kitty (part), New Haven.
6. Lodge, Wortmanville, Bourda, Alberttown (part), Lacytown (part), Queenstown (part).
7. Areas along Water Street from Sea Wall to Abattoir.
8. West Cummingsburg.
9. Robbstown.
10. Newtown (part) Stabroek (part), Werk-en-rust (part), Charlestown (part).
11. Camp Street, Hadfield Street - East of Camp Street.
12. 50 Hz. areas along East Bank from Rahaman's Turn, Lo Hope. (not in area 14) and 50 Hz. Industrial Site.
13. Belair Springs and Gardens, Liliendaal to L.B.I.
14. Meadow Bank, Houston, Agricola, Eccles, Bagotstown, Green field Park, Peters Hall, Providence.
15. Cummingsburg (South).
16. Stabroek (park) Lacytown (part), Werk-en-rust (part), Charlestown (part).
17. Kingston Thomas Land, Cummingsburg (part).
18. Queenstown (part), Alberttown (part), Kitty (part), Newtown.
19. 60 Hz. areas of industrial site.
20. Tucville, Meadown Brook Cardens, South Ruimveldt Gardens and Park, North Ruimveldt, Festival City, Roxanne Burnham Gardens, Guyhoc Gardens.
21. 60 Hz. areas along East Bank from Garden of Eden to Houston, Republic Park, No. 2 Canal Polder.
22. South Friendship.
23. Garden of Eden to Timehri & Linden Highway.

(24.) Versailles to Lookout. (West Coast)

(25.) Versailles to Vriesland. (West Bank)

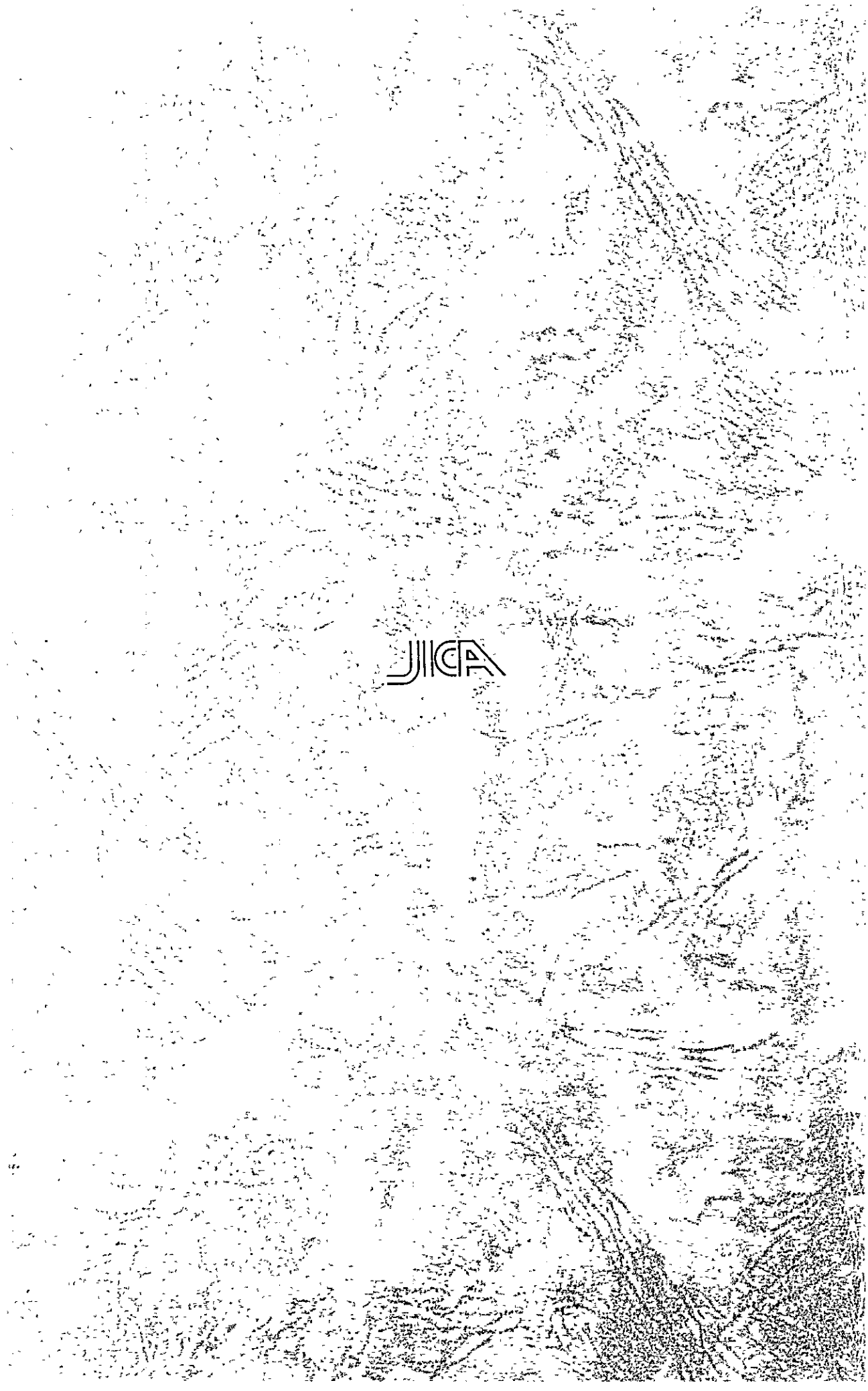
26. Plaisance, Goedverwagting, Beterverwagting, Mon Repos to Nootenzuil.

METEOROLOGICAL DATA

BOTANIC GARDENS - GEORGETOWN

	Temperature (°C)			Rainfall		Ambient Pressure
	Max. Mean	Min. Mean	Mean	Precipitation mm	Humidity %	mbar
1970 - 1979						
Jan.	28.4	23.3	25.8	210.2	79	1,014.0
Feb.	28.9	23.7	26.3	105.0	75	1,014.4
Mar.	29.3	24.1	26.7	110.9	75	1,014.2
Apr.	29.4	24.2	26.8	170.2	77	1,014.1
May	29.3	23.9	26.6	315.3	80	1,014.2
Jun.	29.2	23.4	26.3	342.1	83	1,014.5
Jul.	29.4	23.2	26.3	283.0	82	1,014.7
Aug.	30.0	23.6	26.8	225.3	79	1,014.1
Sep.	30.6	23.9	27.2	133.1	76	1,013.8
Oct.	30.8	24.2	27.5	114.8	76	1,012.9
Nov.	30.3	24.0	27.2	224.1	78	1,012.6
Dec.	29.0	23.3	26.2	304.5	81	1,013.3
Max. Temp. Recorded 31.6°C Min. Temp. Recorded 22.5°C						

Source: Ministry of Works, Hydrometeorological Service.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