

6. 4. 4 開発に関する提言

内水面漁業について、種々の条件を考慮し、“内水面漁業研究普及センター”の設立を提案する。このセンターの目的は、計画地区内の漁民の生活を守るため養殖産業を導入し、ひいてはジャマイカの蛋白質需要に応えていくことにある。センターは農業省水産局が管理することとし、以下の四部門に分ける。

1) 生産部門

生産部門には、ふ化セクションと生産セクションを設立し、主に Macrobrachium rosenbergii 種の養殖を行う。また M. acanthurus などのジャマイカ固有種の養殖及び放流の可能性についても試みる。

2) 研究部門

研究部門は、生物学研究室と養殖研究室から成る。生物学研究では、エビの野生種及び確認されている種についての生物学的調査及び漁業についての統計・解析を行う。また養殖研究室では、1) 水田でのエビ養殖、2) エビと魚の混合養殖及び3) 養殖飼料としての米ぬか、及び4) エビの種とそれらの養殖の研究を行う。

3) 市場開発部門

市場開発部門は、市場調査を行い、養殖事業の新市場を開拓していくとともに、ジャマイカにおける養殖事業の運営要領の策定を目的とする。

4) 教育・普及部門

教育・普及部門では、養殖に関する技術指導などを行い、漁民の養殖事業参入の援助を行う。

このセンターはホランド地区のブラックリバー右岸に、ふ化場はブラックリバー市の市場に近いブラックリバー河口に設置することを提案する。

第 7 章 環 境 評 価

7. 1 農業開発による影響

事業の環境に与える影響は、水系の変化、肥料と農薬の使用及び生息地の破壊と植生変化の側面から考察できる。

ブラックリバーとブロードリバーの水系変化は農業開発地区内の植生の変化をもたらす。ブロードリバー上流域のTyphaハンモッキースワンプ群落と、Cladium-Sagittaria群落の80%は水田に変えられる。しかし、ミドルウォーターズリバー流域のハンモッキースワンプ群落全域と、ブラックリバー、Y.S.リバー流域及びローアモラス南部の湿地林と湿地草原の主要部は手つかずに保存される。

殺虫剤と除草剤などの農薬の使用は、集約的な稲作には必須の条件であるが、その影響を最小限にするため充分注意して取扱わねばならない。これらの農薬は、日本農薬安全基準に従って使用することが望ましい。鳥類の寝場所や非難場所となっているマングローブ林や湿地林は、農業開発計画地区から除外されているので、鳥類相に与える農業開発の影響は軽微と考えられる。またアメリカワニの生息地も、ローアモラスの南部を中心にしており、農業開発による影響は軽微と考えられる。

7. 2 保護区域

以下の諸地域は、保護区域を指定する場合に高い優先順位を有していると考えられる。

(1) ミドルウォーターズリバー、Y.S.リバー及びブラックリバー合流域の

湿地林とハンモッキースワンプ湿地林とその周辺地域

この地域には、地域特有の水中植物群が生息している。またY.S.リバーとミドルウォーターズリバーの周辺地域及び森林地帯には当地域固有の鳥類種が生息している。さらにこの地域は、最も重要な内水面漁場でもある。

(2) フロードリバー上流域とブルーホール周辺地域を含む

Cladium - Sagittaria群落

この地域には、(1)の地域に次いで多数の植物種が生息している。更にブルーホールより湧出する水質が良好なため、独特な水中植物群落も形成されている。又、この地域の生態系は未だ十分に研究されていないが開発から保護されるべきである。

(3) マングローブ林地帯

この地域は、ローアマラス地区の生態系保護において重要な位置を占める。火入れ、伐採、及び木皮の染料利用など的人為的な原因により、ローアマラス南部地区のマングローブ林は、減少しつつある。したがって当地域の保護、再生は湿地管理の重要な課題となろう。

7.3 国立公園としての多目的並びに保続的開発

ブラックリバーローアマラス地区は、ジャマイカ国立公園に指定されるべき条件を有している。したがって、7.2に挙げた沼沢地域全体を国立公園とし、保護区域、可耕区域を含め、多様な湿地管理を行うべきである。

ローアマラスの湿地林、湿地草原及び野生生物の生態学的重要性に鑑み、生態学的調査を行い、自然環境を保護することが必要である。食物生産の自給率増加のため、ジャマイカでは米の生産拡大が重要となるので、一般に、農業開発の影響を評価するための、定期的モニタリング調査に続く基礎的調査を実施することが重要である。

ローアマラスでは、その生物相における固有種の多さからみて、遺伝的資源の保存という面からの生態学的特性は明らかに高いものがある。この地域の自然環境の保全のために、農薬使用の安全基準及び国立公園の指定と同様に、包括的な立法措置が緊急に必要とされている。

第 8 章 開発計画の評価

8. 1 概 要

本計画の経済的妥当性は、経済的内部収益率(EIRR)によって判定した。計画の目標達成期間の遅延及び事業費、事業便益の変動による経済性の感度分析も合わせて行った。財務評価は次の2点について行った、1) 粘土質土壌及び泥炭土壌における入植農家の財務分析、2) 開発会社、及び開発事業全体の財務分析。すなわち想定した借入金額、及び借入条件、また計画地区から発生する便益に基づいて資金繰表を作成し、その償還能力を評価した。計画実施による社会経済的、及び環境への効果については、実施後発生する地域的影響を検討した。

8. 2 経済評価

8. 2. 1 経済費用

開発計画に必要な経済費用(1984年価格)は以下の費用により構成される。

(1) 準備工事費 (2) 末端圃場整備を含む土木工事費 (3) 一般管理費 (4) コンサルタントの技術経費 (5) 運営管理機械購入費及び (6) 10%の工事予備費。なお用地買収費、物価上昇予備費、税金は経済費用には含まれない。シャドウエクスチェンジレートは 1.02 とする。

開発計画にかかわる経済建設費用は総額約 1億 3,600万 J\$(3,330万 US\$)である (Annex N 参照) 以上の費用の他に、かんがい・排水施設の維持管理費や更新費用も経済費用に加算する。(表15参照)

8. 2. 2 便 益

農業便益は計画を実施した場合と実施しなかった場合の純作物生産高の差とした。便益は、年々増大し事業実施から13年目に目標最大便益に達する。総経済便益は 3,080ha 完成時で年間約 3,330万 J\$に達すると見積った(表14参照)。

8.2.3 経済的内部収益率

経済的内部収益率（以下EIRR）は、経済便益と経済費用に基づいて算出した。その結果、EIRRは13.3%となり、本開発計画が経済的に妥当であることを示している。（表15参照）

8.2.4 感度分析

本計画の弾力性を評価するために年次便益、費用の変化及び計画実施期間の延長を仮定して感度分析を行った。結果は以下のとおりである。

条 件	EIRR (%)	感度指標(SI)*
1) 変化しない場合	13.3	—
2) 費用が20%増加した場合	11.6	0.6
3) 便益が20%減少した場合	10.6	1.0
4) 費用が20%増加、便益が20%減少した場合	9.1	—
5) 目標達成期間が2年遅延した場合	10.8	—
6) 目標達成期間が2年遅延し、費用が20%増加した場合	9.5	—

*SI = (EIRRの変化量 / 条件が変わらない場合のEIRR) × 条件の変化率)

この結果から、計画完成の遅れがEIRRに大きなマイナス要因となることから、本計画の実施上の工程管理及び目標取量達成までのスケジュール管理に充分留意することが本計画の妥当性を確保するために重要である。

8.3 財務評価

8.3.1 財務費用

本計画実施のための財務費用は総額 5,430万US\$ (1984年価格)でその内 3,650万US\$ が外貨、1,780万US\$ が現地貨である(4.8.2及び表8参照)ただし、工事予備費を10%年毎の物価上昇率を外貨に対して5%現地貨に対して10%とした物価上昇予備費を含む。表9に財務費用の年毎の投資計画を示す。

8.3.2 支払能力

本開発計画に対する財務評価のため、計画を実施した場合の粘土質土壌及び泥炭土壌における入植農家の財務分析を行った。(表16参照)

計画実施によって発生する農家の年間純留保額は、粘土質土壌において経営規模3.0haの場合約2万1,310J\$、泥炭土壌において経営規模5.0haの場合約2万5,390J\$となる。

8.3.3 水利費

単位面積当りの水利費は、施設の維持管理費用及び施設更新費をまかなうために農家に課すのが望ましい。かんがい・排水設備の維持管理費用は、年間約440万J\$である。(ANNEX N及び表18参照)これは1ha当り約2,000J\$となる。これは、粘土質土壌の入植農家では純留保額の28%、泥炭土壌地の入植農家で39%である。年間2,000J\$/haという水利費は、入植農家にとって支払い可能であり、生産抑制要素にはならないと考えられる。またこの水利費は開発事業全体の財務評価の際、収入として計算されている。

8.3.4 開発会社の償還計画

開発会社は農業機械の購入費及び修理工場の設備購入費を償還していくものとして償還能力を検討した。検討に当り以下の条件を設定した。

- 1) 農業機械と修理工場の設備購入費は親会社から年利4.75%、償還期間25年、据え置き期間7年の条件で借り入れる。

2) 水利費として、入植農家と同じく年間2,000J\$/haを支払う。

以上の条件に基づき借入資金の償還計画及び水利費の支払い計画を表17に示すように作成した。この表によればマザーファームからの利益及び農業機械・器具の賃貸料で借入資金の返済が充分可能である。しかし事業実施の初期には赤字になるため、政府補助などの必要な措置がとられることが望ましい。

8.3.5 償還計画

本事業の財務評価のために事業全体としての事業費償還能力を検討した。償還能力の検討に当たっては、事業費調達条件を下記の様に仮定した。

- 1) 外貨分：年利率 4.75 %、償還期間25年、据え置き期間 7年の条件でジャマイカ政府が準備する。
- 2) 現地貨分：ジャマイカ政府が負担する。

上記条件に基づき、借入資金の償還計画を表18に示すように作成した。この償還計画によれば、開発会社及び農民からの収入だけでは、返済額の全部をまかなうことができない。したがって不足分は政府が手当するものとする。。

8. 4 社会経済便益

計画実施により、経済評価で述べた直接便益に加え、以下のような社会経済的な便益が期待される。

1) 外貨の節約

ジャマイカにおける米の生産量は国内需要を満たしていないため、1983年度で57,000tの米が輸入され約4,480万J\$が支払われている。本計画を実施すれば米の生産量は、乾燥籾で年間約28,950t（精米後15,400t）の増加が見込まれ、米の輸入減少により年間約1,210万J\$（約300万US\$）の外貨節約ができる。

2) 開発示威効果

計画の実施により計画地区はもとより周辺の農民に対し、近代化的かんがい排水手法が普及し、その示威効果が期待されるとともに、それによって、開発計画の目標達成期間が短縮されることも期待できる。

3) 雇用機会の増大

本開発計画の建設期間中には、計画地区内及び周辺地区の失業者に、雇用機会を与えることが期待できる。また実施後、通年かんがい設備と排水設備によりより一層集約的な土地利用が行われ雇用機会が増大するであろう。加えて建設各分野においての経験、技術的知識・技能などを修得することが期待される。このような経験及び人々の資質向上がセントエリザベス教区、ひいてはジャマイカ全土の将来の開発に大きな原動力となる。

4) 環境に与える影響

安全使用基準に則って農薬を使用すればローアマラスの環境に及ぼす影響は極めて小さいと考えられる。（Annex I 参照）しかしながら開発計画実施によって惹起される経済活動がローアマラスの生物相に与える影響を組織的に追跡・調査していく必要がある。

5) 二次便益

計画の実施により、地域経済は大きく変革するであろう。社会インフラストラクチャ及び輸送条件が改善され、ひいては地域の経済活動を活性化する。また農産物生産の増大により、市場組織や営農基盤の改善が進む。

6) 結論

上述のような直接あるいは二次的な便益により、本計画の主目的の一つである地域住民の生活水準の向上が図られる。

8. 5 ブラックリバーローアマラスの生態系の保存と生産性の保続

地球上の資源を良好な管理状態で次世代へ引き継ぐため、土地利用を地域の自然条件に合うよう効率化し、環境悪化を防止することが、世界的に必要になってきている。本計画はこういった目的を達成するのに十分な条件を備えている。

泥炭地の環境悪化は、作付体系の導入と、排水組織の施工を計画通り実施すれば、最小限に食い止めることができよう。選定された地区の農業開発を実施しても、内水面漁業地区や、環境保護地区内の野生生物への影響は少ないと見積られる。また、農薬や肥料の使用が野生生物へ及ぼす影響も軽いと見られる。ただし、これらの点については、Annex L に述べたように定期的なモニタリングを実施して、より確実な評価を行っていくべきである。

付 表

表 1

産業別国内総生産

(Unit: J\$10⁶)

Item	1979 %		1981 %		1983 %	
1. Agriculture, Forestry	310.0	7.1	395.8	7.2	446.8	6.4
a. Export Agriculture	53.7		63.6		74.6	
- Sugar Cane	33.4		40.5		46.4	
- Others	20.3		23.1		28.2	
b. Domestic Agriculture	154.7		209.8		232.6	
- Root Crops	68.6		90.0		93.1	
- Others	86.1		119.8		139.4	
c. Livestock & Hunting	81.9		97.6		105.4	
d. Fishing	3.3		3.7		5.3	
e. Forestry & Logging	16.4		21.1		28.9	
2. Mining & Quarrying	622.5	14.2	543.5	9.9	278.7	4.0
a. Bauxite & Quarrying	614.9		536.0		267.8	
b. Quarrying incl. Gypsum	7.6		7.5		10.9	
3. Manufacture	694.4	15.9	851.8	15.6	1,273.8	18.3
4. Electricity & Water	89.6	2.0	91.3	1.7	163.5	2.3
5. Construction & Installation	311.3	7.1	365.9	6.7	566.8	8.1
6. Transportation and Communication	250.9	5.7	267.8	4.9	386.7	5.5
7. Distributive Trade	759.0	17.4	1,094.9	20.0	1,370.7	19.7
8. Financial Institutions	165.6	3.8	309.0	5.7	957.0	6.5
9. Real Estate	368.8	8.4	505.3	9.2	675.6	9.7
10. Government Services	565.5	12.9	754.9	13.8	1,001.4	14.4
11. Miscellaneous Services	191.9	4.4	240.3	4.4	299.5	4.3
12. Household, etc.	47.1	1.1	47.4	0.9	56.8	0.8
13. Less Imported Service	102.4		170.2		226.9	
Total	4,274.2	100.0	5,297.7	100.0	6,750.4	100.0

Source: Economic and Social Survey Jamaica, 1983

表 2 計画地区の土壌分布

Soil Sub Group	Soil Mapping Unit	Map Symbol	Soil Series (Soil Phase)	Project Area	Area to be Developed		
					Holland	Black River	Broad River
				Area	Left	Right	Left
Typic Eutrothox	1	73	Chudleigh clay loam	23	0	0	0
"	9	83	Anglesey clay loam	197	0	0	0
"	1a	73/77*	" -Bonnygate clay loam	331	0	0	0
Udic Haplustalfs	2	74	Lucky Hill clay loam	36	0	0	0
"	2a	74/77	" -Bonnygate clay loam	82	0	0	0
Lithic Ustorthents	3	77	Bonnygate clay loam	35	0	0	0
"	3a	77/73	" -Chudleigh clay loam	18	0	0	0
Typic Quartzipsments	5	150	Hodges sand	49	0	0	0
"	5a	150/204	" -Fourpath sandy loam	99	0	0	0
Typic Chromusterts	6	151	Cashew clay loam	187	0	22	0
"	6a	151/203	" -Fourpath clay	62	0	0	0
"	12	151/94v	Cashew clay loam - Carron Hall clay	48	0	0	0
"	7	203	Fourpath clay	1,293	197	124	0
"	7a	203/151	" -Cashew clay loam	24	0	0	0
"	13	203/94v	Fourpath - Carron Hall clay extremely rocky	67	0	0	0
"	8	204	Fourpath sandy loam	537	0	0	0
"	8a	204/150	" -Hodges sand	130	0	0	0
"	11	109	Holland clay	304	204	0	0
"	4	94	Carron Hall clay loam - extremely rocky	46	0	0	0
"	4v	94v	Carron Hall clay loam	504	0	0	0
Aquic Halpludolls	10	9	Wellen clay	304	170	0	0
"	10a	9/H1a	" -Broad River Peat	86	86	0	0
Aeric Tropaquepts	14	12	Black River clay	463	51	200	0
Hemic Troposeprists	15	H1a	Broad River peat	2,035	62	450	504
Hydric Tropohemists	16	H1b	Morass Peat - high decomposition phase	1,488	0	298	396
Hydric Tropofibrists	16a	H1c	" -low decomposition phase	903	0	0	0
Typic Sulfishemists	16b	H1s	" -sulfidic phase	1,144	0	0	0
Forest				915	0	106	0
Town				40	0	0	0
Total				11,450	680	1,200	1,000

*73/77: This symbol shows the complex soil type. The area occupies two third by the former(73) and one third by the latter(77).

表 3

稲作のための適性土地分布

(Unit: ha)

Land Capability	Land Class	Project Area	Area to be Developed				Total
			Holland Estate	Black River Left	Broad River Right	Broad River Left	
Suitable	II	3,240	567	146	0	0	713
"	III	3,016	113	650	604	467	1,834
Marginal	IV	2,144	0	298	396	533	1,227
Unsuitable	V	2,095	0	0	0	0	0
" (Forest)	VIII	915	0	106 ^{1/}	0	0	106
Town		40	0	0	0	0	0
Total		11,450	680	1,200	1,000	1,000	3,880

Remarks: ^{1/}: Land of this forest consists of mainly mineral soils. Land class therefore would be changed to class III/IV after drainage improvement and clearing.

表 4

畑作のための適性土地分布

(Unit: ha)

Land Capability	Land Class	Project Area	Area to be Developed				Total
			Holland Estate	Black River Left	Broad River Right	Broad River Left	
Suitable	II	3,240	567	146	0	0	713
"	III	920	51	200	0	0	251
Marginal	IV	4,235	62	450	604	467	1,583
Unsuitable	V	2,100	0	298	396	533	1,227
" (Forest)	VIII	915	0	106	0	0	106
Town		40	0	0	0	0	0
Total		11,450	680	1,200	1,000	1,000	3,880

表 5 土地利用の現況

Item	Category							Ratio to the Whole Area (%)	
	Sugar Cane	Grass-land	Forest/Bush	Trees/Village/Grassland	Upland Crop/Grassland	Paddy/Swamp	Swamp		Total
I. Black River Right Bank									
1. Within area to be developed	310	100	-	-	-	100	170	680	6.0
- Holland Estate									
2. Without area to be developed	600	100	-	-	-	10	310	1,020	8.9
- Holland Estate									
- Other area	-	190	300	10	50	20	270	840	7.3
3. Sub-total	910	390	300	10	50	130	750	2,540	22.2
II. Estuary and Middle Quarters									
1. Within area to be developed	-	-	-	-	-	-	-	-	0.0
2. Without area to be developed	-	630	460	20	10	-	1,560	2,680	23.4
3. Sub-total	-	630	460	20	10	-	1,560	2,680	23.4
III. Black River Left Bank									
1. Within area to be developed	-	170	60	-	60	-	10	300	2.6
- Hatfield									
- Styx River	-	-	-	-	-	-	400	400	3.5
- Frenchman & Holiday-Pen	-	-	100	-	-	-	400	500	4.4
2. Without area to be developed	-	560	200	90	260	-	-	1,110	9.7
3. Sub-total	-	730	360	90	320	-	810	2,310	20.2
IV. Broad River Basin									
1. Within area to be developed	-	20	-	-	-	-	980	1,000	8.7
- Broad River Right Bank									
- Broad River Left Bank	-	-	-	-	-	-	1,000	1,000	8.7
2. Without area to be developed	10	990	540	80	300	-	-	1,920	16.8
3. Sub-total	10	1,010	540	80	300	-	1,980	3,920	34.2
V. Total									
1. Within area to be developed	310	290	160	-	60	100	2,960	3,880	33.9
2. Without area to be developed	610	2,470	1,500	200	620	30	2,140	7,570	66.1
3. Project area	920	2,760	1,660	200	680	130	5,100	11,450	100.0

表 6 肥料及び農薬施用計画

I. Fertilizers

Time of Application	Type of Fertilizer	Amount of Fertilizer (kg/ha)	Active Ingredient (kg/ha)		
			N	P ₂ O ₅	K ₂ O
<u>RICE</u>					
(Mineral Soil)					
Basal	12.24.12	200	24	48	24
Tillering stage	Diam. Phos ^{1/} (18.46.0)	70	13	32	-
	Urea (45%)	74	33	-	-
Panicle formation stage	Urea (45%)	67	30	0	0
	Murate of potash (60%)	60	-	-	36
Total			<u>100</u>	<u>80</u>	<u>60</u>
(Peat Soil)					
Basal	Triple superphosphate (45%)	222	-	100	-
	Murate of potash (60%)	50	-	-	30
	Copper sulphate	9	-	-	-
Total				<u>100</u>	<u>30</u>
<u>SOYA BEAN</u>					
(Mineral Soil)					
Basal	Triple superphosphate (45%)	249	-	112	-
	Murate of potash (60%)	112	-	-	67
Total				<u>112</u>	<u>67</u>

II. Chemicals

Crop	Common Name	(Trade Name)			Rate per ha
			MT ^{2/}	TAA ^{3/}	
(Herbicide)					
Rice	bentocarb	(Saturn)	OS	B	5.7 l
	2,4 D	(2,4 -D)	OS	A	2.9 l
Soya Bean	diphenamid	(Dymid)	OS	A	5.0 kg
	bentazon	(Basagran)	OS	A	2.5 kg
(Pesticide)					
Rice	trichlorphon	(Dipterex)	DS	B	1.5 kg
	fenitrothion	(Sumithion)	OS	B	0.6 l
	mancozeb	(Dithane)	OS	A	1.7 kg
Soya Bean	monocrotophos	(Nuvacron)	OS	A	10 l

Remarks: ^{1/}: Diammonia phosphate
^{2/}: MT: Mammalian Toxicity
OS: Ordinary substances
DS: Deleterious substances
^{3/}: TAA: Toxicity to Aquatic Animals

表 7

各比較案における主要施設諸元

Description	Unit	Alternative Case		
		Case 1	Case 2	Case 3
1. Source of Irrigation Water		Black river and Y.S. river		
2. Gross Irrigable Area	ha	3,880	2,880	1,280
3. Net Irrigable Area	ha	3,080	2,280	1,480
4. Y.S. Intake Weir				
4.1 Design discharge	m ³ /sec	0.45	0.45	0.45
5. Lacovia Pump Station				
5.1 Design discharge	m ³ /sec	3.42	2.27	1.12
5.2 Pump diameter	mm	700	700	500
5.3 Number of pump sets	set	3	2	2
6. Length of Main Irrigation Canal	km	17.2	8.4	8.4
7. Length of Secondary Irrigation Canal	km	31.6	30.1	21.4
8. Drainage Pump Station				
8.1 Number of pump station	place	4	3	2
8.2 Total discharge	m ³ /sec	25.6	20.6	13.9
8.3 Pump diameter	mm		800	
8.4 Number of pump sets	nos.	15	12	8
9. Length of Dikes	km	28.5	22.8	17.1
10. Length of Main Drain Canal	km	41.2	33.0	26.0
11. Length of Catch Drain	km	19.9	4.0	0
12. On-farm Development	ha	3,080	2,280	1,480
13. Length of Main Road	kW	35.2	24.8	16.1
14. Length of Secondary Road	kW	83.4	64.2	46.7

表 8 投資額

(Unit: US\$10 ³)			
Item	Foreign Currency	Local Currency	Total
I. Construction Cost			
1.1 Direct Construction Cost			
Holland Area	2,460	1,570	4,030
Black River Left Bank Area	5,060	2,390	7,450
Broad River Right Bank Area	3,840	1,770	5,610
Broad River Left Bank Area	3,870	1,910	5,780
Office & Quarters	720	780	1,500
Observation Wells	50	20	70
Conservation of Environment	100	100	200
<u>Sub-total</u>	<u>16,100</u>	<u>8,540</u>	<u>24,640</u>
1.2 O & M Equipment	830	0	830
1.3 General Expense	0	650	650 ^{1/}
1.4 Land Acquisition	0	730	730
1.5 Engineering Service	2,930	1,110	4,040 ^{2/}
<u>Sub-total</u>	<u>19,860</u>	<u>11,030</u>	<u>30,840</u>
1.6 Physical Contingency	1,990	1,100	3,080
<u>Sub-total</u>	<u>21,850</u>	<u>12,130</u>	<u>33,980</u>
1.7 Price Contingency	4,370	5,090	9,460
<u>Sub-total</u>	<u>26,220</u>	<u>17,220</u>	<u>43,440</u>
II. Farm Guidance Service	<u>2,790</u>	<u>180</u>	<u>2,970</u>
III. Farm Machinery (see Annex G)	7,470	440	7,910
IV. Total (I + II + III)	36,480	17,840	54,320
V. Post Harvest Facility (see Annex G)	10,830	860	11,690
VI. Social Infrastructures (see Annex F)	-	5,610	5,610
VII. Grand Total (IV + V + VI)	47,310	24,310	71,620

Remarks: 1/: Including environmental monitoring cost.

2/: Including cost for investigation and computer model simulation analysis of post project ground water inflow.

表 9 年次別投資額

(Unit: US\$103)

Item	1st Year		2nd Year		3rd Year		4th Year		5th Year		6th Year		7th Year	
	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.
I. Construction														
I.1 Direct Construction Cost														
Holland Area	0	0	586	384	1,287	682	587	502	0	0	0	0	0	0
Black River Left Bank Area	0	0	999	340	2,259	901	1,414	854	390	290	0	0	0	0
Broad River Right Bank Area	0	0	0	0	1,007	346	1,249	546	973	450	610	429	0	0
Broad River Left Bank Area	0	0	0	0	839	232	1,293	605	1,039	500	708	569	0	0
Office & Quarters	0	0	720	780	0	0	0	0	0	0	0	0	0	0
Observation Wells	0	0	54	23	0	0	0	0	0	0	0	0	0	0
Conservation of Environment	0	0	20	20	20	20	20	20	20	20	20	20	0	0
Sub-total	0	0	2,379	1,547	5,402	2,181	4,563	2,527	2,422	1,260	1,338	1,018	0	0
I.2 O & M Equipment	0	0	0	0	0	0	430	0	0	0	400	0	0	0
I.3 General Expense	0	58	0	106	0	114	0	123	0	123	0	123	0	0
I.4 Land Acquisition	0	360	0	370	0	0	0	0	0	0	0	0	0	0
I.5 Engineering Services	580	220	470	180	470	180	470	180	470	180	470	172	0	0
Sub-total	580	638	2,849	2,203	5,872	2,475	5,463	2,830	2,892	1,563	2,208	1,313	0	0
I.6 Physical Contingency	58	64	285	220	587	248	546	283	289	156	221	131	0	0
Sub-total	638	702	3,134	2,423	6,459	2,723	6,009	3,113	3,181	1,719	2,429	1,444	0	0
I.7 Price Contingency	32	70	321	509	1,018	901	1,295	1,445	879	1,050	826	1,114	0	0
Sub-total	670	772	3,455	2,932	7,477	3,624	7,304	4,558	4,060	2,769	3,255	2,558	0	0
II. Farm Guidance Service	0	0	0	0	509	29	535	32	562	35	590	39	596	49
III. Farm Machinery	0	0	1,565	220	2,007	110	0	0	3,895	113	0	0	0	0
IV. Grand Total	670	772	5,020	3,152	9,993	3,763	7,839	4,590	8,517	2,917	3,845	2,598	596	49

Remarks: F.C.: Foreign Currency
L.C.: Local Currency

表 10

農業機械導入計画

Machinery & Equipment	Holland	Hatfield Styx River	Frenchman Holiday-pen	Broad R. Right B.	Broad R. Left B.	Total
Disc harrow (16" x 16)	8	11	10	19 + 2*	19	69
Rotary harrow (2.2m width)	8	7	5	10 + 2	10	42
Land leveller (1.8m width)	5	5	4	7 + 2	7	30
Ridger (2 row)	8	3	-	+ 1	-	12
Cultivator (3 row)	5	2	-	+ 1	-	8
Tractor (32 Hp)	14	13	10	19 + 3	19	78
Cage wheel (pair)	-	7	10	19 + 3	19	58
Combine harvester (2.5m width 75 Hp)	8	8	6	11 + 1	11	45
Power sprayer (10 - 15 lit./min)	30	19	14	27 + 5	27	122
Manual seeder (1 row)	19	11	14	27 + 5	27	103
Dump truck (2 ton)	5	5	3	6 + 3	6	28

Remarks: *: Figures followed (+) are spare numbers of machinery reserved at the mechanical service center (Broad River Right Basin).

表 11

農産物貯蔵・乾燥施設容量

	Paddy Field (ha)	Paddy Yield (tons/ha)	Pro-duction per Crop (tons)	Max. Paddy Harvested per day (tons)	Capacity		
					Receiving (tons/hr)	Drying (tons/hr)	Storage (tons)
Holland	560	5.5	3,080	102	15.3	25.5	2,400
Hatfield & Styx River	520	-	2,560	84	12.6	21.0	2,000
(Hatfield)	(220)	(5.5)	(1,210)	-	-	-	-
(Styx River)	(300)	(4.5)	(1,350)	-	-	-	-
Frenchman & Holiday-pen	400	4.5	1,800	61	9.2	15.3	1,400
Broad River Right Bank	800	4.5	3,600	110	16.5	27.5	2,800
Broad River Left Bank	800	4.5	3,600	110	16.5	27.5	2,800
Total	3,080	-	14,640	-	-	-	11,400

表 12

農産物及び投入資材価格

		(Unit: J\$)		
	Unit	Financial Price/ ¹ (1984)	Economic Price/ ² (1995)	
I. Farm Products				
1.	Paddy	kg	1.1	1.5
2.	Soya bean	kg	1.3	2.4
3.	Sugar cane	ton	54	68
4.	Gungo pea	kg	5.4	6.2
5.	Peanut	kg	4.8	5.4
6.	Corn	kg	1.3	1.4
7.	Yam	kg	1.1	1.2
8.	Cassava	kg	0.5	0.6
II. Farm Inputs				
1. Seed				
	- Sugar cane	kg	50.0	72.9
	- Gungo pea	kg	6.6	7.5
	- Peanut	kg	9.9	11.3
	- Corn	kg	3.3	3.8
	- Yam	kg	1.5	1.7
	- Cassava	100 Sticks	3.0	3.4
	- Paddy	kg	1.2	1.7
	- Soya bean	kg	2.7	3.0
2. Fertilizer				
	- DAP	kg	1.0	2.2
	- TSP	kg	0.9	1.7
	- Urea	kg	0.9	2.1
	- Muriate of potash	kg	0.7	1.4
	- 12-24-12	kg	0.8	1.1
	- Copper sulphate	kg	2.2	3.1
3. Agro-Chemical				
	- Benticarb	lit	15.0	19.8
	- 2,4 - D	lit	14.5	19.1
	- Diphenamid	kg	56.0	73.9
	- Bentazon	kg	21.9	28.9
	- Trichlorphon	kg	51.6	68.1
	- Fenitrothion	lit	25.5	33.6
	- Mancozeb	kg	0.2	0.3
	- Monocrotophos	lit	66.1	87.2
4. Labour				
	- Family	MD	-	15.8 ^{/3}
	- Hired	MD	22.5	22.5
5. Farm Machinery				
i) Mineral Soil				
	- Disk harrow	hr	22.7	23.3
	- Rotary harrow	hr	29.5	30.8
	- Land leveller	hr	33.1	34.8
	- Ridger	hr	26.6	27.6
	- Cultivator	hr	27.9	29.1
	- Combine harvester	hr	99.4	107.6
	- Power sprayer	hr	9.5	9.9
	- Dump truck	hr	35.2	36.3
ii) Peat Soil				
	- Disk harrow	hr	28.0	29.1
	- Rotary harrow	hr	29.3	30.6
	- Land leveller	hr	32.8	34.4
	- Combine harvester	hr	138.2	150.6
	- Power sprayer	hr	9.5	9.9
	- Dump truck	hr	40.4	42.1

- Remarks: ^{/1}: These data are based on "Cost of Production" Data Bank, MOA and obtained from JCTC, and CIF Price of Kingston.
- ^{/2}: Calculated from the data given in "Price prospects for Major Primary Commodities", IBRD December 1983.
- ^{/3}: Economic Price of family labour cost is assumed 70% of the price of hired labour.

表 13

事業実施に伴うヘクタール当りの便益

I. Economic					
(Unit : J\$)					
	Cost of Farm Input	Cost of Farm Operation	Gross Production Cost	Gross Production Value	Net Production Value
I. Mineral Soil					
1. Small Farm					
Spring Rice	1,236	974	2,210	8,366	6,156
Fall Rice	1,236	900	2,136	8,366	6,230
Soya Bean	2,063	918	2,981	5,943	2,962
Total	4,535	2,792	7,327	22,675	15,348
2. Mother Farm					
Spring Rice	1,236	1,068	2,304	8,366	6,062
Fall Rice	1,236	1,008	2,244	8,366	6,122
Soya Bean	2,063	1,025	3,088	5,943	2,855
Total	4,535	3,101	7,636	22,675	15,039
II. Peat Soil					
1. Small Farm					
Spring Rice	957	1,122	2,079	6,845	4,766
Fall Rice	957	997	1,954	6,845	4,891
Total	1,914	2,119	4,033	13,690	9,657
2. Mother Farm					
Spring Rice	957	1,206	2,163	6,845	4,682
Fall Rice	957	1,088	2,045	6,845	4,800
Total	1,914	2,294	4,208	13,690	9,482
II. Financial					
	Cost of Farm Input	Cost of Farm Operation	Gross Production Cost	Gross Production Value	Net Production Value
I. Mineral Soil					
1. Small Farm					
Spring Rice	754	711	1,465	6,050	4,585
Fall Rice	754	613	1,367	6,050	4,683
Soya Bean	1,450	632	2,082	3,250	1,168
Total	2,958	1,956	4,914	15,350	10,436
2. Mother Farm					
Spring Rice	754	1,026	1,780	6,050	4,270
Fall Rice	754	973	1,727	6,050	4,323
Soya Bean	1,450	992	2,442	3,250	808
Total	2,958	2,991	5,949	15,350	9,401
II. Peat Soil					
1. Small Farm					
Spring Rice	610	867	1,477	4,950	3,473
Fall Rice	610	736	1,346	4,950	3,604
Total	1,220	1,603	2,823	9,900	7,077
2. Mother Farm					
Spring Rice	610	1,148	1,758	4,950	3,192
Fall Rice	610	1,040	1,650	4,950	3,300
Total	1,220	2,188	3,408	9,900	6,492

表 14 事業便益

(Unit: US\$10³)

Description	Mineral Soil		Peat Soil				Total
	Holland	Hatfield	Styx River	Frenchman & Holliday Pen	Broad River Right	Broad River Left	
I. Annual Net Production Value							
1. Without Project	263	41	-	-	-	-	304
- Sugar cane	273	-	-	-	-	-	273
- Rainfed rice	-10	-	-	-	-	-	-10
- Upland crops	-	41	-	-	-	-	41
2. With Project	8,169	3,377	2,881	3,843	7,691	7,691	33,652
a) Small farm							
- Spring rice	2,216	1,354	1,001	1,382	2,860	2,860	11,673
- Fall rice	2,243	1,371	1,027	1,418	2,935	2,935	11,929
- Soya bean	1,066	652	-	-	-	-	1,718
Sub-total	5,525	3,377	2,028	2,800	5,795	5,795	25,320
b) Mother farm							
- Spring rice	849	-	421	515	936	936	3,657
- Fall rice	1,224	-	432	528	960	960	4,104
- Soya bean	571	-	-	-	-	-	571
Sub-total	2,644	-	853	1,043	1,896	1,896	8,332
II. Annual Net Incremental Benefit							
	7,906	3,336	2,881	3,843	7,691	7,691	33,348

表 15

経済費用及び便益の流れ

(Unit: J\$10³)

Year	Construction Cost	O & M Cost	Replacement Cost	Total Cost	Benefit
1	3,870	0	0	3,870	0
2	21,115	0	0	21,115	0
3	37,646	1,640	0	39,286	718
4	37,400	2,669	0	40,069	6,216
5	20,090	3,559	0	23,649	8,426
6	15,879	4,449	0	20,328	11,346
7	0	4,449	0	4,449	15,558
8	0	4,449	1,312	5,761	18,761
9	0	4,449	0	4,449	22,073
10	0	4,449	0	4,449	25,784
11	0	4,449	0	4,449	29,694
12	0	4,449	0	4,449	32,250
13	0	4,449	403	7,852	33,348
14	0	4,449	0	4,449	33,348
15	0	4,449	0	4,449	33,348
16	0	4,449	0	4,449	33,348
17	0	4,449	0	4,449	33,348
18	0	4,449	1,312	5,761	33,348
19	0	4,449	0	4,449	33,348
20	0	4,449	0	4,449	33,348
21	0	4,449	0	4,449	33,348
22	0	4,449	0	4,449	33,348
23	0	4,449	24,137	28,585	33,348
24	0	4,449	0	4,449	33,348
25	0	4,449	0	4,449	33,348
26	0	4,449	0	4,449	33,348
27	0	4,449	0	4,449	33,348
28	0	4,449	1,312	5,761	33,348
29	0	4,449	0	4,449	33,348
30	0	4,449	0	4,449	33,348
31	0	4,449	0	4,449	33,348
32	0	4,449	0	4,449	33,348
33	0	4,449	3,403	7,852	33,348
34	0	4,449	0	4,449	33,348
35	0	4,449	0	4,449	33,348
36	0	4,449	0	4,449	33,348
37	0	4,449	0	4,449	33,348
38	0	4,449	1,312	5,761	33,348
39	0	4,449	0	4,449	33,348
40	0	4,449	0	4,449	33,348
41	0	4,449	0	4,449	33,348
42	0	4,449	0	4,449	33,348
43	0	4,449	24,137	28,585	33,348
44	0	4,449	0	4,449	33,348
45	0	4,449	0	4,449	33,348
46	0	4,449	0	4,449	33,348
47	0	4,449	0	4,449	33,348
48	0	4,449	1,312	5,761	33,348
49	0	4,449	0	4,449	33,348
50	0	4,449	0	4,449	33,348

EIRR = 13.3%

表 16 農業經濟の分析

	Planting/ Harvesting Area (ha)	Gross Income			Gross Outgo			Net Reserve (J\$)	
		Unit Yield (ton/ha)	Produc- tion (ton)	Unit Price (J\$/ton)	Total Value (J\$)	Farming Expenses Unit Produc- tion Cost (J\$/ha)	Total Cost (J\$)		Living Expenses (J\$)
I. Mineral Soil									
Spring rice	3	5.5	16.5	1,100	18,150	1,465	4,395	-	
Fall rice	3	5.5	16.5	1,100	18,150	1,367	4,101	-	
Soya bean	3	2.5	7.5	1,300	9,750	2,082	6,246	-	
<u>Total</u>	-	-	-	-	<u>46,050</u>	-	<u>14,742</u>	<u>10,000</u>	<u>21,308</u>
II. Peat Soil									
Spring rice	5	4.5	22.5	1,100	24,750	1,477	7,385	-	
Fall rice	5	4.5	22.5	1,100	24,750	1,346	6,730	-	
<u>Total</u>	-	-	-	-	<u>49,500</u>	-	<u>14,115</u>	<u>10,000</u>	<u>25,385</u>

表 17 農業開発会社の資金繰り計画

(Unit: J\$103)

Year	Cash Outflow				Cash Inflow				Total	Balance	Accumu- lation	
	Capital Cost	Loan Repayment		O & M Cost	Replace- ment Cost	Water Charge	Fund	Revenue				
		Interest	Principal					Benefit from Mother Farm				Hire of Machinery
1	0	0	0	0	0	0	0	0	0	0	0	
2	7,140	339	0	0	0	0	7,140	0	0	-339	-339	
3	8,468	741	0	811	0	400	10,420	356	507	-1,089	-1,428	
4	0	741	0	1,990	0	800	3,531	955	2,967	391	-1,037	
5	16,032	1,503	0	2,503	0	800	20,838	1,307	2,967	-532	-1,569	
6	0	1,503	0	2,503	0	1,600	5,606	1,796	4,355	545	-1,024	
7	0	1,503	0	2,503	800	1,600	6,406	2,362	5,744	1,700	676	
8	0	1,420	1,754	2,503	1,290	1,600	8,567	2,969	5,744	146	822	
9	0	1,336	1,758	2,503	0	1,600	7,197	3,612	5,744	2,159	2,981	
10	0	1,253	1,758	2,503	5,400	1,600	12,514	4,339	5,744	-2,431	550	
11	0	1,169	1,758	2,503	4,760	1,600	11,790	4,991	5,744	-1,055	-505	
12	0	1,086	1,758	2,503	800	1,600	7,747	5,387	5,744	3,384	2,879	
13	0	1,002	1,758	2,503	10,260	1,600	17,123	5,519	5,744	-5,860	-2,981	
14	0	919	1,758	2,503	0	1,600	6,780	5,519	5,744	4,483	1,502	
15	0	835	1,758	2,503	2,440	1,600	9,136	5,519	5,744	2,127	3,629	
16	0	752	1,758	2,503	0	1,600	6,613	5,519	5,744	4,650	8,279	
17	0	668	1,758	2,503	800	1,600	7,329	5,519	5,744	3,934	12,213	
18	0	585	1,758	2,503	4,250	1,600	10,696	5,519	5,744	567	12,780	
19	0	501	1,758	2,503	4,760	1,600	11,122	5,519	5,744	141	12,921	
20	0	418	1,758	2,503	2,440	1,600	8,719	5,519	5,744	2,544	15,465	
21	0	334	1,758	2,503	8,970	1,600	15,165	5,519	5,744	-3,902	11,563	
22	0	251	1,758	2,503	800	1,600	6,912	5,519	5,744	4,351	15,914	
23	0	167	1,758	2,503	1,290	1,600	7,318	5,519	5,744	3,945	19,859	
24	0	84	1,758	2,503	0	1,600	5,945	5,519	5,744	5,318	25,177	
25	0	0	1,758	2,503	2,440	1,600	8,301	5,519	5,744	2,962	28,139	

Remarks: 1/ Interest; 4.75%
Grace period; 7 years
Repayment period including grace period; 25 years

(Unit: J\$10³)

Year	Cash Outflow				Cash Inflow						Balance	
	Capital Cost		Loan Repayment ^{2/}	O & M Replacement Cost	Total	Fund		Revenue		Total		
	F.C. ^{1/}	L.C. ^{2/}	Interest			Principal	F.C.	L.C.	Development Company			Small Farmer
1	2,680	3,088	127	0	0	5,895	2,680	3,088	0	0	5,768	-127
2	20,080	12,608	1,081	0	0	33,769	20,080	12,608	339	0	33,027	-742
3	39,972	15,052	2,980	0	1,600	59,604	39,972	15,052	1,141	120	56,285	-3,319
4	31,356	18,360	4,469	0	2,604	56,789	31,356	18,360	1,541	2,040	53,297	-3,492
5	34,068	11,668	6,087	0	3,472	55,295	34,068	11,668	2,303	2,040	50,079	-5,216
6	15,380	10,392	6,818	0	4,340	36,930	15,380	10,392	3,103	2,840	31,715	-5,215
7	2,384	196	6,931	0	4,340	13,851	2,384	196	3,103	4,440	10,123	-3,728
8	0	0	6,439	7,974	4,340	20,037	0	0	4,774	4,440	9,214	-10,823
9	0	0	6,060	7,974	4,340	18,374	0	0	4,694	4,440	9,134	-9,240
10	0	0	5,681	7,974	4,340	17,995	0	0	4,611	4,440	9,051	-8,944
11	0	0	5,303	7,974	4,340	17,617	0	0	4,527	4,440	8,967	-8,650
12	0	0	4,924	7,974	4,340	17,238	0	0	4,444	4,440	8,884	-8,354
13	0	0	4,545	7,974	4,340	16,860	0	0	4,360	4,440	8,800	-11,379
14	0	0	4,166	7,974	4,340	16,480	0	0	4,277	4,440	8,717	-7,763
15	0	0	3,788	7,974	4,340	16,102	0	0	4,193	4,440	8,633	-7,469
16	0	0	3,409	7,974	4,340	15,723	0	0	4,110	4,440	8,550	-7,173
17	0	0	3,030	7,974	4,340	15,344	0	0	4,026	4,440	8,466	-6,878
18	0	0	2,651	7,974	4,340	14,965	0	0	3,943	4,440	8,383	-7,862
19	0	0	2,273	7,974	4,340	14,587	0	0	3,859	4,440	8,299	-6,288
20	0	0	1,894	7,974	4,340	14,208	0	0	3,776	4,440	8,216	-5,992
21	0	0	1,515	7,974	4,340	13,829	0	0	3,692	4,440	8,132	-5,697
22	0	0	1,136	7,974	4,340	13,450	0	0	3,609	4,440	8,049	-5,401
23	0	0	758	7,974	4,340	13,071	0	0	3,525	4,440	7,965	-28,655
24	0	0	379	7,974	4,340	12,693	0	0	3,442	4,440	7,882	-4,811
25	0	0	0	7,974	4,340	12,314	0	0	3,358	4,440	7,798	-4,516

Remarks: 1/: Foreign Currency

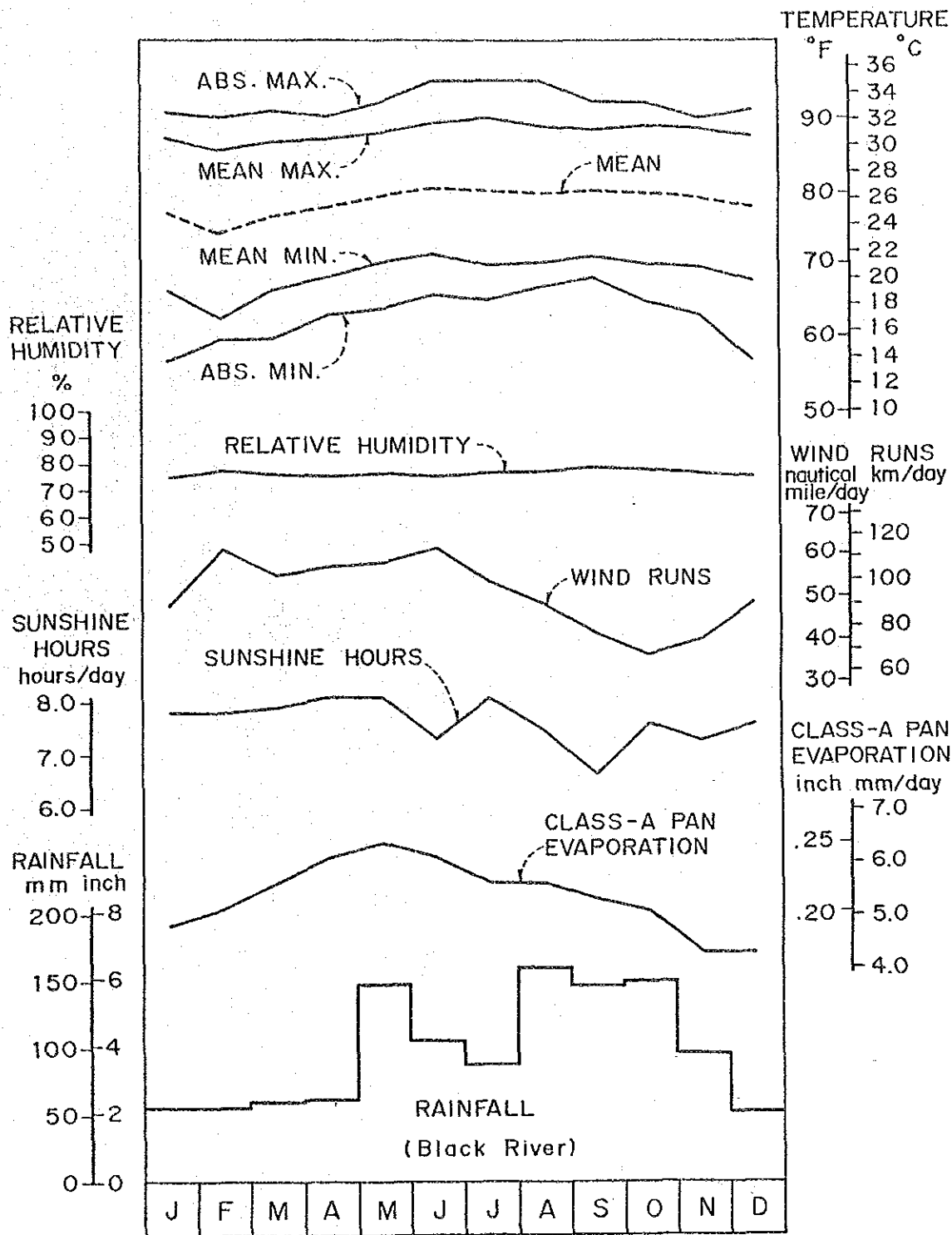
2/: Local Currency

3/: Interest; 4.75%

Grace period; 7 years

Repayment period including grace period; 25 years

付 図

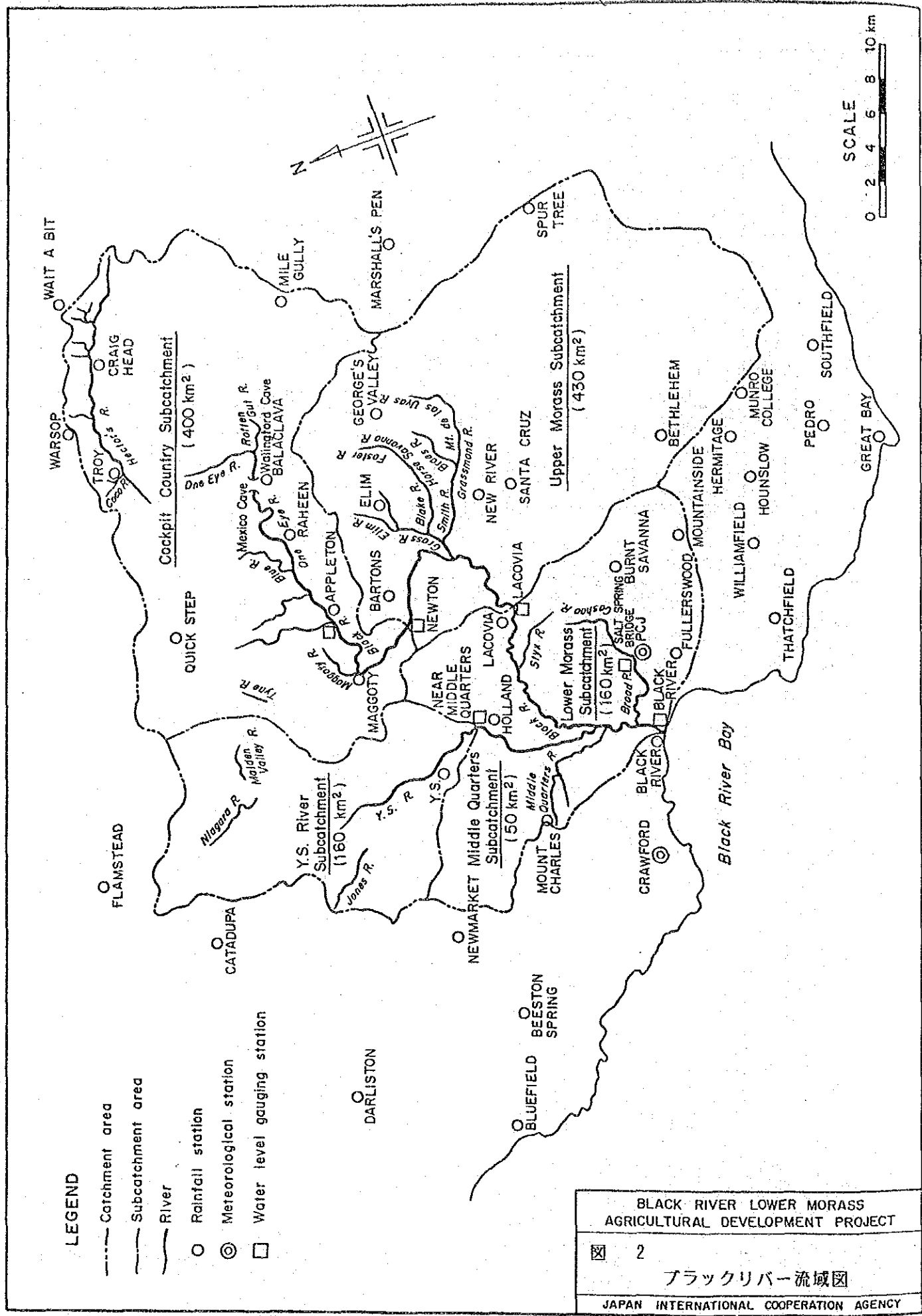


CLIMATIC FEATURES
(Crawford)

BLACK RIVER LOWER MORASS
AGRICULTURAL DEVELOPMENT PROJECT

☒ 1
計画地区の気象諸元

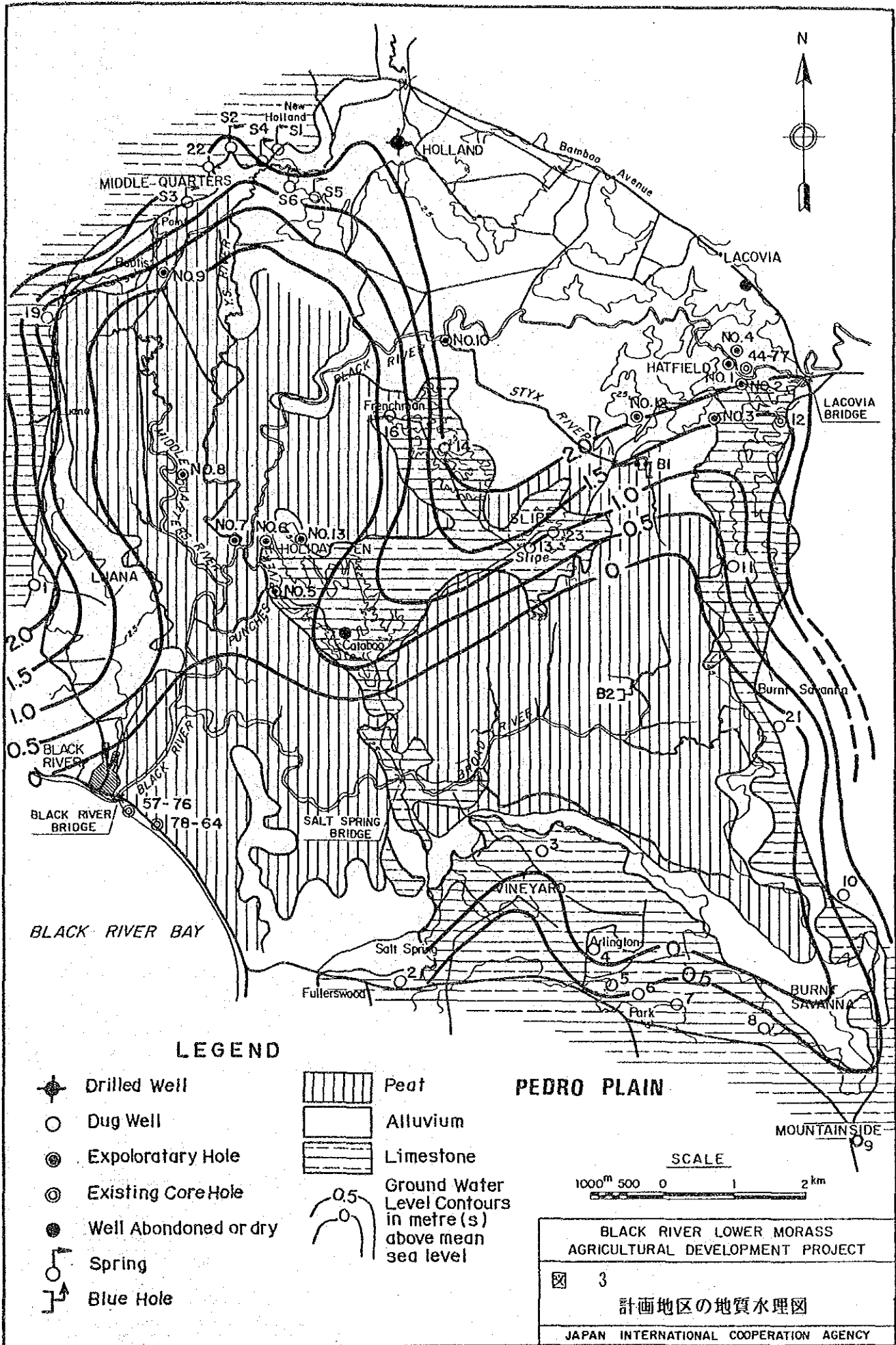
JAPAN INTERNATIONAL COOPERATION AGENCY

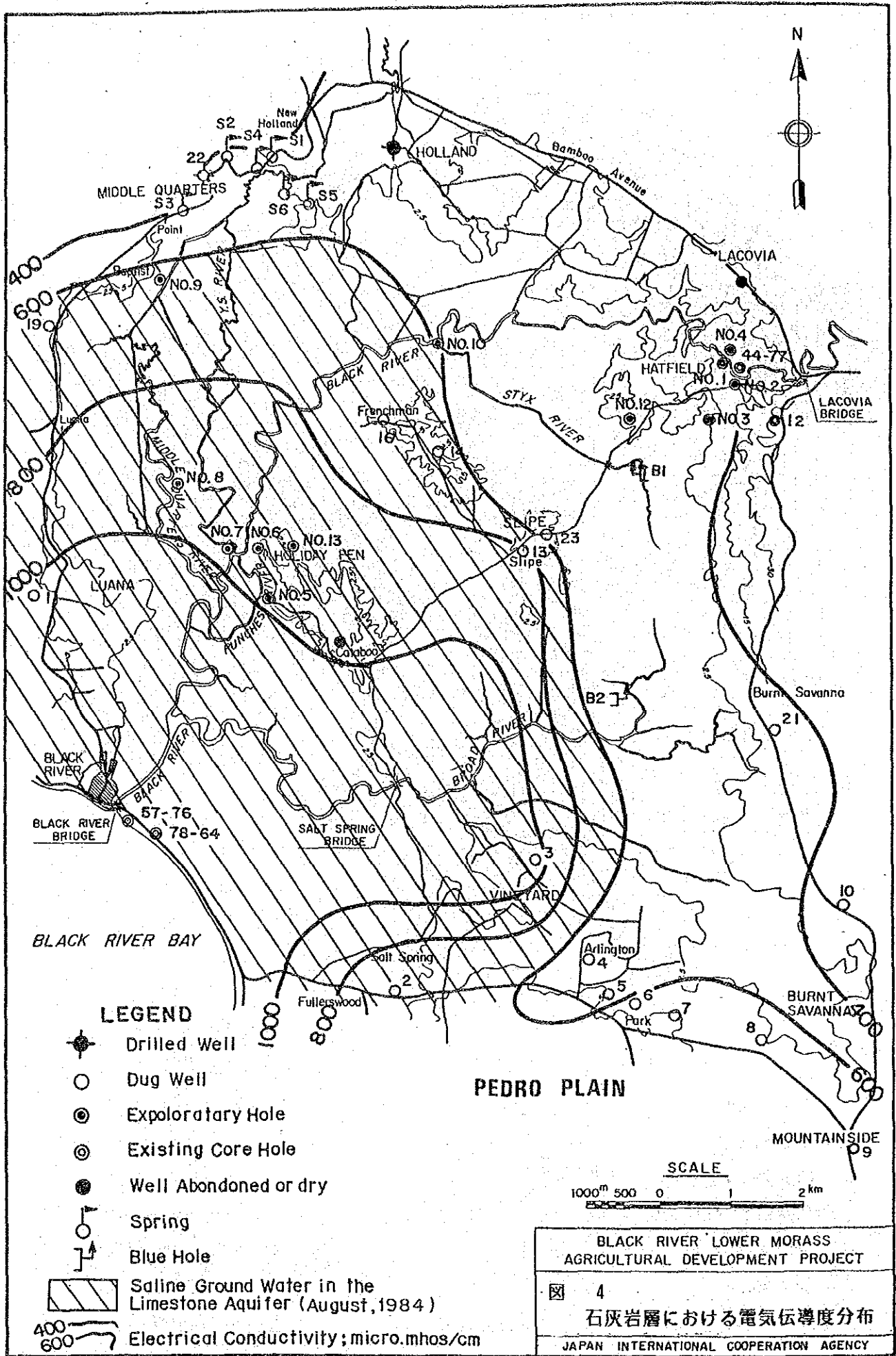


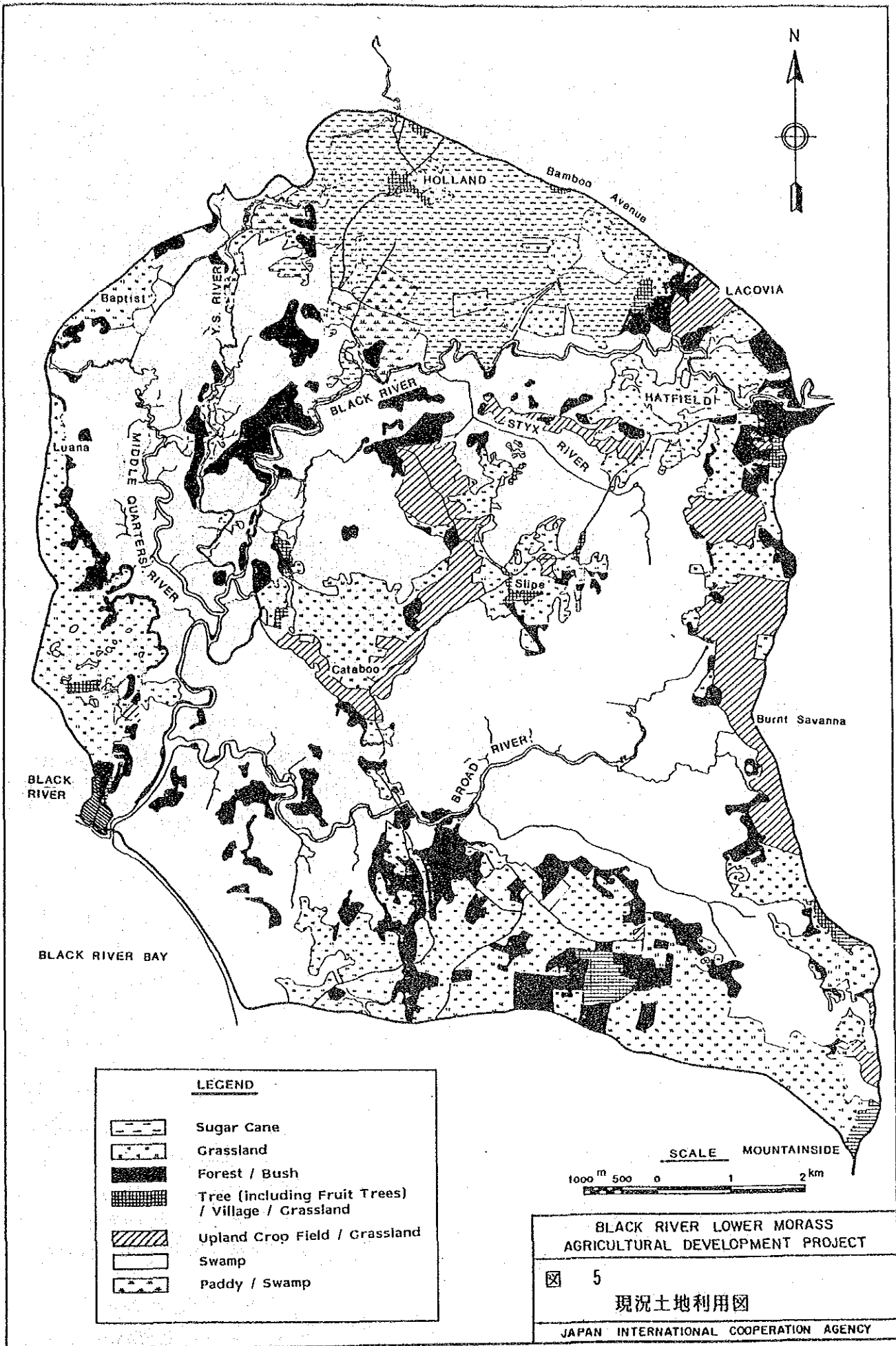
LEGEND

- Catchment area
- - - Subcatchment area
- River
- Rainfall station
- ⊙ Meteorological station
- Water level gauging station








BLACK RIVER LOWER MORASS
 AGRICULTURAL DEVELOPMENT PROJECT
 2
 ブラックリバー流域図
 JAPAN INTERNATIONAL COOPERATION AGENCY







LEGEND

-  Sugar Cane
-  Grassland
-  Forest / Bush
-  Tree (including Fruit Trees) / Village / Grassland
-  Upland Crop Field / Grassland
-  Swamp
-  Paddy / Swamp

SCALE MOUNTAINSIDE

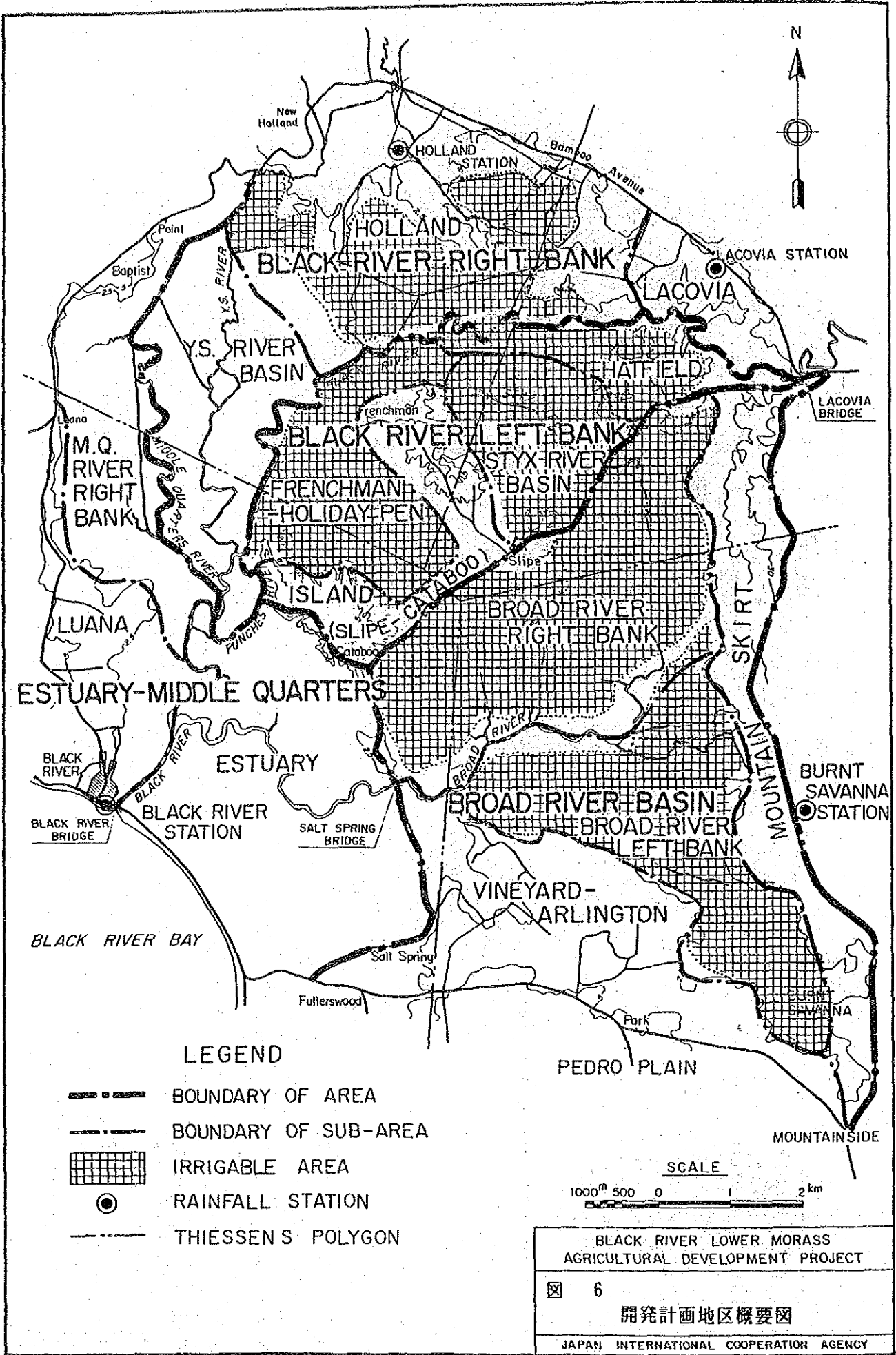
1000 m 500 0 1 2 km

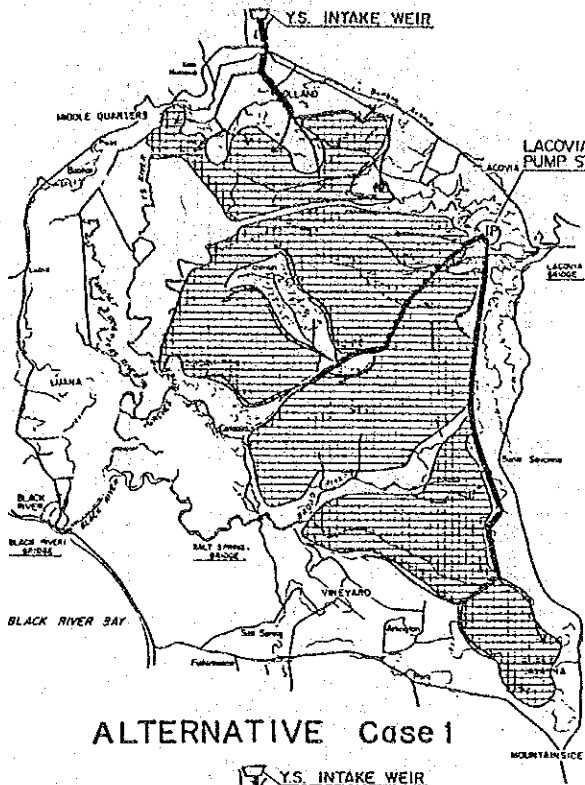
BLACK RIVER LOWER MORASS
AGRICULTURAL DEVELOPMENT PROJECT

5

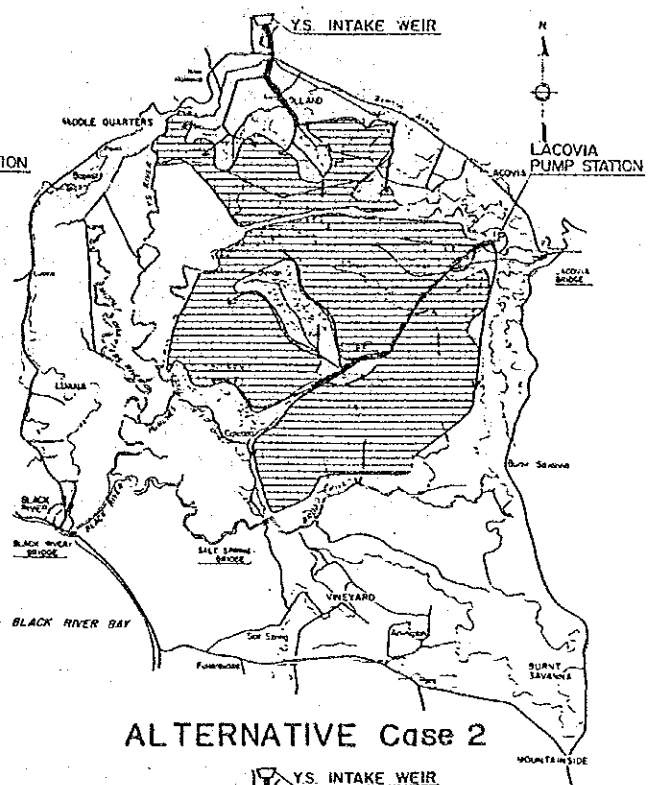
現況土地利用図

JAPAN INTERNATIONAL COOPERATION AGENCY

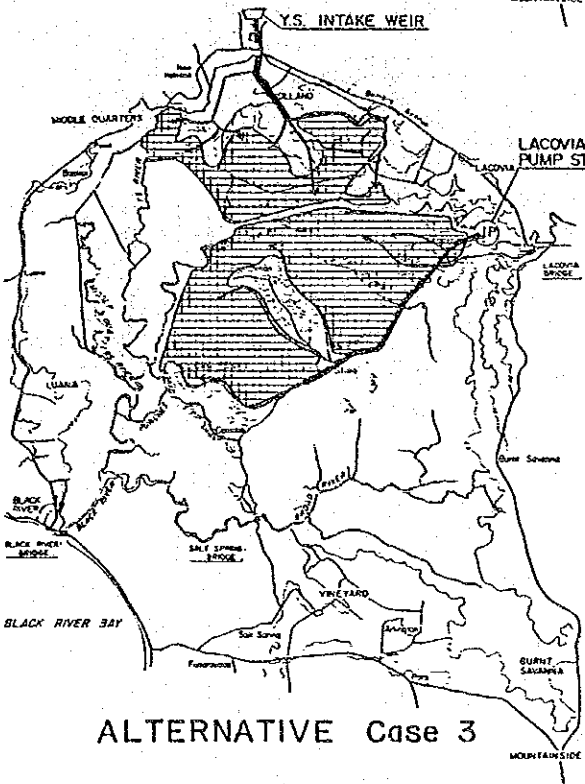




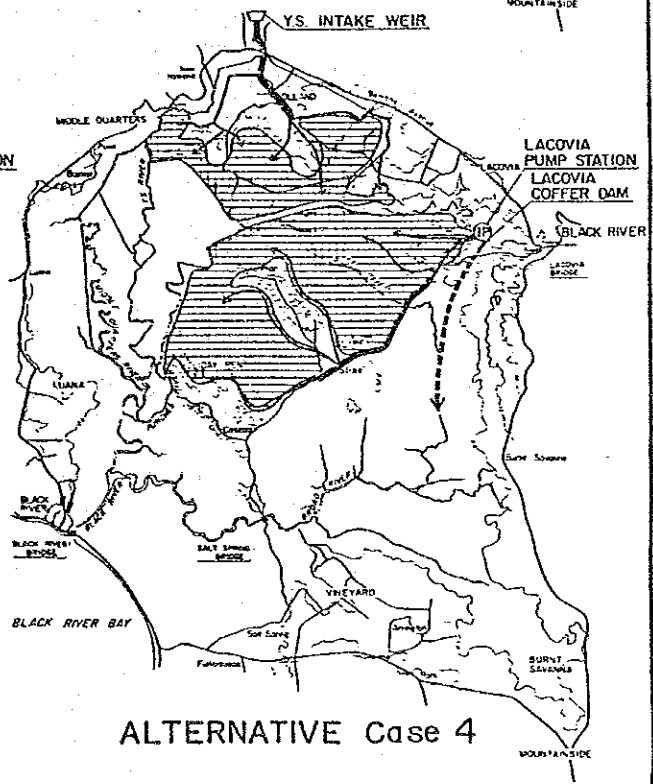
ALTERNATIVE Case 1



ALTERNATIVE Case 2









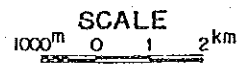
ALTERNATIVE Case 3



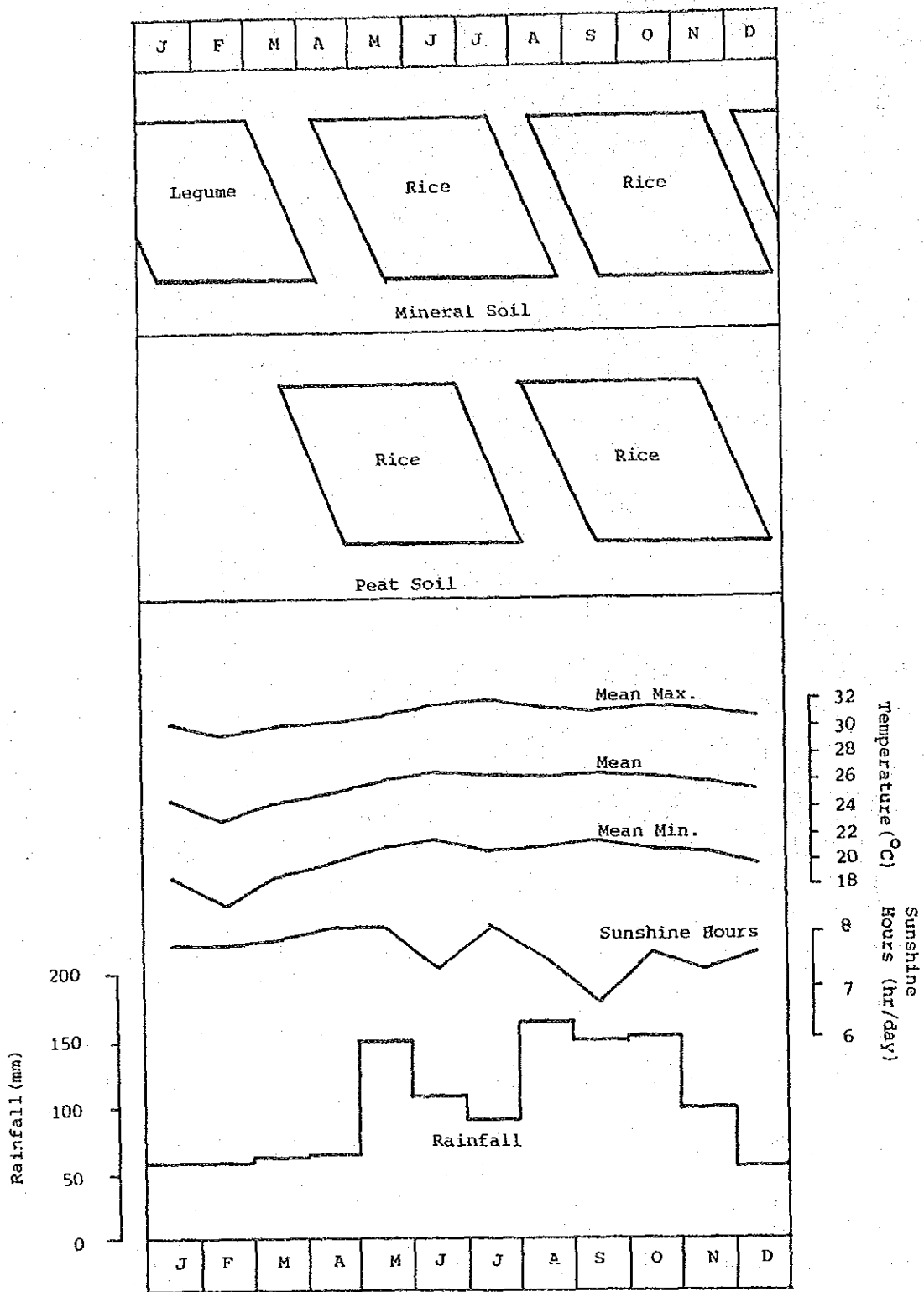
ALTERNATIVE Case 4

LEGEND

-  INTAKE WEIR
-  IRRIGATION PUMP STATION
-  MAIN IRRIGATION CANAL
-  SECONDARY AND SUB-SECONDARY IRRIGATION CANAL
-  BLACK RIVER DIVERSION CANAL
-  DEVELOPMENT AREA



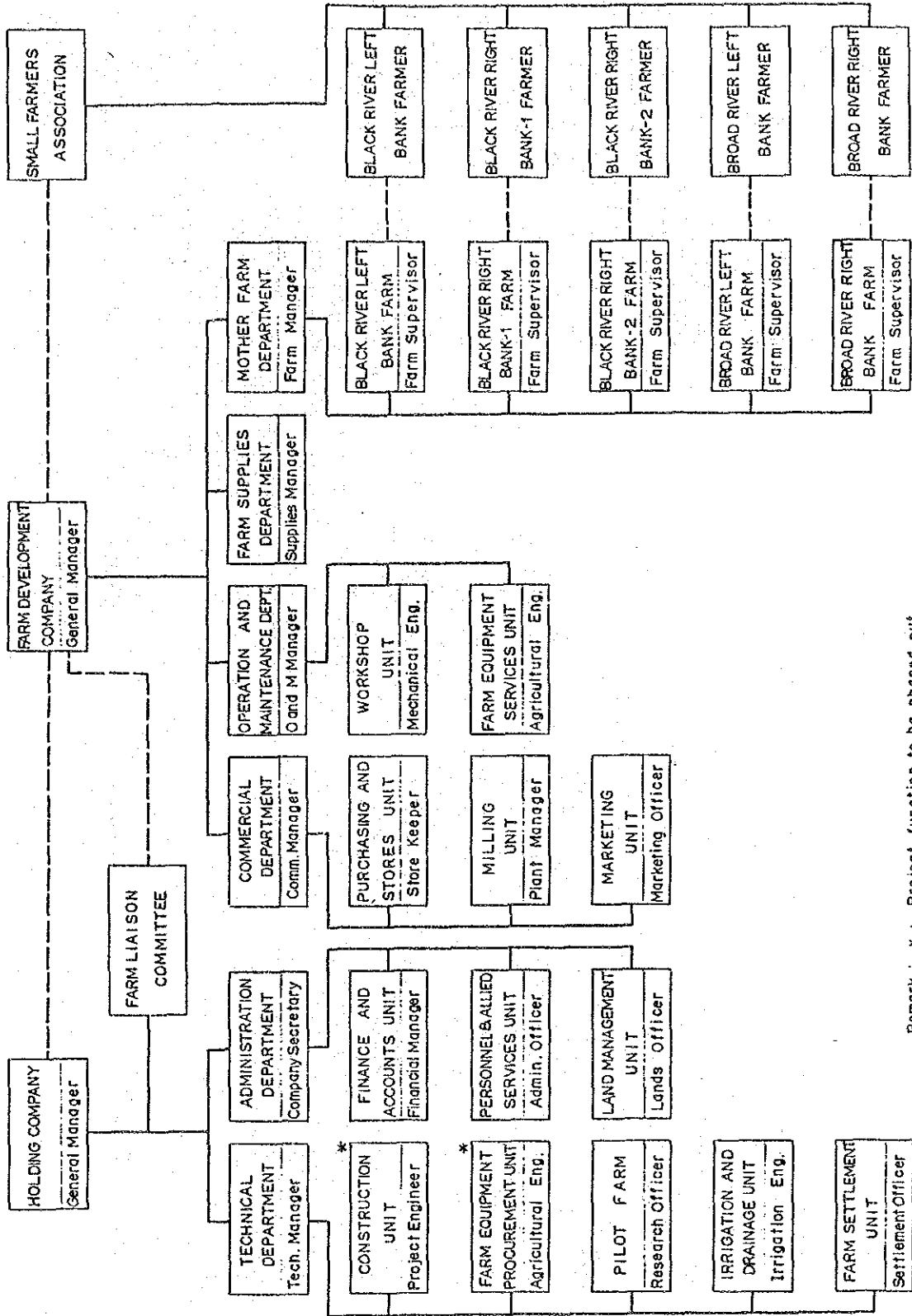
BLACK RIVER LOWER MORASS AGRICULTURAL DEVELOPMENT PROJECT	
☒ 7	開発比較案
JAPAN INTERNATIONAL COOPERATION AGENCY	



BLACK RIVER LOWER MORASS
 AGRICULTURAL DEVELOPMENT PROJECT

図 8 計画作付体系

JAPAN INTERNATIONAL COOPERATION AGENCY



Remark : * : Project function to be phased out on completion of assignment.

BLACK RIVER LOWER MORASS AGRICULTURAL DEVELOPMENT PROJECT

9

事業実施及び維持管理組織図

JAPAN INTERNATIONAL COOPERATION AGENCY

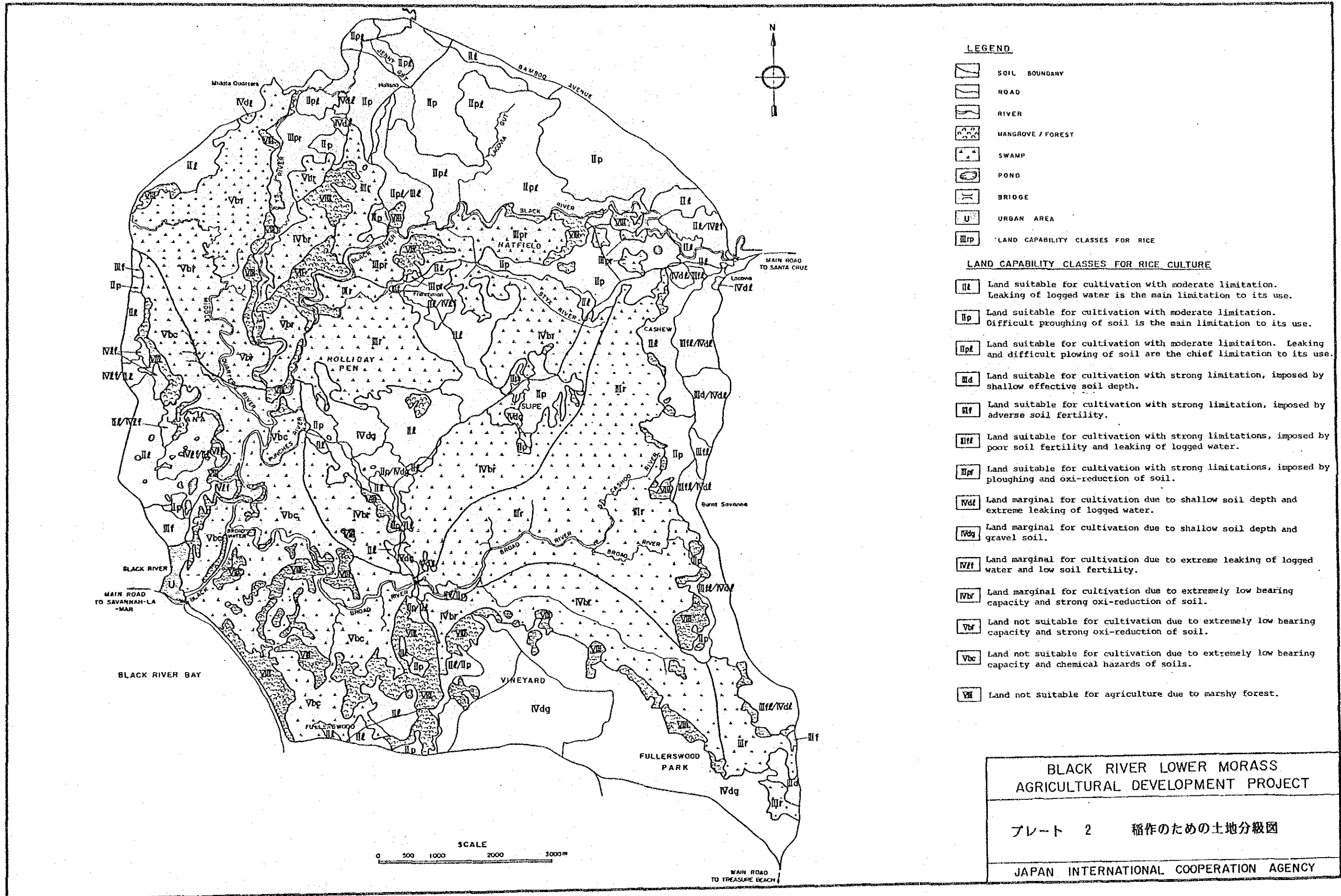
	1-st year	2-nd year	3-rd year	4-th year	5-th year	6-th year	7-th year	8-th year																																													
<p>I. PREPARATORY WORKS</p> <p>1. Survey and detailed design</p> <p>2. Preparation of tender document</p> <p>3. Selection of contractor</p> <p>4. Land acquisition</p> <p>5. Procurement of O&M equipment</p> <p>6. Hydrogeological investigation and computer model simulation</p>																																																					
<p>II. CONSTRUCTION WORKS</p> <p>1. Mobilization and construction of offices and quarters</p> <p>2. Digging observation wells</p> <p>3. 1-st phase construction</p> <p> a. Holland area</p> <p> b. Black River Left Bank area</p> <p>4. 2-nd phase construction</p> <p> a. Broad River Right Bank area</p> <p> b. Broad River Left Bank area</p> <p>5. Prime operation & adjustment</p>																																																					
<p>III. FARM OPERATION</p> <p>1. Holland area</p> <p>2. Black River left bank area</p> <p>3. Broad River right bank</p> <p>4. Broad River left bank</p> <p>5. Total area cultivable</p>																																																					
<p>△ prequalification of tender</p> <p>▲ tender calling</p> <p>○ closing tender</p> <p>● awarding contract</p>																																																					
<table border="1" style="width: 100%; text-align: center;"> <tr> <td>260</td> <td>560</td> <td>560</td> <td>560</td> <td>560</td> <td>560</td> <td>560</td> <td>560</td> <td>560</td> </tr> <tr> <td></td> <td>350</td> <td>920</td> <td>920</td> <td>920</td> <td>920</td> <td>920</td> <td>920</td> <td>920</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>400</td> <td>800</td> <td>800</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>400</td> <td>800</td> <td>800</td> </tr> <tr> <td>260</td> <td>910</td> <td>1,480</td> <td>1,480</td> <td>1,480</td> <td>1,480</td> <td>2,280</td> <td>3,080</td> <td>3,080</td> </tr> </table>									260	560	560	560	560	560	560	560	560		350	920	920	920	920	920	920	920							400	800	800							400	800	800	260	910	1,480	1,480	1,480	1,480	2,280	3,080	3,080
260	560	560	560	560	560	560	560	560																																													
	350	920	920	920	920	920	920	920																																													
						400	800	800																																													
						400	800	800																																													
260	910	1,480	1,480	1,480	1,480	2,280	3,080	3,080																																													

BLACK RIVER LOWER MORASS
AGRICULTURAL DEVELOPMENT PROJECT

☒ 10 事業実施計画図

JAPAN INTERNATIONAL COOPERATION AGENCY

プレート



LEGEND

- SOIL BOUNDARY
- ROAD
- RIVER
- MANGROVE / FOREST
- SWAMP
- POND
- BRIDGE
- URBAN AREA
- LAND CAPABILITY CLASSES FOR RICE

LAND CAPABILITY CLASSES FOR RICE CULTURE

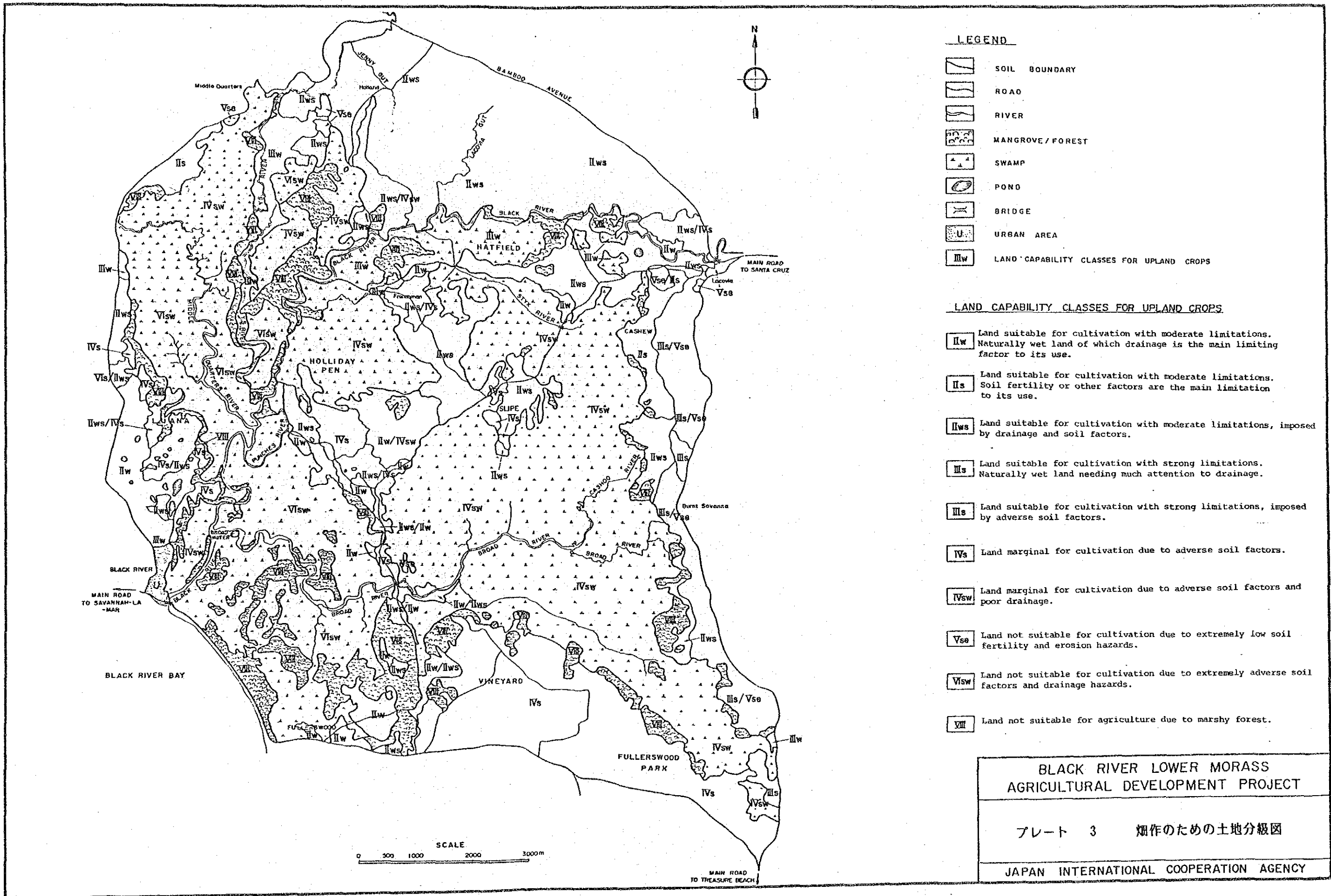
- Land suitable for cultivation with moderate limitation. Leaking of logged water is the main limitation to its use.
- Land suitable for cultivation with moderate limitation. Difficult ploughing of soil is the main limitation to its use.
- Land suitable for cultivation with moderate limitation. Leaking and difficult ploughing of soil are the chief limitation to its use.
- Land suitable for cultivation with strong limitation, imposed by shallow effective soil depth.
- Land suitable for cultivation with strong limitation, imposed by adverse soil fertility.
- Land suitable for cultivation with strong limitations, imposed by poor soil fertility and leaking of logged water.
- Land suitable for cultivation with strong limitations, imposed by ploughing and oxi-reduction of soil.
- Land marginal for cultivation due to shallow soil depth and extreme leaking of logged water.
- Land marginal for cultivation due to shallow soil depth and gravel soil.
- Land marginal for cultivation due to extreme leaking of logged water and low soil fertility.
- Land marginal for cultivation due to extremely low bearing capacity and strong oxi-reduction of soil.
- Land not suitable for cultivation due to extremely low bearing capacity and strong oxi-reduction of soil.
- Land not suitable for cultivation due to extremely low bearing capacity and chemical hazards of soils.
- Land not suitable for agriculture due to marshy forest.

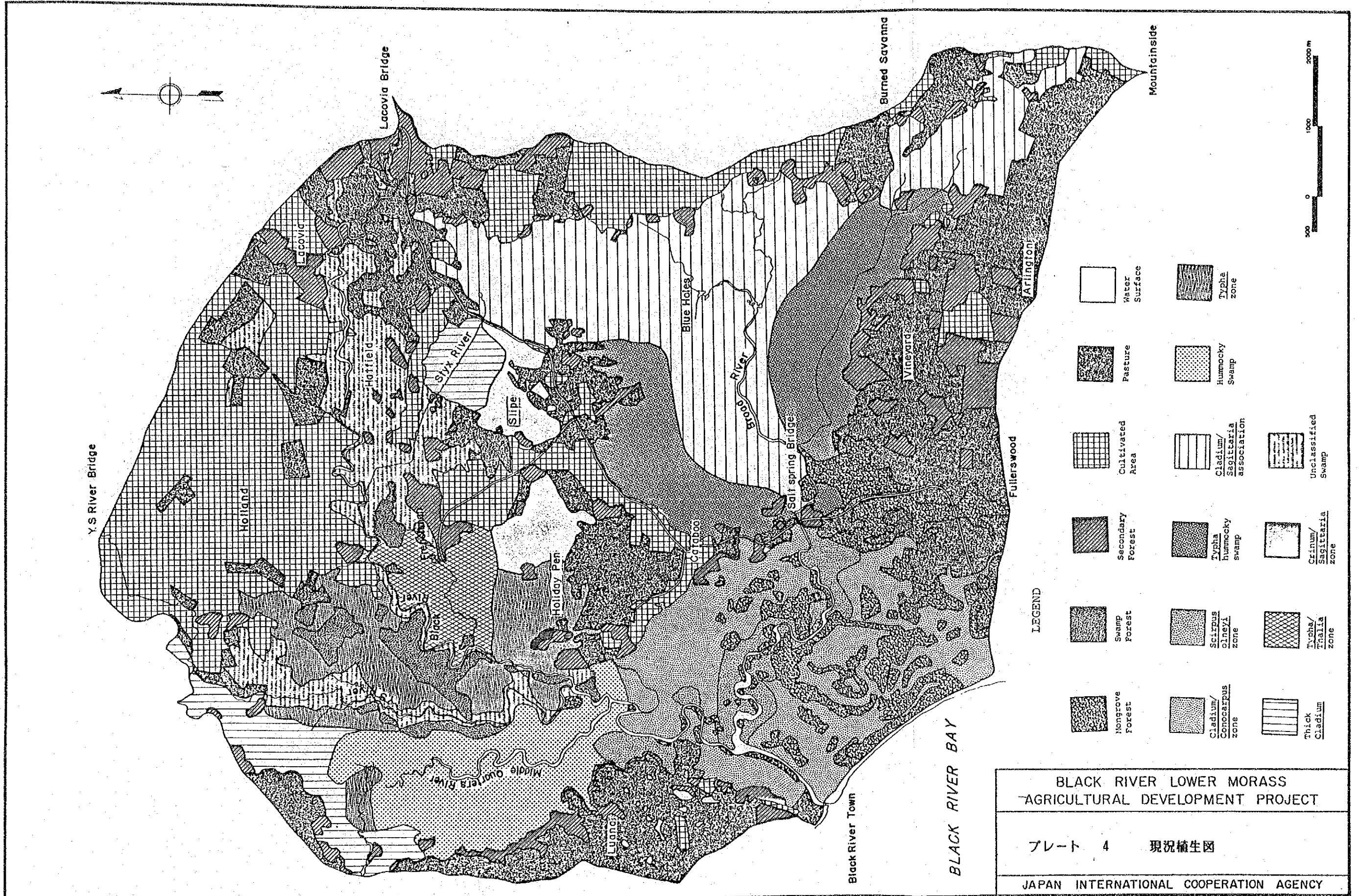
BLACK RIVER LOWER MORASS
AGRICULTURAL DEVELOPMENT PROJECT

プレート 2 稲作のための土地分級図

JAPAN INTERNATIONAL COOPERATION AGENCY

SCALE
0 500 1000 2000 3000m





BLACK RIVER LOWER MORASS
 AGRICULTURAL DEVELOPMENT PROJECT







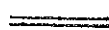

プレート 4 現況植生図

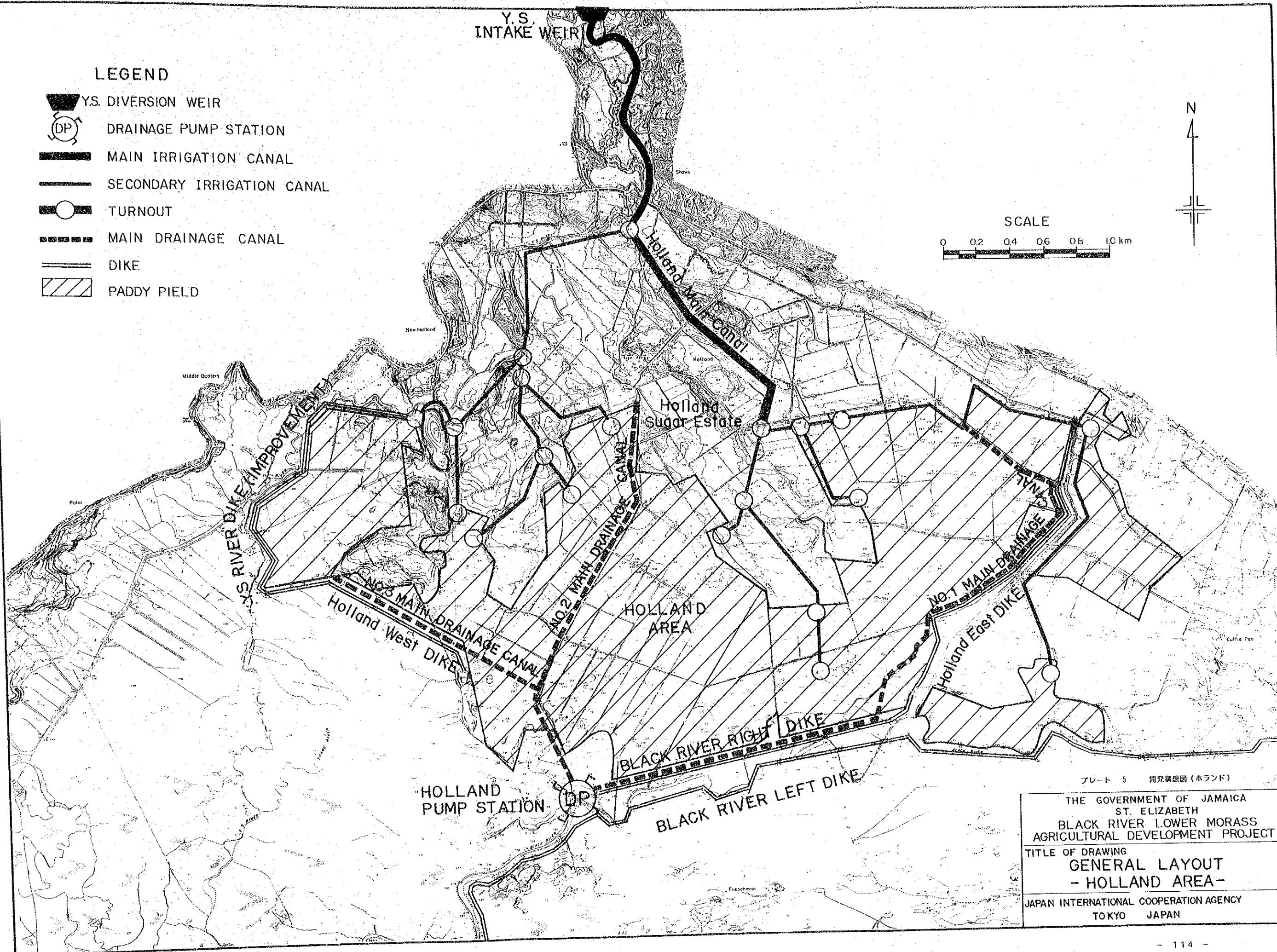
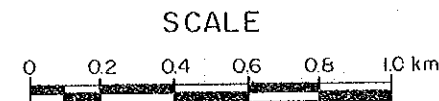
JAPAN INTERNATIONAL COOPERATION AGENCY

LEGEND

- | | | | | | |
|--|------------------|--|--------------------------------|--|------------------------|
| | Nongrove Forest | | Cladium/Conocarpus zone | | Thick Cladium zone |
| | Swamp Forest | | Scirpus olneyi zone | | Typha/Typha zone |
| | Secondary Forest | | Typha hummocky swamp | | Crinum/Sagittaria zone |
| | Cultivated Area | | Cladium/Sagittaria association | | Unclassified Swamp |
| | Pasture | | Hummocky Swamp | | |
| | Water Surface | | Typha zone | | |

LEGEND

-  Y.S. DIVERSION WEIR
-  DRAINAGE PUMP STATION
-  MAIN IRRIGATION CANAL
-  SECONDARY IRRIGATION CANAL
-  TURNOUT
-  MAIN DRAINAGE CANAL
-  DIKE
-  PADDY FIELD

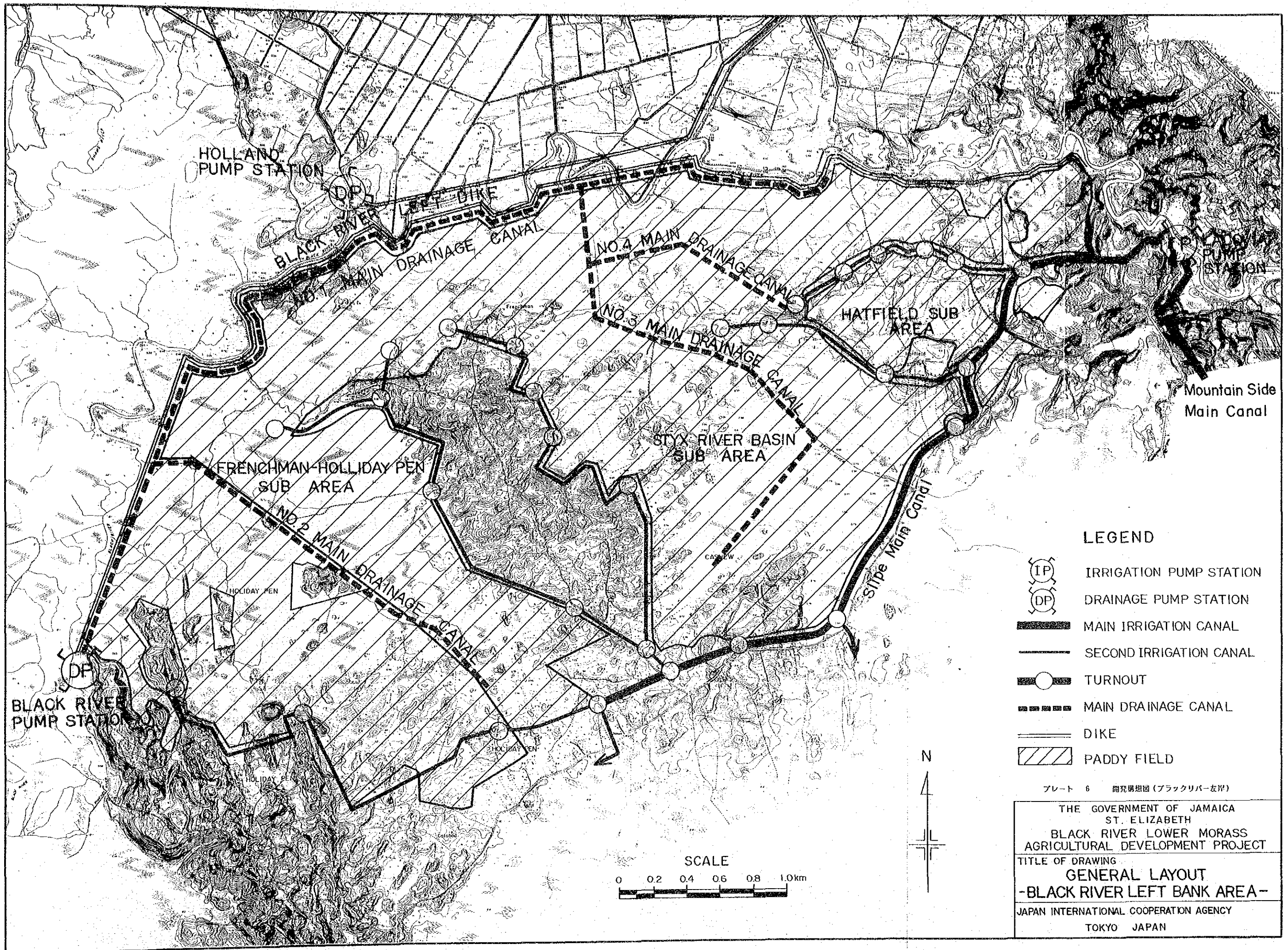


プレート 5 開発構想図 (ホランド)








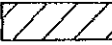
THE GOVERNMENT OF JAMAICA
 ST. ELIZABETH
 BLACK RIVER LOWER MORASS
 AGRICULTURAL DEVELOPMENT PROJECT

TITLE OF DRAWING
GENERAL LAYOUT
- HOLLAND AREA -

JAPAN INTERNATIONAL COOPERATION AGENCY
 TOKYO JAPAN

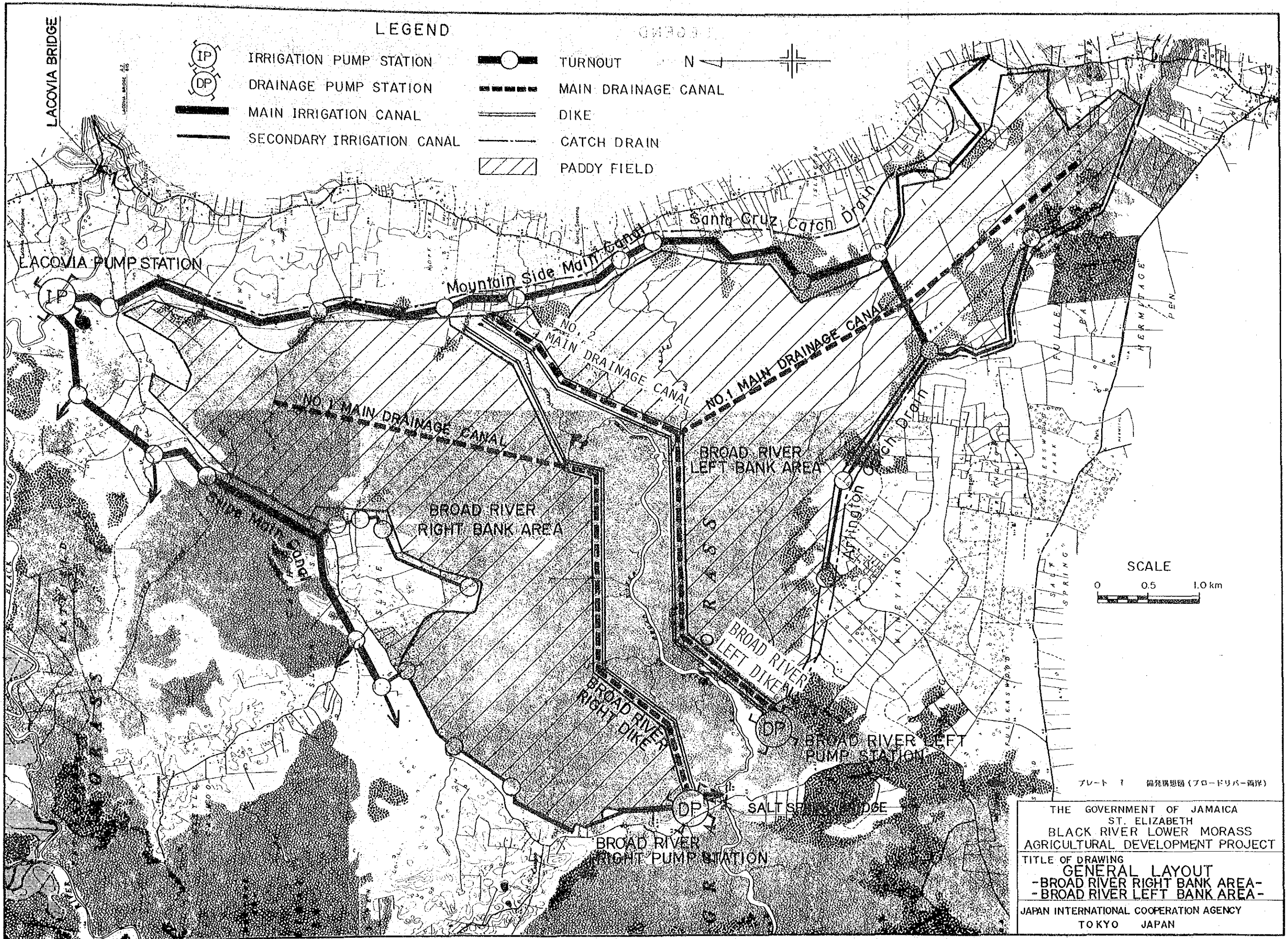


LEGEND

-  IRRIGATION PUMP STATION
-  DRAINAGE PUMP STATION
-  MAIN IRRIGATION CANAL
-  SECOND IRRIGATION CANAL
-  TURNOUT
-  MAIN DRAINAGE CANAL
-  DIKE
-  PADDY FIELD

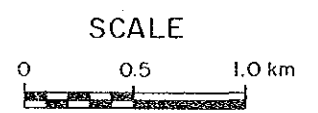
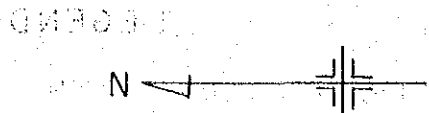
プレート 6 開発構想図(ブラックリバー左岸)

THE GOVERNMENT OF JAMAICA
 ST. ELIZABETH
 BLACK RIVER LOWER MORASS
 AGRICULTURAL DEVELOPMENT PROJECT
 TITLE OF DRAWING
GENERAL LAYOUT
-BLACK RIVER LEFT BANK AREA-
 JAPAN INTERNATIONAL COOPERATION AGENCY
 TOKYO JAPAN



LEGEND

- | | | | |
|--|----------------------------|--|---------------------|
| | IRRIGATION PUMP STATION | | TURNOUT |
| | DRAINAGE PUMP STATION | | MAIN DRAINAGE CANAL |
| | MAIN IRRIGATION CANAL | | DIKE |
| | SECONDARY IRRIGATION CANAL | | CATCH DRAIN |
| | | | PADDY FIELD |



THE GOVERNMENT OF JAMAICA
 ST. ELIZABETH
 BLACK RIVER LOWER MORASS
 AGRICULTURAL DEVELOPMENT PROJECT
 TITLE OF DRAWING
GENERAL LAYOUT
 - BROAD RIVER RIGHT BANK AREA -
 - BROAD RIVER LEFT BANK AREA -
 JAPAN INTERNATIONAL COOPERATION AGENCY
 TOKYO JAPAN

添付資料

添付資料 1

SCOPE OF WORK
FOR
THE FEASIBILITY STUDY
ON
BLACK RIVER LOWER MORASS AGRICULTURAL DEVELOPMENT PROJECT
IN
JAMAICA

AGREED UPON BETWEEN
NATIONAL PLANNING AGENCY
AND
THE JAPAN INTERNATIONAL COOPERATION AGENCY

KINGSTON, DECEMBER 13, 1983

Yvonne E. Roache
Yvonne E. ROACHE
for Chief Technical Director
National Planning Agency

Shingi Takahashi
Shingi TAKAHASHI
Leader of the Japanese
Study Team, JICA

1. INTRODUCTION

In response to the request of the Government of JAMAICA (hereinafter referred to as "JAMAICA"), the Government of Japan decided to implement the feasibility study on BLACK RIVER LOWER MORASS Agricultural Development Project (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan.

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

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

II. OBJECTIVES OF THE STUDY

The objectives of the Study will be:

1. to formulate the Project and verify its technical and economic feasibility; and
2. to undertake on-the-job training and transfer the technology to the Jamaican counterpart personnel in the course of the Study.



III. OUTLINE OF THE STUDY

1. Study Area

The study area will be about 14,000 ha located in the alluvial plain of Black River downstream, and bounded on the north and west by the Black River - Santa Cruz Road, on the east by the Lacovia Bridge - Mountainside Road, and on the south by the Mountainside - Black River Road.

2. Scope of the Study

The scope of the Study to be conducted will be as follows:

1) Field Work

(1) Collection and review of the existing data and information for the Study:

A. natural condition

- a. meteorology and marine meteorology
- b. hydrology
- c. topography
- d. geography
- e. geology
- f. soil

B. general condition

- a. land use
- b. land tenure
- c. water utilization
- d. transportation and communication
- e. electricity
- f. socio-economy
- g. social infrastructure
- h. natural resources
- i. environmental aspect

C. agriculture:

- a. farm household
- b. farm management
- c. crop yield and production
- d. agricultural machinery
- e. animal husbandry
- f. inland water fishery
- g. water resources
- h. groundwater
- i. irrigation water requirement
- j. custom of water use and water rights

D. agro-economy:

- a. marketing and prices
- b. agricultural production cost and production value
- c. farm economy

E. agricultural supporting system:

- a. farmers organization
- b. agricultural techniques and its extension
- c. agricultural credit
- d. experiment and research activities
- e. agricultural training

F. agricultural infrastructure:

- a. irrigation and drainage system
- b. land reclamation
- c. land consolidation
- d. farm road
- e. milling and storage facilities
- f. agro-industry

(2) Necessary field surveys for project planning.

- (3) Formulation of basic development concepts for the Project
- (4) Preparation for preliminary design of project works and provisional determination of key dimensions thereof.

2. Home Office Work in Japan:

- (1) Detail study and analysis of the data and information obtained through the field work.
- (2) Finalization of the optimum development concept for the project.
- (3) Formulation of the Project:
 - A. land use plan
 - B. land resettlement plan
 - C. farming programme and cropping pattern
 - D. estimation of crop yield, crop production, production cost and value
 - E. irrigation and drainage plan
 - F. plan and preliminary design of irrigation and drainage facilities, and other agricultural infrastructures
 - G. construction plan of project works
 - H. plan for operation and maintenance system of facilities
 - I. implementation schedule of the Project
 - J. estimation of the project cost
 - K. agricultural supporting services
 - L. organization for the Project during and after construction
- (4) Evaluation of the Project:
 - A. economic evaluation by means of IRR
 - B. analysis of typical farm budget
 - C. other benefits
- (5) Specific recommendation

(3)

(3)

IV. WORK SCHEDULE

The Study will be conducted in accordance with tentative working schedule attached herewith.

V. REPORTS

JICA will prepare and submit the following reports in English to JAMAICA:

1. Plan of Operation
twenty (20) copies at the commencement of the Study.
2. Progress Report
twenty (20) copies at the end of each field work.
3. Interim Report
twenty (20) copies at the beginning of the Phase II study.
4. Draft Final Report
twenty (20) copies at the completion of the Phase II study.
Within a month after the presentation of Draft Final Report, JAMAICA will forward the final comments on the Draft Final Report to JICA through the Embassy of Japan.
5. Final Report
fifty (50) copies within two (2) months after receiving comments on the Draft Final Report.

VI. UNDERTAKING OF JAMAICA

1. To facilitate smooth conduct of the Study, JAMAICA will take necessary measures:
 - 1) To secure the safety of the Japanese study team;
 - 2) To permit the members of the Japanese study team to enter, leave and sojourn in Jamaica for the duration of their assignment therein, and exempt them from alien registration requirements and consular fees:

- 3) To exempt the members of the Japanese study team from taxes, duties, fees and any other charges on equipment, machinery and other materials brought into Jamaica for the conduct of the Study;
- 4) To exempt the members of the Japanese study team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Japanese study team for their services in connection with the implementation of the Study;
- 5) To provide necessary facilities to the Japanese study team for the remittance as well as the utilization of funds introduced into Jamaica from Japan in connection with the implementation of the Study;
- 6) To secure permission for entry into private properties or restricted areas for the conduct of the Study;
- 7) To secure permission to take necessary data and documents related to the Study out of Jamaica to Japan by Japanese study team;
- 8) To secure permission to use survey equipment including walkie talkie (subject to agreement on specification) for the conduct of the Study;
- 9) To facilitate the quick and smooth custom clearance of the survey equipment and materials brought into Jamaica by Japanese study team for their field study;
- 10) To provide vehicles for the field operation;
- 11) To recruit local staff such as secretaries, typists, labourers and drivers; and
- 12) To arrange medical services for the team during its stay in Jamaica, if necessary.

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

3. National Planning Agency (hereinafter referred to as NPA) shall act as counterpart agency to the Japanese study team and also as coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the Study.
4. NPA shall, at its own expense, provide the Japanese study team with the following, in cooperation with other agencies concerned, if necessary:
 - 1) available data and information related to the Study;
 - 2) counterpart personnel;
 - 3) suitable office with necessary equipment both near the project site and in Kingston; and
 - 4) credentials or identification cards.

VII. UNDERTAKING OF THE GOVERNMENT OF JAPAN

For the implementation of the Study, the Government of Japan, through JICA, will take necessary measures:

1. To despatch, at its own expense, study teams to Jamaica;
2. To pursue technology transfer to the Jamaican counterpart personnel in the course of the Study; and
3. To provide the necessary equipment for the implementation of the Study, which will remain the property of the Government of Japan unless otherwise agreed upon.

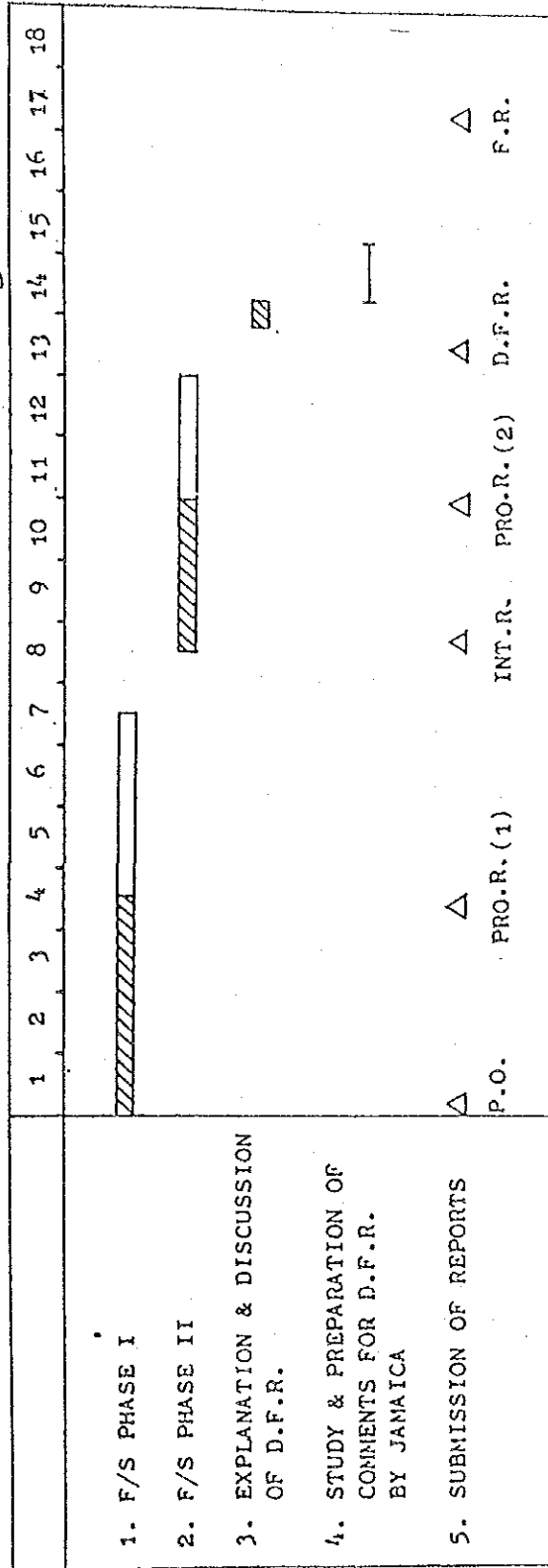
VIII. JICA and NPA will consult with each other in respect of any matter that may arise from or in connection with the Study.

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(Attached Sheet)

TENTATIVE WORKING SCHEDULE FOR FEASIBILITY STUDY
ON
BLACK RIVER LOWER MORASS AGRICULTURAL DEVELOPMENT PROJECT



REMARKS:

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[White bar] in JAPAN

P.O. : PLAN OF OPERATION
PRO-R. : PROGRESS REPORT
INT-R. : INTERIM REPORT
D.F.R. : DRAFT FINAL REPORT
F.R. : FINAL REPORT

(9)

Q.

MINUTES OF MEETING

ON

THE BLACK RIVER LOWER MORASS AGRICULTURAL DEVELOPMENT PROJECT

In response to the request for technical assistance for a feasibility study on the Black River Lower Morass Agricultural Development Project (the Project) by the National Planning Agency (NPA) in Jamaica, Japan International Cooperation Agency (JICA), governmental agency in Japan, despatched the Study Team for the Scope of Work of the Feasibility Study on the Project (the Study Team) headed by Mr. Shingi TAKAHASHI from November 30 to December 15, 1983.

During the stay in Jamaica the Study Team conducted field reconnaissance survey of the project area and discussed and exchanged views on the Scope of Work of the Feasibility Study on the Project with the representatives of the agencies concerned.

The main items which both sides agreed and understood are as follows:

1. Formation of Basic Development Concepts of the Project

The basic development concepts of the Project will be examined on several alternatives and finalized on the basis of the optimum development concepts agreed through discussions and meetings between the Japanese study team and the Jamaican counterpart personnel concerned.

2. Method for Economic Evaluation of the Project

As regard to the method for economic evaluation of the Project stated in Scope of Work (S/W), IRR means Economic Internal Rate of Return, which is a measure of the rate of return on the investment.



Furthermore, economic evaluation is to be conducted not only by means of IRR, but also by additional economic analysis on benefits obtained as a result of the Project, for instance, rising of foreign exchange balance, increase of employment opportunities, etc.

3. Implementation Schedule

JICA will inform the NPA at least one month in advance of the commencement of the study. However, the study is likely to begin early in 1984 just as soon as the Japanese Government is able to conclude preparation of the budget for the study.

4. Provisions of Vehicles

The expression "equipment", to be provided by the Government of Japan in S/W, includes vehicles and/or boats necessary for the Study.

The Government of Jamaica will provide vehicles necessary for the field operation of Jamaican counterpart personnel, and the Government of Japan will provide vehicles (4-wheel-drive cars) including boats necessary for the activities of the Japanese study team.

The above-mentioned provision of vehicles by Japan does not necessarily mean purchase in Japan and transportation to Jamaica, but may include procurement in Jamaica at Japan's expense.

5. Selection of Counterpart Personnel

Immediately after the Japanese study team is fixed, JICA will send a list of the members to NPA.

NPA will select appropriate counterpart personnel from the relevant Jamaican agencies in accordance with the composition of the Japanese study team.

(S)

g

6. Frequency of Walkie Talkie

For the purpose of obtaining permission for using a walkie talkie, the Japanese study team is to inform the frequency range of the instrument to be used to the Government of Jamaica as early as possible.

Signed in Kingston on
December 13, 1983

Shingi Takahashi
Shingi TAKAHASHI
Leader of the Japanese Study
Team, JICA

Yvonne E. Roache
Yvonne E. ROACHE
for Chief Technical Director
National Planning Agency

添 付 資 料 ②

作業監理委員、調査団及びカウンターパートの名簿

A. 作業監理委員

- | | | |
|----------|------|------------------------|
| 1. 高橋 新宜 | 委員 長 | 農用地開発公団 |
| | 総 括 | 技術管理室、指導役 |
| 2. 岡田 正啓 | かんがい | 北海道開発庁北海道開発局農業水産部土地改良課 |
| | 排 水 | 課長補佐 |
| 3. 西澤 厚男 | 栽 培 | 農林水産省北陸農政局計画部資源課 |
| | 土 壌 | 課長補佐 |
| 4. 川口 建男 | 農業経済 | 農林水産省東北農政局計画部地域計画課 |
| | | 農政調整官 |
| 5. 谷本 寿男 | 経済評価 | 海外経済協力基金調査開発部 |
| | | 開発第二課 課長代理 |

B. 事前及びS/W調査団

- | | | |
|----------|----|-----------------------|
| 1. 高橋 新宜 | 団長 | 農用地開発公団 |
| | | 技術管理室、指導役 |
| 2. 岡田 正啓 | | 農林水産省北海道開発局農業水産部土地改良課 |
| | | 課長補佐 |
| 3. 西澤 厚男 | | 農林水産省北陸農政局計画部資源課 |
| | | 課長補佐 |
| 4. 松田 教男 | | 国際協力事業団農林水産計画調査部 |
| | | 農林水産技術課 |

C. 第一次現地作業チーム

- | | | |
|----------|----|------------------|
| 1. 高橋 新宜 | 団長 | 農用地開発公団 |
| | | 技術管理室、指導役 |
| 2. 青木 真 | | 国際協力事業団農林水産計画調査部 |
| | | 農林水産計画課 |

D. 第一次現地作業監理チーム

- | | | |
|----------|----|-----------------------------|
| 1. 川口 武男 | 団長 | 農林水産省東北農政局計画部地域計画課
農政調整官 |
| 2. 松田 教男 | | 国際協力事業団農林水産計画調査部
農林水産技術課 |

E. ドラフト ファイナルレポート説明調査団

- | | | |
|----------|----|-----------------------------|
| 1. 高橋 新宜 | 団長 | 農用地開発公団
技術管理室、指導役 |
| 2. 黒柳 俊之 | | 国際協力事業団農林水産計画調査部
農林水産技術課 |
| 3. 矢野 信一 | | 実施調査団長 |
| 4. 川勝 隆雄 | | 実施調査副団長 |

F. 第一次実施調査団

- | | |
|----------|-------|
| 1. 矢野 信一 | 団長／総括 |
| 2. 児玉 正行 | 気象・水文 |
| 3. 寺沢 四郎 | 土壌 |
| 4. 林 喜郎 | 測量 |
| 5. 豊田 耕三 | 測量 |
| 6. 刑部 孝二 | 測量 |
| 7. 伊藤 量輔 | 測量 |

G. 第二次実施調査団

- | | |
|-----------|-----------|
| 1. 矢野 信一 | 団長／総括 |
| 2. 川勝 隆雄 | 副団長／用水計画 |
| 3. 望月 由三 | 排水計画 |
| 4. 児玉 正行 | 気象・水文 |
| 5. 寺沢 四郎 | 土壌 |
| 6. 住友 俊夫 | 湿地開発 |
| 7. 森 季雄 | 施設計画 |
| 8. 藤井 定吉 | 栽培・営農 |
| 9. 五十嵐生男 | 地質・地下水 |
| 10. 山田 朝男 | 土質基礎・施工積算 |
| 11. 岩野 泰三 | 環境保全 |
| 12. 関口洋二郎 | 農民組織・農業経済 |
| 13. 河野 博 | 漁業 |

H. 第一次実施調査団カウンターパート及びミーティング出席者

1. Mr. Trevor F. Clarke Director, Planning and Policy MOA
2. Mr. J.E. Pusey Agricultural Engineer, Consultant
3. Mr. Michael White Hydrologist, Consultant
4. Mr. Keiffer Thomas Topographic Surveyor, Survey Dept. MOA
5. Mr. Glendon Richard Asst. " " "
6. Mr. Skivy Stewart Regional Soil Surveyor RPPU, MOA
7. Mr. Maruf Ahmed UNV - Soil Surveyor RPPU, MOA
8. Miss Arnella Williams Sociologist RPPU, Central Region MOA
9. Mr. Rowland Girvan Asst. Director, Survey Dept.
10. Mr. Harry R. Barrett Topographical Planner, RPPU, Cr. MOA
11. Mr. James Bayer Planning Consultant, Central Region MOA
12. Mr. Irick W. Kerr Project Analyst/Economist MOA
13. Mr. John Kasantroeno Team leader, Meyersfield Development Project

I. 第二次実施調査団カウンターパート及びミーティング出席者

1. Mr. Trevor F. Clarke Director, Planning and Policy MOA
2. Mr. J.E. Pusey Agricultural Engineering, Consultant
3. Mr. Owen Batchelor Rural Development Specialist, MOA
4. Mr. Michael White Hydrologist, Consultant
5. Mr. H.W. Gray Director, Engineering Division, MOA
6. Mr. R. Girvan Asst. Director, Survey Dept. MOA
7. Mr. Skivy Stewart Regional Soil Surveyor, RPPU, MOA
8. Mr. Maruf Ahmed UNV - Soil Surveyor UNDP
9. Mr. Glendon Richard Asst. Topo-surveyor, Survey Dept.
10. Miss M. Lewis Agronomist, RDU, MOA
11. Mr. V. Lyttle Agro-Economist, RDU, MOA
12. Miss Arnella Williams Sociologist, RPPU, Central Region, MOA
13. Mr. D.A. Robinson Rural Planner, Central Region, MOA
14. Mr. J. Mehra Engineering Consultant, NWC
15. Miss K. Roberts Manager, Resource & Project Planning, NWC
16. Mr. D. Henry Agronomist, NWC

添付資料 3

Minutes of Understanding Between the
Ministry of Agriculture and the Japan
International Cooperation Agency
Feasibility Study Team

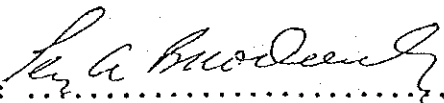
Minutes of Understanding between the Ministry
of Agriculture and the Japan International
Cooperation Agency Technical Mission on the
Black River Lower Morass Agricultural Development
Project

On the completion of the Phase I Section of the feasibility report on the Black River Lower Morass Agricultural Development Project, the Japan International Cooperation Agency Mission and the Ministry of Agriculture met at the Ministry of Agriculture on March 27, 1984 to discuss the Progress Report of the Mission.

It was agreed at this meeting that the Mission had completed its terms of reference satisfactorily.


A request will be submitted by the Ministry of Agriculture to the Japan International Cooperation Agency in Japan for a Technical Expert in Shrimp Culture and Fish farming Systems to be included in the Mission which will be arriving in Jamaica in June 1984 to study the possibility of Shrimp Rearing and Fish Farming in the Zone II Section of the area under investigation.

The Ministry of Agriculture also requested that the Prefeasibility Study should be completed by October 1984.

Signature: 

Dr. Percival Broderick,
Hon. Minister of Agriculture
Jamaica.

Date: 28/2/1984

Signature: 

Mr. S. Yano,
Team Leader
Feasibility Study Team
Japan International
Cooperation Agency.

Signature: 

Witness: Mr. Lincoln McIntosh,
National Planning Agency's Representative

Date:

MINUTES OF UNDERSTANDING BETWEEN THE
MINISTRY OF AGRICULTURE AND THE JAPAN
INTERNATIONAL COOPERATION AGENCY
FEASIBILITY STUDY TEAM ON THE BLACK
RIVER LOWER MORASS AGRICULTURAL
DEVELOPMENT PROJECT

Prior to commencement of the Phase II field survey of the feasibility study on the Black River Lower Morass Agricultural Development Project, the Japan International Cooperation Agency (JICA) and the Ministry of Agriculture met at the Ministry of Agriculture on June 27, 1984 to discuss the Revised Plan of Operation prepared by JICA.

It was confirmed at this meeting that the Revised Plan of Operation was satisfactory and was accepted by the Ministry of Agriculture.

Yvonne E. Roache
.....
Mrs. Yvonne E. Roache
Director of Planning
Planning Institute of Jamaica.

S. Yano
.....
Mr. S. Yano
Team Leader
Feasibility Study Team
Japan International
Cooperation Agency.

DATE: *2 Jul '84*.....

DATE: *2 Jul '84*.....

Trevor F. Clarke
.....
Witness: Mr. Trevor F. Clarke
Director Planning
and Policy
Ministry of Agriculture

Shingo Takahashi
.....
Mr. S. Takahashi
Leader of Advisory Team
for Feasibility Study

MINUTES OF UNDERSTANDING

BLACK RIVER LOWER MORASS AGRICULTURAL DEVELOPMENT PROJECT

This is to confirm that the PLANNING INSTITUTE OF JAMAICA (PIOJ) and the JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) have done a review of the Pre-feasibility Study Scope of Work on the Black River Lower Morass Agricultural Development Project and have reached agreement on the following aspects:

- (a) The Plan of Operation is on schedule and the pre-feasibility study should be presented to the Government of Jamaica by end October 1984.
- (b) The Scope of Work objectives are being accomplished.
- (c) The Profile of the Project indicates that the project is technically and economically sound and demonstrates a satisfactory rate of return for the investment to be made.
- (d) Recommendations and planning will be included in the pre-feasibility on the requirements for paddy and soya bean production components such as inputs and milling facilities.
- (e) Recommendations will be made in the final feasibility report on sub-plans for social infrastructure such as housing, health services, electricity, schools and community facilities.
- (f) The Pre-feasibility Study will be presented to the Government of Jamaica for an investment decision to be taken within thirty (30) days from the date of presentation of report.

(g) The Final Feasibility Report will be presented
by the end of June 1985.

Yvonne E. Roache

.....
YVONNE E. ROACHE (MRS.)
ON BEHALF OF
DIRECTOR GENERAL
PLANNING INSTITUTE OF JAMAICA

S. Yano

.....
S. YANO
TEAM LEADER
FEASIBILITY STUDY TEAM
JAPAN INTERNATIONAL COOPERATION
AGENCY

Trevor F. Clarke

.....
TREVOR F. CLARKE
DIRECTOR, PLANNING AND POLICY
DIVISION
MINISTRY OF AGRICULTURE

Tateo Kawaguchi

.....
TATEO KAWAGUCHI
ASSISTANT CHIEF, REGIONAL PLANNING
DIVISION
PLANNING DEPARTMENT
MINISTRY OF AGRICULTURE, FORESTRY
& FISHERIES
(JAPAN)

11/10/84

.....
DATE

.....
DATE 11 OCT 1984

MINUTES OF UNDERSTANDING
BLACK RIVER LOWER MORASS
AGRICULTURAL DEVELOPMENT
PROJECT

This is to confirm that the PLANNING INSTITUTE OF JAMAICA (PIOJ), on behalf of the Government of Jamaica, and the JAPAN INTERNATIONAL COOPERATION AGENCY (JICA), have done a review of the FEASIBILITY REPORT (DRAFT) on the Black River Lower Morass Agricultural Development Project and we confirm our understanding as set out below:

- (a) The development strategy of Alternative I (total development) is accepted but that implementation should proceed as follows:
 - (i) Phase one would involve the development of Alternative three i.e. the right and left banks of the Black River (the Holland area as well as Hatfield, Styx River basin, and Frenchman-Holiday Pen).
 - (ii) Phase two - the development of the right and left banks of the Broad River - would await further studies on the effects of the drainage on the hydrological regime of the area, particularly on the groundwater of the Pedro Plains and salt water intrusion.

- (b) JICA will recommend the development of a commercial rice research programme on the peat lands at Brumdec.
- (c) JICA will make recommendations for adequate protection and management of the ecology and environment both during the construction phase and after, as discussed.

JICA will proceed to prepare the (Final) Feasibility Report, based on the points of understanding listed above, by June 30, 1985.

Marjorie Henriques

 Marjorie Henriques (Mrs.)
 on behalf of
 Director General,
 Planning Institute of Jamaica

S. Yano

 S. Yano
 Leader,
 Feasibility Study Team,
 Japan International Cooperation
 Agency

Trevor A. Clarke

 Trevor A. Clarke
 Director, Technical Services,
 Special Projects & Programmes
 Ministry of Agriculture

S. Takahashi

 S. Takahashi
 Leader of the Advisory Team
 of the Japan International
 Cooperation Agency

.....*25.3.1985*.....
 Date

.....*25th Mar '85*.....
 Date

