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# Johor tenggara

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part two  
programme

Federal Land Development Authority

Haring Technical Services Ltd  
Binnie and Partners  
Overseas Development Group  
University of East Anglia  
Shankland Cox Overseas

1971

**THE GOVERNMENT OF MALAYSIA AND THE STATE OF JOHOR**

**JOHOR TENGAH AND TANJONG PENGGERANG  
REGIONAL MASTER PLAN**

**FEASIBILITY STUDIES**

**SUPPORTING VOLUME 6**

**PART II**

**FEDERAL LAND DEVELOPMENT AUTHORITY**

**AUGUST 1971**

**Hunting Technical Services Ltd.**  
**Binrie & Partners • Overseas Development Group • Shankland Cox Overseas**  
**University of East Anglia**

C O N T E N T S

	<u>Page No.</u>
<u>SUPPORTING VOLUME 6      PART 2</u>	
<u>CHAPTER 1      INTRODUCTION</u>	1
1.1 <u>Introduction</u>	1
1.2 <u>Summary of the Project</u>	1
1.3 <u>Use of the Report</u>	1
<u>CHAPTER 2      GENERAL BACKGROUND</u>	2
<u>CHAPTER 3      THE FLDA PROJECT</u>	5
3.1 <u>Introduction</u>	5
3.2 <u>Location</u>	5
3.3 <u>Phasing</u>	6
3.4 <u>Organisation and Cropping</u>	6
<u>CHAPTER 4      THE SETTLERS</u>	8
<u>CHAPTER 5      THE MANAGEMENT</u>	8
5.1 <u>FLDA Regional Management</u>	8
5.2 <u>Overall Regional Management and Co-ordination</u>	9
<u>CHAPTER 6      SCHEME DEVELOPMENT</u>	10
6.1 <u>Agricultural Crop Development</u>	10
6.2 <u>Village Development</u>	10
6.3 <u>Scheme Management</u>	10
6.4 <u>Production and Processing</u>	11
6.5 <u>Summary</u>	12
<u>CHAPTER 7      OUTPUTS</u>	15
<u>CHAPTER 8      BENEFITS AND ECONOMIC JUSTIFICATION</u>	16
8.2 <u>Settler Incomes</u>	16
8.3 <u>FLDA's Cash Flow</u>	18
 <u>A P P E N D I C E S</u>	
<u>APPENDIX A      THE PHYSICAL ENVIRONMENT</u>	20
<u>APPENDIX B      SCHEDULE OF LAND CLEARING AND PLANNING PROGRAMME</u>	21
<u>APPENDIX C      THE SETTLERS</u>	22
1 <u>Age</u>	22
2 <u>Number of Children</u>	22
3 <u>Experience/Capabilities</u>	22
4 <u>Land Ownership</u>	22
5 <u>Education</u>	22
<u>APPENDIX D      AGRICULTURAL DEVELOPMENT : PROGRAMME OF WORK - OIL PALM SCHEME</u>	25
<u>APPENDIX E      FLDA S.E. JOHOR MANAGEMENT REQUIREMENTS</u>	27
<u>APPENDIX F      CROP PROCESSING</u>	28
<u>Oil Palm</u>	28
<u>Rubber</u>	29
<u>APPENDIX G      DEVELOPMENT DISBURSEMENTS</u>	33
<u>APPENDIX H      COSTS</u>	34
<u>APPENDIX I      S.E. JOHOR OIL PALM REVENUES</u>	46
<u>APPENDIX J      MARKET REVIEW FOR RUBBER AND OIL PALM</u>	47
1 <u>Rubber</u>	47
2 <u>Oil Palm</u>	48
<u>Prospects for Oil Palm</u>	49
<u>Prospects for Kernels</u>	54
<u>APPENDIX K      ECONOMIC EVALUATION</u>	55
<u>Infrastructure</u>	55
<u>Processing Facilities</u>	55

APPENDIX L

APPENDIX M

APPENDIX N REFERENCES

T A B L E S

2.1	<u>West Malaysia - Major Exports - 1961-70</u>	3
2.2	<u>West Malaysia - Employment by Industry</u>	4
3.1	<u>Distribution of Land Use in the Project</u>	5
3.2	<u>FLDA Development Programme (Planted Acres) - By Year of Clearing, Unit and Crop</u>	7
6.1	<u>FLDA South East Johor - Summary Project Cost Estimates</u>	13
6.2	<u>Development Disbursements (Million Dollars)</u>	13
6.3	<u>Development Costs Per Settler. Comparison of S.E. Johor and Stage II Jengka Project</u>	14
8.1	<u>Costs, Sales and Cash Flow (Resource Values)</u>	17
8.2	<u>Annual Settler Income Oil Palm and Rubber Schemes, Ten Acres Holdings</u>	17
8.3	<u>FLDA S.E. Johor Estimated Total Expenditure, Receipts and Cash Flow</u>	19
C.1	<u>FLDA Oil Palm Settler - Loan Account</u>	23
C.2	<u>FLDA Rubber Settler - Loan Account</u>	23
F.1	<u>FLDA - S.E. Johor - Oil Palms Yields</u>	30
F.2	<u>FLDA - S.E. Johor - Oil Palm Processing Requirement - Ayer Tawar Area</u>	30
F.3	<u>S. Tanjong Penggerang - Oil Palm Processing Requirements</u>	31
F.4	<u>N.E. Tanjong Penggerang - Oil Palm Processing Requirements</u>	31
F.5	<u>Oil Processing Requirements - S. J. Tengah</u>	32
F.6	<u>Oil Processing Requirements - N. Johor Tengah</u>	32
G.1	<u>Development Disbursements (Thousand Dollars)</u>	33
H.1	<u>Oil Palm Development Costs (Dollars Per Planted Acre)</u>	36
H.2	<u>Rubber Development Costs (Dollars Per Planted Acre)</u>	36
H.3	<u>Oil Palm - Clearing and Planting Cost</u>	37
H.4	<u>Oil Palm - Planting Materials (Thousand Dollars)</u>	37
H.5	<u>Rubber Clearing and Planting Cost</u>	38
H.6	<u>Development Costs - Fertiliser</u>	38
H.7	<u>Payments to Settlers</u>	39
H.8	<u>Field Maintenance Costs (Thousand Dollars)</u>	39
H.9	<u>Standard Costs - Salaries Emoluments, Etc.</u>	40
H.10	<u>Total Management Requirements and Costs</u>	40
H.11	<u>Office Staff - Numbers and Costs</u>	40
H.12	<u>Staff Quarters and Office Building Standard Costs and Construction Time-Table/Scheme</u>	40
7	<u>Estimated Production and Exports of Palm and Other Major Categories of Vegetables, Animal and Marine Fats and Oils with Proportions of Total Average 1960-64 and 1966-68 Annual</u>	53
8	<u>Fats and Oils: World Production by Type, Average 1961-63 and Projections for 1975, Low Assumptions</u>	54
K.1	<u>Total Costs (Resource Prices)</u>	56
K.2	<u>Net Cash Flow (Resource Values) At Three Product Price Levels</u>	57
K.3	<u>Government Tax Revenues Directly Derived From Project (Thousand Dollars)</u>	58
L.1	<u>Oil Palm Settler Ten Acres Holding Income (Dollars)</u>	59
L.2	<u>Rubber Settler - Ten Acres Holding Income (Dollars)</u>	59
L.3	<u>Estimated Settler Income Per Year - Oil Palm and Rubber At Three Price Levels</u>	60
M	<u>Cash Flow (Thousand Dollars)</u>	61

F I G U R E S

INTRODUCTION AND SUMMARY1.1 Introduction

FLDA is seen as the major implementing agency for land development over the first ten years of the Johor Tenggara Masterplan period.

The recommended total area of land on which development is to be initiated to be cleared and settled by FLDA up to the end of 1980 is 139,000 acres of which 76,000 is recommended for the period 1971-1975 and the remainder by 1981. It is possible that further areas may be requested by FLDA after 1980 within the Johor Tenggara boundaries. However, recommendations are not given for specific areas or acreages after 1980 as several other major development areas should have reached the implementation stage by then and FLDA's total role in development will be under constant review.

The total development costs to be borne by FLDA for the 139,000 acres up to 1981 are likely to be \$233 million. Of this some \$135 million is related to the acreage developed on which development is started before 1976.

This feasibility report details the programme for the first five years, i.e. the Second Malaysia Plan period which is seen as the first stage in overall FLDA development activities in Johor Tenggara.

1.2 Summary of the Project

The proposed project, to be carried out by the Federal Land Development Authority (FLDA) comprises the clearing of approximately 73,000 acres of undeveloped land in the south-east of the State of Johor. A total of 56,300 acres of oil palm and 11,900 acres of rubber will be planted. Clearance and planting will be carried out over the period 1971 to 1976 in accordance with the programme outlined. This land will be used to settle approximately 6,800 landless families, in thirteen villages. The schemes will be under the management of FLDA who will be responsible for processing and marketing the products. Loans will be provided by FLDA to settlers before the crops mature at an interest rate of 6½ percent to be repaid over a period of about 15-20 years from the proceeds of the project.

The total development cost to be borne by

FLDA will be \$135 million; in addition other government agencies will be required to bear approximately \$37 million for associated infrastructure. Over the period to 1995 total sales of rubber, palm oil and palm kernels principally for export, are estimated to amount to \$990 million. To the national economy (i.e. using resource prices) the project is estimated to yield a return of 18 percent. It is estimated that receipts of FLDA from loan repayments and processing and distribution charges will be adequate to cover development costs.

This project forms an integral part of the overall development proposals for the South East Johor Region. These are detailed in the Johor Tenggara Master Plan and its Supporting Volumes and provide for the development of a total of 286,000 acres of land for agricultural purposes, establishment of a timber complex to process the utilisable timber from 92,000 acres of (undisturbed forest), development of a tourist resort on the South China Sea Coast and two urban areas in addition to villages for agricultural development. Proposals for conservation areas, infrastructure needs and development phasing are included in the Master Plan.

1.3 Use of the Report

This report assesses the feasibility of the outlined programme of land clearance and development to be carried out by FLDA beginning in 1971. If the report is to be used as a basis for an application for loan financing it is recommended that the following additional information be submitted:-

- (a) A statement of FLDA's current financial positions
- (b) An outline of the Authorities programme for the Second Malaysian Plan period, including this project, indicating loan requirements and sources of funds.
- (c) An indication of the position, at the time of application, with respect to the approval of the Government of the State of Johor for the alienation of the land required.

GENERAL BACKGROUND

The performance of the Malaysian economy over the past decade has been somewhat chequered. The overall rate of growth has averaged 5.8 percent while population growth has been at the rate of 3.1 percent per annum. Per capita income grew at about two percent per year to approximately M\$ 1,000 (U.S. \$330) by the end of the decade. Malaysia is therefore far from being a poor country by world standards, and has (with the exception of the city-state of Singapore) the highest living standards in South and South East Asia.

However, these facts hide a number of less satisfactory features of the period principally arising from export price trends. The economy is an extremely open one by world standards. Over forty percent of its production is exported and import restrictions are few. During the past decade the price of the major export commodity, rubber, has steadily declined, from approximately eighty cents per pound to fifty cents per pound. While price trends for other principal exports have been satisfactory the overall effect on export earnings has been severe, (Table 2.1). That the economy has weathered this storm as well as it has is a tribute to its resilience and adaptability. Nevertheless several major problems have arisen:-

(a) Small rubber producers, many of them Malays, and many with ageing trees with declining production, have seen their real incomes fall dramatically since the nineteen-fifties.

(b) Estate producers, with shrinking revenues from rubber have been forced to reduce their labour forces and have replanted a considerable rubber acreage with oil palms, which are less labour intensive, and new estate development has been discouraged.

Data for 1962 and 1967 (Table 2.2) indicate a decline in employment in the estate agriculture sector. Overall growth in employment was 2.4 percent per annum, 0.2 percent below the rate of growth of the labour force. As a result unemployment rose to 6.7 percent of the labour force. While the decline in rubber prices is expected to have been arrested, the unemployment problem in the immediate future will be intensified by the accelerated growth of the labour force, expected to be at the rate of 3.3 percent per annum.

The problem of the smallholder rubber sector and relative stagnation in the coconut and padi sectors, in which Malays predominate, have

resulted in a deterioration of the relative economic position of the Malay section of the population. Because of the multiracial nature of Malaysian society it is essential for the government to attempt to close this gap without impeding the progress of other racial groups.

In order to meet these objectives of increasing the rate of growth of employment and reducing inter-racial economic disparities, the government aims to increase the rate of growth of the economy. In order to speed up industrial growth, the government is developing a new industrial strategy to be incorporated in the Second Malaysia Plan. This will continue recently initiated moves to improve financial incentives to foreign investors through tax concessions, more effective protection where appropriate and, if necessary, direct government participation in establishing new industries. Offshore mineral prospecting for both tin and oil is being initiated.

However, Malaysia's major, most immediately available resource is land. A preliminary Land Capability Classification has indicated that a total of fifteen million acres are suitable for agricultural use, of which only about six million acres are at present cropped. The remainder is under forest some of which has been logged of commercial timber. It is thought that land development during the First Malaysia Plan period has been at the rate of about 70,000 acres per year. About one half of this has been carried out by the Federal Land Development Authority (FLDA). Private sector development has been discouraged by falling rubber prices, but some development has taken place, partly in private/government joint ventures in oil palm and sugar. Smallholder development has continued mainly in rubber.

During the Second Malaysia Plan period it is proposed to speed up the rate of land development to at least 120,000 acres per year. FLDA will continue to have a predominant role in land development. In addition to improving the relative economic position of the rural, predominantly Malay population, the government plans to encourage the creation of new enterprises as well as the main crops of rubber and oil palm and to pursue research and development efforts in production and marketing of alternative products. To this end the Malaysian

TABLE 2.1 West Malaysia - Major Exports - 1961-70

	1961 <sup>+</sup>	1963 <sup>+</sup>	1965 <sup>+</sup>	1966	1967	1968	1969	1970
<u>RUBBER</u>								
Volume <sup>1</sup>	861	908	951	940	975	1105	1265	1271
Value <sup>2</sup>	1567	1476	1462	1396	1216	1301	1940	1663
Unit Price <sup>3</sup>	81	73	69	66	56	53	69	58
<u>TIN</u>								
Volume	75	85	74	72	74	87	90	91
Value	553	642	872	792	756	830	940	1013
Unit Price	7414	7539	11797	10943	10154	9563	10307	11135
<u>ROUND TIMBER</u>								
Volume	1816	2551	3355	777	816	941	1041	1144
Value	135	204	262	43	59	76	86	98
Unit Price	74	80	78	56	72	81	82	86
<u>SAWN TIMBER</u>								
Volume	318	380	521	345	409	565	612	730
Value	51	64	95	56	70	106	123	150
Unit Price	159	168	183	162	172	188	200	206
<u>IRON ORE</u>								
Volume	6435	6582	6634	5681	5246	5107	5262	4778
Value	164	176	161	136	122	111	116	107
Unit Price	26	27	24	24	23	22	22	22
<u>PALM OIL</u>								
Volume	93	115	141	178	177	264	326	358
Value	61	69	107	118	111	117	142	240
Unit Price	655	600	761	662	625	443	439	620
<u>PALM KERNEL</u>								
Volume	21	20	19	23	23	32	34	22
Value	7	7	9	9	9	14	12	9
Unit Price	341	374	468	404	376	443	355	400
Total Major Exports	2538	2638	2968	2550	2343	2555	3359	3280
Other Exports	700	692	815	569	575	648	702	899
Total Exports	3238	3330	3783	3119	2918	3203	4061	4179

<sup>1</sup> Volume figures are in thousands of tons, <sup>2</sup> value figures are in millions of Malaysian dollars and, <sup>3</sup> unit price figures represent f.o.b. unit values in Malaysian dollars per ton, except that rubber prices are in Malaysian cents per pound.

Represents the value of imports of rubber, tin, round timber, sawn timber, palm oil and palm kernels when valued at Malaysian export prices f.o.b. Petroleum imported from Brunei and re-exported to Singapore is also included.

+ Includes East Malaysia.

TABLE 2.2 West Malaysia - Employment By Industry  
(In Thousands)

	1962	1967	Percent per Annum	Increment	Contribution to Total Increment
Agriculture <u>a/</u> (non-perennial)	567	638	2.4	71	22.2
Estate Agriculture (Rubber Estates)	815 (286)	799 (232)	-0.4 (-4.1)	-16 (-54)	-5.0 (-16.9)
Mining	50	69	6.7	19	5.9
Manufacturing	170	211	4.4	41	12.8
Construction	56	67	3.7	11	3.4
Public Utilities	98	115	3.3	17	5.3
Trade	331	389	3.3	58	18.1
Government Services	149	207	6.8	58	18.1
Others	213	273	4.3	60	18.7
	<u>2,479</u>	<u>2,799</u>	<u>2.4</u>	<u>320</u>	<u>100.0</u>

a/ Excludes rubber, oil palm and coconut.

Source: EPU. "The Employment Problem in West Malaysia, 1962-1975", July 1969.

Agricultural Research and Development Institute, (MARDI) has been established. Improvement in productivity in existing smallholder production areas through improved extension, marketing and credit services is being pursued through the medium of Farmers Associations set up by the Ministry of Agriculture.

The major immediate thrust in creating employment and raising output will be through increased land development. Areas for possible major land development projects have been identified from the Land Capability Classification based on reconnaissance survey. Two initial areas, South East Johor and South East have been the subject of detailed survey for the purpose of preparation of regional master plans. The South-East Johor Master Plan, of which this study is a part forms the first of these.

THE FLDA PROJECT3.1 Introduction

The gross area covered by the Johor Tenggara Master Plan is approximately 740,000 acres. It is located to the east and north of Johor Baharu, at a minimum distance of twenty-five miles, (Figure 3.1). The breakdown of this area is shown in Table 3.1

TABLE 3.1 Distribution of Land Use In The Project

<u>Use</u>	<u>Area</u>	<u>Gross acres</u>
Total area		742,200
of which		
Land already alienated		212,500
Excluded land (swamps, regular flooding inaccessible etc.)	81,500	
Forest land above 20° slope	74,100	
Reserved land	45,500	
Water catchments and urban development	47,100	248,200
Land available for agriculture		281,500

478,500 acres are at present unalienated or not subject to special restrictions for example Orang Asli reserves, and of this area, 287,500 or approximately sixty percent is included in agricultural development planning.

The physical environment of the Project Area is described in Appendix A. The climatic conditions in this part of Malaysia are extremely uniform throughout the year. Total rainfall is generally 100 inches or above per year and there are no marked dry seasons although dry periods are more likely in February and July than at other times of the year. The area is situated between 1° 15' and 2° 15' degrees north of the equator, thus day length variations are minimal (about half an hour/day during the year). Details of the climate and of the soils and terrain surveys of the South East Johor Project area are given in Supporting Volume 2 Parts 1 and 3 to the Master Plan.

While as noted earlier, the Government wishes to put greater emphasis on diversification it has been recommended that the FLDA development programme in the Second Malaysian Plan period confine itself to rubber and oil palm. This is because of the risks and management problems involved, at this time in establishing settlement schemes relying on activities such as tapioca, dairying, cocoa or annual crops and because rubber and oil palms are both enterprises

proven within the FLDA settlement organisation. However, in subsequent plan periods a wider range of activities could possibly be considered. Factors influencing this enterprise selection and recommendations for research are discussed in detail in Part I of this volume.

3.2 Location

The Project Area, as noted earlier, contains some 285,000 acres of land suitable for agricultural development. However, not all of this area is immediately available for development.

(a) Approximately 72,000 acres of land in Johor Tengah suitable for agricultural use is covered by unlogged forest reserve. The Master Plan proposes that this area be logged to a central timber complex to be built in the area. It is proposed that logging proceed at approximately 6,000 acres per year, beginning in 1975. In addition approximately 27,000 acres in Johor Tengah is in other unlogged areas or is covered by logging agreements between the State Government and private loggers. Most of these agreements are not due to terminate until 1980.

(b) The Master Plan has recommended that certain river-beds in the area be prospected for tin immediately. Mineral clearance will therefore be withheld from an area up to one quarter mile on either side of the stream bed, until prospecting is completed.

The location of the areas subject to these constraints is shown in Figures 3.1 and 3.2. The choice of areas for FLDA development was influenced by the following factors:-

(a) the desire to avoid large areas of broken country with slopes of greater than twelve degrees. Because of the difficulty of uniformly subdividing such areas they are less suitable for FLDA type settlement.

(b) the need to create schemes of an acceptable size. As far as possible single units of less than 4,000 acres were avoided, as were isolated or fragmented units.

(c) the desire to avoid excessively large contiguous areas under FLDA development, that is to intermix schemes of the FLDA type with other forms of development. This is aimed at providing employment opportunities for dependants of settlers on the major schemes, and to provide some diversity of development form and economic opportunities.

FIGURE 3

DEVELOPMENT PROPOSALS  
& CONSTRAINTS

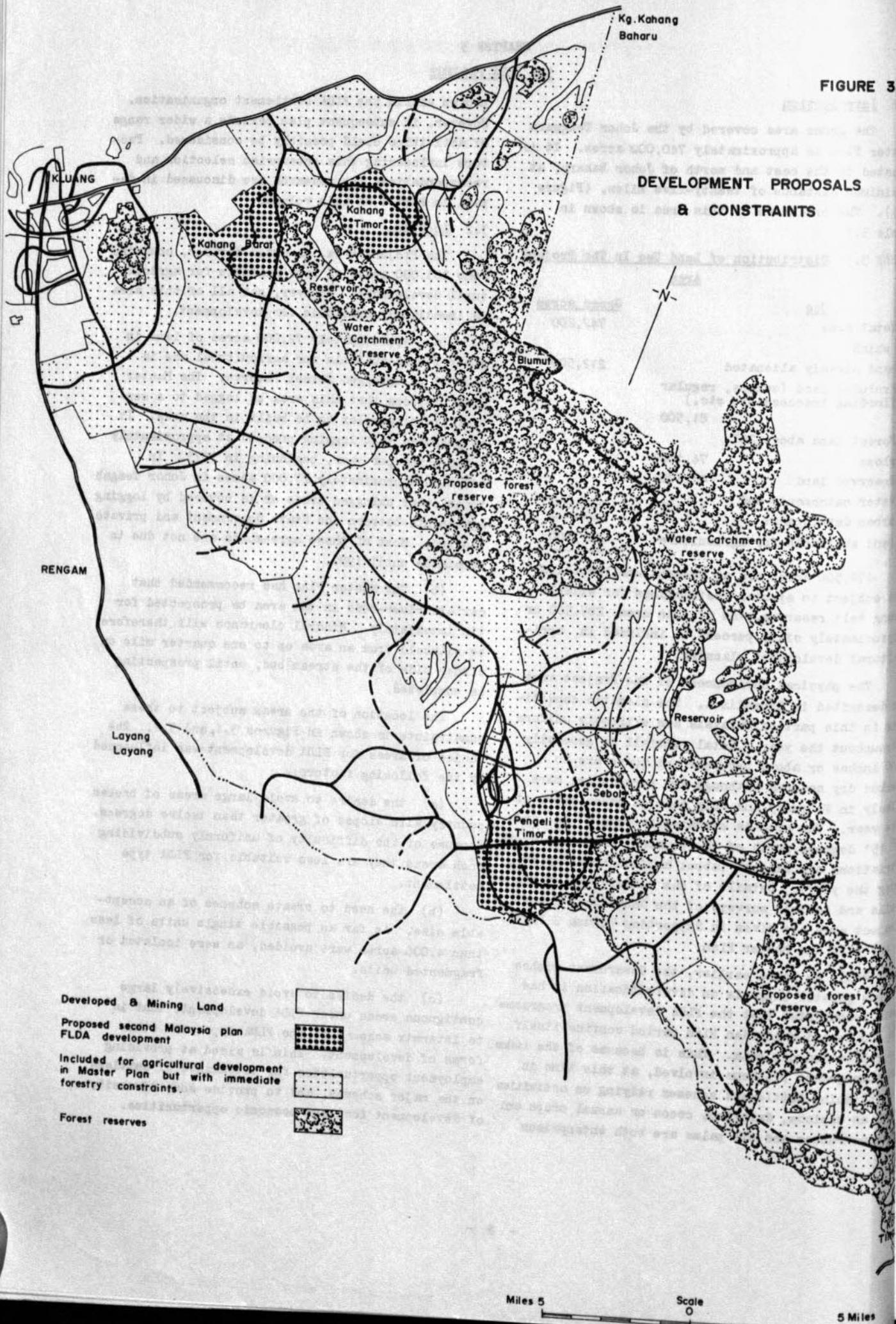
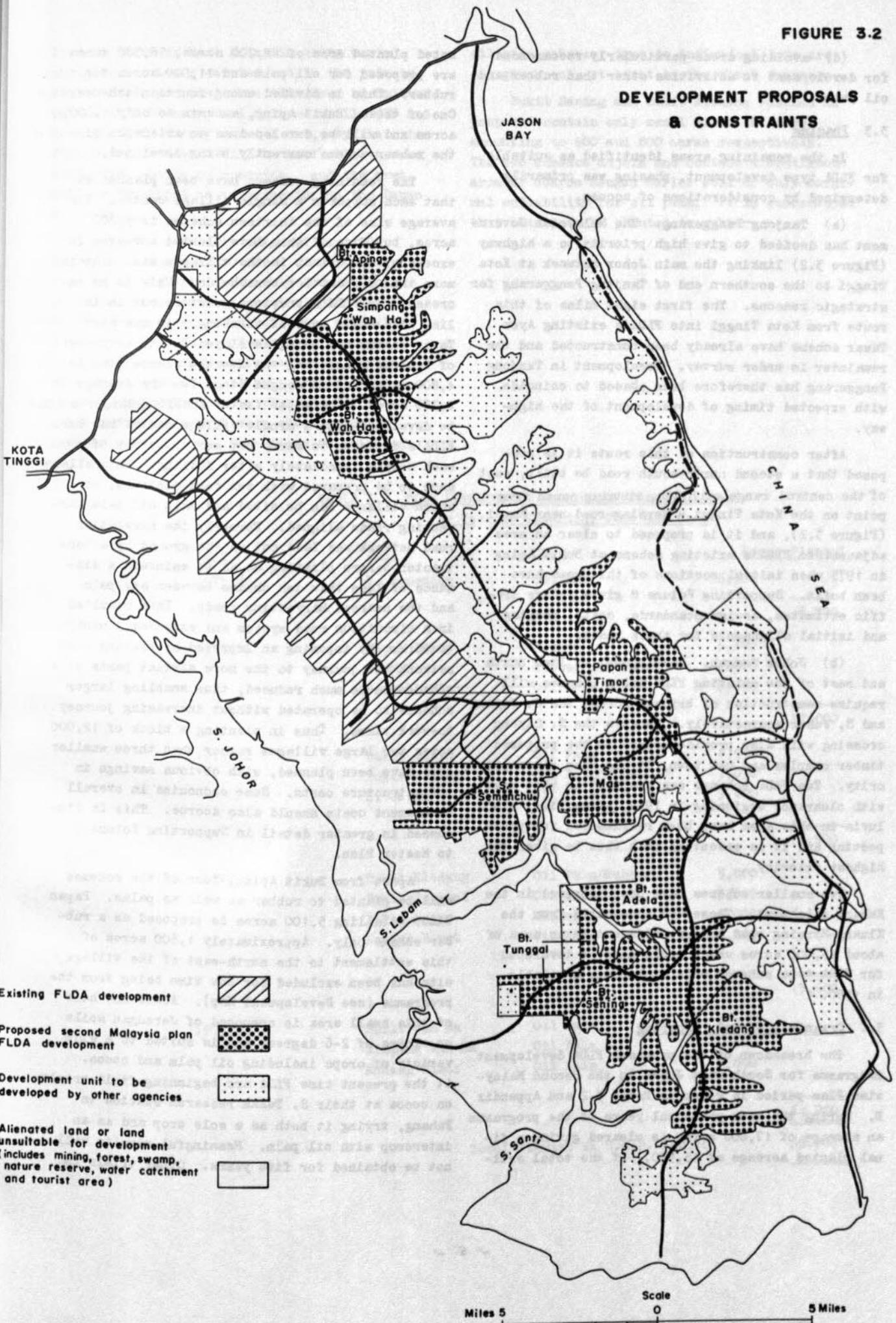
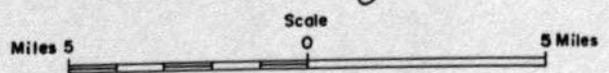


FIGURE 3.2

### DEVELOPMENT PROPOSALS & CONSTRAINTS



- Existing FLDA development 
- Proposed second Malaysia plan FLDA development 
- Development unit to be developed by other agencies 
- Alienated land or land unsuitable for development (includes mining, forest, swamp, nature reserve, water catchment and tourist area) 



(d) avoiding areas particularly recommended for development to activities other than rubber and oil palm.

### 3.3 Phasing

In the remaining areas identified as suitable for FLDA type development, phasing was primarily determined by considerations of access.

(a) **Tanjong Penggerang.** The Malaysian Government has decided to give high priority to a highway (Figure 3.2) linking the main Johor network at Kota Tinggi to the southern end of Tanjong Penggerang for strategic reasons. The first eight miles of this route from Kota Tinggi into FLDA's existing Ayer Tawar scheme have already been constructed and the remainder is under survey. Development in Tanjong Penggerang has therefore been phased to coincide with expected timing of development of the highway.

After construction of this route it is proposed that a second north-south road be built, east of the central range of hills, running south from a point on the Kota Tinggi - Mersing road near Mawai (Figure 3.2), and it is proposed to clear an area adjacent to FLDA's existing scheme at Bukit Aping in 1975 when initial sections of this road have been built. Supporting Volume 8 gives future traffic estimates, design standards, costs, phasing and initial alignments for these roads.

(b) **Johor Tengah.** Development of land north and east of the existing FLDA Kulai schemes will require construction of bridges across the S. Sayong and S. Johor respectively. Because the S. Sayong crossing will also provide access to the proposed timber complex and new town, it has been given priority. Two FLDA schemes are proposed in this area with clearance beginning in 1972. Some river alluvia in this area have been recommended for prospecting and it is essential that this be given the highest priority.

Two smaller schemes have been proposed in the Kahang catchment. These are accessible from the Kluang-Mersing road and are adjacent to an area of about 15,000 acres which could also be developed for FLDA type schemes when it becomes available in 1980.

### 3.4 Organisation and cropping

The breakdown of the proposed FLDA development programme for South East Johor in the Second Malaysian Plan period is given in Table 3.2 and Appendix B. During the four principal years of the programme an average of 17,800 acres is cleared giving a final planted acreage of 15,500. Of the total esti-

mated planted area of 68,200 acres, 56,300 acres are proposed for oil palm and 11,900 acres for rubber. This is divided among fourteen schemes. One of these, Bukit Aping, amounts to only 1,000 acres and will be developed as an extension to the rubber scheme currently being developed.

The remaining schemes have been planned so that each supports a single village centre. The average size of the thirteen schemes is 5,200 acres, but five of them have planted acreages in excess of 6,000; that is the villages will contain more than 600 settler households. This is an increase over FLDA's previous practice but is in line with their current thinking. In the Ayer Tawar scheme now being developed in the north-west of Tanjong Penggerang the average scheme size is 4,800 acres and in Jengka Stage Two the average is 4,370 acres. The major factor enabling larger schemes to be developed with a single village centre has been FLDA's decision to carry out aerial survey of each scheme immediately after felling. This allows maps to be prepared with ten foot contours, on which villages can be sited and main oil palm harvesting roads aligned. Formerly the harvesting road network was laid out on the ground by a contractor before planting so as to maintain a distance of less than ten chains between any palm and the nearest harvesting roads. This resulted in a circuitous road system and extended journeys to work. By imposing an improved harvesting road network the journey to the more distant parts of a scheme can be much reduced, thus enabling larger schemes to be operated without increasing journey to-work times. Thus in planting a block of 12,000 acres two large villages rather than three smaller ones have been planned, with obvious savings in infrastructure costs. Some economies in overall management costs should also accrue. This is discussed in greater detail in Supporting Volume 8 to Master Plan.

Apart from Bukit Aping, four of the schemes will be planted to rubber as well as palms. Papan Timor totalling 5,100 acres is proposed as a rubber scheme only. Approximately 1,600 acres of this settlement to the north-east of the village site has been excluded for the time being from the programme (see Development Map). About one half of this small area is composed of Jerangau soils on slopes of 2-6 degrees and is suited to a wide variety of crops including oil palm and cocoa. At the present time FLDA are beginning field trials on cocoa at their S. Tekam research station in Pahang, trying it both as a sole crop and as an intercrop with oil palm. Meaningful results will not be obtained for five years. Other trials in

different parts of West Malaysia using varied techniques are being carried out by the private sector. It is proposed that this area be omitted from the 1972 clearing and delayed until 1976 and a detailed soil survey carried out. By that time sufficient information will be available to make a definitive choice of cropping, and the area should be developed as an extension to the Papan Timor scheme.

The S. Mas scheme is proposed as 4,100 acres of rubber and 2,200 acres of oil palm. The soils of the area are highly complex and much of the area contains shallow soils unsuitable or only marginally suitable for oil palm. The north-western third of the unit however, is comprised of deeper soils mainly on gentle slopes, well suited to oil palm and it is recommended that this crop be planted. It is further recommended that this mixed cropping scheme be run along the same lines as existing

oil palm schemes, that is individual lots are not given out, at least in the first instance.

Bukit Sening and Bukit Kledang schemes as proposed contain only small areas of rubber amounting to 900 and 800 acres respectively. The two schemes adjoin and contain a contiguous area of coarse Rengam Series soil of only marginal suitability for oil palm. It is recommended that this area be planted to rubber.

TABLE 3.2 FLIDA Development Programme (Planted Acres)  
By Year of Clearing, Unit and Crop

<u>Year</u>	<u>Unit</u>	<u>Crop</u>	<u>Acres Planted</u>
1971/72	S. Semenchu	Oil Palm	6,900
			<hr/> 6,900
1972/73	Papan Timor	Rubber	5,100
	S. Mas	Rubber/Oil Palm	6,300
	Pengeli Timor	Oil Palm	5,600
			<hr/> 17,000
1973/74	Bukit Adela	Oil Palm	4,900
	Bukit Sening	Oil Palm/Rubber	7,000
	S. Sebol	Oil Palm	3,600
			<hr/> 15,500
1974/75	Bukit Kledang	Oil Palm/Rubber	5,800
	Bukit Tunggal	Oil Palm	3,000
	Bukit Aping	Rubber	1,000
	Kahang Barat	Oil Palm	3,800
			<hr/> 13,600
1975/76	Bukit Wah Ha	Oil Palm	5,700
	Simpang Wah Ha	Oil Palm	5,500
	Kahang Timor	Oil Palm	4,000
			<hr/> 15,200
			<hr/> 68,200
Total Started in S.M.P. Period			

THE SETTLERS

The primary aim of FLDA is to develop the land resources of Malaysia and to assist those with little or no land to develop land on their own behalf or to obtain a share in its ownership. Settlers are selected on the basis of a point system (Appendix C). The minimum qualifications require a candidate to be a married, male, Malaysian citizen between the ages of eighteen and thirty-five, without a criminal record and owning less than two acres of land. Applications already received by FLDA for schemes currently being developed at Ayer Tawar suggest that the typical settler will be a Malay aged between twenty-five and thirty at entry and have two children. Data from the Malaysian Socio-Economic Survey of 1967/68 have been used to project population growth in schemes to 1990 (Master Plan Supporting Volume 8). At the same time the number of school children, and the labour force available for work in other than basic agricultural activities on schemes have been estimated. Because of the relatively young nature of the population, growth of the labour force is not rapid until about ten years after settlement. This trend is exacerbated on oil palm schemes by the fall in labour requirements as maintenance needs fall when the palms are mature. These trends are likely to give rise to a substantial future employment problem.

Attempts have been made to alleviate this problem in Master Planning by mixing some development by other agencies which can employ settlers' dependents, at least in part. In Tanjong Penggerang the growth of the regional town serving the potential resort area will be such as to provide a major source of employment, provided the tourist developments grow as predicted. It is anticipated that urban growth in the Johor Baharu and Kluang region will be rapid (Master Plan Supporting Volume 8). Employment opportunities in these centres and also perhaps at Kota Tinggi should be adequate to prevent a major unemployment problem emerging on FLDA schemes in South East Johor.

In total about 6,800 settler families will benefit from the programme. At an expected family size of six about ten years after settlement, about 42,000 people will be supported primarily by FLDA agricultural development.

Details of current organisation of schemes are given in Appendix C together with settler accounts during the immature period. Possible developments of organisational patterns on FLDA schemes are discussed in Supporting Report 4 to the Master Plan.

## CHAPTER 5

THE MANAGEMENT5.1 FLDA Regional Management

The South Johor Region of FLDA covers at present some eighteen land development schemes, nine rubber and nine oil palm, totalling 78,500 acres. Including areas now being developed and those included in this study, this will expand to 167,000 acres by the end of 1975, and to about 250,000 acres by 1980 if FLDA's tentative target of 15,000 acres per year in the region is met. The size of this operation is put into perspective when compared to FLDA's total acreage in 1969 of 257,000.

At present the region is run by a regional secretary working from Johor Baharu. A Senior Planting Officer is responsible for technical matters in the region and deals directly with head office in Kuala Lumpur. A Settler Development Officer fulfils a similar role with respect to settler problems. In addition Area Managers

oversee 3-5 schemes. This latter is mainly a result of a shortage of senior manager staff in FLDA.

Clearly the current regional staff will be unable to implement the expected expansion of operations in South Johor. FLDA plans to construct a new regional office in Johor Baharu and to staff it along the lines of the Jengka Development Division. The organisation for this division as it might apply to South Johor is shown in Figure 5.1. Because of the future size of the region a fairly high degree of decentralization will be both necessary and appropriate. This could extend to regional accounts and planning departments in addition to those included in Jengka. In addition the Palm Oil Bulking facility at Pasir Gudang will probably be managed from Johor Baharu. Because of the relative compactness of the South Johor

region and the interdependence which will develop between the schemes, particularly in terms of processing facilities, it is important that the region continue to be treated as a unit and not split into sub-units depending on phasing or funding.

In estimating costs associated with the development programme included in this study headquarters costs have been taken pro-rata (see Appendix H). In practice they will be shared between Kuala Lumpur and Johor Baharu. Because of the potential size of the South Johor region it is suggested that some of the functions at present performed at headquarters be carried out in Johor. The necessary strengthening of the staff in Johor should be made in the near future before the present staff is overwhelmed by the administrative burdens.

## 5.2 Overall Regional Management and Co-ordination.

It has been recommended that a Development Authority be established as soon as possible to take overall responsibility for implementation of the Master Plan for Johor Tenggara, of which this project forms part.

The recommended Authority is in the form of a State Development Corporation with a Policy Board whose Chairman is the Menteri Besar or appointed by the Menteri Besar and whose members are appointed by State and Federal Governments. The Prime Minister or his designate may give directions to the Authority, approve its budgets and provide Federal finance. The chief executive and senior staff are to be appointed by the State Government with Federal concurrence.

The functions of this organisation are to initiate, expedite and coordinate action; to monitor and evaluate progress and continue comprehensive forward planning of implementation, identifying present and prospective bottlenecks and designating measures to remove or avoid them; to formulate policy for future development; to ensure execution by outside contract or directly where other agencies cannot meet requirements on time or where no agency exists to perform the required tasks.

It is recommended that this Authority be responsible for implementation, by outside contract, of the road construction and other construction programmes in the Project Area in 1971-75 and that technical staff be recruited if necessary outside Malaysia to arrange and supervise this programme.

In general the Authority is intended to be responsible for ensuring that activities on which the rate of agricultural development depends (for example, mineral prospecting) go ahead according to schedule.

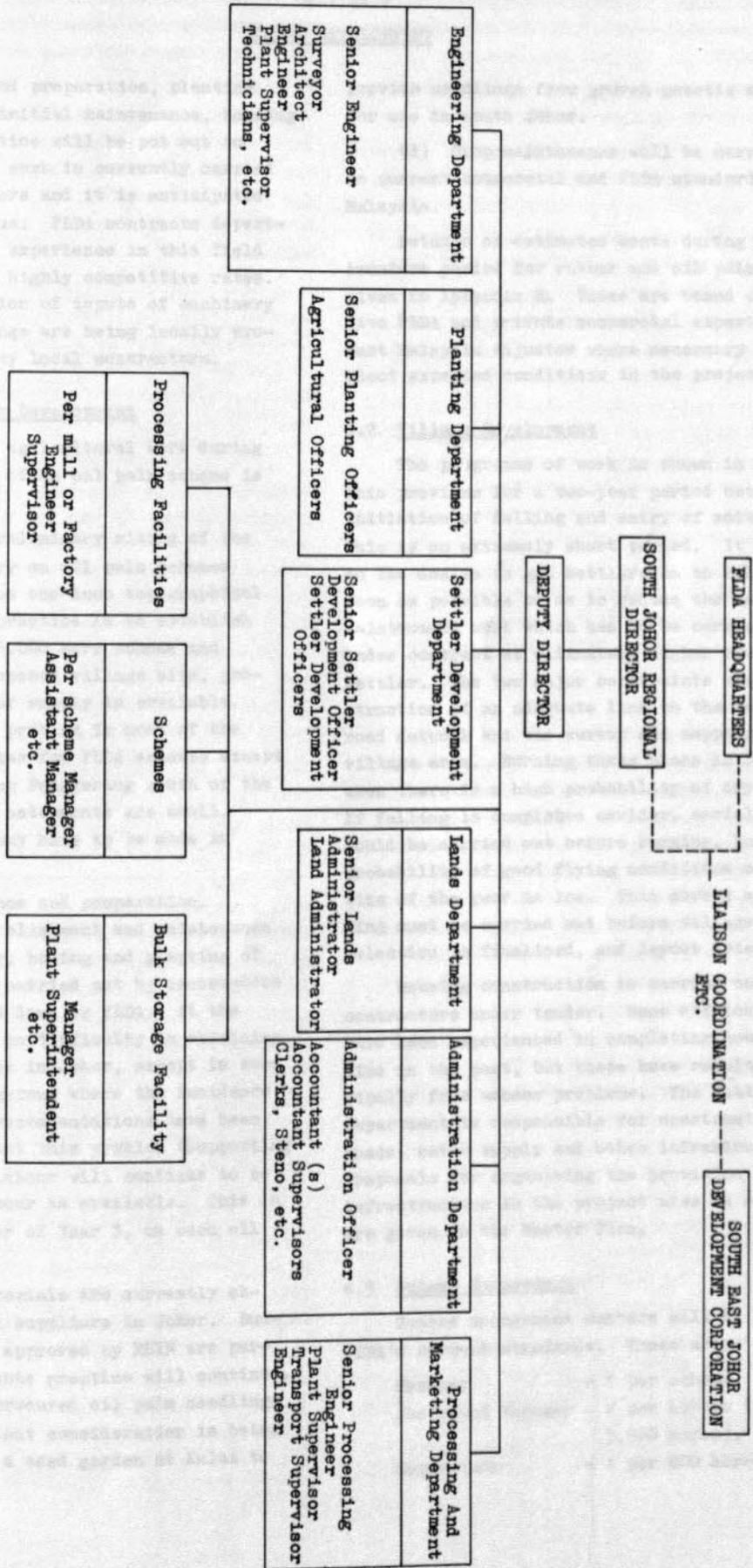
The recommended staff of the Authority also includes an architect-planner who will work in close cooperation with the State Development of Town and Country Planning. He will prepare plans for villages, including FLDA villages, and supervise work on site.

In carrying its functions the Authority will work closely with the major implementing agencies and, in particular, with FLDA's regional organisation for South Johor and FLDA Headquarters.

Further details of the recommended Authority are given in the Master Plan Report Chapter 8 and Supporting Volume 9.

FIGURE 5.1

FIDA - S. JOHOR REGION: ORGANISATION CHART



SCHEME DEVELOPMENT

Land clearance and preparation, planting materials, planting, initial maintenance, housing and processing facilities will be put out to tender. Most of this work is currently carried out by local contractors and it is anticipated that this will continue. FLDA contracts department has considerable experience in this field and is able to obtain highly competitive rates. An increasing proportion of inputs of machinery and non-timber buildings are being locally produced and fabricated by local contractors.

6.1 Agricultural Crop Development

The programme of agricultural work during the first three years of an oil palm scheme is shown in Appendix D.

(a) Nursery. Preliminary siting of the pre-nursery and nursery on oil palm schemes can be carried out from one-inch topographical sheets. Normal FLDA practice is to establish a nursery for each 5-6,000 acre scheme and locate this on the proposed village site, provided an adequate water supply is available. This should create no problem in most of the identified village sites for FLDA schemes except in that part of Tanjong Penggerang south of the S. Lebam, where river catchments are small. Special arrangements may have to be made in this area.

(b) Land clearance and preparation. Felling, burning, establishment and maintenance of cover crops, lining, holing and planting of the main crop will be carried out by contractors to specifications laid down by FLDA. At the present time there is no difficulty in obtaining labour for this purpose in Johor, except in some parts of Tanjong Penggerang where the incidence of malaria is high. Recommendations have been made for steps to combat this problem (Supporting Volume 4). Contract labour will continue to be used until settler labour is available. This is scheduled to be October of Year 3, on each oil palm scheme.

(c) Planting materials are currently obtained from commercial suppliers in Johor. Budded rubber seedlings, approved by RRIM are purchased by tender and this practice will continue. In the past FLDA has procured oil palm seedlings in the same way. Present consideration is being given to establishing a seed garden at Kulai to

provide seedlings from proven genetic material for use in south Johor.

(d) Crop maintenance will be carried out to current commercial and FLDA standards in Malaysia.

Details of estimated costs during the immature period for rubber and oil palm are given in Appendix H. These are based on extensive FLDA and private commercial experience in West Malaysia adjusted where necessary to reflect expected conditions in the project area.

6.2 Village Development

The programme of work is shown in Appendix D. This provides for a two-year period between initiation of felling and entry of settlers. This is an extremely short period. It is based on the desire to get settlers on to schemes as soon as possible so as to reduce the amount of maintenance work which has to be carried out under contract at ultimately higher cost to the settler. The two major constraints are the construction of an adequate link to the regional road network and the survey and mapping of the village area. Burning takes place in February when there is a high probability of dry weather. If felling is completed earlier, aerial survey could be carried out before burning, but the probability of good flying conditions at this time of the year is low. This survey and mapping must be carried out before village site selection is finalised, and layout determined.

Housing construction is carried out by contractors under tender. Some difficulties have been experienced in completing houses on time in the past, but these have resulted principally from access problems. The Public Works Department is responsible for construction of roads, water supply and other infrastructure. Proposals for organising the provision of this infrastructure in the project area as a whole are given in the Master Plan.

6.3 Scheme Management

Scheme management numbers will be based on FLDA's current standards. These are:-

Manager	- 1 per scheme.
Assistant Manager	- 2 per scheme (over 3,500 acres).
Supervisor	- 1 per 800 acres.

Field Assistant - 1 per 400 acres.  
Settler Development- 2 per scheme (one male  
Assistant - and one female).

Details of numbers required in the different positions are given in Appendix E.

It is assumed that management will be provided at this level throughout the life of the project. In practice, when the crop is fully matured the scheme well established and settlers are familiar with required practices it may be possible to reduce the total management input.

During the period 1972-77 the South East Johor programme will require 174 field assistants and 87 field supervisors or approximately thirty and fifteen per year respectively excluding wastage. If FLDA development in South Johor continues at the rate of 15,000 acres per year until the end of 1980, requirements will increase at this rate throughout. Field assistants are usually recruited from School Certificate holders and are given one year's training in schemes and FLDA training centres. In view of the prospective requirements in S. Johor it is recommended that FLDA establish a third training centre in the region.

#### 6.4 Production and Processing

Expected yields from oil palm and rubber from 1972 plantings are given in Appendix F. These are based upon FLDA and current estate performance and results from Rubber Research Institute field trials. Over the past ten years considerable progress has been made in improving the yield potential of both crops. Rubber clones at present under field trial have yielded 3,000 pound dry rubber per acre and these should be available for general release towards the end of the current decade. In estimating total yields it has been assumed that the expected yield curve will increase by four percent in each succeeding year. Considerable progress has also been made with yield stimulants and ethrel in particular has been shown to increase yield dramatically. Long term effects of using such stimulants are not known, but they may inhibit growth of the tree if used in the early years of tapping (up to about the 10th year). Possible yield effects of such stimulants have therefore not been considered.

Increases in yield potential are also expected from oil palm and it has been assumed that successive plantings will increase in yield by two percent per annum. Part of this increase will probably be in the form of increased oil

percentage in the fruit. Techniques to raise yields in the first harvesting years are also likely but this effect has not been allowed for directly.

Oil palm annual production from the project at its peak is expected to amount to about 124,000 tons of oil and 25,000 tons of kernels, and that of rubber 10,000 tons. Virtually all of this production will be sold in export markets.

Total output of oil palm fresh fruit bunches (FFB) are given in Appendix F. Processing mills will be constructed by FLDA to handle the requirements of these schemes. The location and phasing of mill requirements is shown in the same Appendix.

The total installed capacity proposed is approximately five percent below aggregate expected peak monthly yield. With the development of the proposed schemes, FLDA will have a total of 105,000 acres of oil palm in South Johor handled through eight mills. The probability of production on the entire acreage being at its annual peak at the same time is not known, but is expected to be very small. At periods of peak production some switching of fruit among the various mills may be necessary.

FLDA is constructing bulk oil storage facilities at the new port being developed at Pasir Gudang, fifteen miles east of Johor Baharu. Oil from existing and proposed developments in Johor will be exported from this facility. It will have an initial capacity of 8,000 tons in 1973. Provisional plans envisage a capacity of 16,000 tons by 1975. The site could ultimately accommodate a capacity of 50,000 tons, but developments will depend upon trends in size of overseas consignments and experience on relative merits of storage at port or at mill.

Proposed rubber development is confined to Tanjong Penggerang. Together with the 12,000 acres proposed FLDA is currently developing 3,000 acres at Pasak (some now mature) and 13,000 acres at Bukit Aping, both in the northern part of the peninsula. A processing facility could be constructed in Tanjong Penggerang to cater for this acreage. However, FLDA has an additional 17,000 acres in South Johor already developed with rubber. Some of this acreage is being tapped and the crop is being processed by private sector rubber factories. The overall problem of rubber processing for these schemes is currently being reviewed. A single factory may be recom-

mended to handle the entire output from South Johor. No specific provision has therefore been made in this feasibility study for rubber processing facilities. approximately \$28 million or 16.4 percent of total project cost.

6.5 Summary

Total development costs for the FLDA project over the full period of development are estimated at \$171.7 million. These costs are summarised in Table 6.1 and shown by year in Table 6.2. A detailed breakdown of cost estimates is given in Appendices G and H. Of the total cost, \$135.1 million will be met by FLDA and the remaining \$36.6 million by other government agencies.

Table 6.3 expresses the total cost per settler for each of the broad heads and compares these costs with those estimated for Stage 2 of the Jengka Triangle Project. The gross cost per settler family (\$25,175) in the present study is about one percent lower than the Jengka estimates.

The two major cost items which are higher are crop processing facilities and water supplies. This project contains over eighty percent of oil palms compared to less than sixty percent in Jengka and this crop requires much more expensive processing facilities than rubber. In addition assumed capacities allow for two of the mills to be expanded to approximately double their initial capacity to cater for subsequent development. The full first phase costs have been included in the estimates for this project. Water costs in South East Johor are high because of proposed provision of main supply to all villages and because of the need to construct a dam in Tanjong Penggerang to ensure adequate supplies (see Supporting Volume 3). The FLDA project has been charged with part of this dam cost.

Offsetting these higher costs are lower agricultural development and social infrastructure costs. The shorter gestation period of oil palm accounts for the former and the larger village size for the latter.

Foreign exchange costs will arise principally in provision of machinery for oil palm mills, water treatment equipment and agricultural fertilisers. With the growth of the oil palm industry there has been an increasing tendency to fabricate some of the required equipment in Malaysia. However, in the foreseeable future specialised machinery such as boilers, turbines, steam engines, presses and centrifuges will have to be imported and these are usually about fifty percent of final cost. Total foreign exchange costs are estimated at

TABLE 6.1 FLDA South East Johor  
Summary Project Cost Estimates

Item	Cost		Percent Foreign Exchange
	Million Malaysia Dollars	Million U.S. Dollars	
<u>FLDA</u>			
Agricultural Development	72.6	23.7	11.3
Settlers Housing	10.9	3.6	-
Processing Facilities	27.7	9.1	50.0
Scheme Management	14.8	4.8	14.1
Headquarters Costs	9.1	3.0	-
Sub-Total	<u>135.1</u>	<u>44.2</u>	<u>17.9</u>
<u>GOVERNMENT</u>			
Roads and Water	26.4	8.6	15.2
Social Infrastructure	10.1	3.3	-
Sub-Total	<u>36.6</u>	<u>12.0</u>	<u>10.9</u>
TOTAL	171.7	56.1	16.4

TABLE 6.2 FLDA South East Johor - Development Disbursements (Million \$)

Year	Agricultural Development	Settler Housing	Processing Facilities	Management	Total FLDA Expenditure	Other Development Expenditure	Total Government and FLDA
1971	0.5	+	-	0.6	1.2	+	1.2
1972	3.9	0.1	-	1.1	5.1	0.9	6.0
1973	8.2	1.2	-	2.2	11.6	2.9	14.5
1974	12.5	2.7	2.0	3.5	20.7	7.2	27.8
1975	12.8	2.5	2.0	4.4	21.7	5.7	27.4
1976	14.4	2.2	5.2	4.3	26.1	5.1	31.3
1977	9.2	2.3	6.7	3.9	22.1	5.2	27.3
1978	6.9	-	5.6	2.3	14.8	1.3	16.1
1979	3.6	-	4.1	1.4	9.2	4.1	13.3
1980	0.3	-	1.1	+	1.4	2.6	4.0
1981	0.2	-	0.8	+	1.0	0.8	1.8
1982	-	-	0.2	-	0.2	0.7	0.9
1983	-	-	-	-	-	0.3	0.3
1984	-	-	-	-	-	-	-
Total	72.6	10.9	27.7	24.0	135.2	36.6	171.7

+ Less than \$50,000.

Totals may not add due to rounding.

TABLE 6.3 Development Costs Per Settler. Comparison Of  
South East Johor and Stage Two Jengka Projects

<u>Item</u>	<u>Jengka</u> <u>(\$)</u>	<u>South East Johor</u> <u>(\$)</u>
Agricultural Development	13,160	10,645
Settlers Housing	1,610	1,598
Processing Facilities	1,610	4,061
Management	3,650	3,504
Total FLDA	20,430	19,809
Roads and Water	3,390	3,870
Social Infrastructure	1,770	1,480
Sub-Total	5,160	5,350
TOTAL	25,590	25,175

OUTPUTS

Yields of the two crops have been discussed above and elaborated in Appendix I. Total outputs from the project are also given in Appendix I. Palm oil output will rise to a peak in 1985 of 124,000 tons and that of kernels to 25,000 tons in the same year. Because of the longer immature period of rubber and slower yield build up, peak output of 10,000 tons is not reached until about 1995.

Future price levels for these commodities are reviewed in Appendix J. For the past two years palm oil prices have been at very high levels. This resulted from reduced supplies of sunflower, groundnut, coconut and particularly marine oils with which palm oil competes most directly. Increases in palm oil, soybean and rapeseed were insufficient to meet demand at earlier price levels. Continued increase in output of soybeans, of which meal for animal feed is the major component and oil almost a by-product, and a recovery in output of other oils is expected to lead to a reduction of the overall price level for oils in the near future. Having a somewhat restricted range of uses palm oil is likely to be more adversely affected than most oils. However, research into palm oil processing is continuing and there is some prospect of improvements in fractionating oil to allow at least part of the product to compete in the soft oils market. Nevertheless, technological change of this sort cannot be predicted with accuracy, and in its absence it is projected that fob prices will fall to \$420 per ton in 1975 and then slowly to \$344 per ton by 1990. Palm kernel oil is more specific in demand as a substitute for coconut oil in cooking and soap-making. Output of coconut oil is expected to expand slowly and its price and that of palm kernel oil to fall much less drastically than palm oil, from \$370 per ton fob Singapore in 1975 to \$343 per ton in 1990.

Rubber prices have fallen steadily in the past two decades, with the exception of a brief revival in 1969-70 and now stand at forty-eight to fifty-one cents per pound fob Singapore for RSSI grade (sixteen to seventeen U.S. cents). During this period natural rubber output has expanded at about 3 percent per annum, but this has been over-shadowed by growth of 10 percent per year in production of synthetic rubbers.

This has resulted from technical advances in the properties of synthetics and in production reducing cost levels. However, prices of the principal raw material, petroleum, have recently been increased by up to 35 percent in the major importing countries. At the same time a rapid inflation in costs of chemical machinery and equipment is occurring. These trends will make it increasingly difficult to lower prices further even with continued technical advance. It is therefore expected that natural rubber, aided by increased production of standardized rubbers and possible joint marketing arrangements by producers, will be able to maintain its present price level in the future, and an fob price of fifty cents per pound has been used throughout the project life.

Peak annual sales of \$63 million, based on the above yield and price projections are reached in 1985. Over the whole period to 1995 total sales will amount to nearly \$990 million.

FLDA has recently received a report on its future oil palm marketing procedures. Plans are in hand to construct a palm oil bulking facility at the new Johor Baharu port as noted above. While present marketing arrangements for both rubber and palm oil through normal commercial channels are satisfactory, the authority will soon be the world's largest single producer of both these commodities and could consider marketing directly itself. However given existing pressures on managerial resources current arrangements will be continued.

BENEFITS AND ECONOMIC JUSTIFICATION

The project provides for the development of almost 70,000 acres of land for rubber and oil palm, settling some 7,000 families on holdings of ten acres. It will contribute particularly to the development of Tanjong Penggerang and the opening up of potential coastal resort areas on the South China Sea. Over the period to 1995 the project will produce rubber and oil palm products to the value of almost \$1,000 million.

In estimating the value of this project to the Malaysian economy, unskilled labour has been charged at the rate of \$40 per month. This rate is being used by the Malaysian Government in project evaluation for the Second Malaysian Plan. Since Malaysia has traditionally maintained a strong balance of payments position and appears likely to continue to do so, a shadow rate of foreign exchange has not been used.

For purposes of evaluation the life of the project has been taken as twenty-five years to the end of 1995. This is approximately the presently expected economic life of oil palms and plantings made at the beginning of the project could then be due for replacement, depending upon conditions at that time.

Details of costs used in evaluation are given in Appendix K. Table 8.1 give the total costs, returns and cash flow for the project. On this basis the internal rate of return to the project is 18 percent. The project is moderately susceptible to changes in prices, a variation of 10 percent in expected price levels increasing the return to 20 percent or reducing it to 16 percent for higher and lower prices respectively. Rates of return for FLDA oil palm and rubber schemes have not been calculated separately as the area has no exclusively rubber schemes. All contain some oil palm acreage. Assessments of oil palm and rubber on a sole crop basis show oil palm to have a somewhat higher rate of return than rubber (see Supporting Volume 6 Part I). Oil palm has not however been proposed exclusively for this project because the areas allocated to rubber are only marginally suited to oil palm where yields would be below those taken in analysis. On a national basis FLDA is planning to continue to plant about 40 percent of its acreage to rubber because of susceptibility of both crops to price changes.

While the economy as a whole will benefit

directly or indirectly from the increased incomes generated by the project, the governments (State and Federal) will benefit directly through increased tax revenues. Taxes are levied on the export of both rubber and palm oil products which accrue to the Federal government and land tax revenues pass to the State government. Over the period to 1995 it is estimated that these revenues will amount to almost \$100 million (Appendix K). In addition revenue will also accrue to government as a result of the operation of the schemes and the income generated thereby. Taxes are payable on vehicles both commercial and private, fuels, and a wide range of consumer goods in addition to any income tax which may be payable by beneficiaries including FLDA staff. Because of the almost infinite ramifications involved no attempt has been made to estimate these secondary tax revenues.

### 8.2 Settler Incomes

In estimating settler incomes it is assumed that the current forms of agreement and charges will remain in force. Settlers are charged the cost of agricultural development, plus housing. Interest is charged and capitalised at 6½ percent during the development period. Management costs are not charged until the crop reaches maturity when a levy is charged based upon the price of the major crop and acreage of the holding. For settlers on ten acres, the present oil palm levy starts at \$1 per ton ffb at a palm oil price of \$440 per ton fob. The rubber levy would start at one cent per pound at a rubber price of 65.4 cents fob. However, the prices projected in this study are below these levels and it is assumed therefore that no management levy will be charged. Details of settlers' accounts under oil palm and rubber are given in Appendix L.

Settler incomes will vary greatly depending upon the price received for products and yields obtained. Given the medium price and yield assumptions used in this study the annual income of settlers on oil palm and rubber schemes planted in 1972 are shown in Table 8.2, assuming a ten acre holding for each crop. Loan repayments on oil palm schemes have been taken at \$1,500 per year from year 8 to year 20. In years 5-7 repayments are reduced to provide a minimum annual income of \$1,200 per year once harvesting

**TABLE 8.1 FLDA - South East Johor  
Costs, Sales and Cash Flow (Resource Values)**

<u>Year</u>	<u>Costs</u> <u>(Million Dollars)</u>	<u>Gross Sales</u> <u>(Million Dollars)</u>	<u>Cash Flow</u> <u>(Million Dollars)</u>
1971	1.0	-	- 1.0
1972	4.3	-	- 4.3
1973	10.4	-	-10.4
1974	20.7	-	-20.7
1975	20.0	1.1	-18.9
1976	26.2	4.6	-21.6
1977	26.0	10.5	-15.5
1978	20.3	19.3	- 1.0
1979	23.5	30.4	6.8
1980	21.7	43.6	21.9
1981	21.1	52.4	31.3
1982	21.6	58.7	37.0
1983	22.0	62.2	40.2
1984	21.8	62.2	40.4
1985	21.8	62.0	40.2
1986	21.8	61.6	39.8
1987	21.7	60.9	39.2
1988	21.5	59.6	38.1
1989	21.2	58.1	36.9
1990	21.0	56.7	35.7
1991	20.8	55.2	34.4
1992	20.5	53.8	33.3
1993	20.5	53.2	32.8
1994	20.3	52.3	32.0
1995	20.0	50.4	30.4

**TABLE 8.2 Annual Settler Income Oil Palm and Rubber Schemes,  
Ten Acre Holdings**

<u>Year of Scheme</u>	<u>Net Income (Dollars)</u>	
	<u>Oil Palm</u>	<u>Rubber</u>
3 (3 months)	202	202
4	841	1,040
5	1,017	835
6	1,200	870
7	1,200	835
8	1,867	835
9	2,787	1,200
10	3,018	1,200
11	2,932	1,596
12	2,850	2,110
13	2,785	2,377
14	2,605	2,696
15	2,445	3,015
16	2,279	3,335
17	2,210	3,335
18	1,962	3,335
19	1,800	3,335
20	1,677	3,335
21	2,820	3,335
22	2,889	3,974
23	2,738	3,974
24	2,610	3,678
25	2,482	3,678
26	2,356	4,965
27	2,232	5,358
28	2,096	5,038
29	2,096	5,038
30	2,096	4,719

begins. For rubber smallholders, the annual repayment is \$2,000 per year from year 11 to year 25. The higher sum is necessitated by the higher outstanding debt at maturity mainly because of longer immature period. Incomes have been estimated for a thirty year period for comparison purposes. However, it is likely that oil palms will be replanted after about twenty-five years.

The two income streams are somewhat different largely because of the difference in time of first output and yield curves of the two crops. For comparative purposes the present value of the income streams at the time of entry that is Year 3 of the scheme were calculated using a discount rate of 10 percent. Results were as follows:-

<u>Product Price Level</u>	<u>Oil Palm</u>	<u>Rubber</u>
Low	\$13,620	\$15,160
Medium	\$18,650	\$18,500
High	\$24,190	\$22,000

At the expected price levels the two income streams are virtually identical, approximately equivalent to a constant annual income of \$2,000 over the life of the project. Incomes on oil palm holdings are proportionately more sensitive to changes in price levels because of the higher element of fixed charges for processing, transport and mill amortization. In effect the settler is carrying virtually all of the price risk associated with the project.

### 8.3 FLDA's Cash Flow

The expenditure by FLDA in developing the schemes included in this feasibility study have been summarized in Section 6.5. Once the schemes are in production, FLDA has continued expenditures on management, and crop processing and distribution. At the same time it is in receipt of income from these schemes in the form of charges levied for processing and marketing of produce and repayments by settlers of their loans. In addition oil palm settlers are required to pay into a replanting fund which is managed by FLDA. Total outlays and receipts are shown in Table 8.3 and detailed in Appendix M.

Including settler payments into the oil palm replanting fund as receipts to FLDA, the first year of positive cash flow is 1980. Total net outlays to that year are \$118.3 million. Taking the total cash flow for the entire twenty-five year period, the internal rate of return is approximately six percent. Receipts fall fairly rapidly after 1990 as settlers on oil palm schemes complete repayment of their loans, (see Appendix M).

If the oil palm replanting fund is excluded from cash flow the internal rate of return falls to four percent. That is, ignoring interest charges, payments by settlers are adequate to cover development and operating costs.

THE PHYSICAL ENVIRONMENTClimate

The South-east part of Johor has a typical 'Tropical Wet' climate. The area is monsoonal but there are no distinct dry seasons, all months being warm and wet. Rainfall within the area varies from 90 to 120 inches annually and falls on average on 130 to 170 days of the year.

Despite the absence of definite seasons, the variability in rainfall is such that droughts (10 days or more without or with very little rain) may be expected to occur during the NE monsoon period; from January to March a drought of up to 20 days may occur. The only other months in which such dry periods are likely to occur are June and July.

Rainfall is generally of high intensity (0.26 inches/hour) and for short periods during many storms the intensity exceeds 3 inches/hour. As a result crops providing more or less permanent ground cover are preferred and considerable erosion risks attach to annual and semi-perennial crops and during the immature period of perennials unless cover crops are used.

Hours of bright sunshine vary somewhat between the months; Kluang experiences more than 7 hours per day in February but only 4 hours in November. Inland the sky is significantly more cloudy than on the coastal strip, making the environment more suitable for grazing animals. Humidity is high at all times, averaging 85 to 90 percent.

TopographyJohor Tengah

This region consists mainly of rolling or undulating terrain, the steep land being confined to large tracts along the north-eastern project boundary.

Several slow flowing rivers dissect the area, forming narrow flood plains which are in general liable to frequent inundation and consist of poorly drained soils. The terrain is very variable in the north and east of the area. In the west more extensive areas of regular terrain occur.

Tanjong Penggerang

The majority of the area consists of level or nearly level land with very little steep land. The topography is generally more complicated than in Johor Tengah, due to the underlying parent material. In the undulating to hilly classes, valley incision in some localities is severe. The west and north-west of the area consists mainly of undulating to hilly terrain. A central spinal ridge runs from the north of the area in a south east direction to the coast.

The central part of the area is a complex of the undulating to hilly classes. The main feature along the east and south coasts are the extensive peat swamps. The general elevation of these swamps is 5 to 30 feet above sea level.

With the exception of the three major river systems, the valleys are generally narrow belts liable to frequent flooding.

SoilsJohor Tengah

The two series Rengam and Harimau occur extensively throughout the area. They are deep and moderately friable soils with a good available water capacity and are suitable for a wide variety of crops. The next most common soil

series is Durian, a soil suitable for rubber but marginal for oil palm. It is a class III soil.

The Yong Peng Series also occurs fairly widely. It is a heavy textured, rather compacted moderately deep to deep soil.

Riverine Alluvium and Local Alluvium are soils located in river valleys and vary considerably in their texture and drainage. They may be liable to flooding, depending on location, and are with present knowledge judged suitable mainly for certain grasses.

Tanjong Penggerang

The distribution and range of soils series in this area are more complex than in Johor Tengah. The Rengam Series is again the predominant one. It is mainly concentrated in the northern half of the area.

The Yong Peng Series is concentrated along the western boundary.

A large number of soils series, derived from sandstones, shales and metasediments are to be found in very small areas throughout the peninsula.

The Marang Series occurs along the east coast and in the headwaters of the S. Papan. This series has a fine sandy loam friable topsoil overlying a firm compacted sandy clay loam. Vein quartz fragments commonly occur within the compacted layer restricting rooting depth. Soil depth is very variable and ranges from shallow to deep. The latter are suitable for a very wide range of crops, but the restricted rooting depth offered by the shallower phases downgrades many of the areas.

Riverine Alluvium, Local Alluvium and Organic Clays and Mucks are associated with the river valleys and the edges of the peat swamp. Several of the FLDA schemes are dissected or bordered by river valleys of this type. Information obtained from the Project Soil Survey is not adequate to determine the frequency and duration of flooding in these areas and they have consequently been excluded from the area to be planted in the proposed programme. However when the area is settled it will be possible to determine the extent of flooding and it may well prove possible to clear a significant proportion of these valley areas for other agricultural activities in particular grass and to a lesser degree short-term and vegetable crops and padi.

Peat, underlain by sand, occurs in two large areas along the east coast with a depth exceeding ten feet in parts. It is poorly humified, woody and very acid with a recorded pH of around 2.5. It, therefore, has a very low potential for cropping.

## **APPENDIX B**

## APPENDIX B

SCHEDULE OF LAND CLEARING AND PLANTING PROGRAMME

Scheme	A C R E S						T O T A L			
	1971	1972	1973	1974	1975	1976	Felling	Village	Planting	
									Oil Palm	Rubber
S. Semenchu Clearing	7360						7360			
Village		460						460		
Planting		6900							6900	
Papan Timor Clearing		5440					5440			
Village			340					340		
Planting			5100							5100
S. Mas Clearing		6720					6720			
Village			420					420		
Planting			6300						2200	4100
Pengeli Timor Clearing		5970					5970			
Village			370					370		
Planting			5600						5600	
Bt. Adela Clearing			5230				5230			
Village				330				330		
Planting				4900					4900	
Bt. Sening Clearing			7470				7470			
Village				470				470		
Planting				7000					6100	900
S. Sebol Clearing			3840				3840			
Village				240				240		
Planting				3600					3600	
Bt. Kledang Clearing				6180			6180			
Village					380			380		
Planting				5800					5000	800
Bt. Tungal Clearing				3200			3200			
Village					200			200		
Planting					3000				3000	
Bt. Aping Clearing				1000			1000			
Village					-			-		
Planting					1000					1000
Kahang Barat Clearing				4050			4050			
Village					250			250		
Planting					3800				3800	
Bt. Wah Ha Clearing					6080		6080			
Village						380		380		
Planting						5700			5700	
Simpang Wah Ha Clearing					5860		5860			
Village						360		360		
Planting						5500			5500	
Kahang Timor Clearing					4260		4260			
Village						260		260		
Planting						4000			4000	
TOTAL:										
Clearing	7360	18130	16540	14430	16200	-	72660	-	-	-
Village	-	460	1130	1040	830	1000	-	4460	-	-
Planting	-	6900	17000	15500	13600	15200	-	-	56300	11,900

APPENDIX C

THE SETTLERS

FLDA is intended to assist primarily rural people with little or no land. At present those owning more than two acres are not eligible. Retiring members of the armed and police forces may also apply.

Individual State Governments often require, as a precondition for allocating land to FLDA, that a given proportion, usually 50 percent, of settlers be drawn from the State. This is the current position in Johor. In practice FLDA has had a large number of applications from within Johor and the provision has not been operative. The majority of these applications come from the west coast districts of Pontian, Batu Pahat and Muar. At the present time FLDA has a backlog of 3,000 applications in the State and it is expected that the majority of the settlers for the South East Johor project area will come from within the State.

Settler selection is in two stages. Following written application the potential settler is interviewed, usually in his own district. To be eligible the applicant must satisfy certain basic conditions:-

- (1) Be a Malaysian Citizen
- (2) Be a married male (wives may not apply)
- (3) Have no criminal record
- (4) Be physically and mentally fit
- (5) Be willing to abide by the rules and regulations established by FLDA.
- (6) Own less than two acres of land
- (7) Be aged between 18 and 35 (unless an ex-serviceman).

Those satisfying these basic requirements are then assessed on a point system as follows:-

## 5 "characteristics" taken into account:

	<u>Maximum no. of points</u>
1. Age of settler	10
2. Number of children	5
3. Experience/capabilities	6
4. Land ownership	5
5. Education	<u>4</u>
	<u>30</u>

1. <u>Age</u>							
Years	23-26	22/27	21/28	20/29	19/30	18/31	32 <sup>+</sup>
Points	10	9	8	7	6	5	4

<sup>+</sup>Decreasing to 1 for age 35

Those from 36 to 40 years old only selected if ex-soldiers or ex-police; 1 point for these ages.

2. Number of children

Number: 5 or more	4	3	2	1	0
Points:	5	4	3	2	1

3. Experience/capabilities

	<u>Points</u>
Knowledge of rubber or oil palm planting ("Pengalaman tanaman getah/k. Sawit")	3
Active in social life ("Aktif dalam kemasyarakatan")	1
Knowledge of other agriculture	1
Special capabilities (e.g. carpentry, handicrafts)	<u>1</u>
Total possible	<u>6</u>

4. Land ownership

Acres	0	1	1 1/2	2
Points	5	4	3	2

Note: those with more than 2 acres are excluded.

5. Education

	<u>Points</u>
LCE and above	4
Forms I-III	3
Std. 1-6 (or equivalent)	2
Adult education	1

The settler, and it is hoped his family, enters the development scheme approximately two years after initial felling and about one year after planting of the main crop. Initial harvest takes place approximately two years later with oil palms and after five to six years with rubber. During this development period the settlers are engaged on maintaining the growing crop. For this they are paid \$2.90 per day. Should earnings from this source be less than \$69.50 per month the settler receives a subsistence loan to bring his monthly income up to this level.

The individual settler is charged with the agricultural field development costs and house and houselot development cost. These costs are covered by loans made by FLDA to the settler carrying interest at 6 1/2 percent. In addition subsistence credits received by the settler are charged to his loan account. Loan accounts for oil palm and rubber smallholders on 10 acre holdings are shown in Tables C.1 and C.2. Details of outputs from mature holdings and incomes are given in Appendix L.

Upon entry to the scheme the settler signs the first part of his agreement with the Authority. This binds him to abide by the rules laid down by the authority and to carry out work on the scheme as instructed by the representative of the authority, normally the scheme manager. Failure to abide by the rules may result in the settler being expelled from the scheme and replaced by another applicant.

At the end of the fifth year after oil palm planting or the seventh year from rubber planting the settler signs the second part of his agreement. This registers him as an occupier in expectation of title to 10 acres of crop land (the actual acreage depends on the scheme) and a house on a lot of approximately 1/2 acre. On rubber schemes current practice is to allocate a specific plot of land to the settler for which he is subsequently responsible. In the case of oil palms the Authority considers that because of the problems of harvesting and collection it is preferable to operate much larger units. The settler therefore receives the right to a share of proceeds from the scheme as if he were the sole owner of 10 acres of the crop. His status has thus been changed from that of an employee of the Authority to that of a farmer in his own right. In the schemes proposed for the South East Johor area, three are proposed to contain both rubber and oil palm. It is suggested that these schemes be operated in the same way as current oil palm schemes, i.e. the settler will have a share in ownership of each crop. The situation of having some "rubber" and some "oil palm" settlers the same scheme should be avoided.

Rubber smallholders are required (at least during the period of loan repayment) to deliver their latex to FLDA for processing and sale on their behalf. Charges for processing and distribution and loan repayments are then retained by the Authority from sale proceeds. On oil palm schemes fruit collection is organised by the Authority and the fruit is processed in mills owned

and operated by the authority (arrangements to use other facilities are made if necessary). Again, processing and distribution costs and loan repayments are deducted from sale proceeds. In the case of oil palm a deduction is also made into a replanting fund held by the Authority. A similar rubber replanting cess is also paid at the point of export into the National Rubber Replanting Scheme operated by the Rubber Fund Board from smallholder producers. It is anticipated that the FLDA oil palm replanting fund will be used in the same way.

When loans have been repaid the Authority will recommend to the State that in the case of rubber the 10 acre lot plus houselot be alienated to the settler. In the case of oil palm it is currently visualized that alienation of crop land will be to some form of corporate settler ownership possibly cooperative in form.

TABLE C.1 FLDA Oil Palm Settler - Loan Account

	YEAR				
	1	2	3	4	5
Field Development Costs	750	3,800	1,715	2,378	827 <sup>+</sup>
House and Houselot	20	56	1,524	-	-
Subsistence Credit	-	-	67	-	-
Sub Total	770	3,856	3,306	2,378	827
Debt carried forward	-	818	4,966	8,789	11,866
Total to carry interest	770	4,674	8,272	11,167	12,693
Interest at 6½ percent	48	292	517	698	793
Total Debt Outstanding	818	4,966	8,789	11,865	13,486

<sup>+</sup>Net after sale of fruit

TABLE C.2

FLDA Rubber Settler - Loan Account

	YEAR							
	1	2	3	4	5	6	7	8
Field Development Costs	780	3,070	2,030	1,314	1,413	1,160	930	843
House and Houselot	20	56	1,524					
Subsistence Credit			68		81		255	342
Sub total	800	3,126	3,622	1,314	1,494	1,160	1,185	1,185
Debt Carried Forward	-	850	4,225	8,337	10,254	12,482	14,495	16,660
Total to carry interest	800	3,976	7,847	9,651	11,748	13,642	15,680	17,845
Interest at 6½ percent	50	249	490	603	734	853	980	1,115
Total Debt Outstanding	850	4,225	8,337	10,254	12,482	14,495	16,660	18,960

FLDA schemes are frequently remote from existing population centres. In all but a few small early schemes settlers move from their original homes to the schemes. Settlers in any one scheme come from many different areas and do not automatically settle down and adapt quickly to their new surroundings. It became apparent that additional help would be required to help settlers make the change to their new environment. To this end the Settler Development Division was created in 1967.

"The Settler Development Division is responsible for the planning, development, promotion and implementation, and subsequent evaluation of community development projects through extension, education and training of both staff and settlers

with the following objective:-

- to cater for the development of the broad aspects of human development in FLDA programmes.
- to stimulate individual initiative among settlers towards self-help, self improvement and mutual help.
- to establish good working relations with the settlers and settler dependants and to offer them advice and guidance on various aspects of settler development work.
- to induce and to develop the formation of various social settler group activities in the field of recreation, youth movement, women's group, co-operatives, farmer's association through effective and self-sustaining leadership structure.
- to advise and educate settlers in matters of health, sanitation, home economics, family planning, adult education.
- to guide and to encourage settlers to participate more actively in agricultural projects meant to increase their income and consumption.
- to organise and hold training courses from time to time for both settler and scheme staff in various aspects of agricultural production and settler development.
- to get the settlers involved and participate in the day to day administration and development of the scheme.
- to narrow the communication gap that exists between various government agencies and the extension services and the settlers.
- to carry out appropriate socio-economic research and evaluation exercises on selected aspects of settler development work.
- to integrate the scheme communities into the life of the Nation and to enable them

to contribute fully towards the Nation and its progress." (1)

Initially one Settler Development Assistant was appointed for each scheme from among FLDA's intake of agriculturally trained personnel. It soon became apparent however that such an arrangement was not satisfactory and that much of the work required contact with women. Present practice is to aim to place two assistants on each scheme, one male and one female. The male officer

(1) Source FLDA "Functions and Responsibilities of the Settler Development Division and its officers." October 1969.

is primarily responsible for general extension work among the settlers, promoting ancilliary activities such as fisheries and livestock, maintaining community facilities such as the library, helping run community organisations, meetings, film shows etc. The women's assistant is responsible for assistance to settlers wives and families, promoting organisations such as the Women's Institute, helping to teach the women folk how to improve family diets and living conditions and promoting family planning.

In estimating management requirements it has been assumed that two settler development assistants will be appointed per scheme, regardless of its size.

Table 1

APPENDIX D

Survey - see site specific Project Profile  
water - con- lions - needs  
and structure

Main Plant Process  
and plant

Log area - Clipping MAIN PLANT

Survey

Main Plant

# APPENDIX D

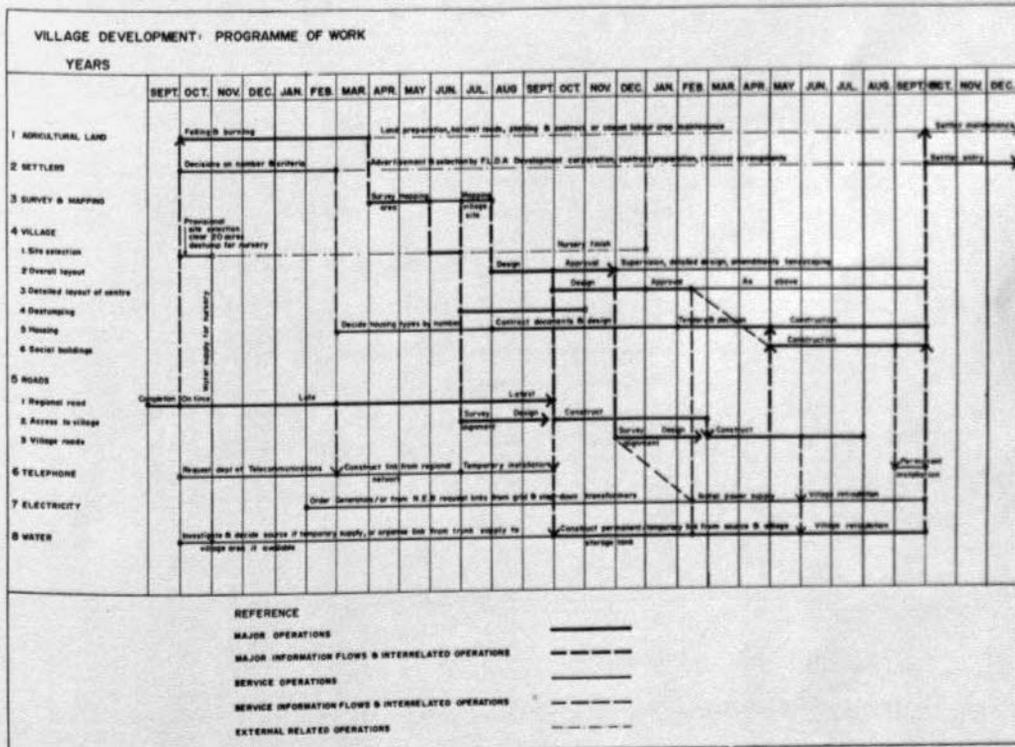
TABLE 1. SUMMARY OF SURVEY DATA FOR THE PROJECT

Parameter	Value	Unit	Notes
Flow	100	gpm	
Temperature	60	F	
pH	7.5		
Dissolved Oxygen	8.5	mg/L	
Total Solids	150	mg/L	
Ammonia Nitrogen	0.5	mg/L	
Nitrite Nitrogen	0.1	mg/L	
Nitrate Nitrogen	1.0	mg/L	
Phosphate	0.2	mg/L	
Chloride	100	mg/L	
Sulfate	100	mg/L	
Calcium	100	mg/L	
Magnesium	50	mg/L	
Iron	10	mg/L	
Copper	0.5	mg/L	
Zinc	0.5	mg/L	
Lead	0.1	mg/L	
Mercury	0.01	mg/L	
Chromium	0.1	mg/L	
Manganese	0.5	mg/L	
Barium	10	mg/L	
Selenium	0.1	mg/L	
Fluoride	10	mg/L	
Strontium	10	mg/L	
Vanadium	0.1	mg/L	
Antimony	0.01	mg/L	
Bismuth	0.01	mg/L	
Cadmium	0.01	mg/L	
Cobalt	0.01	mg/L	
Chromium VI	0.01	mg/L	
Lead	0.01	mg/L	
Manganese	0.01	mg/L	
Mercury	0.01	mg/L	
Nickel	0.01	mg/L	
Silver	0.01	mg/L	
Thallium	0.01	mg/L	
Vanadium	0.01	mg/L	
Zinc	0.01	mg/L	

APPENDIX D

AGRICULTURAL DEVELOPMENT : PROGRAMME OF WORK - OIL PALM SCHEME

	Year 1												Year 2												Year 3											
	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
(1) Survey																																				
(2) Nursery - pre site access selec- tion tion construction																																				
Main																																				
(3) Crop area - Clearing																																				
Covers																																				
Main Crop																																				



APPENDIX E

## APPENDIX E

## FLDA S.E. JOHOR MANAGEMENT REQUIREMENTS

Y E A R

Scheme	Post	1971	1972	1973	1974	1975	1976	1977
S. Semenchu	Manager	1	1	1	1	1	1	1
	Asst. Manager		2	2	2	2	2	2
	S. Supervisor	1	5	9	9	9	9	9
	Field Assistant	3	9	17	17	17	17	17
	Settler Dev. Asst.			2	2	2	2	2
Papan Timor	Manager		1	1	1	1	1	1
	Asst. Manager		2	2	2	2	2	2
	S. Supervisor		1	3	7	7	7	7
	Field Assistant		2	6	13	13	13	13
	Settler Dev. Asst.				2	2	2	2
S. Mas	Manager		1	1	1	1	1	1
	Asst. Manager			2	2	2	2	2
	S. Supervisor		1	4	8	8	8	8
	Field Assistant		3	8	16	16	16	16
	Settler Dev. Asst.				2	2	2	2
Pengeli Timor	Manager		1	1	1	1	1	1
	Asst. Manager			2	2	2	2	2
	S. Supervisor		1	3	7	7	7	7
	Field Assistant		2	7	14	14	14	14
	Settler Dev. Asst.				2	2	2	2
Bt. Adela	Manager			1	1	1	1	1
	Asst. Manager				2	2	2	2
	S. Supervisor			1	3	6	6	6
	Field Assistant			2	6	13	13	13
	Settler Dev. Asst.					2	2	2
Bt. Sening	Manager			1	1	1	1	1
	Asst. Manager				2	2	2	2
	S. Supervisor			1	5	9	9	9
	Field Assistant			3	9	18	18	18
	Settler Dev. Asst.					2	2	2
S. Sebol	Manager			1	1	1	1	1
	Asst. Manager				1	1	1	1
	S. Supervisor			1	3	5	5	5
	Field Assistant			2	5	9	9	9
	Settler Dev. Asst.					2	2	2
Bt. Kledang	Manager				1	1	1	1
	Asst. Manager					2	2	2
	S. Supervisor				1	4	7	7
	Field Assistant				3	7	15	15
	Settler Dev. Asst.						2	2
Bt. Tungal	Manager				1	1	1	1
	Asst. Manager					1	1	1
	S. Supervisor				1	2	4	4
	Field Assistant				2	4	8	8
	Settler Dev. Asst.						2	2
Bt. Aping	Manager				-	-	-	-
	Asst. Manager				-	-	-	-
	S. Supervisor					1	1	1
	Field Assistant					1	3	3
	Settler Dev. Asst.					-	-	-
Kahang Barat	Manager				1	1	1	1
	Asst. Manager					1	2	2
	S. Supervisor				1	2	5	5
	Field Assistant				2	5	10	10
	Settler Dev. Asst.						2	2
Bt. Wah Ha	Manager					1	1	1
	Asst. Manager						1	2
	S. Supervisor					1	4	7
	Field Assistant					3	7	14
	Settler Dev. Asst.							2
Simpang Wah Ha	Manager					1	1	1
	Asst. Manager						1	2
	S. Supervisor					1	4	7
	Field Assistant					3	7	14
	Settler Dev. Asst.							2
Kahang Timor	Manager					1	1	1
	Asst. Manager						1	2
	S. Supervisor					1	2	5
	Field Assistant					2	5	10
	Settler Dev. Asst.							2
Grand Total	Managers	1	4	7	10	13	13	13
	Asst. Managers		2	8	13	17	21	24
	S. Supervisors	1	8	22	45	63	78	87
	Field Assistants	3	16	45	87	125	155	174
	Settler Dev. Asst.			2	8	14	20	26

# APPENDIX F

CROP PROCESSINGOil Palm

FLDA has already planted some 34,000 acres of oil palm in the Kulai Complex, just south of the Johor Tengah region. This acreage is served by mills at Kulai and Bukit Besar schemes which are planned for a joint capacity of 74 tons ffb per hour by 1975.

In addition the authority has approximately 24,000 acres under development to the crop in the Ayer Tawar schemes in the north-west of Tanjong Penggerang. Initial processing capacity of 27 tons in 1974 is planned with a mill at Ayer Tawar II scheme capable of ultimate expansion to 54 tons per hour.

In estimating processing requirements for the schemes included in the feasibility study the available capacities and probable requirements in these existing schemes have been taken into account. Note has also been taken into of possible future schemes tentatively suggested in the South East Johor Master Plan, where these would affect ultimate factory needs and phasing. Two principal assumptions have been made in estimating required capacity and phasing:-

(1) Yields of oil palm planted in 1972 will rise to a peak of 10 tons ffb per acre by year 9 of the scheme (i.e. 1979), remain at that level for five years and then decline slowly (see Table F.1). Yields curves for each succeeding planting are assumed to rise by two percent per annum.

(2) That peak month capacity requirement will be 12½ percent of annual output and that in the peak month a total of 500 hours of operation is possible.

(3) FLDA will continue to plan mill capacities on the basis of a standardized 9 ton per hour press. Mill capacities proposed are therefore in multiples of 9 tons per hour.

(a) Tanjong Penggerang

(1) As noted above FLDA has a 27 ton mill planned for Ayer Tawar II to meet the initial needs of these schemes. The S. Semenchu scheme, included in this proposal, is a logical extension of the Ayer Tawar complex. Table F.2 shows the estimated processing requirements and mill phasing for this area. Allowance has been made for processing the crop from S. Mas scheme (2,200 acres) just east of S. Semenchu and that from a possible small (700 acre) extension of the Papan Timor scheme. It is proposed that a second mill be established at Ayer Tawar V and that both the mills be expanded to a capacity of 45 tons per hour. The Ayer Tawar V mill could also take excess fruit from schemes in the NE of Tanjong Penggerang at peak periods.

Phasing of the two mills is thus proposed:-

Ayer Tawar II, to serve Ayer Tawar schemes I, II and III.

Initial capacity 27 tons per hour  
planned 1975

Extension 18 tons per hour needed 1977

Ultimate capacity 45 tons per hour

Ayer Tawar V, to serve Ayer Tawar schemes IV and V, S. Semenchu and S. Mas.

Initial capacity 18 tons per hour needed 1976

Extension 18 tons per hour needed 1978

Extension 9 tons per hour needed 1983

Ultimate capacity 45 tons per hour.

(2) South of the S. Lebam approximately 19,000 acres of oil palms is proposed. This could be served from a mill at Bukit Sening. Table F.3 shows estimated output and processing requirements

for these schemes. Capacity proposed is:-

27 tons per hour in 1978

18 tons per hour in 1980

Ultimate capacity 45 tons per hour.

(3) In NE Penggerang two oil palm schemes are proposed in this study, totalling approximately 11,000 acres. Possible future schemes are suggested in the Master Plan for an additional 14,000 acres in the Third Malaysian Plan period. Estimated processing requirements are shown in Table F.4. These could amount to 68 tons per hour by 1987. However, by that time the Ayer Tawar schemes will have passed their peak production level. Rather than build two mills in this area it is proposed that a 45 ton capacity mill be located at Simpang Wah Ha and that excess above that be processed at Ayer Tawar V, extended in capacity by 9 tons per hour. This would provide 135 tons per hour of capacity in N Tg. Penggerang with an estimated peak requirement of 145 tons per hour in 1987. Since it is extremely unlikely that all schemes will peak at exactly the same time it should be possible to allocate supplies between mills so as to avoid fruit being wasted.

Phasing proposed for the factory at Simpang Wah Ha is:-

27 tons per hour in 1980

18 tons per hour in 1982

Ultimate Capacity 45 tons per hour

(b) Johor Tengah

(1) Approximately 9,000 acres are proposed north of the S. Sayong adjacent to Kulai Complex. Estimated processing requirements (shown in Table F.5) reach a peak of approximately 24 tons per hour in 1981. A further area of 10,000 acres has been tentatively proposed east of the Johor river next to Kulai complex, which would require an additional 25 tons of capacity, by about 1985. However by that time FLDA estimates suggest that a surplus capacity of about 12 tons per hour will exist at Bukit Besar and Kulai mills. It has therefore been proposed that a mill be constructed at Pengeli Timor with an ultimate capacity of 27 tons. The future schemes to the east of Bukit Besar will be closest to that mill and an extension of about 9 tons per hour might best be located there bringing it to 47 tons per hour. If these future schemes are not carried out then the Pengeli Timor mill could be held at 18 tons per hour. Proposed phasing for the mill is:-

18 tons per hour in 1978

9 tons per hour in 1980

Ultimate capacity 27 tons per hour

(2) In the north of Johor Tengah two schemes are proposed in the Second Plan period, totalling almost 8,000 acres. These could be expanded later, when areas under logging agreements are released as shown in the Master Plan to a total of 19,000 acres. Estimated processing requirements are shown in Table F.6 and proposed mill phasing is:-

9 tons per hour in 1979

9 tons per hour in 1981

9 tons per hour in 1983

18 tons per hour in 1985

Ultimate capacity 45 tons per hour.

Rubber

FLDA is currently developing approximately 16,000 acres of rubber in the North of Tg. Penggerang a further 12,000 acres in Tg. Penggerang are included in the present study. Production from this area would support a rubber factory with a throughput of about 60 tons per day. The water supply available at Bukit Aping from run of the river flows is not considered adequate for such a demand, but a factory could be accommodated in the Lebam catchment area e.g. at the proposed urban centre adjacent to the tourist resort area.

However FLDA has an additional 17,500 acres of rubber coming into tapping at the present time in the South Johor region and is reviewing its processing policy for the region as a whole with a view to siting a single factory for the area. Pending that review, no provision has been made in this study for capital expenditure on processing facilities, but processing charges have been included to cover amortized capital costs.

TABLE F.1

F.L.D.A. - S.E. JOHOR  
OIL PALM YIELDS

Year of Scheme	Yield Tons ffb per Acre	Extraction - Percentages Oil	Kernels
5	2.0	16	3.5
6	5.5	18	3.75
7	7.0	19	4.00
8	8.5	20	4.25
9	10.0	21	4.25
10	10.0	21	4.25
11	10.0	21	4.25
12	10.0	21	4.25
13	10.0	21	4.25
14	9.8	21	4.25
15	9.6	21	4.25
16	9.4	21	4.25
17	9.2	21	4.25
18	9.0	21	4.25
19	8.8	21	4.25
20	8.6	21	4.25
21	8.4	21	4.25
22	8.2	21	4.25
23	8.0	21	4.25
24	7.8	21	4.25
25	7.6	21	4.25

TABLE F.2

FLDA - S.E. Johor - Oil Palm Processing Requirements -  
Ayer Tawar Area

Scheme	ffb Output (Thousand Tons)														
	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	
Ayer Tawar <sup>(1)</sup>	40	74	140	188	220	231	238	240	239	234	227	221	217	211	
S. Semenchu		13.8	37.9	48.3	58.6	69.0	69.0	69.0	69.0	69.0	67.6	66.2	64.8	63.5	
S. Mas			4.4	12.3	15.7	19.0	22.4	22.4	22.4	22.4	22.4	22.0	21.5	21.1	
Papan Timor <sup>(3)</sup>							1.5	4.2	5.4	6.6	7.7	7.7	7.7	7.7	
TOTAL	40	87.8	182.4	248.6	294.4	319.1	331.0	335.7	335.8	332.0	324.8	317.0	311.1	303.3	
Capacity Required (tons/hr.)	10	22.0	45.6	62.2	73.6	79.8	82.7	83.9	84.0	83.0	81.2	79.24	77.8	75.8	
Capacity proposed		27	45	63	81	81	81	81	81	90 <sup>(2)</sup>	→				

(1) FLDA estimate

(2) Extra capacity to handle part of crop from Kr. Lo Heng schemes, see Table F.4

(3) Possible future extension not included in this Project.

TABLE F.3

FLDA - S.E. Johor - S. Tanjong Penggerang - Oil palm Processing Requirements

Scheme	ffb Output (Thousand Tons)											
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Bt. Adela	10.2	28.0	35.7	43.4	51.0	51.0	51.0	51.0	51.0	50.0	49.0	47.9
Bt. Sening	12.7	34.9	44.4	53.9	63.4	63.4	63.4	63.4	63.4	62.2	60.9	59.7
Bt. Kledang		10.6	29.2	37.1	45.1	53.0	53.0	53.0	53.0	53.0	52.0	51.0
Bt. Tungal		6.4	17.5	22.3	27.1	31.8	31.8	31.8	31.8	31.8	31.2	30.6
TOTAL	22.7	79.9	126.8	156.6	186.6	199.2	199.2	199.2	199.2	197.0	193.1	189.2
Capacity Required (tons/hr)	5.7	20.0	31.7	39.1	46.7	49.8	49.8	49.8	49.8	49.8	49.8	49.8
Capacity proposed (tons/hr.)		27	27	45	→							

TABLE F.4

FLDA - S.E. Johor - N.E. Tanjong Penggerang - Oil Palm Processing Requirements

Scheme	ffb Output (Thousand Tons)											
	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Bt. Wah Ha	12.3	33.9	43.2	52.4	61.7	61.7	61.7	61.7	61.7	60.5	59.2	58.0
Simpang Wah Ha	11.9	32.7	41.7	50.6	59.5	59.5	59.5	59.5	59.5	8.3	57.1	55.9
Bt. Easter (2)				9.7	26.5	33.8	41.0	48.3	48.3	48.3	48.3	48.3
Kr. Lo Heng (Barat) (2)		8.6	23.7	30.1	36.6	43.1	43.1	43.1	43.1	43.1	42.2	41.3
Kr. Lo Heng (Timor) (2)					12.4	34.1	43.4	52.8	62.1	62.1	62.1	62.1
TOTAL	24.2	75.2	108.6	142.8	196.7	232.2	248.7	265.4	274.7	272.3	268.9	213.4
Capacity Required (tons/hr.)	6.1	18.8	27.2	35.7	49.2	58.1	62.2	66.4	68.7	68.1	67.2	53.4
Capacity proposed (tons/hr.)		27	27	45 <sup>(1)</sup>	→							

(1) Excess fruit to be processed in Ayer Tawar area, i.e. shipments from Kr. Lo Heng Schemes.

(2) Possible future scheme not included in this Project.

TABLE F.5

FLDA - S.E. Johor - Oil Palm Processing Requirements - S. Johor Tengah

Scheme	ffb Output (Thousand Tons)													
	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	
Pengeli Timor	11.4	31.4	40.0	48.5	57.1	57.1	57.1	57.1	57.1	56.0	54.8	53.7	52.5	
S. Sebol		7.5	20.6	26.2	31.8	37.4	37.4	37.4	37.4	37.4	36.7	36.0	35.2	
TOTAL	11.4	38.9	60.6	74.7	88.9	94.5	94.5	94.5	94.5	93.4	91.5	89.7	87.7	
Capacity Required (tons/hr.)	2.8	9.7	15.2	18.7	22.2	23.6	23.6	23.6	23.6	23.4	22.9	22.5	21.9	
Capacity Proposed			18	18	27 <sup>+</sup>	27	27	27	→					

<sup>+</sup>This extension to depend upon processing requirements of other schemes, particularly in Lubok Ajal area, and capacity at Kulai and Bukit Besar Mills.

TABLE F.6

FLDA - S.E. Johor - Oil Palm Processing Requirements - N. Johor Tengah

Scheme	ffb Output (Thousand Tons)												
	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Kahang Barat	8.1	22.2	28.2	34.3	40.3	40.3	40.3	40.3	40.3	39.5	38.7	37.9	37.1
Kahang Timor		8.6	30.3	36.8	43.3	43.3	43.3	43.3	43.3	43.3	42.4	41.6	40.7
S. Dengar (1)							2.9	7.9	10.0	12.2	14.3	14.3	14.3
S. Yong (1)							9.6	26.3	33.5	40.6	47.8	47.8	47.8
Bt. Jelati (1)							14.1	38.8	49.4	60.0	70.5	70.5	70.5
TOTAL	8.1	30.8	58.5	71.1	83.6	83.6	110.2	156.6	176.5	195.6	213.7	212.1	210.4
Capacity Required (tons/hr.)	2.0	7.7	14.6	17.8	20.9	20.9	27.6	39.2	44.1	48.9	53.4	53.0	52.6
Capacity Proposed		9	9	18	18	27	27	45	→				

(1) Possible future scheme not included in this Project.



## APPENDIX G

TABLE G.1

Development Disbursements (Thousand Dollars)

Item	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	Total
<u>AGRICULTURAL DEVELOPMENT</u>															
Payments to Contractors	517	3166	6869	8913	7205	7481	2976	1550	-	-	-	-	-	-	38,67
Fertilisers and Pesticides	-	34	352	1081	1728	2196	2383	1901	1098	94	63	-	-	-	10,93
Planting Materials	-	725	819	1533	1239	1596	-	-	-	-	-	-	-	-	5,91
Payments to Settlers	-	-	143	938	2636	3145	3855	3475	2542	225	150	-	-	-	17,10
Sub-Total	517	3925	8183	12465	12808	14418	9214	6926	3640	319	213	-	-	-	72,62
<u>SETTLER HOUSING</u>															
	14	73	1178	2705	2469	2158	2316	-	-	-	-	-	-	-	10,91
<u>PROCESSING FACILITIES</u>															
	-	-	-	1980	1980	5220	6660	5580	4140	1080	810	220	-	-	27,67
<u>MANAGEMENT</u>															
Management Salaries	36	210	505	915	1270	1362	1346	975	653	42	16	-	-	-	7,33
Other Staff Salaries	-	-	43	163	263	311	349	249	158	-	-	-	-	-	1,53
Buildings	-	23	309	730	711	658	649	110	44	-	-	-	-	-	3,23
Vehicles and Equipment	27	73	317	419	541	514	465	246	176	-	-	-	-	-	2,77
Headquarters	576	805	1060	1332	1645	1480	1070	740	410	-	-	-	-	-	9,11
Sub-Total	639	1111	2234	3559	4430	4325	3879	2320	1441	42	16	-	-	-	23,99
<u>TOTAL FLDA EXPENDITURE</u>	1170	5109	11595	20709	21687	26121	22069	14826	9221	1441	1039	220	-	-	135,20
<u>OTHER DEVELOPMENT EXPENDITURE</u>															
Water Supply	-	-	69	3170	1666	962	1671	-	2710	975	-	-	-	-	11,22
Roads	-	745	2103	2364	2147	2588	1554	880	858	1127	279	281	274	-	15,20
Village Land Clearance	22	124	222	187	169	153	-	-	-	-	-	-	-	-	81
Social Infrastructure	-	-	477	1431	1694	1431	1957	385	505	460	505	415	-	-	9,20
Sub-Total	22	869	2871	7152	5676	5134	5182	1265	4073	2562	784	696	274	-	36,54
<u>TOTAL GOVERNMENT AND F.L.D.A.</u>	1192	5978	14466	27861	27363	31255	27251	16091	13294	4003	1823	916	274	-	171,74

## APPENDIX H

COSTS(a) Agricultural Field Development Costs

Field development costs used in this study for oil palms and rubber are shown in Tables H.1 and H.2 respectively. These costs are based upon current FLDA and estate practice modified where considered appropriate to meet expected conditions in the Project Area. Total development costs (excluding payments to settlers) are shown in Tables H.3, H.4 and H.5. Payments to settlers during the immature period are shown in Tables H.6.

(b) Agricultural Field Maintenance Costs

Maintenance is assumed to be carried out by the settlers, or their dependents, under the supervision of the scheme management. Cash costs have been estimated as follows:-

Oil Palm - sundries	\$5 per acre
- fertiliser	\$30 per acre plus \$6 per ton ffb

These fertiliser costs are based upon an assumed 60 palms per acre. It is assumed that actual fertiliser applications will be determined by foliar analysis techniques.

Rubber - sundries	\$7 per acre
- fertiliser	\$22 per acre

These costs for the period to 1995 are shown in Table H.8.

(c) Scheme Management Costs

Scheme management requirements have been shown in Appendix E. Table H.9 shows standard costs taken for management and other scheme personnel. Numbers have been estimated on the following criteria:-

Managers	1 per scheme
Asst. Managers	2 per scheme (over 3,500 acres)
Senior Supervisors	1 per 800 acres
Field Assistants	1 per 400 acres
Settler Development Assts.	2 per scheme (1 male, 1 female)
Clerks	1 per 2,500 acres
Secretaries	1 per 5,000 acres
Drivers	1 per 2,500 acres plus 1 per manager or assistant manager
Peons	1 per clerk

Total numbers of these staff required for the Project Area and annual costs are shown in Tables H.10 and H.11. Housing standard costs are shown in Table H.12 and total costs in H.13. Costs for vehicles and other equipment are given in Tables H.14 and H.15. Temporary quarters are assumed to be provided in Year 2 of a scheme for management personnel together with a temporary office. The latter is converted into a store after permanent offices are completed. Temporary quarters are converted into permanent quarters for drivers and other non-management staff such as oil-palm mill employees.

Headquarter Staff

Overall FLDA's headquarters and regional staff costs are approximately 20 dollars per acre operated. This is higher than in average private sector estate companies because of the proportionately much greater extent of new land development which puts heavier demands on head office staff. At the present time FLDA is expanding its acreage by about 12 to 15 percent per year.

The South Johor region at present represents just over 20 percent of FLDA's acreage, and this is likely to rise slightly in the future. Headquarters costs attributable to schemes in the

South East Johor area have estimated as a proportion of estimated total costs for South Johor taken as 20 dollars per acre. These estimates are given in Table H.16.

Village CostsSettler Housing

Costs assumed for site preparation and construction of settler housing are shown in Table H.17.

Cost per house erected has been taken at 1,500 dollars. FLDA has recently received bids somewhat below this level, but increased construction activity in S.Johor and Singapore is likely to exert an upward pressure on rates in this area. Total costs for settler housing are given in Table H.18.

Village roads

Village roads costs have been based upon a basic cost of \$165,000 for a village of 350 agricultural households. Above this number an additional \$300 per household has been charged equivalent to approximately 35 feet of road at \$40,000 per mile. Total village road costs are given in Table H.19.

Other Village Land Clearance

In addition to land cleared for and charged to settler housing land is also cleared for schools, offices, management housing etc. Village area has been taken at 0.67 acres per settler. The area to be cleared for non-settler housing purposes and total costs are shown in Table H.20. Standard Costs per acre have been taken as shown in Table H.10.

Social Infrastructure

Details of infrastructure criteria and costs for the Master Plan are given in Supporting Volume 8. Each agricultural village is assumed to have the following public buildings:-

health clinic
police post
community hall
religious building
landscaped padang
local council office.

These buildings are estimated to cost \$162,000 per village. Except for the local council office. These are all scheduled for construction during Year 3 of the scheme, i.e. at the time of entry of the settlers. The council office has been scheduled for construction 5 years later. Costs of providing this infrastructure for the FLDA villages have been included in the total work programme in the Project Area.

A series of central villages have been proposed in the Project Area which will have a wider range of services and serve surrounding agricultural villages. Each of these central villages has a post office, a health centre and a police station at a total cost of \$265,000 in addition to the padang, community and religious buildings. Three of the central villages form part of the FLDA programme, those at Bt. Sening and Simpang Wah Ha in Tanjong Penggerang and at Kahang Timor in Johor Tengah.

Educational capital expenditures are similarly detailed in Supporting Volume 8 which describes the basis for estimation of the school populations and the total school building requirement in the Project Area.

The social infrastructure cost included in Appendix G assumed public buildings as above to-

gether with 1 primary school of 6 classrooms in every village (plus a second school of the same size in 5 larger villages).

#### Secondary Roads

The total cost of secondary roads proposed for South East Johor is \$35 million (for details see Master Plan). This is equivalent to approximately \$140 per acre of agricultural development. Since these roads primarily serve agriculture the-ir cost has been included as part of the overall agricultural development costs. For the proposed FLDA programme this cost is shown in Table H.23.

#### Oil Palm Processing Facilities

Requirements for oil palm processing have been shown in Appendix D. These mills will not serve only schemes included in this feasibility study but also some existing and possible future FLDA schemes. Capital costs have been estimated for these mills as shown in Table H.24. These include all estimated costs for early phases of mills which may be extended later to process fruit for subsequent FLDA schemes as indicated in Appendix D.

Operational costs have been divided into fixed and variable components. The mills proposed have capacities averaging 40 tons per hour. A mill of this size would have fixed costs as indicated in Table H.25.

Since a 40 ton per hour mill will service approximately 16,000 acres, these fixed charges amount to approximately \$11.50 per acre per year. This figure has been used to estimate the fixed component of processing costs shown in Table H.26.

Variable processing costs have been taken as follows:-

<u>Item</u>	<u>Cost per ton ffb.</u> <u>(Dollars)</u>
Production labour	2.5
Fuel and sundries	0.4
Maintenance of factory	1.8
Storage and packing	0.3
	<u>5.0</u>

Crop transport to the factories is at present carried out by contractors. Contracts specify delivery to a stated factory and contractors are paid additional mileage allowance of 15 cents per ton-mile if fruit has to be diverted to another factory. Transport costs will therefore vary according to individual conditions. Under commercial conditions fruit transport costs have been estimated at \$4 per ton ffb and this cost has been used to estimate total fruit transport cost shown in Table H.27.

#### Product Distribution

The South East Johor area lies between 20 and 50 miles of the port being constructed at Johor Baharu. FLDA is planning to construct a bulk palm oil storage facility and jetty at this port and it is assumed that all FLDA palm oil from the project area will be exported via this route. Costs are assumed to be:-

	<u>Oil</u> <u>(Dollars per ton)</u>	<u>Kernels</u> <u>(Dollars per ton)</u>
Transport to port (at 14 cents per ton mile) to Johor Baharu - 80 miles return	11.2	
to Singapore/Johor Baharu - 100 miles return		14.0
Port Charges	<u>8.0</u>	<u>6.0</u>
	<u>19.2</u>	<u>20.0</u>

Present port charges on oil in Singapore are rather higher than \$8 per ton but with an installation at Johor Baharu and higher volumes they are expected to fall. Packing costs of kernels have been included in processing costs. Distribution costs are given in Table H.28.

#### Rubber Processing and Distribution

FLDA is at present reviewing its position on rubber processing in South Johor. At the present time, processing is being carried out by the private sector but with several schemes now mature output will rise rapidly and consideration is being given to constructing a central factory. FLDA currently levy a charge of 7 cents per pound for processing and distribution in the absence of a decision on size and location of processing facilities, this has been used to produce an estimate of total cost for proposed schemes (see Table H.29).

#### Water Supply

Water supply costs have been divided into two components:

- delivering water from source to the village, including required storage systems.
- Village reticulation.

Main supply costs have been taken from total water supply costs in the project area detailed in Supporting Volume 2 to the Master Plan. An attempt was made to isolate those costs attributable to FLDA development. These approximate to \$450,000 per village, except in southern Tanjong Pengerang where combined agricultural and tourist development and the small size of other catchments south of the S. Lebam mean that a storage reservoir is considered to be required to maintain adequate supply to the region.

Reticulation. Costs per village have been taken as follows:-

<u>Village size</u> <u>(number of agricul-</u> <u>tural settlers)</u>	<u>Costs of water</u> <u>reticulation</u> <u>(dollars)</u>
300	40,000
400	45,000
500	50,000
600	60,000
700	70,000

Total costs for these two components are given in Table H.22.

TABLE H.1

Oil Palm Development Costs (Dollars Per Planted Acre)

	Year of Scheme				
	1	2	3	4	5
Clearance	75	75			
Terracing Draining		30			
Cover Crop		65			
Planting		55			
Planting Material		105			
Fertilisers and Chemicals		5	40.0	55.0	55.0
Roads and Bridges		45		98.7	
Casual Labour			117.5		
Settler Labour (Maintenance)			14.0	84.1	63.8
(Harvesting)					20.0
(Subsistence)			6.7		
<b>T O T A L</b>	<b>75</b>	<b>380</b>	<b>178.2</b>	<b>237.8</b>	<b>138.8</b>
<b>CUMULATIVE TOTAL</b>	<b>75</b>	<b>455</b>	<b>633.2</b>	<b>971.0</b>	<b>1109.8</b>

TABLE H.2

Rubber Development Costs (Dollars Per Planted Acre)

	Year of Scheme							
	1	2	3	4	5	6	7	8
Clearance	78	82						
Terracing Draining		46						
Cover Crop		90						
Planting		75						
Planting Material			0.5	0.4	0.4			
Fertilisers and Chemicals		4	23.5	27.0	38.0	29	35.0	35.0
Roads and Bridges		10			27.5			
Casual Labour			164.5					
Settler Labour (Maintenance)			14.5	104.0	75.4	87	58.0	49.3
(Harvesting)								
(Subsistence)			6.8	-	8.1	-	25.5	34.2
<b>T O T A L</b>	<b>78</b>	<b>307</b>	<b>209.8</b>	<b>131.4</b>	<b>149.4</b>	<b>116</b>	<b>118.5</b>	<b>118.5</b>
<b>CUMULATIVE TOTAL</b>	<b>78</b>	<b>385</b>	<b>594.8</b>	<b>726.2</b>	<b>875.6</b>	<b>991.6</b>	<b>1110.1</b>	<b>1228.6</b>

TABLE H.3

Oil Palm - Clearing And Planting Cost  
(Thousand Dollars)

Scheme	1971	1972	1973	1974	1975	1976	1977	1978
S. Semenchu	517.5	1863	810.7	681.4				
Papan Timor								
S. Mas		165	594.0	258.5	217.2			
Pengeli Timor		420	1512.0	658.0	553.0			
Bt. Adela			367.5	1323.0	575.7	483.9		
Bt. Sening			457.5	1647.0	716.7	602.4		
S. Sebol			270.0	972.0	423.0	355.5		
Bt. Kledang				375.0	1350.0	587.5	493.7	
Bt. Tunggal				225.0	810.0	352.5	296.2	
Kahang Barat				285.0	1026.0	446.5	375.2	
Bt. Wah Ha					427.5	1539.0	669.7	562.9
Simpang Wah Ha					412.5	1485.0	646.2	543.1
Kahang Timor					300.0	1080.0	470.0	395.0
T O T A L	517.5	2448	4011.7	6424.9	6511.7	6932.2	2951.2	1501.0

TABLE H.4

Oil Palm Planting Materials (Thousand Dollars)

Scheme	1972	1973	1974	1975	1976
S. Semenchu	724.5				
Papan Timor					
S. Mas		231.0			
Bt. Adela			514.5		
Bt. Sening			640.5		
Bt. Kledang				525.0	
Bt. Tunggal				315.0	
Bt. Wah Ha					598.5
Simpang Wah Ha					577.5
Pengeli Timor		588.0			
S. Sebol			378.0		
Kahang Barat				399.0	
Kahang Timor					420.0
T O T A L	724.5	819.0	1533.0	1239.0	1596.0

TABLE H.5

Rubber Clearing and Planting Costs (Thousand Dollars)

Scheme	1972	1973	1974	1975	1976	1977	1978
Papan Timor	397.8	1545.3	838.9	-	140.2		
S. Mas	319.8	1242.3	674.4	-	112.7		
Bt. Sening		70.2	272.7	148.0	-	24.7	
Bt. Kledang			624.0	242.4	131.6	-	22.0
Bt. Aping (Ext.)			78.0	303.0	164.5	-	27.5
<b>T O T A L</b>	<b>717.8</b>	<b>2857.8</b>	<b>2488.1</b>	<b>693.4</b>	<b>549.1</b>	<b>24.7</b>	<b>49.5</b>

TABLE H.6

Development Costs - Fertiliser (Thousand Dollars)

Scheme	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
S. Semenchu	34.5	276.0	379.5	379.5						
Papan Timor R		20.4	119.8	137.7	193.8	147.9	173.5	178.5		
S. Mas R		16.4	19.3	110.7	155.8	118.9	143.5			
O.P.		11.0	88.0	121.0	121.0					
Bt. Adela			24.5	196.0	269.5	269.5				
Bt. Sening R			3.6	21.2	24.3	34.2	26.1	31.5	31.5	
O.P.			30.5	244.0	335.5	335.5				
Bt. Kledang R				3.2	18.8	21.6	30.4	23.2	28.0	28.0
O.P.				25.0	200.0	275.0	275.0			
Bt. Tunggal				15.0	120.0	165.0	165.0			
Bt. Wah Ha					28.5	228.0	313.5	313.5		
Simpang Wah Ha					27.5	220.0	302.5	302.5		
Pengeli Timor		28.0	224.0	308.0	308.0					
S. Sebol			18.0	144.0	198.0	198.0				
Kahang Barat				19.0	152.0	209.0	209.0			
Kahang Timor					20.0	160.0	220.0	220.0		
Bt. Aping				4.0	23.5	27.0	38.0	29.0	35.0	35.0
<b>T O T A L</b>	<b>34.5</b>	<b>351.8</b>	<b>1081.4</b>	<b>1728.3</b>	<b>2196.2</b>	<b>2382.6</b>	<b>1901.5</b>	<b>1098.2</b>	<b>94.5</b>	<b>63.0</b>

TABLE H.7

## Payments To Settler (Thousand Dollars)

Scheme	1973	1974	1975	1976	1977	1978	1979	1980	1981
S. Semenchu	142.8	580.3	701.7						
Papan Timor		108.6	530.4	425.8	443.7	425.8	425.8		
S. Mas									
O.P.		45.5	185.0	203.4					
R		87.3	426.4	342.3	356.7	342.3	342.3		
Bt. Adela			101.4	412.1	498.3				
Bt. Sening			126.3	513.0	620.4				
O.P.									
R			19.2	93.6	75.1	78.1	75.1	75.1	
Bt. Kledang				103.5	420.5	508.5			
O.P.									
R				17.0	83.2	66.8	69.6	66.8	66.8
Bt. Tungal				62.1	252.3	305.1			
Bt. Wah Ha					118.0	479.4	579.7		
Simpang Wah Ha					113.8	462.5	559.3		
Bt. Aping				21.3	104.0	83.5	87.0	83.5	83.5
Pengeli Timor		115.9	471.0	569.5					
S. Sebol			74.5	302.8	366.1				
Kahang Barat				78.7	319.6	386.5			
Kahang Timor					82.8	336.4	406.8		
<b>TOTAL</b>	<b>142.8</b>	<b>937.7</b>	<b>2635.9</b>	<b>3145.2</b>	<b>3854.6</b>	<b>3475.0</b>	<b>2541.8</b>	<b>225.4</b>	<b>150.3</b>

TABLE H.8

## Field Maintenance Costs (Thousand Dollars)

Year	Oil Palm	Rubber
1975		
1976	435	
1977	993	
1978	2066	
1979	3103	
1980	4423	
1981	4821	267
1982	5082	293
1983	5229	345
1984	5221	345
1985	5203	345
1986	5168	345
1987	5117	345
1988	5046	345
1989	4975	345
1990	4904	345
1991	4834	345
1992	4745	345
1993	4692	345
1994	4621	345
1995	4550	345

TABLE H.9

## Standard Costs - Salaries Emoluments, Etc

Category	Monthly Salary Range	Average Annual Salary	E.P.F. (10 per cent of salary)	Medical Fees	Travelling etc. at 5 percent salary	TOTAL	Contingencies 10 percent	Unit Costs	
Manager	1000-1600	15,600	1,560	240	780	18,180	1,818	19,998	say 20,000 per year
Assistant Manager	450-630	6,480	648	240	324	7,692	769	8,461	say 8,460 per year
Senior Supervisor	300-500	4,800	480	240	240	5,760	576	6,336	say 6,340 per year
Field Assistant/Settler Development Field Assistant/Secretary	150-330	2,448	244	240	122	3,054	305	3,359	say 3,360 per year
Clerk	200-500	4,200	420	240	210	5,070	507	5,577	say 5,580 per year
Driver	120-160	1,680	168	240	84	2,172	217	2,389	say 2,390 per year
Peon	100	1,200	120	240	60	1,600	160	1,760	say 1,760 per year

Source: FLDA Jengka Stage II and Consultant's Estimates.

TABLE H.10 Total Management Requirements And Costs

Post	1971	1972	1973	1974	1975	1976	1977 onwards
Managers	1	4	7	10	13	13	13
Assistant Managers	-	2	8	13	17	21	24
S. Supervisors	1	8	22	45	63	78	87
Field Assistants	3	16	45	87	125	155	174
Settler Development Assistant	-	-	2	8	14	20	26
Cost (Thousand Dollars)							
Managers	20.0	80.0	140.0	200.0	260.0	260.0	260.0
Assistant Managers	-	16.9	67.7	110.0	143.8	177.7	203.0
S. Supervisors	6.3	50.7	139.5	285.3	399.4	494.5	551.6
Field Assistants	10.1	53.8	151.2	292.3	420.0	520.8	584.6
Settler Development Assistant	-	-	6.7	26.9	47.0	67.2	87.4
TOTAL	36.4	201.4	505.1	914.5	1270.2	1520.2	1686.6

TABLE H.11 Office Staff - Numbers And Cost

Post	1973	1974	1975	1976	1977 onwards
(a) Numbers					
Clerk	3	11	18	24	30
Secretary	2	8	12	16	20
Driver	6	23	38	52	66
Peon	3	11	18	25	32
Cost (Thousand Dollars)					
Clerk	16.7	61.4	100.4	133.9	173.9
Secretary	6.7	26.9	40.3	53.8	70.0
Driver	14.3	55.0	90.8	124.3	162.0
Peon	5.3	19.4	31.7	44.0	56.0
TOTAL	43.0	162.7	263.2	356.0	462.0

TABLE H.12

## Staff Quarters And Office Building Standard Cost And Construction Time-Table Per Scheme

	Standard Cost Per Unit		
	Building	Furniture	Total
			(Dollars)
1. Temporary Offices/Store	3,200	500	3,700
2. Temporary Staff Quarters	2,000	300	2,300
3. Conversion cost for temporary office to store	300	-	300
4. Conversion cost for temporary quarters	300	-	300
5. Permanent office plus Garage	15,000	600	15,600
6. Permanent Staff Quarters:			
(i) Manager	17,000	1,500	18,500
(ii) Assistant Manager	9,000	1,000	10,000
(iii) S/Supervisor/clerk	5,600	500	6,100
(iv) Field Assistant/Settler Dev. Asst.	4,900	500	5,400
(v) Driver			
	(converted temporary quarters as per 2 and 4 above).		

TABLE H.13 Scheme Costs - Buildings (Thousand Dollars)

Scheme	1972	1973	1974	1975	1976	1977	1978 onwards
S. Semenuhu	23,205	245,335	12,735	12,735	12,735	12,735	12,735
Papan Timor		23,205	203,440	10,740	10,740	10,740	10,740
S. Mas		23,205	233,255	12,155	12,155	12,155	12,155
Pengeli Timor		23,205	215,515	11,315	11,315	11,315	11,315
Bt. Adela			18,375	196,175	10,175	10,175	10,175
Bt. Sening			28,035	251,760	13,260	13,260	13,260
S. Sebol			18,375	156,590	8,290	8,290	8,290
Bt. Kledang				23,205	221,185	11,585	11,585
Bt. Tunggal				18,375	138,110	7,410	7,410
Kahang Barat				18,375	172,760	9,060	9,060
Bt. Wah Ha					18,375	208,250	10,750
Simpang Wah Ha					23,205	215,515	11,315
Kahang Timor					18,375	172,760	9,060
<b>T O T A L</b>	<b>23,205</b>	<b>314,950</b>	<b>729,730</b>	<b>711,425</b>	<b>670,680</b>	<b>703,250</b>	<b>137,850</b>

TABLE H.14 Management Costs - II - Vehicles And Equipment Standard Costs

	Capital Costs	Maintenance And Operation Costs (Annual)
Land Rover	\$ 9,200	@ 25 cents per mile for 18,000 miles per year - \$4,500
Tractor	\$15,000	@ \$3.50 per hour per 2,000 hours per year - \$7,000
Generator	\$15,000	@ \$4,800 per annum
Residual Value after 5 years -		
Land Rover	-	\$4,000
Tractor	-	\$2,500

Source: FLDA Jengka Stage II

TABLE H.15

Scheme Costs - Vehicles and Equipment (Thousand Dollars)

Scheme	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Average per year - net
S. Semenuhu	27,075	25,200	93,500	39,300	39,300	39,300	57,000	44,500	69,500	39,300	39,300	39,300	48,150
Papan Timor		10,325	58,700	71,500	39,300	39,300	39,300	44,500	69,500	57,000	39,300	39,300	48,150
S. Mas		10,325	58,700	71,500	39,300	39,300	39,300	44,500	69,500	57,000	39,300	39,300	48,150
Pengeli Timor		27,075	25,200	93,500	39,300	39,300	39,300	57,000	44,500	69,500	39,300	39,300	48,150
Bt. Adela			27,075	25,200	93,500	39,300	39,300	39,300	57,000	44,500	69,500	39,300	48,150
Bt. Sening			27,075	25,200	93,500	39,300	39,300	39,300	57,000	44,500	69,500	39,300	48,150
S. Sebol			27,075	11,500	67,000	27,800	27,800	27,800	45,500	27,800	21,300	27,800	33,700
Bt. Kledang				27,075	25,200	93,500	39,300	39,300	39,300	57,000	44,500	69,500	48,150
Bt. Tunggal				27,075	11,500	67,000	27,800	27,800	27,800	45,500	27,800	45,500	33,700
Bt. Aping				-	-	-	-	-	-	-	-	-	-
Kahang Barat				27,075	11,500	67,000	27,800	27,800	27,800	45,500	27,800	45,500	33,700
Bt. Wah Ha					27,075	25,200	93,500	39,300	39,000	39,300	57,000	44,500	48,150
Simpang Wah Ha					27,075	25,200	93,500	39,300	39,300	39,300	57,000	44,500	48,150
Kahang Timor					27,075	11,500	67,000	27,800	27,800	27,800	45,500	27,800	33,700
<b>T O T A L</b>	<b>27,075</b>	<b>72,925</b>	<b>317,325</b>	<b>418,925</b>	<b>540,625</b>	<b>553,000</b>	<b>600,200</b>	<b>498,200</b>	<b>613,800</b>	<b>594,000</b>	<b>577,100</b>	<b>540,900</b>	<b>520,000</b>

TABLE H.16 Headquarter And Regional Management Costs

Year	Acres Operated In S. Johor	Cost (Thousand Dollars)	Project Area	
			Share of Total (percent)	Cost (Thousand Dollars)
1970	78,500	1,570	-	-
1971	96,000	1,920	30	576
1972	115,000	2,300	35	805
1973	132,500	2,650	40	1,060
1974	148,000	2,960	45	1,332
1975	164,500	3,290	50	1,645
1976	179,500	3,590	46	1,645
1977	194,500	3,890	42	1,645
1978	209,500	4,190	35	1,480
1979	224,500	4,490	24	1,100
1980 on- wards	239,500	4,790	15	700

TABLE H.18 Settler Housing Costs - (Thousand Dollars)

Scheme	No. of Settlers	Year						
		1971	1972	1973	1974	1975	1976	1977
S. Semenuhu	690	13.8	38.8	1051.4				
Papan Timor	650		10.2	28.7	777.1			
S. Mas	630		12.6	35.4	960.0			
Bt. Adela	490			9.8	27.6	746.6		
Bt. Sening	700			14.0	39.4	1066.6		
Bt. Kledang	580				11.6	32.6	883.8	
Bt. Tunggal	300				6.0	16.9	457.1	
Bt. Wah Ha	570					11.4	32.1	868.5
Simpang Wah Ha	550					11.0	30.9	838.1
Bt. Aping	100				2.0	5.6	152.4	
Pengeli Timor	560		11.2	31.5	853.3			
S. Sebol	360			7.2	20.2	548.5		
Kahang Barat	380				7.6	21.4	579.2	
Kahang Timor	520					8.0	22.5	609.5
<b>T O T A L</b>		<b>13.8</b>	<b>72.8</b>	<b>1178.0</b>	<b>2704.7</b>	<b>2468.7</b>	<b>2157.8</b>	<b>2316.1</b>

TABLE H.17 Housing And Houselot Development  
(Costs Per Settler/Dollars)

	Year			Total
	1	2	3	
Site Felling and burning	20.0	1.25		21.2
Destumping		55.0		55.0
Levelling			23.7	
House			1500.0	1500.0
<b>T O T A L</b>	<b>20.0</b>	<b>56.2</b>	<b>1523.7</b>	<b>1600.0</b>

TABLE H.19 Village Road Costs (Thousand  
Dollars)

Scheme	Year				
	1973	1974	1975	1976	1977
S. Semenuhu	267				
Papan Timor		213			
S. Mas		249			
Bt. Adela			210		
Bt. Sening			270		
Bt. Aping			30		
Bt. Kledang				234	
Bt. Tunggal				165	
Bt. Wah Ha					231
Simpang Wah Ha					225
Pengeli Timor		228			
S. Sebol			168		
Kahang Barat				174	
Kahang Timor					180
<b>T O T A L</b>	<b>267</b>	<b>690</b>	<b>678</b>	<b>573</b>	<b>636</b>

TABLE H.20 Other Village Land Clearance Costs  
(Dollars Per Acre)

	Year of Scheme	
	1	2
Felling	78	
Burning and Destumping		225
	78	225

TABLE H.21

## Other Village Land Costs (Thousand Dollars)

Scheme	Village Area	No. of Settlers	Houselot Area	Remainder	1971	1972	1973	1974	1975	1976
S. Semenuhu	460	690	172.5	287.5	22,425	64,687				
Papan Timor	430	650	162.5	267.5		20,865	60,187			
S. Mas	420	630	157.5	262.5		20,475	59,062			
Bt. Adela	330	490	122.5	207.5			16,185	46,688		
Bt. Sening	470	700	175.0	295.0			23,010	66,375		
Bt. Kledang	380	580	145.0	235.0				18,330	52,875	
Bt. Tunggal	200	300	75.0	125.0				9,750	28,125	
Bt. Wah Ha	380	570	142.5	237.5					18,525	53,437
Simpang Wah Ha	360	550	137.5	222.5					17,355	50,063
Pengeli Timor	370	560	140.0	230.0		17,940	51,750			
S. Sebol	240	360	90.0	150.0			11,700	33,750		
Kahang Barat	250	380	95.0	155.0				12,090	34,875	
Kahang Timor	350	520	130.0	220.0					171,160	49,500
					22,425	123,967	221,894	186,983	168,915	153,000

TABLE H.22

## Water Supply Costs (Thousand Dollars)

Area	1973	1974	1975	1976	1977	1978	1979	1980
<b>Main Supply</b>								
S. Tanjung Penggerang		2083	1504	370	164	-	2710	975
N. Tanjung Penggerang					900			
S. Johor Tengah		1000						
N. Johor Tengah				450	450			
		3083	1504	820	1514		2710	975
<b>Village Reticulation</b>	69	170	1625	142	157			
<b>T O T A L</b>	69	3253	1666	962	1671		2710	975

TABLE H.23

## Secondary Road Cost (Thousand Dollars)

Clearing Year	Number of Acres	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
1971	6,900		745				373			124				
1972	17,000			1836				918			306			
1973	15,500				1674				837			279		
1974	13,600					1469				734			245	
1975	15,200						1642				821			274
<b>Total</b>			745	1836	1674	1469	2015	918	837	858	1127	279	245	274

TABLE H.24

Oil Palm Processing Facilities, Estimated Capital Cost (Thousand Dollars)

Mill	1974	1975	1976	1977	1978	1979	1980	1981	1982	Total	Final Cost
Ayer Tawar V	1980	1980	1080	1080				540	540		7,200
Bt. Sening			2520	2520	1080	1080					7,200
Simpang Wah Ha					2520	2520	1080	1080			7,200
Pengeli Timor			1620	1620	540	540					4,320
Kahang Timor				1440	1440	540	540				7,200 <sup>+</sup>
Total	1980	1980	5220	6660	5580	4680	1620	1620	540		33,120

<sup>+</sup> Final phases to be constructed later, see Appendix F.

TABLE H.25

Oil Palm Processing - Fixed Costs

Staff/Item	Dollar per month	Annual cost (Dollars)
Engineer	1,500	18.0
Assistant Engineer	850	10.0
Chief Clerk	600	7.2
Junior Clerk	400	4.8
Factory Conductor	500	6.0
Store Clerk	350	4.0
Laboratory Analyst	300	3.6
Fitter Foreman	300	3.6
Electrical Charginan	400	4.8
15 others at an average of	200	36.0
		95.2
	say	100.0
Medical, welfare, allowance (15 percent of salaries)		15
Insurance and office expenses		7
Water and light-office and staff quarters		6
Maintenance of offices, workshops, quarters etc and other expenses		32
Operation of effluent treatment plant		25
		185

TABLE H.26 Oil Palm Mills: Fixed Costs (Thousand Dollars)

Scheme	1975	1976	1977	1978	1979	1980 onwards
S. Semenchu	79	79	79	79	79	79
S. Mas		25	25	25	25	25
Pengeli Timor		64	64	64	64	64
Bt. Adela			56	56	56	56
Bt. Sening			70	70	70	70
S. Sebol			41	41	41	41
Bt. Kledang				57	57	57
Bt. Tunggal				34	34	34
Kahang Barat				44	44	44
Bt. Wah Ha					66	66
Simpang Wah Ha					63	63
Kahang Timor					46	46
<b>T O T A L</b>	<b>79</b>	<b>168</b>	<b>335</b>	<b>470</b>	<b>645</b>	<b>645</b>

TABLE H.27 Oil Palm - Fruit Transport and Variable Processing Costs

Year	Fruit Transport (Thousand Dollars)	Variable Processing (Thousand Dollars)
1975	55.2	69.0
1976	215.4	269.3
1977	489.7	612.1
1978	891.5	1114.3
1979	1378.6	1723.2
1980	1822.9	2278.6
1981	2088.2	2610.3
1982	2261.8	2827.2
1983	2360.2	2950.3
1984	2354.7	2943.4
1985	2343.0	2928.7
1986	2319.2	2899.0
1987	2285.2	2856.5
1988	2238.3	2797.8
1989	2190.5	2736.1
1990	2148.2	2679.0
1991	2096.7	2620.9
1992	2037.4	2546.7
1993	2002.4	2502.9
1994	1954.6	2443.3
1995	1907.3	2384.1

TABLE H.28 Oil Palm Products - Distribution Costs

Year	Distribution Costs (Thousand Dollars)
1975	53.8
1976	227.2
1977	531.2
1978	1001.6
1979	1593.2
1980	2172.4
1981	2563.4
1982	2827.2
1983	2979.6
1984	2972.6
1985	2958.0
1986	2927.8
1987	2835.4
1988	2825.8
1989	2765.6
1990	2705.8
1991	2646.4
1992	2587.2
1993	2528.2
1994	2488.0
1995	2407.6

TABLE H.29 Rubber Processing and Distribution Costs

Year	Cost (Thousand Dollars)
1980	373.8
1981	646.6
1982	900.2
1983	1062.2
1984	1151.9
1985	1237.5
1986	1314.2
1987	1393.4
1988	1412.2
1989	1425.0
1990	1425.0
1991	1425.0
1992	1425.0
1993	1545.6
1994	1557.8
1995	1523.1

Table 1. Rubber Production, 1950-1959

Year	Film Cost (Thousands of Dollars)	Production (Millions of Pounds)	Value (Millions of Dollars)	Total Value (Millions of Dollars)
1950	1,271	1,000	1,000	2,271
1951	1,316	1,000	1,000	2,316
1952	1,350	1,000	1,000	2,350
1953	1,385	1,000	1,000	2,385
1954	1,420	1,000	1,000	2,420
1955	1,455	1,000	1,000	2,455
1956	1,490	1,000	1,000	2,490
1957	1,525	1,000	1,000	2,525
1958	1,560	1,000	1,000	2,560
1959	1,595	1,000	1,000	2,595
Total	14,000	10,000	10,000	24,000

# APPENDIX I

Table 2. Rubber Production, 1950-1959

Year	Production (Millions of Pounds)
1950	1,000
1951	1,000
1952	1,000
1953	1,000
1954	1,000
1955	1,000
1956	1,000
1957	1,000
1958	1,000
1959	1,000
Total	10,000

Table 3. Rubber Production, 1950-1959

Year	Film Cost (Thousands of Dollars)	Total Value (Millions of Dollars)
1950	1,271	2,271
1951	1,316	2,316
1952	1,350	2,350
1953	1,385	2,385
1954	1,420	2,420
1955	1,455	2,455
1956	1,490	2,490
1957	1,525	2,525
1958	1,560	2,560
1959	1,595	2,595
Total	14,000	24,000

## APPENDIX I

TABLE I.1

FLDA - SE Johor Oil Palm Revenues

Year	Palm Oil (Thousand tons)	F.O.B. Value (Dollars per ton)	Kernel Output (Thousand tons)	F.O.B. Value (Dollars per ton)	Total Value (Thousand Dollars)
1975	2.21	420	0.48	370	1,106
1976	9.38	410	1.98	368	4,574
1977	21.93	400	4.63	366	10,467
1978	41.36	390	8.72	364	19,305
1979	65.88	385	13.80	362	30,352
1980	89.93	380	18.69	360	40,902
1981	106.26	376	21.91	358	47,798
1982	117.34	372	24.02	357	52,226
1983	123.91	369	25.07	355	54,623
1984	123.62	365	25.01	353	53,950
1985	123.00	361	24.90	351	53,143
1986	121.76	358	24.63	350	52,211
1987	119.98	354	24.29	348	50,926
1988	117.49	351	23.80	346	49,474
1989	115.01	347	23.27	344	47,913
1990	112.52	344	22.77	343	46,517
1991	110.07	340	22.25	341	45,011
1992	107.59	337	21.77	339	43,638
1993	105.13	333	21.28	337	42,180
1994	102.62	330	20.78	336	41,183
1995	100.14	327	20.26	334	39,513

TABLE I.2 FLDA - SE Johor Rubber Yields

Year of Scheme	Dry Rubber Yield (Pounds per acre)
9	550
10	900
11	1,130
12	1,275
13	1,350
14	1,440
15	1,530
16	1,620
17	1,620
18	1,620
19	1,620
20	1,620
21	1,620
22	1,800
23	1,800
24	1,710
25	1,710
26	1,620
27	1,620
28	1,530
29	1,530
30	1,440

TABLE I.3 FLDA - SE Johor Rubber Output

Year	Dry Rubber Output (Million pound)	F.O.B. Value (Dollars per pound)	Total Value (Thousand Dollars)
1980	5,340.5	0.50	2,670
1981	9,237.5	0.50	4,619
1982	12,860.4	0.50	6,430
1983	15,173.5	0.50	7,587
1984	16,456.5	0.50	8,228
1985	17,678.9	0.50	8,839
1986	18,774.1	0.50	9,387
1987	19,905.7	0.50	9,954
1988	20,174.6	0.50	10,087
1989	20,357.7	0.50	10,179
1990	20,357.7	0.50	10,179
1991	20,357.7	0.50	10,179
1992	20,357.7	0.50	10,179
1993	22,080.0	0.50	11,040
1994	22,254.9	0.50	11,127
1995	21,758.2	0.50	10,879

APPENDIX J

1. Rubber

The rubber market is an interesting example of the overall state of affairs. The other source is from an article in the Rubber Age which the author has personally seen. The author is a well known rubber expert. The author is a well known rubber expert. The author is a well known rubber expert.

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APPENDIX J

TABLE 1. Rubber

	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56
Natural	1,141	1,080	1,020	960	900	840
Synthetic	1,000	1,000	1,000	1,000	1,000	1,000
Total	2,141	2,080	2,020	1,960	1,900	1,840

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TABLE 2. Rubber Consumption in the United States

	1950	1951	1952	1953	1954	1955
Total	100	100	100	100	100	100
Natural	50	50	50	50	50	50
Synthetic	50	50	50	50	50	50

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## MARKET REVIEW FOR RUBBER AND OIL PALM

## 1. Rubber

Natural rubber is an important component of the overall supply of elastomers. The other source is from so-called synthetic rubbers which are produced primarily from by-products of petroleum refining. Elastomers are used for a wide variety of purposes, the most important of which is in tyres for moving vehicles. Other uses exist in foot-wear, hoses and piping, belting, wire and cable insulation, flooring and foam products.

Not all elastomers are equally suitable for any one of these purposes. Each of the synthetics has particular individual characteristics which limit its use. Styrene-butadiene rubber (S.B.R.) is the most widely produced as well as being the cheapest of the general-purpose synthetics. However its resilience is less than that of natural rubber. Polyisoprene rubber is most like natural rubber in its characteristics but is only produced on a relatively small scale at present.

Trends in production and use of natural and synthetic rubbers over the past two decades are shown in Table 1.

TABLE 1. World Consumption of Natural and Synthetic Rubber  
(Thousand Tons)

	1953-55	1955-57	1961-63	1965-67	1968 (pre- lim)	Annual rate of growth 1954-1968
Natural	1,746	1,860	2,135	2,340	2,772	3.0
Synthetic	1,292	1,420	2,704	3,960	4,651	10.0
Total	3,038	3,280	4,839	6,300	7,423	6.5

Total consumption of rubbers expanded at about 6.5 percent per annum between 1954 and 1968. But this growth was not equally shared between natural and synthetics. While natural rubber consumption rose by about three percent per annum that of synthetics forged ahead at ten percent. As a result the share of natural in the overall elastomer market fell steadily. (Table 2).

TABLE 2. World Consumption Shares (Percentage) of Natural and Synthetic Rubber 1954-1968

	1954	1956	1962	1966	1968
Natural	58	57	44	37	37
Synthetic	42	43	56	63	63

A number of reasons have been offered for this increased penetration of the market by synthetics:-

(a) Perhaps the major single reason was that more natural rubber was not available. Little planting of rubber took place in the main South East Asian producing region immediately prior to World War II and none during it. Plantations were ravaged. The period after the war was one of instability in the area and planters concentrated on rehabilitating and replanting old holdings rather than extending their acreages. As a result expansion of production was relatively slow.

(b) World War II had the dual effect of spurring the development of techniques of synthetic rubber production and emphasising the

strategic risk for importers in relying on supplies from one area of the world.

(c) Because of their individual characteristics, individual synthetic rubbers are preferred to natural rubber for specific uses at current price differentials.

(d) The marginal cost of producing synthetics is well below average cost because of the heavy capital cost involved. Thus once synthetic capacity is installed it will continue to be used even if natural rubber prices fall. This makes it difficult for natural rubber to recapture lost markets.

(e) Natural rubber prices have traditionally fluctuated widely whereas synthetic prices have been relatively stable. Costs are involved in most processes in switching from one type of rubber to another. Thus given uncertainty about natural prices many users have chosen synthetics. Natural rubber prices during the decade 1950-1960 were generally in the region of 90 cents to \$1.00 per lb. f.o.b. Singapore which was above the price of many

synthetics. Since then it has fallen to about 50 cents per lb. The cost of polyisoprene rubber is thought to be about 66 cents per lb. which gives natural rubber a slight price edge at present.

F.A.O. in its indicative World Plan for Agriculture has projected that total elastomer usage in 1985 will be approximately 18.5 million

tons (Table 3). This represents a growth rate of six percent per annum, just slightly below the rate attained in the recent past. Usage of natural rubber is expected to continue to grow at 3 percent per annum while synthetic usage is expected to grow more slowly in future at 7.5 percent per annum. The market share of natural rubber will therefore continue to drop to only one quarter of total rubber usage.

Production of rubber in Malaysia since 1955, together with projections of output over the next decade made by the Rubber Research Institute, are summarised in Table 4. These show a steady increase in output over the past decade of 5.5 percent per annum, and a projected growth over the next of slightly less (4.7 percent). In fact the period of fastest

TABLE 3. Rubber 1962 Balance and Proposals for 1985

	<u>Utilization</u>		<u>Rate of Growth</u>	<u>Market</u>
	<u>1962</u>	<u>1985</u>	<u>1962-85</u>	<u>Split</u>
	('000 tons)		percent per year	1985
Natural	2,236	4,452	3.0	24
Synthetic	2,724	14,048	7.5	76
Total	4,960	18,500	6.0	100

expected growth has already arrived, 10 percent per annum between 1967 and 1972. This results from the initiation of production on the replanted schemes of the late 1950's. These estimates exclude the effects of novel stimulants such as Ethrel which have just been released. It is estimated that these, used on older trees, could expand output by an additional five percent or more i.e. 100,000 tons in 1980. A continuation of this rate of growth to 1985 would mean production in Malaysia of 2.5-2.7 million tons or 60 percent of the world usage projected by F.A.O. Given expected efforts by other producers to expand output this suggests that the global F.A.O. estimate may be a little on the low side. Whether rubber prices will have to fall to accommodate this increase will be influenced by a number of factors:-

(a) Pressure on oil supplies is resulting in rapidly rising crude oil prices. This together with recent high interest rates, low margins in rubber manufacturing and rapidly rising costs of chemical plants may have resulted in some stretching out of investments in synthetic capacity. Prospects of still higher oil prices is likely to cause some re-evaluation of future investments.

(b) The strategic argument, which worked against natural rubber in the past, may operate in the other direction in the future as rubber users wish not to be completely dependent on oil supplies from unstable areas.

(c) Changes in final products can have considerable effects on demands for individual rubbers. There is a current trend towards radial ply high performance car tyres which have a higher proportion of natural rubber content than conventional tyres. Entirely new markets for elastomers may be developed for example in road surfacings.

(d) The increasing proportion of output in the form of standardized and special rubbers will enable natural rubber to compete more directly with synthetics with guaranteed characteristics, although more work needs to be done to produce rubbers of the required form.

(e) As noted earlier buyers have been inhibited from buying natural rubbers because of price fluctuations. Now that the previous price premium for natural rubber over many synthetics appears to have disappeared permanently they might be more interested in buying on a contractual basis at an agreed price. This would require some modification of existing marketing arrangements to achieve but could pay useful dividends for both producers and consumers.

(f) A major breakthrough could be achieved in synthetic production which could lower production costs dramatically, for example, reduction in the cost of isoprene, the major component of polyisoprene rubbers. This could lower costs to about 45 cents per pound and force down natural rubber prices to 40 cents or lower. However, such a breakthrough is not yet in sight.

Therefore the balance of current and foreseeable forces suggest that market equilibrium between supply and demand in the near future will lie in the range 50-55 cents per pound for R.S.S.I. fob Singapore with the upper limit being determined by synthetic prices. For the

purposes of analysis of profitability of plantings from 1972 onwards the price level only really becomes of interest in 1980 when yields build up. In the analysis outlined in this paper an average fob price of 50 cents per pound has been used throughout.

## 2. Oil Palm

The oil palm is processed to produce two products. The pericarp of the fruit is pressed to produce palm oil and the kernel can also be crushed to yield palm kernel oil, leaving a residual oil-cake which is used as a livestock feed. These two oil products are just two of about 20 types of oils and fats which are used throughout the world. As a result the oils and fats market is an important and highly complex part of the world agricultural economy. Trends in world trade in oils and fats are shown in Table 5.

The total quantities entering world trade have risen from 9 million tons in 1960 to an estimated 13.25 million tons in 1970 or an increase of just under 4 percent per year. All oils have not expanded to the same extent, in fact there have been marked differences between them as can be seen from the table. The major expansion has been in edible vegetable oils, where exports have risen by 100 percent and in particular soyabean, sunflower and rapeseed exported principally by United States, U.S.S.R and Canada respectively. Exports of palm oils have remained virtually static over the decade and as a result have fallen as a proportion of total supplies from 26 percent in 1960 to about 19 percent in 1970. Palm oil itself has fallen from 7.1 percent to 6.4 percent over the same period and palm kernel oil from 4.9 percent to 2.8 percent. This trend is in fact even longer lived since, in the early nineteen-fifties palm oil made up over 15 percent of total world exports of fats and oils. During this same period however the price of palm oil has remained relatively stable relative to other oils and fats (see Table 6). It is expected that production of palm oil will expand more rapidly in the near future. In order to discuss the effect of this on future prices it is necessary to review the nature of fats and oils.

Fats and oils are made up of compound fatty acids which vary in the extent of "saturation" of their carbon atoms. Generally speaking those with a greater degree of saturation melt at higher temperatures. Most vegetable oils such as soyabean, groundnuts, cottonseed and sunflower have a relatively high proportion of unsaturated fatty acids and have fairly low melting points being liquid at normal temperatures. Others (most of the tropical oils) have a lower proportion of unsaturated acids and higher melting points. Coconut oil for example melts in the temperature range 55°F to 75°F, and oil palm in the range 75°F to 88°F. Animal fats similarly have relatively high melting points. Each of the individual oils with its particular combination of fatty acids has as a result its own characteristic smell, colour, taste, etc.

Fats and oils are used in the following ways:-

(a) In their natural state or after slight processing (e.g. purification or refining) without altering their nature. Thus coconut oil and other oils are used for cooking purposes, butter and animal fat as a spread and for cooking.

(b) After processing that changes their

TABLE 4 Summary and Projection of Rubber Production,  
Malaysia (Thousand Tons)

Year	West Malaysia		Total	Annual increase (percent)	East Malaysia	Total
	Estates	Smallholdings				
	(1)	(2)	(1)+(2)	(4)	(5)	(3)+(5)
<u>Summary</u>	(1)	(2)	(3)	(4)	(5)	(6)
1955	352	285	637	8.89	58	695
1956	351	255	606	-4.87	61	667
1957	368	250	618	1.98	59	677
1958	389	249	638	3.24	58	696
1959	407	263	670	5.01	64	734
1960	413	272	685	2.24	67	752
1961	428	278	706	3.06	67	773
1962	438	277	715	1.27	56	771
1963	458	295	753	5.31	65	818
1964	477	314	791	5.05	66	857
1965	491	348	839	6.07	64	903
1966	514	386	900	7.27	57	957
1967	526	397	923	2.55	51	974
1968	563	472	1,035	12.13	48	1,083
1969	603	587	1,190	14.97	68	1,258
<u>Projections</u>						
1970	638	635	1,273	6.97	75	1,348
1971	672	717	1,389	9.11	77	1,466
1972	701	786	1,487	7.05	79	1,566
1973	724	846	1,570	5.58	81	1,651
1974	740	894	1,634	4.08	83	1,717
1975	751	929	1,680	2.82	85	1,765
1976	764	971	1,735	3.27	88	1,823
1977	775	1,013	1,788	3.05	91	1,879
1978	785	1,066	1,851	3.52	94	1,945
1979	791	1,132	1,923	3.89	97	2,020
1980	800	1,200	2,000	4.00	100	2,100

TABLE 5 Oilseeds, Oil and Fats (fat or oil equivalent)  
World Exports (Thousand short tons)

<u>Commodity</u>	<u>1960</u>	<u>1962</u>	<u>1964</u>	<u>1966</u>	<u>1968</u>	<u>1970</u>
<b>(a) Edible Vegetable Oils</b>						
Cottonseed	318	328	429	292	203	375
Groundnut	858	1,084	1,111	1,198	1,268	940
Soybean	1,577	1,654	1,895	1,940	2,233	3,475
Sunflower	268	399	427	836	1,321	1,150
Rapeseed	101	152	145	386	434	500
Sesame	87	98	98	95	101	100
Olive	76	96	125	76	90	100
Other(1)	49	65	77	80	57	50
<b>TOTAL</b>	<b>3,334</b>	<b>3,876</b>	<b>4,307</b>	<b>4,903</b>	<b>5,707</b>	<b>6,690</b>
<b>(b) Palm Oils</b>						
Coconut	1,304	1,374	1,469	1,531	1,380	1,250
Palm kernel	443	401	407	415	348	375
Palm oil	645	560	629	691	736	850
<b>TOTAL</b>	<b>2,392</b>	<b>2,345</b>	<b>2,505</b>	<b>2,643</b>	<b>2,474</b>	<b>2,480</b>
<b>(c) Industrial Oils</b>						
Linseed	468	496	492	491	390	500
Other(2)	251	242	281	247	305	290
<b>TOTAL</b>	<b>719</b>	<b>738</b>	<b>773</b>	<b>738</b>	<b>695</b>	<b>790</b>
<b>(d) Animal Fats</b>						
Butter (fat content)	470	465	562	525	530	520
Lard	470	415	522	334	461	465
Tallow and greases	1,100	1,133	1,549	1,505	1,569	1,475
<b>TOTAL</b>	<b>2,040</b>	<b>2,013</b>	<b>2,633</b>	<b>2,364</b>	<b>2,560</b>	<b>2,460</b>
<b>(e) Marine Oils</b>						
Whale	350	262	220	189	140	135
Fish	251	404	395	559	796	700
<b>TOTAL</b>	<b>601</b>	<b>666</b>	<b>615</b>	<b>748</b>	<b>936</b>	<b>835</b>
<b>GRAND TOTAL</b>	<b>9,086</b>	<b>9,638</b>	<b>10,833</b>	<b>11,396</b>	<b>12,372</b>	<b>13,255</b>

(1) Corn, Safflower.

(2) Castor, Citicica, Tung.

TABLE 6 U.K. Import Prices of Selected Oils and Fats 1958-66  
(pound per ton)

<u>Vegetable Oils</u>	<u>1958</u>	<u>1960</u>	<u>1962</u>	<u>1964</u>	<u>1966</u>
Soybean	105	91	85	89	104
Cottonseed	104	85	92	98	94
Groundnut	104	117	104	105	108
Coconut	106	117	85	105	108
Palm Oil	82	78	78	83	84
<b><u>Marine Oils</u></b>					
Whale	73	74	51	79	64
Fish	84	60	45	71	69
Lard	113	82	79	85	93

characteristics and structure (e.g. hydrogenation, dehydration, etc.) but which retains their basic nature. Thus oils are hydrogenated to produce products which are solid at normal temperature and can be used as spreads.

(c) As fatty acids produced by cracking the compound molecules into simple fatty acids. These are used for a wide variety of industrial purposes such as lubrication, coating materials, dressing of leather and skins, etc.

The degree to which individual fats and oils can be used for different purposes varies widely. Most fats and oils contain approximately the same fatty acids but in varying proportions. As raw materials for the preparation of fatty acids, the nature of which can be altered through hydrogenation, there is almost no limit to their interchangeability, at least as far as the demand for saturated fatty acids is concerned.

In terms of specificity of use, fats and oils may be conveniently divided into four groups:-

(a) Linseed and Castor oil which have highly specific industrial uses.

(b) Liquid edible oils, e.g. groundnut, soyabean etc. These have fairly high "specific" demands and can also be hydrogenated etc. to produce a wide variety of end-products.

(c) Lauric acid oils - coconut and palm kernel. Specific demand for these is relatively strong, both in industrial uses (manufacture of soap and of lauric acid) and in food consumption as an all purpose oil popular in warm countries and as a high grade vegetable fat in temperate countries and for use in special margarines.

(d) Among the remaining fats and oils, tallow and palm oil have similar characteristics, as do marine oils. This group has the least specific demand of all.

The position of the oil palm products may therefore be summarized as follows:-

(1) Palm oil has a low specificity of demand. Other oils and fats can easily be substituted for it should price trends make such a move profitable. On the other hand technical constraints greatly restrict its ability to replace other oils.

(2) Palm kernel oil has much greater specificity in use, and its end-uses as a cooking oil and in soaps and margarines are in products which tend towards the "high-quality" end of their respective ranges.

#### Prospects for palm oil

Table 7 shows recent trends in the production as well as exports of fats and oils. Table 8 shows projections prepared by F.A.O., of world output to 1975 and the comparison of these to outputs in 1961-63. Overall output was seen as increasing from 33 to 46 million tons. The major increase was expected to come from soft oils (edible vegetable oils) which were expected to increase by 50 percent from 13 to 20 million tons per year. Data in Table 7 indicate that production of these oils has already reached this level. Palm oil output was expected by the F.A.O. to rise from 1.2 million to 1.8 million tons per annum. As was seen in Table 7 production of palm oil had hardly grown at all by 1968. However during the period since 1960 considerable planting of oil palm has taken place particularly in Malaysia and Ivory Coast. Increasing production in these two countries has been partly offset by declining production in Nigeria and Congo (Kinshasa). However output from the latter two countries is expected to stabilise and as a result overall quantities of palm oil moving on to export markets will expand rapidly and are

likely to reach 1.8 million tons by 1975.

At the present time prices for oils and fats are at a high level, attained initially in 1969 when supplies of groundnut, sunflower, coconut and marine oils were all down over the previous year reducing total world exports from 12.4 million tons in 1968 to 11.8 million tons in 1969. They have stayed at high levels despite markedly higher shipments of cottonseed, soybean and rapeseed during 1970 raising total supplies to an estimated 13.3 million tons. A similar increase in 1971 would almost certainly result in a general reduction of prices. For reasons discussed above the position of palm oil in the overall market is somewhat weak and given the projected increase in its supply it must be expected to be in the forefront of any decline. In 1968 supplies of all fats and oils increased by just over four percent, while palm oil exports rose by over 20 percent. While the prices of all oil fell, palm oil showed a particularly marked decline, and differentials between it and other oils widened.

It is expected that the export price of palm oil (fob Malaysia) will have fallen to \$420 by 1975 as output of palm oil is expected to expand more rapidly than most other fats and oils. Output of palm oil in 1975 is virtually determined by the acreage of the crop planted at present. Changes made now or in the immediate future will have their impact upon supplies in the years after 1975. Longer term demand trends will depend upon the strength of the following factors:-

(a) Those acting to weaken the position of palm oil:

(1) Trends in consumer preference towards those products for which palm oil is not specifically required and cannot easily be used.

(2) The relative ease of expanding production of oil bearing annual crops such as sunflower and soybeans.

(3) The fact that, for several of the major vegetable oils, oil is to some degree a by-product. For example, soybean and sunflower are crushed to provide a meal fed to livestock as well as oil. Increases in demand for livestock products have resulted in a considerable growth in this market and have been a major influence on the increase in output of soybeans in particular. Thus the impact on producers of a fall in oil price is reduced.

(4) Actions by governments to protect producers from world market fluctuations, particularly in North America, Europe and U.S.S.R. These have taken the form of concessional sales of products in third markets e.g. P.L. 480 sales of soybean oil to India, Pakistan and countries in the Middle East and North Africa. Furthermore although the income elasticity of demand for fats and oils by developing countries is high, these markets are often restricted by exchange control as well as concessional sales.

(b) Those acting to strengthen the position of palm oil:

(1) The oil palm is by far the greatest oil producer of all vegetative plants in terms of output per acre. Technological improvement will obviously improve its output further and reduce production costs.

(2) Possible developments in processing to widen the end-uses of the products e.g. improvements in cracking the oil into specific

TABLE 7 Estimated Production and Exports of Palm and Other Major Categories of Vegetable, Animal and Marine Fats and Oils with Proportions of total average 1960-64 and 1966-68 annual

Item	1960-64 average		1966		1967		1968 (est.)	
	Million short tons	Percent						
<b>Production</b>								
<b>Palm oils:</b>								
Palm kernel.....	.46	1.3	.44	1.1	.38	1.0	.39	1.0
Palm.....	1.52	3.9	1.38	3.6	1.24	3.2	1.40	3.5
Other.....	2.42	7.0	2.58	6.7	2.34	5.9	2.22	5.5
<b>Total.....</b>	<b>4.20</b>	<b>12.2</b>	<b>4.40</b>	<b>11.4</b>	<b>3.96</b>	<b>10.1</b>	<b>4.01</b>	<b>10.0</b>
Edible vegetable oils.....	15.14	44.1	18.02	46.5	18.68	47.7	19.62	48.9
Industrial oils.....	1.59	4.6	1.80	4.6	1.60	4.1	1.41	3.5
Animal fats.....	12.28	35.7	13.22	34.2	13.61	34.7	13.82	34.4
Marine oils.....	1.18	3.4	1.26	3.3	1.35	3.4	1.30	3.2
<b>Total.....</b>	<b>34.39</b>	<b>100.0</b>	<b>38.70</b>	<b>100.0</b>	<b>39.20</b>	<b>100.0</b>	<b>40.16</b>	<b>100.0</b>
<b>Exports</b>								
<b>Palm oils:</b>								
Palm kernel.....	.41	4.1	.41	3.6	.30	2.6	.32	2.7
Palm.....	.61	6.1	.68	6.0	.55	4.7	.60	5.0
Other.....	1.42	14.3	1.53	13.6	1.30	11.1	1.19	9.9
<b>Total.....</b>	<b>2.44</b>	<b>24.5</b>	<b>2.62</b>	<b>23.2</b>	<b>2.15</b>	<b>18.4</b>	<b>2.11</b>	<b>17.6</b>
Edible vegetable oils.....	3.63	36.5	4.78	42.5	5.25	44.9	5.53	46.1
Industrial oils.....	.74	7.4	.74	6.6	.73	6.2	.66	5.5
Animal fats.....	2.31	23.2	2.37	21.1	2.65	22.6	2.75	22.9
Marine oils.....	.84	8.4	.74	6.6	.92	7.9	.95	7.9
<b>Total.....</b>	<b>9.96</b>	<b>100.0</b>	<b>11.25</b>	<b>100.0</b>	<b>11.70</b>	<b>100.0</b>	<b>12.00</b>	<b>100.0</b>
<b>Exports as a percentage of production</b>								
----- Percent -----								
<b>Palm oils:</b>								
Palm kernel.....	89		93		79		82	
Palm.....	46		49		44		43	
Other.....	59		59		56		54	
<b>Total.....</b>	<b>58</b>		<b>60</b>		<b>54</b>		<b>53</b>	
Edible vegetable oils.....	24		27		28		28	
Industrial oils.....	47		41		46		47	
Animal fats.....	19		18		19		20	
Marine oils.....	71		59		68		73	
<b>Total.....</b>	<b>29</b>		<b>29</b>		<b>30</b>		<b>30</b>	

Compiled from data in Foreign Agricultural Circular FFO-1-69, January 1969.

TABLE 8 Fats and Oils: World Production by type,  
Average 1961-63 and Projections for 1975, Low Assumption

Oil or Fat	Average 1961-63				1975			
	World	Developed countries	Centrally planned countries	Developing 1/ countries	World	Developed countries	Centrally planned countries	Developing 1/ countries
	Million tons							
Butter	4.51	2.55	1.09	0.88	5.95	3.36	1.54	1.05
Lard	4.94	2.26	2.34	0.34	6.42	2.74	3.18	0.49
<b>SOFT OILS</b>								
Groundnut oil	2.56	0.10	0.35	2.11	4.02	0.15	0.51	3.36
Soybean oil	3.83	2.99	0.81	0.04	6.51	5.14	1.11	0.27
Cottonseed oil	2.21	0.95	0.54	0.71	2.91	1.10	0.80	1.01
Rapeseed oil	1.29	0.27	0.48	0.54	1.88	0.53	0.63	0.72
Sunflowerseed oil	1.98	0.05	1.74	0.19	3.29	0.09	2.97	0.23
Olive oil	1.30	1.13	0.01	0.16	1.49	1.25	0.01	0.23
Total	13.17	5.49	3.93	3.75	20.10	8.25	6.02	5.83
<b>LAURIC ACID OILS</b>								
Coconut oil	2.08	0.18	-	1.90	2.62	0.22	-	2.40
Palm kernel oil	0.48	-	-	0.48	0.61	-	-	0.61
Total	2.56	0.18	-	2.38	3.23	0.22	-	3.01
<b>HARD OILS</b>								
Marine oils	1.02	0.53	0.04	0.45	0.81	0.48	0.05	0.28
Palm oil	1.17	-	-	1.17	1.78	-	-	1.78
Tallow	3.55	2.73	0.35	0.47	4.80	3.73	0.48	0.60
Total	5.74	3.26	0.39	2.09	7.39	4.21	0.53	2.66
<b>INDUSTRIAL OILS 2/</b>	1.29	0.43	0.19	0.67	1.44	0.35	0.23	0.86
<b>OTHER FATS AND OILS 3/</b>	0.83	0.23	0.15	0.44	1.13	0.34	0.18	0.62
<b>GRAND TOTAL</b>	<b>33.04</b>	<b>14.40</b>	<b>8.09</b>	<b>10.55</b>	<b>45.65</b>	<b>19.46</b>	<b>11.63</b>	<b>14.51</b>

1/ Including Antarctic.

2/ Linseed, Castorseed and Tung oils.

3/ Includes all oils of minor importance not shown separately above.

F.A.O. Agricultural Projections 1975-1985.

fractions and possibly the development of a technique for "dehydrogenating" the heavier fractions of the oil.

It is within this demand framework that supply decisions must now be made. The F.A.O. Indicative World Plan has suggested that Malaysia will plant 30,000 acres of oil palms per annum in the 1970-75 period and 35-50,000 acres per annum in 1975-1985, to achieve total acreages of more than 1 million by 1975 and about a million by 1985. This development would yield an output of at least 1.5 million tons in 1985, (not 0.8 million tons as specified in the Plan). This would amount to approximately 40 percent of world production of palm oil of about 3.7-4.0 million tons (about 3.6 million tons in study countries, plus 200,000 tons or more in others, particularly Indonesia). This would mean a growth in world production of about 5.5 percent per annum over the 1970-85 period. In the absence of a technological breakthrough which could dramatically increase the potential market for oil palm (which cannot be predicted with any accuracy) it is anticipated that the price trend of palm oil will be downward in the long-term as follows:-

Dollars

1975	420 (fob Singapore 5 percent F.F.A)
1980	380
1985	361
1990	344

The Project proposals in terms of oil palm acreages planted are based essentially upon a planting programme of the above order of magnitude.

Prospects for palm kernels

It was noted earlier that palm kernel oil has a much greater specificity of demand than palm oil, and that it and coconut oil are favoured for a number of uses particularly as a cooking oil in tropical Asia. As seen in Tables 5 and 7 output and exports of coconut oil have been virtually unchanged over the past decade due partly to increasing age of palms in most producing areas, and partly to adverse weather conditions in the Philippines, the largest single producer, which has resulted in considerable damage to that country's crop.

A steady growth in demand for palm kernel oil is anticipated, and the price of both





ECONOMIC EVALUATION

An evaluation of the proposed project has been made using resource values. Such analyses usually call for appropriate adjustments in labour costs and foreign exchange costs:-

(a) Labour cost. Estimate made by the Economic Planning Unit have suggested that the marginal productivity of labour in rural areas in West Malaysia is approximately \$40 per month. This value has been taken as the value of unskilled labour to the economy in the preparation of the Second Malaysian Plan and it has been agreed to take this value for current project evaluations.

(b) Foreign exchange. By international standards the Malaysian economy is extremely open, and levels of tariffs and export taxes are relatively modest. Calculations have suggested that a premium of about three percent should be used for foreign exchange earnings. However, it is felt that given the ambiguities surrounding calculations such a distortion is negligible. In addition Malaysia has traditionally maintained a strong current account surplus and has continued to do so in the past decade in the face of deteriorating terms of trade. Future terms of trade movements are expected to be more favourable and the economy should not suffer any shortage of foreign exchange.

In this study therefore adjustments have been made for unskilled labour only. These have been as follows:-

(a) Clearing and planting costs. Project estimates have suggested that approximately seventy-five percent of the cost, excluding planting material, fertilisers and chemicals, consists of unskilled labour, assuming that manual clearance methods are used. The total cost has therefore been reduced by one-half on the basis of current wage rates of about \$120 per month.

(b) Settler labour. This has been costed at \$480 per settler per year throughout.

(c) Oil palm processing. Variable processing costs contain about thirty percent unskilled labour. This cost has therefore been reduced by twenty percent to reflect the shadow wage.

(d) Rubber processing and distribution. This is estimated to have an unskilled labour content of about fifteen percent. Total cost has

been reduced by ten percent.

Other adjustments made to estimate costs actually attributable to the project were:-

Infrastructure

Water supply costs indicated in Appendix H include provision of treatment and pumping capacity to settlements other than those of FLDA. These costs have therefore been adjusted downwards to approximate the share of total cost attributable to the FLDA schemes.

Processing facilities

The oil palm mill location and phasing proposed in Appendix D includes facilities for schemes other than those included in the present feasibility study. The costs presented in Appendix H have therefore been adjusted to approximate the share of total cost attributable to FLDA developments in the feasibility study.

Costs used in the analysis are detailed in Table K.1. Project life has been taken as twenty five years that is to end 1995. This is primarily because this period has been estimated to be the likely economic life of an oil palm planting.

Table K.2. shows the cash flow in resource terms attributable to the project at expected product prices and for price levels ten percent above and below the mean.



TABLE K.2

Net Cash Flows (Resource Values) At Three Product Price Levels (Thousand Dollars)

YEAR	CASH FLOWS		
	Most Likely Price	High Price	Low Price
1971	-912	-912	-977
1972	-4284	-4284	-4284
1973	-10,403	-10,403	-10,403
1974	-20,698	-20,698	-20,698
1975	-18,930	-18,819	-19,041
1976	-21,581	-21,123	-22,036
1977	-15,454	-14,407	-16,501
1978	-978	-952	-2,908
1979	6,809	9,844	3,774
1980	21,883	26,240	17,526
1981	31,279	36,521	26,037
1982	36,990	42,856	31,124
1983	40,146	46,367	33,925
1984	40,332	46,550	34,114
1985	40,182	46,380	33,984
1986	-39,842	46,002	33,682
1987	39,215	45,303	33,127
1988	38,103	44,059	32,147
1989	36,850	42,659	31,041
1990	35,668	41,338	29,998
1991	34,394	39,913	28,875
1992	33,289	38,671	27,907
1993	32,765	38,087	27,443
1994	32,050	37,281	26,819
1995	30,410	35,449	25,371

TABLE K.3

## Government Tax Revenues Directly Derived From Project

(Thousand Dollars)

Year	Export Duty	RUBBER		OIL PALM		Land Tax	Total
		Research Cess	Replanting Cess	Oil Export Duty	Kernel Export Duty		
1975				70	13	87	170
1976				288	55	185	528
1977				658	127	369	1154
1978				1210	238	518	1966
1979				1902	375	709	2986
1980	107	53	240	2563	505	816	4284
1981	185	92	416	2997	588	827	5105
1982	257	129	579	3274	643	847	5729
1983	303	152	683	3429	667	847	6081
1984	329	165	741	3384	662	847	6128
1985	354	177	796	3330	655	847	6159
1986	375	188	845	3269	647	847	6171
1987	398	199	896	3185	634	847	6159
1988	403	202	908	3093	618	847	6071
1989	407	204	916	2993	600	847	5967
1990	407	204	916	2903	586	832	5848
1991	407	204	916	2807	569	814	5717
1992	407	204	916	2719	554	780	5580
1993	442	221	994	2626	538	753	5574
1994	445	223	1001	2540	549	718	5476
1995	435	218	979	2456	508	697	5293
TOTAL	5661	2835	12742	51696	10331	14881	98146

APPENDIX I

Oil Palm Settler Ten Acres Holding Income (dollars)

Year of Scheme	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Value of output ffb	1603	4591	6065	7612	9239	9510	9417	9329	9258	8982	8710	8465	8200	7957	7700	7459	7208	6984	6740	6519	6298
Less																					
Duty at 7½ percent	120	344	455	571	693	713	706	700	694	674	638	635	615	597	577	559	541	524	506	489	472
Transport and Processing Charges	438	1206	1534	1863	2192	2192	2192	2192	2192	2148	2104	2060	2017	1973	1929	1895	1841	1797	1754	1710	1666
Distribution Costs	78	228	308	395	485	505	505	505	505	495	485	475	464	454	445	434	424	414	404	394	384
GAC	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	103	103	103	103	103	103
Replanting Reserve	101	278	354	430	506	506	506	506	506	496	486	476	466	455	445	435	425	415	405	395	385
Total Deductions	863	2182	2777	3385	4002	4042	4035	4029	4023	3939	3839	3772	3588	3605	3522	3416	3334	3253	3172	3091	3010
Net Sales	740	2409	3288	4227	5237	5468	5382	5300	5235	5043	4871	4693	4612	4352	4178	4043	3874	3731	3568	3428	3288
Maintenance Costs	550	680	720	860	950	950	950	950	950	938	926	914	902	890	878	866	854	842	830	818	806
Loan Repayment	-827	529	1318	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	200	-	-	-
Net Income	1017	1200	1200	1867	2787	3018	2932	2850	2785	2605	2445	2279	2210	1962	1800	1677	2820	2889	2738	2610	2482

TABLE I.2

Rubber Settler - Ten Acres Holding - Income

Year of Scheme	9	10	11	12	13	14	15	16-21	22	23	24	25	26	27	28	29	30
Output Dry Rubber (100 pounds)	55	90	113	127	135	144	153	162	180	180	171	171	162	162	153	153	144
Value of Sales ffb (dollars)	2750	4500	5650	6375	6750	7200	7650	8100	9000	9000	8550	8550	8100	8100	7650	7650	7200
Less Ceases and Duties at 15 percent	412	675	847	956	1012	1080	1148	1215	1350	1350	1282	1282	1215	1215	1148	1148	1080
Processing and Distribution (7 cents per pound)	385	630	791	893	945	1008	1071	1134	1260	1260	1197	1197	1134	1134	1071	1071	1008
Consolidated Annual Charge	116	116	116	116	116	116	116	116	116	116	93	93	93	93	93	93	93
Net Revenue	1837	3079	3896	4410	4677	4996	5315	5635	6274	6274	5978	5978	5658	5658	5338	5338	5019
Maintenance Costs	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
Loan Repayment	337	1579	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	393	-	-	-	-
Net Income	1200	1200	1596	2110	2377	2696	3015	3335	3974	3974	3678	3678	4665	5358	5038	5038	4719

STATE OF NEW YORK  
DEPARTMENT OF TAXATION

Year of Income	1910	1911	1912	1913	1914	1915
1	100	100	100	100	100	100
2	100	100	100	100	100	100
3	100	100	100	100	100	100
4	100	100	100	100	100	100
5	100	100	100	100	100	100
6	100	100	100	100	100	100
7	100	100	100	100	100	100
8	100	100	100	100	100	100
9	100	100	100	100	100	100
10	100	100	100	100	100	100
11	100	100	100	100	100	100
12	100	100	100	100	100	100
13	100	100	100	100	100	100
14	100	100	100	100	100	100
15	100	100	100	100	100	100
16	100	100	100	100	100	100
17	100	100	100	100	100	100
18	100	100	100	100	100	100
19	100	100	100	100	100	100
20	100	100	100	100	100	100
21	100	100	100	100	100	100
22	100	100	100	100	100	100
23	100	100	100	100	100	100
24	100	100	100	100	100	100
25	100	100	100	100	100	100
26	100	100	100	100	100	100
27	100	100	100	100	100	100
28	100	100	100	100	100	100
29	100	100	100	100	100	100
30	100	100	100	100	100	100

APPENDIX M

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	Total			
<b>EXPENDITURES</b>																													
Lead Clearance and Planting - Oil Palms	518	2448	4012	6425	6512	6932	2951	2501																			31,299		
- Rubber	718	2858	2448	693	549	25	50																				7,341		
Oil Palm Planting Material	724	819	1535	1239	1596																						5,913		
Fertilizers and Chemicals	34	352	1081	1728	2196	2383	1901	1098	95	63																	10,931		
Oil Palm Processing - Capital			1980	1980	1980	5220	6660	5580	4680	1620	1620	540																29,880	
- Fixed Operating						79	168	335	470	645	645	645	645	645	645	645	645	645	645	645	645	645	645	645	645	645		12,017	
- Variable Operating						69	269	612	1114	1723	2279	2610	2827	2950	2943	2929	2899	2857	2798	2738	2679	2621	2547	2503	2443	2384		46,794	
- Fruit Transport						55	215	490	891	1379	1823	2088	2262	2360	2355	2343	2319	2285	2238	2190	2148	2097	2037	2002	1955	1907		37,439	
Distribution						54	227	531	1002	1593	2172	2563	2827	2980	2973	2959	2928	2835	2826	2766	2706	2646	2587	2528	2488	2408		46,599	
Rubber Processing and Distribution																												19,819	
Payments to Settlers			143	938	2636	3145	3854	3475	2542	225	150																	17,108	
Management	639	1102	2240	3559	4430	4752	5121	4304	4054	3649	3632	3596	3575	3575	3575	3575	3575	3575	3575	3575	3575	3575	3575	3575	3575	3575		87,951	
Settler Housing	14	73	1178	2705	2469	2158	2316																						
NOVAL OUTLAYS	1171	5099	11602	20671	21944	27427	25278	20288	17714	12882	14018	13597	13572	13643	13689	13680	13590	13494	13339	13178	13009	12816	12799	12664	12442			363,606	
<b>INCOME</b>																													
Oil Palms - Processing Levy					176	685	1557	2835	4384	5797	6641	7192	7506	7488	7451	7375	7267	7118	6966	6815	6668	6479	6368	6216	6065			119,049	
Mill Amortization					127	496	1126	2050	3171	4193	4803	5205	5429	5416	5389	5334	5256	5148	5038	4929	4822	4686	4605	4496	4387			86,106	
Distribution					54	227	531	1002	1593	2172	2563	2827	2980	2973	2959	2928	2835	2826	2766	2706	2646	2587	2528	2488	2408			46,599	
Replanting Fund					70	273	620	1128	1744	2306	2642	2861	2986	2979	2964	2934	2891	2831	2771	2711	2652	2577	2533	2473	2413			47,359	
Rubber Processing and Distribution																												19,819	
Settler Loan Repayments					380	1347	2875	4796	7141	9692	10496	10753	10825	10825	10825	10825	10825	10825	10825	10825	10825	10032	8993	6941	5073			157,106	
NOVAL INCOME					427	2061	5181	9890	15688	21983	26988	29481	30716	30833	30826	30710	30467	30160	29791	29411	28245	26647	24521	22304	19708			476,038	
CASH FLOW	-1171	-5099	-11602	-20671	-21517	-25366	-20097	-10398	-2026	9101	12970	15884	17144	17190	17137	17030	16877	16666	16452	16233	15236	13831	11722	9640	7266			112,432	
NOVAL INCOME (Minus Replanting Fund)					357	1788	4561	8762	13944	19677	24346	26620	27730	27854	27862	27776	27576	27329	27020	26700	25593	24070	21988	19831	17295			428,679	
CASH FLOW	-1171	-5099	-11602	-20671	-21587	-25639	-20717	-11526	-3770	6795	10328	13023	14158	14211	14173	14096	13986	13835	13681	13522	12584	11254	9189	7167	4853			65,073	

## APPENDIX N

## APPENDIX N

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