TOWARDS A PLAN FOR KUILS RIVER.

E.N. Lipman.

October, 1971.

C O N T E N T S.

PART III.

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M A P S.

T A B L E S.

Photograph taken of Kuils River:
March 1970.

PART 1.

INTRODUCTION.

1.0 Objectives of the thesis.

1.1 A primary aim of the study is seen to lie in the establishment of criteria which could ultimately form the basis of a land-use "plan", or policy for Kuils River. It is therefore considered fundamental to establish, in the first instance, the role of Kuils River in the region. It furthermore, becomes necessary to define the local physical environment. This would serve to establish qualitative features as well as constraints which could determine future planning decisions.

2.0 Methods employed.

2.1 Part 11 underlines the regional context. The historical growth of the urban settlement pattern leads up to certain general assumptions as relating to the future form of Cape Town. Emphasis is placed on the need to formulate regional goals.

2.2 Kuils River is seen to fall within a rural-urban fringe. Problems generally attached to such areas are defined, whilst at the same time, various divergent attitudes are described.

2.3 A study is then made of the physiography as affecting Kuils River. Preservation aspects receive special consideration.

2.4 The Economic Development Programme is referred to in Part 111. Factors relating to the growth - potential of the Western Cape are defined. This leads up to assessment of the present and future possible importance of the Kuils River/Blackheath industrial area in terms of employment needs. Implications of official policy as regards the planned Coloured population settlement on the Cape Flats are weighed up in some depth, in view of the fact that Kuils River adjoins this area.

2.5 Certain characteristics relating to existing manufacturing industry within the Kuils River/ Blackheath complex are defined.

2.6 In Part 1V, attention is focussed upon the residential component. Statistical data intending to emphasise the present dormitory role of Kuils River is set out. Population census figures over time are analysed.

2.7 Comparative rates of residential development between various municipalities are recorded. A tentative projection is applied to Kuils River.

2.8 In Part V, retail and office components at Kuils River are related to a hierarchy of centres within the Metro-region, enabling certain broad conclusions to be derived.

2.9 Services at both regional and local levels are covered in Part V1.

2.1.0 Part Vll places emphasis upon the need for an integrated approach towards communications and land-use. The overall movement system becomes the context. Cognisance is taken of the need to allow for future changes in patterns of population mobility as well as in transportation technology. These concepts are applied to the study area.

2.1.1 In Part Vlll conclusions and criteria derived from studies up to that point are related to the local situation, specifically. Land-use proposals are expressed in the form of preferences, rather than as an attempt to define end-states.

P A R T 11

KUILS RIVER IN THE REGION.

2.0 Historical growth of the urban settlement pattern.

The development of Cape Town has been seen of a series of phases related to the stages of economic development through which the settlement has passed. (1)

- - Stage 1 - Prior to 1860.

  Agrarian economy dominated in the initial stage by the requirements of the Dutch East India Company, with only a small amount of land required. Growth took place subsequently along the False Bay Coast.

- - Stage 2 - 1860 to 1900.

  The economy becomes more sophisticated with the processing of agricultural products for local and export needs. Urban development spreads along the main lines of communication, particulary to the south.

  Little development was in evidence along the eastern communications line as late as 1900, despite the fact that the first permanent road along the route of the present Voortrekker Road was established in 1845.

- - Stage 3 - 1900 to 1945.

  Growth of manufacturing activity in the metropolitan area. Crowded between the mountain and the sea there was little space for large factories. Consequently, most of the new indus-

1. "Goodwood Development Plan ; Motivation Report." (Cape Town 1967) p.p. 1.1 - 1.3.

tries were located on the outskirts of built-up areas wherever level land and adequate transport services were cheaply available.(2) These factors attracted industrial activity along the eastern communications line to the Northern suburbs. At the same time speculative subdivision of land into small plots was taking place in Goodwood, Parow and Bellville.

-- Stage 4 - 1945 to present.

Diversification of the economic base and the development of a metropolitan communication infrastructure. In the early phases industrially-oriented population of lower and middle income groups gravitate towards the northern suburbs where large-scale industrial activity was taking place.

Legislative control has restricted Coloures residential development to the Cape Flats

2.1 Kuils River : Local History.

In the early days Kuilsrivier was known as De Kuilen. It was a cattle-post during the 17th Century which bordered the spot where the present railway station is now situated, and, before the coming of the railway was the outspan of people travelling in the direction of the Hottentots Holland, Stellenbosch and Drakenstein. De Kuilen was the first outspan, and a very important one, after the difficult road over the sand dunes.

During the 19th century the community of separate

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2. Talbot, Professor W.J., Ch Vll of "The Cape Peninsula" Edited by Mabbut, J.A., (1952) p.p. 169 - 170

farms developed into a village. This grew, initially, at a very slow rate, but towards the end of that century, expansion increased slightly.(3)

It would thus appear that Kuils River has experienced a discrete local growth pattern which is now affected by general urban expansion.

2.2 The future form of the urban area.

In a study(4) which tentatively applied certain projected space requirements to the year 2000, the following assumptions were arrived at ;

(a) that the southern, western and eastern arms could expand for Whites,

(b) that the northern arm is likely to be blocked beyond Milnerton by the need to find land for Coloureds and

(c) that outside of these four arms, the metropolitan pattern consists, in the main, of two uses;- the residential land for Coloureds and natural barriers to growth.

2.3 Kuils River : The general situation.

2.3.1 The general location of the present town is illustrated on accompanying map 6 falling within the greater Metropolitan Region of Cape Town. This region is defined by the Bureau of Market Research as the economic region 01, plus the urban areas of Somerset West, Stellenbosch, Wellington and Paarl. Shortest travel distance to the central city by road is approximately 15 miles.

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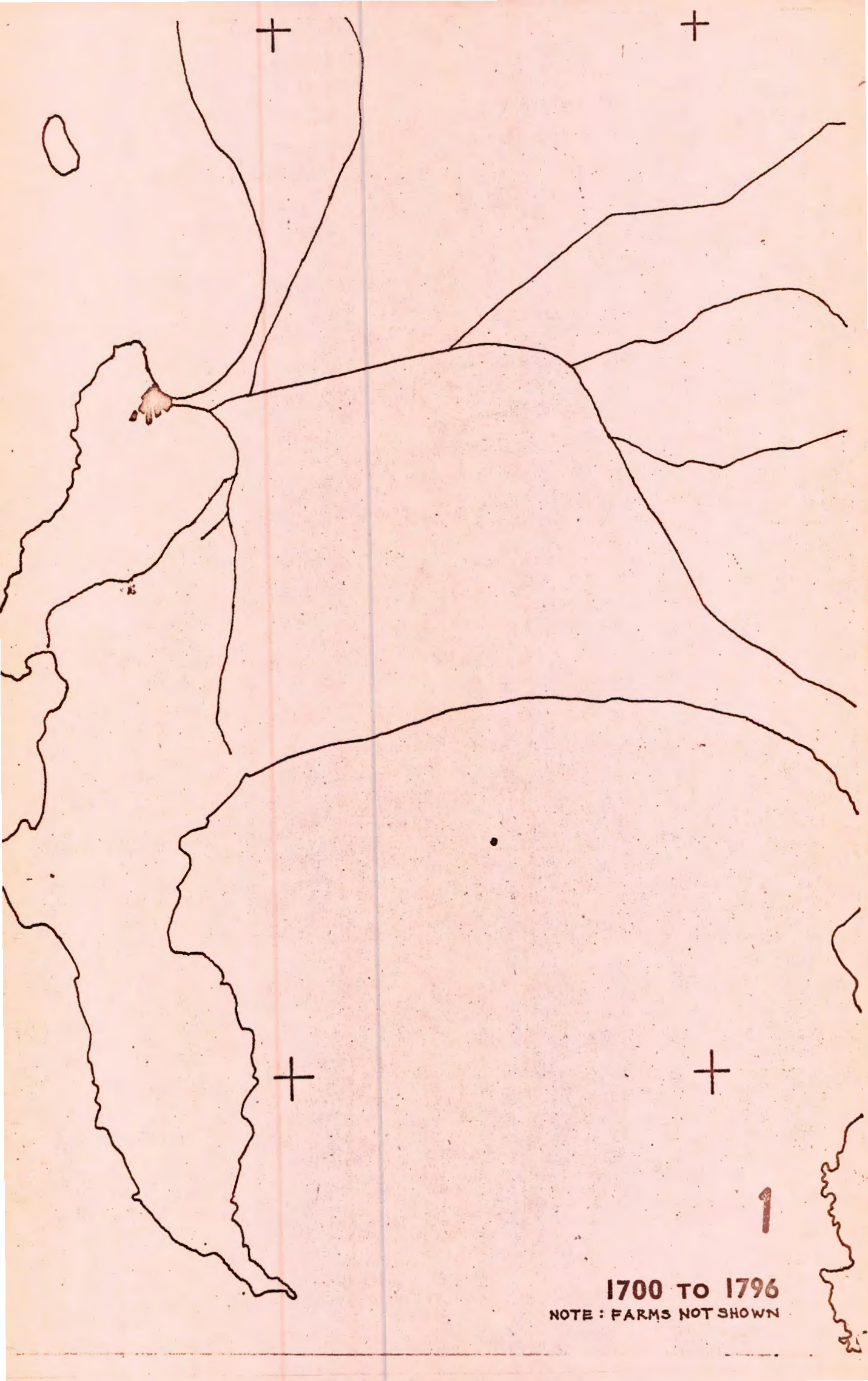
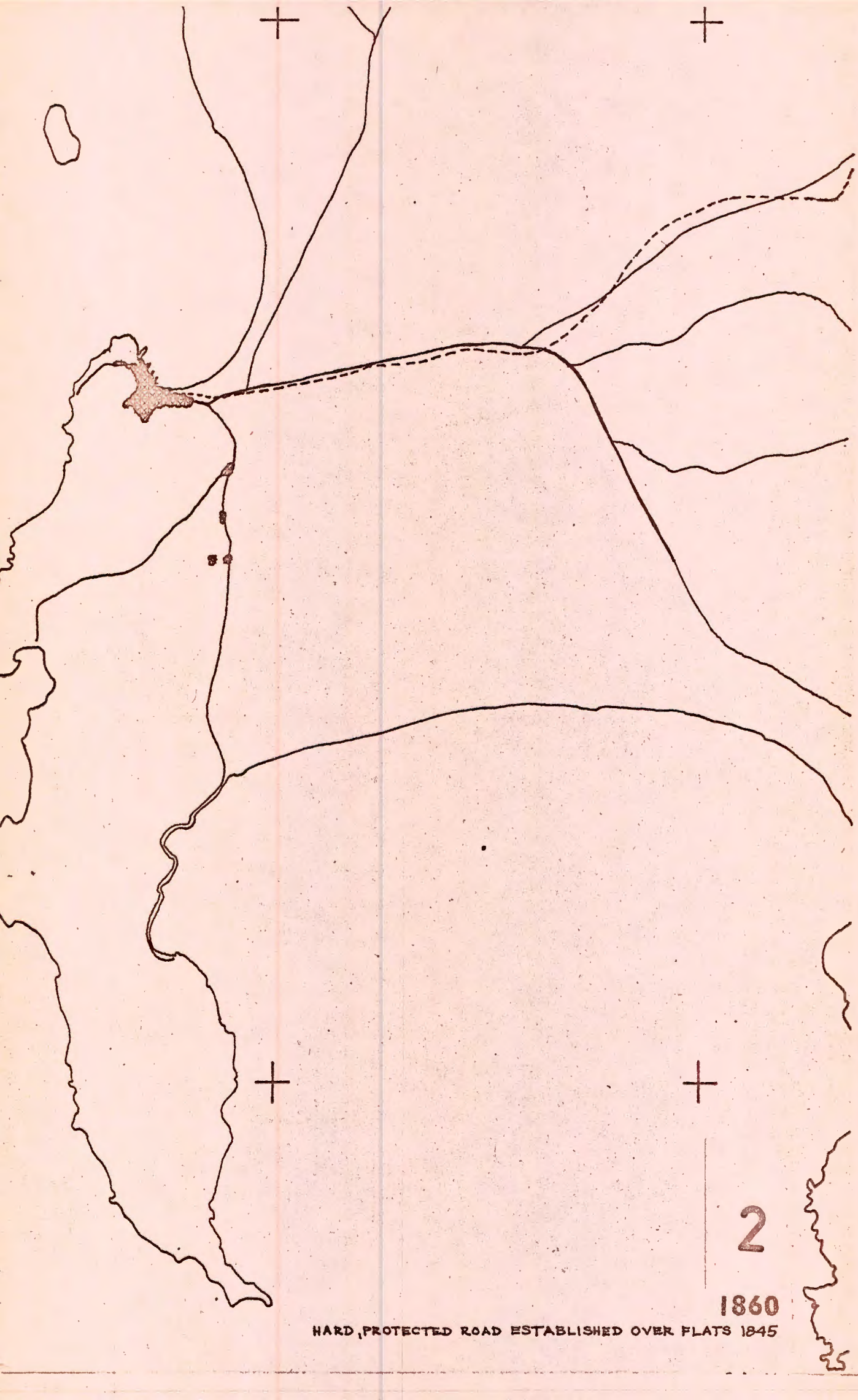
3. "The growth and development of Kuils River." Issued by the Kuils River Municipality on the occasion of the official opening of the Municipal Offices on 28 November 1962.

4. Beinart, Professor Julian, "Urban Growth and the Form of Cities." A paper presented at the 47th Conference of the Institute of Municipal Engineers of Southern Africa (Cape Town, May 1968) p.p; 11 - 12.

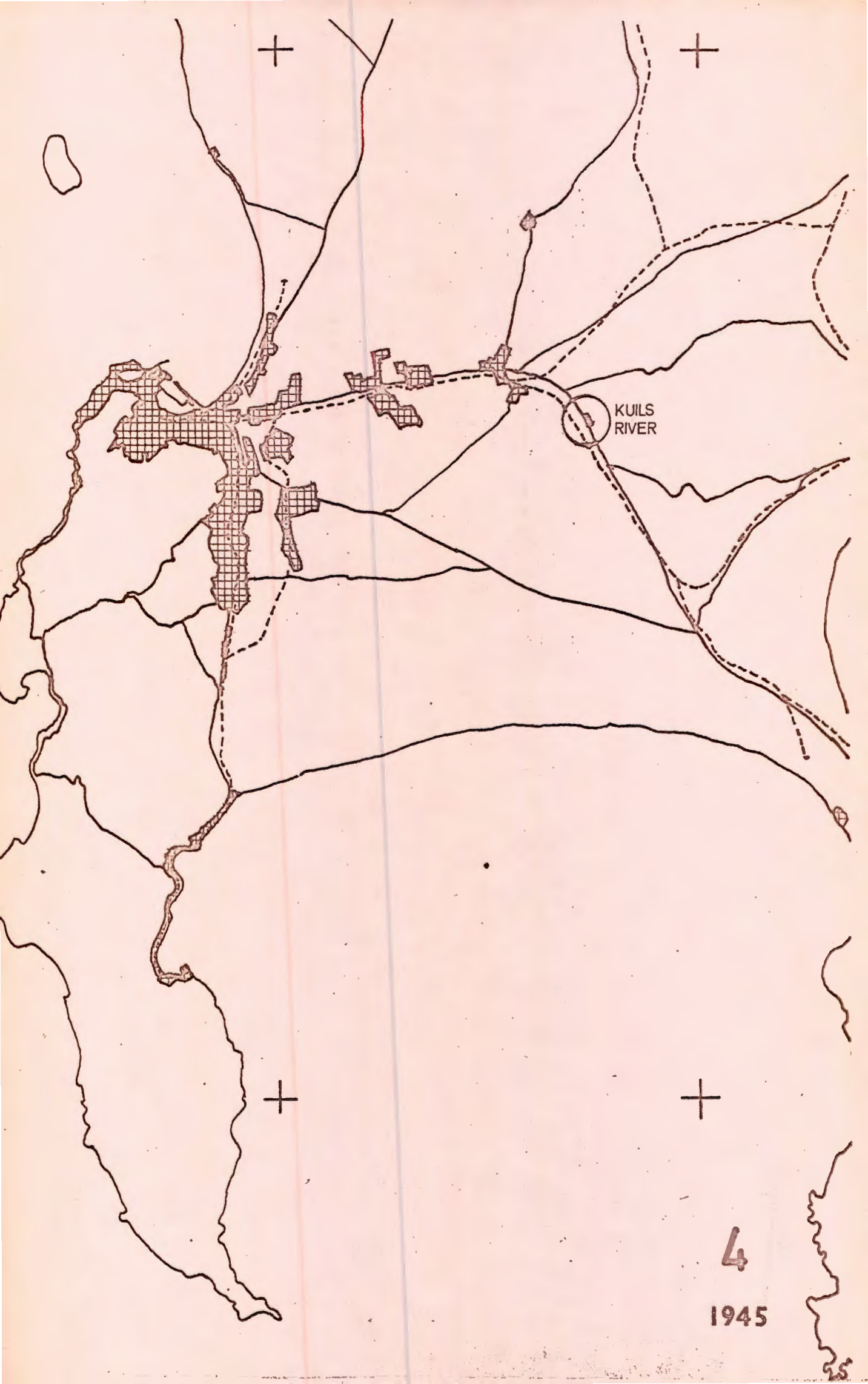
Historical growth of the Urban Settlement Pattern.


1
1700 TO 1796
NOTE : FARMS NOT SHOWN


2
1860
HARD, PROTECTED ROAD ESTABLISHED OVER FLATS 1845

3

1900



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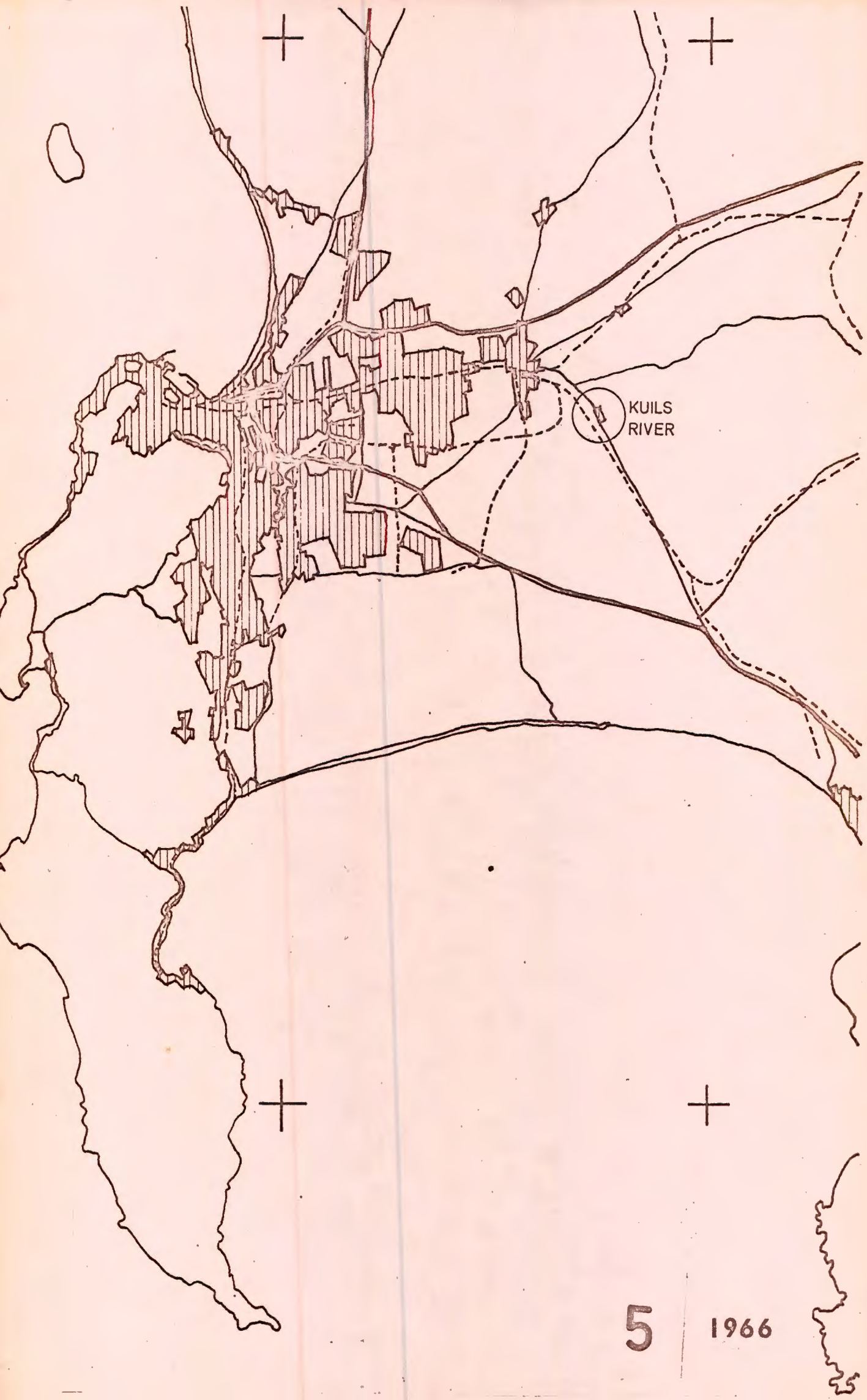
1945


KUILS
RIVER

2.32 Preliminary census estimate for 1970 puts the total residing population, of all races at 8041 persons. This aspect is dealt with in greater depth under Part IV of this study.

2.33 In addition to the residential component, manufacturing industry is present within the municipal boundaries whilst this virtually merges with the Blackheath industrial area to the south. Part III of this paper refers to "local industry" as that which is meant to embrace the Kuils River/Blackheath "complex" in view of the fact that these two areas virtually merge as far as development and zoning are concerned.

2.34 Topographically, the land containing existing residential and industrial development is relatively level with a general rise of contours in an easterly direction.

2.35 The town is structured along major transportation routes. Thus development spreads itself along Strand Road which is a section of one of the radials from the city centre. In addition, this section forms a cross-link between the two national roads.

Branches of the railway forming part of

(a) the Cape Flats System
(b) the loopline which passes through Stellenbosch and Somerset West and
(c) the line to the north, via Wellington, pass through and flank Kuils River.

2.4 Planning Context.

2.41 Emphasis.

This study will stress the following ;

(a) that the present pattern of activities operating at Kuils River, by virtue of its geographic position, tend to be set by forces operating at regional scale,

(b) that the above would include individual locational choices and group policy choices.

(c) that any analysis with the objective of assessing local potential must take into account those broad factors which are likely to cause change,

(d) that a study towards a "plan" for Kuils River could be justified by

(a) the rate of change taking place[5] and

(b) the inherent complexity of factors to be considered, namely, Kuils River in a frontier situation relative to the urban expansion trend.

2.42 Goal Formulation : Reconciliation of local and wider aims.

2.421 A "plan" for Kuils River which sets ot to maximise future opportunities would ideally be formulated in terms of a hierarchy of objectives.[6] This, generally ...

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5. Mallows, Professor E.W.N. University of Witwatersrand, Johannesburg. "Urban Planning and the Systems Approach". I.B.M. Systems Engineering Symposium. (October 1969) reproduced in Plan Volume 55 No. 2. (February 1970) p.p. 11 - 24.

6. Branch, Mellville C., "Planning ; Aspects and Application."

relates to the particular organisational machinery as reflected in different levels of government. Reconciliation of local and wider regional aims could set a delicate balance between centralised directive and local automony. This was dramatically borne out by the experience in the U.S.A. in the breaking away from a "grass roots" tradition to a greater emphasis on national co-ordination as in highway construction, welfare and, lately, environmental planning. Where local and wider interests coincide, this might lead, for example, to a subsidy of the local tax base. On the other hand where these do not, conflict might arise as described by Guttenberg in his contribution to the planning of Philadelphia.(7) He viewed land occupied by any particular community as its "home territory" to be used for a local purpose. For the next larger community, a group subjected to different pressures, with a viewpoint so large as to be impersonal, the same land could represent a resource. Where these different viewpoints produce conflicting demands on the same land, a technical solution would be required in the form of a set of defined land-use relationships to permit a working out of both local and broader interests in the same area with as little friction as possible.

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7. "Comprehensive Plan for the City of Philadelphia". City Planning Commission (1960) "General Concepts" p.p. C-7, Guttenberg, Albert Z.

2.422 Hans Blumenfeld [8] expressed what he considered would be certain desirable aims for the spatial organisation of the metropolis as far as the four main components-central business, production, residence and open land are concerned. These form pairs of seemingly contradictory requirements.

(A) it is desirable to minimise the need for commuting to work and at the same time maximise the ability to do so

(B) to provide quick access to the centre of the city and also quick access to the open country. Most people have tried to achieve a compromise by moving to the suburbs ;

(C) the functions of the metropolis must be integrated, yet these are also strong reasons to separate them - for example, to separate residence from factories or offices -

(D) the social health of the metropolis requires that its people identify themselves both with their own neighbourhood or group and with the metropolis as a whole

(E) the metropolis must strike a balance between continuity and receptiveness to change.

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8. Blumenfeld, Hans. "The Modern Metropolis." Scientific American.
Volume 213, No. 3. (September 1965) p. 72.

2.5 The Rural-urban fringe.

2.51 Definitions.

2.511 L.P. Green (9) in a study of Johannesburg distinguished between the C.B.D. and the rest of what he called the metropolitan zone embracing the population in daily contact with the hub and whose limits determine the second of the main boundaries (beyond the urban complex). A more distant area although not in daily contact with the city, is economically dependent on it for many specialised services.— "Its boundary, in itself an indeterminate and shifting zone, marks the confines of the metropolitan region and the limit of the hub's regional attraction".

2.512 Dickinson (10) sees the peripheral rural-urban fringe as being so diffuse that there arises the problem for definition purposes, of deciding whether to include places that are cut off from the main area, but sufficiently near to it, to be a part of its economic and social organisation. In other words, on the margins, the emphasis in definition must shift from compactness of urban use to functional association and accessibility. As time goes on, the definition of an

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9. Dickinson, Robert E. "City and Region" (1964). p. 227. Refer to article by Green, L.P. (1957).

10. Op cit, p. 237.

urbanised area in terms of continuous urban land uses becomes increasingly elusive.

2.52 Fringe-area problems.

2.521 Wehrwein states that the land problems appear in their most acute form on three fringes or transition zones.(11)

(a) the area between arable farming and grazing,

(b) the zone between farms and forests and

(c) the suburban area lying between the built-up city and farms.

2.522 Walter Firey, a Sociologist, sees specific fringe area problems thus ;(12)

(a) it removes land from agricultural productivity,

(b) the subdivision of land into building plots becomes unguided, unco-ordinated and generally in excess of effective demand, thus creating vast tracts of idle land, irregular settlement patterns and tax delinquent holdings,

(c) taxes must increase in order to maintain the services necessary, but such taxes commonly exceed the taxpaying capacity of those affected.

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11. "Readings in Urban Geography" Edited by Mayer, Harold M., and Kohn, Clyde F.
- Article by Wehrwein, George S.
"The Rural - Urban Fringe". p. 533.

12. Op cit, p. 173.

2.5.2.3 The point concerning land being removed from agricultural productivity ia seen in a different light by Thompson (13) who maintains that "urban sprawl could be nothing more than a colour word dramatising an adverse value judgement - a distinctive combination of land and structures." He questions the fear that the physical growth of cities is "deavouring" prime farm land with ominous long-run implications to the supply of agricultural products in the American economy". He makes the point that in California the yield of groves have actually increased through better and more intensive farming methods, despite urban sprawl.

A study in depth of the Western Cape might be revealing in this sense, namely a comparison between the spread of more intensive viticulture, as compared with the conversion of vineyards to townships.

2.5.2.4 The next problem mentioned by Firey, the unco-ordinated subdivision of land is, in turn, seen by Thompson (14) as follows ;

(A) Over-estimating of plot size.

He states that residential lot size decisions dwarf the influence of others connected with land-use in determining

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13. Thompson, Wilbur R., "A Preface to Urban Economics" Ch 8 p. 320 - "The Price of Urban Sprawl."

14. Op cit, p. 326.

the radius of the urban area, i.e. subdivisions would have to be located further out from the core of the central city than they would have, had the lots of preceding subdivisions been smaller.

(B) Leapfrog sprawl.

is caused more by the land seller who over-estimates the future price of land and holds out for too long. Fundamentally, Thompson regards urban sprawl, in each of its two major forms, as a problem of pricing with elements of poor market information. These elements upset the economic process of land-use allocation through the market mechanism. Perfect competition assumes standard units of trade, which can be consumed quickly, supplied rapidly and be easily transported. The basic commodity traded is land, the total supply of which is limited. The supply of urban land is, however, theoretically, unlimited. The use to which land can be put fixes the price level, and through more intensive use, urban land can outbid that in agricultural use when the yield through subdivision is greater than that obtained through farming.

2.5.2.5 It is thus considered by the author that planning on a broad regional scale is necessary in order to define unique

resources in advance so as to include both high productive farm land and the infrastructure relating thereto. In the Western Cape, in particular, farms of historical importance need to be defined for purposes of preservation.

2.6 Physiography.

2.6.1 GEOLOGY.

2.6.1.1 Formations [15]

Refer to map 10
Four systems are present

	Type of movement.	Lithology	Formation of system.
(A)	Genetic movement	- Alluvial soil - Sand - Consolidated dune sand - Sedimentary deposits - Surface limestone.	Quarterary
(B)	Compression folding and cleavage.	- Sandstone - Quartzite with shale and tillite	Cape(Table Mountain series).
(C)	Compression, upheavals and folding.	- Shale, greywacke with conglo-merates.	Klipheuwel
(D)	Compression and folding	- Shale, conglomerates and quartzite.	Malmesbury

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15. Stellenbosch Divisional Council. "Verslag oor die Voorkomste en Benutting van Natuurlike Hulpbronne in die Afdelingsraad van Stellenbosch". (May 1970).

2.6.1.2 Overall description.

(A) The eastern slopes of the area consist mainly of Table Mountain Sandstone of the Cape System.

(B) In the north east corner, the Klipheuwel formations are found.

(C) Alluvium and river terraces are formed in the catchments of the Plankenberg and Eerste Rivers, with the 'loop' of the Eerste River up to Faure and in the catchment area of the Lourensford River to Somerset West.

(D) The Malmesbury formation is the oldest sediment in the area and stretches over the whole of the northern areas, the catchment of the Plankenbergrivier, a strip from Kuils River to Faure and portions along the slopes of the Stellenboschberg, Helderberg, Schaapenberg and Hottentots Hollandberge at Gordons Bay.

(E) Younger intrusions of granite occur largely within areas where the Malmesbury shale is visible.

(F) The portions of the western area are covered by dunesands, driftsands and surface limestone of the Quarterary System. The spread of Malmesbury shale and granite intrusions are important characteristics in the creation of clay, gravel, stone and Kaolin.

2.6.1.3 Geological pattern in the immediate vicinity of Kuils River.

The following types are found, observed in a direction from west to east.

(A) Sand of the Cape Flats.

Note: the high water table of the Cape Flats together with its sandy nature gives rise to drainage problems.

(B) Malmesbury shale along the lower slopes of the Bottelaryberg and

(C) granite intrusions on the upper slopes.

2.6.2 Mineral resources in the locality.

Refer to Map 11 which depicts known mineral deposits of economic significance in the area and potential areas where deposits are likely to be found.

2.6.2.1 Glass Sand.

An area of potential is described below. Further investigation relating to its actual quality is needed.

(A)- It is found in a broad strip along the western side of Kuils River from Brackenfell to Eerste River. No exploitation has taken place here, as yet. These resources are a continuation of the large deposits found in other parts of the Cape Flats, namely the Philippi area which has been reserved by Government proclamation because of its importance as a national resource.(16)

(B)- Prior to the above proclamation, in May 1965, the Department of Planning requested that the Bureau for Economic Research of the University of Stellenbosch assess the feasibility of proclaiming the area for the mining of glass sand on economic grounds.

(C)- The problems of competing uses were extremely

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16. Bureau for Economic Research,
University of Stellenbosch in conjunction with the Department of Planning.
„'n Ekonomiese Ondersoek na die Philippi-gebied in die Kaapse Vlakte". (1967).

similar to those bordering Kuils River namely demands for

a) market gardening
b) industrial expansion and
c) non-White housing development.

It was considered that the demand for glass sand would be a function of

1. the growth potential of manufacturers in the glass industry - a 5% annual growth rate was predicted.
2. the demand for glass sand in other uses besides glass manufacture although none of importance were envisaged at the time,
3. the possible use of silica-bearing materials other than glass sand in glass manufacture
   - it was considered that deposits at Delmas which were being utilised by 'Pilkington' had, and would not have any appreciable influence on the demand for Philippi glass sand.
4. the point was made that export would only be feasible close to a port and of those deposits available in South Africa, only those at Philippi fulfilled this requirement.

(D) It was considered that the orderly exploitation of glass sand was possible.

2.6.2.2 Kaolin.

The above, suitable for use in ceramic manufacture, is found in granite formations

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Stellenbosch Divisional Council.
"Verslag oor die Voorkomste en Benutting van Natuurlike Hulpbronne in die Afdelingsraad van Stellenbosch" (May 1970).

which have weathered to the correct degree. Reasonably good deposits are found in the granites to the east of the Kuils River. The whole area, covered by intrusive granite, is the bearer of clay which can be heated to good Kaolin. From the investigations which have been carried out, it has been concluded that the lower-lying Kaolin deposits offer the possibility of better quality than the higher portions, which stretch from the Papegaaiberg to the Kuils River. It is thought that the lower-lying granite has weathered more than the high-lying and the former are probably less important for mineral extraction.

It will be noted that

(A) of all the Kaolin deposits occuring in the Republic, those found in the Western Cape are of the highest quality,

(B) 60% of the Kaolin production in the world is used in the manufacture of glass paper. At the moment, the paper industry in the Republic imports processed Kaolin because the local industry is not sufficiently developed. The demand is expected to increase.

2.6.2.3 Limestone.

This has not been positively defined within the environs of Kuils River, however, the meeting of sand shale between the latter and the Eerste River holds possibilities for further investigation.

2.6.2.4 Clay.

Clay, suitable for brickmaking occurs in scattered locations over the area of Malmesbury Shale, previous described. Within this sector other high-quality clay deposits may be present.

2.6.3 Catchment and drainage.

2.6.3.1 Map 6 depicts the two main catchment areas in the vicinity of Kuils River, namely on the northern and south-eastern sides of the Bottelaryberg respectively. The former extends up to the slopes of the Tygerberg with the latter extending up to the Helderberg, Stellenboschberg and Jonkershoekberge.

2.6.3.2 The northern catchment drains into the Kuils River of which the Bottelary River is an upper tributary. The Kuils River dissipates itself in the sandy Macassar coastal area. As far as the south-eastern catchment is concerned, this drains into the Eerste River.

2.6.3.3 Canalisation of the Kuils River is being planned by the various authorities concerned.* A specific flooding problem has been experienced immediately to the north-west of the Blackheath industrial area.

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* Interview - December 1970 with Ninham Shand, Consulting Engineers.

2.6.4 Gradient.

Map 12 illustrates a range of slope in the area immediately surrounding Kuils River from

(a) slopes less than 1:20
(b) those steeper than 1:6

Contours rise gently from 400 feet above mean sea level along Van Riebeeck Road to approximately 1000 feet at the level of the upper vineyards on the Bottelaryberg. No extreme variation in slope which, in itself, might preclude possible residential development, is evident up to the 1000 ft. contour. General gradients do not rise steeper than 1:3. As a rule, the following standards apply to township development in the Cape :-

Slope	
1:3 (and above)	Limit of permitted fall for residential plots.
1:6	ditto for road construction of any significant length.

2.6.5 Rainfall.[19]

Examination of an average annual rainfall map shows that Kuils River falls within an isohyet range of from 500 to 700 millimetres per annum which embraces the fertile farming areas of Durbanville through to Stellenbosch.

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19. Average Annual Rainfall Sheet 3318 of Cape Town. (1921 - 1960).

17. The Cape Peninsula. Chap. 3. Dr. W. Schaffer Meteorological Office. D.F. Malan Airport. Greater Cape Town. Report No. 4. P.6.

2.6.6 Fog.

The Peninsula does not experience misty or foggy weather unduly often, though advection and radiation fog occur and may, at times cover the low-lying parts and much of the adjoining Cape Flats. (17)

TABLE NO 1
Frequency of fog in the Cape Peninsula.

Frequencies	Average
Simonstown	± 5 times per year
Royal Observatory	± 15 " " " (early morning fog).
Cape Town Docks	± 25 times per year.

D.F. Malan Airport. (18) The following information is relevant as far as Kuils River, specifically, is concerned :

(a) Fog occurs on the average of 6 days per month between March and July.

(b) Most advection fog occurs from the north and north-west after 22.00 hours - approximately 13% of the frequencies occur before 20.00 hours.

(c) The abovementioned fog occurrences normally clear by 12.00 hours (March - August) and by 10.00 hours at most other times of the year.

17. The Cape Peninsula. Chap 3. Dr. W. Schaffer.

2.6.7 Temperature inversions.

These are highly significant as far as the siting of noxious-type industries are concerned. Conditions are peculiarly favourable for the development and persistence of temperature inversions over the Cape Flats. Short-term observations conducted by the Air Pollution Research Group of the Council for Scientific and Industrial Research during 1964 and 1965 revealed temperature inversions, extending commonly to heights of 200 - 300 feet, on 26 occasions in 38 days.(20)

2.6.8 Wind.

2.6.8.1 The generalised pattern as recorded at D.F. Malan Airport is illustrated by the average wind rose. Figures are interpreted as follows :

Summer months; Winds of a velocity of between 11 and 25 m.p.h. at a frequency of approximately 50% in a due southerly prevailing direction.

2.6.8.2 Winter month of July; similar kinds of velocity tend to occur when compared to the above from a north and north-westerly direction but at a frequency range of approximately 5 to 5%

. Greater Cape Town Report No. 4. p.6.

20. Talbot, W.J. and Talbot, A.M.
Planning Report No.4 prepared for the Cape of Good Hope.
"Greater Cape Town Region - Land Use".
P.10, Table 2.

TABLE NO 2

Mean monthly wind velocities (21) (m.p.h.) D.F. Malan Airport.

J.	F	M	A	M	J
12.5	10.4	9.4	6.6	8.9	6.2

J	A	S	O	N	D
8.5	10.4	10.0	10.1	10.5	13.6

Year
9.7

2.6.8.3 The micro-wind pattern at Kuils River and in its immediate vicinity appears to differ significantly from the above generalised description. According to local inhabitants, the town itself experiences relatively greater periods of calm as compared with broad conditions along the Cape Flats. This could be due to a"banking-up" effect caused by the Tygerberg, as far as the southerly prevailing winds are concerned, with the likelihood of funelling occuring to the north of the Bottelaryberg. However these assumptions would have to be confirmed by scientifically-controlled wind observations.

2.6.8.4 It would appear that strict future control over the establishment of "noxious industry", such as the present fertiliser factory which spreads dust over the town from a prevailing southerly direction, will be warranted.

2.6.9 Hours of sunlight.

The following is suggested as having significance as far as future residential development is concerned; the south-eastern slopes of the Bottelaryberg according to map 15, obtains 6 to 7

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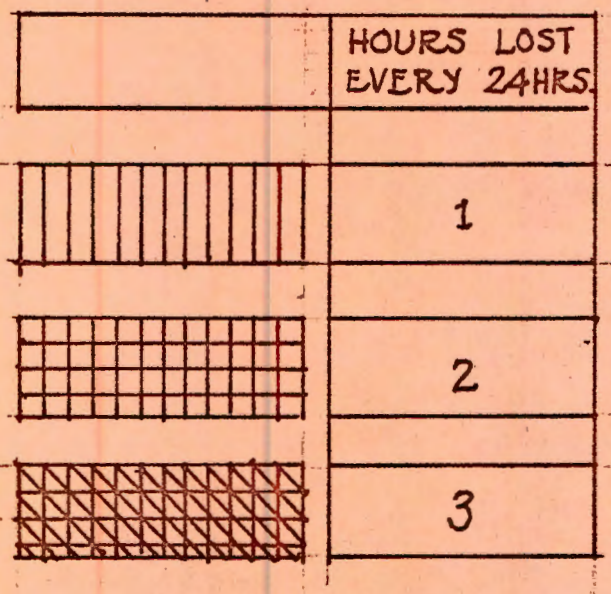
21. Op cit. P.10, Table 2.

HOURS OF SUNLIGHT LOST
THROUGH MOUNTAIN SHADOW
AT THE EQUINOXES.

NORTHERN SLOPES


HOURS LOST
EVERY 24HRS.
1
2
3

average hours of sunlight compared with 8 to 9 hours nett average over one year without mountain shadow.

2.7 Assessment of agricultural land-use.

2.7.1 The influence of physiographic factors within the area surrounding Kuils River.

2.7.1.1 Map 16 plotted from aerial photographs depicts broad land-uses in the area. Based upon the geological pattern and climatic factors, previously described, a natural progression of agricultural fertility is apparent from west to east; in the order described below.

	Formation.	Agricultural use.
(a)	Sands of the Cape Flats covering the old wavecut pattern	- intensive utilisation for market gardening purposes.
(b)	Malmesbury Shale	- combination of vineyards orchards and other cultivated land, plantations.
(c)	Granite	- as above, but with a more frequent occurrence of vineyards.

2.7.1.2 The following general observations may be considered applicable :

(a) The situation of granite intruding through shale normally gives rise to the most poten-

tially fertile soils, in this case utilised for viticulture. In the Cape granite becomes deeply weathered leading to great fertility. This takes place where the slopes flatten out thus permitting relatively more water penetration and giving rise to a clay loam.

(b) Market gardening ; The sandy soil of the Cape Flats, together with subterranean water available for sprinkler irrigation, makes it possible to obtain excellent germination of fine seeded vegetables during the hot summer months [22] This is not possible on the clay soils further afield on the larger inland farms. Secondly, the type of farming on the Cape Flats and the procedure in supplying the Epping Market, is a very effective price - stabilizing factor by virtue of the proximity of the farmers to the market. By maintaining the present position Cape Town would not be dependent upon produce which is the surplus of other markets.

2.7.2 Preservation of agricultural land in its broader context.

2.7.2.1 Land in the Republic, as a limited resource, is brought into focus by the following

22. Grobbelaar, W.S., Department of Agricultural Technical Services, Winter Rainfall Area, Stellenbosch. "Memorandum on the Cape Flats" submitted to the Cape Flats Sub-Committee (18th May, 1966).

statistics :

Table. 3

Land-use in the Republic. (23)

	Million Morgen
White farms	104. 00
Bantu areas	17. 40
Nature reserves	3. 85
Towns and cities	1. 90
State land (Dept. Forestry)	1. 74
Roads, railways and airports	1. 35
Other uses	12. 76
Total area	143. 00

2.7.2.2 In broad terms the general land-use pattern within White agriculture is as follows :

Table 4

Agricultural land-use in the Republic.

	Million Morgen
Areas utilised	12
Forest plantation	1
Farm roads, etc.	2
Natural grazing land	89

2.7.2.3 According to the report of the Tomlinson Committee ;

(a) of the 12 million morgen of agricultural land being utilised, 4 million morgen can be regarded as being in the higher potential class and

23. "Verslag van die Spesiale Komitee insake die Behoud van Plase binne die Munisipale Gebied van Paarl." (September 1970) p.2.

(b) of the above, 600,000 morgen can be rated in the upper potential.

If one then adds land presently under irrigation, then only just over 1 million morgen falls within the upper category of potential.

2.7.2.4 It is obvious that if there were no variation in production potential, then there would be no land utilisation problem. Furthermore it is of major concern that 40% of the value of agricultural production in the Republic is derived from the 4 million morgen of higher potential land (24)

2.7.2.5 In evaluating alternative choices in the utilisation of land in areas surrounding Kuils River it becomes vital to take cognisance of the infrastructure which has been built up over the years, for example, wineries in the region. The actual contribution of agriculture in national terms can be illustrated by the following ;

(a) From 1936 to 1967 the gross value of agricultural production increased from R130 million to R1,286 million.

(b) Secondary industries based on the agricultural sector contributed 20 to 30% of the national income (according to figures available at the date of the report 1970).

2.7.2.6 It is concluded that it is fundamentally important to avoid

(a) unnecessary waste of high potential agricultural land similarly,

(b) Unnecessary cutting up of farms through lax subdivisional control. (23)

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24. Op cit, P.4.

PART 111

INDUSTRY.

3.0 Definition of areas.

3.0.1 Refer to map ~~29.~~ 17. For purposes of this study, the Western Cape, which includes Economic Regions 01, 02 and 03, is to be regarded as a significant unit. The latter cover the following magisterial districts :

Table 5

Definition of Economic Regions 01, 02 and 03.

Economic Region.	Magisterial District.
01.	Bellville
	Cape
	Simonstown
	Wynberg
02.	Ceres
	Montagu
	Paarl
	Robertson
	Somerset West
	Stellenbosch
	Tulbagh
	Wellington
	Worcester
03.	Hopefield
	Malmesbury
	Piketberg
	Vredenburg.

3.0.2 By "local manufacturing industry" is meant the Kuils River/Blackheath industrial complex.

3.0.3 Extractive - type industry in the immediate vicinity of Kuils River is plotted on map 11.

3.1 Inter-regional Economic Forces.

3.1.1 The Economic Development programme (25) for the years 1968 to 1973 concluded that the South African economy has the potential to grow at a rate higher than 5 per cent per annum. It was maintained that the following alternatives were possible.

(a) at a nett immigration level of 30,000 persons per annum a growth rate of 5½ per cent in the real G.D.P., with 1967 as base year, would be attainable with the available production factors and

(b) for the maintenance of a growth rate of 6 per cent per annum, South Africa would have to depend on an inflow of foreign capital, and substantially more than 30,000 immigrants would be needed.

3.1.2 It has been held that in order to maintain a growth rate of from 5 to 5½ per cent it will be necessary to speed up the process of mechanization and improve the employability and quality of South Africa's growing labour force (26) On the other hand were the country to develop in future at a rate dictated by the traditional growth of its labour force and a gradual substitution of capital for labour, then overall growth rates of about 4.5 to 5 per cent a year could not be exceeded without running into structural problems of high rates of price inflation

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25. Economic Development Programme for the Republic of South Africa 1968-1973. Released by the Department of Planning.

26. Back, R.S. for the South African Federated Chamber of Industries. - (November 20th 1970).

and a widening gap on the balance of payments front. All this should be seen in the context of a recent decline in real investment in industry since mid - 1967 due to credit restrictions imposed by the Reserve Bank.

3.1.3 The suggestion implied above is that industrial expansion needs to be maintained on a national level and in the case of the Western Cape, in fact accelerated, since it has been estimated that ½ million additional Coloured people must be taken into employment within the next ten years.(27)

3.2 Economic growth potential of the Cape Town Metropolitan Area and hinterland.

3.2.1 Indices have been calculated which related to the proportion of nationally significant growth industries present in various areas of South Africa. Selected indices are set out below.(28)

Table 6 Growth Potential Indices

Economic Regions	Geographic Area	Index of Growth
01, 02, 03	Cape Town Metropolitan Area & Hinterland	127,65
08	Port Elizabeth/ Uitenhage	87,94
40 - 44	Pretoria - Witwatersrand - Vereeniging.	353,39
30	Durban/Pinetown	10,75

27. Cronje, J.P. for the Cape Chamber of Industries.- (November 18th 1969).

28. "Goodwood Development Plan: Motivation Report". (Cape Town 1967) p.p. 1.4 and Appendix A. 2. 01 Derived from an analysis by Associated Planning Consultants and Architects in their report "Port Elizabeth South".

3.2.2 It is thus evident that the Cape Town Metropolitan Area has a sufficient proportion of growth industries to induce further growth.

3.2.3 An indicator of recent industrial growth is the fact that the demand for electricity in the Western Cape is increasing by more than 6 per cent per annum.(30) Progress is also revealed in statistics relating to industrial building development. The following table gives building completion figures for Cape Town Municipality over recent years and takes no cognisance of alterations and/or additions to existing factory buildings.(31)

Table 7

Industrial building completion figures for Cape Town Municipality.

The table also reflects the rapid increase in expenditure in the industrial sector during the last four years :

Year	Number of factory buildings completed	Value of buildings
1964	30	R1,587,900
1965	41	R1,994,755
1966	45	R2,944,535
1967	55	R3,592,850
1968	40	R4,537,678
1969	54	R3,439,398
* 1970	37	R4,461,296

* Up to and including September, 1970.

30. Dr. Morris, S.S. City Engineer of Cape Town. The Argus - Review of Industry (November 18th, 1969).

31. Municipality of Cape Town. Report on Industry in Cape Town (1970) - unpublished.

3.2.4 The 01 Economic Region can be regarded as an expanding internal market which is estimated to grow to a total of 2 975 004 persons of all races by the year 2000. Refer to Appendix. This market expansion assumes higher per capita income under conditions of relatively full employment.

3.2.5 As far as the Cape Town Metropolitan area is concerned, Table Bay Harbour essentially still remains the focus of its activities making an ideal break-of-bulk point for the expanding export trade.

3.2.6 In inter-regional competitive terms, Cape Town was once a transhipment point for the whole country but now the chief node of socio-economic activity has moved to Johannesburg and the shipping node to Durban. Rail tariffs are distorted in favour of raw materials and food and Cape Town with longer hauls to the main consumer markets of the Rand cannot compete with other centres in attracting industry.

3.2.7 Thus future industrial growth in the Cape Metro Area hinges, inter-alia, on a possible review of the rail tariff structure. (32)

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32. Annual Report of the Executive Council of the Cape Chamber of Industries for the year 1970. P.3.

More specifically, concessions in railway rates for raw materials are seen to be needed so as to stimulate the export trade of the Western Cape.

3.2.8 In another respect, growth of industry within the Metropolitan area could be influenced by policy at national level. It has been held (29) that some of the incentives now to be made available to industrialists in the border areas, such as special tax reductions, could be applied to certain Western Cape industries in order to provide employment opportunities for the Coloured population.

3.2.9 To overcome the comparative disadvantage of the Western Cape from a geographic point of view, as previously indicated, the following possibilities are foreseen :-

(a) A long-term solution in the establishment of significant growth points, which would lead to a diversification of industry, creating employment opportunities and a larger domestic consumer market.

For example, expansion of the Republic's steel production might be located in the Western Cape in the light of the announced rail links to Saldanha Bay for ore exports.

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29. Cronje, J.P. Op cit.

(b) In inexpensive electricity produced, by nuclear reactors. The results of a study carried out by Professor Mason and his colleagues at the Oak Ridge National Laboratory show that a nuclear-powered industrial complex, including desalinated water for agriculture, could support from 25 to 75 million people. The economic production of large quantities of ammonia and phosphates are foreseen.

(c) The port facilities of Cape Town - to be further improved, and extended, so as to provid a comparative advantage to local industrialist in regard to the export trade.

3.2.10 The broad picture is that the South African consumer industry is supplying the local market and reaching out to the export field. Growth potential in this sector is thus levelling off. The spectacular development is now in the diversity and complexity of intermediate industries, those which supply other industries; engineering, chemicals, textiles and components. (33)

3.3 Existing industrial areas and their capacity for further development.

3.3.1 The following statistics tend to emphasise :-

(a) The shortage of industrial land towards the central city i.e. within Cape Town Municipality, and

(b) The outward growth of manufacturing industry along the eastern arm of the Metro-region. (34)

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33. Western Cape Official Guide issued by the Western Cape Development Association (July 1966) p. 21.

34. "Tygerberg Topics". Article - (November 20th 1970.)

3.3.1.2 Cape Town Municipality.

Officials estimated that by the beginning of 1971, 80% of its existing industrial erven will have been developed to some extent. Refer to Table No. 21 for the position in 1968.

3.3.1.3 Goodwood Municipality.

240 morgen (205 Hectares) is zoned for industry, 90% of which has already been developed. The municipality expects that all industrial ground presently zoned for industry will have been sold in less than two years and there is no land left to zone for industry.

3.3.1.4 Parow Municipality.

Approximately 193 morgen (165 Hectares) is zoned for industry, all of which has been sold. There are about 70 morgen (60 Hectares) of industrial land in the municipality yet to be developed.

3.3.1.5 Bellville Municipality.

350 morgen (300 Hectares) of land is zoned and about 90 per cent of this has already been sold. About 220 morgen (188 Hectares) have been developed.
At an annual growth tempo of about 7 per cent, the municipality expects that by 1980 all land presently zoned for industry will have been taken up, although industrial

zoning can be expanded by about 100 morgen.

3.3.2 The following are more peripheral industrial zones along the railway line to the north.

3.3.2.1 Brackenfell West.

The existing industrial zone comprises 220 morgen (188 Hectares) all of which is undeveloped.

3.3.2.2 Brackenfell East.

240 morgen (205 Hectares) are zoned and only a small percentage is developed between the railway line and Old Paarl Road.

3.3.2.3 Kraaifontein Municipality.

The latest revised town planning scheme has a proposed industrial zone off the national road.

3.3.2.4 The zoning position in the study area namely the Kuils River/Blackheath complex is as follows ;

The total area is 350 morgen (300 Hectares)- 35% of the land is developed in that section to the west of the railway line.
80 to 90% of the area to the east of the railway line is developed.

3.3.2.5 Extension of present industrial zoning

from Kuils River itself can take place in a westerly direction as influenced by the following constraints :- Refer to drawing - 30.

(a) slope of land
(b) existing White residential area to the north and
(c) the Kleinvlei Coloured housing area to the south which is in the process of implementation.

3.3.2.6 In terms of the Outline Development Plan for the Cape Flats ;

Three new zones are set aside - two on Mitchells Plain and one between Macassar and Firgrove./

TABLE 8

Industrial Zones.

Cape Town Municiaplity. (35)

Ref No.	Area	Total	Developed	Undeveloped
1	Paarden Eiland/ Brooklyn	266.96	168.90	98.06
2	Woodstock	39.26	39.26	-
3	Salt River	38.65	32.68	5.97
4	Devils Peak/ Observatory	54.40	51.15	3.25
5	Maitland/Oude Moulen/Ndabeni	271.33	195.74	75.59
6	Epping Industrial	1029.56	447.28	582.28
7	Newlands	14.25	14.25	-
8	Lansdowne	28.19	21.39	6.80
9	Wetton Station	82.27	44.31	37.96
10	Crawford	11.24	-	11.24
11	Newfields	36.65	11.24	25.41
12	Heins Road	117.30	1.38	115.92
13	Lansdowne Road	27.35	6.40	20.95
14	Diep River	83.35	32.75	50.60
15	Retreat East	63.63	-	63.63
16	Military Road/ (Retreat West)	71.07	6.70	64.37
17	Lakeside	1.10	1.10	-
18	Ottery	4.87	4.20	0.67
	TOTAL Acres	2241.43	1078.73	1162.70
	" Hectares	906,90	436,25	46,94

N O T E S: (1) Unless otherwise stated, figures above are in acres.

(2) Developed areas were taken off Land Use Maps of January, 1968.

35. Municipality of Cape Town, (February 1969) Industrial Areas : Cape Town. Unpublished Report.

TABLE NO. 9.

Extent of industrial zones.
Milnerton Municipality.
February 1971. *

Location	Area in gross acres.	ditto Hectares.
North of Paarden Eiland	55	22
Montague Gardens Industrial Township	700	283
Area limited to petro-chemical use, but not zoned.	2100	894

* Milnerton Municipality : Information supplied by the Town Engineer.

TABLE 10.

Extent of certain industrial zones within Region 01.

Location of industrial area	Areas in nett acres - 1968(a)	Areas in gross acres 1970 (34)	Percentage development - 1971.
Cape Town Mun.	2400	N/A	± 80
Goodwood "	126	504	90
Parow "	325	405	63
Bellville "	600	735	62
Simonstown "	30	N/A	N/A
Milnerton "	1688	2854 (b)	N/A
Cape Divisional Council	804	N/A	N/A
Total	5973 - (2417 Hectares)		

SOURCES : (a) "Outline Development Plan for the Cape Flats" (36)

(b) Includes the petro-chemical area.

N/A Not available.

3.4 Estimate of future industrial land needs within the region.

3.4.1 This must be qualified by :-

3.4.1.1 the extent of land which will actually be available in the existing "General commercial zones", on the fringes of the city centre, in which many other uses are permitted,

3.4.1.2 the extent to which retail and wholesale activities will continue to expand at the expense of manufacturing industry,

3.4.1.3 a forecast of the various population groups which will engage in industry in the future.

3.4.2 A total of 5973 nett acres which was zoned in the Metro-area, it has been maintained, would balance a future population of 2 986 500 [36] ,(based on 10% of the total working in manufacturing industry and 50 employees per nett factory acre. On the other hand, 2 356 074 persons were projected for the year 2000.
(A later estimate is 2 975 004 according to Appendix B.).

3.4.3 However, notwithstanding the fact that in total terms the present extent of industrial zoning within the Metro-area would, on the basis of the assumptions previously made, be adequate to cater

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36. "Outline Development Plan for the Cape Flats as adopted by the Technical Sub-Committee of the Joint Town Planning Committee of the Cape and Stellenbosch on the 6th February, 1969".

for employment numbers up to the year 2000, it is also clear that

3.4.3.1 on economic grounds alone, space - extensive industries would be forced to forfeit the advantages of a central location.

3.4.3.2 In view of the shortage of industrial land near the centre and re-location of the Coloured population, there is every likelihood that those industries exhibiting high growth characteristics will be compelled to locate elsewhere.
This is notwithstanding the fact that these would be a common advantage for firms to locate in established areas by virtue of the economies of agglommeration which create a potential to attract further growth.

3.4.3.3 It has furthermore been suggested in terms of planning for the Cape Flats, that should the Milnerton zoning be adhered to and developed, there would be serious problems for labour drawn from the Cape Flats from a transportation point of view.

3.5 Implications of the "Outline Development Plan for the Cape Flats" as far as the sub-region is concerned.

3.5.1 Methodology.

3.5.1.1 In this context and for purposes of this study, "the sub-region" could be defined as that area which would be most directly affected by the Cape Flats re-settlement plan, or, potentially would derive an

intensification of activities as a result of its implementation.

3.5.1.2 Objectives in preparing the Outline Plan were - "to plan the residential and industrial future of the Cape Flats bearing in mind :

(a) proposed extensions to the air corridor of D.F. Malan Airport,

(b) glass sand preservation the retention of agricultural areas,

(c) the nuclear research station at Eerste River,

(d) removal of the military rifle range at Bellville"

"To develop on the Cape Flats an autonomous Coloured city within the Metropolitan Area" and -

"To achieve full employment for the labour force of the Cape Flats, whether inside this area or in the rest of the Metropolitan area".

Briefly, the methodology adopted was to examine the space needs for the urban settlement of the Coloured community taking existing proclaimed group areas into account and the extent of existing residential development. These were related to population estimates for the years 1985 and 2000.

3.5.2 Findings.

3.5.2.1 Conclusions as far as capacity of the Cape Flats to absorb future population increase were

(a) that sufficient land was set aside in the Outline Plan to house the then projected population for the year 1985, namely 1,041,000 persons.

		Persons
Capacity of existing proclaimed areas	=	510.883
Capacity of the new areas as shown on the Outline Plan.	=	627.280
		1.138.163

(b) that for the year 2000 these would be a shortfall of land on the Cape Flats to the extent of 662,553 persons - (projected population) = 1,800,716.

It was thus concluded that further studies on a metropolitan scale for long-term requirements were needed. (37)

3.5.2.2 N O T E: An overall gross density of 40 persons per acre was assumed

3.5.3 Labour supply and the needs of industry.

Typical factories seen to employ a high proportion of Coloured labour, and in particular, females, are textile and food factories. These have a relatively high density per unit of land which points to labour - oriented locations near housing development.

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37. Op cit, p. 19.

This is borne out by the recent trend in the clothing industry for factories to re-locate or establish along the eastern arm of the Metropolitan area as distinct from the traditional location on the fringes of the central city.

3.5.4 Inferences.

3.5.4.1 It follows that there appears to be a strong need to establish labour-intensive industry in close proximity to the planned Coloured settlements on the Cape Flats. In turn this would closely affect the future of the present Kuils River/Blackheath industrial complex.

3.5.4.2 Future mobility patterns in respect of the large population concentrations planned between Strandfontein and Macassar, to the south of national route 2, and Belhar to the north must be regarded as unknowns. Nevertheless, in the opinion of the writer, these factors have immediate connections with the planning of the transportation system, dealt with in Part VII of this study, where a flexibility of approach is attempted.

3.6 The Kuils River/Blackheath industrial complex.

3.6.1 Characteristics of an outlying location.

3.6.1.2 Dickinson [38] stated that typical characteristics were that these

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38. Dickinson, Robert E, "City and Region" (1964), p. 71.

(a) cater for heavy industries, large in size and demanding extensive ground area and

(b) the time factor of immediate accessibility to the market being not so important.

Technical factors at work are [39]
- the increasing mechanization and automation of production, which calls for more floor area per worker; the new practice of providing open land around the plant for parking, landscaping and plant expansion. The products as well as their raw materials are bulky so that they require extensive and contiguous railway or water -transport facilities. (it has been previously stressed that the area under consideration relates directly to rail and arterial routes for the movement of goods and people).

3.6.1.3 An interview at a motor manufacturing firm at Blackheath * tended to confirm or establish the following ;

(a) close accessibility to the railway as a link to the harbour was a governing factor at the time of the purchase of the site in 1948.

(b) although the firm employs a total of 1700 persons there appears to be no significant relationship between the industrial and adjoining residential areas at Kuils River.

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39. Blumenfeld, H., "The Location of Economic". Scientific American. (September 1965). p. 71.

* Interview between the manager of a motor manufacturing company and the writer (February 1971).

(c) there is no backward or forward linkage between this firm and any other manufacturer within the same complex.

3.6.1.4 The figures, below, relate to the comparative rateable values of land within four industrial areas [40] Although these are taken at different periods of time, Kuils River and Bellville sites appear to have been fairly similarly valued between 1962 and 1963.

TABLE NO 11.

Rateable valuation of industrial sites within certain municipalities.

Municipality	Average area per site in sq. feet.	Average price per site (R) (Heavy industry)	Year
Milnerton	10 000	40 000	1961
Cape Town	80 000	35 000	1966
Bellville	30 000	16 000	1962
Kuils River	50 000	7 500	1963

3.6.2 Survey of existing manufacturing establishments *

The aim of this survey was to obtain a reasonably factual record of existing manufacturing firms within the complex. This would serve as a base

40. The Official South African Municipal Year Book, 1969-1970. P. 354. "Rateable Valuation and Industrial Land".

* Field Survey of manufacturing establishments in the Kuils River/Blackheath complex (1977) - undertaken by the writer.

for later attempts at structural analysis. Owing to obvious limitations imposed by a survey undertaken by one individual, information relating to local employment characteristics must avoidably form the subject of future basic research.

3.6.2.1 Classification.

Specifically, by "manufacturing activity" or, "secondary industry" is meant the factory production and the processing of goods.(41)

The E.D.P., (1968 - 1973), listed thirty-three distinct sectors in the South African economy. For the purposes of this study, eight categories have been employed.

41. Philips, B.D. and De Coning S.,
"Secondary Industry in the Port Elizabeth/Uitenhage Region. - A Structural Analysis".
Institute for Planning Research, University of Port Elizabeth. Research Report No. 2 (1969)
A Report prepared for the Resources and Planning Advisory Council. P. 24.

TABLE 12

Manufacturing establishments in the Kuils River/Blackheath complex. 1970. Detailed description.

Classification	Description of establishments
3. Wood/Furniture	- Sawmills - Joinery - Timber products - Hardware.
5. Chemicals	- Fertilizers - Paints - Chemicals.
7. Engineering/ Motor manufacture	- Engineering works - Motor car assembly motor manufacture, and central parts division. - Sheet and light metal works.
8. Miscellaneous	- Concrete products - Farming equipment - Boat builders - Scrap merchant - Chinaware - Jewelry - Asbestos products - Fencing - Caravans - Ceramics - Floor tiles - Slateworks - Store.

3.6.2.2 Findings.

It will be seen that of the eight categories in the chosen classification, four are not present locally, these being ;

Classification number	Type.
1	Food and Beverage
2	Clothing/Textile
4.	Paper/Printing
6.	Footwear/Leather.

At this point it might be relevant to note that of the above 'missing' categories, at least three can be regarded as normally labour - intensive. A more detailed breakdown follows;

TABLE NO. 13

Manufacturing establishments in the Kuils River/Blackheath complex - 1970 General breakdown.

Classication	Number of establishments.
1. Food and Beverage	-
2. Clothing/Textiles	-
3. Wood/Furniture	5
4. Paper/Printing	-
5. Chemicals	7
6. Footwear/Leather	-
7. Engineering/motor manufacture	9
8. Miscellaneous	18

3.6.3 Extractive industry in the vicinity of Kuils River/Blackheath.

Refer to Drawing No. 11, which depicts

(a) brickworks, some distance to the north-east near Brackenfell and

(b) several stone and gravel quarries to the south-east near Eerste River.

3.6.4 Growth Industry.

3.6.4.1 The significance of the occurrence of growth industries relates to the composition of the industrial base of a region, and, in the national context, its potential for future growth.(42) Thus the analysis which follows in respect of Kuils River/Blackheath is intended merely as an indication of present trends in the area and as a basis for future analysis, should significant change take place.

42. "Goodwood Development Plan"; Technical Appendices. Table 2 p.p. A.2.0, 1.3 and 4.

TABLE NO. 14

Industry within the Kuils River/Blackheath complex, ranked according to sectoral growth in the national economy.

		Number of firms occuring within the Kuils River/Blackheath complex.
Group 1.	Industries whose rate of growth is lower than the overall growth rate for all Manufacturing Industries in South Africa.	
1	Food	0
4	Clothing and Footwear	0
5	Timber	5
6	Furniture	
9	Leather and leather products	0
10	Rubber products	0
Group 11.	Industries whose rate of growth is similar to the overall growth rate for all Manufacturing industries in South Africa.	
2	Beverages and Tobacco	0
11	Chemicals and chemical products	7
13	Non-Metallic Mineral.	0

			Number of firms occuring within the Kuils River/Blackheath complex.
Group 111.	Industries whose rate of growth is higher than the overall growth rate for all Manufacturing industries in South Africa.		
	3.	Textiles	0
	8.	Printing and publishing	0
	14.	Basic Metal industries	0
	16.	Machinery	9
	17.	Electrical Machinery	0
	19.	Miscellaneous	0
Group 1V.	Industries whose rate of growth is substantially higher than the overall growth rate for all Manufacturing industries in South Africa.		
	7.	Paper and Paper products	0
	12	Products of Petroleum and Coal.	0
	13	Transport Equipment.	See Group 111 No. 16.

3.6.5 Kuils River/Blackheath within the Metropolitan context : Potential expansion of industrial zones.

3.6.5.1 The total potential land which could ultimately be taken up by the Kuils River/Blackheath industrial complex can be calculated, based on the following assumptions :

(a) full utilisation of "undetermined land in terms of the Outline Development Plan for the Cape Flats and

(b) proclaimed residential group area boundaries to remain unchanged within the forseeable future.

TABLE 15

Ultimate possible extent of the Kuils River/Blackheath industrial complex.

Description	Total extent in gross acres.	Total extent in nett acres.
Present zones	735 (43)	490 (44)
Future possible extension (uncommitted land)	1814	1270 *
Total (Acres)	2549	1760
(Hectares)	1031	712

SOURCES.

43. Report on the proposed Eerste River Industrial Township Extension No. 3: Meerlust by the Stellenbosch Divisional Council - unpublished.

44. Planning Report No. 4. Prepared by the Provincial Administration of the Cape of Good Hope "Greater Cape Town Region - Land Use." Table 52.

* Assumption; Major road and railway reserves would be equivalent to 30% of the gross area.

3.6.5.2 The figures, below, correlate present and ultimate possible extent of the Kuils Rover/Blackheath industrial zones as a percentage of the total remaining zones within Region 01.

TABLE 16

Extent of Kuils River/Blackheath industrial zone both existing and projected in relation to Region 01.

Kuils River/ Blackheath industry.	Percentage of total land - Region 01.
Present zones	8, 2%
Future possible extension (un-committed land)	29, 4%

Note: Comparisons are made on the basis of nett area derived from previous tables 10 & 15.

3.7 Conclusions.

In terms of national economic policy, two alternative approaches have been put forward, either

3.7.1 to maintain the present growth rate through mechanization and improving the quality of the labour force, or

3.7.2 development dictated by the traditional growth of the latter. This could lead to structural problems.

3.7.3 The implication for the Western Cape is that industrial expansion needs to be accelerated in order to take into employment an additional ½ million Coloured people within the next ten years.

3.7.4 As far as the economic growth potential of the Cape Town Metropolitan Area and hinterland is concerned, it appears that a sufficient proportion of growth industries are present to induce further growth. This assumption is supported by recent trends in electricity consumption and the rate of factory construction. Furthermore, the 01 Economic Region can be regarded as an expanding internal market. As regards overseas export trade, Table Bay Harbour makes an ideal break-of-bulk point.

3.7.5 The above must be qualified by the fact that Cape Town in relation to other centres, is at a relative geographic disadvantage, with longer hauls to the main consumer markets of the Rand. This disadvantage could possibly be alleviated by various kinds of economic concessions stemming from policy at national level. Other long-term solutions might lie in the establishment of /

3.7.5.1 significant growth points in the Western Cape ;

3.7.5.2 a nuclear-powered industrial complex and

3.7.5.3 the extension of the port facilities of Cape Town.

3.7.6 The capacity of existing industrial zones within the 01 Economic Region were examined. It was estimated that 80% of the existing industrial erven in Cape Town Municipality were developed.

3.7.7 Thus, statistics indicate the shortage of industrial land in the established zones towards the central city and, at the same time, the outward expansion trend of manufacturing industry along the eastern arm of the Metro-region

3.7.8 Goodwood industrial area has almost reached its developed capacity whilst, on the other hand, a significant amount of land is still available in Parow and Bellville for manufacturing industry. Development infill can take place within the present Kuils River/Blackheath industrial complex, mostly to the west of the railway line, whilst expansion can take place along the Cape Flats in a westerly direction.

3.7.9 Estimates of future industrial land needs within the region were set out, basically, as follows :- The total amount of land zoned for manufacturing industry within the Metro-area would balance a total future population of 2 986 500. This is more than the 2 356 074 persons projected for the year 2000. Notwithstanding the apparent adequacy of the extent of industrial zoning in total terms, it could be assumed that, from a location point of view, space-extensive industry and those types exhibiting high growth characteristics will be forced to locate in the more outlying areas of the city.

3.7.10 Implications of the "Outline Development Plan for the Cape Flats" as far as Kuils River is concerned, could be summed up in the following manner :- Should the re-settlement plan be implemented, it is assumed that a definite need will arise for the establishment of labour intensive industry in relative proximity to Coloured housing. By virtue of its location, it is, furthermore assumed that the Kuils River/Blackheath complex could fulfill this function over time.

3.7.11 Typical factories seem to employ a high proportion of Coloured labour, and in particular, females, are in textiles and food.

3.7.12 Because mobility patterns of the future population on the Cape Flats cannot be rigidly anticipated, a flexible approach in the planning of the transportation system is called for.

3.7.13 A survey of present manufacturing establishments within the Kuils River/Blackheath industrial complex reveals the absence of four major categories or types, these being

- Food and Beverages,
- Clothing/Textiles,
- Paper/Printing
- Footwear/Leather.

Of the above categories, at least three are normally regarded as labour-intensive. This ties in with the previously expressed need to create employment opportunities and, which in turn, would be dependent upon entrepeneurship within private and public sectors.

3.7.14 The characteristics of existing industry within the complex were examined leading to the following conclusions:

The presence of firms in the Machinery category, which has a growth characteristic higher than the overall growth rate for all manufacturing industries in South Africa. Again, the motor car assembly and manufacturing firm at Blackheath, is placed in the Transport Equipment category which has a rate of growth substantially higher than the overall growth rate for all manufacturing industries.

3.7.15 Future possible extension of the Kuils River/Blackheath complex in a westerly direction, utilising land which is uncommitted in terms of any official zoning, could lead to its enlargement/

4.2 Population change.

TABLE NO 20

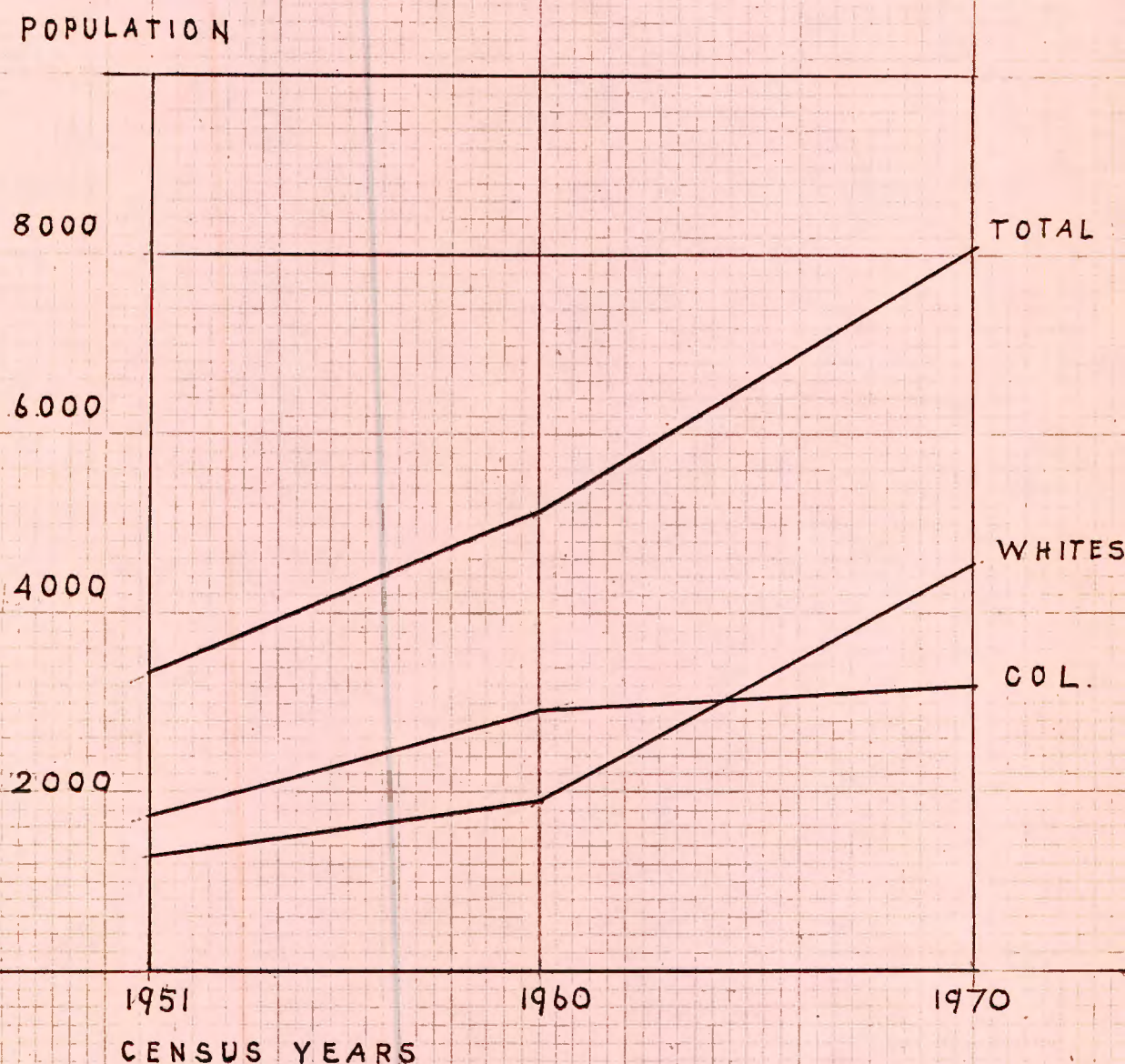
Population trends:
Kuils River as compared with Metropolitan Cape Town taken as a whole.

Census Years	Racial group	Metropolitan Cape Town.		Kuils River	
		Population	Rate	Population	Rate
1951	All races	632 013		3350	
	Whites	266 715		1281	
	Non/White	365 298		321	
	Coloureds	297 018		1748	
1960 (47)	All races	807 211	2,8	5152	4,9
	Whites	305 155	1,5	1864	4,2
	Non-Whites	502 056	3,6	413	2,8
	Coloureds	417 881	3,9	2875	5,7
1970 (48)	All races	1096 597	3,5	8041	5,1
	Whites	378 505	2,4	4477	10,8
	Non-Whites	119 140	17,3	384	0,8
	Coloureds	598 952	4,1	3180	1,1*

* decline

47. Population Census (6th September, 1960), Volume 1. "Geographical Distribution of the Population".

48. Provisional Population Census, 1970 as compiled by the Department of Statistics subsequent to the announcement of the first preliminary results in the House of Assembly on the 25th of September, 1970.



KUILS RIVER:
POPULATION CHANGE.

GRAPH A

4.2.1 Conclusions to be drawn from the preceding table :

4.2.1.1 Total population growth rate (all races) in Kuils River has been significantly higher than that of the Metropolitan area, taken as a whole, between the years 1951 to 1970. This higher rate of growth has been more marked within the latter period, namely 1960 to 1970.

4.2.1.2 Refer to graph A which depicts relative population change by race for the period from 1951 to 1970. This serves to emphasise

(a) an accelerating growth rate for Whites between 1960 and 1970

(b) the fact that the total Coloured population has levelled off in numbers having being restricted to a particular proclaimed Group area within the municipal boundaries.

4.3 Residential growth compared between various Municipalities.

4.3.1 Treatment of data.

The following building plan figures, taken out from various municipalities, are subsequently utilised in this section to compare growth rates. Statistics relate to single dwellings for Whites, only.(49)

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49. Survey of residential erven available in the urban areas of Cape Town, including numbers of building plans approved by certain local authorities - The Provincial Administration of the Cape of Good Hope - (31st December, 1970) - Unpublished.

TABLE NO 21

Building plans approved for single dwellings in respect of certain municipalities within the Greater Cape Town Region.

Municipality	Building plans approved for single dwellings (Whites).					
	1965	1966	1967	1968	1969	1970
Bellville	366	350	285	217	340	482
Brackenfell	-	-	45	102	35	135
Durbanville	24	26	50	53	71	104
Goodwood	153	185	307	349	207	216
Gordons Bay	19	8	9	26	40	19
Kraaifontein	-	133	120	163	261	630
Kuils River	95	105	144	95	121	66
Milnerton Bothasig Montagu Gardens Tableview	68	96	86	124	136	167
Paarl	59	60	48	54	79	94
Parow	280	312	228	143	129	206
Simonstown	17	43	17	28	25	35
Somerset West	86	91	97	97	182	160
Stellenbosch	67	50	65	35	59	55
Strand	85	77	95	83	136	137
Fishhoek	70	60	61	59	63	57
Wellington	33	31	49	47	70	60

TABLE NO 22

Various municipalities within the Greater Cape Town Region ranked according to the total number of built-up single residential erven as at 31st December 1970 (Whites).

Category A: Municipalities with an estimated lesser number than 1000 houses for Whites.

Municipality	Total houses 1970	Estimated percentage change 1965 to 1970
Gordons Bay	377	47.3
Simonstown	493	50.3
Brackenfell	522	154.6
Durbanville	747	78.0
Wellington	802	56.6
	Average percentage development =	77.3

N O T E :

Derivation of estimated percentage change -
Total number of houses recorded in 1970 less the total number of house plans approved from 1965 to 1970.

Refer to Appendix A for total numbers of vacant as compared with developed erven within various municipalities.

Category B. Municipalities with an estimated 1000 to 2000 houses for Whites

Municipality	Total houses 1970	Estimated percentage change 1965 to 1970.
Kuils River	1015	160.3
Kraaifontein	1577	484.0
Fish Hoek	1631	29.3
Stellenbosch	1662	24.9
Somerset West	1842	63.2
	Average percentage development	= 152.3

Category C. Municipalities with over 2000 houses for Whites.

Municipality	Total houses 1970	Estimated percentage development 1965 to 1970.
Milnerton, Bothasig, Montagu Gardens, Tableview	2152	45.9
Strand	2331	22.6
Paarl	2618	17.0
Goodwood	4457	46.4
Bellville	6139	49.8
Parow	6365	25.6
	Average percentage development	= 34.6

TABLE NO 23

Municipalities arranged in descending order, according to the total number of house plans approved for whites during the period 1965 to 1970.

	Municipality.	Total house plans approved 1965 to 1970.
1	Bellville	2040 -
2	Goodwood	1417 -
3	Kraaifontein	1307 -
4	Parow	1298 -
5	Durbanville	747
6	Somerset West	713
7	Milnerton Bothasig Montagu Gardens Tableview	677
8	Kuils River	625
9	Strand	613
10	Paarl	394
11	Fish Hoek	370
12	Stellenbosch	331
13	Brackenfell	317
14	Wellington	290
15	Simonstown	165
16	Gordons Bay	121

FINDINGS:

Kuils River within category B.

(Municipalities with an estimated 1000 to 2000 houses for Whites.)

(1) Kuils River has apparently experienced a higher than average percentage development over the six year period.

(2) of the five municipalities within this category, only Kraaifontein appears to have had a higher development rate.

4.4 The pattern of residential township subdivision at Kuils River.

4.4.1 Refer to the table below and drawing 21.

TABLE NO 24

Kuils River : Recorded township approvals.

Township designation	Year of approval by Administrator.
Extension No. 11	1905
Extension No. 12	1952
Gersham Township	1952
Extension No. 5	1953
" " 1	1953
" " 3	1954
" " 4	1954
Silveroakes Extension No. 1	1955
Extension No. 8	1955
" " 2	1956
" " 7	1956
" " 9	1959
Extension No.14	1965
" " 22	1968
Bosonia	1968
Extension No.21	1969
" " 24	1969
" " 27	1969
" " 23	1969
Silveroakes Extension No.19	1969
Extension No.33	1970
" " 6	1970
" " 30	1970

4.4.2 The latter serves to illustrate the fact that the area to the West of Strand Road and up to the railway line, is the older section of the town which centred on the station. In recent times, White housing development has expanded in an easterly direction towards the Bottelaryberg.

4.5 Projection of development - rate.

The following calculations lead to the finding, that on the basis of past building plan approvals, it would take approximately five years for existing vacant residential erven in Kuils River to be utilised. This must be regarded as a conservative estimate as it assumes a constant percentage growth rate per annum, being an average derived from previous years. It could be concluded that should an accelerating annual rate of development be experienced, then significant expansion of existing residential areas would presumably take place within a lesser time than the estimated five years. This statement is qualified by an awareness that several unknowns enter the picture, within the context of housing supply, namely,

(a) the extent of building development, as tied to the liquidity of the economy, at any particular point in time and

(b) variable factors of production relating to the availability of labour, and cost of materials which generally have a bearing on construction.

TABLE NO 25 Kuils River;

Estimated annual percentage residential development (Whites) for the years 1965 to 1969, inclusive, based on records of building plans approved.

Year.	Estimated percentage.
1965	23.51
1966	21.04
1967	26.66
1968	12.55
1969	15.21

The above represents a 13.7% average increase over five years.
Applying this rate to the formula.

$$A = P \left(1 + \frac{R}{100} \right)^n$$

$$1875 = 992 \left(1 + \frac{13.7}{100} \right)^n$$

$$n = 4.96,$$

say 5 years.

4.6 S U M M A R Y.

4.6.1 Estimated 35% of working population commuted daily by train towards the central city during the period 1966, for which information was available :

4.6.2 Above reflects the dormitory role of Kuils River, with, as far as Whites are concerned, majority of work-journeys taking place in the direction of Bellville, Parow, Goodwood and

the Central City

4.6.3 From a location point of view there appears to be a purely coincidental relationship between the Kuils River/Blackheath industrial complex and the adjoining residential areas. Further substantiating information on local travel patterns is required.

4.6.4 Accessibility to the C.B.D. can be compared as far as various municipalities are concerned. Kuils River is approximately on the same isochrone as Brackenfell and Durbanville, which are experiencing a rapid rate of residential development. However, Kraaifontein on national route 9 is on the same isochrone as the latter (measured during the morning peak) although approximately 2 miles further from the C.B.D. compared with Kuils River. It is concluded that, all in all, Kuils River compares favourable with other locations along the eastern arm of the Metro-area, as far as accessibility to the centre is concerned. This must, however, be qualified by the fact that with several employment centres in the region no one distance can be meaningful to all residents. Choice of residential location would therefore reflect qualitative environmental aspects as well.

4.6.5 Census population figures between the year 1951 and 1970 show that, with all races taken together, Kuils River has exhibited a higher growth - rate when compared to the Metro-area taken as a whole. This reflects a marked increase in the White population over this period but a levelling off in the numbers of the Coloured group as relating to the specific proclaimed area within the municipal boundaries.

4.6.6 The number of house plans approved in Kuils River (Whites) over a 5 year period has been greater than the average of other areas listed.

4.6.7 Extrapolation of township development.
Based purely on previously recorded rates of growth, it would take approximately 5 years for existing vacant erven to be utilised. It is concluded that should an accelerating growth be experienced then expansion must take place within a lesser time.

P A R T V

THE RETAIL AND OFFICE COMPONENTS.

5.0 General Statement.

5.0.1 In retail shopping, the intermediate centre offers greater choice and variety than the neighbourhood centre does and provides the higher quality durable goods for which shoppers make longer but less frequent trips than they do for their day-to-day needs. The intermediate centre comes into being after a certain threshold of potential sales has been reached in the area and this depends, not only on the size of the population of the tributary area, but also on the purchasing power and mobility of that population. (50)

5.1 Existing centres within the Metropolitan Area.

5.1.1 In a study(51) of existing centres in the Metropolitan Area (Region 0 1) indices were selected in order to show, very broadly, the difference in level of the various intermediate centres as compared with the C.B.D. and the centres of a lower order. Whilst the information relating to 1966, on which that study was, based does not fully represent the latest position in detail, findings can reasonably be applied to the area under consideration in order to illustrate the relative position.

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50. "Readings in Urban Geography."
- Article by Homer Hoyt -
"Classification and Significant Characteristics of Shopping Centres." p.p. 454 - 456.

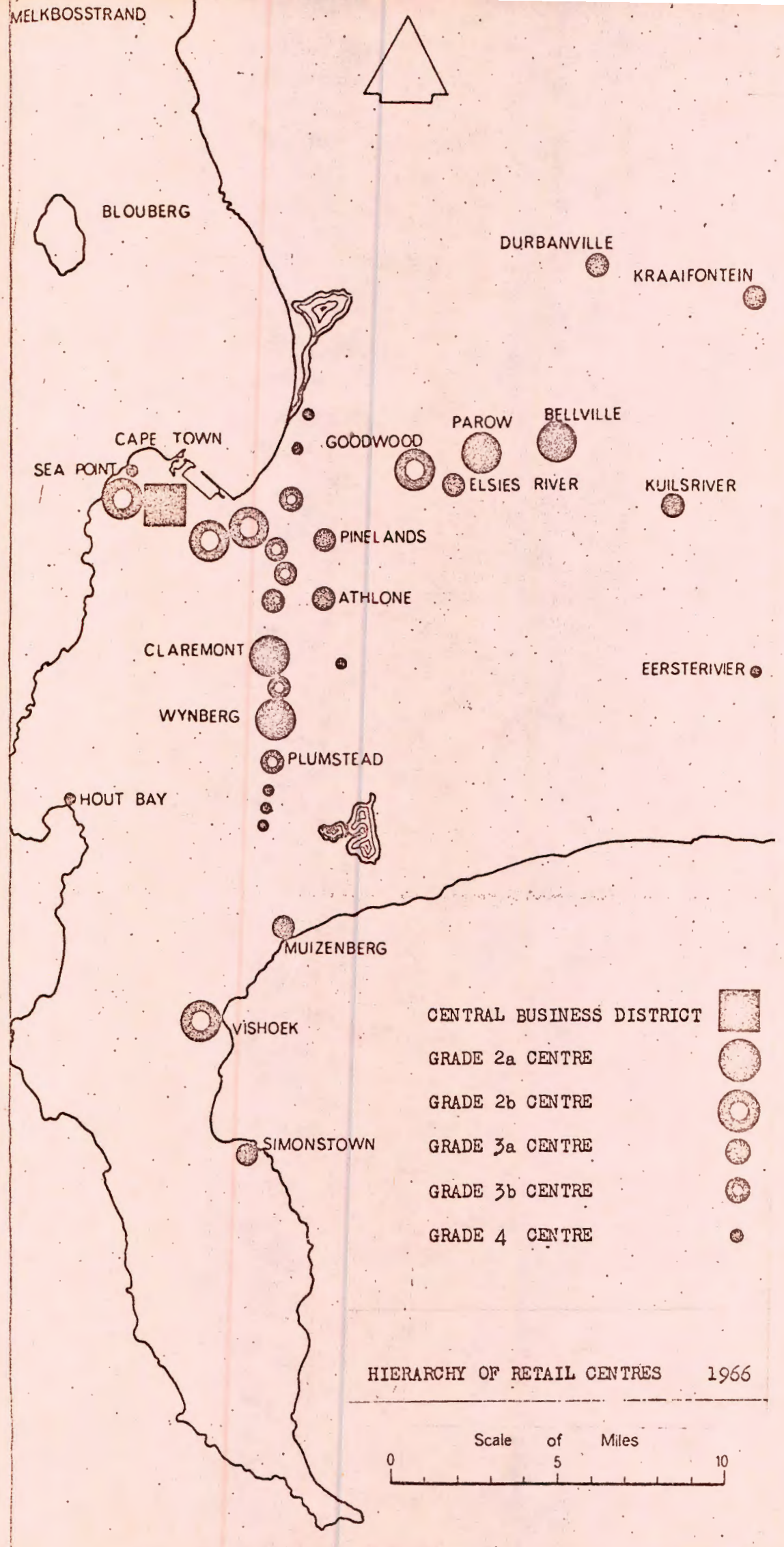
51. Outline Development Plan for the Cape Flats --"

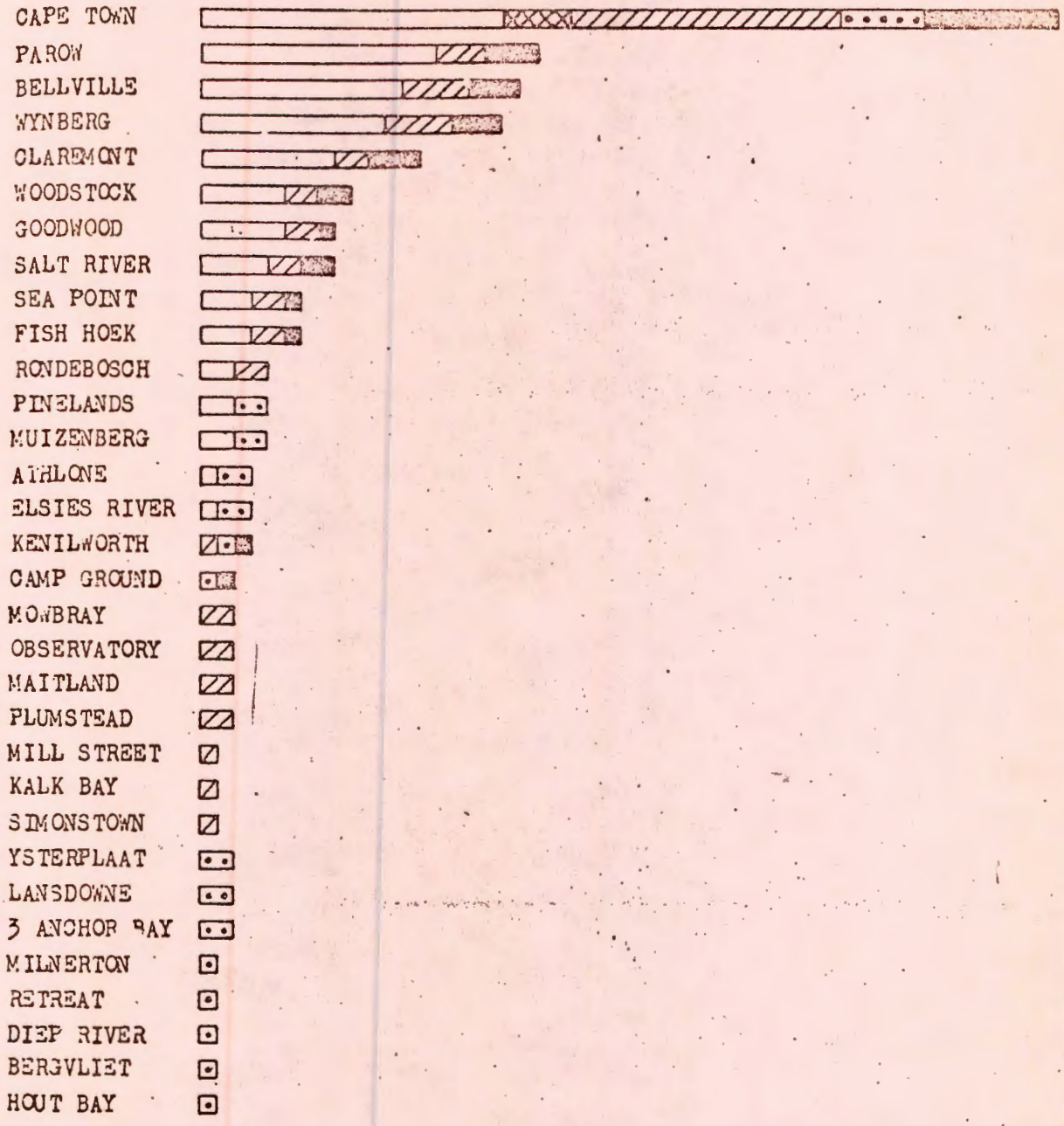
5.1.2 Department stores and variety stores (bazaars) were taken as indices since they were considered to be the most distinctive features of a major shopping centre and a measure of the variety on the level of the services offered in it. Eleven chain stores having a wide spread throughout the Western Province were selected as indices typifying the range of other facilities in the centre and representing its general activity. Bank branches and agencies were included for the same purposes. The order of the frequency of these indices are shown in Figure 26 and presented on map 22. Parow, Bellville, Wynberg, Claremont, Woodstock, Goodwood, Salt River, Sea Point and Fish Hoek emerged, at the time, as the major intermediate centres, having at least one departmental or variety store and two bank branches. Kuils River was depicted as a "Grade 3a Centre" similar, to say, Pinelands or Muizenberg.

5.2 Kuils River; The retail and office components.

5.2.1 General:

In order to establish the latest position as far as Kuils River is concerned, the author conducted a field survey, the results of which are set out below. From this, it would appear that the position of Kuils River in the hierarchy of retail centres remains unchanged.


MELKBOSSTRAND
BLOUBERG
DURBANVILLE
KRAAIFONTEIN
PAROW
BELLVILLE
CAPE TOWN
GOODWOOD
SEA POINT
ELSIES RIVER
KUILSRIVER
PINELANDS
ATHLONE
CLAREMONT
EERSTERIVIER
WYNBERG
PLUMSTEAD
HOUT BAY
MUIZENBERG
VISHOEK
SIMONSTOWN
CENTRAL BUSINESS DISTRICT
GRADE 2a CENTRE
GRADE 2b CENTRE
GRADE 3a CENTRE
GRADE 3b CENTRE
GRADE 4 CENTRE
HIERARCHY OF RETAIL CENTRES 1966
Scale of Miles
0
5
10



Variety or Department Store

Chain Store

Bank, Head Office

" Branch

" Agency

TABLE NO 27

Kuils River - Business Firms.

December 1970.

Type	Number of Establishments.
OFFICES.	
- Banks	2
- Building Society office	1
- Broker's office	1
- Attorneys offices	2
- Post Office	1
- Municipal offices	1
SHOPS.	
- Supermarket	1
- Dress Shop	1
- Furniture Shops	3
- Gift Shop	1
- Motor Showroom	1
- Dairy	1
- Dry cleaner	1
- Chemists	2
- General Dealers	2
- Fish Shop	1
- Hardware Dealer	1
- Bottle Stores	4
- Garages.	6

5.3 Present form of commercial development in Kuils River and future possibilities.

5.3.1 The existing situation is one of "ribbon development" along Strand Road, which connects the two national routes. A core area is defined on the land-use map.

5.3.2 It would appear that the future of the local office and retail components is closely tied to existing intermediate centres along the eastern communications arm, namely at Goodwood, Parow and Bellville in particular. In turn, the extent to which the local centre at Kuils River could develop would depend on the manner in which certain opportunities inherent in an outlying locality are taken up such as relatively cheap land which could be made available for public parking.

PART VI

SERVICES.

6.0 WATER.

6.1 The resource aspect.

6.1.1 Increasing pressures on available water resources indicate that it may ultimately be the determining factor in establishing the upper limits of the capacity of the land to support human needs. These increasing pressures have caused the emergence of a new philosophy regarding water exploitation. No longer are water schemes purely for crop acceleration in drought - prone regions. Today, the accent is on the inter-regional development which requires multi-purpose dams.(52)

One of the most vital conclusions which international engineers have come to is that while the efficiency of water control is dependent upon engineering skills and resource investment, it can only be excercised within the framework of existing legislative requirements.

6.1.2 South Africa's increasing sensitivity to drought conditions is due, in the main, not so much to the severity of recent droughts, but to human failings in agricultural and hydraulic techniques. This has focussed attention on the pattern of

52. Dr. Oliver, Henry. Article in Optima (June 1970) "Water" P.P. 60 - 61, 67.

water demands and priorities. The table below gives a clear picture of where present demands lie :

TABLE NO 28

Water demand in the Republic	% of total.
Local Authorities	6.9
Industry and Railways	4.3
Mining	3.6
Power generation	1.6
Sub total	16.4
Irrigation (average)	82.6
Stock watering	1.0
Total	100.0

6.1.3 Cost - Benefit.

ECONOMIC evaluation entails comparison of 'cost' and the 'value' - measured from the national or the regional viewpoint - in terms of the true value of the resources committed to, and expected to be derived from, the implementation of a particular plan. While this is difficult to measure, there are criteria which can be used to establish a useful economic evaluation. Recovery of the cost of the scheme, viz., financial appraisal, on the other hand, involves comparisons of 'cost' and 'price'. In many instances this comparison serves as a basis for establishing 'price' and indicates whether the undertaking will be self-sustaining. Thus considerable benefit for S.A. would be gained by basing future planning and the design of development on these dual methods of analysis.

6.2 The Western Cape including the Greater Cape Town Region:

6.21 Water consumption and supply.

6.2.11 Water consumption of Cape Town was estimated in 1967 to be about 50 million gallons, daily. A projected demand for 1970 was 61

of the above units. (53) According to information supplied by Cape Town Municipality, the figure, in fact amounted to 53,8 gallons per day, influenced by restrictions which were applied. The water supply system uses a total of 19 storage reservation.

TABLE 29

Greater Cape Town Region:

Present Sources of water supply.

Source		Assured yield m.g.p.d.
(1)	Table Mountain and springs	3
(2)	Steenbras	19
(3)	Wemmershoek	26
(4)	Voëlvlei	12
	Total	60

6.22 Future Sources.

6.221 When the need presses, there is no clear limit to the distance a city will go for water supplies, but at this stage, a limiting range of 90 to 100 miles can be set for Cape Town. Within this radius, three of the four major river systems of the Western Cape have their origin viz.,

(a) Olifants
(b) Berg
(c) Breede with its tributary - the Riviersonderend.

Aggregate annual flows of the above are equivalent to some 1,800 million gallons a day.

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53. Blersch, H.C. Lecture to the Institute of Citizenship "Meeting the Cities appetite for water."

54. Project U.C.T. 1967/2/1 as updated according to figures supplied by Cape Town Municipality, February 1971.

6.222 Indications are that the more immediate future sources of Cape Town's supplies lie in the Berg River and Riviersonderend valleys, with the upper Olifants as an outsider, and the Diep River, not to be entirely discounted because of its relative proximity to the Tygerberg reservoir and absence of major competition for its water.

Between them, and well within the 100 mile radius, these sources have an annual run-off equivalent to some 800 million gallons a day, about eight times the extra needs of the Cape Town supply area by the end of the century, apparently a good margin for other claimants to water.

6.23 Industry.

As far as rising water costs in relation to industry is concerned it must be stressed that the price of water has risen at a rate well below the general inflationary rate. Secondly, manufacturing industries likely to flourish here generally have a low water consumption.

Clothing, shipbuilding, light engineering, motor assembling, fishing, glass and pottery and labour - intensive industries generally, use less than 10 gallons a rand product value. Cotton textiles, fruit processing and leather use less than 50. An increase of 10 cents per 1,000 gallons in water tariffs thus increases production costs by 0.1 to 0.5 per cent.

6.24 General Estimates of needs.

6.241 Present water usage in the region is estimated between 300,000 and 400,000 morgen feet, the bulk for irrigating some 100,000 morgen. The Cape Town conurbations extra need by the end of the century is equivalent to irrigation requirements of about 25,000 morgen. A population of 4 million supported entirely by manufacturing would require less than 10

per cent of the unused river flow.

6.242 Officials from the Water Department estimated that the future gross water demand of the area supplied by Cape Town will be as set out below.

Table 30
Future gross water demand.

1975 :	75	million	gallons	per	day
1980 :	95	"	"	"	"
1990 :	145	"	"	"	"
2000 :	220	"	"	"	"

Cape Town is expecting the allocations as shown below. If these are added to the assured yield of 53.8 m.g.p.d. and compared with the expected future needs, it is seen that they will meet the requirements as follows :-

Table 31
Water allocation : (54) Cape Town Metropolitan region.

	Dams	Yield m.g.p.d.	Added to present yield	Will meet expected requirements up to year.
(5)	Assegaibos	6	76	1972
	+(Wemmershoek)		94	1975
(6)	Twenty-four Rivers	37	103	1983
(7)	Diep River	27	130	1987
(8)	Keerom (Riviersonderend)	50	180	1995
(9)	Misverstand	72	252	2000

NOTES.

(a) the order in which the above schemes are presented must be regard as hypothetical.

(b) the figure of 94 m.g.p.d. projected for 1975 is based on an anticipated increased capacity for Wemmershoek Dam.

6.25 Water supply and reticulation as affecting Kuils River.

6.251 Kuils Rivier draws off the Cape Town system from

(a) Steenbras Dam and

(b) the Tygerberg service reservoir, the latter linking from Wemmershoek.

Voëlvlei to the Tygerberg is an additional source of supply.

6.252 Technically, the local system must be designed so as to

(a) achieve a constant supply and

(b) avoid local variations in pressure. The point where water is drawn off the main to the pump station is critical as this must avoid disturbing the flow of the Cape Town system taken as a whole.

6.253 Supply capacity relates to the overall position. Capital works in this context have to be undertaken to cater for a ten year predicted period. The dormitory role of Kuils River marked reliance on population projections difficult, since the likelihood is that interim adjustments will be necessary.

6.3 Sewage disposal.

6.31 This can become even more important than water supply in view of the health factor involved.

Kuils River is nearing the end in the implementation of a sewerage scheme which was started at the beginning of 1969.

6.32 Brackenfell Municipality passes sewage through to the Kuils River disposal works, which, in turn, affects its capacity. In view of the planned Coloured city in terms

of the Joint Town Planning Scheme, the possibility of a regional works at Maccassar Beach is under consideration. This would take into account the natural drainage system which follows the Kuils River.

6.33 Locally, the area which can be served by gravity flow is extensive. However pumping must be resorted to in the low-lying Blackheath area.

Extension of reticulation to future townships must be phased so as not to place a cost burden upon the local authority.

6.4 Stormwater disposal.

Three main "depressions" may be observed within immediate vicinity namely, along the Kuils and Bottelary Rivers and the Langverwacht sloot. Generally, development creating hard surfaces, affects natural drainage.

6.5 Electricity supply.

This is to be seen from an inter-regional point of view. A gauge of industrial growth is the fact that the demand for electricity in the Western Cape is increasing by more than 6 per cent per annum and to assist in meeting this demand Escom are constructing two 400,000 volt overhead transmission lines from the Transvaal to the Cape. This is the first link in an E.H.V. grid which will eventually cover the entire Republic interconnecting the power generating resources of Cape Town, Port Elizabeth and East London with those of Bloemfontein and the Transvaal.

Once Cape Town is connected by these land lines to the north the way will be open for the construction by Escom of a nuclear power station at a suitable coastal site, the commissioning of which in 1978 will considerably strengthen the electrical ties between north and south. (30)

P A R T V11.

T R A N S P O R T A T I O N

7.0 Preamble.

7.0.1 It becomes necessary to relate the various land-use activities, previously analysed in this study, to an overall system of communications and movement. Thus the intention is, in the first instance, to briefly outline some general concepts leading up to current emphasis on an integrated approach towards transportation and land-use.

7.0.2 Transportation, in the context of the specific region, is then highlighted. Future extension of the system, particularly in response to planned Coloured population re-settlement on the Cape Flats, is seen to be highly significant as far as Kuils River is concerned. A possible form in which this might take, flexible enough to allow for future change, is suggested.

7.1 Theoretical Concepts.

7.1.1 The role of communications in the distribution of urban activities.

Guttenberg[55] sees the primary objective in city planning as the bringing together of people to meet their human cultural needs. He states that "in working towards this objective there are only two means at hand : people can be transported to facilities, or facilities can be transported

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55. "Comprehensive Plan for the City of Philadelphia" "General Concepts"
Guttenberg, Albert Z.

to people. Each method, in the extreme, produces a different kind of city." Thus the two basic elements are seen to be the "facility" and the transportation system. The former element is broken down into

(a) the ' distributed facility', these which are so important to the public welfare that, if possible, they must be distributed throughout the city to be within easy reach of all - in this, transportation has no function and

(b) the "undistributed facility" in the sense that these can only be made accessible to people through the transportation system.

Constraints relate to the differences in the mobility of people and by facilities which cannot be distributed. Mobility varies according to age, sex and income, whilst the distribution of facilities is a matter of economic plant size or of accessibility requirements - hence the hierarchical tendency of urban structure.

7.1.2 The Test of efficiency.

From an economic point of view, Ratcliff[56] maintains that locational maladjustments which might be in existence in the city and which tend to impair its efficiency, are not problems of size, per se. He states that one of the basic costs in all human activity is the cost of overcoming space. Furthermore, that there is a positive disutility of distance, a disutility which is a joint product of the functions involved, the distance and the importance of the contact. Thus he arrives at the conclusion that in

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56. Ratcliff, Richard, U.
Article - "The Dynamics of Efficiency in the Locational Distribution of Urban Activities."
p.p. 300 - 301.

the costs of distance we have the test for the efficiency in the locational distribution of urban activities. Thus, he maintains that the space arrangements of the city are most productive, or efficient, when in total, costs of distance are minimised. A second measure of efficiency would be the equitable distribution of the burden of locational costs in accordance with benefits received. He holds that these tests are "social tests" in the sense that the underlying criterian would be the welfare of the community.

7.2 An integrated approach towards land-use and transportation.

7.2.1 Dyckman (57) refers to a prototype "city planning" study undertaken by the University of Pennsylvania in 1954 which underlined a basic proposition ; that traffic can be manipulated by controlling and re-arranging the land uses that represent the destinations and purposes of transportation. This principle was later applied in the Detroit Area, Penn-Jersey and Chicago studies etc. He states that in focussing on the whole system of relations between users and facilities,

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57. Dyckman, John, W.
Article - "Transportation in Cities."
Scientific American, Volume 213, No. 3.
(September 1965) p. 164.

the material is furnished for the solution to the two major problems of urban transportation, namely

(a) how to obtain efficient movement and

(b) how to promote new activities.

7.2.2 In the above respect, an article relating to British planning practice (58) treats the same subject matter in further depth. The following points are made ;

7.2.2.1. The real complexity of urban systems eventually forces co-ordination across many professional boundaries. The Ministry of Transport and the Ministry of Housing and Local Government have joined in promoting land/use transport studies of particular areas of England and Wales. All major conurbations are being, or, have been, covered.

7.2.2.2 The high cost of transportation facilities justifies the cost of traffic surveys, which are held to be minor in cost relative to the ultimate capital investment.

7.2.2.3 It has been found that in terms of British legislation, the planning of urban roads and transportation has been isolated technically, administratively and financially from statutory land -use planning, even though both sides have often been the responsibility of

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58. Solesbury, W. and Townsend, A. "Transportation Studies and British Planning Practice". Article in the Town Planning Review. Quarterly Volume 41. Number 1. (January 1970).

the same local authority.

7.2.2.4 Furthermore, as far as technique is concerned, the procedure of considering alternative transportation solutions but only one set of zonal land use data may close transportation opportunities with an imbalance in favour of transportation.

7.2.2.5 Finally, organisational techniques which would enable multi-disciplinary work are only slowly developing.

7.3 Transportation and urban strategies.

Planning strategies [58] for conurbations and sub-regions are seen to be essentially long-term. Thus the main historical development has been the evolution of transportation studies as a tool for highway planning over a fifteen year period to a central element in the long term urban structure plan.

The process of considering alternative land-use plans in more recent transportation studies has provided the opportunity to review urban planning strategy in its own right. In turn, the opportunity for developing new urban strategies very much depends on the scale of growth expected, which in turn requires the closest co-ordination with national policy for distribution of population and employment.

Solesbury, W. and Townsend, A.
"Transportation Studies and British Planning Practice".

Notwithstanding the fact that commitments and constraints can often tend to limit the number of practical alternatives which can be considered it is maintained nevertheless that it is the role of testing alternative strategies which has become very important.

7.4 The movement pattern as relating to the Metro-region of Cape Town.

7.4.1 Peak-hour movements.

Refer to maps 24, 25 and 26, which although published in 1968, will serve to illustrate the broad position. Transportation modes represented are road, rail and bus.

7.4.2 Recent official proposals or transportation facilities currently under construction as relating to Kuils River.

The following may be considered to have a relevancy as far as Kuils River is concerned:-

Re-alignment and reconstruction of National Route 2.

This route had reached an advanced stage of construction at the time of writing. The location of future interchanges are depicted on Map 27 namely at the intersections of this route with

- Divisional Road 60
- Main Road 3 and
- Main Road 31 at Firgrove.

STATIONS.

1. Cape Town
2. Woodstock
3. Salt River
4. Koebergweg
5. Maitland
6. Woltemade
7. Mutual
8. Thornton
9. Goodwood
10. Vasco
11. Elsies River
12. Parow
13. Tiervlei
14. Bellville
15. Esplanade
16. Paarden Eiland
17. Ysterplaat
18. Observatory
19. Mowbray
20. Rosebank
21. Rondebosch
22. Newlands
23. Claremont
24. Harfield Rd.
25. Kenilworth
26. Wynberg
27. Wittebome
28. Plumstead
29. Steurhof
30. Dieprivier
31. Heathfield
32. Retreat
33. Steenberg
34. Lakeside
35. False Bay
36. Muizenberg
37. Ndabeni
38. Oude Molen
39. Pinelands
40. Rapenburg
41. Hazendal
42. Athlone
43. Crawford
44. Lansdowne
45. Wetton
46. Ottery
47. Southfield
48. Langa
49. Bonteheuwel
50. Netreg
51. Heideveld
52. Nyanga
53. Lavistown
54. Modderdam
55. Unibell
56. Werkgenot
57. Sarepta
58. Kuilsrivier
59. Blackheath
60. Stikland
61. Brackenfell

Future loop freeway element
along the Kuils River.

The alignment of this route has been approved of in principle by the authorities concerned.

Level crossing being constructed at the intersection of Nooiensfontein Road and the railway line.

Assessment.

It can be assumed that the aforementioned transportation proposals will have a positive effect in respect of

(a) Kuils River and general accessibility and

(b) the removal of local bottlenecks at peak travel times.

Railway Extension.

In terms of the outline Plan for the Cape Flats,(36) a reservation is provided for a loop line to link Mitchell's Plain with the Bellville/ Somerset West line between Blackheath and Eerste River Stations. This is intended as a long range proposal to "meet contingencies which may arise with further development of industry at Blackheath, and to meet the possible future needs of journeys to work."

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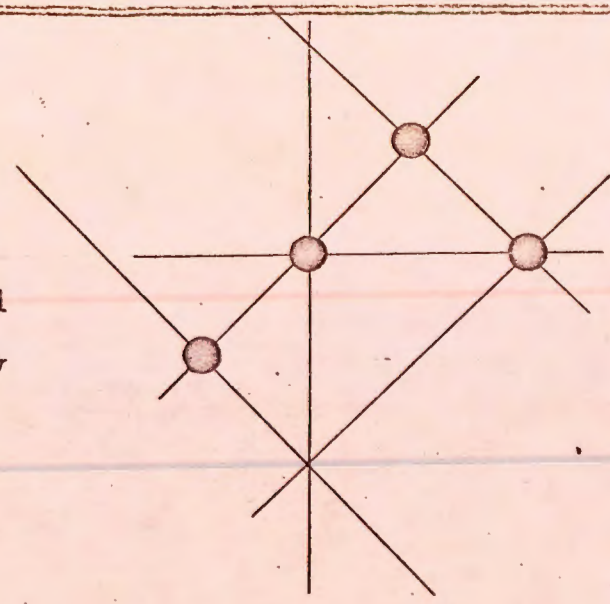
36. "Outline Development Plan for the Cape Flats - "., P. 53.

7.5 Freeway Configuration

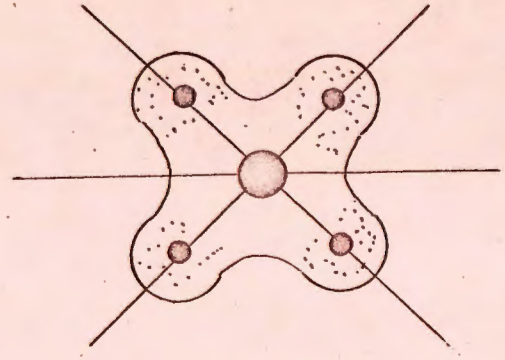
7.5.1 Factors leading up to the demand for a freeway system.



In historical context a small town can be regarded as linked to its own hinterland and other towns by a system of radial roads

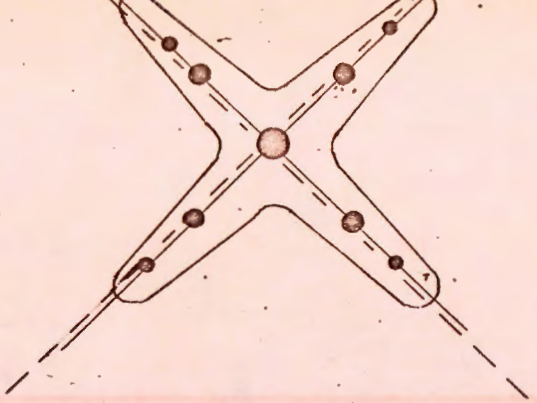
Pre-railway :

The scheme of Walter Christaller[59] of a hierarchy of urban centres, is useful in illustrating how the distribution of urban centres determines the transportation system. In the absence of uniform conditions, some towns will extend their market areas to attract larger populations

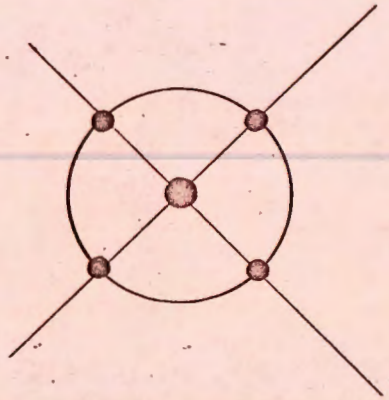


Introduction of the railway;

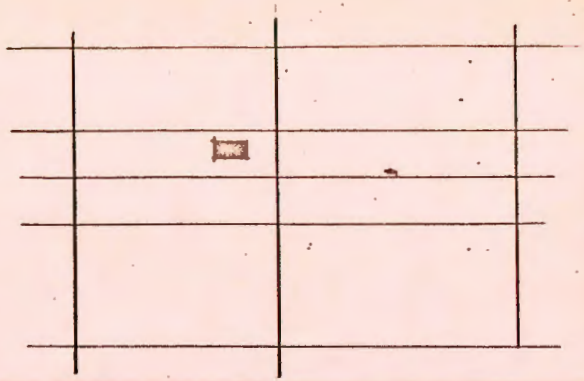
Since goods could not be delivered door to door, land was developed along the railways in corridors. This had the effect of strengthening the central city and the sub-centres on the radial routes as foci of activities.



Motorised transport generated trips not only to the central city but also to the sub-centres. Congestion on the radial routes eventually leads to the demand to construct a freeway system.



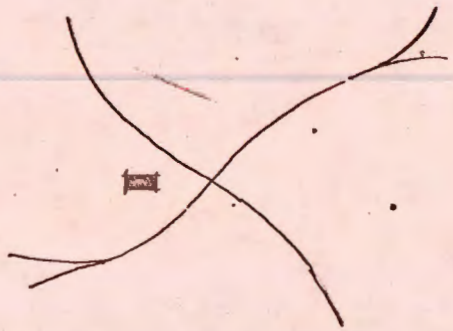
7.5.2 Efficiency of freeway systems. (60)



The effect of a system configuration on maximum freeway loadings in (61) selected urban areas has been studied. Comparisons were made between the "grid", "radial grid" or "radial circumferential".

FINDINGS.

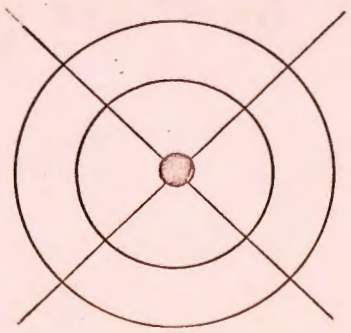
(a) In large cities: the grid system was most efficient in terms of ratio between maximum and average loadings on the system.



(b) Medium sized cities:

(i.e. population less than 500 000), the Radial circumferential system was found to be about as efficient as the grid system).

Note; Refer to Appendix
Total population of Cape Town - Economic Region 01 - was 1 086 831, according to the 1970 Provisional Census figures, and thus, within this context, could be regarded as a large city.

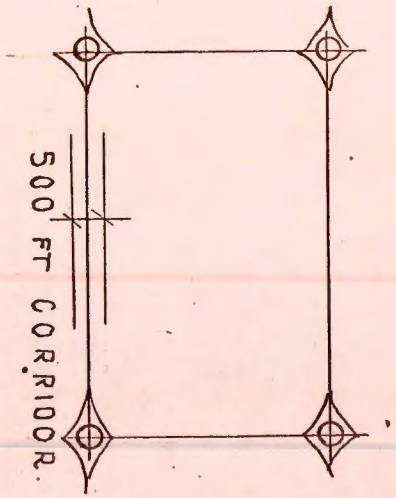


(c) The outer loops in all systems were the least valuable in terms of traffic served.

60. Speed, I.D. "The Relationship between Land-Use and Urban Freeway Interchanges." (October 1969) - Thesis. p.p. 72 - 75.

61. Levenson, Herbert, S., and Robert, Kenneth R., "System configurations in Urban Transportation Planning" Highway Research Record. No.64 p.p. 71 - 83.

7.6 The transportation corridor concept.



Studies have shown [60] that the "grid" freeway system made it possible for sub-centres to grow in accordance with community needs without transportation distortion. The "corridors" permit, in addition, a solution to long-term changes in the pattern of trip generation and changing transportation technologies. The corridors are intended as reservations of land approximately 500 ft. wide and spaced in a 2 to 3 mile grid, within which different modes of transport may be extended to serve land-use expansion.

7.7 Applications to the study area.

7.7.1 Since emphasis has been placed on the Metro-region as the context for purposes of analysis, it is considered relevant to relate the planning of Kuils River to the overall movement system. In so doing, it becomes necessary, in the first instance, to review certain assumptions concerning the future form of Cape Town.

7.7.2 Presuming no change to the present basic structure, but merely an expansion of its present form, then a dominant central business district would be retained. By improving mass transportation, the centre would remain the major provider of jobs and specialised shopping. At the same time, the non-White areas have already begun to resemble an urban model of deconcentration.

7.7.3 Thus, the implications in planning for future movement as far as the Metro-area of Cape Town is concerned, would appear to be two-fold, namely,

7.7.3.1 even greater emphasis could be expected to be placed in the future upon the radial routes which converge on the city centre, as far as mass - transportation is concerned and

7.7.3.2 cognisance would have to be taken of the multi-centred form inherent in the official planning for the Coloured population re-settlement on the Cape Flats, previously referred to in Part 111 of this study.

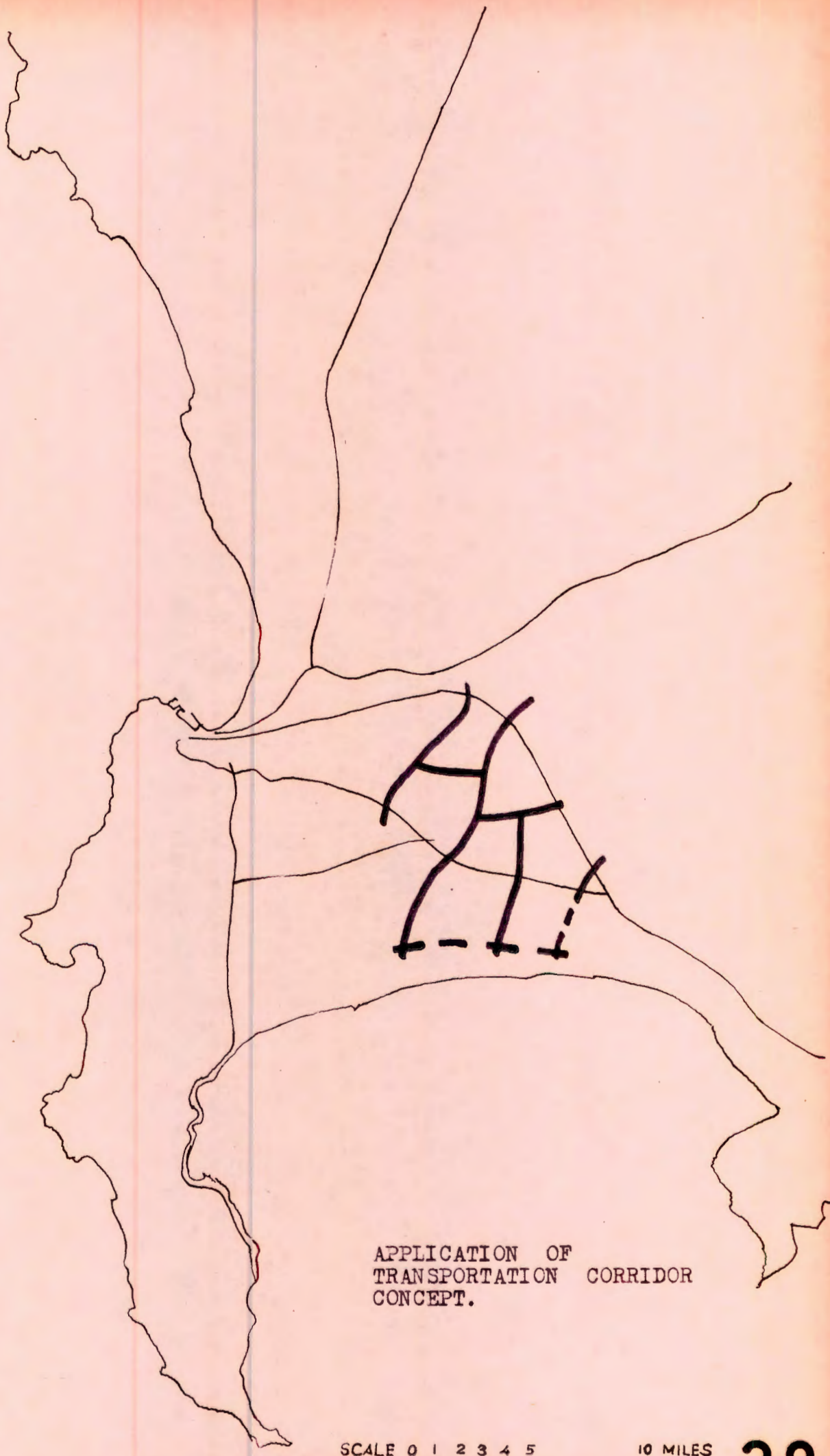
7.7.4 Application of the corridor concept becomes realistic in view of the fact that the area of the Cape Flats, bounded by Strandfontein and Macassar to the south of National Route 2 and Belhar to the north, is relatively remote from the city centre and thus the low intensity of existing development would not preclude the achievement of the necessary reserve widths.

7.7.5 Again, since, as previously mentioned, the grid system of freeway configuration has found to be most efficient as far as large cities are concerned, a hypothetical rectangular spacing, approximately two by three miles, was tentatively placed over the area adjoining to the west of Kuils River.

Refer to Maps 28 and 30. This spacing was then modified to take into account constraints which include

(a) topographic features,
(b) existing development and
(c) official plans relating to the extension of specific elements of the transportation system.

An implication of a suggested long-term structuring of this nature relates to the problem of linking up with existing radial routes. It is thus suggested that further studies are needed, orientated towards a technical solution in adapting the present system to possible future changes in transportation technology.



APPLICATION OF TRANSPORTATION CORRIDOR CONCEPT.

SCALE 0 1 2 3 4 5 10 MILES

7.7.6 The table below relating to present, orthodox modes of travel, lists minimum thresholds governed by the carrying capacities of various modes. (62)

TABLE NO 32

Transportation modes;

comparative carrying capacity per hour.

Freeway	-	1500 cars an hour in a single lane moves 2500 people.
	-	3 lanes in each direction moves 6000 persons per hour in cars.
Bus on a reserved busway.	-	8 000 passengers per hour.
Uninterrupted rail lines.	-	30,000 passengers an hour.

62. The A A Views - Article - "Urban Transport" (May 1970).

P A R T V111.

LAND-USE PROPOSALS.

8.0 The basic framework.

8.0.1 Evaluation of local potential may be related to the following major considerations ;

8.0.2 The demands of manufacturing industry and housing, in the context of the Metro-region of Cape Town, are seen, collectively, to place certain pressures on land within the immediate environs of Kuils River. Stemming from this, it is anticipated that the need will arise to evaluate alternative choices relating to the future uses of this land. Furthermore, it is suggested that previous findings derived from this study, might be employed as criteria. enabling the expression of sets of preferences, as distinct from an approach which would attempt to rigidly define end - states.

8.0.3 It is apparent from Part lll of this study, that certain uncommitted land to the west of the present Kuils River/Blackheath industrial complex could be regarded as having a significant potential for expansion of the manufacturing component. Furthermore, such expansion might contribute towards certain stated objectives as relating to the future economic advancement of the region.

8.0.4 Past rates of residential development were compared between various areas and it was concluded, that based on relatively recent figures, the demand for further land for expansion purposes, locally,

could be justified within an estimated five-year period. Furthermore, this demand could be equated with qualitative features of the environment, affecting locational choice, as part of a set of factors which included distance to work. Certain broad directional development trends may be discerned, as depicted on Map. 29

8.0.5 Preceding Part Vll of this study suggested a system whereby the present transportation system might be extended, so as to take cognisance of

(a) future planned non-White population concentrations on the Cape Flats, bordering Kuils River, and

(b) the need to set up a flexible method of catering for possible long-term changes in mobility patterns.

It is therefore concluded that the future application of the corridor concept might serve as an overall framework, to which more detailed decisions in respect of the transportation network might be related over time.

8.1 Expression of preferences.

8.1.0 An analytical approach was adapted by the writer whereby a series of map overlays were superimposed, thus narrowing down various future planning constraints. Arising from this, four distinct areas were defined locally, where it was anticipated that criteria, previously arrived at in this study, might have special application, as follows ;

- Area No. 1.

8.1.2 Description:

Land falling within the municipal boundaries of Kuils River and to the west of Strand Road. This area is partly developed for residential and partly for industrial purposes. Market gardening is practiced in this area.

8.1.3 Assessment:

As far as this particular sector of the industrial complex is concerned, only infilling of existing development can reasonably be foreseen due to the proximity of surrounding residential areas.

8.1.4 Part 11 of this study underlined the importance of market gardening in the context of the Metro-region. The point was made that, by maintaining the present position, Cape Town need not necessarily become dependent upon surplus produce of other markets. It was stressed that the particular physical conditions found on the Cape Flats, taken together with the price-stabilising effect of supplying the Epping Market, places a high value upon this resource. Preservation of these areas, where reasonably possible, becomes an important issue in the face of other possible functions, in this case arising from

(a) the need to provide public housing for the non-White group and

(b) exploitation of glass sand deposits, should investigations prove this to be feasible.

Thus, it might be concluded, that whilst the implementation of lower-income housing must inevitably be placed high on the list of social priorities, it is now being suggested that this be controlled in such a manner as to be consistent with the preservation aspects, referred to above.

- Area No. 2.

8.1.5 Description:

Largely undeveloped land, lying to the west of the Blackheath sector of the industrial complex.

8.1.6 Assessment:

A basic problem as far as this particular area is concerned, is seen to lie in the reconcilation of the demands of industrial expansion and the provision of housing for the Coloured group. This study has laid emphasis on economic factors in the regional context as follows :-

Most of the older establishment industrial areas in relatively close proximity to the City Centre have approached their capacities for further development. This fact, taken together with official policy for the re-settlement of the Coloured population on the Cape Flats leads to an assumption that manufacturing industry may well be forced to

locate in areas more remote from the centre compared to the position which has obtained up to the present time.

This would presumably apply, in particular, to those categories of manufacturing which have previously exhibited high growth characteristics. It could be assumed, furthermore, that the demand for industrial land would be in direct proportion to future increase in employment. However, in this respect, it would be necessary in the first place to create conditions leading to employment opportunities. Thus, as concluded in Part 111, the establishment of labour - intensive industry for non-Whites of the lower-income group, within reasonable travel distance to housing, becomes of utmost significance.

Seen in the above terms, therefore, it would appear logical to plan for the extension of the existing Kuils River/Blackheath industrial complex in a westerly direction over the Cape Flats. The total extent of uncommitted land which could be utilised, was quantified in regional terms under Part 111.

- Area No. 3.

8.1.7 Description:

Area to the north of Bottelary Road - includes the Bellville East Industrial Area.

8.1.8 Assessment:

Based on physiographic criteria, it is concluded that the area possesses a low rating in terms of residential desirability. Topographically, this location is level and generally featureless. For these reasons, residential expansion over this area might only be considered as a long-term possibility as,far as private sector housing is concerned.

- Area No. 4.

Description:

8.1.9 The eastern side of Kuils River - the lower slopes of the Bottelaryberg which lead up to existing vineyards and orchards.

8.1.10 Assessment:

Problems, generally arising from the unco-ordinated subdivision of land on the "urban/rural fringe" were covered in Part 11. It was suggested that a scientific approach needs to be employed so that rational decisions might be arrived at as regards the optimal utilisation of land in these situations. As far as the particular locality, within which Kuils River is situated, is concerned, it was stated that a vital factor relates to the infra-structue which has been built up around agricultural production over the years. Therefore, in order that the existing vineyards, orchards and forest windbreaks on the slopes of the

Bottelaryberg may be protected, it is recommended that the 300 ft contour be taken as a guide for the upper limit of residential development, if this demand builds up in the future. However, even below this particular reference line, natural features, such as river tributaries, streams and forests should ideally become integral elements of future land-use planning.

APPENDIX A

Residential erven available for Whites in the Urban Areas - 31 December 1970.

Area	Undeveloped single residential erven.	Single residential erven built on.	Total	% developed
Bellvile	3940	6139	10079	60.90
Brackenfell	214	522	736	70.92
Durbanville	1776	747	2523	69.60
Goodwood	2824	4457	7281	61.21
Gordons Bay	469	377	846	44.56
Kraaifontein	1355	1577	2932	53.78
Kuils River	860	1015	1875	54.13
Milnerton	58	950	1008	94.24
Bothasig	2134	899	3033	29.64
Montagu Gardens	1312	0	1312	0
Tableview	1014	303	1317	23.00
Paarl	845	2618	3463	75.59
Parow	1538	6365	7903	80.53
Simonstown	503	493	996	49.49
Somerset West	879	1842	2721	67.69
Stellenbosch	432	1662	2094	79.36
Strand	1434	2331	3765	61.91
Fish Hoek	1274	1631	2905	56.14
Wellington	296	802	1098	73.04
Cape Town	7206	34945	42151	82.90
Cape Divisional Council.	6634	7666	14300	53.60
Total	37000	79978	116978	68.37

ATION PROJECTION : ALL RACES.

APPENDIX B

MAGESTERIAL DISTRICT	1960	1965	1970	1975	1980	1985	1990	1995	2000
Bellville	181,324	215,602	258,720	302,122	347,513	397,539	458,088	526,362	618,220
Cape	254,471	268,315	280,083	297,598	307,363	318,494	332,357	348,526	374,331
Simonstown	29,118	34,881	43,201	53,781	65,141	79,550	96,233	112,612	132,151
Wynberg	342,298	411,517	504,809	630,419	781,404	971,662	1,226,019	1,503,947	1,850,302
	807,211	930,315	1,086,813	1,283,920	1,501,421	1,767,245	2,112,697	2,491,447	2,975,004
Ceres	7,378	8,331	10,381	12,946	14,943	17,742	20,294	23,096	25,358
Montagu	8,196	9,762	11,382	13,205	14,862	16,330	17,046	16,733	15,796
Paarl	44,917	52,948	61,372	72,389	85,989	102,880	122,762	147,058	177,735
Robertson	9,193	10,808	12,345	13,446	14,839	16,514	17,707	18,522	19,335
Somerset West	26,825	33,059	42,489	53,712	66,645	83,202	102,443	124,575	153,941
Stellenbosch	31,165	37,265	43,826	51,395	60,467	71,600	84,576	99,711	119,231
Tulbach	6,634	8,092	9,834	11,615	13,067	14,945	16,031	16,913	16,285
Wellington	11,658	13,721	16,847	19,933	23,888	27,950	32,750	38,661	44,157
Worcester	42,337	51,243	60,607	71,278	83,292	98,107	115,542	137,267	163,437
	188,303	225,229	269,083	319,919	377,992	449,270	529,151	622,536	735,275
Hopefield	2,733	2,970	3,603	4,261	5,145	6,146	7,417	9,101	11,067
Malmesbury	19,710	22,280	25,537	29,334	33,378	38,744	43,847	51,438	60,566
Piketburg	11,831	13,636	15,200	16,752	18,150	17,926	17,120	17,187	15,889
Vredenburg	6,574	8,541	11,545	15,231	20,357	26,955	34,398	45,281	59,814
	40,848	47,427	55,885	65,578	77,030	89,771	102,782	123,007	147,336
, and 03.	1,036,362	1,202,971	1,411,781	1,669,417	1,956,443	2,306,286	2,744,630	3,236,990	3,857,615

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