Town 17 Urban Development Report for
Lembaga Kemajuan Pahang Tenggara

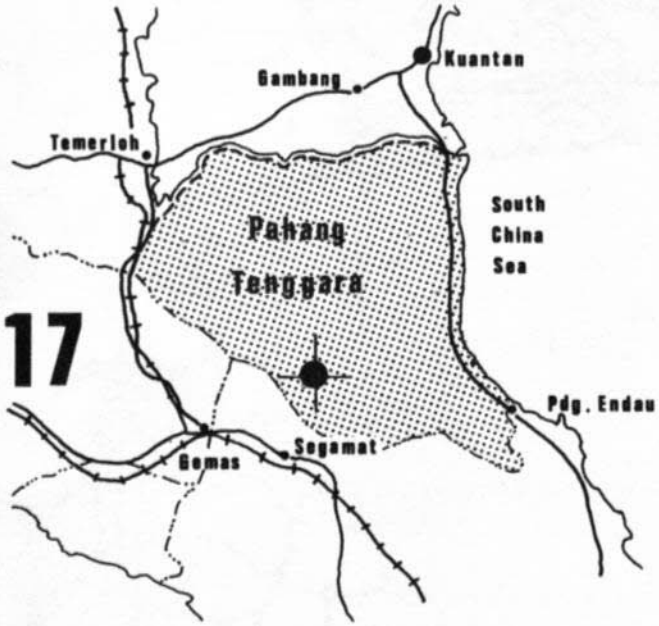
BANDAR TUJUH BELAS

FREEMAN FOX and ASSOCIATES
AKITEK BERSEKUTU MALAYSIA
TAHIR WONG Sdn. Bhd.

DARA

LEMBAGA KEMAJUAN PAHANG TENGGARA

Master Plan and Detailed Development Plans



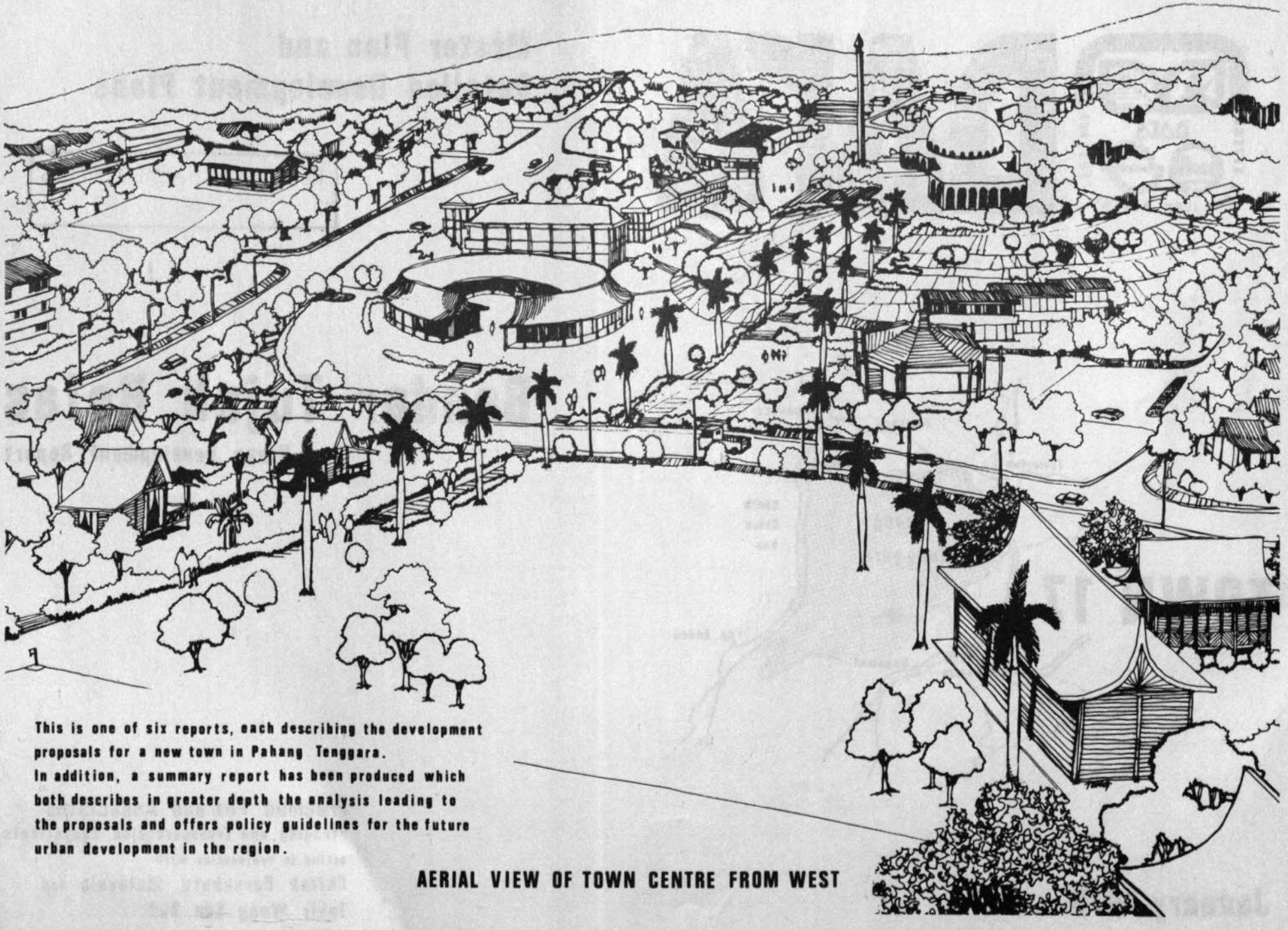
Bandar Tujuh Belas

Urban Development Report

TOWN 17

January 1976

Freeman Fox and Associates
Planning and Transportation Consultants
acting in conjunction with
Akitek Bersekutu Malaysia and
Tahir Wong Sdn. Bhd.



This is one of six reports, each describing the development proposals for a new town in Pahang Tenggara.
In addition, a summary report has been produced which both describes in greater depth the analysis leading to the proposals and offers policy guidelines for the future urban development in the region.

AERIAL VIEW OF TOWN CENTRE FROM WEST

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KUANTAN.

January, 1976

Tuan,

SIX NEW TOWNS IN PAHANG TENGGARA
MASTER PLAN AND DETAILED DEVELOPMENT PLANS
FOR TOWN 17

We are pleased to submit this report on the planning and development of Town 17 in Pahang Tenggara.

The proposals have been designed to assist DARA in the tasks of firstly attracting large numbers of poor rural people, particularly bumiputras, to live in the town, and secondly of providing an environment and a range of economic and social opportunities which will assist the settlers and their families to make a transition to a more secure, rewarding and diversified way of life.

The plans for the Six New Towns involved in the project and the policies described in the accompanying Summary Report result from a truly joint effort. This has involved the Malaysian and British team of consultants, DARA and many other public and private agencies and their staff. While these are acknowledged at the end of the report, I wish here to express our gratitude for the active and willing contributions and for all the assistance we have received throughout the project.

This report summarises the analysis leading to the proposals and provides a framework for the future development of Town 17. The project now proceeds into the production of contract engineering designs and documents, so that an early start can be made to construction.

However, towns are primarily about people, and for Town 17 to be established, grow and flourish, a total approach is required which allies physical implementation to parallel action in a number of critical areas of social development, administration and finance. These aspects which are all being actively pursued by DARA, now need to be co-ordinated and integrated into a town specific implementation programme.

I speak for the whole project team in expressing our sincere appreciation for the opportunity to participate in this important stage of the regional development programme. We hope that this report assists in the attainment of the objectives of the Regional Master Plan and the underlying social and economic development policies.

Yours faithfully,

David Walton

DAVID WALTON
Freeman Fox and Associates

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PREFACE

The Planning and Development Philosophy

There is an opportunity and a need in Pahang Tenggara to create a truly Malaysian urban environment.

The opportunity arises from the strong cultural traditions of the people, from the landscape, from the economic activity and employment possibilities being generated, and from the Government's commitment to the regional urbanisation policy. The need arises from the people.

The rural Malays who will form the majority of the residents of the new towns, will bring with them from kampungs throughout the country sets of beliefs and practices which infuse all aspects of daily life. This cultural and social background gives the potential settler, however poor he is, a sense of balanced values. He will not bring himself and his family readily to the new towns; he finds many aspects of existing towns alien and unwelcoming. He will not easily accept the financial burden of paying for urban amenities and yet will want and expect:

- the security of a well paid job with prospects of advancement.
- a home and land enough to meet subsistence needs which can be modified to changing requirements.
- basic services like water, power, toilet and bathing facilities, and access to roads.
- educational facilities for the family and children.
- a ladder of social and economic advancement afforded by the opportunities inherent in urban life.

To attract people to the towns, gain their acceptance and commitment to life there, and their response to new opportunities, these needs must be met in a setting which is attractive, familiar and sympathetic. It is considered that this can best be achieved by developing the plans from the ideas of the people, so that a new form of Malaysian town emerges, which contains many of the traditional characteristics of kampung life and Malay culture within a modern and efficient urban structure.

This philosophy was derived from all aspects of project research and is basic to the proposals that have been prepared.

SUMMARY

PART 1 INTRODUCTION

On January 31st 1975 an Agreement was signed between Lembaga Kemajuan Pahang Tenggara (DARA) and Freeman Fox and Associates for the preparation of Master Plans, Detailed Development Plans and Engineering Designs for six new towns in Pahang Tenggara, West Malaysia. Town 17 (Bandar Tujuh belas) is one of the six towns.

The purpose of this report is to assist those responsible for the future development of Town 17 by providing a proposal for a Master Plan to be implemented over a twenty year period, and Detailed Plans for the first five years of construction.

The basic objectives of the Master Plan are to assist in the attraction and retention of settlers through the quality of the social, economic and physical environment of the new communities, and to provide a framework for the transition by the new towns' inhabitants, from a rural to an urban society.

The project was conducted throughout by a multi-professional team of Malaysian and British Consultants working in close liaison with DARA and the other public and private agencies involved.

PART 2 REGIONAL CONTEXT

The six new towns included in the project are amongst the smaller of the settlements (population 5,000-15,000) proposed in the Regional Masterplan for Pahang Tenggara, adopted in 1972. All six towns are located in the south-west of the Region, in areas rapidly being converted from jungle to productive agricultural land. It is intended that settlers will be attracted to the new towns by the employment opportunities and incomes afforded by palm oil production and by the corresponding expanding activity in the service sector. This development and urbanisation policy has been instigated by the Malaysian Government as a means of providing poor rural people, particularly Malays (bumiputras), with a greater level of income and security and with improved opportunities for continued economic and social development. The aim of the Regional Masterplan is thus to assist in achieving the desired restructuring of society.

The project was undertaken at an early stage of regional implementation, for which reason it was necessary to ascertain those forms of urban development most appropriate to the needs of the people and to the resources available.

Social research showed that the majority of migrants were likely to be poor rural people, mainly bumiputras, from various kampungs throughout West Malaysia. To attract such people and to encourage them to live and settle in the new towns, a pattern of development was required which combined many familiar features of their present way of life with a high level of social and physical amenities.

The planning and development policy guidelines derived through analysis of the many aspects of project study, gave firm indications as to the desirable urban structure of towns within the Region. Good access by foot, cycle and vehicle, both within the town to individual dwellings and community facilities, and beyond to the hinterland and Region, was an important consideration. A comprehensive system of services had to be provided including a readily available supply of water, electricity and a piped sewerage system for each dwelling. A high standard of educational facilities and of other social amenities was required for all age groups at both a town centre and local level; in addition to which, sites for commercial and industrial uses were needed to encourage the increase in the range of economic and employment opportunities within the towns.

Within this overall urban framework individual houses should dominate the environment. Many such houses would be built or at a later date extended by the settlers themselves, and they should be sited on lots large enough to allow both for some form of cultivation and poultry raising, and for the possibility of starting up new domestic enterprises. Housing should be clustered in an informal manner, closely fitted to the existing topography, and should sit under a cool shaded tree conopy, each residential area having access to local shops, stalls, a padang, community hall, surau and educational facilities.

Throughout each of the towns, a character of instant maturity as well as a generally attractive setting can be created by the retention of certain existing areas of woodland. Such a policy should be complemented by the use of natural materials for construction, (timber dwellings and buildings, grassed open spaces and drainage channels, sealed laterite roads and paths), and by a programme of landscaping which would include for the planting and maintenance of trees and bushes in private and public areas. The difficult topography found on most sites can be used to advantage if carefully related to local roads and footpaths which would wind along the contours linking local communal areas, thereby minimising development damage to the landscape, and creating local environment of varying character and identity.

Policy guidelines are suggested for financing the capital and running costs of the town, through the most effective use of the different resource elements available, namely the settlers, the hinterland agricultural developers and government.

PART 3 URBAN CONTEXT

Town 17 is located in the south-west of Pahang Tenggara, within the area served by Town 22, the proposed district centre some 10 miles to the north. The town lies some 25 miles from the proposed regional centre Bukit Ridan, which will be reached by way of a direct link from the town site to the Kuantan-Segamat Highway.

Town 17 is proposed as a residential and service base for the surrounding agricultural hinterland of 25,000 acres. Part of the hinterland is already well advanced with oil palm development and an early start to the development of the town is required.

The town site and its hinterland drain into the Sungei Keratong and its tributaries. The climate and existing vegetation are typical of inland tropical rain forest.

Within the defined outer town boundary approximately 1,450 acres of land are available for development. The site is generally hilly and broken by a series of steep sided stream valleys, which drain northwards into Sungei Jekatih and westwards to Sungei Chicha, thereby producing a series of separate pockets of developable land close to the tops of the hills and ridges. The range of possible concept plans for the town is thus severely restricted.

In October 1976, towards the end of the project period, it became known that the timber processing mill of the Lesong Forest Complex,

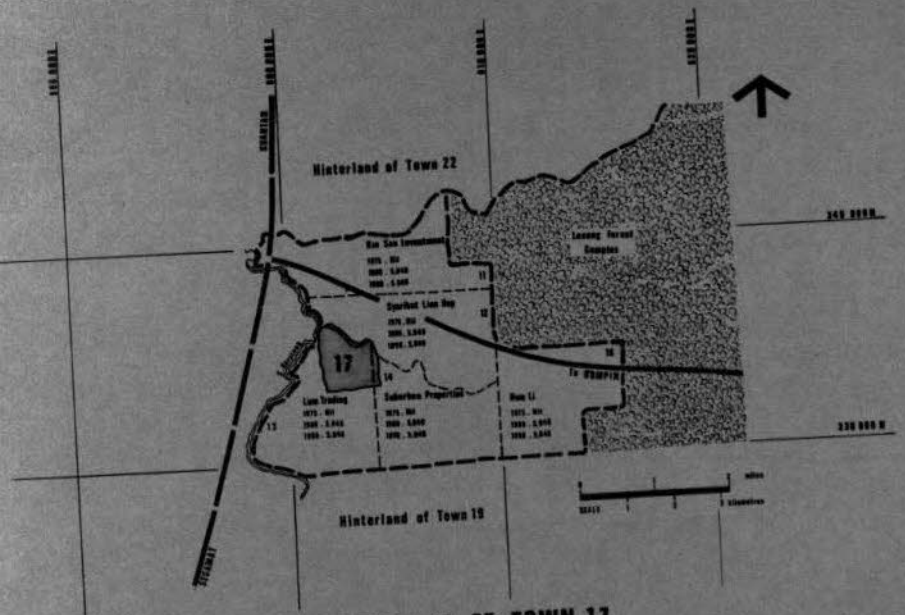


FIG. 1 HINTERLAND OF TOWN 17

OIL PALM MILL

which had originally been associated with Town 17, was to be located 30 miles to the east of the town on the coast at Kuala Rompin. The residential population of the town was thus much reduced from the previously estimated 13,000-15,000 persons; it is now estimated that by 1980 some 7,000 people will be living in the town and that approximately 1,250 houses will be needed by that date.

Prior to the definition of a preferred Concept Plan for Town 17, a series of alternative concept strategies were prepared and evaluated. The preferred Concept Plan was then used as the basis for all further detailed design work required for finalisation of the development plan proposals.

PART 4 PROPOSALS

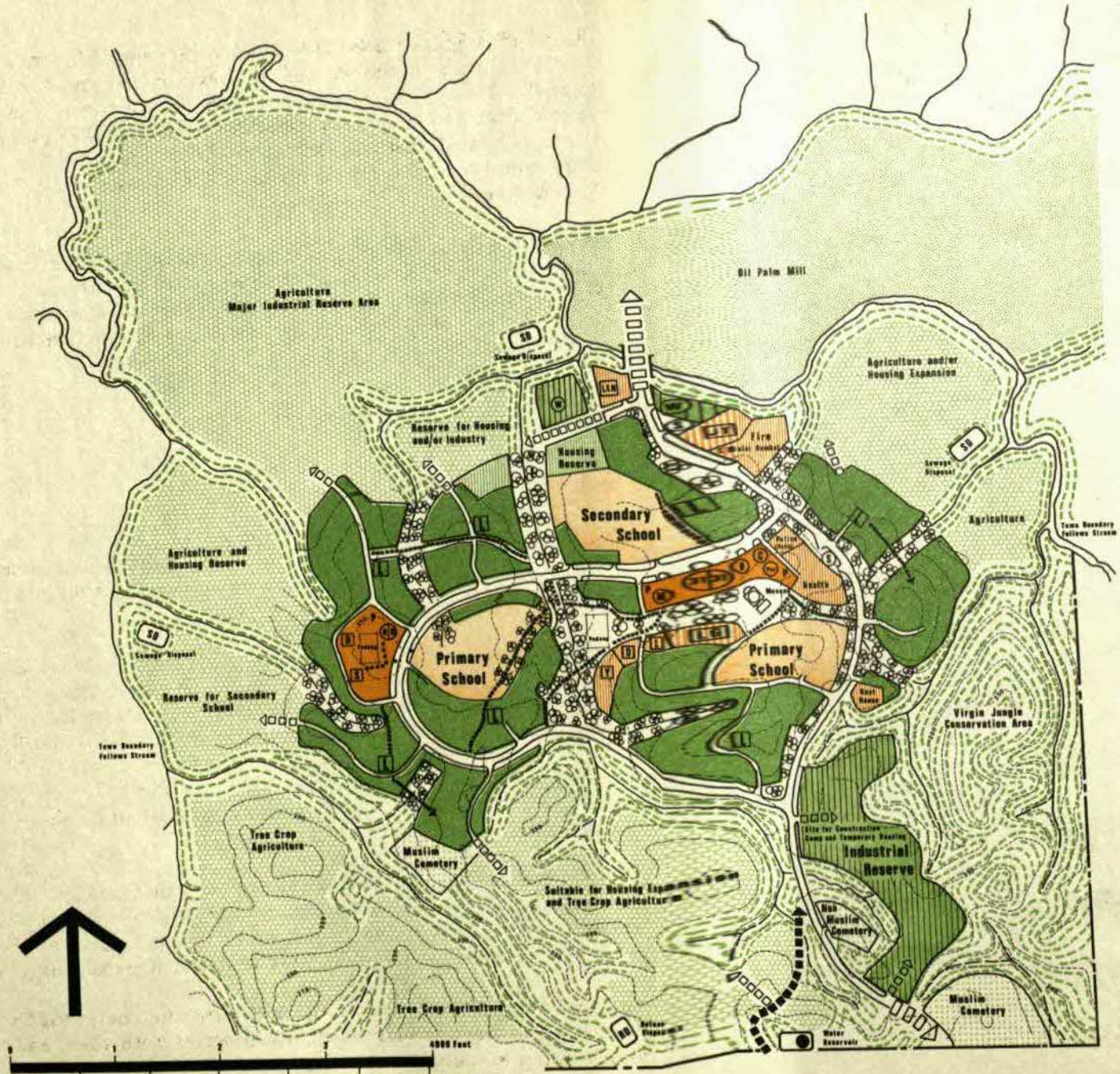
Urban Structure

A major feature of the Masterplan proposals for Town 17 is the linear park and open space area which runs north-south along a major stream valley and divides the urban development into two areas of similar size.

The town centre is located in the eastern development area, close to the regional and hinterland link road that passes through the site. In addition to its function on a whole town basis, the town centre serves the local needs of the residents in the eastern development area for commercial and social facilities. Such local facilities for residents of the western part of the town are located in a local centre; these facilities include in addition to shops and stalls, a padang, community hall and surau.

Each of the two development areas possesses one primary school and adjacent pre-school facility, whilst the Town's single secondary school is situated on gentle sloping ground to the north of the town centre, close to the main hinterland and regional link road.

The two development areas of the town are interconnected by a main town distributor loop road, which serves both town and local centres, schools and housing areas.



URBAN STUCTURE PLAN

LEGEND

- Oil Palm Hinterland Area
- Conservation Areas (Outside Urban Area)
- Housing Areas
- Cemeteries
- Outer Urban Areas
- Industrial Areas
- Commercial Core of Town
- Local Centre
- Schools
- Other Public/Government Uses Police, Health, Library, Dewan, Youth, Fire, BARA/Local Government Offices, LLN, Telecoms, Rest House
- Contours
- Main Rivers
- Permanent Streams
- Intermittent Streams
- Main Town Roads
- Main Town Road Extensions
- Minor Road Extensions
- Existing Access
- Footpaths
- Area Boundaries Major / Minor
- Water Reservoir
- Sewage Disposal (SD)
- Refuse Disposal (RD)
- Power Station (Lembaga Letrik Negara) (LLN)
- Telecoms (Jabatan Telikomi) (JT)
- Fire
- Health Centre
- Police
- Housing Area Centre for Local Shops Creche/ Nursery and Play Area (L)
- Parkland
- Service Station (S)
- Workshops (W)
- Mosque
- Surau (S)
- Community Hall (Dewan) (D)
- Youth Centre (Y)
- BARA/Local Government Office (LG)
- Library (L)
- Market (M)
- Cinema (C)
- Bus and Taxi Station (B)
- Post Office (Pos)
- Shops and Stalls (S/S)
- Parking (P)
- Bus Stops
- Padang

Fig. 2

It is proposed that a large steeply sloping area on the eastern side of the town be retained as a reserve of virgin jungle. Elsewhere, within the outer town boundary there are large areas of land suitable for local agricultural enterprises and future urban expansion. Two industrial reserve areas are indicated in the Masterplan, one to the south of the town on a site proposed initially for reception and construction workers housing, the other to the north adjacent to Sungei Jekatih.

Housing

Housing areas make up the single largest landuse within the urban structure as a whole, and in total provide for some 1,250 dwellings, distributed approximately equally between the two development areas of the town.

Housing provision for the town mainly consists of detached dwellings on sites of 4,000–5,000 sq. ft., although some areas for terraced and semi-detached housing and for executive housing are also provided. Dwellings are clustered around informal open spaces and play spaces, which are related to local facilities such as 'corner' shops and creche/nursery schools. The access road and path system is designed to give convenient access to local and town centre facilities, and buildings are located to as to assist in the creation of attractive housing areas, each with a local character and community identity.

SECTION OF HOUSING AREA

Social Services

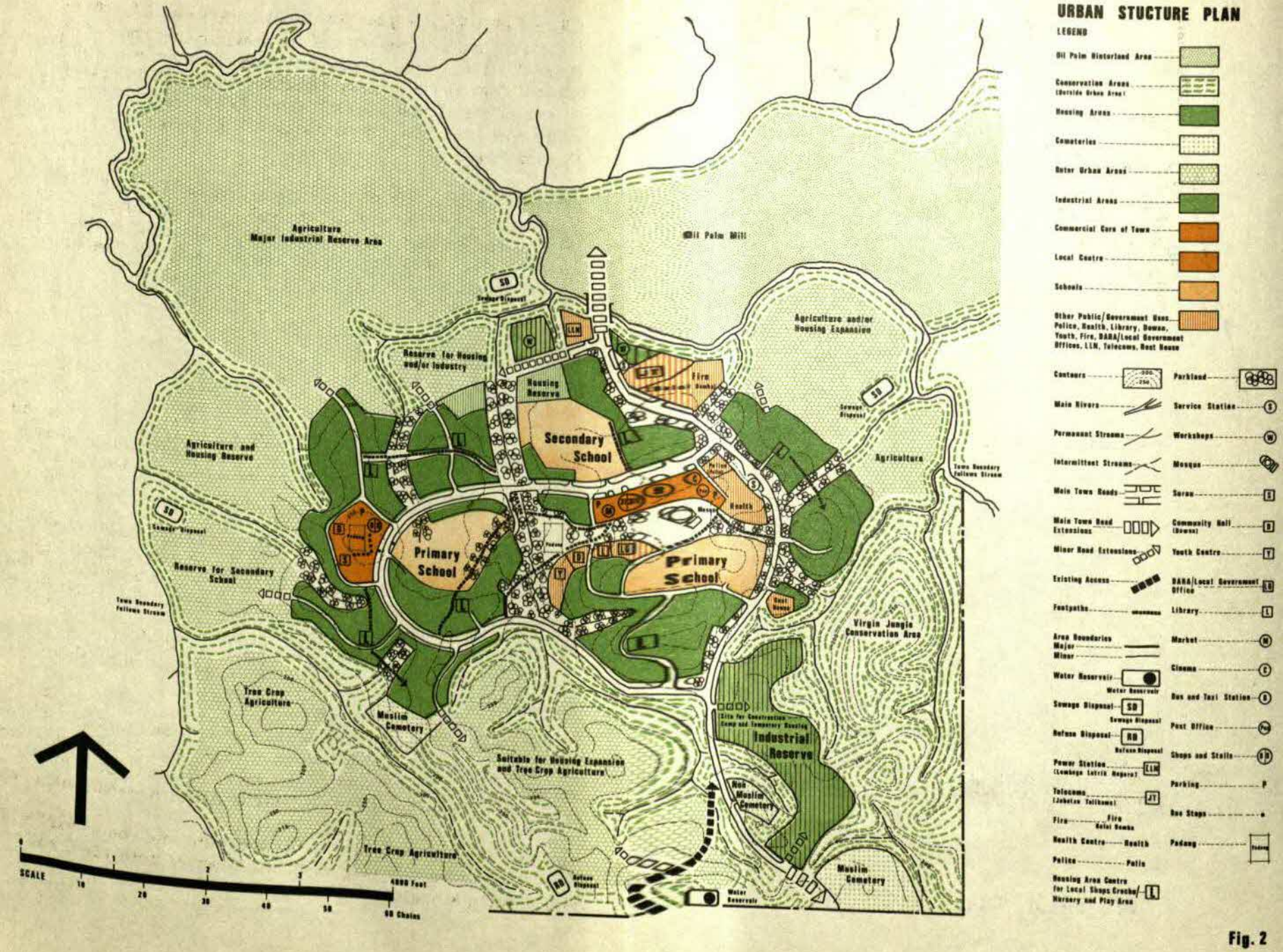
As a result of social research, the importance of a high standard of social service provision was realised, both in terms of a positive inducement to migration to the towns and as a means of attaining a strong sense of community identity within the towns. In all six project towns such facilities have been designed in accordance with a three tier hierarchy of provision: within individual housing areas, within local centres and at a town centre level.

Creche/nursery school facilities are provided within housing areas, each facility serving a catchment of about 150 dwellings. The town and hinterland is served by a secondary school and by two primary and pre-school facilities. All school sites contain an element of residential provision for both academic and non-academic staff.

Sites within the town centre have been agreed for the health centre and police station, whilst an agreed site for the fire staton is located in a strategic position close to the town centre with easy access to both of the proposed industrial areas. Residential accommodation for the three above-mentioned facilities is contained within their sites.

The town mosque, main community hall, youth centre, local government/DARA offices, post office and library are located in the town centre; however, these facilities are complemented by a community hall and a surau in the local centre which serves the western part of the town.

Sites for three cemeteries, two of which are Muslim, are provisionally indicated in areas beyond the urban development but within the outer town boundary.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Parkland
Service Station
Workshops
Mosque
Surau
Community Hall (Dewan)
Youth Centre
BARA/Local Government Office
Library
Market
Cinema
Bus and Taxi Station
Post Office
Shops and Stalls
Parking
Bus Stops
Padang
Agriculture Major Industrial Reserve Area
Oil Palm Mill
Agriculture and/or Housing Expansion
Reserve for Housing and/or Industry
Housing Reserve
Secondary School
Agriculture and Housing Reserve
Agriculture
Reserve for Secondary School
Primary School
Primary School
Virgin Jungle Conservation Area
Tree Crop Agriculture
Muslim Cemetery
Suitable for Housing Expansion and Tree Crop Agriculture
Industrial Reserve
Non Muslim Cemetery
Tree Crop Agriculture
Muslim Cemetery
SCALE
4000 Feet
66 Chains

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Commerce and Industry

Thirty shops are proposed in the town centre, nine in the local centre to the west, and a further nine as 'corner' shops within housing areas throughout the town. This provision is complemented by a similar number of stalls and a central market. There is also reserved site for a cinema in the town centre.

Two sites for vehicle service stations are provided on the through road to serve both northbound and southbound traffic; adjacent to the northern station is a site for the development of workshop facilities.

Two potential industrial sites, totalling 30 acres or more, are proposed, one on the south eastern side of the town and the other to the north between the urban development area and the river.

Landscape and Open Space

Open space requirements are met by padangs in the town and local centres, and by occasional larger games spaces and frequent smaller communal spaces in the housing areas. This provision is supplemented by open space areas provided in the school sites, by the overall parkland character inherent in the generally low density of development and by the extensive conservation areas along the valleys and steep slopes. A major focus of open space is the town park close to the centre, which follows the major north-south stream valley lying between the two development areas of the town.

The implementation and management programme aims to create an attractive urban landscape and minimise environmental problems resulting from the construction process.

Physical Infrastructure

The main road system will provide the basis for a bus and taxi public transport service focussed on a station in the town centre. The local road and footpath system will provide a high standard of accessibility within the town, particularly by foot and cycle.

The town site will be drained along the natural channels that lie within the urban conservation areas, and trunk drainage reserves for these have been agreed with the Drainage and Irrigation Department (DID).

The town will be served by a gravity sewerage system draining to three sewage treatment works with outfalls into adjacent streams. Refuse disposal will be by controlled tipping in designated areas well outside the urban development areas.

A provisional site for a water reservoir is located on high ground to the south of the town. From this site an adequate head of water should be available to all development areas. The water reticulation will allow for the individual connection of all dwellings and buildings.

Concerning a lighting and power supply for the town, discussions have already been held with Lembaga Letrik Negara (LLN) and a site has been allocated for an initial diesel generator, which later will become a step-down station from the national grid. A site for a telephone exchange and telecommunications centre has been allocated to Jabatan Talikom (JT). Sites for both LLN and JT lie to the north of the town, close to the main regional through road.

Town Centre

The town centre is considered as the most important design element of the urban structure, insofar as the creation of a positive identifiable character is concerned. The mosque which is the focal point of the centre is sited in a dominant position on high ground. An area of landscaped public open space around the mosque, links the central area to the town padang and to the town park in the west and defines the principal pedestrian approach from the western part of the town.

The main commercial core of the town centre is to the north of the mosque adjacent to the town loop road. This area which, in addition to the bus and taxi stations, comprises a cinema building, shops, stalls and related public open space and circulation areas, will require a careful and sensitive design approach in order to satisfy the complex patterns of pedestrian movement.

Other social and institutional uses including the post office, health centre, local government/DARA offices, library, main community hall and youth centre are distributed around the mosque and main town padang. Certain facilities are located outside the central area, to the north (secondary school and fire station) and to the south (pre-school, primary school and rest house).

In addition to the housing provision of certain institutional uses, and the residential component contained within the shop house units, housing of various types is introduced in or close to the central area to ensure continual vitality and movement.

Phasing

It is proposed that development of Town 17 should commence at the earliest possible date with the erection of 100 reception core housing units and the provision of a construction camp and temporary 'kongsi' type accommodation. This initial phase of development would take place to the east and south of the urban area, and would require the provision of temporary services.

A steady programme of housing provision is proposed over the next five years, and this should link into a permanent pattern of infrastructure services provided in advance. Such services would be developed in a generally east to west direction, with the areas outside the loop road on the western edge of the town being developed last.

Whilst certain social and community facilities, including the mosque, schools and community halls, should be provided to a high standard from the outset, it is suggested that some other facilities, such as the market, stalls and certain shops, should initially be of a more temporary form of construction. This should limit the construction cost and rental burden on both developer and operator in the initial period of urban development.

A similar phased approach should be adopted in the provision of roads and houses, which can be upgraded and expanded according to demand and availability of resources.

Costs and Finance

The total cost of the town is estimated to be about $22 million, of which nearly 50 per cent will be for residential infrastructure and building costs, and about 20 per cent will be for town and local centre developments. The other major costs are for education and major town infrastructure. Nearly 90 per cent of the expenditure is expected to be incurred fairly evenly over the first five year period, although this period could be extended if it appeared desirable to slow the pace of expansion.

These estimates allow for the development of 350 productive acres within the town area, and a total area for urban uses of 450 acres. The cost per head of population would be of the order of $3,100, and per acre of overall development about $50,000.

For apportionment to productive development, a weighted acreage total infrastructure cost per acre of $12,300 is suggested. If this is accepted as government grant, and a residential contribution from agricultural developers of $25 per worker resident in the town per month is obtained, the settlers should then be able to afford to rent or purchase the differing types of low cost housing proposed. To encourage entrepreneurial development in the early years, a degree of additional subsidy of commercial premises will need to be considered.

The financial and cost analysis provides a basis for the future design and implementation of a financial control system for the town.

PART 5 IMPLEMENTATION

An implementation programme is outlined as a check list for future action in respect of development and construction of the towns of the Region. There are many critical aspects of policy and implementation that need to be pursued with great urgency, and many complex interrelations that must be taken into account.

The problems involved in mobilising and organising the extensive action programme now required should not be underestimated.

Wholehearted and committed support by all relevant government ministries, departments and agencies, especially those concerned with financing, is essential. Given such support, there still remain two major matters of concern.

Firstly, the economy of the project towns provides only a weak basis for proposed settlement and development. Immediate action to offer settlers a greater level of security and income and to establish a firm financial basis for urban development and maintenance, is a prerequisite to the realisation of the stated policy objectives.

Secondly, the urbanisation programme as it stands demands an early and continuous commitment of a high level of resources for the next five years, and there is no guarantee that migration and settlement will be forthcoming. The short time scale allows little flexibility for substantial programming adjustments in relation to changing needs.

If various aspects of the implementation and development programme are not co-ordinated, and if migration is not achieved to the anticipated degree, an unsatisfactory investment picture could emerge. Consideration of such issues suggests not only that all aspects of development should be carefully phased and continuously re-evaluated, but also that attention might be given to a more gradual and flexible time scale for town construction.

1 INTRODUCTION

1.1 PURPOSE OF REPORT

This report summarises the work undertaken in the preparation of the Master Plan for Town 17 and in the production of Detailed Plans for the first five years of development. Its purpose is to assist those responsible for implementation of development proposals for the new town.

This first part of the report summarises the scope of work, the objectives of the project as a whole and the adopted project methodology. Part 2 gives the regional context to the proposals, and part 3 records a more town specific analysis. In part 4 the development proposals for Town 17 and the detailed design rationale behind them are described, whilst in part 5 guidelines for implementation of the proposals are outlined in general terms.

Those studying this report should also refer to 'Six New Towns in Pahang Tenggara – Summary Report', which describes various aspects of project investigations in greater detail. In addition, a series of Reports and Working Papers was produced by the consultants in the course of the project and these are listed in Appendix A.

1.2 APPOINTMENT OF CONSULTANTS AND SCOPE OF WORK

In July 1974, in response to a letter of invitation and Terms of Reference issued by the General Manager of the Lembaga Kemajuan Pahang Tenggara (DARA), Freeman Fox and Associates submitted a proposal to undertake the planning and engineering design of six new towns in Pahang Tenggara.

On January 31st 1975, an Agreement was signed between DARA and Freeman Fox and Associates appointing the latter as Consultants acting in conjunction with Akitek Bersekutu Malaysia and Tahir Wong Sdn. Bhd. to undertake the preparation of Master Plans, Detailed Development Plans and Engineering Designs for these towns. In undertaking the work the Consultants were supported by their associated firms Freeman Fox & Partners, Freeman Fox Braine & Partners and by Alan Turner and Associates and Roger Tym and Associates.

A specification listing the work to be produced was given in Article 3 of the Agreement, and this is contained in Appendix B of this report.

In essence the consultants were commissioned to produce reports and plans for each town under the following headings:–

i) **Concept Plans** – The examination of a range of possible basic alternatives for urban development.

ii) **Master Plans** – Urban land use and structure plans covering 20 years of development, and including outline Engineering Designs, a Detailed Town Centre Plan, and Phasing Proposals.

iii) **Detailed Development Plans** – Area Designs and Layouts for at least the first five years of construction, adequate for the detailed location of lots, buildings, and services on site.

Project work and the resulting proposals for Town 17 under the above headings are summarised in this report.

The Agreement also specified the production of Detailed Engineering Designs for the first five years of construction, and this aspect of the project continues after the preparation of this report and is scheduled to be completed in the two year project period from the 31st of January, 1975.

In the Terms of Reference, Section 3.5 and 3.6, it was also specified that 'the Consultants should approach their Concept Plan proposals as prototype studies that may be used in the preparation of plans for other towns in Pahang Tenggara', and that, 'the Consultants are required to prepare printed texts in the form of a Development Report for each town as well as a general report summarising all proposals applicable to the project'.

This stipulation within the Terms of Reference has resulted in the production of both this report and an accompanying Summary Report, which is designed as far as possible to be a reference handbook for those responsible for the design and development of all towns throughout the Region.

Article 3 of the Agreement, 'the Description of the Project' and all relevant sections of Terms of Reference are given in the Summary Report.

1.3 OBJECTIVES

The Terms of Reference emphasised the need for the new towns to contribute to the achievement of the objectives of the New Economic Policy, implicit in the original recommendations for the urbanisation of Pahang Tenggara. These objectives were summarised as being the eradication of poverty and an end to the identification of race with economic function.

The urbanisation programme's main aims were also summarised in the Terms of Reference. Those were as follows:

i) To attract and retain settlers through the quality of the social, economic and physical environment of the new communities.

ii) To provide a wide range of service sector jobs.

iii) To provide a transition for the new towns' inhabitants between rural and urban society.

iv) To provide opportunities for greater participation of bumiputras in the commercial and industrial sectors of the economy, and by doing so to raise income levels of bumiputras.

Certain other objectives which are either implicit in the Terms of Reference or were agreed in discussions prior to the consultants' proposals, are identified below:–

v) To get the construction and habitation of the towns under way as soon as is possible.

vi) To help determine standards and principles as a basis for the future of the massive urban development programme of the Region.

vii) To relate proposals, particularly for housing and shopping, to the likely economic status of potential migrants.

viii) To phase proposals to population numbers and employment needs.

ix) To dovetail the physical planning of the towns with the developing plans for their social, administrative and institutional infrastructure.

x) To discover what types and forms of development will attract migrants and retain them in the Region.

xi) To secure an acceptable return on public investment capital, bearing in mind the aims of the New Economic Policy.

xii) To achieve a high quality landscape in the towns and avoid risks of erosion, flooding, and other ecological damage during construction and afterwards.

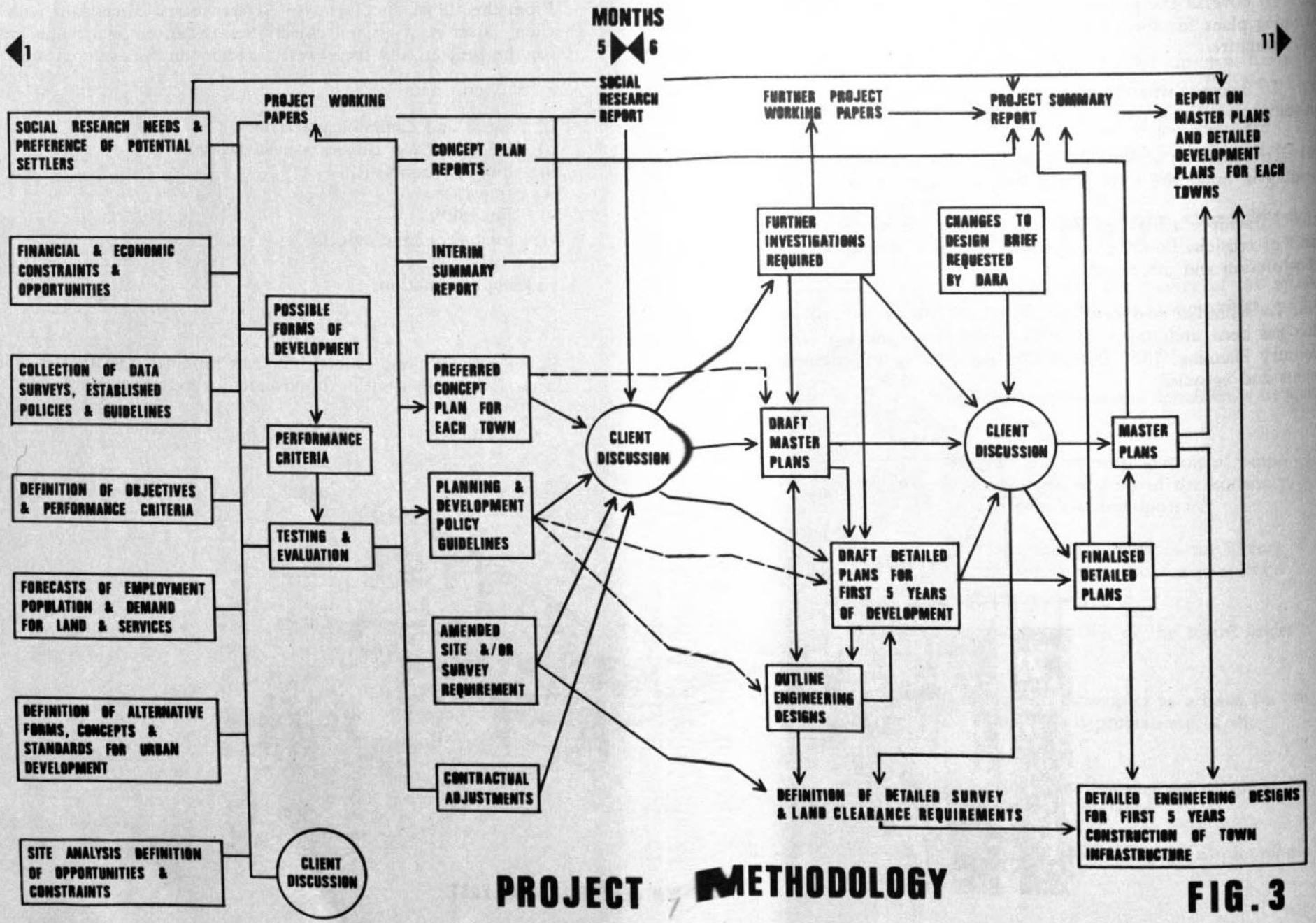
xiii) To assimilate and develop the prior work in appropriate fields, that has been undertaken by DARA, the Department of Town and Country Planning, JKR, DID, Felda and other government departments and agencies.

From the above, the Terms of Reference and discussions with the client, a series of general objectives was derived as a framework for the project, and these were listed in the following groups:—

i) social and community activities.
ii) landscape and climatic considerations.
iii) built environment.
iv) transition.
v) flexibility.
vi) socio-economic aspects.
vii) costs.
viii) implementation.

Under each of these general objective headings, specific performance criteria were then outlined and used for evaluation purposes.

TOWN CENTRE LOOKING EAST



PROJECT METHODOLOGY

FIG. 3

1.4 METHODOLOGY

Figure 3 illustrates in outline, the project work methodology adopted, and the approximate programme.

Work on the project was undertaken by a joint resident team of planners, engineers, architects, sociologists and economists, which in turn was advised by experts both in these fields and in forestry, landscape planning and ecology. Throughout the work programme, a regular programme of reporting to and meetings with the client was held. In addition, discussions were held with all relevant ministries, government departments and agencies both at Federal and State level and also with private companies and individuals.

After a series of parallel basic studies conducted over the first three to four months of the project starting in January 1975, a series of reports was produced outlining:—

i) A preferred Concept Plan for each town.

ii) The concepts, principles and standards to be adopted in the preparation of all further plans and designs.

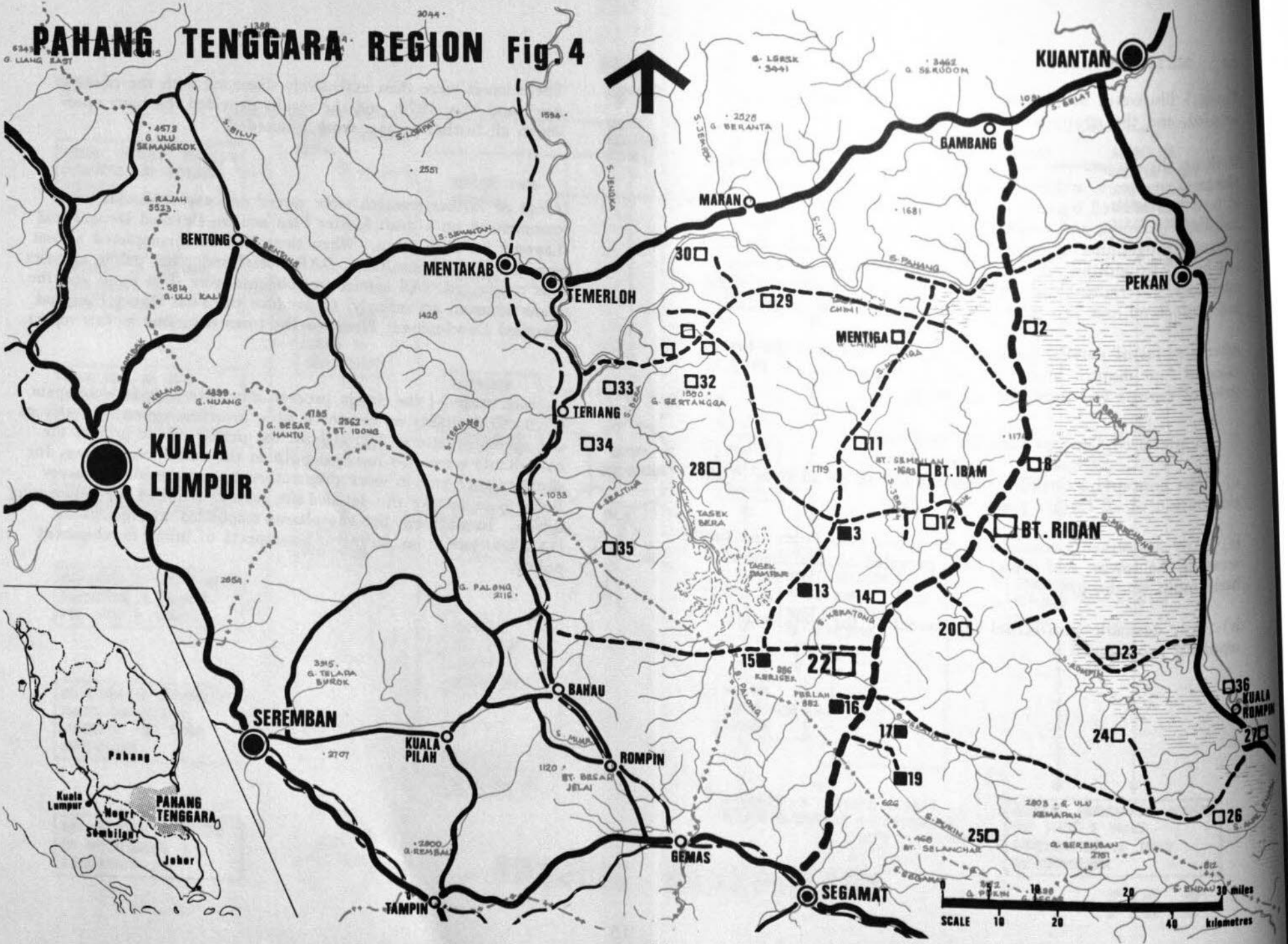
iii) Any adjustments required to the urban boundaries and survey areas of the towns, which had been provided by the client as a basic input to the project.

iv) Any desirable contractual adjustment to the work and reporting programme.

These issues were then extensively discussed with the client in April and May 1975, and the results provided the basis upon which all further project work proceeded.

Areas of further research were agreed and explored, and work commenced on a draft Master Plan and on Detailed Designs and Layouts for each town. When these had been completed a joint seminar of the consultants, DARA staff and other public agencies was conducted. All agreed amendments were then listed and the plans adjusted accordingly, to produce the final Master Plan and Detailed Development Plans for the town described in this report.

At each stage of the design process, extensive periods were spent by the consultants on the town sites, investigating various relevant site specific matters. Throughout the period of the project the consultants were also involved both in the definition of areas for site clearance and in work preparatory to commissioning survey firms to undertake the detailed site surveys required for engineering design. In addition, the consultants responded to requests by DARA to advise on various other aspects of urban development policy.


PAHANG TENGGARA REGION Fig. 4
KUANTAN
GAMBANG
MARAN
BENTONG
MENTAKAB
TEMERLOH
PEKAN
MENTIGA
TERIANG
KUALA LUMPUR
BT. IBAM
BT. RIDAN
BAHAU
SEREMBAN
KUALA PILAH
ROMPIN
KUALA ROMPIN
GEMAS
TAMPIN
SEGAMAT
Pahang
Kuala Lumpur
Negeri Sembilan
Johor
PAHANG TENGGARA
SCALE
kilometres
miles

2 REGIONAL CONTEXT

2.1 PAHANG TENGGARA

The Pahang Tenggara Region covers a total of nearly 3,900 square miles. Roughly triangular in shape, it has three boundaries each some 80-100 miles long; the Pahang River (Sungei Pahang) to the north, the South China Sea to the east, and the Pahang State boundaries with Negri Sembilan and Johor in the west and south.

By 1972 a Regional Masterplan had been prepared for the area, which at that time was predominantly undeveloped land under jungle cover, and the State and Federal Governments had created a development authority – Lembaga Kemajuan Pahang Tenggara (DARA), to co-ordinate its implementation.

The Masterplan was designed to use the massive inherent resources of the Region to fulfill a wide range of social and economic objectives. A pattern of new land uses, settlements, communications and services was programmed over a 20 year period, to provide ultimately for a population of up to 500,000 people, based upon employment in agriculture, forestry, mining, construction, manufacturing and commerce.

Construction work has already started on the regional centre of Bukit Ridan, which is expected to accommodate 50,000 people or more, and on two other large new towns, each of about 30,000 people, which are proposed to serve as the district centres for the northern and southern parts of the Region. Throughout the developable areas of the Region, the Masterplan proposed to complement these larger centres with a pattern of smaller towns and villages, a number of which either are in various early stages of development or already exist. The existing smaller towns are generally located along the main east coast national route, with the exception of Bukit Ibam, an old mining town close to the centre of the Region, which has been converted into a base for forestry, construction and other industrial activities.

A new inland spine road, the Kuantan-Segamat Highway will run north-south through the main corridor of development. When complete this highway will provide an additional link in the national road network, joining the east coast national route, near Kuantan (the Pahang State capital where a new east coast main port is being built), to the west coast national road and to rail routes at Segamat, an urban centre in northern Johor. From Segamat there are also road and rail links northwards to the Federal capital Kuala Lumpur and southwards to the ports of Johor Bahru and Singapore. The Kuantan-Segamat Highway will also provide a connection in the north of the Region, with the main east-west national route between Kuala Lumpur and the east coast States and towns. This route

crosses the national railway network at Mentakab, close to the north-west corner of the Region. A further regional road system to serve the various enterprises and settlements of the Region is being developed within the existing national and regional framework.

Already a great deal of agricultural and forestry development has been stimulated in the Region, and new enterprises have been and are being established in the construction, quarrying, mining, manufacturing and service sectors. In the south of the Region, in the general area in which the project towns are located, large areas of land are either already in agricultural production or will soon reach that stage.

2.2 REGIONAL URBANISATION POLICY

In essence, the Regional Masterplan's urban development philosophy is that major advantages can be achieved by the concentration of agriculturally based settlements, both in terms of capital and operating costs and in terms of social and economic development. These settlements were seen as offering rural people better access to a wider range of employment, housing, educational, commercial and other opportunities, thus providing a basis for greater growth in secondary service and industrial activities, and a framework to assist rural migrants in making a transition to a modern economy and urban way of life.

Initially the main function of all towns within the population range of 5,000–15,000 persons, is to provide residential and service bases for the surrounding agricultural areas up to a radius of 3-6 miles. However, in the Regional Masterplan, these settlements were also seen as a processing centres, yet the oil palm mills being developed are either single estate or group estate based, and some of the service areas cross urban hinterlands. It is therefore no longer relevant to envisage all primary agricultural processing activity as taking place in or close to the towns.

Despite the loss of the processing component, this scale of town (5,000–15,000) is seen as a major innovation when compared with existing practice in Malaysia. Usually, people whose lives are based on rural employment live in smaller groups, on or close to their smallholdings, in housing areas within private agricultural estates or in separate Felda villages.

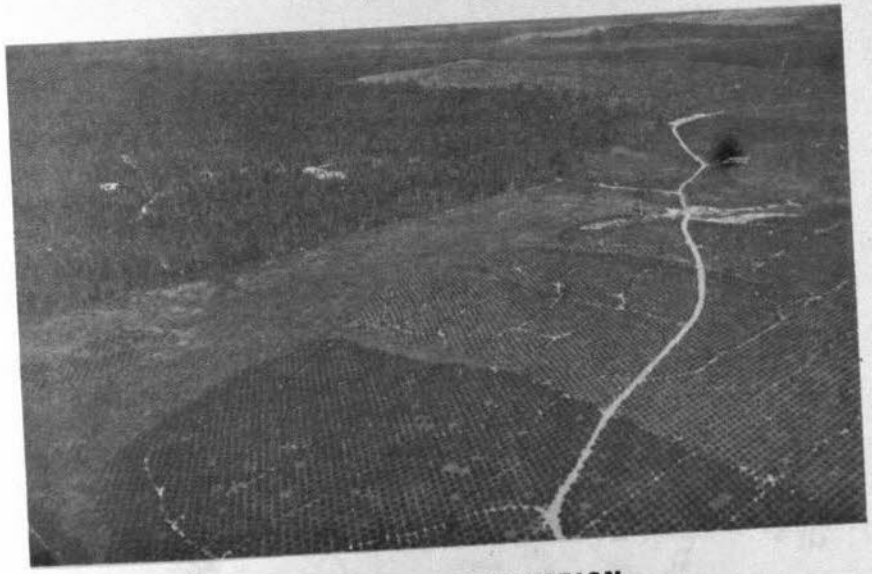
2.3 ECONOMY OF THE PROJECT TOWNS

Agriculture and forestry are the main proposed primary industries of the Region. In the agricultural sector palm oil cultivation predominates, although various other crop and livestock enterprises are being introduced in an attempt to establish a more diverse regional economy. In the areas around the project towns however, palm oil is the main crop and as such it is the basic employment generator of the six project town hinterlands.

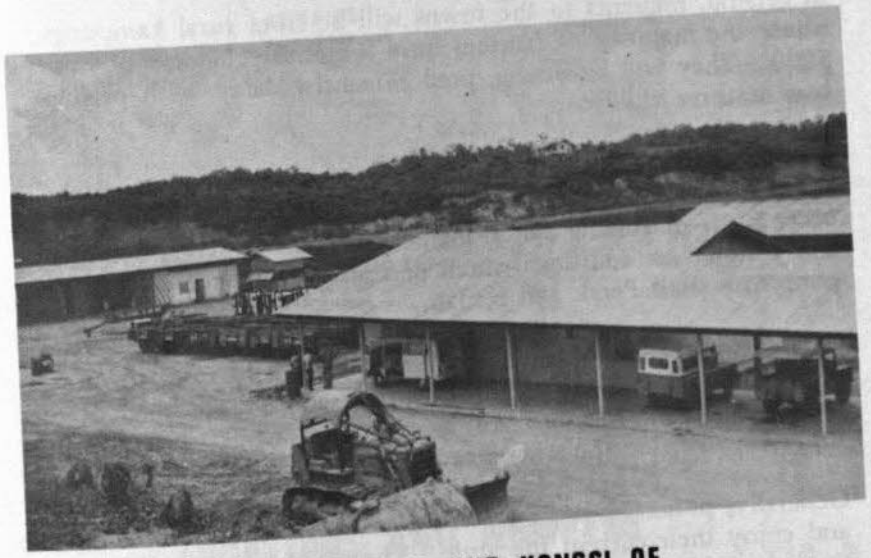
Malaysia is the world's major producer of palm oil. Owing to soil and slope characteristics, and to the climate of the country, large areas are suitable for its cultivation. In response to high world prices in recent years, vast areas have been and are being given over to the crop, and the majority of the land alienation for its development in the areas of the project towns was made by the Pahang State Government in advance of the preparation of the Regional Masterplan. Palm oil is used in varying degrees of refinement in the production of soaps, cosmetics, margerine, confectionery, tin plating and other commodities. Normally, it is only exported after the different refining processes have been carried out.

There is a series of private oil palm estates around each of the towns of the Region, in which the crop has been or is to be planted. During the jungle clearance procedures, planting and three year gestation period, a high labour input is required; however, on those estates now reaching maturity, there is only a permanent labour demand for harvesting, maintenance, and processing.

There are two major problems that can be foreseen insofar as the economy of these towns, reliant solely upon oil palm, is concerned. Firstly, the incomes level and stability of the palm oil industry, and therefore of the urban population itself, are linked closely to the susceptibility of the crop to world demand



OIL PALM CULTIVATION



HEADQUARTERS AND KONGSI OF NUCLEUS ESTATE

and to consequent price fluctuations.

The second problem that can be envisaged is that, with the exception of Felda settlers in parts of Town 19, the labour workforce living either on the estates or as permanent settlers in the towns will rely, as wage paid labourers, mainly on incomes fixed at current union rates. The level of incomes will in turn directly influence the rate of growth of the service sector.

Budgetary provisions have been made in the Second and Third Malaysia Plans for the development of the new towns. It should be noted that the Regional Masterplan targets include the achievement by 1990 of a regional annual per capita income close to the national average (i.e. from US$360-400 in 1971 to US$720-800 in 1990), in a regional economy, which by that time would have only 40-50 per cent of employment in resource based activities and 50-60 per cent in manufacturing industries and services. The Regional Masterplan stated, "it is necessary to adopt a policy of settlement and infrastructure within which the greatest benefits would eventually be derived in providing non-resource based employment". This order of diversity and growth will be difficult to achieve in the areas served by the project towns, as both intrinsic opportunities for diversification and high incomes and security to migrants are lacking.

There clearly must be doubts about the quality of the stated economic base as a means of attaining social development and urbanisation. To achieve the objectives of the Regional Masterplan, a large proportion of initial development costs must be borne by government and attention must be given to ways in which settlers can increase their incomes, such as alternative employment possibilities, smallholdings and profit sharing in agricultural enterprise. In addition, it should be noted that the capital and running cost savings inherent in the towns, as compared with traditional smaller rural settlements will, unless initiatives are taken, be effectively transferred into public subsidies for the agricultural enterprises, who will in any event have reduced liabilities for the provision of housing, social and physical amenities. Means of obtaining financial contributions from the agricultural developers, to assist in the establishment and running costs of the towns, either by agreements or such forms of local taxation as

rating, are required to place the towns and their residents on a firm financial footing.

2.4 TOPOGRAPHY, SOILS AND CLIMATE

The topography of the Region as a whole is dominated by the Sungei Rompin drainage system, while the area of the project towns is drained by its tributary the Sungei Keratong and a number of other smaller tributaries. The towns have generally been sited on higher ground close to the headwaters of the tributaries, and their hinterlands contain some fairly extensive hilly areas. Flood plains along parts of the Sungei Keratong are extremely wide and in the 1971 flood, considerable areas along Sungei Makong, Sungei Kepasing, Sungei Seraya, Sungei Jekatih and Sungei Pukin were also inundated. Flood plains on the smaller rivers and streams however, are frequently confined by steep slopes.

The soils in the vicinity of the new settlements are derived from deeply weathered rocks, both sedimentary and igneous. The predominant soil types are Rengam (from biotite granite) and Bungor (shales and quartzite), although Akob soil (recent alluvium) is found in most valley bottoms. Rengam soils are deep and susceptable to sheet erosion. Akob soils characteristically have a shallow water table (2-5 feet), are poorly drained and subject to flooding.

The winds in Pahang Tenggara are gentle and generally easterly, averaging only 1.5 miles per hour inland; only the north-easterly monsoon winds gust to over 30 mph. There is no distinct dry season and the rainfall in the area of the towns is between 90 and 110 inches a year, with up to 20 inches or more per month occuring in the monsoon period from November to January. The annual mean temperature of the Region is about 80°F and records indicate 75–85°F as the normal temperature range. Despite the high rainfall, sunshine hours are long, reaching an average of 7–8 hours a day in the driest months. Relative humidity is high, being between 55 and 75 per cent during the day and up to 95 per cent during the night.

The natural vegetation of the Region is classified as rain-equatorial forest formed of many species, a high proportion of which are of the Dipterocarp family.

2.5 THE PEOPLE

The primary objectives of the regional urbanisation programme are concerned with social development. To achieve these objectives, it is essential that the towns attract and retain migrants, and for the towns to flourish, the majority of migrants must be families. Within the Regional Masterplan context of new town planning and development, it was necessary to develop an articulated picture of the needs, preferences and attitudes of potential migrants in relation to their existing and future environment. To this end a programme of social research was designed and undertaken, the findings of which are summarised below.

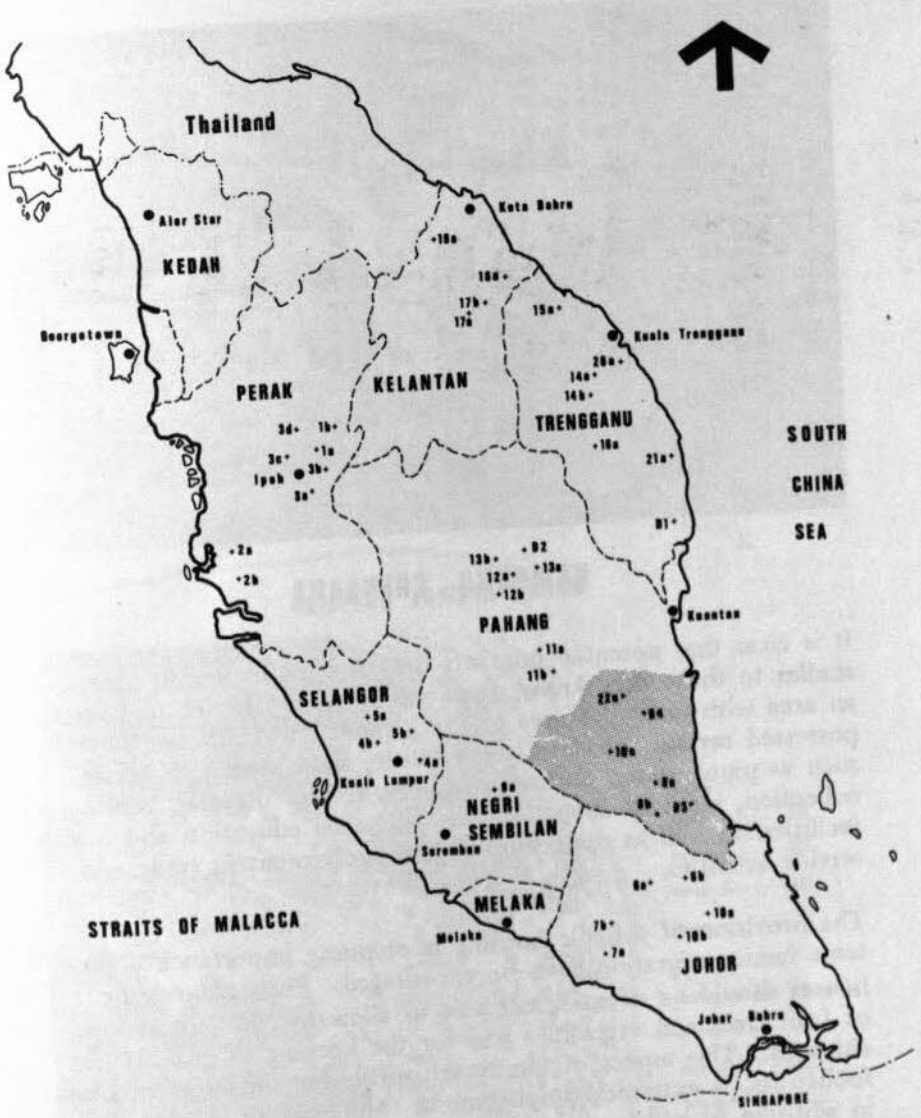
2.5.1 Potential Migrants

In general, migrants to the towns will be from rural kampungs, where the majority of families have a monthly income of under $200. They will be young, predominantly Malay, with perhaps two or three children.

It appears likely that most of the migrants will come from the states of Kelantan and Trengganu, although some will come from other parts of Pahang and from nearby areas of Negri Sembilan and Johor. An additional small percentage may come from the poorer areas of Perak and Kedah.

A large proportion of initial migration, especially from the neighbouring states, is likely to be short-term and by the head of the household only. Migrants will need to find attractive conditions for them to bring their families and to remain in large numbers.

Generally, potential migrants would prefer to stay where they are and enjoy their current life style. The pressure to consider migration, comes from the lack of secure, well-paid employment opportu-



SOCIAL SURVEY INTERVIEW LOCATIONS AND NUMBERS

FIG. 5

nities in the poorer rural areas.

Potential migrants have very clear ideas about the present alternatives available to them. Felda schemes are perceived as being very attractive, not only because of the high incomes, standard of housing, security and land ownership, but also because they allow the settler to continue to live in a rural manner without any of the problems associated with towns. The choice of moving to a town is not generally considered, because it is felt that without any special skills or capital, it is too difficult to make a good living. Few people see the extra facilities generally available in towns, as a reason for moving to urban areas.

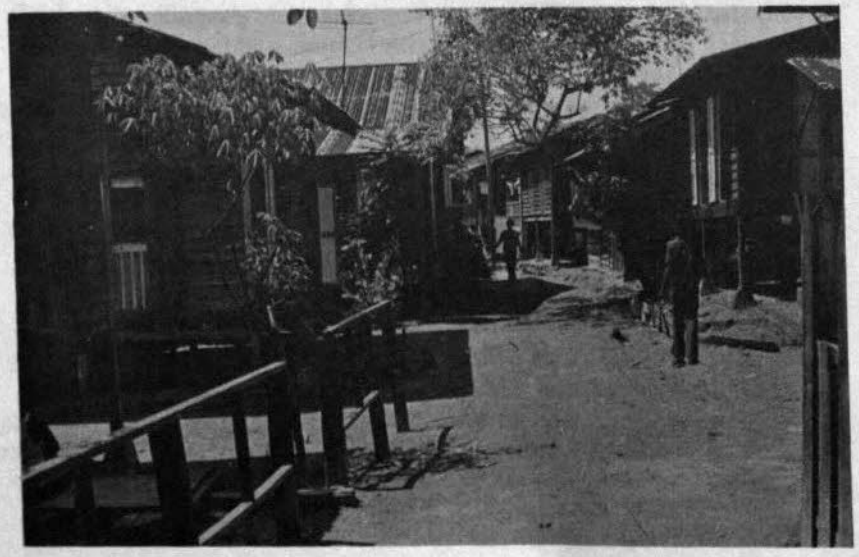
A secure job is less important to potential migrants, than either owning or working their own land or having business opportunities. It is from this standpoint that they view living and working on traditional estates and equally important migrating to the new towns of Pahang Tenggara.

While it is difficult to generalise about the life style of potential migrants, there being so many variations, some common threads can be distinguished. The rural kampungs are generally dispersed settlements with few basic amenities. Land around the house is often used for the cultivation of vegetables and fruit and the rearing of livestock and poultry, and as such is the source of most daily foodstuffs. Housing is of timber construction and of a generally high standard when viewed in relation to family incomes. Household purchases are for the most part made either from a local sundry shop or at markets which are popular and frequently visited. The main sources of income are usually a smallholding in rubber, padi or tobacco, although the kampung dweller often has another job on someone else's land. Trips to work are usually short enough to be made either on foot or by bicycle. A padang and a surau are common features of the rural kampung, and the general setting is informal, hospitable and attractive, the dominating characteristic being a pattern of close social reliance, residents often being closely related.

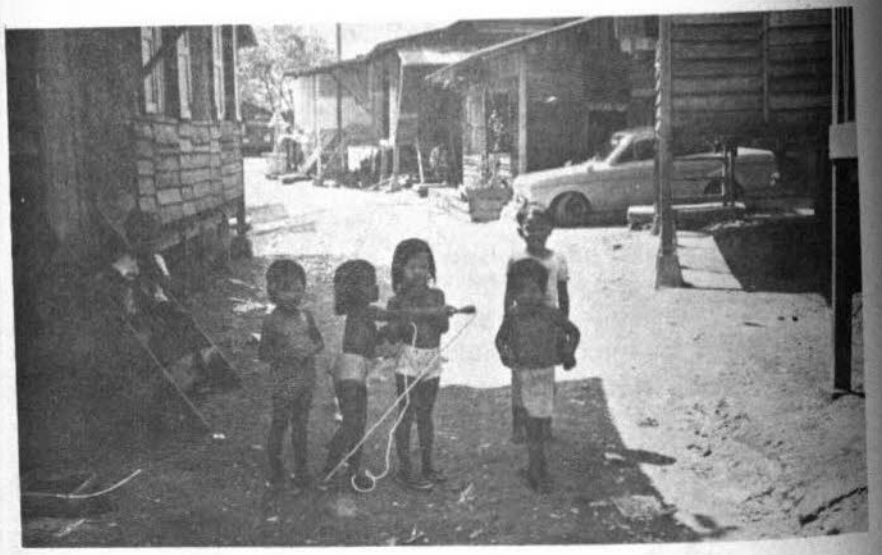
2.5.2 Needs of the Migrants

Prospective migrants to the Region will need to know in which ways the towns of Pahang Tenggara can match or surpass the potential of other competing choices available to them. Such knowledge is fundamental to any decision to either stay where they are, opt for selective short term migration, migrate to larger kampungs, towns or cities, or join Felda schemes or the private estates. It is clear that when compared to the alternative competing choices, the towns of the Region are for a variety of reasons at a disadvantage insofar as the primary stimulus to migration is concerned, namely security of employment and the guarantee of a good income level.

In order to provide a clear and highly marketable choice to potential migrants, the image of the new towns should be unlike that of any other type of settlement in Malaysia. They must not be confused with estate labour lines, Felda schemes, impoverished kampungs or other existing towns.



KAMPUNG CHENDANA



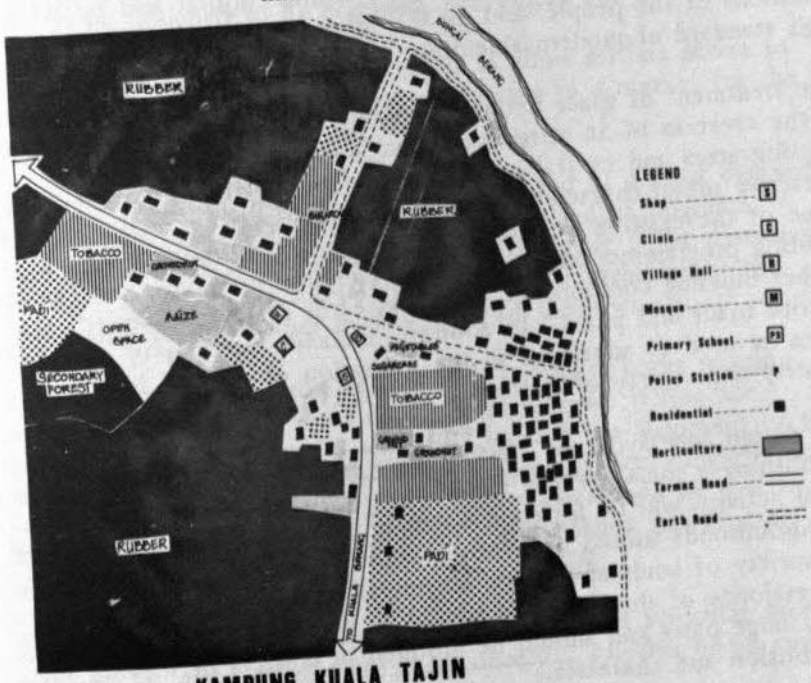
KAMPUNG CHENDANA

It is clear that potential migrants do not wish to live in towns similar to those they know, they would instead prefer to live in an area with many features of the kampung, which nevertheless possessed certain amenities and facilities associated with towns such as piped water, electricity supply, sewage disposal, refuse collection, markets, shops, schools, technical education and health facilities, as well as opportunities for involvement in trade and service activities.

The provision of suitable housing is of prime importance if long-term family migration is to be encouraged. Plots around the houses should be of sufficient size to allow for the cultivation of fruit trees and vegetables and for the keeping of goats and chickens. This aspect of family self-sufficiency in terms of basic foodstuffs, is extremely important in consideration of plot size, in addition to which plots can also be used for small trading and service activities in the manner of existing rural kampungs.

Houses should be of timber, well ventilated, contain enough space initially for a small family, yet be capable of extension and modification as the resident family grows and changes. These qualities

KAMPUNG LAMBOR KANAN



KAMPUNG KUALA TAJIN

are important elements in the formation of the type of physical and social environment at present enjoyed by the potential settler as a typical feature of traditional kampung life.

Ownership of both land and dwelling is an important feature of traditional Malay life that must be incorporated into the towns, if an element of security is to be provided for the settlers. Whether self built, (there is a strong tradition of self built housing amongst rural Malays), or custom built, settlers in the new towns will undoubtedly want to own their own house. Facilities for house purchasing should be made available to residents, for them to buy their property over a period of years.

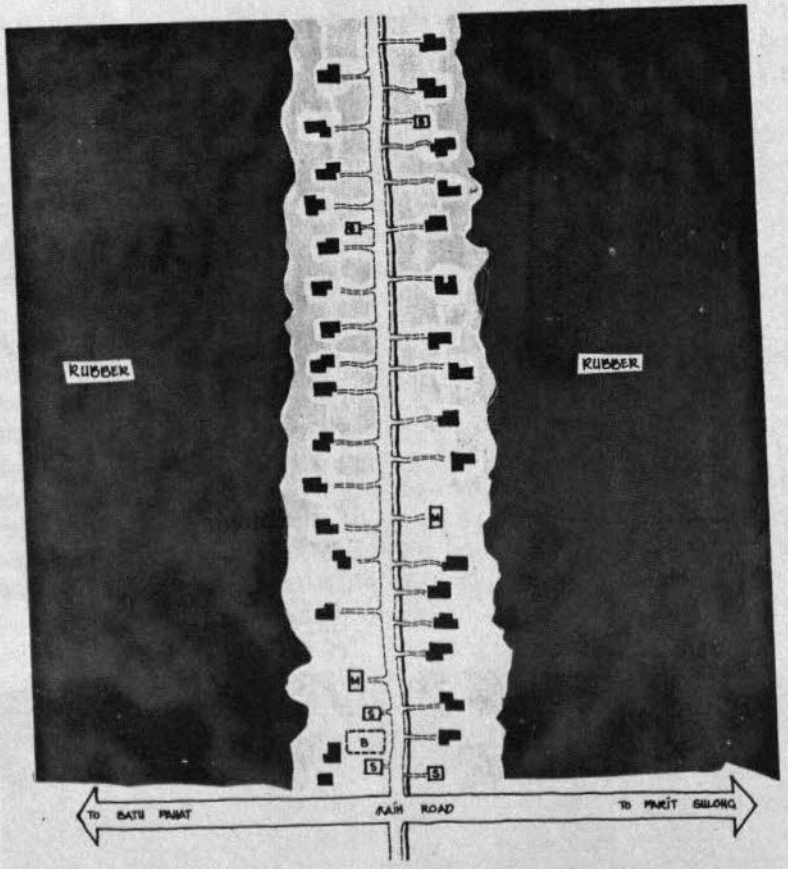
The provision of good academic and technical educational facilities and of health facilities, will be a major incentive to migrants. Potential migrants have high expectations for their children's futures and for these aspirations to be capable of realisation, it is essential that there be good pre-school, primary and secondary school facilities readily available to all families, as well as establishments of further education for those that desire them.

In the rural kampungs at present, there appears to be extremely limited opportunities for potential migrants to involve themselves in trade and service activities, and it would seem that provision of such opportunities, could prove an attractive feature insofar as the new towns of the Region are concerned.

In terms of social and communal activities, such as sports and recreation, casual or formal meetings in coffee shops and community halls, television and cinema viewing, as well as access to public transport, there appears to be a desire amongst kampung residents for a continuation of these activities and facilities but in a manner consistent with traditional values.

2.6 PLANNING AND DEVELOPMENT POLICY GUIDELINES

As the six new towns project represented a major early step in the implementation of the strategies proposed in the Regional Masterplan, a widespread review was undertaken of possible alternative concepts, principles and standards relating to the various



LEGEND
Shop
Mosque
Residential
Horticulture
Badminton Court
Earth Road
Canal

KAMPUNG PARIT MUSTAPHA

facets of urban development in the Region. On completion of this initial phase of the project, the findings of the programme of social research were combined with other aspects of project research to produce a policy framework for the remainder of the project.

The resulting development guidelines are described in greater detail in the Summary Report, and reference is made in later sections of this Report to certain of the principles and standards adopted. The remainder of this section describes solely the main features of the adopted approach.

2.6.1 General Form and Context of Urban Development

It is considered that the new towns of the Region can best be designed and developed by, on the one hand, a respect for the topography, indigenous vegetation and strong cultural and building traditions of the people, and on the other, by the provision of a high standard of modern amenities.

The treatment of space between buildings is an important feature in the creation of an attractive urban landscape. In both the housing areas and central public areas of the towns, a mature and attractive urban character can soon be established by retaining some of the existing woodland, by the implementation of a tree planting programme and by the use of natural materials, such as timber building components, grass and earth drains and sealed laterite roads and paths. In addition, difficult topography can often be used to advantage in the formation of positive local identity and variety of character.

The design and layout of housing areas are especially critical in establishing a social pattern in the towns, mainly because so much social activity will be focussed on or around the home. Resident neighbourhoods should be irregular and informal to help to create the variety of landscape which is generally found in kampungs. The majority of the dwellings should be detached and with relatively large plots and should be grouped in clusters of varying size distribution and character.

A high standard of services provision is desirable for all dwellings within the town. Initial development could require servicing of a temporary nature, however the upgrading of any such provision must be considered a high priority development objective.

Where possible mature trees should be retained in the residential areas to provide a cool, shaded setting, which will allow settlers privacy within their house plots yet, through a more hospitable setting, encourage the kind of social contact that is such a feature of kampung life.

Efforts of settlers to build their own homes should be encouraged by the offer of loans for the purchase of essential building materials and by the formation of community building groups.

Each locality would have its own local centre, comprising a padang, surau, shops, stalls, community hall, pre-school and primary school facilities. The town centre, which would be the main social, commercial, institutional and administrative focus of the town, should be designed to be compact, convenient and attractive.

Shopping facilities should be planned to allow settlers access to sundry shops in their local areas and access to a market for the bulk of their shopping needs.

Social research did not indicate the likelihood of a great demand for organised entertainment facilities from the first migrants. However such facilities would undoubtedly prove to be necessary in order to retain the interest of the younger members of the population in the further development of the town.

Development areas would be separated by linear parks running along the bottom and sides of the river valleys. Within the general area of these parks would be located the alignment of the trunk drainage system for the town. Some original jungle areas would be retained, and elsewhere other areas should be specifically set aside as open space for children's sports fields and general leisure activities.

Each house plot should have easy pedestrian and vehicular access, although in many cases there is no necessity for this to be anything more than a motorable track. It is likely that there will be an increasing desire amongst settlers to purchase motorcycles and at a later date cars, and it is preferable that they should be able to park vehicles on their house plots.

The majority of journeys made in the town, with the exception of journeys to work, will be made either on foot or by cycle,

POORER MALAY HOUSING

the design and location of town and local centres should take this fact into account, and all housing areas and footpath systems should be planned accordingly.

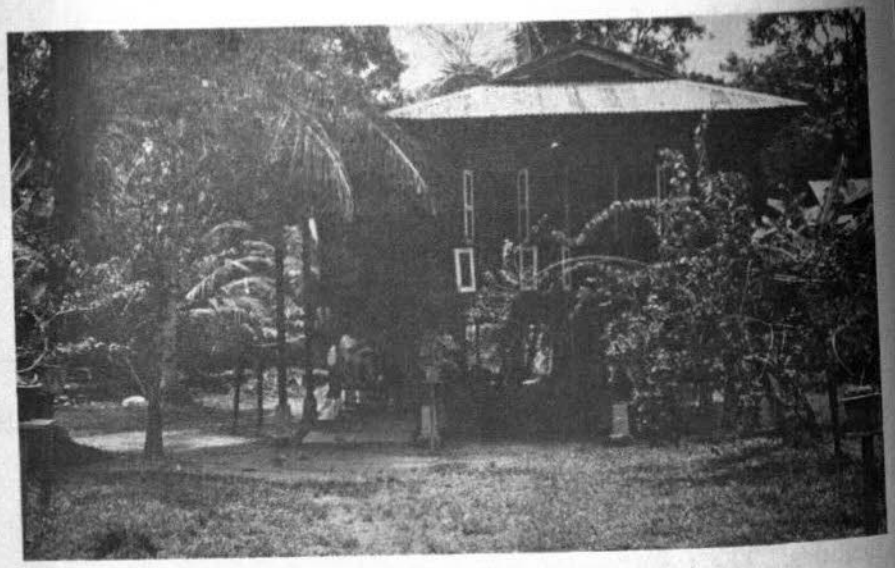
There will be a demand for public transport within the town, and convenient access from the housing areas to the bus routes is essential. The main road system for each town should, if possible, pass within ¼ mile of all development, and this would then form the basis for an in-town bus service. Minor radial routes, access roads and culs-de-sac would provide access to each locality. A footpath system and where appropriate a cycle path system would be developed, with some alignments alongside roads and others following independent routes through open space and housing areas.

In terms of the expressed need to provide ample opportunities for residents to begin private business ventures in the commercial or industrial sectors, it is thought that the most effective way of promoting this is through a programme of technical education and the specific encouragement of small scale enterprise combined with a readily available provision of land, materials, loans and advice.

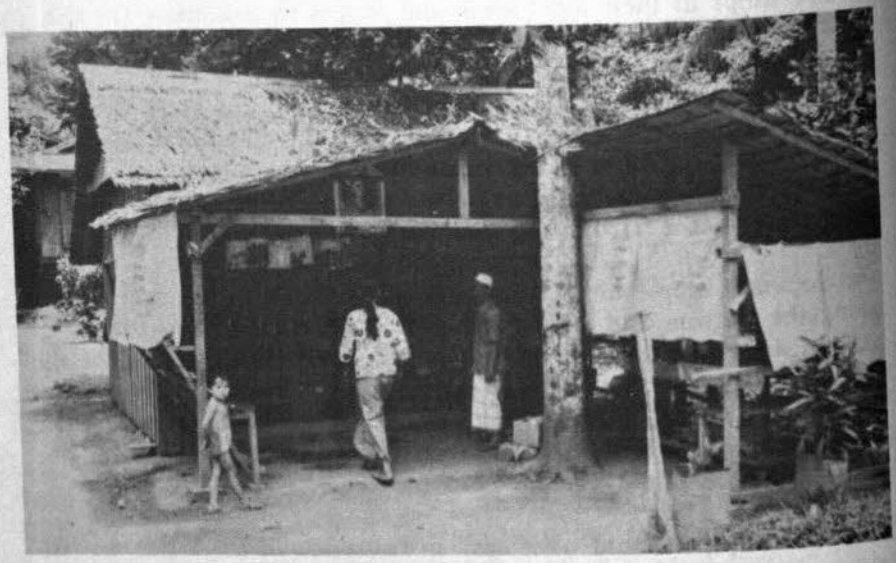
Reserve areas for future industrial development will be set aside on flat or gently sloping land, close to the main through route towards the outer edges of the urban development area.

While hinterland activities are mainly concerned with oil palm and timber, areas immediately adjacent to the town sites could to advantage be set aside for the cultivation of cash and subsistence crops, and possibly fish farming. Such cultivation could be developed in the form of smallholdings which, although lacking the provision of typical urban services, could contain storage facilities or even dwellings suitable for accommodation during harvest periods.

It will be essential to provide a high standard of social services within the towns of the Region if the problems generally associated with migration are to be overcome, and it would be desirable in this respect to encourage the resident population of the towns to establish and strengthen social ties by the formation of community development groups or neighbourhood councils.



TRADITIONAL MALAY HOUSE



KAMPUNG SHOP

2.6.2 Costs and Financial Approach

In other towns in Malaysia, the level of industrial and commercial activity provides non-Government financial resources to support the standard of housing and amenities. These generally are greater than are likely to be available, at least initially, in the smaller new towns in Pahang Tenggara. These towns therefore will start with a weaker economic base than other settlements and at the same time are planned to enjoy at least as high a standard of facilities as other settlements.

Ultimately a demand for services in the towns will create more diversity of employment opportunities; in time a modest degree of manufacturing industry should be attracted to the towns (and this should be vigorously encouraged), but its timing remains uncertain. Clearly, at least in the initial period, considerable government funds will be required to stimulate this development.

The focus of the financial analysis undertaken during the course of the study, has been to determine the scope of minimising costs in the achievement of the desired standard of amenities and to relate these costs to the economic capacity of the settlers.

The total cost of each new town was estimated on a phased year by year basis, in order to identify cost thresholds and determine a series of cost yardsticks by which comparisons can be made and investigated. Furthermore, these costs were related to the various agencies involved in the construction of the towns, and the cost implications for the settlers then calculated.

2.6.3 Data Assembly and Analysis

In order to produce preliminary estimates of the cost of different components of urban development and of the whole town costs, preliminary layout plans were prepared for:—

(i) Housing – medium, low and high density.

(ii) A town centre.

(iii) A local centre.

These components were assembled according to two concepts of maximum attraction and minimum cost, ultimately enabling an optimum choice of development components to be made and a Masterplan produced. (This analysis is described in detail in the Summary Report). This provided the basis for preparing the plans and phasing the expenditure over the development period of each town.

2.6.4 Apportionment of Costs

A rationale is required for the apportionment of costs, which can be commonly applied to each of the new towns and can thereby measure the impact of such apportionments on the individual (a householder or shopkeeper), and on the agency (Government, private and DARA, as the principal development agency).

Whilst the cost of buildings is readily attributable to individuals and agencies, the cost of infrastructure, some of a general nature and some more specific, requires a measurement for equitable apportionment. It is suggested that the most suitable method for apportionment is on the basis of productive acreage, that is to say acreage which has an intrinsic value. Land use for services and community recreational use then becomes part of the general cost of each town.

The effect of these allocations together with the additional cost of buildings can then be converted into annual and monthly rental terms for residential dwelling units and for local and town centre shops, to indicate the likely level of Government subsidy necessary to stimulate the towns and maintain them over the early years of development.

2.6.5 Conclusions

The strength of competing opportunities for potential migrants to Pahang Tenggara requires that the new towns should be well equipped at an early stage in their development. The standards to which the towns will be built will be rivalled in few places in Malaysia. Against this has to be set the initially weak economic

base of the towns. The incomes available to meet the costs of the initial development are extremely limited. Furthermore to pass on these costs to the settlers, in their capacity either as residents or commercial entrepreneurs, would be self-defeating, in that it would deter potential migrants.

The conclusions and recommendations that flow from this analysis can be summarised:—

i) In order that settlers should be able to have a substantial stake in their houses and business premises, the costs of these should be reduced by providing a basic standard immediately. Improvement and expansion of that basic standard would take place partly through the settler's own labour, as his ability and willingness to pay for a higher standard increased.

ii) Items of expenditure that are relatively unimportant in terms of the social and economic objectives of the towns should be deferred, where this is technically possible. The scope is limited; however the phasing of development should be designed to achieve both a strong and immediate start to urban development whilst minimising the costs incurred, and to give flexibility to changing rates of growth and resources.

iii) Government expenditure should be concentrated on the provision of a high standard of public amenities — for example, education, health, physical infrastructure and other social services and works.

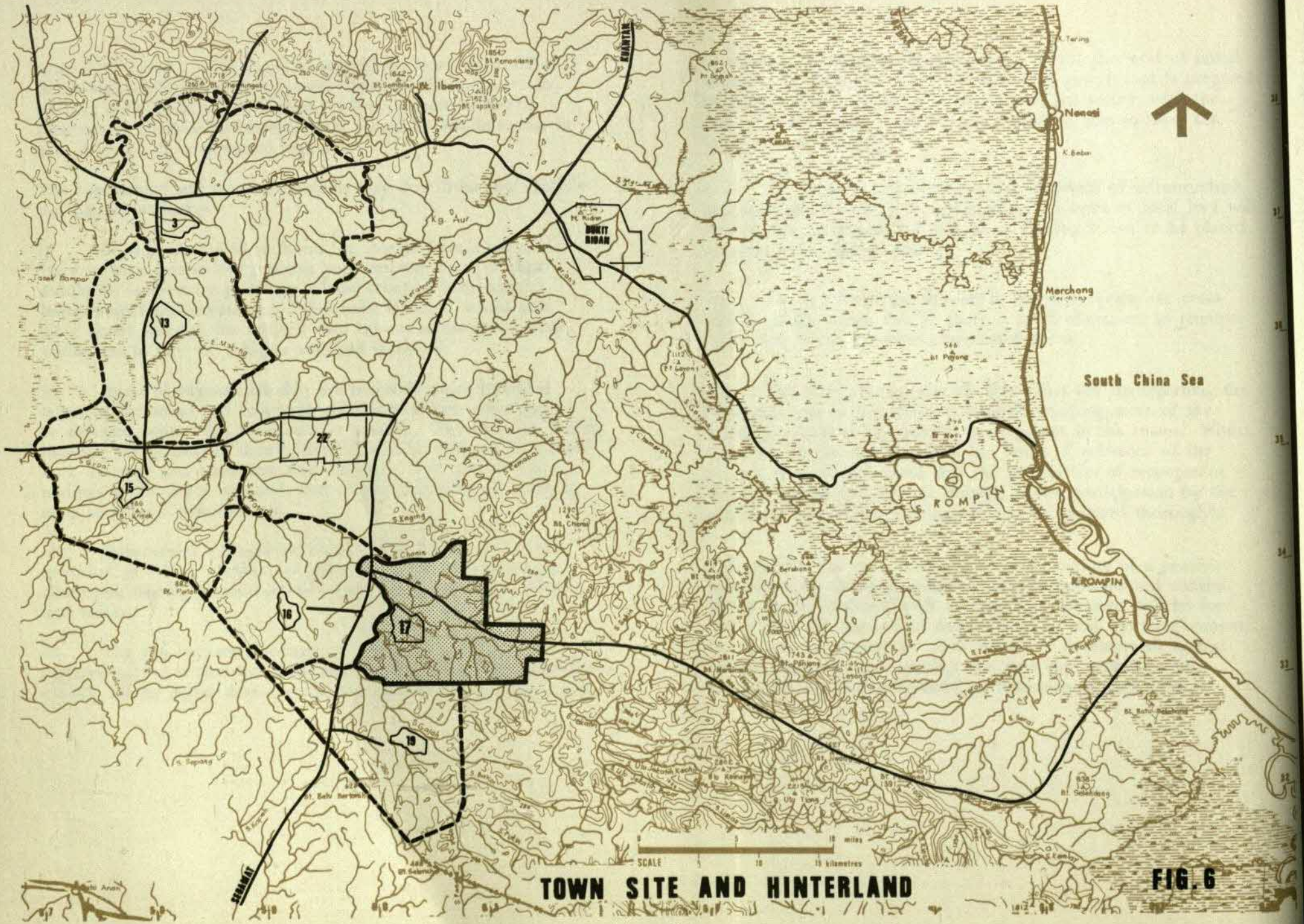
iv) The gap between development costs and the financial capacity of the settlers has implications not only for government subsidy on the initial development, but also for the on-going costs of running and maintaining the towns. Whilst the level of initial payments by settlers is likely to be low, if government is prepared to grant aid for town scale infrastructure, the settler, with the help of a developer's contribution, should be able to meet the initial cost of housing.

v) The costs of maintaining a high standard of infrastructure and amenities are likely to remain high. A form of local levy will need to be considered if a very heavy burden is not to be placed on government agency sources.

vi) There is no scope, at least in the early years, for cross-subsidy in the town; that is, there is no development so remunerative that it can subsidise other development.

vii) The principal opportunity that exists for strengthening the economic base of the towns is through retaining more of the expected profits of agricultural development in the towns. Whilst this does not lie strictly within the terms of reference of the project, it is recommended that the possibilities of recoupment through a municipal levy or through equity participation by the settlers or smallholder schemes, should be explored thoroughly.

This analysis can only be described as an outline of a possible framework for financial measurement, management and control. But it should enable DARA to formulate coherent policies for the pricing and disposal of development or land for development in the towns, monitor the performance of development against original forecasts, and calculate the cost implications of such charges on the overall financial performance of each town.



TOWN SITE AND HINTERLAND **FIG. 6**

3 URBAN CONTEXT

3.1 TOWN 17 AND ITS HINTERLAND

3.1.1 Regional Location

The site of Town 17 is located in the south of the Pahang Tenggara Region, eight miles from the Johor state boundary and some two miles to the east of the future Kuantan-Segamat Highway; it lies approximately 21 miles north of Segamat and some 25 miles south of the proposed regional centre, Bukit Ridan, although it falls within the service area of Town 22, the district centre for the southern part of the Region, which lies some 10 miles to the north.

Since the production of the Regional Master Plan in 1972, certain adjustments to the town site locations and hinterlands have been made, with the effect that Towns 17 and 19 now replace those originally indicated in the Master Plan as Towns 17, 18 and 19. Towns 17 and 18 were scheduled for development in the Second Malaysia Plan period 1972-76, and Town 19 in the Third Malaysia Plan.

In terms of the settlement hierarchy for the Region as defined in the Masterplan, Town 17 (as do all of the six project towns), lies within the population range of 5,000–15,000 persons, and as such can be considered one of the smaller of the proposed towns of Pahang Tenggara. Nevertheless in view of the advanced state of agricultural development in the revised hinterland, immediate and rapid development of Town 17 is required in order to provide the necessary homes and services for the agricultural workers and their families.

3.1.2 Town Hinterland

At the outset of the project the hinterland of Town 17 comprised oil palm estates (blocks 11, 12, 13, 14 and 16) and also the Lesong Forest Reserve. However at a late stage in the project, a decision was made to locate the processing and manufacturing complex associated with Lesong on the coast at Kuala Rompin, some 30 miles to the east of the town site.

The hinterland of Town 17 now contains only the five nucleus estates, each of 5,040 acres, giving a total hinterland area of 25,200 acres. The estates are all wholly devoted to the production of oil palm and the planting schedules of each estates are given in Table 1.

The town site is contained entirely within estate block 13; it lies towards the western edge of the hinterland as defined by S. Pukin and approximately one mile to the south-east of the confluence of S. Pukin and S. Jekatih. Estate blocks 11 and 12 are to the north of S. Jekatih, blocks 13 and 14 to the south. Block 16 lies in the east of the hinterland, its eastern boundary being defined by the Lesong Forest Reserve.

TABLE 1 PLANTING SCHEDULE BY ACRES: NUCLEUS ESTATES – TOWN 17

Estate	Block 11	Block 12	Block 13	Block 14	Block 16	All Blocks
Crops	Oil Palm	Oil Palm	Oil Palm	Oil Palm	Oil Palm	Oil Palm
1972	610	4010	1300	3617	3127	12664
1973	–	–	–	–	–	–
1974	–	–	929	1423	834	3186
1975	1000	1030	1000	–	1079	4109
1976	1000	–	1000	–	–	2000
1977	1000	–	811	–	–	1811
1978	1430	–	–	–	–	1430
TOTAL	5040	5040	5040	5040	5040	25200

Note:– In addition to the estate blocks shown above, the Lesong Forest Management Scheme (Timber Products) with a total acreage of 116,000 acres, is relevant to the development of Town 17, as 10 per cent of its workforce are considered as potential residents. (see Table 2, Employment Requirements).

3.1.3 Regional and Hinterland Communications

The Kuantan-Segamat Highway passes some two miles west of the town site. It is proposed that the main access to the town will be a link from the north connecting to the proposed regional road that runs eastwards from the Kuantan-Segamat Highway towards the coast at Kuala Rompin. This link road, which will cross the S. Jekatih immediately to the north of the town, passes through the town site and continues southwards through the hinterland towards Town 19, some 5 miles to the south. The road will serve as the main north-south access spine between the town and its hinterland. To the south it will link up with the existing network of developers access roads serving blocks 13, 14 and 16, whilst to the north it will bridge S. Jekatih and make a connection with blocks 11 and 12.

In the course of the project, the feasibility of alternative road networks to serve Towns 16, 17 and 19 was investigated. The possible relocation of the Lesong Forest road from its present proposed alignment to one running between Towns 17 and 19, was an important feature of these alternatives, the intention being to create better connections between the two towns and the regional route network, without increasing the route mileage or the number of river crossings. The decision to relocate the Lesong Forest manufacturing and processing complex at Kuala Rompin lessened the validity of this exercise.

A regional transportation study is at present underway (January 1976), for which reason a fundamentally flexible approach to the problems of urban design, in particular to the varied aspects of communications, was adopted for the six project towns in order to facilitate ultimate integration with the preferred regional and hinterland road system.

At present, access to the site of Town 17 is via a developer's road which runs north into the Region from a junction on Federal Highway 1, some 13½ miles south-east of Segamat. This road passes approximately 2 miles to the east of the site, which is then reached by means of a small track that follows the block boundaries, enters the site from the south and terminates within the site.

ACCESS TO TOWN SITE AND HINTERLAND

FIG.7

3.2 EMPLOYMENT, POPULATION, HOUSING AND LAND REQUIREMENTS

3.2.1 Employment

The extent of changes in town sites, hinterlands, development schedules and location of processing plants made it necessary to review the employment and population estimates given in the Regional Master Plan as a basis for the design of Town 17.

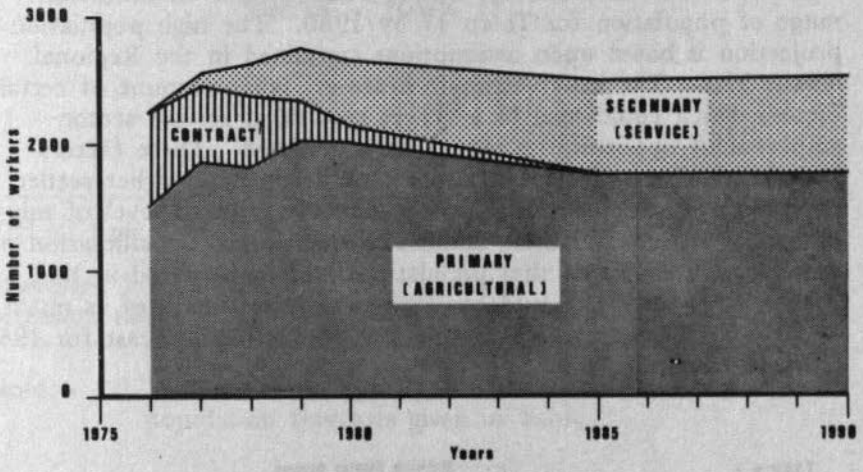
Discussions were held with various agricultural developers inside and outside the Region as a check on the assumptions and coefficients for type of labour by crop as given in the Masterplan. Minor amendments made as a result are specified in the tables; however, it was generally concluded that the basis of the Regional Master Plan was of the right order of magnitude. The resulting employment forecasts are given in Table 2.

The primary employment activity in the Region is in agriculture. Estimates of hinterland employment requirements were made by applying man/land ratios produced in the Regional Master Plan to the proposed planting and development schedules for each estate. It was originally assumed that all employees working in felling and processing activities within the Lesong Forest Management Scheme, would be resident in Town 17, but the decision to relocate the mill in Kuala Rompin now means that employment will mainly be generated there. It has been assumed however, that 10 per cent of the total Lesong workforce, in particular those involved in felling and transport, will live in Town 17.

In the Regional Master Plan it was considered that the agricultural workforce would be made up of permanent settlers and contract workers, the latter group being initially single or unaccompanied, for whom no service provision would be made. However, after a two year period, it is further assumed that approximately half of the original contract workforce will have been sufficiently attracted to the Region to remain and to become permanent settlers, those amongst them married or with other family commitments eventually bringing their families to join them. It is considered that the remaining transitory workers would either continue to move from estate to estate within the Region, or else would migrate possibly only for a limited period to any of the neighbouring States. These aforementioned divisions of workers are somewhat artificial, but they do provide a basis for population and housing forecasts. The subsequent provision of facilities for each group should accurately reflect the demand as it occurs.

TABLE 2 EMPLOYMENT REQUIREMENTS – TOWN 17

		1976	1977	1978	1979	1980	1985	1990
Block 11	Permanent	80	165	240	340	385	350	320
Oil Palm	Contract	170	185	220	290	60	–	–
Block 12	Permanent	365	420	365	375	375	315	335
Oil Palm	Contract	175	45	65	–	10	–	–
Block 13	Permanent	215	305	360	410	395	335	320
Oil Palm	Contract	180	225	195	55	45	–	–
Block 14	Permanent	420	430	365	380	360	315	335
Oil Palm	Contract	20	80	25	10	10	–	–
Block 15	Permanent	360	425	380	385	375	315	330
Oil Palm	Contract	190	65	60	5	15	–	–
Lesong Forest Timber Products (10% of workforce)		70	115	115	115	115	115	115
TOTAL	Permanent	1510	1860	1825	2005	2005	1745	1755
PRIMARY	Contract	735	600	565	360	140	–	–
TOTAL SECONDARY		0	120	245	385	525	750	755
TOTAL PERMANENT		1510	1980	2070	2390	2530	2495	2510
OVERALL TOTAL		2245	2580	2635	2750	2670	2495	2510



EMPLOYMENT FORECASTS TOWN 17
1976–1990 **FIG. 8**

Service or induced sector employment was calculated on the Regional Master Plan basis by the use of a series of multipliers applied to the level of primary employment. However, as a result of a number of independent checks, a somewhat slower rate of build-up in the service sector during initial years of development has been assumed, it being indicated that the Regional Master Plan multipliers were of the right order only for the fully developed mature town.

3.2.2 Population and Housing

While reasonably accurate forecasts of primary employment can be made, there are a number of uncertainties involved in using these forecasts as a basis for estimating the population and household profile of the town, and in formulating a reliable house construction programme.

Uncertainties involved include the rate at which resident migrants, as opposed to transitory workers, will be attracted to the Region; the extent to which certain elements of the labour force may either continue to live in temporary accommodation or on the estates rather than in the towns; the extent to which one town may attract migration as compared to others; changes in agricultural technology; social attitudes to various employment possibilities; the effects of access to differing standards and forms of transport; and perhaps most important of all how incomes, employment, housing and security in the Region prove to compare in the eyes of migrants with competing choices elsewhere.

Most of the factors involved point to possible reductions in town resident populations, especially as single or limited range crop dependence can be taken to mean out-migration over time, and a fluctuating demand for housing and other urban facilities. Yet it is in the nature of the complex and interrelated social and economic objectives of regional development that, to some extent, the forecasts have to be treated as targets.

In such a situation, the consultants consider that the policy to be adopted should be:–

i) To produce the most realistic forecasts as a guideline and where appropriate, express a range of possibilities around such forecasts;

ii) To adopt the forecasts initially as a target;

iii) To subsequently adjust these forecasts and targets both according to any changes in the initial assumptions and more particularly according to actual experience in the development process.

The importance of ascertaining the actual number of migrants of various types that respond to the opportunities offered throughout the early years of development, together with their age, sex, family profile and employment characteristics, cannot be overstressed. The towns could prove to be social and economic failures if their development is not adapted to the real needs and requirements of the settlers as they arise.

The growth of population and consequently of housing demand is based upon the employment forecasts described in the previous section. In the initial years of the town's life, it is anticipated that these will be a high proportion of single workers, but that this will drop, until by 1980 the ratio of single and unaccompanied workers to settlers with their families, will have reached the projected stable level.

Contract workers will be accommodated entirely in temporary housing in the hinterland for the first two years of development; after which time, it is assumed that half of their number will move into the town. Ten per cent of the permanent agricultural workforce, those employed in processing, maintenance and security, will also continue to live in the hinterland with their dependants.

TABLE 3 POPULATION FORECASTS – TOWN 17

	1980 Low	1980 High	1985	1990
Town	6500	8100	6500	6300
Hinterland	550	550	500	500
TOTAL	7050	8650	7000	6800

Note:– i) Figures shown exclude transitory contract workers resident in the hinterland.

ii) 1980 (Low) figures are related to the resident in town workforce, to project assumptions regarding single workers during the early years of settlement and to slow growth in service sector employment.

iii) 1980 (High) and all subsequent figures are based on assumptions and employment levels given in the Regional Master Plan.

The population forecasts set out in Table 3, give an estimated range of population for Town 17 by 1980. The high population projection is based upon assumptions contained in the Regional Master Plan. The lower estimate however, takes account of certain factors which could lead to a slower growth of service sector employment opportunities than that anticipated. These factors include possible variation in the rate of occupancy, higher settler population of the hinterland and a generally reduced level of migration by settlers and their families to the town. Consideration of these factors indicated that population levels anticipated in the Regional Master Plan could constitute an overestimate of as much as 20 per cent, and an alternative low population forecast for 1980 is shown accordingly.

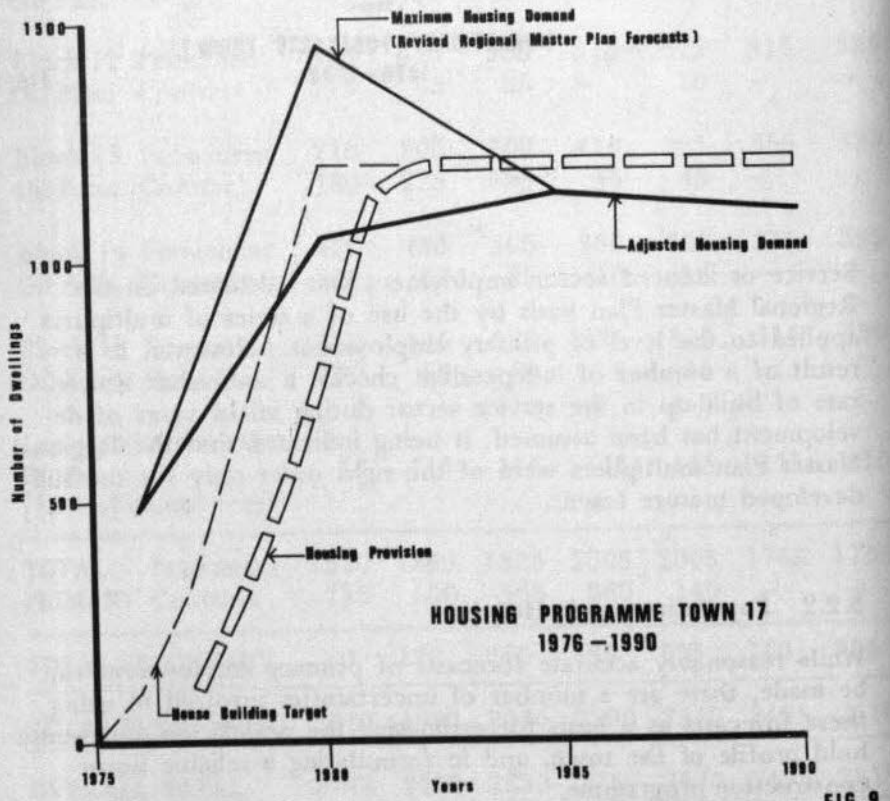


FIG. 9

TABLE 4 HOUSING DEMAND AND SUPPLY BY HOUSING UNITS – TOWN 17

	1976	1980 Low	1980 High
End of year demand.	480	1150	1450
Suggested housing provision target	100	1250	1250

Note:– i) 1980 low and high figures correspond to alternative population forecasts given in Table 3.

The housing demand for Town 17, as indicated in Table 4, has been calculated using the same assumptions in respect of the proportion of workers unaccompanied by dependants as were applied in calculations relating to employment. Assuming multiple occupancy of dwellings by single workers, the total housing demand by 1980 is estimated to be between 1150 and 1450 units.

The programme of recommended house construction illustrated, indicates a provision of 1250 units by 1980, a figure which could possibly entail a shortfall in dwellings by that year, but which would require careful monitoring of population movement to avoid possible over-provision.

The especially critical period insofar as the permanent house building programme is concerned, is the first year of development in which a realistic assumption of house building shows the provision of only 100 housing units. These units and the majority of those permanent dwellings erected in the initial years of development, would be of the extendable core house type with a temporary provision of services. Houses and services would both be capable of improvement and extension; however upgrading of services must be considered of primary importance in terms of public development and expenditure, since the improvement of dwellings, although important, remains more closely related to the domestic requirements and capabilities of the occupants.

The shortfall in housing provision during the initial years of town development, would most severely affect single workers, and as such would be met by 'kongsi' type of temporary accommodation, one 'kongsi' housing approximately 45 single workers and being in terms of accommodation potential, the equivalent of 10 permanent housing units. Every attempt must be made to allocate permanent core house to permanent settlers and their families, however should such allocation not meet the demand for family houses, it is desirable that an alternative form of temporary dwelling to that of the 'kongsi' be provided for family groups.

3.2.3 Land Requirements

In order to provide a framework for the preparation and testing of alternative Concept Plans, it was found necessary to build up a picture of land requirements. These broad categories of land requirements were a convenient design tool in the initial stages of the project. They should however, not be confused with the more specific and detailed land-use allocations which, as a result of research and discussion are listed in Part 4 in the context of the final development proposals.

Broad estimates of general land-use requirements were produced from consideration of population and household forecasts and the planning and development policy guidelines as outlined in Section 2.6, together with application of the examination procedures described in Section 3.3 for defining delineation factors of practical site boundaries and land-use suitability.

The principal developed land use within the town is that of housing and affiliated local uses, for which it was estimated some 100-200 acres would be required. A general overall housing density of 6 dwellings per acre was assumed for this purpose.

Area estimates for town and local centres, were the result of a series of design tests and also the outcome of discussions with DARA and other user agencies involved. These estimates include

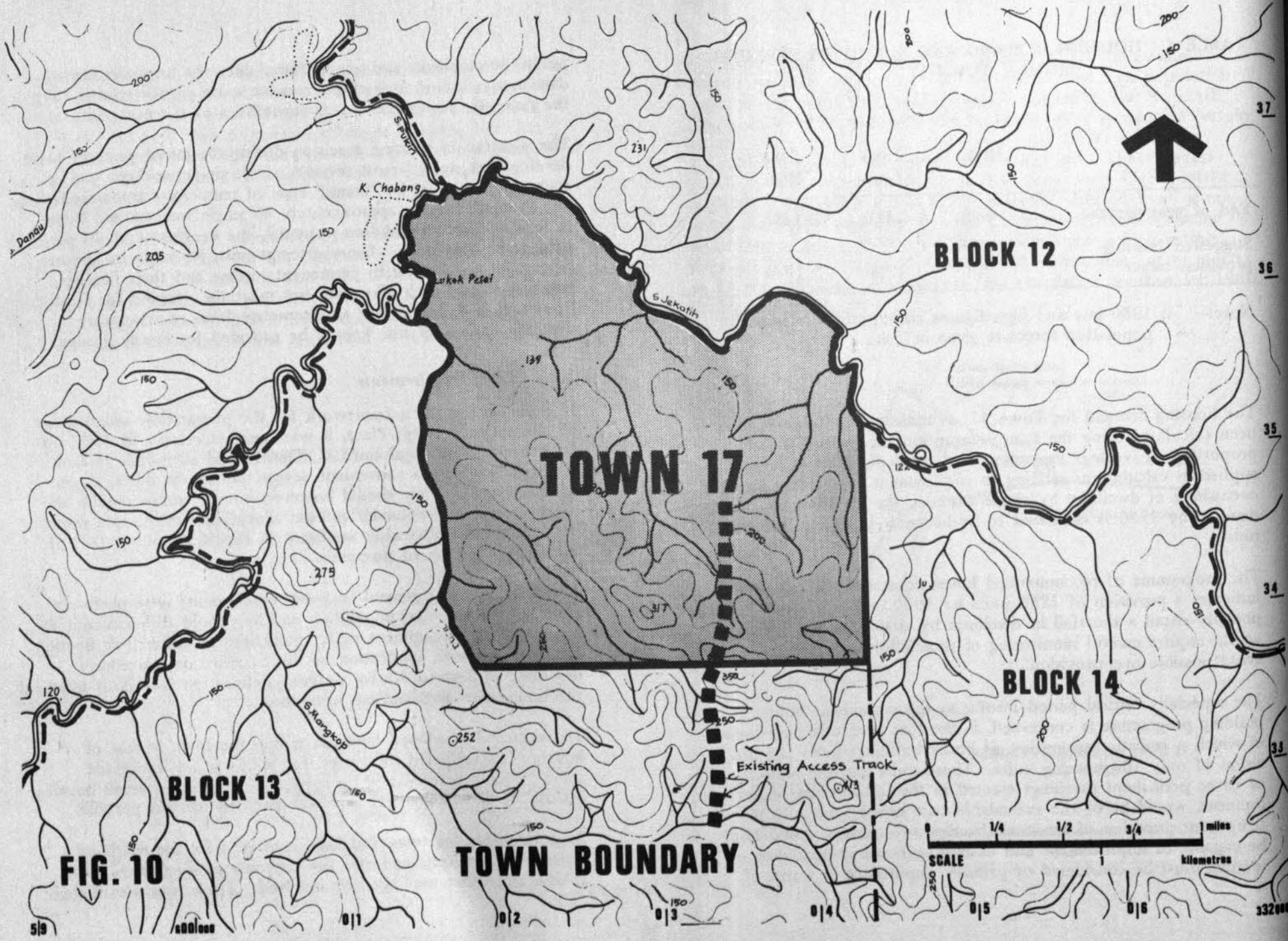

BLOCK 12
TOWN 17
BLOCK 14
BLOCK 13
Existing Access Track
TOWN BOUNDARY
S. Jekotih
S. Kangkop
K. Chabang
SCALE
miles
kilometres

FIG. 10

consideration of all commercial facilities such as shops, stalls and market areas, of sites for all religious, social, administrative, institutional and entertainment activities, and in addition land use requirements such as bus station, taxi rank and general parking areas. A similar process of design and discussion was undertaken to determine area requirements for educational facilities, including those of pre-school, primary school and secondary school sites. Allocations for schools and indeed for certain of the town and local centre facilities, included an allowance for "on site" housing areas for the agencies involved. In all a total of approximately 100 acres was allocated to the above-mentioned town centre, local centre and educational facilities.

To accommodate the development of service industry complementary to the growth of the town and also to encourage the general diversification of industrial activity (a factor especially desirable in the early 1980's after the oil palm labour demands have passed their peak), an industrial reserve of between 30 and 60 acres was proposed and included in calculations of land use requirements.

In addition to the foregoing land-use requirements, there are a number of infrastructural and ancillary uses for which space would be required, some of which would be located more in the peripheral areas of the town. These include for example major road reserves, sewerage reserves, wayleaves for public utilities outside the development areas, water reservoirs, refuse tips and cemeteries. A combined provisional allocation of 50 acres was made for these uses.

The total provisional land requirements for urban development purposes was therefore estimated to be in the region of 400 acres.

It was however considered that a more accurate estimate of development requirements could be arrived at if an allowance was made for land, which although within the general urban development area could be considered unsuitable for development. This undevelopable land, which included flood plains, stream buffer zones, steep slopes and areas which for other reasons were considered uneconomic in terms of their development potential, made up approximately 35 per cent of the area for which survey information was available. Having made allowances for the wide flood plains that could exist close to S. Jekatih and for the limited existing survey data, it was clear that this percentage could rise to 40 per cent within the outer town boundaries.

Further amendment to the original estimates of land-use requirements was brought about by consideration of the need to allocate additional land both for major open space areas and for agricultural smallholdings close to the townsite. (In this context, it should be noted that 1040 acres of land from each of the five nucleus estates, is scheduled to revert to State ownership when it is expected to be given over to smallholders).

Taking into account the qualifying factors listed above and the need for an overall design tolerance to allow for adjustments and modifications, it was decided to increase the original estimate of whole town land-use requirements by 50 per cent, giving a final total for Town 17 of approximately 600 acres.

3.3 OPPORTUNITIES AND CONSTRAINTS

3.3.1 Urban Boundaries and Site Areas

It was found in the early stages of project investigation that the boundaries and site areas originally delineated for the town were unsuitable as a basis for urban development. An outer town boundary as indicated in Fig. 10 was therefore drawn up. It is defined to the north by the S. Jekatih and S. Pukin, to the west by S. Chicha, and to the south and east by the original straight-line boundaries, the eastern one of which being the division between agricultural blocks 13 and 14. The total area enclosed by the outer town boundary is approximately 1450 acres.

Site survey mapping at 5 feet contour intervals and at a scale of one chain to one inch, is currently available only for the original town site. The detailed design of the town has however, been accommodated within this area, although certain land uses, such as sewage works and refuse disposal, will be located outside.

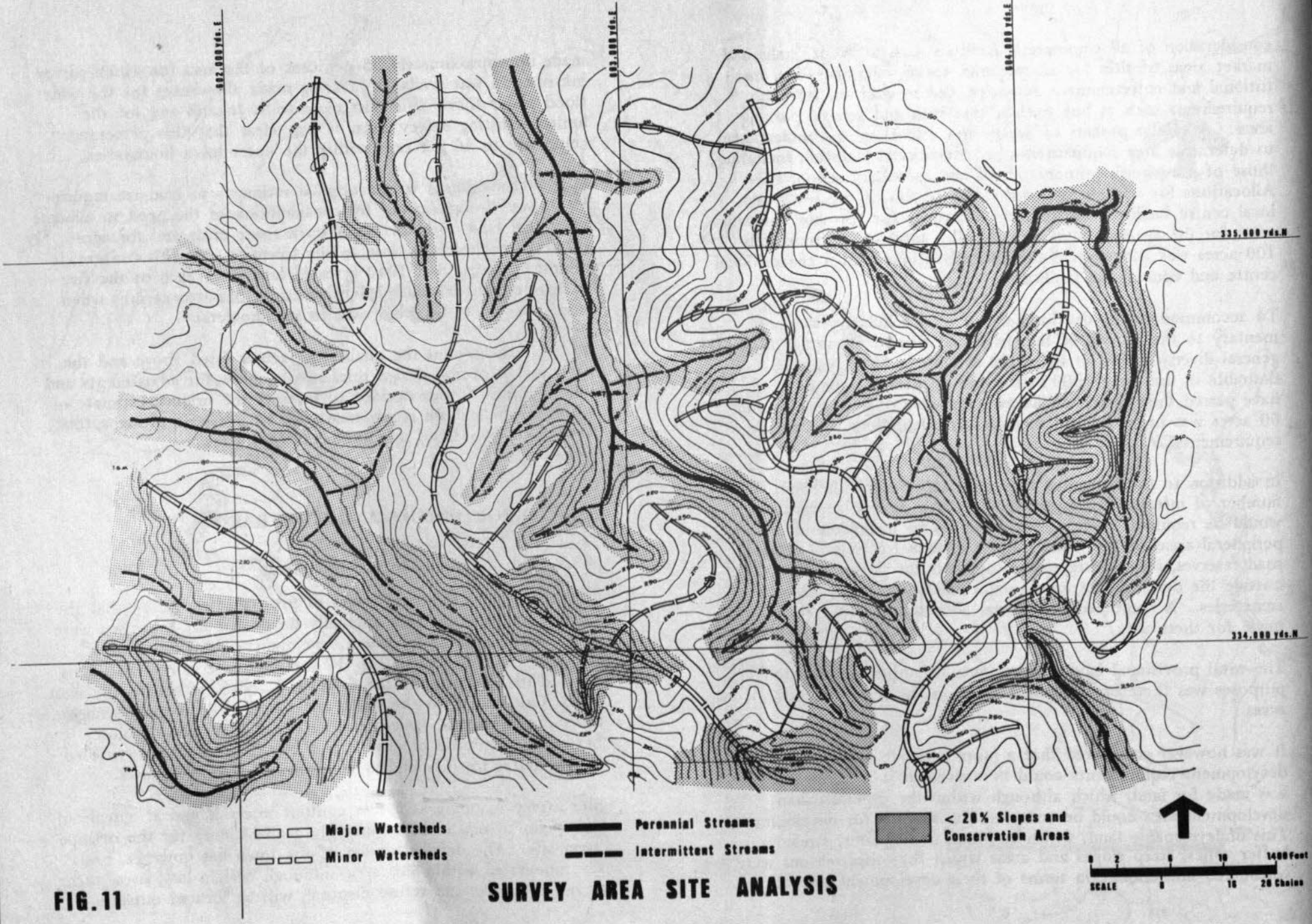


FIG. 11

SURVEY AREA SITE ANALYSIS

At the time of the initial site survey and at the commencement of this project, the site was partially under secondary jungle vegetation, the commercial timber having previously been logged out. However, the larger part of the site, that to the north, was virgin jungle and is currently being logged. A more detailed survey (2 feet contours), has been commissioned as the basis for the detailed engineering design of the town and is being conducted at present under jungle cover.

Clearance of the jungle when undertaken will be only in those areas proposed for development during the first five years. Areas unsuitable for or not required initially for development will be left under existing jungle cover.

3.3.2 Physical Analysis and Land Suitability

A physical site analysis of the surveyed area of the town site is illustrated in Fig. 11. This plan indicates those areas considered unsuitable for urban development. These conservation areas cover approximately one third of the surveyed area and are defined by major flood plains, areas of steep land or buffer zones adjacent to streams and watercourses. The areas of flood plains are based on 100 year flood levels provided by the Drainage and Irrigation Department. Areas of steep land are defined as those larger than one acre with a slope continuously in excess of 20 per cent. The stream buffer widths are 200 ft. each side of the centre line of major streams, 150 ft. each side of tributaries and 100 ft. each side of intermittent stream courses. Trunk drainage reserves as specified by DID fall entirely within the stream buffer zones and flood plains.

Many of the slopes within the development areas are in excess of 10 per cent, and as such are considered suitable only for medium and lower density housing. The more gently sloping areas with gradients less than 10 per cent, are consider to be desirable locations for town and local centres, industrial areas, school sites and higher density housing areas.

The resulting characteristics of the town site, apparent from Fig. 12, are a number of developable pockets of land separated by steep sided valleys. The flatter areas of the site occur mainly on the higher land generally in the northern part of the site.

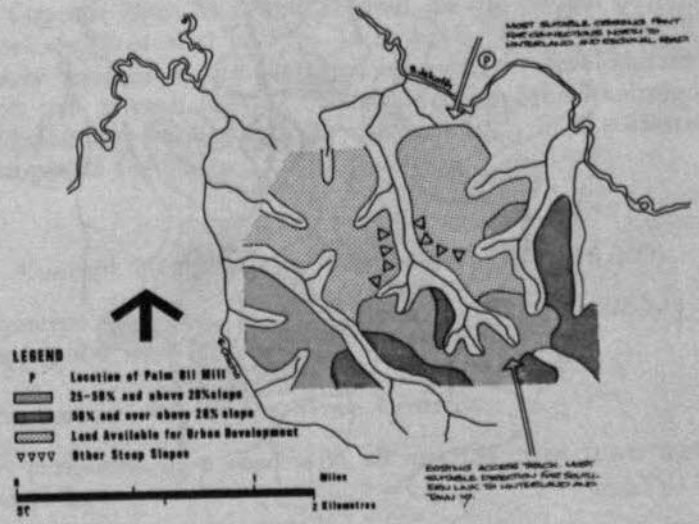
3.3.3 Physical Infrastructure Constraints

Most of the areas suitable for development encompass high ground of similar elevation, and the nearest convenient ground of adequate elevation for a ground level reservoir to serve the town site, lies in the south-east, close to the site boundary and to the existing access track from the south.

Temporary water supplies for the initial stages of development could be taken from the S. Jekatih, preferably on the north-eastern corner of the site and upstream from the oil palm mill.

The complex topography and natural drainage pattern of the site make it desirable, insofar as minimising works on drainage and sewarage is concerned, to design and phase the plans with great care.

Infrastructure constraints generally suggest starting development on the eastern side of the town and as far as possible focussing development to the north rather than to the south.



SUMMARY OF CONSTRAINTS FIG. 12

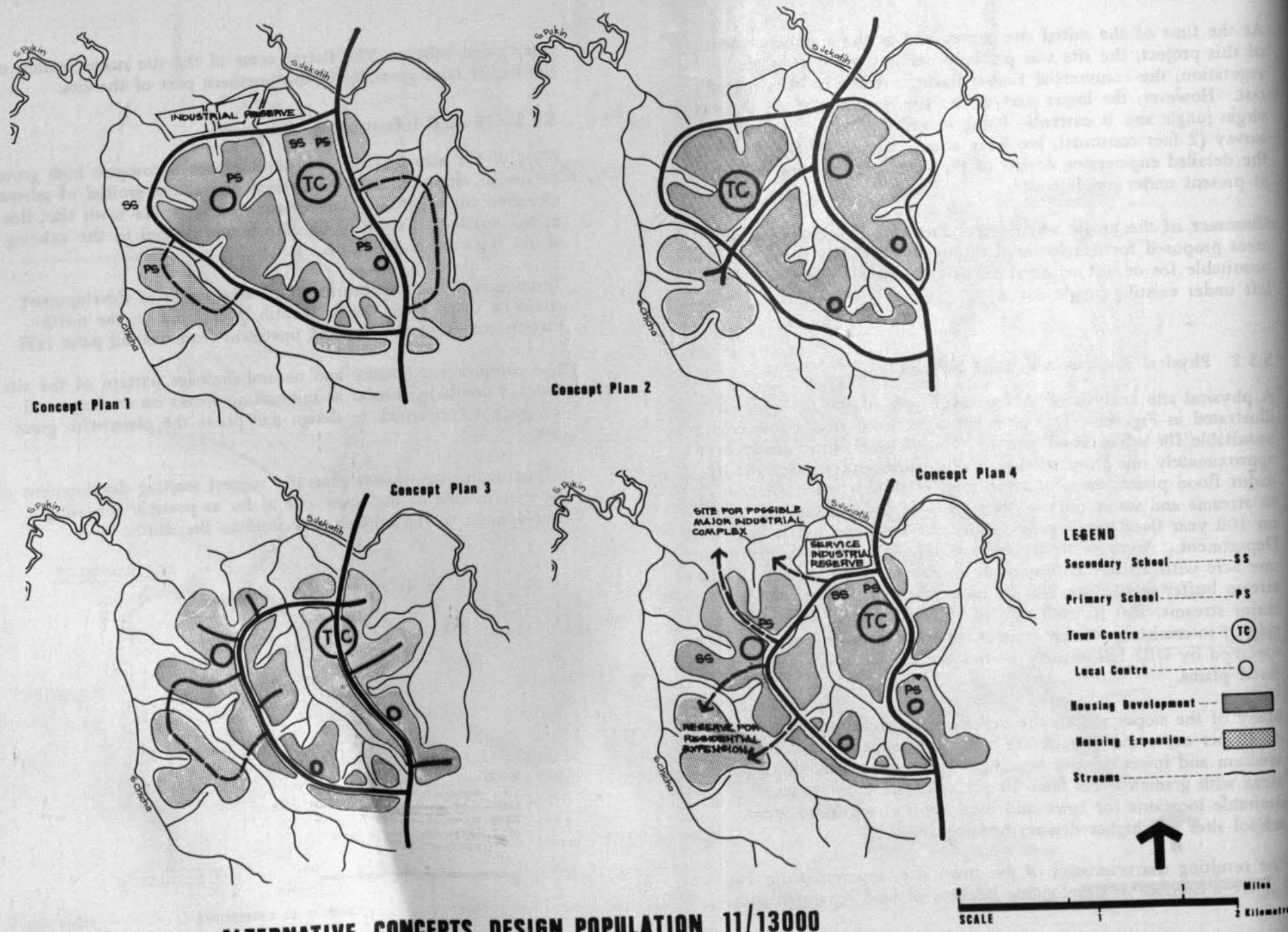


FIG. 13 **ALTERNATIVE CONCEPTS DESIGN POPULATION 11/13000**

3.4 ALTERNATIVE CONCEPT PLANS

Alternative concepts, principles and forms of urban development were considered as part of the basic project investigations, in three groups.

i) Alternative theoretical whole town concepts, (e.g. high, medium or low density).

ii) Alternative components of which any town might be designed and constructed, (e.g. watershed or valley route systems).

iii) Alternative outline plans for each specific town (e.g. comparisons of a radial or loop road concepts applied to a specific site).

As Town 17 was of the highest priority in terms of the work programme for the six project towns, it became the test bed for many of the alternatives explored in the course of developing design guidelines for the project as a whole. It was especially well suited for this role as its topography was particularly severe: a wide valley splits the site in two and a large proportion of the site, especially to the south and east, has slopes in excess of 20 per cent.

These general areas of investigation are described more fully in the Summary Report and in the various project Working Papers listed in Appendix A. The following section however, summarises the main specific alternative concepts of development as applicable to Town 17.

While a wide range of concepts was considered, the tight boundaries of both the town site and the survey area, precluded the preparation and consequently the evaluation of many theoretically feasible alternatives, for example, a comparison of linear and radial urban structures.

The major determinant of the viability of alternative concepts, was unquestionably the consideration of constraints to development imposed by the physical characteristics of the site. As is evident from the foregoing site analysis, large gently sloping sites suitable for the town centre, schools or higher density housing are limited largely to the northern side of the site. This factor, together with the fragmented nature of the remaining developable areas, severely limited the range of urban structure options available.

The most feasible hinterland road access points to the town were determined early on in the programme and used as a basic input to all of the alternative concepts of development considered.

For the first nine months of the project, Town 17 was planned on the basis of a design population of 11,000 to 13,000 persons, and on the assumption that a large proportion of its residents would be employed in various capacities within the Lesong Forest Complex; four alternative whole town concepts based on this original assumption are shown in Fig. 13, that of Concept Plan 4 being the development strategy originally preferred.

The decision, taken in October 1975, to relocate the industrial component of the Lesong Forest Complex at Kuala Rompin, meant a drastic reduction in the projected population for Town 17 to a figure between 6,000 and 7,000 persons and consequently a complete reappraisal of the basic structure of the town. Alternative Concept Plans 5, 6 and 7 based on the revised population estimates are illustrated in Figs. 14 and 15. Concept Plan 7 was ultimately selected as the preferred whole town development concept, and as such provided the framework for all subsequent detailed planning studies and for the formation of the Master Plan proposals for Town 17.

3.4.1 Concept Plan 1 (Design Population 11,000–13,000)

This concept illustrates, in a combined form, the possibility of developing the town on the basis of:–

i) An eastern site for the Town Centre.

ii) A peripheral loop road with all internal cross town movement by footpath.

iii) A low residential density of 3 dwellings per acre (dpa).

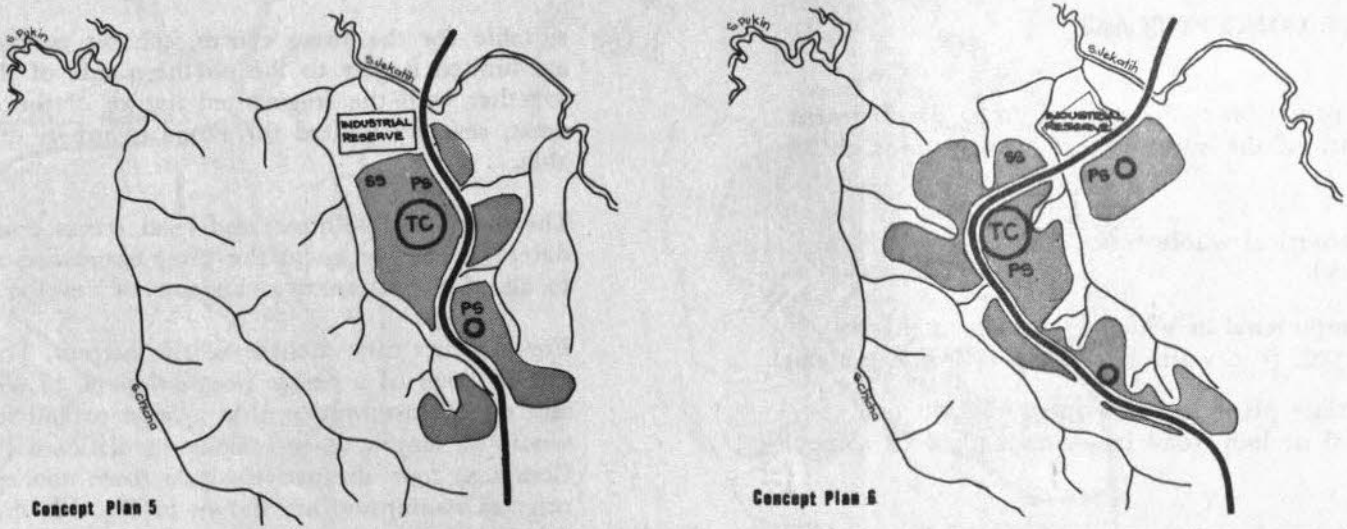


FIG. 14 **ALTERNATIVE CONCEPTS DESIGN POPULATION 6/7000**

iv) A medium residential density of 6/7 dpa.

v) A high residential density of 10/12 dpa.

Because of the differing design criteria that relate to detached dwellings and terrace housing, it was apparent that the high and medium density concepts would consume approximately the same area of land; these densities are therefore combined in the Concept Plan. Thus one of the expected major advantages of a dominant role of terrace housing namely the reduction of the required development area and consequently of infrastructure costs, was not realised, due largely to site constraints.

For this reason, and also because it was felt that high density terrace housing represented an alien environment to the majority of potentional settlers, a high density solution was not pursued further in other alternative concepts.

A concept of low residential density demands a more extensive urban development area and, in the case of Town 17, the use of land basically unsuitable for urban development due to severe slope characteristics. Infrastructure systems become radically extended as well as expensive to build and maintain; also the resultant series of widely separated pockets of development proved problematic in terms of standards of access and convenience both at a whole town and at a local or domestic level. Consideration of these factors invalidated further use of a very low density concept.

3.4.2 Concept Plan 2 (Design Population 11,000–13,000)

This plan illustrates a medium density residential development concept for Town 17 using:–

i) A valley route system.

ii) A western location for the town centre.

The town centre utilises the only alternative suitable site in the town to that illustrated in Concept Plan 1. However the eastern site is preferred, because it gives improved access to the regional and hinterland road links, and thus is better able to assist in the growth of the servicing role of the town in relation to its hinterland.

3.4.3 Concept Plan 3 (Design Population 11,000–13,000)

This plan reverts to an eastern location for the town centre, and employs a main route system that follows closely the ridges that form the watersheds of the site.

Following a review of the alternative route system, it was concluded that the watershed system was the most convenient in terms of general movement, and that it was less costly in both financial and environmental terms than either of the other concepts. In comparison, an outer loop system produced a more extended road pattern, did not lend itself to radial movements, and was generally an artificial and inflexible concept in relation to the likely movement patterns of local buses, taxis, cars, motor cycles and cycles. Alternatively, the valley system, while giving a convenient spine for development again produced a generally more extended road system, in addition to which it separated development areas from parkland and brought major construction works with earth movement close to the drainage reserves and steep sided valleys, with the consequence of larger culverts and greater risks of erosion and flooding.

Although the watershed route system appeared best suited, it was apparent that a degree of adaptation was required to avoid splitting up the most suitable areas for comprehensive planned development which, in the case of Town 17, generally lie along the tops of hills and ridges.

3.4.4 Concept Plan 4 (Design Population 11,000–13,000)

The originally preferred Concept Plan was derived from the tests and analysis summarised above, and is illustrated as Concept Plan 4.

The main road loop pattern was adjusted to give four substantial, self-contained areas, one on the eastern side of the town for the town centre and its environs; the three others for development as housing areas each with a local centre. A medium density housing assumption was adopted, and five of the few possible school sites in the town were used to give a balanced pattern of access to primary and secondary educational facilities.

3.4.5 Revised Concept Plan 5 (Design Population 6,000–7,000)

When the consultants were informed that the population of Town 17 was to be radically reduced, detailed planning had already been completed.

It was considered initially that it might be possible to adapt the originally preferred development concept (Concept Plan 4), by elimating the development areas to the west of the town and thus catering for the reduced population. This solution, which is illustrated in Concept Plan 5, was undoubtedly the most convenient in terms of time-saving by the designers; however, the southern side of the site contains large areas of land which are of marginal suitability for urban development. While it was necessary to utilise this land for the original town population of 11,000–13,000, it no longer remained so with the reduced forecast of population. Moreover, in terms of infrastructure and maintenance costs, there would be a higher proportion of unusable

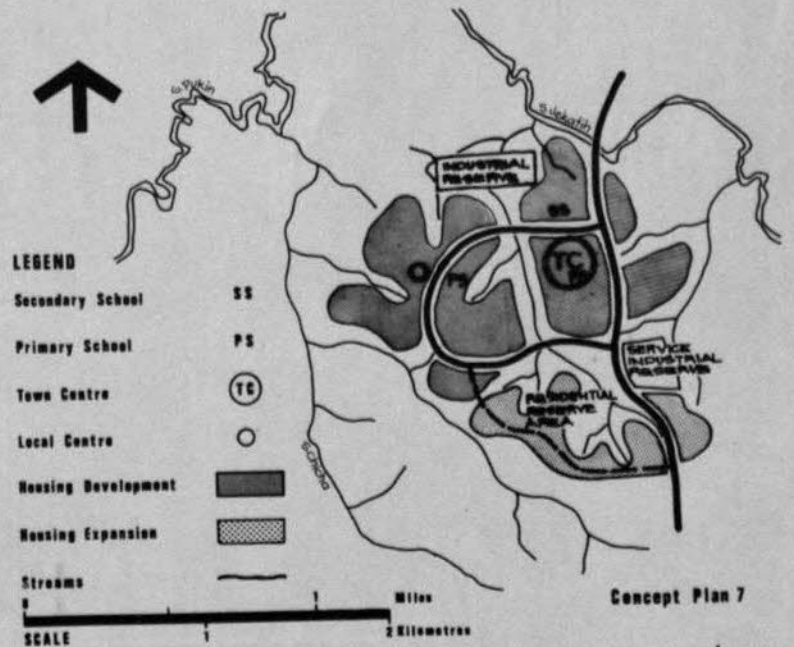


FIG. 15 PREFERRED CONCEPT PLAN DESIGN POPULATION 6/7000

land which would require the trunk sewerage and drainage works to be unnecessarily extended along the valleys, serving only one side of their potential catchment areas.

3.4.6 Revised Concept Plan 6 (Design Population 6,000–7,000)

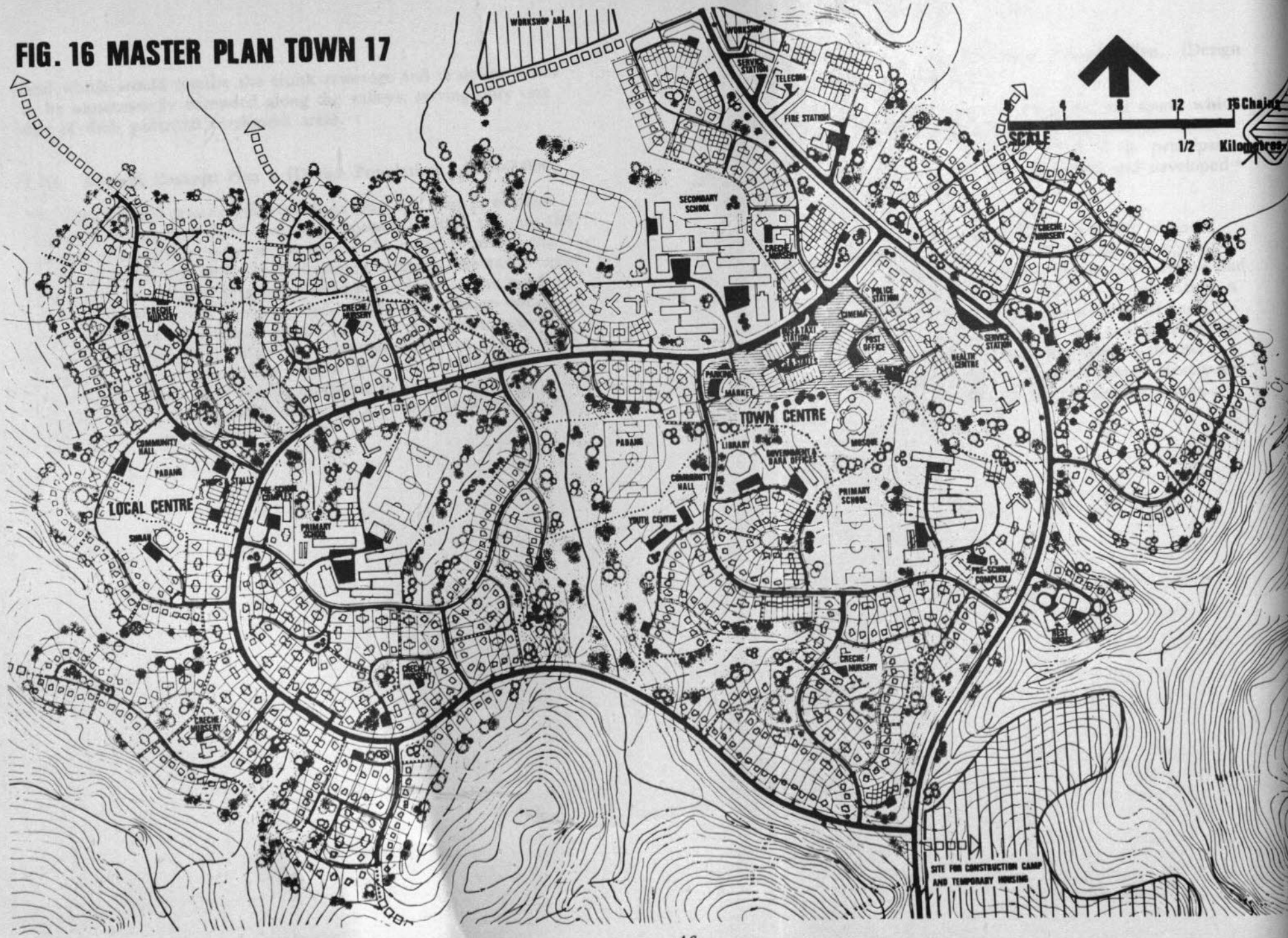
The development concept illustrated in Concept Plan 6, mirrors that of Concept Plan 5, in that it proposes utilisation of only the western development areas of the town. In order to match the requirements of this shift of development strategy, the town centre is proposed in an area of prime development land to the north-west of the town site; however, such a radical relocation entails total replanning of the town centre itself, in addition to which it becomes problematic to arrive at a rational alignment of the main through route in the southern part of the site. Also inherent in this concept, there exist similar problems to those of Concept Plan 5, in the provision and maintenance of an economical services infrastructure to the town as a whole.

3.4.7 Revised Concept Plan 7. Preferred Concept Plan. (Design Population 6,000–7,000)

Concept Plan 7 illustrates an urban structure for the town, which utilises the most suitable land for urban development to north of town site, both to the east and to the west of the principal central stream valley. This concept was designed and developed as the revised preferred concept.

The need for balanced access to the reduced number of social, commercial and educational facilities, implied total redesign of the whole town. The loop road system and the town centre had to be reconsidered to achieve a generally east-west orientation, a factor not involved in the larger town. The number of local centres was reduced to one and adjacent to this was located one of the two primary and pre-school sites; the other such site, together with the single secondary school, was related closely to the town centre in the eastern part of the development area.

FIG. 16 MASTER PLAN TOWN 17



4 PROPOSALS

TABLE 5 SUMMARY OF PROPOSED LAND USE ALLOCATIONS – TOWN 17

		Acres	Acres
TOWN CENTRE	(including padang)		41
LOCAL CENTRE	(institutional/social	2	
	(commercial	1	
	(open space remainder	3	6
RESIDENTIAL	(including nursery/creche and incidental open space)		186
EDUCATION	(Pre-school and Primary school	27	
	(Secondary schools	20	47
URBAN CONSERVATION AREAS AND PARKLAND			51
INDUSTRY AND WORKSHOPS			45
PUBLIC UTILITIES		5	
	LLN	2.5	
	Reservoir	20	
	Cemeteries	15	
	Refuse Disposal	7.5	50
	Sewage Disposal		20
MAJOR TOWN ROADS			446
NET TOTAL			
URBAN FRINGE	(jungle reserves, service wayleaves, agriculture, and reserves for expansion)		999
TOTAL AREA WITHIN OUTER TOWN BOUNDARY:			1,445

4.1 URBAN STRUCTURE

A major physical feature of the Masterplan for Town 17 is the north-south stream valley which divides the development area into two approximately equal parts.

The main road access to the town from the hinterland is by means of a north-south road, which passes through the eastern development area close to its perimeter. The town centre is located centrally within this eastern area, in a position immediately to the west of the main through route. The town mosque, which is situated on high ground in an open setting, forms the focal point of the central area, and around it are grouped the main social, commercial and institutional facilities. A pre-school and primary school area is integral to the centre, and the town's single secondary school is located immediately to the north of the centre.

Two potential future industrial reserves are indicated in the Masterplan. The first of these, located to the south-east of the town, is eminently suitable for light and service industry. The second industrial sector is located to the north of the town, in the area between the S. Jekatih and the fringes of the northern residential areas. This area is more appropriate as a site for the development of heavy industrial activity.

A distributor loop road system links the western development area to the town centre, main through route and eastern development area. A little over half of the town's housing is located in this western area, which is served by an easily accessible local centre comprising basic commercial, social and religious facilities, close to which is the second of the town's pre-school and primary school areas.

Several areas of jungle will be conserved, particularly in the river and stream valleys intersecting the site. Such conservation will help to provide a strong local identity within the separate development areas of the town and will help also to achieve an overall informal parkland landscape, focussed around a town park in the central valley alongside the main town padang.

A major virgin jungle conservation area is proposed on the very steep land to the east of the town. Elsewhere, other peripheral areas, particularly those to the north-west, provide substantial areas for local agricultural development and for future urban expansion. Table 5 summarises the land uses allocated in the Master Plan for Town 17.

4.2 HOUSING

4.2.1 Numbers and Density of Dwellings

Town 17 is designed to cater mainly for people whose family incomes are derived from employment in the surrounding nucleus oil palm estates. The housing areas provide for various dwelling types in a ratio of 10-20 per cent terrace houses and 70-80 per cent semi-detached and detached houses, with 10-20 per cent of all detached houses on larger lots. This housing mix gives a net residential density of about 6 dwellings or 25-35 persons to an acre; this calculation of density includes local roads and paths and communal spaces suitable for sitting out, local games and young children's play areas.

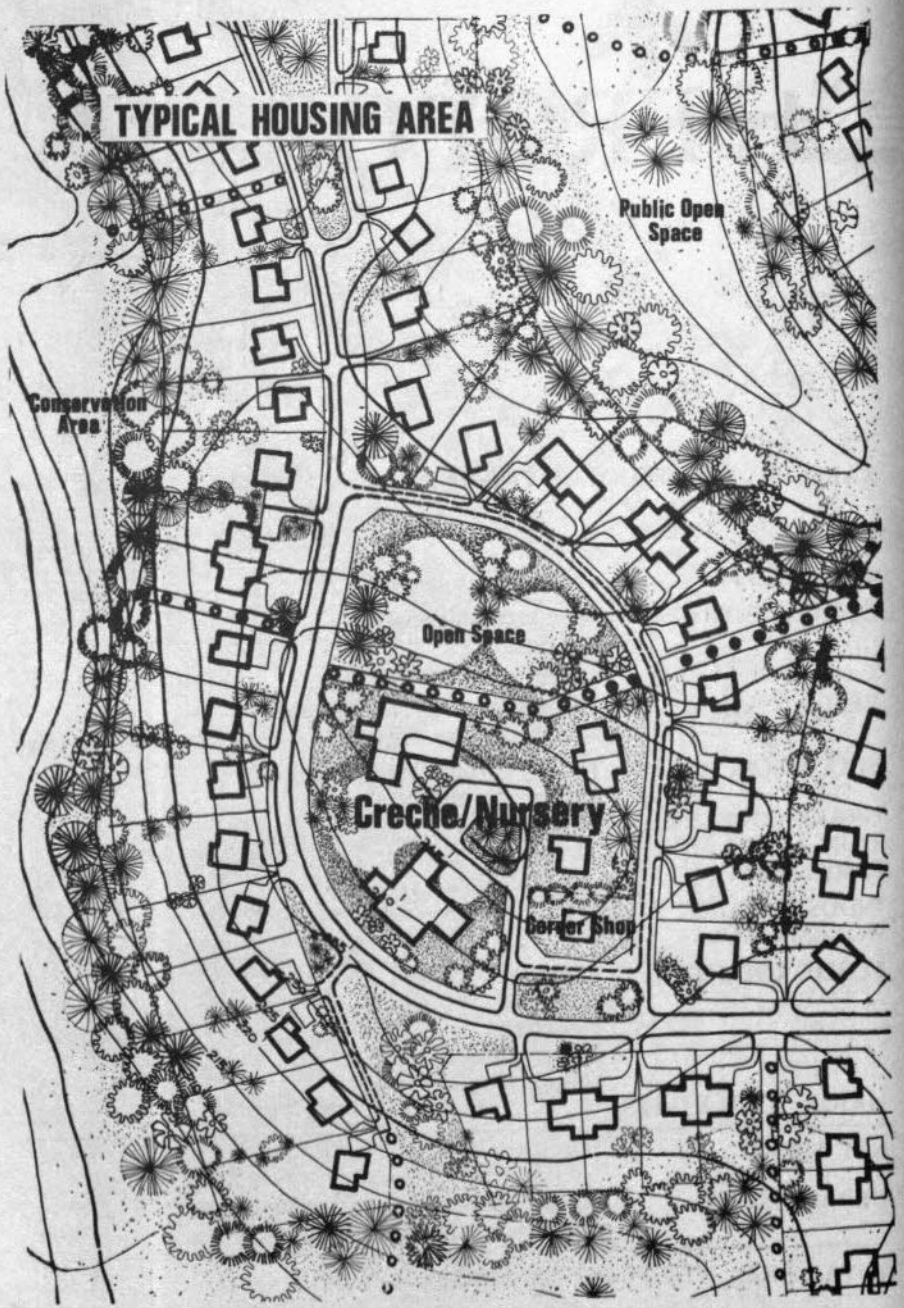
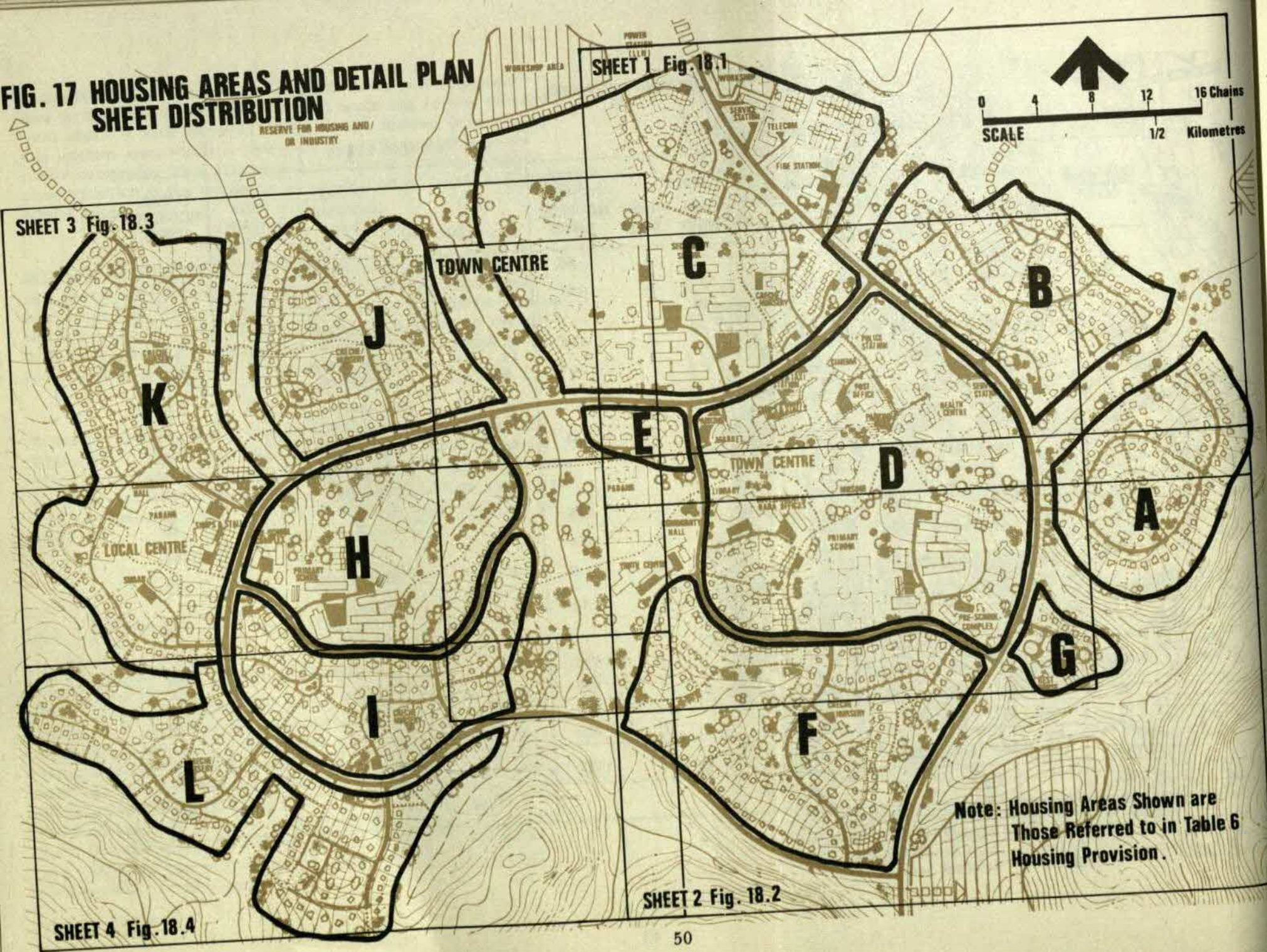


TABLE 6 HOUSING PROVISION TOWN 17

HOUSING AREA	UNTIED HOUSING UNITS									TIED HOUSING UNITS					
	GENERAL				CRECHE NURSERY		SHOPS		TOTAL UNTIED HOUSING UNITS				Related Institution/ facility	TOTAL TIED HOUSING UNITS	TOTAL HOUSING UNITS
	Ter.	S. Det.	Det.	TOTAL	S.Det.	Det.	Town and Local Centre	Corner Shops		Ter.	S. Det.	Det.			
A	–	18	67	85	–	–	–	1	86	–	–	–	–	–	86
B	18	30	65	113	2	1	–	1	117	–	–	–	–	–	117
C	59	36	12	107	2	1	–	1	111	4	4	2	Secondary School	34	145
										14	4	1	Fire Station		
										4	–	1	Telecoms		
D	12	6	17	35	–	–	30	–	65	4	4	1	Primary School	50	115
										–	2	1	Pre School		
										1	–	–	Post Office		
										4	18	2	Health Centre		
										–	12	1	Police		
E	–	24	2	26	–	–	–	–	26	–	–	–	–	–	26
F	14	42	94	150	2	1	–	1	154	–	–	–	–	–	154
G	–	–	8	8	–	–	–	–	8	4	–	–	Rest House	4	12
H	–	4	13	17	–	–	–	–	17	4	4	1	Primary School	12	29
										–	2	1	Pre School		
I	–	58	72	130	2	1	–	1	134	–	–	–	–	–	134
J	–	32	86	118	2	1	–	1	122	–	–	–	–	–	122
K	19	58	110	187	2	1	9	1	200	–	–	–	–	–	200
L	–	30	87	117	2	1	–	2	122	–	–	–	–	–	122
SUB-TOTAL	122	338	633	1093	14	7	39	9	1162	39	50	11		100	1262
					21			48							
TOTAL			1093				69				100				1262

Note: a) Housing areas are indicated in Fig. 17
b) Ter. – terraced house
S. Det – Semi detached house
Det. – detached house

FIG. 17 HOUSING AREAS AND DETAIL PLAN SHEET DISTRIBUTION



Housing areas throughout the town therefore comprise a variety of semi-detached and detached dwelling types, with plots of sufficient size to allow for fruit and vegetable growing, poultry rearing and also for the development of the type of service and craft industries that are compatible with residential areas. Table 6 indicates the proposed housing provision for Town 17.

4.2.2 Plot and House Types

While rectangular plot shapes are not essential or generally proposed, the average plot dimensions are between 40–50 ft. x 70–100 ft., with a total plot area of between 3,000 and 5,000 sq ft. To utilise certain of the areas of steeply sloping land, some plots with depths of up to 150 ft. or 200 ft. are included, the houses being located on the more gentle slopes at the front of the site. A small percentage of plots with areas of up to 10,000 sq ft is proposed in order to attract executives and managerial classes to live in the town and to assist in the creation of social and economic diversity.

On the flatter land in the vicinity of the town and local centres, terrace housing with plots of between 1,500–2,500 sq. ft is provided. A proportion of this type would be initially for rental and would be built in the early phases of urban development.

Such dwellings would provide accommodation for single workers, young married couples and other settlers who do not require larger plots. The proportion of terrace housing in any one area should not be large and should be mixed with lower density housing, so as to avoid forming a dominating influence on local character and identity.

The pattern of residential development throughout the town is generally one of groups of dwellings clustered around the short culs-de-sac and access paths which wind along the contours. Attempts have been made to create a similar type of local identity along access and distributor roads. An informal and varied housing environment should result, which at the same time has the effect of minimising earthworks and land disturbance.

FIG. 18 KEY TO DETAILED DEVELOPMENT PLANS

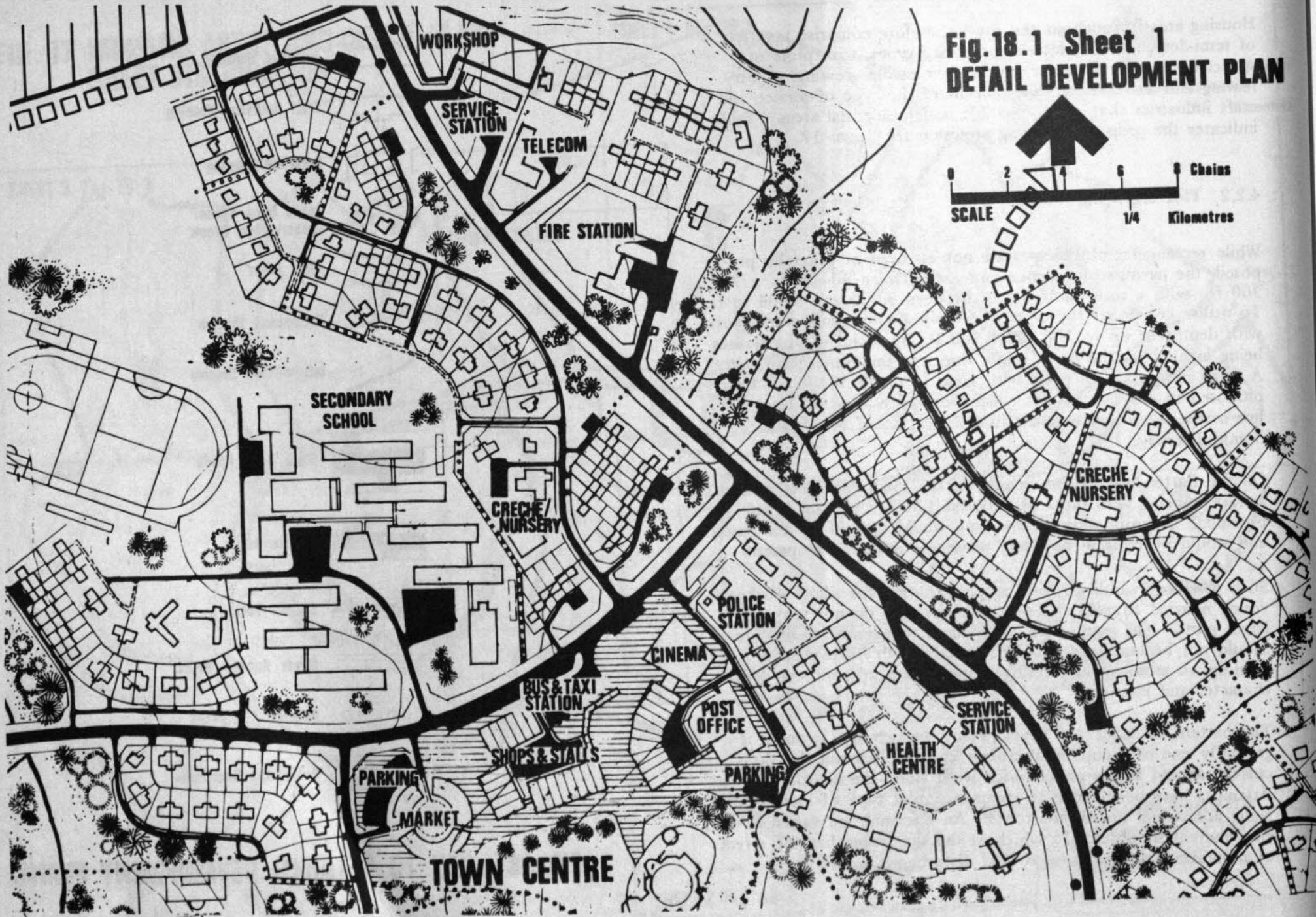


Fig. 18.1 Sheet 1
DETAIL DEVELOPMENT PLAN

The majority of housing developed in the initial years should be in the form of basic 'core' or self-built units. The design and quality of house construction should be such that the settler may, over time, extend his house. All dwellings should be provided with a comprehensive system of services, including a water supply, sewage disposal and electricity supply.

Special sites will be required for construction workers' camps, and also for temporary residential 'kongsi' type accommodation to cater for any shortfall in the house construction programme. Provision of such sites will assist in the early and rapid development of the town and, suitable locations for them are indicated on the south-eastern side of the town.

4.2.3 Detail Design of Housing Areas

The house construction programme will begin in those development areas around the town centre in the eastern part of the town site. Provided that sufficient migrants can be attracted to the town, employment possibilities indicate that a total of some 1200 housing units, will need to be completely developed by 1980. A house building programme of 100 units in 1976, rising to 300 units per annum until 1980, has been proposed to meet this target and to spread construction over a five year period.

The first housing areas programmed to be developed are the two pockets of development lying to the east of the main through route. Provision for a local 'corner' shop is made in each of these areas and a creche/nursery is located in the northern area. Housing areas are formed by clusters of dwellings around small areas of informal open space, which function also as vehicle turning areas at the heads of culs-de-sac. Initial vehicular access to both of these housing areas is from the main through route, although in neither area is direct vehicular access made from the main road to individual house plots. In the case of the two rows of terraced dwellings which lie directly east of the town centre, access is made via a service road, an arrangement which has an additional advantage of facilitating the orientation of the principal elevations of the dwellings towards both the main road and the town centre.

In addition to the two housing areas described above, there are a number of other residential areas within the eastern section of the town, that form the subsequent stages of the house building programme within the first phase of urban development. These housing areas can be broadly be classified in three distinct areas of development,

i) north of the town centre,

ii) within the town centre,

iii) south of the town centre.

i) The area of housing adjacent to the secondary school to the north of the town centre, as defined by the distributor loop, and to the west of the major through route, is of a higher density than housing areas elsewhere. This is due to the strategic location of the area in terms of its proximity to the main northern approach road and town centre, and also due to the opportunity for exploitation of a high density solution, afforded by the more gentle topography. Two main groups of terraced housing are included in the area, one to the north on high ground close to the river bridge providing a defined edge to the town, the other opposite the town centre marking the principal junction of the main through route with the distributor loop. Elsewhere in the area, dwellings are mostly semi-detached, those immediately adjacent to the main road being orientated across an area of open space towards the main approach road and served by a separate access road.

A creche/nursery school is located within this residential area, the catchment area of which will extend not only to housing within the secondary school site, but to convenient residential elements of the town centre (including police housing, health centre housing and shop houses), and also possibly to residents of the telecommunications and fire services sites, across the main through route.

ii) A major residential component of the town is that contained within the town centre itself, either as part of other commercial, social or institutional uses, (shops, police, health centre and schools), or as a separately discernible, although well integrated, residential

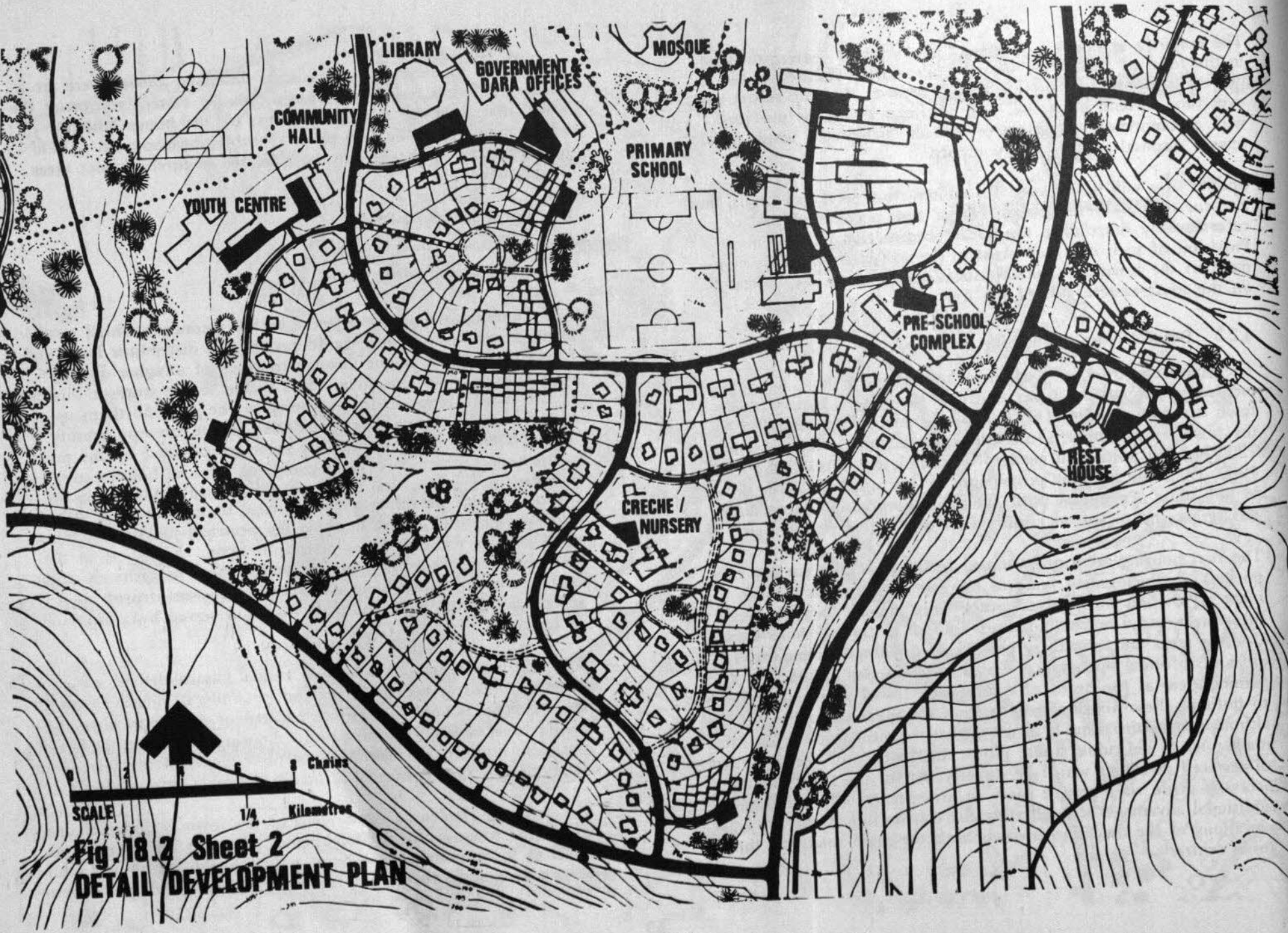


Fig. 18.2 Sheet 2
DETAIL DEVELOPMENT PLAN

community. There are two such housing areas related to the town centre; one to the west forms the northern fringe to the main town padang and a buffer between the padang and the town distributor loop; the other to the south-west is bounded by the major access road serving part of the town centre, and defines both major open space, government and primary school uses, as well as the alignment of major footpath approaches to the centre from the south and west.

iii) The largest housing area, in terms of both land area and numbers of dwellings in the eastern section of the town, is that located to the south of the town centre. It is a well defined area, bordered on three sides by major roads and to the west by the north-south river valley which, it is proposed, has the ultimate function of a town park. A wide range of plot sizes is provided, an outcome of a general need for diversity in housing form and also the varied topography of the area. Initial vehicular access is from the major access road to the north and from the town distributor loop to the south, and again no direct vehicular access to plots is designed from the major town through road.

Community facilities in the area comprise a centrally situated creche/nursery school, in the vicinity of which is located a local 'corner' shop; this creche/nursery facility will also serve residents in the south of the town centre, including those of school sites, as well as those of the small residential area to the east of the main through road, in the immediate vicinity of the rest house.

The western section of the town, which in terms of the urban development programme represents the second phase, comprises fundamentally three main housing areas, one of which is located within the town distributor loop.

The housing area lying within the distributor loop and defined to the east by the main town park, contains a mixture of detached and semi-detached dwellings; however the overall residential density in this area is marginally higher than other areas of the western section, through considerations related to the central location of the area in terms of whole town development and to the absence of the larger plots generally associated with steeper ground in the periphery of other housing areas.

The major development feature and land use of the area is the second primary school and pre-school site, which serves the entire population west of the town park. A creche/nursery located to the south of the area, has a catchment population that extends to residents beyond the distributor loop. At a local scale the area will be served by a 'corner' shop; however, a more comprehensive selection of commercial and social facilities is to be found in the local centre to the west, although in all probability, certain residents in dwellings adjacent to the town park will elect to use those facilities provided in the town centre.

Initial vehicular access to the area is from the town distributor loop and in certain instances, where such an arrangement is not compromised by considerations of sight lines and traffic movement, individual vehicular access to plots is made directly from the distributor loop.

Beyond the town distributor loop to the north and to the south and south-west, are the two additional housing areas that go to make up the western section of the town. These two areas which are served in the first instance by vehicular access from the town loop road, are separated by the local centre, which lies immediately adjacent to the pre-school and primary school site and which itself has a small residential component, including a proportion of terrace housing.

The northern-most of these housing areas represents, together with that area within the town loop road, the first stage of construction within the second phase of development. Both areas have an extremely varied allocation of house types; around the local community areas, which comprise creche/nursery facilities, corner shops and general open space areas, are grouped semi-detached and in places, terraced dwellings; elsewhere, on the perimeter of the housing areas adjacent to the conservation areas that define them, are to be found much larger plots of up to 10,000 sq. ft. in area.

The aforementioned local centre serves the main commercial, social and community needs of the population of these areas. It contains nine shop units and an area for stalls, together with a surau, community hall and padang, and is readily accessible both

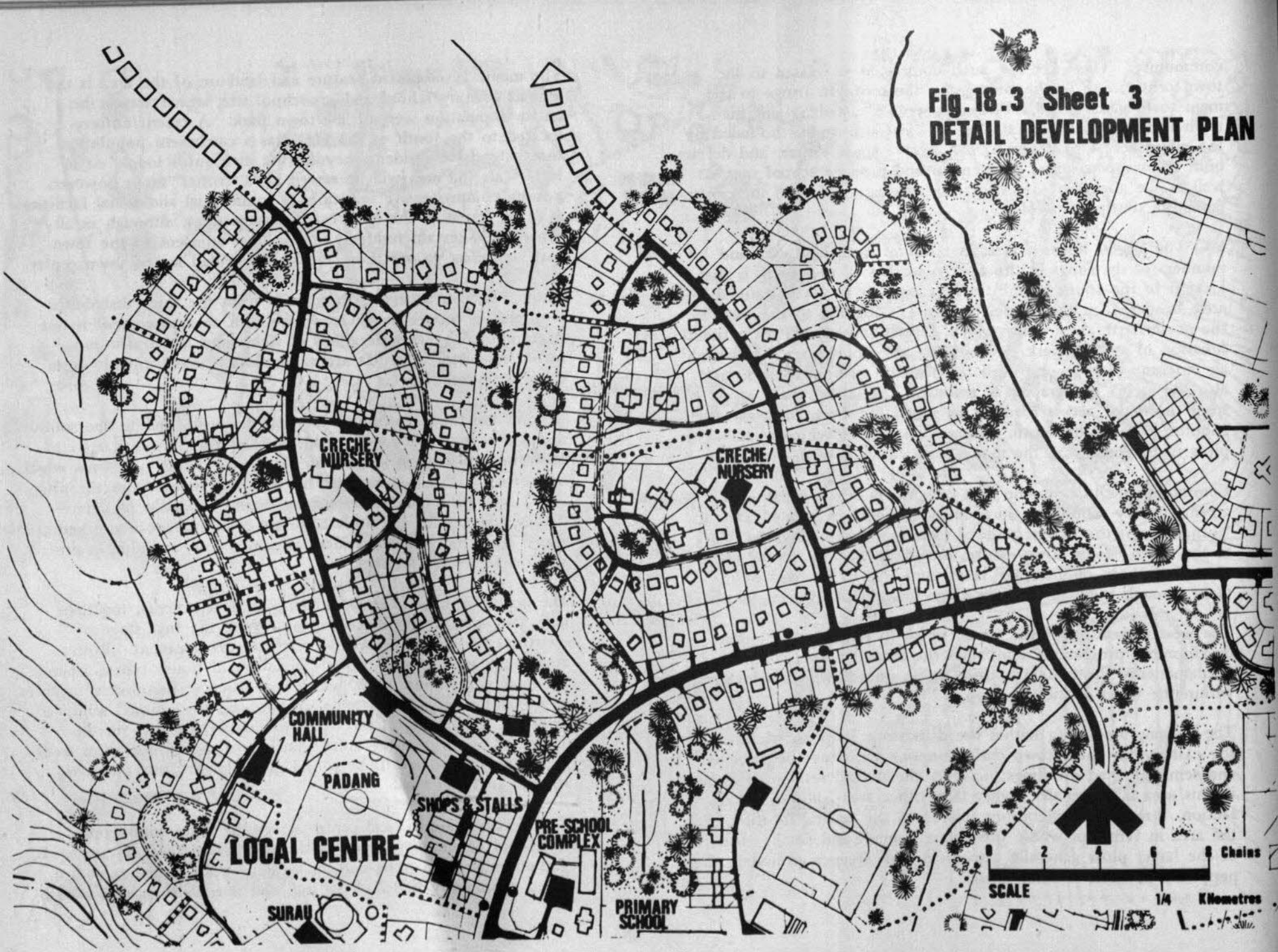


Fig. 18.3 Sheet 3
DETAIL DEVELOPMENT PLAN

by car and by foot from all dwellings within the western sector of the town.

4.3 SOCIAL SERVICES

4.3.1 Planning Principles

The social research conducted among potential migrants to Pahang Tenggara, showed that emphasis in design should be placed on the creation of a strong sense of local community identity. One of the devices used in the creation of such an identity, is the provision of certain social and communal facilities at a very local scale, and both these facilities have been distributed throughout all of the six project towns, in accordance with a three tier hierarchy of provision, namely:—

i) within specific housing areas: local corner shops will be related to smaller scale community open space and play space areas and in many instances also to local creche/nursery school facilities.

ii) within local centres: a more comprehensive provision of basic shopping and social amenities is to be found within local centres, and these will generally be no more than ½ mile from the outer limit of surrounding housing areas. Such provision will include a padang, surau, local community hall and creche/nursery, as well as shops, stalls and adequate parking and servicing facilities.

iii) within the town centre: sites for the provision of the principal administrative, religious, recreational and social facilities for the community as a whole, will be located within the town centre. These will include the main town mosque, government offices, health centre, police station, library, post office, main community hall, youth centre and town padang. Regional and urban transport systems will focus upon the town centre, for which reason it is the rational location for both the bus station and taxi rank. A wider range of commercial facilities will be provided in the town centre than elsewhere, including, in addition to basic shops and stalls, a market area, cinema and shops of a specialised nature.

To allow for future expansion and/or modification of the layout and content of the town centre, a number of reserved sites should be provided.

Certain of the aforementioned facilities, (police station, health centre, shop houses) contain their own residential component, nevertheless it is important that an element of free market housing exists within and immediately adjacent to both the town and local centres, in order to promote a more vital character within these areas, and to integrate more fully their activities into those of the community as a whole, thereby forming a more cohesive urban entity.

Primary and secondary schools and active and passive recreational open space should be distributed so as to afford optimum accessibility to the greatest number of people. These facilities should if possible, be closely related to town and local centres, although this objective is at times compromised by the shortage of relatively flat land in such locations. Acreages recommended for school sites are 10-12 acres for primary schools and 18-20 acres for secondary schools, both these figures including consideration of an element of staff housing. The recommended site area for pre-school facilities is approximately one acre, the site being closely related to that of the primary school.

The fullest range of social community facilities and public utility services, should be provided at the earliest possible stage in the overall development programme.

4.3.2 Child Care

Based on a catchment of 150-200 families, (approximately 1,000 population), a number of creche and nursery schools are distributed throughout the town, to provide both child-minding services and a 'play-school' type of facility, catering for children from one year of age up to school-age. Each of these creche/nurseries would be staffed by two trained personnel, assisted by locally recruited helpers. Provision of these facilities would enable both the husband and wife in any family to continue working and bolster their income, during the early years of raising their family. The location of creche/nursery schools, would be such as to form

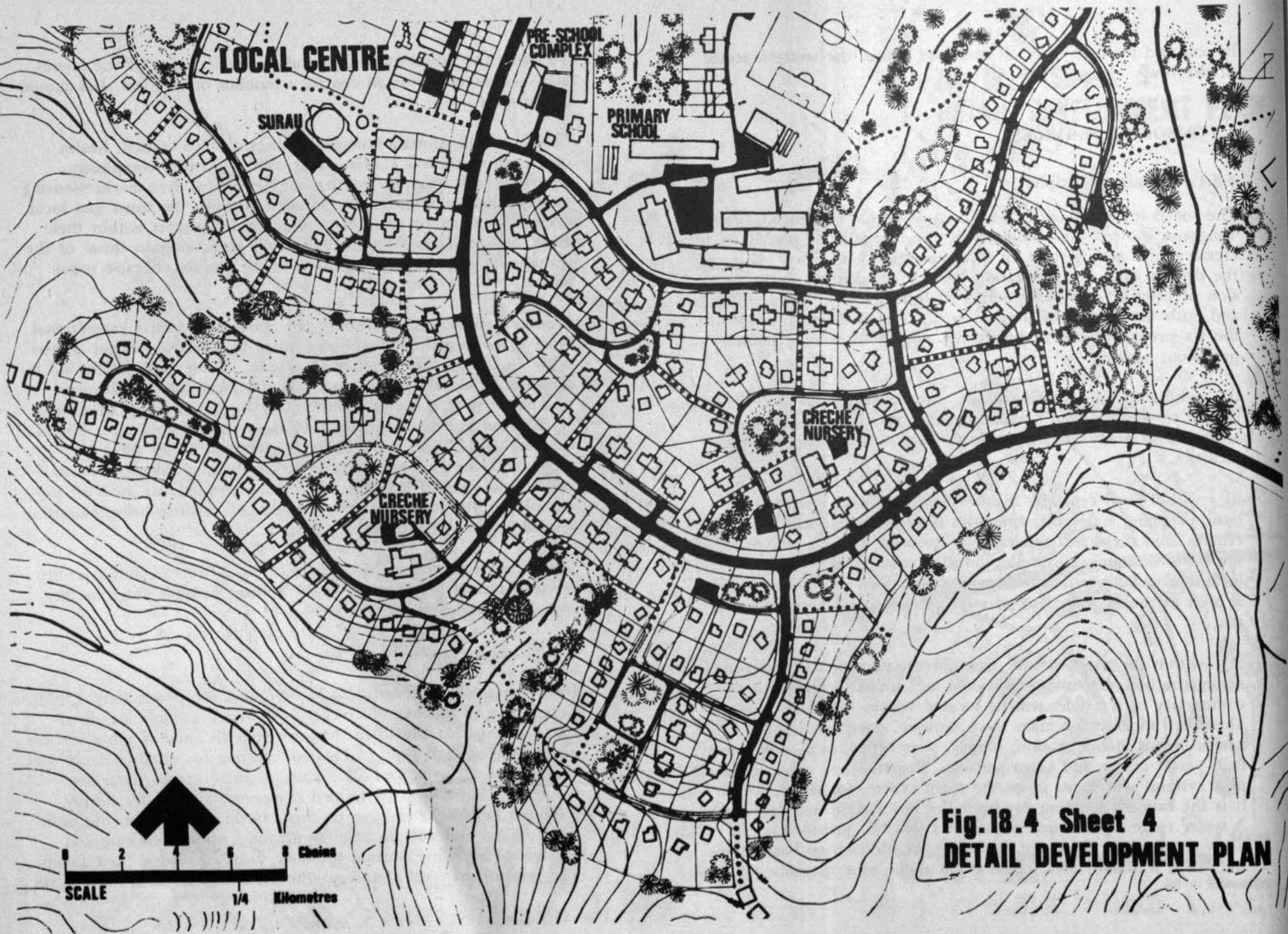


Fig.18.4 Sheet 4
DETAIL DEVELOPMENT PLAN

a local focus, close to local shopping facilities, open space and play areas, and to collection points for transport to work on the estates.

4.3.3 Pre-School and Primary Education

A pre-school complex is indicated adjacent to each of the primary schools. This facility, which will be the responsibility of the Education Authority, will cater for children in the year immediately prior to beginning primary school attendance. Apart from school buildings and play spaces, the pre-school site includes for the provision of staff housing.

Projections of school-age populations have been made and are given in Table 7. By 1980 two primary schools, each with an ultimate capacity of 800 students, are required in Town 17. One of these schools is located in the eastern half of the town, adjacent to the town centre and the other within the western development area adjacent to the local centre. Construction of the school to the east, should commence as soon as the site becomes available, in order to serve the families of initial settlers and also those already established in the hinterland. The second primary school will need to be developed as the demand arises, simultaneously with development of the western area of the town.

4.3.4 Secondary Education

Estimates of educational requirements indicate that by 1980, one secondary school will be required. This school is located adjacent to and north of the town centre, and will be required during the first five years of development. It is proposed that a residential secondary school be situated in Town 22 and it is this school that will provide facilities for a wider range of secondary education and also perhaps a source of secondary education for Town 17 if the provision of the proposed secondary school is delayed. It is possible also that upper secondary facilities will be provided in Town 19, and should this be the case, students from Town 17 could study there and reside in the in-school hostel facilities.

Population forecasts indicate that an additional secondary school for Town 17 will not be required at least before the end of the plan period. However to cater for such an eventuality at a later date, a second suitable secondary school site is indicated to the west of the town.

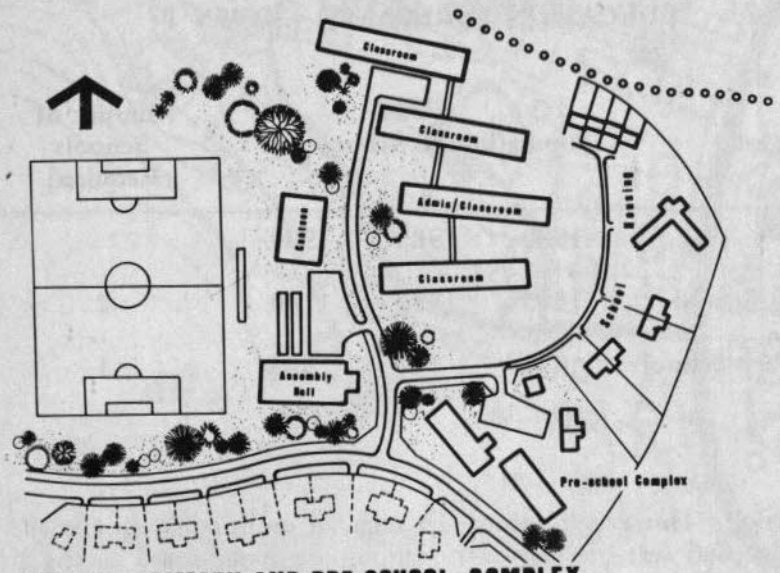
TABLE 7 EDUCATION FORECASTS – TOWN 17

	Population of School Age			Number of Schools Required
	1980	1985	1990	
Primary School	1865	1380	1140	2
Secondary School	670	710	585	1

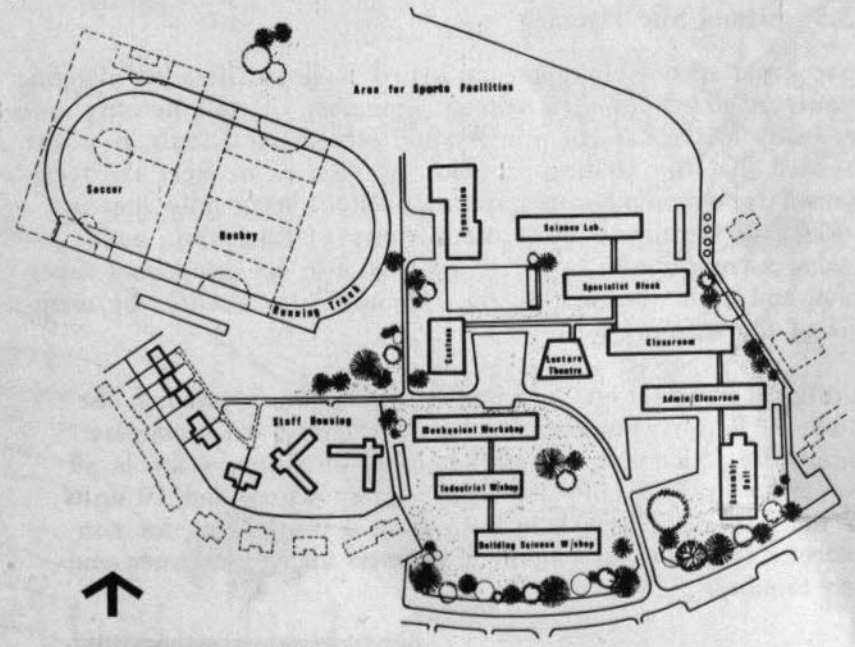
4.3.5 School Site Planning

Apart from school buildings and sports facilities, detailed planning layouts of all school sites indicate a number of staff housing units. Especially in the case of primary and secondary schools, it is not intended that the housing provision be such as to meet the total demand for accommodation amongst school staff, only that it satisfies the requirements of the Ministry of Education, whilst making a compromise between the need for on-site school supervision and a commitment to the community as a whole by members of the schools' staff.

Additional information on school site planning is given in the Summary Report; however, insofar as primary and secondary schools are concerned, the staff housing provision, made in all project towns, is 9 units for each primary school and 10 units for the secondary school, in both cases 4 units being for non-academic staff such as labourers, cleaners and groundsmen and their families.



TYPICAL PRIMARY AND PRE-SCHOOL COMPLEX



TYPICAL SECONDARY SCHOOL

Indicative building layouts are shown for each school, not only to indicate the practicality of any particular site, but to indicate also favoured building locations as a means of facilitating the internal working of the school itself and the provision of public access to those parts which could function on a wider community level (e.g. hall, gymanisum, lecture theatre, canteen and sports facilities). Furthermore, the design layouts of all schools shown, attempt to utilise the various physical elements, such as space and the massing of buildings, as a positive contribution to the town-scape for which reason it is intended that, such designs be used as guidelines for development in the course of all further detailed design and implementation.

4.3.6 Health Facilities

A district health centre is provided in the town centre on a seven acre site. The site provides 22 housing units to accommodate medical and nursing staff and to enable provision of a 24 hour service. A clinic, dispensary and store form the public buildings to the health centre and are located conveniently to the town centre and pedestrian access routes.

4.3.7 Police

A 2.5 acres site is allocated for a police station, parade ground and residential quarters, situated in a key position at the junction of the town distributor loop road and the main through route. The station building itself is both easily visible and accessible from adjacent main roads and from the town centre. Thirteen residential units are provided within the site.

4.3.8 Fire Service

The fire station and residential quarters are located on a site of 2.5 acres to the north of the town centre, in a position adjacent to the main through road. Access from the site is readily afforded to all sections of the town, in particular to the town centre itself and to the two proposed industrial sectors. The fire station building itself comprises garaging facilities for three fire engines,

offices, canteen, rest room and prayer room facilities, and is closely related to the parade ground and practice tower. Nineteen residential units are provided within the site.

4.3.9 Community Halls (Dewan)

A public hall of approximately 7,000 sq ft. in area is provided on a site of 1.0 acre, in the town centre area adjacent to the main padang. This hall will serve a number of functions ranging from wedding receptions to public meetings, and in the early years of urban development, prior to certain other facilities being provided, may in addition serve as a cinema, library, youth centre and sports hall. In any event, it is proposed that there be a certain flexibility in the use of social amenities and the close proximity of the main community hall to the proposed youth centre complex, is intended to encourage the interchange of their respective facilities.

A smaller multi-purpose community hall is located alongside the padang within the local centre to the west of the town. This hall will serve a similar function to that of the hall within the town centre, and in conjunction with the nearby surau, will act as a focus of community activity for the western residential areas.

4.3.10 Youth Centre

The youth complex, situated adjacent to the padang and the main community hall, comprises a canteen and facilities for indoor sports and meetings. In addition, courts are provided within the 3 acre site for tennis, badminton, basketball and sepak takraw. The nearby town padang will be used to provide pitches for football, cricket, hockey and other sports and games requiring a larger area. The youth complex could also serve or supplement the multi-purpose functions of the community hall should it be decided to develop it during the initial phase of town centre construction.

4.3.11 Library

A site for the future provision of a library is indicated close to the commercial area and government offices. Prior to the development of the library, the site would be landscaped as part of the open space within the town centre.

4.3.12 Post Office

A site of 0.5 acre is provided for the post office, integral with the commercial centre. The main post office building, which in addition to typical public post office facilities comprises first floor residential accommodation for the principal post office clerk, abuts the main pedestrian concourse, while the service and security yard lie to the rear, masked eventually from the main road by the mass of cinema building. In the early years of development, a temporary post office would be located in one of the shop units within the first phase of permanent town centre shop house development, and during such time the intended permanent site would be landscaped as open space.

4.3.13 Local Government/DARA Offices

Local government and DARA offices are located on a two acre site, to the south-west of the commercial core of the town centre and on the fringes of the public open space area that links the commercial core and mosque to the main town padang in the west. Development of the site will be closely linked to demand throughout the development of the town as a whole, however the lack of more definitive accommodation requirements for both local government and DARA make the type, size and distribution of buildings elements as shown somewhat theoretical.

4.3.14 Rest House

A site for a government rest house is provided immediately to the east of the main through route, in a location easily visible and accessible to all passing traffic, and convenient to the various government, social and commercial facilities within the town centre. A provisional site size of one acre is allocated, and although more specific accommodation requirements are as yet undefined, it is recommended that some form of development take place at an early stage.

4.3.15 Religious Facilities

The main town mosque is situated on a prominent landscaped four acre site, central to the town centre in a location which hopefully will be fully exploited in terms of the building's great

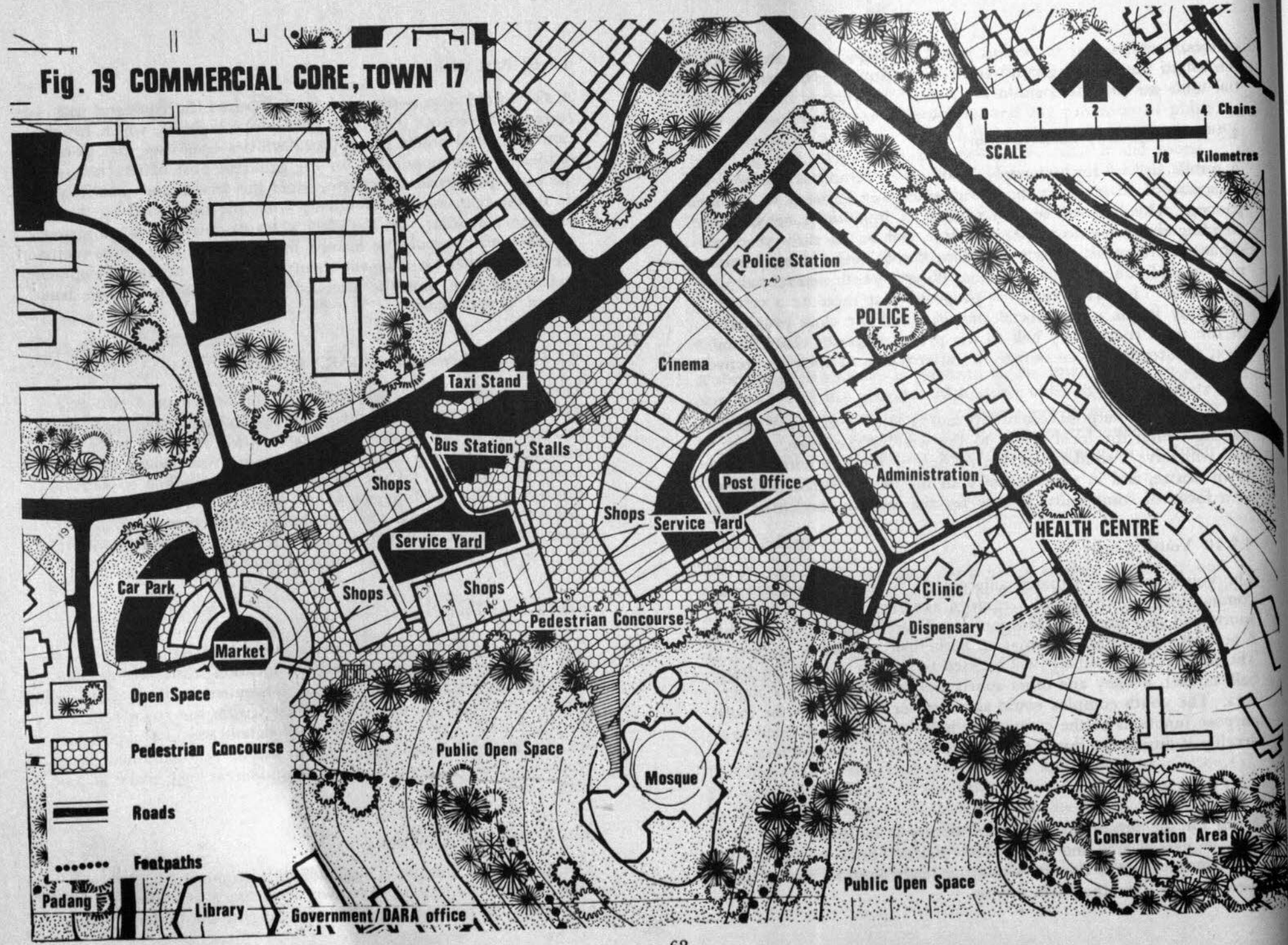


Fig. 19 COMMERCIAL CORE, TOWN 17
0 1 2 3 4 Chains
SCALE 1/8 Kilometres
Police Station
POLICE
Cinema
Taxi Stand
Bus Station
Stalls
Shops
Post Office
Administration
Shops
Service Yard
HEALTH CENTRE
Service Yard
Car Park
Shops
Shops
Clinic
Pedestrian Concourse
Dispensary
Market
Open Space
Pedestrian Concourse
Roads
Footpaths
Public Open Space
Mosque
Conservation Area
Public Open Space
Padang
Library
Government/DARA office

potential for architectural expression. The mosque should be developed at an early period in the urban development programme as a symbol of confidence by the government in the project, and as a focal point of religious activity for the community as a whole.

Provision of a mosque in the town centre is complemented by that of a surau in the local centre to the west. Although it is intended that the main mosque has a real whole town identity, practical considerations related to routine religious observance, indicate the need for an additional surau to serve the residential areas to the west.

4.3.16 Cemeteries

Two sites for Muslim cemeteries are proposed within the outer town boundary, one to the south-east of the urban development area, the other on the western edge of the town. A general burial area for persons of other faiths has also been allocated on the south-eastern side of town, however it is proposed that further subdivision of this area into cemeteries related to specific creeds, be carried out at a time when the urban population mix in terms of minority religions, becomes more clearly defined.

4.4 COMMERCE AND INDUSTRY

4.4.1 Shopping Provision

Analysis of forecasts of migrants' disposable income and of the commercial viability of individual shop and market units, has led to the adoption of recommended standards of commercial provision throughout the town. A total of six shops and six stalls per thousand population is recommended as being the requirement by 1990. However should population grow beyond the target figure, provision of reserved commercial sites is further recommended.

Approximately 60 per cent of the town's shopping facilities is located in the town centre itself, the remainder being divided between the local centre to the west and corner shops within the individual housing areas. Throughout all the project towns, subdivision of shops between local centres and housing areas is essentially a function of the specific town, depending on the physical layout of the town, the catchment areas of the centres themselves and the relative accessibility and size of the housing areas.

A total of 48 shops will be required in Town 17 by 1990: 30 of these should be provided in the town centre, nine within the local centre to the west, a further nine being distributed throughout the housing areas. Apart from acting on a whole town basis in terms of the provision of shopping facilities, the town centre contains local shopping provision for certain of the neighbouring residential areas. Neighbourhood corner shops are located close to creche/nursery schools and open space areas, to serve as a focus of local community activity. Local and neighbourhood shops would cater for the daily shopping requirements of the settlers and would be predominantly 'sundry' shops and coffee shops. Their establishment is likely to occur at an earlier stage in the development of the town than that of the majority of town centre shops, which will combine to provide the full range of commercial facilities for the ultimate whole town population.

4.4.2 Market

Analysis of social survey research data revealed a strong dependence among potential migrants on markets as a source of many daily purchases. In addition, markets can be considered an important commercial facility in that they provide a readily available outlet for a variety of locally produced items, including such agricultural produce as may be grown on smallholdings by for example, settlers wishing to diversify their source of income. The central market thus occupies an important and readily accessible site within the town centre and it is desirable that it is built at an early stage in the development process, either as a temporary wooden structure which at a later date can be replaced, or as a phased permanent facility which is expanded in accordance with demand.

4.4.3 Cinema

A site for the development of a cinema is included in the main commercial core of the town, as it is considered that the

provision of entertainment facilities will prove to be a strong determinant in the retention of the second generation of settlers. In the early years of development film shows can be provided in the community hall, during which time the cinema site provided can be landscaped and used as a temporary open space or parking area.

4.4.4 Service Station

Two sites for petrol filling stations are indicated, one to the east of the approach road north of the town centre and the second, to serve northbound traffic, sited to the east of the town centre. Both service stations should possess facilities for at least small scale vehicle repairs and other associated activities, such as tyre repairs and the garaging of any local bus fleet. The demand for fuel supply and vehicle servicing in the town will be evident from the outset, and it is desirable that at least one station be established at an early date to forestall such development on other, less appropriate sites.

4.4.5 Workshops

North of the town centre two areas are allocated for the development of workshop facilities, one within the proposed northern industrial sector and the other in the vicinity of the northern service station. It is proposed that within these areas, premises for small service industries be provided, such as those for furniture manufacture, vehicle repairs and servicing, building materials supplies and construction contractors equipment and materials storage facilities.

4.4.6 Industry

Although the main function of the town is as a service base to the agricultural hinterland, it is desirable that sites be allocated to allow for future industrial diversification. Wherever possible the establishment of agricultural processing plants should be encouraged within allocated industrial reserves, to provide employment close to the residential areas. At present a number of palm oil mills are already being developed elsewhere in the hinterland, and the environmental consequences of such action needs to be taken into account.

Two reserve sites are indicated in Town 17 as suitable locations for industrial expansion. One site, to the south of the town and immediately to the east of the main through route, is suitable, on account of its position at the head of drainage system and its slope characteristics, only for light service industry and smaller land uses; the second site to north of the town is better suited to industrial activity requiring heavy water consumption. In time availability of these sites should be promoted with the objective of attracting new industries to the town and encouraging a more diverse economic base.

4.5 LANDSCAPE AND OPEN SPACE

The urban conservation areas along the valleys and the streams, the low overall housing densities, and the local and main town padangs and larger open sites for the mosque and schools, will give the town an overall parkland character.

The open space is distributed throughout the town in the form of padangs in the town and local centres, and less formal areas of maintained open space within the housing areas. Open space areas within road reserves and turning circles, or in the centres of housing clusters, could be utilised as games pitches for less formal play activities, whilst areas along footpaths, particularly at the heads of certain conservation areas are of sufficient size and suitable gradient to be utilised as larger playing field areas.

The character of the residential areas will be very much one of a series of linked open space areas around which dwellings are grouped. Such areas, under the constant surveillance of residents within a group of houses, become ideal play areas for children of any age.

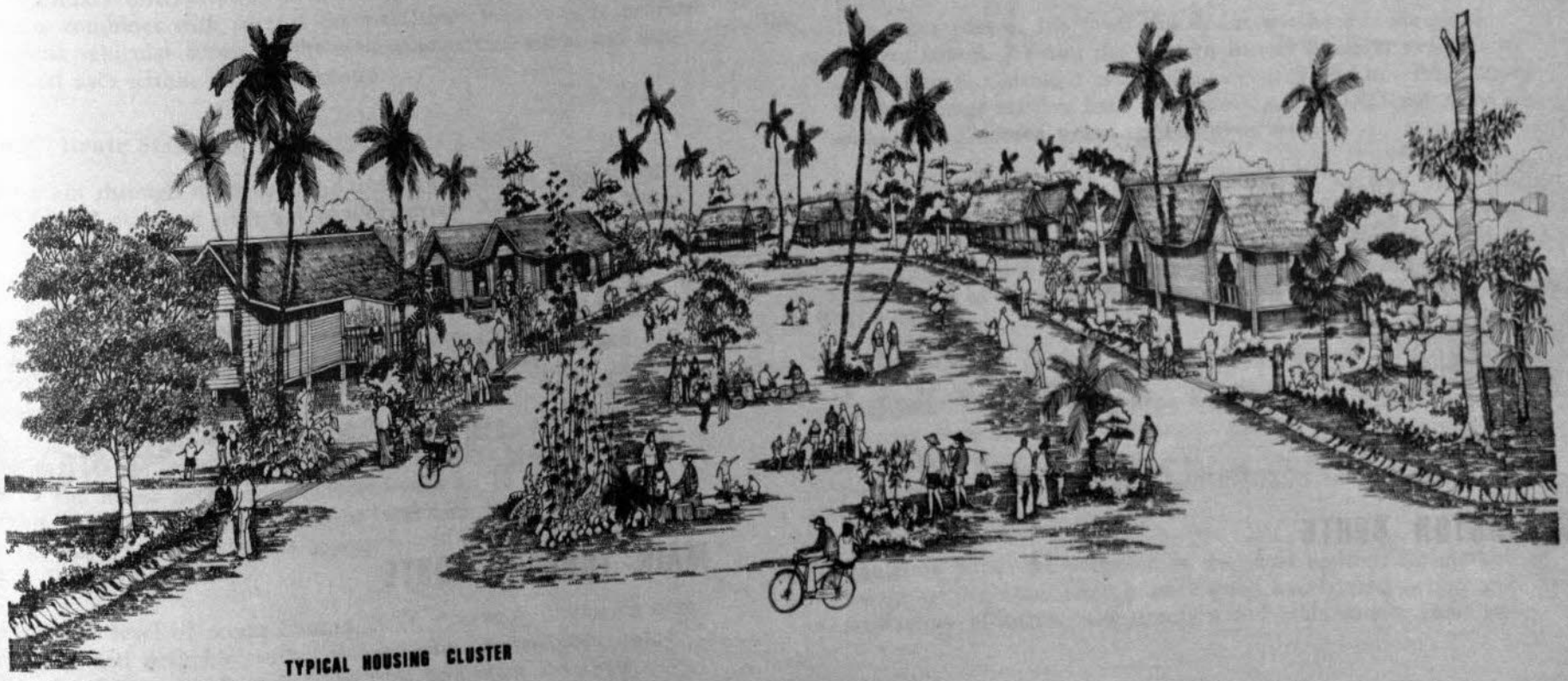
Close to the town centre and in other well used areas, selective clearing of the conservation areas and careful management policies could be undertaken to create areas of public parkland. In the case of Town 17, such an area is designated in the main north-south stream valley which defines so clearly the two major development areas of the plan. Establishment of a linear town park within this area not only provides a positive contribution to the open space and recreational facilities of the town's population,

but also binds together the two development areas to form a more cohesive whole town plan.

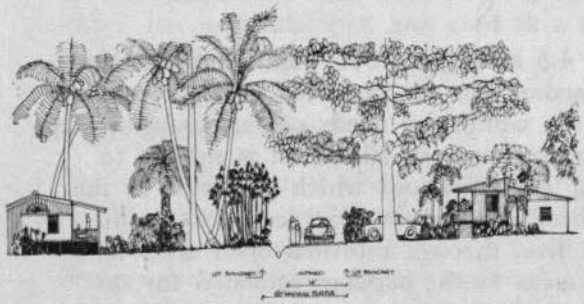
In certain other conservation areas, especially those towards the perimeter of the town, clearance would be minimised to facilitate only the alignment of necessary service works. Such areas, left under their existing jungle cover, would have the effect of merging the town into its surrounding natural environment, and would soften the edge of the urban development areas.

People's requirements for open space may be classified into two groups, those of active and passive recreation. In the towns of Pahang Tenggara, set amid a vast agricultural hinterland and themselves containing significant areas of non-developable land, it is considered that the needs for passive recreation will largely be met incidentally in the overall layout of the town. These facilities also allow easily for the provision of open space for active recreation.

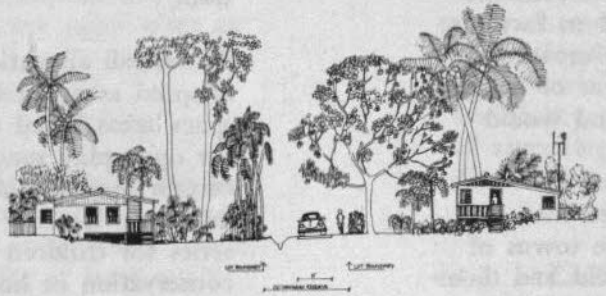
An overall allocation of 4.5 acres per 1000 population has been adopted as a suitable standard for the provision of active open space areas based upon the competing needs of various age groups for open play space, however such an allocation is subject to certain specific qualifying considerations which are listed in the Summary Report. Facilities range from play areas in the nurseries for children under five, through informal open areas in conservation or housing areas to the padangs provided for organised games and sports activities.



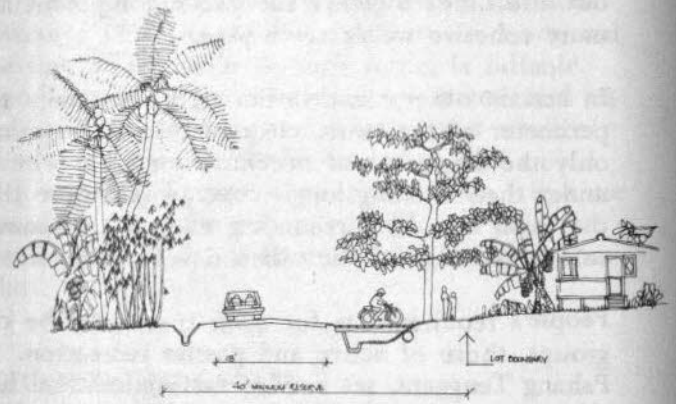
TYPICAL HOUSING CLUSTER



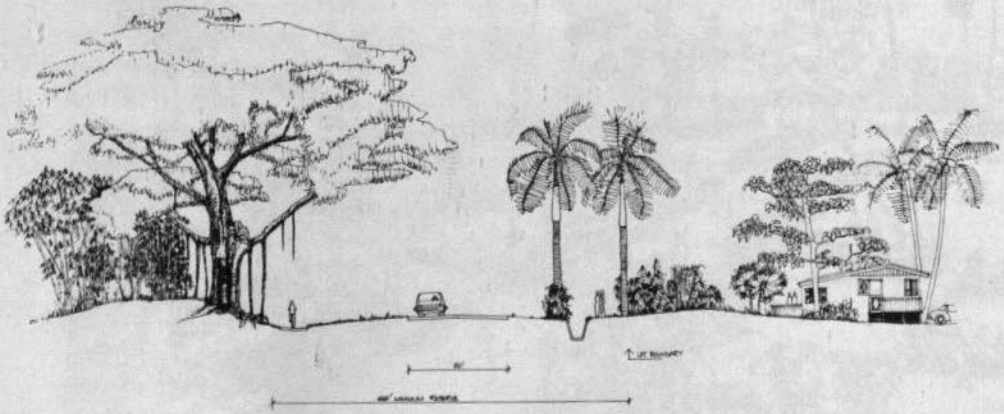
MINOR ACCESS PATH



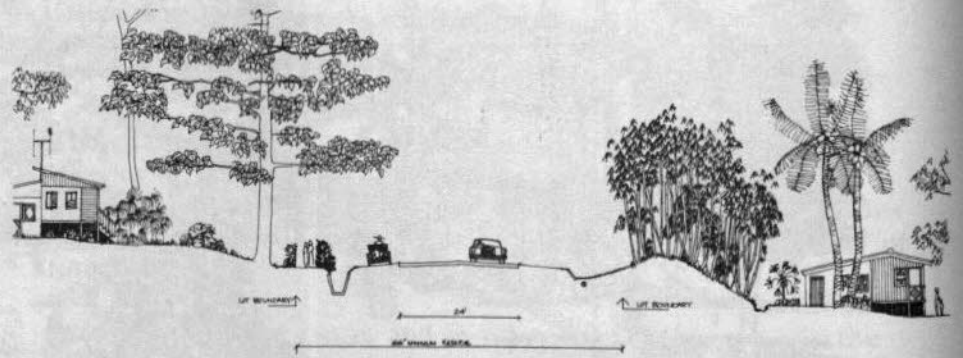
ACCESS PATH



MAJOR ACCESS ROAD



DISTRIBUTOR ROUTE



MAIN THROUGH ROUTE

4.6 PHYSICAL INFRASTRUCTURE

4.6.1 Communication Pattern

The main through route, which links the regional road system in the north and Town 19 in the south, forms the eastern leg of a town loop road system which joins together the two main areas of development. This town loop crosses the central valley in two places and provides access to the local centre, primary school and housing areas in the west of the town. Branching from this loop system there is a complementary pattern of local roads and paths. The system will provide a basis for a bus and taxi public transport service focussed on a station in the town centre and running close to all housing areas and local and community centres.

A secondary distributor loop to the west and south of the town centre, combines with part of the main town loop road to provide efficient vehicular access to the main commercial, social and institutional uses within the town centre.

4.6.2 Route Standards

The main through route and the town loop will be constructed to JKR 03 standard with a 1 chain reserve. An additional 50 ft. buffer strip is indicated alongside the main through road and access to the road will be limited.

From forecasts of vehicle ownership and use, it is evidence that foot and cycle trips will predominate within the town, and that motorcycles will account for approximately two thirds of all vehicular traffic.

The main links into housing areas and into the town centre will be of the major access road standard with an 18 ft. carriageway within a 40 ft. reserve. An access road with a 14 ft. carriageway in the same reserve width is appropriate in situations serving more than 50 dwellings.

Below this level of access road, a 20 ft. reserve is considered both adequate and desirable; within this minimum reserve, two forms of paths are proposed, each mainly for pedestrian and cycle movement, but both large enough to contain the projected volume of vehicular traffic. Access paths will have an 8 ft. carriageway of bound earth or laterite within a 14 ft. minimum formation and will serve up to 50 dwellings. Minor access paths would serve up to 10-12 dwellings and generally be unsurfaced.

In general, services will be laid within road reserves alongside the carriageway, but in the case of access paths and minor access paths this may not always be feasible or proposed.

No formal standards are adopted for the network of footpaths within the town, although the detailed design should be such as to discourage their use by motorcycles. In situations where motorcycle use is likely a 20 ft. reserve should be allowed.

4.6.3 Drainage

The major part of the town site drains northwards via small streams into S. Jekatih; the western fringes however drain westwards into S. Chicha, a small tributary of S. Pukin. Preliminary trunk drainage reserves have been specified by DID and these lie within the proposed urban conservation areas.

Drainage of the areas of development will be by way of a system of open channels, generally located in road reserves, and having outfalls into the trunk drainage system. Close liaison should be maintained with the DID during the engineering design period to ensure that scouring and siltation problems are minimised.

4.6.4 Sewerage, Sewage Treatment and Disposal

Sewage from the town development will be drained by a gravity sewerage system. The development falls in three catchments, and hence three sewage treatment and disposal works will be required, two discharging to S. Jekatih, and the third to S. Chicha to the west of the town.

Oxidation ponds are proposed as the most appropriate method of sewage treatments. They provide good bactericidal action and satisfactory effluents. Construction and maintenance costs are

Fig . 20.1 PHYSICAL INFRASTRUCTURE SEWERAGE SYSTEM

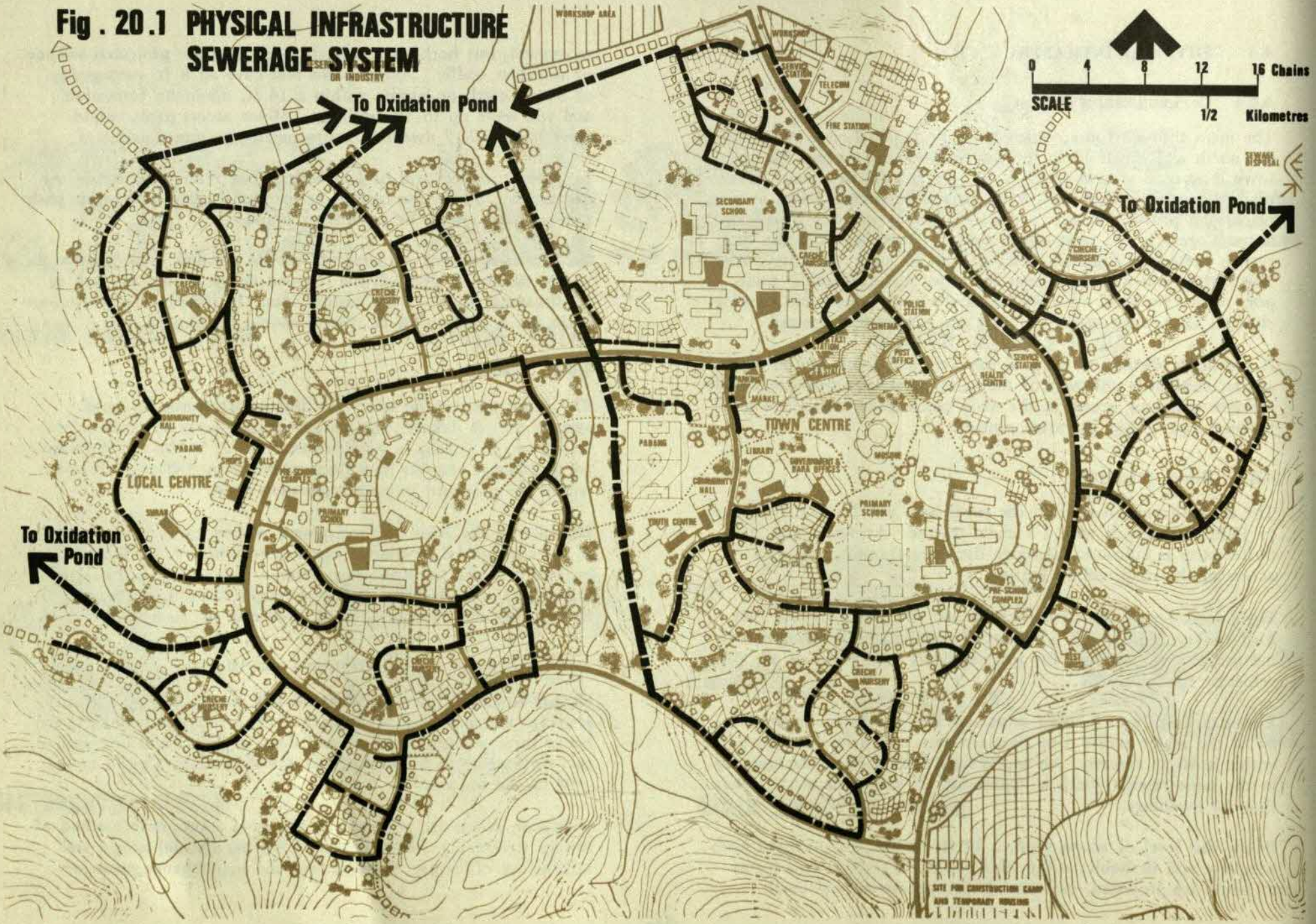
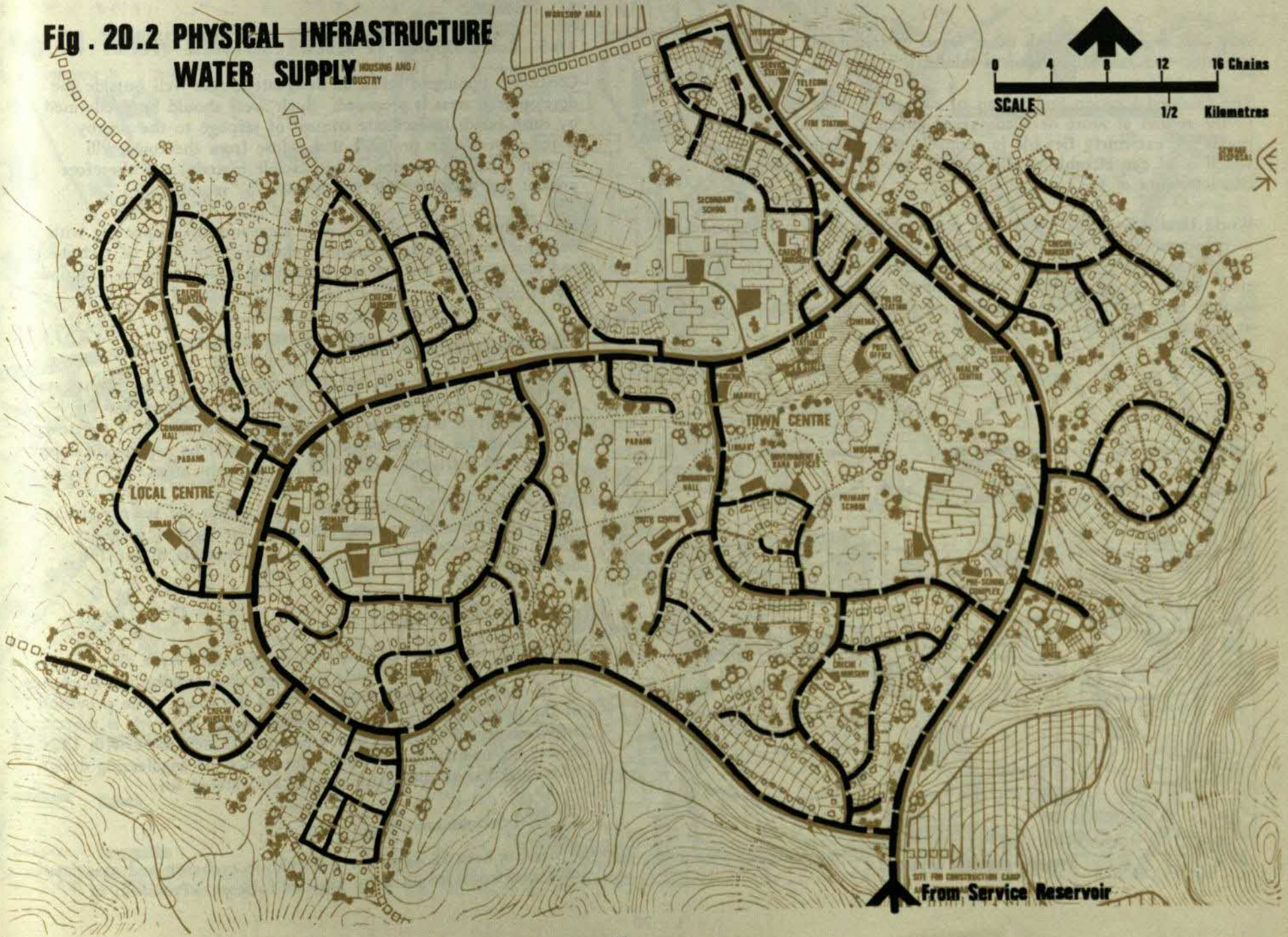


Fig . 20.2 PHYSICAL INFRASTRUCTURE WATER SUPPLY



telephone facilities is the responsibility of JT, and close liaison should be maintained to ensure that projected requirements are catered for.

4.7 TOWN CENTRE

The design and location of the town centre is such as to enhance its role as the focal point of commercial, social, religious and administrative activity for the population of both town and hinterland. Situated generally in the northeast of the town, closely related to the main regional approach road and to the major intersection of that road with the main town distributor loop, the town centre is a dominant element in the overall urban structure, and should be exploited as such to give the town a dynamic, identifiable character.

In terms of the general topography of the eastern section of the development area, the town centre site comprises some of the more gentle slopes and is therefore well suited to the somewhat higher density of development characterised in the commercial core and also to the provision of large open space and playing fields areas such as those of the town padang and of the secondary and primary schools. Certain areas of steeply sloping land however do exist, and these have been utilised to advantage in several ways; for example, the dominant location of the town mosque is emphasised further by the landscaped slopes which, as an extension of the town padang and central park to the west and open space areas to the south, lead up to the mosque, the architectural design of which should capitalise on such natural features and also on the building's inherent multi-elevational character. An alternative positive use of steeper slopes is made to the east of the town centre site, where distinct separation of levels is used to reduce both the noise and pollution effects of the main through route on adjacent residential areas of the police station and health centre.

Fig. 21 illustrates the ultimate form of the town centre appropriate to the time when the town has reached full maturity. In the early years of development not all facilities will be fully provided, and many buildings may be of temporary construction.

TABLE 8 PROPOSED TOWN CENTRE LAND USE ALLOCATIONS TOWN 17

	Acres	Acres
Police Station (Polis)	2.5	
Health Centre	7.0	
Community Hall (Dewan)	1.0	
Youth Centre	3.0	
Library	1.0	
Post Office	0.5	
Local government/DARA offices	2.0	
Mosque	4.0	
SOCIAL SERVICES		21.0
Shops and Stalls (including paved area)	4.5	
Market	0.5	
Cinema	0.5	
Service Station	0.5	
Bus Station/taxi stand	0.5	
COMMERCIAL		6.5
Padang and Ancillary Open Space (inc. pedestrian routes)	8.5	
Main Roads	0.8	
Parking Areas	0.5	
ROADS AND OPEN SPACE		9.8
*Pre-school/Primary school complex		13.2
*Residential (General housing areas only)		4.0
TOTAL CENTRAL AREA		54.5
† Fire Station	2.5	
† Rest House	1.0	
TOTAL TOWN CENTRE LAND USE ALLOCATION		58.0

Note:– * Non-town centre land use located within centre.
† Classified town centre land uses located outside centre.

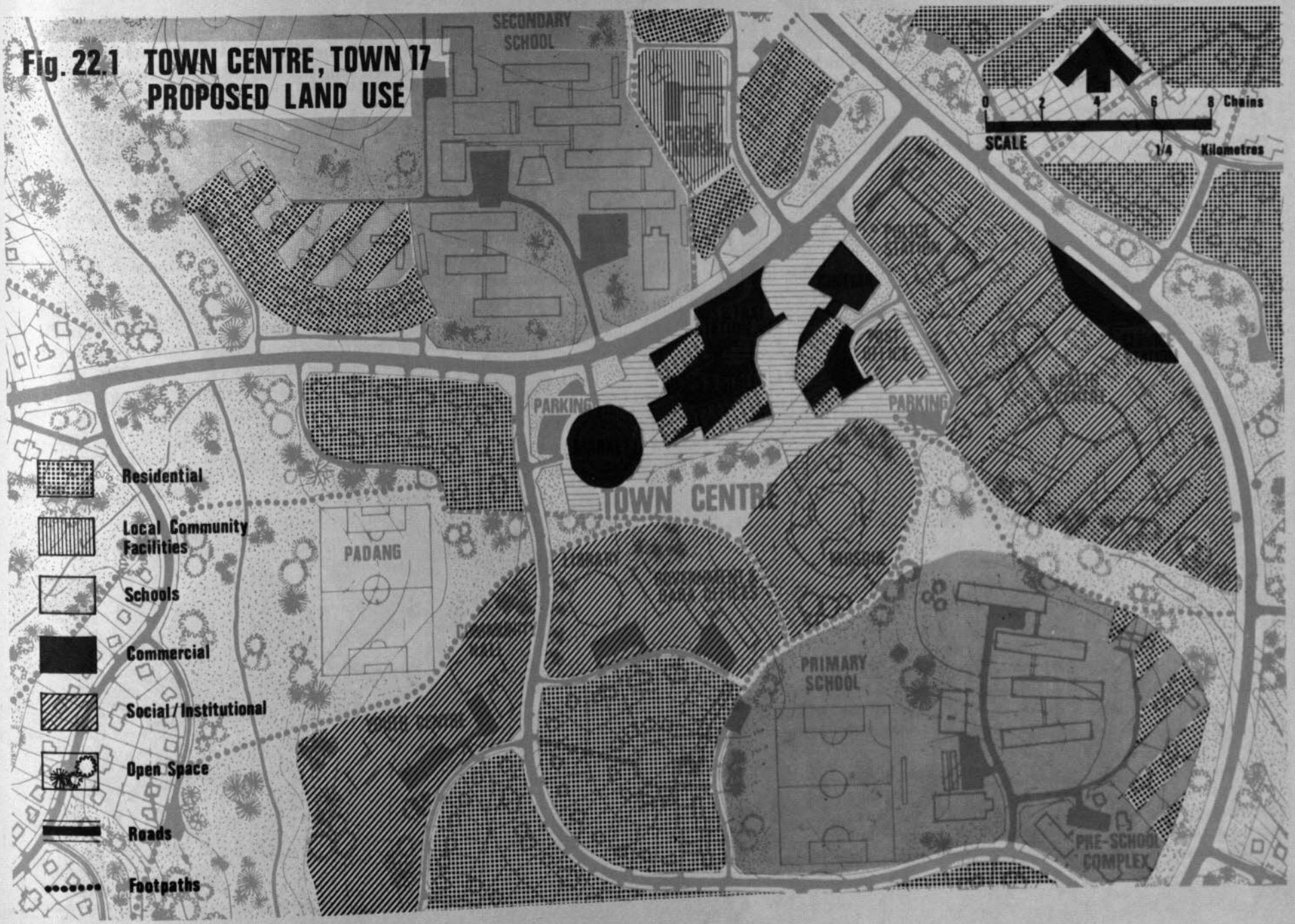


Fig. 22.1 TOWN CENTRE, TOWN 17
PROPOSED LAND USE
SECONDARY SCHOOL
PARKING
PARKING
TOWN CENTRE
PADANG
PRIMARY SCHOOL
PRE-SCHOOL COMPLEX
0 2 4 6 8 Chains
SCALE 1/4 Kilometres
Residential
Local Community Facilities
Schools
Commercial
Social / Institutional
Open Space
Roads
Footpaths

However, one of the major design criteria has been the ease and suitability of staged construction, in addition to which allowance has been made, wherever practical, for further growth beyond the plan period.

The town centre is located immediately adjacent to the main town through route; however with the exception of access to certain peripheral facilities, access to central area facilities from this through route is strictly limited. Vehicular access to the centre is from the northern leg of the town distributor loop or from the secondary loop which borders the town centre to the south and west. That part of the town centre lying within this main road network can be considered the nucleus of central area activity, comprising as it does the market, commercial core, post office, cinema and bus/taxi station to the north; the police station and health centre to the east; and the public library, local government/DARA offices and pre-school/primary school facilities to the south and west. All of these elements are ranged around the town mosque and landscaped public open space area, which forms the focal point of the town centre itself, and on which all pedestrian and cycle approach routes converge.

The commercial heart of the town centre is that area formed by a pedestrian concourse which links together the four main blocks of shop houses, the market, cinema, post office and a number of car-parking areas. Rear service access to the shops is provided and designed in such a manner as to ensure that these service yards, which inevitably accummulate rubbish and waste, are effectively screened from the main areas of pedestrian activity.

The bus and taxi station which is located immediately to the north of the commercial core and adjacent to the main town loop road, is conveniently located in terms of both access to the principal commercial facilities and to the town and regional bus routes.

The market is located close to those commercial facilities phased for construction in the early stages of development and in a stategic location in respect of pedestrian approach routes and public transport services. A circular form of open sided market building is indicated, which allows servicing to take place from within, reduces the areas of potential conflict between pedestrians and vehicles and in addition ensures that refuse and waste material may be stored away from the main pedestrian areas.

The more easterly block of shops is that suggested for the later phases of development and linked to this block are the cinema building and post office. The latter being provided towards the end of the first five year period. With the exception of the mosque, the cinema will probably be the largest single building mass in the town centre, and recognition of its value as a prominent physical component is in the fact of its location and strategic position giving positive visual impact in terms of the main regional road approach. In the initial years postal services will be operated from a shop-house unit in the first phase of commercial development; however full postal facilities would be required to be provided from a permanent site as the town develops. A fenced security yard is provided to the rear of the post office building, however this area of post office activity together with the service yards of the adjoining shops is screened from the abutting main pedestrian concourse by the post office building itself and from the town distributor loop by the cinema.

COMMERCIAL CORE AND MAIN PEDESTRIAN CONCOURSE

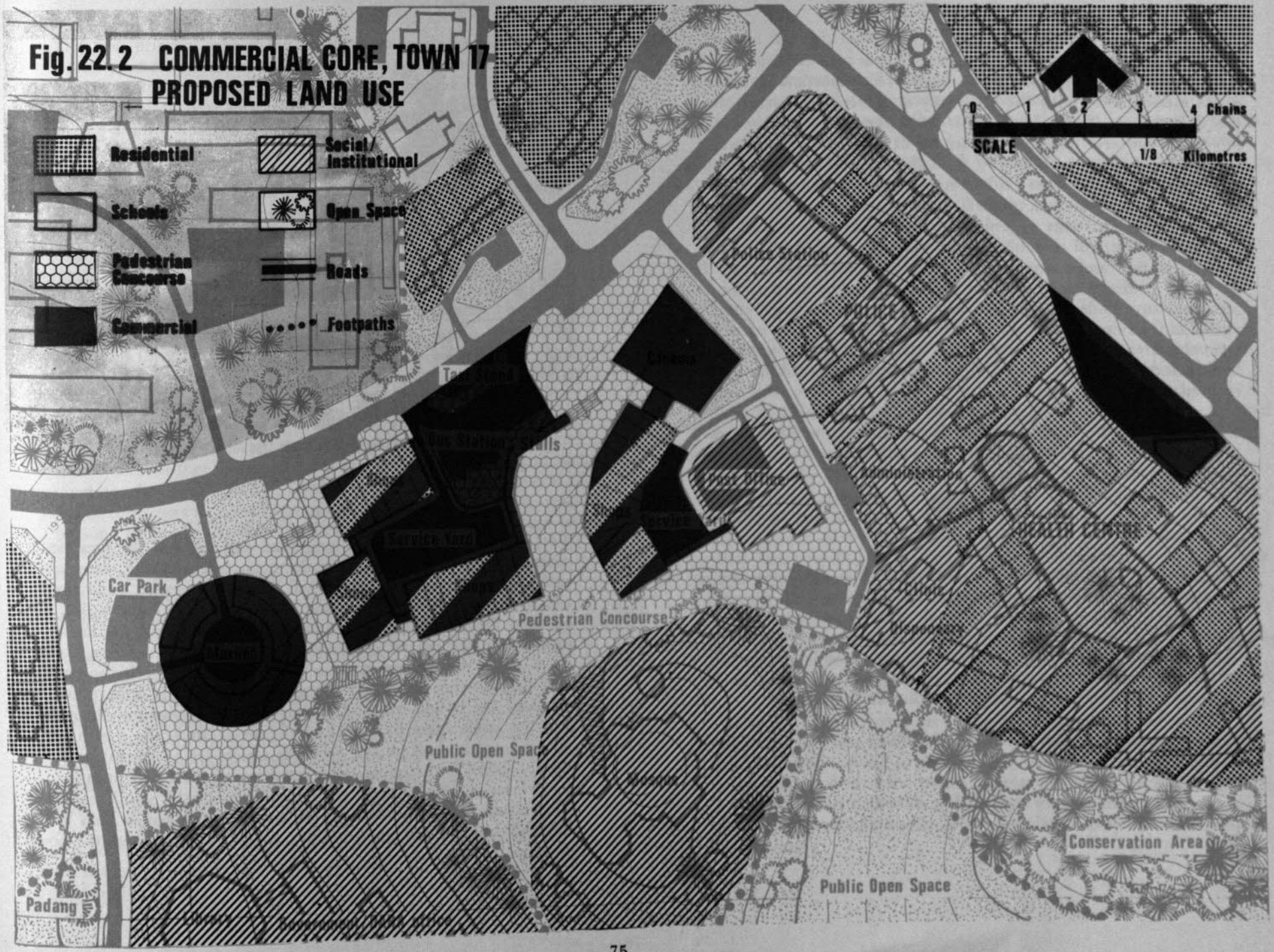


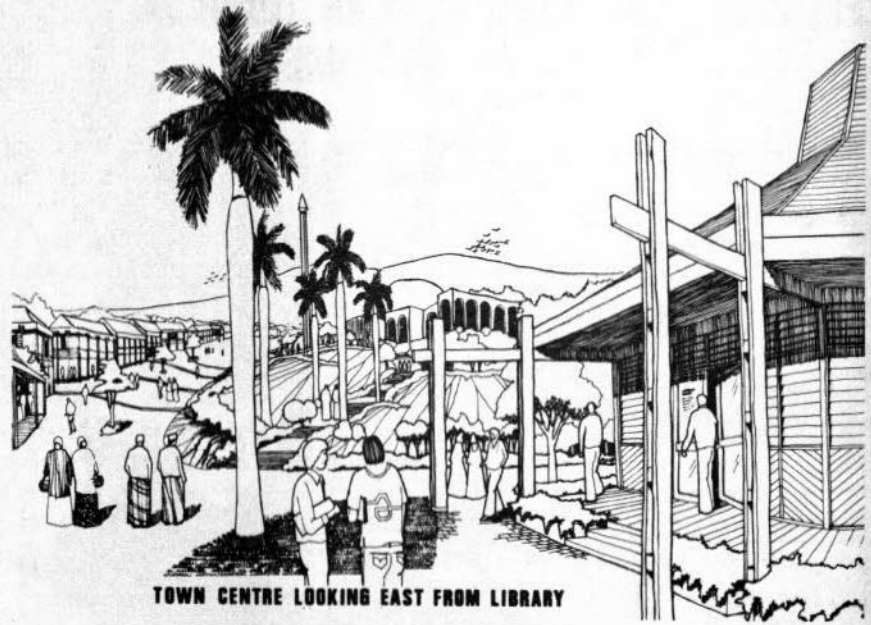
Fig. 22.2 COMMERCIAL CORE, TOWN 17
PROPOSED LAND USE
Residential
Social/ Institutional
Schools
Open Space
Pedestrian Concourse
Roads
Commercial
Footpaths
SCALE
0 1 2 3 4 Chains
1/8 Kilometres
Car Park
Pedestrian Concourse
Public Open Space
Conservation Area
Public Open Space
Padang

Apart from affording access to certain central area facilities, the main pedestrian concourse can be considered important in terms of its influence on both the efficiency and overall character of the town centre itself. Within this concourse people will move, meet and converse either with purpose or more informally, and whilst encouraging such activity through the provision for example, of seating areas and stalls (either in the form of permanent lock-up units or as temporary pitches), basic circulatory patterns must be respected. In terms of pedestrian movement, the area of greatest activity will undoubtedly be that area leading south from the bus station and cinema up a gradual incline rising some 40 ft. to 50 ft. to the mosque and the landscaped public open space area that surrounds it. Flanked on both sides with shops and stalls, and varying constantly in terms of changing levels of activity, this area requires extremely sensitive detail planning and architectural treatment if its full environmental potential is to be realised.

To the east of the main commercial area and at the junction of the main town loop road and the main through route is the police station and associated residential accommodation. The police station building is located at the entrance of the site and in such a position is close to both the bus and taxi station and to principal pedestrian routes.

The major access road which gives initial access to the police station, is extended further south to give vehicular access to both the post office and to the health centre. The clinic and dispensary buildings of the health centre are grouped close to the main pedestrian concourse and to a parking area. Residential accommodation for staff of the health centre and other areas for future expansion lie to the south and east behind the principal public health buildings.

The proposed local government/DARA offices and the public library building are orientated towards the area of public open space that runs westwards from the mosque towards the town padang and linear park. The offices will be expanded to meet demand, whilst the public library when developed, could also serve other public functions.



TOWN CENTRE LOOKING EAST FROM LIBRARY

West of the secondary town loop road and towards the western perimeter of the town centre is the main town padang, associated with which are the community hall and youth centre buildings and sports facilities. The padang forms part of the green link between the public area surrounding the mosque and the linear park within the central conservation area. Main pedestrian access routes from the western portion of the town approach the central area through this major area of open space, and its importance in terms of the overall urban structure must be recognised through sensitive landscaping treatment of the area. Both the youth centre and community hall possess facilities which are to advantage, closely linked with the sporting activities of the town padang. Courts and hard play areas are located behind the youth centre and related to it; however it is assumed that all games such as football, hockey, cricket and rugby would take place on the town padang.

The first primary school for the town is located on a site to the south of the central area, where it may conveniently serve the eastern residential areas of the town and is readily accessible from the hinterland link roads. Although the main entrance is to the south, close to the main through route, it is hoped that an additional pedestrian access would be provided directly from the town centre. The sports facilities of the primary school are located on the most suitable land, whilst the school buildings themselves are grouped to the east. Accommodation for five academic and four non-academic staff is provided within the boundaries of the school site.

The town secondary school is located to the north of the town centre, with the main buildings, which potentially serve a community function, grouped close to the entrance and to the town centre so as to provide convenient public access. Accommodation for six academic and four non-academic staff is provided on the secondary school site.

In addition to the housing provided by government bodies for their staff, further higher density housing is provided within and close to the town centre. This housing, a certain proportion of which comprises terraced housing, is particularly suitable for single persons or young married couples, and will help to give the centre familiarity and constant vitality. Including residential accommodation provided above shops and that within the sites of the various public agencies, over 120 residential units are provided within the centre.

Apart from those facilities listed above, certain other amenities which can be classified as having a whole town function, are for reasons of practicality and convenience, located elsewhere in the urban development area. To the north of the central area, immediately adjacent to the main approach road are located a service station with adjoining service workshop area, the telecommunications exchange (Jabatan Talikom) and associated residential area, and the fire station and residential quarters.

An additional service station is located immediately to the west of the main through route in the vicinity of the police station and health centre, a location particularly convenient to north-bound through traffic.

To the extreme south-east of the urban development area, in a small pocket of developable land defined by conservation areas and the main through road, is located the site for the rest house. Such a site is clearly visible to passing traffic, is convenient for access to the town centre, and yet enjoys a certain seclusion while at the same time taking advantage of views into the surrounding jungle reserves.

4.8 PHASING

4.8.1 Population Growth

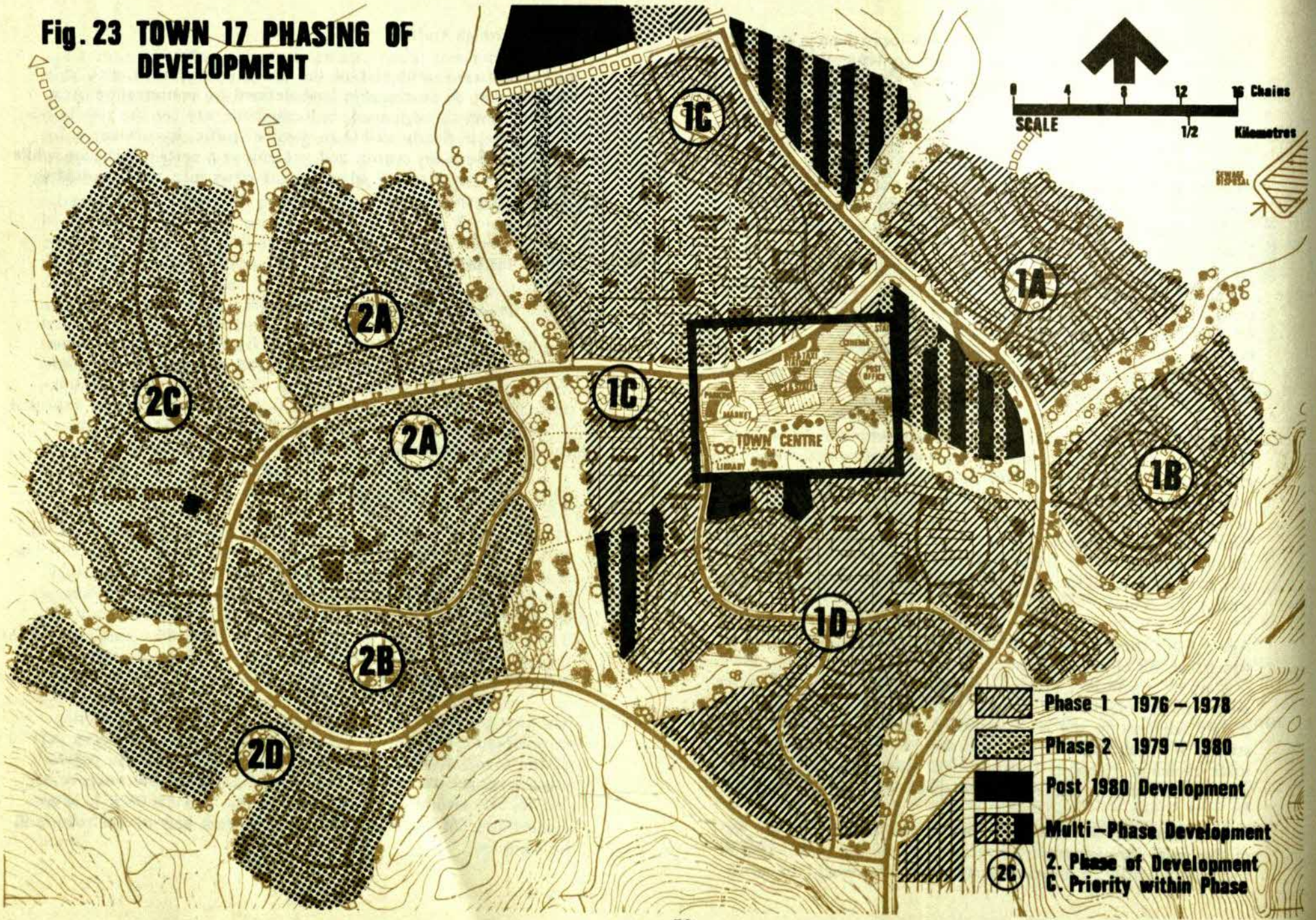
Employment in the agricultural hinterland reaches a maximum around 1980, and the only employment growth after that date will be that in the service sector or that due to subsequent industrial diversification. The town population can thus be expected to stabilise around 1981, the only fluctuations being due to changes in household size or economic activity rates.

4.8.2 Pattern of Development

The phasing of housing, social facilities and infrastructure for the first five year period of development is illustrated in Fig. 23. The initial permanent housing area is that to the east of the main through route, and this route, which extends from the existing access track south of the site should be constructed at an early date. Construction of the primary school should commence within this initial phase as well as development of shopping facilities within the housing area.

The first phase of construction should include all engineering infrastructure necessary for the development of the eastern part of the town, as well as that for the connection to the regional road network. A start should also be made on the town centre and on the secondary school, and by the end of 1978 it is anticipated that all housing areas in the eastern half of the town will be complete.

Fig. 23 TOWN 17 PHASING OF DEVELOPMENT



The western section of the town including all the housing areas, local centre and primary school, will be developed during the period 1979–1980. Construction of the main town loop road would be completed as part of this development.

With the exception of certain areas of infilling and the expansion of some facilities within the town centre, the pattern of urban development for the town can thus be expected to be fully complete by 1981.

4.8.3 Housing

Sites for temporary housing to accommodate both construction workers and the initial influx of migrants prior to permanent housing stock being available, are located to the south-east of the town, in an area easily accessible from the existing access track. This area which lies to the east of the main through route is designated as a future industrial reserve, and may be developed not only for temporary housing but also for a construction camp, site offices, materials and equipment storage area.

The housing construction programme is described in Section 3.2.2. During the first year (1976) it is assumed that 100 reception housing units can be constructed. These would be in the form of basic 'core' houses, which it would be possible to consolidate and expand in later years. Initially services would be of a temporary nature, until such time as a permanent water supply, electricity supply and piped sewerage system could be made available. The housing layout would however, be in accordance with the final plan, the intention being that an individual settler would remain on his initial house lot and improve and extend the dwelling over time. Any shortfall in housing supply would be met by the provision of 'kongsi' type temporary accommodation, but wherever possible family settlers, as opposed to single contract workers, would be housed in core housing.

4.8.4 Engineering Infrastructure

The pattern of development for the town indicates that by the end of 1978 the eastern part of the town will be complete. To achieve this, it is proposed that all the engineering infrastructure associated with this area be provided under one civil works contract to be let during the second half of 1976. The contract should however be drawn up so as to provide for the early completion of infrastructure for particular areas as required. The provision of the infrastructure for the western part of the town, is proposed under a second civil works contract to be let during 1978.

Road access can easily be provided so as to conform to any required phasing plan. Initially, simple graded roads would be provided, but the infrastructure contracts would provide surfacing to the relevant required standard by their termination.

While it is relatively simple to provide a workable road access to limited areas as required, water supply and sewerage facilities function on a network basis. Thus they are more difficult to phase into efficient limited networks. It is apparent that phasing of water supply is more dependent on the timing of the provision of the regional facilities (pumping mains and service reservoir) than on population requirements within the town site. It is probable that a temporary water supply, abstracted from S. Jekatih and pumped to a temporary elevated tank, may have to provide not only for the temporary reception housing area but also for the early phases of permanent housing, until such time as the regional scheme is in operation. The period of reliance on a completely temporary supply can be reduced if the design and implementation of the regional service reservoir is approved without delay. This facility could then be commissioned and brought into use in conjunction with the temporary intake and provide improved service compared with the completely temporary scheme.

Phasing of the sewerage system is altogether more difficult. Sewering of the development area can be readily divided into three networks:

(i) the network outfalling at the oxidation pond to the north-east.

(ii) the major network outfalling to the north.

(iii) the small network outfalling at the oxidation pond to the west.

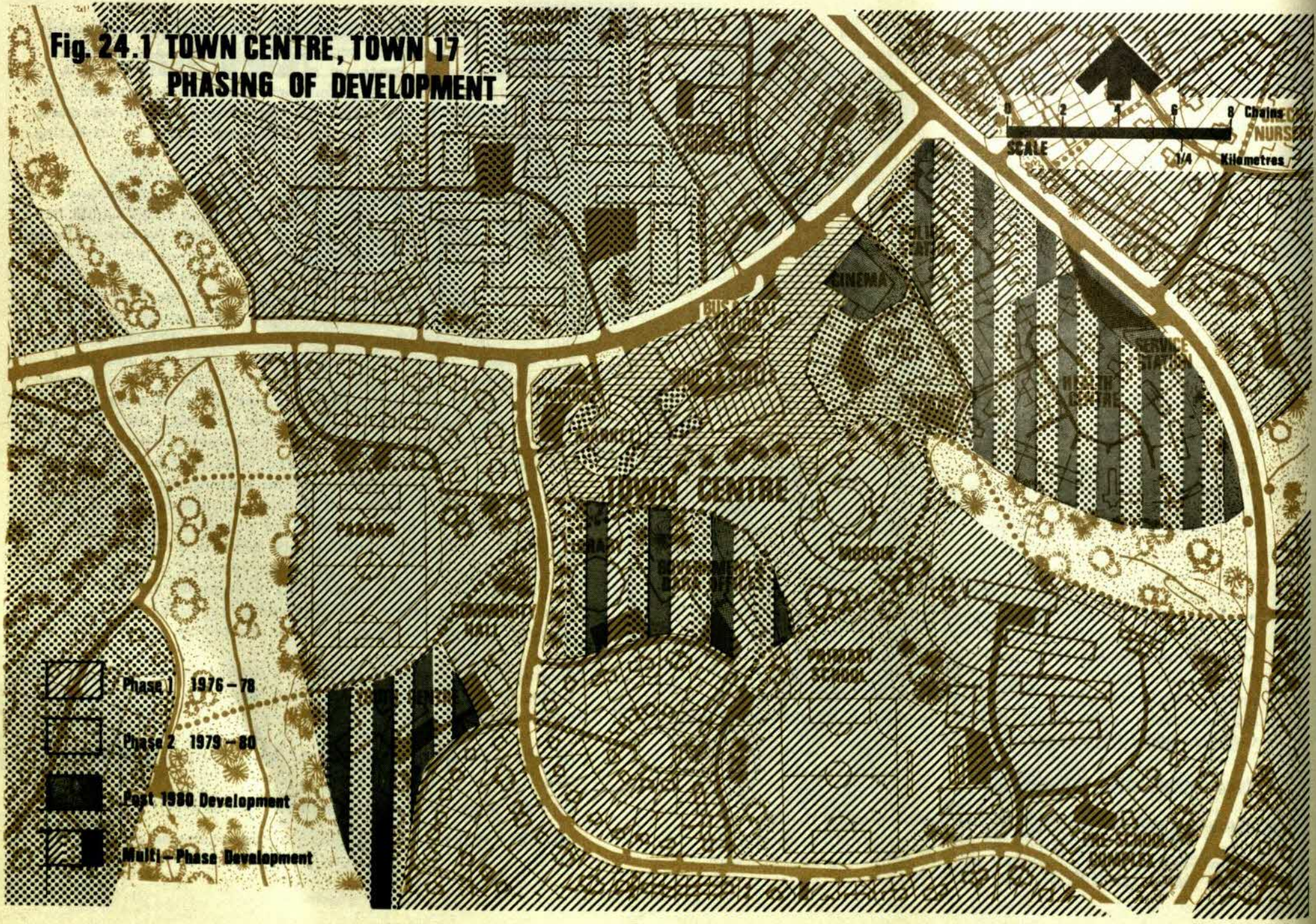


Fig. 24.1 TOWN CENTRE, TOWN 17
PHASING OF DEVELOPMENT
SCALE
1/4
Kilometres
CINEMA
TOWN CENTRE
Phase 1 1976 – 78
Phase 2 1979 – 80
Post 1980 Development
Multi – Phase Development

As the early development is served by the first and part of the second networks, these and their associated ponds will be brought into operation first. The satisfactory operation of partial networks brought into operation as development proceeds, must be checked at the detailed design stage. Such checks must be continued throughout the development phase of the town so that the water supply and sewerage schemes operate satisfactorily at all times.

4.8.5 Town Centre

Development of the town centre will be carefully geared to demand over time; however there are certain central area facilities which should be established at the outset of development.

A block of at least ten permanent shop house units should be built early on in the development programme to provide not only the necessary town centre commercial facilities, but also premises from which such government institutions as police, health and postal services can temporarily operate. Additional shopping facilities required within the first phase of development would initially be provided as temporary units, and consolidated as more permanent structures at a later date. Similarly, a simple temporary market structure, together with a number of more permanent stalls, are suggested as being appropriate to the first phase of construction, thereby enabling those settlers of limited financial means to participate in the commercial life of the town.

Development of the mosque and the surrounding open space areas must be considered an important element of first phase development, both as a symbol of confidence in the town's future and as a focus of religious activity.

Ease of accessibility can be considered a key issue in terms of development of the town, and the growth of a comprehensive regional and hinterland transportation network will require the early development of the central area bus and taxi station. Urban development within the town itself will necessitate the provision of a complementary and expanding local public transport service, and the establishment at an early date of a focal point to this service can only be considered advantageous.

An important feature of the early development of the town centre is the provision of the community hall, which in addition to its more conventional uses, could serve a number of functions, such as those of public library, cinema, youth centre, until such time as these facilities are developed on a permanent basis.

The early provision of the rest house could act as an important stimulus to the development of the town, since it will provide the type of accommodation and catering likely to encourage both government officials and private developers or investors to establish a base in the town.

Development of the local government/DARA office complex will be phased to complement the growth of the town over the plan period; initially such provision should be in the form of an extendable timber structure.

The timing of the full provision of the fire and police stations is a matter for the individual government departments concerned, but it would appear unlikely that the necessary finance and staff will be available initially to fully equip such facilities in each of the towns of Pahang Tenggara. A form of procedure whereby such facilities are provided to serve on a group town basis would appear more appropriate for the initial years of development.

Similarly, provision of a health service in the town during the initial stages of development, could be by means of a regular visiting team of medical staff, who would serve a number of towns in the Region, and who would operate in temporary facilities provided within the first phase of shop house construction. Such an arrangement would prove adequate in those years prior to the development of the clinic, dispensary and staff quarters on the permanent health centre site.


Fig. 24.2 COMMERCIAL CORE, TOWN 17
PHASING OF DEVELOPMENT
Phase 1 1976 – 78
Phase 2 1979 – 80
Post 1980 Development
Temporary Structures Erected in Phase 1 Consolidated in Phase 2
0 1 2 3 4 Chains
SCALE 1/8 Kilometres
Police Station
Cinema
Bus Station
Public Open Space
Mosque
Conservation Area
Public Open Space
Padang

4.9 COSTS AND FINANCE

Although social and environmental considerations are of primary importance in the planning and phasing of a town's development, the cash flow requirements of the programme are a critical aspect of its successful achievement. Inevitably in the creation of a new community, the heavy initial investment is rarely matched by an early creation and realisation of capital funds sufficient to meet its demand. Nevertheless, care can be taken to minimise investment levels consistent with the strategic objectives of the plans; the phasing of engineering infrastructure, housing and town centre development forms part of this philosophy. The aim has been in all cases to avoid a long lead time of investment in social and physical infrastructure in meeting the generated demand, and to relate the level of capital investment to the capability of residents to meet the resultant burden of cost. This Section of the report attempts to quantify this approach in financial terms.

4.9.1 Methodology

The financial analysis of the town has taken the form of a cost estimate of the Master Plan, and the preparation of a rational programme for the creation of an infrastructure network and its associated phased building programme. The methodology is more fully described in the Summary Report.

Four categories of cost have been chosen, namely:–

(i) Residential
(ii) Local Centre
(iii) Town Centre
(iv) Other Developments

Expenditure has been phased over five years (1976–1980) and expenditure not expected within this five year development period has been designated as post 1980.

Town infrastructure has been allocated to the various land uses and agencies, whilst the implications of these allocations for an average dwelling unit and for local and town centre uses are also shown.

4.9.2 Development Areas

The planned development area (excluding peripheral development) of Town 17 is 351 acres within the outer town boundary area of approximately 1450 acres. Of the latter area, 50 acres are likely to be used for utilities and 45 acres have been earmarked for future industry. The total area to be developed for urban use is therefore 446 acres. Of this total acreage, 311 acres can be said to be productive in terms of possessing an intrinsic value, although some of the value, for example commercial land values, will be deferred until a later stage of the development of the town. Table 10 gives the breakdown of this total acreage into productive acres.

4.9.3 Analysis of Costs

Tables C1-C4 in Appendix C set out the estimated phased expenditure for implementation and cover all aspects of the town development. Table 11 summarises these estimates and from this table it can be seen that the total cost of the town is estimated at $22.198 million comprising:–

TABLE 9 ANALYSIS OF COSTS –TOWN 17

	Capital Cost $ Million	%
Residential	10.017	45.1
Local Centre	0.305	1.4
Town Centre	4.913	22.1
Education	3.525	15.9
Industrial	0.221	1.0
Major Town Infrastructure	3.217	14.5
TOTAL	22.198	100.0

The cost per head of population (7130) is $3,110 and per acre of overall development (446 acres) is $49,770. The population has been calculated from the total number of dwelling units (including commercial and institution housing) and the expected average occupancy of 5.65 persons per dwelling.

For broad budgeting purposes by type of contract or agency, a different summary breakdown of the costs is given in Table 12.

TABLE 10

TOWN 17

TOTAL ACREAGE AND PRODUCTIVE ACREAGE

		Acres	Productive Acres
RESIDENTIAL (incl. all general housing, corner shops, creche/nurseries and incidental open space)		186	186
MAJOR INFRASTRUCTURE:			
urban conservation areas and parkland	51		
major town roads	20	71	
TOWN CENTRE:			
institutional	20		20
DARA commercial	7		7
non-DARA commercial	1		1
government commercial	4		4
other land uses	9	41	
LOCAL CENTRE:			
commercial	1		1
institutional/social	2		
open space remainder	3	6	
EDUCATIONAL:			
pre school (2 x 1.5)	3		
primary (2 x 12)	24		
secondary (1 x 20)	20	47	47
TOTAL PLANNED DEVELOPMENT AREA		351	
UTILITIES: LLN	5		
Reservoir	2.5		
Cemeteries	20		
Refuse Disposal	15		
Sewage Disposal	7.5	50	
INDUSTRY AND WORKSHOPS		45	45
TOTAL AREA DEVELOPED FOR URBAN USE		446	311
TOTAL AREA WITHIN OUTER TOWN BOUNDARY		1445	
∴ URBAN FRINGE		999	

4.9.4 Allocation of Costs

Table C.5 in Appendix C indicates the cost of infrastructure associated with the main development areas of the town and its allocation for land disposal purposes. It has been assumed broadly that 50% of the infrastructure costs of local and town centres are attributable to the whole town, and have therefore been transferred to the major town infrastructure costs for allocation.

On the basis of a weighted acreage for each classification of infrastructure the following factors were adopted:–

TYPE OF INFRASTRUCTURE	ACREAGE (PRODUCTIVE)	WEIGHTING FACTOR
Residential Infrastructure	Residential.	1.00
Local Centre Infrastructure	Commercial (DARA)	1.00
Town Centre Infrastructure	Government Institutional.	0.5
	Government Commercial.	1.0
	Commercial (DARA and private).	1.0
Main Town Infrastructure	Residential, Local Centre and Town Centre.	1.00
	Education.	0.50
	Industry.	2.00

Note: Different weighting factors may in the course of time be adopted within this methodology.

TABLE 11 — SUMMARY OF COSTS ($ thousands) — TOWN 17

		TOTAL COSTS			ANNUAL COSTS					
		Sub-Total	Total	%	1976	1977	1978	1979	1980	POST 1980
1.	RESIDENTIAL (1123 dwellings)									
a)	Infrastructure	3,938		20.4	351	1,033	564	1,182	808	–
b)	Housing	4,773		24.7	453	868	877	1,207	1,368	–
			8,711	(45.1)						
2.	LOCAL CENTRE		265	1.4	–	2	–	191	72	–
3.	TOWN CENTRE									
a)	Govt. Agencies	1,840		9.5	–	208	116	–	480	1,036
b)	Commercial (non-DARA)	530		2.7	–	65	–	–	–	465
c)	DARA Development	1,902		9.9	27	180	667	114	179	735
			4,272	(22.1)						
4.	OTHER DEVELOPMENT									
a)	Education	3,065		15.9	17	567	729	792	960	–
b)	Industry	192		1.0	–	–	–	–	–	192
c)	Other major & trunk infrastructure	2,798		14.5	440	1,122	249	720	267	–
			6,055	(31.4)						
5.	TOTAL COST OF TOWN		19,303	100.0	1,288	4,045	3,202	4,206	4,134	2,428
6.	INCL. CONTINGENCIES 15%		22,198		1,481	4,652	3,682	4,837	4,754	2,792
7.	PERCENTAGE INCIDENCE OF PHASED EXPENDITURE			100.0	6.7	21.0	16.6	21.8	21.4	12.5

TABLE 12

URBAN DEVELOPMENT COSTS ($ millions) IN POSSIBLE CONTRACT/AGENCY CATEGORIES (Including 15% contingencies)

TOWN 17

	Site Acquisition, Preparation and Engineering Infrastructure	Housing	Institutions	Commerce	Industry	Total	%
1976	0.960	0.521	–	–	–	1.481	6.7
1977	2.476	0.998	0.973	0.205	–	4.652	21.0
1978	1.139	1.009	1.128	0.406	–	3.682	16.6
1979	2.235	1.388	1.113	0.101	–	4.837	21.8
1980	1.343	1.573	1.751	0.087	–	4.754	21.4
	8.153	5.489	4.965	0.799	–	19.406	87.5
Post 1980	–	–	1.231	1.340	0.221	2.792	12.5
TOTAL	8.153	5.489	6.196	2.139	0.221	22.198	100.0
%	36.8	24.7	27.9	9.6	1.0	100.0	

Notes:
1. Housing excludes institutional housing and town/local centre shops.
2. Institutions include government agencies, community halls, bus and taxi stations, surau, creche/nurseries and all educational facilities.
3. Commerce includes all shops and stalls in town centre and local centre, the market, filling stations and cinema.

Table 13 shows the result of allocating all of the town's infrastructure on this basis to the various land uses, the last columns of the table indicating the cost to each average unit of production. For the purposes of comparison of other new town costs it is appropriate that an apportionment be made by spreading the total cost of non-residential infrastructure ($4,199,000) over the weighted acreage (333 acres), then the cost is $12,610 per weighted acre; the significance of this cost becomes apparent by reference to the Summary Report, which deals with cost comparisons of towns, one with another.

4.9.5 The Effect of Apportionment of Infrastructure Costs on Housing and Shopping Rentals

The effect of apportioning infrastructure, plus the capital cost of buildings, for dwelling and shopping units is shown in Table 14. The capital costs are converted to annual loan charges and after allowing for administration, the monthly rent for each unit is calculated. A reduced monthly rental for each unit is also calculated on the basis of town infrastructure being written off by the Government as a charge on the development of the towns, and in the case of residential units, account is also taken of an agricultural developer's contribution per worker of $25 per month.

The net monthly rental of between $47 and $63 for the average cost of dwelling units must be considered in relation to the average earning capacity of the settler and his willingness to contribute a percentage of his income towards housing costs. On the basis of an average income per settler household of $300 – $400 dollars per month, an average amount of $50 (14%) per month might be considered a reasonable proportion available for rent. This matches the monthly rental rate of the average dwelling unit but only if town infrastructure is accepted as a government grant.

The rentals charged by LKNP in Maran and Kuantan for permanent shop houses are between $150 and $180 per month. These must be compared with an economic rent estimated for local and town centre shops in Town 17 of $160 and $330 respectively; and if town infrastructure is treated as grant – $150 and $310. The Government (DARA) will clearly have to consider additional subsidy in the earlier years to encourage entrepreneurs.

4.9.6 Conclusions

The financial analysis, at this stage of the planning process, can only be undertaken in broad terms.

It has however been possible to identify the probable level of infrastructure requirements, the level of institutional investment and DARA's investment responsibility as the principal development agency. The incidence of cost over the first five year development period and beyond has been calculated, and the results used to assess the proportion of whole town infrastructure costs which each land user may be required to bear, and determine the capability of future settlers and shopkeepers to meet the resultant annual costs of the standard of amenities aimed for. The design of the town has attempted to achieve the maximum benefit at the minimum cost possible. Its design has also assisted the adoption of an optimum phasing strategy which limits "front end" costs.

When compared with the financial forecasts for other towns, the figures assume a greater relevance. However the framework adopted can only be a start in monitoring the financial performance of the town. The effect of interest during the period of development when income lags behind expenditure can be an important factor in the overall financial results, and can only finally be determined when the arrangements for finding the capital investment are settled. The treatment of development agency overheads, supervision of contracts and general administrative expenses are also important and will need to be taken into account in future forecasting. The rate of interest and period of loans, the amount of outright grant aid and the level of future inflation on finally achieved contract prices are all factors that may have to be varied when DARA adopt a system for financial management of urban development.

However, the analysis so far undertaken should greatly assist the future adoption of a relevant system of financial planning and control; equally, the results of the analysis give a clear indication of the likely level of investment required and the broad implications in social and economic terms of the development philosophy adopted.

TABLE 13 APPORTIONMENT OF INFRASTRUCTURE COSTS TOWN 17

	Prod. Acres	Units	Infrastructure Costs to be Apportioned ($000)			Weighted acres for Town Centre Apportionment	Weighted acres for Major I/S Apportionment	Major I/S Costs to be Apportioned ($000)	Total I/S Costs Apportioned ($000)	COSTS per ave. unit $	COSTS per prod. acre $
			Residential	Local Centre	Town Centre						
Totals	311	–	4,529	54	343	–	333	3,802	8,813		
Residential Dwellings	186	1,123	4,529	–	–	–	186	2,124	6,653	5,290	–
Local Centre Shops	1	9	–	54	–	–	1	11	65	7,200	65,000
Town Centre Government Institutional	20	6	–	–	156	10	20	228	384	64,000	19,200
Government Commercial	4	5	–	–	62	4	4	46	108	21,600	27,000
Commercial	1	3	–	–	16	1	1	11	27	9,000	27,000
DARA Commercial	7	31	–	–	109	7	7	80	189	6,100	27,000
Education All schools	47	3	–	–	–	–	24	274	274	–	5,830
Industry	45	–	–	–	–	–	90	1,028	1,028	–	22,840

Notes:
(i) Government Institutional includes Mosque, Health Centre, Police, Library, Fire Station & Youth Centre (i.e. 6 agencies).
(ii) Government Commercial includes Government Offices (3 units), Post Office & Rest House (i.e. 5 agencies).
(iii) DARA Commercial includes Shops & market.
(iv) Details of productive acreages are given in Table 10.
(v) For allocation of infrastructure costs, see Table C.5 in Appendix C.

TABLE 14 APPORTIONMENT OF INFRASTRUCTURE AND INDICATIVE ANNUAL AND MONTHLY COSTS CHARGEABLE TO HOUSEHOLDERS AND SHOPKEEPERS (All costs include 15% contingencies) TOWN 17

	Residential (Average) $	Local Centre Shops $	Town Centre Shops $
1. Major town infrastructure	1890	1220	2580
2. Site specific infrastructure	4030	6000	3520
3. Building Cost	4890	12650	34500
4. Total Capital Costs	10810	19870	40600
5. Loan Charges: 7% for 20 years	1027	1889	3857
6. Administration Costs @ 2½%	26	47	96
7. Total Annual Cost	1053	1936	3953
8. Residential Contribution from agricultural developer M$25 per month	300	–	–
9. Net Annual Cost	753	1936	3953
10. (a) Net Monthly Cost	63	161	329
(b) Net monthly cost if Major Town Infrastructure costs written off by Government (Item 1)	47	148	308

Note: An allowance for fees has been made in the above figures but not for interest charges during building operations.

5 IMPLEMENTATION

5.1 PRESENT ENGINEERING DESIGN STAGE

At the present stage of the project there are a number of tasks that require completion as part of the urban planning process. Due to the limited extent of detailed survey cover at the time of report preparation, only provisional sites, lines and measures could be defined for refuse disposal, industrial reserves, sewage works, agricultural activities and other peripheral uses and routes.

Engineering design work will take place on a different and more detailed survey base, than that used as a basis for this report. If major discrepancies occur between the new detailed surveys and those previously used in the planning stage of the project, certain areas, which at present are regarded as having fixed land use allocations and detailed designs, may need thorough reconsideration.

The continuance of joint professional working between engineers and planners throughout the engineering design stage of the project is therefore critical. It is important to the character and cost of the towns that road and building platform levels are individually designed to minimise earthworks.

Engineering supervision of contractors responsible for construction of the infrastructure of the town should be supplemented by planning, forestry and landscaping design advice.

5.2 FUTURE ACTION

A town plan, however thorough and balanced in conception and however skilled in design, is only a blueprint – a starting point; it is in essence something of a limited document, for being unable in itself to achieve objectives which are largely social and economic rather than physical, it can at best only aim to avoid impeding the desirable and encourage development along the most appropriate lines. The prime responsibility for the creation of a town falls upon those dealing with the varied aspects of implementation, whilst the prime judgement of success can only be made by the residents themselves according to the total quality of the lives they enjoy in terms of shelter, security, income, freedom and access to desired opportunities.

5.3 TOWN IMPLEMENTATION PROGRAMME

Although specifically concerned with implementation of the Master Plan for Town 17, this section of the report attempts to set down guidelines relevant to the development of all project towns in the Pahang Tenggara.

The many and varied aspects of the urban development programme are described and set down as a check-list for those concerned with all implementation procedures. Certain of the concepts and

IMPLEMENTATION DIAGRAM

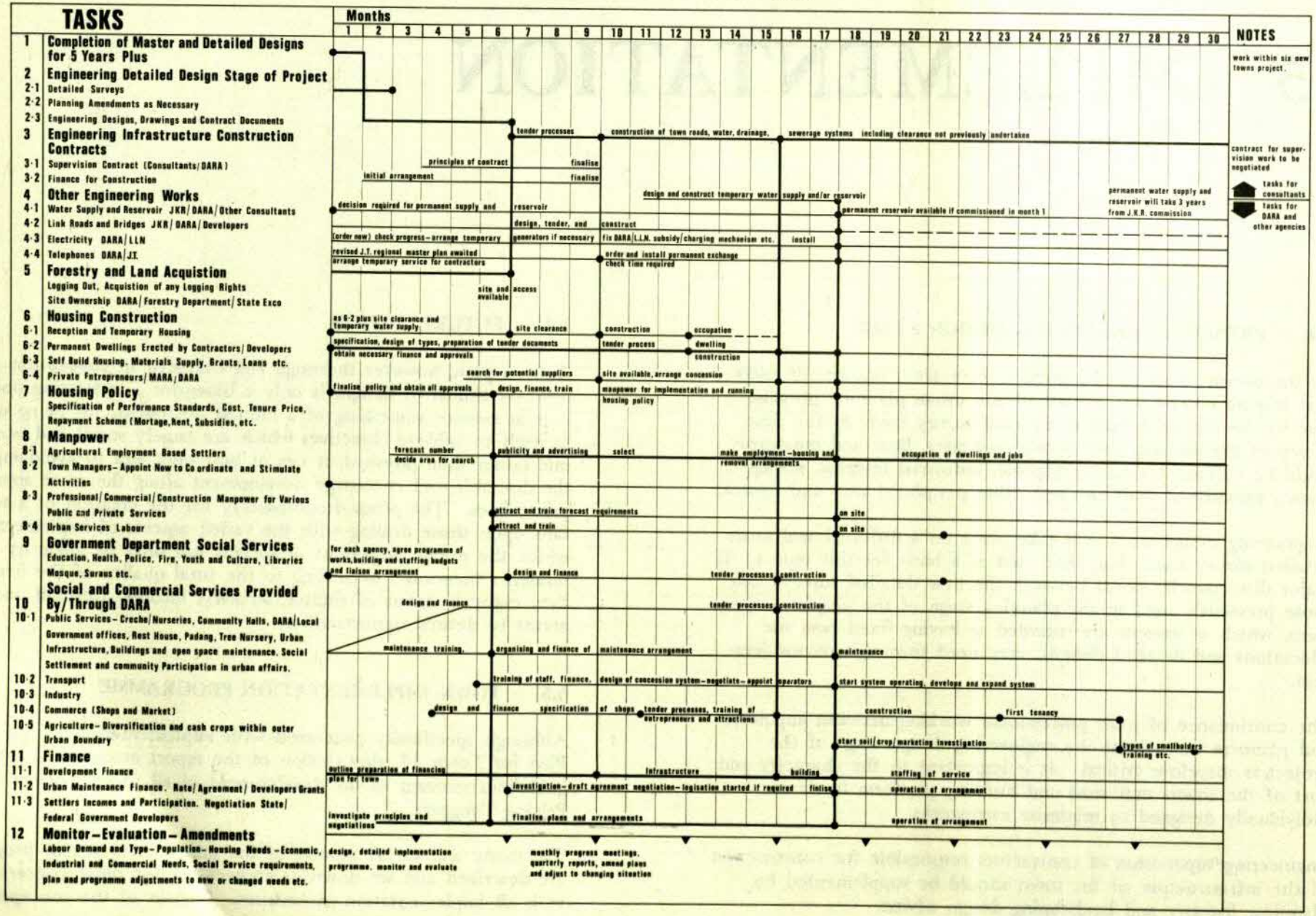


Fig. 25

issues involved in such procedures are developed and analysed in more detail in the Summary Report, and it cannot be claimed that the following check-list is fully comprehensive; nevertheless it does deal with the major inputs involved in the initiation of construction activities and in the occupation of the town during the critical early phases of development. Certain of the time periods allocated to different tasks cannot be regarded as precise but only as reasonable indications of a development time scale.

The implementation diagram, shown in Fig. 25, illustrates clearly the complex and wide-ranging, interrelated policy issues involved in urban development. It also emphasises the need for co-ordination and integration, on a town specific basis, of all the different aspects of policy realisation involved.

Key aspects of co-ordination are the early appointment of town managers, the formation of locally orientated multi-professional implementation teams with delegated responsibility in appropriate fields, and the establishment of liaison arrangements over technical and social services.

5.4 ENGINEERING INPUTS TO IMPLEMENTATION

5.4.1 Water Supply and Service Reservoir

Approximately three years, including survey time, will be required to plan, design and construct a Regional water supply system linked to a permanent town service reservoir, and there is now insufficient time to provide initial settlers with water from the permanent system. However, if an early approval from JKR is obtained for construction of the service reservoir, this could probably be ready in time to be linked to the first phases of the town reticulation network at present under design.

As a temporary water supply system will be necessary and temporary storage tanks may be required, DARA should make arrangements for the design, ordering, and installation of the temporary supply system, in discussion with JKR and its Consultants, and with the engineering design team of this project.

5.4.2 Sewerage and Sewage Treatment

The maintenance and monitoring of the sewerage system and sewerage treatment works will probably be the responsibility of DARA, who should take steps to ensure that the necessary manpower and expertise are made available.

5.4.3 Refuse Disposal

Similar considerations arise to those described in Section 5.4.2.

5.4.4 Electricity Supply

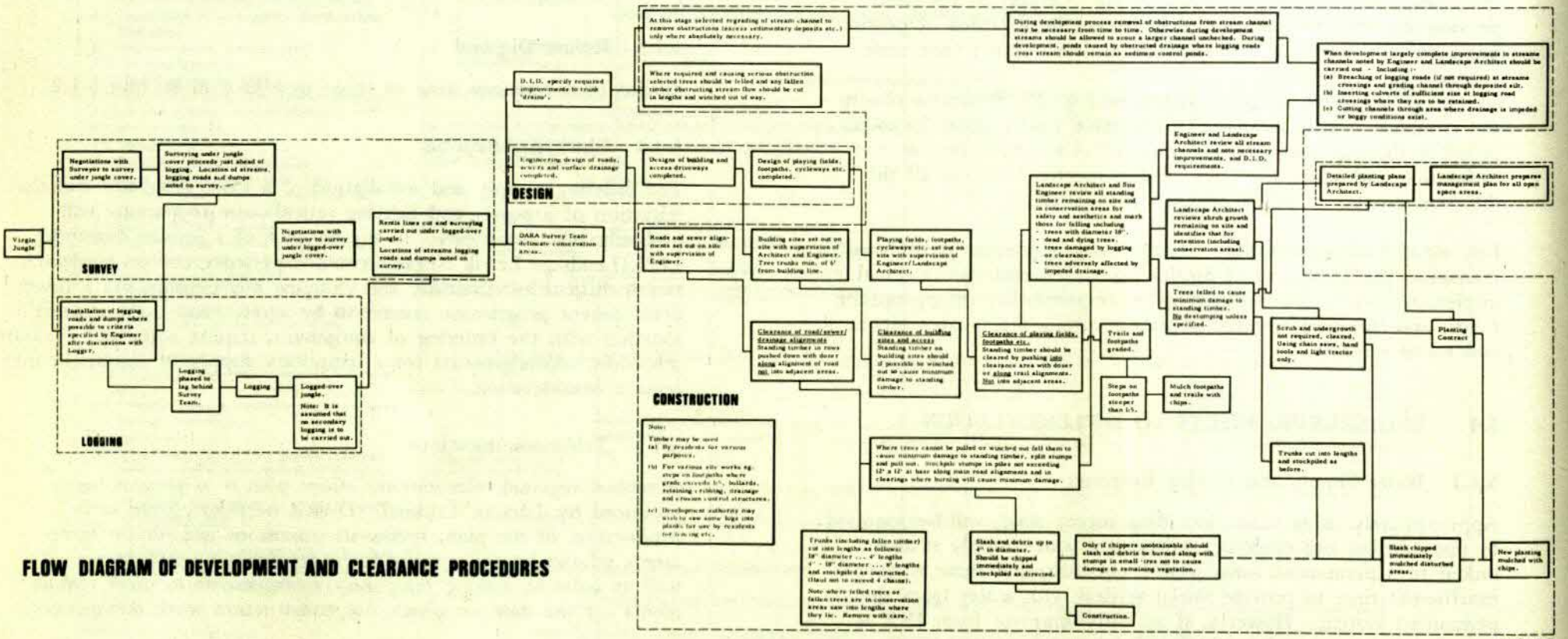
The ordering, supply and installation of a town generator and the initiation of a power and lighting reticulation programme will probably take two years. In the absence of a proven demand, LLN (Lembaga Letrik Negara) could experience certain implementation difficulties. Subsidy and charging mechanisms and a town development programme remain to be agreed, and these matters, together with the ordering of equipment, require early and constant attention. Arrangements for a temporary supply of electricity may require consideration.

5.4.5 Telecommunications

A revised regional telecommunications plan is at present being produced by Jabatan Talikom. DARA need to ensure early production of the plan, review its provisions and obtain agreements relative to the specific town development programme, as well as assist in making temporary arrangements to meet requirements for the date on which site construction work commences.

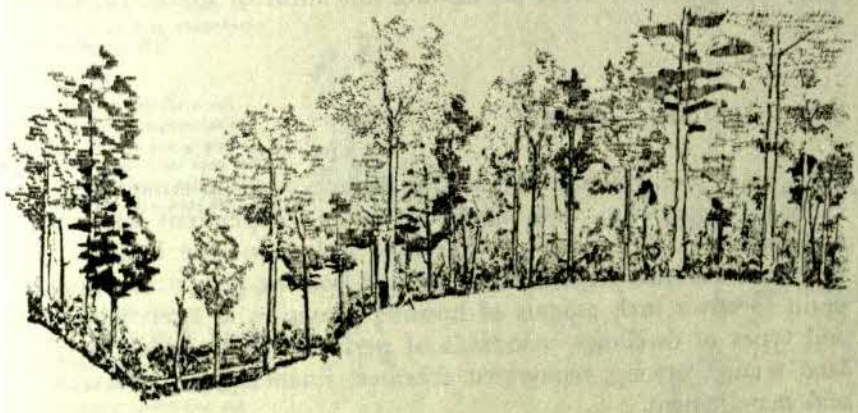
5.4.6 Link Roads and Bridges

Existing logging tracks and roads give adequate access to the town sites for construction purposes; however arrangements for their use by contractors and their subsequent maintenance need to be made with the developers that own them, and such negotiations as are necessary should be carried out with urgency. The towns also need to be linked with the regional and hinterland road



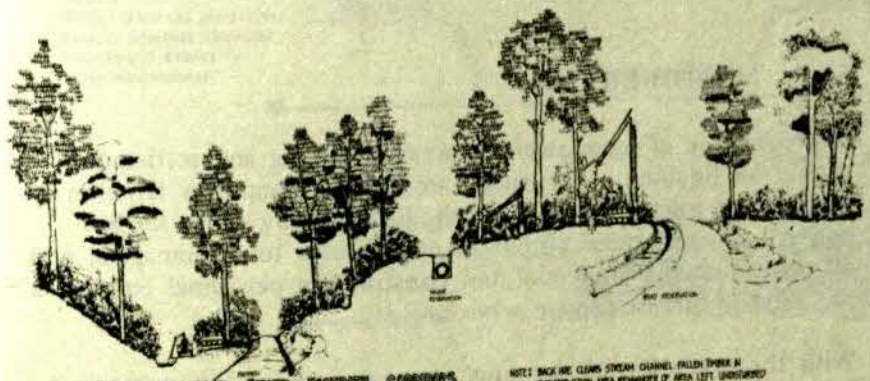
FLOW DIAGRAM OF DEVELOPMENT AND CLEARANCE PROCEDURES

FIG. 26



·JUNGLE

·LOGGING COMPLETED



·CLEARANCE OF ROAD, SEWER, FOOTPATH CORRIDORS

·COMPLETION OF DEVELOPMENT

system at the earliest possible opportunity, and the design and construction arrangements necessary with JKR in respect of the relevant road links must be considered a priority issue.

5.5 FORESTRY AND LAND ACQUISITION

It is essential that the organisation of non-site logging out procedures be given priority attention, to ensure that land for development becomes available on schedule. Any delays incurred in this process will have a direct result on construction time and consequently on occupation of the town. Within this period land ownership within the town will require to be formally and clearly vested in the Development Authority itself.

5.6 HOUSE CONSTRUCTION

Arrangements for reception housing are already being attended to by DARA, and in this context, site availability, on-site erection procedures and water supply require immediate attention.

Insofar as the initial housing contracts for the town are concerned, a range of specifications, costs, and outline house types needs to be agreed in the immediate future; sources of finance need also to be determined and tender documents prepared for housing developers. This area of work must be completed at a rate sufficient to match the provision of sites for house construction, and it is estimated that these should be available within two years. There must be careful monitoring of site development progress to ensure that housing contractors do not arrive on site too early and that there is minimal delay between site availability and the initiation of the house construction programme.

Semi-prefabricated house types capable of rapid on site assembly and of occupation within 6-8 weeks, have been assumed in the preparation of the housing programme given in the Master Plan.

Initiation and development of a programme of self-build housing will require the location and cooperation of suitable building materials suppliers, agreement of appropriate terms for acquisition of house plots, and arrangements for the provision of all necessary loans and grants to those attempting this form of house construction

5.7 HOUSING POLICY

Both house construction and settler attraction programmes for Pahang Tenggara are, to a significant extent, dependent upon the formulation and adoption of a housing policy for the Region. It is essential at this stage that an outline housing policy be agreed upon to cover such aspects of housing provision as specification and types of dwellings, standards of performance, services, costs, land tenure, pricing, repayment schemes, financing, organisation and management.

Expansion of any such outline policy in greater detail and possible modification, will prove necessary prior to its receiving the approvals and agreements necessary for its implementation. Such procedures should be completed within six months, at which time a housing authority will have to be established in order to instigate all policy directives and decisions. To ensure that such a housing authority is operational at the time of the first phase of the house construction programme, its working methods (particularly those at a local level), will have to be determined, its managers appointed and its staff recruited and trained within the space of one year.

5.8 MANPOWER

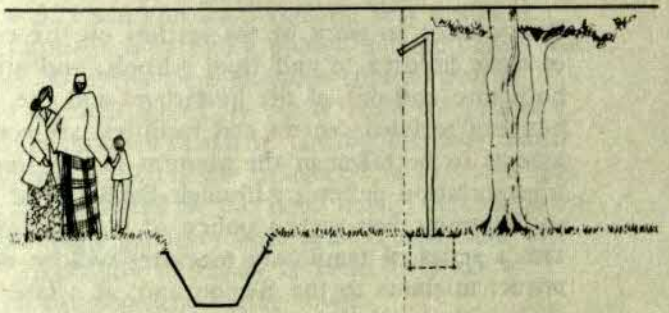
A programme of manpower attraction, training and settlement should be finalised at an early date by the Manpower Division of DARA. Such a programme should not only cover settlers engaged in agricultural employment, but also town managers, and all professional, commercial and construction personnel employed in either public or private services.

With the exception of the town manager, whose appointment is urgent, it is considered that such a programme should be under way by the sixth month of implementation. Key inputs into the

PRINCIPLES FOR USE IN BOUNDARY AND FENCING TREATMENT

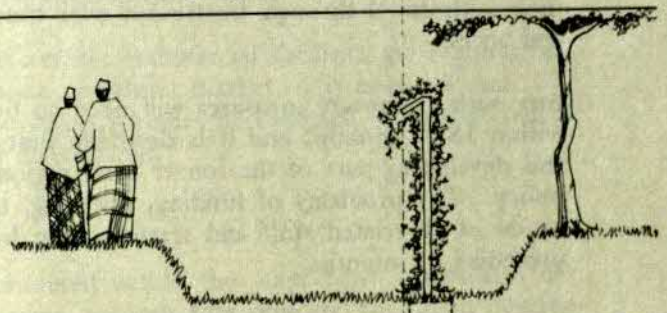
1 NORMAL PRACTICE
6'-6" chain link fence on boundary line sometimes as low as 3'-0"

NOTES
Visually intrusive and ugly. Rigid seperation of public from school playing fields and other open space. Reduced fence height and minimal treatment desirable.



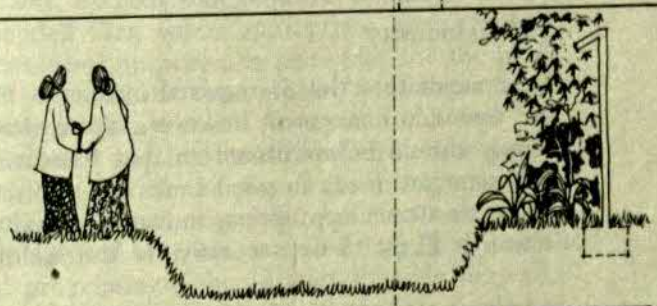
2 SECURITY FENCE RETAINED WITH WIDER DRAINAGE DITCH
Grass lined ditch (ha ha) crossing boundaries and planting used to soften impression

NOTES
Visual intrusion reduced and security maintained. Corridor character and rigid seperation retained.



3 PLANTED BOUNDARY WITH INTERNAL SECURITY FENCE

NOTES
More varied and attractive. Retains corridor character. Problems of access for fence maintenance.



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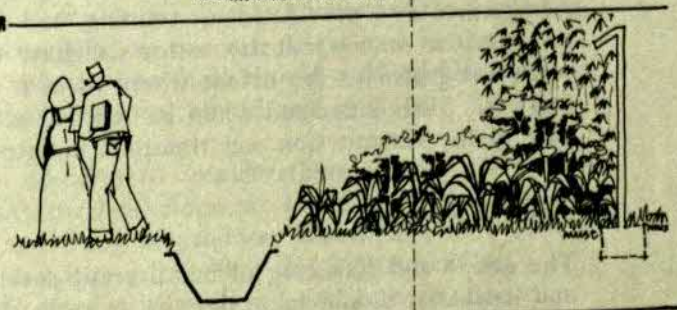
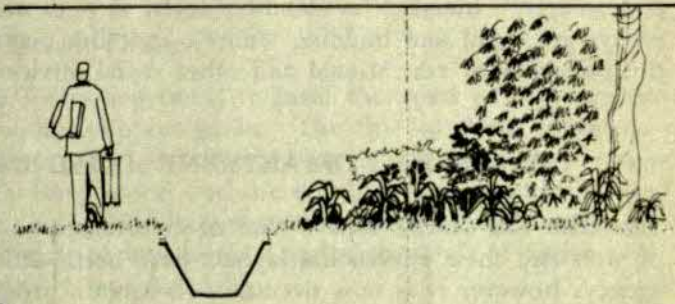


4 PLANTING ONLY AS BOUNDARY

NOTES
Greatly improved visual character



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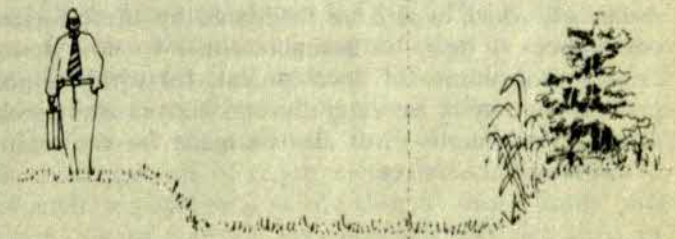
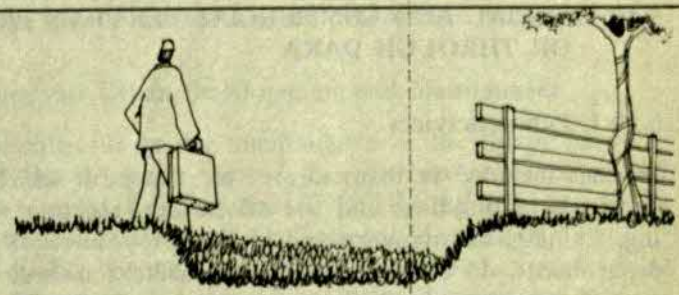


5 LOW DEFINITION FENCE ONLY.

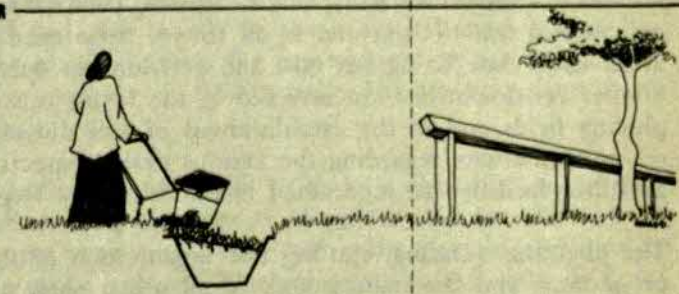
NOTES
Use of post and rail sawn timber. Suitable for barrier against persons and animals.



OR

AS ABOVE

NOTES
Suitable for stopping children from running onto roads etc. and boundary definition without security.



OPEN SPACE, FOOTPATH AND ROAD RESERVE — PLOT OR SITE BOUNDARY

OPEN SPACE, FOOTPATH AND ROAD RESERVE — PLOT OR SITE BOUNDARY

programme of settler attraction are those of employment (income and security), housing (availability, costs, services methods of repayment, land and building tenure), and firm commitment to the provision of educational and other social services.

5.9 GOVERNMENT DEPARTMENT SOCIAL SERVICES

The main role in this area is that of co-ordination. The location of sites and their provisional layouts have been settled with each agency, however it is now necessary to agree a programme of staffing and construction and also to extend such liaison to cover the design of buildings and the provision of adequate financial resources, which would be facilitated by the creation of a liaison committee. It may be desirable either to slow down or accelerate certain programmes of development, for which reason demand and performance must be carefully and continually checked. Appropriate arrangements must also be made for the temporary provision of most initial services.

5.10 SOCIAL AND COMMERCIAL SERVICES PROVIDED BY OR THROUGH DARA

5.10.1 Public Services

Services included in this category are those for which existing standards of buildings and site allocations, together with the staffing, training, maintenance and budget procedures of government departments, do not operate. Such facilities include creche/nurseries, community halls, youth centres, DARA/local government offices and rest houses, and in all towns, these need to be designed at an early date to agreed cost and performance specifications. Similar considerations are involved in the laying out of public playing fields and in the establishment of tree nurseries. (Detailed recommendations regarding the various design aspects of these and all other facilities are contained in the Summary Report).

The planning, funding, staffing and organisation of the building programme and the maintenance of all urban open space and infrastructural components, are high priority issues, as are the establishment of firm proposals for assistance, advice and leadership to the new communities.

5.10.2 Transport

The journey to work of the settlers on the estates, the transport of their children to and from schools, and arrangements for access both into and out of the hinterland and the Region, as well as between regional centres and facilities, are some of the major aspects to be taken in the account in the formulation of a regional transportation policy. Although DARA is at present taking steps to determine just such a policy of transportation, it appears likely that a series of temporary measures will be necessary, both to attract migrants to the Region and, at a later date, to prevent their withdrawal through frustration over transportation movement and access.

Any such temporary measures will need to become operational within 18-24 months, and it is desirable that they form an integral and developing part of the longer term regional transportation policy. The problems of funding, licensing, training and organisation of all related staff and services must be resolved in the preceding 12 months.

5.10.3 Industry

No immediate action is required insofar as industrial promotion in the towns in concerned; however, labour demand in relation to supply should be monitored so that forecasts of possible unemployment are made in good time and so that remedial steps can be taken to attract appropriate industrial activity to the town. Such action is likely to be necessary by the middle of the next decade.

Arrangements to provide loans, training, and sites for those wishing to enter the service industry sector will have to be made once the town has grown to the extent where there is a real demand for services. Such a demand could be reached at an early date in the case of the construction and transport maintenance industries.

5.10.4 Commerce

The design and financing of initial retail development (shops, stalls and markets), should take place at an early date. With the exception of one permanent block of shops in the town centre, all other retail premises in the initial phase of development should be single storey, temporary structures.

While some initial commercial development is essential to establish the site and function of town and local centres, it is desirable that all further development is carefully phased in accordance with proven demand. The objectives of bumiputra enterpreneurial development will not be well served by costly rents for property developed in advance of market demand;, and by turnover inadequate to meet repayment; it is critical to success in this area that commercial options are exercised at the right time. Careful observation of spending patterns, property development costs and consumer needs will be constantly necessary in order to make a success of commercial development in the towns.

Due to the fact that certain commercial facilities are required in advance of an adequate consumer market, it is essential that deferred rental or purchase schemes be designed for those traders running initial retail concessions.

5.10.5 Agriculture

The area of land contained within the outer town boundaries of all the six project towns, exceeds that required for urban development. It is recommended that, where appropriate, such residual land be used for agricultural purposes, in particular for the production of crops and livestock for consumption within the towns themselves and the Region as a whole. An agricultural land potential survey is therefore required in each of the urban peripheral areas, in addition to which the planning of programmes governing the production of fruit, vegetables and livestock, fish farming and other agricultural activities is called for. It is essential that both survey and programming should start towards the end of the first year of construction, so that concessions and training programmes can be designed to become operational in three to four years time, by which time there should exist within the towns, sizeable markets for local agricultural produce.

It is evident that in addition to considerations of production, programmes of agricultural development could cover also the transportation and marketing of produce. Given this scale of activity, it would seem appropriate that the Department of Agriculture be be allocated a suitable site convenient to each town.

5.11 FINANCE

5.11.1 Development Finance

Arrangements for raising funds to meet the costs of development fall broadly within two categories. The first of these concerns the establishment of an initial commitment on the part of service agencies, both for physical and social infrastructure provision and for the setting up of the liaison machinery necessary for the continual updating of investment requirements, all of which will need to be closely monitored.

The second category is that of finance for development, the responsibility for which falls directly on DARA. The institution of a clear and precise financial planning methodology is essential to facilitate both the preparation of accurate forecasts of necessary funds and the arrangements for their approval, thereby avoiding delay in the development programme. The system should provide for the continual reappraisal of requirements, so as to minimise the burden of interest payments, in the case of those funds raised by way of loans. Grant approval arrangements will also need to be effected on time in order to meet programme demands.

5.11.2 Finance for Urban Development and Maintenance

The only commitment to the maintenance of the urban fabric of the towns of the Region is that of the government, through both national and regional agencies, and of DARA in their responsibility for the implementation of the Regional Masterplan. The normally profitable elements of urban development, namely those of industry, commerce and private executive housing, are both small and delayed, due mainly to the heavy reliance on agriculture as the major stimulus for employment in the project towns. In consequence of this situation the towns possess a weak revenue potential.

While the capacity of the settler to make a contribution to the cost and maintenance of urban development will be relatively low in the early years, the ability and willingness of agricultural developers to make not only a major contribution towards the provision of settlers' housing but towards the continued main-

tenance costs of the new community, remains also in doubt. Clearly the development structure of the new towns is such that agricultural enterprises are absolved from their traditional responsibility of providing housing and social amenities, however unless means are established for obtaining financial contributions from the developers, there is a danger that the development expenditure involved will fail to be met by way of public subsidies. Contributions might initially be sought through special agreements with the developers, but ultimately, when legislation can be enacted, a form of local taxation is needed to create a firmer financial basis for the upkeep of the towns.

The need for early action in respect of both development and maintenance finance cannot be over-emphasised. Poor standards of social services and urban maintenance as a consequence of inadequate revenue, will be a strong disincentive to permanent settlement and nullify the effect of the heavy capital investment. Excessive levels of government support on a long-term basis cannot be guaranteed and should not be expected.

5.11.3 Settlers' Incomes and Participation

When compared to other competing options, the towns of the Region are at a distinct disadvantage in terms of the principal stimuli for migration, namely security of employment and a constant high level of income. The financial consequences of this situation are twofold; firstly, that in order to compensate for relatively low incomes, a large proportion of initial development costs must be borne by government; secondly, that attention must be given to ways in which settlers can increase and supplement their incomes. There is a range of possibilities for the attainment of improved issue of income, which includes the creation of industrial and service sector job opportunities, the access by settlers to smallholdings and possibly profit sharing or equity arrangements in agricultural enterprises. Failure to give strong consideration and attention to these possibilities could jeopardise the success of the urban development programme.

Negotiations with both State Government and with estate developers are desirable, to determine whether or not smallholding elements of the nucleus estates could with advantage, be turned into profit sharing schemes. It is however doubtful that smallholdings as such do represent an equitable and effective method of increasing incomes, mainly because of the exclusive work demands and ownership of smallholdings, and because of the fact that the estates themselves will largely retain a captive market for the produce.

Suitable guarantees in respect of this matter should be given to potential settlers as part of the attraction and settlement campaign. As the aforementioned tripartite negotiations will take time, there must be immediate and sustained action by DARA on the matter, and such action could mean the difference between success and failure for the urbanisation programme in the private estate areas.

Similar attention is required at a local level within the towns, for arrangements concerning loans, advice, training and marketing in relation to cottage and service industries, agricultural and commercial opportunities, and employment in public services, transport and construction.

5.12 MONITORING, EVALUATION AND AMENDMENTS

In Pahang Tenggara there are no direct antecedents for the main urban development policy, and the new town proposals described in this report have been designed to match as closely as possible the demands of the situation as it appears at present. The Master Plan proposals are a product of considerations and analysis of optimum available forecasts and assumptions for this point in time; they provide a firm basis for initiation of the process of urban development and form also a flexible framework for future requirements.

Needs and resources however change over time, and urban development is an organic process involving many complex and interrelated functions. As development proceeds, a dynamic response to change will be essential if a high order of benefits is to be achieved.

In terms of the future development of the towns, it is essential that as of now, all six urban development programmes are monitored, evaluated, adjusted and amended in relation to each other

on an on-going basis. The cost, in both economic and social terms of failure to do this could be disastrous, and the urban development programme could become counter-productive in terms of the underlying objectives of the New Economic Policy.

Initially, the prime aspect of monitoring should be the preparation of a series of detailed programmes on the basis of the schedule given at the start of this Section. The progress of each programme should then be recorded regularly (possibly once a month), the effects of progress evaluated, and the programmes themselves adjusted as necessary. If for example, initial promotion efforts show an inadequate level of settler interest in migrating to the towns, it will then be necessary to consider what steps should be taken, in order to boost the level of migration (such as increased inducements, different areas of search); further to this it may prove necessary to reconsider the rate of development altogether if a fall off in migration becomes more than a temporary phenomenon.

Monitoring processes fall within two fundamental categories, those of short term and long term; short term monitoring enables the rapid identification of problems to be made in sufficient time to allow for remedial action and minimal delay; long term monitoring is concerned with development trends which require action, but which are of a less urgent nature. In the context of the latter category, there must be continuous recording of the numbers and types of jobs available and of the migrants and their varying housing and social services requirements. Development programmes must be adjusted to the real needs and available resources put to best effect.

There exists a high degree of flexibility inherent in the Master Plan; for example the first five years of programmed development can be subdivided into a series of separate phases and contracts, which in turn can be redistributed, according to requirement, over a broader time scale. The changing situation within all of the towns requires careful and constant study and analysis, so that any of the many alternative options for adaptation to the demands of a developing world can be exercised at the correct time and to the best effect.

Appendices

APPENDIX A: LIST OF TECHNICAL REPORTS AND WORKING PAPERS SUBMITTED DURING PROJECTS.

DOCUMENT	TITLE
Working Paper No. 1	Evaluation Methodology.
Working Paper No. 2	Development Potential Criteria and Open Space Planning.
Working Paper No. 3	Evaluation of Alternative Locations for Distributor Roads.
Working Paper No. 4	Site clearance Specifications for Project Towns.
Working Paper No. 5	Population and Employment – Some Basic Calculations
Working Paper No. 6	Criteria for the Definition of Housing Forms (Part I).
Working Paper No. 7	Principles and Standards for Roads.
Working Paper No. 8	Principles and Standards for Drainage and Drainage Structures.
Working Paper No. 9	Principles and Standards for Water Supply and Reticulation.
Working Paper No. 10	Principles and Standards for Sewerage, Sewage Treatment and Disposal.
Working Paper No. 11	Principles and Standards for Refuse Collection and Disposal.
Working Paper No. 12	Access and Present State of Forest Clearance in Town Sites and Hinterlands.
Working Paper No. 13	Population, Employment and Income Forecasts.
Working Paper No. 14	Demand for Commercial Facilities.
Working Paper No. 15	Housing Economics
Working Paper No. 16	Town Costs and Phasing.
Working Paper No. 17	Housing Demand 1976-80.
Working Paper No. 18	Social Research : Methodology and Analysis.

Working Paper No. 19	Social Research : Edited Depth interviews.
Working Paper No. 20	Social Research : Drawings.
Working Paper No. 21	Community Facilities – Town and Local Centres.
Working Paper No. 22	Criteria for the Definition of Housing Forms (Part 2).
Working Paper No. 23	Open Space and Recreational Requirements.
Working Paper No. 24	Cost Data Assembly and Analysis for Alternative Concept Evaluation.
Working Paper No. 25	Educational Requirements.
Working Paper No. 26	Traffic Requirements and Design Standards for Access Roads in Housing Areas.
Working Paper No. 27	Planning Brief on Community Facilities.
Working Paper No. 28	Care and Education Facilities for Children from 0 – 6.
Working Paper No. 29	Sewage Disposal and River Water Quality.

Concept Plan Report	(Draft) Town 15, Feasibility and Location of Urban Development.
Concept Plan Report No. 1	Regional Setting and Urban Development Concepts, Town 17 and 19, Initial Evaluation of Alternative Concepts, Urban Policies and Dilemmas, Alternative Forms of Residential Development.
Concept Plan Report No. 2	Town 3
Concept Plan Report No. 3	Town 13.
Concept Plan Report No. 4	Town 15
Concept Plan Report No. 5	Town 16

Working Notes	Notes on Clearance Procedures and Supervision
Working Notes	Proposed Revised Outer Urban Boundaries.
Socio-economic Working Note No. 1	Population and Employment Forecasts.
Socio-economic Working Note No. 2	Revised Population and Employment Forecasts.
Socio-economic Working Note No. 3	Revised Population and Employment Forecasts.
Socio-economic Working Note No. 4	Revised Population and Employment Forecasts
Socio-economic Working Note No. 5	Household size & Composition.
Working Note No. 6	Revised Population and Employment Forecasts.
Summary Report	Concepts, Principles and Standards for Urban Planning and Development.

Draft Master Plan	
Report No. 1	Town 17
Report No. 2	Town 19
Report No. 3	Town 13
Report No. 4	Town 16
Report No. 5	Town 3
Report No. 6	Town 15
Draft Structure Plan Working Note	Population, housing construction programme & social/commercial requirements.

APPENDIX B

In Article 3 of the Agreement, Description of the Project, it was specified that the following be produced for each of the project towns:

Concept Plans

For each town alternative concept plans proposing:—

(a) arrangements of functional or land use components of the town, with particular attention to the integrative relationships between components;

(b) circulation systems with linkages to the immediate hinterland and to the region, with special concern for appropriateness to the socio-economic conditions of the settlers;

(c) a rational hierarchy of services, facilities and amenities with particular attention to their distribution within the context of convenient access, the appropriate mode of transportation or movement particular to the settlers, the socio-cultural demands of a transitional population, and the economic level projected.

Master Plans

For each town a Master Plan translating and adapting the accepted alternative concept plan to the topographical conditions of the site. Master Plan should be prepared at a scale of 1 inch to 8 chains or 1 inch to 4 chains depending on the overall area of the town. The Master Plan should incorporate, but not be limited to:—

(a) a land use zoning plan indicating the major land use components of the town i.e. town centre, residential areas, industrial areas, open space, etc. It should indicate density proposals with reference to the residential areas as well as indicate the locations of facilities, amenities, such as local shopping areas, schools, local community centres, etc.;

(b) a circulation plan incorporating a rational hierarchy of roads and footpaths/cycle-paths and proposing appropriate reserve widths;

(c) a phasing plan programmed to the development of the hinterland and the population intake generated by such development. The first phase should at least constitute five years of implementation. Although some of the towns may reach a stable population very rapidly the plan period to be considered should be 20 years;

(d) a utilities system including, but not limited to drainage, sewerage, water and electricity supplies;

(e) a tree felling programme, taking into careful consideration sound ecological practice, soil erosion control, slopes and drainage channels protection and soil quality preservation methods;

(f) a town centre plan at a larger scale proposing an organization of use components, circulation system, phasing as well as a detailed development plan for the first phase of construction.

Detailed Development Plans

Detailed Development Plants (Detailed Layout Plans) should be prepared for at least the first five years of implementation and should show all necessary design controls such as lot boundaries, building ratios, building-lines, setbacks, height restriction, building uses, floor area ratios, parking ratios, servicing, loading and on-site circulation standards not covered by the general circulation plans, advertising controls, any overall aesthetic treatments, and any other features that will assist in the implementation of the detailed layouts.

APPENDIX C

Detailed analysis of whole town development costs and apportion ment related to Section 4.9.

TABLE C.1 (a) **RESIDENTIAL DEVELOPMENT COSTS – INFRASTRUCTURE** **TOWN 17**

(Note – Post 1980 costs are nil)

		Quantity	Units	Unit Cost $	Total Cost $	1976 $	1977 $	1978 $	1979 $	1980 $
1.	Roads: 40' (18' carriageway)	1.50	miles	224,000	336,000)	82,000	326,000	82,000	330,000	164,000
	40' (14' carriageway)	1.25	miles	203,000	254,000)					
	Access paths: 20'	4.00	miles	76,000	304,000)					
	20' (minor)	2.00	miles	45,000	90,000)					
2.	Water Supply: 4" dia. pipes	20,000	lin. ft.	6.00	120,000)	30,000	121,000	30,000	113,000	56,000
	6" dia. pipes	20,000	lin. ft.	8.00	160,000)					
	Specials		25% of Pipe Cost		70,000)					
3.	Sewerage: 6" dia. pipes	22,000	lin. ft.	9.00	198,000)	72,000	284,000	72,000	252,000	128,000
	9" dia. pipes	22,000	lin. ft.	12.50	275,000)					
	House Connections	1,123	dwellings	150	169,000)					
	Manholes		35% of Pipe Costs		166,000)					
4.	Electricity Supply	40,000	lin. ft.	7.50	300,000	–	78,000	78,000	–	144,000
5.	Clearance	186	acres	675	126,000	61,000	–	–	65,000	–
6.	Earthworks	1,123	dwellings	100	112,000	9,000	21,000	23,000	32,000	27,000
7.	Service connections: Water) Electricity) Sewerage)	1,123	dwellings	500	562,000	45,000	104,000	113,000	159,000	141,000
8.	Landscaping: General provision	186	acres	500	93,000	–	–	46,000	–	47,000
9.	Incidental Open Space	16	acres	5,000	80,000	–	–	50,000	–	30,000
10.	Creche/Nursery Schools	7	no.	40,000	280,000	–	80,000	40,000	80,000	80,000
11.	Landscaping within lots (trees, shrubs, paving)	1,123	Residential Lots	275	309,000	25,000	56,000	63,000	87,000	78,000
12.	Land	186	acres	50	9,000	9,000	–	–	–	–
	Survey Fees	1,123	lots	200	225,000	18,000	41,000	45,000	64,000	57,000
	TOTAL COST				4,238,000	351,000	1,111,000	642,000	1,182,000	952,000
	Less: Grants receivable from LLN				300,000	–	78,000	78,000	–	144,000
	NET COST				3,938,000	351,000	1,033,000	564,000	1,182,000	808,000

TABLE C.1 (b) RESIDENTIAL DEVELOPMENT COSTS – UNTIED HOUSING (excluding towns and local centre shops) TOWN 17

			Quantity	Units	Unit Cost $	Total Cost $	1976 $	1977 $	1978 $	1979 $	1980 $
1.	Untied:	Detached	649)	)	Average						
		Semi-detached	352) 1,123	dwellings)	cost of	4,773,000	453,000	868,000	877,000	1,207,000	1,368,000
		Terrace	122)	)	$4,250						

Note: Institutional housing is costed with government agencies.

TABLE C.2

LOCAL CENTRE COSTS

TOWN 17

		Quantity	Units	Unit Cost $	Total Cost $	1976 $	1977 $	1978 $	1979 $	1980 $
1.	Shops: Local Centre	9	no.	11,000	99,000	–	–	–	55,000	44,000
	Stalls	10	no.	200	2,000	–	–	–	1,000	1,000
2.	Surau	1	no.	45,000	45,000	–	–	–	45,000	–
3.	Community Hall	1	no.	50,000	50,000	–	–	–	50,000	–
4.	Padang	2	acres	5,000	10,000	–	–	–	10,000	–
5.	Paved Areas: Vehicular	200	sq. yds.)	9.00	3,000	–	–	–	–	3,000
	Pedestrian	150	sq. yds.)							
6.	Utilities: Service lines	–	lump sum	20,000	20,000	–	–	–	20,000	–
7.	Landscaping	–	lump sum	20,000	20,000	–	–	–	–	20,000
8.	Clearance	6	acres	675	4,000	–	–	–	4,000	–
9.	Telephone lines	1,000	lin. yds.	10.00	10,000	–	–	–	–	10,000
10.	Earthworks	6	acres	2,000	12,000	–	–	–	12,000	–
11.	Sundry Equipment: Police post, call box, post box, notice board.	–	item	3,000	3,000	–	–	–	–	3,000
12.	Land: Commercial	1	acres	200)	1,000	–	1,000	–	–	–
	Social/Institutional	2	acres	175)						
	Remainder	3	acres	10)	2,000	–	1,000	–	–	1,000
	Survey Fees	11	lots	200						
	TOTAL COST				281,000	–	2,000	–	207,000	82,000
	Less: Grants Receivable: LLN			6,000)	16,000	–	–	–	6,000	10,000
	JT			10,000)						
	NET COST				265,000	–	2,000	–	191,000	72,000

TABLE C.3 TOWN CENTRE COSTS TOWN 17

		Quantity	Units	Unit Cost $	Total Cost $	1976 $	1977 $	1978 $	1979 $	1980 $	Post 1980 $
A.	Government Agencies:–										
1.	Police Station) incl.	1	no.	130,000	130,000	–	–	–	–	130,000	–
2.	Fire Station) staff	1	no.	350,000	350,000	–	–	–	–	350,000	–
3.	Post Office) quarters.	1	no.	120,000	120,000	–	–	–	–	–	120,000
4.	Health Centre	1	no.	600,000	600,000	–	–	–	–	–	600,000
5.	Govt./Local Govt. Offices	10,000	sq. ft.	20.00	200,000	–	68,000	66,000	–	–	66,000
6.	Youth Centre	1	no.	150,000	150,000	–	–	–	–	–	150,000
7.	Mosque & Ancillary	1	no.	140,000	140,000	–	140,000	–	–	–	–
8.	Library	3,000	sq. ft.	16.00	50,000	–	–	–	–	–	50,000
9.	Rest House incl. staff quarters	1	no.	100,000	100,000	–	–	50,000	–	–	50,000
	TOTAL COST				1,840,000	–	208,000	116,000	–	480,000	1,036,000
B.	Commercial (non-DARA):–										
1.	Cinema	1	no.	400,000	400,000	–	–	–	–	–	400,000
2.	Petrol Filling Stations	2	no.	65,000	130,000	–	65,000	–	–	–	65,000
	TOTAL COST				530,000	–	65,000	–	–	–	465,000
C.	DARA as Developing Agency:–										
1.	Shops: Permanent	30	no.	30,000	900,000	–	–	300,000	–	–	600,000
	Temporary	20	no.	6,000	120,000	–	60,000	–	30,000	30,000	–
	Stalls	30	no.	300	9,000	–	3,000	3,000	2,000	1,000	–
2.	Market	1	no.	200,000	200,000	–	50,000	50,000	–	–	100,000
3.	Bus Station – Office & Shelter	1	no.	40,000	40,000	–	5,000	–	–	–	35,000
	Taxi Stand – Shelter	1	no.	5,000	5,000	–	–	5,000	–	–	–
4.	Community Hall	1	no.	100,000	100,000	–	–	100,000	–	–	–
5.	Open Space (Padang)	5	acres	15,000	75,000	–	–	75,000	–	–	–
6.	Roads: Major local streets	–	lump sum	–	100,000	–	–	50,000	–	50,000	–
7.	Utilities: Service lines	–	lump sum	–	100,000	–	–	50,000	–	50,000	–
8.	Paved areas: Vehicular	1.8	acres	45,000	81,000	–	–	45,000	–	36,000	–
	Pedestrian	2.2	acres	20,000	44,000	–	24,000	–	20,000	–	–
9.	Landscaping	3.5	acres	6,000	21,000	–	–	–	–	21,000	–
10.	Earthworks	41	acres	2,000	82,000	20,000	20,000	–	42,000	–	–
11.	Clearance	41	acres	675	28,000	7,000	7,000	–	14,000	–	–
12.	Land: Commercial	8)		200							
	Institutional	20)		175							
	Govt. Commercial	4)	acres	350	7,000	–	7,000	–	–	–	–
	Other Uses	9)		10							
	Survey Fees	100	lots	200	20,000	–	4,000	4,000	6,000	6,000	–
	TOTAL COST				1,932,000	27,000	180,000	682,000	114,000	194,000	735,000
	Less: Grant Receivable: LLN				30,000	–	–	15,000	–	15,000	–
	NET COST				1,902,000	27,000	180,000	667,000	114,000	179,000	735,000
	TOTAL TOWN CENTRE COSTS				4,272,000	27,000	453,000	783,000	114,000	659,000	2,236,000

TABLE C.4 DEVELOPMENT COSTS OF OTHER AREAS TOWN 17

	Quantity	Units	Unit Cost $	Total Cost $	1976 $	1977 $	1978 $	1979 $	1980 $
1. Education (costs incl. staff housing)									
Pre-schools (2 no. at 1.5 acre)	2	no.	50,000	145,000*	–	73,000	–	73,000	–
Primary schools (2 no. at 12 acre)	52	classes	30,000	1,920,000*	–	480,000	480,000	480,000	480,000
Secondary schools (1 no. at 20 acre)	20	classes	33,000	960,000*	–	–	240,000	240,000	480,000
Landscaping & Clearance	47	acres	675	32,000	9,000	14,000	9,000	–	–
Land	47	acres	175	8,000	8,000	–	–		
TOTAL COST				3,065,000	17,000	567,000	729,000	793,000	960,000
* Including an allowance of $15,000 per acre for earthworks.									
2. Industry: Land Reserve	45	acres	600	27,000)					
Clearance	45	acres	450	20,000)					
Earthworks	45	acres	2,000	90,000)	All costs post 1980				
Service Workshops	5	no.	11,000	55,000)					
TOTAL COST				192,000					
3. Major and Trunk Infrastructure									
Roads: 66' Town Distributor	2.4	miles	470,000	1,128,000	115,000	457,000	114,000	295,000	147,000
Upgrading existing excess	4.0	miles	50,000	200,000	200,000	–	–	–	–
Trunk Sewerage: 9" dia. pipes	8,300	lin. ft.	18.75	156,000)					
12" dia. pipes	8,300	lin. ft.	22.50	182,000)	56,000	222,000	56,000	86,000	43,000
Manholes	35% of Pipe Costs			120,000)					
Trunk Water Mains: 6" dia. pipes	8,400	lin. ft.	8.00	67,000)					
8" dia. pipes	8,400	lin. ft.	10.00	84,000)	22,000	88,000	22,000	38,000	19,000
Specials	25% of Pipe Costs			38,000)					
Trunk Drains: Improvements	10,000	lin. ft.	30,000	300,000)	35,000	140,000	35,000	73,000	37,000
Structures	2	no.	10,000	20,000)					
Conservation Areas: Selection, clear & replant	51	acres	1,500	77,000	7,000	30,000	70,000	22,000	11,000
Footpaths	25,000	sq. yds.	1.00	25,000	3,000	10,000	3,000	6,000	3,000
Afforestation: Length of Distributor	2.4	miles	8,000	19,000	–	– –	12,000	–	7,000
Utilities: Clearance	45	acres	450	20,000)	–	50,000	–	60,000	–
Earthworks	45	acres	2,000	90,000)					
Sewage Treatment & Disposal	8,000	persons	30	240,000	–	100,000	–	140,000	–
Refuse Disposal Site	1	site	15 acres	25,000	–	25,000	–	–	–
Electricity: Generator	1	no.	300,000	300,000)	–	45,000	245,000	25,000	125,000
Cable Runs	14,000	lin. ft.	10	140,000)					
Telephone: Exchange	1	no	460,000	460,000)	–	–	330,000	–	180,000
Cable Runs	5,000	lin. ft.	10	50,000)					
Land: In-town (Remainder)	71	acres	10.00)						
Utilities (outer Town)	50	acres	10.00)	2,000	2,000	–	–	–	–
Remainder (Outer Town)	999	acres	1.00)						
TOTAL COST				3,748,000	440,000	1,167,000	824,000	745,000	572,000
Less: Grants:			440,000)	950,000	–	45,000	575,000	25,000	305,000
LLN			510,000)						
JT									
NET COST				2,798,000	440,000	1,122,000	249,000	720,000	267,000
TOTAL COST OF DEVELOPMENT OF OTHER AREAS				6,055,000					

Residential Infrastructure

		$
Summary Figure from Table C1. (a)		3,938,000
Plus 15% Contingencies,	Total	4,529,000

Local Centre Infrastructure

	$	$
Comprising (from Table C.2)		
Paved Areas	3,000	
50% Utilities	10,000	
Landscaping	20,000	
50% Earthworks/Clearance	8,000	
Sundry Equipment	3,000	
Land & Survey Fees	3,000	47,000
Plus 15% Contingencies,	Total	54,000

Town Centre Infrastructure

	$	$
Comprising (from Table C.3)		
50% Roads	50,000	
50% Utilities	50,000	
Paved Areas	125,000	
Landscaping	21,000	
50% Earthworks/Clearance	55,000	
Land & Survey Fees	27,000	
	328,000	
Less: LLN Grant	30,000	298,000
Plus 15% Contingencies,	Total	343,000

Major & Trunk Infrastructure

	$	$
Summary Figure from Table C.4.		2,798,000
Additional Infrastructure in Town Centre applicable to whole town development		
Bus Station/Taxi Stands	45,000	
Community Hall	100,000	
Padang	75,000	
50% Roads	50,000	
50% Utilities	50,000	
50% Earthworks/Clearance	55,000	385,000
Additional Infrastructure in Local Centre applicable to whole town development		
Surau	45,000	
Community Hall	50,000	
Padang	10,000	
50% Utilities	10,000	
50% Earthworks/Clearance	8,000	123,000
		3,306,000
Plus 15% Contingencies,	Total	3,802,000

Acknowledgements

The project was carried out for and in collaboration with the Lembaga Kemajuan Pahang Tenggara (DARA).

The Consultants express their warmest thanks to the Chairman and Board Members:–

Y.M. Tunku Datuk Shahriman bin Tunku Sulaiman, (Chairman)

and

Y.B. Tan Sri Datuk Thong Yaw Hong
Encik Jamil bin Mohd. Jan
Y.B. Encik Abdul Rahman bin Ismail
Y.B. Datuk Wan Sidek bin Hj. Wan Abdul Rahman
Encik Abdul Razak bin Hitam

the General Manager;
Encik Mohd. Saufi bin Hj. Abdullah

the Deputy General Managers;
Encik Mohd. Noordin bin Hassan
Encik Ismail bin Mansor

and to the Directorate and Staff of DARA.

The Consultants also wish to express their appreciation for all the assistance and co-operation rendered to them in the course of the project by the following Federal and State Agencies, and by the private companies listed below:–

Bahagian Penyelarasan Pelaksanaan dan Kemajuan Pentadbiran.	Implementation and Co-ordination of Development Administrative Unit.
Bahagian Perancang Ekonomi	Economic Planning Unit.
Jabatan Haiwan, Pahang	Veterinary Dept., Pahang
Jabatan Kebajikan Masyarakat	Social Welfare Dept.
Jabatan Kerja Raya	Public Works Dept
Jabatan Parit dan Taliair	Drainage & Irrigation Dept.
Jabatan Perancang Bandar dan Kampung	Town and Country Planning Dept.
Jabatan Perancang Bandar dan Kampung – Jabatan Unit Khas Perancang	Town and Country Planning Dept. Special Planning Unit.
Jabatan Perangkaan	Statistics Dept.
Jabatan Perhutanan, Pahang.	Forestry Dept., Pahang
Jabatan Pertanian, Pahang.	Agriculture Dept., Pahang
Jabatan Polis, Pahang.	Police Dept., Pahang
Jabatan Talikom.	Telecommunications Dept.
Jabatan Ugama, Pahang.	Religious Dept., Pahang
Jabatan Ukur, Pahang.	Survey Dept., Pahang
Kementerian Buruh dan Tenaga Rakyat.	Ministry of Labour and Man-power
Kementerian Kebudayaan Belia dan Sukan.	Ministry of Sports, Youth & Culture.
Kementerian Kesihatan.	Ministry of Health
Kementerian Pelajaran, Bahagian Perancang dan Penyelidikan Pelajaran.	Ministry of Education.
Kementerian Perdana Menteri	Prime Minister's Dept.

Lembaga Kemajuan Johor Tenggara.	Johor Tenggara Development Corporation
Lembaga Kemajuan Pertanian MUDA.	MUDA Agricultural Development Corporation.
Lembaga Kemajuan Tanah Persekutuan.	Federal Land Development Authority.
Lembaga Letrik Negara.	National Electricity Board.
Perkhidmatan Bomba	Fire Services
Pejabat Jurutera Dewan Bandaraya, Kuala Lumpur	Engineers Department Kuala Lumpur City Council
Perbadanan Kemajuan Jengka, Pahang.	Jengka Development Board, Pahang.
Perpustakaan Negara Malaysia	National Libraries Dept.
Perkhidmatan Pos.	Postal Services.
Tentera Udara DiRaja Malaysia.	Royal Malaysian Air Force
Universiti Malaya – Kuala Lumpur.	University Malaya, Kuala Lumpur.
Universiti Sains, Penang Malaysia.	University Science, Penang

Bina – DARA Sdn. Bhd.

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Pahang Bif Sdn. Bhd.

Barlow Boustead Estates Agency Sdn. Bhd.

Dawn Oil Palm Plantations Sdn. Bhd. – Kluang Estates

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Mentiga Forest Products Sdn. Bhd.

Paloh Estate, Johor.

Purnama Timor Agency Sdn. Bhd.

Syarikat Keratong Sdn. Bhd.

Syarikat Steven Sdn. Bhd.

Tabong Haji Oil Palm Estate.

Tee Teh Sdn. Bhd.

Yusoff, Ibrahim Sehu Berakan, Kuala Lumpur.

Zaidun Leeng, Kuala Lumpur.

Finally, but not least, our gratitude must be expressed both to the various district officers, pengurus and others who assisted in the organisation and conduct of the social surveys and above all to the people throughout Malaysia who gave so readily of their time and ideas to the interview teams. We hope the proposals put forward, reflect their needs, and help them achieve their aspirations.

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January 1976

Kuantan, Malaysia

Printed in Malaysia by:
Moore Secretarial & Printing Services Sdn. Bhd.,
52B, Jalan Bukit Bintang, Kuala Lumpur. Tel: 24508

MASTER PLAN TOWN 17

0 4 8 12 16 20 24 Chains

SCALE 0·5 Kms

LEGEND

- Town and Local Centres
- Government and Public Uses Outside Centres
- Housing Areas
- Indicative Areas for Local Shopping and other Activities
- Housing Expansion Reserves
- School Sites
- Industrial Areas
- Town Parks with Retained and Reinforced Tree Planting and Landscaping
- Cemeteries
- Jungle Conservation Areas Outside Inner Urban Area
- Outer Urban Areas Suitable for Agriculture, Expansion, Playing Fields, Etc.
- Agricultural Hinterland
- Sewage Disposal (Provisional Site)
- Refuse Disposal (Provisional Site)
- Water Reservoir (Provisional Site)
- Bus Stops
- Footpaths (8 ft. Min. Reserve)
- Pedestrian Area
- Minor Access Paths (20 ft. Min. Reserve)
- Access Paths (20 ft. Min. Reserve)
- Access Roads (40 ft. Min. Reserve)
- Main Town Roads (66 ft. Min. Reserve)
- Future Main Town and Hinterland Roads (66 ft. Min. Reserve)
- Future Possible Access Roads (40 ft. Min. Reserve)
- Existing Tracks
- Main River
- Permanent Streams
- Intermittent Streams

NOTE: Drainage Reserves as agreed with D.I.D. lie within the Town Park and Jungle Conservation Areas

DARA BANDAR TUJUH BELAS PAHANG TENGGARA

FREEMAN FOX and ASSOCIATES
PLANNING AND TRANSPORTATION CONSULTANTS
Akitek Bersekutu Malaysia
Tahir Wong Sdn. Bhd. January 1976