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Feasibility Report

Upper Didesa Project

Phase II
Southwest Development

United States Agency
for International
Development

Ministry of Agriculture
Ethiopian Provisional
Military Government

Project Proposal
October 1975

TAMS
Agricultural
Development
Group

PLAIN TABLE SURVEY
ON RED SOILS NEAR
PROPOSED PROJECT FARM

LOOKING NORTH
ACROSS DIDESA RIVER

TYPICAL VEGETATION ON BLACK
SOILS. KOLOSURI MOUNTAIN IN
BACKGROUND

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CHAPTER I

SUMMARY AND RECOMMENDATIONS

RECOMMENDATIONS

On the basis of findings, summarized in this chapter and presented in more detail in Chapter III, it is recommended that a resettlement program, consisting of 5,000 families on small farms of five hectares each with concurrent controlled agricultural development (including farm family livestock component), be initiated at the earliest possible date within a selected Project Area totaling over 34,000 hectares in the Upper Didesa River Valley. Of this total area, 25,000 hectares are classified as net arable lands.

This recommended program was selected from three alternatives which were quantitatively analyzed in detail. Briefly, the other two alternatives are:

1) settlement of 3,400 farm farm families on small farms of five hectares each on 17,000 hectares of red/brown soils, and mechanized State farming on 8,000 hectares of black vertisols; and

2) same as 1) above, except that the State farmed areas would be phased into small farm settlement during the fifth and sixth years of Project implementation, resulting in the same total of 5,000 settled farm families as in the recommended program.

The estimated capital and recurring costs of the recommended program for Project Year Zero (pre-settlement inputs) and Project Years One through Four are summarized in Tables I-1 and I-2, respectively. Capital costs for this period carrying through the first four years of Project implementation total E$11,145,000 (foreign exchange component E$6,070,000), and annual recurring costs for the same period total E$3,925,000 (foreign exchange component E$873,000).

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Table I - 1

Estimated Capital Costs
Years 0 Through 4
(Thousands of Ethiopian Dollars)

	Project Year					Total	Foreign Exchange
	0	1	2	3	4		
Extension Services	57	6	5	5	4	77	45
Project Farm	-	107	-	-	-	107	75
Project Machinery Pool	-	127	97	77	106	407	407
Livestock Health Program	-	38	24	-	17	79	24
Credit Loan Fund	17	234	377	230	232	1090	451
Storage & Marketing	-	76	-	45	90	211	85
Tsetse Fly Control	-	164	15	15	15	209	22
Surveys & Mapping	148	42	63	84	84	421	41
Roads	286	286	406	286	-	1264	128
Drainage System	-	-	-	-	1823	1823	182
Water Supply System	80	860	-	-	-	940	342
Public Services	-	80	80	55	45	260	130
Management	-	225	-	-	-	225	106
Technical Assistance	576	1152	1152	1152	-	4032	4032
Total	1164	3397	2219	1949	2416	11145	6070

Table I - 2

Estimated Annual Recurring Costs
Years 0 Through 4
(Thousands of Ethiopian Dollars)

	Project Year					Total	Foreign Exchange
	0	1	2	3	4		
Extension Services	44	80	134	163	199	620	39
Project Farm	-	88	126	126	126	466	107
Project Machinery Pool	-	85	164	246	351	846	508
Livestock Health Program	-	3	40	40	41	124	22
Credit Loan Fund	10	21	21	21	21	94	-
Storage & Marketing	-	21	29	34	43	127	9
Tsetse Fly Control	-	20	32	29	27	108	11
Roads	-	7	14	24	32	77	7
Water Supply System	-	-	68	99	105	272	66
Public Services	-	90	120	145	155	510	25
Management	57	138	162	162	162	681	79
Total	111	553	910	1089	1262	3925	873

DESCRIPTION OF THE PROJECT

Purpose

The purpose of the Project, which conforms with present Government aims and policies, is twofold: 1) to settle up to 5,000 landless farm families within a selected net area of 25,000 hectares in the Upper Didesa Valley; and 2) to increase agricultural production therein from its present level of about 250 tons per year (less than two percent of the Project Area now under cultivation) to over 33,000 tons of grains and pulses and 6,000 tons of seed cotton annually.

Project Features (Inputs)

Extension Services - The extension service program envisages recruiting, and training as required, a sufficient number of senior and junior extension agents to enable attainment of Project output goals. Initially, the ratios would be one junior agent to 50 settlers and approximately one senior agent for each ten junior agents. The program would be phased out in Project Year Eight, after which regular EPID services would take over.

Project Farm - Establishment of a Project Farm is proposed for testing, training, demonstration, and seed multiplication purposes. Technical direction would emanate therefrom in areas of management, conservation, cultural practices, agronomy and entomology. Results of IAR research elsewhere would be tested under local environmental conditions. Areas would also be provided for training extension agents. The Project Farm would cover an area of about 300 hectares and would include both mechanized and oxen equipment, and other capital cost inputs such as a vshicle, fencing, farm roads, office and shed, and staff housing. Proposed staffing includes a farm manager, two technical assistants, one secretary, one storekeeper, one mechanic, one tractor driver and helper, one driver and labor as required.

Project Machinery Pool - Due to the expected difficulty in working the black vertisols, it is assumed for the purpose of analysis that these soils (8,000 hectares) will require mechanical seed bed preparation. To effect this, a Project-operated custom machinery pool is envisaged with a build-up to 28 sets of equipment (79 horsepower tractor, plow, disc and ridger) by Project Year Seven. This machinery pool would also prepare two hectares of seed bed for the first year's cultivation on the red/brown soil farms. In addition, a build-up to

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28 three-ton tractor trailers is proposed for the input and output hauling requirements of all farmers. Costs of custom services are proposed to be recovered by levying hourly charges on beneficiary farmers.

Livestock Health Program - To control and prevent the spread of disease in farm family livestock herds, an animal health program building up to three facilities by Project Year Eight is proposed. Facilities would include receiving pens, holding and quarantine areas, crushes, dips, buildings, sick pens, and a field laboratory. Staffing would include animal health assistant, secretary, vaccinators, clerks, and dip attendants.

Credit, Storage and Marketing - A revolving credit loan fund is proposed to provide short term loans for food, implements, oxen, and production costs. It is anticipated that this fund can be repaid and phased out in Project Year Eight. Staffing would include one credit supervisor, one secretary and one bookkeeper.

Storage facilities comprising rodent-proof grain and pulse stores and cotton shelters are proposed with capacities to handle 25 percent of surplus grain and pulse production and 20 percent of cotton production. Staffing would include one supervisor, one secretary, one bookkeeper, and day labor as required.

Tsetse Fly Control - Tsetse fly control is prerequisite to successful Project implementation. Proposed measures include clearing buffer zones, clearing tributaries, clearing strips through the riverine forest to the Didesa River, and annual spraying. Contributing to this program would be on-farm clearing and clearing of Project farm and Kolosuri (Project Headquarters and expected town center) areas.

Surveys and Mapping - It is expected that surveys and mapping will be carried out on the basis of ground surveys. It is necessary to obtain topography of the entire Project Area in Year Zero and to stake out village and farm plot boundaries over a five-year period commensurate with the proposed settlement schedule.

Roads - It is proposed to upgrade the 50-kilometer external road access from Bedele to Kolosuri (Project Center) to rural roads standard and provide an internal Project road net to the same standard (about 35 kilometers total). With the exception of one bridge over the Ambelta River, all crossings would be by paved fords. Construction would be by labor intensive methods.

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Drainage System - A complete surface drainage system is proposed for the 8,000 hectares of black vertisols. Construction would take place during Project Years Four and Five and would be carried out by labor intensive methods. It is proposed that charges be levied on drainage users in order to recover most of the capital expended on the system.

Water Supply - A Project-provided potable water supply system is proposed only for the Project Center area (Kolosuri) and the expected large town in the same vicinity. The system would include pumping water from the Didesa River via a pipeline to Kolosuri Mountain where it would pass through a filter into a reinforced concrete reservoir; from there, after treatment, the water would be fed into a gravity distribution system to public fountains and the Project Farm. A charge would be placed on water in order for the Project to approximately break even over a 20-year period.

Public Services - Proposed public services included in Project Analyses include malarial control, health stations, MFE (minimum formal education - grades one through four) schools and a police sub-station.

Technical Assistance - A minimum technical assistance program of 14 man-years over a four-year period (Project Years Zero through Three) is recommended in the fields of management, engineering, agronomy, and equipment maintenance.

Organization and Management - It is envisaged, at this writing, that Project development and operation would work within the framework of the Ministry of Agriculture (MOA) and would, therefore, be an integral part of the Extension and Project Implementation Department (EPID) as has historically been the case. However, the Government is presently considering top level policy and responsibility changes which could result in a different implementing agency. However, the proposed Project management should have the highest possible degree of autonomy and be directly responsible for implementation of works and administration of funds regardless of which Ministry or authority may be in overall top level charge.

Planned Project Production (Outputs)

Projected Project Area production, or outputs, which would be realized through proposed Project implementation is shown in Table I-3. The parameters and bases for these projections are presented under farm budget analyses presented in Chapter III of this Project Proposal.

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Table I-3

Projected Production
(thousands of metric tons)

Crop	Project Year 1	2	3	4	5	6	7	8	9	10-20
Maize	0.8	2.9	6.4	11.0	15.2	17.3	18.0	18.0	18.0	18.0
Sorghum	0.5	1.4	2.7	4.4	5.4	6.0	6.0	6.0	6.0	6.0
Chick Peas	-	0.3	1.0	2.0	[illegible]	4.3	4.7	4.8	4.8	4.8
Teff	-	-	-	-	-	0.7	2.5	4.0	4.6	4.8
Total Grains & Pulses	1.3	4.6	10.1	17.4	23.9	28.3	31.2	32.8	33.4	33.6
Cotton	-	-	-	-	0.7	2.5	4.4	5.6	6.0	6.0

SUMMARY FINDINGS

On the bases of field investigations, office studies, and financial and economic analyses, it is concluded that the proposed Project is technically, economically and socially feasible. It is further concluded that the Project is ready for the implementation of pre-settlement activities including: 1) upgrading of external access from Bedele to Kolosuri; 2) selection, orientation, and gainful employment (labor intensive construction) of the first year's settlers from the Jima area and within the Project boundary; 3) recruitment and training of extension agents; 4) final designs of proposed Project works; 5) topographic surveys; 6) appointment of senior project staff; and 7) provision of technical assistance.

The proposed Project meets all relevant criteria established by Ethiopian law, including all recent proclamations on rural land reform; it also falls within Government policies regarding farm sizes and agricultural development.

Financial Analysis

Model Farms - Cash flow analyses of the two proposed farm models indicate the following net cash flows (in Ethiopian dollars) during the first ten years of farm operations:

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Farm Model	0	1	2	3	4	5	6	7	8	9	10
Red/Brown Soil	18	6	414	764	1102	1131	1140	1382	1244	1266	1292
Black Soil	18	40	547	898	1103	1128	1146	1061	1086	1054	1086

Estimated Government Cash Flow - An approximation of the overall financial impact the Project can have is discussed in Chapter III (page III - 33) and tabulated on page II - 38. After only six years, the Project is expected to begin generating a net positive cash flow (before debt service) to the Government.

Economic Analysis

Economic analysis of the proposed Project is presented in Chapter III of this Project Proposal (pages III - 39 through III - 47). The internal economic rate of return was computed at 32 percent, and the benefit-cost ratio at ten percent discount rate was computed at 1.8.

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CHAPTER II

PROJECT BACKGROUND AND DETAILED DESCRIPTION

BACKGROUND

Ethiopia is located on the northeast coast of Africa between latitudes 4° and 18° North and longitudes 33° and 48° East. It is bounded on the northeast by the Red Sea and the French Territory of the Afars and Issas; on the east and southeast by the Peoples Republic of Somalia; on the south and southwest by Kenya; and on the west and northwest by The Sudan. The total area of the country is approximately 1,165,000 square kilometers.

The heart of the land is a high, dissected plateau, known as the Ethiopian Plateau and covering over one half of the country's area with peak elevations exceeding 4,500 meters. The plateau is split diagonally from northeast to southwest by the Great Rift Valley which extends through Kenya and into Tanzania and Uganda. The majority of the population (estimated to be about 27 million in 1975) live and farm on the plateau and in parts of the rift valley. The northern and eastern edges of the plateau are marked by abrupt escarpments which drop some 1,500 meters or more to hot, arid coastal plains. To the southwest, the fall is more gradual to broad, undulating to flat, tropical savannah grasslands along the Sudan border. To the south and southeast, the highlands slowly yield to semi-arid desertic plains towards Lake Rudolf, Kenya and Somalia.

The economy of Ethiopia is heavily dependent upon the earnings of the agricultural sector and is likely to continue to be so in the future. Present agricultural sector analyses by USAID, IBRD, and others have indicated that economic growth rates anticipated in the first three five-year development plans have not been realized, and, in spite of current efforts to increase crop yields through experimentation and various extension and assistance programs, population increases continue to exceed the rate of agricultural growth.

In response to accelerating population pressure in the highlands, the Planning and Programming Department of the Ministry of Agriculture (PPD/MOA) in 1972 directed an interministerial effort in carrying out a reconnaissance survey of the Southwest

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Region of Ethiopia to identify potential project developments. The purpose of this survey was to locate underdeveloped and largely unsettled areas whose apparent technical and economic potential deserved more attention in the Government's resettlement and agricultural development programs. Criteria for selection were areas that would offer attractive agricultural and livestock benefits and, at the same time, provide large tracts of Government-owned lands for settlement of indigenous groups and resettlement of peasant farmers from the overcrowded highlands. As a result of the 1972 reconnaissance survey, several areas in the Southwest Region were identified for more detailed study.

In 1973, the Government of Ethiopia requested USAID participation in a two-phase study of five areas selected from those identified. USAID in 1974 contracted with Tippetts-Abbett-Mc Carthy-Stratton (TAMS) to carry out the study. The Phase I pre-feasibility survey of four areas (the fifth area deleted by the Interministerial Committee with USAID concurrence during the first week of Phase I activities) was completed in August 1974 upon submission of "Prefeasibility Report, Phase I Southwest Development, USAID and GOE", August 1974.

The Interministerial Committee accepted the Prefeasibility Report in September 1974 and the GOE requested USAID to provide continuing support for Phase II activities which comprised feasibility grade studies of the two recommended projects, the Upper Didesa Valley and Gambela. Mobilization for Phase II work was initiated in December 1974.

Until recently, Ethiopia was a constitutional hereditary monarchy with a long history of aristocratic dominance. In September 1974, the Emperor was deposed and the affairs of government taken over by the Provisional Military Administrative Council (PMAC). The Ethiopian Provisional Military Government has subsequently embarked on a socialist-oriented program dedicated to sharing the country's resources and assets among the mass of its people. The most pertinent change with respect to this study was the proclamation issued in March 1975 whereby all rural lands were nationalized.

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THE PROJECT AREA

Location

The Upper Didesa Valley study area, comprising over 54,000 hectares, is bounded on the southeast (upstream limit) by the confluence of the Didesa and Wama Rivers and on the northwest (downstream limit) by the Bedele-Arjo-Nekemte track (National Route 39) which crosses the Didesa River via a well-constructed bridge.

That portion of the study area southwest of the Didesa River was selected as the initial Project Area for settlement and agricultural development; approximately 34,300 hectares of land are included in this area which is wholly within Buna Bedele Awraja of the Ilubabor Administrative Region.

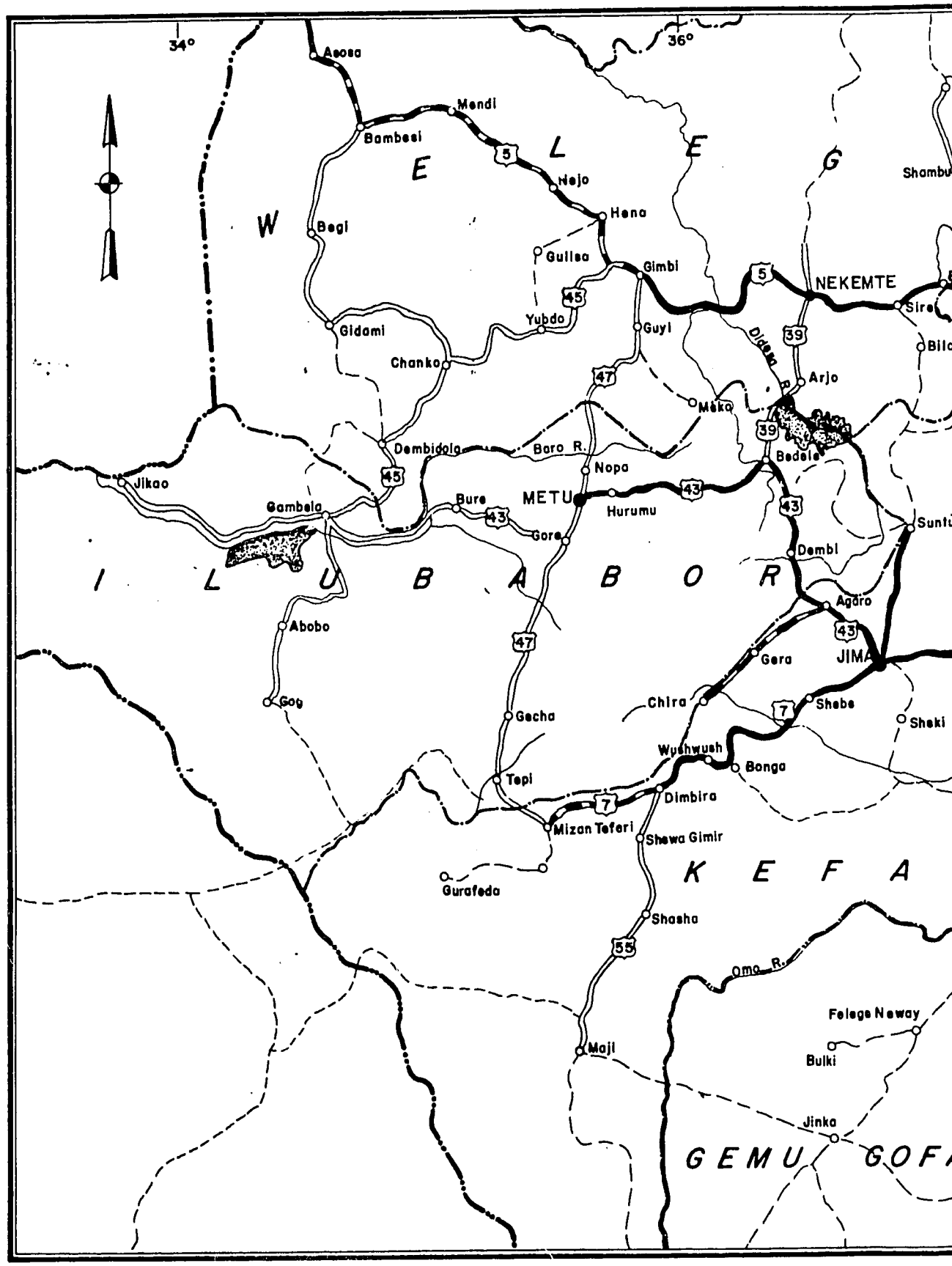
The remainder of the study area, lying to the northeast of the Didesa River and comprising some 20,000 hectares, was analyzed as to its potential for livestock development; however, in view of the relatively low internal financial rate of return (less than ten percent) it was concluded that a future second stage settlement and agricultural development project would be a preferred use of capital.

The general location of the study area is shown on Figure 1, and both the study area and the Project Area are shown on Figure 2.

The Project region is presently connected with the rest of the country by two all-weather primary roads: 1) Route No. 5 extending from Gimbi to Addis Abeba; and 2) Route No. 7 from Addis Abeba, via Jima, to Bonga connecting with the Jima-Bedele-Metu Road (Route No. 43). The Bedele-Arjo-Nekemte feeder road has recently been funded for construction under the Sixth Highway Program. This road, which will cross the Didesa River on the existing bridge at the northwest limit of the Project Area will provide direct all-weather access to regional markets and Addis Abeba by mid-1979. Locations of above routes may be seen on Figure 1.

Climate and Water Resources

The Project Area lies within the highest annual rainfall region in Ethiopia. As no climatological station has been operated


34°
36°
Asosa
Mendi
Bambesi
Nejo
Hena
Begi
Gulisa
Gimbi
NEKEMTE
Shambu
Sire
Bilo
Yubdo
Guyi
Gidami
Chanko
Dideya R.
Arjo
Mako
Dembidolo
Baro R.
Nopa
Bedele
Jikao
Gambela
Bure
METU
Hurumu
Gore
Dembi
Suntu
I L U B A B O R
Agaro
Abobo
JIMA
Gera
Goq
Chira
Shebe
Sheki
Gecha
Wushwush
Bonga
Tepi
Dimbira
Mizan Teferi
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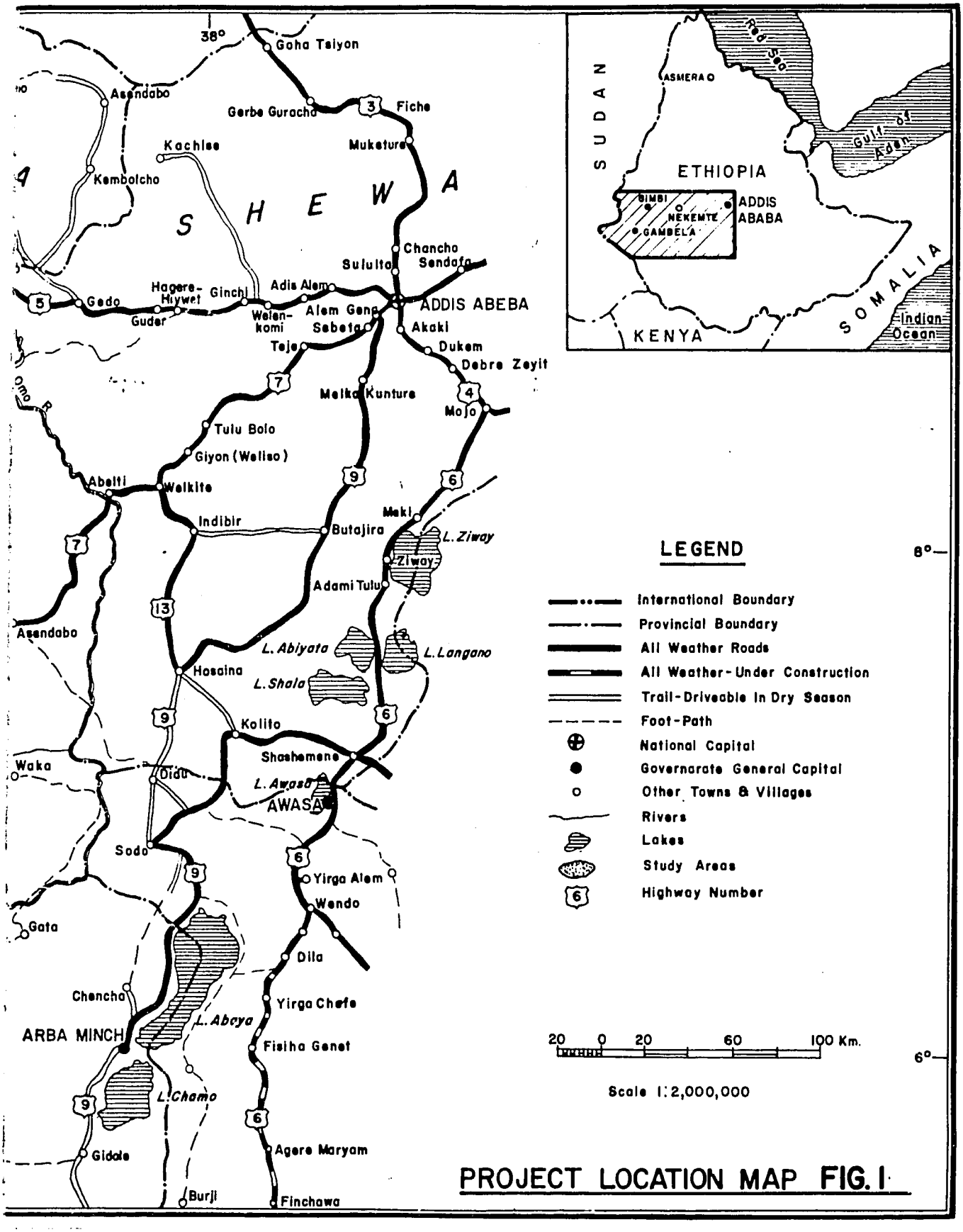
Omo R.
Felege Neway
Bulki
Maji
Jinka
GEMU GOFA



PROJECT LOCATION MAP FIG. I

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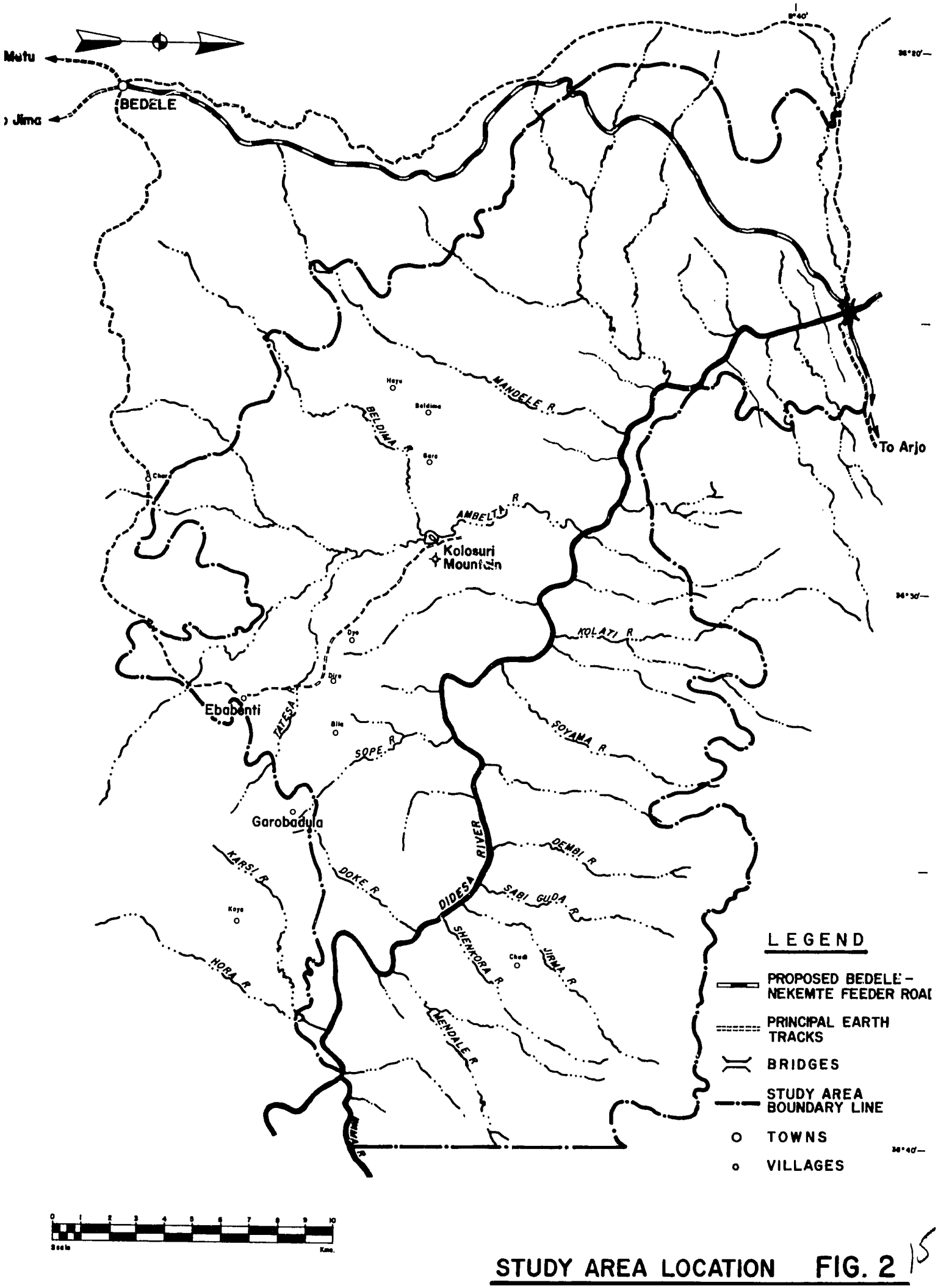

STUDY AREA LOCATION FIG. 2

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within the Project Area, the nearby Dabana Mission Station (formerly called Bedele) is of importance to Project studies because of its length of precipitation record and the similarity of that portion of its record in common with the limited data from Chara, a village near the Project Area at about 1,500 meters elevation.

The mean annual precipitation at Dabana (Bedele) is nearly 2,000 millimeters distributed as follows:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
31	40	59	77	251	278	327	328	349	160	64	15	1979

The mean diurnal range in temperature in the Didesa Valley is about 21°C. Mean recorded temperatures (in °C) at the Didesa Valley Station are as follow:

Month	Maximum	Minimum
January	32.9	6.3
February	33.4	7.6
March	34.5	11.9
April	34.1	12.1
May	31.2	10.8
June	28.7	11.5
July	27.3	11.5
August	27.1	11.1
September	28.7	11.2
October	30.3	10.1
November	29.4	8.2
December	30.3	6.1
Year	30.7	9.8
Mean	20.3	

The area covered by hydrologic studies includes the Didesa River basin upstream from the gaging station at the existing bridge, known as "the Didesa River near Arjo", with a drainage area of approximately 9,500 square kilometers. Mean annual runoff for the 14-year period of record is 4,686 million cubic meters, an amount equivalent to 148 cubic meters per second average discharge or 494 millimeters yield from the drainage basin. Mean annual yield from the basin is about 25 percent of mean annual precipitation. Runoff is low during February-April; increases in irregular patterns during May-July; usually

is greatest in August or September; and recedes, at first irregularly in October, then more regularly from November to January. Mean monthly and annual flows (in cubic meters per second) are as follow:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
19	12	9	13	41	105	308	465	418	265	78	35	148

Geology and Geomorphology

The Project Area overlies and is derived from tertiary Trappean lava composed largely of basalts and basaltic tuffs. It is a part of a lengthy valley formed by erosive action of the Didesa River and its numerous tributaries. The surrounding highland plateau elevations average 2,000 meters or more while the valley floor elevations range from 500 to 700 meters lower. The valley lands form a complicated system of low hills which border and interrupt, savannah plains sloping gently towards the river. Numerous Didesa River tributaries, some with near perennial flows, frequently dissect the plains.

Soils and Ecology

Parent material and climate do not vary within the Project Area; consequently, soil formation and differentiation has primarily been influenced by three environmental factors: slope, aspect, and drainage. On the hills, red and brown inceptisols have developed, covering 52.2 percent of the area. On the slightly sloping plains and in the basins, dark grey to black vertisols have formed on 27.5 percent of the area. Adjacent to tributary streams and the Didesa River, alluviums have been deposited; and at the foot of some hills, especially those close to the river, colluvial materials are found. Alluvial and colluvial soils together comprise 16.6 percent of the Project Area, and scattered steep hills account for the remaining 3.7 percent.

As shown on Figure 3, the soils have been grouped into seven soil series which primarily differ in color of top and subsoil, texture, and cracking characteristics.

Throughout the Project Area, the natural vegetation is closely related to soil types and other environmental factors. In general, the red and brown inceptisol series are characterized by the presence of Combretum glaucescens trees which

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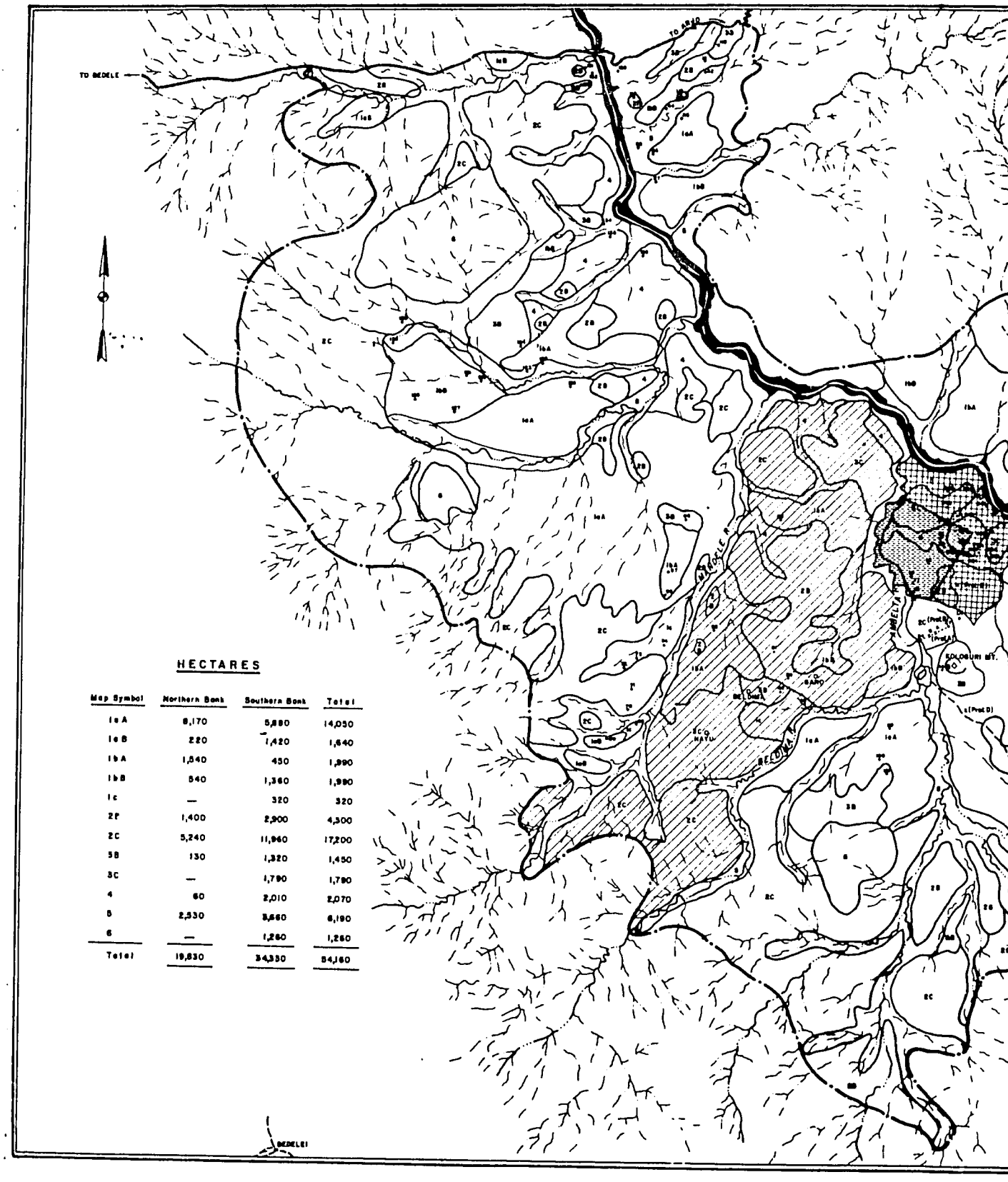
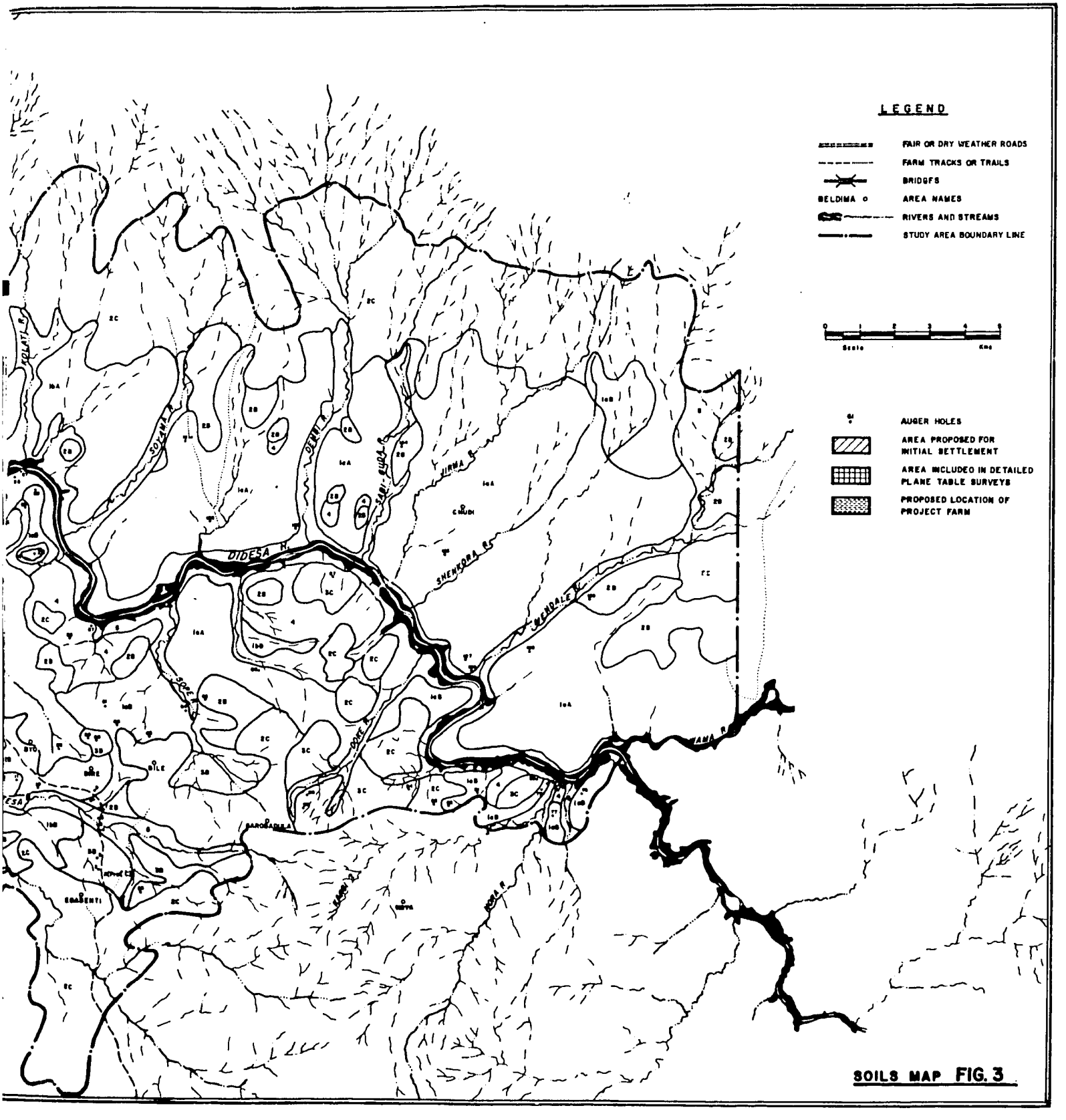


HECTARES

Map Symbol	Northern Bank	Southern Bank	Total
1a A	8,170	5,880	14,050
1a B	220	1,420	1,640
1b A	1,540	450	1,990
1b B	540	1,360	1,990
1c	—	320	320
2F	1,400	2,900	4,300
2C	5,240	11,960	17,200
3B	130	1,320	1,450
3C	—	1,790	1,790
4	60	2,010	2,070
5	2,530	3,660	6,190
6	—	1,260	1,260
Total	19,830	34,330	54,160



SOILS MAP FIG. 3

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dominate and by Ficus exasperata when C. glaucescens is absent. Typically, grass species include Hyparrhenia cymbaria, Imperata cylindrica and Panicum sp.

The expanding and deeply cracking black and dark grey vertisols are typically without trees or shrubs and primarily form grassland and sedge meadows. Hyparrhenia cymbaria, I. cylindrica and Panicum sp. grasses predominate. Occasionally, woody species occur, including Rhoicissus erythrodes and Tephrosia sp.

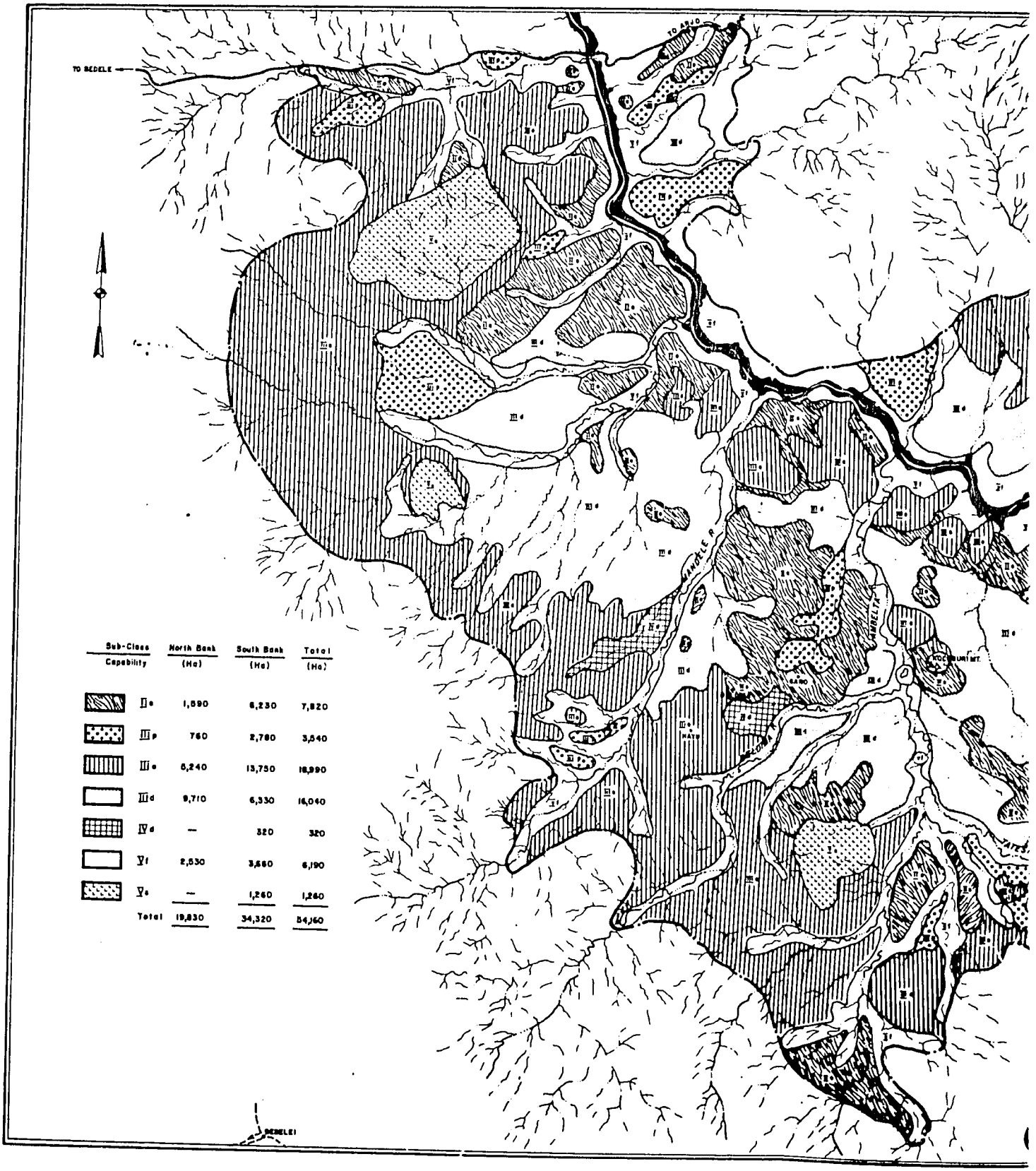
Land Use and Classification

Field and aerial observations and air photo interpretation indicated the present land use in the Project Area to be as follows:

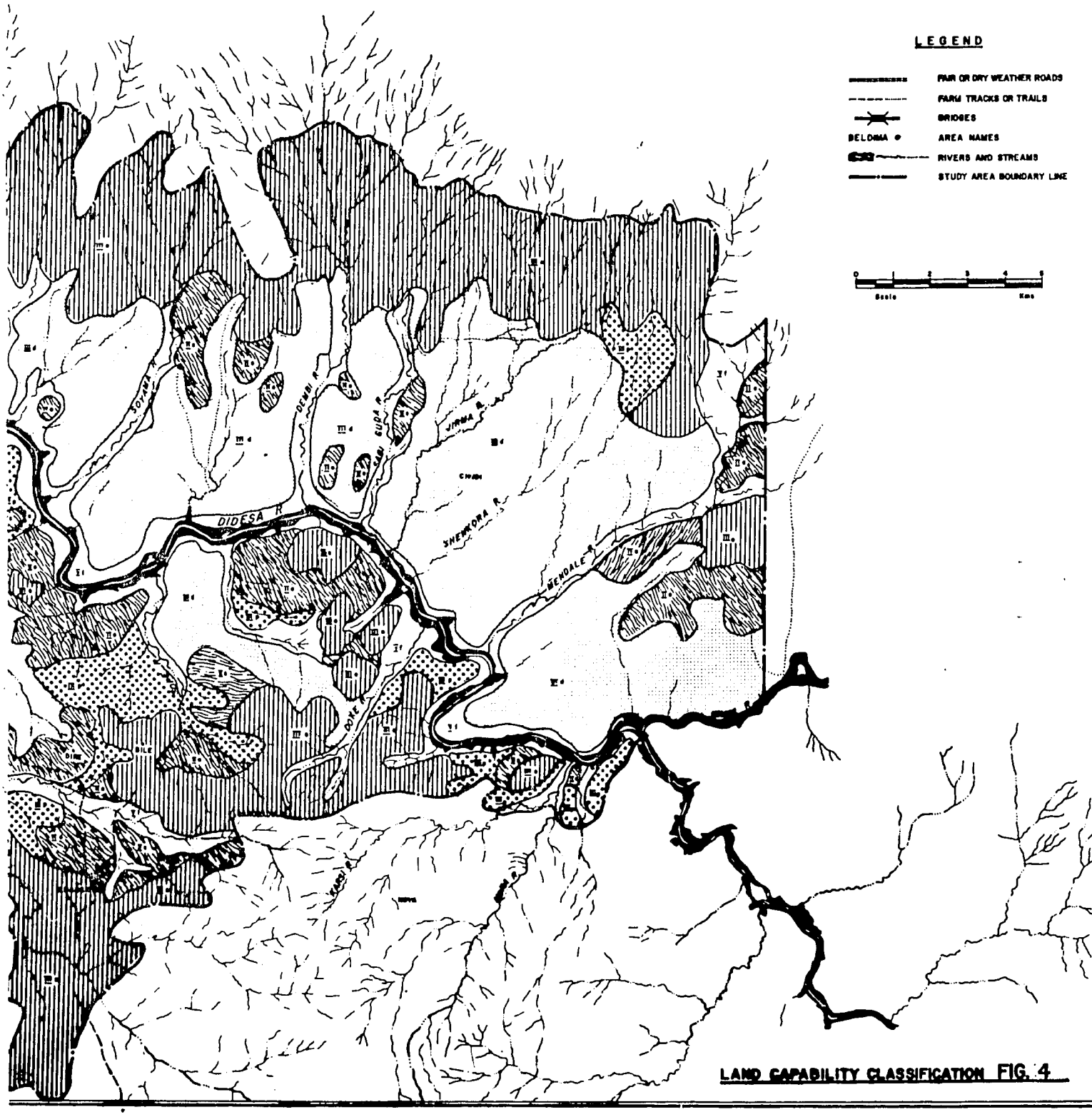
	Hectares	Percent
Villages and related farm lands	600	1.5
Lands occasionally grazed	2,400	7.0
Unoccupied savannah plains and low hills	26,300	76.5
Riverine forest and water surface	3,700	11.0
Mountainous intrusions	1,300	4.0
Totals	34,300	100.0

Present land use, however, is not a valid indicator of the soils capability to produce economic agricultural returns under sustained agriculture. The soils have been classified for land use capability under rainfed farming as follows: (Also, see Figure 4)

Capability (Subclass)	Area (in hectares) (Rounded)
IIe	6,200
IIIp	2,800
IIIe	13,800
IIId	6,300
IVd	300
Vf	3,600
Vs	1,300
	34,300



Sub-Class / Capability	North Bank (Ha)	South Bank (Ha)	Total (Ha)
IIe	1,590	6,230	7,820
IIIp	760	2,780	3,540
IIIe	5,240	13,750	18,990
IIId	9,710	6,330	16,040
IVd	—	320	320
Vf	2,530	3,660	6,190
Vs	—	1,260	1,260
Total	19,830	34,320	54,160



LAND CAPABILITY CLASSIFICATION FIG. 4

Population

The Project Area is very sparsely populated. Primary constraints to spontaneous settlement have been the presence of endemic human and livestock diseases. Some historic evidence indicates that the valley was once more heavily settled, but a proliferation of malarial mosquitos and trypanosomiasis infected tsetse flies combined to force survivors to migrate to the surrounding highlands, the elevations of which form effective natural barriers to the insect vectors.

The present population of the Project Area is estimated at 1,500, representing a density of only about 4.4 persons per square kilometer. Field surveys indicated an average of six people per household, thus approximately 250 farm families are residing within the Project boundaries.

Present Agricultural and Economic Conditions

Information and data concerning the existing agricultural and economic conditions were obtained by field surveys covering the physical aspects of farms, farming equipment and systems, crop production and distribution and demographic factors.

The present residents in the Project Area are all smallholder peasant farmers engaged in substance agriculture. Farm sizes vary from 0.25 to 5.0 hectares, averaging 1.75, and include 1.5 parcels per holding. They occupy portions of the red and brown inceptisols located on intermediate valley elevations.

Prior to the rural land reform proclamation, land was held under the following tenure:

Resident owners	38 percent
Tenants of non-resident owners	39 percent
Tenants on Government land	10 percent
Mixed owner and tenant	13 percent

Following the proclamation, tenure arrangements became redundant as all rural lands became the collective property of the Ethiopian public and private ownership was abolished.

Crop Production and Value - A small portion of crop yields are either bartered or sold at the weekly Chara market to obtain other cereals, spices, clothing and basic necessities.

Present estimated yields, production and value of principal crops are summarized below. The market prices shown are those obtained at the traditional Chara market, which is isolated from regional and national market systems, and are not indicative of true value.

Crop	Total Area (ha)	Avg. Yield (qq/ha)	Total Production (qq)	Market Value (E$/qq)	Total Value (E$)
Maize	125	5.8	725	12	8,700
Sorghum	115	6.5	748	13	9,700
Millet	105	6.3	662	13	8,600
Chick Peas	30	3.5	105	22	2,300
Teff	25	3.7	93	16	1,500
Noug	10	2.2	22	23	500
Bebere	10	3.0	30	22	700
Other	30	3.0	90	20	1,800
Totals	450		2,475		33,800

Livestock Production - Due primarily to the prevalence of trypanosomiasis, livestock are generally scarce in the Project Area. Field surveys indicated a present livestock population of approximately 1,250 cattle, 500 sheep and goats, and less than 3,000 poultry. Pastures are undergrazed by the limited number of domestic and wild animals in the valley. Annual burning during the dry season allows for seasonal basal leaf growth on the typical bunch grasses, in particular the dominant Hyparrhenia spp.

Livestock disease has been one of the primary constraints to spontaneous settlement in the Upper Didesa Valley. The endemic and chronic diseases and parasites must be identified, treated and brought to control status before livestock can safely be bred or used to till the land.

Money received from occasional sales of cattle, butter and poultry provides the average farm family with its major source of cash income. The average farmer, with five head of mature cattle, has traditionally sold one immature animal at tax and rent paying time, usually at a depressed price. Milk and eggs are normally consumed as dietary supplements; however, surplus butter and poultry are marketed. The annual sales/barter value of these products was estimated as:

One heifer or young bull	E$ 40
Butter	8
Poultry	3
Total	E$ 51

Of the above total, the average farmer historically paid E$20 for taxes and rental, leaving E$31 for family needs.

Agricultural Credit

The institutional framework of agricultural credit is in an immature state of change. Land reform has now made it impossible to pledge land as loan collateral; credit and financial institutions have been nationalized; and policies are being restructured by the Provisional Military Government.

In the past, the major conflict with respect to agricultural credit in Ethiopia has been between development goals with credit evaluation based on ex-ante project return criteria and sound banking principles involving loan criteria based on the pledging of assets. A major objective in nationalizing all credit and financial institutions was to allow the Government to pursue development aims in accord with its revised policies. It is currently believed that this implies major reallocation of Government expenditure towards financing of development projects.

Institutionalized credit activity in the Project Area's marketing region appears to have been confined to: 1) AIDB involvement with five smallholder coffee producer cooperatives; 2) short-term working capital arrangements between commercial banks and traders; 3) limited credit provision from traders to smallholder grain producers; and 4) EPID Minimum Package Programs.

Markets and Prices

A comprehensive review of national and regional markets, marketing and prices is included in Chapter 8, Part I, of the report. The national picture is important in that Ethiopia's periodic food shortages, the distribution and planned relocation of population relative to available new cropland, and other development projects may have an impact on the markets for

surplus commodities produced in the Project Area. The objective of the regional analysis was to determine the proportion of surplus Project production that could be marketed regionally.

Population growth rates, income rates, per capita cereal and pulse consumption data, and assumed income elasticities were projected through 1995 to obtain order-of-magnitude demands for selected cereals and pulses over the next two decades. Should present national average yields remain constant, an additional 2.6 million hectares of land planted to selected cereals and pulses would be required by 1995, considering population effects only. If income effects are also considered, about 3.8 million additional hectares would be needed.

A survey of 19 markets in the Project Area's region showed a net annual grain deficit in 1973 of some 16,000 tons, centered mainly in Jima, Agaro, Nekemte and Gimbi. At Gambela, Nejo and Gimbi, skyrocketing prices, seasonal food shortages, or famine were regular yearly occurrences. Population effects between 1975 and 1980 would increase annual regional consumption requirements by about 150,000 tons. By 1995, regional consumption requirements would be increased by about 85 percent over 1970 levels due to the effect of population alone.

Regarding cotton, it has been assumed that Ethiopia has the capability to maintain self-sufficiency considering both incremental population and income effects upon projected demands. However, rainfed cotton from the Project could substitute for higher quality irrigated cotton on the domestic market, allowing for the higher quality lint from Awash to be exported for foreign exchange earnings. As the Project Area has no commercial cotton processing facilities, it would be necessary to utilize facilities in Addis Abeba where gins are presently operating considerably below capacity.

As will be discussed later, the major crops proposed to be grown in the area are maize, sorghum, chick peas, teff and cotton. On the basis of market analyses, it was concluded that surplus maize, sorghum and chick pea production would be sold in Project region markets and that teff and cotton would be transported to the Addis Abeba market.

Planning prices were derived for both Addis Abeba and regional markets, from which farmgate prices were determined

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by subtracting transport costs and Project handling and storage charges therefrom. The following farmgate prices (in Ethiopian dollars per quintal) were used in Project financial and economic analyses:

Maize	18.00
Sorghum	25.75
Chick peas	26.25
Teff	35.50
Cotton (seed)	54.50

DESCRIPTION OF THE PROJECT

Purpose

The purpose of the Project is twofold: 1) to settle up to 5,000 landless farmers within a selected net area of 25,000 hectares in the Upper Didesa River Valley; and 2) to increase agricultural production from its present level of less than 250 tons per year (less than two percent of the Project Area now under cultivation) to over 33,000 tons of grains and pulses and 6,000 tons of seed cotton annually.

Recent Government proclamations and guidelines have served to clarify the aims and direction of national development in terms of restructuring the agricultural and financial sector. On 4 March 1975, the Government announced a rural land reform act known as the "Proclamation to Provide for the Nationalization of Rural Land, 1967 E.C. (1975)". This proclamation set in force a drastic alteration of the feudal land tenure system which had existed for centuries. In part, it stated:

> ". . . in order to increase agricultural production and to make the tiller the owner of the fruits of his labour, it is necessary to release the productive forces of the rural economy by liquidating the feudal system . . . ."

A land settlement policy paper prepared by the MLRA gives additional insight and guidelines for settlement objectives. In part, this paper states:

". . . Ethiopia is fortunate in that, as part of its national heritage, there exist fertile areas which are unoccupied or under-utilized. With appropriate investment in infrastructure, especially access roads, and disease controls, plus other expenditures for relocation and settlement, Ethiopia could bring many of these areas into production, and create additional employment opportunities . . . . "

The Project development plan alternatives were conceived in the context of the primary aims stated by the PMG and MLRA. These aims relate to increasing agricultural production and settling landless farmers. The realization of these aims required development plans devising means to improve upon existing agricultural practices in the Project Area; to provide optimum-size farm plots for new settlers; to support newly settled families as required; to control the prevalent human and animal diseases; to provide for necessary infrastructure and public services; to extend knowledge of improved farming techniques throughout the Area; and to provide adequate marketing and storage facilities. These objectives require that physical, social and economic resources of pertinent Government agencies, supplemented by international assistance, be used to remove the constraints that have prevented voluntary and spontaneous settlement in the valley. They also call for planning of agricultural systems which together with adequate infrastructure and institutional support would increase production on cultivated land and open new land to settlement and farming.

Project Features (Inputs)

Resource surveys and planning studies led to consideration of six alternative plans for settlement and agricultural development of the Project Area, three of which were eliminated qualitatively. The three alternatives which were selected for detailed planning and financial and economic analyses are, briefly, as follow:

Alternative 1 - Small farm settlement throughout the Project Area utilizing oxen power on the more easily worked red and brown soils, and seed bed preparation by Project custom mechanized services on the black vertisols.

Alternative 2 - Small farm settlement on the red and brown soils utilizing oxen power after the first year (seed bed preparation by Project custom mechanized services on two hectares in the first year). State farms on the black soils with mechanized seed bed preparation and hired labor for all other operations.

Alternative 3 - Same as Alternative 2, initially, with the State farms phasing into small farm settlement on the black vertisols, as in Alternative 1.

Detailed analyses of the above three development alternatives are presented in Part II - DEVELOPMENT PLANNING of the report. However, Alternative 1 is summarized in this Project Proposal and recommended for implementation for the following major reasons:

1) increased social benefits in that 5,000 peasant farmers (at least 4,750 presently landless) would benefit as compared with only 3,000 under Alternative 2;

2) lower capital and recurring costs than for Alternatives 2 and 3;

3) a longer time spread for capital cost inputs than for Alternatives 2 and 3;

4) maximization of settlement while, at the same time, fulfilling the second Government aim--- increasing agricultural production.

5) somewhat higher internal economic rate of return and benefit-cost ratio than the other two alternatives.

Presented in the following paragraphs are brief descriptions of the various proposed project features, or inputs, together with recommended time-phasing where applicable.

Recommended Land Use - The Project Area comprises virtually unsettled and uncultivated land which offers opportunities to devise optimum sized farm models based on more advanced practices than presently used. The proposed land use for the future project, based on the land capability classification described earlier, is as follows:

	Agricultural Land	Project Farm and Non-agricultural Land
	(ha.)	(ha.)
Farming - red/brown soils	17,000	-
Farming - black soils	8,000	-
Grazing and forest	-	7,900
Major settlements, Project Farm and infrastructure	-	1,400
Totals	25,000	9,300

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Proposed Farm Sizes - A five-hectare unit has been adopted as the optimum sized farm which can be managed by one family on both red/brown and black soils. The farm unit would be composed of a four-hectare farm plot and a separate one-hectare homestead forming an integral part of a small 50-family communal village. On red and brown soils, the four-hectare farm plot would, for purposes of financial and economic evaluation, consist of three hectares in cultivation and one hectare in fallow (rotated annually) to be used for grazing. In all cases, settlers', homesteads would be located on red/brown land. The typic characteristics of the black vertisols---expanding and sticky when wet, cracking and hardening when dry---make such soils unsuitable for homesteads, villages and other infrastructure (in particular, roads).

Cropping Patterns - Simplified cropping patterns were evaluated utilizing five basic crops, all of which are presently grown in the Project Area. Red and brown soil alternatives were evaluated with various maize, sorghum and chick pea patterns and rotations. Cotton and teff in rotation were the considered crops for black soils.

The selected pattern for smallholders on red/brown soils is:

Maize	- 2 hectares
Sorghum	- 1 hectare
Chick peas	- 2 hectares interplanted with maturing maize
Fallow	- 1 hectare in rotational grazing

The selected pattern and rotation for smallholders on black soil considers Project custom mechanical seedbed preparation (plus ridging for cotton) and tractor hauling service. As labor requirements have less critical time spans, an average smallholder family can easily farm four hectares without requiring outside labor. The selected pattern is:

Cotton	- 2 hectares
Teff	- 2 hectares (in rotation)

Crop yields, time lags to reach full production, production costs, returns, and other technical and economic items pertainint to the proposed agricultural development plan, will be presented in Chapter III of this Project Proposal.

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Settlement Program - Settlement plans were designed within the context of Government objectives and were based on, and related to, ecological conditions, in particular the soil characteristics in the Project Area. The following schedules of settlement and land development are proposed:

Project Year	Red/Brown Soils		Black Soils	
	Settlers	Hectares	Settlers	Hectares
1	500	2,500	-	-
2	600	3,000	-	-
3	800	4,000	-	-
4	1,000	5,000	-	-
5	100	1,400	900	3,600
6	-	1,100	1,100	4,400
Totals	3,000	17,000	2,000	8,000

Thus, a total of 5,000 farm families would be settled in small village units and be engaged in agricultural production by the end of Project Year Six, and by the end of Project Year Seven, a total of 17,000 hectares would be under cultivation.

The first 500 settlers would actually arrive on site during the last quarter of Year Zero, the Year Two settlers during the last quarter of Year One, etc., to enable orientation, formation of village associations, farm plot assignments, home building, land clearing, and other pre-cultivation activities.

No serious problems are anticipated in finding sufficient settlers for the Project. In general, present residents of the Valley and those with valid traditional claims would be given priorities in relocating to larger farms and homestead units. New settlers would be recruited from among the large pool of landless farm laborers in the Jima area and from among families who would be attracted to the area by the paid labor opportunities. Project development activities, including road and drainage system construction, tsetse fly control, and clearance and operation of the Project testing and demonstration farm, would all be labor intensive and thereby afford sufficient opportunities to meet a large part of family requirements until first harvest.

In order to benefit from previous experience in settlement planning and implementation in Ethiopia, data from

more than 50 settlements were accumulated and studied. Twenty-one settlement sites were visited including projects sponsored by both public and private agencies; projects with high, medium and low inputs; and projects designed for ethnically mixed and homogeneous populations.

It would appear unwarranted to attempt to duplicate existing settlement experiences elsewhere in Ethiopia. Development plans for the Project must provide necessary investments in both infrastructure and services to insure adequate financial returns from agricultural production. Existing constraints to settlement must be minimized through Government effort, and methods to maintain new settlers until their first harvest must be devised. No existing large-scale settlement project has had either similar constraints or objectives.

Livestock Program - Three livestock enterprises were analyzed to determine the viability of a livestock development program; 1) a cow-calf program; 2) a stocker program; and 3) farm family livestock herds.

The cow-calf program did not indicate sufficient returns to withstand the necessary investment in infrastructure and, therefore, was eliminated from further consideration.

A stocker program located in that 15,00-hectare portion of the study area to the northeast of the Didesa River, with a build-up to 30,000 head of cattle over a six-year period was analyzed. The infrastructure proposed included: 1) 20 kilometers of one-lane rural road to provide access to markets; 2) four stock watering ponds; 3) tsetse fly control; 4) three health care facilities; and 5) staff. The internal economic rate of return for this program was only 14 percent which is not considered sufficiently high to warrant recommending such a use of the land resource. Eventual settlement and agricultural development of this area, either spontaneously or as a second stage Upper Didesa Project, is considered a much better alternative use of this area.

The livestock element proposed to be included in the Project was confined to farm family livestock herds. Settlers on red and brown soils would build up their herds to an average size of between eight and nine livestock units by Year Six of their participation in the Project. Two oxen would be purchased by each family in Year Two, one cow in Year Three and one cow in Year Four. The composition of the average herd, which

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would be maintained through sales commencing in Year Seven, would be as follows:

2 oxen
2 cows
1 three-year old
2 two-year olds
1 one-year old
Total LSU's 8.65

Values of purchases and sales of the above farm family herds on red and brown soils are included in the farm budget analyses presented in Chapter III of this Project Proposal.

The infrastructure proposed to be provided for livestock in the Project comprises livestock health facilities. A total of three strategically located facilities would be required: one in Project Year One, one in Project Year Four, and one in Project Year Eight. Each facility would occupy an area of about 100 hectares comprising:

3 holding/quarantine areas of 25 hectares each
1 receiving pen of 10 hectares
1 building area of 2 hectares
1 dip/holding area of 4 hectares
1 sick pen area of 4 hectares
1 dip/crush and alleyway of 5 hectares

One equipped laboratory would be provided for the Project in Year One. Staffing, commencing in Project Year Two, would include: one animal health assistant; one laboratory assistant; one secretary; one clerk; one vaccinator; and one dip attendant. In each of Project Years Five and Nine, one clerk, one vaccinator, and one dip attendant would be added to the staff.

Testing and Extension Services - To facilitate settlement and land development plans, supporting programs in agricultural extension and testing and demonstration are proposed.

The agricultural extension program would be a variation of the successful results obtained at WADU settlements. Initially, families would enter the scheme and be settled in villages and peasant associations in units of fifty. Each unit would be assigned a junior extension agent who would reside in their village and provide liaison with Project and settlement

staff. One senior extension agent would be assigned to supervise ten junior agents. After two years, the ratio would be reduced to 100 settlers to one agent for an additional two years. The extension program would then be phased out as regular EPID services became available.

The proposed schedule for assigning and phasing out extension agents is as follows:

	Project Year									
	0	1	2	3	4	5	6	7	8	9
Senior Agents	1	2	4	5	6	6	4	2	1	0
Junior Agents	10	22	38	47	59	60	42	21	11	0

Key elements of support would center around the proposed Project testing, demonstration and seed multiplication farm. Expert technical direction and advice would emanate therefrom in such areas as management, engineering, agronomy, and entomology. Results of IAR experimentation elsewhere would be tested under local ecological and climatological conditions. Improved oxen-powered farming methods would be demonstrated; seed varieties found to be adapted would be multiplied and distributed; and areas would be provided for training extension agents so that all settlers would benefit from the farm's activities.

The Project Farm covering an area of about 300 hectares, would be established in Year One and is assumed to continue operating throughout the 20-year period of analysis. Facilities and equipment, all to be provided in Year One, would include:

Office and shed
Staff housing
Fencing
Farm roads
1 Four-wheel drive pick-up
1 Tractor, 79 hp
1 Plow, 4-disc
1 Disc, 11-foot
1 Ridger, 4-row
1 Planter, 4-row w/fertilizer attachment
1 Trailer, 4-ton
2 Teams oxen
2 Sets oxen implements
Miscellaneous hand implements and tools

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Proposed Project Farm staffing is as follows:

Farm Manager
2 Technical Assistants
1 Secretary
1 Storekeeper
1 Mechanic
Tractor Driver and Helper
1 Driver
Labor as required

Project Custom Machinery - Due to the extremely difficult workability of the black vertisols (8,000 hectares with 2,000 farm plots), it is assumed, for the purpose of analyses in this report, that mechanized seed bed preparation will be required. To best accomplish this, it is proposed that mechanized services be provided to the small farms at cost by Project operated custom services. It is noted at this point that the black soil farms are the last to be phased in (Project Years Five and Six); should Project Farm experimentation indicate that these soils can be worked by oxen power, either initially or after a period of mechanized plowing, then a large capital cost saving may possibly be realized. In addition, it is proposed that the first year's seed bed preparation for two hectares of the farm plots on red/brown soils be carried out at cost to the farmers by Project mechanized custom services.

The equipment package required for the above custom services would comprise:

Tractor, 79 hp
Plow, 4-disc
Disc, 11-foot
Ridger, 4-row

The proposed schedule for procuring the above sets of equipment is as follows:

Project Year		Sets of Equipment
1		4
2		3
3		2
4		3
5		0
6		8
7		8
	Total	28

In addition to seed bed preparation, as described above, it is proposed that the Project provide hauling services (both inputs and surplus production) to and from the Project Center at Kolosuri, at cost to the farmers, by means of four-ton trailer attachments for the tractors. The proposed schedule for procuring the trailers is as follows:

Project Year	Trailers Required
1	2
2	2
3	4
4	4
5	8
6	8
7	8
Total	28

Credit, Marketing and Storage - On the assumption that settlers will arrive at the Project without cash, credit will have to be available when required. The types of credit envisaged are: 1) food allowances until first harvest; 2) production loans; and 3) investment loans for tools and oxen. The extent to which credit is required will be alleviated somewhat due to paid labor opportunities in which the farm families can engage as they have time available. The magnitude and terms of credit required will be presented in Chapter III of this Project Proposal.

It is proposed that farm credit be administered by a small Project staff working through village associations and the assigned junior extension agent rather than the individual farmers. The staff proposed for this purpose commencing in Year Zero, is as follows:

1 Credit Supervisor
1 Secretary
1 Bookkeeper

Capital cost items, scheduled for Year One would include staff housing and office space and equipment.

It is proposed that marketing and storage, at least initially, be handled by the Project; for the purpose of Project evaluation, it is assumed that the Project carries out this service through the 20-year period of analysis. Surplus produce would be hauled by Project tractor/trailer from farmer villages, at cost, to grain and cotton storage facilities at the Project Center. The

Project would then sell to the future Agricultural Marketing Corporation and to the Addis Abeba cotton ginners.

It is anticipated that all surplus maize, sorghum and chick pea output can be sold within the Project region markets (average 190 kilometer haul) and that surplus teff and all cotton would be sold on the Addis Abeba market (about a 370 kilometer haul).

Rodent-proof, dry storage capacity equal to 25 percent of surplus grain and pulse output is proposed to be constructed in units of 1,000-ton capacity. Covered cotton shelters are proposed for 20 percent of cotton production.

The proposed schedule for constructing and equipping grain stores and cotton shelters is as follows:

Project Year	Grain Stores	Cotton Shelters
1	1	-
2	-	-
3	1	-
4	2	-
5	1	-
6	1	1
7	1	1
8	1	1
Totals	8	3

The following staffing plan is proposed for marketing and storage operations:

1 Supervisor
1 Secretary
1 Bookkeeper
Day labor as required

Tsetse Fly Control Program - Tsetse fly control is prerequisite to successful Project implementation. In general, the proposed control measures include: 1) clearing a buffer zone at the upstream and downstream Project boundaries to an elevation of 1,500 meters; 2) clearing all tributaries within the Project boundary; 3) clearing strips through the riverine forest

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to the Didesa River; 4) clearing Project Farm area; 5) clearing Project Center area; and 6) annual spraying of buffer zone fringes, tributaries, fringes of riverine forest along the Didesa River, and fringes of cleared strips.

It is proposed that all clearing be carried out on a labor-intensive basis during Project Years Zero and One. The downstream Project boundary buffer zone would be about 15 kilometers long by 2.5 kilometers wide (3,750 hectares), and the upstream buffer zone would be approximately eight kilometers long by 2.5 kilometers wide (2,000 hectares). Tributary clearance would total some 200 hectares and Didesa River access strips about 140 hectares. Other cleared areas would total approximately 430 hectares. The rest of the Project Area would eventually be cleared by settlers on communal and family bases.

Surveys and Mapping - It is essential that either photogrammetric mapping or topographical ground surveys be carried out and contour maps prepared of the entire area early in Project Year Zero. These maps are required to enable layouts of village sites, farm plots, drainage systems, roads, Project Center water supply, the Project Farm, and other items of infrastructure. It is estimated that four ground survey parties could complete field work in six months.

On the basis of farms and village layouts made on the contour maps, boundaries would be staked out during Project Year Zero through Five in accordance with the proposed ratio of settlement during Years One through Six. It is estimated that this boundary marking would proceed according to the following schedule:

Project Year	No. of Survey Parties	Field Time (months)
0	2	6
1	2	6
2	3	6
3	4	6
4	4	6
5	4	6

Roads - In order to permit early implementation of the Project, it is proposed tu upgrade the existing, dry weather

track connecting Kolosuri (Project Center) to Bedele to single lane rural roads standard---a distance of about 50 kilometers. New internal Project roads, consisting of a spine road connecting with Route 39 near the existing bridge and two spur roads and totaling about 35 kilometers, are proposed to be constructed to single lane rural roads standard. With the exception of one bridge crossing the Ambelta River (the major tributary to the Didesa), all stream crossings would be by paved ford.

With the exception of the Ambelta River bridge, it is proposed to carry out all road construction work by labor-intensive means with only a minimum of equipment on hand (1 bulldozer, 1 motor grader, 1 dump truck, and 1 Pickup). It is estimated that an unskilled labor force averaging some 500 men can, with adequate supervision, complete the proposed roads over a four-year period (Project Years Zero through Three).

Drainage System - The 8,000 net hectares of black vertisols in the Project Area are waterlogging and must be drained in order to produce economic yields. The most economic means of effecting drainage is by means of surface drains (open ditches) which would channel surplus rainfall into the numerous natural water courses tributary to the Didesa River. The extensive black soil plains are not completely flat but slope very gently towards the Didesa River, consequently, gravity drainage is technically feasible.

Due to the flat slopes, heavy surplus rainfall and soil characteristics in the Project Area, field, lateral and collector ditches must be spaced relatively close with resultant large quantities of excavation (on the average, over 200 cubic meters per hectare).

As in the case of road construction, it is proposed to excavate the surface drains by labor-intensive means. In order to meet the settlement schedule for black soils, it would be necessary to construct the drainage system over a two-year period (45 percent in Project Year Four and 55 percent in Year Five). A very large labor force would be required (over 6,000 in Year Five) which would have to be adequately supervised.

Water Supply - It is proposed to provide a potable water supply system only for the Project Center and expected town at Kolosuri and the Project Farm. Provision of farm village water supplies would be the collective responsibility of the village associations with technical advice provided by the Project organization. These village water supplies might be dug wells, if

groundwater is present in sufficient quantity near the surface, or small earthen dams across minor waterways to carry through the dry season when many tributary streams dry up.

The Project water supply facility mentioned above is proposed to be designed in Project Year Zero, constructed in Year One and become operational in Year Two. The source of supply would be the Didesa River from which water would be pumped via a five-kilometer pipeline to a filtering plant and reservior on the slopes of Kolosuri Mountain. The filtered water would be chlorinated and flow by gravity through a pipeline to the Project Center and town thence into a distribution system to public fountains and the Project Farm.

Estimated water requirements, based on a consumption of 40 liters per capita per day domestic use plus 10 liters per capita per day for commercial and other uses are summarized as follow:

Project Year	Estimated Population	Annual Water Requirement (m^3)
2	4,000	73,000
3	7,000	128,000
4	10,000	183,000
5	14,000	256,000
6	18,000	329,000
7-20	20,000	365,000

To meet the above ultimate demand, the required pumping capacity would be about 45 horsepower. It is proposed to power the pump by electricity which would require some 35 kilowatts; however, a 50-kilowatt diesel generator is proposed which will leave 15 kilowatts of surplus power to supply the needs of Project Headquarters and the Project Farm. Pro-rated cost of the additional 15 kilowatts would be charged to Project Headquarters.

It is further proposed that water be charged for by having attendants at the public fountains; the rate should be such as to permit the facility to approximately break even over the 20-year period of analysis. A financial analysis of the proposed water supply system is presented in Chapter III of this Project Proposal.

Public Services - There are presently no Government services in the Project Area nor are any scheduled at this time. In

addition to the services and infrastructure already described, there are certain other public services fundamental to successful Project implementation, namely: 1) health (including malaria and other disease control); 2) education; and 3) police. For purposes of evaluation, these services are included as Project inputs even though they should be funded through the appropriate public agencies.

Over the first ten years of Project implementation, the total population in the Project Area is expected to increase to a total of some 60,000, of which 30,000 would be farm families.

Malaria control is proposed to be advanced both by spraying and by widespread dissemination of drugs. The program would be initiated in Project Year One and continue through the 20-year period of analysis.

Clinical medicine is proposed to include two health stations for the purpose of Project evaluation. It is noted, however, that the predicted population of 60,000 would justify establishment of a health center. The first health station is scheduled to be established in Project Year One and the second in Year Three.

The educational facilities proposed for the purpose of Project evaluation includes ten minimum formal education (MFE) schools (grades 1 through 4) with a capacity of 200 students each, with two each being established in Project Years One through Five.

It is proposed that one police sub-station, established in Project Year Two, would be adequate to maintain law and order.

Organization and Management - It is envisaged, at this writing, that Project development and operation will work within the framework of the Ministry of Agriculture (MOA) and will, therefore, be an integral part of the Extension and Project Implementation Department (EPID), as has historically been the case. However, the Government is in a stage of considering top level policy and responsibility changes which would result in a different implementing agency. However, Project management should have the highest possible degree of autonomy and be directly responsible for implementation and administration of funds regardless of which ministry or authority may be in overall top level charge.

Project management would have direct responsibility for: 1) agricultural extension services; 2) Project Farm establishment and operation; 3) road layout and construction; 4) layout, design, construction and operation of the drainage system; 5) surveying, mapping and demarcating farm and village boundaries; 6) tsetse fly control; 7) design, construction and operation of the Project Center (Kolosuri) water supply system; 8) operation of the Project custom machinery pool; 9) livestock health program; and 10) settlement of farmers.

It is expected that the Ministry of Land Reform and Administration (MLRA), probably through the planned National Land Settlement Authority (NLSA) would be responsible for selecting and bringing settlers to the area, in coordination with Project management.

In addition to the direct responsibilities listed above, management would have a coordinating role with other ministries and agencies with respect to: 1) credit and marketing; 2) crop storage; 3) cooperatives; 4) processing; 5) town and village planning; 6) health and sanitation; 7) education; 8) security; 9) agricultural research; and 10) posts and communications.

The proposed staffing plan for overall Project management is as follows:

Project Director	1
Senior Settlement Officer	1
Agricultural Economist	1
Secretary	1
Personnel Manager	1
Administrative Assistant	1
Accountant	1
Purchasing Officer	1
Storekeeper	1
Typist	1
Clerks	2
Building Maintenance Supervisor	1
Mechanic	1
Drivers	4
Laborers	10

The above staff would be mobilized and commence functioning in Project Year Zero.

Following is a listing and proposed scheduling of capital cost items necessary for efficient Project management:

Item	Project Year
Offices	1
Store	1
Equipment	1
Staff Housing	1
Guest House	1
4-Wheel Drive Vehicles, 4 each	1
Share of Electric Generator	1

Technical Assistance - It is proposed that expatriate technical assistance be provided for Years Zero through Three of Project final planning, design and implementation. This assistance would be most beneficial in: 1) preparation of final design; 2) crop testing and experimentation; 3) soil conservation; 4) training extension agents; 5) advisory services to Project management; and 6) training mechanics and establishing an efficient equipment maintenance facility.

The following minimum technical assistance team is proposed:

Position	Number	Project Years
Team Leader	1	0 - 3
Agronomist/Plant Protectionist	1	0 - 3
Agricultural Engineer	1	1 - 3
Equipment Maintenance Specialist	1	1 - 3

Planned Project Production (Outputs)

Projected Project Area production, or outputs, which would be realized through proposed Project implementation is shown in the following tabulation. The parameters and bases for these projections are presented under farm budget analyses presented in Chapter III of this Project Proposal.

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Projected Production
(thousands of metric tons)

Crop	Project Year 1	2	3	4	5	6	7	8	9	10-20
Maize	0.8	2.9	6.4	11.0	15.2	17.3	18.0	18.0	18.0	18.0
Sorghum	0.5	1.4	2.7	4.4	5.4	6.0	6.0	6.0	6.0	6.0
Chick peas	-	0.3	1.0	2.0	3.3	4.3	4.7	4.8	4.8	4.8
Teff	-	-	-	-	-	0.7	2.5	4.0	4.6	4.8
Tot Total Grains & Pulses	1.3	4.6	10.1	17.4	23.9	28.3	31.2	32.8	33.4	33.6
Cotton	-	-	-	-	0.7	2.5	4.4	5.6	6.0	6.0

ENVIRONMENTAL CONSIDERATIONS

The proposed Project envisages resettlement of 4,750 presently landless rural families, reallocation of plots to the present farm population of some 250 families who cultivate an average of less than two hectares each, rainfed agricultural development of 17,000 annually cultivated hectares, and grazing of family livestock herds on about 15,000 hectares. Since irrigation is not considered, the natural water regime will be disturbed only minimally by domestic and livestock water use.

The following paragraphs cover briefly the various pertinent environmental considerations and how they are proposed to be controlled during Project implementation.

Environment/Resource Linkages

The Project Area has obviously undergone earlier man-induced changes even though the present population is cultivating less than two percent of the total area. Evidence exists that the Didesa Valley was once much more heavily populated and that the farming and livestock population was driven to higher elevations by malarial mosquito and tsetse fly infestation. The only remaining undisturbed

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tropical forests in the area are the narrow riverine belts averaging some 200 meters wide along the Didesa River and much narrower along the tributaries. The remainder of the area is either grasslands (on the black vertisols) or moderate brush with scattered trees on the red and brown soils. Annual burning takes place.

The surface water availability within the Project Area during March (the month of lowest runoff) averages over 24 million cubic meters. The estimated maximum monthly water requirements for domestic and livestock consumption, at full development, would be less than 156,000 cubic meters, or less than one percent of the minimum average supply.

In view of the extent of proposed infrastructure and services, and the expressed willingness of the few present inhabitants to accept new settlers as long as they (the present inhabitants)are also provided the services, no environmental, health or social problems are likely to be created. On the contrary, these conditions would be improved through project implementation.

Project Design

Health - The two major health constraints to resettlement and development of the Project Area are the presence of malarial mosquitos and tsetse flies in large concentrations. The proposed measures to remove these constraints are: 1) a malarial control program consisting of routine spraying and dispensation of drugs; and 2) a tsetse fly control program including clearing of barrier zones and tributary areas, on-farm clearing, clearing strips through the riverine forest to the Didesa River, and annual spraying of barrier zone fringes and remaining riverine forest.

Also included in the proposed Project are two clinical health stations and three animal health stations.

Soil Conservation - Clearing and cultivation of the Project Area would introduce the danger of erosion if adequate conservation measures are not invoked. It is proposed that terracing and contour plowing be enforced through the extension service which would be provided, together with training and technical assistance from Project Headquarters. Terracing would be required only on the red/brown soils and would be designed by Project staff and implemented through communal work by the village associations.

Fisheries - The Didesa River is a source of large numbers of fish. In addition, some village water supplies would consist of

damming small drainage areas; the ponds thus created, if stocked with fish, would provide a valuable protein supplement to the using inhabitants.

Affect on Downstream Water Users - As was noted earlier in this section, less than one percent of the available surface water would be required under full Project implementation. Thus, the affect on downstream water users, as regards supply, is considered negligible.

More serious ecological repercussions might result from the use of chemicals, especially organo-chlorine pesticides, some of which would drain into the Didesa River. To control this and other possible sources of pollution, the Didesa River would be monitored downstream from the Project to ensure that contamination does not reach dangerous levels. On the basis of data from this monitoring scheme, Project management would control the use of pesticides and other pollutants so as to ensure that the ecosystem would not be seriously engangered.

Drainage - The black vertisols, which comprise about one third of the net arable area in the Project, are water logging and must be drained to be productive. The most economical drainage system, and the one proposed, is by open ditch gravity flow to the many natural water courses in the Project Area, thence to the Didesa River. This drainage system will change the ecology of a portion of the Project Area, but not adversely; nor would its effect be severe beyond the Project. There would be some increase in river flow during the rainy season due to loss of some 8,000 hectares of valley storage. However, since the Didesa River channel is large in comparison to the water presently held back and slowly released from water logged areas and since the rainy season is long, this somewhat increased flow (roughly two percent increase) is not expected to be significant in its ecological repercussions.

Wildlife - The mammalian population in the Project Area is very sparse. Observations during field surveys included a few groups of hippopotami in the Didesa River; several troops of Colobus monkeys; a few warthogs, giant forest hogs, and bush pigs; some baboons and vervet monkeys; numerous small antelope (Oribi); spotted hyena; and small animals including hare, porcupines and rodents. Lions are known to be scarce and none were observed. Thus, wildlife is not considered a major factor; however, the Colobus monkey should be protected by establishing refuges on the steeper forested areas within and adjacent to the Project Area.

Grain and Pulse Storage - Rodents and insects are present in the Project Area and are potential menaces to storage of agricultural produce. As protection, it is proposed to construct rodent-proof grain and pulse stores; insecticides would be used to control the insect pests.

Project Operations

It is proposed that constant monitoring of effects on the environment, human health, and social welfare would be carried out, particularly during the first eight years of the Project. The primary means of carrying out this monitoring and control would be through the extension agents one of whom would work and live directly with each village association (proposed 50 families per village cluster). These agents would receive their training and direction from Project Headquarters via the Project Director, Settlement Officer and Senior Extension Agents. Training and demonstration would be carried out on the proposed Project Farm. It is also proposed that specialized expatriate technical assistance would be provided one year before settlement commences and during the first three years of Project implementation. Advice and assistance would also be forthcoming from the Soil and Water Conservation Department of the Ministry of Agriculture.

Sociocultural Factors

Settlement Program - A large pool of potential settlers in the Jima region has already been identified by the Ministry of Land Reform and Administration (MLRA). Plans have been initiated for selecting the first year's group of 500 families from this pool which comprises thousands of refugees and other underemployed or unemployed rural peoples whose only potential source of income is coffee picking during a maximum of three months per year. Qualified Rural Sociologists from the MLRA are actively engaged in preparing complete plans for relocating these people to the Project Area at the earliest possible date; the possibility of taking the first group of 500 and gainfully employing them on construction of Project infrastructure for a year prior to settlement on farm plots is being seriously considered for early action.

All settler candidates would be thoroughly oriented and briefed as to the environment to which they will have to adapt, and clearly advised of their rights and obligations to which they would be required to sign agreement.

The settlers would be required to enter into village associations and adopt cultural practices, which may be new to them, including

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soil conservation, fertilizer applications, insecticide spraying, etc. Ample extension agents (one per 50 farmers) would be provided during the initial years to train the farmers in new methods.

The existing farmers in the Project Area (some 250 families) have expressed a desire to join the Project and have stated, during field interviews that they would not object to outsiders being relocated in their environs so long as they themselves were extended the same services and benefits. It is noted that the present residents are not indigenous to the Didesa Valley, the average head of family having lived in the area for about 27 years.

Health Impacts

As was noted earlier, measures would be provided to protect both human and animal health. New settlers would be examined and treated, if necessary, to ensure against the introduction of new diseases.

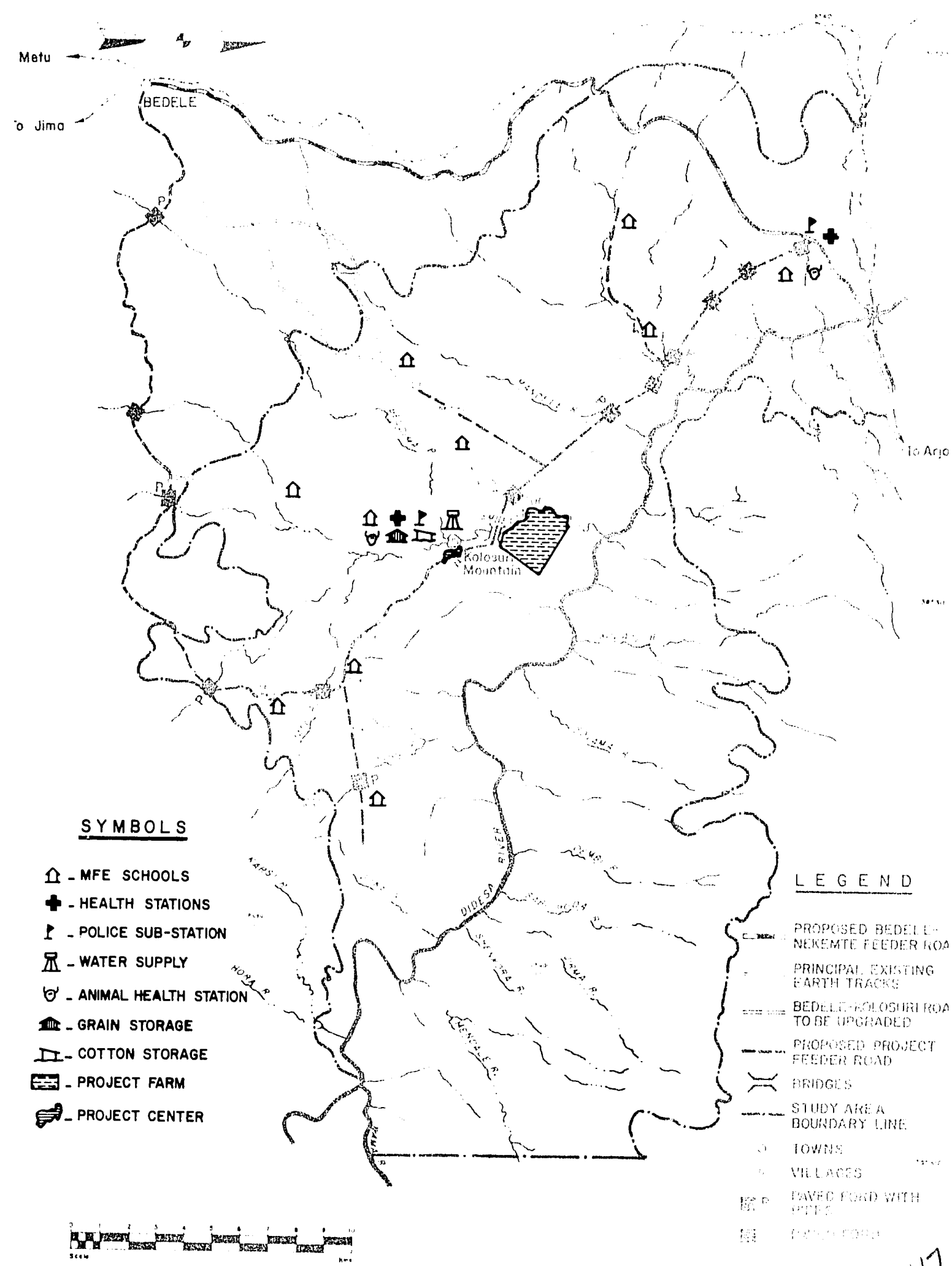
Settlers would be advised of existing health hazards, particularly malaria, and be instructed in the routine of taking anti-malarial drugs with which they would be provided. They would also be instructed in methods of sanitation to reduce the incidence of intestinal parasites. Until such time as the tsetse fly is under control, initial settlers would be advised of the symptoms of human sleeping sickness and instructed where to report for treatment.

Long Term Considerations

Project implementation would alter the environment to one of agricultural use which, however, is considered beneficial in view of the need to provide land to the landless peasant and the need for increasing agricultural production.

As was noted earlier, water logging in the black vertisol areas is an existing problem which would be eliminated through construction of a proper drainage system. Soil salinity would not become a problem.

No mesoscale climatic changes would be expected since no large areas of tropical forest exist, hence could not be removed.



PROPOSED INFRASTRUCTURE AND PUBLIC SERVICES FIG. 5

CHAPTER III

PROJECT ANALYSES

TECHNICAL INPUTS AND COSTS

Agricultural Development Plan

As was discussed in Chapter II, the recommended Project is to settle 5,000 peasant farmers on farm units of five hectares each over a six-year period. One hectare would be in a 50-family village site located on red/brown soils and would be utilized for communal grazing, houses, gardens and village commons. The other four hectares, located nearby, would comprise the farm plot.

The recommended land use for the Project Area, together with proposed cropping patterns, was discussed in Chapter II. Here, will be presented in summary form for the two selected farm models (one for red/brown soils and one for black vertisols): 1) yields, production and sales data for each model; and 2) financial analyses for the two models.

Yields, Production and Sales Data - Production estimates by crop were prepared for each farm model and are summarized on Tables III-1 and III-2. It is noted that yields are assumed to build up to full production over a period of three years in each model.

Financial Analyses of Farm Models - In arriving at farm budgets for the proposed Project, the following steps were taken:

1) determination of basic unit costs for equipment and materials;

2) determination of farm operating costs for each farm model utilizing the basic data compiled in step 1), above;

3) compilation of investment expenditures;

4) estimation of sales revenue (see Tables III-1 and III-2; and

5) preparation of cash flow for each model farm.

Table III-1

Land Use, Production and Sales Data Sheet
Red/Brown Soil Model Farm

	Model Farm Year				
	1	2	3	4	5 - 20
Land Use (ha)					
Maize	1	2	2	2	2
Sorghum	1	1	1	1	1
Chick Peas (1)	1	2	2	2	2
Fallow	2	1	1	1	1
Homestead	1	1	1	1	1
Total	5	5	5	5	5
Yields (quintals/ha)					
Maize	15	25	30	30	30
Sorghum	10	15	20	20	20
Chick Peas	6	7	8	8	8
Production (quintals)					
Maize	15	40	55	60	60
Sorghum	10	15	20	20	20
Chick Peas (2)	-	6	13	15	16
Home Consumption (quintals)					
Maize	7.0	6.0	3.5	2.5	2.5
Sorghum	0.8	0.8	0.8	0.8	0.8
Chick Peas (2)	-	1.6	1.6	1.6	1.6
Surplus Production (quintals)					
Maize	8.0	34.0	51.5	57.5	57.5
Sorghum	9.2	14.2	19.2	19.2	19.2
Chick Peas	-	4.4	11.4	13.4	14.4
Price (E$/quintal)					
Maize	18.00	18.00	18.00	18.00	18.00
Sorghum	25.75	25.75	25.75	25.75	25.75
Chick Peas	-	26.25	26.25	26.25	26.25
Sales (E$)					
Maize	144	612	927	1035	1035
Sorghum	237	366	494	494	494
Chick Peas (2)	-	115	299	352	378
Total Sales (E$)	381	1093	1720	1881	1907

(1) Interplanted with maize prior to maize harvest.
(2) Sales in January.

Table III -2

Land Use, Production and Sales Data Sheet
Black Soil Model Farm

	Model Farm Year				
	1	2	3	4	5 - 20
Land Use (ha)					
Cotton	1	2	2	2	2
Teff	1	2	2	2	2
Fallow	2	-	-	-	-
Homestead (1)	1	1	1	1	1
Total	5	5	5	5	5
Yields (quintals/ha)					
Cotton	7.5	11.25	15	15	15
Teff	8.0	10.00	12	12	12
Production (quintals)					
Cotton	7.5	18.75	26.25	30	30
Teff (2)	-	8.00	18.00	22	24
Home Consumption (quintals)					
Cotton	-	-	-	-	-
Teff (2)	-	3	3	3	3
Surplus Production (quintals)					
Cotton	7.5	18.75	26.25	30	30
Teff (2)	-	5.00	15.00	19	21
Price (E$/quintal)					
Cotton	54.50	54.50	54.50	54.50	54.50
Teff	-	35.50	35.50	35.50	35.50
Sales (E$)					
Cotton	409	1022	1431	1635	1635
Teff (2)	-	177	532	674	745
Total Sales (E$)	409	1199	1963	2309	2380

(1) On red/brown soils.
(2) Sales in January.

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1. Operating Costs - The total operating costs for each model farm were arrived at by summing direct production costs, indirect costs, and interest on production loan (extended at one percent per month). Direct production costs include seedbed preparation (by Project custom machine services on two hectares in farm model year one on red/brown soils and throughout the period of analysis on black soils); seed; fertilizer; spray chemicals; bags; and input and output hauling (by Project tractor/trailer). Indirect costs include animal health service provided by the Project; repair and maintenance of farm equipment; and drainage user's fee (for black soil model only - calculation of fee is presented later in this chapter in Table III-20).

   Total operating costs for each of the model farms are summarized in Tables III-3 and III-4.

2. Investment Expenditures - The principal investment expenditures to be made by the farmers would be for housing and storage; oxen and cattle (red/brown soil model only); oxen implements (red/brown soil model only); sprayer; hand tools; and cotton picking bags (black soil model only). Investment schedules for the two farm models are summarized in Tables III-5 and III-6.

3. Model Farm Cash Flows - Cash flow projections were calculated for the two farm models, based on cost and revenue data derived above, and are summarized in Tables III-7 and III-8. Implement and livestock loans were financed at ten percent interest over a period of two years for the red/brown soil model; and implement loans for the black soil model were financed at ten percent interest over a period of 14 months. Agricultural income tax is based on the official Ethiopian Government Tax Schedule (Consolidated Laws of Ethiopia, Volume I, Section V.A. Schedule D).

   It is noted that no credit assistance is required beyond year two of either farm model. Net family annual incomes level out at about E$1250 and E$1100 on the red/brown soil and black soil models, respectively after year six. These incomes are well above the average for small farmers in Ethiopia and can only be attained through implementation of the supporting services and infrastructure described in Chapter II and costed in the following paragraphs of this chapter.

Table III - 4

Operating Cost Summary
Black Soil Model Farm

	Model Farm Year						
	1	2	3	4	5	6	7
Direct Production Costs							
Cotton (E$/ha)	139.53	156.07	193.88	229.78	229.78	229.78	265.68
Total (E$)	139.53	312.14	387.76	459.56	459.56	459.56	531.36
Teff (E$/ha)	107.02	107.02	142.92	142.92	142.92	142.92	142.92
Total (E$)	107.02	214.04	285.84	285.84	285.84	285.84	285.84
Bags & Hauling (E$)	15.	44.	76.	89.	93.	93.	93.
Total Direct Costs (E$)	261.55	570.18	749.60	834.40	838.40	838.40	910.20
Indirect Costs (E$)	10.	20.	178.	315.	322.	327.	327.
Interest on Production Loan (E$)	23.29	47.73	-	-	-	-	-
Total Operating Costs (E$)	295.	638.	928.	1149.	1160.	1165.	1237.

Table III-5

Investment Schedule
Red/Brown Soil Model Farm

Item	Units	Price (E$)	Outlay (E$)	Life (Years)	Model Farm Year 0	1	2	3
Tukul & Storage	1	100	100	10	-	-	-	100
Oxen	1 pair	280	280	N/A(3)	-	-	280	-
Cattle	1	90	90	N/A(3)	-	-	-	94(4)
Plow, Ropes & Yoke	1 set	10	10	4	-	-	10	-
Back Pack Sprayer	0.2(1)	125	25	4	-	25	-	-
Hand Tools	1 set(2)	33	33	3	9	12	12	9
Totals					9	37	302	203

Item	Model Farm Year 4	5	6	7	8	9	10
Tukul & Storage	-	-	-	-	-	-	-
Oxen	-	-	-	-	-	-	-
Cattle	90	-	-	-	-	-	-
Plow, Ropes & Yoke	-	-	10	-	-	-	10
Back Pack Sprayer	-	25	-	-	-	25	-
Hand Tools	12	12	9	12	12	9	12
Totals	102	37	19	12	12	34	22

(1) One sprayer for each five farms.
(2) Eleven units at E$3.00 purchased over 26 months.
(3) Oxen and cattle would be replaced from family herds.
(4) Each village association would purchase two bulls at E$100, or E$4.00 per farm family.

Table III-6

Investment Schedule
Black Soil Model Farm

Item	Units	Price (E$)	Outlay (E$)	Life (Years)	Model Farm Year 0	1	2	3
Tukul & Storage	1	100	100	10	-	-	-	100
Back Pack Sprayer	0.2(1)	125	25	4	-	25	-	-
Hand Tools	1 set(2)	33	33	3	9	12	12	9
Cotton Picking Bags	1 set	10	10	2	-	10	-	10
Totals					9	47	12	119

Item	Model Farm Year 4	5	6	7	8	9	10
Tukul & Storage	-	-	-	-	-	-	-
Back Pack Sprayer	-	25	-	-	-	25	-
Hand Tools	12	12	9	12	12	9	12
Cotton Picking Bags	-	10	-	10	-	10	-
Totals	12	47	9	22	12	44	12

(1) One sprayer for each five farms.

(2) Eleven units at E$3.00 purchased over 26 months.

Table III-7

Cash Flow
Red/Brown Soil Model Farm
(Ethiopian Dollars)

	Model Farm Year										
	0	1	2	3	4	5	6	7	8	9	10
Cash Inflow											
Crop Sales	-	381	1093	1720	1881	1907	1907	1907	1907	1907	1907
Livestock Sales	-	-	-	-	-	-	-	230	94	140	150
Wages	18	180	-	-	-	-	-	-	-	-	-
Loan Proceeds											
Food Allowance	24	97	-	-	-	-	-	-	-	-	-
Implements	9	-	-	-	-	-	-	-	-	-	-
Production Loan	-	309	314	-	-	-	-	-	-	-	-
Livestock Loan	-	-	280	-	-	-	-	-	-	-	-
Total Inflow	51	967	1687	1720	1881	1907	1907	2137	2001	2047	2057
Cash Outflow											
Operating Costs	-	378	478	566	632	679	688	683	685	687	683
Investments	9	37	302	203	102	37	19	12	12	34	22
Food Expense	24	97	-	-	-	-	-	-	-	-	-
Debt Service	-	449	493	169	-	-	-	-	-	-	-
Total Outflow	33	961	1273	938	734	716	707	695	697	721	705
Cash Balance	18	6	414	782	1147	1191	1200	1442	1304	1326	1352
Agricultural Income Tax	-	-	-	18	45	60	60	60	60	60	60
Net Income	18	6	414	764	1102	1131	1140	1382	1244	1266	1292

Table III-8
Cash Flow
Black Soil Model Farm
(Ethiopian Dollars)

	Model Farm Year										
	0	1	2	3	4	5	6	7	8	9	10
Cash Inflow											
Crop Sales	-	409	1199	1963	2309	2380	2380	2380	2380	2380	2380
Wages	18	180	-	-	-	-	-	-	-	-	-
Loan Proceeds											
Food Allowance	24	160	-	-	-	-	-	-	-	-	-
Implements	9	-	-	-	-	-	-	-	-	-	-
Production Loan	-	247	526	-	-	-	-	-	-	-	-
Total Inflow	51	996	1725	1963	2309	2380	2380	2380	2380	2380	2380
Cash Outflow											
Operating Costs	-	295	638	928	1149	1160	1165	1237	1237	1237	1237
Investments	9	47	12	119	12	47	9	22	12	44	12
Food Expense	24	160	-	-	-	-	-	-	-	-	-
Debt Service	-	454	526	-	-	-	-	-	-	-	-
Total Outflow	33	956	1176	1047	1161	1207	1174	1259	1249	1281	1249
Cash Balance	18	40	549	916	1148	1173	1206	1121	1131	1099	1131
Agricultural Income Tax	–	-	2	18	45	45	60	60	45	45	45
Net Income	18	40	547	898	1103	1128	1146	1061	1086	1054	1086

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Extension, Testing and Project Machinery Services

Extension Services - The estimated capital and recurring costs for implementing the proposed extension program are summarized in Table III-9. Capital costs include housing, office and storage space, and vehicles for the senior extension agents; and bicycles for the junior agents who would house themselves in the 50-farm family village clusters. These capital costs total E$124,000 (foreign exchange component E$78,000) and would be expended over a seven year period (Project Years Zero through Six). Recurring costs comprise annual staff salaries, building maintenance, and vehicle and bicycle operation and maintenance; the eight-year total (life of the program, after which regular EPID services are assumed to take over) of these costs is E$1,091,000 (foreign exchange component E$70,000).

Project Farm - The estimated capital and recurring costs for establishing and operating the proposed Project testing, training, demonstration and seed multiplication farm are summarized in Table III-10. Capital costs are for farm machinery, vehicle, office, shed, fencing and farm roads, and total E$107,000 (foreign exchange component E$75,000) in Project Year One. Recurring costs are for staff salaries, labor, machinery and vehicle running costs, fertilizer, seeds and chemicals and level out at E$126,000 (foreign exchange component E$30,000) from Project Year Two on.

Project Machinery Pool - Estimated capital and recurring costs for the proposed Project machinery pool, which would provide custom seedbed preparation for black soil farms (first year preparation for two hectares of red/brown soil farms) and hauling services for all farms, are summarized in Table III-11. Capital costs are for farm machinery and total E$1,105,000 (all foreign exchange) through Project Year Seven. Recurring costs comprise machinery operations and repair and maintenance costs and level out at E$836,000 (foreign exchange component E$502,000) per year from Project Year Thirteen on. It is planned that these costs would be recovered over the 20-year period of analysis of the Project through hourly charges to the beneficiary farmers.

Livestock Health Services

Estimated capital and recurring costs for providing livestock health facilities are summarized in Table III-12. Capital costs total E$123,000 (foreign exchange component E$40,000) during Project Years One through Nine (three facilities required) and include staff housing, office, laboratory and equipment, store, fencing, dip/crusher, livestock scale,

Table III-9

Estimated Capital and Recurring Costs
Extension Services
(Thousands of Ethiopian Dollars)

	Project Years									Total	Foreign
	0	1	2	3	4	5	6	7	8	Cost	Exchange
Capital Costs											
Office and Store	6	-	-	-	-	-	-	-	-	6	-
Staff Housing	4	4	2	2	-	-	-	-	-	12	2
Vehicles (4-WD)	45	-	-	-	-	-	45	-	-	90	60
Bicycles	2	2	3	2	4	3	-	-	-	16	16
Total Capital Costs	57	6	5	4	4	3	45	-	-	124	78
Foreign Exchange Component	32	3	4	2	4	3	30	-	-	78	
Recurring Costs											
Staff Salaries	31	67	120	149	185	187	130	65	34		
Building Maintenance		-	1	1	1	1	1	1	1		
Vehicle O & M	12	12	12	12	12	12	12	12	12		
Bicycle Maintenance	1	1	1	1	1	2	1	-	-		
Total Recurring Costs	44	80	134	163	199	202	144	78	47		
Foreign Exchange Component	7	7	8	8	9	9	8	7	7		
Total Annual Costs	101	86	139	167	203	205	189	78	78		
Foreign Exchange Component	39	10	12	10	13	12	38	7	7		

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Table III-10

Estimated Capital and Recurring Costs
Project Farm
(Thousands of Ethiopian Dollars)

	Project Years 1	Project Years 2 on	Total Cost	Foreign Exchange
Capital Costs				
Farm Machinery (1)	46		46	46
Back Pack Sprayers (2)	1		1	1
Oxen (3)	1		1	1
Oxen Implements (4)	1		1	1
Hand Implements	1		1	1
Hand Tools	1		1	1
Office and Shed	6		6	2
Staff Housing	6		6	2
Vehicle (4WD) (5)	24		24	15
Fences	15		15	8
Farm Roads	5		5	1
Total Capital Costs	107		107	75
Foreign Exchange Component	75		75	
Recurring Costs				
Staff Salaries	40	40		
Labor	15	15		
Machinery Running Costs	13	13		
General R & M	3	3		
Vehicle O & M	7	7		
Fertilizer, Seeds, Chemicals	10	20		
Total Recurring Costs	88	126		
Foreign Exchange Component	17	30		
Total Annual Costs	195	126		
Foreign Exchange Component	92	30		

(1) Machinery replacement schedule: Tractor-Years 7,13,19; Plow-Year 11; Disc Harrow-Years 9 and 17; Ridger-Year 11; Trailer-Years 10 and 19; Planter-Year 11.
(2) Replaced in Years 5, 9, 13, 17.
(3) Replaced in Years 9 and 17.
(4) Replaced in Years 7, 13, 19.
(5) Replaced in Years 6, 11, 16.

Table III-11

Estimated Capital and Recurring Costs
Project Machinery Pool
(Thousands of Ethiopian Dollars)

	Replacement Life (Years)	Project Years 1	2	3	4	5	6	7	13-20	Total Cost	Foreign Exchange
Capital Costs											
Tractors, 79 hp	6	86	64	43	64	-	171	257		685	685
Plows	10	13	10	6	10	-	26	26		91	91
Disc Harrows	8	19	14	10	14	-	38	38		133	133
Ridgers	10	-	-	-	-	15	35	20		70	70
Trailers	9	9	9	18	18	-	36	36		126	126
Total Capital Costs		127	97	77	106	15	306	377		1105	1105
Foreign Exchange Component		127	97	77	106	15	306	377			
Recurring Costs											
Machinery Running Costs		85	164	246	351	405	627	797	836		
Foreign Exchange Component		51	98	148	211	243	376	478	502		
Total Annual Costs		212	261	323	457	420	933	1174	836		
Foreign Exchange Component		178	195	225	317	258	682	855	502		

Table III-12

Estimated Capital and Recurring Costs
Livestock Health Program
(Thousands of Ethiopian Dollars)

	Project Years										Total Cost	Foreign Exchange
	1	2	3	4	5	6	7	8	9	10 on		
Capital Costs												
Fencing	5		-	5	-	-	-	5	-		15	-
Shades	4		-	3	-	-	-	3	-		10	-
Dip/Crush	6		-	6	1	-	-	6	1		20	-
Office, Laboratory, Store	5		-	-	-	-	-	-	-		5	-
Sheds	1		-	1	-	-	-	1	-		3	-
Staff Housing	8		-	2	-	-	-	2	-		12	-
Laboratory Equipment	6		-	-	-	-	-	-	-		6	6
Livestock Scale	3		-	-	-	-	-	-	-		3	3
Vehicle (4-WD)	-	23	-	-	-	-	23	-	-		46	28
Bicycles	-	1	-	-	-	1	-	-	1		3	3
Total Capital Costs	38	24	-	17	1	1	23	17	2		123	40
Foreign Exchange Component	10	14	-	-	-	1	14	-	1		40	
Recurring Costs												
Staff Salaries	-	27	27	27	35	35	35	35	43	43		
General R & M	-	3	3	3	4	4	5	5	6	6		
Chemicals & Supplies	3	3	3	4	4	4	4	4	5	5		
Vehicle O & M	-	7	7	7	7	7	7	7	7	7		
Total Recurring Costs	3	40	40	41	50	50	51	51	61	61		
Foreign Exchange Component	-	8	7	7	7	8	8	8	7	8		
Total Annual Costs	41	64	40	58	51	51	74	68	63	61		
Foreign Exchange Component	10	22	7	7	7	9	22	8	8	8		

vehicle and bicycles. Recurring costs include staff salaries, building and facility maintenance, vehicle and bicycle operation and maintenance, chemicals and other supplies; these costs build up over a period of nine years to a constant E$61,000 per year (foreign exchange component E$8,000).

Credit and Crop Storage

Credit Loan Fund - Funds for production, food, livestock and farm implements, would require a revolving loan fund with a peak annual input of E$377,000 (foreign exchange component E$158,000) in Project Year Two. This revolving fund would be recovered in full by Project Year Eight, the last loans being made in Year Seven. Other capital costs include staff housing and office and total E$11,000 (foreign exchange component $3,000) in Project Year One. Recurring costs (over a period of nine years with phase-out at the end of Year Eight) include staff salaries and building maintenance totaling E$10,000 in Year Zero and E$21,000 in each of Years One through Eight; no foreign exchange required. Loan fund requirements, capital costs, and recurring costs are summarized in Table III-13.

Crop Storage - Estimated capital and recurring costs for providing grain and pulse stores and cotton shelters are summarized in Table III-14. Capital cost items include eight grain and pulse stores and three cotton shelters constructed over a period of eight years, a truck scale, staff housing and miscellaneous equipment; the total estimated cost is E$394,000 (foreign exchange component E$142,000). Recurring costs are for staff salaries, labor and general repair and maintenance and build up to E$78,000 per year (foreign exchange component E$8,000) from Project Year Nine on.

Storage and Handling Charges - Project revenue, which would be realized by collecting storage and handling charges of E$ 2.00 per quintal for grains and pulses and E$0.50 per quintal for cotton, is summarized in Table III-15. After deducting assumed two percent losses on grains and pulses, net revenue would build up to E$504,000 annually from Year Ten on.

Infrastructure Development

Tsetse Fly Control - Estimated capital and recurring costs for carrying out the proposed tsetse fly control program are summarized in Table III-16. Capital costs include clearing and purchase of hand tools and total E$239,000 (foreign exchange component E$26,000)

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Table III-13

Estimated Capital and Recurring Costs
Credit Loan Fund
(Thousands of Ethiopian Dollars)

	Project Years									Total Cost	Foreign Exchange
	0	1	2	3	4	5	6	7	8		
Capital Costs											
Revolving Loan Fund											
Loans Made	17	223	597	750	961	1096	972	561	-		
Recovery	-	-	220	520	729	933	1065	1135	575		
Annual Inputs	17	223	377	230	232	163	(93)	(574)	(575)	0	0
Foreign Exchange Component	-	105	158	96	96	67	(39)	(241)	(242)	0	
Staff Housing	-	6	-	-	-	-	-	-	-	6	2
Office	-	5	-	-	-	-	-	-	-	5	1
Subtotal	-	11	-	-	-	-	-	-	-	11	3
Foreign Exchange Component	-	3	-	-	-	-	-	-	-	3	
Total Capital Costs	17	234	377	230	232	163	(93)	(574)	(575)	11	3
Foreign Exchange Component	-	108	158	96	96	67	(39)	(241)	(242)	3	
Recurring Costs (1)											
Staff	10	20	20	20	20	20	20	20	20		
R & M	-	1	1	1	1	1	1	1	1		
Total Recurring Costs	10	21	21	21	21	21	21	21	21		

(1) No Foreign Exchange Component

Table III-14

Estimated Capital and Recurring Costs
Storage and Marketing
(Thousands of Ethiopian Dollars)

	Project Years									Total Cost	Foreign Exchange
	1	2	3	4	5	6	7	8	9 on		
Capital Costs											
Grain & Pulse Stores	45	-	45	90	45	45	45	45	-	360	119
Truck Scale (1)	20	-	-	-	-	-	-	-	-	20	20
Cotton Sheds	-	-	-	-	-	1	1	1	-	3	-
Staff Housing	6	-	-	-	-	-	-	-	-	6	2
Miscellaneous Equipment	5	-	-	-	-	-	-	-	-	5	1
Total Capital Costs	76	-	45	90	45	46	46	46	-	394	142
Foreign Exchange Component	42	-	15	28	15	14	14	14	-	142	
Recurring Costs											
Staff Salaries	20	20	20	20	20	20	20	20	20		
Labor	1	4	9	16	23	28	33	35	36		
Repair & Maintenance	-	5	5	7	12	15	17	19	22		
Total Recurring Costs	21	29	34	43	55	63	70	74	78		
Foreign Exchange Component	-	3	3	3	5	5	6	7	8		
Total Annual Costs	97	29	79	133	100	109	116	120	78		
Foreign Exchange Component	42	3	18	31	20	19	20	21	8		

(1) Replaced after ten years

Table III-15

Estimated Revenue
Storage and Handling
(Thousands of Ethiopian Dollars)

	Project Years									
	1	2	3	4	5	6	7	8	9	10 on
Grains & Pulses										
Surplus Production (tons)(1)	860	3662	8637	15359	21961	26415	29040	30680	31310	31530
Storage Charges (E$1.50/qq)	13	55	130	230	329	396	436	460	470	473
Handling Charges(E$0.50/qq)	4	18	43	77	110	132	145	153	157	158
Total Revenue, Grains	17	73	173	307	439	528	581	613	627	631
Cotton										
Production	-	-	-	-	675	2513	4425	5588	6000	6000
Storage & Handling charges (E$.50/qq)	-	-	-	-	3	13	22	28	30	30
Total Revenue, Cotton	-	-	-	-	3	13	22	28	30	30
All Crops										
Total Annual Revenue	17	73	173	307	442	541	603	641	657	661
Less										
Storage Losses of 2% on Grains & Pulses	4	17	40	70	100	123	137	150	156	157
Net Annual Revenue	13	56	133	237	342	418	466	491	501	504

(1) Excluding home consumption

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Table III-16

Estimated Capital and Recurring Costs
Tsetse Fly Control
(Thousands of Ethiopian Dollars)

	Project Year							Total Cost	Foreign Exchange
	1	2	3	4	5	6	7 on		
Capital Costs									
Buffer Zone Clearing	130	-	-	-	-	-	-	130	13
Tributary Clearing	17	-	-	-	--	-	-		2
Didesa River Strips Clearing	13	13	13	13	13	13	-	78	8
Hand Tools	4	2	2	2	2	2	-	14	3
Total Capital Costs	164	15	15	15	15	15	-	239	26
	16	2	2	2	2	2	-	26	
Recurring Costs									
Maintenance of Cleared Zones	-	16	17	19	20	21	23		
Spraying	20	16	12	8	4	1	1		
Total Recurring Costs	20	32	29	27	24	22	24		
Foreign Exchange Component	2	3	3	3	2	2	2		
Total Annual Costs	184	47	44	42	39	37	24		
Foreign Exchange Component	18	5	5	5	4	4	2		

over a six year period. Recurring costs comprise maintenance of cleared zones and annual spraying and build-up to E$24,000 per year (foreign exchange component E$2,000) from Year Seven onwards.

Surveys and Mapping - The estimated capital costs for Project Area mapping and village and farm boundary marking are summarized in Table III-17; these costs total E$505,000 (foreign exchange component E$49,000) and would be incurred over a six-year period (Project Years Zero through Five).

Roads - Capital costs for road construction are estimated to total E$1,264,000 (foreign exchange component E$128,000) over a four-year period (Project Years Zero through Three). Both total costs and the foreign exchange component are relatively low since construction would be labor-intensive with only a minimum of equipment for specialized tasks. Equipment costs are based on hourly rental rate and include one motor grader, one bulldozer, one dump truck and one pick-up. Costs are summarized on Table III-18. The proposed supervision and labor force are as follow:

Supervisor	1
Assistant Supervisor	1
Foremen	4
Survey Party	1
Equipment Operators	2
Drivers	2
Mechanic	1
Carpenter	1
Masons	2
Clerk	1
First Aid Man	1
Laborers	500

Recurring costs (see Table III-18) are for road maintenance and build up to a constant E$32,000 annually (foreign exchange component E$3,000) from Project Year Four on.

Surface Drainage System - As for roads, construction of the surface drainage system (on black soils only) would be labor intensive and with the same minimum equipment input. The estimated supervision and labor force are listed below.

Supervisor	1
Assistant Supervisors	2
Foremen	50

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Table III-17

Estimated Costs - Surveys and Mapping
(Thousands of Ethiopian Dollars)

	Project Year						Total Cost	Foreign Exchange
	0	1	2	3	4	5		
Topographic Survey								
Ground Surveys	48	-	-	-	-	-	48	2
Field Costs	36	-	-	-	-	-	36	8
Plotting & Map Preparation	22	-	-	-	-	-	22	1
Subtotal	106	-	-	-	-	-	106	11
Foreign Exchange Component	11	-	-	-	-	-	11	
Farm & Village Boundary Marking								
Surveys	24	24	36	48	48	48	228	9
Field Costs	18	18	27	36	36	36	171	29
Subtotal	42	42	63	84	84	84	399	38
Foreign Exchange Component	4	4	6	8	8	8	38	
Total Surveys & Mapping	148	42	63	84	84	84	505	49
Foreign Exchange Component	15	4	6	8	8	8	49	

Table III-18

Estimated Capital and Recurring Costs
Proposed Project Roads
(Thousands of Ethiopian Dollars)

	Project Years					Total Cost	Foreign Exchange
	0	1	2	3	4 on		
Capital Costs							
Equipment	88	88	88	88	-	352	88
Supervision	34	34	34	34	-	136	-
Skill Labor	29	29	29	29	-	116	-
Unskilled Labor	109	109	109	109	-	436	-
Bridge	-	-	120	-	-	120	30
Materials	26	26	26	26	-	104	10
Total Capital Costs	286	286	406	286	-	1264	128
Foreign Exchange Component	29	29	41	29	-	128	
Recurring Costs							
Road Maintenance	-	7	14	24	32		
Foreign Exchange Component	-	1	1	2	3		
Total Annual Costs	286	293	420	310	32		
Foreign Exchange Component	29	30	42	31	3		

Survey Parties	4
Equipment Operators	2
Drivers	2
Mechanic	1
Carpenter	1
Masons	4
Clerks	2
First Aid Men	10
Laborers	5,500 to 6,600

Estimated capital and recurring costs are summarized on Table III-19. Total estimated capital costs, during Project Years Four and Five, are E$3,980,000 (foreign exchange component E$398,000). Recurring costs are for annual maintenance of drains and build up to a constant E$80,000 (foreign exchange component E$8,000) from Project Year Six on.

In order to recover most of the capital and annual maintenance outlay, it is proposed that beneficiary farmers be charged drainage users' fees commencing in Project Year Seven (black soil settlement would commence in Project Year Five and construction of drains is scheduled to start in Project Year Four). Calculation of proposed drainage users' fees is summarized in Table III-20; the charge per farm would be E$149 in Project Year Seven, E$278 in Years Eight through 19, and E$169 in Year 20. The total unrecovered cost to the Project, for interest during the assumed repayment deferral per period (Years Four through Six) and annual maintenance during Years Five and Six, would be E$800,410.

Water Supply - Estimated capital and recurring costs for the proposed potable water supply system for the Project Center and expected large town at Kolosuri are summarized in Table III-21. Estimated capital costs total E$976,000 (foreign exchange component E$378,000), with disbursements in Project Years Zero, One and Six; these costs include a pumping plant on the Didesa River, a power plant (30 percent charged to Project Headquarters for electricity), pipeline and distribution system, filter, reservoir, operations building, staff housing, and engineering and contingency.

Estimated annual recurring costs include staff salaries, repair and maintenance, fuel and general expenses; these costs increase to a constant E$116,000 (foreign exchange component E$33,000) from Project Year Seven on.

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Table III-19

Estimated Capital and Recurring Costs
Proposed Drainage System
(Thousands of Ethiopian Dollars)

	Project Years			Total Cost	Foreign Exchange
	4	5	6 on		
Capital Costs					
Equipment	88	88	-	176	128
Supervision	117	118	-	235	-
Skilled Labor	77	80	-	157	-
Unskilled Labor	1224	1496	-	2720	-
Materials	166	196	-	362	180
Camp Operations	151	179	-	330	90
Total Capital Costs	1823	2157	-	3980	398
Foreign Exchange Component	182	216	-	398	
Recurring Costs					
Maintenance	-	36	80		
Foreign Exchange Component	-	4	8		
Total Annual Costs	1823	2193	80		
Foreign Exchange Component	182	220	8		

Table III-20

Proposed Users' Fees
Surface Drainage System on Black Soils
(Ethiopian Dollars)

	Project Years					
	4	5	6	7	8-19	20
Disbursements	1823000	2157000				
Interest During Deferral	127610	278600	278600	150990		
Annual Maintenance		36000	79600	79600	79600	79600
Basic Payment			-	218123	476210	258087
Principal				140231	306154	165923
Interest				77893	170057	92164
Total Annual Costs	127610	314600	358200	448713	558810	337687
Proposed Users' Fees						
Principal + Interest				218123	476210	258087
Annual Maintenance				79600	79600	79600
Total	-	-	-	297723	355810	337687
Fee per Farm (1)	-	-	-	149	278	169

Note: Assumed 7 percent interest, 16-year term, 3-year deferral

(1) 2000 farms

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Table III-21

Estimated Capital and Recurring Costs
Proposed Kolosuri Water Supply System
(Thousands of Ethiopian Dollars)

	Project Years								Total Cost	Foreign Exchange
	0	1	2	3	4	5	6	7 on		
Capital Costs										
Pumping Plant (45 hp)	-	40	-	-	-	-	16	-	56	49
Power Plant (50 kw)	-	56	-	-	-	-	20	-	76	56
Pipeline	-	206	-	-	-	-	-	-	206	62
Filter	-	23	-	-	-	-	-	-	23	8
Reservoir	-	79	-	-	-	-	-	-	79	30
Operations Building	-	40	-	-	-	-	-	-	40	21
Distribution System	-	320	-	-	-	-	-	-	320	67
Housing	-	8	-	-	-	-	-	-	8	2
Engineering & Contingency	80	88	-	-	-	-	-	-	88	83
Total Capital Costs	80	860	-	-	-	-	36	-	976	378
Foreign Exchange Component	40	302	-	-	-	-	36	-	378	
Recurring Costs										
Staff	-	-	35	35	35	35	35	35		
Repair & Maintenance	-	-	27	54	54	54	54	54		
Fuel	-	-	4	7	11	15	19	21		
General Expenses	-	-	2	3	5	5	6	6		
Total Recurring Costs	-	-	68	99	105	109	114	116		
Foreign Exchange Component			13	26	27	29	32	33		
Total Annual Costs	80	860	68	99	105	109	150	116		
Foreign Exchange Component	40	302	13	26	27	29	68	33		

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Based on a financial analysis, assuming a water charge of E$0.55 per cubic meter and ten percent leakage and waste, the water supply facility would break even over the 20-year period of analysis (financial rate of return, 0.8 percent). This analysis is summarized in Table III-22.

Public Services - The estimated capital and recurring costs for providing malaria control, two health stations, ten schools (minimum formal education - grades one through four), and a police sub-station, are summarized in Table III-23. Capital costs, which are order-of-magnitude and may not have to be incurred in whole or in part by the Project, total E$305,000 (foreign exchange component E$152,000) during Project Years One through Five.

Annual recurring costs at full operation of all proposed services would be approximately E$226,000 (foreign exchange component E$11,000) from Project Year Ten on.

Project Management - The estimated capital and recurring costs for facilities and equipment proposed for Project Headquarters are summarized in Table III-24. Capital costs are for offices, store, equipment, housing, vehicles, and a portion of the water supply power installation, and total E$225,000 (foreign exchange component E$106,000) in Project Year One.

Annual recurring costs build up to a constant E$162,000 (foreign exchange component E$22,000) from Project Year Two on, and include staff salaries, general repair and maintenance, vehicle operation and maintenance, fuel, and general expenses.

Technical Assistance - The estimated capital costs for the minimum proposed expatriate technical assistance team discussed in Chapter II are summarized in Table III-25 and total E$4,032,000 (all foreign exchange); these costs are all-inclusive and comprise expatriate salaries, allowances, overhead, travel and transport of effects; local staff salaries; vehicles and vehicle operation and maintenance; and other direct costs including local office and field operations.

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Table III-22

Financial Analysis of Proposed Kolosuri Water Supply System
(Thousands of Ethiopian Dollars)

Project Years	0	1	2	3	4	5	6	7	8	9	10
Outflow											
Capital Expenditures	80	860									
O & M Costs	-	-	68	99	105	109	114	116	116	116	116
Replacement							36				
Total Outflow	80	860	68	99	105	109	150	116	116	116	116
Inflow											
Sales @ E$0.55/$m^3$	-	-	40	70	100	140	181	201	201	201	201
Annual											
Surplus/Deficit	(80)	(860)	(28)	(29)	(5)	31	31	85	85	85	85
Cumulative											
Surplus/Deficit	(80)	(940)	(968)	(997)	(1002)	(971)	(940)	(855)	(770)	(685)	(600)

Project Years	11	12	13	14	15	16	17	18	19	20
Outflow										
Capital Expenditures										
O & M Costs	116	116	116	116	116	116	116	116	116	116
Replacement	107					36				
Total Outflow	223	116	116	116	116	152	116	116	116	116
Inflow										
Sales @ E$0.55/$M^3$	201	201	201	201	201	201	201	201	201	201
Annual										
Surplus/Deficit	(22)	85	85	85	85	49	85	85	85	85
Cumulative										
Surplus/Deficit	(622)	(537)	(452)	(367)	(282)	(233)	(148)	(63)	22	107

Table III-23

Estimated Capital and Recurring Costs
Public Services
(Thousands of Ethiopian Dollars)

	Project Years										Total Cost	Foreign Exchange
	1	2	3	4	5	6	7	8	9	10on		
Capital Costs												
Malaria Control	24	-	-	-	-						24	12
Health Stations (2)	12	-	12	-	-						24	12
Schools (10 MFE)	44	44	43	45	45						221	110
Police Sub-Station (1)	-	36	-	-	-						36	18
Total Capital Costs	80	80	55	45	45						305	152
Foreign Exchange Component	40	40	27	23	22						152	
Recurring Costs												
Malaria Control	68	71	76	76	76	78	80	85	88	92		
Health Stations	10	10	20	20	20	20	20	20	20	20		
Schools	10	20	30	40	45	53	64	76	85	95		
Police	-	19	19	19	19	19	19	19	19	19		
Total Recurring Costs	90	120	145	155	160	170	183	200	212	226		
Foreign Exchange Component	4	6	7	8	8	9	9	10	11	11		
Total Annual Costs	170	200	200	200	205	170	183	200	212	226		
Foreign Exchange Component	44	46	34	31	30	9	9	10	11	11		

Table III-24

Estimated Capital and Recurring Costs
Organization and Management
(Thousands of Ethiopian Dollars)

	Project Years			Total Cost	Foreign Exchange
	0	1	2 on		
Capital Costs					
Office Buildings	-	20		20	6
Store	-	10		10	3
Equipment	-	10		10	3
Housing (Project Director)	-	20		20	6
Guest House & Furnishings	-	30		30	9
Staff Housing (10 Apartments)	-	20		20	6
Vehicles (Four 4-WD) (1)	-	91		91	57
Electric Power (2)	-	24		24	16
Total Capital Costs	-	225		225	106
Foreign Exchange Component	-	106		106	
Recurring Costs					
Staff	57	115	115		
General R&M	-	-	6		
Vehicle R&M	-	15	15		
Vehicle Fuel	-	8	8		
Fuel (Electric Power)	-	-	8		
General Expenses	-	-	10		
Total Recurring Costs	57	138	162		
Foreign Exchange Component	-	13	22		
Total Annual Costs					
Foreign Exchange Component					

(1) Replaced in Years 7, 13 and 19.

(2) Pro-rated share of surplus power generated by water supply system.

Table III-25

Estimated Costs - Technical Assistance
(Thousands of Ethiopian Dollars)

	Project Year			
	0	1	2	3
Expatriate Salaries & Overhead	226	426	446	468
Local Staff	62	76	76	76
Allowances	64	122	120	122
International Travel and Transport	52	72	54	134
Local Travel	10	20	20	20
Vehicles	42	64	-	-
Vehicle O & M	28	70	70	70
Other Direct Costs	40	198	262	158
Subtotal	524	1048	1048	1048
Fee	52	104	104	104
Total	576	1152	1152	1152

Note: Foreign Exchange Component: 100 percent.

FINANCIAL ANALYSIS

Summary of the Financial Cost of the Project

The total cost of the Project (capital plus recurring costs) during the 20-year period of analysis) is estimated to be E$47,108,000. A summarized breakdown of the costs involved is given in Table III-26. The foreign exchange component of the total cost is E$19,474,000 or about 41 percent. Expenditures on capital cost items during the period would be E$15,827,000, or about 34 percent of the total. Of capital cost items E$8,991,000 or approximately 57 percent would be in foreign exchange.

Estimated Government Cash Flow

An approximation of the overall financial impact the Project can have on Government finances is shown in Table III-27. After only six years, the Project could begin generating a net positive cash flow (before debt service) to the Government. This, of course, would depend on efficient administration to insure that potential revenues are actually collected.

Income tax revenues were calculated on the basis of the official tax schedule. Fuel tax and other import taxes were only included where they could be positively identified; undoubtedly, other items requiring foreign exchange will generate additional revenue to the Government.

Farm machinery rental fees were based on full recovery of hourly costs, including downtime, fuel, lubricants, filters, repair and maintenance, drivers' wages, insurance and capital recovery.

Water sales were based on a charge of E$0.55 per cubic meter which would permit the Project to slightly more than break even over the 20-year period of analysis.

Handling and storage charges for grains and pulses were computed at E$2.00 per quintal which is understood to be the customary charge in Ethiopia. For cotton, these charges were taken at E$0.50 per quintal.

Drainage users' fees were based on recovery of all costs, except for interest and maintenance during an assumed three-year grace period (capital recovery at seven percent interest over a 16-year term) including principal, interest, and annual maintenance.

Table III-26

Total Estimated Financial Costs
(Thousands of Ethiopian Dollars)

Project Years	0		1		2		3		4		5	
	Cap.	Rec.	Cap.	Rec.	Cap.	Rec.	Cap.	Rec.	Cap.	Rec.	Cap.	Rec.
Roads-Total	286	-	286	7	406	14	286	24	-	32	-	32
Foreign Exchange Component	29	-	29	1	41	1	29	2	-	3	-	3
Drainage System-Total	-	-	-	-	-	-	-	-	1823	-	2157	36
Foreign Exchange Component	-	-	-	-	-	-	-	-	182	-	216	4
Water Supply-Total	80	-	860	-	-	68	-	99	-	105	-	109
Foreign Exchange Component	40	-	302	-	-	13	-	26	-	27	-	29
Testing & Extension-Total	57	44	113	168	5	260	5	289	4	325	4	328
Foreign Exchange Component	32	7	78	24	4	38	2	38	4	39	3	39
Credit & Marketing-Total	17	10	310	42	377	50	275	52	322	64	208	76
Foreign Exchange Component	-	-	150	-	158	3	111	3	117	3	82	5
Tsetse Fly Control-Total	-	-	164	20	15	32	15	29	15	27	15	24
Foreign Exchange Component	-	-	16	2	2	3	2	3	2	3	2	2
Project Machinery-Total	-	-	127	85	97	164	77	246	106	351	15	405
Foreign Exchange Component	-	-	127	51	97	98	77	148	106	211	15	243
Surveys & Mapping-Total	148	-	42	-	63	-	84	-	84	-	84	-
Foreign Exchange Component	15	-	4	-	6	-	8	-	8	-	8	-
Livestock Health-Total	-	-	38	3	24	40	-	40	17	41	1	50
Foreign Exchange Component	-	-	10	-	14	8	-	7	-	7	-	7
Public Services-Total	-	-	80	90	80	120	55	145	45	155	45	160
Foreign Exchange Component	-	-	40	4	40	6	27	7	23	8	22	8
Mgmt. & Organization-Total	-	57	225	138	-	162	-	162	-	162	-	162
Foreign Exchange Component	-	-	106	13	-	22	-	22	-	22	-	22
Technical Assistance-Total	576	-	1152	-	1152	-	1152	-	-	-	-	-
Foreign Exchange Component	576	-	1152	-	1152	-	1152	-	-	-	-	-
Total (Foreign & Local)	1164	111	3397	553	2219	910	1949	1089	2416	1262	2529	1382
Total Foreign Exchange	692	7	2014	95	1514	192	1408	256	442	323	348	362

Table III-26 (Continued)

Project Years	6		7		8		9		10		11	
	Cap.	Rec.	Cap.	Rec.	Cap.	Rec.	Cap.	Rec.	Cap.	Rec.	Cap.	Rec.
Roads-Total	-	32	-	32	-	32	-	32	-	32	-	32
Foreign Exchange Component	-	3	-	3	-	3	-	3	-	3	-	3
Drainage System-Total	-	80	-	80	-	80	-	80	-	80	-	80
Foreign Exchange Component	-	8	-	8	-	8	-	8	-	8	-	8
Water Supply-Total	36	114	-	116	-	116	-	116	-	116	107	116
Foreign Exchange Component	36	32	-	33	-	33	-	33	-	33	107	33
Testing & Extension-Total	65	270	23	204	-	173	7	126	6	126	40	126
Foreign Exchange Component	45	38	21	37	-	37	5	30	6	30	31	30
Credit & Marketing-Total	(47)	84	(527)	91	(529)	95	-	78	-	78	20	76
Foreign Exchange Component	(25)	5	(227)	6	(228)	7	-	8	-	8	20	8
Tsetse Fly Control-Total	15	22	-	24	-	24	-	24	-	24	-	24
Foreign Exchange Component	2	2	-	2	-	2	-	2	-	2	-	2
Project Machinery-Total	306	627	377	797	64	822	62	832	88	834	32	834
Foreign Exchange Component	306	376	377	478	64	493	62	499	88	500	32	500
Surveys & Mapping-Total	-	-	-	-	-	-	-	-	-	-	-	-
Foreign Exchange Component	-	-	-	-	-	-	-	-	-	-	-	-
Livestock Health-Total	1	50	23	51	17	51	2	61	1	61	6	61
Foreign Exchange Component	1	8	14	8	-	8	1	7	1	8	6	8
Public Services-Total	-	170	-	183	-	200	-	212	-	226	-	226
Foreign Exchange Component	-	9	-	9	-	10	-	11	-	11	-	11
Mgmt. & Organization-Total	-	162	91	162	-	162	-	162	-	162	-	162
Foreign Exchange Component	-	22	57	22	-	22	-	22	-	22	-	22
Technical Assistance-Total	-	-	-	-	-	-	-	-	-	-	-	-
Foreign Exchange Component	-	-	-	-	-	-	-	-	-	-	-	-
Total (Foreign & Local)	376	1611	(13)	1740	(448)	1755	71	1723	95	1739	205	1737
Total Foreign Exchange	365	503	242	606	(164)	623	68	623	95	625	196	625

Table III-26 (Continued)

Project Years	12		13		14		15		16		17	
	Cap.	Rec.	Cap.	Rec.	Cap.	Rec.	Cap.	Rec.	Cap.	Rec.	Cap.	Rec.
Roads-Total	-	32	-	32	-	32	-	32	-	32	-	32
Foreign Exchange Component	-	3	-	3	-	3	-	3	-	3	-	3
Drainage System-Total	-	80	-	80	-	80	-	80	-	80	-	80
Foreign Exchange Component	-	8	-	8	-	8	-	8	-	8	-	8
Water Supply-Total	-	116	-	116	-	116	-	116	36	116	-	116
Foreign Exchange Component	-	33	-	33	-	33	-	33	36	33	-	33
Testing & Extension-Total	-	126	24	126	-	126	1	126	24	126	7	126
Foreign Exchange Component	-	30	24	30	-	30	-	30	15	30	6	30
Credit & Marketing-Total	-	78	-	78	-	78	-	78	-	78	-	78
Foreign Exchange Component	-	8	-	8	-	8	-	8	-	8	-	8
Tsetse Fly Control-Total	-	24	-	24	-	24	-	24	-	24	-	24
Foreign Exchange Component	-	2	-	2	-	2	-	2	-	2	-	2
Project Machinery-Total	213	836	281	836	112	836	132	836	161	836	65	836
Foreign Exchange Component	213	502	281	502	112	502	132	502	161	502	65	502
Surveys & Mapping-Total	-	-	-	-	-	-	-	-	-	-	-	-
Foreign Exchange Component	-	-	-	-	-	-	-	-	-	-	-	-
Livestock Health-Total	23	61	2	61	1	61	-	61	1	61	24	61
Foreign Exchange Component	14	8	2	8	1	8	-	8	1	8	16	8
Public Services-Total	-	226	-	226	-	226	-	226	-	226	-	226
Foreign Exchange Component	-	11	-	11	-	11	-	11	-	11	-	11
Mgmt. & Organization-Total	-	162	91	162	-	162	-	162	-	162	-	162
Foreign Exchange Component	-	22	57	22	-	22	-	22	-	22	-	22
Technical Assistance-Total	-	-	-	-	-	-	-	-	-	-	-	-
Foreign Exchange Component	-	-	-	-	-	-	-	-	-	-	-	-
Total (Foreign & Local)	236	1741	398	1741	113	1741	133	1741	222	1741	96	1741
Total Foreign Exchange	227	627	364	627	113	627	132	627	213	627	87	627

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Table III-26 (Continued)

Project Years	18		19		20		Total through Year 20		
	Cap.	Rec.	Cap.	Rec.	Cap.	Rec.	Capital	Recurring	Capital & Recurring
Roads-Total	-	32	-	32	-	32	1264	589	1853
Foreign Exchange Component	-	3	-	3	-	3	128	55	183
Drainage System-Total	-	80	-	80	-	80	3980	1236	5216
Foreign Exchange Component	-	8	-	8	-	8	398	124	522
Water Supply-Total	-	116	-	116	-	116	1119	2119	3238
Foreign Exchange Component	-	33	-	33	-	33	521	589	1110
Testing & Extension-Total	-	126	29	126	-	126	414	3573	3987
Foreign Exchange Component	-	30	29	30	-	30	305	657	962
Credit & Marketing-Total	-	78	-	78	-	78	426	1501	1927
Foreign Exchange Component	-	8	-	8	-	8	158	128	286
Tsetse Fly Control-Total	-	24	-	24	-	24	239	490	729
Foreign Exchange Component	-	2	-	2	-	2	26	43	69
Project Machinery-Total	185	836	275	836	88	836	2863	13421	16384
Foreign Exchange Component	185	502	275	502	88	502	2863	8115	10978
Surveys & Mapping-Total	-	-	-	-	-	-	505	-	505
Foreign Exchange Component	-	-	-	-	-	-	49	-	49
Livestock Health-Total	1	61	-	61	-	61	182	1058	1240
Foreign Exchange Component	1	8	-	8	-	8	82	148	230
Public Services-Total	-	226	-	226	-	226	305	3921	4226
Foreign Exchange Component	-	11	-	11	-	11	152	193	345
Mgmt. & Organization-Total	-	162	91	162	-	162	498	3273	3771
Foreign Exchange Component	-	22	57	22	-	22	277	431	708
Technical Assistance-Total	-	-	-	-	-	-	4032	-	4032
Foreign Exchange Component	-	-	-	-	-	-	4032	-	4032
Total (Foreign & Local)	186	1741	395	1741	88	1741	15827	31281	47108
Total Foreign Exchange	186	627	361	627	88	627	8991	10483	19474

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Table III-27

Estimated Government Cash Flow
(Thousands of Ethiopian Dollars)

Project Years	0	1	2	3	4	5	6	7	8	9	10
Source of Funds											
Income Tax	-	-	-	9	33	71	121	179	239	270	284
Fuel Tax	1	42	58	69	84	84	127	169	168	168	168
Other Import Tax	9	102	-	-	-	9	102	-	-	-	-
Water Sales	-	-	40	70	100	140	181	201	201	201	201
Farm Machinery Rental Fees	-	85	127	202	293	330	618	795	817	825	827
Handling & Storage Fees	-	13	56	133	237	342	418	466	491	501	504
Drainage Users' Fees	-	-	-	-	-	-	-	298	556	556	556
Subtotal	10	242	281	483	747	976	1567	2108	2472	2521	2540
Project Outlays	1275	3950	3129	3038	3678	3911	1987	1727	1307	1794	1834
Balance, + (-)	(1265)	(3708)	(2848)	(2555)	(2931)	(2935)	(420)	381	1165	727	706

Project Years	11	12	13	14	15	16	17	18	19	20
Source of Funds										
Income Tax	300	287	270	270	270	270	270	270	270	270
Fuel Tax	168	168	168	168	168	168	168	168	168	168
Other Import Tax	102	-	-	-	-	102	-	-	-	-
Water Sales	201	201	201	201	201	201	201	201	201	201
Farm Machinery Rental Fees	827	827	827	827	827	827	827	827	827	827
Handling & Storage Fees	504	504	504	504	504	504	504	504	504	504
Drainage Users' Fees	556	556	556	556	556	556	556	556	556	556
Subtotal	2658	2543	2526	2526	2526	2526	2526	2526	2526	2526
Project Outlays	1942	1977	2139	1854	1874	1963	1837	1927	2136	1829
Balance, + (-)	716	566	387	672	652	665	689	599	390	697

ECONOMIC ANALYSIS

Presented in this section is the economic analysis of the proposed Project. Discussions to this point have proceeded in financial terms in that all costs and prices have been given at market values. In this section the components of the Project are aggregated and their costs and benefits compared at economic prices. Costs are evaluated in terms of the estimated net drain on the economy's resources, and benefits are evaluated in terms of their estimated net contribution to the country's economic welfare. Both the internal economic rate of return and the benefit-cost ratio are calculated to give an estimate of the relative contribution the Project will make to the economy as compared to other projects similarly evaluated.

Project Benefits

In a comprehensive multidisciplinary project of this type, both costs and benefits are numerous and varied. The economic analysis must, out of practical necessity, be focused on the costs and benefits which can feasibly be identified and evaluated. The estimated Project costs were presented in financial terms previously in this chapter. For the purpose of economic analysis, these costs must be evaluated at economic prices.

Many benefits would be derived from the Project. There are the obvious benefits of increased farm production which form the quantitative basis upon which the Project is analyzed. The incremental gross benefits are determined by simply subtracting the extremely small present production value from the estimated Project production value through each of the 20 years in the period of analysis. Many other benefits would also result from implementation of the Project which can only be accounted for on a qualitative basis, including:

1) the social benefits in settling nearly 5,000 landless farm families;

2) jobs and income generated in the handling and transport of agricultural produce;

3) spontaneous settlement of adjacent lands outside the Project boundary;

4) spontaneous development and other economic activity along the Bedele/Kolosuri road proposed to be upgraded;

5) income to the anticipated non-farm population (expected to roughly equal the farm population) in providing services and consumer goods to the farm population;

6) jobs and income in construction and construction materials;

7) improved labor productivity due to better health care and educational facilities;

8) value of orchards, gardens, woodlots and small animals on each farm; and

9) time savings of passenger traffic over new roads.

The two farm models presented earlier in this chapter were the basic units from which aggregate benefits were derived. The total annual gross benefits (farmgate value of crops plus livestock sales in the case of farmers cultivating red and brown soils) for each model type were aggregated according to the same schedule as for the settlement of farmers of each type into the Project (settlement schedule presented in Chapter II). This aggregation resulted in a stream of gross farm benefits due to the Project. Present Project Area production value was subtracted from this stream to yield an incremental gross benefit stream.

Valuation of Costs and Benefits

The "Guide to Project Planning in Ethiopia"[1/] was generally followed in converting costs and benefits to economic terms for this analysis; however, certain variations were made (most notably unskilled labor) to fit regional conditions. The basic conversion factors calculated by the PCO are as follow:

1/ "A Guide to Project Planning in Ethiopia", Planning Commission Office (PCO), June 1972, Chapter Four.

Transport	1.00
Electricity	1.30 or 1.70 depending on which power authority is supplier
Construction	0.90
Standard Conversion Factor (SCF)	0.85
Wage Rates	0.70

Wage rates (unskilled) were shadow priced at 50 percent of the market rate in converting the labor portion of labor intensive estimated construction costs in that the only major alternative employment in the region is seasonal coffee picking which spans about a three-month period; the normal construction season for Project works would have at least six months duration each year. In other instances where the PCO Guide was neither specific enough nor did not treat a particular item, a factor was used which was most consistent with the basic approach contained in the Guide.

Conventional project analysis, from the economic point of view, excludes taxes and duties. Nearly all imported farm inputs are duty free, thus adjustment for duties was not necessary. A major exception is fuel, from which duty was removed to arrive at the economic cost of operating farm machinery. Duty was also removed from vehicles and required fuel in arriving at economic costs for these items.

The following conversion factors were used in shadow pricing all development costs and farm budget items presented in Part II of this report:

Mapping and Surveys	0.85
Heavy Equipment Operation	0.75
Materials	0.85
Management	0.85
Salaries and Skilled Labor	0.85
Unskilled Labor	0.50
Buildings	0.85
Bridge Construction	0.85
Machinery	1.00 1/
Vehicles	1.00 1/
Farm Machinery	1.00
Fuel	1.00 1/
Spare Parts	1.00 1/

1/ This factor was applied after deducting import duties.

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Public Services	0.85
Credit	1.00
Animals	0.85
Drugs and Chemicals	1.00
Insecticides	1.00
Fertilizer	1.00
Seeds	0.85
Farm Family Labor	0.00
Income Tax	0.00
Drainage Users' Fees (Farm Budgets)	0.00
Debt Service (Farm Budgets)	0.00
Custom Machine Services (Farm Budgets)	0.00

The estimated crop market prices backed up to farmgate, presented in Chapter II, were considered to also represent economic prices in that: 1) maize, sorghum, chick peas, and teff were all assumed to be marketed and consumed within Ethiopia; and 2) the international cotton price was used since it appears, based on market analysis, that future cotton prices in Ethiopia will be tied to world prices, less export costs, under the expectation of continued self-sufficiency.

Aggregated Economic Costs

The sum of the costs of the various proposed Project investments plus the aggregated farm costs constitute the cost stream of the Project. The annual costs (both capital and recurring) for each investment, the aggregated annual farm investment and operating costs, and the total for the Project are given in Table III-28. These costs are all converted to economic terms in accordance with the factors discussed earlier in this section. It is noted that the revolving credit funds are returned to the net benefit stream, at their discounted value, during years six, seven and eight as the need for credit phases out. Handling and storage charges are included as negative costs; i.e., net revenues.

Aggregated Economic Benefits

Economic benefits were determined by aggregating the farmgate sales value of crops and livestock for each year in accordance with the settlement rate discussed in Chapter II

Table III-28

Economic Project Investment and Farm Costs
(Thousands of Ethiopian Dollars)

Project Year	Roads	Drainage System	Water Supply	Testing & Extension	Credit & Marketing	Tsetse Fly Control	Project Custom Machinery
0	192	-	68	73	17	-	--
1	197	-	747	230	295	119	173
2	304	-	16	206	344	35	186
3	209	-	12	230	161	32	210
4	22	1112	(16)	261	104	25	296
5	22	1323	(54)	262	(102)	26	234
6	22	49	(55)	253	(429)	23	646
7	22	49	(110)	177	(952)	15	808
8	22	49	(110)	127	(976)	15	509
9	22	49	(110)	97	(448)	15	512
10	22	49	(110)	96	(450)	15	539
11	22	49	(3)	122	(432)	15	483
12	22	49	(110)	91	(450)	15	664
13	22	49	(110)	114	(450)	15	733
14	22	49	(110)	91	(450)	15	564
15	22	49	(110)	91	(450)	15	584
16	22	49	(74)	91	(450)	15	613
17	22	49	(110)	97	(450)	15	517
18	22	49	(110)	91	(450)	15	637
19	22	49	(110)	119	(450)	15	727
20	22	49	(110)	91	(450)	15	540

Table III-28 (continued)

Project Year	Surveys & Mapping	Livestock Health	Public Services	Management & Organization	Technical Assistance	Total Farm Costs	Total Costs
0	126	-	-	49	576	4	1105
1	36	37	144	283	1152	110	3523
2	54	51	170	129	1152	444	3091
3	71	35	170	129	1152	852	3263
4	71	50	170	129	-	1379	3607
5	71	45	170	129	-	1978	4104
6	-	45	144	129	-	2333	3160
7	-	59	156	185	-	2666	3075
8	-	44	170	129	-	2968	2947
9	-	45	180	129	-	3133	3624
10	-	45	192	129	-	3194	3721
11	-	50	192	129	-	3214	3841
12	-	58	192	129	-	3295	3955
13	-	45	192	185	-	3361	4156
14	-	45	192	129	-	3368	3915
15	-	44	192	129	-	3355	3921
16	-	45	192	129	-	3364	3996
17	-	59	192	129	-	3394	3914
18	-	45	192	129	-	3414	4034
19	-	44	192	185	-	3317	4110
20	-	44	192	129	-	3330	3852

and the farm budget analysis presented earlier in this chapter, and subtracting present Project Area production value. The resulting benefit stream is given in Table III-29.

Internal Economic Rate of Return and Benefit-Cost Ratio

Presented in Table III-30 is the basic economic analysis of the Project. Total Project and farm costs are subtracted from gross benefits to arrive at net economic project benefits; this column is the basic economic benefit stream generated by the Project.

The internal economic rate of return from the Project was found by discounting the net benefit stream, and the benefit-cost ratio was computed by discounting the gross benefit and total cost streams at ten percent and dividing. The rate of return is 32 percent, and the benefit-cost ratio is 1.8.

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Table III-29

Gross Project Benefits
(Thousands of Ethiopian Dollars)

Project Year	Farmgate Sales Value	Present Production Value	Gross Project Benefits
0	-	-	-
1	263	8	255
2	948	18	930
3	2035	32	2003
4	3640	55	3585
5	5341	55	5286
6	7404	55	7349
7	9398	55	9343
8	10650	55	10595
9	11203	55	11148
10	11413	55	11358
11	11349	55	11294
12	11357	55	11302
13	11397	55	11342
14	11360	55	11305
15	11361	55	11306
16	11414	55	11359
17	11340	55	11285
18	11366	55	11311
19	11403	55	11348
20	11362	55	11307

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Table III-30

Net Project Benefits,
Internal Economic Rate of Return
and Benefit-Cost Ratio
(Thousands of Ethiopian Dollars)

Project Year	Gross Project Benefits	Total Costs	Net Project Benefits
0	-	1105	(1105)
1	255	3523	(3268)
2	930	3091	(2161)
3	2003	3263	(1260)
4	3585	3607	(22)
5	5286	4104	1182
6	7349	3160	4189
7	9343	3075	6268
8	10595	2947	7648
9	11148	3624	7524
10	11358	3721	7637
11	11294	3841	7453
12	11302	3955	7347
13	11342	4156	7186
14	11305	3915	7390
15	11306	3921	7385
16	11359	3996	7363
17	11285	3914	7371
18	11311	4034	7277
19	11348	4110	7238
20	11307	3852	7455
PW at 10%	52757	28571	24186

NPW at 10% = E$24,186,000 B/C Ratio at 10% = 1.8

IERR = 32%

Lastly, those benefits which cannot be quantified or evaluated in economic or financial terms are briefly discussed.

Following the announcement of the rural land reform proclamation, the underprivileged rural masses (mostly underemployed agricultural laborers, landless peasants, and nomadic herdsmen) expected near-miraculous Government action to settle them on economic size farms. The financial and personnel resources of several ministries (MLRA, MOA and MNCD) have been directed towards early implementation of land reform and settlement objectives to prevent unrest developing among the proposed beneficiaries.

Initiation of implemental activities in the Upper Didesa Project Area and recruitment of Year One settlement candidates from the Jima area, would provide the peasants in Kefa and Ilubabor with visible proof of the Government's intentions. In all, 5,000 families comprising approximately 30,000 people would perhaps for the first time, have sufficient arable land for farming (with salable surplus production), home gardening, and maintenance of a small livestock herd. Government support in terms of extension, credit, public health, education, animal health, road construction, and administrative and technical services would be available to meet their needs.

Experience has shown that a non-farming support and service population roughly equaling the number of agricultural beneficiaries, would be attracted to population centers in the Project Area. The first center, and the headquarters of field operations and settlement activities, would develop near Kolosuri Mountain. Government services, including potable water supply, health, education and police would be provided to this center and other village areas. In time, a second town would be expected to develop in the vicinity of the Didesa River bridge or near the intersection of the Bedele-Nekemte road (Route No. 39) and the proposed Project road net as shown on Figure 19-1. Social services already established at Kolosuri would be extended to this center as required.

By Project Year Seven or Eight, the total population within the valley would probably reach 60,000, all receiving direct and indirect benefits from the Project.

Experience gained during initial organization and management of the settlement component; the tsetse fly control program; the intensive labor construction activities on roads and drainage systems; and provision of the various public services, would provide Ethiopia with a trained cadre of experienced personnel. This cadre could

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expand their knowledge, experience and aptitudes into many areas to be similarly developed in other economically and socially depressed and underpopulated agricultural regions in Ethiopia.

Another unquantifiable social benefit would be the spread effect expected to occur outside the Project boundary occasioned by the proximity of a road network and public services. Likewise, the proposed upgrading of the Kolosuri/Bedele track to rural roads standard would lead to increased economic activity along that route.

As long as the settlers are carefully interviewed and selected and demonstrate a willingness to work together, no social conflicts are expected. The present Project resident farmers (about 250 families) have stated that they have no objections to outsiders being relocated into the Didesa Valley as long as they (the present residents) were given equal opportunity and provided with equal services.

CHAPTER IV

PROPOSED IMPLEMENTATION SCHEDULE

The principal development programs of the proposed Project are shown on Figure 6 with implementation scheduling for Years Zero through Five, the period of heaviest capital investment. The numbered years reflect calendar years; thus, if immediate initiation of pre-settlement activities is considered, Year Zero would commence in January 1976.

The major pre-settlement activities include: 1) mobilization of Project Headquarters staff and expatriate technical assistance; 2) recruitment and training of Year One extension agents; 3) topographic survey and contour map preparation for the entire Project Area; 4) survey and boundary marking for village sites and farm plots for Year One settlers; 5) selection of Year One settlers; 6) recruitment of labor force (which would preferably comprise or include Year One settlers); 7) upgrade access track from Bedele to Kolosuri; 8) lay out and construct project road to Year One settlement area; design the proposed Kolosuri water supply system; 9) construction of temporary structures for Project Headquarters at Kolosuri; and 10) preparation of settler reception center and facilities.

Road construction is scheduled to be carried out during a consecutive four-year period commencing in Year Zero as noted above. Thus, road access would be provided to the proximity of all settlement areas by the beginning of Year Zero. Due to heavy rainfall, the construction period is limited to six months each year (January through April and November-December).

Initiation of settlement and construction of the drainage system on the 8,000 hectares of black vertisols are deferred until Years Five and Four, respectively, in order to: 1) permit time for experimentation and testing on these difficult soils; and 2) postpone the heavy capital expenditures involved in extensive construction activities.

The livestock health program must be fully operational by the latter part of Year One to coincide with the introduction of oxen and other livestock which is planned to occur between the last two months of Year One and the first two months of Year Two.

Credit facilities must be operational by October of Year Zero to extend implement and food credit to Year One settlers during the period November through January.

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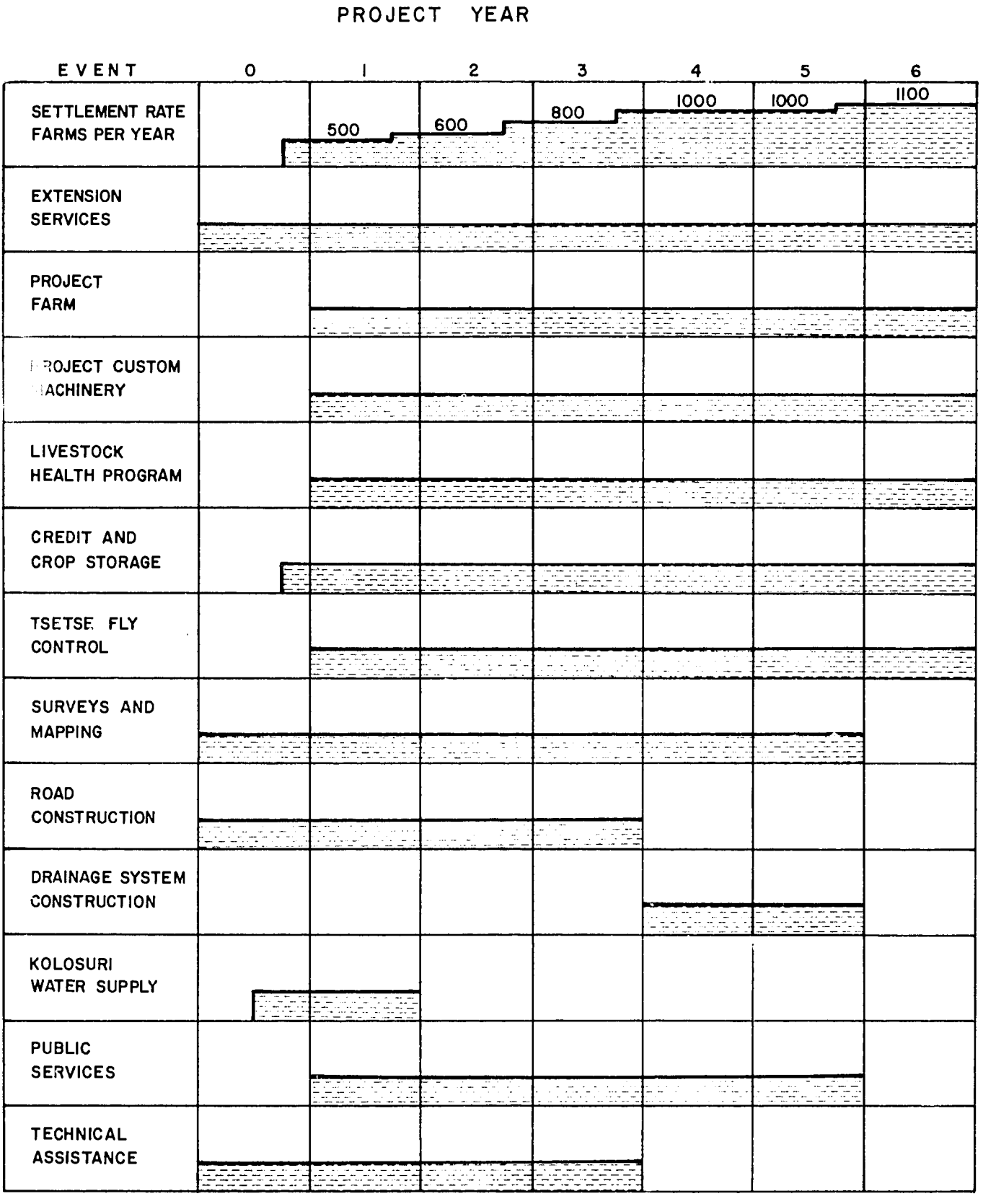

PROPOSED IMPLEMENTATION SCHEDULE FIG. 6

The tsetse fly control program is critical to Project implementation; the proposed buffer zone and tributary clearing and first annual spraying must be completed in Year One. Years Two through Five would be devoted to clearing strips to the Didesa River and annual spraying.

The Kolosuri water supply system for Project Headquarters, the proposed Project Farm (established in Year One), and the expected town development would be installed in Year One.

Capital expenditures on Project custom machinery are scheduled to commence in Year One with the final complement being purchased in Year Seven; however, capital expenditures for replacements would be incurred annually throughout the life of the Project.

Public services are scheduled to be provided commencing in Year One with the establishment of malaria control, one health station and two MFE (minimum formal education) schools. A police sub-station and two MFE schools would be established in Year Two, a second health station and two MFE schools in Year Three, and two MFE schools in each of Years Four and Five.

Table III - 3

Operating Cost Summary
Red/Brown Soil Model Farm

	Model Farm Year				
	1	2	3	4	5
Direct Production Costs					
Maize (E$/ha)	144.42	86.70	104.65	122.10	140.55
Total (E$)	144.42	173.40	209.30	244.20	281.10
Sorghum (E$/ha)	130.30	72.58	90.53	90.53	90.53
Total (E$)	130.30	72.58	90.53	90.53	90.53
Chick Peas (E$/ha)	34.21	34.21	34.21	34.21	34.21
Total (E$)	34.21	68.42	68.42	68.42	68.42
Bags & Hauling (E$)	31.	94.	148.	163.	165.
Total Direct Costs	339.93	408.40	516.25	566.15	605.05
Indirect Costs (E$)	10.	36.	50.	66.	74.
Interest on Production Loan(E$)	28.32	33.76	-	-	-
Total Operating Costs (E$)	378.	478.	566.	632	679.