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AGENCY FOR INTERNATIONAL DEVELOPMENT  
**PROJECT PAPER FACESHEET**

1. TRANSACTION CODE  
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2. DOCUMENT CODE  
 67089  
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 3

3. COUNTRY/ENTITY  
 Guyana

4. DOCUMENT REVISION NUMBER

5. PROJECT NUMBER (7 digits)  
 501-0075

6. BUREAU OFFICE  
 A. SYMBO. TA  
 B. CODE [3]

7. PROJECT TITLE (Maximum 40 characters)  
 Small Farm Development-Black Bush Region

8. ESTIMATED FY OF PROJECT COMPLETION  
 FY [8][4]

9. ESTIMATED DATE OF OBLIGATION  
 A. INITIAL FY [78]  
 B. QUARTER [3]  
 C. FINAL FY [8][4] (Enter 1, 2, 3, or 4)

10. ESTIMATED COSTS (\$000 OR EQUIVALENT \$) -

A. FUNDING SOURCE	FIRST FY			LIFE OF PROJECT		
	B. FY	C. L.C.	D. TOTAL	E. FY	F. L.C.	G. TOTAL
AID APPROPRIATED TOTAL						
GRANT	-	-	-	1,201	90	1,400
LOAN	-	-	-	5,769	1,731	7,500
OTHER U.S. 1						
OTHER U.S. 2				1,000		1,000
HOST COUNTRY						
OTHER DONOR(S)						
TOTALS			7070	5,930		12,900

11. PROPOSED BUDGET APPROPRIATED FUNDS (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. 1ST FY 78		H. 2ND FY 79		K. 3RD FY 80	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	GRANT	J. LOAN	L. GRANT	M. LOAN
(1) GRANT	220	211	071	-	7,500	-	-	315	-
(2)									
(3)									
(4)				-	7,500	-	-	315	-
TOTALS		81		80					

A. APPROPRIATION	N. 4TH FY 81		O. 5TH FY 82		LIFE OF PROJECT		12. IN DEPTH EVAL. UATION SCHEDULED
	P. GRANT	Q. LOAN	R. GRANT	S. LOAN	T. GRANT	U. LOAN	
(1)	550	-	235	-	1,400	7,500	MM YY 08 79
(2)							
(3)							
(4)							
TOTALS	550	-	235	-	1,400	7,500	

13. DATA CHANGE INDICATOR WERE CHANGES MADE IN THE PID FACESHEET DATA BLOCKS 12, 13, 14, OR 15 OR IN PRP FACESHEET DATA, BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET.

1 = NO  
 2 = YES

14. ORIGINATING OFFICE CLEARANCE

SIGNATURE  
 Edna A. Poorady *Edna A. Poorady*

TITLE  
 Director, USAID/Guyana

DATE SIGNED  
 MM DD YY  
 5 10 78

15. DATE DOCUMENT RECEIVED IN AID W. OR FOR AID W. DOCUMENTS, DATE OF DISTRIBUTION  
 MM DD YY  
 05 16 78

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2. Logical Framework
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PROJECT PAPER

GUYANA: SMALL FARM DEVELOPMENT - BLACK BUSH REGION

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  - D. Extension Specialist
  - E. Research Specialist
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**PART I - PROJECT SUMMARY AND RECOMMENDATIONS**

**A. Recommendations**

The Project Development Team recommends the following:

1. Approval of the Project described herein for a total cost of U.S.\$8,900,000.
2. Approval of an AID grant of U.S.\$1,400,000.
3. Approval of an AID loan of U.S.\$7,500,000.

Loan terms: 20 years, 10 years grace period  
2% per annum during the grace period, 3%  
thereafter.

**B. Borrower/Grantee**

The Borrower/Grantee will be the Government of Guyana (GOG) acting through the Ministries of Finance and Economic Development. The Ministry of Agriculture will be responsible for carrying out the Project through the Hydraulics Division and the Guyana Rice Board.

**C. Project Summary**

The purpose of the Project is to increase the production of rice and food crops by 6000 small farm families in the Black Bush Region of Guyana. Eighty-three percent of the farms in the project area are ten acres or less and 58 percent are five acres or less. For these two farm sizes, per capita income is presently about U.S.\$40 and \$75 respectively, and will increase to U.S.\$65 and U.S.\$115 as a result of the project.<sup>(1)</sup> The project will include works to improve and increase the water supply, to rehabilitate and improve the

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(1) For purposes of consistency among the various international donors contributing to the overall U.S.\$42.8 million Project baseline statistics gathered by the IBRD have been used throughout the Project Paper. This includes statistics on cropping patterns, yields, and on-farm income. (See economic analysis Section IV C.1).

irrigation and drainage systems, to improve on-farm development and improve agricultural supporting services and other facilities in order to increase rice production in the project area. Project inputs will strengthen delivery systems for rice and food crops to the targeted farm families so that these recipients can more efficiently utilize existing technology and come closer in achieving potential productivity given systematic inputs for land preparation and development.

During the infrastructure construction phase, attention is to be directed at identifying improved methods of reducing production risks at the farm level, improving the productivity of the land and labor resources, and seeking ways to increase farmer profit. A.I.D.'s intent is to ensure that an adequate system of production services and marketing services exist enabling small farmers to increase rice and other food crop production with the increased availability of water to be forthcoming under the Project. Elements of outreach under the A.I.D. component will include: (1) improvement of the seed production system using certified high yielding varieties that are tested, evaluated and released to growers; (2) adaptive research methods in combination of inputs such as fertilizer and pesticides to obtain high yielding packages of technology; (3) perfecting better means of communicating technology to the farmer which includes upgrading proficiency of extension personnel; (4) improved system of water management; (5) improved land preparation and maintenance capability and (6) improved processing and marketing linkages that will result in significant increments in production.

It is estimated that Project implementation will require about five and one half years, i.e., from early 1979 to mid-1984. The total incremental net value of production with Project will be \$4.5 million per year beginning in year eight. This increase would result from higher intensity of land use, bringing non-irrigated lands under irrigation, higher yields, improved water supply and drainage, improved seed and better farm management. The total cost of the Project is estimated at U.S.\$42.8 million, complemented by a U.S.\$1.4 million grant. External financing in the amount of U.S.\$8.9 million will be provided by A.I.D. (\$7.5 million loan, 1.4 million grant), U.S.\$10.0 million World Bank credit, U.S.\$10.0 million loan from IFAD, and U.S.\$8.5 million loan presently under negotiation by GOG, the World Bank, and other interested donors. The GOG will contribute U.S.\$6.8 million to the global project, and an additional U.S.\$1.0 million to

the A.I.D. grant. The budget for the global Project can be found in Annex III, Exhibit 8 (a).

D. Summary Financial Plan

The multi-donor Global Loan Package developed by IBRD amounts to U.S.\$42.8 million, to be disbursed over a five year and one half year period.<sup>1</sup> The proposed breakdown by donor is: (1) World Bank (IDA): \$10.0 million (23.4%); (2) IFAD: \$10.0 million (23.4%); (3) other donor (not yet identified): \$8.5 million (19.8%); (4) A.I.D.: \$7.5 million (17.5%); and (5) GOG: \$6.8 million (15.95%).

In addition to the A.I.D. loan of \$7.5 million, the Project Development Team recommends a complementary \$1.4 million grant, to be supplemented by an additional GOG counterpart of \$1.0 million, which will provide additional technical assistance, training and limited staff support for GOG extension. The grant assistance is directed specifically towards meeting A.I.D. target group considerations.

The following Summary Financial Plan indicates major categories of expenditure for the total A.I.D. financed Project, broken down into local currency and foreign exchange categories.

	(In U.S.\$000)				
	A. I. D.		GOG LC	TOTAL	
	FX	LC		\$	%
Agricultural Equipment	2,984	271	461	3,716	28.8
Technical Assistance	1,747	70	1,160	2,977	23.1
Training	81	29	---	110	.8
Construction	393	430	244	1,067	8.3
Engineering Consultant Services	1,865	1,030	2,135	5,030	39.0
<b>Total</b>	<b>7,070</b>	<b>1,830</b>	<b>4,000</b>	<b>12,900</b>	<b>100.0</b>

1. U.S.\$1 = G\$2.55

E. Summary Rationale

1. Project Rationale

The Project responds directly to the Government of Guyana's medium and long term objectives of priority investment in developing the country's productive capacity as a basis for effecting an economic recovery program. In recent Budget Messages, a Four Year Development Plan was announced (1978-81), and it was made explicit that while social infrastructure would not be ignored, a major program of increasing domestic savings would be primarily channeled to the development of productive potential. In terms of sectoral allocation of a projected U.S.\$440 million public sector investments program, to be implemented over the four year period, nearly one-third of the total (U.S.\$147.5 million) has been assigned to the agricultural sector, particularly related to the three large drainage and irrigation projects<sup>(1)</sup> which are intended to increase agricultural acreages and yields in existing farm areas. The Black Bush Development Plan, to be financed by the proposed Project, is thus in direct consonance with the GOG's priority objectives.

a. Importance of Rice Production to Guyana's Economy

Of a total of approximately 700,000 acres in agricultural production, it is estimated that some 50% is devoted to rice production. Production levels have varied considerably over the past decade, primarily as a result of weather conditions, hitting a high of over 220,000 long tons in 1977. Table 1 shows rice acreages and production from 1969-1975.

Agriculture as a whole currently contributes about 25% of GDP; about 16% is contributed by sugar and another 2-3% by rice. Despite its secondary position in terms of contribution to GDP and the generation of export earnings, rice has a disproportionately high importance in terms of its welfare impact, both in terms of employment and its basic importance to the Guyanese diet.

Rice production is primarily a small farmer activity with about 45,000 farm families comprising the bulk of producers.

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(1) The three Projects are Tapakuma, Mahaica Mahicony Abary, and Black Bush.

Table 1RICE ACREAGE AND PRODUCTION - GUYANA 1969-1975

Year	Spring Crop	(First Crop)		Autumn Crop	(Second Crop)		Total for Year		
	Acreage Harvested	Production		Harvested	Production		Production		
		(Long Tons)			(Long Tons)		(Long Tons)		
		Paddy	Rice		Paddy	Rice	Harvested	Paddy	Rice
1969	82,024	37,095	24,112	197,279	133,454	86,745	279,303	170,549	110,857
1970	82,290	54,317	35,306	211,992	164,584	106,980	294,282	218,901	142,286
1971	61,846	41,800	27,170	171,696	142,727	92,773	233,542	184,527	119,943
1972	79,406	39,487	25,667	116,866	105,289	68,438	196,272	144,776	94,105
1973	81,779	50,761	32,995	147,489	99,155	64,451	229,268	149,916	97,446
1974	81,780	67,167	43,000	179,400	184,615	120,000	261,180	251,782	163,000
1975	106,661	91,478	61,159	181,200	194,410	120,000	287,861	285,888	181,157

Source: Ministry of Agriculture.

In addition, thousands of laborers are engaged in transporting, processing and marketing rice.

Rice is also the major ingredient in the diet of both rural and urban sectors, and its importance has increased as the GOG has instituted import restrictions on other staple food items (principally grains and potatoes). Rice has a high substitution capacity, and currently the annual per capita consumption in Guyana is some 140 lbs, up from 130 lbs in 1971.

As well as forming the only food staple grown domestically, rice is an important foreign exchange earner for Guyana. Depending on annual production levels, 70-90% is exported, principally to CARICOM countries under regional arrangements. In 1975, rice contributed U.S.\$39.9 million, or 12% of Guyana's total export earnings.

b. Importance of Rice to Region

The CARICOM countries overall form a food deficit area. Poor resource endowments in the LDC's<sup>(1)</sup> have precluded sufficient agricultural development to meet domestic food requirements; the MDC's have increasingly focused attention on rehabilitating agricultural lands, but the deficit has, in recent years, assumed such proportions that it is highly unlikely that self-sufficiency can be achieved in the foreseeable future.

Throughout the region, import bills have increased dramatically since 1974, while exports (primarily raw materials) have not kept pace, resulting in severe balance of payments pressures throughout the Caribbean.<sup>(2)</sup> The increased reliance on food imports has only exacerbated the pressures.

The CARICOM Secretariat has estimated that through 1985 the total demand for rice within the region will be 210,000 metric tons (60,000 metric tons within Guyana and 150,000 metric tons in the rest of the region).

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(1) CARICOM LDCs include the seven english-speaking Leeward and Windward and Belize; MDCs include Guyana, Jamaica, Trinidad and Tobago and Barbados.

(2) The exception has been Trinidad and Tobago, which is an oil producer.

Internal production outside of Guyana could reach 20,000 tons, leaving a deficit of 130,000 metric tons. If Guyana's production increases as anticipated, a total of 230,000 metric tons would be available for export, (1) thus allowing the region to import all requirements from a member of CARICOM.

c. Government Priority and Plan for Rice Industry

The GOG's Four Year Development Plan places clear emphasis on the rehabilitation and expansion of the rice industry. In 1983 when the three major drainage and irrigation projects are either completed or well underway, the whole of the coastal area in Guyana will have been brought under efficient water control, and the potential for doubling current rice production will have been established.

The GOG is aware of the need to complement land reclamation and rehabilitation efforts with ancillary investment in related areas of concern - improving transportation networks, increasing the GRB's capacity to provide timely and cost-effective assistance to farmers so that yields improve, and improving rice storage and processing facilities to handle anticipated volumes. Improved research techniques in developing seed varieties, and an adequate extension service to disseminate new techniques, are also key elements in the GOG's plans for the rice industry.

2. Rationale for A.I.D. Involvement

a. Target Group

Participation by A.I.D. in the development of the Black Bush region is justified on the basis of the impact on small farmers in the project area, (i.e. increased rice production and increased income, as well as its beneficial impact on the Guyanese economy as a whole.)

More than 6,000 farm families or an estimated 42,000 people will be the direct beneficiaries of the Project. 83 per cent of the farms in the project area are ten acres or less and 58 per cent are five acres or less. For these two farm sizes, per capita income is presently about U.S.\$40 and \$75, respectively, and will increase to U.S.\$65 and U.S.\$115 as a result of the project. Therefore, the target group is clearly within A.I.D.'s legislative mandate. Notwithstanding the additional labor requirements for double cropping production activities, the small farm holders would continue to augment their annual income by off-farm labor. Income to the small

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(1) This assumes total production of between 300,000 and 350,000 tons by 1984. Long range projections (10-15 years) are for a total production of 500,000 tons.

farmers will be increased as a result of higher yields, cropping intensity rising from the Project, and the development of 6,500 acres of unutilized land. In addition, secondary benefits in terms of employment creation and expansion of commercial services related to processing of agricultural produce in the East Berbice region will be forthcoming.

b. Alternative Strategies

Land suitable for rice production in Guyana is severely limited. The land most economically suited for rice production is the clay and silty clay soils of the coastal plain where rice is presently grown. These soils only represent approximately 4.5 per cent of Guyana's total area.

There are soils further inland suitable for rice production on the interior lowlands and the hilly rolling loamy soils. An alternative to increasing production on existing rice land is the development of these new lands. For the following reasons, however, that alternative is not feasible at the present time:

(1) The interior lowlands are subject to flooding and agricultural development would also require flood control.

(2) Hilly lands development would require a system of terracing, an expensive technology not presently practiced in Guyana.

(3) Extensive land clearance is needed prior to development.

(4) Access roads would have to be built, and communication networks constructed.

(5) Farmers would have to be resettled since the interior is sparsely settled.

(6) Institutional services to farmers, extension and production inputs, would have to be greatly expanded to include these remote areas, implying a shift of scarce GOG manpower resource from the coast.

The magnitude of total investment involved in developing Guyana's interior for agricultural expansion is such that it is only economically feasible when considered in conjunction with an integrated development package. In isolation the cost

side of the equation far exceeds any reasonable level of benefits.

At present, the GOG is seeking external financing for one such integrated project in the Upper Mazaruni region in the central part of the country. The project includes irrigation infrastructure, hydroelectric development, the construction of an aluminium smelter, development of a transport system, and related agricultural development. The total cost is currently estimated at U.S.\$1.6 billion, and given Guyana's current economic situation, external financing sources have not been found.

c. Multi-Donor Approach

With regard to multi-donor financing, the Caribbean Region, particularly the English speaking countries, is undergoing a transition phase as operating economies adjust to sharply increased petroleum and food prices, governments seek new political structures to assure economic independence and social equity, and the smaller islands move towards full independence. In response, the USG has given the region increased priority. This has been manifested by several high level visits to the area and the sponsorship of a newly established Caribbean Group for Cooperation in Economic Development led by the World Bank.

One of the primary goals of the Group is to accelerate economic development of the Caribbean countries through increasing the total flow of external financial and technical assistance in forms and on terms that are appropriate to the needs of recipient countries and institutions. The World Bank has been attempting to develop mechanisms by which donors could join to help recipient countries, including the joint financing of priority projects by several donors.

The proposed Project is the first such multi-donor financing effort in which the Bank has asked for A.I.D. participation. In requesting A.I.D. participation the World Bank has advised that because of the current economic crisis in Guyana the Project should be financed on concessional terms, i.e. IDA funds, of which the Bank has only \$10.0 million available for this Project. It is therefore seeking financing from other donors as well as A.I.D. but stressed the importance of A.I.D. participation in order to help mobilize other donor support.

F. Summary Findings

On the basis of the analysis contained herein

the Project Team concludes that the proposed Project is technically, economically, financially and environmentally sound. The Team recommends that the Project be approved and that a grant for \$1.4 million and a loan for \$7.5 million be authorised.

The Project meets all applicable statutory criteria (See Annex I). The USAID Mission Director to Guyana has certified that Guyana has the capability to utilize the Project (Annex I).

The conditions precedent and covenants are described below.

G. Project Development Team

Project Team

Gil Corey, Agricultural Engineer

Charles Mathews, Engineer

Alan Hankins, Agronomist

Robert Gray, Agricultural Economist

Janet Ballantyne, Economist

George Wachtenheim, Finance Officer

Robert Otto, Environmentalist

Project Support Team

Lee Braddock, USAID/G

George Eason, USAID/G

H. Conditions and Covenants

In addition to the standard conditions and covenants the Loan Agreement will contain the following:

1. Conditions precedent to initial disbursement:

- a. The Government of Guyana shall furnish to A.I.D. in form and substance satisfactory to A.I.D., evidence that external

financing in the amount of Thirty-six Million United States Dollars (\$36,000,000) has been formally committed to the Black Bush Project.

- b. A fully detailed, time-phased implementation plan satisfactory in form and substance to A.I.D. covering each component of this Project showing as appropriate its inter-relationship with and priority relative to other components.
- c. Evidence from Borrower that a coordinating committee comprised of representatives of the principal government agencies with responsibility for Project implementation has been established. In addition to GOC representatives the committee will include farmer representatives and will be responsible for monitoring progress during Project implementation.

2. Conditions Precedent to Subsequent Disbursement

- a. Prior to any disbursement or the issuance of any commitment documents under the Project Agreement to finance technical assistance, the Cooperating Country shall furnish to A.I.D., in form and substance satisfactory to A.I.D.:

(1) A technical assistance plan indicating for each advisor requested brief terms of reference, as well as Ministry of Agriculture counterpart and timing.

(2) A preliminary implementation plan for establishing an Extension Training Program, Land Preparation Training Program, and Equipment Maintenance Program.

- b. Prior to any disbursement or the issuance of any commitment documents under the Project Agreement to finance equipment, including spare parts, the Cooperating Country shall furnish to A.I.D. in form and substance satisfactory to A.I.D. a list of equipment and spare parts.

- c. Prior to any disbursement or the issuance of any commitment documents under the Project Agreement to finance any expenditure for the Seed Production and Testing Laboratory, the Cooperating Country shall furnish to A.I.D. in form and substance satisfactory to A.I.D. an implementation plan indicating the research program it is proposing to undertake.

### 3. Covenants

- a. The Government covenants that all commodities procured under the Loan will be used exclusively in the Project area during Project implementation.
- b. The Government covenants that an adequate level of production credits and machinery services for rice and other food crop production would be maintained in the Project area to meet the requirements consistent with a higher intensity of land cultivation and the introduction of high yielding rice varieties.
- c. The Government covenants that priority will be given to the Frontlands for use of the farm machinery to be provided under the Project.
- d. The Government covenants to assign appropriate personnel and sufficient operating budgets to the production technical consultants (rice and other food crops) as counterparts and trainees so that programs developed can be institutionalized and improved over time.
- e. The Government covenants to solicit from IFAD or other International Agencies one specialist to assist in the development of a cost recovery system.
- f. The Government covenants to solicit outside assistance to review and improve the GRB's accounting system and financial management, so as to provide detailed and up-to-date data to GRB management in order

to assess the financial results and implications of its policies and determine, from time to time, the steps necessary for ensuring its financial viability and operating efficiency.

- g. The Government covenants to provide satisfactory assurances through the GOG's existing bonding requirement that personnel trained overseas will return to serve in Guyana for a specified period of time commensurate with the amount of training provided.

## II PROJECT BACKGROUND

### A. Project Setting: The Country

Guyana is located on the northern coast of South America between Venezuela, Surinam and Brazil, and is culturally and ethnically unlike any other country in South America. It is part of the Commonwealth Caribbean, and as one of the strongest advocates of economic intergration of the region, serves as the headquarters of the Caribbean Free Trade Area.

The population of Guyana (766,000), small in relation to the country's land area, is concentrated along a narrow coastal strip and in the interior bauxite town of Linden which together make up only about 1.8 percent of the total land area of the country. Much of the unpopulated area of the interior is unsuitable for agriculture and the high population concentrated along the coast has resulted in Guyana being likened to an "island" on the South American continent. Two major ethnic groups, one of African, the other of East Indian origin, predominate. The East Indians constitute about 55% of the total population and work for the most part in agricultural and commercial activities, while those of African origin, about 35 percent of the total population, are employed primarily in public service and live in urban areas.

### B. Macroeconomic Conditions

#### 1. General Economic Overview

Guyana's economic performance over the past decade has been extremely uneven, marked by persistent unemployment (averaging 20 to 25%), slow agricultural sector growth, weak balance of payments performance, and sluggish private investment. The economy is heavily dependent upon three major activities -- sugar, bauxite and rice -- and any year's performance can be judged in direct correlation to international commodity prices and productivity in these activities. Lowered world prices for bauxite and sugar, combined with an increased oil import bill and extensive strike activity in the sugar industry in 1977, contributed

to a severely declining balance of payments position by 1978. The economic situation was exacerbated by persistent high levels of Central Government spending. This continued high spending, coupled with the current account deficit, led to a record overall deficit for the Central Government in 1976 of approximately US\$139 million, or 33% of GDP. In 1977, the deficit has been calculated at 27% of GDP.

Guyana is endowed with considerable unexploited resources and land relative to its population, but most of the land is in the interior where there is little economic activity, inadequate infrastructure and sparse population. The majority of productive capacity is located along Guyana's coastal plain, which accounts for 80% of GDP.

In 1970 Guyana declared itself a Cooperative Republic, and the Central Government has taken an increasingly important role as entrepreneur. At present, it is calculated that some 80 - 90% of economic activity is in GOG hands. The bauxite industry, previously a wholly owned subsidiary of the Aluminum Corporation of Canada, was nationalized in 1971 and is administered by the Guyana Mining Company (GUYMINE); since 1976 the Government has taken almost complete control of the sugar industry, which in 1976 contributed 63% of agricultural output, primarily for export; rice, while still largely produced on small family-owned or government-leased farms, is controlled by the Guyana Rice Board, the sole rice buying and selling agency. Some 30 other State enterprises control the major aspects of the economy.

## 2. Current Economic Position

Guyana's recent economic performance (1976 to present) has been highlighted by the following:

- \* Severely declining balance of payments position and heavy drawings on the Bank of Guyana foreign exchange reserves;
- \* Increasing rates of unemployment and labor unrest in major productive sectors;
- \* Sluggish private investment and domestic savings efforts.

The result of the foregoing has been a severe eroding of investor confidence, from both external and internal sources, in Guyana. The following chronology indicates the principal events since 1975.

1975: In 1975, GDP rose by approximately 8%, well above the 3% average recorded during the 1972-75 period. This was primarily due to good weather conditions which allowed for excellent agricultural sector productivity, high world prices for sugar and rice, and an improved world market for bauxite. International reserves increased and imports rose, reflecting GOG confidence in its economic position.

1976: In 1976, production in all major sectors was adversely affected by heavy rainfall during the first half of the year, followed by several months of severe drought. Declines in production (compared to 1975) for rice, dried bauxite, alumina and calcined bauxite were, respectively, 40%, 20%, 12% and 5%. In addition, sugar yields were down nearly 15% and faced a sharp decline in world market prices. The sum effect of these conditions, combined with huge increases in the oil import bill, which jumped from US\$40 million in 1973 to US\$200 million by 1976, was a severe blow to Guyana's balance of payments position. Exports of goods and non-factor services fell by about 21%, from US\$385 million in 1975 to US\$305 million in 1976. Despite the fall-off in export revenue, the GOG made no effort to restrict imports. Public sector investment programs caused a nominal increase in the import of capital goods of about US\$85 million between 1974 and 1976, and this, together with higher imports of consumer durables and higher interest payments, resulted in an unprecedented deficit on current account of US\$133 million in 1976, compared to US\$20 million in 1975. Rather than resorting to external borrowing to cover the gap, the GOG began drawing on its international reserves, and during the course of 1976 there was a draw-down of about US\$100 million, virtually exhausting gross reserves

In addition, public sector savings registered sharp deterioration. Current expenditure expanded significantly, reflecting larger payments to social sectors, higher interest payments to ALCAN and high subsidies to both the public and private sectors. This continued high level of capital spending, coupled with the current account deficit, led to a record overall deficit for the Central Government in 1976 of about G\$350 million (US\$139 million),

approximately 33% of GDP. Two-thirds of this was financed by borrowing from the banking system, about 20% from non-banking sources, with the rest coming from external sources.

1977: The balance of payment deficit, on current account, amounted to an estimated US\$100 million in 1977, putting further pressures on the GOG. The principal contributor to Guyana's disappointing export earnings was 135-day sugar strike called by the Guyana Agricultural and General Workers' Union (GAWU) which caused a 22% shortfall in the production target. At the same time, pressure from public sector workers led the Government to announce a 150% increase in the public sector minimum wage. Under a graduated increase system, the minimum daily wage rose to G\$11.40 in early 1978, compared to G\$5.50 in 1976. This will rise further to G\$14.00 in 1979. In an attempt to soften the impact on levels of current Central Government expenditure, the GOG has announced a "redeployment" scheme, designed to effect a transfer of excess government employees to other sectors, principally agriculture. To the present, the efforts have met with resistance, and actual numbers of "redeployed" workers have remained small.

By mid-1977, as a result of lowered export receipts, arrears on Guyana's external account began to accumulate. In May, a delegation from the IMF was invited to Guyana to discuss a possible second tranche stand-by agreement, (the GOG drew down its first tranche in 1976). When informed of the types of conditionality the Fund would require, Guyana told the IMF that they would first attempt to cover their short-term balance of payments gap from other sources. The World Bank has estimated that Guyana will receive (excluding commitments from the United States) approximately US\$110 in new aid commitments/during the year from July, 1977, to June, 1978, including:

- \* US\$30 million from IBRD
- \* US\$50 million from IDB
- \* US\$6 million from Caribbean Development Bank
- \* US\$10 million from the European Development Fund
- \* US\$10 million in bilateral aid from the UK and Canada

While this would provide a certain amount of relief for the Guyanese, this level of assistance is not sufficient to cover the types of development expenditures which the GOG feels necessary to effect a comprehensive recovery package.

1978: By 1978 it had become increasingly obvious, both to the Guyanese as well as the international financial community, that the GOG must effect some significant turnabouts in the management of both its domestic and external economy. As a result, the GOG and IMF are currently in discussions, and it is anticipated that a second tranche stand-by will be negotiated during 1978. Under any agreement, Guyana will be requested to target new levels of domestic savings, bring its current Central Government expenditures more into line with anticipated receipts, and attract new levels of foreign exchange in order to achieve balance of payments equilibrium.

3. Proposed Recovery Program: 1978 Budget and Four Year Development Plan (1978-81).

In March, the Finance Minister presented a series of Budget Messages, outlining both the 1978 budget projections as well as a 1978-81 Development Plan designed to effect a significant turnaround in the Guyanese economy. In broad macroeconomic terms, the strategy for economic recovery is based on achieving four basic targets:

- a) The achievement of an annual rate of growth of GDP at current factor cost of about 10%, implying growth in real terms of somewhat less than 5% annually.
- b) The achievement of "reasonable" targets of growth in all sectors, but particularly in agriculture, forestry, mining and manufacturing.
- c) Increasing the rate of growth of exports to an average annual rate of between 12% and 15%.
- d) Restraint in both public and private expenditure and consumption in order to achieve a rapid rise in domestic savings levels.

In order to achieve these targets, as well as set the base for sustained economic development throughout the 1980's, the Government proposes a Four Year Development Plan which will require the investment of approximately US\$450 million by the Public Sector (Central Government and Public Corporations and Enterprises) over the 1978-81 period, as well as additional investments totalling nearly US\$65 million by the Co-Operatives and Private Sector.

On the Public Sector side, investment in productive capacity and related services is designed to put the majority of state-owned enterprises on a sound financial footing. "Profitability" is to become a measure of overall sector success, and aside from a selected few enterprises which emphasize social welfare, all will be expected to generate surpluses, which will form the key-stone to future public sector savings and investment.

In order to monitor its progress in achieving its economic goals, the GOG will measure performance on key indicators, which include: (1) fiscal management; (2) balance of payments; (3) productivity and (4) investment.

a. Fiscal Management. The 1978 Budget calls for reducing the overall fiscal gap from G\$144 million in 1977 to G\$116 in 1978. The major changes from 1977 include:

- 1) Reduction in subsidies from G\$20.3 million to G\$6.6 million.
- 2) Increased taxes on non-essentials such as cigarettes, liquor, gasoline, and luxury items, amounting to a projected G\$44 million.
- 3) A projected increase in receipts on Capital Account of G\$86 million to a new level of G\$151 million.

b. Balance of Payments. If the targeted level of production is reached, exports should rise from G\$660 million in 1977 to G\$797 million in 1978. The increase is predicted on improvement across the entire spectrum but relies most heavily on a more normal sugar export year. There is no specific projection for imports or for the service balance, but the balance on current account is set at a deficit G\$140 million (US\$56 million) for 1978, compared to US\$100 million in 1977. The Bank of Guyana further estimates the following trend:

<u>Year</u>	<u>Deficit</u> <u>(In Millions of US Dollars)</u>	<u>Deficit as %</u> <u>of GDP</u>
1977	\$100	23%
1978	\$58	11%
1979	\$31	6.5%
1980	\$11	4.5%

c. Productivity. Serious efforts are being made to increase the productivity of workers. As part of the mechanism to support the drive for increased productivity, incentive and surplus-sharing schemes and on and off-the-job training will be instituted to encourage a continuous improvement in worker output. An incentive committee has been established and is working out "parameters and modalities" of a National Incentives Scheme.

In terms of specific production goals, increments are tied largely to investments programmed in major sectors. In the Budget Messages, the Finance Minister stated that the target for overall productive growth is 17% in real terms during the period 1978-81. Based on prices prevailing in 1977 that would mean that GDP should expand from G\$1,006 million in 1977 to G\$1,238 million (in 1977 prices) in 1981. Major increments include:

** Bauxite	-	G\$98 million
** Sugar	-	G\$60 million
** Rice	-	G\$25 million
** Other Food Crops	-	G13 million
** Fishing	-	G\$4 million
** Forestry	-	G\$11 million
** Manufacturing	-	G\$25 million

d. Savings/Investment: A major thrust of the 1978-81 Development Plan is to restrain or postpone consumption -- both private and public sector -- in order to increase the level of domestic savings and to maintain it at the level of at least 6% of GNP over the next four years. As yet, the mechanics for achieving this level of savings are not totally clear. On the private side, supply constraints together with increased taxation of non-essential items and reducing subsidies to consumers will have the effect of lowering consumption, but it is not possible to calculate the magnitude of the reduction. On the public side, the GOG intends to reduce - and eventually eliminate - its current fiscal deficits, effect some consolidation of public sector enterprises to achieve economies of scale, and restructure the orientation of the majority of these enterprises towards profitability as a measure of success.

The Four Year Development Plan goes on to elaborate the proposed breakdown of investment for the 1978-81 period. Table 2 presents a comparison of proposed capital expenditure, by category, of the 1972-76 and 1978-81 plans. The most notable increase is in the share of investment going to agriculture, rising from 15.5% to 33.5% of total investment. Mining and quarrying rise by 7% to 12.9% while General Administration and other services rise to 19.9% of the total. These increases are at the cost of health and housing which falls from 21.7% to 6.9% of total investment; roads which drops from 18.1% to 6.8%; and education and social development which comprised 21.7% of the 1972/76 Plan and only 3.9% of the 1978-81 Plan.

The Government's interpretation of these changes is that they represent a shift from social programs to productive programs. Investment in what are broadly considered to be social areas has been held to less than 8% of the total, compared to nearly 40% in the earlier Plan.

TABLE 2

COMPARISON OF PLANNED INVESTMENT ALLOCATIONS

IN PERCENTAGES

<u>SECTOR</u>	<u>1972 - 76 PLAN</u>	<u>1978 - 81 PLAN</u>
Agriculture	15.5%	33.5%
Forestry and Fishing	7.9%	7.8%
Mining and Quarrying	5.3%	12.9%
Manufacturing	4.1%	3.9%
Power	7.1%	6.5%
Education and Social Development	21.7%	3.9%
Health and Housing Roads	18.1%	6.8%
Sea Defence	3.5%	1.9%
General Administrative and other Services	12.2%	19.9%
Engineering and Construction	.8%	
Distribution	3.2%	
<u>Total Programmed Public Investment</u>	G\$ 1,018.3 million	G\$ 1,122 million
<u>Private Investment</u>	G\$ 132.7 million	G\$ 160 million
<u>Total Investment</u>	G\$ 1,152 million	G\$ 1,282 million

### C. Role of Agriculture in the Economy

The agricultural sector constitutes the largest productive sector in the economy of Guyana. It is more heavily dependent upon this sector than any of the other more developed countries of the Commonwealth Caribbean. The sector's share in gross domestic product at current factor cost average 23% in 1960-73, although it was generally on a declining trend over the period. The surge in sugar prices in 1974-75 boosted the sector contribution to an average of 31%, but, with sugar prices retracting in 1976, the sector's contribution declined to 25%. Real growth in the agricultural sector has not kept pace with population growth in the period since 1961, resulting in increasing dependence on imported food. With the increase in import prices beginning in 1972, and the consequent pressure on the balance of payments, the Government began to intensify its efforts towards self-sufficiency in most food items.

This drive to increase production was subsequently complemented with the imposition of strict controls on non-essential imports. Price increases which would normally have developed under these conditions were kept down by controls on several basic items and there was energetic surveillance against parallel market activities. Although the Government's accelerated production program is still in its emergent stage some limited progress has been made in this drive for self-sufficiency in basic food supply. This, together with the controls on consumer good imports, is reflected in the decline of food imports as a per cent of total merchandise imports from an average of 13.5% per year in 1960-63 to an average of 6.5% in 1974-76, a trend which is expected to be maintained into the foreseeable future.

By and large all major sectors maintained their relative shares of GDP up to 1974. Since 1974, however, agriculture has improved its position due to: generally favourable weather conditions; the influence of government production stimulus; and favourable export prices. Agricultural crops purely for domestic consumption and livestock have not done as well as in the case of export oriented crops. To date Guyana has been unable to produce moderate cost poultry and swine rations even though the country has the potential, given the ready available by-products from the sugar, rice and coconut crops, complemented by some forms of ground provisions and corn. Overall prospects in the case of cattle are good, but the pace of development is being hampered by high investment cost and constrained external market possibilities

Sluggish growth in agricultural production has been associated with a decline in the proportion of the labor force employed in this sector, from 45% in 1950 to 31% in 1975.

During this period the share of the population living in rural areas has remained about constant implying a substantial increase in rural unemployment and under-employment. With limited employment opportunities in the urban areas due to slow growth in light industry and employment saturation in the tertiary sector, there is a strong need for the development of new lines of agricultural production for both export and for the domestic market.

Historically sugar production has accounted for the major share of the value of Guyana's agricultural production; and the sugar subsector contributed an average of 48% of agricultural output in the 1960-1973 period, 71% during 1974-1975 and 63% in 1976 (despite substantial decline in production). The rest is made up by rice, other crops, livestock forestry and fishing in descending order of magnitude, as shown in the following table:

GUYANA: Distribution of Value-Added in Agriculture, 1960-76  
(per cent)

	<u>CROPS</u>				<u>Livestock</u>	<u>Forestry</u>	<u>Fishing</u>
	<u>Sugar</u>	<u>Rice</u>	<u>Other</u>	<u>Total</u>			
1960-73	48.3	15.3	13.4	77.0	10.6	6.8	5.6
1974-75	70.8	10.0	7.0	87.8	6.4	2.8	3.0
1976	63.4	9.9	10.3	83.6	8.8	3.8	3.8

D. The Problem

1. Importance of Rice Production

Although rice ranks behind sugar in terms of contribution to agricultural value added, contribution to GDP and in the generation of export earnings, it employs more people than sugar and is the mainstay in the Guyanese diet. Of a total of some 700,000 acres of land under crop production it is estimated that some 50% pertains, in some form, to rice production. Producers are, for the most part, small independent farmers operating either on a free-hold or government-lease basis. The entire cycle of rice-related activities, however from provision of inputs through final liquidation of sales, is controlled by the Guyana Rice Board (GRB).<sup>1</sup>

Until 1975 when over 170,000 metric tons of rice were produced, 1965 marked the high point in rice production in Guyana - at that time some 165,000 metric tons of rice were produced, with production generally declining thereafter. For 1976 it is reported that production declined to 110,000 tons due to heavy rains and consequent flooding which disrupted planting schedules; output for 1977 is projected to be in the range of 220,000 metric tons. The present general upsurge in rice production is due in part to governmental production incentives programs initiated in 1973, especially in relationship to support prices, cut-rate prices on farm inputs, machinery rental and the introduction of more productive varieties of rice.

1. The rice subsector is controlled by the Guyana Rice Board (GRB) - the sole rice buying and selling agency, handling both local sales and exports. The Board also provides technical assistance, credit and farm inputs, including machinery inputs and improved seeds. The GRB has a tractor and combine pool which is used to aid farmers in the cultivation and reaping of rice. Assistance has been provided in this area by USAID through a US\$12.9 million loan which was authorized in November 1968.

Improved yield, from an average of 0.49 ton per acre in 1960-73 to a 0.58 in 1974-75, is, at least partly, a reflection of governmental initiatives during that period. As an additional inducement to farmers, and because about three-quarters of a typical years output come from the autumn crops, the Government introduced a G\$10.0 bonus for every acre of rice planted in the spring in order to provide farmers with some insurance against higher weather risks during that season. Government subsidies equivalent to G\$62.0 per acre of single-cropped rice and G\$108.0 per acre for double-cropped rice were instrumental in giving farmers an incentive to produce. In 1978, as a result of the economic austerity program most subsidies were removed and the price to consumers raised considerably. The price to the farmer thus remained essentially the same, with the consuming public effectively assuming the subsidy.

Currently the annual per capita consumption of rice in Guyana stands at some 140 lbs. up from 130 lbs. in 1971; this is partly due to the fact that Guyana has sought to rely more on locally produced basic food stuff and drastically reduced the importation of such items. In addition to fulfilling its normal role, rice has also been substituting for other products such as potatoes which were normally imported. Actually rice is not only a major income earner and employment generator but also a "country feeder", especially when it is realized that rice is the only staple food grown in Guyana in any significant quantity.

Most of the rice produced in Guyana (70-90%) is exported primarily to CARICOM countries under regional agreements, and the country has been able to supply other customers only intermittently. In fact, a 39% decline in output in 1976 resulted in Guyana not being able to fulfill even its regular contracts. Unit prices for exported rice jumped from an average of G\$325 in 1970-72 to G\$521 in 1973 and an average of G\$1,018 in 1974-76.

Based on information supplied by the CARICOM Secretariat it is estimated that through 1985 the total demand for rice within the CARICOM community will be some 210,000 metric tons. At that time, some 60,000 metric tons would be consumed in Guyana with the remaining 150,000 metric tons exported to the rest of the CARICOM area. These countries could be expected to produce some 20,000 metric tons leaving them a deficit of 130,000 metric tons, most of which could be expected to be imported, primarily, from Guyana. By 1985 if expectations which are considered to be reasonable are realised, Guyana should be in a position to produce some 310,000 metric tons of rice with 250,000 metric tons available for the export market.

2. Current Rice and Food Crop Production  
Situation Including Constraints

a. Rice

Although average rice production yields in the Project area have been gradually increasing during recent years, there are serious production and marketing constraints which must be addressed if the proposed investments in additional irrigation and drainage systems are to reach their maximum payoffs. Most of these constraints lie within the production services area - the area to which AID is directing a major part of its financial resources and expertise. If these constraints are not alleviated, the small scale farmer may opt for a 'low input - low output' combination to minimize losses from a potentially high risk venture. The problem is to devise a delivery system that reduces these risks and brings forth prompt and effective economic rewards.

Efforts have already been made, or are being made, by the GRB to provide most of the essential elements of a modern rice production system. For example, there is an Extension Service in the Project area - although there is only one rice extension officer, who also has many other duties. He has two field assistants to serve 6,000 farm families. Likewise, some farm machinery owned by both the GRB and by private owners is already in the Project area for plowing and harvesting - although more than fifty per cent of the GRB farm machinery is inoperable for lack of spare parts and repair.

Credit is being granted by the GRB to farmers for seed, fertilizers, and pesticides although the credit covers less than 50% of cash production costs. One result of this credit is that some fertilization is usually done - but the fertilization rate is not based upon specific crop responses or economic returns which can be expected. The field testing of fertilizer responses on the different soils of the Project area has simply not been done. The GRB rice research station (MARDS) has been successful in multiplying imported rice varieties for use in Guyana. Also, some creditable work has been done on the development of new rice varieties which are more specifically adapted to Guyana rice production condition than are the imported varieties. What is needed now is a seed multiplication

and delivery system to get quality reproduction of this seed out to the small farmer on a regular and timely basis.

Likewise, GRB through AID assistance increased rice storage and milling capacity in the area under the Rice Modernization Loan. This capacity - especially for prompt crop drying and storage if rice quality is to be maintained - will be insufficient to handle the expanded production.<sup>1/</sup>

There are other production problem areas which the GRB has either not sufficiently recognized as important ingredients to high production or has not had the manpower or financial resources to launch improvement programs. These include land management and effective use and control or irrigation water. Presently, most rice fields are extremely uneven resulting in excessive water usage to ensure that all of the rice is covered. Weed control is not practiced on a serious and sustained basis, nor is pest management an integral part of the production process. Farmers generally purchase chemicals only after they have discovered serious insect or disease damage, and often it is too little and too late. They do not realize that the best and most efficient way to control pests may not be with pesticides alone but with limited pesticides coupled with good weeding and water management practices.

## 2. Production Of Food Crops Other Than Rice

The production of food crops other than rice is an important element of the Project. Generally, the farmer devotes the larger portion of his land to rice production (often two crops per year if irrigation water is available). A smaller, more intensively cultivated plot of his land is planted in fruits and market vegetables. The rice production part of his total farming operation is supported by GRB. The food crops production services are provided by the Extension Division of MAg - although that agency is also sparsely staffed in the Project area. The

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<sup>1/</sup> A Second Rice Modernization Loan, currently being prepared and scheduled for AID authorization in FY 78, will address nationwide shortages in storage and milling capacity, including those in the Project area.

Extension Division supplies only technical assistance and sometimes seed for food crop production. Credit, fertilizers, pesticides, and marketing services come from other sources. Fertilizers and pesticides for food crop production are presently in short supply.

### 3. The Proposed Production Services Support Program

Considering the constraints to effectively utilizing the irrigation and drainage system which is to be improved or expanded in the Black Bush area, the Project Team has developed a production services support program to help overcome these constraints and blend together the resources which will be available for optimal use. This program is based upon two concepts. The first is the need for an integrated approach for modern rice production. The interrelationships of proper land preparation and water use, high quality seed, correct fertilization and weed control as well as integrated pest management have all been considered in developing this program. So too has timely and efficient harvesting, drying, and storage.

The second concept is that although the same farmer may produce both rice and food crops other than rice, efforts will be made to maximize his net income from whatever mix of rice and food crop production that best suits his interests, resources, and capabilities. The implementation of this concept will be facilitated through the training programs for extension personnel of both the GRB and the MAg.

Despite the above constraints the opportunities for achieving a significant impact on the small farmers in the Project area through implementation of the AID component are great. Farmers in the area are already growing rice and food crops (although with poor technology in some cases), and both the GRB and MAg recognize the need for provision of the various components for modern agricultural production and have in some cases put these components in place.

E. GOG Priorities and Response

1. Medium/Long Term Economic and Financial Recovery

The overall GOG program to effect an economic recovery program is discussed above, in II.3.3 (Proposed Recovery Program). In general the Government has recognized the need, at least in the short run, to defer investment in social infrastructure in favor of vastly increasing Guyana's productive sectors, particularly in agriculture.

2. Current Rice Production/Modernization Efforts

In general the rice industry has received considerable attention from the Government. In part this is due to the importance of rice in the domestic economy, both in terms of employment generation and consumption. The GOG also recognizes, however, the need to diversify its agricultural base which is currently highly dependent upon sugar as an export commodity. Given the wide fluctuation of world sugar prices in recent years, the Government sees increased rice exports as one means of stabilizing its foreign receipts.

Much of the GOG's proposed investment in infrastructure is thus aimed at increasing rice production. In addition, local research into higher-yielding and more easily marketable varieties has advanced beyond that of any crop other than sugar-cane; demonstration plots are prevalent and training seminars are frequently organized; and implementation of a GS35.0 million rehabilitation program (storage, handling and processing) is underway.

The general expectation of those associated with rice policy is to have some 300,000 acres of land under double cropped rice, and to this end the Government for a number of years has been focussing attention on the Tapakuma, Black Bush and Manaica-Mahaicony Abari (MMA) areas. The three areas account for some 68% of rice produced in the country, MMA 42%, Black Bush 6%, and Tapakuma 20%.

In addition, the GOG has focussed attention on the need to increase and modernize services and facilities which form the forward and backward linkages to actual rice production. These include: (a) more efficient provision of basic pre-production inputs, such as land preparation and timely delivery of seeds, fertilizers and technical assistance to the farmer; (b) increasing extension efforts to farmers, in terms of introducing new techniques and input packages; and (c) improved post-harvest services, such as grading, drying and storage of production.

At present, the U.S. based consulting firm Checchi and Co. is conducting a survey of existing systems and bottlenecks in these areas under an A.I.D. contract. The findings will be reflected in a Rice Modernization II Loan, scheduled for AID/W review during FY '78.

F. A.I.D. Activities in Guyana

1. Background and Program Direction

U.S.A.I.D./Guyana priorities are linked to GOG priorities, within the parameters defined by pertinent legislation and overall A.I.D. policies. The GOG has two options in pursuit of development: to strengthen and build on the existing economic base or to undertake new initiatives to broaden and diversify the economy. The latter option entails development of the hinterland, i.e., the areas away from the coast which traditionally have been less settled and exploited. The second option is seen as offering the most favourable long-term prospects and was, until tightening financial constraints dictated a reversal, the GOG priority in recent years. While this option appears to offer the greater benefits in employment and income distribution (assuming successful governmental efforts to induce settlement in the relatively unpopulated hinterland), it also requires larger capital inputs and lower return on investment (at least in the short run) and places heavier demands on the GOG's rather than managerial capacity. Consequently, GOG priority has been shifted to the first option in its current four-year plan (1978-1981) in order to get the most production and income to help it out of its current financial problems.

These two options are not mutually exclusive, but, given the limited absorptive capacity of the Government and the economy (with a total population of approximately 770,000 concentrated along a narrow coastal belt), priority attention to maximizing the returns from the existing productive sectors will necessarily mean little developmental attention to the hinterland (although humanitarian activities among the native Indian populace scattered about the hill and savannah country may still receive attention).

AID activities, which in years past concentrated on basic infrastructure (engineering, highway construction and maintenance, sea defence, airport and harbor development), are shifting toward rural sector development with the focus on agricultural production. The GOC is aiming at rapidly increasing production of both export crops (especially rice) and food crops for domestic consumption (import substitution). Other donors (see below) are helping improve the infrastructure for rice production. AID also has provided assistance to the rice sector, in which most of Guyana's small farmers are employed, and plans further assistance in coordination with other donors. Additional attention will be paid to food crop production and marketing within the general focus on rural development. Current AID project development, in addition to the Black Bush Polder activity, is as follows:

## 2. Current AID Projects

### a. Manpower Training

A loan for one million dollars was signed in 1977 and the project got underway in early 1978. The project will support the Ministry of Public Service in developing its training capacities and will also fund technical training, principally in the agricultural field.

### b. PL480

A two million dollar loan (Title I) was signed in early 1978 to provide wheat flour, edible oil, and tobacco during FY 1978.

c. Agricultural Sector Assessment

In cooperation with the Ministries of Agriculture and Economic Development (Department of Statistics), AID is undertaking an Agricultural Sector Assessment to provide the analysis required to support future project development in rural Guyana. Basic data for the assessment will be derived from a national rural household survey to be conducted in late 1978.

d. Special Development Activities

This grant funded activity is providing up to \$200,000 (including FY 1977 and FY 1978 funds) for community projects mostly in rural areas and including small-scale crop and livestock activities.

3. AID Projects in Preparation

a. Rural Roads

Designed primarily to improve the CCG's capacities for maintaining its road system (and secondarily to augment funding for building feeder roads), this 6.2 million dollar loan (1.7 million dollar grant) is scheduled to be signed in FY 1978.

b. Rice Modernization II

A study is currently underway to assess an earlier rice project and the prospects and requirements for a follow-on project. Storage, transportation, shipping, and marketing needs are being considered. Current funding estimates are for a \$10 million loan and a two million dollar grant in FY 1978.

c. Weaning Foods

Proposed for FY 1978 initiation with three-year AID funding of \$480,000 (plus an estimated \$840,000 of PL480 Title II commodities), this project is now being developed. It will establish the capacity in Guyana to produce and distribute low-cost nutritious foods for pre-school children.

d. Seed Farm

With anticipated two-year AID funding of \$500,000, this project is being developed for start-up in 1978. It will help the Ministry of Agriculture to improve its production, storage, and distribution of seed towards self-sufficiency in domestically produced seeds for major food crops.

e. Leprosy Control

This \$250,000 OPG beginning in FY 1978 through American Leprosy Mission's Inc. will support three years of work to better the management of the Leprosy Control Program in Guyana, including identification and treatment.

4. Projected AID Projects

a. Agriculture Sector Loan

This is scheduled to be developed for FY 1979 funding. The specific nature of the activity will be contingent upon findings and recommendations of the sector assessment.

b. Rural Health System

Projected for FY 1979 loan funding of 2.6 million dollars (and \$300,000 grant), this project will design and develop a low-cost rural health delivery system based on a corps of community health workers.

Additional projects, especially for the rural sector, will be considered for future development.

G. Other Donor Assistance

The proposed Project for the development of the Black Bush region is one of three major GOG drainage and irrigation schemes which require external financial assistance. The other two, the Tapakuma Irrigation Project and Mahaica/Mahaicony/Abary (EMA) Water Control Project

represent major efforts which when combined with the Black Bush development - will effectively bring the coastal area of Guyana under efficient water control.

a. Tapakuma Irrigation Project

The first of the three major irrigation projects, Tapakuma, is currently in execution, and has received World Bank financing in the amount of U.S. \$12.9 million (out of the originally estimated total of U.S.\$18.5 million). The Project has suffered severe cost overruns, however, and the GOG is currently attempting to secure other external commitments in order to complete civil works.<sup>1</sup>

When Tapakuma is completed, it is expected that some 66,000 acres of land in the area will be brought under efficient water control, allowing new lands to be developed and creating conditions for improved rice yields. While the area is predominantly in rice cultivation, some additional production of ground provisions and fruits is also expected.

b. Mahaica/Mahaicony/Abary Project

The MMA water control Project has an estimated cost of U.S.\$72.6 million, and would be the third major drainage and irrigation scheme (after Black Bush). The Inter-American Development Bank has completed a Project Report on the plan, and signed an agreement with the GOG to carry out the Project.

The project would provide flood control for the agricultural development of 115,000 acres of land in which rice and sugar cane are the major crops. The project consists of a reservoir dam and a drainage and irrigation system supplemented by investments in equipment and services.

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1. Current estimates are U S.\$40.2 million; CIDA of Canada, the Overseas Development Ministry of United Kingdom, and OPEC are possible sources of financing.

G. Other Donor Activities in Related Areas

In addition to the above World Bank and IDB projects, the GOG has requested a US\$7.8 million loan from the IDB to improve food crop production and marketing. The proposed project will provide an integrated package of goods and services needed to increase the production of basic foods. It would provide: supervised agricultural credit; technical assistance in a variety of areas including: marketing management; marketing design; agricultural statistics; and farm management; construction of rural marketing centers and related infrastructure; and engineering and administrative services.

The major portion of the project - supervised credit - will be concentrated in three Agricultural districts. Black Bush will not be among them, but the area will benefit from marketing elements of the loan. Black Bush Polder has been selected for development of marketing infrastructure under the Project.

PART III - PROJECT DESCRIPTION

A. Chronology of Project Development

Under a previous (July 1971) A.I.D. financed host country contract, Harza Engineering Company of Chicago, in conjunction with Aubrey Barker Associates of Georgetown, Guyana, conducted a feasibility study (published in November 1975), of the East Berbice region of Guyana to determine the potential of the area for further agricultural production and marketing development. The area studied in this report was the Black Bush Backlands and the Manarabisi Cattle Pasture, a gross area of 51,500 acres, to determine its potential for rice and sugar production. In addition, the study included an analysis of the Black Bush Frontlands to determine whether adequate water was available to satisfy irrigation requirements.

While the development proposed in this study was found to be technically and economically feasible, it was considered too costly to finance under the prevailing conditions. As a result, the feasibility of developing the Black Bush Polder, Black Bush Frontlands and Block III was analysed by Harza under a May 1976 agreement with the GOG and financed by a World Bank Project Preparation Facility Loan. The report of this analysis was published in March 1977. In considering the proposed project for financing the World Bank prepared a staff report based upon findings from these two studies, Bank field investigations, and experiences gathered from the Tapakuma Project.<sup>1/</sup> The World Bank found the proposal to be technically and economically feasible, and recommended that the Project be financed.

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<sup>1/</sup> Description of the Tapakuma Project can be found in Part IV A.

Because of Guyana's recent serious financial difficulties it is not eligible for World Bank loans, but is eligible for IDA credits. The present IDA allocation for Guyana is \$15 million which is being divided between two projects and only \$10 million could be allocated to the Black Bush Project. The Bank therefore sought additional financing from other donors as well as A.I.D. but stressed the importance of A.I.D. participation in order to help mobilize other donor support. In addition to A.I.D. and World Bank financing, IFAD and an as yet undetermined donor will provide the balance of funds required under the Project.

During Project Team/GOG development of the A.I.D. financed component it became apparent that a number of project elements required financing above the levels indicated in the World Bank Staff Appraisal Report. An A.I.D. financed grant component of U.S. \$1.4 million and a GOG counterpart of U.S. \$1.0 million was designed to finance new project requirements. 2/

B. Specific Area Production Problems

The analysis of the importance of both rice and other food crop production as contributors to farmers' income, was performed in the context of the total farming system, taking into consideration, current farming practices and constraints to improved production methods.

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2/ The A.I.D. Funded Grant and corresponding GOG counterpart will finance technical assistance, training, and limited staff support.

Data collected on rice productivity in the Project area has indicated that yields have been slowly increasing during the past 2-3 years. Present yield levels of about 13.6 bags (140 lbs. each) per acre (1900 lbs.) are still considered low however. The water availability potential, the soils base, climatic and topographical conditions existing in the area indicate that with packages of production technology and strengthening input components, yields could easily reach twenty bags (2800 lbs.) per acre per crop over the life of the Project.

Most small farmers in the Project area devote the majority of their land to rice production and have a smaller more intensively cultivated plot for production of fruits and vegetables for home use and for sale.

The GOG has established one agency - the GRB - to deal exclusively with rice and another agency - the Extension Division of the MAG to promote and support production of the other food crops. The infrastructure to support rice production, processing, and marketing is somewhat more complex than that to support other food crops. The result of this separate approach to the farmer's problems has meant that the optimal mixes of cultural practices and production inputs related to both rice and other crops have not yet been developed for dissemination to farmers. Each service has functioned independently though both services often attend the same client.

A close coordination between the two services is needed to develop a systematic approach to production with the goal of increasing small farmer income and improving his well-being. The technical advisors for applied research extension and training, farm management, and water management will train

and help to develop the government personnel assigned to both rice and to food crops, thereby setting the foundation for a closer working relationship between the MAg and GRB.

(1) Land and Farm Development

The Project area consists of low-lying coastal plain having little surface relief. The general gradient is only about 0.5 feet per mile toward the coast. Surface deposits consist of silt and clay of marine and riverine origin. Sandy reefs and beach ridges (9,800 acres) occur more or less parallel to the coastline. These surfaces are two to four feet higher than adjacent low lands and are presently used for coconut production. Because of the extensive land development necessary to convert these reefs to crop production, the intensive management required to maintain them, and the high water requirements of sandy soil these areas are excluded from the Project area and will remain in coconut production.

The soils of the area are predominantly dark colored, fine textured, and slightly to moderately acid in the surface layers and fine textured, light colored and somewhat alkaline in the subsoil. Owing to the high clay content, these soils swell and shrink considerably upon wetting and drying. Most of the Project area consists of low-lying, poorly drained clay soils used primarily for rice production.

Soil infiltration capacity is in general very low, but this is not an unfavorable condition for rice under flood irrigation. For vegetables, however, the soil must be formed into beds in order to permit adequate drainage. Soil fertility is relatively

high compared to most humid tropical soils; however, Project soils do respond to nitrogen and phosphorous fertilizers. Some soils especially near the coastline are saline and in some cases alkaline but most of these occur outside the Project area. There are apparently no minor element deficiencies or chemical toxicities among the Project soils. The soils are well suited for crops under consideration and should produce relatively high yields.

Surface land slopes are small and the general appearance of the land is flat. However, topographical irregularities do exist on all lands with many fields having undulations with ground elevation differences of as much as one foot. Realization of the production potential on both existing and new land in the Frontlands area will require removal of surface irregularities by land leveling and/or grading. Low areas in fields cause poor stands, excessive waste of water, and problems with harvesting and seed bed preparation because of excessive soil water within these areas. Careful land preparation to permit application of a uniform depth of water over the entire field is essential.

The farm fields vary in size from 0.5 acres on vegetable plots up to 15 acres under rice production. These variations result from size of individual ownership as well as leasing of smaller parcels within individual ownerships.

Seed beds are prepared by tractor powered discs and moldboard plows. A common practice is to plow again in a wet condition prior to planting. Plowing leaves surface undulations which aggravate the unevenness of the surface topography. These localized irregularities should be corrected by floating or land planing prior to planting each rice crop. Land preparation equipment and tractors are either privately owned, or leased from the private sector or the

GRB machinery pool. Availability of such equipment on a timely basis is a problem for the farmer who does not own the equipment. Approximately 40 percent of the land preparation and harvesting in the Project area must be accomplished with leased equipment. There is presently no adequate land leveling equipment in the Project area, either privately or government owned.

(2) Water and Water Management

Water supply for the sugar estates, the Black Bush Polder, Block III, and a portion of the Frontlands is presently supplied by pumping from the Canje River. A part of the Canje River supply comes from the Berbice River by gravity flow through the Torani Canal.

During the critical low flow, dry season period when crop water demands are highest, the present system is of insufficient capacity to meet crop demands in 5 out of 8 years. The project will provide for a 1,000 cfs pumping plant into the Torani canal, increased pumping capacity at all pump stations from the Canje River into the canal system. Canal extensions will be provided for the lands not presently under irrigation. There is an adequate water supply in the two river systems for irrigation of Project lands with sufficient base flow remaining in the rivers to insure that the tidal salt water wedge does not reach pumping plants. If future development of these water resources is contemplated beyond the scope of this Project, however, the danger of salt water intrusion will need to be carefully analysed.

The quality of water in both the Berbice and Canje Rivers is excellent for irrigation. Even during low rainfall and low flow periods the dissolved solids content rarely exceeds 200 parts per million. The only water quality

problem relates to the salt water intrusion upstream from the Canje river mouth. In the past, it has occasionally been necessary to temporarily cease pumping at the downstream sugar estates when the salt content reached 2000 ppm. The transfer of additional water from the Berbice river will eliminate this problem.

The secondary canal system which delivers water to farms from main canals consists of parallel water courses from 800 to 1,600 feet apart. Drains run parallel to and midway between water-courses. This permits a water supply at one end of each irrigation unit and a drainage channel at the other end. Drainage channels are equally as important as the irrigation channels since water must be drained to permit good root development and for harvest and land preparation. Also during periods of high rainfall, excess water must be continually drained from the paddy. Since land elevations are less than ten feet above sea level adequate drains and maintenance of them is essential for project success.

Irrigation water is scheduled through the canal system by blocks. The Operations and Maintenance Section of the Hydraulics Division prepares and publishes irrigation schedules. During the irrigation season, this schedule is prepared slightly in advance of field operations and is based on current needs and preceding period rainfall. Irrigation water is normally provided on a 10-14 day schedule; however, with present facilities and water quantity, only a limited amount of supplemental irrigation water is provided to the Frontlands area.

Watercourses in the Frontlands show considerable deterioration with sloughing of banks and considerable vegetative growth. Many have not been used recently. Because of this general

deterioration and improper channel alignment, rehabilitation and revision will be required to improve these watercourses. The realignment will result in less land being used for watercourses and collector drains. Water supply and drainage channels in the Polder and Block III are in fair repair but show signs of poor maintenance.

Irrigation diversions to farms are not measured, consequently application efficiencies cannot be determined quantitatively. Field inspection and present practices, however, indicate that efficiencies are quite low since drains are practically always full of water. In some cases water is allowed to run off while water is still being applied. Present seed bed preparation methods also require large quantities of water since an irrigation is applied to already plowed fields. This undoubtedly requires at least one acre foot per acre. Uneven fields, draining water off to establish good rooting, and poor timing of irrigation supplies all reduce irrigation efficiencies.

In summary, the major water management problems connected with the existing irrigation system are serious deterioration of facilities in the Frontlands and some deterioration in Block III, insufficient water supplies at periods of peak demands, lack of water control, unlevel farm fields and questionable farm management practices. The major problems associated with the existing drainage system are inadequate main drainage channels and maintenance of the collector drain system.

Better water control to secure an adequate and timely supply and better land preparation for controlled uniform depth of flooding are necessary for improved production. Water delivery control can be improved by **timely** planting of one variety of rice in each block.

### (3) Cultural Practices

Modern rice production technology requires a careful, definite sequencing of activities, including the application of inputs. The margin of error is small if high production is to be achieved. This means that land must be properly prepared in a timely manner. High quality, disease resistant seed must be readily available. Fertilizer and pesticide applications must be applied in the amounts and timing required. Water supply must be regular and in adequate quantity. Harvesting must be done within a frame-work of a few days. Premature harvesting results in high moisture grain which must be rapidly and successively dried, at high cost, if quality is not to deteriorate. A delay in harvesting causes lodging or grain shattering resulting in heavy crop losses. Also paddy should be dried as soon as possible after harvest if quality is to be retained.

Rice seed beds are prepared, in Guyana, by tractor drawn plows. Disc plows, with 2 or 3 discs, are commonly used because most tractors are of the 35-40 hp. class. The first plowing is done shortly after harvest when the soil has good moisture. It is common to then wait until just before planting to apply a heavy irrigation and plow again in the wet condition.

Land leveling or grading is not common since appropriate equipment is not available. The second plowing does have a puddling effect and high spots are minimized; however low spots become very fluid and rice seed tends to work its way too deep below the soil surface and does not germinate resulting in poor and uneven stands.

Rice is seeded by hand broadcasting in the wet field and irrigation water is applied until the rice germinates. This is a weed control measure. After germination, fields

are drained so the seedlings can establish a good rooting system.

Fertilizers are normally applied twice during the season. As a general rule  $\frac{1}{3}$  to  $\frac{1}{5}$  of the nitrogen is top dressed 2-3 weeks after planting and the balance  $\frac{2}{3}$  -  $\frac{3}{4}$  is applied about 3 weeks before heading at panicle initiation. The fertilizer is broadcast by hand.

Insecticides are applied with knapsack sprayers when infestations are present.

Irrigation water is applied through a water course system which supplies water on a turn basis. Water is usually available to each field 4 or 5 days in each 30 day period. There is little actual control over the quantity of water used since the amount available depends on the fields proximity to the watercourse. Sometimes fields are drained prior to fertilization thus creating a need for extra water beyond plant needs.

The rice is harvested by privately owned and GRB machinery pool combines. Inadequate maintenance and lack of spare parts creates problems with harvesting on a timely basis.

Other cultural practice problems include; the lack of land grading to provide good germination and water use; no adaptive research to learn proper fertilizer recommendations; poor water control and questionable practices of draining paddies too often and wasting water; no real water control and no knowledge of how much water is presently used.

An applied research and increased extension emphasis is needed. Dry seed bed preparation needs to be tested, land planing (leveling) and better and more efficient irrigation

practices need to be initiated. Most of these need to be done on a pilot basis first through a research and extension program.

The common problem of tension between farmers and government institutions can be greatly alleviated by a well-trained articulate extension staff which can act as coordinators and mediators between the two groups. Extension workers need to not only address the human relations concerns between the farmers and the GRB but also should serve as effective technology change agents. An example of the type of coordination which should be promoted by the extension staff should be block planting in which all, or a majority of, farmers along a particular canal and drainage ditch would be encouraged to prepare land simultaneously, or in sequence; to irrigate at the same time; and to therefore harvest rice in the area over a matter of days. This would have many advantages for both the farmers and the GRB. The farmers would find machinery more readily available as many acres can be prepared or harvested without machinery having to move long distances. Farmers would have less conflicts with their neighbors as disputes over irrigation timing and machinery use are presently a source of irritation. It is believed that the entire process of improved dialogue between the GRB and the rice farmers will be greatly enhanced through the provision of adequate extension coverage.

(4) Inputs - Fertilizer, Pesticide, Seed

Availability of inputs is presently a problem in the Project area. Farmers often make several trips to the GRB supply stores to receive seed, fertilizers, and pesticides. Reasons are inadequate accounting procedures,

inefficient flow of materials to the field, and excessive paperwork. Expanded extension personnel numbers will permit better prediction of needs over time and should increase the efficiency of flow of inputs.

(a) Rice Seed

The availability of high yield seed is the cornerstone for developing packages of technology for modern rice production. The seed must be genetically pure, have a low moisture content and a high level of germination and should be free from weed seed, other impurities, and seed-borne insects and diseases.

The variety "Starbonnet" imported from the U.S. during the early 1970's occupies approximately eighty per cent of presently cultivated rice land in the project area. Traditional varieties are grown on the remainder, except for limited areas of the new variety "N" which was developed from IRRI crosses at MARDS (Mahaicony Abary Rice Development Station). Variety "N" is a short stiff strawed nitrogen responsive type. It is expected to be grown on at least eighty per cent of the Project areas as soon as irrigation water is available, with Starbonnet occupying the remaining twenty per cent. This new variety "N" has good blast disease resistance, its milling quality is reported to be nearly as good as Starbonnet, and it is a non-photosensitive, early maturing rice. The new lines (77916 and 75698) were increased in 1977 for release during 1978. These new varieties in initial field tests have demonstrated an improved yielding ability and better blast disease resistance than variety "N". Rice blast (or broken neck), caused by the fungus Piricularia oryzae Cav., is common in most rice growing countries and has been

the principal disease, causing serious losses in Guyana. The loss from this disease becomes more serious as nitrogen fertilizer applications increase. Thus, developing high yield varieties with considerable resistance to blast would allay fears of farmers that additional nitrogen fertilizer would cause serious blast infection.

MARDS is responsible for providing foundation seed to the GRB in the Project area. The quality of seed and the availability of new varieties appropriate to Guyana conditions depend upon the quality and depth of research, and the technical capabilities and availability of research personnel at MARDS. The physical facilities to produce, dry, store, and treat the foundation seed must also be in place. The production of quality foundation seed is fundamental to the success of an adequate rice seed delivery system.

Given the current limitations of physical facilities, personnel, equipment, and field testing conditions, the MARDS staff has done a creditable job in producing quality foundation seed. Foundation seed production would be greatly facilitated by providing adequate cleaning, drying and storing facilities at the MARDS station in order to accommodate the several varieties which are being produced. All foundation seed for varieties being produced at MARDS, with the exception of Bluebonnet, must presently be sun-dried and held in bagged storage because of a lack of operational drying and processing facilities. The Rice Modernization II Project scheduled for funding in FY 78 is addressing the need for additional physical facilities for foundation seed production at the MARDS Station.

The adaptive research element incorporated into the Black Bush Project will allow researchers to design adaptive research trials and to test results under actual farm conditions. This will provide valuable feedback upon which to

base future research.

Plans in the Project area call for production of certified rice seed on 600 to 1,000 acres at the Government Rice Improvement Farm in the Polder. This production will provide approximately sixty per cent of the rice seed needed for the Polder, Block III, and the Frontlands. This expanded effort will require provision of seed drying, cleaning and sizing equipment as well as equipment and materials for a seed testing laboratory which is required if seed quality is to be maintained.

The necessary seed production and seed technology equipment for a greatly expanded rice seed production area will be provided under the Project.

(b) Vegetable Crop Seed

Guyana is presently experiencing an acute shortage of reasonably priced vegetable crop seed which is adapted to tropical growing conditions. Most of the vegetable seed is imported from temperate climates, such as New Zealand or the United States. Due to tropical conditions, the shelf life of the vegetable crop seed is relatively short, thus creating many problems of germination.

The capacity of the MAg to provide an adequate supply of vegetable seed appropriate to Guyana conditions will be addressed by the Vegetable Seed Farm Development Grant, also to be funded in FY 78 by A.I.D.

(c) Pest Management

Good crop husbandry methods (i.e. proper

weeding of rice fields, dikes and waterways) is generally the cheapest and most effective way of controlling most crop pests. This concept is not generally followed in the Project area at present. Farmers treat insects and diseases on a case-by-case basis rather than attempt to prevent their occurrence. Unfortunately, by the time the farmer discovers the pest, secures the product to combat it, and applies the product, considerable damage frequently has been done.

A program of "integrated pest management" will be developed within the Project area as a result of the AID-financed Project components. Extension agents and applied research personnel will demonstrate to farmers (on the farmers' properties) the values of insect and disease prevention as an effective and economical part of this system. Chemical pesticide applications will also be used where, when, and in the amounts needed. This limited and controlled use of chemical agents - which will be developed, demonstrated, and promoted under this Project - should result in higher rates of economic return to the farmer as well as fewer damaging effects to the environment than would be the case if disease and insect control chemicals were used on a continuing ad-hoc basis as at present.

(d) Fertilizer Utilization

(1) Rice

The high yielding, short season, lowland rice varieties provide profitable yields with adequate fertilizers. This is especially true with the variety "N" which was derived from an IRRI cross. Most farmers use fertilizers even though it may be at a

low rate. On the average, farmers use as much fertilizer as they can afford or can obtain from the GRB on credit. This is normally one-half bag (56 lbs.) of Triplesuperphosphate (TSP) and 112 lb. bag of urea (50 lb. of nitrogen) per acre.

There are no data at present upon which to base specific fertilizer recommendations for the Project area. Applied research results at the Tapakuma Irrigation Project on fertilizer applications varied widely according to types of soil. Also, the returns per C\$ invested in fertilizer varied from negative to over four fold - depending upon rice variety, soil type, and the mixture of fertilizer used. The adaptive research to determine optimal fertilizer usages on the various rice varieties and soil types will be done for the Project area as part of the A.I.D. contribution.

## (2) Food Crops other than Rice

Vegetable crops also require considerable amounts of nitrogen and phosphorous fertilizers although at present the use of fertilizers in those crops is limited to about the same level as rice, since larger amounts are not available to vegetable growers.

## (5) Machinery Services

Land preparation (plowing, discing, and puddling) and harvesting in the Project area are done by machine. At the present time 60 per cent of this is done by privately owned equipment operating on the owner's land or leased on a custom basis (Harza Feasibility Report, 1977). The incidence of machinery

ownership is high in the area with more than 300 farmers owning tractors and plows in the Polder. However, only a few own combines.

The GRB attempts to provide the balance of equipment needed for the Polder and Frontlands from its main machinery pool and maintenance station at Joanna in the Polder. The machinery pool's inventory of equipment includes: 37 self-propelled half-track combines with 14-foot cutter heads; 34 tractors ranging in horsepower from 46 to 75; 28 three-disc plows; 1 moldboard plow; 18 harrows; and miscellaneous shop and field equipment.

Availability of equipment on a timely basis is a problem because: (a) there is insufficient equipment available; for example there is no proper equipment for land planning either privately or government owned; and (b) more than one-half of the equipment in the GRB pool is inoperable.

Repair and maintenance, spare parts supplies, training, logistics, scheduling, and general shop and machinery management are all areas which presently encounter serious deficiencies in the GRB machinery pool. According to the Ministry of Overseas Development Report on the Use Maintenance of Government-owned Mechanical Equipment dated March 1978, there are a variety of reasons for poor equipment management including:

1. Equipment inventories are inadequate.
2. The rate of destruction of equipment is faster than the rate of rehabilitation.
3. Operator carelessness and lack of training are contributory factors to the high rate of breakdown.

4. There is a serious shortage of workshop tools and equipment.
5. There is an insufficient number of qualified mechanics.
6. Little attempt is made to give any form of training.
7. Workshop space is being occupied by crash or broken vehicles on which no work is undertaken.
8. There is a lack of workshop manuals specifying maintenance and repair requirements.
9. Routine servicing of vehicles and machines is inadequate.
10. Workshop records on individual pieces of equipment are inadequate or non-existent.
11. Spare parts stocks are in general inadequate.

It is true that these observations apply to Government operated machinery pools in general but those listed above appear to apply to the GRB pool in Joanna.

Undoubtedly, the most serious constraint to higher yields in the Project will be the limited availability of machinery to perform timely field operations. The small size of land units in the Project area will continue to preclude individual ownership of tractors and combines. The farmer will continue to be affected by the equipment operator or the availability of equipment from the government machinery pool. If this constraint is overcome sufficiently to allow timely high quality land preparation and harvest, the yields in

the Project area will be increased significantly.

It is essential that the GRB machinery pool be improved to provide equipment on a timely basis. Items needing investigation and/or implementation include:

1. Better equipment for land leveling.
2. Adequate supply of spare parts, especially those needed on a regular basis.
3. Improved overall administration of the entire operation for better control and scheduling of equipment, procurement, repairs, and routine servicing.
4. More shop tools so repairs can be made.
5. A system of accounting for the entire operation (maintenance, equipment operation, servicing, repair work, etc.), so programs can be improved and equipment available on a timely basis.
6. Better organization of farmers into block planting so that logistics of machinery throughout the project area can be facilitated.
7. Training programs for machine operators, mechanics and foremen.

8. Full-time employment for combine operators so experienced men are always available.
9. Incentive systems and assignment of responsibilities so employees are rewarded for efficient use of equipment in the field.

(6) Credit

(a) Rice

A 1975 survey showed that 41 percent of credit recipients in the Polder received credit from the GRB; 32 percent from friends and neighbors; 22 percent from agricultural and commercial banks; and 17 percent from merchants and money leaders. 1/ This includes credit for both rice and for other food crops.

The GRB presently provides approximately one-half of the total cash production costs for farmers in the Project area. This credit allowance (in kind) provides for seed and fertilizer. The other cash production costs such as land preparation, acquisitions of pesticides, harvesting costs, and transport of crop must be provided by the farmer himself or from other credit sources.

(b) Food Crops

The Agricultural Cooperative Development Bank, established in 1973, provides loan funds

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1/ This adds to more than 100 percent as some farmers receive credit from more than one source.

both to cooperatives and to individuals for the production of rice and food crops other than rice.

The Agricultural Bank provides no short-term production credit for rice but loan funds are available for medium term (2-5 years) and long-term (over 5 years) financing of rice production activities - which would be primarily for on-farm development. The Agricultural Bank portfolio for rice development is projected to increase from the present US\$800,000 to US\$1.8 million by 1981.

The Agricultural Bank provides both short and long term capital for food production other than rice. A special program for short term credit for food crop production is expected to increase from its present US\$800,000 per year to US\$1.4 million by 1979-80.

As the fruit and vegetable producers in the Project area are expected to maintain very small acreages of production with almost no mechanized equipment, available credit for production of food crops other than rice will be sufficient to meet the credit demands.

(7) Marketing Services

(a) Rice

The rice industry, including production, processing and marketing, is largely controlled by the Guyana Rice Board (GRB). The GRB provides some drying, storage and milling facilities, and all milled rice, except that retained by the farmers, must by law be sold to GRB which handles both internal and export marketing. In the

Project area about eighty per cent of the milling is performed by privately owned mills.

Rice production in Guyana fluctuates dramatically from year to year because of changing weather conditions but recent performance points to a significant trend upward. Production reached a seventeen year low in 1972 at 94,000 tons, but since then it has increased substantially reaching 160,000 tons in 1975 and an estimated 220,000 tons in 1977. The 1976 crop, however, was only 110,000 tons as a result of extraordinarily adverse weather.

(1) Milling

The Guyana Rice Board (GRB) has five rice mills in the East Berbice region and there are 52 privately owned mills (32 single-stage and 20 multi-stage). These facilities include concrete drying floors and, in some cases, small mechanical drying units. In addition, there is a new and larger drying unit at the GRB mill at Joanna in the Black Bush Polder comprising three dryers with a combined bulk storage capacity of 7,500 tons. The drying capacity is 240 bags (15 tons) per hour. The IBRD estimated combined mechanical drying capacity in the region at 240,000 bags of paddy (15,000 tons) per month, or 25 tons per hour. At a milling yield of 65 per cent, two bags (140 lb) of paddy yield one bag (180 lb) of milled rice.

The five GRB milling units have a combined capacity of 250,000 bags

(20,000 tons) of milled rice per year. The private sector provides an additional annual capacity of 975,000 bags (78,000 tons) per year. This capacity would be adequate to handle the production which will increase from 851,000 bags per annum to approximately 1,700,000 bags per annum at Project maturity. However, many of the private mills are old and inefficient and the milling quality is low. Throughout the country 59 single-stage mills were closed and only seven new multi-stage mills constructed during the period 1969-75. In the past the owners have lacked incentive and funds for capital improvements due to the low profit margin between the fixed prices paid by GRB for milled rice. Further, the policy of the AgBank is that private owners may receive investment loans only on land totaling 60 acres or more. In practice, three or four farmers solicit loans from the AgBank as a group for purposes of soliciting a loan. There is a trend for farmers to use toll milling, i.e. a fixed cost per bag, instead of selling paddy to the mills. This permits farmers to sell milled rice to GRB and retain the by-products.

It also permits private millers to earn higher revenues for their services. With the

increased production in the last three years GRB has begun contracting a significant amount of milling to the privately owned mills. With toll milling and the contracts with GRB, the private sector has started to recover from the previously depressed conditions but it is important that Government recognize the importance of private mills to the industry and ensure their operation in the future, particularly in light of the financial limitations of the GOG to invest heavily in the construction of new Government mills.

(2) Storage and Drying

Total storage capacity in the Project region is estimated by the IBRD at 1,205,000 bags (75,312 tons) per year, including 315,000 (19,687 tons) in the GRB facilities and 890,000 bags (55,625 tons) in the private sector. Although GRB storage capacity is smaller, it stores 65 per cent of all rice milled, leaving storage of paddy largely to the private mills. Of the total storage capacity, only 10 per cent is bulk type storage. Projections made by the IBRD and shown in Table 3, based on estimated production with the project, indicate a drying and storage deficit of about 450,000 to 500,000 bags (27,000 tons) per year. This could lead to serious problems of loss and

TABLE 3  
Monthly Flow of Paddy  
Harvested, Dried, Milled and Stored  
(140-lb. bags)

	<u>FEBRUARY</u>	<u>MARCH</u>	<u>APRIL</u>	<u>MAY</u>	<u>JUNE</u>	<u>JULY</u>	<u>AUGUST</u>	<u>SEPTEMBER</u>	<u>OCTOBER</u>	<u>NOVEMBER</u>	<u>DECEMBER</u>	<u>JANUARY</u>	<u>FEBRUARY</u>
Harvested	81,431	285,007	325,723	122,146	-	-	-	333,264	555,439	222,176	-	-	-
Dried <u>1/</u>	81,431	240,000	240,000	240,000	12,876	-	-	240,000	240,000	240,000	240,000	204,537	-
Not Dried <u>2/</u>	-	45,007	130,730	12,876	-	-	-	93,264	315,439	444,537	204,537	-	-
Milled <u>3/</u>	81,431	204,166	204,166	204,166	48,710	-	-	204,166	204,166	204,166	204,166	204,166	371
In Storage <u>4/</u>	-	80,841	166,564	48,710	-	-	-	129,098	480,371	498,371	240,371	371	-

1/ Mechanical drying capacity - 240,000 bags/month - 25 tons/hr (20-hour day).

2/ Maximum monthly volume of paddy not dried - 445,000 bags - 29,000 tons.

3/ Milling capacity - 204,166 bags/month - 21 tons/hr (20-hour day).

4/ Storage capacity - 1,205,000 bags/year - 75,000 tons/year. Total yearly storage 1,644,697 bags/year.  
 Storage deficit - 439,697 bags/year - 27,359 tons/year.

damage and the Project provides for construction of new drying and storage facilities, for 200,000 bags of that deficit - particularly to serve the Frontlands area.

(b) Food Crops

Fruits and vegetables produced in the project area are basically consumed in Guyana. The Guyana Marketing Corporation (GMC), the agency responsible for food crops distribution, is strengthening its services to cater primarily to domestic markets. However, increasing internal demand for food has not stimulated production significantly and the incremental output of 5,200 tons of food crops from the project would be easily absorbed and contribute to Guyana becoming more self-sufficient in food supply.

The GMC has a weekly collection schedule for the project area where farmers can dispose of their produce at guaranteed fixed prices. Other marketing channels include the small traders who continually purchase in the area and whose presence is felt strongly during times of excess demand when, by bidding higher prices, they monopolize the market. Additional marketing facilities to accommodate the incremental output from the project area may be warranted at full development and the GMC has tentative plans to open a central warehouse for farmers to dispose of their products regularly.

C. Project Goal and Purpose

The sector goal toward which the Project is directed is the improvement of the standard of living in rural areas of Guyana (See Annex II Exhibit 2, Logical Framework). The subgoal to which the Project is specifically related is to increase small farmer income, productivity and quality of life.

(1) Global Project Purpose

The purpose of the global multi-donor financed Project (which includes the civil works to be financed by the World Bank and other donors) is to increase the production of rice and other food crops by 6,000 small farm families in the Black Bush region. The conditions that will indicate that this overall Project purpose has been achieved (EOPS) are: (1) rice production in the Project area will increase from current levels of approximately 34,000 tons a year to an estimated 67,500 tons annually, and corresponding increases will occur in food crop production; and (2) 46,600 acres of agricultural land will have been rehabilitated and improved.

(2) AID Project Purpose

The purpose of the AID-financed component is to provide a package of services, complementary to the other donor-financed civil works, which includes: (1) A & E services for the design and supervision of the construction phase of Global Project works; and (2) services which will maximize the production potential and benefits of the irrigation infrastructure to area farmers. Conditions that will indicate that the AID Project purpose has been achieved are: (1) completion of design and construction of civil works; and (2) an operating system of services directed towards on-farm development and efficient utilization of infrastructure improvements.

D. Global Project Description

1. Introduction

The Government of Guyana (GOG) has requested A.I.D. assistance to participate in financing a Project for the rehabilitation and improvement of irrigation and drainage systems and other agricultural improvements for rice production on about 46,600 acres of presently cultivated land in the East Berbice region of the country. 1/

The proposed Project forms part of a comprehensive plan being undertaken by Government to rehabilitate existing irrigation and drainage systems, including feeder roads and on-farm development, and improve agricultural supporting services for about 700,000 acres of lands suitable for rice and sugar cane production in the coastal areas of the country. This is the second of three major irrigation projects currently being implemented by the GOG. The main objectives of this program are to provide flood protection, a dependable water supply for double-cropping, adequate drainage, all-weather roads, on-farm development (land leveling) and improved agricultural support services, all of which would increase small farmer income, increase rice production and improve the quality for export markets.

2. The Project Area

The Project area is located in the northeastern part of Guyana in the East Berbice coastal region. The area is a low lying coastal plain having little relief, with parts of the area below mean sea level and the general elevation of the low lying lands about three to four feet. The region

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1/ See Annex II Exhibit 3 for map of Project area

has two wet and two dry seasons as follows:

Major Wet Season	May - July
Major Dry Season	August - November
Minor Wet Season	December - January
Minor Dry Season	February - April

Precipitation in the area occurs mainly as high intensity showers, with an annual average of about 80 inches. Other climatic factors such as temperature, humidity, sunshine and evaporation show little variation throughout the year; the recorded average monthly temperature in the region is 82°F.

The three areas to be benefitted by the Project are briefly described below:

a) The Black Bush Polder is a new land settlement scheme (26,500 acres) completed in 1963 and presently farmed by about 1,500 families on state leased land with homestead plots of 2.5 acres and rice plots of 7.5 acres or 15.0 acres. The scheme is located inland from the cultivated areas along the coast and was constructed in an area that was mostly occupied by a swamp. The irrigation supply for this area is obtained by pumping from the Canje River. The Polder was constructed as a model rural development project with four central villages including housing, water supply, electric power, schools, health services, paved roads and four rice mills with drying and storage facilities. The scheme has been successful and is presently producing about 500,000 bags (31,250 tons) of paddy annually. From the standpoint of rehabilitation and improvement of existing developed areas, the Polder is not specifically a part of the Project, since the existing irrigation and drainage systems in the Polder are generally adequate. It is, however, considered in the planning and implementation of the overall

Project since the main canal distribution will be enlarged to convey water to the Frontlands areas, supplied from a new pumping plant which will be constructed adjacent to the existing Black Bush pumping plant. This makes it possible to increase the water supply to all lands in the Polder. In addition, the Polder will benefit from improved extension services and seed research and production.

A total of 4,000 acres in the Polder will benefit directly from the proposed Project, comprising 2,500 acres which are too high to be irrigated and 1,500 acres which are at present imperfectly drained, thus restricting the growth of vegetables and other food crops. Cropping intensity is at present quite low: 90% for rice and 50% for food crops, reflecting the lack of irrigation water in the first case and deficient drainage in the second. With the proposed works, double cropping of rice will be possible and food crop production increased considerably.

b) The Black Bush Frontlands  
(29,600 acres) are located between the Polder and the coastal highway. This is one of the older developed areas along the coast and was formerly farmed partially using irrigation waters supplied from the Black Bush swamp. However, with the construction of the Polder this supply was cut off and presently the area is generally limited to the autumn rice crop under rain-fed conditions. The lower-lying clay soils (29,000 acres) are suitable for rice growing and a full water supply would permit double cropping and more than double production. This area has the highest priority for

increased water supply under the Project. 1/ The area also has 1,000 acres in sugar cane, 500 acres in food crops, and 3,800 acres in coconuts on the reef lands which are also suitable for vegetables, eddoes, soybeans, maize and other crops that require light textured and well drained soils. The existing coconut groves consist of trees 30 to 40 years old with low productivity. Investment in irrigation for these trees could not be justified given the small anticipated benefit, and very little can be done to develop these lands for other crops until these trees are removed. This probably will not occur as long as there is some coconut production. Due to this situation the Project does not include on-farm development of these lands at present; however, the pumping plants and main canal will provide sufficient capacity to irrigate these lands in the future, when it becomes certain they would be utilized for other crops. There are about 2,100 acres in the area which are not suitable for cultivation due to salinity.

c) The Block III area (19,400 acres) is contiguous with the Frontlands and extends along the coast from Estate No. 52 to Estate No. 74. The depth of these frontland areas from the sea coast to the backdams or distributary canals, is roughly 4 miles. The

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1/ Frontland farmers agreed to the Polder development fifteen years ago by being assured of a firm water supply. The Polder was settled by outsiders brought in and since then the Frontland farmers have felt pre-empted. With the Project however, these farmers will again receive an adequate water supply.

Block III area was developed as an irrigation and drainage district during the 1940's, mainly by and for private landowners, and the efficiency of land and water use and the level of production is better than in most irrigated areas in the country, including the Polder. However, after 30 years of operation the main pumping plant needs to be replaced and the project works require rehabilitation. About 12,000 acres are cropped to rice under irrigation; an additional 5,000 acres cannot be served due to insufficient water supply or low levels in the canals which are below the level of these lands. The initiative of the farmers in this area is reflected in better cultivation practices and higher production than in other areas; the area is also characterized by a high percentage of ownership of tractors and combines, and a large number of privately owned rice mills.

The Project irrigation system also includes the existing Torani canal, which connects the Berbice and Canje Rivers, as the transfer of additional water for the Project from the Berbice River will utilize this canal. The GOG has expressed an interest in developing an area of about 10,000 acres for irrigation and drainage between the back of the Manarabisi Cattle Pasture and the Canje River where a number of livestock cooperatives have been established. The Project will include funds to finance a feasibility study for the development of this area at a future stage.

The area between the public road and the sea, comprising about 10,500 acres adjacent to the Frontlands and Block III, will not be included in the Project area since a large part is subject to inundation by sea water. The lower areas are heavily salinized and reclamation of the soils would be costly, requiring construction of a sea defense, an extensive drainage system including pumping plants, and a large

supply of fresh water for leaching. The productive potential of these lands does not justify this magnitude investment, particularly when better lands, such as the Manarabisi Cattle Pasture, are available for development.

### 3. Present Land Use and Production

Cropping intensity for the total cultivated lands is currently 110%, much lower than the potential in the three areas, mainly due to the lack of irrigation water in the Frontlands and Block III. The major crop in the three areas is rice with traditional varieties occupying about 20% of the rice areas and improved varieties such as Starbonnet and "N" about 80%. Rice is grown under flooded conditions (paddy) and rainfed crops, including rice, are grown in areas where irrigation is not available and where autumn rainfall conditions are favorable. A variety of foodcrops are also grown in some of the low lying clay soils, including eggplant, eddoes, cabbage, black-eye peas, tomatoes, peppers and legumes. The estimated net value of production for the three areas is US\$2.5 million, using current prices.

In the Frontlands, rice constitutes the predominant agricultural land use, occupying 74% of the cultivated lands. Coconuts represent the second most extensive crop (20%) but they occupy the reef soils which are not suitable for rice. Sugar cane (5%) occupies an area of 1,000 acres and food crops (1%) are grown mainly in the small lots adjacent to the village centers or in the low-lying areas of clay soils interspersed with the long narrow strips of reef soils. Cropping intensity in this area is the lowest in the total project area (104%)

mainly due to the lack of irrigation water which, in most cases, precludes a spring crop of rice and limits the production of food crops.

Rice is even more predominant in the Block III occupying 93% of the cultivated lands. The availability of irrigation water from the existing scheme allows for a higher cropping intensity (119%) than in the Frontlands. Coconuts occupy only 6% of the cultivated lands and they are planted on reef soils. Food crops are also grown in 1% of the cultivated lands.

#### 4. Global Project Components 1/

The Project will include works to improve and increase the water supply, rehabilitation and improvement of irrigation and drainage systems, on-farm development and improvement of agricultural supporting services, and other facilities for the main purpose of increasing rice production in the Frontlands, Block III and the Polder. The rehabilitation of irrigation and drainage systems will be carried out on the Frontlands and Block III areas and on about 4,000 acres in the Polder.

The increase in rice production will be partially achieved by providing a full water supply to the three areas sufficient for double-cropping of rice on about 46,600 acres. In addition about 3,000 acres suitable for food crop production will receive adequate water supply. The increased water supply will be obtained by pumping from the Berbice River to supplement the present gravity diversions through the Torani canal to the Canje River, from which the supply to the three areas will be obtained by pumping. The entire cultivated

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1/ See Annex III Exhibit 7 (c) for global project time-phased implementation plan

area in the Polder will benefit from an increased water supply, since the new pumping plant to be constructed for the Frontlands would discharge into the existing main canal serving the Polder and the capacity of the plant would provide an increased supply of the Polder.

A description of the major civil works components to be financed by other donors participating in the Project are as follows:

- a) A new 1000 cfs pumping plant on the Berbice River at the intake of the existing Torani Canal for transfer of water to the Canje River;
- b) Limited rehabilitation including slide removal of the Torani Canal to restore it to a capacity of 1000 cfs;
- c) A new 300 cfs pumping plant on the Canje River to replace the existing 30 year old plant which supplies water to the Block III Frontlands through the Manarabisi Canal;
- d) Rehabilitation of the Manarabisi Canal (10.5 mi) and the Seaford distributary canal (8 mi) including construction of 15 new main regulators;
- e) A new 500 cfs pumping plant on the Canje River adjacent to the existing Black Bush Polder pumping station to discharge into the Black Bush main canal;

f) Upgrading of the Black Bush main canal (7 mi) the north and south branch canals and the distributaries (22 mi);

g) Improvement of existing water delivery and drainage facilities in the Polder to provide water to 2,500 acres that cannot now be irrigated and to correct certain localized drainage problems in the Lesbeholden and Mibikui homestead areas;

h) Rehabilitation and improvement of irrigation and drainage systems in the Frontlands area;

i) Construction of 15 miles of all weather access road including bridges;

j) Provision of five sluice structures on the new main drains to be constructed in the Frontlands area together with 1000 cfs of drainage pumping to supplement drainage through the sluices.

In addition to the civil works, the Project will include an agricultural development program to improve supporting services such as land development, equipment maintenance, seed production and testing, extension, water management, training and marketing to improve the production and processing of rice.

E. A.I.D. Participation

1. A.I.D. Intent

A.I.D. intent is to ensure the existence of an adequate system of production support (e.g. land development, applied research, seed production and testing, extension, water management, farm inputs) and marketing services (e.g. drying and storage), thereby enabling small farmers to increase rice and other food crop production with the increased availability of irrigation water.

The A.I.D. Project development team, during an intensive review of the A.I.D.-financed components, performed an analysis of the technical and economic financial and environmental feasibility of the Project and designed levels of inputs that would ensure achievement of the purpose. 1/

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1/ See Annex III Exhibit 7 (b) for time phased schedule of Project inputs

2. Description of AID-Financed Components

a. Production Services

The AID-Financed production services element of the Project is designed to help achieve full and efficient agricultural utilization of the irrigation and drainage system to be improved or constructed.

Rice will occupy 92 per cent of the total arable land in the Project area and will provide the majority of incremental income. The production of food crops other than rice is expected to provide 34 per cent of the incremental income from the Project. Thus, production services must be devised to support both rice production as well as food crop production.

Farmers in the Project area generally produce both rice and other food crops on the same farm. The larger portion of the farm is devoted to rice and much smaller acreage to the cultivation of food crops. The farmer who produces both rice and other crops is supported by two governmental agencies. Rice production inputs and marketing services are provided by the GRB, whereas food crop production (including food crops research) is the responsibility of the Extension Division of the MAG. Food crops marketing is done either through private traders or through the Guyana Marketing Corporation (GMC). The Agricultural Development Cooperative Bank (AgBank) and other money lenders, private rice millers and private merchants also play a role in the overall production possibilities equation.

The overall intent of the AID-Financed production services component is to upgrade those production input elements which are presently deficient and devise delivery systems to the small farmer that bring prompt economic rewards while keeping risks at an acceptable level.

Two systems have been chosen for the conceptual framework for designing the production services program. The first is the integrated package approach to technology for rice and for the other food crops. This approach - in the case of rice for example - is based upon the complementary and interrelated nature of the production inputs. High levels of rice production must be based upon ready availability of high producing seed, proper land preparation which includes leveling, correct and timely management of irrigation water on the land, adequate seed and pesticide control, and timely harvesting. It is important to note that a deficiency in the application of one of these factors can damage the productivity of the entire package, resulting in low yields and poor quality rice.

Second, the total farm should be viewed as an economic and management unit. Rice production and food crop production in the Project area are complementary in terms of maximization of income, adjusting the flows of income, labor and land utilization and in risk reduction. AID-Financed technical assistance 1/ will make efforts to sensitize the GOG extension agents and their superiors to the fact that net income to the small farmer can be maximized through close coordination of the two agencies involved in developing production patterns (GRB and MAg) that best fit the farmer's individual resources and capabilities.

(1) Land Development

Proper land and seed bed preparation is very important in rice production. Sub-standard work results in wasted irrigation

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1/ See Annex III Exhibit 7 (b) for time-phased procurement schedule of T.A. and Annex III Exhibit 4 for T.A. Budget

water, poor crop stands, excessive weeds, poor germination, and non-uniform production over the rice field. The seed bed preparation method is important, but equally so is the timing when two crops per year are to be grown. There is only a two month period to harvest one crop and prepare the land for the second crop.

The land development, water management, and machinery service components of the Project are closely related. Seed beds are prepared and the crop is harvested by machine and the technique used for field layout and seed bed preparation greatly affects water use efficiency.

The main objectives of mechanizing rice production are to increase crop yields and to make a contribution to the improvement of the economic progress and welfare of the rural population in the rice-producing areas.

Farm mechanization can be described as the application of technological principles and techniques on the farm level.

The aims and objectives of farm mechanization are the development of a strategy designed to address the particular factor constraints (i.e. land, labor, capital and technology) which characterize a specific country.

The following are five concerns that need to be addressed in such a strategy:

1. Spread of high-yielding varieties of food crops.
2. Increase of protein supply.

3. Reduction of waste.
4. Full use of available human resources.
5. Saving and earning of foreign exchange.

The result of this consideration is that farm mechanization should make a contribution to:

- a) land reclamation;
- b) improved land and water management;
- c) more intensive and more diversified cropping systems;
- d) improved timeliness of operations and other quality improvements;
- e) reduction of waste during harvesting, threshing, processing and storage;
- f) improved balance of labor demand and supply;
- g) development and extension of local farm machinery industry and related activities such as training and repair services.

The Project proposes to make appropriate machines available on a timely basis, to demonstrate and implement improved seed bed preparation methods, to document present water management practices, and to test and implement improved production practices to improve water use. This will require new equipment, repair of old equipment, technical assistance, training, and development of a coordinated program of testing and scheduling improved practices into the present farm production system. Technical assistance will be provided in the areas of machinery management and maintenance and in farm water management. The GOG agency with responsibility in these areas is the Guyana Rice Board.

Land smoothing will be accomplished by land planes. Land planes do not move large quantities of soil but do remove high spots by depositing them into low areas. The topsoil is too thin in the Project area to use heavy equipment soil scrapers.

Since surface irregularities are small, the land planes are recommended but planing should be done with each seed bed preparation. Nine land planes and nine appropriate tractors will be purchased under the Project for this purpose.

Other land preparation equipment being purchased under the Project include: three 85 hp tractors and twenty 65 hp farm tractors, all equipped with disc plows; four 12 ft. disc harrows, four ditchers, and ten border discs. This equipment will all be available to farmers on a rental basis to prepare seed beds and lay fields out for efficient irrigation. 1/

The machinery specialist (agricultural engineer) 2/ working with GRB applied research personnel will develop a demonstration program of proper seed bed preparation. The technique of plowing with disc harrows or disc plows immediately after harvest when soil moisture is optimal, harrowing and land planing immediately thereafter will be tested as a possible method of preparing seed beds rapidly without requiring a heavy irrigation prior to

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1/ See equipment list Annex III Exhibit 3 (a)  
2/ See scope of work Annex III Exhibit 5 (b)

final plowing. A border disc will be used to lay out irrigation units within a farm and a ditcher will provide a drainageway through the center of each field. This dry cultivation system will be developed so that farms can be prepared for planting in one operation thus permitting more efficient use of machinery. This method may create problems with weed control and rice planting; however if done on timely basis, these problems would be minimal.

The improved land preparation program will start with the arrival of the equipment, approximately 18 months after Project initiation. It is anticipated that, with proper scheduling of reliable machines, lands can be prepared for planting rapidly enough to promote block planting. Such a program will facilitate equipment scheduling but, more importantly, will make it possible to greatly improve water management practices and thereby conserve water.

Data will be collected by the GRB on yield increases resulting from good seed bed preparation and land planing so that these practices can be built into the extension programs.

## (2) Water Management

In modern rice culture, water management is one of the most important cultural practices. Water management involves interrupting and manipulating various stages in the hydrologic cycle to make more water available, to remove

it when there is an excess, and to improve the quality when necessary. In other words, water management is a tool in stimulating the rice crop to high productivity directed toward maximum grain production. It involves irrigation, drainage and conservation of water.

A water management program will be initiated with the arrival of the Water Management Specialist 1/ 18 months after Project initiation. This Specialist will, with help from the Agricultural Engineering Specialist, assist GRB personnel in the applied research and extension programs to develop appropriate practices which would improve scheduling and efficient use of water.

The initial phase of the program will involve an inventory of present irrigation system management to evaluate the existing water management situation. This will be done through the development of a data collection program including worksheets and collection schedules. Information collected will include dates, methods, and duration of all cultural practices including irrigation, size of farms and fields, crop yields, and other relevant information. Sample precise measurements will be made to insure reliability of data. Information will be collected on the overall scheduling of water through the canal and drainage systems.

The data will be analysed to determine where and how water is presently being

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1/ See scope of work Annex III Exhibit 5 (c)

used and misused, the extent of the farmers knowledge in water management and his attitude towards change. Finally, from this analysis, improved practices can be developed and tested on a pilot basis. Programs such as block planting, community water channel maintenance, improved scheduling of irrigation water to meet plant needs, more efficient field layout, and less drainage from fields should emerge resulting in improved cultivation practices. Without a data collection process to evaluate the present situation it is unlikely that such technologies could be satisfactorily implemented. It is therefore essential that the extension division be involved in the process by assisting with data collection and analysis.

The water management program will also include training machinery operators in improved methods of seed bed preparation, land leveling, and field layout techniques to advance water management technology. Initially this activity will be done on the GRB seed farm and extended to farms as techniques are perfected.

Project provided equipment for the water management program include one 4-wheel drive vehicle for the technical specialist (included in equipment list Annex III Exhibit 3 (b) ) and an assortment of inexpensive trade tools to be provided upon arrival of the technician.

### (3) Machinery Services

The Project proposes to improve the GRB

machinery pool so that it can handle the machinery requirements in the Project area. The equipment pool's primary responsibility will be to provide maintenance and repair services for land planing, seed bed preparation and harvesting equipment on-hand as well as equipment to be purchased under the Project.

Initially the Project will address the problem of inoperable tractors and combines through a program of major overhaul and repair. Spare parts for existing machines as well as all new equipment will be purchased under the Project.

The presently inadequate and critical factor which will be addressed by the Project is the establishment of a system of machinery and spare parts inventory, machinery monitoring, timely service and repair, and maintenance. This will involve the establishment of an accounting procedure for machines and spares so that maintenance and servicing can be monitored on a weekly basis. It will also involve initiation of a routine maintenance scheduling and records keeping program for each piece of equipment; development of two field service units so minor repairs can be done in the field; establishment of a maintenance and repair program for combines in the off-season so that all machines are in good running order at the beginning of each harvest; development of a machine work schedule system to program machines onto farms in a way which minimizes travel time from farm to farm; and finally an overall management system which

establishes work teams and assigns responsibilities for machine servicing, machine repairs, machine operation and scheduling of machine operation.

The Project will finance 36 months of technical assistance by an agricultural engineer with farm machinery background who will serve as a technical advisor to the GRB machinery pool. 1/ Arrival of the agricultural engineer is scheduled approximately nine months after Project initiation. The Specialist will assist the GRB in the preparation of specifications for new equipment, tools, and spare parts. He will assist with planning, developing, implementing, and provide training for establishment of the shop and machine operation programs described above. He will also assist and cooperate with the applied research team in developing improved land development procedures and techniques.

Design of the equipment pool system and arrival of the necessary equipment is scheduled approximately nine months subsequent to the arrival of the agricultural engineer. At that time, a machinery specialist will arrive for a one year period to develop and conduct, together with the GRB, a training program for shop foremen, machine operators, mechanics, machinists, and tractor drivers. The training program will consist of several parts since not all teams need specifically the same training. Basically there are three groups; combine operators,

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1/ See Scope of Work Annex III Exhibit 5 (a)

tractor drivers, and mechanic/machinists. Routine maintenance and servicing of equipment training will be given to all shop and field personnel. The training will be done at site and foremen will get on-the-job instruction as they implement the machine management system. During the course of each training session a method of record keeping will be presented and explained so that after training the machine records system will be in place. With some 35 combine operators, 50 tractor drivers, and 20 mechanics and machinists needing training it is anticipated that several training sessions will need to be held for each group. 1/

The GRB machinery pool at Joanna in the Black Bush Polder presently has neither sufficient staff nor appropriate machines and hand tools to service and repair the equipment currently on hand. Adequate tools and minor shop renovation (concrete floor and siding and roof for storage area) will be provided under the

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1/ The GRB presently has a Preventative Maintenance Officer whose responsibility is to provide machine maintenance training for all GRB owned equipment in Guyana. He works in Georgetown however spends extended periods at the GRB machinery pools throughout the country. It is contemplated that his expertise will be utilized in the Project area to assist with necessary training and development of the machinery servicing and maintenance programs.

Project. 1/

With the purchase of the new equipment, the pool's farm equipment inventory will include: 42 rice combines; 66 tractors; 51 disc plows; 18 harrows; 9 land planes; 10 border discs; 4 disc harrows; and 4 ditchers. Since approximately 40 per cent of the gross Project area will need to be serviced by the GRB machinery pool, it is essential that most of the equipment is kept in operating condition. The pool will serve approximately 30,000 acres twice annually with land preparation and rice harvesting. To accomplish this in the 30-50 day period between harvests will require 50 tractors plowing at an approximate rate of 20 acres daily, and 30 combines harvesting at the same acreage rate. Land planes will service more gross area since there are none privately owned, however, they would not be used on the vegetable crop lands. The nine land planes should readily service 35,000 acres in a 45 day period. The equipment purchased under the Project is primarily for the extension of the machinery pool service to the Frontlands area where the lowest incidence of privately owned equipment exists, and where drainage and irrigation efforts will make the greatest impact.

The systematic operation of the Joanna machinery pool will be a practice that can be replicated in all GRB machinery pools throughout the country. This aspect of the Project therefore will

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1/ \$49,000 has been budgeted for this purpose.

be of great value to the rice production system of Guyana, since one of the major constraints to increased rice production has been the lack of an effective machinery service capability within the GRB.

(4) Seed Production and Testing

To address a key production concern, the Project proposes to upgrade the quality of seed produced by the Guyana Rice Board seed farm in the Black Bush Polder and make it available on a continuing basis and in adequate amounts to participating farmers. High quality seed developed through research and made available to farmers should possess genetic purity true to the variety name, high viability, moisture content of not over 14 per cent, free from weed seeds and other physical impurities and protected from diseases and insects. This will require the procurement of seed processing and seed testing equipment 1/ based on the recommendations of an AID-financed seed-technologist/engineer.2/

These items will be used to equip a seed processing facility which will clean, dry, process, store and make available quality certified seed for distribution. This will include all seed grown on the GRB seed farm which is produced from foundation stock and from selected growers in the Project area.

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1/ See equipment list Annex III Exhibit 3 (a 2)  
2/ See scope of work Annex III Exhibit 5 (j)

Concurrently, at the same site, the Project will provide the necessary equipment for a seed testing laboratory 1/ to serve as the central point for certifying seed grown both on the GRB seed farm and by selected producers using systematic quality control procedures. This laboratory will contain the appropriate scientific tools and equipment which will objectively test seed for superior quality.

The provision of AID-financed equipment will be supplemented by a \$25,000 AID budget allocation to support the renovation needs of the two facilities. Most of the \$25,000 will be used for locally procured materials and services to install an appropriate loading platform for seed movement to and from the processing facility and reconditioning the cement base of the processing facility.

During the second year of the loan, at a time agreed upon by GRB, the seed technologist/engineer will assist in the installation and test operations of the equipment for a period of approximately one month.

A major effort will be directed to assuring that the seed processing and seed testing facilities meet optimum levels of operation and that seed certification procedures are strengthened both in the laboratory

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1/ See equipment list Annex III Exhibit 3 (a)

and on the farm.

Immediately following the signing of the loan agreement, USAID/Guyana will request AID/W to obtain the services of a Seed Technologist/Engineer from Mississippi State University, under the centrally funded T.A. contract at no cost to the Mission or to the GOG, to prepare the procurement specifications for the items suggested above which support the seed improvement activity under the loan. These services are to be accomplished in cooperation with the GRB and are to include an assessment of the existing seed processing and seed testing facilities at the GRB seed farm in the Polder as well as recommendations regarding improvements to these facilities needed to meet minimum acceptable standards of operation. Length of services should not exceed 18 work days.

At the end of Project, it is anticipated that the GRB seed farm and selected private growers in the Project area will be producing 2400 acres (2 crops/year) of seed for certification per year at an average yield of 30 bags (140 lbs/bag) per acre or a total of 72,000 bags. At the rate of 5/7 (100 lbs) bag/acre for seeding purposes, it is estimated 100,000 cultivated acres can be served with certified rice seed each year. Therefore, it is projected that all farmers growing rice in the Project area will have access to certified seed for replacement after every second crop. In addition, because the GRB seed farm presently services the entire East Berbice Region including the Project area the GRB

will be in a position to provide improved seed varieties throughout the area of its responsibility.

(5) Applied Research and Extension (Rice)

The Project will provide an Extension Specialist (Training) 1/ and Adaptive Research Specialist 2/ by the 8th or 9th month of Project implementation. They will serve as a team to assist the GRs perfect an effective outreach staff that can directly relate to the farmers. The extension specialist will serve 30 months. Their principal task will be training of host country personnel in their respective areas of expertise. The extension specialist will plan and implement training programs for extension workers in the project area in order to provide an integrated approach to production technology. The training program will develop an extension system that will make use of printed technical information, audio visual aids, field visits, on-farm demonstrations, seminars, and workshops.

The applied research specialist will plan and implement applied research activities on rice, addressing key components that must be included in perfecting optimum packages of production technology and can be utilized by the farmer. Tasks include providing training to applied research staff in the design, implementation and evaluation of applied research and developing recommended practices based on actual field conditions.

A critical component of the Research

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1/ See scope of work Annex III Exhibit 5 (d)

2/ See scope of work Annex III Exhibit 5 (e)

Specialist's duties will be training the field supervisor and the adaptive research assistants. This will include a thorough study of the principles and practices of conducting field experiments and of the methods of harvesting, measuring and recording resultant crops. During this period, priority research problems will be identified.

Over the life of the project adaptive research experiments and demonstrations will be conducted on farmers' lands. Based on the Research Specialist's recommendations, in cooperation with GRB rice research personnel, adaptive research activities will be conducted, including trials on: variety testing; variety/fertilizer response; soil fertility; cultural practices using water, improved land preparation and management, weed control, timing and seed bed preparation; herbicide and pesticide application; and the various combinations of the above practices and inputs which will assist extension workers and are appropriate for use at the farm level. Inputs such as fertilizer and pesticides will be provided by the GRB to conduct these trials and demonstrations.

The Project has also incorporated a specialist in farm management as part of the long term specialist team. 1/ This technician will arrive in Guyana at the beginning of the 4th year of the Project for a 24 month period. His duty schedule will overlap for several months with those of the research and extension specialists before those positions are phased out. The staff that has been developed and trained over the prior two years should be in place and this Specialist will be able to concentrate on planning and implementing the improved packages of

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1/ See scope of work Annex III Exhibit 5 (f)

production technology at the farm level. He will also work closely with the water management specialist on land preparation, weeding and cultural practices. The specialist will develop the necessary tools for evaluating the economics of the new production methods as related to the total farming system. The GRB intends to make 21 persons available to the Project. 1/ Currently, there are only three field agricultural assistants. The GRB will recruit an additional 8 technical workers within the first year of the Project and A.I.D. together with the GRB will finance an additional 10 technicians over a three year period. 2/ The GRB has committed itself to incorporate all new employees into its permanent staffing pattern for the Project area. The MAG has also committed itself to budget for and hire 10 additional technicians to be trained by the A.I.D. financed consultant team.

In order that adequate transportation is available for the GRB and MAG supervisory staff and field workers A.I.D. will finance the purchase of 5 vehicles and 20 motorcycles. 3/ In addition two vehicles will be purchased for use by the A.I.D. financed consultants. Supplemental vehicles, as needed, will be provided by the GRB.

Upon completion of the research, extension, and farm management specialist's assignment, all host country staff will have received minimal acceptable levels of training

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- 1/ See GRB staffing pattern Annex III Exhibit 5 (e)  
2/ A.I.D. staff support will finance salaries for 10 extensionists on the following schedule: FY80 - 100%; FY81 - 75%; FY82 - 50%. Beginning FY83 the GRB will finance 100% of all staff costs.  
3/ See applied research and extension equipment list Annex III, Exhibit 3 (c).

to perform basic tasks. The work of extension and applied research at Tapakuma which has been successful serves to demonstrate the effect on small farmer production levels when an effective extension service is in place. By incorporating and refining elements of the Tapakuma training model and expanding the range of adaptive research in the Black Bush Project, the technical adequacy of the outreach staff will have a significant impact on farmers in the area.

(6) Training

Training of host country personnel will be addressed through both in-country programs and participant training abroad. 1/2/ In-country seminars, and workshops for applied research and extension personnel as well as farm leaders will be conducted. These activities will be developed by the Research and Extension Specialists with the appropriate GRB counterparts. The main task will be to develop the content and training materials needed for conducting these programs and selecting the types and numbers of persons who can actively participate. The Project contemplates a training component consisting of four person months for short courses and on-the-job training in U.S. or 3rd country facilities for seed technology personnel of

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1/ See training budget Annex III Exhibit 4 (c)  
2/ See equipment list Annex III Exhibit 3 (c)

the GRB. Additionally, approximately three in-country short courses on seed technology and development will be financed by the Project. Courses, designed by seed technology consultants, will be made available for seed producers, adaptive research and extension assistants as well as the professional seed staffs of the GRB.

In addition, the Project proposes to finance approximately 44 person months in U.S. or 3rd country training programs for 10-12 participants. Most will be in-service type of programs and/or short courses in selected subject areas. Possible U.S. resource institutions included those located in Louisiana, Mississippi, Texas and Arkansas, as well as the rice training facilities at Centre International de Agriculture Tropical (CIAT) in Colombia. Training under this program for applied rice research and/or extension would include such areas as agronomy, seed production, plant breeding, integrated pest management, soil fertility, entomology, pathology, water management or appropriate combinations of the above. In addition to the Research and Extension long term consultants, the Project proposes to sequence the following short term specialists at periods agreed upon by the GOG and the long term consultant team to assist in the training programs.

(a) An Extension Communications Specialist 1/ to develop teaching aid techniques, demonstrate improved rice farming to field workers and farmers. His duties will include designing materials which are appropriate to the needs of the Project, taking into consideration the social aspects of the target group.

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1/ See scope of work Annex 5 (g)

(b) The Soils/Fertility Specialist(s) 1/ will address soil fertility problems related to improving cultural practices and input recommendations in rice and will participate, where appropriate, in workshops/seminars and demonstrations with extension and applied research personnel. Specialist(s) will be sequenced for two periods during the life of project as agreed upon by the GOG and the long term specialist team.

(c) The Pest Management/Weed Control Specialist(s) 2/ will provide specialized assistance in insect and disease problems, weed control and pesticide/herbicide usage for rice. A primary aim of these efforts is to perfect improved integrated pest management activities that will address the economics, profitability, and effectiveness of such practices into the overall production system. Specialists, as agreed upon by the GOG and the long term specialist team, will be sequenced approximately four periods during the life of the Project.

(d) A vegetable crops research specialist 3/ will be required for approximately five person months to improve the vegetable production program in the Project area. He will assist the long term consultants and will specifically address plant breeding, seed production and multiplication and adaptive research needs for improved vegetable crop production. He will assess the existing vegetable industry in the Project area and make recommendations for implementing an adaptive research program.

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1/ See scope of work Annex III Exhibit 5 (h)

2/ See scope of work Annex III Exhibit 5 (l)

3/ See scope of work Annex III Exhibit 5 (k)

He will assist in the training of research and extension field personnel so that extension agents from the MAG can work with farmers in improving production practices, at the same time the seed testing and production facilities will provide high quality seeds to be distributed to the farmer. 1/

(7) Conclusion

The extension/research system for food crops is institutionally separated from rice and is handled through the MAG Extension Division while the GRB handles similar activities vis a vis rice. MAG has recognized the need to promote food crops which can be grown in rotation which are complementary to rice, and although it is doubtful that the two groups will unite in the near future, the problems involved in developing an adaptive research/extension system for food crops are fundamentally the same as in rice.

The A.I.D. support in this Project component therefore addresses the principle constraints in the food crops production system and where feasible, resources are made available to service both rice and food crops.

Consultant services in most cases will be shared by the MAG and the GRB. The Adaptive Research, Extension Training and Farm Management Specialists will all have responsibilities to both the MAG and GRB

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1/ Vegetable seed production efforts in the Project area will be supported by a USAID/G FY 78 Grant that will provide additional assistance in vegetable crop production.

Research/Extension Programs in the  
Project area.

Under the A.I.D. Seed Farm Development Project, resources will be made available to develop the appropriate levels of quality seed needed to support programs in the Project area. Also being made available under the Seed Farm Development project are adequate funding levels for technical assistance, seed production equipment and relevant training. Short term consultants will service both GRB and MAg needs in these specialized areas.

b. Marketing Services

The GRB rice drying and storage capacity within the Project area will be increased under the Project. 1/ Although a 450,000 - 500,000 bag drying and storage deficiency at full Project development was identified in the IBRD staff report, the funds in this Project will provide for drying and sotrage for only 200,000 bags. Provision for additional drying and storage facilities within the Project area will be considered under the Rice Modernization II Project which is scheduled for funding during FY 78.

The provision of the 200,000 bag storage capacity has two components. First is the conversion of an existing GRB building which is presently used for storage of rice in bags into a bulk horizontal rice storage facility. This conversion consists of installation of reinforced wooden side walls

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1/ See Construction Cost Estimate Annex III Exhibit 2 (c) and Facility sketch Annex III Exhibit 2 (b)

inside of the building shell so that it will hold rice in bulk, as well as installation of an auger system so that bulk grain can be removed mechanically. Modifications in concrete floor will also allow for aeration of the bulk stored grain. This system will be completed through the installation of an overhead conveyer to bring bulk grain into the building and to distribute it. The renovated horizontal structure will hold 100,000 bags (6250 tons) of bulk stored rice.

Second, a comparable metal or wooden constructed horizontal storage building with an additional 100,000 bag bulk storage capacity will be built beside the renovated building described above. It likewise, will be complete with a similar auger system for removal of grain, an aeration system, and an overhead conveyer system for entry of grain. This building, will also be equipped with batch scales for weighing of grain as it leaves storage so that inventories can be kept as well as estimates made of weight losses during storage.

The combined storage facilities will be coupled by elevators and conveyers to a receiving, drying and tempering facility for the receiving of paddy (rice in the husks before milling). Two 500 bag dryers will be installed and linked by conveyers and elevators to tempering bins where over-moist grain will be held between successive dryings. Rapid drying of moist grain causes excessive cracking of the grain. Moist grain must therefore be held, for tempering, between several rounds of drying.

The entire system will be linked by elevators and conveyers so that grain can be mechanically moved throughout the facility, from one building to another, back to the dryers as grain moisture begins to build up in an area of storage, from tempering bins back to the dryers, etc.

The facility will be located at Yakusari which is approximately half-way between the GRB rice mill and storage facility at Joanna and the Frontlands.

It is easily accessible from the Frontlands which is important since paddy from the Frontlands has not been accepted by the GRB during recent seasons due to a lack of drying and storage facilities.

Construction and installation may be performed through GOG force account over a one year period beginning the second year of the Project. 1/

c. Project Management

(1) Consulting Services

The global project includes 470 man months of engineering consultant services for carrying out investigations, surveys, design of project works, preparation of plans and specifications, bills of quantities, cost estimates, bidding documents, evaluations of bids and recommendation for awards, negotiation of construction contracts, and construction control. This Project will provide funding for these consulting services. In addition the 196 man months of technical assistance in the disciplines of agricultural research and extension, on-farm and water management, weed and pest control, soil fertility, seed processing and testing, shop and equipment operation and maintenance.

These consulting services could be all included under one prime contract or could be engaged separately from the engineering consulting services. The agricultural group will be required to collaborate and cooperate with one another in carrying out their individual tasks pursuant to overall project objectives and will be able to operate relatively independently of the engineering group. However, administration and coordination of all consulting services by the GOG would be simplified if one prime

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1/ See Construction Cost Data Annex III Exhibit 2 (a)

contractor were engaged to furnish all services. In any case, the consultants will be responsible to the MAG, with the GRB being the client of the agricultural group and the Hydraulics Division being the client of the engineering group.

It is expected that the consultants would be employed from both foreign and local firms and the terms of reference would incorporate scopes of work such as those illustrated for guideline purposes in Annex III. 1/ The consultants contract scope of work would be prepared by the Ministry of Agriculture and be subject to the approval of both A.I.D. and IBRD. The procedure for selection of the consulting firm or firms, and the employment contract would also be subject to such approvals. Selection would be on a fully competitive basis consistent with the DAEC issues guidance cable (STATE 107282) even though the optional non-competitive selection provided for in AID Handbook II (Ch. B2/c) and preferred by the GOG was considered. Equipment and vehicles will be purchased for the consultant engineers. 2/

Consulting services will also be contracted to undertake a feasibility study for development of 10,000 acres between the back of the Manarabisi Cattle Pasture and the Canje River, and presently occupied by some seven livestock cooperatives and several private holdings. In recognition of the GOG's high priority for development of this area, A.I.D. has included the funding necessary to perform the feasibility study in its Project. With the proposed pumping from the Berbice River and some return flow pumping in the Frontlands, an adequate water supply from the Canje River (about 200 cfs) would be available for this area of about 10,000 acres. The feasibility study

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1/ See scope of work Annex III Exhibit 2 (d)

2/ See equipment list Annex III Exhibit 3 (d)

could be contracted separately although it is possible to include it in the prime consulting contract. 1/

(2) Operation and Maintenance Facilities

The Hydraulics Division of the MAg, in addition to having responsibility for engineering planning and implementation of project construction, will have responsibility of operation and maintenance (O & M) of the irrigation and drainage systems to be rehabilitated or built under the overall project. This Division presently operates and maintains the systems in the Polder as well as in other projects elsewhere in the country. A Project Engineer will be appointed by the Minister of Agriculture who will supervise O & M responsibilities in the Polder, the Frontlands and Block III, and will be under the supervision of the Project Engineer.

Current O & M activities in the Polder and the up-stream system are hampered by budget constraints. For example, although cleaning out of the aquatic growth in the Canje River between the mouth of the Torani Canal and the Black Bush Pumping Station is an annual undertaking (November - December), it was not done last year due to shortage of funds. The Hydraulics Division is extremely interested in obtaining outside assistance to establish an effective cost recovery system. The A.I.D. Loan Agreement as well as the World Bank Loan Agreement will contain a covenant that the GOG will seek such assistance and implement a cost recovery plan which will provide the required financing. In spite of financial constraints however, O & M activities are carried out efficiently, an observation supported by the IBRD staff report. Hydraulics Division inventory of O & M equipment currently in the Project area is

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1/ See consultant engineer budget Annex III Exhibit 4 (b)

inadequate to properly maintain the Project once completed. The IBRD has therefore included \$1,140,000 for new O & M equipment and spare parts in the budget of the overall project.

The facilities available at present for management of the project areas include O & M stations at Whim and Benab, both of which need to be expanded and improved, and a headquarters office at Mibikuri. The Project includes construction of a new headquarters to be centrally located in the Project area and new O & M stations at Benab and in the Polder. The new headquarters will include 6,000 ft<sup>2</sup> of office space, security storage, fuel storage facilities, parking area and fencing.

O & M station offices at Benab and the Polder will have similar facilities but with less office space. Construction will consist of concrete slab floors, wood frame and siding with galvanized corrugated metal roofing which is conventional in Guyana. 1/2/

### (3) Feasibility Study

AID will provide \$405,000 which, together with GOG counterpart funding of \$100,000, will finance a study to determine feasibility and costs in extending irrigation, drainage systems and on-farm development facilities into the Livestock Cooperatives area. Given limitations of land suitable for rice cultivation in Guyana, the GOG is committed to maximizing the production capabilities of suitable land and has therefore included the Backlands and Manarabisi areas in its comprehensive plan to provide adequate water

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1/ See Annex III Exhibit 2 (b) for facility sketch

2/ See Annex III Exhibit 2 (c) for operation and maintenance construction cost estimate

supply, on-farm development and agricultural supporting services for all land suitable for rice and sugar-cane production. The area to be included in the study comprise 10,000 acres located to the South of the current Black Bush Project. The scope of work for contracting with a firm to conduct the study will be prepared by the GOG with assistance from the A.I.D.-Financed consultants working on the Black Bush Project, and will require approximately one year to complete. The results will be assessed by the GOG with assistance from the Project consultants and a determination will be reached as to the feasibility and cost involved in implementing phase II. Should it decide to implement the project, the GOG will have approximately 18 months to seek outside financing, prior to completion of the Black Bush Project.

F. Financial Plan

1. Global Project Financing

The multi-donor Global Loan package as developed by the IBRD amounts US\$42.8 million, to be disbursed over a five and one half year period. The proposed breakdown by donor is as follows:

World Bank (IDA)	\$10.0 million (23.4%)
IFAD	10.0 million (23.4%)
Other Donor <u>1/</u>	8.5 million (19.8%)
A.I.D.	7.5 million (17.5%)
Government of Guyana	<u>6.8 million (15.9%)</u>
Total	\$42.8 million (100%)

Annex III, Exhibit 7 (a) presents a breakdown, by major category of expenditure, of components to be financed by each of the above institutions.

The Global Project has been divided into two discrete, but complementary, aspects: (1) civil works, including irrigation, drainage, equipment to support the works, and operation and maintenance of equipment; and (2) complementary services, including seed production, research, extension, on-farm development and water management, marketing, and training which have been designed to maximize the on-farm benefits as a result of improved infrastructure. The civil works component will be financed by IDA, IFAD and an as yet unspecified donor; A.I.D. will finance the complementary services.

2. A.I.D. Financial Plan

The total A.I.D. commitment to the Project is US\$8.9

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1/ The IBRD and GOG are currently seeking to finalize commitments from an external donor.

million in loan and grant funds. The GOG counterpart to Project components specifically the concern of A.I.D. is scheduled at US\$4.0 million (31% of the A.I.D. Project Package). Broken down by loan and grant portions, A.I.D./GOG financing will be split as follows:

	A.I.D.		GOG		TOTAL	
	\$	%	\$	%	\$	%
Loan	7.5	71	3.0	29	10.9	100
Grant	1.4	58	1.0	42	2.4	100
Total	8.9	69	4.0	31	12.9	100

Table 4 itemizes major Project components, indicating the loan/grant split, and showing A.I.D. and GOG contribution.

Essentially, the loan-financed components and GOG loan counterpart are for those components which the World Bank has identified as essential to meeting Global Project objectives. Those items to be financed with grant funds - training, technical assistance and limited staff support in addition to that identified in the World Bank Staff Appraisal Report - are Project elements which will ensure that A.I.D. target group considerations are met along with the Global objectives.

### 3. Projected A.I.D. Disbursement Schedule

Table 5 shows expected A.I.D. disbursements, broken down into local currency and dollar costs by fiscal year according to the five principal expenditure categories. Total local currency expenditures amount to US\$1,830,000, or 21% of the total A.I.D.-financed package, with dollar costs accounting for the remaining 79%.

Table 4

**FINANCIAL PLAN**  
(Figures in US\$000)

Component	AID	AID	AID	GOG COUNTERPART		TOTAL	
	LOAN	GRANT	TOTAL	LOAN	GRANT		
<b>1. Production Services</b>							
<b>A. Farm Development</b>	<u>2435</u>	<u>535</u>	<u>2970</u>	<u>429</u>	<u>245</u>	<u>674</u>	<u>3644</u>
- Equipment	(1780)		(1780)	( 75)		( 75)	(1855)
- Technical Assistance	( 265)	(535)	( 800)	( 55)	(245)	( 300)	(1100)
- Spare Parts	( 300)		( 300)				( 300)
- Tools	( 50)		( 50)	( 20)		( 20)	( 70)
- Shop Renovation	( 40)		( 40)	( 9)		( 9)	( 49)
- Equipment Operators				( 270)		( 270)	( 270)
<b>B. Seed Production and Testing</b>	<u>225</u>	<u>50</u>	<u>275</u>	<u>331</u>	<u>143</u>	<u>474</u>	<u>749</u>
- Technical Assistance		( 30)	( 30)		(143)	( 143)	( 173)
- Training		( 20)	( 20)				( 20)
- Equipment	( 200)		( 200)	( 96)		( 96)	( 296)
- Construction	( 25)		( 25)	( 235)		( 235)	( 260)
<b>C. Extension and Applied Research</b>	<u>407</u>	<u>772</u>	<u>1179</u>	<u>105</u>	<u>612</u>	<u>717</u>	<u>1896</u>
<u>Rice</u>							
- Vehicles	( 35)		( 35)				( 35)
- Motorcycles	( 20)		( 20)				( 20)
- Technical Assistance	( 300)	(582)	( 882)		(369)	( 369)	(1251)
- Training		( 85)	( 85)				( 85)
- Training Supplies	( 15)		( 15)				( 15)
- Staff Support		( 70)	( 70)				( 70)
<u>Other Food Crops</u>							
- Vehicles	( 14)		( 14)				( 14)
- Motorcycles	( 12)		( 12)				( 12)
- Technical Assistance		( 35)	( 35)		(243)	( 243)	( 278)
- Training	( 5)		( 5)				( 5)
- Training Equipment & Supplies	( 6)		( 6)				( 6)
- Housing				( 105)		( 105)	( 105)
<b>2. Marketing Services</b>	<u>823</u>		<u>823</u>				<u>823</u>
- Construction	( 381)		( 381)				( 381)
- Equipment	( 442)		( 442)				( 442)
<b>3. Project Management</b>	<u>3520</u>		<u>3520</u>	<u>2135</u>		<u>2135</u>	<u>5655</u>
<b>A. Design and Supervision</b>							
<u>Consulting Services</u>							
- Consultants	(2490)		(2490)	(1500)		(1500)	(3990)
- Equipment	( 145)		( 145)	( 135)		( 135)	( 280)
- Housing				( 400)		( 400)	( 400)
<b>B. Operations and Maintenance</b>							
- Construction	( 480)		( 480)				( 480)
<b>C. Feasibility Study</b>	( 405)		( 405)	( 100)		( 100)	( 505)
Contingency	<u>90</u>	<u>43</u>	<u>133</u>				<u>133</u>
<b>Total</b>	<u>\$7,500</u>	<u>\$1,400</u>	<u>\$8,900</u>	<u>\$3,000</u>	<u>\$1,000</u>	<u>\$4,000</u>	<u>\$12,900</u> <sup>(1)</sup>

(1) The AID Loan and counterpart to the Loan total \$10.5 million which form part of the total Project cost of \$42.8 million. The AID Grant and GOG counterpart to the Grant total \$2.4 million.

TABLE 5

PROJECTED A.I.D. DISBURSEMENT SCHEDULE BY FISCAL YEAR (LC AND DOLLAR COSTS)  
(Figures in U.S.\$000)

	FY 79		FY 80		FY 81		FY 82		FY 83		FY 84		TOTALS	
	LC	US TOT.	LC	US TOT.										
Consultants	81		207		240		278		164		60		1030	
	203		400		480		520		172		90		1865	
	284		607		720		798		336		150		2895	
Technical Assistance	-		30		25		15		-		-		70	
	-		370		588		518		251		20		1747	
	-		400		613		533		251		20		1817	
Agri. Equipment	-		135		136		-		-		-		271	
	289		1940		405		-		350		-		2984	
	289		2075		541		-		350		-		3255	
Construction	60		190		170		10		-		-		430	
	222		17		16		5		89		44		393	
	282		207		186		15		89		44		823	
Training	-		10		10		9		-		-		29	
	-		24		32		25		-		-		81	
	-		34		42		34		-		-		110	
Local Curr.	141		572		581		312		164		60		1830	
U.S.\$	714		2751		1521		1068		862		154		7070	
Grand Total	855		3323		2102		1380		1026		214		8900	

Annex III, Exhibit 7 (b), Tables 1 through 5, present a detailed breakdown of projected disbursement for each of the five principal categories.

4. Loan/Grant Disbursement (A.I.D./GOG) By Fiscal Year

Table 6 shows loan/grant split, in local currency and foreign exchange costs, according source of financing and fiscal year.

Table 6

Projected Disbursement by Fiscal Year (LC and FX)  
(figures in \$ 000)

	FY 79		FY 80		FY 81		FY 82		FY 83		FY 84		TOTAL		GRAND TOTAL
	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	
LOAN															
1. A.I.D. Loan	141	714	532	2,476	546	1,006	288	757	164	662	60	154	1,731	5,769	7,500
2. GOG Counterpart	1,090	-	750	-	295	-	295	-	270	-	300	-	3,000	-	3,000
GRANT															
1. A.I.D. Grant	-	-	40	275	35	515	24	311	-	200	-	-	99	1,301	1,400
2. GOG Counterpart	-	-	150	-	250	-	250	-	250	-	100	-	1,000	-	1,000
TOTAL	1,231	714	1,472	2,751	1,126	1,521	857	1,068	684	862	460	154	5,830	7,070	12,900

3. Description of Government Counterparts

GOG counterpart in the amount of US\$4,000,000 (31%) will be provided by three divisions of the MAg.

The GRB will provide a total of approximately US\$1.5 million comprised of the following elements:

(figures in 000's)

1) Farm Development Equipment (on hand)	75
2) Tools (on hand)	20
3) Seed Testing Facility (on hand)	235
4) Seed production equipment (on hand)	96
5) Technical Assistance (50% new costs)	812
6) Equipment operators (85% new costs)	270
7) Local construction costs for shop renovation (100% new cost)	<u>9</u>
Total GRB counterpart	<u>\$1,517</u>

The Extension Division will make available the following counterpart contributions:

(figures in 000's)

1) Technical Assistance (85% new costs)	243
2) Housing for new extension agents (100% new cost)	<u>105</u>
Total MAg Extension Div. Counterpart	<u>348</u>

The Hydraulics Division will provide a total of US\$2,135 million to be distributed in the following way:

(figures in 000's)

1) Local counterparts to consultant engineers (100% new cost)	\$1,500
2) Equipment (on hand)	135
3) Housing for consultant engineers (100% new cost)	400
4) Local counterparts to feasibility study team (100% new cost)	<u>100</u>
Total Hydraulics Division Counterpart	<u><u>\$2,135</u></u>

Counterpart

GRB	\$1,517
MAG Extension Division	348
Hydraulics Division	<u>2,135</u>
Total	<u><u>\$4,000</u></u>

4. Ability of GOC to Provide Counterpart (1978-81)

Under the Four Year Development Plan (1978-81), announced in March, priority will be given to the agricultural sector, particularly irrigation and drainage infrastructure to rehabilitate the coastal rice and sugar growing areas. Of a total planned four-year public sector investment program of US\$450 million, 33% of US\$150 million has been programmed for this sector.

The current GOC economic situation has led Guyanese economic planners to carefully examine the structure of government expenditures. This initial analysis led to a decision to drastically cut back on subsidies and reorient public sector enterprises in an attempt to put the majority of them on a sound economic base. Discussions with the IMF have also led the GOC to institute a program of domestic savings, increased taxes, and a cut-back in imports.

The expected turn-around in the Guyanese economy will take at least four years to implement, and during this period the GOC must assume austerity measures. At the same time, however, investment in Guyana's productive capacity will be accelerated. Since agriculture - particularly rice - is considered a priority area, the GOC should experience no difficulty in providing counterpart on a timely basis.

5. Recurrent Budget Analysis

Major project implementation responsibility for AID financed activities rests with the GRB which is financed by regular GOC budget appropriations and which has a high priority for obtaining budgeting allocations. The budget implications of the project were discussed with other organizations involved in implementation of project, as well as with the Ministry of Economic Development and assurances were obtained from the Minister

of Agriculture, the GRB, and the Ministry of Economic Development that funds needed to implement the project will be provided. A covenant to that effect will be included in the Loan Agreement. Yearly financial plans will also be provided by GRB to AID and other donors.

Profit and loss statements are not available from GRB for recent years. The IBRD has requested that the GOG request assistance to improve its financial analysis capability. Such assistance is currently contemplated under Rice Modernization II which is scheduled for authorization in FY 78.

PART IV - PROJECT ANALYSES

A. Technical Analysis

1. Engineering

(a) Global Project

The proposed project initially investigated by Harza Engineering Company and subsequently defined by a World Bank project development team will increase the water supply, rehabilitate and improve the irrigation and drainage systems, improve on-farm development, water management and agricultural supporting services pursuant to increased rice and other food crop production in the Black Bush Frontlands, Block III, and a portion of the Black Bush Polder.

The water source for irrigation of the Black Bush Polder and the adjacent and nearby Sugar Estates is the Canje River supplemented by gravity diversions from the Berbice River through the Torani canal, which was constructed during the period 1945-1958. Water is pumped from the Canje through 5 pumping stations located along the Canje River beginning about 12 miles from the mouth to about 22 miles above the mouth. The Torani canal (12 miles long) discharges into the Canje River about 15 miles upstream of the Skeldon Pump Station which is the furthest upstream.

The Torani Canal was originally planned to provide a gravity transfer of water from the Berbice to the Canje River for supplemental irrigation water but was unsuccessful until head and tail control works were installed. The Torani Canal water transfer procedure requires operation of the head and tail controls to take advantage of tidal differences which depend on the river flows and differences in distance of the two ends of the canal from the ocean.

Technical feasibility of the global project depends upon increasing the available water supply in the Canje River at the pump stations over and above that now available in the Canje supplemented by

gravity diversions from the Berbice. Such feasibility is established by the proposed pumped diversion from the Berbice River. Intensive review, which includes study of the above reports and pertinent references, inspection of existing systems, and interviewing GOG and Harza personnel, disclosed no obstacle to technical feasibility of the proposed project.

The (March 1977) Harza report indicates ample analysis of existing conditions and available data, and provides adequate basis for pre-investment decisions. The IBRD review for the Bank's staff appraisal report drew heavily upon the Harza study for technical aspects of the project but represents original work in project definition, equipment, personnel and budget needs for project implementation.

Harza cost estimates were based on detailed quantity estimates taken from preliminary plans, sketches and specifications of the various project features extended from unit costs of labor and materials derived from current GOG experiences in Guyana. Operation costs for construction equipment were developed from U.S. hourly rates and adjusted to local conditions. Basic prices for materials not available in Guyana were surcharged by 10 percent to include ocean and inland freight. Harza costs represent January 1977 price levels which were escalated over the life of the project by IBRD in accordance with official increases in Guyanese labor rates through 1979 and extrapolated projections thereafter through the life of project for labor, and in accordance with rates of price increases calculated by IBRD. Total global project costs are presented in Annex III Exhibit 7(a).

(b) Water Requirements and Supply

The World Bank used the modified Blaney-Criddle method to determine water requirements for rice in the Project area. It used an application efficiency of 70 percent and a conveyance loss of 15 percent to arrive at field demand. It also added an amount to account for irrigation for land preparation and the necessary field draining during fertilization and harvest.

Although the assumed efficiencies are high, the allowances for drainage and land preparation brings the water requirement calculations in line with reasonable irrigation system design; thus the water requirements as calculated by the World Bank are adequate.

There is adequate water in the Canje and Berbice river systems to supply the present needs and the added need produced under this Project.

(c) Water Rights

Water resources in Guyana are owned by the State and vested in the Guyana Water Authority, which was created by law in 1972 to control and regulate all activities related to water development and use, including: collection, production, treatment, storage, transmission, distribution and use of water; research; construction and maintenance of waterworks; approval of plans and proposals for water works; and to advise Government on all matters related to use and development of water resources. The Authority may delegate its powers to other agencies or Boards, and all new projects for development and use of water resources must be reviewed and approved by the Authority. For existing irrigation and drainage projects the Authority has delegated its powers to the Drainage and Irrigation Board.

Legislation for the granting of water rights to individual farmers for irrigation does not exist in Guyana. Within Declared "Drainage and Irrigation Areas", the D & I Board recognizes the right to use by establishing "time run" schedules at the beginning of each irrigation season for land owners or lease holders within an area, which assigns a given number of hours of use during each return period of 7 to 10 days. The entire project will become a declared "Drainage and Irrigation Area" upon the signing of the Loan Agreement with the respective donors.

(d) A.I.D. Financed Construction

The construction work to be financed under the Project consists of a new headquarters building and two district offices to be used by the

Hydraulics Division O & M staff, a new rice drying and storage facility including conversion of an existing building for bulk storage use, expansion of the machinery shelter of the GRB's Johanna facility, and conversion of two existing buildings to seed processing and testing facilities. All of these are described elsewhere in this PP.

The headquarters building may serve as the consultants engineering office at the project site and therefore should be the first building to be built. Design and construction of the other facilities would follow more or less in accordance with the schedule shown in Annex III Exhibit 7(b). The headquarters building, O & M district offices, expansion of the machinery shelter and the seed processing and testing facility do not represent contracts that would attract foreign bids. Local contractors are competent in this type of work and it is expected that this work can be packaged to require a minimum of contracts. The Hydraulics Division carried out similar type construction at the Tapakuma project utilizing both local contracts and force account.

The storage and drying facility is likewise of a magnitude that foreign bids would not likely be attracted and will likely be constructed by a local contractor or by force account. Due to the site conditions that prevail in the project area, a pile foundation may be required for the tempering bins which have concentrated loading points, in which case the foundation would likely be contracted. The imported equipment installation in this facility will require the services of a manufacturers representative to advise on installation and startup. The costs for this service have been included in the budget.

The engineering consultant will prepare all plans and specifications for the A.I.D. financed construction as well as for the global project civil works. He will also be responsible for construction control.

Sketches of the drying and storage facility and the O & M office building appear in Annex III exhibit 2(b). Sketches of conversion, expansion, or renovation of facilities do not appear due to

the relatively minor nature of work to be performed.

(e) Consulting Services

The IBRD staff report calls for 470 man-months of consultant time of engineering services. Of the 470 mm of engineering time, 198 mm were allocated to local hire technicians. A.I.D.'s review of the work to be accomplished leads to the conclusion that the IBRD mix of specialties on the consultants staff together with the allocation of expatriate and local staffing is reasonable.

Total estimated costs for engineering services are \$2,490,000, about 3/8ths of which is local currency cost. Estimated costs include salaries, overseas differential on expatriate salaries, home office and field office overhead, fixed fee, per diem, transportation and other allowances.<sup>(1)</sup>

The staff report lists equipment to be procured for administration, engineering and supervision which includes office equipment and supplies, engineering equipment, concrete and soils laboratory equipment, drilling and site investigation equipment, and standard and 4-wheel drive vehicles. The list is illustrative rather than explicit and the estimated cost of \$145,000 is adequate.<sup>(2)</sup>

Housing for expatriate consultant personnel will be furnished by the GOG for which adequate funds have been budgeted.

2. Credit

a. Rice

The GOG, in February of this year, withdrew the rice subsidy to domestic consumers. The implicit subsidy on local sales - which had come from the GRB trading accounts - totalled G\$5.9 million in 1975 rising to G\$7.47 in 1977. With the withdrawal of the subsidy, the GRB will be better equipped to supply the credit needs of participant

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(1) See Annex III Exhibit 4(b) for consultant engineers' budget.

(2) See Annex III Exhibit 3 (d) for consultant engineers' equipment list.

farmers from its own resources.<sup>1/</sup> The Guyana rice farmer receives credit from a number of sources as pointed out in Section III B. The GRB presently grants loans for approximately 50% of the cash costs for rice production. This amount is normally tied to in-kind credit for seed and fertilizers. The balance of the farmer's credit needs is supplied by other sources or self-financed. In addition to the GRB, the AgBank is an important source of credit to rice growers although it does not make funds available for short-term production credits. It does however provide funds for medium term (2-5 years) and long-term (over 5 years) financing for rice production activities. Approximately 70% of the Bank's production loans, at moderate interest rates (9%), were in support of rice growers. The AgBank expects to increase its present rice development portfolio substantially by 1981, however it feels that Bank resources will not be sufficient to meet expected credit demands once full production levels are reached. It is therefore seeking additional external financing from its present creditors which include the Inter-American Development Bank (IDB) and the Caribbean Development Bank (CDB).

b. Food Crops

The AgBank provides both short and long-term capital for food production other than rice. A special national program for short-term credit for food crop production is expected to increase from its present annual level U.S.\$800,000 to U.S.\$1.4 million by 1979-80.

The IDB is also presently developing a Food Diversification Project which is expected to channel \$5.0 million in credit funds for food production through the AgBank.<sup>2/</sup>

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<sup>1/</sup> The Loan Agreement will contain a covenant committing the GOG to maintaining adequate levels of production credits in the Project area to meet the requirements consistent with a higher intensity of land cultivation and the introduction of high yielding rice varieties.

<sup>2/</sup> USAID/G is considering a request from the AgBank to finance a production credit loan to service areas of the country that will not benefit from the proposed IDB loan. The Black Bush Region is not currently scheduled to receive IDB financed credits under the proposed loan.

### 3. Marketing

#### a. Present and Projected Marketing Channels

1. Rice. The Rice industry - including production, processing, and marketing - is largely controlled by the GRB, a statutory body attached to MAG. The GRB is responsible for helping to establish pricing policies, for storage of milled rice, and for all export and internal sales at the wholesale level.

The private sector presently accounts for 99 percent of production, 86 percent of milling, 35 percent of the storage of milled rice, and for retail sales at regulated prices.

Guyana's membership in CARICOM has insured substantial market outlets, accounting for 95% of rice exports. The Agricultural Marketing Protocol, a mechanism created by CARICOM, facilitates trade flows among member countries. Export prices are negotiated annually and have remained almost constant since 1975 despite world market prices falling substantially. At present the negotiated price is some 30% above the prevailing world market price.

The volume of rice exports has largely been determined by the availability of a marketable surplus. The slow export growth is attributed to internal factors affecting the rice industry rather than market limitations. First, paddy output fluctuated significantly in response to pricing policies, particularly in the mid-1960's when both acreage and productivity declined substantially. In addition, recurrent droughts and floods affected the level of output thus depressing the marketable surplus. Second, the quality of rice has been below international standards, containing a high proportion of foreign material and red rice. With increasing per capita income of the principal trading partners, Jamaica and Trinidad and Tobago, demands for better quality rice were met by suppliers from the United States.

The current annual import requirement of CARICOM is 150,000 tons with Canada, Cuba and other Central and South American countries importing a further

250,000 tons. World Bank projected demand increases both within the Western Hemisphere and the rest of the world of 2.4% per annum should ensure Guyana suitable markets provided an aggressive marketing strategy is adopted.

In order to guarantee an expanded steady supply of rice exports at a high quality, the marketing infrastructure needs to be strengthened. With only one domestic and export marketing channel, the country's annual production of rice is purchased and sold solely by the GRB. Farmers have the option of delivering paddy or milled rice at prices fixed by the Board. The predominance of private millers has given them an indispensable role in the marketing mechanism. However, the deteriorating state of these private mills, coupled with low profit margins, has led to poor quality milling. Many of the private millers (approximately 25%) own single-stage mills which are inefficient and severely antiquated. Unless a program is launched to offer some support either through improvement of the profit margins or opening of credit facilities to rehabilitate and modernize the private mills, the GRB will have to absorb the current high cost of processing which affects its future competitiveness in the open world markets. Other measures required to improve efficiency in rice marketing will involve immediate expansion of storage and drying facilities, a part of which will be developed under this project. The Rice Modernization II Project will consider additional needs for facilities. Existing storage and drying facilities in the Project area lend themselves to crop losses and quality deterioration. Since improvement in quality is essential in future rice export performance, the need for these additional facilities would augment other complementary measures. Finally, GRB should initiate export shipments directly from rice producing areas as they are currently doing from Corriverton. This practice would not only eliminate double handling when the rice is shipped to Georgetown but also reduce transport costs. Furthermore, introduction of bulk storage and transport could cut the cost of handling the rice in bags.

2. Other Food Crops. Fruits and vegetables produced in the Project area are either consumed domestically or add marginally to export supplies. The Guyana Marketing Corporation (GMC), the agency responsible for food crops distribution, is strengthening its services to cater primarily to domestic markets.<sup>1/</sup> However, increasing internal demand for food has not stimulated production significantly and the incremental output of 5,200 tons of food crops from the Project will be easily absorbed and contribute to Guyana becoming more self-sufficient in food supply.

The GMC has a weekly collection schedule for the Project area where farmers can dispose of their produce at guaranteed fixed prices. Other marketing channels include the small traders whose presence is felt strongly during times of excess demand. Additional marketing facilities to accommodate the incremental output from the project area may be warranted at full development and the GMC has tentative plans to open a central warehouse for farmers to dispose of their products regularly.

b. Pricing

The market mechanism in Guyana has a secondary role in determining prices. Essential consumer products like rice, wheat, edible oils, sugar and other food crops are subject to Government price control. While the Government's intervention to stabilize food prices has eased the domestic inflation rate, it has resulted in a heavy burden on public revenues. It is estimated that over twelve percent of annual current revenue is allocated to subsidize both consumers and producers. The depletion of foreign exchange reserves in recent years has forced the GOG to introduce austerity measures by eliminating or reducing consumer

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<sup>1/</sup> The marketing capacity of GMC is limited to major food crop growing areas and absorbs only 40% of total production.

subsidies for transport, wheat flour, electricity and stock feed. However, sugar and edible oils are still highly subsidized. The subsidy on domestically consumed rice was removed in February of this year.

1. Rice. The process of fixing domestic prices of both paddy and milled rice is complex and involves primarily the GRB, the Rice Action Committees and the Rice Producers Association. Upon the recommendations of these organizations, the Cabinet establishes prices for different grades of both paddy and milled rice, as well as the retailer's margin for the internal market. Since 1974 rice and paddy prices paid by GRB remained unchanged except for a few selected grades.<sup>1/</sup> In the meantime, however, export prices rose between 1974 and 1976. A comparison of producers and export prices would indicate that the latter have been growing at a faster rate than the former. As a result, GRB's profit margin, after allowing for the costs of processing and marketing, is estimated at an average of G\$12.30 per bag of paddy in 1977 prices. Although this price differential accrues to GRB, it is used to support the subsidy programs for production inputs, domestic sales and research and to cover operation and management costs.<sup>2/</sup>

Although this system for establishing prices is complex, the GOC is aware of the need to maintain an adequate profit margin at the production level. Because of the importance of rice to the Guyanese economy, the GOC is sensitive to farmer concerns and prices paid to farmers for paddy or milled rice are continually being scrutinized and adjusted. The Project team was informed that a price increase to farmers will be approved for the next crop. No evidence was found that farmers did not have sufficient incentive to grow rice given adequate seed, water, and other production inputs. On the contrary, all suitable land for rice cultivation was being utilized.

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<sup>1/</sup> Incentive prices of G\$1.00 per bag of paddy and G\$2.00 for milled rice have been in force since 1976.

<sup>2/</sup> Domestic consumers received a price subsidy of forty percent which the GRB absorbed as part of its operating costs until this year.

2. Food Crops. Since it is assumed that the incremental production of food crops would be marketed domestically and are not considered import substitutes, no attempt was made to estimate export prices. Comparisons of vegetable prices in urban centers of Guyana and other Caribbean countries show no significant price difference, with the exception of cabbages and blackeye peas, which are in strong demand in Jamaica, Trinidad and Tobago. However, the absence of regular shipping services in the CARICOM area, particularly facilities for perishables and Guyana's current deficit in most foods makes it unlikely that Guyana would enter these markets. For the purpose of the economic and financial analysis, a weighted average price for fruits and vegetables of G\$694 per ton has been derived, based on domestic market conditions. It is further assumed that in real terms the price will remain constant.

#### 4. Project Maintenance

##### a. Operations and Maintenance

As mentioned elsewhere in the PP, operation and maintenance of the project is the responsibility of the Hydraulics Division of the Ministry of Agriculture and is carried out by the District Engineers in their respective jurisdictions under the overall guidance and supervision of the District Superintendent. O & M work consists of scheduling water deliveries and drainage, as required, to the farmer's headgate and from his drain outlet, cleaning and bank maintenance of canals, waterways, sluices and system control structures, cleaning of the Canje River course from the Torani Canal mouth to the Black Bush Pump Station, and the cleaning and upkeep of the Torani Canal. Black Bush Pump Station and Torani Canal Headworks and Tailworks operators are also part of the O & M staff.

Hydraulics Division staffing for O & M activities in the Polder and upstream (e.g. pump station and Torani Canal control works) is comprised of approximately 36 persons, 6 of whom are clerical including one administrator, 2 storekeepers and the balance operational personnel. The non-administrative/ clerical staffing would more than double under the

Project and would be phased in as the workload demand increased.

b. Cost Recovery

The Drainage and Irrigation Ordinance of 1953 empowers the D & I Board to collect actual operation and maintenance costs and recover the full amount of capital investments from the beneficiaries. The GOG, however, has made no effort to recover capital investments and the collection of operation and maintenance costs has averaged about 15% for the past several years. As a result, the GOG subsidizes the O & M costs for all projects at a rate of about U.S.\$400,000 per year.

Assessments for O & M costs are based on detailed estimates prepared by the Hydraulics Division. However, no rates are levied towards the recovery of capital costs. The situation regarding recovery of investment is complicated by the unique nature of the rice industry in Guyana. Almost 50% of the rice lands are farmed under Government leases and farmers object to repaying development costs on land they do not own even though they derive benefits from the land.

The annual operation and maintenance of project facilities will amount to an estimated U.S.\$588,000 for serving 42,000 ac or a rate of about U.S.\$14 per ac. An annual charge of U.S.\$4 per ac has been considered for replacement of the irrigation and drainage pumps at year 25 of project life. Operation and maintenance costs are based on detailed estimates prepared by the Hydraulics Division and 70% of the operation and maintenance costs is due to the operation of the irrigation and drainage pumps. It was assumed that the total annual cost of operation and maintenance would be charged to all the beneficiaries in the Project area. The analysis of cost recovery takes into account the estimated net farm income on different size holdings and the ability of the farmers to pay project charges. The IBRD Staff Report indicates that the capacity to recover capital costs was examined on the basis of Project rents which are residual incomes net of production costs; after deducting imputed values for family labor, management services, risk and depreciation. This

analysis arrives at the estimated income surplus which would be available to pay project charges. Quoting from the Staff Report,...."other factors like the need for the project executing agency to mobilize additional revenue, the attainment and regulation, the charges levied may not reflect the real economic cost of the scarce resource. However, the equity and generation of additional revenue criteria could be fulfilled. Two alternative plans were examined to recover costs of capital and operation and maintenance in 43 years, allowing a grace period of seven years."

"The first alternative is to recover 100% of total costs which would amount to \$23.5 million when discounted at 10%. However, a progressive distribution of cost recovery in this amount among the different farm sizes results in an excessively high proportion of total net farm income. Hence, another alternative cost recovery scheme was analyzed under the assumption that the maximum direct Project charge should not exceed 35% of total net farm income for the larger farms and progressively less for smaller farms as shown in the table below. The schedule presents proposed charges per ac on a progressive scale, the relation between charges and farm size, and the percent of farm income allocated to Project charges as farm size and income increases. This indicates that these charges would be within the capacity of the farmers to pay, ranging from 10% of net income for farms less than 5 ac to 35% for larger farms of 20 ac to 50 ac, and would cover the O & M costs and recover a portion of the capital investment."

"To derive the rent and cost recovery indices, the total incremental Project costs, rents and charges have been discounted at 10%, the assumed opportunity cost of capital in Guyana. On this basis the present value of the total project charges would be U.S.\$10.0 million."

The results in the Staff Report show where the total rent recovery index is 36% and the respective cost recovery index is 16%. The cost recovery index under this assumption is low, while the average charges appear relatively high, due in part to the relatively high charge for reserve and replacement of irrigation and drainage pumps. Higher rates may affect the

Proposed Annual Project Charges at Full Development<sup>1/</sup>  
(Figures in U.S. Dollars)

<u>Representative Farm Size (ac)</u>	<u>Total Area (ac)</u>	<u>O &amp; M Charges (\$/ac)</u>	<u>Total O &amp; M Charges (\$000)</u>	<u>Recovery of Investment (\$/ac)</u>	<u>Total Recovery of Investment (\$000)</u>	<u>Total O &amp; M and Capital Recovery (\$000)</u>	<u>% of Total Net Farm Income</u>
2.5	11,718	17.5	202			202	10
8	11,718	17.5	202	5.9	69	271	18
15	12,477	17.5	215	13.7	171	386	19
28	1,800	17.5	31	19.6	37	70	35
<u>Total</u>	27,800		661		277	929	16

<sup>1/</sup> Figures have been rounded in conversion from Guyanese dollars.

farmer's incentives and willingness to pay such charges.

This analysis indicates that farms in all categories from small to large would have a net income with the Project sufficient to pay Project charges to cover O & M costs and a proportion of the capital costs. Assurance would be sought during negotiations that GOG will impose a progressive system of Project charges, as Project facilities are completed and lands come into full production, sufficient to cover actual annual operation and maintenance costs and recover a proportion of the capital investment in Project works over a period of 40 years. The system of charges will be reviewed with the IDA at least once every two years to evaluate the effect of the changes in prices on the value of the investment and to make adjustments as required in these charges. (1)

c. Maintenance of AID-financed components

(1) Farm Development Equipment

The farm development and harvest equipment, purchased under the Project, consists of tractors, combines, plows, ditchers, land planes, in addition to shop tools and spare parts. This equipment will be assigned to the existing GRB machinery pool at Joanna in the Black Bush Polder. The purchased equipment is necessary so the machinery pool can extend its service under double cropping by the Project. The shop tools are necessary to improve the pools' capability to maintain and repair the presently owned and new equipment. An evaluation of the operating condition of all existing equipment will be made early in the Project and necessary spare parts purchased to recondition as many machines as possible. Since most machines are less than 10 years old, good recovery is expected. All new equipment will be purchased complete with a stock of spare parts.

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(1) As noted earlier both A.I.D. and the World Bank will covenant that outside assistance be solicited to install an effective cost recovery system. The covenant has been endorsed by the Minister of Agriculture as well as the corresponding division under his control.

A total of 52 person months technical assistance is programmed into the GRB machinery pool to assist with development of a machinery management system and to provide the necessary training to improve its operational efficiency in meeting former demand for the service and to recondition and maintain existing machines. The demand for the service is real and the GRB is committed to upgrading its effectiveness. The Project provides a three year period for training, developing, and installing good management practices for machine operation and maintenance. With this Project assistance, the GRB machinery pool will be an effective operating facility which is essential to increased production in the Project area. At project completion, the machinery pool will have a system of farm machinery accounting, service, maintenance, and operation. It will be operated by personnel who assisted with development of the system and were trained in it. The incentives to continue efficient operation should be high and it is expected to not only continue but to be expanded to other GRB machinery pool operations throughout Guyana.

### (2) Vehicles

Vehicles purchased under the Project include 26 motorcycles, 10 four-wheel drive vehicles, and 5 trucks. These are necessary to provide transportation for the technical assistance experts, for the additional extension agents called for in the Project, and to provide transport for field servicing of farm machines. They will be placed in the appropriate divisions of the GRB i.e. research, extension and the machinery pool.

Vehicular servicing and maintenance does not appear to be a critical problem in Guyana as in the case with machinery. Spare parts and vehicle mechanics are in greater supply. The Project purchased vehicles will be serviced by GRB machinery pool. Since this is the case, it is expected that vehicles will be maintained and replaced as needed after the project has terminated.

### (3) Seed Production and Testing

The resources for this component as programmed into the Project will strengthen the base for an effective

seed production and certification program for rice. The equipment needs will be supported by the technical assistance and training program personnel to make certain that the equipment is operational and maintained according to manufacture's instructions and that the seed system as planned can operate efficiently.

Both prior and projected investments for developing and expanding seed farms largely through GRB resources and its commitment in renovating and/or constructing required facilities to support the seed processing and testing system are indications that the GRB realizes the importance of institutionalizing and supporting an efficient system of seed production and testing. Every effort will be made during the Project period to ensure that the inputs are properly managed and that there is institutional capacity to self-generate the financial and technical resources necessary for the activities to continue and/or expand after the Project is terminated.

(4) Adaptive Research and Extension (Rice and Food Crops)

This component of the Project is designed to develop a capacity within the GRB and MAG to integrate services and resources whereby production on the farm for rice and food crops will significantly increase.

The A.I.D. supplied resources, both technical and financial - will be used to strengthen the efforts which are already underway by the GRB and MAG. As the A.I.D. supplied resources will support institutions already established and activities already underway (although some of them may be at a weak and rudimentary level) there will be no problem of integrating the A.I.D. effort into overall GOG priorities by Project termination.

Technical assistance will emphasize development of staff who will be prepared in production planning and implementation and will have accrued the skills required to maintain an effective adaptive research and extension program.

Given continuity of staff and an adequate implementation period, there is every assurance that the system developed during the life of the Project will be incorporated into the MAG's long term production program.

(5) Evaluation of Tapakuma Project

The Tapakuma development plan, a U.S.\$18.5 million World Bank project signed in 1975, is the first phase of the GOG's comprehensive plan to increase production and improve the quality of rice, particularly for export. The project was initially examined in an A.I.D. financed feasibility study carried out between 1971-1973, and was designed to improve irrigation and drainage systems and expand production services to 5,000 small farm families along the Essequibo Coast. The project served as a model in designing the Black Bush Project, however adjustments have been made to avoid the difficulties encountered during implementation.

a. Cost Overruns

The most serious problem has been a substantial cost overrun that has prevented the completion of construction works. The GOG is currently negotiating with other outside donors to finance the actual deficit of almost U.S.\$20.0 million.

In designing the A.I.D. financed component of the Black Bush Project an adequate contingency factor was included in the budget. Other donors have similarly taken into consideration physical and price contingencies.

b. Implementation Constraints

Second, because the Project did not define input needs clearly for such items as training aids, transport, and equipment, considerable energies have been devoted over the past two years to resolving these issues.

To facilitate implementation, a coordinating committee which seeks to harmonize the work of the different departments and endeavor to resolve differences that occur in day-to-day operations was established. Project management recognized that a number of problems were developing due to this lack of coordination which in turn was confusing the participating farmers. The objectives of the committee are to agree on priorities for action and assure that the supply of adequate and

timely services to the farmer were in place.

Based on observations at Tapakuma, the plan for the Black Bush Irrigation Project is addressing these implementation constraints to assure that problems of a similar nature do not occur.

Strengthening machinery maintenance and repair operations, reinforcing adaptive research and extension efforts with budgets for support items and the need for well coordinated project management are important elements and have been considered in the Black Bush Project Plan.

c. Extension

The extension activity has had excellent consultant leadership. Well implemented training programs have resulted in an extension staff of a supervisor, pest control officer and four extension workers. A new group of four trainees in field extension begins in April 1978.

The project intends to use the extension workers to serve groups of farmers who are utilizing waters from the same irrigation unit. It is expected that this will stimulate the idea of "block planting" so that machinery utilization can be maximized.

Interim data indicates that with this extension effort which attempts to bring better packages of production technology - principally in pest management and the use of fertilizers - significant increments of rice have resulted even before the irrigation infrastructure is in place.

d. Applied Research

The Seed Farm at the Tapakuma Project has an excellent spring rice crop which is likely to yield over 30 bags per acre. This is an indication that the applied research program is functioning, as obviously good land leveling, seeding and fertilization practices are being accomplished.

e. Equipment and Water Management

The GRB machinery pool at Anna Regina in the Tapakuma area, appeared to have problems of lack of machinery

maintenance and repair similar to those found in the Black Bush Polder. The Tapakuma Project does not have an equipment technical assistance component and its absence is obvious. The land development machinery pool appeared to have problems as well. To date no new farm equipment has been purchased under the Project.

Many canals and drains in the Project area are sorely in need of maintenance and are almost completely choked with weeds. Some land leveling has been attempted using bull-dozers which are not efficient as land levelers. In general, there appears to be no farm water management improvement program for the Project. The Project Management office has ordered two disc harrows for seed bed preparation but no land planes are available on the Project. Given the design of the Black Bush Project, problems of equipment and water management should not occur.

f. Adaptive Research

Adaptive research efforts in Tapakuma have concentrated on investigating the effects of the major fertilizer nutrients on rice production on the more important soil types using a number of varieties. These trials, in operation since 1975, have largely been done on the farmers' fields. Although the work is still incomplete, the data show that substantial responses using chemical fertilizers has occurred on all soil types in every season and with every variety tested. The data also implies that a good base is being established for providing some overall fertilizer recommendations for rice in Guyana.

g. A & E Services

Consultants for the Tapakuma Project are the English firm, Sir William Halcrow and Partners who were the consultants on the original Black Bush Polder project, the original Tapakuma Project, the Guyana Sea Defenses as well as other Guyanese projects. Halcrow's headquarters office is in Georgetown where design work is carried out. The Halcrow Tapakuma office is organizationally divided into so-called Contract and Project functions with 3 expatriates, a Resident Engineer, a Deputy Engineer

and a Chief Inspector. The Project Office is headed by a Project Liaison Officer organizationally followed by a Project Engineer who are both Guyanese. The expatriates in this office are an Agricultural Engineer (mechanical), a Rice Agronomist and an Extension Training Officer. Both offices are supported with additional local staff personnel.

Procurement for the Tapakuma project has not functioned well due to inclusion of local currency components to procurement packages, and bureaucratic delays in letter of credit procedures and approvals. There has been too much involvement of local officials in the procurement process for desired efficiency in the Tapakuma experience, however Halcrow has had a satisfactory and productive relationship with the Hydraulics Division and excellent support and cooperation is reported in design and documentation preparation and approval.

B. Institutional Assessment

1. Guyana Rice Board (GRB)

The GRB is a semi-autonomous organization which exercises considerable independence in its budgetary and physical operations, but which is part of the Ministry of Agriculture and comes under the supervision of the Minister of Agriculture.

The activities of the GRB under the Project would include: an agricultural credit program to supply fertilizers, chemicals and other inputs to rice farmers; machinery services for land preparation and harvesting from their machinery pool; drying storage and milling of rice; a research program for varietal and cultural practices improvement; production of foundation seed and multiplication for supply of certified seed to farmers; technical assistance for introduction of improved varieties and improved production practices; the cleaning, grading, blending, and packaging of rice; and the marketing of all milled rice except that retained by farmers for their own use.

The GRB has the organizational framework to handle

the above, however inadequate staff and operational budget precludes efficient and effective operation. This and other projects will improve the management and operation of various components of the GRB. The Checchi Rice Modernization II evaluation and feasibility study will recommend that the GRB seek outside assistance to revise and improve its overall management and operational procedures. Although interested in improving its management capabilities, the GRB is committed to and capable of supporting the Project by providing the necessary technicians and scientists for training and providing adequate funds for implementation of the production components called for in the Project. GRB requirements to add new staff would not necessitate the transferral of large numbers of technicians from other priority project regions since the GRB policy is to employ technicians from within the geographic area to be affected. It appears that sufficient numbers of extension agents can be recruited and trained locally given the area's long rice growing tradition.

## 2. Hydraulics Division

The Hydraulics Division within the Ministry of Agriculture will have direct responsibility for engineering planning, construction of project works, and operation and maintenance of works. This Division is presently fulfilling these tasks on other projects in the country as well as on existing works in the Project area. The Hydraulics Division will be assisted on implementation of the project by a team of consultants financed by A.I.D.

The Minister of Agriculture, through the Hydraulics Division, will appoint a Project Engineer who will work with the consultants and represent the Division on technical matters during the implementation period. Following completion of construction he will supervise operation and maintenance of the entire Project civil works. The Project Engineer will also supervise the two District Engineers now located at Whim and Benab.

These two engineers with their staffs and equipment will continue to operate as at present, however, O & M facilities will be expanded and improved under the Project to permit them to provide service to the increased acreage provided under the Project.

The team of consultants will perform the engineering work required to implement the Project, including surveys, site investigations, technical studies, planning and final designs, construction drawings, specifications and tender documents to supervise construction. The Hydraulics Division will supply the local staff to support these consultants.

The Hydraulics Division is capable of performing the work called for under the Project and this in fact, is their normal function. The Division appears to be well organized, under good leadership and efficient in its overall management. Its greatest constraint in the construction of irrigation and drainage systems is inadequate budget. Hydraulics Division current staff in the Project areas will be expanded by employing new people rather than by diverting personnel from other areas of the country. Since this growth will be gradual as the Project develops, the current base of skilled personnel will be able to grow along with the increase in responsibilities. (1) With the inputs provided by the Project, the Hydraulics Division is expected to be fully capable of handling the Project.

### 3. Mag Extension Division

The Ministry of Agriculture has the primary responsibility for planning, implementation and management of irrigation and drainage projects as well as administering land ownership, settlement and providing appropriate extension and training services for food crops other than rice.

Several different departments and divisions within the Ministry carry out this agricultural and rural infrastructure activities. The Drainage and Irrigation Board (D and I Board) is responsible for policy formulation and general planning. The Hydraulics Division is charged with engineering, construction, operations, and maintenance.

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(1) See Annex III Exhibit 6 for listing of counterpart staff to be supplied by the Hydraulics Division

The Extension Division does the agricultural planning and research and seed development on all crops other than rice. The Land Development Division is responsible for the administration of settlement schemes and the Lands Development administers land ownership and leases.

The principal production program in the Project by the Ministry of Agriculture will be in food crops development. The organizational framework for the Ministry of Agriculture is essentially in place. However, like the GRB, the Ministry has had inadequate budget during the past several years which has severely restricted their operational programs. Concurrently, staffing of many technical positions remain unfilled due to the insufficient numbers of trained personnel.

Training is a critical area, for the Ministry of Agriculture. The substantial inputs of technical assistance and educational efforts placed in the Project should adequately develop the technical staff of the MAG to effectively manage and implement the Project.

Presently, the University of Guyana (which will have its first agricultural baccalaureate candidate in 1982) cannot resolve the immediate demand for qualified technical personnel. The Guyana School of Agriculture also does not produce enough diploma graduates to satisfy agricultural sector needs of the country. The extension model for training in the Tapakuma project has been successful in producing qualified technicians and both the MAG and GRB are enthusiastic about providing an intensive extension training program in Black Bush.

Both Ministry of Agriculture and GRB have stated their intention to fill proposed technical positions under the Project by recruitment from the Project area. Given the relatively large rice growing population, the GRB will be in a position to recruit staff locally and thus will not detract from on-going regional or national programs.

The proposed A.I.D. "Public Sector Training Loan" is complementary to this Project and will address

a significant portion of its resources to staff development needs of the Ministry of Agriculture, thus providing the MAG with a significant number of trained extension agents.

C. Economic Analysis

1. Macroeconomic Impact

The proposed Project will have a positive and direct impact on four economic areas which are currently contributing to Guyana's overall economic problems. These areas are:

(a) growth in GDP;

(b) availability of foreign exchange and overall improvement in Guyana's balance of payments situation;

(c) employment and worker productivity; and

(d) small farmer income.

(a) Impact on GDP

The 1978-81 Development Plan announced in March, 1978, and currently in final preparation, is a serious attempt on the part of GOG economic planners to reverse the downward trend in GDP growth experienced over the past two years. (See Section IIA - General Economic Overview). The emphasis in the new Four Year Plan is on generating domestic savings and channelling the bulk of these - and external resources - into productive ventures which will result in new levels of GDP growth (GOG target is an overall increase of 17% in real terms by 1981).

The Agricultural Sector, and particularly rice production, has been selected for particular emphasis in the Four Year Plan. This is seen as a clear indication of the GOC's commitment to create a viable commodity counter-balance to the current dominance of sugar in the Agricultural Sector, as well as channel sector investment into areas where employment and income pay-offs are the highest.

The present Project is one of three priority rice rehabilitation and production improvement programs. The Tapakuma project, financed by the IBRD, and the Mahaica-Mahaicony-Abary project, financed by

the IDB, together with the Black Bush Project, will result in a virtual doubling of Guyana's rice production. In 1976, rice accounted for 2.5% of GDP; by 1981, the GOG expects its contribution to rise to 5% of GDP, and by 1986 to reach a stable 7.5%.

The current net value of production, in economic terms, in the Black Bush area is an estimated U.S.\$2.5 million. If the Project were not to be carried out and development continue at current levels, it is assumed that some new lands would be brought into production and some yield increases achieved as a result of on-going research and extension activities. By 1985 (which corresponds to Year 8 in "With" Project calculations) net value of production would rise to an estimated \$5.1 million.

With the Project, the rate of development is vastly accelerated: cropping intensity is increased, and yields increase more sharply as a result of Project technical assistance inputs. Incremental benefits with the Project begin in year 3 of Project implementation and gradually increase until they peak in Year 8. At that time, total net value of production is calculated at \$9.6 million, or an incremental net increase of nearly \$4.5 million over projected production without the Project.

Table 7 shows anticipated values of production with and without the Project.

(b) Impact on Foreign Exchange and Balance of Payments

At full development, the incremental foreign exchange earnings from rice exports will amount to an estimated U.S.\$8.2 million annually. An additional U.S.\$1.0 to 1.5 million of foreign exchange will be saved as a result of the increased food crop production. In total, counting additional sugar revenues, the Project should produce about U.S.\$10 million in foreign exchange earnings/savings, thus contributing substantially to correcting Guyana's balance of payments situation.

(c) Employment and Worker Productivity

Two of the major economic problems in Guyana are:  
(1) lack of employment opportunities and

TABLE 7

BLACK BUSH IRRIGATION PROJECT

Incremental Economic Benefits

	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985-2027</u>
	----- (US\$ '000) -----							
<b>I. <u>Frontlands</u></b>								
<b>A. Without Project</b>								
Rice	543	815	1,167	1,212	1,291	1,368	1,468	1,501
Food Crops	120	120	120	121	122	123	124	124
Sugarcane	736	816	902	902	902	902	902	902
Coconuts	69	69	69	69	69	69	69	69
<b>Total:</b>	<u>1,468</u>	<u>1,820</u>	<u>2,258</u>	<u>2,304</u>	<u>2,384</u>	<u>2,462</u>	<u>2,563</u>	<u>2,596</u>
<b>B. With Project</b>								
Rice	543	815	1,315	1,601	2,147	2,774	3,790	4,162
Food Crops	120	120	201	233	288	346	422	449
Sugarcane	736	816	949	1,061	1,061	1,061	1,061	1,061
Coconuts	69	69	69	69	69	69	69	69
<b>Total:</b>	<u>1,468</u>	<u>1,820</u>	<u>2,534</u>	<u>2,964</u>	<u>3,565</u>	<u>4,250</u>	<u>5,342</u>	<u>5,741</u>
<b>Incremental Benefits (B-A)</b>	0	0	276	660	1,181	1,788	2,779	3,145
<b>II. <u>Block III</u></b>								
<b>A. Without Project</b>								
Rice	542	863	1,280	1,354	1,474	1,597	1,772	1,819
Food Crops	84	84	84	84	84	84	84	84
Coconuts	16	16	16	16	16	16	16	16
<b>Total:</b>	<u>642</u>	<u>963</u>	<u>1,380</u>	<u>1,454</u>	<u>1,574</u>	<u>1,697</u>	<u>1,872</u>	<u>1,919</u>
<b>B. With Project</b>								
Rice	542	863	1,348	1,418	1,574	1,792	2,086	2,181
Food Crops	84	84	86	88	94	100	107	111
Coconuts	16	16	16	16	16	16	16	16
<b>Total:</b>	<u>642</u>	<u>963</u>	<u>1,450</u>	<u>1,522</u>	<u>1,684</u>	<u>1,908</u>	<u>2,209</u>	<u>2,308</u>
<b>Incremental Benefits (B-A)</b>	0	0	70	68	110	211	337	389
<b>III. <u>Polder</u></b>								
<b>A. Without Project</b>								
Rice	92	138	197	205	216	231	250	255
Food Crops	383	383	383	383	383	383	383	383
<b>Total:</b>	<u>475</u>	<u>521</u>	<u>580</u>	<u>588</u>	<u>599</u>	<u>614</u>	<u>633</u>	<u>638</u>
<b>B. With Project</b>								
Rice	92	138	216	257	332	427	563	610
Food Crops	383	383	492	550	648	755	892	941
<b>Total:</b>	<u>475</u>	<u>521</u>	<u>708</u>	<u>807</u>	<u>980</u>	<u>1,182</u>	<u>1,455</u>	<u>1,551</u>
<b>Increment Benefits (B-A)</b>	0	0	128	219	381	568	822	913
<b>Total Incremental Benefits</b>	0	0	474	947	1,672	2,567	3,938	4,447

consequent underemployment; and

(2) low worker productivity.

Under the project, as cropping intensity on all cultivated lands increases, both employment opportunities and productivity per worker will rise.

Since most rice operations are fairly highly mechanized, relatively small amounts of hired labor are needed at planting and harvesting times, but current demand would increase and sufficient supply is available, particularly from the Frontlands area. The real impact is likely to be felt at the family labor level. Currently family labor is underutilized on rice alone, causing out-migration of younger sons to the Georgetown area where they join other job seekers in competing for scarce urban jobs. A major policy of the GOG is to "redeploy" the urban unemployed and underemployed to productive jobs in the agricultural sector, and the present Project is highly supportive of such efforts. Especially in the area of increasing food crops, the Project will impact favorably upon underemployment levels.

(d) Impact on Farm Family Income

The Farm Budget analysis (see Section C. 2) shows calculations of anticipated annual income increments on four representative farms, of 3.5 acres, 8.0 acres, 15 acres, and 28.0 acres. The following table summarizes the findings.

Farm Size (Acres)	Pre-Project Net Income	Estimated Net	Incremental Net Income
		Farm Income With Project	
Figures in U.S.\$			
3.5	\$232	\$416	\$184
8.0	\$451	\$682	\$231
15.0	\$1130	\$1700	\$570
28.0	\$1512	\$1817	\$305

Taking the distribution frequency of each size farm in the Project area, we can then calculate the net annual family income impact in the area:

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<u>Farm Size</u> <u>(Acres)</u>	<u>No. Farms</u>	<u>Incremental</u> <u>Net Income</u>	<u>Total</u>
<hr/> Figures in U.S.\$ <hr/>			
3.5	3348	\$184	\$616,032
8.0	1465	\$231	\$338,415
15.0	832	\$570	\$474,240
28.0	68	\$305	\$20,740
<hr/> TOTAL:			\$1,449,427

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Income generation potential at the farm family level is, then, approximately U.S.\$1.5 million annually once the full production level is reached.

2. Farm Budget Analysis(1)

In order to determine the economic impact of the Project on farmers in the region, four prototype farms were analyzed considering actual conditions and projected conditions with the Project. Farm budgets were prepared to show the incremental benefits which would accrue to each major category of farm found in the area:

1. Farms up to five acres (3.5 acres were analyzed);
2. Medium sized farms (8.0 acres was taken to be typical);
3. the typical 15.0 acre farm which is uniform in the Polder settlement scheme; and
4. 28.0 acre farms which represent the relatively few large farms in the Project area.

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(1) The World Bank Staff Appraisal Report on the Black Bush Irrigation Project is the source of data continued in this section. The A.I.D. Project Team discussed and confirmed all assumptions with the GRB, Agricultural Cooperative Development Bank and Ministry of Agriculture.

In the smaller 3.5 and 8.0 acre farm budgets, food crops were included to better utilize farm family labor; on the 15.0 acre settlement farm, 2.5 acres of homestead plots for food crops near the villages are included; at the 28.0 acre level, no food crops are considered, since family labor is more fully utilized in rice production.

Some yield and input differences can be observed in the four farm budgets. Smaller farms have somewhat lower rice yield projections, due to dependency on custom or GRB equipment for land preparation and harvesting and the timeliness and quality of this work tends to affect yields. For these reasons they tend to use less fertilizer but at the same time, give the crop better care in terms of pest control, weeding and application of fertilizer. Hired labor is not usual in the case of smaller farms. In food crop production, the same principles apply, resulting in higher yields for smaller farms than larger farms. Land preparation has been assumed to cost less per acre on larger (28.0 acre) farms, since they generally own tractors or have access to them more readily than in the other cases.

Table 8 indicates estimated production costs for each representative farm unit.

Yields are based on the following projections:

3.5 acre farm:	1.25 tons per acre	(20	140-lb bags)
8.0 acre farm:	1.3 tons per acre	(21	140-lb bags)
15.0 acre farm:	1.3 tons per acre	(22	140-lb bags)
28.0 acre farm:	1.3 tons per acre	(22	140-lb bags)

Annex V, Tables 1 through 4, presents the four farm budgets. In each case, substantial incremental net income is projected, sufficient to warrant the assumption that beneficiary participation will be forthcoming.

### 3. Economic Rate of Return

The estimated cost of the Project, not including price contingencies and farm machinery, is U.S.\$30.4 million in mid-1977 prices. Annual operation and

Table 8

FARM BUDGET - BLACK BUSH POLDER IRRIGATION PROJECT: PRODUCTION COSTS

COST PER ACRE FOR FARM SIZE OF:

	<u>3.5 acs</u>	<u>8.0 acs</u>	<u>15.0 acs</u>	<u>28.0 acs</u>
Land preparation	\$44.00	\$44.00	\$44.00	\$33.00
Seed Padi	14.94	14.94	14.94	14.94
Transportation	.75	.75	.75	.75
Fertilizers - Urea \$15.72/cwt	15.72	17.95	19.19	19.19
T.S.P. \$17.52/cwt	8.76	8.76	8.76	8.76
Transportation	1.00	1.20	1.20	1.20
Weed Control	9.20	9.20	9.20	9.20
Pest & Disease Control-				
Seed Treatment	.44	.44	.44)	
Rice Caterpillar	2.60	2.60	2.60)	8.41
Stemborer	3.09	3.09	3.09)	
Padi Bug, (2 treatments)	5.78	5.78	5.78)	
Harvesting \$2.50/bag	50.00	52.50	55.00	55.00
Transportation of padi from field to Mill \$1.00/bag				
Empty bags 70¢ each	<u>14.00</u>	<u>14.70</u>	<u>15.40</u>	<u>15.40</u>
<u>Total:</u>	<u>190.40</u>	<u>196.91</u>	<u>201.12</u>	<u>187.85</u>

Source: IBRD and Agricultural Co-Operative Development Bank

\* Figures are in 1977 prices.

maintenance costs at full development are estimated at U.S.\$643,000 (U.S.\$17 per acre).

Incremental economic benefits will result from: higher yields in the project area; increasing the cropping intensity of rice from its current level of 110% to 154%; and the development of 6,500 acres of currently unutilized land. The principal crop, rice, will occupy 92% of total irrigable land, excluding coconut grove, followed by food crops (5%) and sugarcane (2%). Incremental benefits will gradually increase starting in year 3 of project development, with full development peaking in year 8.

Table 7 shows the IBRD calculation of incremental benefits as a result of the project. The bulk of the benefits will be derived from Frontlands development, with Block III and the Polder contributing to a lesser extent.

Table 9 calculates economic costs and benefits. For the purposes of the economic evaluation, the following assumptions were made:

(a) Price contingencies, which amount to 26% of the total project cost, are deducted since the analysis is in constant 1977 prices. It is further assumed that relative prices would not change.

(b) The cost of farm machinery has not been included since this is part of annual production costs. The cost of O & M equipment is also excluded as this would be covered by annual depreciation as a part of the total O & M cost. The cost of the studies for a stage II project is not included.

(c) The total project cost is also net of taxes since they represent financial costs rather than real resource consumption.

(d) In an attempt to estimate shadow wage rate for unskilled labor, both the national and project area unemployment situations were examined. The recent unemployment figure for Guyana indicates a 15% overall unemployment rate and 27% for the East Berbice region. In the absence of any regional parameters for a shadow wage rate for labor, it is assumed that the opportunity cost

Table 9

BLACK BUSH IRRIGATION PROJECT

Economic Costs and Benefits<sup>1/</sup>

Project Cost				
<u>Year</u>	<u>Capital</u>	<u>Operation and Maintenance</u>	<u>Total</u>	<u>Incremental Benefits</u>
----- ( US\$ '000) -----				
1. (1978	537	---	537	---
2. (1979	1,653	---	1,653	---
3. (1980	6,228	50	6,278	474
4. (1981)	10,985	129	11,114	947
5. (1982)	5,356	67	5,423	1,672
6. (1983)	3,859	121	3,980	2,567
7. (1984	---	185	185	3,938
8-28. (1985-2005)	---	225	225	4,447
29. (2006	3,700	225	3,925	4,447
30-50. (2007-2027)	---	225	225	4,447

Rate of Return: 13.3%

<sup>1/</sup> In constant 1977 prices.

of labor is 75% of going wage rate.

(e) The life of the project will be 50 years and construction is scheduled for completion in year 6. Accordingly, project benefits gradually reach their peak in year 8.

(f) Commodity prices used in the economic analysis are based on world market projections provided by the IBRD's commodities and Export Projection Division.

(g) A shadow exchange rate of G\$3.00 to U.S.\$1.00 was adopted, against the official rate of G\$2.52.

Based on the above assumptions and values, the economic rate of return is 13.3% which is higher than the opportunity cost of capital for Guyana.<sup>(1)</sup> Hence, the project as proposed is viable in both economic and financial terms. In order to gauge the response of the rate of return to possible changes in costs and benefits, sensitivity analysis was carried out for selected variables and results are set out below.

#### SENSITIVITY ANALYSIS

	<u>Rate of Return</u>	<u>Percentage Change From Basic Rate</u>
(a) Basic rate	13.3	
(b) Benefits reduced by 10%	11.9	-11
(c) Costs increased by 10%	12.0	-10
(d) Combination of b and c	10.8	-19

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(1) The IBRD calculates that the opportunity cost of capital in Guyana is 10%.

Even for the most severe combination with benefits reduced by 10%, and project costs increased by 10%, the project remains viable with a rate of return of about 11%.

The basic rate of return of 13.3% is considered to be extremely conservative. The GOG policy to emphasize agricultural production is expected to result in increased prices to producers, and the history of rice production in Guyana over the past ten years has shown the high supply elasticity in response to price incentives. In addition, AgBank and MAG officials feel that incremental food crop production could be significantly higher than the U.S.\$910,000 projected at full development -- perhaps as much as double that amount.

#### 4. Capacity to Repay

At the end of 1977, the external public debt of the Central Government was approximately U.S.\$275 million. Most of this - approximately U.S.\$220 million - represents long term loans and nationalization payments having repayment periods of twenty years or more.

In addition, the external debt of the Public Corporations and State-owned enterprises, which is Government-guaranteed, stood at about U.S.\$70.6 million. Most of this is due in the medium term, carrying repayment periods varying between 5 and 10 years.

The Finance Minister, in his March 1978 Budget Messages emphasized that priority would be given to meeting repayment schedules,<sup>(1)</sup> stressing the developmental aspects of foreign indebtedness.

In general, the longer term overall external debt structure is favorable, since the bulk is spread out and much of the debt incurred for development purposes is still in the grace period.

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(1) Guyana has been current on all payments on its Government and Government-Guaranteed debt; there are currently arrearages in the private sector, but these are generally paid within six months of the date due.

Provided GOC authorities pursue a sound development strategy over the coming years, such as that reflected in the 1978-81 Development Plan, increased production benefits will more than be sufficient to service its debts.

A recent IBRD study indicated that Guyana's debt service ratio reached about 12% in 1976 and is projected to decline to about 8.5% in 1980.

Table 10 shows major international donor commitments (both signed and projected) to Guyana. In addition, the Mission is aware of the possibility of external financing from the United Kingdom (£10 million for sea defense, Tapakuma support, road construction, and coastal and river boats); the USSR; German Democratic Republic; Peoples' Republic of China; Korea; Yugoslavia; and Venezuela (latter not yet specified).

Since all of these will most likely have long grace periods, they will not appreciably affect the GOC capacity to repay the proposed loan for the Black Bush Development Project.

The incremental foreign exchange earnings from the Black Bush Project are calculated to be U.S.\$8.2 million annually at full development (year 8 of implementation).<sup>(1)</sup> This amount alone fully justifies the conclusion that the GOC has the capacity to repay the loan.

#### D. Social Analysis

Annex IV presents a consultant's analysis of the target population in the Project area, identifying major cultural patterns among the farmers. In general, the area is marked by strong ethnic and kinship ties (about 90% of farmers are of East Indian descent, maintaining close cultural identity), and as a result there is little evidence of social friction which would jeopardize Project implementation.

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(1) See Economic Analysis

Table 10

MAJOR DONOR COMMITMENTS

A.I.D.

<u>Signed</u>	<u>DONOR</u>	<u>GOG</u>
Public Sector Manpower Training	\$1,000	\$715
Georgetown Streets	6,200	3,300
<u>Projected</u>		
Guyana Roads	7,900	2,638
Ag Sector Development	5,000	2,000
Rural Health Systems	2,999	2,000
Seed Farm Development	500	800
Rice Modernization II	10,000	4,000

I.D.B.

<u>Signed</u>		
Abary Irrigation	49,500	23,100
<u>Projected</u>		
Food Crop	9,000	2,000
Livestock	9,000	2,000
Health	9,000	2,000

World Bank

<u>Signed</u>		
Livestock Development	2.2	.5
Highway	4.4	1.2
Tapakuma	12.9	4.0
Education	12.0	4.6
<u>Projected</u>		
Forestry	15.0	5.0

NOTE: Does not include Black Bush Small Farm Development.

The report does, however, identify a possible constraint on Polder lands, (1) which are held under lease arrangements with the GOG. Tenants may be reluctant to make on-farm capital improvements on land to which they do not possess clear title. At the same time, however, there are indications that tenant farmers are equally adaptive to technology improvements and equally receptive to government-provided technical assistance. The AgBank reports that there is no discrimination between freehold farmers and tenants on Government-leased land in terms of credit, and the GRB has focussed much of its attention on providing assistance to the Polder.

Project-financed technical assistance will be directed to all beneficiaries in the area, and Project management will identify implementation problems if they do occur on the Polder leased lands.

1. Project Beneficiaries

The Project will benefit an estimated 6,000 farm families. Farm size in the Polder is uniform since land was parcelled out in a resettlement scheme, and comprises rice plots of 7.5 acres or 15.0 acres as well as a 2.5 acre homestead plot for foodcrops. In the Frontlands and Block III, farm sizes vary. In these two areas, 83% are 10 acres or less and 53% are less than 5 acres.

Present per capita income in the project area is low. The following table summarizes annual income levels (in U.S. dollars) by representative farm size.

<u>Farm Size Acres</u>	<u>Net Family Income</u>	<u>Per Capita<sup>(2)</sup> Income</u>
3.5		
3.5	\$232	\$33
8.0	\$451	\$64
15.0	\$1130	\$161
28.0	\$1512	\$216

- 
- (1) The Polder, which represents about one-third of the Project lands, is only affected marginally by proposed capital improvements. Technical assistance in areas such as improved seeds, adaptive research, extension and on-farm development will, however, be extended to the Polder.
- (2) Assumes seven members per family. Statistics available for the region indicate family size ranges from five to ten members.

Health, nutrition, and education conditions are generally inadequate, as discussed in Annex IV.

## 2. Role of Women

The Government of Guyana is committed to a policy of increasing and strengthening the role of women in developing the country's productive capacity. With a relatively small population (estimated at 770,000 and a large unexploited resource base, the GOG has recognized the need to utilize all available human resources.

The proposed Project, by increasing the amount of land under irrigation and thereby increasing cropping intensity, will result in an increased demand for family labor. Women are expected to share equally in meeting new labor requirements, thus maximizing disposable income available to the family. The East Indian background of the majority of Project beneficiaries is one that emphasizes the extended family as a cohesive economic unit, and all members are expected to participate.

In addition, increased family income will allow Project area families to invest in labor saving home equipment - refrigeration, etc..... which will serve to "free up" time that women must currently devote to traditional household duties.

## E. Environmental Assessment

An Impact Identification and Evaluation was prepared on the Project in April, 1978, by a consultant from Island Resources Foundation, Inc. in conjunction with the Environmental Advisor of the Latin America Bureau. (See Annex III, Exhibit 1).

The IEE resulted in a finding of no significant impact leading to a recommendation of a negative determination.

PART V IMPLEMENTATION ARRANGEMENTS

A. Project Organization and Implementation

1. Project Organization

The Ministry of Agriculture (MAG) will be the executing agency for the project and will have responsibility for all the principal Project activities.

The MAG will appoint co-Project Managers selected from the Hydraulics Division and the GRB. The Hydraulics Division representative will be responsible for the irrigation and drainage and other civil works, while the GRB representative's responsibility will be to assure coordination of land preparation and harvesting with irrigation schedules, to increase the use of improved varieties, to facilitate the availability of credit, seed and inputs for the farmers and to generally improve the standards of GRBs operations. The co-Project Managers will have authority to supervise and manage field activities and operations and, specifically, to coordinate the participation of the various Divisions and Boards operating in the project area. The co-Project Managers will be under the authority of the Minister of Agriculture and their appointment will provide administrative authority for operation and management of the global Project. Their authority will extend to the three project units (Frontlands, Polder, Block III). The Project Managers will work closely with the consultants during the project implementation period. Local staff requirements to be provided by Government for administration, engineering and supervision of the project and for agricultural development are presented in Annex III Exhibit 6.

A Project Engineer will be appointed by the Hydraulics Division and will work with the consultants and represent the Division on technical matters during the implementation period and, following completion of construction will supervise operation and maintenance (O & M) for the three Project units, particularly for scheduling the operation of pumping plants and delivery of water as required to the Project areas. The Project Engineer will also supervise overall maintenance activities and the two District Engineers now located at Whim and Benab, who are responsible for O & M in the Polder and Block III respectively. The Station at Whim also performs a limited amount of work in the Frontlands. These two engineers with their staffs and equipment will continue to operate as at present; however,

the O & M facilities will be expanded and improved through A.I.D. financing under the Project.

The Project components for which the Hydraulics Division and the GRB will be responsible are as follows:

a. Hydraulics Division - The Hydraulics Division will have direct responsibility for engineering planning, construction of civil works, and operation and maintenance of works, tasks which this division is presently fulfilling on other projects in the country as well as on existing works in the Project area. The Hydraulics Division will be assisted in implementing the drainage and irrigation components of the project by a team of consultants. The Hydraulics Division will appoint a Project Engineer as its official representative on the project and provide the necessary support staff to work with the engineering consultants on investigations and surveys, planning and design, and supervision of construction. The Hydraulic Division project designee will represent the Ministry for management of the engineering and construction phases of the project and serve as "Contract Engineer" for the administration of construction contracts.

b. The Guyana Rice Board (GRB) - The GRB is a semi-autonomous organization which exercises considerable independence in its budgetary and physical operations, but which is part of MAG and comes under the supervision of the Minister of Agriculture. A Project manager for the farm production and marketing components will be designated to supervise implementation of those elements, and to coordinate activities with the Hydraulics Division. The activities of the GRB under the Project will include: an agricultural credit program to supply fertilizers, chemicals, and other inputs to rice farmers (these inputs are not loan or grant financed); machinery services for land preparation and harvesting from their machinery pool; drying, storage and milling of rice; a research program for varietal improvement; increased production of foundation seed for supply of pure line seed to farmers; technical assistance for pest and disease control and water management; introduction of improved varieties and production practices; cleaning, grading, blending and packaging of rice for both export and local consumption; and the marketing of all milled rice, except that retained by farmers for their own use.

c. Extension Division - This Division of the Agriculture Department in MAG, will have responsibility for the extension and training programs on the Project and for the

agricultural research program for all non-rice food crop production.(1) The Extension Division of MAg is basically concerned with research and technical assistance and distribution of seeds and fertilizers for crops other than rice and with training programs for farmers. At present the Division has a Senior Agricultural Officer serving the East Berbice region and an Agricultural Officer with three assistants working in the Polder. The extension and research programs of the Project will be patterned after similar programs now underway on the Tapakuma project which are proving to be effective. Since Guyana does not have a national extension service at present, the main task of the Extension Division will be to train extension workers and create a permanent extension unit to serve the area. This unit will become a part of the National Extension Service when it is established, but there is need to provide this assistance to farmers during the course of the Project if the objectives and goals are to be met. This training program will be coordinated with the rural training center to be established in the Polder under a World Bank-financed Education Project and the National Agricultural Extension In-service Training and Communications Center to be established under the MAg.

d. Coordinating Committee - A Coordinating Committee composed of senior officials from the GRB, Hydraulics Division, Land Development Division, MAg Extension Department, Agricultural Cooperative Development Bank, and three farmer delegates (one from each of the three Project sub-areas), will be appointed to coordinate the activities of the Project, monitor progress and to link the findings with their respective departments, and to discuss farmer concerns.

## 2. Project Implementation

### a. Civil Works

A team of consultants from either local or foreign firms will be contracted to perform the engineering work required to implement the global project including surveys, site investigations, technical studies, planning and final designs, construction drawings, specifications and tender documents and to supervise construction. This team will be

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(1) The MAg staff will operate under the GRB Project Manager for purposes of Project implementation.

supported by local staff supplied by the Hydraulics Division and will relate directly to the Hydraulics Division Project Manager. The construction of major project works will be by contract, most likely a foreign contractor with local firms as sub-contractors.

b. Production and Marketing Services

A team of consultants, either forming part of the consultant engineer contract through a consortium, or under a separate contract, will provide technical assistance in seed research and production, water management, on-farm development (land preparation, equipment, maintenance), and extension.

The production consultant team will relate directly with the GRB which will coordinate its activities with the MAG Extension Division in implementing the program. The GRB will supervise the use of farm machinery provided under the Project, the seed research and production program, the training of extension agents, water management, construction of drying and storage facilities and other farm production related activities.

Should the GOG determine that a single contract to provide all required services is the most appropriate method, a team leader will be named by the contractor to work directly with the co-Project Manager for civil works on all aspects of Project implementation. A deputy team leader will be selected from among the farm production related technical assistance team to deal directly with the GRB co-Project Manager for implementation of farm development, seed research and production, extension and marketing.

Should the GOG decide to contract with two firms, a team leader will be named from each, to coordinate their activities -- one responsible to the Hydraulics Division and the other to the GRB.

3. Relationship between AID and the World Bank

1. General

Major responsibility for monitoring Project implementation rests with the World Bank as both major donor and coordinator of donor contributions to the project. A.I.D. will participate with other donors in the Bank's periodic

supervision missions for review of the global project and will receive other donors supervision reports and periodic progress reports as prepared by the borrower. However with regard to the following A.I.D. financed project elements, a memorandum of understanding will be signed by A.I.D. and the World Bank specifying the responsibilities of each institution.

1. A & E Services

The global project has been divided by negotiation with the IBRD such that the IBRD finances all civil works including related procurement, and A.I.D. finances all services, procurement of equipment and materials to support agricultural development and consulting services, and construction of drying and storage facilities for the GRB, and O & M facilities for the Hydraulics Division. The A.I.D. financed engineering consultant will be responsible for engineering services for the global project and therefore, a definition of the limits of responsibilities for which A.I.D. and the IBRD will have jurisdiction will be needed.

The IBRD and A.I.D. will enter into a memorandum of understanding which will define limits of monitoring by A.I.D., reporting responsibilities of the consultant, and approval reservations. A.I.D. procurement regulations will apply to A.I.D. financed equipment and materials while both A.I.D. and IBRD will approve selection of the engineering consulting firm or firms. IBRD financed procurement will be subject to IBRD procurement regulations.

Plans, specifications and bidding documents for A.I.D. financed construction will be subject to A.I.D. approval. Plans, specifications and bidding documents for other donor financed construction components will be subject to IBRD approvals and A.I.D. will not be involved therein. Approval procedures for engineering consultant payment vouchers will be agreed upon in the memorandum and monitoring thereof will be minimal consistent with good fiscal practice.

Any changes in the scope of work, contract time or financing of the consultant will be subject to A.I.D. approval. The IBRD will also approve scope of work and contract time changes.

The consultant will be responsible to the Ministry of Agriculture with day to day liaison being handled through

the Hydraulics Division's Project Engineer for technical matters and its Project Manager for other matters of consequence.

## 2. Production Services

For Production Services and Marketing Services, components of the Project, A.I.D. through its Mission Project Committee will have sole responsibility for assuring compliance with A.I.D. regulations with regard to procurement and shipping of A.I.D. commodities, approval of the contract award for technical assistance, monitoring of the operation of Project facilities and monitoring the effects of Project implementation and progress toward purpose achievement which will also serve as the basis for project evaluation.

### C. Schedule of Major Events

The major events taking place during the Project Implementation period were reviewed by the Project Team and have been described below. The major overall loan and grant events are as follows: The Project Paper will be reviewed June 1 and the loan and grant authorized by June 15. Both loan and grant agreements will be signed by August 15. The conditions precedent should be met by September 30, 1978. The loan/grant will disburse over the next 5½ years until the TDD of March 31, 1984.

The major Project events are outlined in Annex III Exhibit 7(b) and are as follows:

The RFP for the TA contract should be issued September 15, 1978 with a contract negotiated and signed by February 1, 1979. The first personnel should arrive by February 15, 1979. These would include: Project Team Leader, Planning Engineer, Surveys Engineer and First Design Engineer. Technical assistance personnel to support production activities will arrive in the first quarter of FY 80.

### D. USAID Monitoring Requirements

Monitoring of the Project will be performed by a Mission Project Committee whose members will have the following responsibilities:

- a. The primary monitoring task will reside with

the Project Manager who will be the Rural Development Officer of the Mission. His principal responsibilities will include, but not be limited, to the following agriculture production elements: (i) maintaining contact with the MAg Project officials and Ministry personnel; (ii) maintaining contact with the technical assistance team; (iii) anticipating problems and ensuring timely action by A.I.D. and, to all extent possible, MAg personnel.

b. The Capital Development Officer will play a strong supporting role in: (i) monitoring provisions of the loan and grant agreements; (ii) assisting in procurement; and (iii) assuring that overall Project objectives are met.

c. The Mission Engineer will be responsible for monitoring progress on the A.I.D.-financed construction elements of the Project to ensure timely and satisfactory performance.

d. The Office of the Controller will be responsible for assisting the borrower in: (i) establishing disbursement procedures; (ii) setting up adequate loan accounting procedures; and (iii) reviewing contracts and financial documents to ensure conformity with A.I.D. procedures and regulations.

#### E. Procurement Procedures

All equipment and material procured with A.I.D. loan and grant funds will have as their source and origin Geographic Code 941 countries and/or Guyana.

The Project calls for a substantial technical assistance effort of 666 man months for which the GOG has expressed a desire to enter into a single contract.<sup>(1)</sup> In addition there will be numerous item procurements of farm development equipment, vehicles, supplies, laboratory equipment and rice drying equipment. These procurements will be conducted in accordance with standard A.I.D. procedures as set

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(1) The alternative would be two separate contracts - one for the civil works elements and the other for related agricultural development activities. The GOG will examine both alternatives prior to making a final decision.

out in Handbook II.

There will be several A.I.D. financed construction components, including:

- (1) seed processing and testing facility;
- (2) one combined project headquarters and operation and maintenance station;
- (3) two O & M stations;
- (4) rice storage and drying facility; and
- (5) expansion of machinery shelter.

U.S. firms would probably not be interested because of the magnitude of the jobs - approximately U.S.\$ 1.3 million; therefore this work will be carried out by the Hydraulics Division and the GRB under force account. (See Annex III Exhibit 7(b) for procurement schedule).

#### F. Disbursement Procedure

No deviation from standard A.I.D. disbursement procedures is anticipated. Materials and equipment procured in the United States or other Code 941 countries, as well as the dollar cost of the technical assistance contract, will be paid through standard letter of commitment procedure. Disbursement for local currency costs will be in accordance with procedures established by the Mission for other loans. It is anticipated that advances into a revolving fund will be necessary.

#### G. Evaluation

Monitoring will be conducted on a continuing basis by the Project Committee. This will be supplemented by annual evaluations. The first annual review, to be held 12 months from the date of loan signature, will focus on the initial implementation phase of the Project. It will involve actions and recommendations to alleviate problems which are contributing to getting Project inputs into place in a timely manner. The second annual evaluation will assess progress in achieving the major institutional development outputs, i.e. training for water management and improved delivery of farm inputs, on-farm

development and equipment maintenance. The third and fourth evaluations will concentrate on the overall purpose of the Project as well as progress in achieving the outputs.

H. Reports

The submission of the following reports will be required from the MAg:

- a. Status reports to be presented quarterly.
- b. Shipping reports to be presented quarterly.

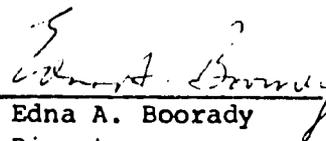
MISSION DIRECTOR'S CERTIFICATION

GUYANA: SMALL FARM DEVELOPMENT - BLACK BUSH REGION

I certify that the Government has the capability required to implement the proposed loan, maintain and utilize the referenced Project, taking into account the following factors:

- A. All projects previously financed by the U.S. Government either have been, or are being, implemented, used and maintained.
- B. This Project will provide substantial technical assistance and training directed toward improving maintenance and utilization of existing facilities and equipment.
- C. Government recognizes the value of maintenance of facilities and is budgeting funds for this purpose.

May 6, 1978  
Date

  
Edna A. Boorady

Director  
USAID/Guyana





Director:	<input checked="" type="checkbox"/>
Asst. Director:	<input checked="" type="checkbox"/>
Exec. Off.:	<input checked="" type="checkbox"/>
Controller:	<input checked="" type="checkbox"/>
Program. Off.:	<input checked="" type="checkbox"/>

8th May, 1978

Ref. No. EcD: 13/2

Miss Edna Boorady,  
Director,  
United States Agency for  
International Development,  
65, Main Street,  
Georgetown.

Annex I  
Exhibit 2  
Page 1 of 1

*BLACK BUSH*  
*[Signature]*

Dear Miss Boorady,

LOAN APPLICATION

On behalf of the Government of Guyana, I hereby apply to the United States Agency for International Development for a development grant of approximately One Million, Four Hundred Thousand U.S. Dollars (US\$1,400,000) and a development loan of approximately Seven Million, Five Hundred Thousand U.S. Dollars (US\$7,500,000) to participate in the financing of a multi-donor Project that will: (1) finance works to improve and increase the water supply; (2) rehabilitate and improve irrigation and drainage systems; (3) improve on-farm development; and (4) improve agricultural supporting services and other facilities in order to increase rice production in the Black Bush Region.

....

The proposed Project is based on discussions among Government of Guyana officials, World Bank officials, and the AID Project Development Team using the findings of a Project Feasibility Study undertaken by Harza Engineering Company for the Ministry of Agriculture. The result of discussions between the AID Project Development Team and officials of the Ministry of Agriculture is contained in the attached Project summary dated April 28, 1978.

....

The total cost of these project components which are complementary to the civil works, and therefore eligible for joint AID - GOC financing amounts to Twelve Million, Nine Hundred Thousand U.S. Dollars. Project implementation is estimated to require five and one half years. Our understanding is that the Agency for International Development is prepared to consider financing Eight Million, Nine Hundred Thousand U.S. Dollars (US\$8,900,000) of the total project cost. The Government of Guyana will contribute Four Million U.S. Dollars (US\$4,000,000) from its own funds toward the cost of the Project. The Government's contributions will be met from existing and new budgeting allocations. The components of the Project are contained in the attached Project Summary and Financial Plan.

It is our understanding that the loan will be for 20 years including a 10 year grace period, with interest at 2% per annum during the grace period and 3% per annum thereafter.

Very truly yours,

*[Signature]*  
S.S. Naraine  
Minister of Economic Development  
and Co-operatives (Ag.)

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Statutory Checklist6C(2) - PROJECT CHECKLIST

Listed below are, first, statutory criteria applicable generally to projects with FAA funds, and then project criteria applicable to individual fund sources: Development Assistance (with a sub-category for criteria applicable only to loans); and Security Supporting Assistance funds.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? IDENTIFY. HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT?

I. GENERAL CRITERIA FOR PROJECT.1. App. Unnumbered; FAA Sec. 653(b)

(a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project;  
(b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than \$1 million over that figure plus 10%)?

This project was not originally contemplated for funding in FY 78. A special advice of program change has been sent to each of the Committees advising them of the project.

2. FAA Sec. 611(a)(1). Prior to obligation in excess of \$100,000, will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

Preliminary engineering, financial and other plans have been developed. Feasibility studies were prepared by Harza Engineering Inc. and financed by IBRD.

3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?

No further legislative action will be required for accomplishment of the purposes of the loan, (with exception of ratification of the Loan Agreement by Parliament). There is reasonable expectation that Parliament will ratify the Loan Agreement.

4. FAA Sec. 611(b); App. Sec. 101. If for water or water-related land resource construction, has project met the standards and criteria as per Memorandum of the President dated Sept. 5, 1973 (replaces Memorandum of May 15, 1962; see Fed. Register, Vol 38, No. 174, Part III, Sept. 10, 1973)?

Yes. Benefit-cost computation was conducted as part of the economic analysis, and the Project meets economic and financial tests.

5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed \$1 million, has Mission Director certified the country's capability effectively to maintain and utilize the project?

Mission Director has so certified.

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A.

6. FAA Sec. 209, 619. Is project susceptible of execution as part of regional or multi-lateral project? If so why is project not so executed? Information and conclusion whether assistance will encourage regional development programs. If assistance is for newly independent country, is it furnished through multi-lateral organizations or plans to the maximum extent appropriate?

Project is part of a multilateral effort including AID, World Bank, OPEC and IFAD

7. FAA Sec. 601(a); (and Sec. 201(f) for development loans). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.

The project through increased water supply and improved production and marketing services to small rice farmers will result in increased flow of international trade due to the magnitude of rice exported in Guyana. The Project will foster private initiative and competition among farmers and will improve the technical efficiency of industry, agriculture and commerce.

8. FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).

Portions of the loan will be earmarked for procurement of U.S. goods and services

9. FAA Sec. 612(b); Sec. 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized to meet the cost of contractual and other services.

The GOG has always agreed to meet the counterpart contributions on AID loans. The GOG will meet at least 25% of the project cost.

10. FAA Sec. 612(d). Does the U.S. own excess foreign currency and, if so, what arrangements have been made for its release?

NO.

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec. 102(c); Sec. 111; Sec. 281a. Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production, spreading investment out from cities to small towns and rural areas; and (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions?

The GOG emphasizes the use of cooperatives as a means to a better existence. It is anticipated that the rural poor will benefit from this project. The project will extend access to economy at local level, increase labor-intensive production, spread investment out from cities to small towns and rural areas.

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b. FAA Sec. 103, 103A, 104, 105, 106, 107. Is assistance being made available: [include only applicable paragraph -- e.g., a, b, etc. -- which corresponds to source of funds used. If more than one fund source is used for project, include relevant paragraph for each fund source.]

- (1) [103] for agriculture, rural development or nutrition; if so, extent to which activity is specifically designed to increase productivity and income of rural poor; [103A] if for agricultural research, is full account taken of needs of small farmers;
- (2) [104] for population planning or health; if so, extent to which activity extends low-cost, integrated delivery systems to provide health and family planning services, especially to rural areas and poor;
- (3) [105] for education, public administration, or human resources development; if so, extent to which activity strengthens nonformal education, makes formal education more relevant, especially for rural families and urban poor, or strengthens management capability of institutions enabling the poor to participate in development;
- (4) [106] for technical assistance, energy, research, reconstruction, and selected development problems; if so, extent activity is:
  - (a) technical cooperation and development, especially with U.S. private and voluntary, or regional and international development, organizations;
  - (b) to help alleviate energy problem;
  - (c) research into, and evaluation of, economic development processes and techniques;
  - (d) reconstruction after natural or manmade disaster;
  - (e) for special development problem, and to enable proper utilization of earlier U.S. infrastructure, etc., assistance;
  - (f) for programs of urban development, especially small labor-intensive enterprises, marketing systems, and financial or other institutions to help urban poor participate in economic and social development.

In conjunction with other donor activity this project will increase rice and other food crop production by small farmers in the project area, thus increasing their incomes. Since rice production is a small farmers activity in Guyana, research and other project elements take into full account the needs of the small farmer.

Not applicable.

Not applicable.

Not applicable.

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4.

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(5) [107] by grants for coordinated private effort to develop and disseminate intermediate technologies appropriate for developing countries.

Not applicable.

c. FAA Sec. 110(a); Sec. 208(e). Is the recipient country willing to contribute funds to the project, and in what manner has or will it provide assurances that it will provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been waived for a "relatively least-developed" country)?

Guyana will contribute U.S. \$4,000,000 to this project as stated in its application letter.

d. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing?

NO.

e. FAA Sec. 207; Sec. 113. Extent to which assistance reflects appropriate emphasis on: (1) encouraging development of democratic, economic, political, and social institutions; (2) self-help in meeting the country's food needs; (3) improving availability of trained worker-power in the country; (4) programs designed to meet the country's health needs; (5) other important areas of economic, political, and social development, including industry; free labor unions, cooperatives, and Voluntary Agencies; transportation and communication; planning and public administration; urban development, and modernization of existing laws; or (6) integrating women into the recipient country's national economy.

U.S. assistance in Guyana encourages development of trained personnel at the national level a program beginning in FY 79 will furnish a 3 year rural health and nutrition project which will reflect indirectly on population growth. Women are given equal opportunity to participate in programs that will improve the country's economy. The project will encourage self-help in meeting the country's food needs.

f. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.

The GOG program for development encompasses human resource training in specific fields of agriculture, management and natural resources.

6C(1) - COUNTRY CHECKLIST

Listed below are, first, statutory criteria applicable generally to FAA funds, and then criteria applicable to individual fund sources: Development Assistance and Security Supporting Assistance funds.

A. GENERAL CRITERIA FOR COUNTRY

1. FAA Sec. 116. Can it be demonstrated that contemplated assistance will directly benefit the needy? If not, has the Department of State determined that this government has engaged in consistent pattern of gross violations of internationally recognized human rights?  

The loan is aimed at improving the income of the small farmer by providing for the expansion and improvement of irrigation and drainage systems and the provision of production and marketing services.
2. FAA Sec. 481. Has it been determined that the government of recipient country has failed to take adequate steps to prevent narcotics drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully?  

The Government of Guyana has taken adequate steps to meet the requirements of Section 481.
3. FAA Sec. 620(a). Does recipient country furnish assistance to Cuba or fail to take appropriate steps to prevent ships or aircraft under its flag from carrying cargoes to or from Cuba?  

Guyana has a policy of cultural and economic cooperation with Cuba and has not furnished technical or economic assistance to Cuba. Guyanese ships and aircraft are not known to have carried cargoes to or from Cuba.
4. FAA Sec. 620(b). If assistance is to a government, has the Secretary of State determined that it is not controlled by the international Communist movement?  

The Secretary of State has determined that Guyana is not controlled by the International Communist Movement.
5. FAA Sec. 620(c). If assistance is to government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies and (b) debt is not denied or contested by such government?  

There is no evidence that such a situation exists.
6. FAA Sec. 620(e) (1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities?  

No such situation is known to exist.

A

7. FAA Sec. 620(f); App. Sec. 108. Is recipient country a Communist country? Will assistance be provided to the Democratic Republic of Vietnam (North Vietnam), South Vietnam, Cambodia or Laos? NO
  
8. FAA Sec. 620(i). Is recipient country in any way involved in (a) subversion of, or military aggression against, the United States or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression? NO
  
9. FAA Sec. 620(j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction, by mob action, of U.S. property? Guyana provides adequate protection for U.S. property.
  
10. FAA Sec. 620(l). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, inconvertibility or confiscation, has the AID Administrator within the past year considered denying assistance to such government for this reason? Guaranty agreement is in effect.
  
11. FAA Sec. 620(o); Fishermen's Protective Act, Sec. 5. If country has seized, or imposed any penalty or sanction against, any U.S. fishing activities in international waters,
  - a. has any deduction required by Fishermen's Protective Act been made? Guyana has taken no such action.
  - b. has complete denial of assistance been considered by AID Administrator? Not applicable.
  
12. FAA Sec. 620(q); App. Sec. 504. (a) Is the Government of the recipient country in default on interest or principal of any AID loan to the country? (b) Is country in default exceeding one year on interest or principal on U.S. loan under program for which App. Act appropriates funds, unless debt was earlier disputed, or appropriate steps taken to cure default? No denial of assistance has been considered.
  
13. FAA Sec. 620(s). What percentage of country budget is for military expenditures? How much of foreign exchange resources spent on military equipment? How much spent for the purchase of sophisticated weapons systems? (Consideration of these points is to be coordinated with the Bureau for Program and Policy Coordination, Regional Coordinators and Military Assistance Staff (PPC/RC).) Guyana is not in default on any AID loan.
  
13. FAA Sec. 620(s). What percentage of country budget is for military expenditures? How much of foreign exchange resources spent on military equipment? How much spent for the purchase of sophisticated weapons systems? (Consideration of these points is to be coordinated with the Bureau for Program and Policy Coordination, Regional Coordinators and Military Assistance Staff (PPC/RC).) Appropriately 6% of the GOG budget is allocated for military expenditure. Of this over half of the expenditure is allocated for personnel. No sophisticated weaponry is scheduled for procurement.

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g. FAA Sec. 201(b)(2)-(4) and -(8); Sec. 201(e); Sec. 211(a)(1)-(3) and -(8). Does the activity give reasonable promise of contributing to the development: of economic resources, or to the increase of productive capacities and self-sustaining economic growth; or of educational or other institutions directed toward social progress? Is it related to and consistent with other development activities, and will it contribute to realizable long-range objectives? And does project paper provide information and conclusion on an activity's economic and technical soundness?

This project is expected to give incentive and provide support services for increased production and facilitate the growth of social progress in the area.

h. FAA Sec. 201(b)(6); Sec. 211(a)(5), (6). Information and conclusion on possible effects of the assistance on U.S. economy, with special reference to areas of substantial labor surplus, and extent to which U.S. commodities and assistance are furnished in a manner consistent with improving or safeguarding the U.S. balance-of-payments position.

The foreign exchange component of the project is U.S.\$7.070 million. The loan will have no adverse effects on the U.S. economy.

2. Development Assistance Project Criteria (Loans only)

a. FAA Sec. 201(b)(1). Information and conclusion on availability of financing from other free-world sources, including private sources within U.S.

No other free world sources of financing are available.

b. FAA Sec. 201(b)(2); 201(d). Information and conclusion on (1) capacity of the country to repay the loan, including reasonableness of repayment prospects, and (2) reasonableness and legality (under laws of country and U.S.) of lending and relending terms of the loan.

Guyana has the capacity to repay the loan. The proposed terms are considered legal and reasonable by both Guyana and the U.S.

c. FAA Sec. 201(e). If loan is not made pursuant to a multilateral plan, and the amount of the loan exceeds \$100,000, has country submitted to AID an application for such funds together with assurances to indicate that funds will be used in an economically and technically sound manner?

Letter of Application has been received from the GOG.

d. FAA Sec. 201(f). Does project paper describe how project will promote the country's economic development taking into account the country's human and material resources requirements and relationship between ultimate objectives of the project and overall economic development?

Yes.

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8.

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e. FAA Sec. 202(a). Total amount of money under loan which is going directly to private enterprise, is going to intermediate credit institutions or other borrowers for use by private enterprise, is being used to finance imports from private sources, or is otherwise being used to finance procurements from private sources?

Equipment

U.S. consultants

f. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete in the U.S. with U.S. enterprise, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?

3. Project Criteria Solely for Security Supporting Assistance

FAA Sec. 531. How will this assistance support promote economic or political stability?

increased rice production for export will have significant positive balance of payment effects

4. Additional Criteria for Alliance for Progress

[Note: Alliance for Progress projects should add the following two items to a project checklist.]

a. FAA Sec. 251(b)(1), - (8). Does assistance take into account principles of the Act of Bogota and the Charter of Punta del Este, and to what extent will the activity contribute to the economic or political integration of Latin America?

Not applicable.

b. FAA Sec. 251(b)(8); 251(h). For loans, has there been taken into account the effort made by recipient nation to repatriate capital invested in other countries by their own citizens? Is loan consistent with the findings and recommendations of the Inter-American Committee for the Alliance for Progress (now "CEPCIES," the Permanent Executive Committee of the OAS) in its annual review of national development activities?

Not applicable.

A

14. FAA Sec. 620(t). Has the country severed diplomatic relations with the United States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption?

Guyana has not severed diplomatic relations with the U.S.

15. FAA Sec. 620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget?

Guyana is not delinquent in its U.N. obligations.

16. FAA Sec. 620A. Has the country granted sanctuary from prosecution to any individual or group which has committed an act of international terrorism?

NO

17. FAA Sec. 666. Does the country object, on basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. there to carry out economic development program under FAA?

NO

18. FAA Sec. 669. Has the country delivered or received nuclear reprocessing or enrichment equipment, materials or technology, without specified arrangements on safeguards, etc.?

NO

19. FAA Sec. 901. Has the country denied its citizens the right or opportunity to emigrate?

NO

## B. FUNDING CRITERIA FOR COUNTRY

### 1. Development Assistance Country Criteria

- a. FAA Sec. 102(c), (d). Have criteria been established, and taken into account, to assess commitment and progress of country in effectively involving the poor in development, on such indexes as: (1) small-farm labor intensive agriculture, (2) reduced infant mortality, (3) population growth, (4) equality of income distribution, and (5) unemployment.

The GOG has modernized its rice industry with a U.S. \$12.9 million A.I.D. Loan, primarily in rice storage and distribution. GOG is also pursuing extensive development in the Intermediate Savannah Area (Ituni/Ebini/Kwakwani), and with IBRD financing will implement a major land rehabilitation scheme.

- b. FAA Sec. 201(b)(5), (7) & (8); Sec. 208; 211(a)(4), (7). Describe extent to which country is:

- (1) Making appropriate efforts to increase food production and improve means for food storage and distribution.
- (2) Creating a favorable climate for foreign and domestic private enterprise and investment.

GOG places high priority on agriculture development. An IDB Foodcrop Loan now under review for funding in the 2nd Quarter of FY 78 will streamline the agro-based economy with particular emphasis on the poor rural/urban communities, contributing to increased production.

Guyana's stated economic policy is to own and control its natural resources. This has resulted in curtailment of foreign investment in 'natural resource' enterprises. The GOG's policy of cooperative socialism leaves some room for private sector involvement.

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- (3) Increasing the public's role in the developmental process. The GOG owns 70% of the national economy.
  - (4) (a) Allocating available budgetary resources to development. Guyana allocated approximately 70% of its national budget to development activity.  
 (b) Diverting such resources for unnecessary military expenditure and intervention in affairs of other free and independent nations. Guyana's allocation for defence is minimal and does not intervene in other countries affairs.
  - (5) Making economic, social, and political reforms such as tax collection improvements and changes in land tenure arrangements, and making progress toward respect for the rule of law, freedom of expression and of the press, and recognizing the importance of individual freedom, initiative, and private enterprise. GOG has streamlined its tax collection system with the help of A.I.D. Technical Assistance. The private sector is disciplined by adherence to the GOG's development programs. Opposition parties are allowed freedom of the press. GOG in general respects the rule of law.
  - (6) Otherwise responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures. The GOG has encouraged Guyanese in the spirit of self-help, and much has been accomplished through these programs - notably in the rural areas.
- c. FAA Sec. 201(b), 211(a). Is the country among the 20 countries in which development assistance loans may be made in this fiscal year, or among the 40 in which development assistance grants (other than for self-help projects) may be made? Development loans and grants will be made available to the GOG.
- d. FAA Sec. 115. Will country be furnished, in same fiscal year, either security supporting assistance, or Middle East peace funds? If so, is assistance for population programs, humanitarian and through international organizations, or regional programs? NO.
2. Security Supporting Assistance Country Criteria
- a. FAA Sec. 507B. Has the country engaged in a consistent pattern of gross violations of internationally recognized human rights? Is program in accordance with policy of this Section? Not applicable.
  - b. FAA Sec. 531. Is the Assistance to be furnished to a friendly country, organization, or body eligible to receive assistance? Not applicable.
  - c. FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made? Not applicable.

6C(3) - STANDARD ITEM CHECKLIST

Listed below are statutory items which normally will be covered routinely in those provisions of an assistance agreement dealing with its implementation, or covered in the agreement by exclusion (as where certain uses of funds are permitted, but other uses not).

These items are arranged under the general headings of (A) Procurement, (B) Construction, and (C) Other Restrictions.

A. Procurement

1. FAA Sec. 602. Are there arrangements to permit U.S. small business to participate equitably in the furnishing of goods and services financed? Yes.
2. FAA Sec. 604(a). Will all commodity procurement financed be from the U.S. except as otherwise determined by the President or under delegation from him? Yes.
3. FAA Sec. 604(d). If the cooperating country discriminates against U.S. marine insurance companies, will agreement require that marine insurance be placed in the U.S. on commodities financed? Cooperating countries does not discriminate against U.S. marine companies.
4. FAA Sec. 604(e). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity? Not applicable.
5. FAA Sec. 603(a). Will U.S. Government excess personal property be utilized wherever practicable in lieu of the procurement of new items? Yes.
6. MMA Sec. 901(b). (a) Compliance with requirement that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S.-flag commercial vessels to the extent that such vessels are available at fair and reasonable rates. Yes.
7. FAA Sec. 621. If technical assistance is financed, will such assistance be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis? If the facilities of other Federal agencies will be utilized, Yes.

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are they particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs?

8. International Air Transport, Fair Competitive Practices Act, 1974

Yes.

If air transportation of persons or property is financed on grant basis, will provision be made that U.S.-flag carriers will be utilized to the extent such service is available?

B. Construction

1. FAA Sec. 601(d). If a capital (e.g., construction) project, are engineering and professional services of U.S. firms and their affiliates to be used to the maximum extent consistent with the national interest?

Yes.

2. FAA Sec. 611(c). If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable?

Yes.

3. FAA Sec. 610(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed \$100 million?

Yes.

C. Other Restrictions

1. FAA Sec. 201(d). If development loan, is interest rate at least 2% per annum during grace period and at least 3% per annum thereafter?

Yes.

2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights?

Not applicable.

3. FAA Sec. 620(h). Do arrangements preclude promoting or assisting the foreign aid projects or activities of Communist-Bloc countries, contrary to the best interests of the U.S.?

The project will not promote or assist foreign aid projects/activities of Communist-Bloc countries.

4. FAA Sec. 636(i). Is financing not permitted to be used, without waiver, for purchase, long-term lease, or exchange of motor vehicle manufactured outside the U.S. or guaranty of such transaction?

Yes.

5. Will arrangements preclude use of financing:
- a. FAA Sec. 114. to pay for performance of abortions or to motivate or coerce persons to practice abortions? Yes.
  - b. FAA Sec. 620(g). to compensate owners for expropriated nationalized property? Yes.
  - c. FAA Sec. 660. to finance police training or other law enforcement assistance, except for narcotics programs? Yes.
  - d. FAA Sec. 662. for CIA activities? Yes.
  - e. App. Sec. 103. to pay pensions, etc., for military personnel? Yes.
  - f. App. Sec. 106. to pay U.N. assessments? Yes.
  - g. App. Sec. 107. to carry out provisions of FAA Sections 209(d) and 251(h)? (transfer to multilateral organization for lending). Yes.
  - h. App. Sec. 501. to be used for publicity or propaganda purposes within U.S. not authorized by Congress? Yes.

A.I.D. Loan No. 504-0075

PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS

GUYANA: Small Farm Development - Black Bush Region.

Project Number: 504-0075

Pursuant to the authority vested in the Assistant Administrator for Latin America, Agency for International Development ("A.I.D."), by the Foreign Assistance Act 1961, as amended (the "Act"), and the delegations of authority issued thereunder, I hereby authorize pursuant to Part 1, Chapter 1, Section 103 of the Act and in furtherance of the Alliance for Progress a loan in an amount not to exceed Seven Million, Five Hundred Thousand United States Dollars (\$7,500,000) (the "Loan") and a grant in an amount not to exceed One Million, Four Hundred Thousand United States Dollars (\$1,400,000) (the "Grant") to the Republic of Guyana ("Cooperating Country") to assist in financing certain foreign exchange and local currency costs of goods and services for a program to increase the production of rice and food crops in the Black Bush Region of Guyana and to provide an integral package of services, complementary to the civil works, which will be directed to design and supervision consultants, research needs, technical assistance in related production services, marketing services and extension. The entire amount of the Loan funding herein authorized for the Project will be obligated when the Project Agreement between A.I.D. and the Cooperating Country (the "Project Agreement") is executed.

I approve the total level of A.I.D. appropriated funding planned for the project of not to exceed Eight Million, Nine Hundred Thousand United States Dollars (\$8,900,000), of which \$7,500,000 will be Loan funded and \$1,400,000 Grant funded, during the period FY 1980 through FY 1984. I approve obligations during that period of Grant funding up to \$1,400,000 subject to the availability of funds in accordance with A.I.D. allotment procedures.

I hereby authorize the negotiation and execution of the Project Agreement by the officer to whom such authority has been delegated in accordance with A.I.D. regulations and delegations of authority, subject to the following essential terms, covenants and major conditions together with such other terms and conditions as A.I.D. may deem appropriate:

1. Interest Rate and Terms of Repayment.

The Cooperating Country shall repay the Loan to A.I.D. in United States Dollars within twenty (20) years from the date of first disbursement of the Loan, including a grace period of not to exceed ten (10) years. The Cooperating Country shall pay to A.I.D. in United States Dollars interest from the date of first disbursement of the Loan at the rate of (a) two percent (2%) per annum during the first ten (10) years, and (b) three percent (3%) per annum thereafter on the outstanding disbursed balance of the Loan and on any due and unpaid interest accrued thereon.

11. Source and Origin of Goods and Services

- (i) Except for ocean shipping, goods and services financed by A.I.D. for the Project under the Loan shall have their source and origin in countries included in A.I.D. Geographic Code 941 or in the Cooperating Country except as A.I.D. may otherwise agree in writing. Ocean shipping financed for the Project shall be procured in any eligible country except the Cooperating Country.
- (ii) Goods and services financed by A.I.D. for the Project under the Grant shall have their source and origin in the United States except as A.I.D. may otherwise agree in writing.

111. Conditions Precedent to Initial Disbursement

Prior to any disbursement or to the issuance of any commitment documents under the Project Agreement, the Cooperating Country shall furnish to A.I.D., in form and substance satisfactory to A.I.D.

- (i) A legal opinion of the Attorney General of Guyana or other legal counsel acceptable to A.I.D. to the effect that the Project Agreement has been duly authorized and/or ratified by the Cooperating Country in accordance with all its terms;
- (ii) A certified statement of the name of the person or persons authorized under the Project Agreement to act as the Cooperating Country's representative under the Project Agreement, with authenticated specimen signatures of said person or persons.
- (iii) The Government of Guyana shall furnish to A.I.D. in form and substance satisfactory to A.I.D., evidence that external financing in the amount of Thirty-six Million United States Dollars (\$36,000,000) has been formally committed to the Black Bush Project.
- (iv) A fully detailed, time-phased implementation plan satisfactory in form and substance to A.I.D. covering each component of this Project showing as appropriate its inter-relationship with and priority relative to other components.
- (v) Evidence from Borrower that a coordinating committee comprised of representatives of the principal government agencies with responsibility for Project implementation has been established. In addition to GOG representatives the committee will include farmer representatives and will be responsible for monitoring progress during Project implementation.

IV. Conditions Precedent to Subsequent Disbursement

- (i) Prior to any disbursement or the issuance of any commitment documents under the Project Agreement to finance technical assistance, the Cooperating Country shall furnish to A.I.D., in form and substance satisfactory to A.I.D.:
  - (1) A technical assistance plan indicating for each advisor requested brief terms of reference, as well as Ministry of Agriculture counterpart and timing.
  - (2) A preliminary implementation plan for establishing an Extension Training Program, Land Preparation Training Program, and Equipment Maintenance Program.
- (ii) Prior to any disbursement or the issuance of any commitment documents under the Project Agreement to finance equipment, including spare parts, the Cooperating Country shall furnish to A.I.D. in form and substance satisfactory to A.I.D. a list of equipment and spare parts.
- (iii) Prior to any disbursement or the issuance of any commitment documents under the Project Agreement to finance any expenditure for the Seed Production and Testing Laboratory, the Cooperating Country shall furnish to A.I.D. in form and substance satisfactory to A.I.D. an implementation plan indicating the research program it is proposing to undertake.

V. Covenants

- (i) The Government covenants that all commodities procured under the Loan will be used exclusively in the Project area during Project implementation.
- (ii) The Government covenants that an adequate level of production credits and machinery services for rice and other food crop production would be maintained in the Project area to meet the requirements consistent with a higher intensity of land cultivation and the introduction of high yielding rice varieties.
- (iii) The Government covenants that priority will be given to the Frontlands for use of the farm machinery to be provided under the Project.
- (iv) The Government covenants to assign appropriate personnel and sufficient operating budgets to the production technical consultants (rice and other food crops) as counterparts and trainees so that programs developed can be institutionalized and improved over time.
- (v) The Government covenants to solicit from IFAD or other International Agencies one specialist to assist in the development of a cost recovery system.
- (vi) The Government covenants to solicit outside assistance to review and improve the GRB's accounting system and financial management, so as to provide detailed and up-to-date data to GRB management in order to assess the financial results and implications of its policies and determine, from time to time, the steps necessary for ensuring its financial viability and operating efficiency.
- (vii) The Government covenants to provide satisfactory assurances through the GOG's existing bonding requirement that personnel trained overseas will return to serve in Guyana for a specified period of time commensurate with the amount of training provided.

\_\_\_\_\_  
Assistant Administrator

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Date

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DAEC REVIEW OF GUYANA: SMALL FARM DEVELOPMENT

(BLACKBUSH) PID (April 27, 1978)

Project Response

1. Subject PID was reviewed and approved for further development. The following concerns were raised in the DAEC and should be addressed in the PP.

2. Overall development of rice industry. The PP should discuss the GOG plans for developing the rice industry in Guyana, discuss any other major existing or proposed projects, and show how the proposed project fits into the GOG plans.

See Part II

3. GOG capacity. Concern was expressed over the capacity (Financial and Human Resources) of the GOG to carry out another major development project. The PP should indicate clearly what costs will be funded by the Government and how they will be financed (Budget, other donor, etc.). In addition, a review of the counterpart requirements of the major existing projects should be included in the PP. The PP should clearly establish that staff of existing services (Extension Marketing, Credit) are not being diverted to the proposed project to such a degree as to leave national institutions incapable of providing existing services in other areas of the country. In addition, the professional capacity, staff and budget of the major operating divisions of the major institutions

See Part III F and  
Part IV B

Project Response

should be reviewed to ascertain their capacity.

4. Environment. Although the World Bank has looked at some environmental issues it was decided that a more thorough review was required. It was agreed that an IEE would be prepared by an outside contractor to be reviewed by the Bureau Environmental Coordinator. Should further issues be identified it might be necessary to proceed immediately to a full environmental assessment. The results of the IEE or EA would be incorporated in the PP.

See Part IV E and  
Annex III, Exhibit 1

5. Economic Viability. The DAEC questioned the apparently low magnitude of net benefits compared to cost and asked that a project team recalculate the benefit/cost analysis and include it in the PP.

See Part IV C

6. Beneficiaries. The high cost per beneficiary of the total project was noted. The PP should briefly review the rice land constraint in Guyana and establish whether or not there is a cheaper alternative, e.g. opening up some of Guyana's virgin territory for rice production. In discussing the project's beneficiaries, the social soundness analysis should include a review of the incentive for the small producer to increase rice production, given impediments like uncertain land tenure; and government subsidization of farmer inputs and prices to the consumer.

See Part I E,  
Part IV A,C, and D

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Project Response

7. Funding Levels. As a result of discussions subsequent to the DAEC with the World Bank, preliminary analysis of the project, and reduction in the amount of OPEC financing, it was agreed that A.I.D. would be prepared to fund a maximum of DOLS. 9.5 million of project costs. Up to Dols. 8. 0 million would be available on a loan basis and Dols. 1.5 million on a grant basis. A.I.D. financing would be restricted to those elements complementing the irrigation infrastructure financed by other donors. A.I.D. would not be involved in the civil works and off-farm irrigation equipment. Grant funding should be limited to technical assistance and limited staff support. The latter should be phased in to ensure that GOG will be covering all recurring costs by end of project.

See Part III F, and  
Annex III, Exhibit 7

8. A.I.D. and World Bank's role. The PP should specify how the A.I.D. component will be managed and how the management of the A.I.D. - financed component will relate to the overall project management.

See Part V

9. Procurement. The DAEC did not agree that the A and E contract should be negotiated but insisted that it should be awarded on a competitive basis. In addition, the DAEC was willing to consider a waiver for vehicle procurement if it became necessary to provide right-hand drive vehicles if such vehicles were not manufactured in the U.S.

See Part III C.1.

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

ANNEX II  
Exhibit 2  
Page 1 of 1  
Life of Project:  
From FY 1978 to FY 1984  
Total U. S. Funding \$8.9 million  
Date Prepared: 5 May 1978

Project Title: Small Farm Development -- Black Bush Region

NARRATIVE SUMMARY	OBJECTIVE	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS																																																																						
<p>Program or Sector Goal: The broader objective to which this project contributes:</p> <p>Sector Goal: To improve the standard of living in rural areas of Guyana.</p> <p>Subgoal: To increase small farmer income and productivity.</p>	<p>Measures of Goal Achievement:</p> <p>Sector Goal:</p> <ol style="list-style-type: none"> <li>Increase in area under production.</li> <li>Increase in production yields.</li> </ol> <p>Subgoal:</p> <ol style="list-style-type: none"> <li>Average increase in farm family income of at least 30%</li> <li>Increased level of land use efficiency.</li> </ol>	<p>Conditions that will indicate purpose has been achieved: End of project status.</p> <p>Overall Project: Rice production in Project area increased from current level of 34,000 tons annually to some 67,500 tons, with corresponding increases in food crops, on 46,600 acres of rehabilitated and improved land.</p> <p>AID-Financed Component: (1) Completion of civil works; and (2) an operating system of services directed towards on-farm development and efficient utilization of infrastructure.</p> <p>Magnitude of Outputs:</p> <ol style="list-style-type: none"> <li>56</li> <li>9: N.A.</li> </ol>	<p>1. MAG production statistics</p> <p>2. GRB production statistics</p> <p>3. Ag Bank statistics</p> <p>4. Department of Statistics reports</p> <p>5. Bank of Guyana and Ministry of Economic Development reports</p>	<p>Assumptions for achieving goal targets:</p> <ol style="list-style-type: none"> <li>Small farmers are willing to participate.</li> <li>GOG is able to effect projected increases in domestic savings.</li> <li>GOG continues to pursue consistent rural development strategy.</li> <li>Weather conditions remain favourable.</li> </ol>																																																																						
<p>Project Purpose:</p> <p>Overall Project Purpose: To increase the production of rice and other food crops by 6,000 small farmers in the Black Bush region.</p> <p>Purpose of AID-financed Component: To provide a package of services, complementary to other-donor financed civil works which includes: (1) A &amp; E services for the designing and construction phase of the Overall Project; and (2) services which will maximize production potential and benefits.</p>	<p>Outputs:</p> <ol style="list-style-type: none"> <li>MAG personnel trained</li> <li>Preparation of necessary designs and specifications for civil works</li> <li>Renovation of seed production/testing facility, and improved seed delivery system</li> <li>Renovation of equipment, maintenance shop</li> <li>Const. of rice storage/drying facility</li> <li>Const. operations/maintenance stations</li> <li>Improved system of on-farm development and extension services</li> <li>Improved water memt. capability</li> <li>Feasibility study for 2nd stage</li> </ol>	<p>1. On-site field inspections and joint IBRD-US AID evaluations.</p> <p>2. GRB reports</p> <p>3. MAG reports</p> <p>of design construction</p>	<p>Assumptions for achieving purpose:</p> <ol style="list-style-type: none"> <li>Sufficient GOG personnel available to serve as Project counterparts.</li> <li>No major delays in civil works.</li> <li>GOG managerial capacity, at national level, able to support all major development projects (i.e. Tapakuma, Black Bush and MMA)</li> </ol>	<p>Assumptions for providing outputs:</p> <ol style="list-style-type: none"> <li>Adequate staff available for training</li> <li>Suitable candidates available for training</li> </ol>																																																																						
<p>Inputs:</p> <p>USG:</p> <ol style="list-style-type: none"> <li>Consultants</li> <li>Technical Assistance</li> <li>Agricultural Equipment</li> <li>Construction</li> <li>Training</li> </ol> <p>GOG:</p> <ol style="list-style-type: none"> <li>Consultants</li> <li>Technical Assistance</li> <li>Agricultural Equipment</li> <li>Construction</li> </ol>	<p>Implementation Target (Type and Quantity)</p> <table border="1"> <thead> <tr> <th></th> <th>FY 79</th> <th>FY 80</th> <th>FY 81</th> <th>FY 82</th> <th>FY 83</th> <th>FY 84</th> </tr> </thead> <tbody> <tr> <td>1. 284</td> <td>507</td> <td>720</td> <td>798</td> <td>336</td> <td>150</td> <td></td> </tr> <tr> <td>2. -</td> <td>400</td> <td>613</td> <td>533</td> <td>251</td> <td>20</td> <td></td> </tr> <tr> <td>3. 289</td> <td>2,075</td> <td>541</td> <td>-</td> <td>350</td> <td>-</td> <td></td> </tr> <tr> <td>4. 282</td> <td>207</td> <td>186</td> <td>15</td> <td>89</td> <td>44</td> <td></td> </tr> <tr> <td>5. -</td> <td>34</td> <td>42</td> <td>34</td> <td>-</td> <td>-</td> <td></td> </tr> <tr> <td>1. 735</td> <td>300</td> <td>300</td> <td>300</td> <td>300</td> <td>200</td> <td></td> </tr> <tr> <td>2. 50</td> <td>200</td> <td>245</td> <td>245</td> <td>220</td> <td>200</td> <td></td> </tr> <tr> <td>3. 61</td> <td>400</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td></td> </tr> <tr> <td>4. 244</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td></td> </tr> </tbody> </table>		FY 79	FY 80	FY 81	FY 82	FY 83	FY 84	1. 284	507	720	798	336	150		2. -	400	613	533	251	20		3. 289	2,075	541	-	350	-		4. 282	207	186	15	89	44		5. -	34	42	34	-	-		1. 735	300	300	300	300	200		2. 50	200	245	245	220	200		3. 61	400	-	-	-	-		4. 244	-	-	-	-	-		<p>1. Consultant and contractor reports</p> <p>2. GOG Annual Budget</p> <p>3. AID Disbursement records</p>	<p>Assumptions for providing inputs:</p> <ol style="list-style-type: none"> <li>All external financing in place</li> <li>AID and GOG funds become available on schedule</li> <li>Personnel available</li> </ol>	<p>1. MAG production statistics</p> <p>2. GRB production statistics</p> <p>3. Ag Bank statistics</p> <p>4. Department of Statistics reports</p> <p>5. Bank of Guyana and Ministry of Economic Development reports</p>
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2. -	400	613	533	251	20																																																																					
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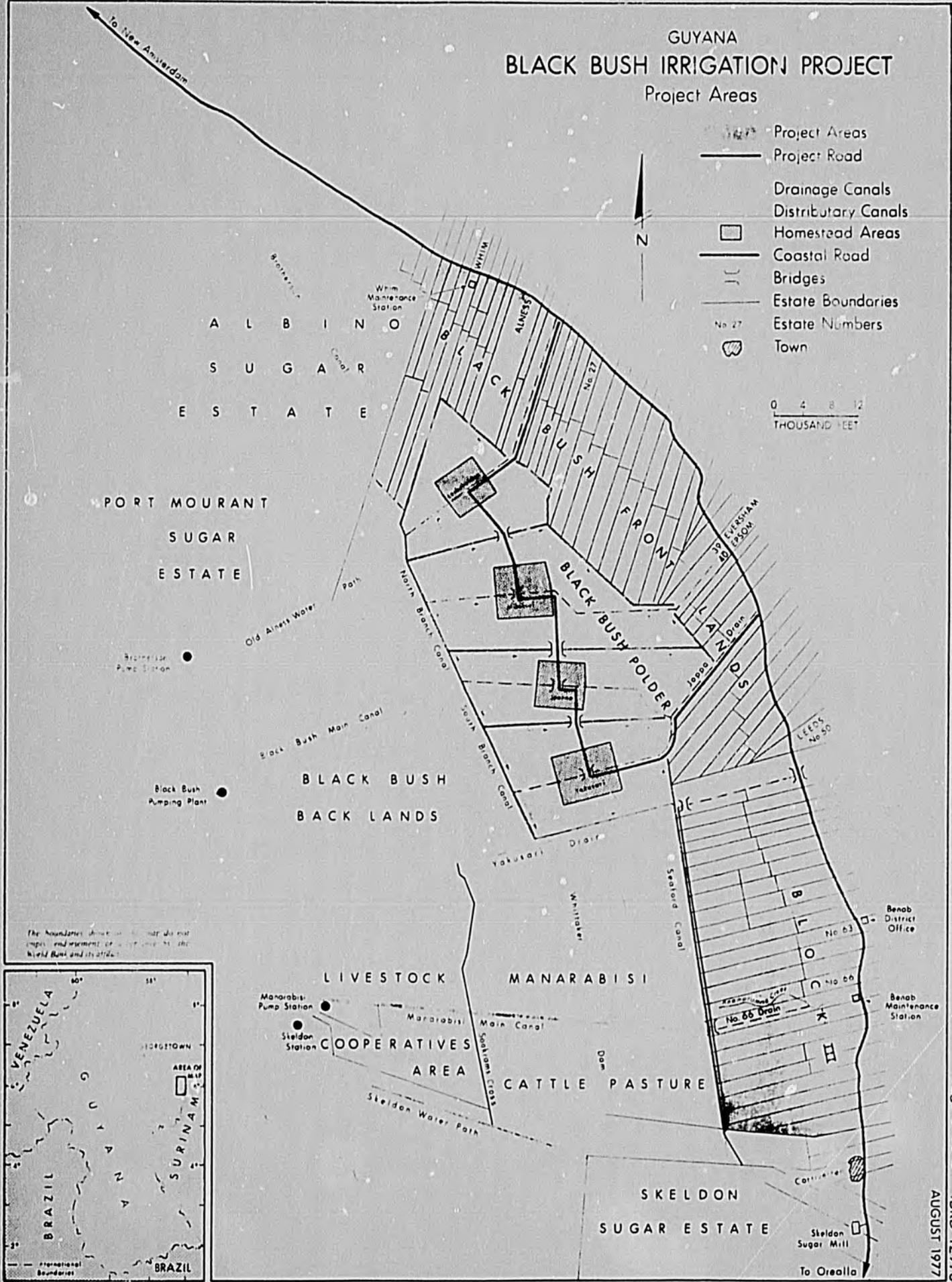
# GUYANA

## BLACK BUSH IRRIGATION PROJECT

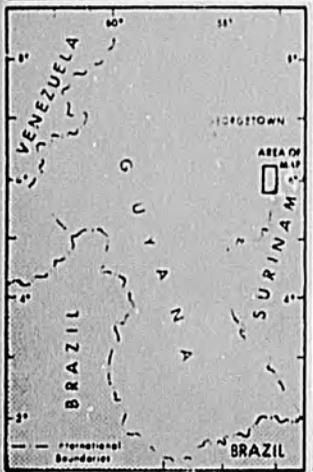
### Project Areas

-  Project Areas
-  Project Road
-  Drainage Canals
-  Distributary Canals
-  Homestead Areas
-  Coastal Road
-  Bridges
-  Estate Boundaries
-  Estate Numbers
-  Town

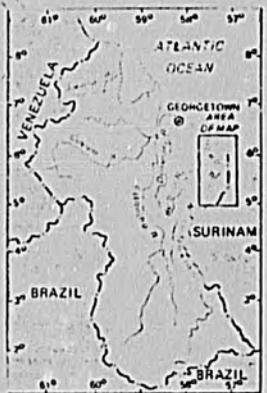
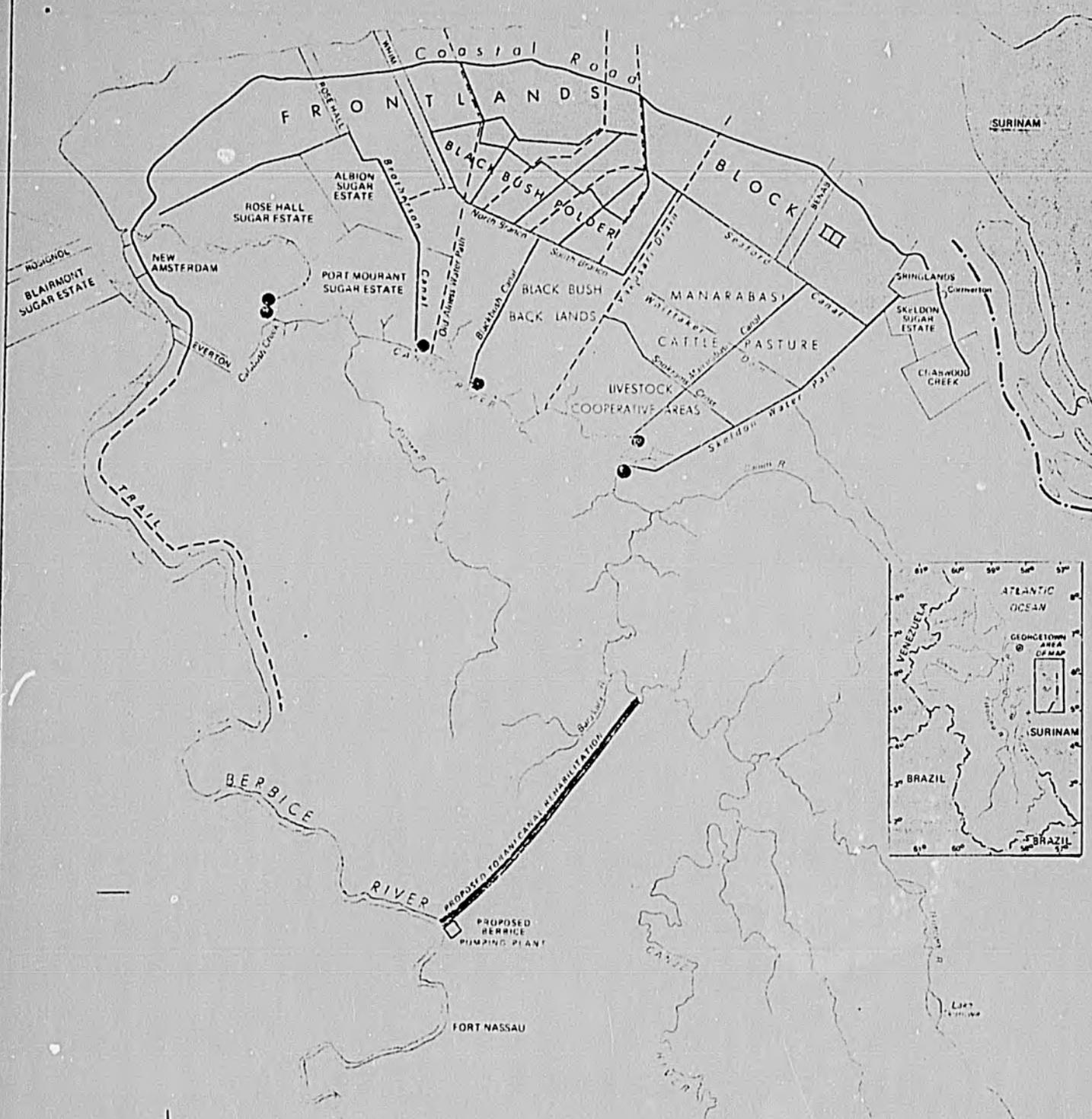
0 4 8 12  
THOUSAND FEET



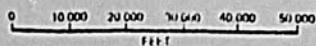
The boundaries shown on this map do not imply endorsement or approval by the World Bank and its affiliates.



ATLANTIC OCEAN



GUYANA  
**BLACK BUSH IRRIGATION PROJECT**  
 General Location Area



- PROJECT AREA
- PROJECT ROAD
- - - DRAINAGE CANALS
- DISTRIBUTARY CANALS
- PUMPING STATIONS
- - - ESTATE BOUNDARIES
- - - INTERNATIONAL BOUNDARIES

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IMPACT IDENTIFICATION AND EVALUATION  
GUYANA SMALL FARM DEVELOPMENT PROJECT

Prepared for  
United States Agency for International Development

by

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April, 1978

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I Project Description	1
II Project Area Description	2-9
III Impact Identification and Evaluation	10-18

## I. PROJECT DESCRIPTION

The main aim of the Black Bush Irrigation Project is to significantly increase rice production and food crops by 6,000 peasant farmers.

The principal objectives of the program are to provide:

- flood protection;
- dependable water supply for double cropping rice;
- adequate drainage;
- all-weather roads;
- on-farm development (land-levelling, block planting);
- improved agricultural supporting services.

The project development will include:-

- utilization of certified high yielding rice varieties;
- combination of inputs to obtain high yielding packages of technology;
- upgrading proficiency of extension personnel in communications technology;
- improvement of processing and marketing linkages to adequately handle significant increment in production.

The time span for the project is estimated at 5 1/2 years beginning in early 1979.

The total financing is estimated at U.S.\$42.8 million plus U.S.\$1.4 million A.I.D. grant to be shared by A.I.D. U.S.\$8.9 million (\$7.5 million loan, \$1.4 million grant), World Bank credit, U.S.\$10.00 million, I.F.A.D. loan U.S. \$10.0 million, and other donors to be determined, U.S. 8.5 million.

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Three areas comprise the Project Area proper and are described as follows:-

- (a) The Black Bush Polder (26,500 ac.)
- (b) The Black Bush Frontlands (29,600 ac.)
- (c) The Block III Area (19,400 ac).

- (a) The Black Bush Polder, a model rural development project with four central villages equipped with up-to-date infrastructural facilities and services was completed in 1963. The area is farmed by 1,500 families who are allocated homestead plots (2.5 ac.) and rice plots (15 ac.) with a total production capability of over 31,500 tons of paddy annually. The water supply requirements of the Polder would increase significantly when the main canal and the distributaries of the Polder are rehabilitated and enlarged to convey water to the Black Bush Frontlands. To complement this a new pumping plant would be constructed adjacent to the existing Black Bush pumping plant on the Canje River.
- (b) The Black Bush Frontlands are located between the Polder and the sea along the main public road, extending from Bloomfield Estate to Estate No. 51. This area was formerly under irrigation by water supplies from the then Black Bush swamps. Crops presently grown include sugar-cane, rice, coconuts and vegetables. Presently the area relies on rainfed conditions for the autumn rice crop. This area has the highest priority for future development and entitlement to water with the increase in supply under the project. There are about 4,100 ac. in the area which are not suitable for

cultivation due to salinity. A feasibility study could determine alternative land use.

- (c) The Block III area is contiguous with the aforementioned Black Bush Frontlands. It extends along the main public road from Estate No. 52 to Estate No. 74, with a depth of 4 miles from the sea coast to the Seaford distributary. This area was developed as an irrigation and drainage district during the 1940s and the efficiency of land and water use and the level of production have not been surpassed anywhere in the country. After 30 years the main pumping plant needs to be replaced and the project works rehabilitated. The project area also includes the Torani canal which connects the Berbice to the Canje river as the transfer of additional water for the project by pumping would utilize this canal which would also have to be rehabilitated.

GEOMORPHOLOGY:

In general the area is flat to gently undulating with many parts being below mean sea level. The sediments comprise superficial deposits of beach ridges, terraces and old levees as well as clays, sands, sandy and silty clays of the Demerara and Coropina formations overlying the white sands. Open areas of savannah, scrub, clay and pegusse swamps which become water-logged in the wet season are covered with grasses and sedges while river courses and Coropina "islands" are forested in areas that have not been developed.

CLIMATE:

The climate is tropical humid. Data by Cleare (1961) from New Amsterdam show a mean temperature of about 82 degrees, a mean relative humidity of about 80 percent and mean annual rainfall of about 80 inches.

- 1990

Georgetown data show a mean annual evaporation of about 50 inches from a free water surface. There are two rainy seasons and two dry seasons, but great variations in duration and intensity occur. The longest rainy season is from May to July, and the longest dry season is from August to November. The total annual rainfall is adequate for crop production but there are seasonal excesses and deficits requiring both drainage and irrigation.

(FAO/FS: 19 BRG Vol. V. Page 4).

SOILS:

Relatively fertile soils are located along the seaward and riverain portions of the coastal area. Most soils are clays with some silts and sands which are developed from marine and river deposits.

Large areas of organic soils (pogasse) are generally difficult to drain and have low fertility which declines rapidly when cultivated. Some soils contain toxic salts which would make agricultural utilization difficult.

(FAO/SF: 19 BRG. Vol. III Page 2).

According to Cate (1964) there are three major chemical problems which may be encountered in the soils of the Canje area. One is salinity, which is the presence of neutral salts like those in sea water. Sodium chloride is normally the major compound, but magnesium sulphate is also common. Crops vary in their tolerance to such salts, but it is desirable to remove as much of the salinity as possible by good drainage, and to prevent subsequent flooding by salt water.

A second problem is that caused by free acid (i.e. toxic salts, mainly iron and aluminium sulphates). These compounds are toxic to most plants even in very low concentrations and they must be removed.

RIVERS:

The Canje river flows parallel to the sea coast about 15 miles inland and provides irrigation water for a large part of the Courantyne Coast. The right bank flood plain of the Canje between Sandaka creek and downstream to the Brotherson Canal varies between 53' and 56', its seaward edge marked by the Black Bush reefs.

Traditionally "Frontlands" cultivation which extends four miles from the coast road, utilized trapped rainfall that lay in shallow conservancies in the flat marsh ground. Since the Canje catchment was not large enough to secure irrigation water for all the fertile areas worth draining and clearing, the Torani gravity canal was linked at the Berbice river in 1957 to make the Canje flow sufficient to sustain irrigation of the Block III and the Black Bush areas while leaving enough water for a reasonable expansion of sugar-cane cultivation on the coast.

WILDLIFE:

The fragile and vulnerable neotropical wildlife resources of the coastal river basin systems in the project area proper, have been under accelerating environmental pressures over several decades.

The coastal mangrove swamps continue to develop with increasing rapidity seawards in some areas and serve as nurseries for important fisheries and water-fowl habitats for resident and migrant species.

The tidal mudflats and shoals left by receding tides interface with the sea and mangrove fringes. Here small colonies of scarlet ibises and roseate spoonbills once again find sanctuary after overhunting brought the flocks to near extinction.

In some areas where the protective mangrove belt was removed by man, an endless cycle of erosion and accretion continues unimpeded. The coastline gradually creeps inland and only expensive protective seadefence works can keep the sea and river at bay.

Further inland habitat manipulation and management to ensure maximum and sustained yield from cultivated crops involve engineering works such as drainage and irrigation canals and roads as well as ribbon settlements along the main highway, and rural development projects like the Black Bush Polder, originally a vast swamp propulated by a diversity of waterfowl and aquatic fauna such as the capybara. No records are extant of the irreversible damage done to these resources including the decimation of endangered species such as the giant armadillo.

In the immediate project area there are no significant feral mammal populations. However, the contiguous areas which include the catchment of the Canje river, the lower course of the Corentyne river as well as the area traversed by the Torani Canal in the Berbice River Basin are indirectly affected.

Of the remaining wildlife, reptilian and fish faunas are significant in the project area. These resources have suffered as a result of indiscriminate harvesting and man continues to regard all wildlife as fair game.

PEOPLE:

In the project area the community is chiefly engaged in farming activities with special attention to rice. Total mechanisation of the rice industry and partial mechanisation of marketing gardening in the Black Bush Polder have significantly improved the economic status of the farmers. Over the past decade they have been able to open up opportunities to their offsprings in more lucrative fields notably in higher education.

194'

The area has produced its own school teachers as well as a surplus for the neighbouring districts. Farmers' children continue to leave the area to marry and to acquire skills in law, medicine and the "status" professions.

#### SETTLEMENTS:

The Black Bush Polder comprises of four main communities with a population of 9,000 inhabitants living in Lesbeholden, Mibikuri, Joanna and Yakusari.

Each settlement has its own primary school and an agriculture office. There are three rice-mills, belonging to the Guyana Rice Board, (GRB), a rice research unit and an administrative compound in Mibikuri, with a land Development office, and a Health Centre (a caravan offered by USAID in the 1970's).

The Black Bush Frontlands with a ribbon development along the main road have a settled population of over 22,000 people.

#### ROADS:

The settlement areas in the Polder are connected with the existing coastal public road by a 22 mile bituminous surfaced road 12 feet wide. This road is only designed for light traffic. The rest of the Polder is provided with fair weather roads which can be used for moving machinery and even for the transportation of paddy by trailers during the dry weather.

\* \* \*

1

III IMPACT IDENTIFICATION AND EVALUATION

BACKGROUND AND THRESHOLD RECOMMENDATION:

The following section together with the attached impact identification and evaluation form is given to define the project's probable impacts on the environment. Under Section 216 of 22CFR, a threshold decision regarding environmental impact is required prior to project authorization. A threshold decision can be of two types. The first is a negative determination implying that all reasonably foreseeable impacts have been evaluated, that no significant impacts on the human environment are likely and that further impact evaluation in the form of an environmental assessment (EA) is not required. The second or positive determination, implies that significant impact issues have been identified. In the instance of a positive determination, an EA is required under AID Rule 16.

The threshold recommendation of the USAID Guyana Mission Director concerning this project is for a finding of no significant impact leading to a negative determination. This implies that the project is free of foreseeable impacts which would have a significant effect on the human environment or, alternatively, that the environment holds no constraints to the development and implementation of the project.

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IMPACT IDENTIFICATION AND EVALUATION FORM

Impact  
 Identification  
 and  
Evaluation

Impact Areas and Sub-areas

A. LAND USE

1. Changing the character of the land through:
  - a. Increasing the population \_\_\_\_\_ N
  - b. Extracting natural resources See B (Water Resource)
  - c. Land clearing \_\_\_\_\_ L
  - d. Changing soil character \_\_\_\_\_ L
2. Altering natural defenses \_\_\_\_\_ N
3. Foreclosing important uses See B (Water Resource)
4. Jeopardizing important uses See B (Water Resource)
5. Other factors \_\_\_\_\_ I

B. WATER RESOURCE

1. Physical state of water \_\_\_\_\_ 2
2. Chemical and biological states \_\_\_\_\_ 1
3. Ecological balance \_\_\_\_\_ 2
4. Other factors \_\_\_\_\_ 1

C. ATMOSPHERIC

1. Air additives \_\_\_\_\_ 2
2. Air pollution \_\_\_\_\_ 2
3. Noise pollution \_\_\_\_\_ 2
4. Other factors \_\_\_\_\_ 1

N - No environmental impact  
 L - Little environmental impact  
 M - Moderate environmental impact  
 H - High environmental impact  
 U - Unknown environmental impact

IMPACT IDENTIFICATION AND EVALUATION FORM

D. NATURAL RESOURCES

- 1. Diversion, altered use of water See B (Water Resource)
- 2. Irreversible, inefficient commitments See B (Water Resource)
- 3. Other factors \_\_\_\_\_ 1

E. CULTURAL

- 1. Altering physical symbols \_\_\_\_\_ 2
- 2. Dilution of cultural traditions \_\_\_\_\_ 2
- 3. Other factors \_\_\_\_\_ 1

F. SOCIOECONOMIC

- 1. Changes in economic/employment patterns \_\_\_\_\_ 1
- 2. Changes in population \_\_\_\_\_ 2
- 3. Changes in cultural patterns \_\_\_\_\_ 2
- 4. Other factors \_\_\_\_\_ 1

G. HEALTH

- 1. Changing a natural environment \_\_\_\_\_ 2
- 2. Eliminating an ecosystem element \_\_\_\_\_ 2
- 3. Other factors Water-borne Diseases  
See Discussion \_\_\_\_\_ 2

H. GENERAL

- 1. International impacts \_\_\_\_\_ 2
- 2. Controversial impacts \_\_\_\_\_ 2
- 3. Larger program impacts See B (Water Resource) \_\_\_\_\_ 1
- 4. Other factors \_\_\_\_\_ 1

I. OTHER POSSIBLE IMPACTS

- \_\_\_\_\_ 1
- \_\_\_\_\_
- \_\_\_\_\_

10/25

IMPACT ISSUES

- A. LAND USE: 1 (a) Increased population - Land within the project area are currently owned or leased by resident farmers. Little or no population increases.
- A1 (b) Extraction of natural resources - There are two project activities which will result in resource extraction. The first involves the possible onsite extraction of material for road building. It is expected that bauxite overburden from the Everton Bauxite works will be used for this purpose, consequently no significant impact is anticipated. The second project activity involving resource extraction is the diversion and use of Canje and Berbice River waters for irrigation. Further discussion of the probable impacts of diversion of water can be found in Section B, Water Resources.
- A1 (c) Land clearing - The project area is primarily cleared of native vegetative cover and planted for rice, mixed crops and coconuts. Little or no clearance of native vegetation will take place during the project. There is a possibility that some channel improvement to the Canje River between Torani Tail and the Manarabisi pumping station will be required to improve flow. However, project budget constraints will not allow for substantial improvements. Under these circumstances, little impact is anticipated. Should substantial channel improvement be deemed necessary, further analysis of the impacts on the Canje river ecosystem should be undertaken.
- A1 (d) Changing soil character - Since the Black Bush Irrigation scheme was first developed in 1963, there has been no noticeable increase in soil salinity. Continuous cropping of the rice monoculture could result in the removal of organic material and concomitant reduction of topsoil. While some soil constituents can be replaced through the use of chemical fertilizers, current practice of burning field stubble

A1 (d) Cont'd.

may result in the depletion of humus. While this will potentially have an effect on tilth and organic content in the future, no significant impacts will occur which will not be remediable through soil fertility management such as is proposed in the project design.

- A2. Altering natural defenses - No significant impacts are anticipated. Special attention was given to the possibility of distress and/or clearance of aquatic, coastal vegetation. Following a brief site survey, it is determined that no coastal vegetation is likely to be affected adversely by the project.
- A3. Foreclosing Important Use - see discussion in Section B, Water Resources.
- A4. Jeopardizing Man or His Works - see discussion in Section B, Water Resources.

B. WATER RESOURCES:

The matter of water quality is the most complex of environmental issues. Dimensions of the issue include water quality, sufficiency of water supply for the project area and sufficiency of water supply considering the needs of other existing and foreseeable water demand schemes.

Water Supply: The project would result in the diversion during low flow periods, of approximately 1,000 cubic feet per second (cusecs) from the Berbice River via the Torani Canal to the Canje River. The project's pumps, located on the Manarabisi and Black Bush Canals (as well as pumps outside of the scheme at Brotherton and Skeldon canals) would carry this reallocated supply. A concern with regard to this reallocation is the possibility of drawing down the base flow of the Berbice and Canje Rivers

to the extent that the tidal portion of these rivers may experience an increase in salinity. This circumstance would occur during the dry season when surface water sources do not receive rainfall run off. While increased salinity occurs under natural conditions, the specific concern with regard to this project is that saline waters would go beyond its historical limits to contaminate water being pumped for other schemes and uses (including Branwagt Sari and Mara on the Berbice River and Port Mourant and New Amsterdam city). Discussions on this issue with the Chief Hydraulics Officer, Mr. Lawrence Charles, has confirmed that GOG has considered this matter. Mr. Charles stated that a study had been completed which determined that 50 cusecs and 450 cusecs of base flow are required in the Canje and Berbice Rivers (respectively) to maintain the status quo visavis saline water penetration. Furthermore, the base flow of the subject rivers is such that the minimum requirements will be available. Mr. Charles stated that the Branwagt Sari and Mara schemes have little or no demand on fresh water from the rivers as they are currently virtually defunct projects. Other users of water below the Black Bush project intakes are primarily sugar plantations which have a different pattern of consumption than the rice crop. Consequently, there is no significant competition between these two uses for water. A third type of water demand (that of domestic use in New Amsterdam) is satisfied by groundwater sources.

In summary, it is possible that the Black Bush project may place a demand on the water supply of the Canje and Berbice to the extent that further development of the area for irrigated agriculture requiring fresh water will depend upon either better on-farm water management practices

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or the diversion of other rivers to supplement the Canje and Berbice flows. A feasibility study of possible expansion of irrigation to the area south of the project site is being proposed as a part of the project. Such diversion considerations for future development should be addressed at that time.

Water Quality:

With increased double cropping as a possibility following project implementation, it is probable that agriculture inputs such as chemical fertilizer and pesticides will be increased. While neither the global project nor AID's activities include the provision of pesticides or fertilizers, a possible secondary or indirect effect of the capacity for double cropping could be increased contamination of drainage waters by fertilizer and pesticides supply by the GRB. However, this possible indirect effect of the project has been addressed in the design of the AID component through the provision of seven months of consulting services in soils and fertility (aimed at more conservative practices with fertilizers) and pest/weed management (aimed at more conservative practices with pesticides). It is possible that, with the development of an integrated pest management system, less pesticides will be used than under current practices without exploitation of cultural and natural controls.

Technical assistance will also be provided for improving utilization of fertilizer. In addition to having the beneficial effect of reducing contamination of drainage canals, improved fertilizer use will have the effect of reducing the cost of a very expensive production input. While certainty with regard to the efficacy of these technical assistance activities is not

possible, it is clear that there will be support within GCG for any activities which reduce the cost of production, and required imports for use in rice production.

E. CULTURAL:

The project area is occupied by recent settlers. Therefore, no historic building, archaeological site or the like are to be found. There are no Amerindians tribes in the project area.

F. SOCIOECONOMIC:

One of the purposes of the project is to make possible the practice of double-cropping of rice. A consequence of such a practice might be the loss of leisure time currently available to rice growers who normally plant no more than one crop per year. At present, single cropping farmers may choose to prepare a home garden or perform casual labor on sugar plantations and elsewhere. Alternatively, the farmer may take the option of leisure. To the extent that the double cropping option is exercised, there may be a localized impact on the pool of casual laborers during that period of time during which some of the area's farmers would be formerly "off season".

No significant change in the population of the area is anticipated. Land within the project area is either privately owned or under long term lease. Much of the land is currently in production and some is being double cropped.

G 3. Health:

Malaria, jungle yellow fever, rabies, cutaneous leishmaniasis (bush yaws), elephantiasis, onchocerciasis (river blindness) and leprosy are found in various parts of Guyana. However, with the exception of leprosy, there are no reports of the above diseases in the project area. While the project will involve the creation of possible habitats for host/vector species for some of the above disease agents, no evidence or indication of waterborne diseases has resulted from the initiation of the original project in 1963. Apparently, previous vegetation clearance coupled with proper canal maintenance and flow regulation has minimized the risk to human populations from these diseases. As there will be no change which would be directly or indirectly deleterious to human health in land and water management systems, as a result of the project, no resulting threat from these diseases is expected. However, there is one disease which is cause for some concern. Schistosomiasis is a water borne disease whose propagation depends upon a number of ecological factors being present. These factors include fresh water, tropical climate and one of three species of snails which act as intermediate hosts for the miracidic or schistosome larvae. According to several sources, these factors are all extant in the project area. For reasons which are not altogether clear, no cases of schistosomiasis have been reported in Guyana despite the fact that World Bank and AID documents have identified Schistosomiasis as being endemic to Northern Brazil, Surinam and Venezuela.

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It has been suggested by local experts that water of the Black Bush Polder region is too acidic to support the schistosomes. Another possibility is that the schistosomes have never been introduced to the area in such a way as to promote its propagation. A third possibility is that the vector snails do not infect exist in the area and extant snail species are not suitable to "schisto" larvae. There is nothing in the project's design which would indicate ecological change which would in turn promote or foster the spread of the disease into this project area. In all likelihood, given the settled nature of the area's population and the relatively high quality of sanitation practised in the project area, infestation will not occur. With or without the proposed project's implementation, the possibility of serendipitous infestation should be considered by the GRB and Ministry of Health.

\* \* \* \*

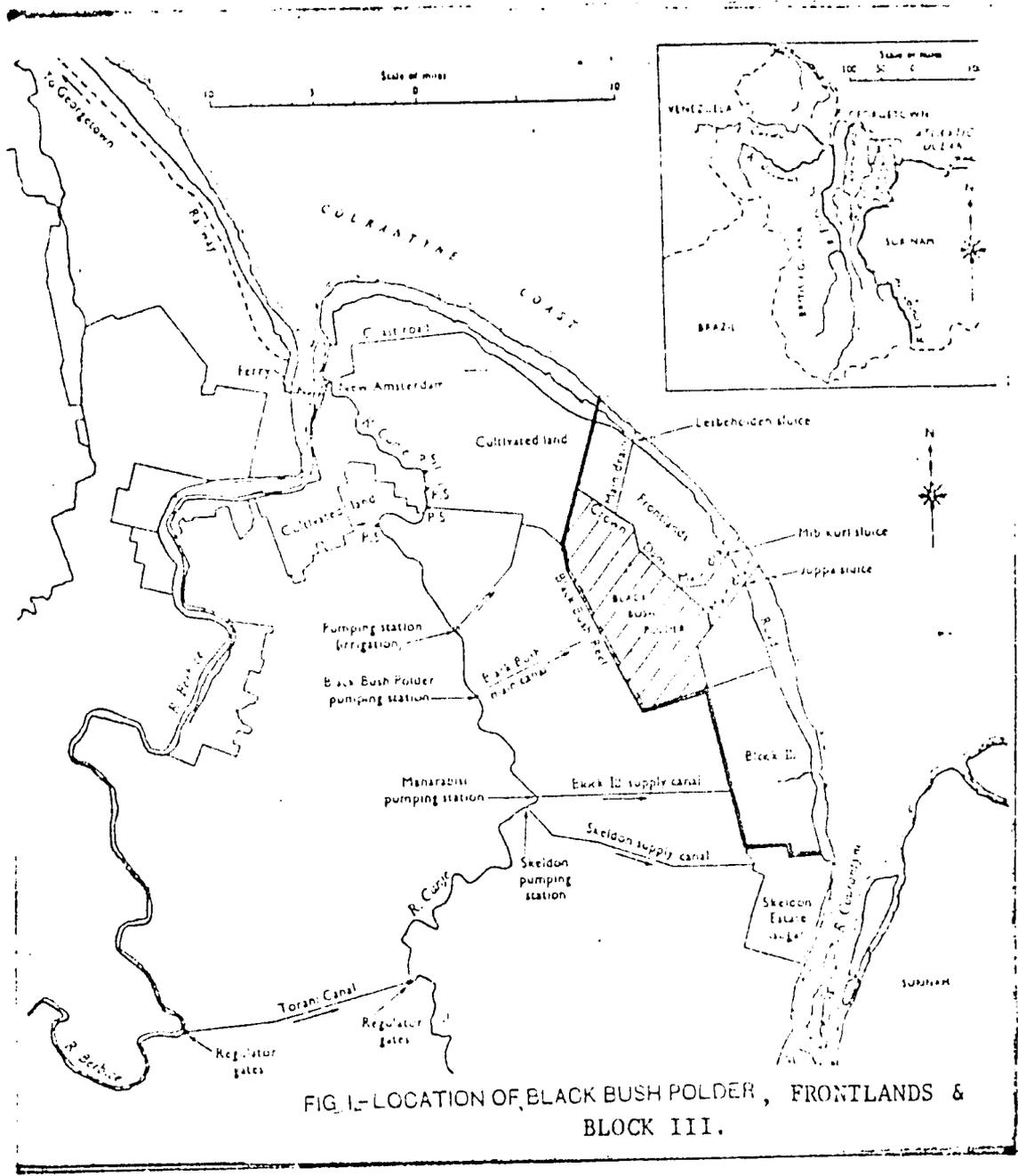


FIG. 1.-LOCATION OF BLACK BUSH POLDER, FRONTLANDS & BLOCK III.

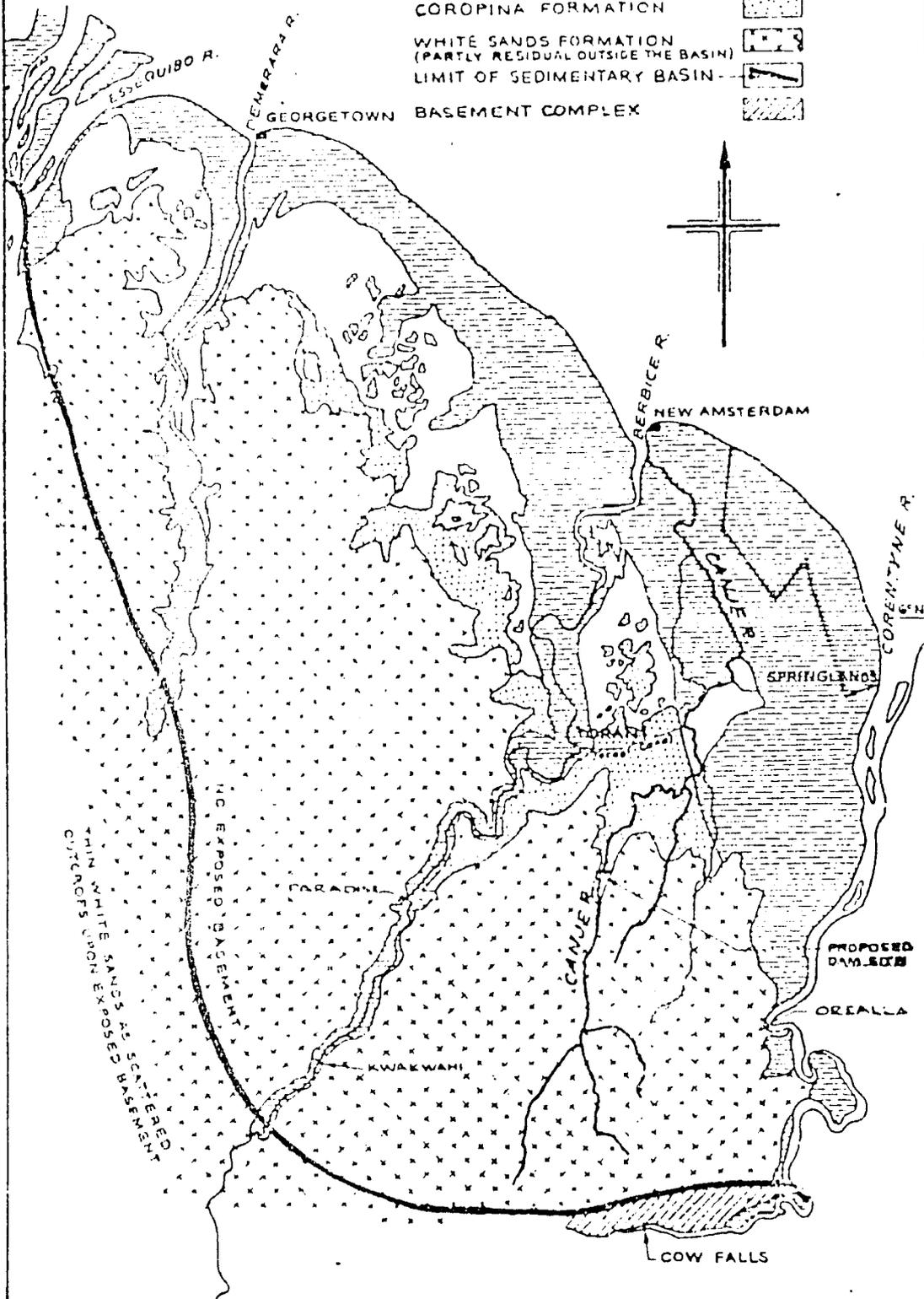
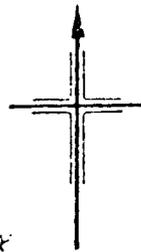
206

GEOLOGICAL MAP  
OF  
NORTH-EAST GUYANA

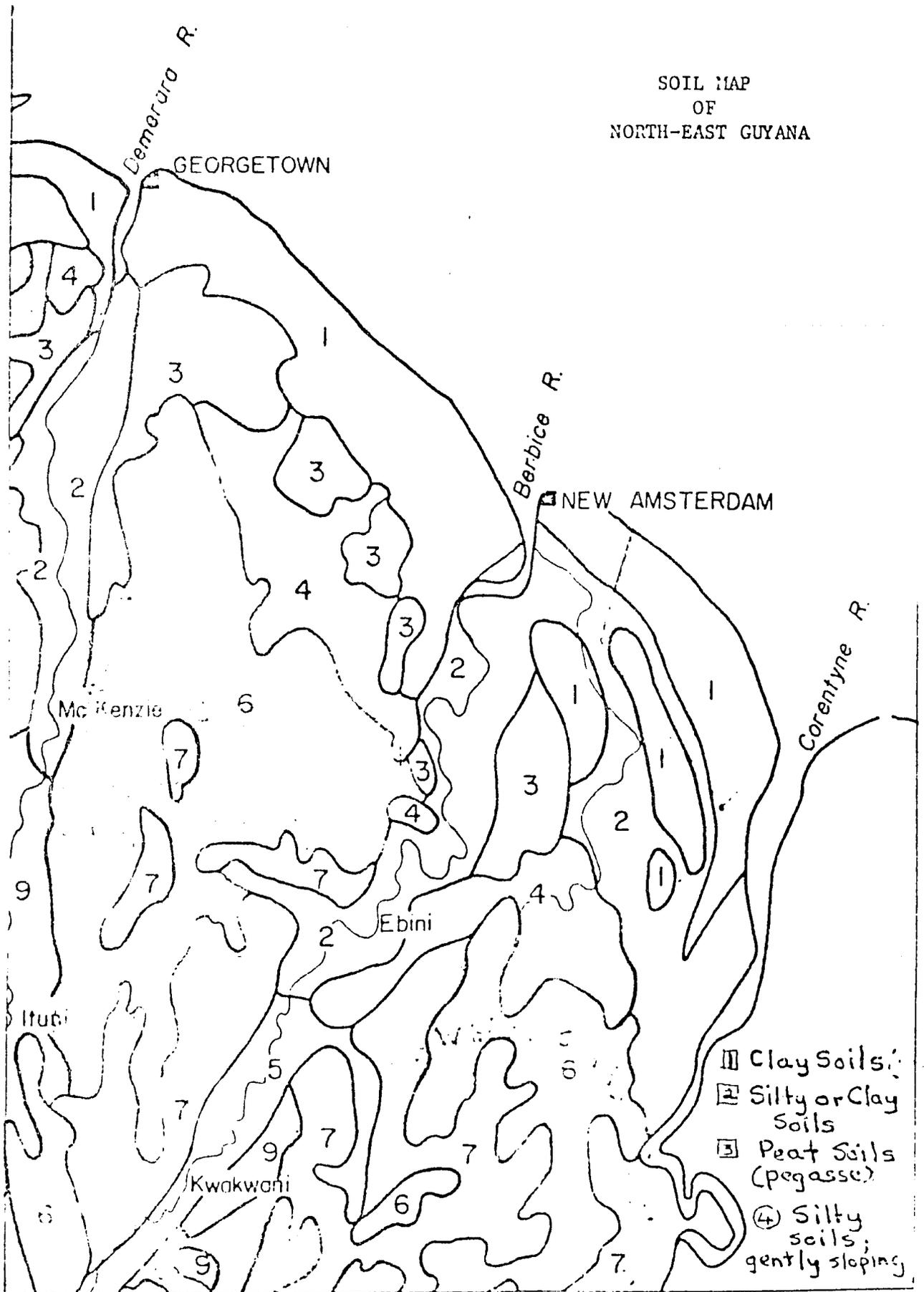
50°W

LEGEND

- PEAT (PEGASSE) SWAMPS 
- DEMERARA FORMATION 
- COROPINA FORMATION 
- WHITE SANDS FORMATION (PARTLY RESIDUAL OUTSIDE THE BASIN) 
- LIMIT OF SEDIMENTARY BASIN 
- GEORGETOWN BASEMENT COMPLEX 



SOIL MAP  
OF  
NORTH-EAST GUYANA

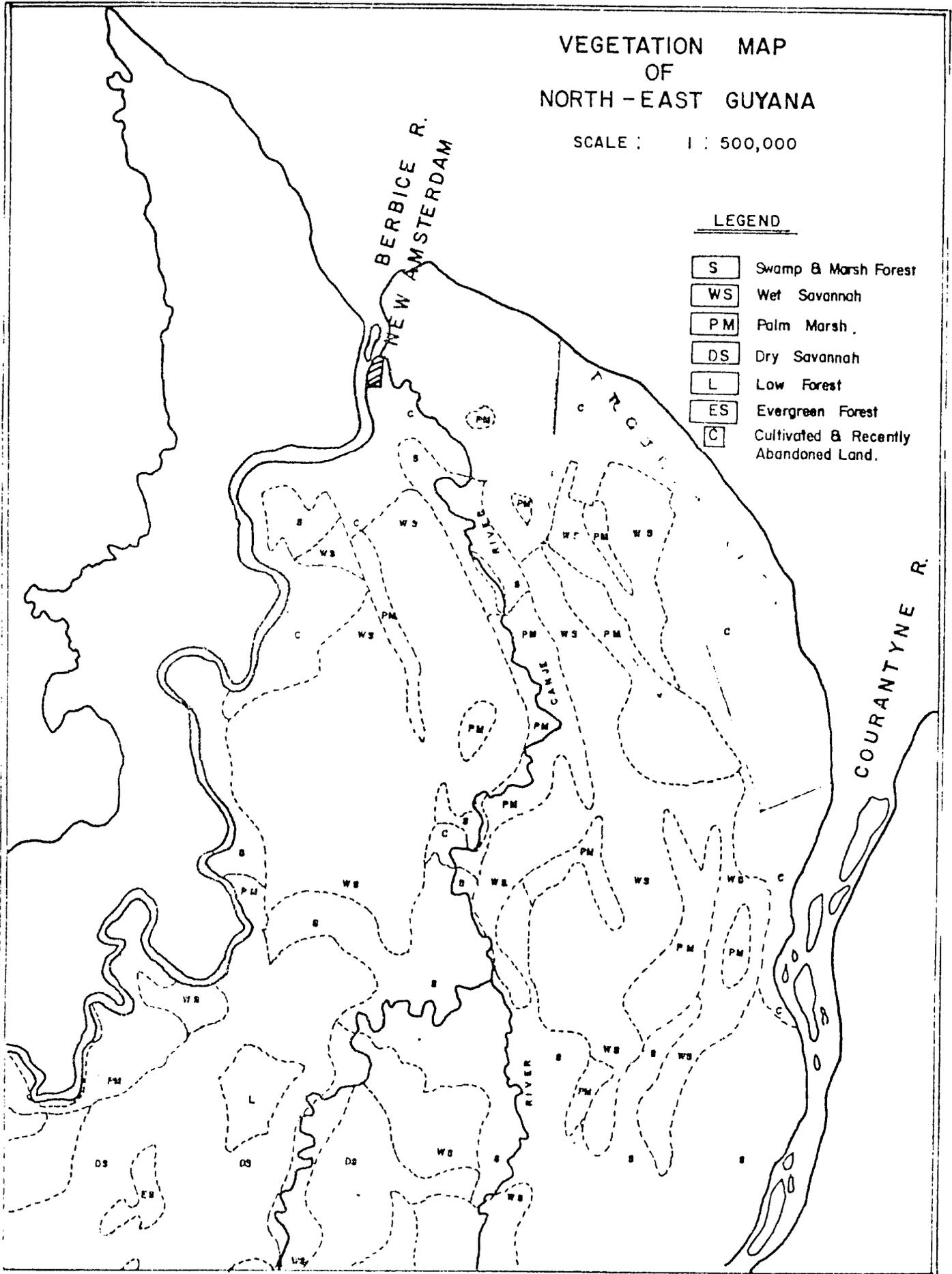


# VEGETATION MAP OF NORTH - EAST GUYANA

SCALE : 1 : 500,000

## LEGEND

S	Swamp & Marsh Forest
WS	Wet Savannah
PM	Palm Marsh
DS	Dry Savannah
L	Low Forest
ES	Evergreen Forest
C	Cultivated & Recently Abandoned Land



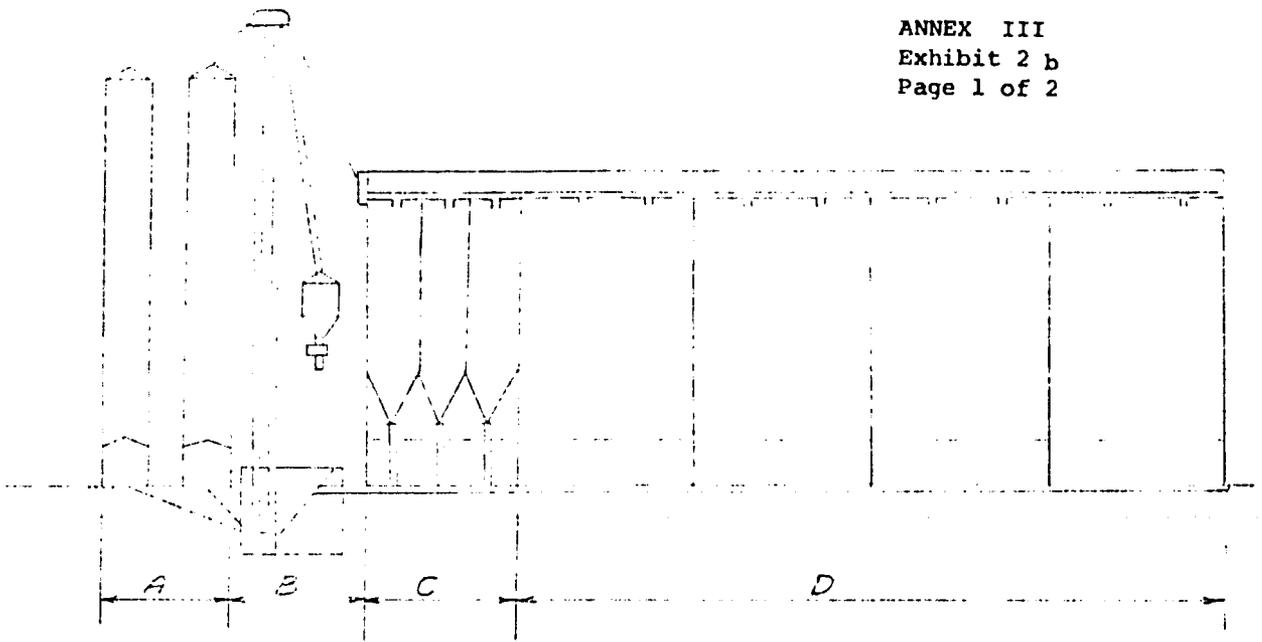
ANNEX III

Construction Cost Data

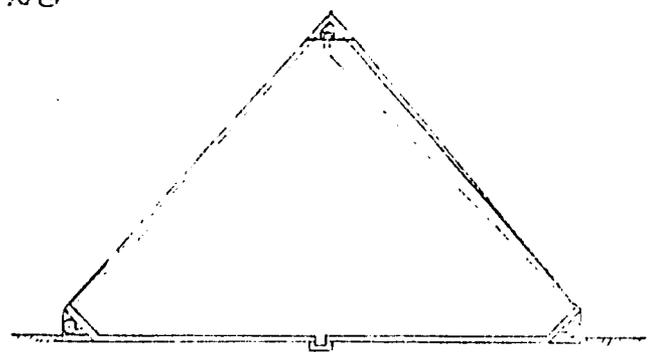
Construction work to be financed under the loan consists of the seed processing and testing facility (conversion of existing buildings), headquarters and two station offices for Project operation and maintenance, a drying and storage facility (including conversion to bulk storage of one existing building), and extension of the GRB equipment storage shelter.

New building construction costs were estimated on the basis of unit prices costs per square foot for the type of building and the intended use of the space based on Hydraulics Division and Guyana Rice Board (as appropriate) experience at Tapakuma and elsewhere. Local and dollar cost breakdowns are approximate, based on judgements of incorporation of materials procured locally or imported. Escalation of totals was based on anticipated increases in labor and materials costs projected to the time construction is expected to take place.

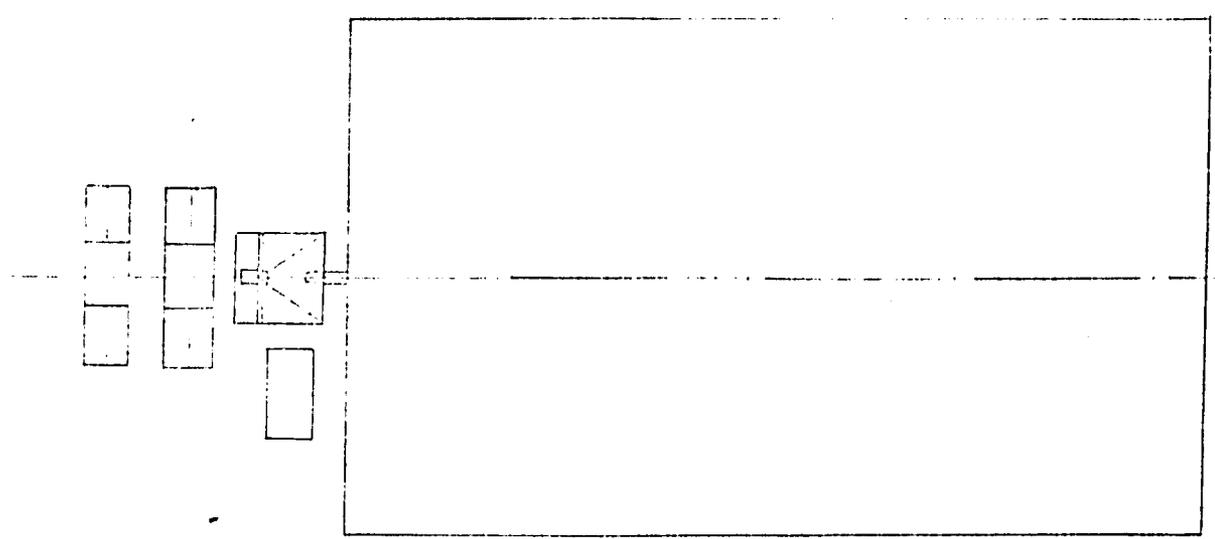
Construction cost estimates for the rice drying and storage facility is based on actual GRB experience in recent procurement of similar equipment and installations thereof escalated to projected Project construction time.



- A - DRYERS
- B - ELEVATORS, RECEIVING AND DISCHARGE
- C - TEMPERING BINS
- D - BULK STORAGE



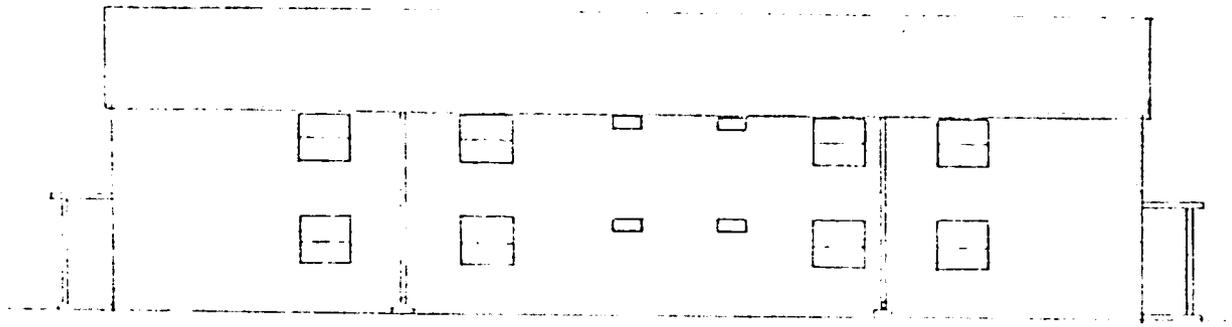
SECTION THRU STORAGE



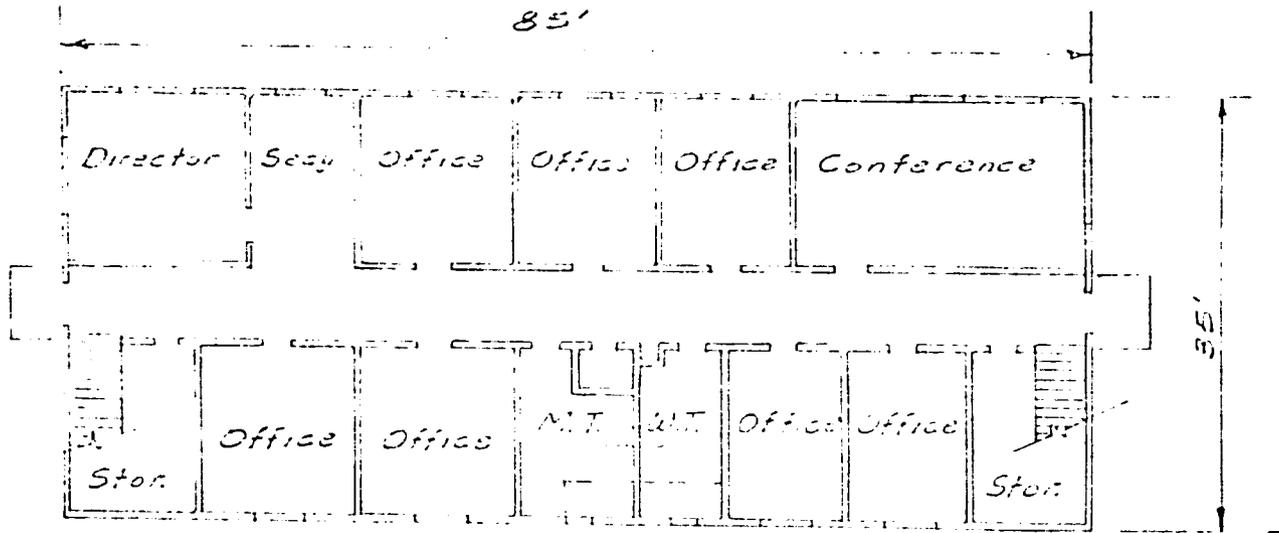
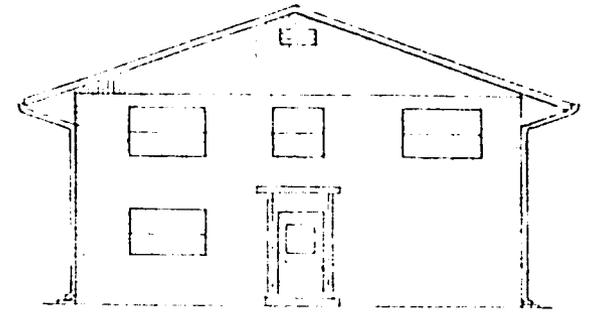
PLAN

DRYING AND STORAGE FACILITY

211'



SIDE ELEVATION



1ST FLOOR PLAN

NEW HEADQUARTERS BUILDING

- 22 -

Construction Cost Estimate

DRYING & STORAGE FACILITY

<u>Cost Estimate</u>	<u>L/C</u>	<u>US\$</u>	<u>TOTAL</u>
1. 100,000 Bag bulk storage	45,000	105,000	150,000
2. Conversion of existing building to 100,000 bag bulk storage	45,000	5,000	50,000
3. Two 500 bag dryers	24,000	141,000	165,000
4. Platform scales	6,000	8,000	14,000
5. Cleaner	2,000	11,000	13,000
6. Tempering Bins	95,000	85,000	180,000
7. Electrical switchgear	13,000	47,000	60,000
8. Conveyors	10,000	60,000	70,000
9. Five elevators	10,000	55,000	65,000
10. Bulk discharge scale	1,000	5,000	6,000
11. Testing lab and office	20,000	30,000	50,000
<u>TOTAL</u>	<u>\$271,000</u>	<u>\$552,000</u>	<u>\$823,000<sup>(1)</sup></u>

(1) Includes contingency estimates.

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ANNEX III

Scope of Work for Consultant Engineers

A. Introduction

This project involves rehabilitation, upgrading and expansion of the irrigation and drainage system, on-farm development, water management, technical assistance, applied research, training, agricultural extension equipment procurement and some infrastructural facilities all pursuant to the objective of increasing agricultural production principally of rice, in the designated project area of the East Berbice Region of Guyana.

The total area to be benefitted by improved water supply (46,600 acres) is comprised of the Black Bush Frontlands, Block III and approximately 4000 acres of the Black Bush Polder.

The consultant will carry out investigations analysis, surveys, designs, preparation of plans and specifications, bidding documents for equipment procurement and construction, and will be responsible for construction control and project coordination in cooperation with the Hydraulics Division and the Guyana Rice Board of the Ministry of Agriculture.

B. The project includes:

- a) A new 1000 cfs pumping plant on the Berbice river at the intake of the Torani Canal.
- b) Limited rehabilitation including slide removal of the Torani Canal to restore it to a capacity of 1000 cfs.
- c) A new 300 cfs pumping plant on the Canje River to replace the existing 30 year old plant which supplies water to the Block III Frontlands through the Manarabisi Canal.

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- d) Rehabilitation of the Manarabisi Canal (10.5 mi) and the Seaford distributary canal (8 mi) including construction of 15 new main regulators.
- e) A new 500 cfs pumping plant on the Canje River adjacent to the existing Black Bush Polder pumping station to discharge into the Black Bush main canal.
- f) Upgrading of the Black Bush main canal (7 mi), the north and south branch canals and the distributaries (22 mi).
- g) Improvement of existing water delivery and drainage facilities in the Polder to provide water to 2500 acres that cannot now be irrigated and to correct certain localized drainage problems in the Lesbeholden and Mibikuri homestead areas.
- h) Rehabilitation and improvement of irrigation and drainage systems including on-farm development in the Frontlands area.
- i) Construction of 15 miles of all weather access road including bridges.
- j) Provision of 5 sluice structures on the new main drains to be constructed in the Frontland area together with 1000 cfs of drainage pumping to supplement drainage through the sluices.
- k) Construction of a rice drying and storage facility including conversion of an existing building to a bulk storage facility.
- l) Construction of a new headquarters facility and two station facilities for operation and maintenance of the project.
- m) Conversion of existing buildings to seed processing and seed testing facilities.
- n) Construction of machinery storage shelter as an expansion of the existing such facility at Joanna.

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B. The services to be furnished by the Consultant will include:

- 1) Review the applicable existing available data and make appropriate additional investigations to verify the adequacy of water supply to the project;
- 2) Carry out all detailed surveys necessary for the preparation of engineering designs and layout of project;
- 3) Prepare detailed engineering drawings, specifications, bills of quantities, cost estimates, tender and contract documents and assist in the evaluation of bids and contract administration;
- 4) Supervise the construction of project works including on-farm development;
- 5) Assist on the seed production and the applied research programme and with the organisation and training of the Extension services in the project area for agricultural development;
- 6) Prepare final designs, specifications, bills of quantities and cost estimates for the approval of the Chief Hydraulics Officer.
- 7) Prepare tender and contract documents and plans suitable for international bidding in keeping with the regulations of the International Bank for Reconstruction and Development and the laws and regulations of Guyana. Such documents must be submitted to the Chief Hydraulics Officer for approval.
- 8) Assist in tender procedures including pre-qualification of contractors and invitations to bid.
- 9) Review and analyse bids received and make recommendations on the award of contract.

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- 10) Review and analyse bids received and make recommendations on the award of contract.
- 11) Establish field survey control and construction layout as required in accordance with the construction contract.
- 12) Make all surveys required for the determination of actual quantities of work items accomplished by the contractor.
- 13) Prepare specifications for equipment and materials and assist with inspection and acceptance of such equipment and materials.
- 14) Approve and/or disapprove the quantity and quality of all materials and equipment delivered to the project.
- 15) Conduct all field and laboratory tests required to ensure conformance with the specifications.
- 16) Inspect and approve or disapprove all construction work performed by the Contractor. (The consultant shall require the contractor to remove and/or correct all defective work).
- 17) Review all invoices and accounts presented by the Contractor for payment.
- 18) Approve contractor's invoices and accounts or portions thereof, certify that quantity and quality and cost of materials, equipment, work performed and/or services listed therein comply with the terms of the Construction Contract, and issue interim and final payment certificates as required under the construction contract and the terms of the Loan Agreement.
- 19) Interpret all drawings and specifications as may be required.
- 20) Review all claims by the contractor and make written determination of his findings supported by relevant evidence as may be required. For all claims that the consultant recommends for approval he shall prepare change orders only after they have been approved by the Chief Hydraulics Officer.
- 21) Prepare change orders as required during the progress of the work to cover necessary changes within the general scope of the construction contract.

5.

- 22) Make final inspection of completed works and prepare for approval certificates of acceptance and final payment including a recommendation that Government may make final payment because the works are satisfactorily completed.
- 23) Maintain in each field office an up-to-date progress chart and cost control of the work supervised by that office.
- 24) Maintain marked-up master sets of construction drawings and plans to represent as-built conditions.
- 25) Prepare monthly and quarterly reports and a final report on the completion of the project in forms required by the International Bank for Reconstruction and Development, A.I.D. and the Guyana Government.
- 26) Furnish inspection of the project from a principal of the home office in accordance with schedule in contract.
- 27) Undertake to co-ordinate and co-operate with any other consultant employed by the Government of Guyana in the execution of the project as well as with the Ministry of Agriculture and other Government agencies on all design and other matters relating to the construction contract.
- 28) Assist in organising the office for project management.
- 29) Assist with the implementation of an applied research programme in the project area.
- 30) Coordinate the above work with the activities of the seed processing and testing facility with the Guyana Rice Board Technical Assistance Program.
- 31) Assist in organising a programme for soil testing on individual farms in order to determine fertilizer and water requirements more effectively.
- 32) Assist in improving the operations of seed production farms and the processing of seed in order to improve quality.
- 33) Assist in organising an effective extension service, training extension agents and initiating programmes for training farmers.

In addition to the itemized scope of work components, the consultant will be expected to train its local technical staff as needed in the respective disciplines where they will be employed.

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COST ESTIMATEOPERATION & MAINTENANCE FACILITIES

<u>New Headquarters</u>	<u>L/C</u>	<u>US \$</u>	<u>TOTAL</u>
Two storey office building, 12000 ft <sup>2</sup>	162,400	20,000	182,400
Bonded storeroom, 850 ft <sup>2</sup>	7,000	3,200	10,200
Stockroom, 1000 ft <sup>2</sup>	7,000	3,000	10,000
Pump, fuel storage, parking area & fencing	<u>12,000</u>	<u>20,000</u>	<u>32,000</u>
New H.Q. Subtotals	<u>\$188,400</u>	<u>\$46,200</u>	<u>\$234,600</u>
<u>Benab Facility</u>			
Two storey office building 5000 ft <sup>2</sup>	70,000	6,000	76,000
Bonded storeroom, 850 ft <sup>2</sup>	7,000	3,200	10,200
Stockroom, 1000 ft <sup>2</sup>	7,000	3,000	10,000
Pump, fuel storage, parking area & fencing	<u>6,000</u>	<u>16,000</u>	<u>22,000</u>
Benab Subtotals	<u>\$ 90,000</u>	<u>\$28,200</u>	<u>\$118,200</u>
<u>Black Bush Polder Facility</u>			
Two storey office building, 4000 ft <sup>2</sup>	56,000	4,800	60,800
Bonded storeroom, 750 ft <sup>2</sup>	6,200	2,800	9,000
Stockroom, 800 ft <sup>2</sup>	5,600	2,400	8,000
Pump, fuel storage, parking area & fencing	<u>4,000</u>	<u>12,000</u>	<u>16,000</u>
B.B. Polder Subtotals	<u>\$ 71,800</u>	<u>\$22,000</u>	<u>\$93,800</u>
Totals	\$350,200	\$96,400	\$446,600
Escalation	<u>24,800</u>	<u>8,600</u>	<u>33,400</u>
Total Estimated Cost	<u>\$375,000</u>	<u>\$105,000</u>	<u>\$480,000</u>

EQUIPMENT LIST FOR SEED RESEARCH PRODUCTION AND TESTING FACILITIES

1. Seed Testing Laboratory

Items include: rice sieves, Boerner sampler, grain inspection scale, sampler sheller, aspirator, fluorescent lamp and magnifier, grain sample boxes, forceps, purity work board, vitascope with seed kit and tetrazolium powder, desk calculator, sample pans, germinator, air conditioner, moisture tester.

(U.S. \$8,000)

2. Seed Processing Facility

Items include: drying bins with heater/fan units, elevators/conveyers/grain augers, grain seed cleaners, packaging system machine, air and screen machine, seed treator, storage bins, safety equipment, moisture testing equipment, seed triers, grain scales.

(U.S. \$192,000)

Total

\$200,000

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EQUIPMENT LIST FOR FARM DEVELOPMENT

Farm Development

<u>Number</u>	<u>Description</u>	<u>Estimated Cost</u> (US \$ 000)
9	Tractors, track type, 75 hp or farm type; flotation wheels 100 hp	670
20	Tractors, farm type, 65 hp with disc plows attached	350
3	Tractors, farm type, 85 hp with 3 disc plows attached	75
5	Rice Combines, self-propelled, half-track, 14 ft. header	350
9	Land planes, tractor-drawn, 35 ft, with 12 - 14 ft. blade	110
4	Disc Harrows, 12 ft. cut.	40
4	Ditchers, tractor drawn, 36 inches	50
10	Border discs, tractor drawn	25
2	Trucks, stake body, 4-ton	25
3	Vehicles, 4-wheel drive	25
3	Trucks, pick-up, 1 ton	25
2	Mobile service units	<u>35</u>
Total Equipment		\$1,780

Tools

1 lot	Shop equipment: milling machine, drill press, reboring machine, bench grinder, battery charger, hydraulics press, table saw, band saw, wood shaper, valve grinding set, motor rewinder, hydraulics jacks, hoist, sets of general tools, surveying equipment . . . . .	\$50
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Spare Parts

Total	1 lot	\$300 \$2,130
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EQUIPMENT LIST FOR APPLIED RESEARCH AND EXTENSION TRAINING

Adaptive Research: 1 lot includes measuring tapes, sighting squares, knapsack sprayers, portable platform scales, grain scales, desk calculators, torsion balance scales, sampler pans, nursery thresher, moisture testers, portable soil and water testing kits, respirators, rubber gloves, related research aids. (US\$9,000)

Extension: 1 lot include projectors, screens, bull horns, technical training slides, cassette recorders and tapes, printed technical materials, packaging materials (cardboard cartons, wide mouth plastic bottles for packing chemicals in mini-kit, sealing machine for plastic bags), stencil machine, related extension training materials. (US\$6,000)

Training Equipment and Supplies: 1 lot include knapsack sprayers, printed technical materials and related training supplies measuring tapes, projectors, screens, cassette recorders with tapes, portable soil testing kits, calculator, scales, packaging materials for mini kits, stencil machine. (US\$5,000)

7 four wheel drive vehicles will be purchased for AID Financed Consultant, and GRB and MAG supervisory staff. (US\$49,000)

26 motorcycles for use by GRB and MAG extensionists. (US\$32,000)

Total

\$101,000

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EQUIPMENT LIST FOR CONSULTANT ENGINEERS

			(Figures in \$000s)
Office equipment and supplies	lot		20
Engineering equipment	lot		20
Vehicles, standard or 4-wheel drive	10		70
Concrete and soils laboratory equipment	lot		15
Drilling and site investigation equipment	lot		20
	Total		<u>\$145</u>

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TECHNICAL ASSISTANCE BUDGET

	L/C.	US\$	TOTAL
U.S. Salaries - long term consultants		470,000	470,000
U.S. Salaries short term consultants		65,000	65,000
Local Salaries (Staff support)	70,000		70,000
Overhead	75,000	245,000	320,000
Fixed Fee		87,000	87,000
Per Diem	22,000	70,000	92,000
International travel		15,000	15,000
Transport of H.H.E., etc.		48,000	48,000
Allowances and fringe benefits		130,000	130,000
	167,000	1,130,000	1,297,000
Escalation	90,000	430,000	520,000
<b>Totals</b>	<b>\$257,000</b>	<b>\$1,560,000</b>	<b>\$1,817,000</b>

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Engineering Consultant Cost Estimate

	<u>L/C</u>	<u>US \$</u>	<u>TOTAL</u>
U.S. Salaries plus overseas Differential		878,350	878,350
Local Salaries	148,500		148,500
Overhead	245,740	108,900	354,640
Fixed Fee		122,460	122,460
Per Diem	6,720	13,520	20,240
International Travel		9,600	9,600
Transport of BHE etc.		50,000	50,000
Allowances	8,000	12,000	20,000
	<u>408,960</u>	<u>1,194,830</u>	<u>1,603,790</u>
Surveys sub-contract	180,000		180,000
	<u>588,960</u>		<u>1,783,790</u>
Escalation	346,210	360,000	706,210
	<u>935,170</u>	<u>1,554,830</u>	<u>2,490,000</u>
Totals	\$935,170	\$1,554,830	\$2,490,000

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IN-COUNTRY AND PARTICIPANT TRAINING BUDGET

Participant Training

General Categories	No. of participants	Location	Cost per mo.	Total months	International Travel	Total
Seed Technology	2	3rd country (regional)	US\$600 ea.	4	US\$600 ea.	US\$6,000
Adaptive research/extension (rice)	5	Colombia	US\$240 ea.	15	US\$600 ea.	US\$21,000
	1	U.S.	US\$1,100	16	US\$900	US\$16,500
	4	U.S.	US\$525 ea.	13	US\$800 ea.	US\$30,500
				44		US\$70,000
Adaptive Research (food crops)	2	3rd country (regional)	US\$750 ea.	3	US\$550	US\$5,000

Total Participant Training	\$81,000
<u>In-Country Training Seminars and Workshops</u>	\$29,000
Total	<u>\$110,000</u>

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AGRICULTURAL ENGINEER - FARM MACHINERY - SCOPE OF WORK

To begin nine months after Project initiation and continue for three years. He/she should be trained and experienced in management, maintenance, and operation of tractors and farm equipment. He/she would assist the Guyana Rice Board machinery pool at Joanna with the following :

1. General advisor on administration, planning and operation of the machinery pool.
2. Inventory and evaluate condition of presently owned equipment.
3. Prepare specifications for new equipment and spare parts supplies for old and new equipment.
4. Development of equipment inventory, maintenance, servicing, and work schedules so that machines are available to farmers on a timely basis.
5. Assist the training advisors with training material and programs.
6. Work with the Water Management Advisor in development of land preparation techniques which conserve water and increase yields.
7. Work with the applied research team in studying benefits and costs of various methods of seed bed preparation.
8. Train machinery pool foremen and assist with accounting procedures to provide better shop and machinery management.

AGRICULTURAL ENGINEER - TRAINING - SCOPE OF WORK

To begin 18 months after Project initiation and continue for one year. He/she would be trained and experienced in farm machinery operation and maintenance, as well as operation of machine and hand shop tools. He/she would:

1. Develop and conduct a training program for mechanics, machinists, tractor drivers and machine operators.
2. Prepare field guides for tractor and machine operators which will indicate servicing requirements of machines.
3. Assist the machinery advisor with implementation of a fixed program of routine servicing and maintenance of all machinery pool equipment.

WATER MANAGEMENT SPECIALIST - SCOPE OF WORK

To begin 18 months after Project initiation and continue for three years. His/her background and training should be in the field of irrigation water management. His/her field could be either agricultural engineering, agronomy or soils. He/she would:

1. Work with the applied research team and extension specialists in developing extension information in the area of water management.

2. Develop and conduct a system of monitoring present irrigation and other cultural practices to use as background data to develop improved practices.

3. Develop an applied research and demonstration site that includes all farms on one or two watercourse systems. Land development, field layouts, and irrigation scheduling would be accomplished according to plant needs and good practice. Unit would provide guidance for extension and teaching packages and demonstrate inputs needed for efficient water use.

4. Train extension specialists and farmers in water management practices that can be used on farms. Develop training materials and programs for farmer use.

5. Work closely with machinery pool to determine best and most timely methods of land preparation and land leveling.

EXTENSION SPECIALIST - SCOPE OF WORK

36 months, starting about twelfth month after Project is signed. The duty schedule should run concurrently with Adaptive Research specialist. General area of expertise should include: (1) planning and implementing extension training programs for field workers and farmer leaders; (2) extension techniques necessary for production specialists; and (3) experience in providing an integrated approach to production technology for rice and food crops necessary to the development of groups of farms and farmers.

Specialist should have at least five years of extension experience, have a base in farm economics and preferably hold degree creditals at the Masters level.

Tasks include:

1. Plan, develop, and implement training programs for extension workers, both in rice and food crops, to become effective "change agents" in serving participating farmers with improved packages of production technology.

2. Develop and provide extension teaching services to smaller farmers through the use of technical bulletins, farm budgets, audio-visual aids, field days, on-farm demonstrations, seminars and field workshops to address production concerns.

3. Promote the participation of field officers of all agencies (e.g. GRB, MAg, AgBank) concerned with agricultural development to provide an integrated approach in conducting applied research, training and information activities for the Project target group.

4. Strengthen adaptive production research efforts at the farm level, working cooperatively with the Research (adaptive) Specialist and field specialists. Areas of concern include pest management, weed control, soils and fertility, and improved cultural practices.

5. Implement extension education and support activities that promote the continual use of high-yielding seed both in rice and food crops.

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6. Develop and cooperate on extension activities with the Agricultural Engineering Specialist and Water Management Specialist in the area of the use and maintenance of farm equipment and on-farm water management.

7. Plan and coordinate with Research Specialist and extension personnel the utilization and timing of short-term specialists planned under the Project.

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RESEARCH SPECIALIST (APPLIED RESEARCH) - SCOPE OF WORK

24 months, starting about twelfth month after Project is signed. The duty schedule is to be concurrent with Extention (Training) Specialist. General area of expertise should include: (1) strengthening programs in relevant adaptive type of research at the farm level; (2) establishing channels for flow of information from researchers to field specialists and professional field agricultural leaders to the farmers; and (3) experience in systematizing components of adaptive research into the overall integrated production technology required for rice and food crops.

Specialist should have at least five years of research experience; have in-depth knowledge of rice production technology and those food crops grown in rotation with or complimentary to rice; and preferably have degree credentials at the doctorate level.

Tasks include:

1. Plan, develop and implement training programs for research personnel, both in rice and food crops which strengthen research design, implementation and evaluation.
2. Coordinate field adaptive research activities by back-stopping with agencies responsible for basic research in rice and food crops.
3. Address research needs in terms of problem areas at the farm level and develop adaptive research activities that will promote improved packages of production technology for the farmer. Areas of concern include pest management, weed control, soils and fertility and improved cultural practices.
4. Help carry out field testing of high yielding rice and vegetable crop seed.
5. Incorporate within the design for applied research the most effective combination of cultural practices and production inputs that will reduce risks to the farmer and yet provide economic incentives.

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6. Help develop applicable extension tools in cooperation with extension (training) specialist such as promotion of production kits, field trails, field days which demonstrate improved techniques and practices adapted from research efforts.

7. Where feasible, incorporate research on farm equipment and on-farm water management as part of the total package of production technology for rice and food crops.

8. Plan and coordinate with Extension (training) Specialist and GRB and Mag personnel the utilization and timing of short term specialists planned for under the project.

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FARM MANAGEMENT SPECIALIST - SCOPE OF WORK

24 months, starting work at beginning of fourth year after Project is signed. The duty schedule should overlap with those of the Extension and Research Specialists for several months before those positions are phased out. General area of expertise should include: (1) applying packages of improved production technology at the farm level; (2) carrying out a unified outreach effort on production practices through farmer-oriented meetings, demonstrations, and other training programs at production sites; and (3) developing appropriate tools for evaluating the economics of the new production methods as related to the total farming system.

Specialist should have practical experiences in production economics, extension related work in crop production (preferably rice) and have at least an M.S. degree.

Tasks include:

1. Implement programs of improved production practices with staff developed and trained in the Project, while utilizing those research findings deemed appropriate for general use.
2. Continue the development and implementation of extension teaching services to smaller farmers through the use of technical bulletins, audio-visual aids, field days, on-farm demonstrations, seminars and field workshops to address production concerns.
3. Advise and participate with host country personnel involved in the rice and food crops projects on evaluation and analysis of the production activities and propose recommendations for replanning, modification and/or improvements to crop production programs in Guyana.
4. Promote the use of farm plans and budgets with farmers which will include costs of inputs and yields, farm improvements, marketing, and savings. Requires the participating of credit institutions and extension personnel.

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5. Assess production programs in terms of economic benefits derived by the participating farmers. Address problem areas and propose appropriate courses of action. This includes analysing various combinations of cultural practices and production inputs to maximize net farm income.

6. Plan and coordinate with GRB and Ministry of Agriculture the utilization and timing of short term specialists planned for under the Project in supporting the overall program.

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COMMUNICATIONS SPECIALIST (EXTENSION) - SCOPE OF WORK

Two person months of a Specialist who will assist the Extension Specialist (training) in developing appropriate teaching aids which will demonstrate improved rice and food crops farming techniques to workers and farmers. Specialist will be sequenced for approximately two time periods as needed and agreed upon by the GRB, the MAG and the Extension Specialist (training).

Specialist must have in-depth experience in the use of audio-visual and other group training techniques for promoting agricultural education activities.

Tasks include:

1. Design and prepare training materials appropriate to targetted audiences while carefully assessing cultural and social values of the groups.
2. Develop and participate in training programs using improved teaching aids for field workers and farmers.
3. Organize with appropriate GRB and Ministry of Agriculture personnel the procedures and resources required for developing continual informational backstopping for extension and adaptive research personnel.
4. Provide on-the-job training for appropriate personnel in the control, maintenance and utilization of teaching aids and flow of relevant technical information.

SOILS/FERTILITY SPECIALIST(S) - SCOPE OF WORK

Specialist(s) will assist long term Specialist team for a total of two person months to address key problem areas related to soil fertility problems in rice and food crop production. Specialist(s) will be sequenced for approximately two time periods as needed and agreed upon by the GRB, MAG and the long term Specialists.

Specialist(s) should have extensive experience in the investigation of fertilizer requirements and practices and of other means of increasing and maintaining soil fertility. A knowledge of soil conditions in the humid, lowland tropics where rice and food crops grown in rotation with, or complementary to rice is highly desirable.

Tasks include:

1. Participate in adaptive research efforts on rice and food crops where increasing and maintaining soil fertility is problematic.
2. With research personnel, make recommendations for fertilizer requirements and practices needed for high yieldings lowland rice varieties and food crops.
3. Investigate and forecast the behaviour of lands under irrigation, including the anticipated physical and economic consequences.
4. Participate in training programs for adaptive research and extension personnel which address soil and fertility issues and are a part of the overall improved packages of production inputs for farmers.

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PEST MANAGEMENT/WEED CONTROL SPECIALIST(S) - SCOPE OF WORK

Specialist(s) will assist long term Specialist team for five person months to upgrade the capacity of GOG institutions to plan and execute programs in pest management on crops and plant products and in adopting more efficient weed control methods. Specialist(s) will be sequenced for three to five time periods as needed and agreed upon the GRB, MAG and the long term Specialists.

Specialist(s) should have extensive field experience in the practical application of pest management programs, including weed control, on tropical rice and food crops.

Tasks include:

1. Assist appropriate Project personnel on programs to improve operations for survey, identification and evaluation of plant pest outbreaks; and on the selection and application of cultural, biological, chemical and/or mechanical control or eradication methods.
2. Participate in training programs for host country adaptive research, extension and pest management specialists which will improve their capability in overseeing pest control programs on rice and food crops. This includes storage pest as well as rodent control.
3. Assess the environmental, economic and practical aspects of herbicide and insecticide usage in Project area on the growing crops and stored food products.
4. Promote the concept of integrated pest management systems, where feasible, including improved practices of cultivation and environmental sanitation which reduce the use of chemicals.

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SEED TECHNOLOGY SPECIALIST(S) - SCOPE OF WORK

Specialist(s) will assist the GRB for a total of four person months to improve the seed delivery system for high yielding rice varieties. Specialist(s) will be sequenced for approximately four time periods as needed and agreed upon by the GRB and the long term Specialist.

Specialist(s) must have considerable experience in seed certification programs and be able to render operational and engineering assistance in those matters related to the seed laboratory and the seed processing facility

Tasks include:

1. Advise and assist the GRB in the production of certified seeds of superior rice varieties for project needs.
2. Advise GRB on the installation, maintenance and utilization of equipment and facilities being developed under the loan which will improve the quality and amount of certified rice seed for farmers.
3. Assist GRB in the installation, maintenance and utilization of the Project seed testing laboratory which will improve the seed certification process for rice and result in pure, viable, high quality seed.
4. Provide guidance to the GRB rice research station in improving procedures for producing foundation rice seed.
5. Participate in seed technology training programs for host country applied research and extension field assistants.

VEGETABLE CROPS RESEARCH SPECIALIST - SCOPE OF WORK

Specialist will assist MA and long term specialist team for a total of five person months to improve vegetable production programs in the project area. This person will address plant breeding, seek production and multiplication and adaptive research needs for improved production. Specialist will be required for a six to eight week period shortly after the arrival of the long term Research and Extension Specialists preferably during the January/February on the August/September/October vegetable production cycle. The first task to be performed will be an assessment of the existing vegetable industry in the Project area, followed by recommendations for implementing an adaptive research program. Consequential specialist visits will be sequenced for approximately four time periods by the MA and the long term consultants. Specialist(s) must have extensive experience in vegetable production especially in cabbages, tomatoes, watermelons, eggplants, okra, eddoes, green beans, and carrots for small scale farmer production under tropical conditions.

Tasks include:

1. Develop an assessment report complete with recommendations on the vegetable situation in Project area.
2. Identify priority areas for adaptive vegetable crop research in areas which can be effectively utilized in improved production practices for the farmer.
3. Participate in seed breeding programs which will result in the development and dissemination of improved cultivars appropriate to tropical conditions.
4. Assist in improving the certified seed multiplication system for vegetable which includes seed farm development, seed processing and seed testing.
5. Assist in vegetable crop training programs for host country applied research and extension field assistants.
6. Evaluate vegetable production processing and marketing needs and priorities.

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GOG STAFF TO BE ASSIGNED TO PROJECT

Guyana Rice Board

Storekeeper  
Engineer  
Workshop Foreman  
Mechanics (6)  
Farm Manager  
Field Foreman  
Lab Technician  
Tractor Operators  
Research and Extension Officers (2)  
Extension Assistants (3)  
Applied Research Assistants (6)  
Extension Specialists (10)

Ministry of Agriculture

Extension Division

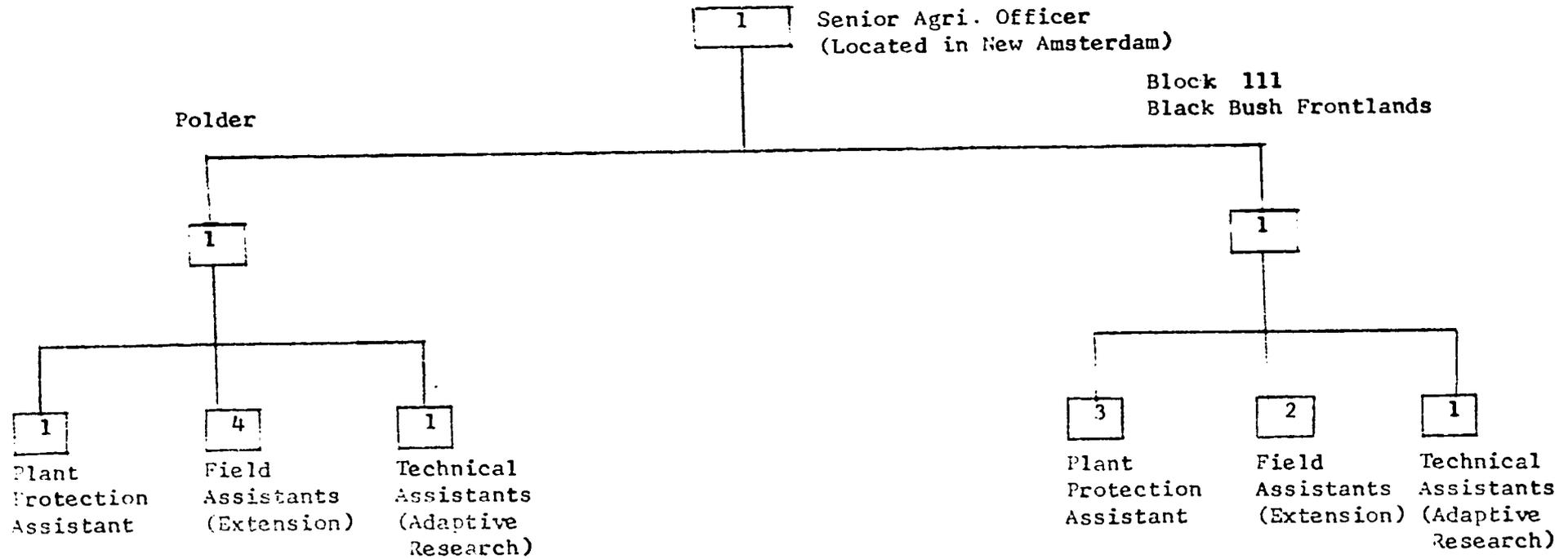
Agricultural Officers (2)  
Technical Assistant  
(adaptive research) (2)  
Extension Field Assistants (9)  
Technical Specialists  
(pest management) (2)

Hydraulics Division

Project Manager  
Project Engineer  
Admin. Officer  
Surveyors & Crews (4)  
Drilling and Site Testing Crews (2)  
Senior Surveyor  
Senior Inspectors  
Inspectors (6)  
Technicians (6)  
Draftsmen (6)  
Secretaries (3)  
Clerks (6)  
Driver, Boatmen, Laborers (16)

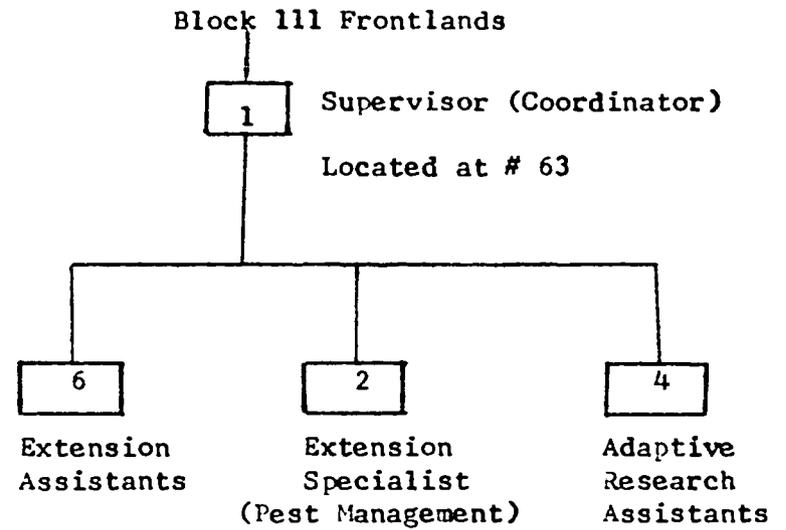
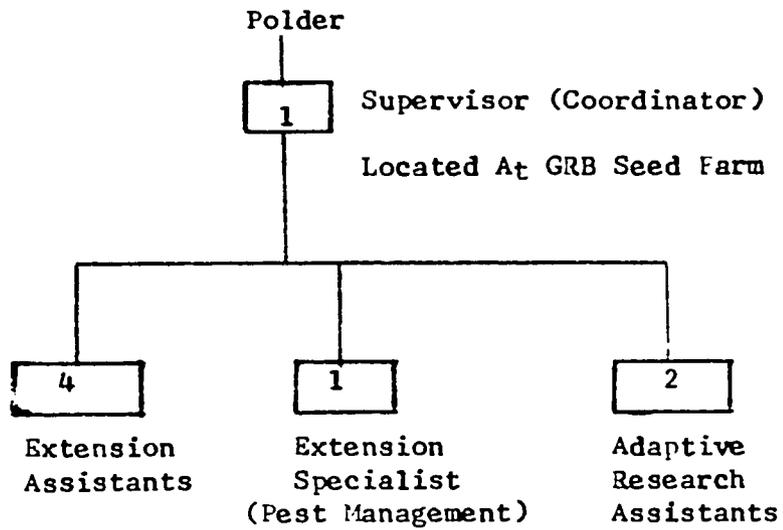
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Food Crops Extension and Applied Research  
Staffing Proposal



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Rice Extension and Applied Research  
Staffing Proposal



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GLOBAL PROJECT FINANCING: SOURCES OF FUNDING 1/

(Figures in US\$ 000)

ANNEX III  
Exhibit 7(a)  
Page 1 of 1

ITEM	I.D.A.	I.F.A.D.	OTHER DONOR	A.I.D.	G.O.G.	TOTAL
<u>Civil Works: Irrigation &amp; Drainage</u>	4,035	6,400	8,500	-	-	18,935
<u>Construction</u> (incl. renovation)	-	-	-	926	244	1,170
<u>Equipment (incl. vehicles)</u>						
1. Irrigation Pumps	2,840	-	-	-		2,840
2. Operation & Maintenance	1,140	-	-	-		1,140
3. Extension, Research and Seed Production	-	-	-	281	96	96 281
4. Marketing Equipment	-	-	-	442		442
5. Design & Supervision Equipment	-	-	-	145	135	280
6. On-Farm Development	-	-	-	2,130	95	2,225
7. Equipment Operators	-	-	-	-	270	270
<u>Management &amp; Technical Services</u>						
1. Consultant Services	-	-	-	2,490	1,500	3,990
2. Extension, Research & Seed Production	-	-	-	300	-	300
3. On-Farm Development	-	-	-	265	55	320
4. Feasibility Study	-	-	-	405	100	505
5. Project Preparation Study	280	-	-	-	-	280
6. Housing	-	-	-	-	505	505
<u>Training</u>						
1. Training	-	-	-	5	-	5
2. Equipment & Supplies	-	-	-	21	-	21
<u>SUB TOTAL BASE COST</u>	<u>8,295</u>	<u>6,400</u>	<u>8,500</u>	<u>7,410</u>	<u>3,000</u>	<u>33,605</u>
Contingencies	1,705	3,600	-	90	3,834	9,229
<u>TOTAL</u>	<u>10,000</u>	<u>10,000</u>	<u>8,500</u>	<u>7,500</u>	<u>6,834</u>	<u>42,834</u>

1/ Does not include AID Grant and GOG Counterpart to Grant, totalling US\$2.4 million

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PROJECTED PROCUREMENT BY FISCAL YEAR

ANNEX III  
Exhibit 7(b)  
 Page 1 of 5

SUBJECT: CONSULTANTS

	FY 79				FY 80				FY 81				FY 82				FY 83				FY 84			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
<u>CATEGORY:</u>																								
Team Leader		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Planning engineer		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Surveys engineer		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Design engineer No. 1		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Design engineer No. 2						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Mechanical engineer								—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Construction engineer No. 1							—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Construction engineer No. 2								—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Principal engineer	—				—				—				—			—			—				—	
Materials engineer (Local)						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Asst. engineer No. 1 (Local)									—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Asst. engineer No. 2 (Local)		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Asst. engineer No. 3 (Local)		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Feasibility study													—	—	—	—	—	—	—	—	—	—	—	
<b>Total</b>		\$284,000				\$607,000				\$720,000			\$798,000			\$336,000			\$150,000					

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PROJECTED PROCUREMENT BY FISCAL YEAR

SUBJECT: AGRICULTURAL EQUIPMENT & SUPPLIES

CATEGORY:	FY 79				FY 80				FY 81				FY 82				FY 83				FY 84			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Seed process. & test. equipment - procurement					████████████████████ (\$200,000)																			
Vehicles - extension & research, TA					████████████████████ (2) (\$14,000)																			
Vehicles & motorcycles					████████████████████ (5 Vehicles) \$35,000				████████████████████ (26 motorcycles) \$32,000															
Extension & research equipment & supplies					████████████████████ (\$21,000)																			
Drying & storage facilities					████████████████████ (Equipment & matls.)				████████████████████ (FY 80 \$492,000)				████████████████████ (1./C Installation)				████████████████████ (½ FY 80, ½ FY 81) \$381,000							
Spare parts					████████████████████ (\$300,000)																			
Shop tools					████████████████████ (\$50,000)																			
Land planes					████████████████████ (9) \$110,000																			
Vehicles- machinery pool					████████████████████ (8) \$75,000																			
Combines																	████████████████████ (5) \$350,000							
Tractors, 65 hp. & disc plows									████████████████████ (20) \$350,000															
Tractors, track type 75 hp.					████████████████████ (9) \$670,000																			
Tractors, 85 hp. & disc harrows					████████████████████ (3 tractors, 4 Disc harrows) \$115,000																			
Border discs, ditchers, mobile service units					████████████████████ (10 border discs, 4 ditchers, 2 service units) \$110,000																			
<b>Total</b>																								
	\$289,000				\$2,075,000				\$541,000								\$350,000							

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PROJECTED PROCUREMENT BY FISCAL YEAR

SUBJECT: CONSTRUCTION

ANNEX III  
Exhibit 7 (b)  
Page 4 of 5

CATEGORY:	FY 79				FY 80				FY 81				FY 82				FY 83				FY 84			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Seed processing & testing facility								(\$25,000)																
GRB shop facility																(\$40,000)								
Engineering equipment								(\$145,000)																
Headquarters facility								(\$252,000)																
Other buildings																(\$228,000)								
Contingency																								(\$133,000)
<b>Total</b>								\$207,000				\$186,000				\$15,000				\$89,000				\$44,000
				\$282,000																				

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PROJECTED PROCUREMENT BY FISCAL YEAR

SUBJECT: TRAINING

CATEGORY:	FY 79				FY 80				FY 81				FY 82				FY 83				FY 84			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
<u>Third Country</u>																								
Seed technology								(\$3,200)								(\$3,200)								
Rice research & extension								(\$4,800)				(\$4,800)												
Rice research & extension								(\$4,800)				(\$4,800)				(\$4,800)								
Rice research & extension								(\$4,800)								(\$4,800)								
Rice research & extension																(\$4,800)								
Food crops, adaptive research								(\$1,600)				(\$3,200)												
<u>In Country</u>																								
Seed technology								(\$4,200)				(\$4,200)												(\$5,600)
Research & extension								(\$3,000)				(\$3,000)				(\$3,000)								(\$3,000)
<b>Total</b>								\$34,000				\$42,000				\$34,000								

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SOCIAL SOUNDNESS ANALYSIS

BLACK BUSH SMALL FARM  
IRRIGATION PROJECT

Project No. 504-0070

April 17, 1978

GEORGETOWN, GUYANA

Extracted from a Report

BY

DR. JOHN J. HOURIHAN  
DEPARTMENT OF ANTHROPOLOGY  
HOWARD UNIVERSITY  
WASHINGTON, D.C.

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1: Introduction

The following report offers a sociological assessment of the expected beneficiaries of the proposed agricultural development scheme in East Berbice, Guyana.<sup>1</sup> In this geographic area the human population is found in two distinct types of communities. The majority, about 40,000 persons (Cervantes et. al. 1974: Figure 6), is located in a string of small villages along the Corentyne highway between Whim and Springlands. These villages are in two districts, called the Black Bush Frontlands and Block III, both of which are called the "Road Area" in this report (see accompanying map)

Another 10,000 people are located in four non-contiguous communities in a district called Black Bush Polder. Although many similarities are found in the two types of villages, there are significant differences which will be discussed in the paper.

2: Ethnicity and the Target Population.

Essentially, two distinct ethnic groups are found within the area of the proposed development: East Indians (Indo-Guyanese) and Negroes (Afro-Guyanese). Within this area, the former group account for over 80% of the total population (Roberts 1976: 17-24). More importantly, the East Indians probably number closer to 95% of the population actually engaged in rice farming.

Of course, there are some Afro-Guyanese who are rice farmers, and many who engage in at least some subsistence agriculture, particularly in the area known as Zambia, in Black Bush Polder. However, given their small populational representation, this report will be concerned essentially with the East Indian population.

Numerous writers have noted that the Guyanese East Indian population has attempted, over the last 100-plus years, to maintain certain aspects of traditional customs, particularly in the areas of religion, the inheritance system, and marriage and residence patterns (see for example, Araneta and Singer 1967; Despres 1967; Smith and Jayawardena 1967; Mitchell et. al. 1969). To some degree, these efforts were successful because the British had sanctioned the continuity of the traditional Indian customs by a series of laws and actions taken during the 19th Century. Nevertheless, a good deal of acculturation has occurred during the last 120 years so that,

today, the Indian customs reflect a fusion with Western (particularly English) and Afro-Guyanese patterns of behavior.

### 3: Social Organization.

As noted above, the patterns of behavior exhibited by the Indo-Guyanese tends to include aspects (at least in the "ideal") of traditional Indian Culture as well as aspects borrowed from other cultures and societies. However, behavior in the Polder has been further influenced by the unique social and economic structure of the Polder project. Thus the original settlers, after filing applications, were chosen by a Selection Committee, with preference given to unemployed persons with large families (Barker 1975: 19-28). These settlers came from many areas of Guyana, and they came essentially as nuclear families separated from their kinsmen. They came to build houses on leased, two and one-half acre homestead plots, laid out in a grid pattern in the four living areas of the Polder Scheme: Yakusari, Joanna, Mibikuri, and Lesbeholden. Each house also controls fifteen acres of land, which are also leased, and which are to be used for the production of rice.<sup>2</sup>

In the Frontlands and Block III Areas, most of the land is "transport" <sup>3</sup> or privately owned lands, although some of the lands in both the housing and the cultivation areas are leased from their private owners. In these areas, many families have occupied their lands for several generations and, for any given family, kinsmen tend to be numerous and in proximity. In these areas as well, the houses tend to be placed very closely together in dense village clusters.

The differences in settlement patterns, kinship proximity, and leased vs. owned lands between the Polder and Road areas caused variations in the patterns of behavior in the two places.

Household Composition. In both the road and the Polder areas, houses typically contain a nuclear family of Mother, Father and offspring. However, on occasion, the residents may be extended to include grandchildren (most commonly, these children would be the offspring of unmarried/divorced/separated daughters).

Also, following Indian tradition, the household may be extended to include the wives of married sons. In India, of course, the ideal is to have a large, extended family constituting a co-residential and economic unit. With Guyanese Indians, however, and partially for historical reasons (Mitchell et. al. 1969: 76-77), married sons tend to establish separate households

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near to the male's father by the time the first child is born to the couple. As will be shown later, these patterns have been disrupted, particularly in the Polder Area, and the household composition is, consequently, being modified. Finally, I should note that, although the numbers vary, as an average, ten individuals reside in each house.<sup>4</sup>

The Descent System. Due to the British influence, the East Indians practice a cognatic descent system wherein descent is traced through both the male and the female lines. Or, at least, this is stated to be the legal situation. In fact, however, the population has a strong patrilineal orientation/preference in their descent system, and this preference is crucial for such things as marriage and residence patterns, and for the inheritance of the largest and most important items, such as land, houses and tractors.

Marriage Patterns.<sup>5</sup> Unlike in traditional India, marriages in the Road or Polder areas need not be strictly "arranged" between the respective fathers. However, for the marriage to occur, in most instances, the fathers must give their approval. This is so because of the cost involved in the marriage itself (a figure of G \$2,000 would not be unusual).

It is because of these costs that the patrilineal descent lines assume their importance. While it is true that a couple could simply marry without the consent of their fathers, the marriage itself would not be "up to code" and the couple would receive little help in starting their married life. The importance of this should be obvious since few young men can financially underwrite the costs of marriage (even excluding the cost of a large ceremony). It should also be noted here that young men, before marriage, are obligated to share whatever financial earnings they may have with the head of their household - i.e., their father. The significance of this latter point is that it is almost impossible for a young man to save enough money to finance his own wedding.

In Black Bush Polder, houses may be built only on the 2 1/2 acre homestead plots. However, for health reasons, the Government decreed that no more than two houses could be built on any single homestead. Also, in an economic sense, any more houses would begin to reduce the productive capability of the household plots which provide much of the subsistence requirements of the Polder residents. Moreover, Guyanese Indians traditionally do not reside in the households of either set of parents, upon marriage, except perhaps for a brief period of time.

In the Frontlands and Block III areas, people are not constrained by a limit on the number of houses that can be built on any given family-owned plot. Nevertheless, other factors have reduced the Road Areas to the same plight as the Polder. Specifically, these include: (a) an apparent limitation to the number of house plots on either side of the road, usually four in depth; (b) an obvious limitation to the number of houses that realistically can be built on a family plot (in many areas, new houses simply cannot be constructed); (c) the high value of land in the living areas which results in the leasing of land to non-relatives for the monetary profit.

Thus in both the Road and the Polder Areas, land shortage has tended to alter the traditional marriage system and has resulted in a large, and growing, group of alienated men and women who are residing with their parents well past the age when they would have set up separate households.

Residence Patterns. In most societies of the world, there is a strong correlation between descent systems and post-marital resident patterns. Thus, in cognatic systems, such as practiced in the U.S.A. and Britain, the residence pattern tends to be neolocal: i.e., the newly married couple establish their household apart from either set of parents. However, with the East Indians of Guyana (again, technically/legally "cognatic"), the residence patterns are strongly virilocal: i.e., the couple live close to the household of the father of the groom. This is historically understandable since Indians, long practitioners of agricultural economies, have utilized married and unmarried sons as the pool of cooperative agricultural labor (Ibid: 58).

However, again due to the problems of land (especially in the Polder), virilocality is virtually impossible. This factor has affected the traditional patterns of cooperative labor and resulted in real problems/alternations in the organization of labor. The forced neolocality has also helped to undermine further the traditional family organization - at one time, arguably the greatest single strength of the Indo-Guyanese. I should note here also, that virtually all of the settlers to the Polder area assumed, by definition, neolocal residencies. In that area, neolocality will now be carried to a second generation.

Inheritance. Like residence patterns, inheritance patterns tend to correspond to descent systems. Thus, in cognatic descent systems, all surviving offspring of the deceased parents tend to have rights to an equal share of the estate (termed "partible" inheritance). Of interest in such systems is that it is very difficult to aggregate property

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through generations. Precisely this point is the stated objective of the Burnham Government.

However, in terms of inheritance among Indo-Guyanese, the patrilineal descent line again assumes the predominant significance in terms of the dispersal of the most valuable parts of an estate; i.e. houses, a shop, land, tractors. That is, for these items, there is a strong preference for inheritance by a son, usually, but not necessarily the first-born son (i.e. "primogeniture").

This non-partible inheritance system has apparently worked fairly well in the Road Areas though it, of course, tends to "short-change" some of the sons. Still, from the Indian perspective, this is better than continually dividing the valuable property in such a manner that all had some but none had enough. Furthermore, by Indian custom, the older son(s) who inherit the property tend to assist younger brothers in social and economic ways following the death of the father. In addition, with virilocality, it must be remembered that married brothers would be in proximity and would, therefore, be able to share in the property.

However, a serious problem has arisen in regards to inheritance within Black Bush Polder. This problem is caused by the nature of the lease which stipulates that, although the leasee may indeed designate the heir(s) a Selection Committee (composed of Government Officers and private persons nominated by the Government) is ultimately responsible for approving that heir, but it is simply not guaranteed. If it does not give its approval, the property reverts to the Government to be allocated anew. Compensation, as determined by the Government, is extended to the survivors for improvements to the property (such as in the irrigation and drainage canals, in the construction of houses, sheds, and so forth.) But, for the Indians in the Polder, these regulations have raised a series of questions in their minds. Among these are:

(A) What of the son who may have built the one allowable additional house on his father's property? (B) What if the family is not satisfied with the degree of compensation?

(C) Where are the families thus "evicted" to go?

#### 4: Quality of Life Indicators.

Housing Conditions. Throughout the area of the proposed project, the housing is essentially of two varieties. First, there is a two-room wooden structure about 20 by 14 feet. These houses, as well as the other type, are built on posts or concrete blocks, because of periodic flooding and as a precaution against vermin, snakes or other pests.

Wooden steps lead to the front and perhaps the back door. The area beneath the house is used as a "living room" during the day and perhaps as sleeping quarters at night. Roofs for these small houses are commonly made from corrugated iron (called pieces of "zinc") or wooden shingles. These houses are, for the most part, unpainted. Kitchens tend to be below the house or to the side of the house. Few if any, have electricity or refrigerators, and most such households cook with firewood. Indoor or outdoor lavatories are unusual, although their presence is apparently required by law.

The second type is a larger house with a center living room, several bedrooms, perhaps a bathroom, and a kitchen with modern conveniences. These houses, also built of wood tend to have electricity, glass windows, be brightly painted, and be well-tended.

The important thing about the two kinds of houses is that, based on observation, each seems to constitute about 50% of the total number of houses in the project area. However, about 80% of the houses in Black Bush Polder are of the first variety. This is not caused so much by a disparity of income between the Road and Polder areas, but is rather, related to the difference between "owned" vs. "leased" land, and to the problems of inheritance discussed earlier.

Education. Primary education (6-12 age group), which is compulsory, is provided by Government, denominational, and private schools. In the Government schools, the education is essentially free.

At the secondary level, there are also Government and private schools. Moreover the Government schools at this level offer a variety of programs: Senior Secondary Schools carry a sixth form and provide a seven-year academic program; Junior Secondary Schools end at the fifth form and provide a five-year program; Multilateral Schools provide a five year course of studies during the last two of which students are "streamed" according to their interests and aptitudes for a technical, agricultural, or commercial education; Community High Schools are four-year institutions with vocational curricula designed to make students eligible for the Multilateral Schools (Guyana Handbook: 1976 20-21). Primary School children, from across the country, sit a Common Placement Examination for entrance to these various Government Secondary Schools.

There are a number of Government and private primary and secondary schools in the Frontlands and Block III areas, whereas, there is one Government Primary School in each of the four communities of Black Bush Polder, but no Secondary Schools.

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Still, of more importance than the number, location or kinds of schools, or than the statistically documented levels of educational attainment, is the actual education being achieved by students (who, like children in many countries, are annually "passed" from one grade to the next whether they deserve to be or not).

One possible measure on actual education would be to correlate population growth with enrollment growth and attendance rates by school district. Data of this sort is partially available from Black Bush Polder, and the remainder of this section will be devoted to a discussion of this data.

The four primary schools in the Polder were completed in 1962. Enrollment for four selected years is presented in Table I.

<u>Year</u>	<u>Enrollment</u> (To Nearest Thousand)
1963	2,500
1967	3,900
1971	2,800
1977	2,500

TABLE I: Primary School Enrollment by Selected Years, Black Bush Polder (Adapted from Barker 1975: 14-40 and Chandra 1978: 11).

Table 2, presented below, shows the average daily attendance of students from the four Polder schools for 1977:

	<u>Enrollment</u>	<u>Attendance</u>
Lesbeholden	510	259.96
Mibikuri	833	566.76
Joanna	522	274.58
Yakusari	597	358.78
Total	<u>2,462</u>	<u>1,460.08</u>

TABLE 2: Comparison of Total Enrollments to Average Daily Attendance for 1977, Black Bush Polder (Ibid. 11).

From these figures, several things are apparent: (A) Even with an increase in population, there has been a steady decline in school enrollments, and (B) For any given day, two-fifths of all students are absent from school. These indicate that the actual education being received by children in the Polder is something less than what it could or should be. Several possible reasons could underlie this.

First, it has been suggested that there are a lack of qualified teachers and a lack of facilities/aids for instruction within the schools and this has led to student disinterest or apathy and eventual "dropping out" (Barker 1975: M-40).

Second, the project manager suggested that the drop in attendance was due:

To tedious access from their homes due to absence of suitable bridges across the canals to connect the earth-streets, in addition to the difficulty in using these streets during the wet season when they become muddy and slippery thereby making it impracticable for them to reach school in a tidy condition (Chandra 1978: 11).

Fourth, it has been suggested that the poor attendance records of the Indo-Guyanese has historical determinants: First, although education has been compulsory at the primary level since 1876, it has never really been enforced, particularly with the East Indians, who were, in fact, exempted from the original compulsory law (Mitchell et. al. 1969: 95-96). Second, Indians have long had a disregard for external authority in favor of a high respect for kinship bonds, and teachers have been viewed as external authorities (Ibid: 58). Related to this second point is the notion that the Indo-Guyanese, from the time of completing their terms of indenture, have continued to live in rural areas, maintaining as much as possible of their traditional customs. But, until recently, most education could be received only in Christian schools, and the Indians shunned these institutions as a culturally divisive force (Ibid: 56).

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A final historical factor has been that many East Indians have believed that their African teachers were of low caste (Chamar") (Ibid: 58). In sum, the argument here is that traditional forces have mitigated against the Indo-Guyanese utilizing formal education as a means of social or economic success or mobility. Instead, but obviously only in the most general sense, the East Indians seem to stress little more than a minimal reading and writing capability.

A Fifth possible reason for the low attendance rates, is the necessity of school-age children assisting their parents with farm chores - especially male children. It is reported that children are used for "limited periods of time" during the planting and harvesting of the rice padi.

Health Status. Very little specific information concerning the health status of the proposed beneficiaries was available. However, there have been several national health studies which provide instructive data. Thus, within the confines of the proposed development school, there is one Hospital (with 60 beds)<sup>6</sup>, and several health centres/stations<sup>7</sup> which care for patients from most of the Polder, Frontlands and Block III areas (Cervantes et. al. 1974: 21)<sup>8</sup>. In addition, there is a Medical Dispenser located at Mibikuri, the administrative center of Black Bush Polder, and a Government Medical Officer makes "periodic" visits to the Mibikuri Dispensary (Barker 1975: M-40).

Health records for the project area were not found, but it can be noted that medical attention was given to 21,054 persons at the Mibikuri Dispensary during 1977 (Chandra 1978: 10). Exactly what illnesses were treated was not available, but the ten most common causes of morbidity according to the Cervantes Report were: gastro-intestinal and genito-urinary systems diseases; pregnancy; accidents; infectious and parasitic diseases (causing 40% of the deaths of children under 5 years); no diagnosis reported perinatal diseases; cardiovascular and circulatory systems diseases; respiratory diseases; malignancy, nutritional (1974:8).

In terms of nutrition, the Cervantes group had estimated that 28.4% (or 399) of the total number of deaths of children under five years during 1967 were caused by malnutrition (Ibid.: 10). Moreover, a 1971 PAHO Study of Nutrition in Guyana indicated that 25% of the rural East Indian population were suffering from moderate to severe malnutrition (1976: 31-42).

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It is fairly obvious, moreover, that the daily diet in the project areas is very high in carbohydrates and low in proteins. Many homes throughout the area raise chickens, ducks and turkeys (particularly in the Polder). Larger animals, such as cattle, pigs, sheep and goats (unless they are prohibited by dietary taboos) are normally slaughtered only on religious holidays or during such ceremonies as marriage. On the other hand, in the PAHO Study, fully 70% of all East Indians expressed some kind of meat prohibition. (1976: 74-75).

Fish are fairly common in the Road Areas where some percentage of the population engage in full or part-time fishing. In the Polder, fish is less available, except for the fairly small (but increasingly rare) fish commonly called "Hassar". This fish is taken from the irrigation and drainage canals which were, at least at one time, stocked by the Government. Taboos also exist in relation to fish, with many households avoiding scaleless fish (Ibid.).

Labor Organization. On the lands within the Project area, the organization of labor is accomplished in one or more of four possible ways: formal cooperative; informal cooperative; hire; family. The most common is "family", wherein a farm operator utilizes himself, his wife, and his married and unmarried children to accomplish the kinds of tasks that do not require either mechanization (for example, with rice harvesting) or large numbers of adult males (for example, with house building). Here, again, is evidenced the traditional Indian strategy of keeping married sons nearby the father's household to provide a mutual labor pool, as well as to reduce "Hire" labor costs.

Closely related to family labor is what I have labeled "informal cooperative", wherein friends and/or neighbors would assist each other in certain tasks (for example, house building) on the basis of a balanced reciprocity of quid pro quo. Here if there are costs entailed, it will be in the form of food or drink. I should note that this form of labor has existed for a long period of time in Indian societies. However, I have reason to believe that, in the Polder, this form of labor exchange is much more frequent than elsewhere precisely because of the breakdown in the virilocal post-marital residence patterns. In other words, I believe that friendly relations between small groups of adult males have been substituted for the traditional small groups of related males.

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"Hire" labor is, of course, when someone (either Government or private) is paid to complete a specific task, such as the harvesting of rice. This is the most expensive form of labor organization, and it has caused certain problems in the project area.

Risk Management. If we may define "risk management" as economic decision-making based on degrees of uncertainty, then the target population must be discussed in terms of two historical phases.

In the first phase, when the traditional East Indian family organization was still viable (essentially until recently), decisions concerning economic choices would be made almost solely on the basis of the perceived gains or losses to the extended family. This is so since the family acted essentially as an autonomous, cooperative agricultural unit, wherein risk for any single member was minimized by the built-in "insurance" of belonging to the group. In other words, any single member, say eldest married son, could sustain an economic setback (for example, crop loss) by receiving assistance from his father and/or brothers.

The peculiar thing about this first phase is that economic risks could be taken, even with a good deal of uncertainty, by at least one household of any given extended family, again because of the system of sharing economic gains and losses. Paradoxically, real economic innovation would only be accepted if they were not perceived as being threatening to the existing family structure, i.e., there there was virtually no uncertainty regarding the continued viability of the most basic social and economic unit.

The second phase is marked by a breakdown of the traditional family organization (as discussed in earlier sections), especially in Black Bush Polder. As such, risk can be taken if the farmer is convinced that innovations will lead to increased production and income. In fact, the original decision of so many East Indians to be uprooted from their areas of birth (and their extended families), and to move to Black Bush Polder in the 1960's was precisely because the economic uncertainties were minimized by the Guyana Government, but the potential economic gains were considerable. The risks and uncertainties were minimized in the sense that the Government, with the assistance of International Agencies, built the Polder; allocated the lands; provided an extension service, fertilizers, pesticides, and seed; bought, milled and sold the harvested rice, and so forth.

Credit. In the project area, credit may be obtained in a variety of ways, and for a variety of purposes. The purposes may include the costs incurred in: "Hire" labor; production inputs that are provided by the GRB (for example, fertilizer, insecticides, harvesting); purchasing a tractor; marriage ceremonies; house building, and so forth.

The ways in which credit is obtained, however, varies from the Polder to the Road Areas. In the Polder, I would estimate that over 50% of credit for production is obtained from the GRB (c.f. Barker 1975: L-20), with a repayment time of six months to one year, and with the padi being the collateral requirement (Ibid: L-61, L-62).

Credit for production or other purposes may also be obtained from merchants, commercial banks, or relatives and friends. There is a problem with the first two, however, in that, because their lands are leased, the Polder farmers have very little property to be used as collateral. I would estimate that these two sources provide no more than 20% of credit needs.

The final 30% of credit in the Polder Area is derived from relatives and friends, where collateral is essentially unnecessary.

Sources of Income. Households in the project area are not limited to their own farms for deriving their income, though the small farms, owned or leased, undoubtedly provide the bulk of income, directly or indirectly, for most households. This income includes money earned from the rice crops; from marketing other foodstuffs, such as coconuts, fruits and vegetables; from "custom" work (with a tractor) such as plowing and raking; and from hiring out as a daily wage laborer or someone else's farm.

Other sources of income include the ownership of private businesses (such as shops and cinemas); hiring out as a tradesman; part or full-time fishing; chicken farming; occasional sale of large animals, such as cattle, sheep, or goats; working as a day laborer with such organizations as the Drainage Board, the Guyana Rice Board, the Polder Administration at Mibikuri, or the State farms; and, finally, through remittances sent from relatives in such places as England, Canada and the U.S.A. This latter source of income appears to be particularly crucial for young men and women who, because of problems already discussed, are unable to own or work their own lands which, otherwise, would be their major source of income.

Technology. Although some agricultural work in the project area is accomplished by the use of such hand tools as hoes and machetes (particularly on the relatively small subsistence plots), the vast majority of the agricultural labor is mechanized. The agriculture itself is very intensive in the sense that where available the farmers utilize irrigation and drainage canals, fertilizers, insecticides, and so forth.

One important point concerning technology is that, essentially, the proposed development project in no way involves the introduction of neo-technology, (Section 5B). Instead, this project is simply an expansion and improvement of existing technology.

6: Conclusions: Constraints and Strategies.

General Conclusions. The proposed Black Bush Project, will benefit the majority of the estimated 6,000 farm families in the project area. This is true for a number of reasons.

- (1) There will be an increase in incomes as derived from increased rice yields and from increased employment due to the need for expanded support services. This especially will be the case with the Frontlands and Block III areas due to the construction of irrigation and drainage schemes.
- (2) The increased income should lead to an improvement in the quality of the housing, at least in the Road Areas where investment in housing entails few risks or uncertainties. By extension, health conditions should improve for this same population considering that an improvement in housing would probably include the construction of waste facilities and or more sanitary kitchens (c.f. PAMO 1976: 73-77).
- (3) The diet of the target population could be enhanced if at least some of the lands to be irrigated could be set aside for grazing purposes. In any event, some of the lands in the Frontlands and Block III areas will undoubtedly be utilized for the production of fruits and vegetables, either for family consumption or marketing.
- (4) In the Polder area, and to a certain degree in the Block III area, increased production will surely stem from the rehabilitation of the existing irrigation and drainage systems and this will increase the economic viability of the small farmers in these areas.

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Constraints and Strategies. As noted earlier, there appear to be no serious constraints in terms of acceptance of the project by the target population, particularly since this project is simply an extension and improvement of existing technology. However, there are several possible impediments to the maximum success of the project, which should be considered during implementation.

(1) There may be a need to compensate some landowners for lands lost to the construction of the irrigation and drainage canals. I suspect, however, that this compensation will be modest on any individual basis and that cooperation will be given by the landowners since, in the end, they stand to gain economically.

(2) The project design should take into consideration the accompanying need for infrastructural development.

(3) Every effort should be made to maximize the use of Indians in the proposed development scheme, not just as the target population, but as a source of labor to implement the scheme. If this is not done, acceptance of the project will be dampened.

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FOOTNOTES

1. This analysis is part of Project Number 504-0075, The Black Bush Small Farm Development Scheme.
2. I should also note that frontland farmers control some 2,860 acres of Polder land, on farms from 10 to 20 acres in size. The "Tenure pattern is a mixture of owner-operators (on land leased from Government) and tenant-operators of large private holders" (Barker 1975: M-38).
3. These are called "Transport" lands because the deeds can be transported to the Bank for credit purposes.
4. I was unable to take a household census in the villages where I worked, and this figure of 10 individuals is based on my few observations and on Mitchell et. al. (1969). The PAHO Study of 1971 indicated that, for the country as a whole, the average household size was 6.14, though it tended to be higher in rural areas (1976: 26).
5. "Marriage" is used here to mean either legal marriage or consensual unions. However, it is important to note that Indo-Guyanese, unlike the Afro-Guyanese, tend to favor religious wedding ceremonies which legitimize the union in the eyes of the family and of the village.
6. The Hospital provides acute, in-patient health care.
7. Health stations are intended to provide for pre-natal, post-natal, infant and pre-school child health clinics, immunization services, emergency first aid and referral services to health centers. The latter provide out-patient care, maternal/child care, family counselling, immunization services, dental care, control of mental tuberculosis, leprosy and venereal diseases, and referred services to the district hospital. Cervantes et. al. reported that these various health services were not fully provided (1974: 23-24).
8. It might be instructive to report the general conclusions of the Cervantes Report (Ibid: 1) -

- A. The level of health in the country is low as evidenced by the high levels of infant, maternal and child mortality, plus the high incidence of infectious and parasitic diseases.
- B. The health facilities are obsolete, non-functional and hazardous.
- C. The human and financial resources are inadequate to meet the demand of the population.
- D. There is a lack of health statistics for the purpose of planning and evaluation.

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3.5 Acre Farm Budget  
(in G\$)

<u>Crop</u>	<u>Land Area</u> (Ac.)	<u>Cropped Area</u> (Ac.)	<u>Yield</u> (T/Ac.)	<u>Price</u> (\$/T)	<u>1/</u>	<u>2/</u>	<u>Gross Benefits</u>	
					<u>GVP</u> (Per ac. per crop)	<u>Inputs</u> (Per ac. per crop)	<u>(Per ac.)</u>	<u>(Total)</u>
Rice	3.3	5.0	1.25 <sup>3/</sup>	296	370	190.40	179.60	898
Food Crops	.2	.3	4.0	694	2,776	469.26	2,308.70	693
<b>Total</b>	<b>3.5</b>	<b>5.3</b>						<b>1,591</b>
Cropping Intensity: 151%								
<u>Gross Farm Benefits</u>								
Less: Hired labor						-		
Family labor						276		
Interest <sup>4/</sup>						98		
							<b>374</b>	
<u>Net Farm Benefits</u>							<b>1,217</b>	
Project Charges							154	
Operation and maintenance							-	
Investment recovery							<b>1,063</b>	
<u>Net Farm Income</u>							<b>592</b>	
<u>Estimated Net Income Without Project</u>							<b>471</b>	
<u>Incremental Net Income</u>								

1/ Gross value of production.  
2/ Production costs less labor.  
3/ 20 140 lb. bags.  
4/ 9% per annum.

8.0 Acre Farm Budget  
(in G\$)

<u>Crop</u>	<u>Land Area</u> (Ac.)	<u>Cropped Area</u> (Ac.)	<u>Yield</u> (T/Ac.)	<u>Price</u> (\$/Ton)	<u>GVP<sup>1/</sup></u> (Per ac. per crop)	<u>Inputs<sup>2/</sup></u> (Per ac. per crop)	<u>Gross Benefits</u> (Per ac.) (Total)	
Rice	7.8	12.5	1.3 <sup>3/</sup>	296	389.80	196.91	187.89	2,349
Food Crops	.2	.75	3.9	694	2,706.5	460.00	2,246.60	562
Total	8.0	12.75						2,911

Cropping Intensity: 160%

Gross Farm Benefit

Less: Hired labor	49.00	
Family labor	414.40	
Interest <sup>4/</sup>	236.34	699

Net Farm Benefits

2,212

Project Charges

Operation and maintenance	352
Investment recovery	120

Net Farm Income

1,740

Estimated Net Income Without Project

1,152

Incremental Net Income

588

<sup>1/</sup> Gross value of production.

<sup>2/</sup> Production costs less labor.

<sup>3/</sup> 21 140 lb. bags.

<sup>4/</sup> 9% on working capital.

15.0 Acre Farm Budget  
(in G\$)

<u>Crop</u>	<u>Land Area (Ac.)</u>	<u>Cropped Area (Ac.)</u>	<u>Yield (T/Ac.)</u>	<u>Price (\$/Ton)</u>	<u>GVPl/ (Per ac. per crop)</u>	<u>Inputs<sup>2/</sup> (Per ac. per crop)</u>	<u>Gross Benefits (Per ac.) (Total)</u>	
Rice	13.3	23.5	1.3 <sup>3/</sup>	296	384.80	201.12	183.68	4,316
Food Crops	1.2	1.5	3.9	694	2,706.60	483.00	2,224	3,336
<b>Total</b>	<b>15.0</b>	<b>25.0</b>						<b>7,652</b>
Cropping Intensity: 167%								
<u>Gross Farm Benefits</u>								
Less: Hired labor						818.40		
Family labor						768.00		
Interest <sup>4/</sup>						525.74	2,112	
<u>Net Farm Benefits</u>							<u>2,540</u>	
Project Charges								
Operation and maintenance							660	
Investment recovery							525	
<u>Net Farm Income</u>							<u>4,355</u>	
<u>Estimated Net Income Without Project</u>							<u>2,884</u>	
<u>Incremental Net Income</u>							<u>1,471</u>	

<sup>1/</sup> Gross value of production.

<sup>2/</sup> Production costs less labor.

<sup>3/</sup> 22 140 lb. bags.

<sup>4/</sup> 9% on working capital.

28.0 Acre Farm Budget  
(in G\$)

Crop	Land	Cropped	Yield	Price	GVP <sup>1/</sup>	Inputs <sup>2/</sup>	Gross Benefits	
	Area	Area					(T/Ac.)	(Per ac. per
	(Ac.)	(Ac.)		(\$/Ton)	crop)	crop)		
Rice	28	50.4	1.3 <sup>3/</sup>	296	384.80	187.85	196.95	9,926
Food Crops	-	-						
Total	28	50.4						

Gropping Intensity: 180

Gross Farm Benefits

Less: Hired labor	1,412.20	
Family labor	296.00	
Interest <sup>4/</sup>	952.46	2,660

Net Farm Benefits

Project Charges		
Operation and maintenance		1,232
Investment recovery		1,400

Net Farm Income 4,634

Estimated Net Income Without Project 3,857

Incremental Net Income 777

<sup>1/</sup> Gross value of production.  
<sup>2/</sup> Production costs less labor.  
<sup>3/</sup> 22 140 lb. bags.  
<sup>4/</sup> 9% on working capital.

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