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(595)

THE GOVERNMENT OF MALAYSIA
LEMBAGA KEMAJUAN TRENGGANU TENGAH

INTERIM REPORT
**TRENGGANU TENGAH REGIONAL PLANNING
AND DEVELOPMENT STUDY**
**APPENDICES
AND MAPS**

HUNTING TECHNICAL SERVICES LIMITED

MALAY 2350

THE GOVERNMENT OF MALAYSIA
LEMBAGA KEMAJUAN TRENGGANU TENGAH

I N T E R I M R E P O R T

TRENGGANU TENGAH REGIONAL PLANNING
AND DEVELOPMENT STUDY

A P P E N D I C E S
A N D M A P S

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HUNTING TECHNICAL SERVICES LTD.

Kuala Trengganu, Malaysia

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TERMS OF REFERENCE

Trengganu Tengah Regional Planning and Development Study

INTRODUCTION:

The State of Trengganu is located on the eastern shore of West Malaysia. It has an area of about 5050 square miles. Trengganu suffers from an economy in which low productivity traditional agriculture predominates and in which there is serious unemployment and under employment. The State of backwardness arises from historical and geographical factors such as distance from growth points, lack of a good port and inadequate infrastructures. Other factors such as small residential population (405,539 in 1970), administrative deficiencies and lack of a supply of trained manpower has been a barrier to new investments in Trengganu.

The state however has good natural resources in the form of large forest reserves, excellent tourist attractions and large acreage of good agricultural land. In order to realize the Government's N.E.P. with respect to Trengganu, the Federal Government has established an Authority called the Lembaga Kemajuan Trengganu Tengah to co-ordinate, oversee and initiate the planning and implementation of the development of Trengganu Tengah.

Trengganu Tengah covers an area of 1.09 million acres being the districts of Kemaman, Dungun and Ulu Trengganu. It is estimated that about 600 thousand acres in the area is capable of Forestry and Agriculture development. Up to now about 306 thousand acres are identified as suitable for high productivity agriculture development.

Recognizing the resources potential of Trengganu Tengah Area and the problems currently facing the Trengganu State such as infrastructure bottleneck, trained manpower and financial deficit, a Study is required to provide the guide lines and plan for action to locate the necessary development activities in the area and effect changes to meet the New Economic Policy.

OBJECTIVE

The major objectives of the Study are as follows:-

- a) To develop an agricultural settlement pattern based on schemes to be executed by FELDA and other government agencies and the private sector.
- b) To undertake economic evaluation of alternative policies in regard to the role of the public sector vis-a-vis the private sector in the development of the region, taking into account the important aims of income improvement and distribution, creation of employment and maximising Malay participation.
- c) To prepare a structure plan for the region taking into account of planned and proposed development so as to maximise the use of present and planned infrastructure including network of feeder roads and other social services.
- d) To consider other options for diversification of agricultural development, apart from oil palm and rubber and to recommend the initiation of pilot projects either by the private or public sector.

- e) To identify component projects within the development programme that can be implemented immediately as well as those for which further project preparation work need to be undertaken e.g. feasibility studies etc. prior to execution.

II. SCOPE OF CONSULTING SERVICES

A. GENERAL

1. In the course of this Study, the CONSULTANTS shall take into consideration the National objectives, such as those indicated in the S.M.P.

2. This Study shall cover the whole area of Trengganu Tengah but assessment of the problem and proposals for accelerating development in the area must be viewed in such a wider context such as the development of the area viz-a-viz the other part of the State, and particularly the development of the area in the regional (East Coast) and national context.

3. This Study shall be based primarily on the analysis and extrapolation of existing data such as:

1. Dutch Survey Team Report
2. Soil Studies by Department of Agriculture
3. Feasibility study of the Jerangau Jabor road
4. Joint Federal - State Task Force Report
5. Population Census (1970)
6. Data compiled by the State Economic Planning Unit

Collection of new data shall be kept to a minimum level consistent with the nature and objectives of the work required herein.

4. The CONSULTANTS shall perform all technical/administrative studies, economic analysis, financial investigations and related work herein described as required to attain the objectives given. In the conduct of the work the CONSULTANTS shall co-operate with the GOVERNMENT and/or its agencies which will provide the data, services and facilities outlined. The CONSULTANTS shall be solely responsible however for the analysis and interpretation of all data received for their findings, conclusions and recommendations.

5. The CONSULTANTS shall review, sort and index all data, maps and reports made available in the course of Study. Upon completion of this assignment, the CONSULTANTS shall submit these materials to the GOVERNMENT for future use in its regional planning activities.

6. The following topics are to be considered by the CONSULTANTS though these topics need not be necessarily regarded as all inclusive.

i) Development Strategy:

The CONSULTANTS shall forecast the economic prospects for the region taking into account the development in the rest of the

economy for the 1974-1990 period. Emphasis shall be given to GOVERNMENT policies regarding:-

- a) Creation of Employment
- b) Improvement and Distribution of Income
- c) Increase in the participation rate of the Bumiputra population in the modern sectors
- d) Creation of an adequate supply of managerial and technical personnel in all major fields.

The CONSULTANTS shall consider what the course of development might be if individual aspects of the GOVERNMENT policy had priority in the development programme i.e. if different "Concepts" of development are followed, the concepts to be considered are:-

- a) Employment: To maximize employment opportunities in the region and particularly their contribution towards opportunities for Malays
- b) Income: To maximize the growth of per capita income over the planning period while at the same time improving its distribution particularly as between Malays and non - Malays.
- c) Transition: To maximize the diversification of opportunities in both income and employment. This concept examines the role of industrialization and urbanisation within the region in providing such diversification and particularly methods of ensuring Malay participation in all aspects of the social and economic community.

2. Role of Private and Public Sector

The CONSULTANTS shall develop a consistent strategy for the future development of the region by both public and private sector. Also examine the relative share each sector should play to achieve the best result. Further the CONSULTANTS shall determine the relative proportion each GOVERNMENT agency shall undertake within the public sector.

3. Population and Labour

The CONSULTANTS shall examine present population structure, work force, employment and manpower situation in the region. Projections shall be made regarding population increase, population structure and manpower availability and requirement to support and sustain development in the region. The projection shall include breakdown of skills required and the number particularly those of the management level. The CONSULTANTS shall ascertain the necessity for the State to embark upon a crash training programme to alleviate any anticipated shortage and to make recommendations accordingly.

4. Settlement Pattern

In the light of this massive settlement of people and their dependents in and around the envisaged projects, develop an orderly plan for the establishment and distribution of urban/town centres complete with the necessary health, educational, social amenities and other physical infrastructural facilities to support a progressive

modern community.

The CONSULTANTS shall locate the major centres of population and industrial facilities for processing the agricultural and forestry products.

The objective shall be to minimize total infrastructure development cost to meet the objective of the N.E.P.

5. Forestry

The CONSULTANTS shall study the present deforestation program and make recommendations for a forest exploitation programme with particular consideration to co-ordinate land clearance programme with the fullest feasible exploitation of timber resources. This would include a deforestation phasing programme to synchronise with the land development programme.

6. Agriculture Diversification

Through appraisal of the status and condition of the land, consultations with GOVERNMENT agencies responsible for human and natural resource development, evaluation and planning, and making use of data available from these sources and other secondary information the CONSULTANTS shall assess the potential for accelerating development in the region through its resources particularly agriculture, agrobased industries, fisheries and forestry.

The CONSULTANTS shall assess the agricultural potential of the region for possible crop diversification and livestock development. As part of the assessment the CONSULTANTS shall review the latest research results and analyses of market prospects, checking recent price projections. The CONSULTANTS shall draw up an agriculture development plan which gives an optimum mix of enterprises.

The CONSULTANTS shall assess the possibility of other industries to be developed within Trengganu Tengah bearing in mind the opening of Jerangau/Jabor (Kuantan) road and the Tanjong Gelang Port.

7. Project Implementation Studies

The CONSULTANTS shall identify a list of high priority projects and with the direction and approval of the GOVERNMENT undertake the preparation of feasibility studies to a stage ready for immediate implementation and in a form suitable for seeking financial assistance from international lending agencies (e.g. ADB, World Bank).

8. Structure Plan

The CONSULTANTS shall relate development in the agricultural sector to a "structure plan" maximizing the use of present and planned infrastructure, including an improved network of feeder roads. The plan shall have a phased programme for development, with projects ranked for implementation within it. The CONSULTANTS shall prepare the phased programme using network technique (PERT/CPM).

9. Institutional and Implementation Aspect of the Plan

The CONSULTANTS shall examine the role and activities of all implementing agencies and ascertain the role each would have to play in implementing the plan. The CONSULTANTS shall also draw up a plan of action for each implementing agencies and the physical and financial input required.

PUBLISHED MATERIAL COLLECTED FOR THE STUDY TO DATE

A. GENERAL REPORTS

1. National Economy

SECOND MALAYSIA PLAN 1971 - 1975
Kuala Lumpur 1971.

MID TERM REVIEW, SECOND MALAYSIA PLAN 1971 - 1975
Kuala Lumpur 1973.

EDUCATIONAL STATISTICS OF MALAYSIA, 1971
Ministry of Education
Kuala Lumpur, 1973.

MALAYSIA 1971
Official Year Book
Kuala Lumpur, 1972.

2. Regional Development Studies

MIRI - BINTULU REGIONAL PLANNING STUDY - THE PERSPECTIVE PLAN.
Hunting Technical Services, et. al. March, 1973

PAHANG TENGGARA - REGIONAL MASTER PLANNING STUDY
Foundation of Canada Eng. Corp. LTD., et. al. June, 1972
(includes Master Plan, Supporting Volumes, Study Reports, Study Papers and Working Papers).

JOHOR TENGGARA - REGIONAL MASTER PLAN
Hunting Technical Services, et. al. August, 1971
(includes Master Plan, Supporting Volumes and Working Papers).

KELANTAN REGIONAL PLANNING AND DEVELOPMENT STUDY (6 Volumes)
Robert. R. Nathan Associates Inc.
Washington D.C. November, 1973

3. Trengganu Reports

ANNUAL REPORT & ACCOUNTS 1972
Lembaga Kemajuan Trengganu Tengah.

TRENGGANU TENGAH DEVELOPMENT, JOINT FEDERAL - STATE
TASK FORCE, PROGRESS REPORT I
March - May 1972.

FEASIBILITY STUDY, JERANGAU - JABOR ROAD, TRENGGANU
Ove Arup & Partners, et. al.
(Summary Volume and Economic Studies).

LEMBAGA KEMAJUAN TRENGGANU TENGAH
Budget Estimate 1974.

KAJIAN PERTENGAHAN PENGGAL RANCANGAN MALAYSIA KEDUA 1971 - 1975
(Mid Term Review for Trengganu 2nd Malaysia Plan)
Government of Trengganu. April, 1973

REGIONAL ECONOMIC DEVELOPMENT PLAN FOR THE STATE OF
TRENGGANU
Ilaco N.V. et.al. December, 1968

SETTLEMENT PATTERN, TRENGGANU TENGAH LAND DEVELOPMENT SCHEME
Department of Town & Country Planning, Kuala Lumpur. May 1972

AN INDUSTRIAL POTENTIALITIES STUDY OF THE STATES
OF KELANTAN AND TRENGGANU, MALAYSIA
Part II. Agro-based, Allied and Food Processing Industries
Part III. Wood-based Industries
Federal Industrial Development Authority
Kuala Lumpur. March, 1972

LOOKING AHEAD - TRENGGANU 1982
W. FAIRBANK
Department of Town & Country Planning
Kuala Lumpur, September 1964

TOURIST POTENTIAL IN TRENGGANU
State Economic Development Corporation
Kuala Trengganu, August 1973

MARKET SURVEY FOR ORGANISED GROUP HOLIDAYS TO
TRENGGANU
SGV - Kassim Chan Sdn. Bhd.
Kuala Lumpur, May 1972

STATE ECONOMIC DEVELOPMENT CORPORATION, TRENGGANU
Annual Report 1971
Kuala Trengganu.

B. TECHNICAL REPORTS

1. Economics and Statistics

THE EXPENDITURE BUDGET OF THE FEDERAL GOVERNMENT 1974
Kuala Lumpur 1973.

ECONOMIC REPORT 1973 - 1974
Kuala Lumpur December 1973.

ANNUAL REPORT & STATEMENT OF ACCOUNTS 1972
Bank Negara Malaysia.

ANNUAL STATISTICAL BULLETIN, MALAYSIA 1972
Department of Statistics,
Kuala Lumpur 1973.

1970 POPULATION AND HOUSING CENSUS OF MALAYSIA
Department of Statistics,
Kuala Lumpur 1971 - 1972

Field Count Summary

Community Groups

Urban Connurbations - Population and Households in Ten
Gazetted Town and Their Adjoining Built-up Areas.

VOL. I - General Housing Tables Part VII TRENGGANU.

VOL. II - General Housing Tables, towns, villages and local
council areas Part VII - TRENGGANU.

AN INTERIM REPORT ON THE POST ENUMERATION
SURVEY

Department of Statistics

Kuala Lumpur, October 1973.

AGE DISTRIBUTIONS (1970 POPULATION & HOUSING CENSUS)

Department of Statistics

Kuala Lumpur, September 1973

POPULATION CENSUS, 1957

Report No 11. State of Trengganu

Department of Statistics

Kuala Lumpur, July 1959

ANNUAL STATISTICAL BULLETIN, MALAYSIA, 1972

Department of Statistics

Kuala Lumpur.

MALAYSIA EXTERNAL TRADE 1970

VOL II - Imports

Department of Statistics

Kuala Lumpur.

2. Natural Resources

THE PRESENT LAND USE OF TRENGGANU

I.F.T. WONG,

Soil Science Div. Dept. of Agriculture,

Kuala Lumpur September, 1970.

RECONNAISSANCE SOIL SURVEY OF TRENGGANU

Wm. P. PANTON

Department of Agriculture,

Kuala Lumpur December 1958.

SOIL SUITABILITY CLASSIFICATION TRENGGANU TENGAH REGION

Soil Science Div. Ministry of Agriculture,

Kuala Lumpur 1973.

KNOWN AND POTENTIAL MINERAL RESOURCES OF THE
TRENGGANU TENGAH AREA

Fateh CHAND

Department of Mines 1972

3. Agriculture

A STATISTICAL SOURCE BOOK ON MALAYAN AGRICULTURE

PEE Teck Yew

Faculty of Agriculture, University of Malaya,
Kuala Lumpur 1967.

VOL. 1 Acreage and Production of Main Crops

VOL. 2 Acreage and Production of Miscellaneous Crops.

WEATHER CHARACTERISTICS AS RELATED TO MALAYSIAN AGRICULTURE

Floyd L. CORTY

College of Agriculture, Malaya,
April, 1971.

A FEASIBILITY STUDY OF CLOVE PRODUCTION IN TRENGGANU

A. AZIZ bin Ibrahim

Dept. of Agriculture, Trengganu, 1973.

PADI FARMING IN WEST MALAYSIA

S. SELVADURAI

Min. of Agriculture & Fisheries,
Kuala Lumpur 1972.

CLOVE IN PENANG

Agricultural Leaflet No. 54

HASHIM bin Shamsuddin

Dept. of Agriculture, Extension Branch,
January 1973.

PROMISING VARIETIES OF FIELD CROPS FOR MALAYSIA

Agronomy Publication No. 1

Charles A. MILLER

College of Agriculture, Malaya,
October 1968.

AN INVESTIGATION INTO THE POSSIBILITY OF UTILISING SANDY
LOAM FOR CATTLE DEVELOPMENT

Justin K. CAMOENS

Min. of Agriculture & Fisheries, Malaysia,
Kuala Lumpur,
April 1972.

COCONUT PALM

Agriculture Leaflet No. 41

Ministry of Agriculture & Fisheries,
December 1972.

CASHEWNUT IN TRENGGANU

Agriculture Leaflet No. 51

OSMAN bin Mohd. Noor

Ministry of Agriculture & Fisheries, Malaysia
Kuala Lumpur,
April 1972.

COCOA

Agricultural Leaflet No. 53

Revised, C.I. PHANG,
Ministry of Agriculture & Fisheries, Malaysia,
Kuala Lumpur,
1972.

THE OIL PALM INDUSTRY - PHYSICAL PROGRESS AND
DEVELOPMENT AGENCIES

SIA Tong Hock

MARDI December 1973.

OBSERVATIONS ON LARGE SCALE MAIZE PRODUCTION IN
TRENGGANU

LIM Kim Lin

MARDI. December 1973.

ON PROSPECTS OF SELF-SUFFICIENCY IN RICE FOR
WEST MALAYSIA

LAI Kok Chew

MARDI Agricultural Economic Review VOL. I No. 1
January 1971.

THE PRICE ELASTICITY OF DEMAND FOR WEST MALAYSIA
PALM OIL EXPORTS

SIA Tong Hock

MARDI Agricultural Economic Review Vol. I No. 4
September 1971.

RICE POLICY IN MALAYSIA

ABDUL RAHMAN bin Haji Yusof and ANI bin Arope
MARDI Agricultural Economic Review Vol. I No. 5
September 1971.

ANNUAL REPORT 1970, ANNUAL REPORT 1971

MARDI

THE MARKET FOR CASSAVA

Heather WALKER

Tropical Products Institute

London April 1966.

A REVIEW OF THE FEDERAL LAND DEVELOPMENT
AUTHORITY, ITS POLICIES AND OPERATIONS

Hunting Technical Services.

SOIL SURVEY PROCEDURES IN LAND DEVELOPMENT
PLANNING

Anthony YOUNG

Hunting Technical Services

AGRICULTURAL COMMODITIES - PROJECTIONS FOR 1975
AND 1985. Vol. I

FAO

Rome 1967.

FISH PROCESSING INDUSTRY IN WEST MALAYSIA

E.P. SIDAWAY and M. BALASINGAM

Division of Food Technology, Ministry of Agriculture & Fisheries,
FAO

May 1971.

PROGRESS REPORT. RISDA TRENGGANU

Kuala Trengganu. March 1974.

ANNUAL REPORT, STATE DEPARTMENT OF AGRICULTURE

Kuala Trengganu, 1974.

ECONOMICS OF PRODUCTION, VARIOUS CROPS
MARDI
March 1974.

ANNUAL FISHERIES STATISTICS - MALAYSIA 1972
Min. of Agriculture & Fisheries
Kuala Lumpur. October 1973.

STATISTICAL DIGEST, WEST MALAYSIA, 1971
Ibid, May-1973.

PADDY STATISTICS - WEST MALAYSIA 1972
Ibid, May 1973.

RUBBER STATISTICS HANDBOOK, MALAYSIA, 1971
Dept. of Statistics
Kuala Lumpur.

4. Forestry

NATIONAL LAND CODE. NO. 56-1965
Government Gazette

PROPOSED PERMANENT FOREST ESTATE, PENINSULAR
MALAYSIA
Dept. of Forestry
Kuala Lumpur. March 1974.

ANNUAL REPORT 1971 - STATE FOREST OFFICE, TRENGGANU
Kuala Trengganu.

5. Infrastructure

BUKIT RIDAN URBAN STUDY, PAHANG TENGGARA
Foundation of Canada Engineering Corp. LTD et. al.
VOLUME ONE - General Plan
VOLUME TWO -

KUANTAN PORT FEASIBILITY STUDY
Bish and Partners, Consulting Engineers.
February 1973
GENERAL REPORT
APPENDICES
DRAWINGS

6. Miscellaneous Reports

REPORT OF THE MEDICAL DEPARTMENT, 1960
Ministry of Health
Kuala Lumpur
January 1967.

C. MAPS

10 sheets Malaysia 1:63,360 covering the Trengganu Tengah
Development Area

Sheet 48	Gunong Gajah Terom
Sheet 49	Bukit Besi
Sheet 50 - 51	Kuala Dungun
Sheet 60	Mandi Angin
Sheet 61	Ulu Paka
Sheet 62	Kuala Kerteh
Sheet 71	Gunong Palas
Sheet 72	Ayer Puteh
Sheet 73	Chukai
Sheet 83	Kuantan

Soil Suitability Classification Map, Trengganu 1:126,720

Ministry of Agriculture, Soil Science Division 1972.

SOIL SUITABILITY CLASSIFICATION
TRENGGANU TENGAH REGION

This **brief** Soil Suitability Classification Report and the accompanying maps* is a preliminary report of the Trengganu Tengah Region. This has been extracted from a more detailed report being prepared by the Soils and Analytical Services Branch of the Department of Agriculture for the whole of Trengganu State.

This report is based on the soils information gathered by the staff of the Department of Agriculture over the past. The Trengganu Tengah Region itself was examined in greater detail in the last few months. However it must be pointed out that due to the paucity of information the accompanying maps are subject to improvement as and when more information is gathered. It is also proper to point out that the map will thus obviously have some limitations. The map should only be used for planning purposes and any area to be developed should be referred again to the Department of Agriculture for final approval.

Since a more detailed report is being prepared it is not intended to describe in detail the various Soil Suitability Classes. The Classification used in preparing the maps is that drawn by I.F.T. Wong (1970) "A Soil Suitability Classification for Malaysia. The limitations to crop growth used in this report is reproduced as Table 1.

Based on these limitations the soils are divided into 5 Soil **Suitability** Classes as follows:-

- Class 1 - Soils with no limitation or one or more minor limitations to crop growth.
- Class 2 - Soils with one or more moderate limitations to crop growth.
- Class 3 - Soils with one serious limitation to crop growth.
- Class 4 - Soils with more than one serious limitation to crop growth.
- Class 5 - Soils with at least one very serious limitation to crop growth.

Brief Description of Soil Suitability Classes

CLASS 1

Soils with no limitation or one or more minor limitations to crop growth

Sub-class 1G

These are generally deep friable soils with slightly sandy textures. The terrain is generally 2° - 6° slopes. This group of soils includes Rengam and Bungor Series on gentle terrain. This group is generally well suited to a wide range of crops.

* The Soil Suitability Map is not presented as part of this Appendix. Copies may be obtained from the Soil Science Division, Ministry of Agriculture, Kuala Lumpur.

Sub-class 1g

These are generally also deep friable soils with clayey textures occurring on 2° - 12° slopes. Soils in this group include Munchong and Kuantan Series. These are also generally well suited to a wide range of crops.

Sub-class 1d

The soils in this sub-class suffer from slightly excessive drainage. Included in this group are the levee soils like the Telemong Series and some of the higher terrace soils. This group of soils although marginal for padi are generally suitable for a wide range of crops.

CLASS 2

Soils with one or more moderate limitation to crop growth

Sub-class 2G

This sub-class consists of sandy soils on slopes 6° - 12° . Included in this group are soils of the Rengam, Bungor and Serdang Series. Crops like oil palm and other tree crops are well suited to this sub-class. Annual crops like maize, and sorghum can be grown if terracing or soil conservation is practiced.

Sub-class 2g

This sub-class is characterized by heavy textured soils on slopes of 12° - 20° . The more dissected terrain therefore limits the range of crops which can be grown. Included in this are soils like Apek and Durian Series.

Sub-class 2d

Soils which are imperfectly drained like the Akob and Merbau Patah are included in this group. Most of the areas currently under padi have been included in this group.

Sub-class 20

This sub-class consists of organic clays and muck soils. It has a wide tolerance of crops provided drainage is not a problem.

Sub-class 2do

Shallow peat areas which are mainly still poorly drained or partly drained form this sub-class. With effective drainage these soils can be improved.

Sub-class 2dn/3d

This sub-class consists of two soil series namely the Rudua and Rusila which are commonly known as the 'Bris Soils'. The Rudua Series is excessively drained and has acute nutrient deficiencies while the Rudua is very poorly drained and can be used for padi.

CLASS 3

Soils with one serious limitation to crop growth

Sub-class 3G

This sub-class consists of sandy textured soils on hilly terrain (12° - 20°). Included in this group are soils of the Bungor, Serdang and Rengam Series. Due to the terrain and sandy texture soil

erosion can become a serious problem and soil conservation measures are essential.

Sub-class 3d

Soils which are waterlogged throughout the year are generally included in this sub-class. Drainage of these areas such as inland swamps can be costly.

Sub-class 3cG

Soils having a shallow profile or those having a compact layer between 10 to 20 inches eg. Kuala Berang Series are included in this group. The terrain is often not a serious limitation but the compact layer is.

CLASS 4

Soils with more than one serious limitation to crop growth

Sub-class 4Gc

Sandy textured soils occurring on hilly terrain and also having shallow profiles fall into this category. The Kuala Berang Series is a good example of this sub-class. This sub-class can be planted with shallow rooted tree crops but soil conservation practices are imperative. Wherever possible these areas should be left as forests.

Sub-class 4do

Deep peat which has not been drained belongs to this category. Very little examination has been carried out in these areas and most of the information is based on the work of the Dutch Team.

Sub-class 4sd

The areas inundated by the tides and covered mainly by mangrove swamps belong to this sub-class. These areas generally occur at the mouth of the larger rivers. They suffer from salinity and poor drainage. If drained these soils could develop into acid sulphate soils.

CLASS 5

Soils with at least one very serious limitation to crop growth

Sub-class 5h

This category consists of areas disturbed by man and includes mined and urban land. Mined lands can with intensive care support annual crops.

Sub-class 5STP

This group consists of areas unsuitable for agricultural development due to their steep terrain. These must remain as forests.

TABLE C1

LIMITATIONS TO CROP GROWTH

SYMBOL	TYPE	VERY SERIOUS	SERIOUS	MODERATE	MINOR
G	GRADIENT AND	> 20° or 25° slopes with light textured soils	12° - 20° or 25° slopes with light textured soils	6° - 12° slopes with light textured soil	2° - 6° slopes with light textured soils
g	TEXTURE	or > 35° slopes with heavy textured soils	20° or 25° ^{or} - 35° slopes with heavy textured soils	12° - 20° ^{or} or 25° slopes with heavy textured soils	2° - 12° ^{or} slopes with heavy textured soils
d	DRAINAGE	-	Very poorly to poorly drained	Imperfectly drained or excessively drained	Somewhat excessively drained
C	DEPTH TO STRONGLY COMPACTED LAYER	Less than 10 inches (25 cm)	10 to 20 inches (25 - 50 cm)	20 to 40 inches (50 - 100 cm)	40 to 50 inches (100 - 125 cm)
s	SALINITY	-	Strongly saline	Moderately saline	Weakly saline
a	ACID SULPHATE LAYER	0 to 10 inches from the surface	10 to 20 inches from the surface	20 to 40 inches from the surface	40 to 50 inches from the surface
o	ORGANIC HORIZON	-	(Water logged) any thickness	(Drained) 4 ft thick at the surface	(Drained) 2 to 4 ft thick at the surface
r	ROCKINESS	Extreme (> 75% of soil volume)	Moderately extreme (50-75% of soil volume)	Moderate (25-50% of soil volume)	Slight (10-25% of soil volume)
n	NUTRIENT IMBALANCE	Toxicity caused by extremely high contents of certain elements	-	Acute nutrient deficiencies	Moderate nutrient deficiencies
h	HUMAN	Disturbed land	-	-	-

S = SUITABLE

M = MARGINAL

RAMBUTAN, DURIAN GROUP 1

TAPIOKA

RAMBUTAN

LAKSAT

DURI

SOURSOP

JACKFRUIT

CHEMPADAK

AVOCADO

KINCANGAN

TABLE C2

INDICATIONS OF SOIL SUITABILITY FOR VARIOUS CROPS

Soil Suitability Class	Rubber	Oil Palm	Coconut	Coffee	Tea (Lowland)	Cocoa	Citrus (Mangosteen) Chiku	Bananas Durian Group 1	Pepper	Cashew	Tapioca Vegetables Group 2	Sugarcane	Maize Sorghum Group 3	Papaya Guava Group 4	Pine-apple	Sago Palm	Padi (Wet)	Pastures
1G	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	U	U	S
1g	S	S	S	S	S	S	S	S	S	S	M	M	S	S	S	U	U	S
1d	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	U	M	S
2G	S	S	S	S	S	S	S	S	S	S	S	M	M	S	S	U	U	S
2g	S	M	M	S	S	S	S	M	M	S	U	U	M	M	M	U	U	S
2d	S	S	S	M	M	M	M	U	U	M	M	M	M	U	S	S	S	S
20	S	S	M	S	U	M	M	M	U	M	M	M	M	U	S	M	M	M
2do	M	M	U	M	U	U	U	U	U	U	M	U	M	U	S	M	M	M
2dn/3d	U	U	M	U	U	U	U	U	U	S	M	U	M	U	M	U	M	M
3G	S	M	M	S	S	S	S	M	M	S	U	U	U	M	M	U	U	S
3d	U	M	M	U	U	U	U	U	U	U	U	U	U	U	M	S	U	U
3cG	M	U	U	M	M	M	M	M	M	M	U	U	U	M	M	U	U	M
4Gc	M	U	U	U	M	U	M	M	M	M	U	U	U	M	M	U	U	S
4do	U	U	U	U	U	U	U	U	U	U	U	U	U	U	M	U	U	U
4sd	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	M	U
5h	U	U	U	U	U	U	U	U	U	M	M	U	M	M	U	U	U	M
5STP	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U

NOTE:

S = SUITABLE

M = MARGINAL

U = UNSUITABLE

STP = STEEPLAND

BANANAS, DURIAN GROUP 1

TAPIOCA, VEGETABLES GROUP 2

MAIZE, SORGHUM GROUP 3

PAPAYA, GJAVA, GROUP 4

including: RAMBUTAN
LANGSAT
DUKU
SOURSOP
JACKFRUIT
CHEMPADAK
AVOCADO
KUNCANGAN

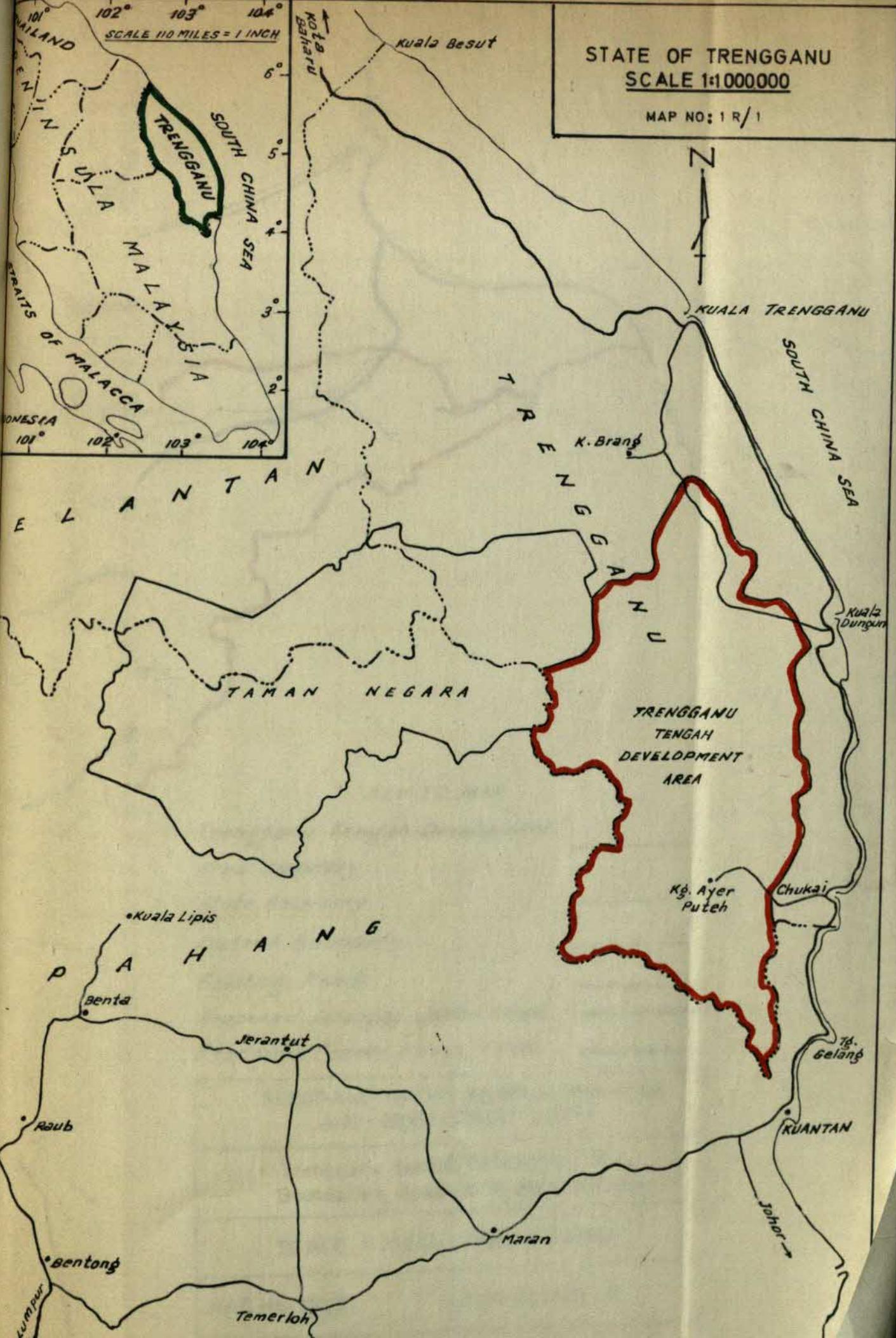
Including: SWEET POTATOES
SOYA BEANS
CHILLIES
WATERMELONS

Including: GROUNDNUT
TOBACCO
FODDER GRASSES

Including: PASSION FRUIT
SALAK



STATE OF TRENGGANU
SCALE 1:1 000 000
MAP NO: 1 R/1



AGRICULTURAL PROJECTS
ADJACENT TO TRENGGANU TENGAH
SCALE 1:1,000,000

KEY TO MAP

FELDA Rubber Schemes

- ① Tenang
- ② Chalok
- ③ Chalok Barat
- ④ Belara

SEDC

- ⑤ Sungei Tong Estate
- ⑥ Tapioca Project

FELCRA Youth Scheme

- ⑦ Bukit Kapah

RISDA Group New Planting

- ⑧ Sungei Gawi
- ⑨ Gerdang

Federal Livestock Authority

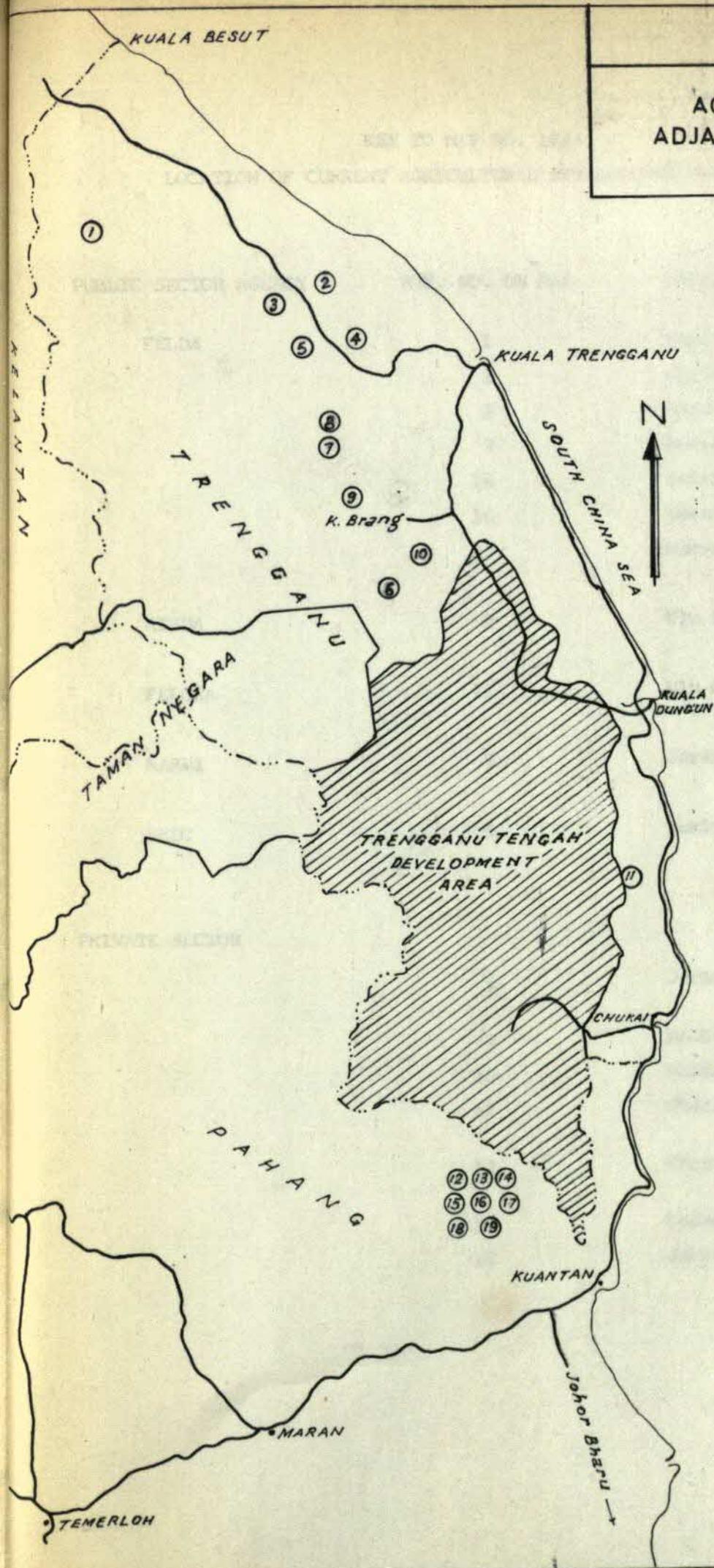
- ⑩ Kuala Brang Cattle Project
- ⑪ Kretay Estate (Private)

FELDA, Pahang Oil Palm Schemes

- ⑫ Bukit Kuantan
- ⑬ Bukit Goh
- ⑭ Panching utara
- ⑮ Panching Selatan
- ⑯ Panching Timor
- ⑰ Bukit Sagu

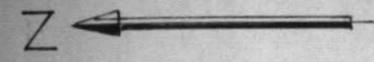
LKPP Pahang

- ⑱ Sungei Charu
- ⑲ Bukit Goh Y. S.



KEY TO MAP NO. 1R/4
LOCATION OF CURRENT AGRICULTURAL DEVELOPMENT PROJECTS

PUBLIC SECTOR AGENCY	REF. NO. ON MAP	PROJECT NAME
FELDA	1	Bukit Bading
	2	Jerangau
	3	Jerangau Barat
	7	Rasau-Kerteh
	14	Seberang Tayor
	16	Neram I
	17	Neram II
RISDA	8	Ulu Paka
FELCRA	11	Ulu Chukai Youth Scheme
MARDI	5	Jerangau Research Station
SEDC	6	Bukit Besi Estate
PRIVATE SECTOR		
	4	Jerangau/Landas Cocoa Estate
	9	NADEFINCO/SEDC Area
	10	NADEFINCO Oil Palms
	12	Sharikat Protein Tumbuh-Tumbuhan
	13	Chenderong Concession Oil Palms
	15	Ladang Tenggara
	18	Jabor Valley Estate



SOUTH CHINA SEA

K. Trengganu
MERCHANG
MARANG

MARANG

ULU TRENGGANU

TAMAN NEGARA

G. Mendi Angin
(G. Chelah)

DUNGU

KUALA PAKA

KUALA KERTEN

KEMASIK

G. Lipat Sanggol

KEMAMAN

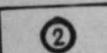
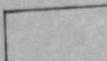
PAHANG

Bt. Paloh

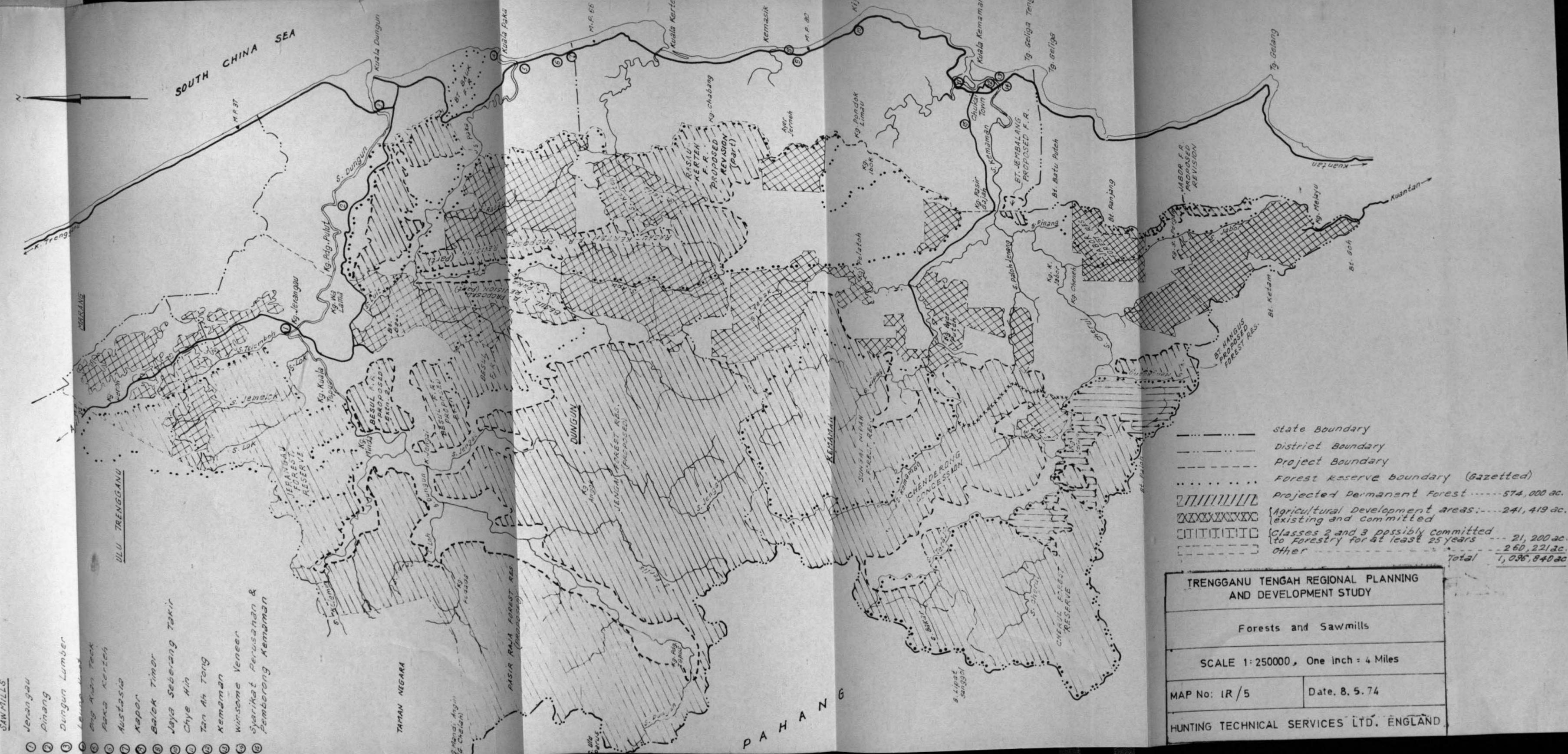
Tanjong Gelang



KEY TO MAP

-  Boundary of existing or committed agricultural projects.
-  Area of land in classes 1-4 according to Soil Suitability Classification Map.
-  Area of land in class 5 considered unsuitable for agriculture.

TRENGGANU TENGAH REGIONAL PLANNING AND DEVELOPMENT STUDY	
Trengganu Tengah Development Area Showing Land in Classes 1 To 4 and Current Agricultural Projects	
SCALE 1 : 250,000, One Inch = 4 Miles	
MAP No: 1R/4	Date 5. 5. 74
HUNTING TECHNICAL SERVICES LTD. ENGLAND	



- 1 Jerangau
- 2 Pinang
- 3 Dungun Lumber
- 4 Lemau Lumber
- 5 Ong Awan Teck
- 6 Paka Kereta
- 7 Austasia
- 8 Kapor
- 9 Balok Timor
- 10 Jaya Seberang Takir
- 11 Chye Hin
- 12 Tan Ah Tong
- 13 Kemaman
- 14 Winsome Veneer
- 15 Syarikat Perumahan & Pembarong Kemaman

-----	state boundary
- - - - -	district boundary
- . - . -	project boundary
.....	forest reserve boundary (Gazetted)
	Projected Permanent Forest ----- 574,000 ac.
XXXXXX	Agricultural development areas: --- 241,419 ac.
	existing and committed
	Classes 2 and 3 possibly committed to Forestry for at least 25 years --- 21,200 ac.
	other --- 260,221 ac.
	Total 1,096,840 ac

TRENGGANU TENGAH REGIONAL PLANNING AND DEVELOPMENT STUDY	
Forests and Sawmills	
SCALE 1:250000, One inch = 4 Miles	
MAP No: IR/5	Date: 8.5.74
HUNTING TECHNICAL SERVICES LTD. ENGLAND	