A PHYSICAL DEVELOPMENT PLAN

FOR THE TYGERBERG HILLS AREA

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"In the Beginning .... and then .... and then came Man, arrogant, impatient and full of greed. For centuries he was forced to live with nature and within the delicate balance created for all things. Gradually he developed from the hunter to a member of an agrarian society knowing full well his complete dependence upon the bounty of nature. With the advent of the Twentieth Century, Man gave more and more of his attention to industrialisation and mechanisation finally reaching out to touch the stars, and in doing so forgot the world within which he must live and his attendant responsibility to it and to generations yet unborn".

Ephraim Tomlinson II.

CHAPTER 1

INTRODUCTORY

1.0 Preface

It has been aptly said that one thing in the world is invincible .... an idea whose time has come. Such an idea in our days, I believe, is the care of man's ancestral home .... the natural environment.

However, our country is still in a pioneering stage in so far as it, up till now, accepts the rugged principle that man has the freedom to do with his land just about whatever he wants to do. Under a proud banner of the above "right", man is unscrupulously exploiting his natural resources and ruthlessly despoiling his landscape. This really boils down to uncontrolled speculation and limitless profit to the few in the name of progress and, if this is how the development of the environment is understood by man, then the perfect formula has already been found. That is to say, that no planning is needed .... planning is then obviously only an obstacle in the free-for-all, laissez-faire competitive market.

To argue this point .... is it really necessary to look any

further than merely to mention a few local "symptoms" of the above "disease" i.e. Constantia, Sandy Bay and our "coast-to-coast" townships?

The above attitude cannot be accepted for planning has a definite and meaningful role to play in the development of our total environment and each person has a fundamental and inalienable right to a healthful environment.

In simple terms, the basic aim of the planner should be to create for mankind a better environment, a better way of life. Man is the product of heredity as well as of environment.... it is thus clear that the nature of this environment is of major concern. The ideal environment would most probably be a world of order and beauty, where man could achieve his optimum development and where, as the philosophers of old Peking envisioned, man could live, grow and develop "in harmony with nature, God and his fellow man".

On the local schene there is, fortunately, an increasing awareness and a pressing demand today for a radical change in attitude toward the environment. Ecological, man/man and man/nature relationships are rapidly becoming significant phrases to great numbers of people, especially to the younger generations. They are developing an entirely new set of values that is becoming, together with the awareness of the decay of our natural environment and our communities, a protest movement capable of transforming the human habitat.

Writer subscribes to the above values.

2.0 The Man-Nature System

Man is part of the ecology of the earth, part of a system of relationships between the earth, its atmosphere, its climates, its vegetation and its inhabitants of all kinds.

The following simple diagrams (1.1) suggest a framework within which the central relationship of man and nature can be seen clearly:

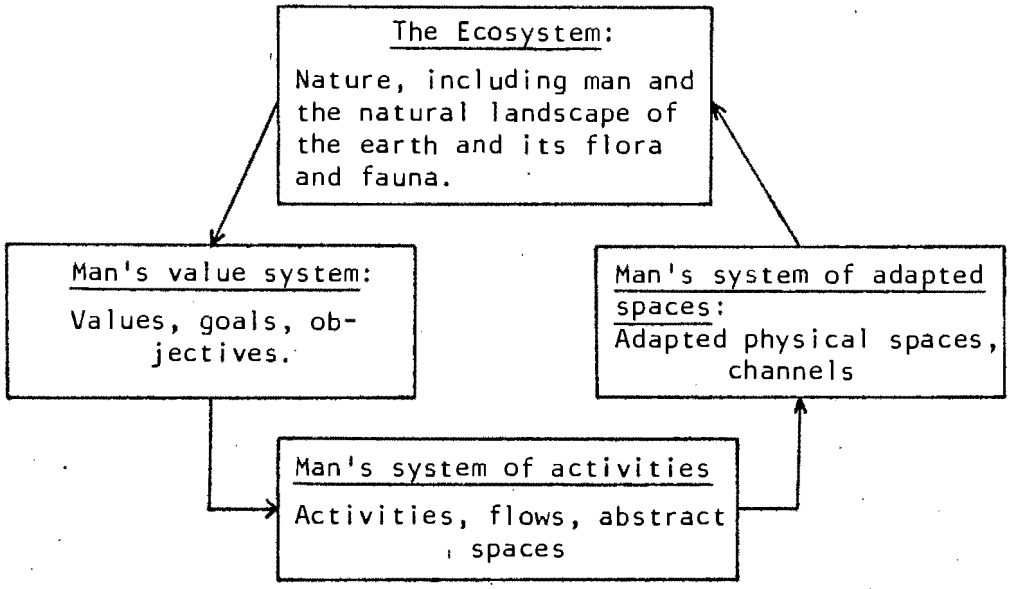

Figure 1.1: The Man-Nature System

As shown in the above diagram the second component of importance in the relationship is fundamental, i.e. the nature of man's system of values or man's ability to reason which motivates him to act (man's system of activities - specific kinds of conduct by man). The fourth set of relationships is where man is attempting to modify nature as expressed in adapted physical spaces and channels.

Figure 1.2 on the next page presents an alternative presentation of the man-nature system.

(1.1) Chadwick, George: A Systems View of Planning. Towards a Theory of the Urban and Regional Planning Process. Pergamon Press. Oxford 1971. p.18-20.

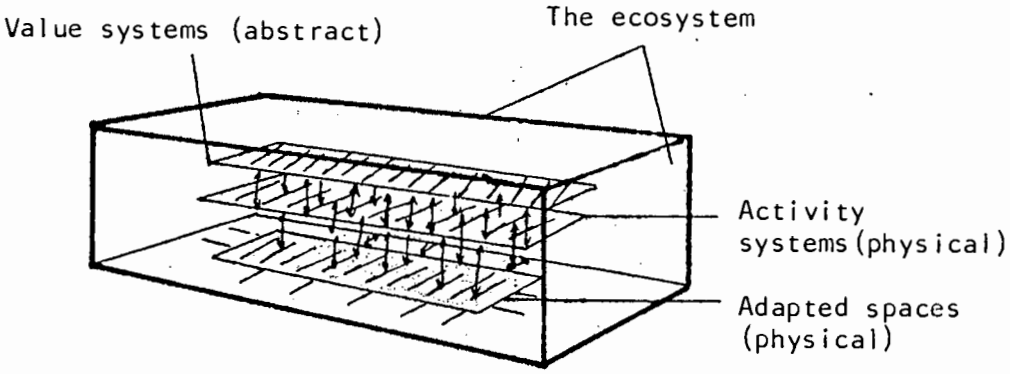

Figure 1.2: An alternative presentation of the Man-Nature System

3.0 Manifesto

A Metropolitan Regional Plan with clear goals and objectives regarding the future growth of the Cape Town Metropolis would have been a great guidance in this study. Unfortunately, there is no such plan. At present, metropolitan growth entails uncontrolled and disorderly development with little taste or skill and in which no, or insignificant, attention is paid to natural environmental issues.

The following section declares the student's attitude and preferences regarding the above issue and subsequently to this study.

3.1 The inevitability of growth, which has become manifest in the past decade, is accepted and it is believed that the need for planning is growing with the multiplication of problems of our visible and invisible environment. Planning is concerned with man's habitat.... the complete set of environmental factors affecting him and the planner must, therefore, view man and his environment as a whole and must strive after a syncretic understanding of the nature of man and his relationship with the environment.

3.2 Man is witnessing environmental degradation through uncontrolled growth and haphazard development, but this is being treated as an inevitable economic eventuality called progress .... somehow we will manage to deal with the attendant problems where the Americans and the British have failed! This sort of environment is not inevitable, nor is the environmental state to which we are moving and happily accepting satisfying the qualities of life that man wishes to attain for himself and his descendants. Growth (progress) need not be synonymous with "ugliness" !

3.3 With rational planning founded on an understanding of environmental issues and the opportunities and constraints they afford, man's use of the land can be accommodated by nature's delicate balance and beauty without detriment to the health and welfare of the community or the environment. Once parts of life of the natural environment are altered or obliterated on such a scale as is evident today possibilities of replacement do not exist.... man does not replace with something equal to or better than that which he has destroyed.

3.4 Spoliation of the natural environment enjoys no biblical or constitutional sanction - the anticipation and avoidance of spoliation in the process of growth is the responsibility of government, a responsibility owed to present and future generations. The crux of the matter here is whether municipal planning and control can be made to work, so that growth through diversified residential and other developmental pressures may be accommodated with preservation of valuable environmental resources, natural amenities, open spaces and recreational values. The opinion is that this can be achieved through administrators and planners who are not timid and who are not proud to be "realistic" when this (being realistic) is too often a disguise for lack of imagination and courage to envisage the changes our times call for.

4.0 Broad Goals

There are inherent dangers involved in becoming goal-oriented in the planning process .... a tendency that crops up in every field of endeavour. This oversimplified approach in planning .... as rational thinking creatures we must try to solve the problem facing us .... let us set ourselves a "goal" upon which we all agree and proceed posthaste to achieve it by the most direct method possible .... does not work! Planning is not an exact science where the goal of perfection can be reached. We can be scientific and precise about gathering data and inventorying resources, but in the multivariable and open planning process necessary for human life-styles and attitudes, creativity, unquantifiable attitudes, openess and on-goingness will always be required when acting as an idealistic planner. There is thus a difference between being idealistic, which is life- and process-oriented, and utopian, which implies a finite and formal goal.

Similar views were expressed regarding the above issue by Boyce and others in a book which was reviewed by Schneider (1.2) "Perhaps their most significant recommendation is that the typical goal-oriented planning process has outlived its usefulness and needs to be replaced by a cyclical planning process that enables goals and values to be revealed as part of the process rather than being prerequisite to its initiation".

Basically the theme involved throughout this project will be as spelled out in the manifesto, i.e. planning in harmony with the natural environment, taking into consideration the particular context within which the study area finds itself. This does not imply the wishful idea of man living happily in a pre-industrialised world, but to

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(1.2) Schneider, J.B. Univ. of Washington. Commenting on "Metropolitan Plan Making: An Analysis of experience with the preparation and evaluation of alternative land use and transportation plans". by Boyce, Day and McDonald. AIP Journal, May 1971. p.199.

accept contemporary technologies and growth and to aim to control, guide and incorporate inevitable changes with benefit or least harm to the natural environment.

In the above context the following broad directional goals are given as part of the planning process involved in this study which rejects a single factor analysis as well as the above-mentioned oversimplification.

4.1 To understand the dynamic natural processes and phenomena of the study area that affect man and are affected by him and which constitute a value system. (The attributes of these phenomena and processes seen as more or less intrinsically suitable for prospective human uses).

4.2 To aim to determine, to create and then to keep current an optimum relationship between man and his natural environment ..... a relationship in which man and nature, with mutual respect, look after each other in an ordered way.

5.0 Definition of Study Area

The study area, as it has been defined for the purposes of this study, is identified in the south, south-east and south-west by a band of existing urban development. Table View, Milnerton, Bothasig and Edgemead in the south-west; Goodwood, Parow and Bellville in the south and Durbanville in the south-east form a man-made boundary here. The western boundary comprises the Diep River Basin from Rietvlei in the south going past the historical Vissershok farmstead and then following a main watershed (between the existing National road to Malmesbury and the old Malmesbury road) in a northerly direction up to a point where it reaches the proposed Diep River flood control dam. This dam forms the northern boundary

of the study area (dam included). The eastern boundary between the proposed flood control dam in the north and the existing man-made environment of Durbanville in the south-east has been taken as Adderley Road. The acceptance of this road as the eastern boundary was not done on an arbitrary basis. Preliminary investigations have shown that it forms a rather definite boundary between two different natural environs in the east and west (study area) respectively. Topography, soil conditions, geological formations, (Klipheuvel formation as opposed to the Malmesbury formation in study area) rainfall and therefore farming practices were found to be, to a large degree, different to those similar natural elements in the study area. Adderley road, broadly speaking, represents thus the division between these two environs and was therefore taken as the eastern boundary of the Tygerberg Hills area.

The study area as located within the defines of the above-mentioned boundaries comprises approximately an area of 77,6 sq. miles (20 100 ha) in extent of which the proposed dam is about 9,3 sq. miles (2400 ha). It also comprises the lower catchment area of the Diep River in the north and west and the catchment area of the Kuils and Elsies Kraal Rivers in the east.

6.0 Problem Statement

"And I brought you into a plentiful country, to eat the fruit thereof and the goodness thereof; but when ye entered, ye defiled my land, and made mine heritage an abomination".

Jeremiah 2:7

Land is a many-splendored thing. Man uses land for crops, homes, cities, highways, junkyards, parks, etc. To some of us, land is a piece of earth to be cherished, to most, unfortunately, it is a commodity to be exploited. To all of us - we cannot enlarge the extent of our precious land - it is all we have.

Two major forces .... population growth and urbanisation/ horizontal expansion of cities.... have been gobbling up land at a prodigal rate. The resulting sprawl has been marked by haphazard location of residential subdivisions and dull and inefficient suburbs. Lewis Mumford has described this process of scatteration as producing a "large mass of undifferentiated low-grade urban tissue".

6.1 Population growth

"It is quite clear that, the Vatican notwithstanding, Man has to spend more of his time trying to stop God making not alcohol but children, if we are to avoid ultimate disaster. It is almost a platitude to say that there would be no environmental pollution without people, and that potential (and actual) pollution is directly proportional to the density of the human population. This point is made at every conference on the environment, every discussion of man's future". (1.3)

(1.3) Dunbar, M.J.: Environment and Good Sense. An Introduction to Environmental Damage and Control in Canada. McGill-Queen's University Press. 1971. p.77

Since 1910, Cape Town's population growth has been rapid. In earlier years, absolute numbers were small and increases did not lead to disturbing total populations, but the situation today has become disturbing with growth rates during the decade 1960-1970 among the highest in the world; whites 2,2%, Coloureds 3,55% and Africans 3,75%.

The spreading nature of Cape Town's suburbs seems inevitable as long as the population continues to increase at the rate of approximately 30 000 people per annum - the equivalent of a new settlement the size of the Strand. It is thus clear that,if no sensible and forceful birth control programme is introduced soon, and,if there is no judicial planning in the spatial location of the increasing number of people, the chances are high that we will irreversibly damage our total environment.

6.2 Urbanisation.

The use of land and expansion of cities have been related closely since early settlement. Greater productivity in agriculture and growing commercialisation of agriculture were initial conditions for urban expansion. A smaller number of workers needed to produce food and fibre makes more of the labour force available to produce non-agricultural goods and services. Urban expansion at the same time provides the market for agricultural products and employment opportunities for released workers.

Another interrelationship is the effect of urbanisation on patterns of land use within the zone of influence of cities. Improved means of transport of persons and products have extended continuously the zone of urban influence on the use of land. Also relevant is the amount of land required to meet urban needs in relation to requirements for other major uses.

Today the modern city is a dynamic organism which grows by a process of internal as well as peripheral expansion. The face of the Cape Metropolitan area is being changed incessantly through the urbanisation process as expressed to a large extent through one of the most voracious consumers of our open land i.e. residential expansion. Man's preference in residential location results in the sprawl of single detached housing units in an awesome continuum across the countryside. What really is the origin of the desire to flee the city and to build cube on cube across the open land? Is it a desire for tax relief, vested equity or the poetics of "Home Sweet Home"? Reasons may be many, but the fact remains that present local development is in response to a market that appreciates the scenic diversity and grandeur of the location, but which is largely uninformed about the complex and sensitive situation from which to assess the potentialities and restrictive conditions that nature offers. In fact, it suggests that residential location should be determined exclusively by the self-serving real estate market as manifested in powerful and ruthless pressures for "progress".

The sprawling Cape Town Metropolitan area does not only mean an increasing number of people and an increasing number of buildings. It also involves an increasing encroachment on the natural environment .... nearby agricultural land, valleys and hills are built over as in the case of the Tygerberg hills area. Uncontrolled urban encroachment upon the natural environment and the intensification of land use is likely to impair and even irreparably to destroy the capability of land to support life and maintain ecological processes.

Figure 1.3 on the following page, illustrates diagrammatically what could happen to the environment if the above attitude of "growth towards progress" is allowed to continue uncontrolled (1.4)

(1.4) Baines, John D.: The Environment. Published by B.T. Batsford, London. 1973 p.53

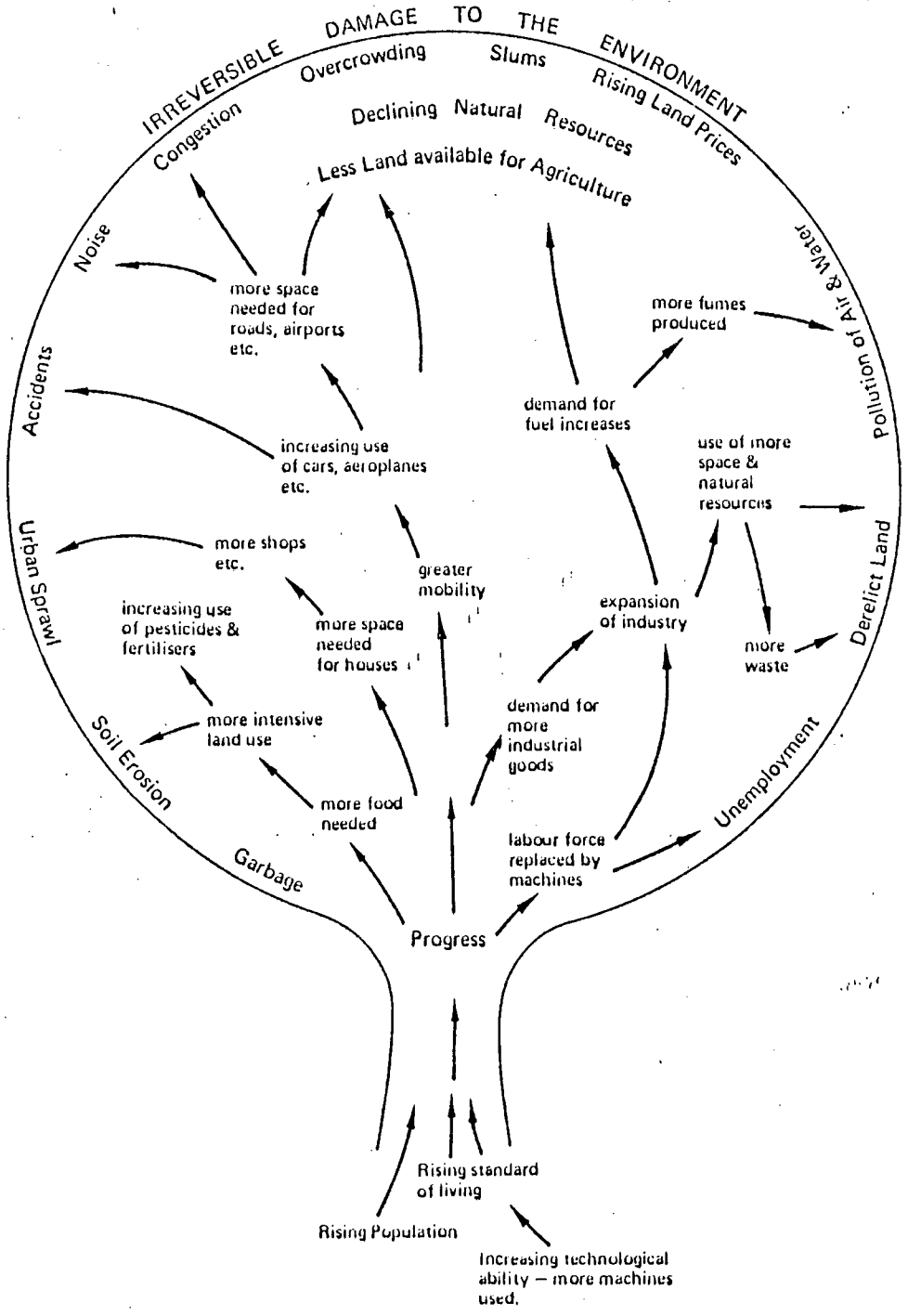


Fig. 1.3: Diagram representing the environment as a balloon that is being blown up to breaking point with progress. The greater the pressures, the greater are the chances that we will irreversibly damage our environment.

6.3 The Study Area and Metropolitan Growth

Where does the Tygerberg-hills area stand in relation to the expanding Cape Town Metropolitan area? The area is considered one of particular natural beauty, both in topography and vegetation and one offering magnificent views of the Hottentots Holland Mountain Ranges in the east, Table Mountain and the sea in the south and west and the rolling landscape of the Swartland in the north. The larger part of it is intensively farmed, with the upper slopes of the hills under indigenous vegetation. Traditionally a wheat growing area, this crop has slowly been giving way to vineyards. It is known that the area, or rather certain sections of it, offers some of the best soil conditions in the Western Cape for the growing of vines from which quality dry red wines such as the Meerendal Pinotage and Shiraz are produced. It is furthermore an area well known and very important on a local scale for its stone-quarrying activities.... an activity which is not always compatible with the farming and residential components in the area.

Basically the above-mentioned few characteristics form the credit side of the area's planning balance sheet. On the debit side one finds, as shown on Map 1.1, the urban spread of the Cape Town Metropolitan area, eastward (towards Paarl) and in a northerly direction along the West Coast line towards Saldanha, which is in the process of engulfing the Tygerberg hills from the west, south and east. In the total absence of a Cape Town Metropolitan Regional Plan, which states in concise terms exactly what its regional goals and objections are and the manner in which they will be pursued, it appears logical to argue that, with planning inputs (pulls) at Saldanha, Mamre, Duynefontein, Blouberg/Melkbos, the proposed Diep River flood control dam and the proposed new campus of the

University of Stellenb osch east of Durbanville, spreading urbanisation with all its paraphernalia will force itself now much stronger than ever before upon the area.

6.4 Summary of Problem

The landscape of the Tygerberg Hills area lies beyond the "congested" city of Cape Tow n and for the people of especially the northern suburbs it is precious in its natural variety and beauty. This heritage is now threatened by the economic pressures of spreading suburbanisation and is about to suffer breakdowns in its character under conflicting present day demands. Urbanisation, if allowed to proceed unchecked or if uncontrolled will engulf the area, destroying the serene landscape and replacing it, most probably, with faceless "sluburbia". The impending rampant growth is not merely visually destructuvem but it brings in its wake a host of impacts which degrade, diminish and ofter obliterate the resources cherished by society.

In short, the basic problem is how to resolve the conflict between the natural amenity of the Tygerberg Hills area and the prosperity which seeks it and in doing so, may destroy it.

7.0 Methodology

An environmental approach with the following basic underlying propositions were preferred in the context of this study.

7.1 Basic Propositions.

- The area is beautiful and vulnerable in its own right.
- Inevitable development which is accepted, must not imply uncontrolled growth with its inevitable destruction and depletion of environmental resources.

- Observance of conservation principles can avert destruction of natural qualities and will, therefore, ensure enhancement.

7.2 Approach

The first chapter is of an introductory nature and describes this text's attitude to planning in general and to the Tygerberg Hills area specifically. Broad directional goals were set to guide the study in its approach to the problem facing the study area.

The second Chapter defines the study area's place and status in the Cape Town Metropolitan region. Historical growth patterns of Cape Town were identified and, taking cognisance of various "forces", future growth trends were predicted. This was related to their cumulative effect on the Tygerberg Hills area as it finds itself in the "northern arm" of Metropolitan expansion namely in the northern suburbs.

Thus, the first two chapters basically introduced the study area and show the pressures it has to face. It examined the consequences of this problem (which is, in Cape Town, "normal development") in terms of both its deleterius impact upon the environment, and the degree to which it selects favourable locations for human occupancy.

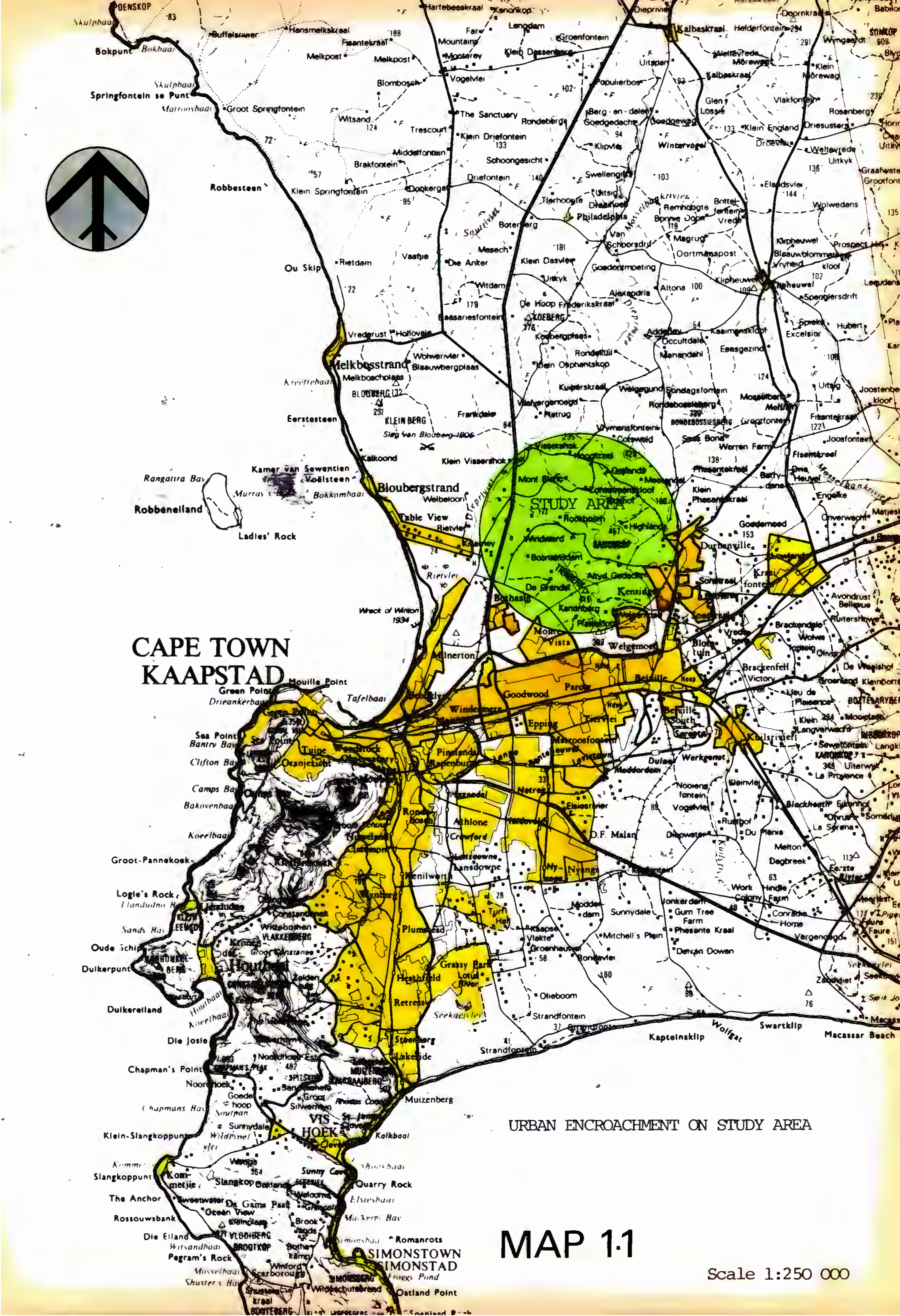
Following this, Chapter III forms the basis of a detailed environmental resource analysis. The method applied here was derived from a brief study of the work of such environmentalists as McHarg, Lewis and Hills.

The analysis commences with the climatic phenomenon in the area and cover other resources such as geology, physiography, hydrology, soils, vegetation, wildlife, scenic/cultural in a specific sequence. The resulting maps describe the various characteristics of the phenomena and their distribution.

The next chapters deal with the interpretation and syntesising of the spatial data. Use was made of translucent sheets to indicate areas of coincidence and conflict. Areas were rated in terms of their suitability (four ranges) to conservational/recreational, urban residential and agricultural land usage. As intercompatibility of land uses vary a matrix was prepared reflecting the degree of inter-compatibility between all land uses occurring in the area now and likely to occur in future. This structure was used in conjunction with the synthesis of land use suitabilities in the land use structuring process.

From this stage a development plan was derived showing the areas most intrinsically suitable for a specific use. Each land use component was discussed in terms of management, control and implementation.

In summary the method consists of identifying the Tygerberg Hills area as natural phenomena and processes, selecting those attrib utes which, on concurrence, represent the most propituous locations for specific types of development and, in contrast identifying those areas wherever exist hazards to life and health. The study believes it is an explicit and replicable method and its conclusions are fundamental to the future of the Tygerberg Hills area.



MAP 1.1

URBAN ENCROACHMENT ON STUDY AREA

Scale 1:250 000

8.0 References

(1.1) Chadwick, George: A systems View of Planning. Towards a Theory of the Urban and Regional Planning Process. Pergamon Press. Oxford, 1971. p.18-20.

(1.2) Schneider, J.B: University of Washington. Commenting on "Metropolitan Plan Making. An Analysis of experience with the preparation and evaluation of alternative land use and transportation plans" by Boyce, Day and McDonald. AIP Journal, May 1971. p.199.

(1.3) Dunbar, M.J: Environment and Good Sense. An Introduction to Environmental Damage and Control in Canada. McGill-Queen's University Press. 1971. p.77.

(1.4) Baines, John D: The Environment. Published by B.T. Batsford. London. 1973. p.53.

CHAPTER II

HISTORICAL AND REGIONAL CONTEXT

1.0 Introductory

2.0 Historical Growth of the Cape Town Metropolitan Region.

3.0 Future Metropolitan Growth Patterns.

4.0 Growth Potential of Northern suburbs

5.0 Status of the Tygerberg hills area in the Metropolitan Region

6.0 Summary

7.0 References

1.0 Introduction

A town is the result of the spatial concentration of land use activities which derive mutual benefits from concentration .... activities which are related to the provision of accommodation, employment and service to a population not all of whom are resident within a municipal boundary and who often go elsewhere and look further afield for certain shopping, recreational and other special requirements. It follows, thus, that a town is not self-sufficient in every respect and it is this interaction which is of essence in contemporary urban living.

The Tygerberg hills area is not a formal proclaimed township - NOT YET - but to function efficiently it is as dependent as a town on interaction with different urban communities offering certain higher order activities. In order now more fully to appreciate the function and nature of the study area it is important to understand the context of the said interaction. In this case, the context is the Metropolitan Region of Cape Town, the area within which the Tygerberg hills area functions, upon which it reacts and from which it derives stimulus for its own growth.

2.0 Historical Growth of the Cape Town Metropolitan Region.

Setting metropolitan growth in its historical context illustrates a progression which clearly traces the impulses and responses which have yielded the development pattern we know today and upon which future growth may depend to some extent.

Cape Town had its beginnings as a port of call on the important sea-route to the East. Ever since this route was opened by Vasco da Gama in 1548, ships put into Table Bay. Settlement, however, began only with the arrival, in 1652, of Jan van Riebeeck.

The development of Cape Town from its initial function as a victualling station to its present status has been in a series of phases related to the staging of economic development through which the settlement has passed.

2.1 Development Phase 1: Prior to 1901

Refer to Maps 2.1 and 2.2

The initial phase of development was dominated by the requirements of the Dutch East India Company and only a small amount of land was required to fulfil the victualling needs of passing ships. In fact, this first stage may be seen as an agrarian economy which, at the outset, was at subsistence level.

Subsequent settlement and minor expansion took place at first under rigorous restrictions with the granting of land to free-burghers along the Liesbeeck during 1657. Development in the study area during this period was the granting of farms such as Vissershok, Diemersdal, Hoog-gelegen, Maastricht, Meerendal and Contermanskloof between the years 1683 and 1706 as well as the subsequent establishment of Durbanville (farm Pampoenkraal) during 1836.

Eventually more rapid and natural expansion began and reference to the degree of settlement by 1860 shows the nucleus of the second stage of growth along the link to the False Bay Coast. An important development during this stage was the establishment of agriculture-based industries - wine making especially - on the slopes of Constantia Berg,on the farms Groot Constantia and Witte-boomen and on the eastern slopes of the Tygerberg on the farm Meerendal. (2.1)

By the end of this stage the economy had become more sophisticated with the processing of agricultural produce

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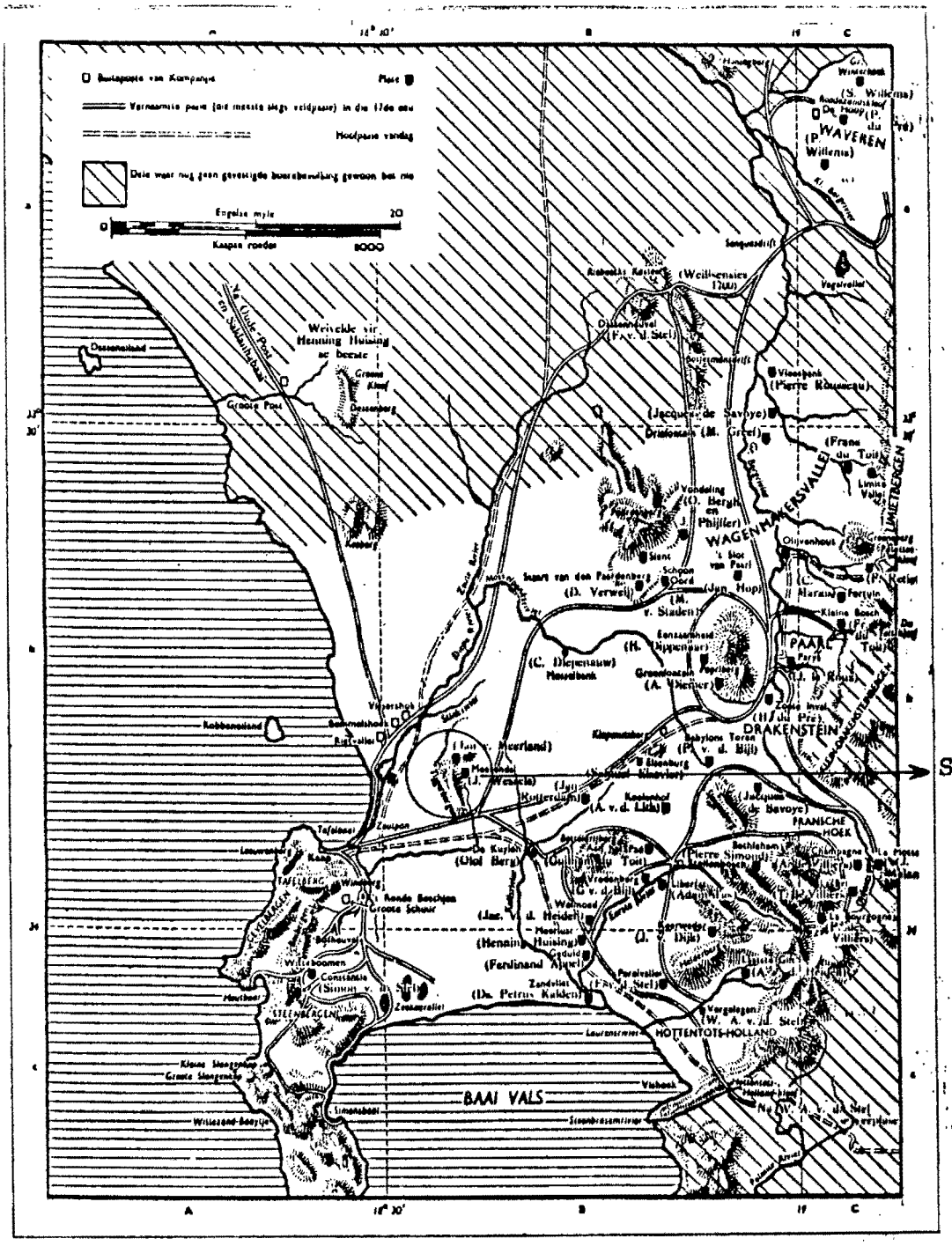
(2.1) Die Burger, 15 & 18.11.74. Dr. D. van Zyl, "Constantia se Soetwyne"



DEVELOPMENT IN CAPE TOWN AND ENVIRONS TOWARDS THE END OF THE SEVENTEENTH CENTURY

(Of relevance here are the farming activities in the study area. The farm Meerendal is still known today for its viticulture).

Source: "GESKIEDENIS ATLAS VIR SUID-AFRIKA" Anna J. Böeseken

MAP 2·1

METRO AREA

HISTORICAL GROWTH

prior to 1901

1901 - 1943

1943 - 1974

STUDY AREA

Blouberg Strand

Camps Bay

Hout Bay

Belhar

Kuils River

Parow

Mitchells Plain

Fish Hoek

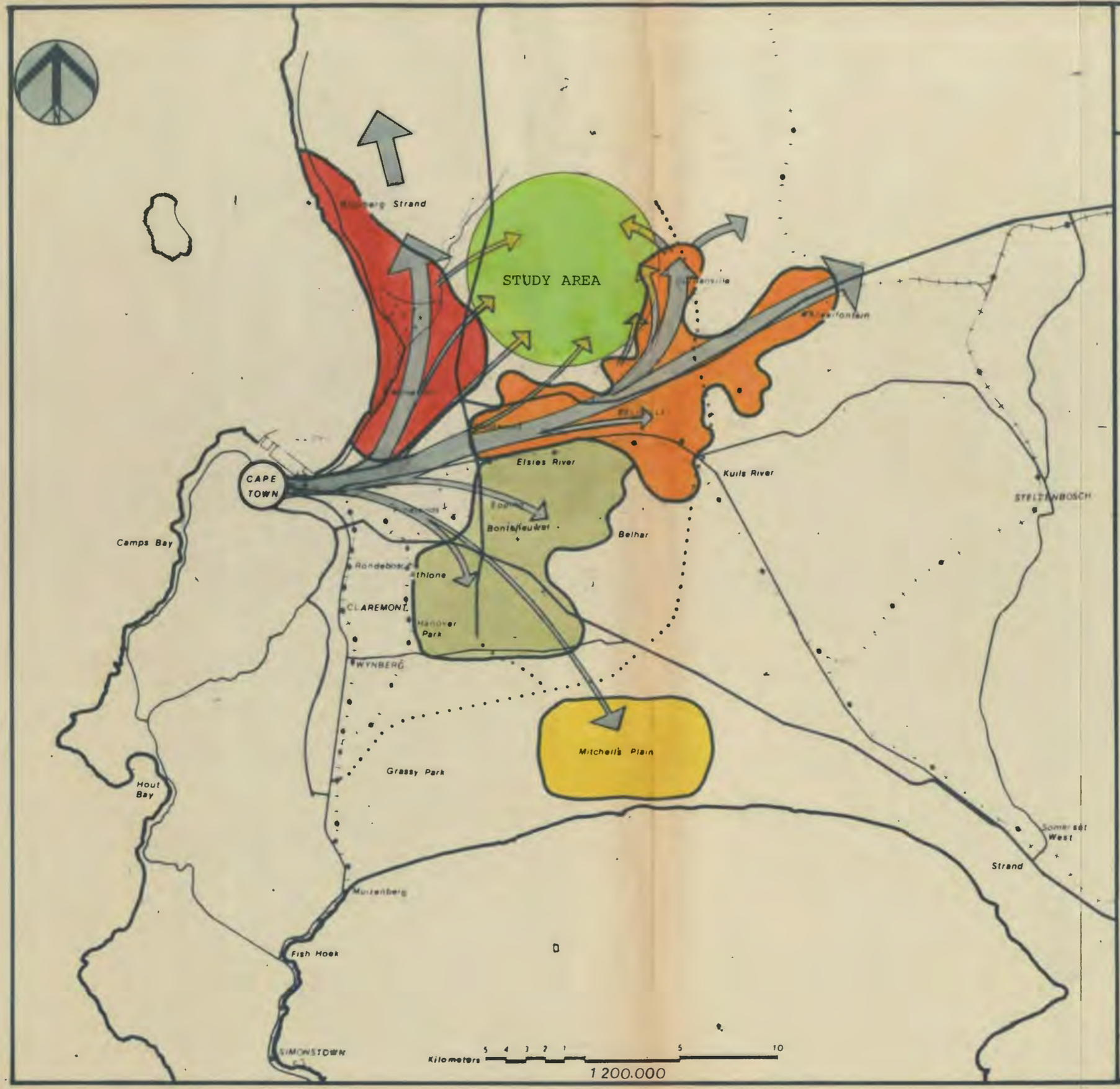
SIMONSTOWN

SOURCE: CAPE METROPOLITAN PLANNING

Kilometers 5 4 2 1 5 10

1 200.000

MAP 2·2



METRO AREA

PRESENT GROWTH TRENDS

- Mitchell's Plain
- Athlone/Elsies River complex
- Northern suburbs (Cape Town/Paarl axis)
- growth along "northern" arm
- growth pressures on study area

MAP 2·3

for local and export needs. Urban concentration and the development of service functions took place in relation to the original development of good agricultural land close to Table Mountain and spread along the main lines of communication, particularly to the south.

It is evident that the preferred location of development was on the fertile slopes of the peninsula mountains. There were also signs of development, although to a lesser degree, along the eastern communications line, i.e., along the present Voortrekker Road which was established in 1845. Impetus was also given to this phase of a more sophisticated economy by railway construction, the discovery of diamonds in 1867, followed by the opening up of the Transvaal goldfields in 1886.

2.2 Development Phase II: 1901-1943

Refer to Map 2.2

This stage was characterised by the growth of manufacturing activity. The manufacture of textiles from natural fibres together with clothing factories developed close to the port.

The availability of flat land and accessibility by railway attracted industrial activity along the eastern arm of development to the Northern suburbs. Concurrently, the speculative subdivision of land into small plots was taking place in Goodwood, Parow and Bellville and the relatively low price of these plots, together with the credit facilities made available to the purchaser, led to increases in population here.

2.3 Development Phase III: 1943-1974

Refer to Map 2.2

Diversification of the economic base and the development of a metropolitan communications infrastructure have typified the most recent period of development. Growing populations followed concentrations of economic activity, giving rise to settlement on a basic stimulus and response pattern. In the early phases the industrially-orientated population of the lower and middle income groups gravitated towards the Northern suburbs where large scale industrial activity could take advantage of the area.

More recent implementation of the Government's policy of the spatially separated development of the different ethnic groups in South Africa has altered and slowed down the pattern of growth and has produced changes in emphasis in terms of metropolitan development. The most noticeable effect of this legislative control has come through the restriction of development of Coloured residential areas to the Cape Flats and has led to residential infill between the eastern and southern development axes. One of the implications of the above-mentioned legislative control is that, because the Cape Flats have been earmarked for Coloured development, pressure on the Tygerberg area for residential location by the White group has increased.

3.0 Future Metropolitan Growth Patterns

It has been shown above that the growth of Cape Town historically followed two basic axes of development ..... south towards Muizenberg and east along Voortrekker Road towards the present northern suburbs. Initial growth was the result of historical forces - that of settlement (which was influenced by and large by topographical features) along lines of communications to the interior and to the richer farming lands of the South Peninsula. The possibility of a similar axis

of growth northwards, up the West Coast, did not materialise due to the relatively poorer hinterland and the absence of a railway.

3.1 At the present moment the absence of an effective metropolitan administration, and the diversity of local authorities staking their claim into peripheral rural areas with their standard attitude of attraction of more rateable properties in order to decrease the unit cost of the urban infrastructure, make it somewhat difficult to obtain clarity about locational aspects of future metropolitan expansion. However, the following trends seem to be crystallising: (Refer to Map 2.3)

3.1.1 South-easterly development of the Cape Flats including Mitchell's Plain for Coloured housing.

3.1.2 A cell of higher residential development in the Elsies River/Athlone complex for Coloureds.

3.1.3 Eastward development of White residential areas along the Cape Town/Paarl axis of development.

3.1.4 A more recent development northward along the Atlantic Coast in the direction of Milnerton, Bloubergstrand and Melkbosstrand. Typical peri-urban activities such as market gardening, dairy and poultry farming, drive-in cinemas, riding schools, industries and other non-residential activities have gradually spread northwards along the Atlantic Coast as township development has succeeded them closer to town. This trend has been, to a large extent, a function of the increased standard of living of the Whites, their aspirations, mobility and search for a "home of one's own".

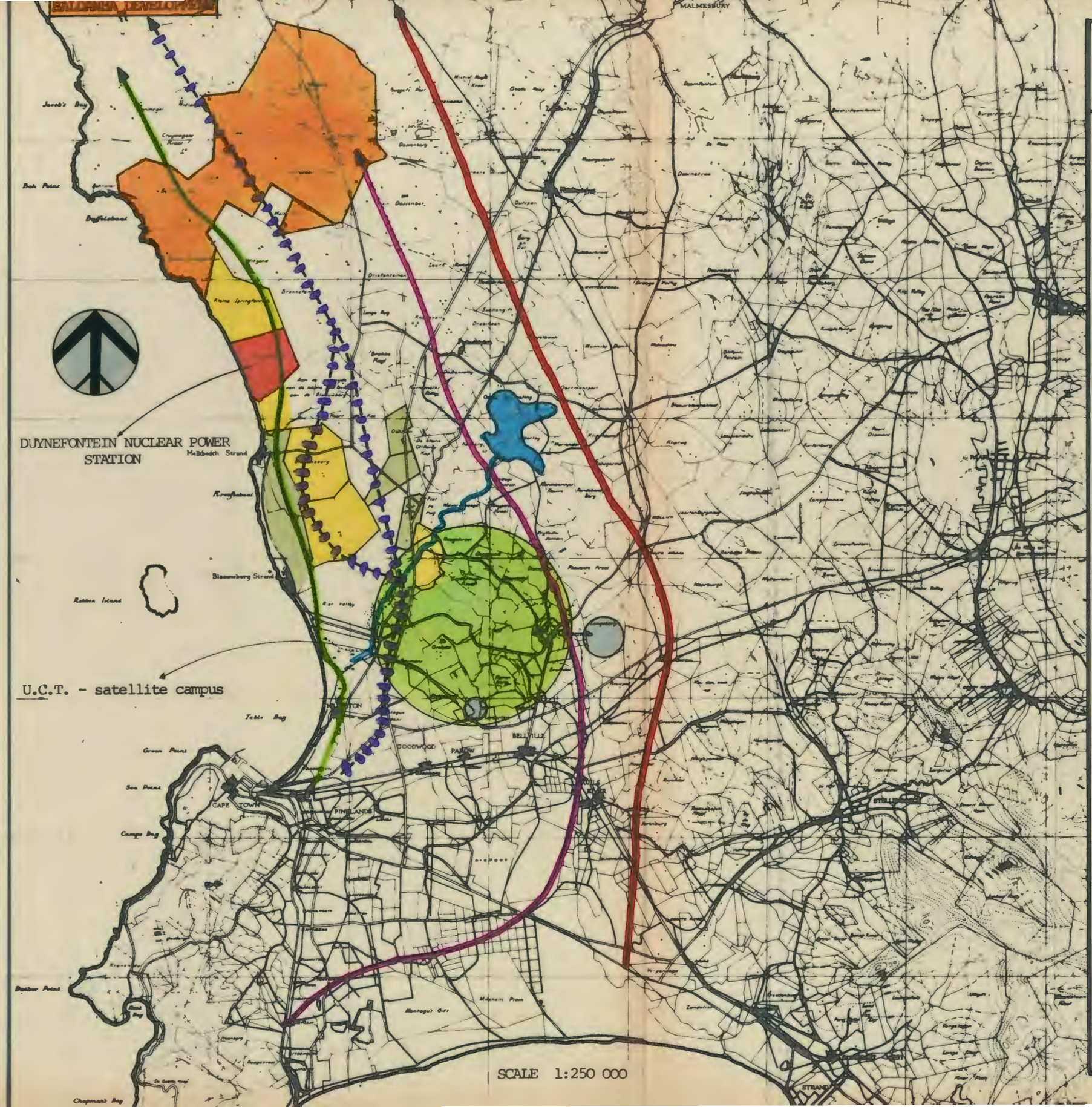
3.2 Up till now Metropolitan growth patterns were influenced and directed by and large by demands of natural and market forces. Unless this growth is properly guided and controlled, according to a comprehensive metropolitan plan, it seems to be logical to conclude now that Cape Town will probably expand in the above-mentioned directions, with increasing emphasis on development in a northerly direction as indicated under 3.1.4.

3.3 To substantiate the above conclusion it will be necessary to identify and briefly to evaluate certain long term forces operating in the so-called West Coast Region (04 economic region) with their possible effects on future expansion patterns of the Metro Area and hence on the study area.

In other words, to carry the historical growth pattern further in order to postulate the future pattern of development, it is necessary to take into consideration the effect of forces exerted by certain current physical and economical morphology.

3.4 It must be emphasised here that this study does not purport to present a detailed analytical study with interpretation of certain identifiable forces operating in the West Coast Region with regards to its affect on the geographical context of the Cape Town Metro Area in the short and long run. It only aims to identify these forces and to see if they will exercise any immediate influence on the physical growth patterns as mentioned under sections 3.1.1 - 3.1.4 and hence their effect on the Tygerberg hills area.

In this context the following major long term developmental decisions have been identified:
(Refer to Map 2.4)



FORCES THAT MAY AFFECT THE FUTURE GROWTH PATTERN OF THE METRO AREA AND SUBSEQUENTLY THE STUDY AREA

- study area
- Mamre development
- private development
- public development
- U.S. - satellite campus
- proposed West Coast railroad
- West Coast road
- Kuilsriver freeway
- N.T.C. freeway
- Diep River
- "proposed" Diep River flood control dam

MAP 2·4

Saldanha scheme, Mamre scheme, Koeberg nuclear power station at the farm Duynefontein, certain infrastructural developments (in particular transportation facilities), proposed Koeberg flood control dam in the Diep River and the known intentions of certain private property developers.

With all the uncertainty and variables present regarding these forces and their implementation it becomes rather difficult to put a quantitative value to their possible effect on the future growth pattern of the Cape Metro Area.

3.4.1 With regard to the Saldanha and Mamre schemes, it is clear that various authorities hold different opinions upon their impact on Cape Town and its future growth pattern. One school of thought sees Cape Town and Saldanha as two definite complementary, but functionally different growth poles (2.2) which can be compared with classical other South African examples of similar nature, i.e. the Durban/Pinetown/Pietermaritzburg and Port Elizabeth/Uitenhage growth axes. That is to say a development axis with some major complementary growth point in an axis relationship to the centre. It further holds that the evolution of such a development axis is necessarily a gradual process, depending on the expansion of both poles as well as the "infill" of intermediate centres. (e.g. Mamre) The development of such an axis will clearly add thrust to Metro area expansion in a northerly direction along the Atlantic Coast.

Another opinion that has been voiced is that Saldanha should develop as an entity on its own - a self-contained city with no significant relationship with Cape Town other than normal inter-city linkages.

(2.2) Greater Saldanha and the Development of the Western Cape, Bureau for Economic Research, University of Stellenbosch. An investigation commissioned by the Syfrets-A.U.L. Group, compiled and written by W.H. Thomas, August 1973.

3.4.2 The Mamre scheme, although it has been given growth point status, is generally interpreted as an attempt by the State to absorb some of the Coloured population growth in the Metro area. The root cause of this problem is a totally different issue and does not warrant discussion here, further than to say that with a large Coloured labour pool at Mamre there might be additional emphasis on urban expansion northward.

3.4.3 The development of a nuclear power station on the farm Duynefontein may put the whole issue of a West Coast Development Corridor in a new perspective. The Koeberg nuclear power station (2.3) will be built on the farm Duynefontein some 6 Km north of Melkbosstrand and 28 Km north of Cape Town. The station now planned will contain two nuclear reactors of similar or identical design, the first of which will operate in 1982.

Much has been said about the danger factor, i.e. radio-active effluents, discharge into sea, solid radio-active waste and the melting of fuel within certain radii of the nuclear plant. Although nuclear scientists maintain that, by making use of careful design, construction, testing and operational techniques, residential location "near" this sort of activity is as safe as living at the foot of Table Mountain, it may be found initially that there will be a built-in psychological bias against locating near this activity. The nuclear plant may thus act as a repulsive force against residential location within its immediate vicinity. In fact, it could become a temporary physical barrier in a Cape Town/Saldanha Development Corridor which may consequently result in greater pressure on land for residential development along the Atlantic Coast between Milnerton

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(2.3) "Nuclear energy comes to South Africa" Escom. 5.3.1974.

and Melkbosstrand. Taking this argument further, it is submitted that due to this psychological "blocking" effect of the nuclear power station, centrifugal forces will begin to operate, resulting in residential locations spreading towards the periphery of this development corridor. In an otherwise rather monotonous landscape there will thus be increased pressures from township developers on the more attractive western and north-western slopes of the Tygerberg hills, which is located on the eastern flank of such a development axis.

3.4.4 The proposed new West Coast Road has been approved (2.4) Tenders have been accepted and construction work has started. The main purpose of this road is to constitute a basic coastal link between Cape Town, various beach resorts along the coast, the Saldanha/Vredenburg/Langebaan triangle and, in the second phase, the coastal towns north of the Berg River up to Lamberts Bay. The first stage, a single carriageway main road up to the mouth of the Berg River, is expected to be completed within four years, i.e. during 1978. The proposed route will start from the Cape Town Metropolitan freeway system (Otto du Plessis Drive) north of Milnerton, continue past Bloubergstrand, Melkbosstrand bypassing the area of the proposed nuclear power station heading northwards.

This road appears to be the first physical manifestation of an evolution of a development axis between Cape Town and Saldanha as seen by various Government Departments. In that it is generally accepted that transportation is a powerful determinant of urban configuration (from historic times the technology of transport has structured the city and has also played a prominent role in the location of early settlements) it only appears to be reasonable now to hold that the

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(2.4) Declaration of a trunk road. Official Gazette No. 3665 dated 21.4.72. Proclamation No. 170/1972.

impact of the West Coast Road on the Metropolitan growth pattern will express itself in new growth pressures along it, especially from the Cape Town side. This would tend to reinforce the northerly thrust referred to earlier.

An additional factor that will give impetus to this tendency of growth northward is the proposed railway line (extension of the existing Paarden Island/Montagu Gardens line) to Mamre.

On the eastern periphery of the study area one finds the proposed Kuils River freeway and the National Transport Commission roads running roughly parallel and in a general south-north direction. These two roads, especially the Kuils River freeway which is being described as an "inner-outer" ring road, will make the study area even more accessible and it will become an additional input toward urban growth and development pressures in the northern suburbs and, subsequently, on the study area.

3.4.5 The proposed Koeberg flood control dam (2.5) in the Diep River, some 12 Km north-northwest of Durbanville on the common boundary of the farms Adderley, Rondekuil and Soethoutskloof just south of the conjunction of the Diep and Mosselbank Rivers, forms an integral part of the next chapter dealing with environmental resources and will be discussed in detail there.

3.4.6 Other than the above forces, which are of regional, long term magnitude, there is the fact that private township developers are very active in this "arm" of development northwards along the Atlantic Coast from Cape Town. Some of the known long term intentions of a few of the private companies are summarised below.

(2.5) Boland Project. The future Water Resources in the South Western Cape. Department of Water Affairs. 1973.

Masters Development

Have assumed a demand for "houses and flats" on the farm Vissershok which would total, at typical occupancy rates, approximately 25 000 people.

Garden Cities (2.6)

Bloubergsvlei Garden City: Both portions of the farm Bloubergsvlei have been acquired and preliminary planning of a vast new town to accommodate 50-60 000 persons has been initiated.

Glen Anil

"A township bigger than Bellville is to be established north of Bloubergstrand by Glen Anil, the property giant which is based in Johannesburg. It will consist of 12 000 stands capable of supporting a population of 40 000 people and will have the shops, sports fields and other services a community of that size will need .... it has enough land already, discounting future purchases, to put 16 500 stands on the market .... At today's prices they represent a total value of R100 million". (2.7)

Milnerton Estate

"Plans for a R50 million marina development with its own subsidised harbour on the shore of Table Bay .... the project, centred on Rietvlei and less than 10 Km from the centre of Cape Town .... will eventually provide homes for 34 000 people". (2.8)

(2.6) Fifty Years of Housing - The Story of Garden Cities, Garden Cities Pinelands, Cape. S.A. December 1972
(2.7) Property Argus - 16.9.1972. "Glen Anil Plans Giant Township"
(2.8) S.A. Financial Gazette. 19.4.1974. "Vast Marina Development on Table Bay".

Without overall co-ordination, therefore, the private sector already has in mind development capable of housing 160 000 people in this area.

Other "investors" in this area are the Department of Community Development, Divisional Council of the Cape, Citizens Housing League, Corlett Drive Estates and Creative Homes.

3.5 Inference

The impact of the forces as listed under 3.4.1 - 3.4.5 above, has been considered and the following conclusions have been arrived at:

3.5.1 Curtailment of the quantity of land within the Cape Flats for Coloured settlement, together with the development of a large Coloured "labour" pool at Mamre, is likely to produce a shift in emphasis of metropolitan growth in a northerly thrust.

3.5.2 Due to the limited amounts of building land available in the southern and south-eastern suburbs, major new white residential developments will take place along the Cape Town/Paarl axis, although, it is expected that the rate of growth along this line may, to a certain degree, be retarded by growth in the said northerly direction.

3.5.3 Development proposals for the Saldanha/Vredenburg/Langebaan triangle as well as the Mamre/Silwerstroom strand area may in the long run result in a decrease of the growth rate of the Cape Town Metropolitan area due to a decreased rate of migration from the rural hinterland. This may affect, on a time-scale only, the growth pattern of the Cape Town Metropolitan area.

4.0 Growth Potential of Northern Suburbs*

It has been pointed out in paragraph 3.5.2 that the inter-relationship of the urban concentrations of Stellenbosch and Paarl/Wellington with the development of the Cape Town Metropolitan complex, has, along with other factors, tended to attract development along lines of communications of the eastern arm of Metro expansion over a period of time. The result of this is an evident expansion between the Cape Town Central Business District and the northern suburbs.

With the immediate environs of Cape Town hemmed in between mountains and sea, it was a natural development that demanded both residential and attendant industrial and commercial accommodation should, at first gradually, and then at increasing tempo, reach out into the northern areas.

Here, comparatively lower priced land was available to engage the attention of both the individual home-owner as well as the property developer. Contributing to this development and adding to the growth impetus was a drift from platteland to urban areas with the Tygerberg areas offering a convenient base for transition from country to urban living.

While factors which stimulated the initial progress of the northern townships are still evident to a greater or lesser degree, the continued interest in these areas over the years has led to self-generating development - the development of services and amenities to accompany a constant growth in the main areas of Bellville, Parow, Goodwood, Kuils River and Durbanville. This development is tending to make the area overall self-contained and independent of outside services. (The vast Tygerberg Hospital is a particularly good example of this).

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* Northern Suburbs taken as the Municipalities of Bellville, Durbanville, Goodwood, Kraaifontein and Parow.

In a mere 10 years (from 1962 to 1972) the total municipal valuation of the five areas mentioned climbed from R103 million to R335 million - a three-fold increase and representing, at the end of the same period, well over a quarter of the total municipal valuation of Greater Cape Town (R1 259 million).

These figures are perhaps sufficient to indicate the boom which has developed in the Tygerberg area, but even more startling are the visible indications of this growth.

Ultra-modern shopping centres and blocks of flats are rising at focal points, newer housing estates catering largely for the middle to higher income groups, are developing, and well-serviced factories have been established or are in the course of construction, with road development seeking to keep pace with the increasing demands that all this development entails.

It is also evident from the examination of various additional data that the emphasis of development of the Cape Town Metropolitan area has been shifting to the northern suburbs and in the following section certain broad trends and aspects are briefly discussed from the point of view of implications for the future of the study area.

4.1 Population Growth

A comparative tabulation of population growth trends for the northern suburbs and the Cape Town Metropolitan area* is summarized in Table 2.1.

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* Cape Town Metropolitan area taken as being the 01 economic region, i.e. the magisterial districts of Bellville, Cape Town, Simonstown and Wynberg.

TABLE 2.1 COMPARATIVE INTERCENSAL POPULATION GROWTH RATES*
(WHITES)

Period	% COMPOUND GROWTH RATE**					
	Metro	Bell-ville	Durban-ville	Good-wood	Kraai-fontein	Parow
1921-36	2,42	6,27	1,28	8,06	5,08	7,39
1936-51	2,48	7,33	5,25	3,70	6,17	4,97
1951-60	1,49	6,67	2,83	1,65	5,20	5,53
1960-70	2,12	5,43	9,82	7,35	8,08	3,41

Source - Bureau of Statistics. Urban and Rural Population of South Africa 1904-1960. Report No. 02-02-01.

The overall picture that emerges clearly from the above table is that the northern suburbs (except Durbanville during 1921-36 period) have grown at a rate consistently higher than that of the Cape Town Metropolitan area. Of particular importance, especially for the purposes of this study, is the high rate of growth of Durbanville during 1960-1970 decade.
In the absence of any significant distorting factors this figure of 9,82% is indicative of, inter alia, the attractiveness of the Durbanville and Tygerberg hills area to the potential home-seeker with the resulting increase of pressure to use this prime land for residential development.

The relevance of Durbanville in this context needs clarification. It is located on the eastern periphery of the study area. It is the local, low order functional centre and from a geographical as well as an environmental point of view forms part of the study area. Furthermore, Durbanville is characterised by distinctive growth and development patterns. The study area now experiences growth pressures and demanded development patterns which are very similar to those occurring in Durbanville. In short, development in Durbanville can be seen as a yardstick of the type of development being attracted to the study area.

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* Refer to Appendix I for a detailed comparative tabulation of growth

** Growth rate - % rate compounding continuously.

The following section, dealing with township subdivision in Cape Town Metropolitan area, will affirm the above inference that the Tygerberg hills area is very attractive to the potential home-seeker.

4.2 Township Approval

TABLE 2.2 CAPE METROPOLITAN AREA. APPROVAL OF TOWNSHIPS 1966 - 1973* (WHITES)

A R E A	Number of erven	% of Total
Northern suburbs	12 654	77
Remainder of Metro Area	3 735	23
T O T A L	16 389	100

Source - Cape Provincial Administration, Director of Local Government.

Assuming that the approval of subdivision for residential townships is an index of the pressure on prime land for residential purposes in a given area, this pressure is expressed in the fact that between January 1966 and December 1973, townships were approved in the Cape Town Metro area containing a total of 16 389 single residential erven for White occupation. Table 2.2 above reflects two broad areas in which townships have been subdivided. Refer to Map 2.5 for a visual picture of the occurrence of these subdivisions.

The above assumption in no way implies that approval of residential townships indicates a real demand for residential erven. The demand may be artificial in that prospective buyers and township developers may get township approval and then hold on to the erven for speculative purposes.

However, the submission is that the Cape Town Metro area is growing and expanding without any clear policy or guide lines as to the location and phasing of such growth and as

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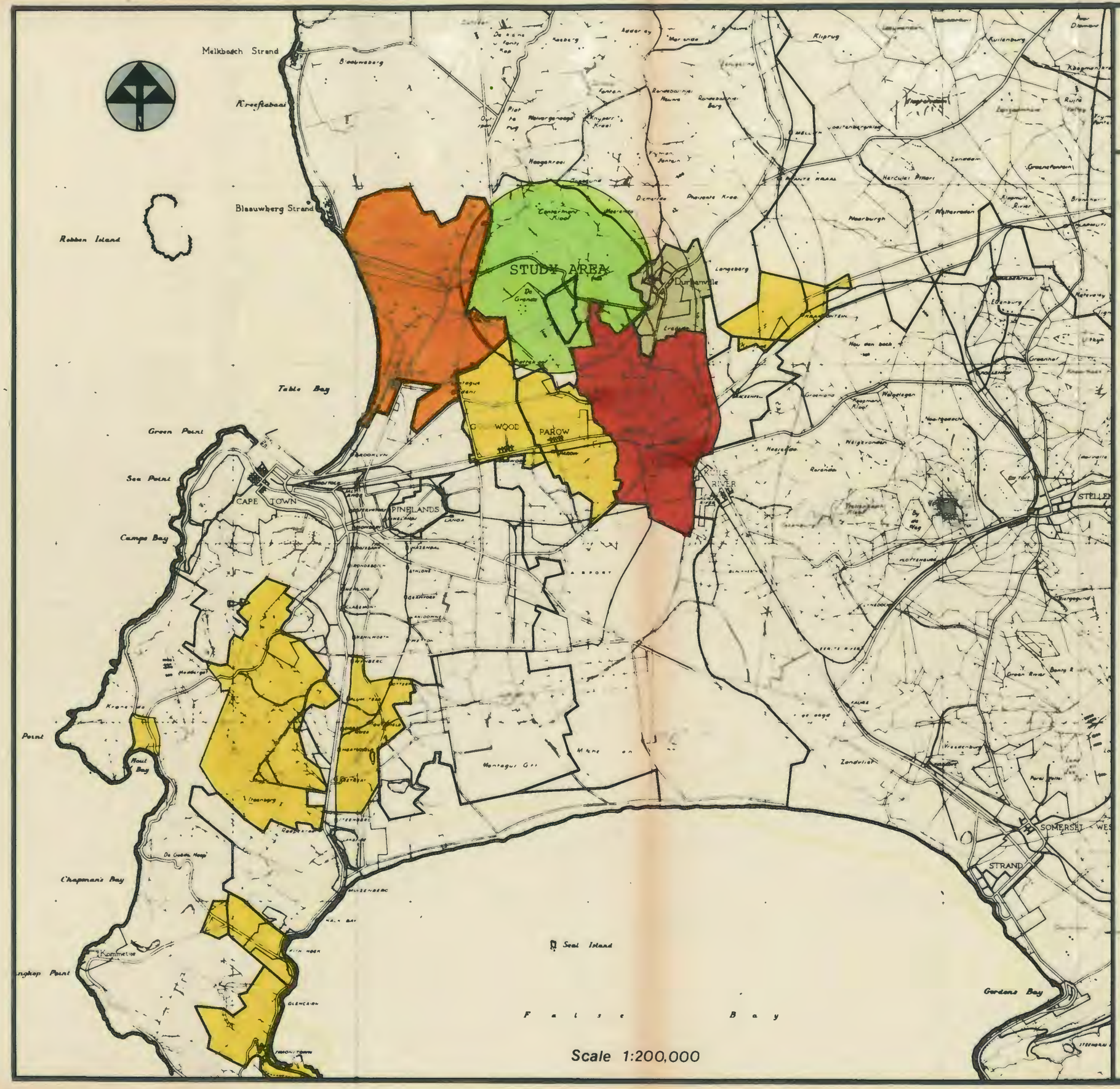
* Refer to Appendix II for a detailed analysis.



METRO AREA

TOWNSHIP DEVELOPMENT

1966-1973 *

AREA	% of total number of Single Residential erven **
	30 +
	30 - 20
	20 - 10
	10 - 0

* Total no. of single residential erven that came on market (township proclamation) in the metro area during the 1966-1973 period.

** No. of single residential erven per area that came on market expressed as a percentage of the total number in the metro area.

MAP 2·5

long as this is the case the northern suburbs, and in particular the study area with its popular environmental and other assets, are faced with high developmental pressures irrespective of whether such pressure is artificial or not.

4.3 Conclusion

From the above broad comparative analysis of growth in the northern suburbs, it is apparent that there is no reason to suspect that the growth rate of the Cape Town Metropolitan area in an easterly direction will decline significantly in the near future and thus relieve development pressure on the study area unless controlled and guided by intelligent planning measures. There may be, however, a relative decline in this growth rate due to an increasing emphasis in metropolitan expansion along the Atlantic Coast in a northerly direction.

The Tygerberg hills area, forming part of the so-called northern suburbs, with its high scenic value and accessibility, is very attractive to the potential township developer. It is located, furthermore, in the way of a strong and established arm of growth of the metropolitan area and is subsequently faced with high development pressures. (Refer to Map 2.3) Under this pressure of growth and demand some of the Tygerberg hills farms and vast tracts of its other "open" land are known, or are believed, to have been sold or optioned for development.

5.0 Status of the Tygerberg hills area in the Metropolitan Region.

Referring to Appendix III, (Historic perspective of the Tygerberg hills area including Durbanville) it is clear that the first known inhabitants of the Tygerberg hills area were hunters and food gatherers and through the period of their occupation their effect on the natural environment was negligible. But as man progressed

to farming the changes were increasingly thorough as habitat + farmer produced a very different landscape from habitat + hunter/foodgatherers. However, modern man is changing rapidly from farming man to industrialised man and inevitably habitat + industrialised man will produce a new landscape as the case is with the Tygerberg hills area at present.

This flow of functional events and consequences over a period of time as caused by man in the process of climbing to the top of an evolutionary ladder can generally be summarised in the following words of Marsh (2.9). "Purely untutored hamanity interferes comparatively little with the arrangements of Nature; the destructive agency of man becomes more and more energetic as he advances in civilization".

The point to be made here is that man with his increasingly organised societies is the first creature to change the habitat he lives in. Most, if not all, of our landscapes are therefore man-made - countryside as well as towns and it is a fallacy to accept that God made the country and man made the town.

Man is thus responsible for the landscape of the Tygerberg hills area and its functional status in the metro area today. Man will be responsible for the proper shaping of its future physical environment which must meet evolving social and economic needs - a proper shaping which will depend on an understanding of the operation of cause and effect in producing the physical environment.

In short, blind preservation of the past will not work, neither will blind trust in a future where new land uses are supposed to work out their own salvation without benefit of intelligent planning measures.

(2.9) Marsh, G.P.: Man and Nature: Physical Geography as Modified by Human Action. 1864.

5.1 Regional Setting

Regionally the Tygerberg hills area is situated between 15 and 20 Kilometres north-east of Cape Town Central Business District and it forms part of the Metropolitan area which is popularly known as the northern suburbs. (Refer to Map 2.6) The study area comprises in its broadest sense an area of approximately 103 Km^2.

5.2 Accessibility

The general accessibility of the area, in terms of existing roads, is good, although it has no direct railroad access at the present moment. Refer to Map 2.7 showing existing major transport activities in the Metro area as well as an inset indicating peak period isochrones for cars.

National Road N9 on the Cape Town/Paarl axis skirts the area at its southern boundary. Access into the area off this road is through Durban Road running at the foot of the eastern slopes of the hills.

The Tyger Valley and Vissershok main roads traverse the area in an east-west direction along the Tyger and Contermanskloof valley systems respectively. These two roads are also directly linked with Durban Road in the east and Bloubergstrand Road in the south-east and National Road N.11 on the western periphery of the hills. N.11 gives additional access to the Cape Town C.B.D. as well as to the hinterland. (Swartland-Malmesbury) Refer to Map 2.8.

The study area is furthermore criss-crossed with numerous farm roads.

STUDY AREA IN A REGIONAL SETTING

study area

20 accessibility expressed in distances of 10 Km radii

SCALE: 1:500 000

MAP 2·6

Official future road proposals, include, inter alia, the Kuils River freeway which runs approximately 3 Km east of and parallel to the existing Durban/Vissershok roads. This road is an extension of the Cape Flats freeway originating from the False Bay Coast and, with the proposed satellite campus of the University of Stellenbosch on the farm Langeberg, east of the existing Durbanville township, will accelerate the process of urbanisation in the northern suburbs north of the National Road N.9 with the attendant higher development pressure on the Tygerberg hills.

5.3 Status

Today the status of the Tygerberg hills area in the region is basically of a threefold nature. Firstly, there is the function of Durbanville as a dormitory suburb where people who mostly work elsewhere, live. The suburb of Durbanville forms, from a functional and environmental point of view, part of the study area and it attracts people who want to escape the insecurities of city life, who want to recapture the romantic ideal of rural living and who want a better place for their children. So they say! However, the truth is that suburbs are part of the metropolitan complex and are dominated by central city. An "exurbanite" retains many urban ties. If his office is in the city, the part of his life that is job-oriented also remains there. There is no immediate severing of connections with friends in the city and he returns frequently to the city for specialized services. In short, his attitudes and values remain urban. Maps 2.6 and 2.7 give an indication of the location of the study area in the metro area with emphasis on accessibility, i.e. how far from the Cape Town C.B.D. and therefore some idea of its attractiveness to the typical homeseeker

STUDY AREA

Blouberg Strand
Milnerton
Table View
Parow
Bellville
Durbanville
Stellenbosch
Kuils River
Cape Town
Woodstock
Salt River
Observatory
Rondebosch
Athlone
CLAREMONT
Wynberg
Belhar
Campe Bay
Mitchells Plain
Glossy Park
Hout Bay
Somerset West
Strand
Muizenberg
Fish Hook
SIMONSTOWN

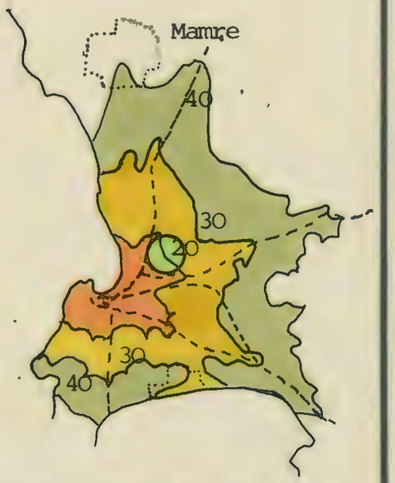
Kilometers 5 4 3 2 1 0 5 10
1:200.000

SOURCE: CAPE METROPOLITAN PLANNING

METRO AREA

MAJOR TRANSPORT ACTIVITIES

- railways
- main roads/freeways
- bus activities
- airport
- harbour
- railway yards
- projected freeways

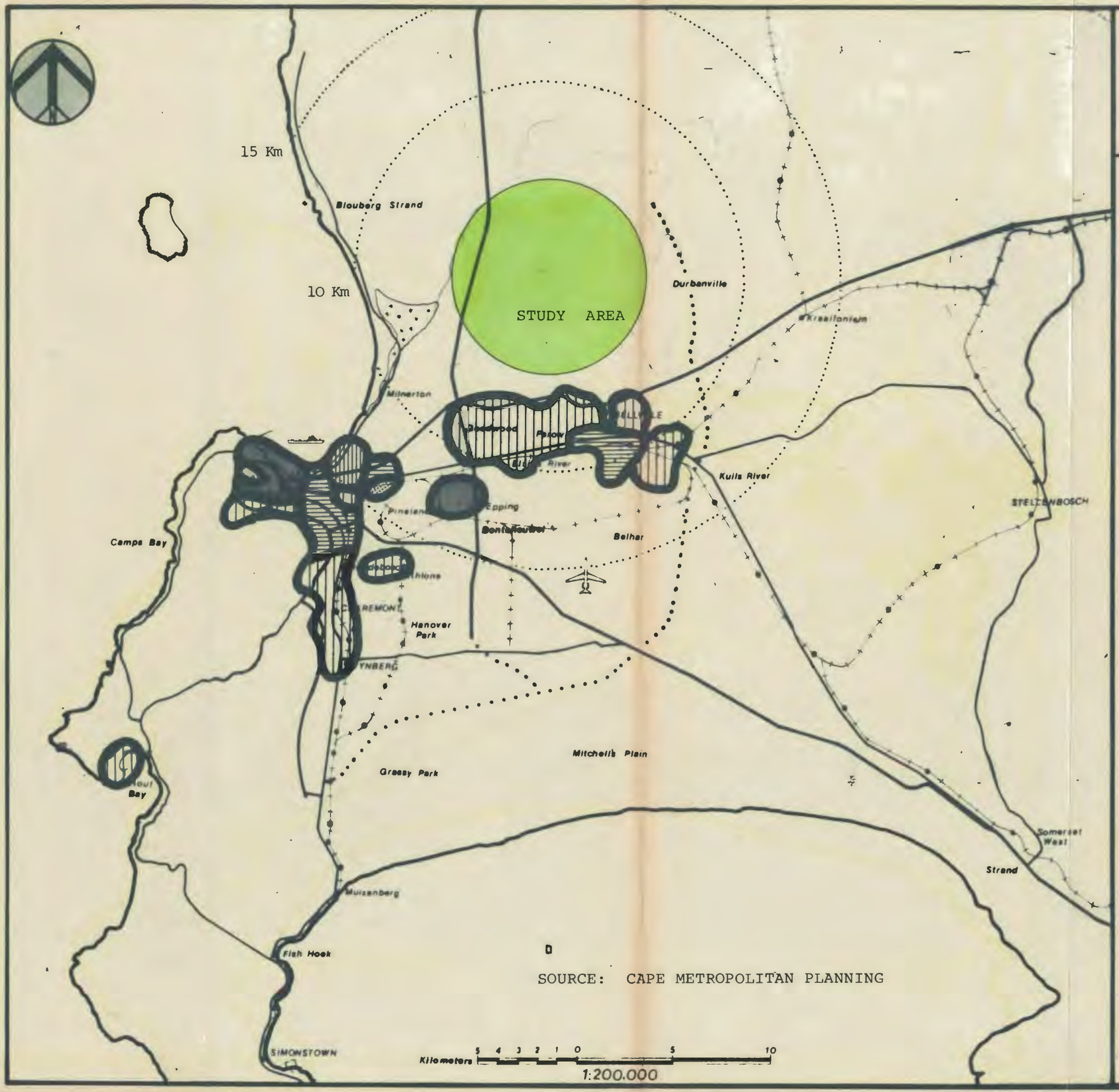


PEAK PERIOD ISOCHRONES FOR CARS (minutes)

MAP 2·7

EXISTING ROAD STRUCTURE

MAP 2·8



SOURCE: CAPE METROPOLITAN PLANNING

METRO AREA

MAJOR CENTRES

OF EMPLOYMENT

grade 10 (high intensity)

grade 5

grade 4

grade 3

grade 2

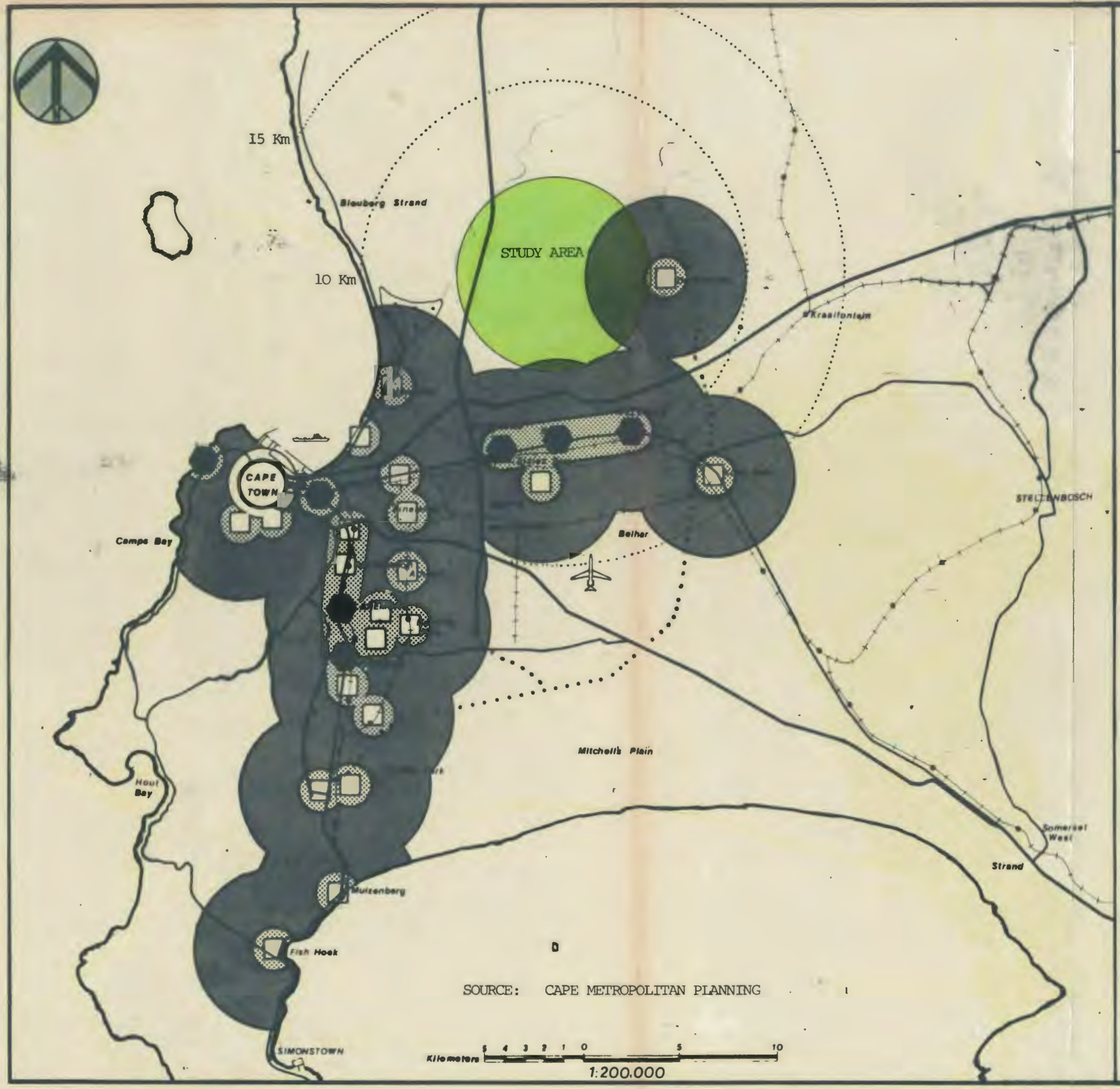
grade 1

MAP 2·9

METRO AREA

MAJOR COMMERCIAL CENTRES

AND ACCESSIBILITY



C.B.D.

district centres

suburban centres

pedestrian access

4 Km — convenient vehicular access

SOURCE: CAPE METROPOLITAN PLANNING

MAP 2·10

METRO AREA RECREATION FACILITIES

Proposed Flood Control Dam

15 Km.

10 Km.

Bloubergstrand

Rietvlei

STUDY AREA

Durbanville

Kraaifontein

Milnerton

BELLVILLE

Goodwood

Parow

Eisies River

Kuils River

CAPE TOWN

Pinelands

Epping

Bonteheuwel

Belhar

Camps Bay

Rondebosch

Athlone

CLAREMONT

Hanover Park

WYNBERG

Mitchells Plain

Grassy Park

Hout Bay

Somerset West

Strand

Muizenberg

Fish Hoek

CAPE POINT RESERVE

SIMONSTOWN

Kilometers 5 4 3 2 1 0 5 10

1:200,000

water-based recreation

land-based recreation

mass recreation

scenic drives

hiking/walking

nodes of existing recreation

MAP 2·11

wanting to move "beyond" the city "limits" and yet to be within reasonable reach of certain specialized high order activities. Maps 2.9, 2.10 and 2.11 are supplementary to the above-mentioned and show respectively the location of the study area in a Metropolitan context with regards to the occurrence of certain basic urban functions, i.e. employment, commerce and leisure (open space and recreation) and hence its attractiveness to the potential resident.

Secondly, the study area is an area well-known on a local scale for its specialized agricultural pursuits, especially for its viticulture and, thirdly, it is an area very important for its stone quarrying activities.

Above-mentioned are three basic functional components of the area that give status and role to it in its metropolitan setting. However, a most important fourth component of the area which is so sadly overlooked by contemporary man as an impatient, greedy, and arrogant animal, is the high environmental and natural quality of its surroundings which must be carefully and intelligently protected against unsympathetic urban development.

5.4 The Rural-Urban Fringe

Except for the high value of its environmental resources and natural amenities, the Tygerberg hills area, or rather peripheral sections of it, is also viewed as an area of which characteristics correspond to those of a typical rural-urban fringe. In this regard Pryor (2.10) argues that "A rural-urban fringe can only exist between a growing urban centre and its rural hinterland". In this case the interface between urban and rural land expresses itself in agricultural, industrial and residential forces which exert high developmental pressures on the prime land of the area. The planners' concern here, for example, is

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(2.10) Pryor, Robin J.: Defining the Rural-Urban Fringe. Larry S. Bourne (Ed.) Internal Structure of the City. Readings on Space and Environment. P.61

how, if necessary at all, existing farming practices will pass into more intensive development with advance of urbanisation. In other words, how to plan and which planning tools/techniques are to be employed in controlling the sensitive and complicated urban-rural fringe area are of prime importance. A discussion of this specific aspect will follow in a later chapter.

A detailed analysis and interpretation of the agricultural and industrial components that operate in the study area will be presented in later chapters.

6.0 Summary

Historically, it has been traced that, since the days of Jan van Riebeeck, the Tygerberg hills area drew the attention of our ancestors as an area offering rich farming opportunities, a function it still fulfils today. The role of the area is also expressed in its importance in providing the Cape Town Metro Region with building-stone materials. Furthermore, Durbanville, as the low order functional centre of the study area, developed along a, at the time, important route to the interior at an outspan about one day's journey (ox wagon) from Table Bay. Impetus to the growth of this settlement was given with the erection of the Dutch Reformed Church at the outspan. This settlement has grown, especially over the last decade, at a comparatively high growth rate and is attracting families of the upper middle income group.

Parallel to the gradual development and intensification of land use in the study area over a period of time since the days of Van Riebeeck, was the growth and expansion of Cape Town. The development patterns of Cape Town were influenced by and large by two major factors, i.e. the physical environment (sea and mountain) and lines of communication. The two main axes of growth were in a southerly direction to False Bay and eastward towards Paarl.

The Cape Town/Paarl axis of development is of specific importance as this started the phenomenal rate of development and growth of the so-called northern suburbs with the resultant township development north of N.9 and the steadily "eating away" into the Tygerberg hills rural land from the east and south.

At present, without any overall plan directing metro and West Coast growth, an additional axis of urban expansion is developing in a northerly direction along the Atlantic Coast under incentives of certain long range planning "pulls" in the 04 region as well as forces of a more local nature. The study area on the eastern periphery of this development arm will experience consequently increasing pressures from developers on its western slopes.

Today the Tygerberg hills area, faced with high developmental pressures, is symptomatic of a "Metropolitan-growth-without-direction" disease. To conclude, the area is still a dominantly rural haven with high environmental and natural values surviving, but only just, within the interstices from urban tentacles spreading outward from Cape Town Metro Area and which are engulfing it in a horseshoe fashion from the south, east and west.

7.0 References

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(2.4) Declaration of a trunk road. Official Gazette No. 3665 dated 21.4.1972. Proclamation No. 170/1972.

(2.5) Boland Project. The Future Water Resources in the South Western Cape. Department of Water Affairs. 1973.

(2.6) Fifty Years of Housing. The Story of Garden Cities, Garden Cities Pinelands, Cape, S.A. December, 1972.

(2.7) Property Argus - 16.9.1972. "Glen Anil Plans Giant Township".

(2.8) SA Financial Gazette. 19.4.1974. "Vast Marina Development on Table Bay".

(2.9) Marsh, G.P.: Man and Nature. Phys ical Geography as Modified by Human Acti on. 1864.

(2.10) Pryor, Robin J.: Defining the Rural-Urban Fringe. Larry S. Bourne (ed.). Internal Structure of the City. Readings on Space and the Environment. p.61.

CHAPTER III

ENVIRONMENTAL RESOURCE ANALYSIS

1.0 Introduction

2.0 Philip H. Lewis

3.0 Ian L. McHarg

4.0 G. Angus Hills

5.0 A Comparison

6.0 Conclusion and Applicability.

7.0 References

1.0 Introduction

The following quotes are rather apt and specifically applicable in the South African context where it seems that, until very reent times, the planning profession and administration has partitioned itself off from environmental issues.

"Traditionally, man has viewed the natural environment as an encumbering element to be overcome, manipulated and adjusted to his immediate needs. Until very recently, the predominant body of urban area planning theory and methodology reflected this attitude, offering little warning of impending natural threats to the urban environment, much less guidelines for their prevention"(3.1)

Furthermore,

"The planning profession, as represented by a selected portion of its literature, has given only marginal attention to natural environmental issues. Although there has been an increased awareness of the problems of the natural environment, particularly during the last decade, this has been of little significance when compared with other issues in the profession. Apparently the profession has followed, and not led, the development of natural environmental issues" (3.2)

However, in all parts of the world there is growing concern for the quality of our environment and recently professionals in several fields have begun to assemble data on existing methods of resource analysis and to develop new methods and

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(3.1) Richard May, Jr.: Preserving a Human Environment at the World Scale. AIP Journal, July 1971. p.268

(3.2) Thomas D. Galloway & Ronald J. Huelster: Research Note. Planning Literature and the Environmental Crisis. A Content Analysis. AIP Journal, July 1971. p.272.

techniques. In choosing a method to identify, analyse and evaluate the natural and man-made resources that constitute the physical environment of the study area, three significant contemporary approaches to resource analysis have been consulted. This section of Chapter III presents a brief comparative analysis of the three approaches to resource analysis. The need for such a comparative analysis seems obvious - given increasing public awareness of the need for resource use policies which will minimize the inevitable conflicts among the various demands for land, planners are challenged to go beyond the level of individuality towards a level of understanding which approaches the theoretical. The planner must have, therefore, a clearer understanding of current approaches to resource analysis to effectuate judicious land use planning.

The three approaches selected were those developed by Lewis, McHarg and Hills.

The shortcomings underlying this brief comparative analysis must be made clear. Firstly, the three methods selected by no means represent all of the approaches which deal with environmental analyses and secondly only a portion of each person's work will be discussed as it was understood from available published documentation.(3.3) In this given context the section obviously does not represent a complete and comprehensive survey of the field of the environmental resource analyst. However, it does raise and discuss, in brief terms, some of the major issues involved in resource analysis as presented by the three selected methods.

(3.3) Except for in the case of McHarg (additional literature was available here) the source throughout this section was: Three Approaches to Environmental Analysis. Prepared by the Landscape Architecture Research Office, Graduate School of Design, Harvard University, November 1967.

2.0 Philip H. Lewis Jr.

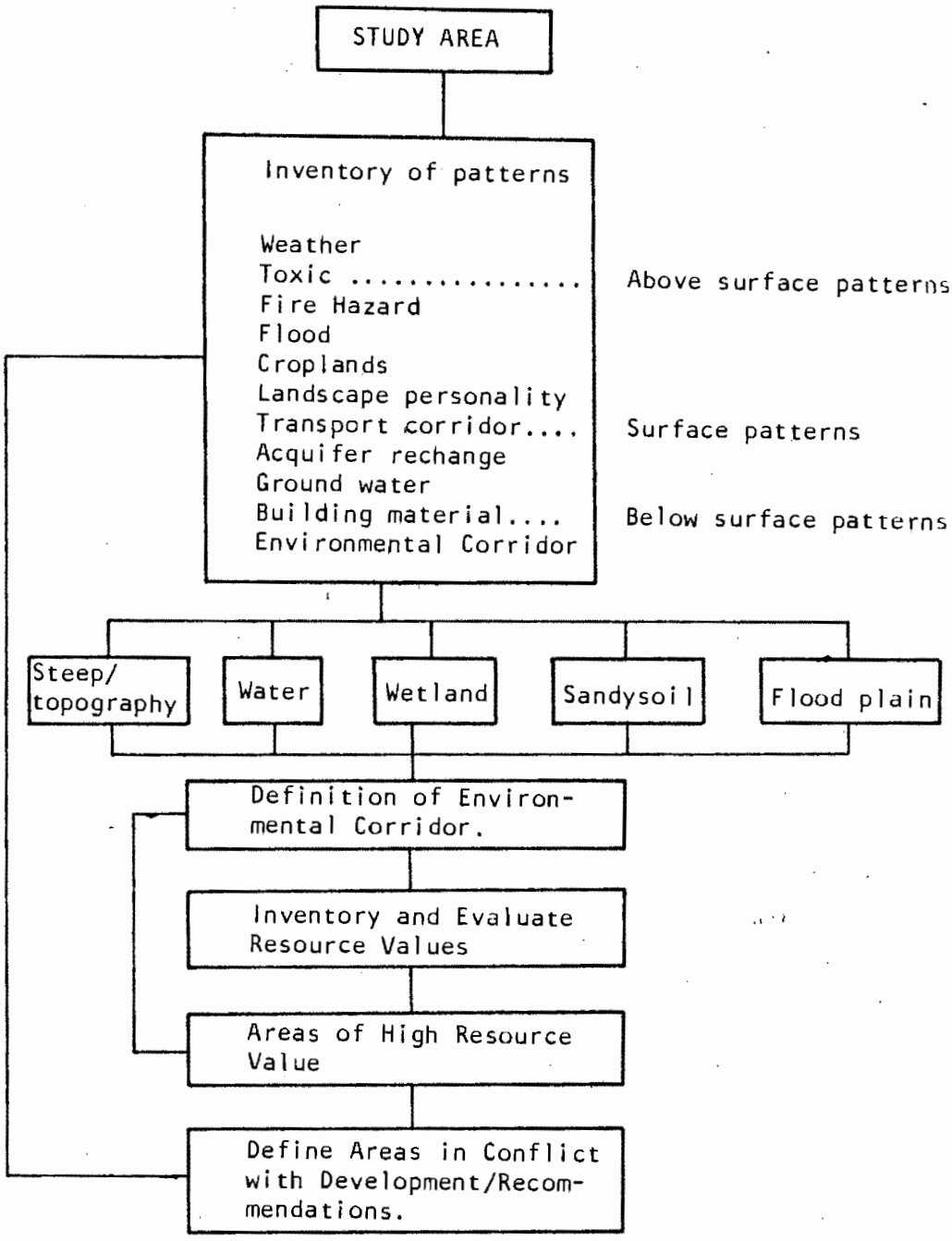
The Lewis approach is diagrammed in Figure 3.1. His methods consist mainly of a systematic inventory of many resource patterns that he defines and evaluates in terms of their ability to be form determinants, i.e. resource patterns which will help guide future growth in a rational manner and without the understanding of which future needs for a healthy environment would be impossible to fulfil.

Resource patterns are defined and mapped on transparent overlays of a given area. Their superimposition shows various priority areas for conservation and development.

Lewis distinguishes between three major categories of resource patterns, namely above surface (weather patterns), surface (fire hazard, cropland, landscape personality patterns, etc.) and below-surface (acquifer recharge patterns, etc.)

The most significant form determining pattern that Lewis identifies and the one which has been most closely identified with him is the environmental corridor pattern. The areas in these corridors provide a great diversity of resources and if protected will be the most suitable areas for a variety of activities, notably recreation. They are identified through a relatively efficient method of inventory and evaluation. Environmental corridors are defined by mapping phenomena such as water patterns, wetlands, flood plains and steep topography on transparent overlays. According to Lewis as much as 90% of the resources which man can and does enjoy, will be in these corridors and he further advocates that these most richly diverse areas be subjected to detailed inventory and evaluation particular in cases of potential conflict with development pressures.

Fig. 3.1 Philip H. Lewis. Diagrammatic outline of analysis procedure.



Lewis also identified places whose resources have intrinsic and extrinsic values. Intrinsic values are found in places in the natural environment that are in their native state, e.g. waterfalls, virgin timber stands, etc. Extrinsic values have been created by man-made changes, adaptations and additions to the natural landscape, e.g. canals, golf courses, historical locations etc. Lewis relied on opinions of local experts who have great familiarity with specific geographical areas to identify places of in- and extrinsic values. Points of in- and extrinsic value, once located, are mapped on overlays and these points of value typically cluster within his environmental corridors. Lewis identifies these areas of maximum natural and cultural diversity as resource modes.

Lewis also makes use of a numerical point rating system in identifying areas of priority for protection and recreational development. The basic corridor resources such as major water patterns, topography, flood plains, etc., are assigned points and summed to identify areas of highest resource value.

2.1 Comment

Lewis's approach appears to have distinct advantages in economy and efficiency for large scale regional inventories although components of his method are equally suitable for smaller scale operations. He can identify resource areas to be preserved and protected, as well as prime areas for recreational development, using his environmental corridor pattern as the basic resource unit.

A key advantage of the Lewis method is the use of local experts for data, because these people are not likely to omit relevant information. However, it must be borne in mind that the "locals" believe that they have the tallest trees, nicest scenery, etc.

The problems here is that the standardisation of these, often subjective, judgements is a difficult task.

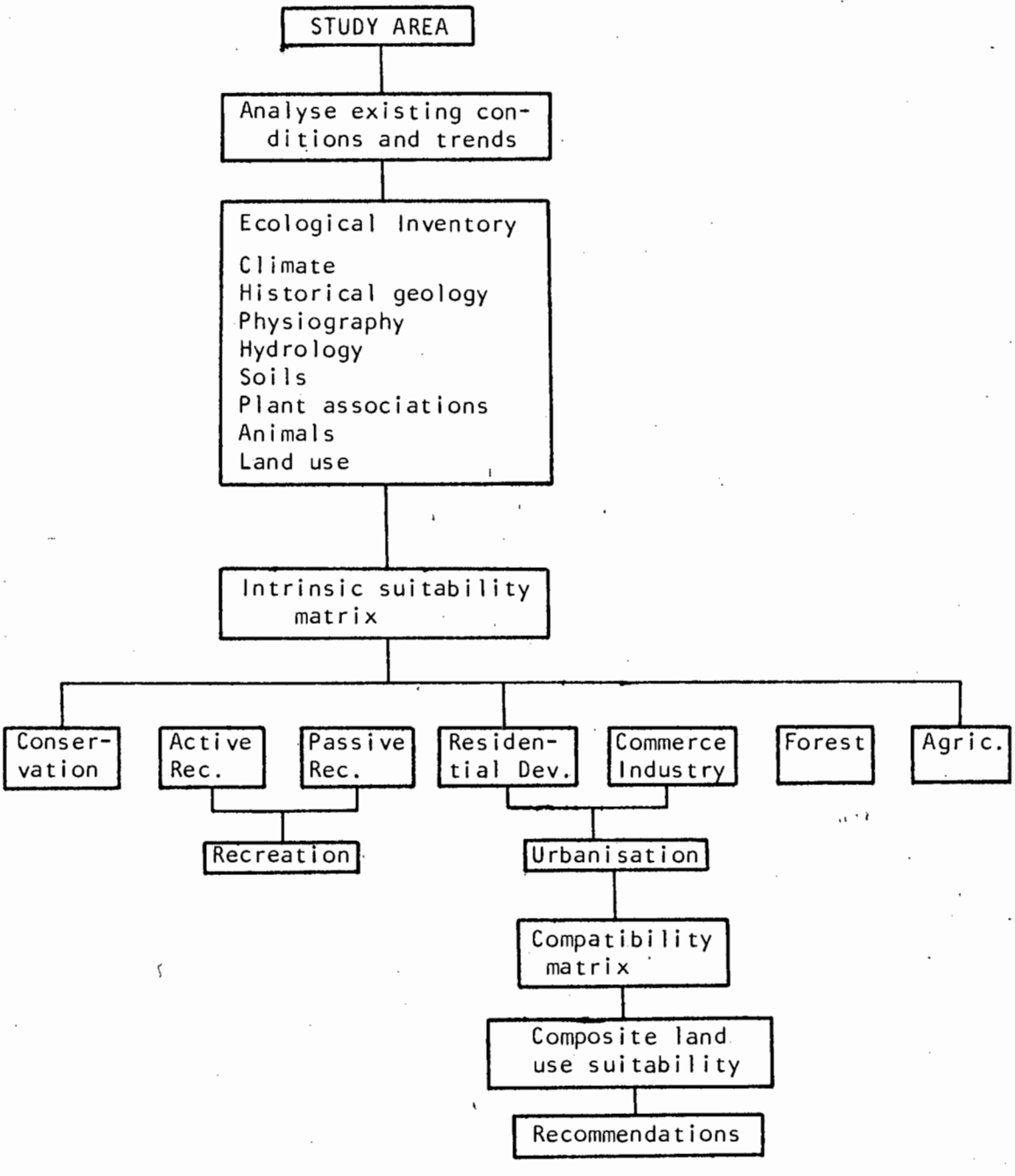
The general applicability of Lewis's point rating system to different scales and geographical regions is questionable (as are several other point rating schemes) and the point evaluations do not seem to have the same degree of objectivity as his inventories and interpretations.

3.0 Ian L. McHarg

Refer to Figure 3 .2 for a diagram overviewing McHarg's method as it has evolved through his various studies into a relatively consistent set of procedures for resource inventory and interpretation. McHarg is wellknown for his ecological approach to land use planning. He normally starts off with an ecological inventory in which the following eight groups of data are collected, namely climate, historical geology, physiography, hydrology, soils, plant associations, animals and land use. The sequence of data collection as mentioned above is important to him, as it emphasises the causality of natural ecosystems, e.g. from an understanding of the climate and historical geology of an area its physiography can be interpreted. Physiography, according to McHarg, is a most effective basis for describing smaller areas within a given area.

The information collected is mapped in colour on a transparency and then interpreted in a series of maps of intrinsic suitability (compare Lewis's method) with a view to establish resource based priority locations for each of a variety of potential uses. The importance of each inventoried and measured ecological variable is evaluated for each intrinsic land use suitability. These are indicated on a matrix showing all prospective land uses on each co-ordinate, and existing and potential single uses

Fig. 3.2 Ian L. McHarg. Diagrammatic outline of analysis procedure.



can thus be measured for their degree of compatability with all other uses. The data is finally synthesized when each activity (having been mapped on transparency) is rated for maximum suitability by the visual coincidence of the most positive factors.

3.1 Comment

McHarg attempts to integrate all of the various natural factors into his analysis of land use. His inventory stage is clear and explicit with data collected leading directly into the analysis of land use suitabilities and compatabilities.

McHarg is a major advocate of the use of natural processes in determining land use and although he reacts strongly against the current predominance of economic values in determining development patterns he does not ignore these values. To substantiate, Wallace and McDonald (3.4) argue that "The Plan used a new ecological planning approach that first identified land that should be left in a natural estate. Land suitable for limited development as well as land whose development did not significantly affect natural processes or the unique visual character of the Valleys was then examined to see whether or not it could meet metropolitan needs for development and local property owners' economic goals if a mechanism for equitable distribution of gains in land values coule be devised". It is thus clear that the McHargian approach takes due cognisance of the inevitable economic components of any planning project, but, as it has been stated above, McHarg rejects the current predominance of economies in land use allocation.

(3.4) Wallace, David A. & McDonald, William C.: Diary of a Plan. AIP Journal, January 1971, p.11. (An article discussing McHarg's and Wallace's study for the Green Spring and Worthington Valleys, Baltimore County - "Plan for the Valleys", 1963).

It might be argued that his proposals which combine suitability analyses oversimplify in that they do not give sufficient consideration to the matter of demand. Land uses are assigned to an area because the natural conditions which allow them to be present, are there. Can one believe that just because an area is intrinsically suitable for, say, residential development, that the people and economic demand will cause houses to be built there? However, is it not time that the major agencies responsible for the shaping of our living environment - an environment and style of life so easily accepted by man and yet, offering so little in terms of usefulness, life enrichment, scale and place - be "indoctrinated" to guide the demands and aspirations of the people into locations which give due cognisance to the importance of nature and site in the maintenance and enhancement of environmental quality?

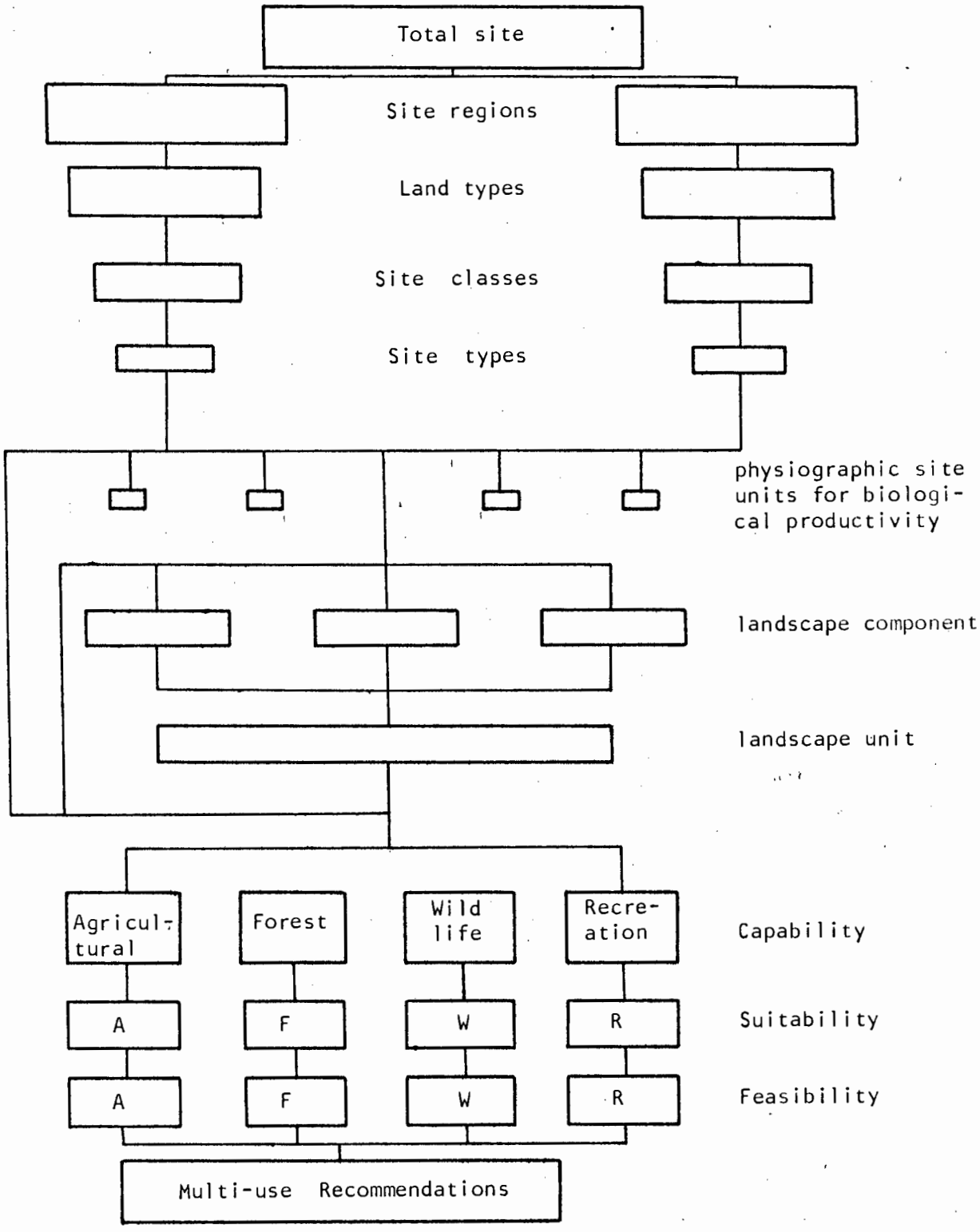
Methodological issues aside, McHarg's approach must be acknowledged for its understanding of the influence of the natural landscape in development policy.

4.0 G. Angus Hills

Hills is concerned with ecologically-orientated planning and his method provides criteria for dividing very large regions into units of physiographic site types on which basis evaluations of potential biological productivity can be made. A key aspect of his approach is its system of land classification based on natural characteristics.

Hills's method leads firstly to a hierarchical division of a given total site area into different site regions which occur, by definition, as consistent patterns of vegetation that reflect micro-climatic conditions.

Fig. 3.3 Angus G. Hill. Diagrammatic outline of analysis procedure.



Secondly, the different site regions are again subdivided into land types which are classified within a specific climatic region according to texture and topography of the parent soil materials.

From his land types Hills derived different physiographic site classes. The site classes are used to divide the land into physiographic units for the purpose of rating potential biological production. Three major variables are defined in site classes, namely the different soil moisture content, the depth of bedrock and the local climatic conditions. These variables (gradients) eventually lead to different physiographic site types at a typical size of roughly half an acre square.

According to Hills the physiographic site units (the division of physiographic site types) are ultimate and can be considered homogeneous. At this stage site types are described in finer and more detail, i.e. soil profile, stoniness of soil, slope and aspect.

This method of Hills of subdividing a large region into consecutively smaller physical units allows the evaluation of the resources for potential activities. Hills suggested three levels of evaluation, namely capability, (land's true potential), suitability (land's existing conditions), and feasibility (land's present and future socio-economic conditions).

Having completed the disaggregation of the total site into homogeneous land units for various planning purposes, the units are now recombined for different scales of planning recommendations (local, community or regional). Example - at a community planning level where larger planning units are necessary, the physiographic site types are grouped into landscape units if larger planning units are desired.

At each of these re-aggregated planning levels an appropriate panel of experts would make evaluations and recommendations for the proposal development types.

4.1 Comment

In presenting his method Hills was trying to provide various scales of units for the ecological planning of forest, fish, wildlife and recreational management as well as a system able (within the same data sources) to handle additional community and regional planning recommendations. His method is widely used in Canada for the analysis of the supply side of regional resource planning.

5.0 A Comparison

The following section compares a few aspects of the three resource analyses which have been briefly described above.

5.1 Goals

Assuming that both high technical quality and broad analytical capability are the goals of any resource analysis method it is clear that the three methods discussed above present a reasonably comprehensive approach to resource analysis. However, comprehensiveness does not necessarily imply judgement of quality and looking at the goals of the three methods one gets the impression that these in fact may be "first look" methods and that none of the methods are specifically directed at detailed site planning and design. In other words the planner knows little about the region and his task is to identify prime areas for various kinds of development - a problem is determined and these methods are applied in order to focus on areas which would then require more detailed investigation.

This generalisation must not be viewed as a severe shortcoming as there is very little doubt about the

value of the work of these resource analysts in making the urban designer, architect and the public aware of the influence of the natural environment in development as well as the positive effect of these methods in improving the practice of physical planning. Environmental issues and urban planning, therefore, must not be viewed as forming a dichotomy; they are complementary parts of one process. As Morris has put it: "... an ecological inventory is not an extravagance, but a necessary element in a truly comprehensive plan". (3.5).

5.2 Method

Lewis's method consists generally of a systematic inventory of the many resource patterns he defines and evaluates in terms of their ability to be form determinants, i.e. resource patterns which will help guide future growth in a rational manner and without the understanding of which future needs for a healthy environment would be impossible to fulfil.

Lewis, as does McHarg, reverses the more typical suitability evaluation procedures and evaluates resource patterns or resource areas which "shall not" be subject to unconstrained development because of natural factors which would be detrimental to the interests of developments itself.

McHarg attempts to measure the demand for urbanisation in his rating evaluations of various sites for potential urbanisation. By implication it seems that the method assumes that a given quantity of demand will spatially organise itself in direct relation to the capability of the resource to such demand. (It must be remembered, however, that this assumption is often not borne out in fact - demand variables are subject to change and this must be understood).

(3.5) Morris, John R.: Review Comments. McHarg. AIP Journal July, 1971. p.288.

McHarg's approach also seems heavily involved in public persuasion, i.e. if the public is not made aware of the value of its resources, efforts to save or improve them cannot come about. (The McHargian approach is sometimes quite literally to frighten people into caring about the environment).

Hills's method deals primarily with the supply side of natural resources. His method seems to be most explicit and his descriptions of suitability, capability and feasibility, although internally dichotomous are most useful. It provides criteria for dividing very large units of physiographic site types on which basis evaluations of potential biological productivity can be made. The units can then be recombined for different scales of planning recommendations. A key aspect of the method is its system of land classification based on natural characteristics.

5.3 Content

McHarg's and Lewis's work show generally similar characteristics. Both offer broad analysis of potential land uses and their implications on site regions. Their methods deal with agriculture, recreation and urbanisation in order to define where the landscape can absorb urbanisation or otherwise. The presumption here is that the different activity groupings are in conflict and that this conflict can be rationally approached if priorities of each are defined.

Hills's method is basically a classification of soil types to deal specifically with regional development for agriculture and forestry, although it is mostly broadened to absorb other kinds of development too.

5.4 Data zones and sources

In trying to identify places of in- and extrinsic resource value Lewis makes use of local experts who have great familiarity with specific geographic areas. Lewis defines many resource patterns and evaluate them in terms of their ability to be form determinants. These resource patterns are identified from conventional data sources and field surveys and mapped on transparent overlays of the study area.

In the McHarg approach are data zones determined by the spatial spread of the resources themselves. The technique of preparing overlays for each resource used with every overlay being to a common scale and coming from whatever represents the best source of information. The assumption of homogeneity is derived when these transparencies are overlaid and areas defined.

Hills seeks through the progressive interpretation of resource characteristics such as soils to identify hierarchical orders of land units which can be used for various inventory and evaluation purposes. He seems to be trying to identify the smallest unit which can be used, efficiently that is, for evaluation and inventory purposes. It appears also that Hills is recognising that it may be more efficient in terms of professional and financial resources to collect data from scratch rather than to collate and reorganise the existing and often erroneous data on a region. Aerial photogrpahic analysis is well-used.

6.0 Conclusion and Applicability

None of these three methods can operate in isolation and each planning problem must be treated according to its

own peculiar characteristics. In this study much of the applied method relates to the McHargian approach, but where applicable specific criteria and analyses were drawn from the other two methods. The diagrammatic expression * on the following pages, illustrates a derived environmental planning process relating basically to the three methods consulted and which will form the basis of analysis and synthesis in this study.

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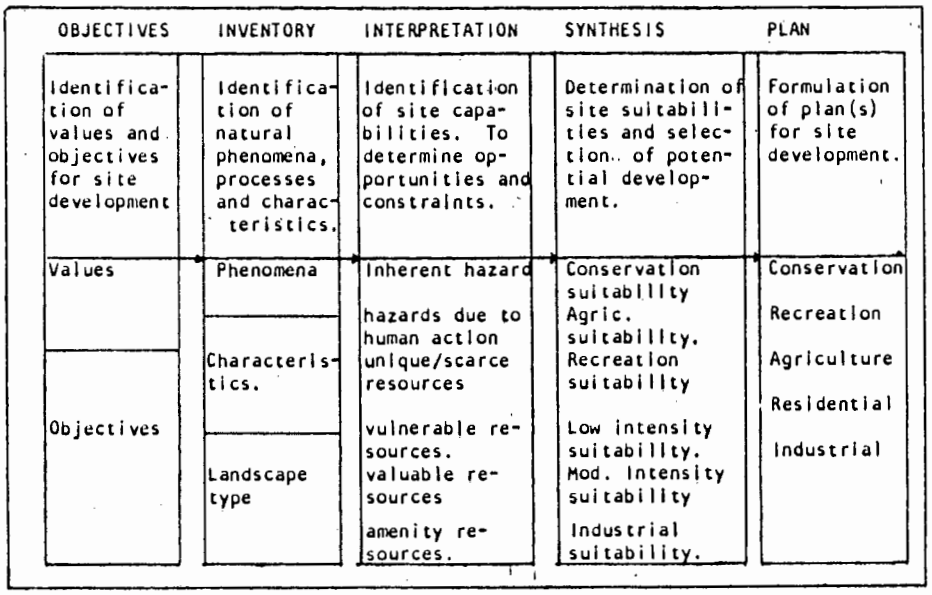
* The basic framework for this diagrammatic expression was obtained from Mr. B. Oberholzer and Miss. L. le Roux at present from the School of Landscape Design, University of Philadelphia, U.S.A.

6.1 Diagrammatic Expression of a derived Environmental Planning Process.



OBJECTIVES: Identification of Values and Objectives for Study Area's Development.

Maintenance of the long range survival and stability of the total human-nature system

Maintenance of overall integrity of the study area's natural and cultural values to preserve and enhance quality of life.

Maximisation of Study Area's natural opportunities, protection of unique and scarce resources and the balanced use of land to create a best-fit solution.

Protection of the health, welfare and safety of residents from inherent as well as man-induced hazards.

Creation of a blend between natural and built environments for individual and community enrichment.

INVENTORY: Identification and description of observable phenomena. Identification of phenomena characteristics and interrelationships. Classification of definable ecological and visual zones.

Phenomena	Characteristics	Classification
Climate	Isolation, sunlight, wind exposure, precipitation.	Watersheds
Geology	Outcrops/Minerals/ Bedrock	Physiographic provinces
Physiography	Landforms/Slopes	Landscape families
Hydrology	Water bodies, Streams/ Acquifers	Landscape units
Soils	Erosion/fertile soils	Edges
Vegetation	Fynbos/Swartland associations	The mosaic of systems often have similarities in their landforms, landcover or cultural adaptations. These form a broad group of landscape "families". The families are made up of smaller landscape units.
Wildlife	Mammals/birdlife/ insects.	
Scenic Cultural	Views/Visual features Farm houses/Roads, etc.	

INTERPRETATION: Identification of site capabilities represented by the natural phenomena and processes. To determine opportunities and constraints.

The ecosystems and landscape units represent varying degrees of social value.

The systems also have varying degrees of sensitivity to human actions.

The tolerance of natural systems to human intervention determine their capability

Value, capability and amenity constitute a range of opportunities and constraint over the site.

Inherent hazards to Human life and Health.
.floods. .fire. disease etc.

Hazards to life and health due to human actions.
.pollution of surface and ground water.

Unique or Scarce Resources requiring preservation.
.mature trees .wildlife habitats etc.

Vulnerable Resources requiring protection.
.acquifer recharge areas
.scenic areas .building stone deposits

Vulnerable Resources requiring Management.
.water bodies .grazing areas etc.

Amenity Resources
.views .recreational areas

SYNTHESIS: Determination of Suitabilities for Land Use Represented by Site Opportunities and Constraints.
Selection of Potential sites for Community Development.

Intrinsic suitabilities for site development are derived from the opportunities and constraints of the land.

Suitability criteria are further determined by cultural factors and locational preferences.

The suitability synthesis is a balance between compatible natural and developed systems.

Conservation Suitability	.wetlands .floodplains .wildlife areas
Agricultural Suitability	.vineyards .grazing .croplands
Recreation Suitability	.nature related outdoor sports
Low Intensity Residential Suitability	
Moderate Intensity Residential Suitability	
Industrial Suitability	.building stone

PLAN: Formulation of Plans and Strategies for Site Development

- .Conservation plan
- .Agricultural plan
- .Recreational plan
- .Residential plan
- .Industrial plan

7.0 Natural Inventory

From the preceding sections it is clear that the underlying proposition that characterizes this study is that it is necessary to understand the natural processes of the Tygerberg Hills area before one can plan. The study area consists of phenomena, rocks, streams, valleys, hills, soils and plants which are aspects of dynamic processes that affect man and are affected by him. This really means that no important element can be changed without widespread effects. The study area should not simply be seen as a future site with a collection of buildings and streets, but as a living organism of structures, surfaces, spaces, living things, climates and details. Every site, natural or man-made, is to some degree unique; a web of things and activities. This web must be understood as it imposes limitations and offers new possibilities and any plan, however radical, should maintain some continuity with the pre-existing locale. The planner, in other words, must really have a chronic anxiety about the genius loci of the area.

The phenomena and processes operating in the study area constitute a value system. The attributes of climate, land, water, life and location exhibited can be interpreted as more or less intrinsically suitable for prospective human uses. Only when the study area has been represented as an interacting natural system with intrinsic values, is it possible to plan.

7.1 Climate

Climate is one of the physical elements of the natural environment, exerting an influence on nearly every human activity and over a wide range of biological and physical processes. Each site has a general climate, (macro-climate) which it shares with the surrounding region, (Tygerberg Hills in the Western Province climate region)

and a series of micro-climates, which may be peculiar to a small area. Macro-climate is expressed in a set of average data for the region, i.e. the wind, precipitation, sunshine, temperature, etc.

Within the macro-climate there are surprising variations in the micro-climate of a site due to cover and topography, and the planner should pay close attention to these effects since he can take excellent advantage of them. It must also be understood that man is comfortable or uncomfortable at certain levels of climatic conditions. Unfortunately there is very little data available on the pertaining micro-climatic conditions in the study area. However, during discussions with the Professor of Environmental Studies (UCT) it became clear that the general (macro) climate of the Western Cape is not limiting in a physical sense, but only in terms of human acceptance and preference. The exception here is the summer wind conditions, i.e. direction and velocity.

The macro-climate of the study area can be classified as belonging to the Mesothermal, Warm Dry Summer type (Csb-type according to the Köppen classification). The climate is typical of the Cape Winter Rainfall area (mediterranean) and precipitation falls during the cooler winter months with very little rainfall during summer. The rain bringing winds are the north-westerlies, and a southerly operates during summer.

Wind

It has been mentioned that micro-climatic data on the Tygerberg Hills area is non-existing, but rather than to disregard this natural factor altogether an attempt has been made to use known data of climatic behaviour of D.F. Malan and Wingfield which are the nearest

weather stations for which long term records are available. (Wingfield is approximately 3,5 kilometres to the southwest and D.F. Malan approximately 6,5 kilometres to south of the southern ridges of the Tygerberg Hills). Due to general elevation and exposure of the southernmost slopes of the Tygerberg Hills one can expect that the velocity of the winds here will be higher than those occurring at D.F. Malan and Wingfield. However, it is assumed that the observations at these two stations will provide a reasonably satisfactory guide to general conditions in the Tygerberg.

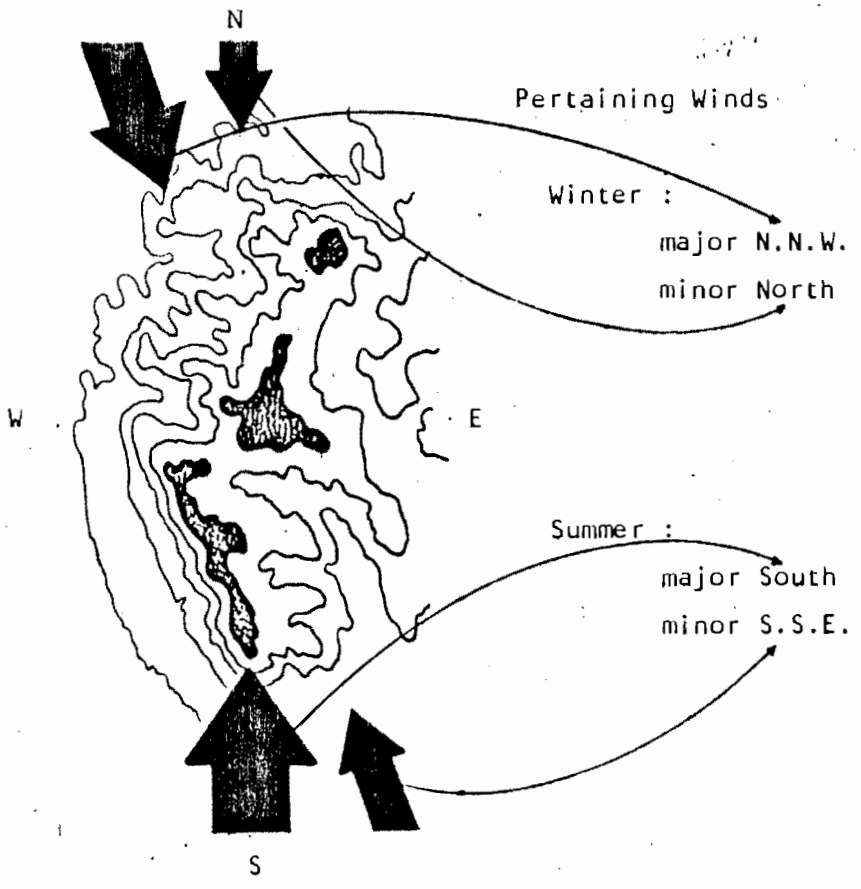
The most pertinent feature of wind conditions in the Tygerberg appears to be exposure. Two main components, namely velocity and direction relate specifically to periods when protection from the summer southerly (popularly known as the "Black South-easter") is required to maintain human comfort.

Continuous records, maintained with a Dines anemograph at the selected two stations over a period of approximately 9 years, are summarized in Tables 1-3 in Appendix III. These conditions are assumed as indicative of the general conditions in the Tygerberg Hills, with the proviso that somewhat higher wind velocities are to be expected here.

Summer is the season when windy spells are most frequent and prolonged. In January wind velocities of 15 m.p.h. or more prevail for nearly half the time; on an "average day" velocities exceed 20 m.p.h. for 4.25 hours and 25 m.p.h. for more than 40 minutes. Southerly winds predominate, north-westerly winds are of minor importance and strong winds from other directions are rare. In January more than 75% of the time the wind direction lies between SE and SW, for only one eighth

of the time it is north-westerly between WNW and NNW. The strongest winds are almost invariably from the SSE, S or SSW, 95% of winds in excess of 20 m.p.h. and all winds over 30 m.p.h. being recorded from these directions.

In winter windy weather is likely to be less prolonged. In July winds of more than 15 m.p.h. were recorded during less than 20% of the time and calm conditions (less than 3 m.p.h.) for more than 15%. But, although on the average there is less wind than in summer, the strongest winds of winter are equally violent and winds of more than 30 m.p.h. are actually more likely to be experienced. Wind direction is more variable, north-westerly winds are most frequent but are not as dominant as the southerly winds of summer. In July north-westerly winds between WNW and NNE were recorded for 47% of the time and Southerly between SE and SW for 31%. The north-west is nevertheless th e quarter from which the strongest winds originate - over 90% of the winds in excess of 20 m.p.h. are from between WNW and NNE whereas only 3% are southerly from SSE, S or SSW.



"Diep River Air Stream" (3.6)

An additional and important natural characteristic relating to airflow is the influence of cool air draining from the higher uplands through the Diep River valley toward the Cape Flats and Cape Town city. Cold air drainage from the high ground north (Tygerberg Hills) and east of the Cape Flats is directed along a few clear drainage routes, of which the valley of the Diep River on the western periphery of the study area appears to be most important in playing a role in the micro-climate of the western Cape Flats, Bloubergstrand, Milnerton and Cape Town city. It was found (in the quoted study) that this drainage pattern is frequently responsible for the development of a very sharply defined inversion stratum which is the upper limit of a dense and virtually stagnant layer of smoke haze covering the industrial and residential areas of Milnerton, Cape Town and western portions of the Cape Flats. During these conditions air travellers will often see only the upper portions of high structures, while low structures remain obscured. It was also found (3.7) during observations from a military aircraft that this drifting air, often heavily laden with smoke, flows out as far as False Bay in a general direction of Hangklip.

Of prime planning importance here is that any smoke polluting industry in the Diep River valley as well as on the western slopes of the study area should be avoided to minimize an accumulation of smoke pollution in the downstream areas i.e. Blouberg, Table View, Bothasig, Milnerton and Cape Town. In this regard it is difficult to understand the rationale behind the location of both the petro-chemical layouts (Caltex) and the Fedmis fertilizer factory where they stand today . The

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(3.6) E.C. Halliday & H.M. Langeberg. Airflow over the Cape Flats. Department of Geography U.C.T. S.A. Geographic Journal. Jubilee Conference. 1967

(3.7) ibid.

Milnerton residents angry at pollution

By a Staff Reporter

THE Milnerton Town Council has asked the Minister of Health, Dr S. W. van der Merwe, to compel the Caltex Oil Refinery and the Fedmis fertiliser factory — both in the centre of the municipal area — to stop polluting the air above the town.

Councillors were told this by Mr C. M. de Goede (chairman of the Public Health and Amenities Committee) at the monthly meeting of the Milnerton Town Council last night.

Mr de Goede spoke during a debate which followed discussion of a letter received from the Table View Ratepayers and Civic Association.

The letter reads as follows:

'At the fourth annual meeting of this association held on March 26, discussion took place regarding the continuing atmospheric pollution caused by the operations of the abovementioned undertakings (Fedmis and Caltex) in the vicinity of Table View.

BITTER COMPLAINTS

'Bitter complaints were voiced in regard to the unpleasant and indeed intolerable conditions which continue to develop and cause irritation, to say the least, of the nasal passages and respiratory channels among the residents of Table View.

Dr S. W. van der Merwe

'Children, too, are among the worst sufferers.

'It was emphasised that both Fedmis and Caltex have been the subject of complaints for the best part of 11 years, and promises have been made repeatedly to remedy the situation. Yet the practical result of all these representations and all these promises has been completely inadequate.

'The point was made that these industries came almost 25 years after Table View was established as a residential township and they should never have been allowed to operate near any residential area.,

The letter then refers to a resolution adopted at the meeting in which the Milnerton Municipality was asked 'to take such steps as may be necessary to obtain from both Fedmis and Caltex specific dates by which the respective undertakings expect to remove once and for all any further cause for complaint, failing which this association requests that the situation be further reviewed in order to determine what legal remedies must be resorted to.'

In the discussion that followed, the councillors were told of a letter received from the manager of Fedmis, Mr D. K. Edwards, saying his company had already spent about R439 000 to control pollution.

FIGHT POLLUTION

Mr M. H. L van Niekerk, however, read out a report about Sasol's attempts to fight air pollution and quoted a figure of R4,5-million which was to be spent on eliminating air pollution at Sasolburg.

If Sasol could spend such a lot of money, Fedmis and Caltex could also spend more money on combating air pollution, he said.

Mr van Niekerk later spoke again and said residents in the area could not sleep with their windows open at night. He had already woken up choking and gasping for air.

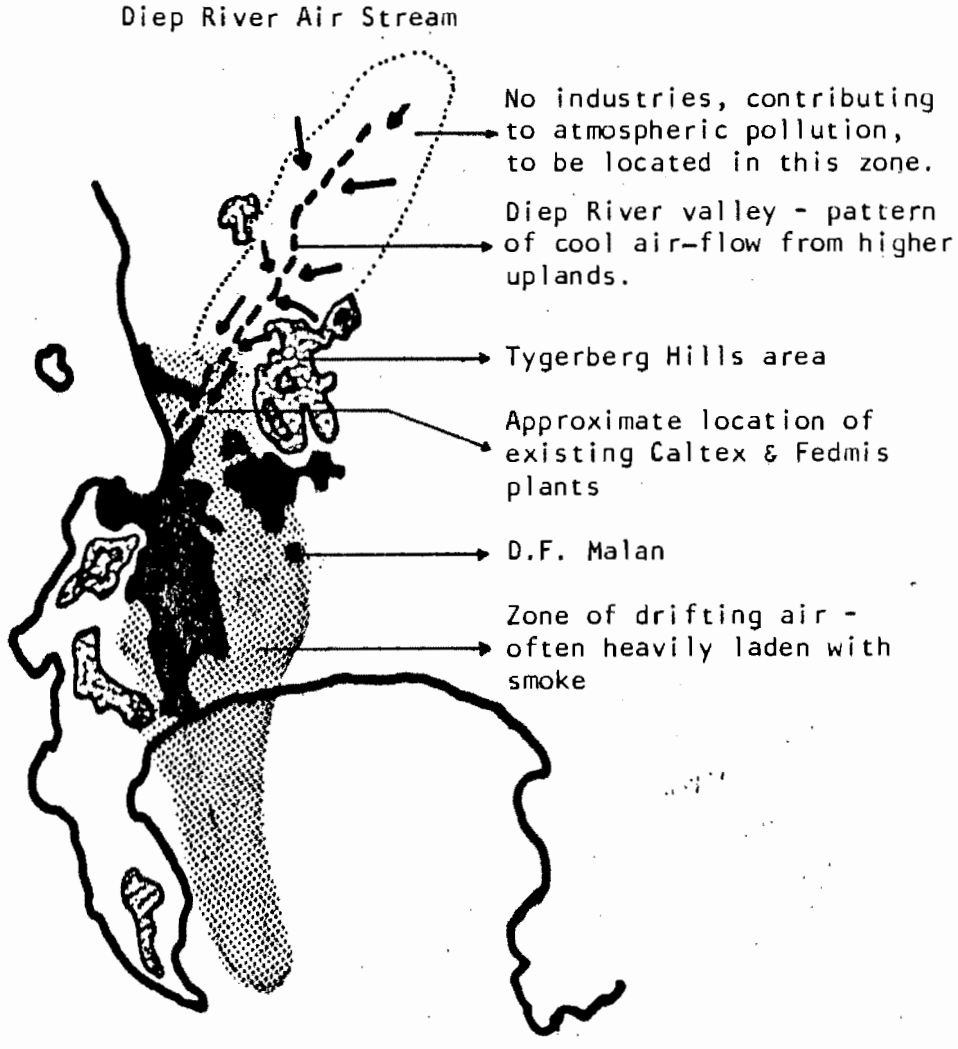
SYMPATHY

Mr R. F. van Rooyen said he had 'a lot of sympathy' for the residents of Bothasig and Table View.

He was convinced only money was needed to rid Table View and Bothasig of the air pollution. It could be done, as Sasol had just proved, and he felt these two firms should be compelled to purify the air.

At this stage the matter was already in the hands of the Minister of Health and nothing more could be done.

submission is that these activities are known for their "contribution" to atmospheric pollution and that they are completely mislocated in so far as they contribute to environmental quality. Attached report in the Cape Argus (17/4/75) confirms the above submission.

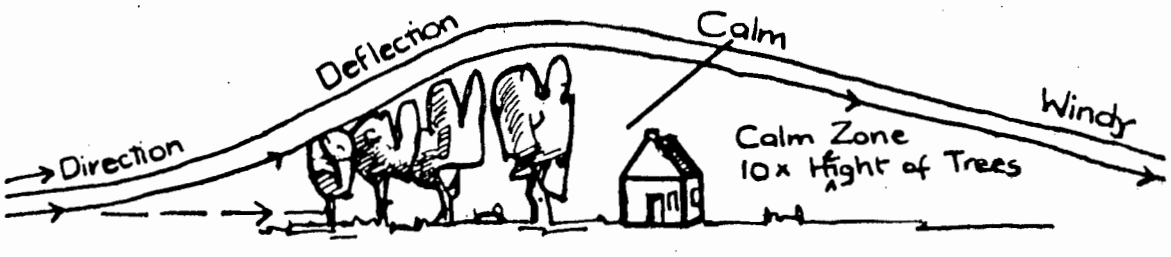


7.2 Summary

The influence of the winter north-westerly is minimal although locations on the western slopes of the hills may experience less desirable conditions expressed in terms of human preference. However, the study area as a whole is very exposed to the summer south and south-east winds which are cooled somewhat by the elevation of the hills. It is thus clear that in the location and design of any communities of human habitation in the hills it will be desirable, in terms of

human comfort, to -

7.2.1 provide shelter from winds from the quadrant between SSE and SSW. (It is known that strong winds could be controlled by particular types of architectural design - by slopes on roofs for example, wind could be funnelled up and over outdoor living areas and by locating houses in the lee of existing windrows calm zones could be developed. "Thick belts of shrubs or trees are effective windbreaks. They reduce wind velocities by more than 50 per cent for a distance downwind of ten times their height" (3.8).



7.2.2 avoid locations that might at any point concentrate or "funnel" winds from a south- south-east direction.

The petro-chemical industry and Fedmis fertilizer factory located in the Milnerton municipal area (in the Diep River airflow path) are definitely offensive and most probably injurious to human life and it should be clear that no additional industries contributing to uncontrolled atmospheric pollution must be located higher up in the Diep River valley.

(3.8) Lynch, Kevin: Site Planning. 2nd Edition. M.I.T. Press. 1971 p.75

7.3 Other climatic elements

It has already been mentioned that, except for the summer winds, the climate of the Western Cape is not limiting in a physical sense - in fact it roughly represents an optimal threshold for normal working and living conditions. Fig. 3.5 presents a diagrammatic picture of the January and July wind conditions (direction, velocity and frequency) mean monthly rainfall and temperature.

Rainfall

The study area has a medditerranean climate with wet winters and dry summers. June and July are the wettest months whereas from November to March no month receives more than 20 mm.

Temperature

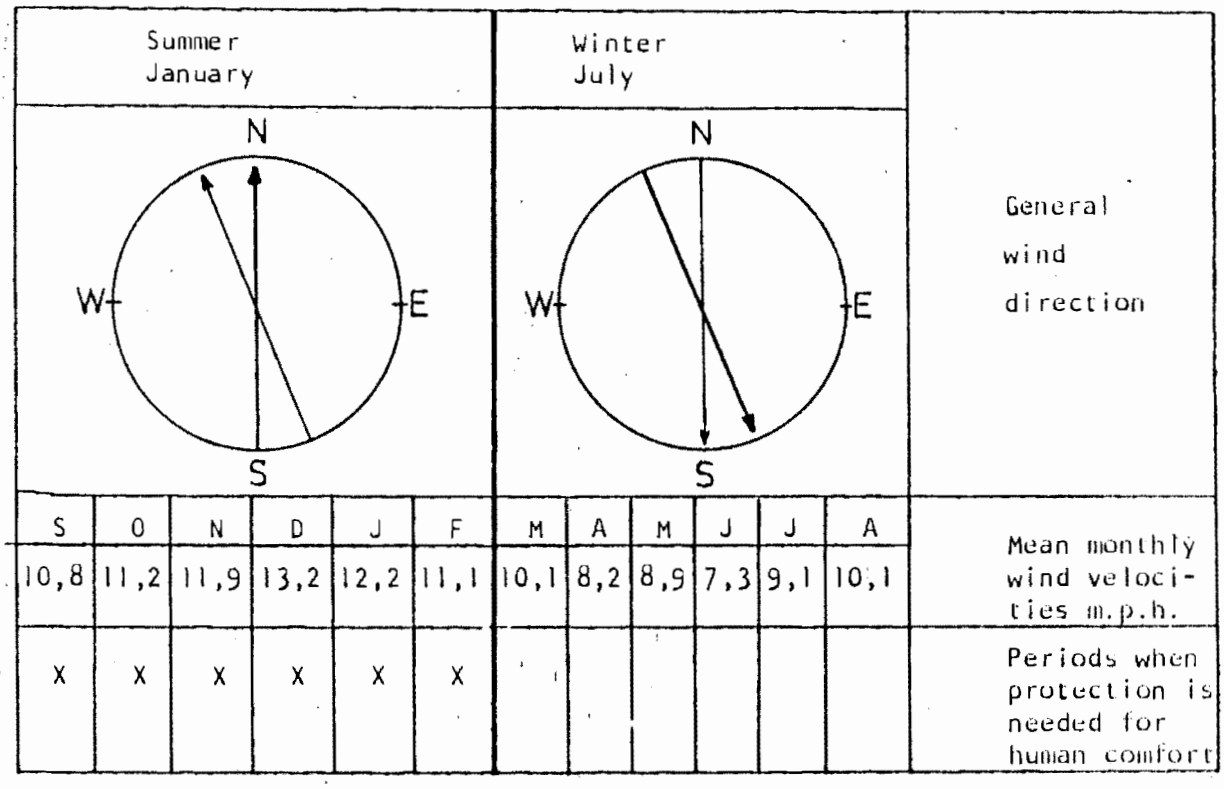
The mean monthly temperature varies between 21^{o}C during January and 12,5^{o}C during July.

Sunshine

The mean sunshine duration per day varies between 6-10 hours respectively for winter and summer periods.

The question may now well be asked what the relevance of the above information to this specific study is. The answer is of twofold nature. Firstly, mention has already been made of the summer wind conditions which form a restraint to human habitation in certain locations. Secondly, proper rainfall during a specific period, the right temperatures with no extremes of heat and cold, enough sun combined with other natural elements such as well-drained slopes on suitable soil offer the required characteristics for the production of red wines - and of course viniculture is an elementary component of the total frame of the Tygerberg Hills area which gives place and meaning to it. It has an equable climatic disposition, nurturing its grapes to ripeness through the winter wet months and warm sun of summer, whilst the cool shades promote the slow maturation of the wines.

Fig. 3.4 Wind conditions related to human comfort * Tygerberg



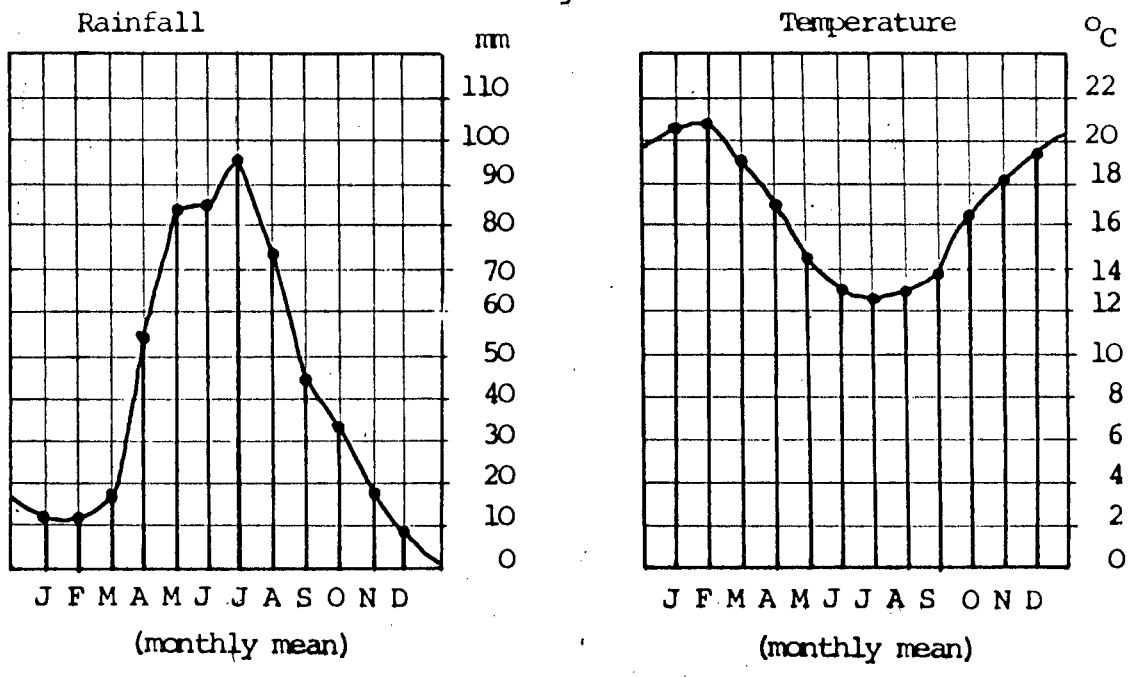
S	O	N	D	J	F	M	A	M	J	J	A	
10,8	11,2	11,9	13,2	12,2	11,1	10,1	8,2	8,9	7,3	9,1	10,1	Mean monthly wind velocities m.p.h.
X	X	X	X	X	X							Periods when protection is needed for human comfort

* It was found in a planning study of Woodlands, New Community, (3.9) Houston, U.S.A. that in case of wind velocities exceeding 11 m.p.h. protection or adaptation for human comfort should be recognised. The general (macro) climatic conditions and elevations used in the Woodlands study (no micro-climatic information was available) appear to be very similar to the whole range of conditions prevailing at the D.F. Malan and Wingfield stations. It was felt that the Woodlands study could therefore be used as an appropriate example.

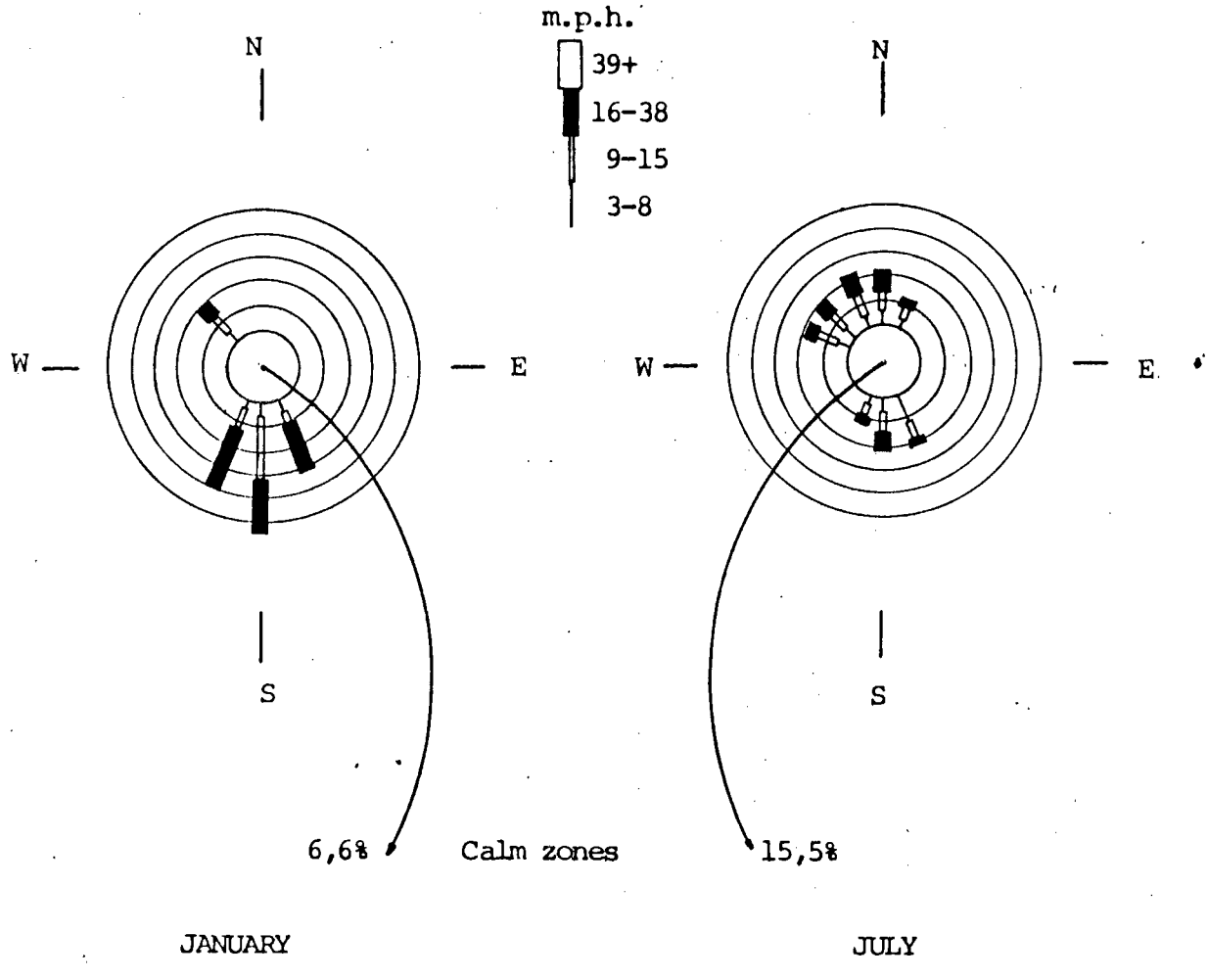
(3.9) Wallace, McHarg, Roberts and Todd: Woodlands New Community. Phase one: Land Planning and Design Principles. pp. 36-37.

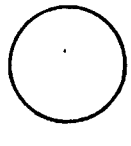
FIG. 3.5 CLIMATE IN THE TYGERBERG

D.F. Malan and Wingfield stations



MAJOR WINDS





Each circle (after calm zone) represents a 5% frequency

8 .0 Geology

Planners need sufficient knowledge of earth processes operating in their area of responsibility to foresee short and long term consequences of these processes and to plan accordingly. They should know something about the potential geological hazards (planning constraints) produced by these processes and methods and costs of controlling them or living with them. Certainly they should be aware of areas of potentially unstable terrain conducive to landslides, swelling, heaving etc. They should also be aware of the geologic hazards created by man in his use of the environment - hazards such as subsidence and collapse due to mining or pumping and mass movement induced by removal of the base of unstable slopes or increasing the normal moisture content of unstable earth masses. The planner must also be aware of the need and importance of geological deposits that offers economic mining prospects - in this respect the Tygerberg Hills area is very important for stone quarrying on a local scale.

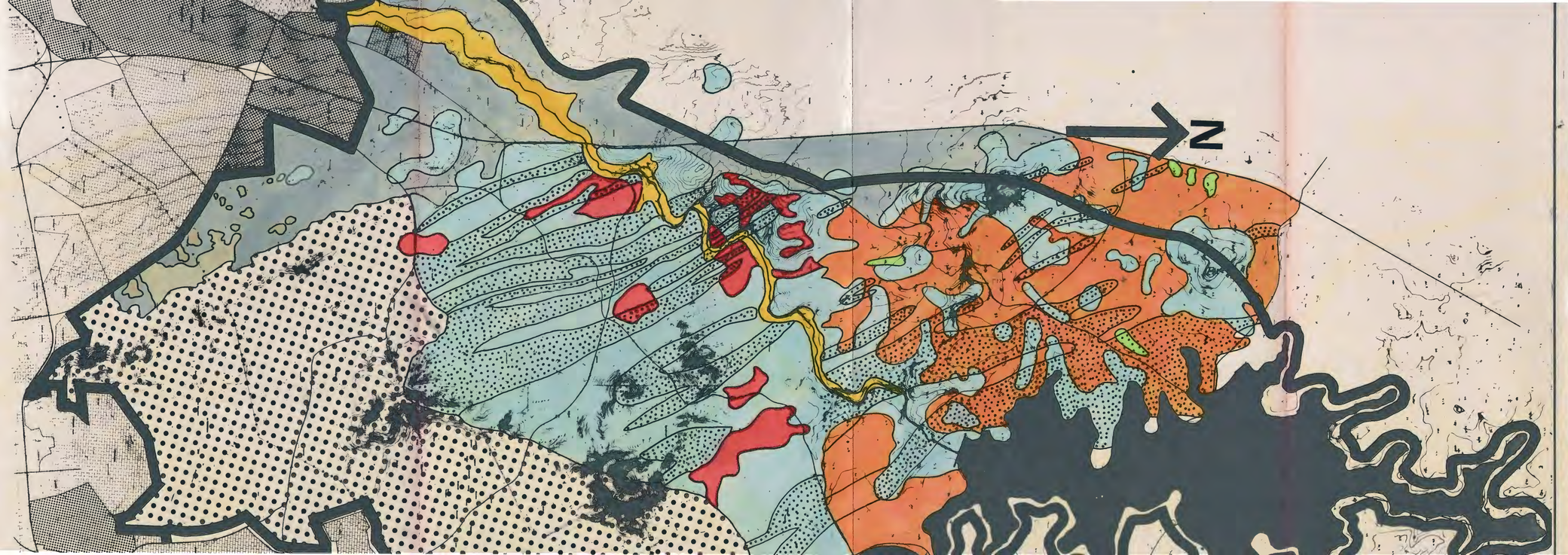
8.1 General Geological background of the Cape Metropolitan Area.

Four major geological formations can be defined in Cape Town and the surrounding environment; namely the Malmesbury, Cape Granite, Table Mountain Sandstone formations as well as the more recent sand deposits. The Malmesbury formation is the oldest sedimentary rock formation in the geological history of the area. Deposits occurred over a wide area and stretch as far as Malmesbury and Piketberg in the north, Caledon and Bredasdorp in the south-east and Worcester in the north-east. Large portions of this formation are covered with younger (more recent) deposits - the Malmesbury beds in fact acted as a base on which the later materials were deposited.

In areas where the Malmesbury formation outcrops, fine-grained greywacke and shales together with quartzites and feldspathic gravel are found.

At some period following the deposit of the Malmesbury formation, Cape Granite crystallised through a stage of magmatic action. These magmas (in liquid form) pushed their way into the older Malmesbury beds and, due to terrific pressures of overlying deposits, big dome-shaped bodies have been formed.. Very high temperatures occurred with the intrusion of the magmas into the Malmesbury formation and this resulted in the stabilizing of deposits which were in close contact with the magmas. Thus, the Malmesbury deposits which were in contact with the magmas have, in certain zones, undergone a contact metamorphosis. These areas often offer building stone material of good quality, as is the case in the Tygerberg Hills.

After the above stage a period occurred during which no noteworthy deposits were formed. This period of quiet (erosion took place) was followed by the deposits of Table Mountain formation. Sands were deposited and lithisised across a large area into what is known today as Table Mountain Sandstone (TMS) deposits. Erosion of the Table Mountain sandstone caused the deposits of large areas of sand between Muizenberg and Strand, over the Cape Flats and along the West Coast between the Atlantic ocean and the western foothills of the Tygerberg. Dune sands occur along the False Bay coast as well as north of Milnerton. In most cases, these dunes are reasonably well consolidated through vegetation and in certain areas through sedimentation.



PRE-CAPE SYSTEM

phyllitic shale, graywacke and quartsite sandstone dotted with minor impine limestone

QUATERNARY & TERTIARY

silcrete

ferricrete

white to light reddish soil

loam and sandy loam of hillocky veld

alluvium

soil cover over shale

field surveys done, but not mapped

8.2 Geology of the Tygerberg Hills Area.

The field work and mapping of detail geological formations in the study area has not yet been completed. However, available information (not published) was obtained from Dr. Theron, Geological Surveys, Cape Town and is shown on Map 3.1.

The underlying formation is the Malmesbury formation which outcrops especially in the area south and south-east of the Diep River. The surface materials are phyllitic shale, greywacke, quartzitic sandstone and minor impine limestone. North of the Diep River the shale is covered with soil with patches of silcrete and white to light reddish soils of the Quaternary and Tertiary deposits. On the western periphery of the study area a large area is covered with recent sand deposits. (Parent formation is Table Mountain Sandstone). Recent deposits in the form of alluvium, ferricrete, loam and sandy loam soils of the hillocky veld are also apparent in the study area from the Diep River in a southerly direction.

8.3 Economic Geology.

Building stone ("blue stone") is used in the construction of roads, bridges, dams as well as in the building industry. The specific deposits being used for these purposes are found in the Malmesbury formation in the form of hornfels, quartzitic sandstone and greywacke which are in close contact with granite.

The Tygerberg area is known to possess the richest deposits of building stone in the Cape Town Metropolitan area. Bearing in mind the high rate of construction work being undertaken in the metro area, the submission is that building stone is a scarce resource on a local scale and that careful consideration must be given to

protect this resource against other forms of land use necessitated by the expanding Cape Town.

Map 3.2 shows the existing active stone quarries in the Tygerberg area. The location of these quarries corresponds closely to the bands of quartzitic sandstone which runs in a north-west to south-eastern direction. There are five existing active quarries in this area namely Ciolli Bros. and Sons, Clifford Harris Quarries, Hillcrest Quarries, Murray and Stewart Quarries and Peninsula Quarries. The total of all known reserves of building stone in the Tygerberg area is $\pm$ 118 million m^3 which represents roughly 77% (3.10) of the total known reserves in the Greater Cape Town area. The expected life span of the active quarries is between 10 - 75 years. Additional quarry zones (active) are located in the Eerste River@Faure and Sir Lowry Pass areas.

8.4 Detrimental effects of stone-quarrying in the Tygerberg.

8.4.1 Dust

Stone quarrying is not always compatible with other land uses in its immediate vicinity. In the Tygerberg area one of the biggest problems caused by the stone quarries is the detrimental effect of dust from quarries on farming practices nearby.

"From a scientific investigation in this regard it appeared that farmers in the vicinity of gravel quarries annually suffer thousands of rands damage from dust pollution of vineyards, vegetables, cultivated grazing and even on natural grazing. It

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(3.10) "Provinsiale Administrasie van Die Kaap die Goeie Hoop : Die Geologie en Voorkoms van Ekonomiese Delfstowwe in die Omgewing van Groter Kaapstad" 1973. p.17.

Cottswold quarry (e on map) is excluded from the "dust zone" as it has succeeded in controlling the dust problem effectively. This indicates that with proper management, control of the dust problem is possible, and that there is justification in suggesting that "legal control" be enforced to ensure environmental quality. Effective management would not only mean effective dust control per se, but it would also be an incentive to the bona-fide farmer to remain in the area and not to give up his farming practice in despair. And this study views farming as an integral component of the total Tygerberg Hills area.

ECONOMIC GEOLOGY

Location Of Existing Active Stone Quarries

a Tygerberg Quarry

b Hillcrest Quarry

c Gran Sasso Quarry (Ciolli Bros.)

d Mount Blanc Quarry (Peninsula Quarries)

e Cottswold Quarry (Clifford Harris)

Area affected by dust from quarries a, b, c & d

areas owned by quarry-concerns

Blakes brick & clay works

SCALE: 1:50 000

MAP 3·2

was also found that the dust on grain leads to a great increase in the wear and tear of harvesting machinery. Taking into consideration that an automatic combine today costs over R15 000 you can imagine the damage suffered by any single farmer if the productive life-time of such an implement is shortened by 25 per cent as a result of excessive wear and tear. In addition the repair costs of these implements are increased by over 50 per cent on dust-polluted crops". (3.11)

The zone of affected area (dust from the quarries) is also shown on Map 3.2. The quarries that cause the biggest problems in this regard are Peninsula, Ciolli Brothers, Tygerberg and Hillcrest. It is also highly likely that these Quarries contribute to the atmospheric pollution problem experienced in the Milnerton area via the Diep River valley.

It is thus clear that a very real nuisance is being created at certain of the quarries, to such an extent, that clouds of fine stone dust are being carried downwind for a considerable distance. Both activities (farming and quarrying) are important in the Tygerberg area and an appropriate method of dealing with this issue would be to declare the quarry area a "Dust Control Area" in terms of the Atmospheric Pollution Prevention Act No. 45 of 1965. (Refer to Appendix V). At present the farming community is bearing virtually all additional costs due to this nuisance and it seems only logical to expect the quarry owners to contribute. In terms of the above-mentioned Act the quarry owners can be forced to

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(3.11) Secretary. Durbanville Farmers Association. Extract (translated) of a letter sent to the Cape Divisional Council during May 1973.

take any prescribed steps or to adopt the best practical means for the abatement of the nuisance.

8.4.2 Landscape scars.

Quarries, in fact most extractive industries, have up to the present day adopted an "exploit and move-on" policy resulting in a large legacy of dereliction. Admittedly, spoiling of the environment by quarries cannot easily be avoided, however, a new approach to this problem is decidedly necessary on the part of quarry owners and local authorities. Quarries must not simply be seen as unpleasant necessities to be kept neat. They are big and meaningful enough to take their place in large landscapes. In the Tygerberg the quarries explain the industrial base of the area and once exhausted could well be interwoven (visually complementary that is) with extensive recreational open spaces on the urban fringe. Tree planting to screen the active quarries is one example of ameliorating the visually unwelcome intrusion into the rural situation. Objective requirements in this regard would be hardiness and maintenance of the trees, (this would point to trees such as the Wild Peach, Wild Olive and Kersbos which are indigenous to the Tygerberg hills) whereas visual fit would be a subjective requirement.

8.5 Summary

Althouth all field work and surveys have been done (not mapped or published) there is no factual information of any geological characteristics of the study area which could form constraints or hazards to development in the area. However, according to the opinion of Dr. Theron, Geological Surveys, there are no restrictive factors present in the geological formations of the Tygerberg which would curtail "any sort of development".

The area is rich in geological deposits (building stone) which are very suitable for economic extraction. In fact, in the Cape Town Metropolitan area these deposits are viewed as a scarce resource and are of great value to society. Any plan for this area should give cognisance to thi s fact and should make provision for the judicious protection of this resource.

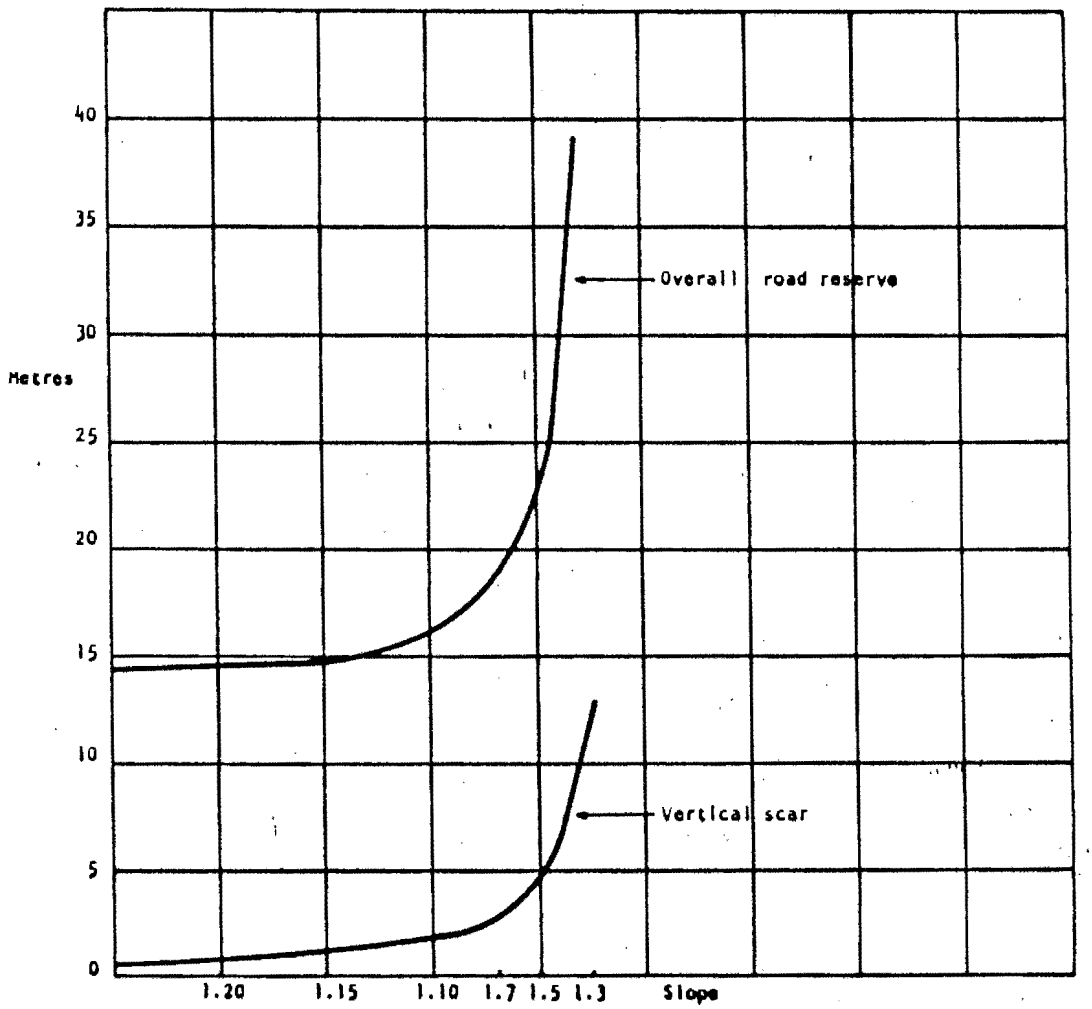
Unfortunately the quarrying of building stone in the area interferes with farming practices in the immediate vicinity - prob lems of quarry dust on crops and machines. It follows that management of these industries is of prime importance. There are legal tools which would control their nuisance-value and the controlling authority should, through the offices of the Health Department, have the quarry zone declared a "Dust Control Area". This would alleviate the financial losses incurred by the affected farming community and may just be an additional incentive to the bona fide farmer to continue their operations.

Once the quarries are exhausted they are normally left as permanent scars on the landscape, but people are now unwilling to accept that huge holes are an inevitable price they must pay for progress. This study considers the problem of landscape scars, in principle, to be the responsibility of those who create the scars and dereliction. An approach to after-use following quarrying is that the costs of restoration should be borne by the relevant industry. As a condition of planning consent, a proportion of the day to day profits of the industry should be placed in a trust fund, the sole purpose of which is to pay for ultimate restoration. Furthermore planning requirements should be strengthened to ensure that, as far as possible,

GRAPH 3.1: SLOPE vs. OVERALL ROAD RESERVE AND SLOPE vs. VERTICAL SCAR

13m Road Reserve

Landmass slope	Overall reserve	Vertical scar
1,3	39,0m	13,0m
1,5	22,0m	4,5m
1,7	18,5m	2,8m
1,10	16,2m	1,6m
1,20	14,4m	0,8m



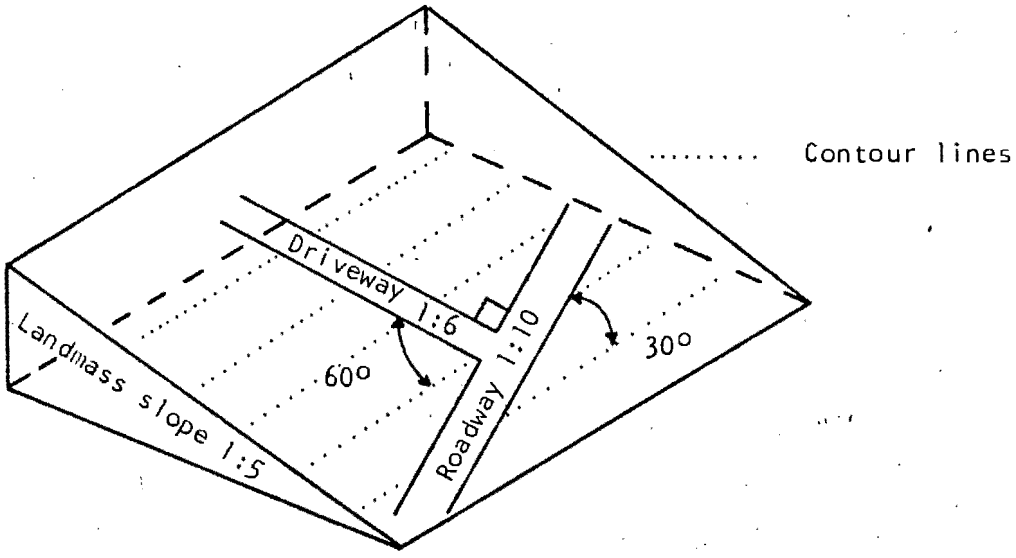
drastic increase in width of the reserve and resulting vertical scar when the slope exceeds 1:5. (3.12)

The technical assumptions underlying the above submission are:

The long section of an access road has a grade limit of 1:10 (road construction at a steeper grade presents severe technical problems).

The limiting grade for plot drive-ways is 1:6 (this limit is the maximum grade that will avoid the back, front or undercarriage of a vehicle scraping when negotiating the sudden changes in grade)

A graphical representation of the limiting condition (1:5 slope) is shown below.



Landmass Prism

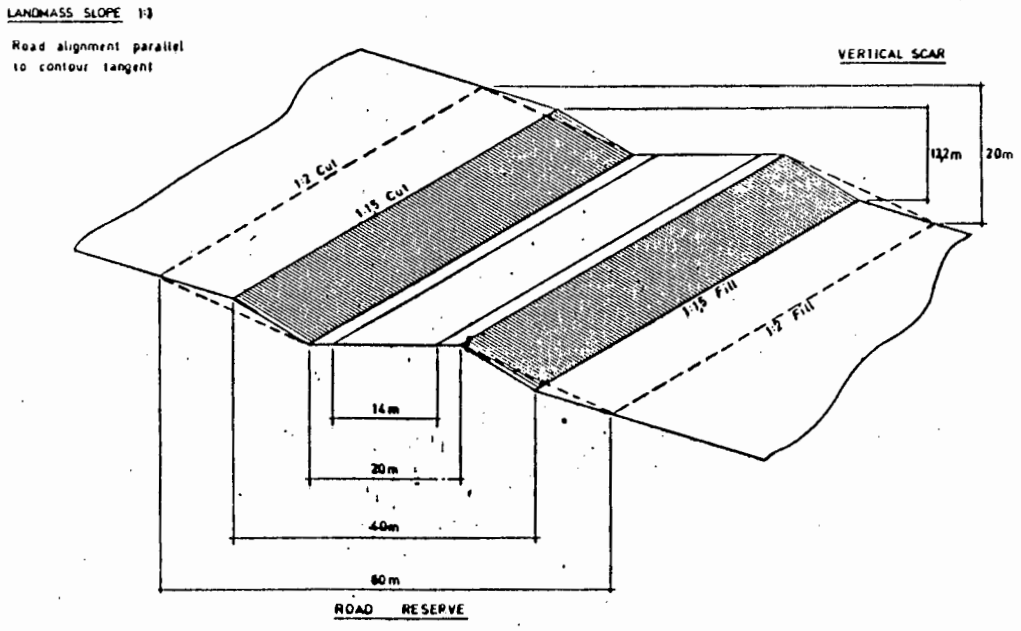
Roadway - limiting horizontal alignment is 30°
Drive-way - limiting horizontal alignment is 60°

A steeper landmass slope will require the drive-way to be angled to the roadway and/or garages will have to be cut into the slope or built-up on stilts.

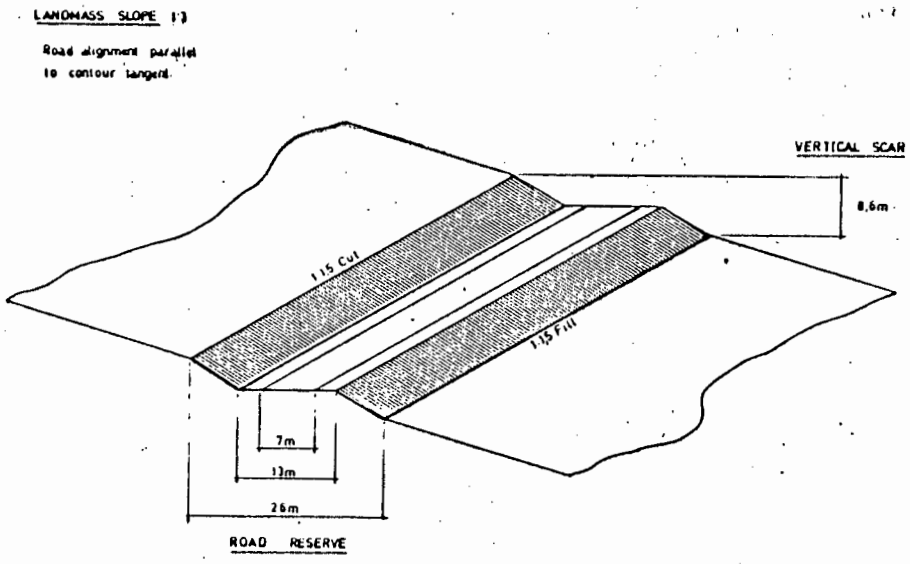
(3.12) A. McVitty. Relaxation of subdivision standards in Single Residential areas of Hout Bay. Cape Divisional Council. November 1974.

However, when a road alignment runs parallel to a contour tangent the maximum side cut and fill is experienced for a particular landmass slope. Four diagrams are shown below to illustrate this effect.

MAJOR ACCESS



LOCAL ACCESS

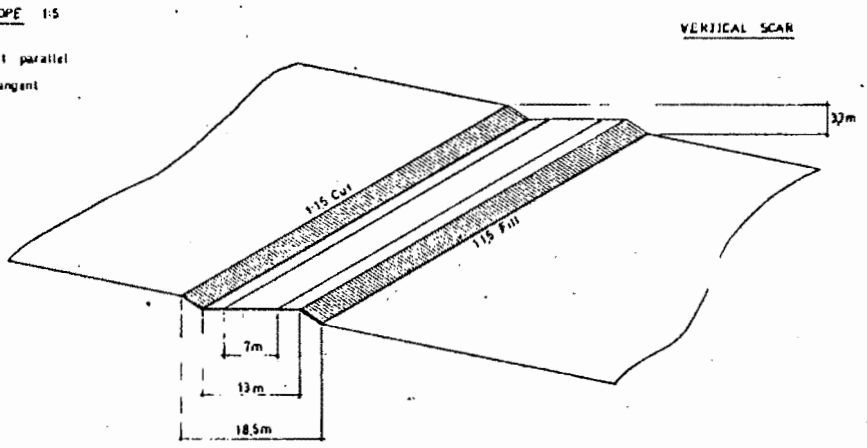


Source: A. McVitty
Cape Divisional Council,
November 1974.

LOCAL ACCESS

LANDMASS SLOPE 1:5

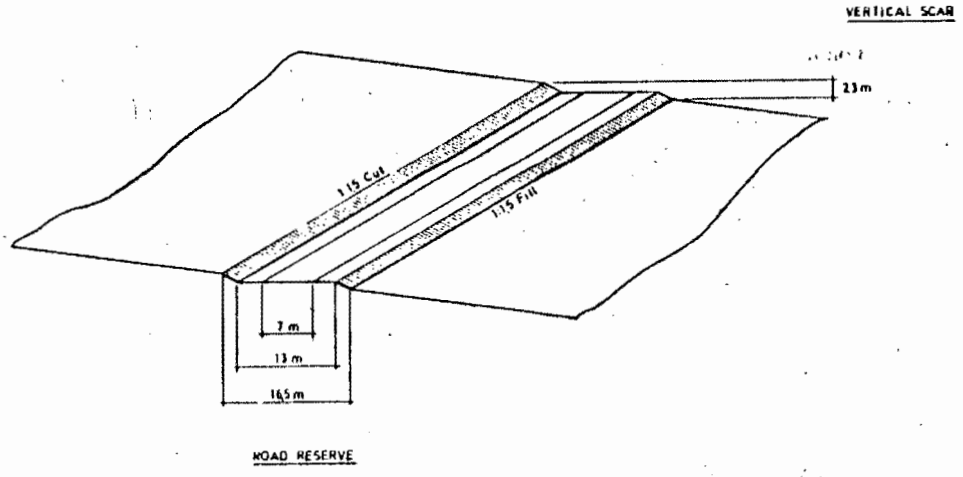
Road alignment parallel to contour tangent



LOCAL ACCESS

LANDMASS SLOPE 1:7

Road alignment parallel to contour tangent



Source: A. McVitty
Cape Divisional Council
November 1974.

From the preceding analysis it is clear that single residential development with drive-ways to individual plots on a slope steeper than 1:5 presents serious aesthetic, construction and therefore financial problems. In fact the problem of vehicles scraping when negotiating from the drive-way to the access road at slopes steeper than 1:5 presents a definite technical constraint to development and will be implemented as such in the context of this study.

The classical counter-argument about the above submission is "what then about development at Sea Point and Llandudno for example?" Admittedly there are areas where development has taken place at very steep slopes. But certainly, the crux of the matter here is what sort of development is taking place at those steep slopes and will it really be sensible and skilful to have similar patterns of development in the Tygerberg? Is there an established need for either high density development or private development on large single residential properties by an exclusive few people? (due to the excessive cost factor). How will this sort of development at this sort of slope affect the Tygerberg environment as it appears to human perception? Will the environment and its value to people be enhanced or destroyed? Those are some of the questions that must be asked and answered. The answer to the above, in terms of this study with its underlying approach as spelled out right in the beginning of the first chapter is negative. Sea Point, for that matter, is unique in its own right and cannot be compared to the Tygerberg Hills. McHarg (3.13) has the following to say about this matter: "Steep lands, and the ridges which they constitute, are central to the problems of flood control and erosion. Slopes in excess of 12% ($\pm$ 1.8) are not recommended for cultivation by the Soil Conservation Service. The same source suggests that, for reasons of erosion, these lands are unsuitable for development. The role of erosion control and diminution

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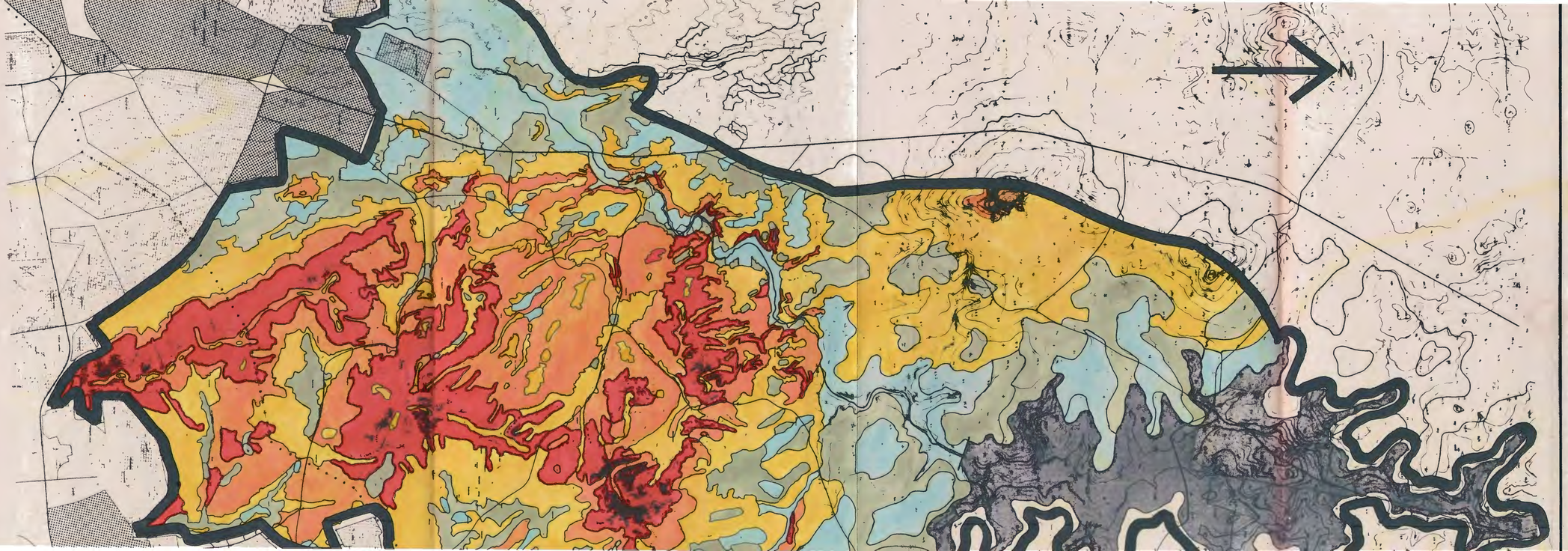
(3.13) I.L. McHarg. Design with Nature. Conservation Foundation, Washington, D.C. 1971. p.60.



1 - 1.3(33%)

1.3 - 1.5(20%)

1.5 - 1.10(10%)

1.10 - 1.20(5%)

1.20 - 1.40(2.5%)

1.40 + (flatter than 2.5%)

** A slope steeper than 1.5(20%) is accepted as a constraint to residential development (technical and environmental arguments have been put forward in text to substantiate this).

SCALE : 1:50 000

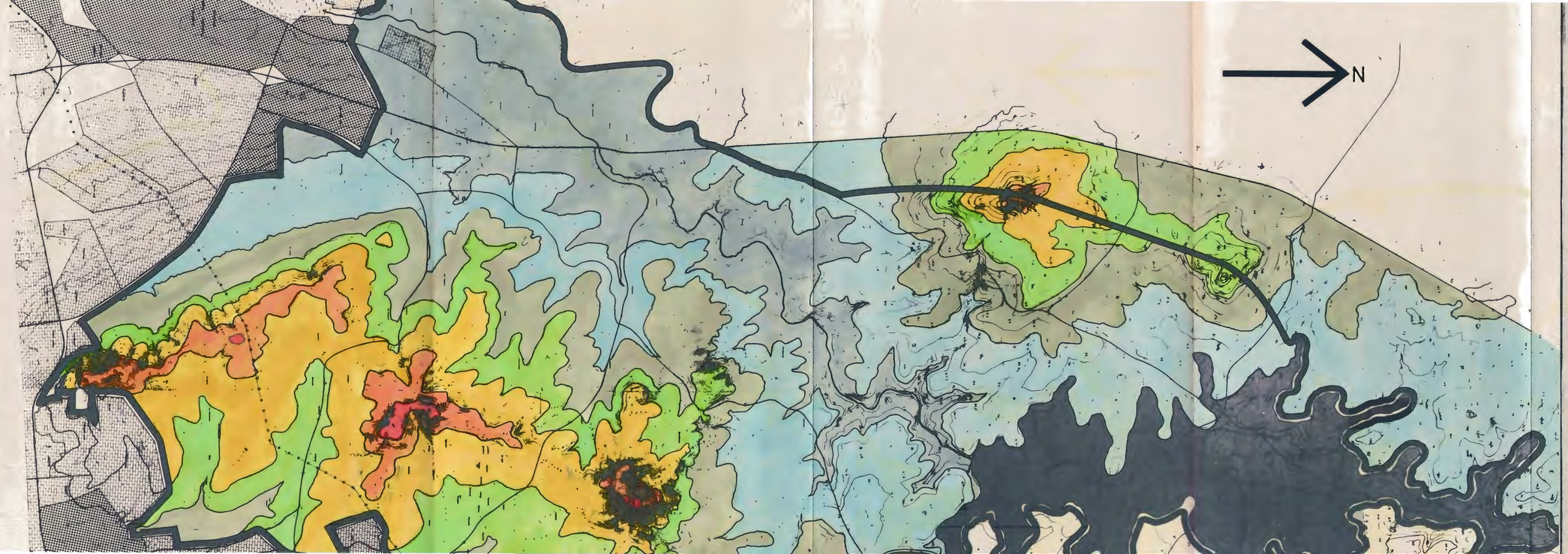
of the velocity of runoff is the principal problem here. Land uses compatible with this role would be mainly forestry and recreation, with low density housing permitted on occasion". (own underlining) Of course, runoff and erosion problems are part of the Tygerberg total. The Tygerberg Soil Conservation Area, for example, was proclaimed during 1947 and yet, today municipalities are too happy to allow urban development of all sorts in this area with no apparent idea of flooding, runoff and erosion problems this could cause in downstream areas.

Map 3.3 represents a slope analysis of the study area.

Relief.

The land surface of the Tygerberg Hills area, as defined in terms of this study, shows great variation. The northern section of the area forms part of the gently rolling landscape of the Swartland sub-region. The upper basin of the Diep River runs in a south-west direction through this area with Koeberg (389m) on its western flank as the highest point.

The southern section of the area is characterized by two major valleys namely the Contermanskloof and Tygervalley. Contermanskloof valley is flanked in the north by the Dorstberg (440m) range of hills and in the south by Kanonkop (460m - the highest point in study area). Kanonkop with the surrounding hills form again the northern boundary of the Tygervalley. This latter valley is flanked in the south by Tierberg which lies in an approximate south-east to north-west direction with its highest points (410-441m) immediately west to south-west of Welgemoed and Loevenstein townships. Numerous small ravines form part of this southern section's valley-and-hill pattern. The major watershed (divide) in the area starts



RELIEF

flatter than 50 m

50 - 100 m

100 - 150 m

150 - 200 m

200 - 300 m

300 - 400 m

steeper than 400 m

SCALE : 1: 50 000

off in the southernmost hills and follows the crest of the Tierberg in a north-west direction and from here it swings back in a north-east direction towards Kanonkop. From Kanonkop the divide runs in an approximate northerly direction towards Dorstberg (highest point on ridge north of Contermanskloof valley) and from here it swings westward towards the Diep River. This major divide bisects the southern portion of the study area with major directions of drainage eastward toward the Kuils and Elsies Kraal rivers and westward towards the Diep River.

There is furthermore, a general flat plain ranging from the western foot of the Tierberg Hills up to the Atlantic ocean. There is no significant variation in elevation in this plain which forms part of the western coastal plain of recent geological deposits (sand). Map 3.4 gives an indication of the general elevation of the area.

Physiographic Provinces

The heritage of the geological history, briefly outlined under the geological section, manifested itself in a variety of landforms which constitute a number of rather well-defined physiographic provinces. The agents of climate (wind, temperature, rainfall, etc.) together with geological formations have presented the area with five different physiographic units. This again emphasises the causality of natural ecosystems and its interpretative value of the physiography of an area.

The five units referred to are indicated on Map 3.4A and comprise the Eastern Valleys, The Hills, Western Flatlands Diep River Basin and Swartland. The definition of these provinces was not backed by any scientific study or mathematical model - they were derived from personal observation with regards to visual appearances, (even the absolute layman will immediately differentiate between the Hills, Swartland and Diep River Basin) and the knowledge acquired in having


N
DIEP RIVER BASIN
WESTERN FLATLANDS
THE HILLS
SWARTLAND
SWARTLAND
EASTERN VALLEYS
TYGERBERG
KAREENKOP
Riebeekshof
Tyger
Kontermanskloof
Eastern Valleys
The Hills
Western Flatlands
Diep River Basin
Swartland
SCALE I: 50 000

done the sections on climate, geology, gradient-analysis and relief. The model of physiographic provinces as indicated on Map 3.4A was later tested against data from the additional environmental analyses e.g. soils, drainage patterns and the occurrence of fauna and flora to find whether any further similarities occur in these areas over and above physiographic characteristics. It was found that, except for a few very small and insignificant deviations, these divisions show great similarity of all natural systems operating within their respective defines.

Eastern Valleys

The three major valleys (there are numerous smaller ravines spread throughout the area) in this physiographic province are the Riebeeckshof, Tyger and Contermanskloof valleys. They are on the eastern side of the major divide (refer to Map 3.5) with the Riebeeckshof and Tyger valleys forming the main catchment areas of the Elsieskraal River. Drainage off the Contermanskloof valley on the other hand is towards the Kuils River which runs east of, and roughly parallel to the Elsies Kraal River. This area also represents the best farming opportunities in the area - soil conditions, slope orientation and drainage give it a very high agricultural potential rating. (arguments will in a later section be submitted to classify this area as a unique resource in terms of quality red wine production).

The Hills

This province forms really the heartland of the study area. It comprises in main the Tygerberg range of hills, (the most prominent in the study area) Kanonkop (highest point in area) and the Dorstberg range of hills. It is commonly known that the Malmesbury geological formation underlying virtually the whole study area is not conspicuously resistant to weathering.

Consequently smooth and gently rounded landforms are characteristic of, especially, the Swartland area. However, in this province the Malmesbury Formation has offered much more resistance to the agents of climate and subsequently the range of hills here is much more pronounced. There is a large variety of indigenous flora and fauna to be found in this province - it appears as if its protective environment of small ravines, ridges, spurs and higher hills is acting as a catchment area for flora and fauna species being driven out, especially, from the Western Flatlands and Swartland where urban residential encroachment and a complete conversion from natural veld to grainlands are the causal factors.

Another noteworthy physiographic characteristic in this province is the major watershed (divide) running along the crest of the highest hills. Major drainage routes from this watershed are eastward towards the Elsieskraal and Kuils Rivers and westward towards the Diep River basin and Rietvlei.

Western Flatlands.

This rather flatlying area lies on the western foot of the Hills and is flanked in the east by the Diep River Basin. Its geological structure relates to recent sand deposits (stabilised) which occur continuously from the False Bay Coast over the Cape Flats and then along the Atlantic Coast northward. This area is rather poor in deep soils, drainage is moderate to low and it has no indigenous flora and fauna. The flora of the area comprises, in main, of aliens such as the Port Jackson Wattle and Myrtle. The soil conditions of this province are the same as those areas which accommodate Bothasig and Edgemead townships.

The Diep River Basin

The two ultimate ends of this basin (in the defines of this study) are the proposed Diep River Flood Control Dam in the north and Rietvlei in the south. Drainage towards the river is from the hills west of the major divide and from the Swartland. The soils in the basin are wet and shallow and the elevation is generally between 50-100 m above sea level. Water of the Diep River is brack and is not usable for irrigation (agriculture) purposes. An outstanding feature of this rather flat basin is its abundance of birdlife of which some species are rare in the peninsula. The Diep River is also the cause of severe floodings in downstream areas such as Table View and Milnerton.

Swartland

This area is typical of the Swartland wheatgrowing region in the vicinity of Malmesbury. The area is extensively farmed with wheat and there are very few patches of land under indigenous flora. The relief can be described as gently rolling and there are no slopes steeper than 20%.

The value of having identified the above-mentioned physiographic personalities is that it was found a definite tool in helping to understand how the Tygerberg Hills area operates, how all its parts fit together and thus giving it place and status in a wider setting. It also allows a better understanding and evaluation of the resources and intrinsic suitabilities within each of the five provinces defined. This method of dividing a given area into smaller physiographic components is, of course, widely used by Angus C. Hills - in Canada, for example he used this approach with great success in the analysis of the supply side of regional resource planning.

10.0 Hydrology

The main features of the Tygerberg Hills in this context are the following: rivers, (Diep River and the Elsies Kraal River) dams, (proposed Diep River Control Dam, a series of smaller dams spread right through the area and which relates in major to run-off control and erosion problems) streams, marshland and well-defined drainage patterns.

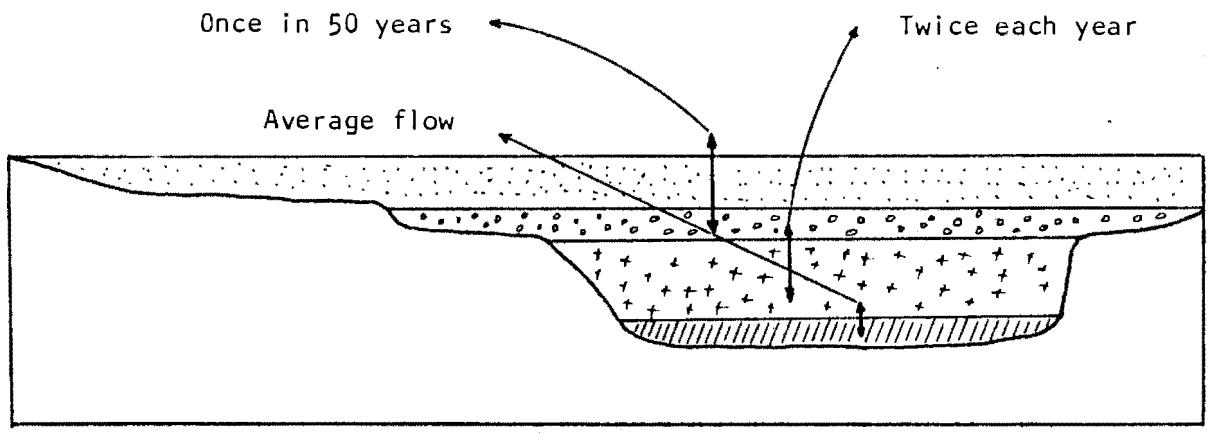
Diep River

This river which constitutes the western boundary of the study area rises in the Riebeeck Kasteel mountains north-east of Malmesbury and flows slightly west of south in an open valley as far as Kalabaskraal. Thence it meanders in a narrower incised valley through the Koeberg area and passes on the western foothills of the Tygerberg until it reaches the coastal strip where it enters Rietvlei. Before entering the Tygerberg area it is joined by the Mosselbank River which flows in a northerly and westerly direction until its junction with the Diep River. The river drains a catchment area of over 1400 square kilometres and Rietvlei serves as a flood absorption area during times of high runoff.

The catchment area of the Diep River is depicted in the north by the rolling landscape of the Swartland, in the east it is the crest of the Tygerberg Hills and in the west by the Koeberg ridges and surrounding hills. The general flat topography of the coastal plain in the west, makes it very difficult to get a clear picture of drainage and runoff towards the river. The Diep River is further characterised by rapid "wet season" flow and becomes a dry river bed in the summer months. This is generally interpreted as indicative of a rather deep water table of the area - there is no groundwater flow. However, most showers, except very light drizzles, cause spates derived from surface runoff.

Flooding of the Diep River constitutes an indisputable hazard to life and property in the Rietvlei (Table View and Milnerton) area and this must be recognised and understood in whatever planning proposals are suggested along it. Flooding generally occurs in those land areas adjacent to surface water which are required to accommodate increased amounts of waterflow during heavy showers. A stream generally runs within a channel made by itself. It is only about twice a year that there is enough flow that this channel is fully occupied by water. Intense storms occurring at less frequent intervals than twice a year produce such flow in the stream that the water overflows its banks and inundates adjacent land areas. The area of inundation is referred to as the floodplain. The following sketch gives an idea of the amount of water in a river channel and its frequency of occurrence.

Sketch showing the Theoretical amount of water in a River Channel and its Frequency of Occurrence.



The width of the floodplain area varies for different frequencies of flood related to the frequency of intense storms. Theoretically, it can be assumed that once in 50 years a storm will occur which will produce enough flow to occupy a floodplain of a depth equal to the height of the streambank exposed by the normal average flow in the stream. The adjacent topography determines the width of the floodplain required to accommodate such depth of flood water.

It must be appreciated furthermore, that the balance between stream, channel, stream flow and floodplain is a delicate one which has evolved over a long period of time. Alteration of any of these very frequently leads to exacerbation of flooding hazard. Any obstruction of the existing floodplains by either fill or other means will alter stream behaviour, both in cross-section and along its length. These changes are likely to lead to increased siltation, erosion of stream banks and aggravation of flooding conditions. Such a case is the recent construction of the Otto du Plessis Drive road bridge across Milnerton lagoon. By reducing the cross sectional area of flow

August 1974 !

Diep River in flood. Otto du Plessis Drive road bridge across Milnerton Lagoon (top) and houses in the eastern section of Table View (below).

By courtesy: "Die Burger"

and hence the discharge at the point where flood waters leave Rietvlei, peak flood levels in the flood absorption area are increased to a higher level than would otherwise have been the case. Any further development in Milnerton Lagoon which reduces the outflow to the sea could result in a significant increase to the peak vlei level and result in some flood waters being channelled around the east side of the road bridge into low lying areas which have been recently developed for residential purposes. In fact, this has happened (flooding of sections of the Tableview residential area) during severe flooding conditions during 1973 and 1974.

The introduction of the above-mentioned artefact (Otto du Plessis Drive bridge) to the floodplain constitutes thus a change to the Rietvlei flood regime. Rietvlei by nature of its large flat low-lying area serves as an ideal flood absorption area for the Diep River. The exact nature of this flood relief however is dependent not only upon the area of Rietvlei lying below the peak flood level but also upon the outflow through Milnerton lagoon which itself is dependent upon tide conditions and the state of the sand bar across the lagoon mouth. Consequently any form of development in the vlei area or lagoon could have significant effects upon peak flood levels.

Closely related to the Diep River and its flooding problems downstream is the proposal by the Department of Water Affairs (3.14) to have a flood control dam built in the northern section of the study area. Factual information regarding this dam, whether it is eventually going to be built, implementation, etc. is non-existent. However this study assumes the construction of this dam as a fact. The reasons for this assumption are the following :

10.1 Control of existing flooding problems in the Tableview/Milnerton areas.

(3.14) Boland Project. The future Water Resources in South Western Cape. Department of Water Affairs. 1973.

10.2 Protection of the proposed marina development at Rietvlei by Messrs. Graaff's Trust.

10.3 An additional source of domestic water for Cape Town.

10.4 The potential of the intelligent incorporation of this dam into a system of regional open space - which may be specifically related to waterbased recreational activities.

The above reasons by no means imply in absolute terms that floodplains are hazards which must be controlled by man. Control yes, but not by building townships in those floodplains (eastern portions of Tableview & Milnerton) and then to be forced to "control" by building a flood control dam higher up in the river. There are other uses which may be located in and adjacent to floodplains and which are not so vulnerable to this hazard (agriculture, forestry, recreation, open space etc.) However, in the context of this study with a "given" situation it was felt that there is justification in the construction of a flood control dam in the Diep River. The capacity of the proposed dam is given as ± 60 million m^3 (3.15) and in terms thereof compares favourably with other dams which have been built by means of Government funds.(3.16)

DAM	RIVER	CAPACITY
Voëlvlei	24 Rivieren	159,5 million m^3
Clanwilliam	Olifants	121,4 "
Brandvlei	Holsloot & Smalblaar	76,1 "
Wemmershoek	Wemmers	58,6 "
Steenbras	Steenbras	20,7 "
Keerom	Nuy	8,4 "
Buffeljags	Buffeljags	5,2 "
Steetynskloof	Stettynskloof	4,8 "
Idas Valley	Kromme	2,3 "
Diep River	Diep River	60,0 "

(3.15) "Nasionale Instituut vir Waternavorsing. Navorsing oor die ontsouting van water in die Diep Rivier en die benutting daarvan as drinkwater vir Kaapstad. Augustus 1971" p.3

(3.16) University of Cape Town, Department of Urban & Regional Planning. West Coast Development Project Practice II - Project 1, Regional Planning, June 1974. p.21

Elsies Kraal River

This river originates in the south-eastern slopes of the Tygerberg Hills and its major catchment area is delineated, basically by the Tygerberg and Van Riebeeckshof valleys. It is, as the Diep River, wellknown for the causing of flooding problems downstream in areas such as Goodwood, Elsies River and Pinelands. In fact, flooding of the Elsies Kraal River was the main cause of the proclamation of the Tygerberg Soil Conservation Area (refer to Appendix VI) which constitutes the first, and repeatedly, the most successful soil conservation area in the Republic.

Due to repeated flooding of parts of Parow, Elsies River, Goodwood and Pinelands, in particular in the years 1941-1945, the Tygerberg Soil Conservation Area was proclaimed during 1946. At that time the general condition of the area, from a conservation point of view, was such that runoff water from unprotected lands and vineyards rapidly collected to form an uncontrolled flood downstream of the Elsies Kraal River. Dwellings and factories were damaged, streets were inundated, drains and culverts were blocked with sand and silt, while low-lying lands were swamped over long periods. The water which brought down these masses of soil and sand, came from the rather steep gradients of the south-eastern slope of the hills. On reaching the flats lower down, the coarser particles of sand and soil are deposited, which obstructed the normal channel flow of the water and giving rise to flooding.

The area as proclaimed during 1946 comprises an extent of 10 square miles and originally there were 14 farms involved. The total expected annual runoff from the catchment area was 173 million gallons with the storage capacity of the flood control dams 95 million gallons i.e. 55% of total runoff (3.17).

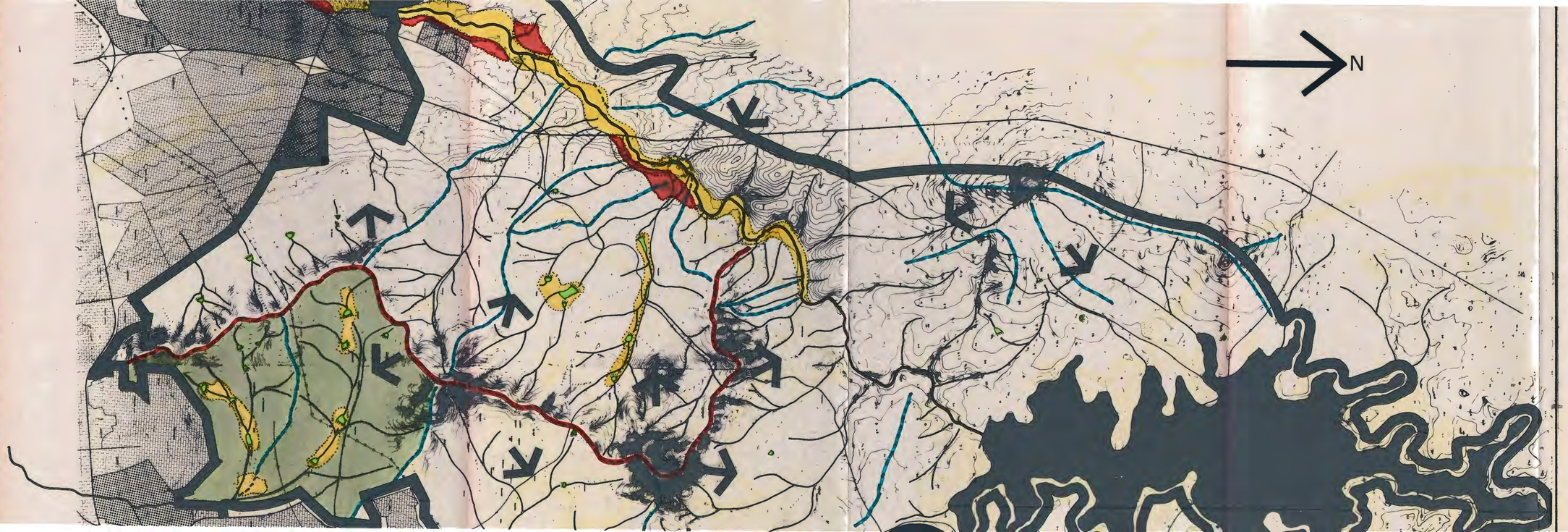
(3.17) A. Kotze. Agricultural Extension Officer, Durbanville. Factual information obtained (old files and letters most of which are undated and unnumbered) from this official in personal consultation.

The extent and costs of the actual construction work involved, comprises the following:

stormwater furrows	-	15 miles
contour embankments	-	150 miles
grassed waterways	-	19 miles
fencing off of waterways	-	20 miles
flood control dams	-	15
valuation of works	-	± R50 000

This programme was concluded during 1952 and the area has been successfully managed and controlled by the Department of Agricultural Technical Services in terms of the Soil Conservation Act, 1946 (Act No. 45 of 1946) as amended.

The Tygerberg Soil Conservation Area is a classical example of how man could interfere with the natural environment without detrimental effects. Admittedly, the crux of this matter was unsympathetic farming practices in the area. Here, deterioration of the soil had been caused by the monotonous regularity with which grain crops succeded each other and it is therefore most important to pay particular attention to proper methods of farming in order to rehabilitate soils sadly depleted by man. Furthermore, it became clear in discussions with the Agricultural Extension Officer (Durbanville) that any artefact introduced to this area which will cause additional runoff will bring us back to the 1946 situation - flooding caused by excessive runoff which could not be accommodated by the existing system of dams and channels. To develop this area as a residential component (irrespective of low, moderate or high density) will, therefore, be indicative of a very shallow understanding of this matter. Over and above renewed flooding problems an area of particular settled environmental quality will be ruined! The Tygerberg Soil Conservation Area is also shown on Map 3.5.



major divide (watershed)

secondary divide

streams (non-perennial)

dams (perennial)

marshland

major drainge directions

area subject to Diep River flooding*

* There is no information available on the area subject to flooding. No technical investigations have been done in this regard and the delineation of such areas as shown on map was derived from personal observation (1974 floods) and from discussions with officials of the Cape Divisional Council and the Milnerton Municipality.

SCALE : 1:50 000

Dams, streams and drainage patterns.

The study area is criss-crossed with a number of smaller dams to control stream runoff and erosion. The streams form part of the total system of drainage which is particularly characterized by a major divide (watershed) running along the crests of the highest hills in an approximate south-east to north-west direction. The principal drainage pattern as caused by the major divide is in an eastern direction (towards the Kuils and Elsies Kraal Rivers) and westward (towards the Diep River). Except in the Tygerberg Valley the streams are small and have no flow save in winter months.

Wetlands occur along the Diep River and some of the streams and have been indicated on Map 3.5. Marshes are generally related to wildlife habitat and personal observation has confirmed this characteristic in the Tygerberg area.

Unfortunately present research and data has not been available to furnish information regarding one of the most essential components of any water system namely the location and distribution of acquifers and acquifer recharge areas.

11.0 Soils

No extensive research and analysis have been done on soils (expansiveness, permeability, corrosion and bearing capacity) in the Western Cape in general and in the Tygerberg Hills in particular. However, a map of soil associations have been drawn by A.O.C. Technical Services in collaboration with the Department of Agricultural Services which, inter alia, covers the study area. The same institution also prepared a more detailed soil classification map of a very small area in the Contermanskloof valley.

Soil Associations

Four major groups of soil associations characterized the study area namely coarse sandy soils, fine sandy soils, red terrace soils and residual soils on shales, phyllites and schists (refer to Map 3.6). The following general characteristics of each group have been compiled.

The general characteristics as presented were derived in discussion with Messrs. A. Kotze (Agricultural Extension Officer, Durbanville), J. Lamprecht (University of Stellenbosch - Soils Laboratory) and Dr. Beaumont (Civil Engineer - Hill, Kaplan, Scott & Partners). These gentlemen made it clear however, that the characteristics are broad and general and that scientific analyses may show small deviations.

A-group Coarse Sandy Soils.

The A9 category (Durbanville dominant soil) is found in the eastern sections of both the Tygerberg and Contermanskloof valleys. The parent material is granite. The soil is brown to dark brown, soft, apedal becoming slightly gravelly at depth. The bearing capacity is medium with fair to good drainage.

The A12 and A13 categories (Groenkloof and Katara groups dominant) are found in the northern section of the study area namely that area comprising the Swartland landscape. The parent material is the Klipheuvel Sandstone. It is a gravelly, coarse sand soft in texture, apedal with frequent quartz fragments and occasional round terrace stones and early stone age artefacts. The soil is moderately deep with good drainage except in the Diep River bed. (The Diep River bed has been classified seperately). It has a medium agricultural potential.

B-group Fine Sandy Soils

The distribution of this soil (both the Fernwood and Mkambati dominant groups) occurs on the western portion of the study area - from the south-western foothills of the Tygerberg across towards the Atlantic Coast. The parent material is aeolian sand and the soil is of a pale brown colour, apedal with a slightly hard surface crust. It is generally characterised by broad, low-lying areas with a medium bearing capacity and the drainage is good. It has a rather low agricultural potential but has potential for residential development.

D-group Red Terrace Soils

These soils cover in main the eastern slopes of the Tygerberg Hills and thus the major parts of the Tygerberg and Contermanskloof valleys. Two smaller areas of the Glendale dominant group (D5) occur on the western slopes of the hills. It is a deep red soil with some clay and loam. It has a medium bearing capacity with excellent drainage and it has a very high agricultural potential. The "locals" (farmers) in the area see this soil as "a quality red soil on which wuality red table wines are produced". The parent material is hornfell and laterite on Malmesbury shale.

E-group Residual Soils on Shales, Phyllites and Schists.

The distribution of this group is between the Diep River and the major divide (watershed) of the area. It is fine to coarse in texture and contains abundant quartz gravel. Drainage is medium and it has a medium bearing capacity. The potential of these soils expressed in agricultural production is also medium, especially in the case of grain production.

A — Coarse Sandy Soils
- A9 Durbanville group dominant
- AI2 Groenkloof group dominant
- AI3 Katara group dominant

B — Fine Sandy Soils
- BI Fernwood group dominant
- B2 Mkambati group dominant

D — Red Terrace Soils
- D4 Durbanville group dominant
- D5 Glendale group dominant

E — Residual Soils On Shales, Phyllites And Schists
- E3 Kanonkop group dominant
- E4 Zwartfontein group dominant

W — Shallow Wet Soils (Diep River basin)

R — Rock And Undifferentiated Lithosols

** Refer to text for further detail

SCALE I: 50 000

Shallow Wet Soils (Diep River Course - W on Map 3.6)

The soils in the river course are very shallow with clay overlying it. The surface form is smooth and both bearing capacity and drainage is poor.

The following analysis of soil series and characteristics in the north-eastern sector of the Tygerberg Hills was also done by Messrs. A.O.C. Technical Services in collaboration with the Department of Agricultural Technical Services. (Refer to Map 3.7)

SOIL CLASSIFICATION PROJECT (3.18)
WESTERN CAPE
DURBANVILLE KEY AREA

Map Symbol	Soil Series	General Characteristics	Analysed Profile Nos.
Du	Durbanville	Red gravelly sandy clay loam, on ferricrete abruptly overlying a moderate blocky yellow clay; moderately acid; moderate water holding capacity; impeded internal drainage.	107,116
Di	Blinkklip	Brown to dark brown sandy loam to loamy sand on yellowish brow n sandy clay loam; apedal to weak blocky; moderately acid to neutral; moderate water holding capacity; moderate internal drainage.	120
K	Hermon	Brown skeletal sandy loam soils with weak soil horizonation; steep, stony; moderately acid; low water holding capacity; impeded internal drainage.	119
Ka	Katarra	Grey brown coarse and abruptly overlying a prismatic mottled grey, red and yellow clay; moderately acid; low water holding capacity; impeded internal drainage.	
M	Shorrocks	Red sandy clay loam; apedal; strongly to moderately acid; moderate water holding capacity; rapid internal drainage.	93,111,92
	Argent	Red sandy clay loam on red sandy clay; moderate to strong blocky structure; moderately acid; moderate water holding capacity; moderate internal drainage.	125
	Makatini	Red sandy clay loam on red sandy clay; apedal; moderately acid; moderate water holding capacity; moderately rapid internal drainage.	141,117
S	Williamson	Dark brown sandy loam to loam on a dark brown blocky loam to clay loam with a gradual transition to weathering shale; moderately acid; moderate water holding capacity; slow internal drainage.	103
	Langvlei	Brown to dark brown sandy clay loam abruptly Overlying a yellow brown strong prismatic clay; moderately alkaline; saline; moderate to high water holding capacity; slow internal drainage.	
	Rocklands	Grey brown sand abruptly overlying a weak coarse prismatic to blocky gleyed sandy clay loam; moderately acid to neutral; non saline; low water holding capaci ty; impeded internal drainage	104

(3.18) A.O.C. Technical Services. Analysis by Department of Agricultural Technical Services.

SOIL COMPLEXES AND MISCELLANEOUS LAND CLASSES

Map Symbol	Soil Series	General Characteristics	Analysed Profile Nos.
B		Complex of Langvlei and Rocklands as defined above, not differentiated on the map.	
M2		Complex of Argent and Makatini as defined above, not differentiated on the map.	
Du-S etc.		Complexes of soil series as defined above, not differentiated on the map.	
Q		Quarried land disturbed land.	
RS		Silcrete outcrops and lithosols	
R		Rock and lithosols.	

The two most important general conclusions to be drawn from this and the first mentioned broad soil analyses are the following:

11.1 The extreme suitability of the D4 category (Durbanville group dominant) of the red terrace soils for agriculture in general and specifically for viticulture.

11.2 The absence of any real constraints to development. There are no expansive clays present, (a view supported by Dr. Theron of Geological Surveys, Department of Mines) drainage as well as bearing capacity is moderate to good and the soils are generally well compacted. No dune sands (B4 group) containing unconsolidated patches which could cause differential settlement and which are subject to wind erosion if stripped of vegetation are accommodated in the study area.

(Covering the Contermanskloof valley area only)

• K Symbol on map indicating soil series *

125 Analysed profile numbers *

* Refer to text for a detail description and analysis of the relevant soils and their characteristics.

SCALE 1:50 000

12.0 Vegetation and Wildlife

The study area has been divided into four broad categories based on similarity and occurrence of vegetation in each category. The areas were delineated with the aid of photo-interpretation, (air-photos taken during the beginning of this year) orthophotos, (1:10 000 scale) information obtained from "locals" (mostly farmers) flora and fauna studies of the area and personal observation,

Area 1 - The Hills

The Bolus Herbarium (Dr. A.V. Hall), University of Cape Town, did a survey of vegetation on the southern slopes of the Tygerberg during July 1974 (3.19). This survey showed that the upper, uncultivated areas were botanically very interesting and could be managed as a scientific useful and pleasing natural amenity.

Three belts of vegetation exist above the foot of the hills. The uppermost belt carries a species-rich natural vegetation that can be classed as a coastal fynbos, characteristic of the somewhat dry clay slopes. Dominant shrubs are the scented-leaved Wild Rosemary (Eriocephalus africanus) and the Renosterbos (Elytropappus rhinocerotis). Many other low shrubs and perennials were found present in this belt, including Asparagus, Authospernum, Muraltia, Euphorbia, Tetragonia, Arctopus, Berkheya and Maytenus.

Among the shrubs, there was a fine showing of spring-flowering annuals, and bulbs. These included Androcymbium, Bulbine, Albuca, Haemanthus, Watsonia, Homeria and Satyrium.

Scattered groups of tall shrubs are also present namely Olea africana, Euclea racemosa, Rhus tomentosa, Rhus mucronata, Putterlickia pyracantha and salvia aureo-africana.

(3.19) Dr. A.V. Hall, Bolus Herbarium, U.C.T. The Vegetation of A Part of the Southern Slopes of the Tygerberg. July 1974.

The middle belt comprises a broad strip of cultivated grasses and a few scattered indigenous species such as Wild Olives (Olea africana) and Kersbos (Enclea racemosa). This belt of vegetation seems to act as a buffer to the movement of invasive alien shrub to the upper hills.

The lower belt is some 200 metres wide and consists of a generally dense infestation of Port Jackson Wattle, (Acacia saligna) with some plants of Cluster Pine (Pinus pinaster), Australian Myrtle (Leptospermum laevigatum) and Rooikrans (Acacia cyclops). These invasive aliens consisted of about ten plants per hectare. They are seeding copiously, with the Acacia seed awaiting a fire before germinating.

On the slopes of the eastern hills i.e. east of the major divide (watershed) a somewhat different picture emerges. Soil composition plays a major part in the occurrence of vegetation here (3.20). Two main soil types namely the sandy patches of the relative flatter land and valley beds and the more clayish soil against the slopes are specifically related to different species. The beautiful Blue Afrikaner (Gladiolus carinatus) is a native of the sandy patches. Another characteristic feature of the sandy soils is the patches of reed clumps ("biesiepolle"). Personal observation confirmed this and reeds were found right on top of Kanonkop (the highest point in the area). The sandy knolls and especially the Tygerberg valley are covered by relatively dense thickets of Wild Olives (Olea africana), Kersbos (Euclea racemosa) Wild Peach (Kiggelaria africana) and Taaibos (Rhus mycronata). The Red Afrikaner (Homoglossum watsonium) is a native of the hills with soils of a more clayish nature.

The growth cycle of the indigenous plants in this area, and for that matter the whole study area, is determined by the prevailing climate. In this region autumn and

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(3.20) Messrs. N.M. du Plessis, Robert Dyer and John Visser. A brief Brochure prepared on flora and fauna of the Tygerberg and presented to the Bellville Municipality. (Date unknown ± 1971/72).

not spring is the bringer of new life. The falling temperatures and reasonably substantial rainfall of late autumn triggers off growth. Seeds begin to germinate, trees and shrubs spout anew and the leaves of plants equipped with underground storage organs such as bulbs, pierce the surface soil. Growth continues throughout winter and gradually more and more plants come into flower until the peak flowering period is reached during spring.

A few plants, like the Kukumakrankas, do however, flower during summer. Their flowers appear when the leaves have died and wilt after a few days so that the flowering and leafing stages are completely separate. The Blood Flower ("Velskoenblaar"), a fairly close relative of the Kukumakranka, also flowers during the dry period, just before the leaves appear.

The various types of plants are differently equipped to survive the rigours of summer. Annuals like the Cape Rain Daisy die off completely during summer and depend on the vast numbers of seeds dispersed to ensure the future of their kind. In perennials the parent plants have evolved various mechanisms to survive the summer. Trees, shrubs and other plants which retain their leaves during summer can compensate for the lack of water, whilst succulents like mesembryanthemums (Vygies) store water in their leaves.

A further distinctive feature of the vegetation of this "plant-community region" of the Tygerberg Hills is the grey-green colour of the "coastal fynbos" a feature it shares with the Swartland landscape.

Wildlife

The amazing diversity of bird-life present in this area would come as a surprise even to students of ornithology. During 1972 a survey was done in the area (3.21) where a

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(3.21) Ibid.

striking feature of bird life dependence on vegetation was found. Natives of the more grassy slopes are the following - Orange-throated Longclaw (Kalkoentjies), Richards Pipit (Koester), Stone Chat (Bontrokkie) and the Crowned Guinea fowl. The grassy slopes also offer ideal nesting sites for the groundnesters such as the Longclaw; which often use long tufts of grass for their nests.

Many other species find the bushy(fynbos) slopes specially attractive, for example, the berry of the Wild Peach, ripe during June attracts the Cape Bulbul (Kaapse Tiptol of Bottergat - Pycnonotus capensis), the speckled Mousebird (Muisvoël) and the ever present Cape White-eyes (Kaapse Wit-ogies). The fynbos is also dense enough to provide shelter for the shyer Greywing Francolin, (Bergpatrys) Grassbird, (Grasvoël) Bar-throated Apalis (Bandkeel-klein-jantjie) and many others.

A great spurt of activity marks the onset of the breeding season during September. Many nests of several species can be found e.g. that of the Karoo Prinia (Karoo Langstert Tintinkie). Many other rarer local species occur in this area, for instance the Ant-eating Chat, (Swartpiet) Pied Barbet (Bonthoutkapper) and the Rameron Pigeon (Geelbek-bosduif). A striking variety of predators are also found in the area - Peregrine Falcon, (Slegvalk) Rock Kestrel, (Rooivalk) Pied Crow, (Witborskraai) Lanner Falcon, (Edel-valk) Steppe Buzzard, (Bruin Jakkalsvoël) Black shouldered Kite, (Blouvalk and the Spotted Eagle Owl (Gevlekte Ooruil) feeding on small birds and mice.

In addition to the birdlife of the area this area supports a rich reptile fauna. Two of the species - the Coral snake (Koraalslang) and a lizard, the Karoo Zonure (Likkewaan-akkedis) - reach their nearest point to Cape Town in the

hills. Apart from the lizards of which the Cape Dwarf Chameleon, (Verkleurmannetjie) the Ocellated Gecko, (Gevlekte Geitjie) Koggelmander, the Karoo and Common Zonures (Likkewaan-akkedis en Klipsalmander) are most likely to be encountered, this area is also the home of the Cape Cobra, (Geelslang) Puffadder, (Pofadder) Karoo Sandsnake, (Karoo-sandslang) Skaapsteker and other less venomous and also harmless snakes.

Amphibians are also quite common. Amongst several kinds of toads and frogs, the Leopard Toad must be mentioned.

Rodents of many kinds such as Mole-rats and Gerbills (Duine- Bles- en Stootmolle) are still plentiful and even the occasional Porcupine (Ystervark) is found. It is sad however that the remaining mammals of this truly "flora and fauna-rich" area are only shades of a glorious past.

The most common buck is the Cape Grysbok (Kaapse Grysbok) and Steenbok have been observed recently (Personal observation against Kanonkop slopes).

The small carnivores are represented by the Cape Grey Mongoose (Grys muishond) and the Cape Polecat (Stinkmuishond) and in discussions with farmers in the area the rare presence of the beautiful, but destructive, Caracal (Lynx) (Rooikat) was mentioned.

Of importance regarding the above analysis of vegetation in this area, is -

12.1 The area in general is botanically and zoologically very interesting and could be used as a scientifically useful and pleasing amenity.

12.2 Most of the plants indigenous to this area are quite easy to cultivate and manage. They are naturally adapted to the climate and require little - if any water - in addition to rain.

12.3 The flora of this region as well as for most of the grain producing areas of the Boland is seriously threatened by the ever expanding grain lands. This submission is particularly true in "region" no. 4 (Swartland) where virtually no indigenous flora are left over. This problem has also been identified by Dr. Jan Giliomee, Secretary of the Society for the Protection of the Environment (3.20) in a letter submitted to the Cape Divisional Council. Dr. Giliomee argued that -
"Die vorm van die natuurskoon van hierdie heuwels d.w.s. geronde, golwende heuwels van Malmesbury-kleie bedek met die kenmerkende fynbos van hierdie grondtipe in assosiasie met klein donker bosse in die klowe en laerliggende wingerde is baie skaars in die Wes-Kaap - hoofsaaklik 'n berglandskap met wye tussenliggende vlaktes.

Die flora van die Malmesbury-skalies word kwaai bedreig deur uitbreidinge op landboukundige gebied, en ook deur die snelle groei van nabyliggende stedelike gebiede. Hierdie flora word goed verteenwoordig teen die hellings van die Tygerberg-heuwels en geniet ook goeie beskerming juis langs die steiler hellings wat nie nuttig gebruik kan word nie".

It follows now that once the natural vegetation is depleted the chances that indigenous fauna (specifically related to vegetation) will be found are remote. The animals will normally seek a more sympathetic new environment.

Area 2 - Flatlands

This "region" is completely invaded by large patches of aliens of which the Port Jackson Wattle is the dominant

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(3.20) Dr. J. Giliomee, Secretary for the Protection of the Environment. Letter to the Cape Divisional Council dated 24 June 1974.

specie. The northernmost portion of this area however, shows occurrences of the following shrubs and Sandveld flowers:

Shrubs:	Geelsalie	(Salvia africana - lutea)
	Skilpadbos	(Zygophyllum morgsana)
	Bloubos	(Metalasia muricata)
Sandveld Flowers:	Varkblom	(Zantedeschia aethiopica)
	Chinkerichee	(Ornithogalum thyrsoides)
	Wild Ceneria	(Senecio Elegans)
	Geel Ceneria	(Senecio burchelli)

Wildlife

Due to the rather flat topography and scarce vegetation cover plus the encroachment of urban grow th (Bothasig and Edgemead) virtually all forms of noteworthy fauna have moved out to the more hilly and thus protective environment of area 1.

Area 3 - Diep River basin and Rietvlei (3.21)

The flora of the Diep River basin and Rietvlei is largely controlled by the seasonal nature and quality of the water supply. The drainage from poorly cultivated farm land causes the Diep River to have very muddy water, much mud settling out onto Rietvlei during periods of flooding. The river also carries a high amount of salts (CL, Na, Mg) probably derived from decomposing Malmesbury slate and clayey soil in the catchment areas. The saline soil conditions along and in the river basin are indicated by various salt indicating plants (Arthyochemum natelense and Atriplex).

In general the flora of the Diep River basin from the proposed flood control dam to Rietvlei indicates brackish conditions. There is little trace of zonation, the river near Vissershok bridge running in one or several deep

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(3.23) Factual information regarding this section was obtained from: Dr. N.A.H. Millard. Faunal Report on the Milnerton Estuary and Diep River. Submitted to Milnerton Municipality 1974. pp.57-62

channels in a rather wide flood plain. Judging by scourmarks this plain appears to be largely submerged during severe floods and new channels may then develop, the old ones silting up and becoming overgrown. Sedge-grass (Phragmites communis) is frequently responsible for choking the old channels. This sedge-grass has an immense growth capacity and its system of rhizomes anchor the plants very well during floods. Both the Phragmites communis and Scirpus littoralis has been found recently in Rietvlei whereas previously it occurred exclusively in the Diep River basin. The colonization of these communities has therefore proceeded very rapidly and is indicative of a changing biotape. Should they become established in Rietvlei it would be difficult to control as it easily regenerated from pieces of rhizome.

Wildlife

Rietvlei is at present the largest and most important haven in the Cape Peninsula for duck and both migrant and indigenous waders. The most significant reason for this is the following :

> An abundant food supply - the winter floods submerge the summer growth of vegetation and this, together with the large amounts of fauna (small fish) brought down from upstream and those emerging from the mud, attract vast quantities of birds. Similarly when the vlei dries up, the acquatic vegetation and associated fauna becomes exposed, causing a second peak in bird population.

A number of detailed surveys of the birds of Rietvlei and the lower Diep River basin have been conducted by the Cape Bird Club since 1947. 158 Species were recorded by Winterbottom in 1960 and another 5 added by Blaker and Winterbottom in 1968 (3.22).

(3.24) Ibid. p.57

The more important species are mentioned below. Some of them (marked *) are rarities in the Cape Peninsula and have been recorded only, or practically only, from this area.

Migrant waders

Greenshank, Plovers, (ringed grey) Stints, (little) Sandpipers, and Whimbrel*.

Indigenous waders

Plovers, Stilt, (black-winged) Avocet, Snipe (painted).

Ducks and Geese

Duck (whistling*) (Knob-nosed*) (white-faced*) and (maccoa*).
Goose (Egyptian spurwing) Shoveller, Teal, (Red-billed Cape) Shellduck (African).

Many duck, such as Yellow-bill (September/November) and Cape Shoveller (October/November) breed in this area. The nests are usually constructed in lush grass or reeds close to the water's edge.

Other water-fowl

Pink-backed Pelican*, African Spoonbill*, Black Stork*, White Stork* and the Reed Cormorant*.

Terrestrial birds

During autumn when the vlei and river basin is relatively dry, terrestrial species move into this area from the surrounding environment. Swifts, swallows and martins feed on insects. Some of them breed in the Diep River basin near marshy patches and nests of the white-throated swallow, the larger striped-breasted swallow and Cape sand-martin have been observed here.

Other forms of fauna of this area is similar to that of many brackwater vleis of the Cape Peninsula. It con-

sists of enormous numbers of minute forms, which include water-fleas, insect larvae and watersnails. This aquatic population is a seasonal one and therefore does not support any large predators other than frogs and birds and shows a peak of abundance during mid-winter and early spring.

Only two species of small fresh-water fish occur, the minnow (Galaxias punctifer) and the Cape Kurper (Sandelia capensis) and are restocked each year from the tributaries of the Diep River.

Area 4 - Swartland

This is an area where a virtual complete conversion of natural veld to grainland has occurred and it shows much evidence of the deterioration and depletion of natural vegetation. However, patches of aliens such as Rooikrans (Acacia cyclops) and Port Jackson Wattle (Acacia saligna) occur in the area.

Wildlife

Due to the deterioration and depletion of natural vegetation in this area the fauna of the area is sparse and has taken to the protective environment of the hills (Area 1) in the south.

The inference from the above discussions (both flora and fauna regimes in the relevant areas) is the following -

12.4 The very interesting and diverse flora species of the Hills (Area 1) which support an abundance of wildlife, presents, on a local scale, a source of scientific, educational and scenic value. This phenomena can be managed as a pleasing natural amenity.

is the interdependency between wildlife and vegetation. This area also seems to be a catchment area for certain species of wildlife driven out from areas 2 (spreading urbanisation) and 4 (complete conversion from natural veld to grainlands).

2

Area 2 - The flats
Completely invaded by aliens.
(Port Jackson Wattle) No noteworthy wildlife species occur here.

3

Area 3 - Diep River basin and Rietvlei
Flora and fauna are related to brackish water and soil conditions. An outstanding characteristic is the abundant birdlife (with rare species) in especially the Lower Diep River and Rietvlei. Saline conditions along and in the river are shown by various salt indicating plants.

4

Area 4 - Swartland
Natural vegetation and wildlife virtually non-existent due to very intensive grain-farming practices.

12.5 The lower Diep River basin and Rietvlei on the other hand is important for its abundant birdlife. In addition to its resident species (some of which are rare) this regine is also important for migratory species. It offers potential for the development of a bird sanctuary. Here it must be mentioned again (as it has been done in discussion on climate - Diep River air flow) that the Caltex works and Fedmis Fertilizer factory appear to be a pollution liability to the ecological balance in this area. It is, furthermore, also highly probable that farms higher up along the Diep River provide a rich source of nitrogenous fertilizer (dung) and probably also leached-out superphosphate to the river which invariably will end up in Rietvlei. This rich fertilizing of the water would quickly lead to immense algal blooms, choking water weed and eventual entrophication and death of the water body.

12.6 The flora and fauna regimes in both above-mentioned areas are vulnerable resources and this must be appreciated in any planning endeavour.

13.0 Cultural and Scenic Resources

Of all the irreplaceable resources, the publicly recognised symbols of the study area's past should be incontrovertibly acknowledged as of high value. Historic remnants are not merely objects of interest to a pedantic chronicler, an antiquity or a passing tourist; they are testimonies of often successful adaptation by past generations and thus, can act as beacons to guide present and future generations in their striving to attain a fitting adaptation to the total environment.

Surviving historical structures include scattered farmsteads spread throughout the area. These include the farmsteads of Altyd Gedacht, Morgenster, Bloemendal, Maastricht, Klein and Groot Roosboom, Hooggelegen, Diemersdal, Meerendal, Contermanskloof, Hoogkraal, Vissershok, Welbeloond, Platrug, Welvergenoegd, Kuiperskraal, Adderley (previously known as Brakkefontein) and Olifantskop. With a very few exceptions these houses have lost so much of their historical character that it is virtually impossible to recognise them as "old" buildings constructed by our forefathers. The few exceptions referred to are the following : (3.23)

* Welbeloond - approximate date of construction is 1768.

* Vissershok - constructed during 1768.

* Olifantskop - constructed during 1824.

** Brakkefontein (now Adderley) - constructed during 1805.

The other farmsteads mentioned have been changed beyond "historic" recognition. However, their functions and therefore their relationships with the past are still the same as during the years of van Riebeeck and the van der Stels. These farmsteads with their dominant use of

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(3.25) Hans Fransen & Dr. Mary Cook. The Old Houses of Cape Town. Chapter 17. Malmesbury. pp. 147-148.

* The authors of the above source, have given star ratings to the buildings. Structures with one star have lost much of their character but retain sufficient of their original features for them to be recognisable as old buildings. Two stars have been given to houses that have been changed but are nevertheless still attractive and are good examples of the Cape Dutch style.

agricultural production of some variety (mostly viticulture) have thus ensured, up till today, maintenance of a traditional historic value.

Another value of these farmsteads in the area is that of perception and adaptation in a total setting. The farmsteads with their vast werfs are integral components of the relative quiet, rural atmosphere of an area which has somehow and to a certain degree survived spreading urbanisation - they form part of a visual, pleasant scenery.

There are, except for the numerous private farm roads, three roads which are classified in context of this study as sources of scenic value. These are the Tygervalley Road, the Contermanskloof/Vissershok Road and a private, state-owned and controlled road which runs from the Tygervalley Road to the top of Kanonkop (highest spot in area).

The structures and land routes mentioned above are neither unique nor scarce in a regional setting. This is not the point however, they form fundamental parts of a total "Tygerberg-Hills-area-sum". This area has status and character of its own,making it an environmental "whole" of highly perceptual values of sense of life and usefulness. It must be understood therefore, that the scale and place of these components in this specific area demand careful regulation of their immediate environment. To preserve isolated examples of the past on an ad hoc basis as a token memorial is not accepted by this study. This attitude may just reflect the very shallow degree of understanding we as Cape Tonians have reached of what has real meaning and place.

Map 3.9 indicates the location of the components discussed.

VISSERSHOK (1768)x

Symbol indicating location of farmsteads (opstalle) in the Cape Dutch style that have some historical/cultural value. Date(in brackets) refers to year of construction and star refers to a rating of these structures in terms of their original features. ****

Meerendal

Historical farmsteads in the area with large werfs, particular scale and place in a total environment.

Tygervalley scenic route

Contermanskloof/Vissershok scenic route

Private scenic route to top of Kanonkop

**** Ratings done by Hans Fransen and Dr. Mary Cook in their book "The Old Houses Of Cape Town"

SCALE I. 50 000

14.0 Agriculture

Agriculture, per se, is not a characteristic of the natural environment of the Tygerberg hills area. However, it is such a "natural" part of this environment that it warrants discussion under this section. Agriculture, in fact, is a man-made component of the environment and it emphasises the "causality" (McHarg) of natural ecosystems operative in the area, which explains the pursuit of this activity.

The single-most important agricultural activity in the study area is that of viticulture. This study views viticulture, particularly the quality of red table wines being produced in an area indicated as A1 on Map 3.10, as a unique resource. Support for this view was obtained from a scientific study (3.24) done on the suitability of certain areas for the production of superior wines; and from the opinion of a wine-expert of the K.W.V. (3.25).

The above-mentioned study was based on climate (especially certain critical temperatures), but it was emphasised by the author, as well as by Dr. Beukman, that with regard to the production of quality wines there is no such thing as a single-factor-analysis. It is incidental that the quoted study made extensive use of temperature; many other factors such as rainfall, slope, drainage, soil conditions orientation, cultivars and maturing techniques were all built into the study.

Le Roux, in his study, proved that temperature is significantly important in the chemical composition and quality of wines as shown in chemical analysis and organic judgement of mature wines. This submission was also investigated and found to be scientifically acceptable for viticulture in the United States (California). Thus, by making use of a temperature-summation-

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(3.26) E.G. le Roux. "'n Klimaatsindeling van die Suidwes Kaaplandse Wynbougebiede" Unpublished Msc. thesis in Agriculture. University of Stellenbosch. December 1974.

(3.27) Dr. Beukman. K.W.V. Paarl. Personal Contact.

concept, the Western Cape was classified into 5 regions. The basis for this classification was the expression of temperature-summation during the physiological growth period of the vine (September-March) in "graaddae" above a basic temperature of 50°F(10°C). A temperature of 10°C was chosen because it is proved and commonly accepted that a vine is physiologically inactive at lower temperatures. On the basis of the above-mentioned, the study area was divided into 5 categories with area 1 having the lowest number of "graaddae", (less than 2 500 - working with 50°F) area 2 (between 2501-3000 "graaddae") up to area 5 with more than 4000 "graaddae". Area 1 represents the cooler (influence of sea) temperatures and area 5 the higher temperatures - this again means high quality table wines in the first two areas and dessert wines in the other areas. In terms of the study it was found that there is no known, existing wine production area that qualifies for the first group, but that the Tygerberg hills area (as demarcated on Map 3.10 in group A1) falls in the second area. It means that some of the highest quality table wines in the South Western Cape, especially red wines such as Cabernet, Pinotage and Shiraz are produced in this area. The other known areas (producing) in this group are Constantia, Villiersdorp and Barrydale. Mr. le Roux has gone further and tested his findings by interviewing fourteen known experts of the South African Wine Industry. His findings especially with regard to areas 1 and 2, were accepted.

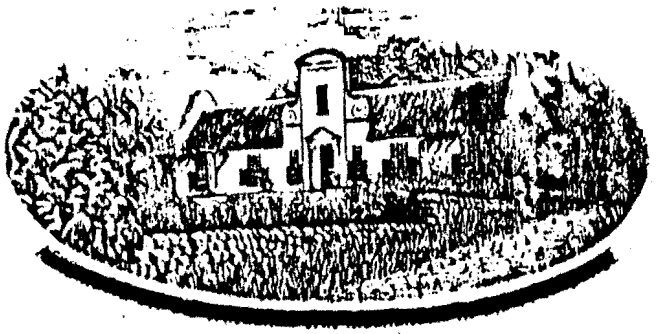
To summarize. " We have in the specific Tygerberg area an unique resource with regards to the production of quality table wines (especially red) and this must be realised by you planners" (3.26) Furthermore, not only quality which is of utmost importance, but quantity also comes into the picture.

"Graaddae" - calculated by multiplying the average temperature of the relevant months minus 10°C with the number of days per month and then to calculate the sum of the product.

(3.26) Dr. Beukman, K.W.V. Offices, Paarl, 21 April 1975. A translation of the exact words used by Dr. Beukman during interview with him.

OESJAAR 1970 VINTAGE

Meerendal

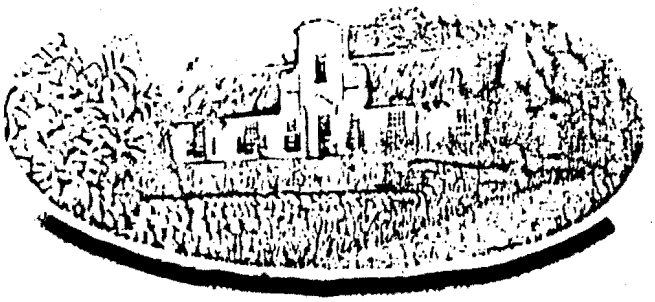


SHIRAZ

IN VATE VEROUDER EN AFGEVUL IN
DIE KELDERS VAN DIE K.W.V. — PAARL
PRODUK VAN SUID-AFRIKA

INHOUD
750 ml

Meerendal



PINOTAGE

IN VATE VEROUDER EN AFGEVUL IN
DIE KELDERS VAN DIE K.W.V. — PAARL
PRODUK VAN SUID-AFRIKA

INHOUD
750 ml

Both Dr. Beukman as well as Mr. Kotze, Agriculture Extension Officer, Durbanville, is of the opinion that the production/ha of this area compares favourably, in fact is higher, than any other known area under dry-land conditions. A production figure of 6-7 metric tons/ha is found in this area - this is indicative of a very high potential in quantitative terms. A figure of 5 metric ton/ha is given by the Department of Agricultural Technical Services (3.27) as indicative of high potential with no irrigation.

The farms in this area, wellknown for viticulture, are the following : Hooggelegen, Meerendal, Diemersdal, Altyd-gedaght, Bloemendal, Maastricht and Klein Roosboom. There are in addition to the above farms also a number of small holdings growing vines. They are mostly located in the vicinity of the farm Hooggelegen south of the Vissershok/ Contermanskloof Road. The four most common cultivars grown on the farms are Pinotage, Cabernet, Shiraz, Hermitage and Steen. (the latter, of course, being a white wine cultivar).

The other important agricultural product in the study area is wheat. Wheat production occurs in area A on Map 3.10. Although wheat production in this area, expressed both in qualitative and quantitative terms, is high, its more important contribution is that of being supplementary to a few rather extensive, dairy farms of which De Grendel, Vissershok and Bloemendal are classical examples. In fact, none of the known farms in this category relies exclusively on wheat farming as a source of income (as the case in the Swartland proper). There is rather a tendency to mixed farming with wheat a strong basic supplement to dairying and sheep farming. Wheat farming per se is therefore, not seen as a scarce or vulnerable resource - it is rather seen, as in cases manifested on portions of the western hills, as being detrimental to

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(3.29) Department of Agricultural Services, Agricultural Extension Officer, Durbanville, "Winterreënstreek: Produksiesone" 1972.

the natural environment. Prolonged cultivation under a system which undertakes no effective provision for maintaining the organic content of the soil has resulted in the destruction of the erosion-resistance qualities of the soil.

Lastly, the derivation of Map 3.10 needs clarification. This map was prepared, basically, from an agricultural potential map compiled in 1972 by the Department of Agricultural Technical Services for the Planning Section, Cape Provincial Administration. It was further modified with the assistance of Messrs. Lamprecht and Ellis of the University of Stellenbosch - Soil Laboratory to accommodate the study area in greater detail. The intimate knowledge and experience of "locals" (farmers) was also obtained and additional determinants such asproductivity figures, soil, drainage and climatic figures were all incorporated in this map.

AI — Very high potential for the production of superior red and white table wines, as well as for wheat production. Arguments have been forwarded in text for classifying this area as a unique resource, in the Greater Cape Town Area, for the production of excellent quality red table wines.

A — High potential for wheat production. In both the A categories the soils are deep, red and well-drained in a prominent relief. (rolling landscape)

B — Moderate potential. Suitable for wheat farming. Rainfall in this area is too low for dry-land viticulture, and the water of Diep River too brack for irrigation. Soils are moderate deep, clayey and residually-formed. Drainage usually good except in the Diep River basin. Undulating terrain.

C — Low to very low potential. This category comprises in main of the sandy flatlands along the foot of the western slopes of Tygerberg as well as the dune areas west of Diep River. Occurrences of lime is common, soils are shallow, (sand overlaying clay) wet and drainage is poor.

D — Excessively rocky and steep slopes. No cultivation possible.

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CHAPTER IV

INTERPRETATION

1.0 Introduction

1.1 Inherent hasards to human life and property

1.2 Hasards due to human action

1.3 Unique and scarce resources

1.4 Vulnerable resources requiring protection and management

1.5 Cultural and scenic resources

2.0 Brief summary in schedule-form

3 .0 References

CHAPTER 4.

INTERPRETATION

1.0 The preceding chapter deals with an inventory of the natural resources of the Tygerberg Hills area and it has equipped the study to understand and to interpret these natural processes comprising the area. It has thus, the positive merit of identifying propituous areas for various types of future human use.

This chapter deals with the identification of site capabilities represented by the natural phenomena and processes - it will start seeking to determine opportunities and constraints. Underlying assumptions are as follows :

The natural systems and landscape provinces represent varying degrees of social value.

These systems also have varying degrees of sensitivity to human action.

The tolerance of natural systems to human intervention determine their capability.

Values, capabilities and amenities constitute a range of opportunities and constraints over the study area.

To summarize; the above assumptions mean that certain types of land are of such intrinsic value, or perform work for man best in their natural state or, present such hazards to development that they should not be urbanized. Similarly, there are other areas that are intrinsically suitable for urban uses.

It should be noted that in Chapter 3 (Sections 7-14) dealing with the environmental resources, interpretative values of the natural systems were discussed. This chapter then, will briefly summarise these arguments.

1.1 Inherent hazards to human life and property.

Flooding

The Diep River and Elsies Kraal downstream areas are subject to occasional severe flooding. The areas subject to flooding were indicated on Map 3.5 (only the Diep River will be dealt with here, as those areas subject to flooding from the Elsies Kraal river fall outside the boundaries of this study - Goodwood, Elsies River and Pinelands.

The causal factor of flooding from the Elsies Kraal River is excessive runoff in its catchment area (The Tygerberg Soil Conservation area) and will be dealt with under the heading vulnerable resources requiring protection.

The 50 year floodplains for the Diep River (as indicated on Map 3.5) are accepted as those areas from which all development should be excluded save for functions which are unharmed by flooding or for uses that are inseparable from floodplains. These uses will include recreation, institutional, open space, agriculture and certain types of residential development such as marinas. In addition no structures or other artifacts must be permitted which will impinge upon the floodable cross-section area at any point along the water flow channel.

Fire

The other intrinsic hazard in the study area is the very reverse of excess water and this is fire. The area most prone to fires (the study assumes that man is the primary agent for initiating fires) is The Hills area as indicated on Map 3.4A. This area comprises a rather dense vegetational cover of which the

fynbos and renosterbos associations are most vulnerable to fires which normally occur during the dry summer months. The fire hazard is aggravated in the western hills of this physiographic province due to dry wheat lands (stubble-fields) during the critical dry periods. In this specific section of The Hills, surface water and a high water table as ameliorative factors which could mitigate against the risk of casual small fires, are absent. There was no documented evidence on the occurrence of fires in this area, but discussions with local farmers reveal a random pattern of both frequency and severity of fires.

Management of the dense vegetation against the western slopes of the Tygerberg by the regular bruning of highly flammable litter and shrub layers can reduce the probability of major fire occurrence. But the risk remains high, especially it it develops into a major fire which is very hard to control. Such a fire occurring during a period of drought and under high summer wind conditions (howling south and south-easters) can develop into a wildfire which is generally uncontrollable.

1.2 Hazards due to human action.

Having identified the phenomena which are inherently hazardous, this text now turns to those which are, at present beneficial resources, but are highly vulnerable and can become health hazards unless their utilization is carefully regulated. Water and air in different contexts are such resources in the study area.

Water

Non-perennial streams, specifically those draining towards the Diep River are of no or marginal value as sources of water supply, but have value for accommodating channels for transporting run-off. If polluted, these

streams pose a definite threat to that very high resource value of wildlife in the lower Diep River Basin and Rietvlei.

In Chapter III section 12 (dealing, inter alia, with flora and fauna of the Diep River and Rietvlei), it was submitted that farming practices along the Diep River and its contributory streams provide a rich source of nitrogenous fertilizer and leached-out superphosphate to the river which will invariably end up in Rietvlei. This, of course, can lead to algal blooms, choking water weed and the death of the water body with its high value as a wildlife (especially birds) resource.

This study views the birdlife regimes in the lower Diep River and Rietvlei as a resource of great value to society. It follows therefore that the local farmers must be made aware of this problem of water pollution and its hazardous consequences and action must be taken to prevent the deterioration of the quality of the water from the streams into the river and the river itself. There must be furthermore, very strict control of outfall of any sewage disposal plant into the Diep River. The wetland areas comprise, in main, the Tygerberg Soil Conservation Area and areas along the Diep River. These areas are of crucial importance to the surface water regime, and function as a "flood storage system" by holding water and gradually releasing it to the stream which drains it, thereby helping to moderate stream flow both during peak flow and low flow conditions. Furthermore, the biological activity of the wetlands vegetation (especially along the Diep River) performs the function of absorbing nutrients and thus maintaining water quality. Any loss of function of these wetlands will result in an increased hazard of flooding and higher nutrient concentrations in surface waters.

Air

The importance of the Diep River Air Stream and its effect on the micro-climate of downstream areas such as Tableview, Bothasig, Milnerton, etc. have been discussed in detail (Chapter III, section 7.1). It has been pointed out that both the Caltex plant and Fedmis factory are pollution liabilities and completely mislocated. It is thus clear that no industries contributing towards atmospheric pollution should be allowed to locate in the Diep River basin.

1.3 Unique and Scarce Resources

It is now necessary to identify those valuable and irreplaceable resources within the study area which represent high social values.

Flora and Fauna regimes

The most noteworthy among these are the flora and fauna regimes of both The Hills and the Diep River Basin physiographic provinces. Both these regimes are scarce resources of high educational and scenic value. The flora and fauna of The Hills are scarce in a metropolitan setting, as they represent the last of a typical Swartland regime on the Cape Town periphery. Extensive wheat farming in the Swartland has, for all practical purposes, depleted this resource completely in other areas. (Refer to Chapter III, section 12.0). The birdlife regime of the lower Diep River and Rietvlei falls into the same category. Rietvlei has been described as the largest haven for aquatic birdlife, with the occurrence of rare species, that exists in the Cape Peninsula (Chapter III, section 12 - vegetation and wildlife of the Diep River Basin).

Retention of the above-mentioned resources in open space recreation use will ensure maintenance of their floral and faunal values. From this it follows that these two areas must be protected against human activities of an intensive nature - no permanent human habitation should be allowed.

Viticulture in the Tygerberg Hills as a Unique Resource.

Section 14 of Chapter III deals with this man-made resource in the eastern valleys physiographic province. The growth of vines here, especially of the red table wine cultivar, over and above being a very scarce and pricy commodity, has been uniquely identified within the Tygerberg Hills area, (refer to Map 3.10) even from historical times. (refer to Map 2.1). Of course, the natural agent that supports this man-made activity is the underlying soil condition which is described by local farmers as being a "deep red soil". This again proves that in understanding natural systems man can work with nature to the common good of an environment in total. Viticulture, therefore, is also a fundamental part of the visual "whole" of the area. It needs careful protection and management to retain its existing quality as a resource of high value in the Tygerberg environment.

Replacement of this resource by suburbanisation will be more than a loss of serene pastoral landscape; it will mean an immutable destruction of a unique and scarce resource. It is through geological time and process that the physical and biological evolution of a place produces factors of soils and climate (causality, McHarg) which are conducive to the growth of crops. The cultural history of this area determines this specific agricultural practice followed by the farmers, to avail themselves of this resource. To the extent that viticulture in this area follows principles of good management, the resource value will be

sustained for generations to follow. Incompatible practices such as paving over and accelerated erosion of productive soils will degrade and deplete soils to an extent which renders them useless for agriculture in future.

Building Stone deposits

This resource is found, generally, west of the major divide against the slopes of the western hills (refer to Section 8.3.1 of Chapter III, Map 3.2). Building stone materials are quarried in this area to supply an ever increasing demand for construction purposes in the Cape Town environment. It offers the largest known quantities of building stone in the Cape Metropolitan area (some 77% of the existing supply of this material comes from the Tygerberg). It is therefore viewed as a scarce resource which must be protected. The exploitation of this resource is, unfortunately, detrimental to the quality of the environment in areas nearby (dust-pollution) and it is also highly instrumental in physical environmental degradation (landscape scars). However, these problems are discussed under section 8.3.1 of Chapter III where it is submitted that they can be effectively controlled and administered.

1.4 Vulnerable resources requiring protection and Management.

Tygerberg Soil Conservation Area

(Chapter III - section 10.0) The major factors instrumental in having this area proclaimed a soil conservation area during 1947 were firstly, excessive runoff and flooding in downstream areas of the Elsies Kraal River and secondly to combat soil erosion on the steep slopes of

the south-eastern Tygerberg Hills which constitute the catchment area of this river. A successful attempt to control this hazard was made by the Department of Agricultural Technical Services. It comprises a series of contour walls, small earth dams, grassed sluits and effectively controlled cultivation methods. At present this area has stabilised into a mature regime of excess runoff control. However, this controlling tool was developed to deal with a given rainfall, a given slope-gradient and therefore a given excess runoff. Calculations were based on an area where no human activities of an intensive nature occur. In short, the Tygerberg Soil Conservation area was proclaimed to deal with and to control a given set of elements. It follows logically, that if man, as a variable, is introduced here in the form of permanent habitation, the existing system of control would not be able to control additional runoff due to the introduction of hardened surfaces (roofs, streets) and the depletion of natural vegetation. The result would be retrogressive, a return to the 1947 situation of severe floodings in downstream areas of the Elsies Kraal River and the destruction of a settled cultivated vegetational and wildlife regime in the conservation area. Protection and management must be enforced here. No permanent human habitation of any kind or density must be allowed.

1.5 Cultural and Scenic resources.

It has been argued in section 11.0 of Chapter III, that the historical structures and scenic routes in the study area do not constitute either unique or scarce resources in the Cape Town Metropolitan area. However, they are important and vulnerable amenities due to their

cumulative visual effect on the total Tygerberg environment. The protection of these man-made structures on an ad hoc basis as single units would mean absolutely nothing to enhance or protect the environment. The collective value, scale and place of these structures must be understood - they demand the careful regulation of the immediate, total surrounding environment (Refer to Map 3.9).

The scenic amenity of, especially The Hills physiographic province, needs similar protection. Over and above the scenic value of the flora and fauna regimes in the area, it offers beautiful long (from the crests of the higher hills) and short vistas. Personal observation (walking along the major watershed) can confirm 360 degrees of beautiful panoramic views covering distant natural features such as Table Mountain, the False Bay Coast, the Hottentots Holland range of mountains in the east, the rolling Swartland landscape in the north including Piketberg, the Atlantic coast and Robben Island in the west. The sum total of all these parts means that The Hills offer cultural and scenic values in total which make it a priceless asset of high value in this given environment. A critical slope of 20% (1.5) and higher is seen as a constraint to human habitation (refer to section 9.0, Chapter III and Map 3.3). It has been shown that development on steeper slopes, means so much more environmental scarring (drive-ways to private houses) and it also becomes a real physical constraint to road construction - access roads as well as drive-ways.

2.0 The following very brief schedule summarises this chapter broadly -

BRIEF SUMMARY IN SCHEDULE FORM

	PHENOMENON	LOCATION AND OCCURRENCE	CONTROL AND MANAGEMENT
A.	Inherent hazards to Human Life and Property:		
	Flooding. (subject to inundation by 50 years frequency probability flood).	Downstream areas (Tableview & Milnerton) of the Diep River. (Map 3.5)	Protection of environmental conditions which sustain flood storage capacity Prohibit any obstruction which will result in alteration and degradation of stream behaviour.
	Fire	The Hills physiographic province - especially the slopes west of the major divide.	Management of dense vegetation cover and by regular, but controlled burning of highly inflammable litter and shrub layers.
B.	Hazards due to Human Action :		
	Water	Non-perennial streams draining towards the Diep River.	Control pollution from adjacent farmlands
C.	Unique and Scarce Resources:		
	Flora and Fauna regimes.	The Hills and Diep River Basin physiographic provinces.	Protection against human activities of an intensive nature - no permanent habitation should be allowed
	Viticulture	Eastern valleys physiographic province. (Map 3.10)	Avoid replacement of this resource by urbanization.
	Building Stone	West of the major divide against the slopes of the western hills. (Map 3.2)	Protect against urban residential activities.
D.	Vulnerable Resources:		
	Tygerberg Soil Conservation Area.	Map 3.5 In main the Riebeekshof and Tyger Valleys.	No permanent human habitation of any sort to be allowed in this area.
E.	Cultural and Scenic Resources:		
	Historic buildings, scenic routes and vistas.	Map 3.9	Careful regulation of the immediate total environment within which these components function

CHAPTER V

SYNTHESIS

CHAPTER V.

SYNTHESIS.

1.0 Given the intrinsic suitabilities for site development are derived from the opportunities and constraints of the land it follows that a suitability synthesis should provide a balance between compatible natural and development systems.

For the purposes of this study suitability maps were prepared for the following four activity groups: Recreation, Conservation, Agriculture and Urbanisation. A list of criteria (permissive as well as restrictive factors) was set up for each activity group. Maps, on transparent material, used in presenting the data for the preceding two chapters were used, and with overlaying techniques a summation of values involved was obtained. Where the greatest number of, say, restrictive factors occur for a given activity that specific area was taken as being least suitable (highly unsuitable) for the specific activity. On this basis maps were prepared indicating areas most to least intrinsically suitable for the activities mentioned above. The intrinsic suitability of each activity group was rated in four categories, namely highly unfavourable, unfavourable, favourable and highly favourable.

1.1 Highly unfavourable refers to a situation where the controlling factors (permissive or restrictive) produce such as adverse effect upon the area that location of the particular activity would be absolutely detrimental to that area and most probably adjacent areas.

1.2 Unfavourable means that the controlling factors still impose detrimental effects on the area - but they are now of a less severe nature.

1.3 Favourable refers to the situation where the controlling factors are generally suitable for development of that specific land use activity. However, minor constraints may have to be incorporated during the implementation stage.

1.4 Highly favourable refers to the situation where the controlling factors produce such beneficial effects upon the area that the location of the specific activity is highly desirable.

2.0 Recreation and Conservation Suitability

For the purpose of preparing a broad suitability map for the above-mentioned activities a list of controlling factors were drawn up, which, it is submitted, will cover both activities. Except for scale and intensity of use, both recreation and conservation are subject to the same range of permissive and restrictive factors. So, for example, resources of water, wetlands, vegetation, features of historic and cultural value and wildlife will be criteria necessary to establish suitabilities for both recreation and conservation areas. Above-mentioned criteria are used both by McHarg and Lewis in identifying areas intrinsically suitable for conservation and recreation.

In the next chapter a definite distinction will be drawn between these two activities especially with regards to active recreation, passive recreation and conservation.

2.1 Controlling factors

Slope - A slope greater than 20% (1.5) is not only a definite physical constraint to development (access road and drive-way construction, substantial retaining walls) but it was also submitted in section 9, Chapter III, that development on steeper

slopes will not be visually compatible with the existing attractiveness of the area. Landscape scarring and thus environmental degradation is likely to occur with the development on steeper slopes.

Areas susceptible to erosion - in the context of the Tygerberg Hills area this controlling factor is covered by the slope factor above. McHarg, however, includes in this category all slopes in excess of ± 1.8 or 12% (5.1)

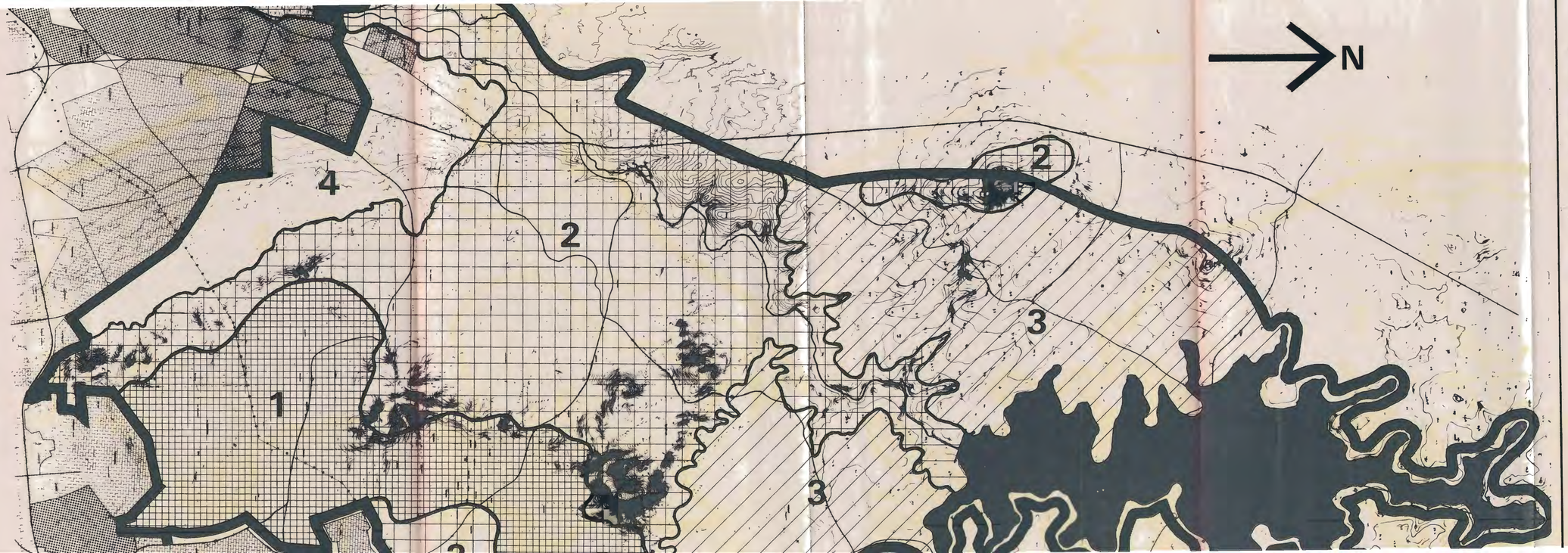
Historic/Cultural and Scenic features.

Vulnerable areas include the following: Tygerberg Soil Conservation Area (with its system of streams, wetlands, and dams), major streams (non-perennial) draining westward towards the Diep River Basin, and the Diep River Flow channel with its adjacent wetlands and Rietvlei.

Areas subject to natural hostilities. These areas include the Diep River Flood plain, Elsies Kraal River catchment area, the western hills, which are subject to fire hazards, and the Diep River basin in terms of its air flow drainage which could contribute towards atmospheric pollution in downstream areas.

Unique and Scarce resources. The flora and fauna regimes of The Hills physiographic province and the lower Diep River and Rietvlei, an area in the eastern valleys known to be the supplier of a very high quality red table wine and the building stone deposits in The Hills physiographic provi nce are all included in this category.

(5.1) McHarg, Ian. Design with Nature. p.60



1 Highly favourable

2 Favourable

3 Unfavourable

4 Highly unfavourable

* Refer to text for list of selected criteria and rating

SCALE I:50 000

Large water bodies. The proposed Diep River flood control dam, the Diep River and Rietvlei are listed here.

3.0 Urban Suitability

This activity refers in general to all structures which do not have special foundation loading problems. No differentiation is made between the intrinsi c suitability of land for various types of buildings, e.g. residential, commercial, industrial and institutional.

3.1 Controlling factors.

Slopes - A slope not steeper than 20% is interpreted in the context of this study as being suitable for urbanisation. A slope exceeding this limit has, therefore, been rated as being highly unfavourable to urban suitability. An unfavourable rating was given to slopes of 1.80 and less (1.25 - 1%). This rating was based on drainage problems in these very flat areas. Favourable to highly favourable ratings were given for slopes between 1.5 and 1.80 (20 - 2%) The main factors considered in taking a slope of 1.5 (2%) as a barrier to any form of urban development are in brief, excessive road construction (drive-way and access roads) and foundation excavation costs, environmental scarring due to cut and fill and erosion problems. (Substantial arguments regarding this issue have been forwarded in Section 9, Chapter III).

Aspect - A north facing orientation of land to include 67^{o} east and west of true north has been interpreted as highly favourable. Such orientation is considered desirable when cognisance is taken of the relatively steep and long slopes (south facing) which limit the available sunlight to the site in general, particularly

in winter. It has been shown that the summer south and south-east winds are unpleasant to human comfort especially against the southern slopes. The collective weight of the above-mentioned two factors are important criteria for residential suitability. Admittedly the constraint value of wind is not fixed and can be lowered considerably by design controls. (Chapter III, section 7.1) However, in the context of this study southfacing slopes exposed to the summer southerly winds have been rated as intrinsically unfavourable for urban development.

Water - Flooding. The floodplain of the Diep River, as well as the main flow channel have been considered highly unfavourable for urbanisation. The same applies to the Elsies Kraal River catchment area which comprises the Tygerberg Soil Conservation Area. Wetlands (vleis), along the lower Diep River and Rietvlei, have been shown to provide an habitat for an abundance of water fowl. The importance of the relationship between these fowl and the water bodies with their characteristic vegetation has also been illustrated. Development of these areas have thus also been considered highly unfavourable. The proposed Rietvlei Marina in Rietvlei is the exception here. This is a specific form of residential development that may be accommodated here, providing that a thorough environmental/ecological study (environmental impact statement) is undertaken with regards to the whole sensitive ecological system operating here. No disturbance of the existing faunal and floral regimes should be tolerated.

Agriculture - Areas of highest to lowest potential (derived from Maps 3.10 and 5.3) were given suitability ratings accordingly.

URBAN SUITABILITY

1 Highly favourable

2 Favourable

3 Unfavourable

4 Highly unfavourable

SCALE 1:50 000

in winter. It has been shown that the summer south and south-east winds are unpleasant to human comfort especially against the southern slopes. The collective weight of the above-mentioned two factors are important criteria for residential suitability. Admittedly the constraint value of wind is not fixed and can be lowered considerably by design controls. (Chapter III, section 7.1) However, in the context of this study southfacing slopes exposed to the summer southerly winds have been rated as intrinsically unfavourable for urban development.

Water - Flooding. The floodplain of the Diep River, as well as the main flow channel have been considered highly unfavourable for urbanisation. The same applies to the Elsies Kraal River catchment area which comprises the Tygerberg Soil Conservation Area. Wetlands (vleis), along the lower Diep River and Rietvlei, have been shown to provide an habitat for an abundance of water fowl. The importance of the relationship between these fowl and the water bodies with their characteristic vegetation has also been illustrated. Development of these areas have thus also been considered highly unfavourable. The proposed Rietvlei Marina in Rietvlei is the exception here. This is a specific form of residential development that may be accommodated here, providing that a thorough environmental/ecological study (environmental impact statement) is undertaken with regards to the whole sensitive ecological system operating here. No disturbance of the existing faunal and floral regimes should be tolerated.

Agriculture - Areas of highest to lowest potential (derived from Maps 3.10 and 5.3) were given suitability ratings accordingly.

Geology - Geological structure is an important basic factor in development as it influences foundations capabilities and road construction. There are no rock outcrops in the area (that is in the area surveyed and mapped) and this constraint thus falls away. The main constraint here is the mineral deposits (building stone) which occur in the western hills (see Map 3.2) Being a scarce resource in the metropolitan setting this area has been viewed as highly unfavourable to urban expansion.

4.0 Agricultural Suitability

Section 14 of Chapter III deals extensively with this issue. Map 5.3 was derived from the original Map 3.10.

4.1 Controlling factors.

Soils - depth, fertility, internal drainage, clay and lime content.

Rainfall which is too low for viticulture production in the Swartland physiographic province - groundwater, including that of Diep River which is too brack for irrigation purposes.

Slope and orientation, especially with regard to viticulture - slope in excess of 20% (1.5) prohibitive - flat areas with known drainage problems also not suitable.

Excessively rocky soils

Existing production figures in terms of known potential production norms.

Example: (1) Viticulture - known production figure is 6-7 metric tons/ha whereas the calculated production norm (high) for this area is 5 metric ton/ha.

(2) Wheat - known production figure is ± 14 bags/ha
The calculated production norm (high) for this area is also 14 bags/ha (5.2)

Map 3.5 represents the area most to least suitable for urbanisation in terms of the above-mentioned criteria.

This chapter has served to assess the Tygerberg Hills area in terms of its inherent potential for conservation, recreation, urbanisation and agriculture by the setting up and evaluation of those permissive and restrictive criteria and the mapping of them by means of overlay - and super-imposing techniques to form suitability maps for the specific activities and uses.

(5.2) Department of Agricultural Technical Services. Agricultural Extension Offices, Durbanville. "Winterreënstreek Produksie-norme". 1972

AGRICULTURAL SUITABILITY

Highly favourable

Favourable *

Unfavourable

Highly unfavourable

* 2a - It was difficult to classify this area into either suitability group 2 or 3. Its actual productivity as well as potential was calculated to be much higher than 3, but lower than 2. Therefore this subgroup.

SCALE 1:50 000

5.0 References

(5.1) McHarg, I.L.: Design with Nature. p.60.

(5.2) Department of Agricultural Technical Services. Agricultural Extension Officer, Durbanville. "Winterreenstreek Produksienorme". 1972.

CHAPTER VI

THE PLAN

1.0 Introductory

2.0 Recreation/Conservation Plan

- 2.1 Objectives
- 2.2 General description
- 2.3 Passive recreation/conservation activities
- 2.4 Active outdoor recreation
- 2.5 An idealistic proposal

3.0 Agricultural Plan

4.0 Residential Plan

5.0 Implementation

- 5.1 Agricultural areas in need of special attention
- 5.2 Immediate acquisition of certain areas
- 5.3 Administrators

6.0 Conclusion

CHAPTER VI

THE PLAN

1.0 Introductory

The preceding analyses of intrinsic suitabilities for recreation/conservation, agriculture and urbanisation have led to the compilation of a single map indicative of the main suitability of each area within the Tygerberg Hills (Map 6.1)

It must be understood, however, that within the confines of the study area a specific parcel of land may be suitable not only for one optimum activity, but for multiple compatible land uses. Uses, thus, may be completely compatible, compatible in various degrees or clash completely. Towards the end of getting a proper understanding of the degree of compatibility of various uses in the given area a matrix was developed with the major land uses occurring now as well as those planned for the future on each co-ordinate. Each of the land uses was weighed against all others to determine comptaibility, incompatibility and two intervening degrees. (Refer to Table 6.1) The same table also reflects determinants for land use.

2.0 Recreation/Conservation Plan (Refer to Map 6.2)

2.1 Objectives

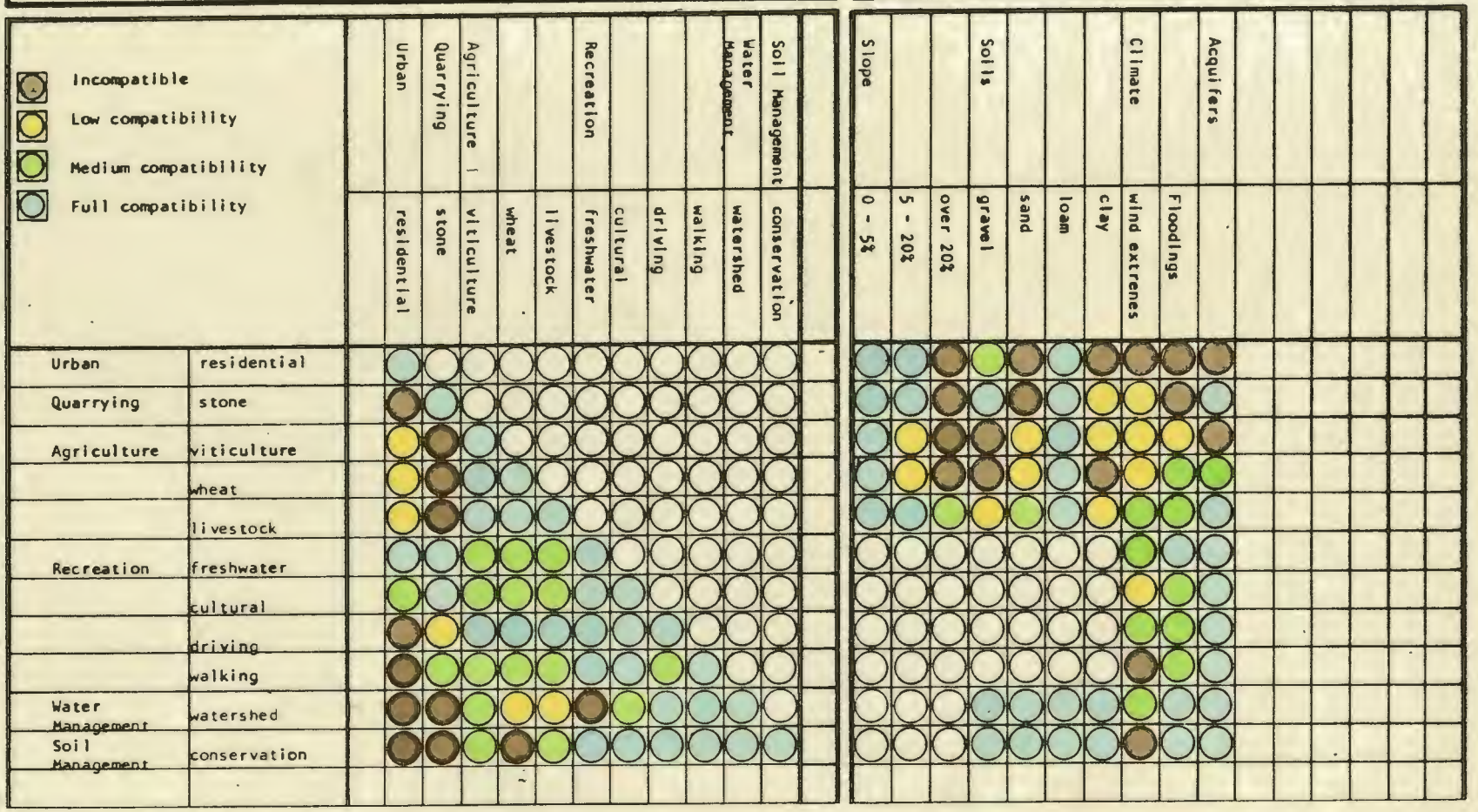
The following objectives have been identified as basic to the plan.

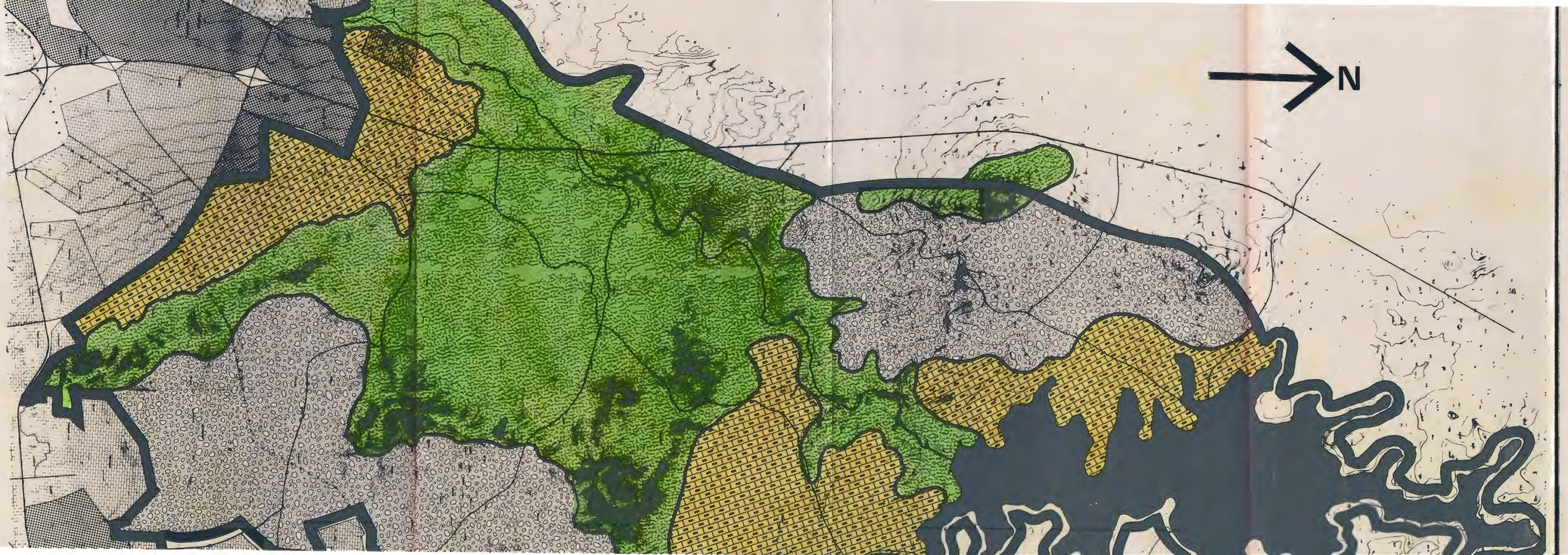
To encourage the use of the area for a variety of educational purposes related to the needs of schools, universities (proposed new campuses of both major Cape Universities are located on the periphery of the study area) youth groups, natural history societies, etc.

To provide for cultural activities and interests in so far as these relate to countryside pursuits.

TABLE 6.1: MATRIX ON INTERCOMPATIBILITY OF LAND USES

NATURAL DETERMINANTS





AREA

Residential

Recreation/Conservation

Agriculture

* Detailed plans of each section will be presented separately.

SCALE 1:50 000

To ensure that no area of this component is subject to over-pressure of use through the careful distribution throughout the area of points of interests and activity.

2.2 General description.

The proposed recreational/conservation component of the study area has the form of a huge octopus - the tentacles of which can be interpreted as giving this area very good access. It is accessible from Rietvlei in the south-west, from Welgemoed and Loevenstein townships in the south and from the existing Durbanville area in the east. An arm stretched out in a northerly direction towards the existing Malmesbury Road will again provide access from that direction. Access meaning here, for people on foot. Vehicular access to the area in the form of the existing road structure is also very good as can be seen from Map 6.2.

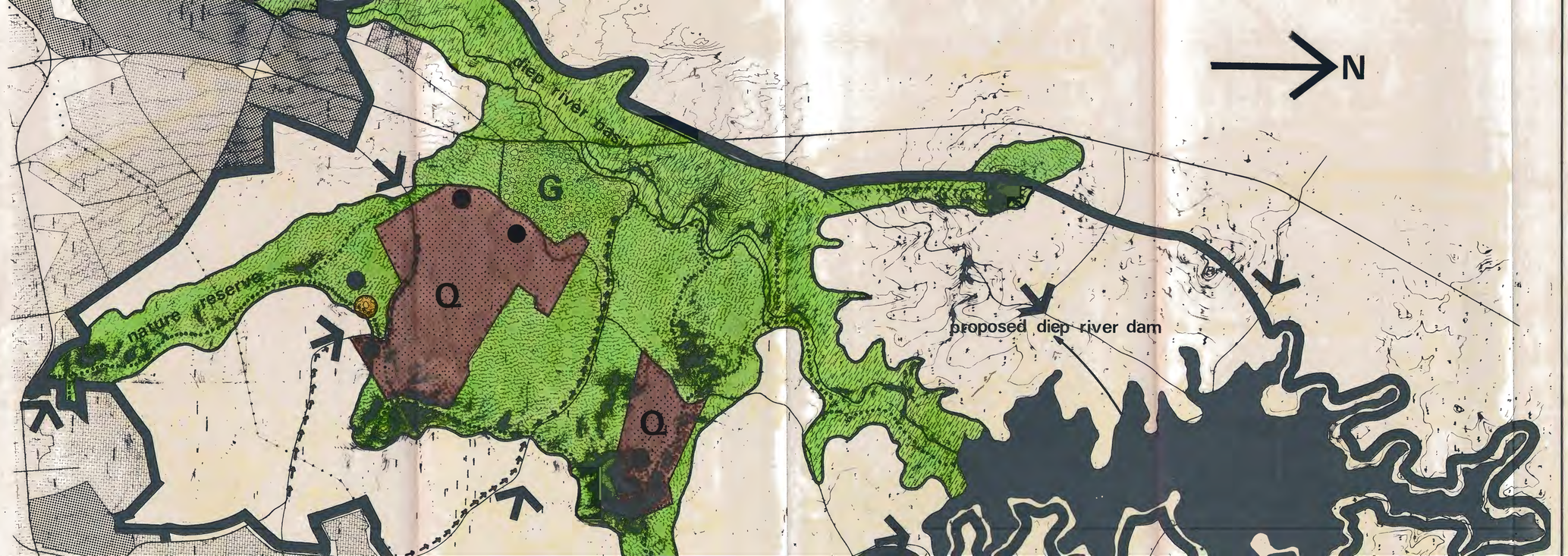
2.3 Passive recreation/conservation activities.

Nature reserve. The area as shown on Map 6.2 is proposed as a nature reserve. This specific area is very rich in indigenous vegetation species and could be managed as a scientifically useful and pleasing amenity. Marginal infestation exist here in the natural vegetation and it is suggested that all plants of invasive aliens be removed as soon as possible. The area should furthermore be regularly patrolled for the removal of seedlings of invasive aliens. Maintained pathways, a small visitor information centre and leaflet guided nature trail would encourage an informed approach to public us e of the nature reserve. It is essential, however, that this activity be linked with the remainder of the recreational activities - there must be continuity.

A further activity of the same kind as the nature reserve would be the establishment of a bird sanctuary on the eastern flank of Rietvlei. Public access to this activity should be controlled, but a feature might be made of screened bird watching platforms with fenced approach tracks for pedestrians.

Leisure tracks. These tracks will follow the major divide (northward from the nature reserve) towards the proposed Diep River Flood control dam. Deviations as shown on Map will give access to points of historical value - for example a track is shown across the Diep River in a north to north-west direction towards Koeberg and the farmstead of Olifantskop. (historical value) Hikers and horse-riders could be the main users of these tracks. Bronze view-boards should be provided at suitable vantage points along these tracks. These boards could indicate relief, distances from major points of interest, flora and fauna species in that specific area and other factors of interest and educative value.

Heritage centre. This activity could become an interpretation centre and folk museum where visitors could see an account of the heritage of natural, social and cultural history of the Tygerberg Hills Area. It is further proposed that this centre be supplemented by a centre of scientific research which could draw both universities (U.C.T. & U.S.) into a venture, for example, which will relate to the faunal and floral regimes of the area. The location of the heritage centre is such that it provides easy access to the motoring public (Tygervalley scenic route) as well as to hikers (leisure tracks). Except for their value as being access roads to this component, both the Tygervalley and Contermanskloof roads are of high scenic value and as such implemented in the system of w alking paths and scenic drives.



Quarry areas

Existing active quarries

Gholf course

Leisure track

Heritage centre

Scenic routes (drive)

Major linkages (access routes)

SCALE 1:50 000

The issue of the existing active quarries and quarry areas needs clarification in context of the conservation/recreational plan. This study holds the view that these activities can fulfil a very appropriate role, short and long term, in context of recreation and conservation. They act firstly, as absolute constraints to urbanisation at the present moment. Table 6.1 will show that quarrying and urban residential activities are incompatible. Table 6.1 will also show that there is relative high degree of compatibility between quarrying and cultural recreation activities. Secondly, once the economic life-span of these quarries has come to an end (given as between 10-75 years, see Chapter III, page 66) they can be incorporated judiciously in a total open space system. Proper landscaping and the usage of the open quarries as freshwater resources will be an additional asset to the area.

2.4 Active outdoor recreation.

It has been stated before (Chapter III, p. 81) that this study accepts the construction of the proposed Diep River Flood Control dam as a fait a complè. Over and above its purported function of controlling floods in downstream areas and being an additional source of fresh water to Cape Town it lends itself beautifully for water-related recreation.

Referring back to Map 2.11 it is clear that, based purely on location criteria, the northern suburbs are poorly served in terms of water-based recreational facilities. In discussion with Mr. Brian Lello, President of the Cape Yachting Club , the above inference was confirmed (6.1). Furthermore, the general lack of opportunities and facilities regarding water-sport in the Metro Area was mentioned. It was mentioned that

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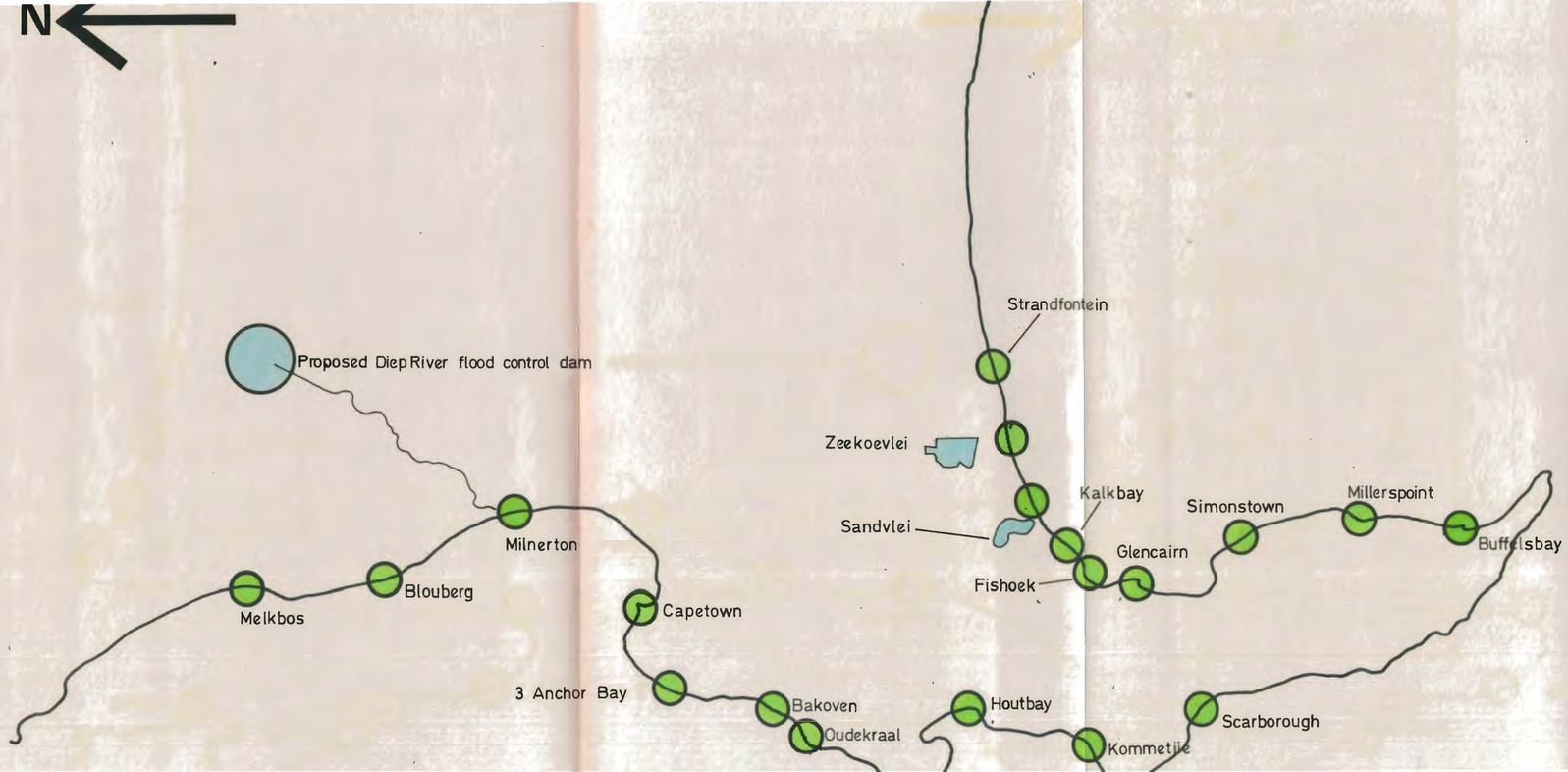
(6.1) Lello, Brian. Personal communication.

there is nowhere in the Peninsula where one can hire a simple rowing boat for a pleasant afternoon's row; yet in inland towns such as Johannesburg (Zoo Lake and Florida Lake) this is possible, also, virtually every other dam boasts a yacht club . It was stated that in False Bay alone there are at present over 800 amateur ski-boats and present facilities cannot even cater for 25% of them. Coming from the mouth of the Secretary of the Cape Yachting Club, surely the above is indicative of the dire need for water-related recreation in the Metropolitan area. Add to this the additional demand for this activity that will be triggered off with development along the West Coast and at Mamre (assuming of course that colour of skin would not be prohibitive in making use of any such facility) it is quite clear that there will be a very high demand to use the proposed Diep River Flood Control dam for amenity purposes. Map 6.3 gives an idea of existing boating and related facilities in the Metro Area. It shows that Sandvlei and Zeekoevlei, at the present moment, are the only two waterbodies (land-orientated) which offer facilities in this regard.

It is therefore, appropriate that this waterbody be used for recreation purposes. Provision of a launching ramp, dinghy sailing, pleasure boating and competitive rowing could be made here. Strongly related to these activities are the provision of adequate parking facilities for vehicles and trailers. The area west of the dam shown as suitable for residential development on Map 6.1 can accommodate and absorb the functions generally required with water-related sport.

The Diep River itself is a non-perennial waterbody and activity on it should be restricted to pleasure rowing (canoeing) during winter.



	D	S	L	O	D	P	P	C	S	B	T	C
GORDONS BAY	●	●	●	●	●	●	●		●	●		●
STRAND						●	●		●		●	
STRANDFONTEIN									●		●	
ZEEKOEVLEI					●	●	●	●				
ZANDVLEI			●		●		●					
KALK BAY		●					●			●		●
FISH HOEK			●				●				●	
GLENCAIRN											●	
SIMONSTOWN	●	●	●	●	●	●	●		●	●	●	●
MILLERS POINT			●				●		●			
BUFFELS BAY			●						●			
SCARBOROUGH									●		●	●
KOMMETJIE							●					
HOUT BAY		●			●	●	●			●	●	●
OUDEKRAAL							●					
BAKOVEN							●					
THREE ANCHOR BAY						●	●					
CAPE TOWN	●	●	●	●	●		●					●
MILNERTON							●		●			
BLOUBERG							●		●			
MELKBOS							●		●			

Broad Study of Metropolitan Boating and Related Activities.

A country club/golf course of championship standards can be developed between the Diep River and the main quarry area - indicated on Map 6.2(G). With the expanding Tableview, Edgemead and Bothasig areas in the immediate vicinity this activity will be popular and will fit in with the visual "value" of the area in main. The two existing active quarries (Gran Sasso and Mount Blanc) immediately east of the golf course, could eventually skilfully be used as water storage agents to maintain this activity.

Rietvlei at present moment is being used for competitive rowing. This is acceptable on the proviso that no intervention with the wildbird regime in the vlei be allowed. The main connector between these two centres of active recreation (Rietvlei in south and the proposed dam in the north) is the Diep River which could link the two areas during winter by means of water access (pleasure rowing) whereas leisure tracks should be available throughout the year.

2.5 An Idealistic Proposal.

This study views the derived conservation/recreational plan not only of local importance, but sees it as a regional asset with the definite ability to provide a service to a much larger area than its immediate, or its Cape Town based surroundings. It is large and open enough to give its users the feeling of space and freedom. This study now is convinced that the "regionality" of this component must be extended further so that it could be incorporated in a national system of open space/conservation. It is known that the Department of Water Affairs and Forestry (6.2) has acquired large tracts of land and has proclaimed them Wildernis areas. The southernmost portion of which is just north of

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(6.2) Andrag, Rudolf: Department of Forestry, Cape Town. Personal communication.

Piketberg. It is also known that plans are on hand to develop a system of leisure tracks/horse trials right through these areas which eventually will end in the Northern Transvaal Bushveld. It is therefore, suggested that the authority controlling the Tygerberg Hills area in conjunction with the Department of Water Affairs and Forestry appoint a firm of environmental consultants with the specific brief to investigate the possibility of extending the Tygerberg Hills Area (recreation/conservation component) northwards so that it will form a continuous "whole" with the existing Wildernis area north of Piketberg. It is believed that there is definite merit in this. For example the Diep River originates in the Riebeek Kasteel Berge, so does the river (Berg River) which will fill the Misverstand dam just north-east of Piketberg. These two natural elements with a common water catchment area could possibly be linked.

This is a sensible suggestion which would take the system of Wildernis areas with their related pathways to its logic conclusion namely an environmental corridor between Pretoria in the north and Cape Town in the south. It is worth investigating.

Referring to Map 2.4 it should be noted that the proposed Kuils River freeway cuts across the Diep River and cutting the dam off from the remainder of the study area. The alignment of this road in this section of the study area has not been fixed and it is strongly suggested that an alternative route for this artefact be found so that the study area as defined and discussed be retained as an "environmental whole". (Private environmental consultants are, at the present moment, busy with an environmental investigation regarding both the Kuils River freeway and the N.T.C. freeway and their impact on the environment). The detrimental effect of the Kuils River freeway on the proposed dam with its recreational potential and its

linkages with the Tygerberg's s ystem of open space/conservation has been brought to the attention of the consultants.

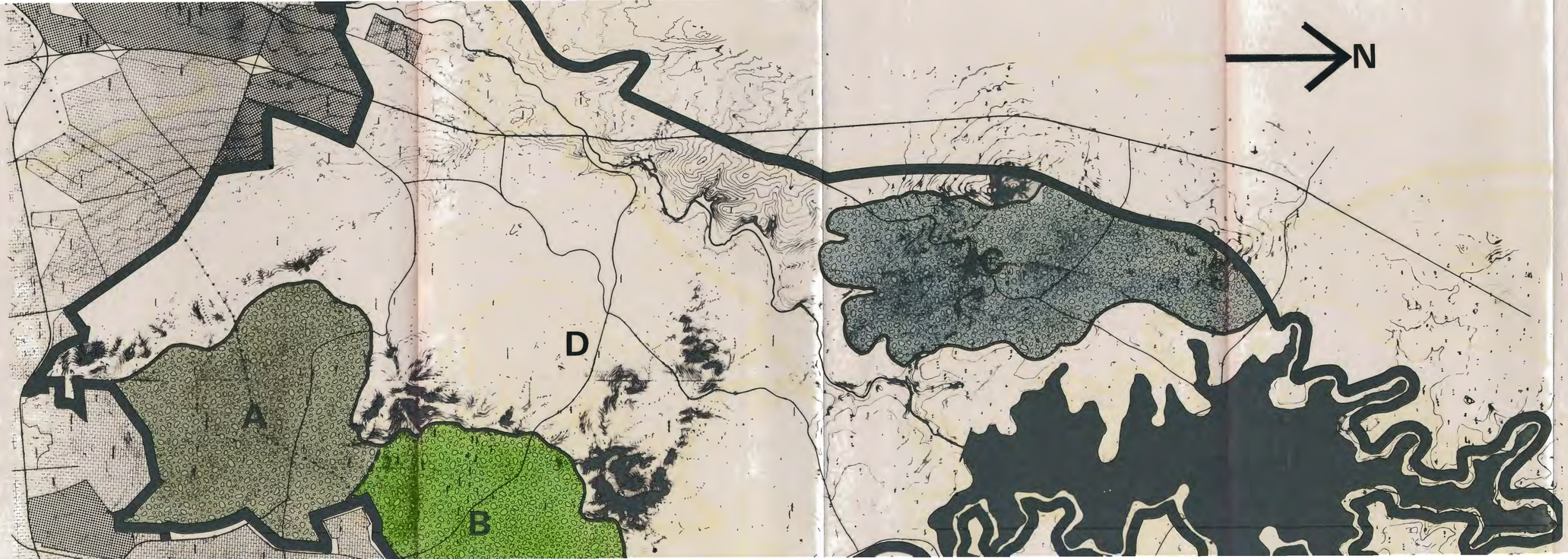
3.0 Agricultural Plan (Refer to Map 6.4)

Except for the active quarry areas the Tygerberg Hills area is extensively farmed including those areas shown on the derived development plan (Map 6.1) which are suitable for other uses. It does not mean that those areas (non-farming uses) must now be acquired immediately to implement the plan. Farming is a fundamental part in the approach to this matter and this must be appreciated.

Three main agricultural areas have been indicated on Map 6.4 namely Tygerberg Soil Conservation Area (A) adjacent to it the area so wellknown for its viticulture (B) and area C on the western boundary where the main produce is wheat. Areas A & B are homogenous in terms of their produce, soil conditions and general topography. The only real difference is that farming practices in A are under control of the Department of Agricultural Technical Services (Soil Conservation) as it is a declared soil conservation area. Area D where mixed farming i.e. wheat livestock/dairying and garden vineyards occur is not so vulnerable as the other areas. However, as it has been stated, the farms in the area form an integral part of the openness and rural atmosphere of a total area and as such are fundamental in retaining the character of the Tygerberg Hills Area. It must be clear by now that, from an implementation point of view, the farming practices in the area hold the key to the success of the derived development plan of the area. (This will be discussed under the heading implementation).

4.0 Residential Plan. (Refer to Map 6.5)

It was found that three areas are suitable, in the context of



A — Tygerberg Soil Conservation Area. (viticulture, wheat, dairying and livestock) Catchment area of the Elsies Kraal River - very sensitive area and proper cultivation and management control necessary

B — Viticulture - red table wine cultivars

C — Wheat farming

D — Farming practices in the Recreation/ Conservation sector forming an integral part thereof. (wheat, dairying and livestock)

SCALE I: 50 000

the study, for urban residential development. They are indicated on Map 6.5 as areas A, B and C.

Area A

Residential development here would be an extension of the existing Edgemead, (Garden Cities), Bothasig and Milnerton/ Tableview developments. It is felt that a development similar to that of Edgemead would fit (visual) here. The planning of Edgemead "incorporates the concept of life-cycle housing and innovative forms of accommodation such as grouped linked, patio, atrium houses and the like, in addition to single detached houses". (6.3)

Moderate densities of approximately 15-20 persons/acre gross (40 persons/Ha) are proposed here to fit in with the natural character of the area. However, this study is not equipped to deal with urban design problems and ultimate design principles will have to be dealt with by a competent urban designer. The few issues mentioned in this regard must be seen as broad directional guidelines.

Before any development be allowed in this area a thorough investigation of the possible effect of the petro-chemical industries on any development must be investigated. Although it appears that only the urban communities south (downstream of the Diep River airflow) of these industries are affected by atmospheric pollution it is considered necessary to have a proper environmental study undertaken to establish the precise state of affairs.

Area B

This area, located north of the Dorstberg range of hills, can become the future residential component to absorb the growth of Durbanville (Refer to Chapter II, section 4, p.29 for the

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(6.3) Garden Cities, Pinelands. Fifty Years of Housing. p.66

A — Residential component on the western foothills linking the existing development of Edgemead, Bothasig and Milnerton with the study area.

B — Residential component north of the Dorstberg hills which could cater for some of Durbanville's growth.

C — Recreational development (non-permanent) such as bungalows and picnicing structures related to the dam as a source of recreation.

General accessibility

1 — Adderley road

2 — Malanshoogte road

4 — Old Mamre road

a — Proposed road crossing from B to C making use of the dam wall to minimise on impinging of Diep River flow channel.

SCALE. I.50 000

compounded growth rates of Durbanville) The area is located on marginal agricultural land where wheat farming is practised.

Area C

This sector on the south-western periphery of the proposed Koeberg Flood Control Dam is closely related to the recreation opportunities offered by this waterbody. No permanent residential development should be allowed here. Bungalows, picnicking huts for especially "weekenders" should be provided here with facilities to cater for the parking of vehicles and trailers and a small kiosk/shop selling soft goods and emergency equipment for water sport. The accessibility of this active recreational node is very good as can be seen from Map 6.5. The only access problem is from area C to area B. It is suggested that with the construction of the wall of the flood control dam provision be made for an access road across the wall.

5.0 Implementation

Preservation and the sympathetic treatment of the farming practices in the study area are crucial in implementing the derived development plan for the Tygerberg Hills area. Outright purchase of the land here is clearly not desirable. Sufficient funds would not be forthcoming and an activity (productive farming) now valued would fall away.

The requirement here is the maintenance of the status quo. The Townships Ordinance has the power, in theory, to prevent the subdivision of the land, it has not the power to prevent the sale of good farming land to township developers. Past events have shown that such a sale can be correlated to eventual development, for the Ordinance has no power to force continued farming of the land. The lack of progress in producing viable guide plans for the Cape Metropolitan area and

thus the early proclamation of statutory "green belts" is probably the single most important factor contributing to this state of affairs. Having neither a metropolitan guide plan spelling out in concise terms what sort of land use may occur where, nor sufficient funds to buy large tracts of land from the farmers to conserve as of recreational/conservational value other means of implementation must be looked at.

5.1 Agricultural areas in need of special attention.

The two areas referred to here are shown on Map 6.4 namely the Tygerberg Soil Conservation Area and the area (indicated as B on map) proved to be a unique resource for the production of quality red table wines in the Western Cape. These two areas are under tremendous development pressures (expansion of Durbanville) and the following ideas are put forward to retain the status quo here:

5.1.1 The declaration of this total area (A and B) as a soil conservation area in terms of the Veld Conservation Act of 1941 as amended. Ministerial approval for this must be obtained and once the area is proclaimed a soil conservation area no development whatsoever (including changes to existing farming practices) is allowed without the consent of the Department of Agricultural Technical Services.

5.1.2 The proper implementation of the Subdivision of Agricultural Land Act, 70/1970 whereby the Department of Agricultural Technical Services controls the subdivision of agricultural land. The stand of this Department in matters regarding the incorporation of prime agricultural land into

municipal boundaries is rather poor. The attitude of "the land has a high agricultural value, but people need houses " cannot be accepted - the virgin land bonanza is over !

5.1.3 An additional idea that may be worth investigating is the purchasing of "development rights" from the owners and setting up trusts to assure the continued farming of the area. This is not a new idea and has been used successfully in America (6.4)

5.1.4 A further possibility to keep the farming practices in the area will be to investigate ways and means of tax (property) relief for the farmers in these specific areas.

5.1.4 Lastly, the K.W.V. must be approached in this matter. They could be asked to consider the acquisition of these two areas for viticulture research (as they have done elsewhere) and run them as experimental farms.

5.2 Immediate acquisition of certain areas.

The areas that need immediate acquisition are, firstly, the nature reserve site and secondly a system of servitudes over the relevant farms will have to be implemented throughout the study area to allow the hikers and horse-riders to use the proposed system of leisure tracks.

5.3 Administrators.

Map 6.6 shows that there are, at present, three local authorities involved in the control of these areas namely Milnerton in the south-west, Bellville in the

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(6.4) Juneja, Narendra. Medford. Center for Ecological Design in Planning and Design. University of Pennsylvania. U.S.A.

ADMINISTRATORS

a Milnerton Municipality

b Cape Divisional Council

c Bellville Municipality

d Durbanville Municipality

SCALE 1:50 000

south and Durbanville on the eastern periphery. The Cape Divisional Council controls the remainder of the area. In terms of the "regional" value of the Tygerberg Hills area as manifested in recreation/ conservation and agricultural resources it is submitted that there will be merit in investigating the possibility of controlling this area under one body. This would minimize the ridiculous "leap-frog" situation as in case of Bellville municipality who has stated their claim in the Tygerberg Soil Conservation Area for reasons that are only known and accepted by themselves. It is suggested that one body comprising members of various local authorities and institutions be formed to deal with the area. Milnerton, Bellville, Durbanville municipalities, Cape Divisional Council, representatives of both universities, Durbanville Farmers Association, Department of Agricultural Technical Services and the Swartland Farmers Association could all be accommodated in such a group whose main function would be to implement proper management and control. They will have to decide on detail design standards, development phasing, implementation and the pro-rata share of costs involved.

It is felt that the plan for this area needs careful consideration - it must be considered in ways divorced from petty local authority attitudes - it is a plan from which the community at large will benefit. It therefore needs understanding and advertising. Advertising in an educative context would be an additional function of the above-mentioned body.

6.0 Conclusion.

If public policies and actions are directed towards the recommendations of the plan, despoliation in the Tygerberg Hills area will be averted. Short-sighted greed (usually euphemized as "development") and, not to put too fine a point on it,

the stupidity that has characterized so many aspects of settlement in the Cape will be controlled in this area of high amenity and place.

The problem in the Tygerberg Hills area is not a disease on its own, it is a symptom of Metropolitan-growth-without-guidance or direction. This study viewed the lack of a metropolitan plan, spelling out its objectives and motives, as the single most important causal factor in uncontrolled growth. Add to this the very subtle exploitation of the people by developers - developers insisting that they know what man wants and needs and convincing man of his need of their product and the picture of environmental degradation is complete. Therefore, notwithstanding implemental and financial problems, the success or failure of the plan for the Tygerberg Hills area is viewed to be finally determined by the will of the people as manifested in the values they hold.

The method used in deriving the plan for the Tygerberg Hills area is a method from which the nature of the place was learned and understood and this is what an environmental planning method is all about. It has shown that the area is unusually rich and diverse in terms of environmental opportunities. It has shown that uncontrolled growth need not be an only option - this method and study reveal other, better options.

7.0 References

(6.1) Lello, Brian. President, Cape Yachting Club. Personal communication

(6.2) Andrag, Rudolf. Department of Forestry, Cape Town Personal communication

(6.3) Garden Cities, Pinelands. Fifty Years of Housing. p. 66

(6.4) Juneja, Narendra. Medford. Center for Ecological Design in Planning and Design. University of Pennsylvania, Philadelphia. U.S.A.

APPENDICES

APPENDIX I

* COMPOUNDED POPULATION GROWTH. COMPARISON BETWEEN THE NORTHERN SUBURBS AND CAPE TOWN METRO AREA (WHITES)

CENSUS DATE	CAPE TOWN Popu-lation	% rate	BELLVILLE Popu-lation	% rate	DURBANVILLE Popu-lation	% rate	GOODWOOD Popu-lation	% rate	KRAAIFONTEIN Popu-lation	% rate	PAROW Popu-lation	% rate
1921	127099	2,42	986	6,27	483	1,28	1629	8,06	168	5,08	1821	7,39
1936	183046	2,48	2737	7,33	586	5,25	6613	3,70	375	6,17	6359	4,97
1951	266715	1,49	9422	6,67	1348	2,83	11704	1,65	1022	5,20	13918	5,53
1960	305155	2,12	175099	5,34	1743	9,82	13584	7,35	1648	8,08	23143	3,41
1970	377870		30270		5108		29387		3883		32675	

* Formula to calculate compounded growth rates.

$$\frac{\frac{A - B}{X}}{\frac{A + B}{y}} \times \frac{100}{1}$$

A - 2nd Census period
B - 1st Census period
X - Number of years between A & B
y - Number of census periods

APPENDIX II

CAPE METROPOLITAN AREA

(Magisterial districts of Bellville, Cape Town, Simonstown and Wynberg)

APPROVAL OF TOWNSHIPS DUEING THE PERIOD JANUARY 1966 - DECEMBER 1973 (WHITES)

TOWNSHIP	Date of Approval	No. of Single Residential erven.
Barbarossa	July 1966	38
Bellville Ext. 4	Dec. 1966	37
Bellville Ext. 16	Oct. 1966	269
Chapmans Peak Ext. 1	Oct. 1966	16
Constantia Hills	March 1966	58
Constantia Hills Ext.6	March 1966	12
Constantia Hills Ext.8	July 1966	13
Constantia Heights	May 1966	27
Durbanville Ext. 12	May 1966	48
Durbell Estate	Dec. 1966	50
Glencairn Ext. 3	June 1966	64
Loevenstein (Bellville Ext. 17)	April 1966	129
Milnerton Ext. 6	Dec. 1966	18
Morningside	July 1966	47
Parow Ext. 12	Nov. 1966	50
Plattekloof	Dec. 1966	78
Silverhurst Estate	Nov. 1966	19
Vita Nova	Aug. 1966	27
Vredehoek Ext. 4	May 1966	27
1966 TOTAL		1027

APPENDIX II

CAPE METROPOLITAN AREA

(Magisterial districts of Bellville, Cape Town, Simonstown and Wynberg)

APPROVAL OF TOWNSHIPS DURING THE PERIOD JANUARY 1966 - DECEMBER 1973 (WHITES)

TOWNSHIP	Date of Approval	No. of Single Residential erven
Bellville Ext. 21	May 1967	290
Bergsight	Sept. 1967	48
Bothasig Ext. 1	Aug. 1967	2070
Brommersvlei	Jan. 1967	31
Constantia Ext. 13	Sept. 1967	20
Constantia Ext. 14	May 1967	11
Constantia Ext. 16	April 1967	10
Constantia Ext. 17	Aug. 1967	22
Constantia Ext. 20	May 1967	33
Durbanville Ext. 13	Oct. 1967	170
Durbanville Ext. 14	May 1967	14
Fishhoek Ext. 10	Dec. 1967	430
Kirstenhof Ext. 1	March 1967	55
Kreupelbosch	June 1967	10
Oakridge	May 1967	55
Oakridge Ext. 1	May 1967	23
Parow Ext. 10	July 1967	128
Parow Ext. 16	Nov. 1967	48
Weltevreden	April 1967	50
1967 TOTAL		3518

APPENDIX II

CAPE METROPOLITAN AREA

(Magisterial districts of Bellville, Cape Town, Simonstown and Wynberg)

APPROVAL OF TOWNSHIPS DURING THE PERIOD JANUARY 1966 - DECEMBER 1973 (WHITES)

TOWNSHIP	Date of Approval	No. of Single Residential erven
Bellville Ext. 18	Jan. 1968	224
Bellville Ext. 19	Aug. 1968	40
Bellville Ext. 23	Febr.1968	302
Chantecler	Nov. 1968	118
Constantia Ext. 12	Aug. 1968	27
Constantia Ext. 15	Febr.1968	14
Constantia Ext. 18	April 1968	14
Constantia Ext. 19	Febr.1968	11
Constantia Ext. 21	March 1968	75
Constantia Ext. 23	May 1968	10
Constantia Ext. 24	June 1968	18
Durbanville Ext. 15	Febr. 1968	31
Eversdal Ext. 3 (Stellenberg)	Febr. 1968	339
Glencairs Ext. 4	Sept. 1968	13
Parow Ext. 14	June 1968	169
Parow Ext. 15	Febr. 1968	105
Tokai Ext. 4	April 1968	34
1968 TOTAL		1545

APPENDIX II

CAPE METROPOLITAN AREA

(Magisterial districts of Bellville, Cape Town, Simonstown and Wynberg)

APPROVAL OF TOWNSHIPS DURING THE PERIOD JANUARY 1966 - DECEMBER 1973 (WHITES)

TOWNSHIP	Date of Approval	No. of Single Residential erven
Bellville Ext. 20	April 1969	162
Bellville Ext. 22	April 1969	18
Bellville Ext. 24	Febr. 1969	34
Diep River Ext. 3	Nov. 1969	70
Drumblair	Nov. 1969	34
Durbanville Ext. 16	March 1969	265
Durbanville Ext. 19	Nov. 1969	20
Durbanville Ext. 20	Nov. 1969	45
Eversdal Ext. 2	May 1969	19
Tableview Ext. 6	Dec. 1969	166
1969 TOTAL		833

APPENDIX II

CAPE METROPOLITAN AREA
(Magisterial districts of Bellville, Cape Town, Simonstown and Wynberg)

APPROVAL OF TOWNSHIPS DURING THE PERIOD JANUARY 1966 - DECEMBER 1973 (WHITES)

TOWNSHIP	Date of Approval	No. of Single Residential erven
Bellville Ext. 25	Aug. 1970	369
Belombre	Febr. 1970	148
Constantia Ext. 25	Febr. 1970	11
Constantia Ext. 26	May 1970	24
Dennendal	March 1970	69
Edgemead	May 1970	307
Eversdal Ext. 4	Sept. 1970	157
Eversdal Ext. 5	July 1970	183
Eversdal Ext. 6	March 1970	447
Eversdal Ext. 9	Nov. 1970	27
Eversdal Ext. 10	Nov. 1970	68
Eversdal Ext. 14	June 1970	56
Eversdal Ext. 15	Dec. 1970	212
Melkbos Ext. 4	June 1970	390
Oakridge Ext. 2	Sept. 1970	24
Ottery Ext. 5	June 1970	31
Ottery Ext. 6	Nov. 1970	478
Plumstead Ext. 1	Aug. 1970	47
1970 TOTAL		3048

APPENDIX II

CAPE METROPOLITAN AREA

(Magisterial districts of Bellville, Cape Town, Simonstown and Wynberg)

APPROVAL OF TOWNSHIPS DURING THE PERIOD JANUARY 1966 - DECEMBER 1973 (WHITES)

TOWNSHIP	Date of Approval	No. of Single Residential erven
Bellville Ext. 27	Oct. 1971	33
Bellville Ext. 29	Nov. 1971	63
Constantia Ext. 28	Jan. 1971	28
Diep River Ext. 5	June 1971	17
Durbanville Ext. 27	Oct. 1971	130
Durbanville Ext. 28	March 1971	26
Eversdal Ext. 7	May 1971	67
Eversdal Ext. 8	April 1971	39
Eversdal Ext. 16	Jan. 1971	105
Eversdal Ext. 19	July 1971	41
Glencairn Ext. 5	March 1971	200
Kenridge Ext. 3	Febr. 1971	107
Kirstenhof Ext. 2	Nov. 1971	34
Kirstenhof Ext. 3	Sept. 1971	35
Meadowridge Ext. 3	Oct. 1971	22
Retreat Ext. 16	July 1971	17
Southfield Ext. 3	Sept. 1971	63
1971 TOTAL		1027

APPENDIX II

CAPE METROPOLITAN AREA
(Magisterial districts of Bellville, Cape Town, Simonstown and Wynberg)

APPROVAL OF TOWNSHIPS DURING THEPERIOD JANUARY 1966 - DECEMBER 1973 (WHITES)

TOWNSHIP	Date of Approval	No. of Single Residential erven
Bellville Ext. 31	May 1972	14
Bloubergstrand Ext. 1	Nov. 1972	171
Chapmans Peak Ext. 2	March 1972	133
Constantia Ext. 27	Oct. 1972	40
Durbanville Ext. 22	Aug. 1972	95
Durbanville Ext. 23	April 1972	17
Durbanville Ext. 25	Febr. 1972	16
Durbanville Ext. 29	Febr. 1972	154
Durbanville Ext. 32	Jan. 1972	31
Durbanville Ext. 33	Aug. 1972	237
Eversdal Ext. 20	May 1972	27
Eversdal Ext. 21	May 1972	44
Eversdal Ext. 22	June 1972	25
Eversdal Ext. 23	Dec. 1972	31
Fishhoek Ext. 12	July 1972	15
Glencairn Ext. 6	Sept. 1972	39
Houtbay Ext. 17	Nov. 1972	39
Kreupelbosch Ext. 2	Sept. 1972	15
Marina da Gama Ext. 1	Dec. 1972	211
Noordhoek Ext. 1	May 1972	62
Retreat Ext. 15	March 1972	19
Silverhurst Ext. 1	Oct. 1972	88
Tableview Ext. 8	Sept. 1972	590
Tableview Ext. 9	July 1972	24
Swaanswyk	Oct. 1972	52
Kraaifontein Ext. 6	March 1972	264
Kraaifontein Ext. 7	Sept. 1972	305
1972 TOTAL		2758

APPENDIX II

CAPE METROPOLITAN AREA

(Magisterial districts of Bellville, Cape Town, Simonstown and Wynberg)

APPROVAL OF TOWNSHIPS DURING THEPERIOD JANUARY 1966 - DECEMBER 1973 (WHITES)

TOWNSHIP	Date of Approval	No. of Single Residential erven
Bellville Ext. 26	Febr. 1973	186
Bellville Ext. 34	Dec. 1973	286
Bellville Ext. 35	Aug. 1973	372
Durbanville Ext. 18	Nov. 1973	42
Durbanville Ext. 26	Sept. 1973	154
Edgemead Ext. 2	Dec. 1973	155
Edgemead Ext. 3	Dec. 1973	177
Edgemead Ext. 4	Dec. 1973	169
Kirstenhof Ext. 4	Jan. 1973	68
Kirstenhof Ext. 5	Nov. 1973	62
Ottery Ext. 7	Jan. 1973	145
Ottery Ext. 8	Sept. 1973	40
Pekalmy Ext. 1	Jan. 1973	98
Tableview Ext. 5	April 1973	328
Tableview Ext. 10	April 1973	324
Wetton Ext. 1	Aug. 1973	27
1973 TOTAL		2633
TOTAL FOR WHOLE PERIOD		16 389

APPENDIX III

Historic Perspective of Study Area including Durbanville*

It is submitted that without knowing and understanding the past, the present and future are merely incomprehensible points in time and given that a settlement is the product of human endeavour and reflects at any one moment society's aspirations and its environment, one should note historical developments in human activities when trying to understand the development of an urban settlement. This by no means implies using the past as a mirror of the way ahead - the revelance of the past to the future is in showing the direction of the path one is travelling. Thus, in tracing the historical development of the Tygerberg hills area (including Durbanville) it is hoped to make clear some of the "deeper" forces or the impulses and responses that have been decisive in what has been happening here since the days of early man.

It is known that the Strandlopers were mainly foodgatherers before Van Riebeeck landed at Table Bay - they were living on shellfish which they gathered from the rocks in the bay. However, inland towards the present Koeberg/Tygerberg area were other groups of Hottentots who were hunters and herdsmen whose movement patterns were guided by the scarcity or abundance of grazing for wildlife and stock. It is thus evident that even before the establishment of a halfway station at Table Bay the Tygerberg hills area was known to the indigenuous people as an area offering farming opportunities (although at a very informal and foot-loose scale at that time). It is also clear that in those early days the total effect of stock grazing on the natural environment of the study area, was marginal.

Van Riebeeck's first and main duty in coming to the Cape was to establish a halfway station where ships of the Council of Seventeen (East India Company) could obtain fresh water and food supplies.

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* State Archives, Queen Victoria Street, Cape Town: All factual information in this section was obtained from various documents and charts found in this institution.

The Council of Seventeen held the view that they would be able to obtain sufficient supplies by bartering with the Hottentots. This did not materialise and Van Riebeeck was forced to give land out to "free burghers" who could farm on condition that they sold their produce at a fixed price to the company.

The first grants were mainly in Table Bay Valley and along the banks of the Liesbeeck River during 1657, and towards the end of the 17th Century the "favourable" agricultural conditions of the "Luipaardsberge" attracted the attention of the Company. On a chart of 1657 the Tijgerberg mountains are shown as "'t gevleckte lupaerts gebergte" or "the spotted leopard mountains" and on another chart of the same year as the "lupaerts berghen" or leopard mountains. Van Riebeeck in his journal says the Leopard mountains was about three-and-a-half hours from the Fort. In 1661 the Journal records its present name of Tygerberg or Tigerberg which, Valentyn relates, was so called on account of the dark or brown patches which made it different from the other mountains and not because it was the lair of tigers.

The first farm in the "Luipaardsberge" area, Vissershok, was occupied by the Company from August 1683 for growing wheat, grazing cattle and rearing of poultry for the Governor's table and household. During the war between England and Holland in 1781 several Englishmen on the way to England from India were taken from the ships in which they were sailing and interned as prisoners of war at Vissershok. Shortly after 1683 other farms were granted and established in the area, i.e. Phesantekraal (1698), Mosselbank (1698), Diemersdal (1698), Hooggelegen (1702), Maastricht (1702), Meer-en-Dal (1702) and Contermanskloof (1706).

It was previously stated that the first inhabitants of the Tygerberg hills area were food gatherers, hunters and people keeping livestock and through the period of their occupation their effect on the natural environment was negligible. But as man progressed to formal farming as shown in the above paragraph, changes wrought were greater as habitat + farmer

produced a different landscape from habitat + hunter and slowly the landscape of the study area emerged as it is known today.

A natural route from the Fort into the Swartland led through the Tygerberg area and was used by the farmers to transport their products by oxwagon to the Cape Town market. Alongside this road, a day's journey from Cape Town, was a fountain with a fairly steady flow of water. Lying a convenient distance from the market, this spot soon developed into a public outspan, where farmers could rest their oxen. This outspan gradually began to take on the character of a communal meeting place.

On the 15th August 1802, Sir David Baird, Governor of the Cape Colony, authorised the first subdivision in this area, one morgen of land being granted to one Joseph Jones. Adjacent to the outspan it marks the first piece of land set aside in the Tygerberg area for urban settlement. This date can be regarded as that on which the village of Durbanville, then known as Pampoenkraal, was founded.

With the growth of the farming community (several farmers in the area began to plant vines in addition to wheat, and together with Constantia, Paarl and Stellenbosch, this area was responsible for producing the Colony's supply of wine), a need was felt for a local church site as the farmers had to travel long distances to Cape Town or Stellenbosch to attend Sunday services. In 1824 a petition was handed to Lord Charles Somerset, Governor of the Cape, requesting permission to establish a church. Both permission and three morgen of land bein g granted, the church was dedicated in 1825. It was situated adjacent to the outspan, watering point and the property of Jones, and a small settlement began to form round these nucleii.

During 1836 Sir Benjamin D'Urban was requested permission by members of the church, to substitute his name in place of Pampoenkraal. Permission was granted and on 2nd September 1836, the name D'Urban

became official, however, to prevent confusion with Durban (Natal) the name was changed again to Durbanville during 1886. The first sale of erven in this newly founded village, D'Urban, was during 1836. Subdivision and selling of the erven was carried out by a member of the above-mentioned Dutch Reformed Church.

In terms of time Cape Town was still a considerable distance away and the few stores of the village supplied the local market with their immediate necessities. The main mode of transport was the ox wagon. This led to a local wagon-building industry which was controlled by the King brothers who were residents in the area. This industry, however, collapsed mainly due to the substitution of the ox wagon by the train - a railway line was built between Cape Town and Bellville to transport farm produce from the Tygerberg area to Cape Town. During 1862 this line reached its northern terminus, i.e. Durban Road and a settlement also began to form here.

Durbanville's status was given official recognition in 1901 when the village was proclaimed a municipality, the first in the northern suburbs of Cape Town. Until then a local Village Management Board begun in 1897 and consisting of local inhabitants, had been responsible for the maintenance of essential community services. This body and its successor, the Municipal Council, sought to look after the interests of all in the area. Municipal records state that any resident householder shall be allowed to graze on the common free of charge, two (2) head of cattle, two (2) horses and twenty-five (25) sheep.

The reasons for the location of a settlement are often clouded in antiquity and difficult to derive - certainly it is risky, and in the case fo Durbanville wrong, to infer the original location decision from an analysis of the functions of a settlement today. Durbanville today is a typical dormitory suburb in the Cape Town Metro Area offering certain low order services to its inhabitants and it has strong ties with centres of fundamental activities (leisure, employment and shopping) in the metro area. In short it is part of the whole metropolitan activity system and in many

aspects it is dominated by the central city - transport and religion have thus ceased to be important in its present growth and development. However, two characteristics of the Tygerberg hills area that have given place and status to it in a continuous evolving process since early man, are its natural unvironmental assets as well as its business of agriculture. It follows that there is an important obligation resting with the planners of the area, to preserve and protect the above components in order to retain place and identity of the area. It is fairly easily predictable what the alternative to the above attitude would be - we live with it daily - another Cape Town suburb, another yellow patch on a municipal zoning plan, another "no-place" where a certain number of Cape Town people are residing !

APPENDIX IV

GENERAL WIND CONDITIONS PERTAINING TO THE TYGERBERG HILLS AREA

D.F. Malan and Wingfield stations

TABLE 1 January wind directions and velocities.*

Direction	VELOCITY - miles per hour								TOTAL	
	Calm	3-8	9-15	16-20	21-25	26-30	31-35	36-38	All velocities	Over 15 mph only
N		3,4	2,0	0,3	0,5	-	-	-	6,2	0,8
NNE		1,0	0,1	0,1	-	-	-	-	1,2	0,1
NE		0,5	-	-	-	-	-	-	0,5	-
ENE		0,2	-	-	-	-	-	-	0,2	-
E		0,2	-	-	-	-	-	-	0,2	-
ESE		1,8	0,6	0,1	-	-	-	-	2,5	0,1
SE		7,1	3,0	0,7	0,1	-	-	-	10,9	0,8
SSE		23,8	44,1	30,6	18,1	2,4	0,2	-	119,2	51,3
S		23,9	88,6	100,2	57,2	12,0	0,9	-	282,8	170,3
SSW		12,0	47,6	56,8	29,9	5,7	-	-	152,0	92,4
SW		4,5	3,8	0,6	1,0	0,2	-	-	10,1	1,8
WSW		0,7	0,7	-	-	-	-	-	1,4	-
W		3,4	4,5	2,5	-	-	-	-	10,4	2,5
WNW		16,7	26,4	9,1	1,3	-	-	-	53,5	10,4
NW		9,0	13,5	4,3	1,0	0,5	-	-	28,3	5,8
NNW		8,1	4,8	1,1	0,9	0,3	-	-	15,2	2,3
	49,4								49,4	
TOTAL	49,4	116,3	239,6	206,8	109,9	20,9	1,1	-	744	338,6

The relative frequency (total duration) of calms and winds in each velocity category from each direction is expressed in hours per month.

* Department of Transport. Weather Bureau. Climate of South Africa. Climate Statistics, Part 1.

TABLE 2 : July wind directions and velocities

Direction	VELOCITY - miles per hour								TOTAL	
	Calm	3-8	9-15	16-20	21-25	26-30	31-35	36-38	All velocities	Over 15 m.p.h.
N		18,8	33,7	17,6	10,5	4,2	0,8	-	85,6	33,1
NNE		8,9	11,1	8,3	3,1	0,5	-	-	31,9	11,9
NE		3,3	1,6	0,7	0,4	-	-	-	6,0	1,1
ENE		2,5	0,2	-	-	-	-	-	2,7	-
E		3,3	0,1	-	-	-	-	-	3,4	-
ESE		14,6	0,1	-	-	-	-	-	14,7	-
SE		40,5	5,5	0,1	-	-	-	-	46,1	0,1
SSE		44,1	22,8	3,0	0,9	-	-	-	70,8	3,9
S		20,3	34,4	5,7	0,5	-	-	-	60,9	6,2
SSW		10,4	21,4	3,6	0,5	-	-	-	35,9	4,0
SW		4,0	4,7	1,0	0,2	0,2	-	-	10,1	1,4
WSW		3,5	3,4	1,3	0,9	0,1	0,1	-	9,3	2,4
W		5,8	6,5	3,6	1,0	0,4	-	-	17,3	5,0
WNW		22,3	30,2	8,4	3,3	2,7	-	-	66,9	14,4
NW		18,5	31,0	15,1	6,5	2,6	0,3	-	74,0	24,5
NNW		19,3	34,7	22,3	10,9	4,5	1,3	0,1	93,1	39,1
	115,3								115,3	
TOTAL	115,3	240,2	240,9	90,8	38,9	15,3	2,5	0,1	744	147,1

The relative frequency (total duration) of calms and winds in each velocity category from each direction is expressed in hours per month.

PART IV

DUST CONTROL

27. Dust control areas.—(1) The Minister may, after consideration of a report by the committee and after consultation with the Minister of Economic Affairs, by notice in the *Gazette*—

(*a*) declare any area to be a dust control area for the purposes of this Act;

(*b*) include any area in or exclude any area from a dust control area.

(2) The Minister may, after consideration of a report by the committee, by notice in the *Gazette* withdraw any notice under sub-section (1).

28. Steps to be taken by certain persons for preventing atmospheric pollution by dust.—(1) Any person who in a dust control area—

(*a*) carries on any industrial process the operation of which in the opinion of the chief officer causes or is liable to cause a nuisance to persons residing or present in the vicinity on account of dust originating from such process becoming dispersed in the atmosphere; or

(*b*) has at any time or from time to time, whether before or after the commencement of this Act, deposited or caused or permitted to be deposited on any land a quantity of matter which exceeds or two or more quantities of matter which together exceed twenty thousand cubic metres in volume, or such lesser quantity as may be prescribed, and which in the opinion of the chief officer causes or is liable to cause a nuisance to persons residing or present in the vicinity of such land on account of dust originating from such matter becoming dispersed in the atmosphere,

[Para. (*b*) substituted by s. 10 of Act No. 17 of 1973.]

shall take the prescribed steps or (where no steps have been prescribed) adopt the best practicable means for preventing such dust from becoming so dispersed or causing such nuisance.

(2) For the purposes of sub-section (1) the expression "best practicable means" includes in any particular case any steps within the meaning of that expression as defined in section *one* which may be determined by the chief officer and specified in a notice signed by him and delivered or transmitted by registered post to the person who is in terms of the said sub-section required to adopt such means.

(3) Any person who fails to comply with the provisions of sub-section (1) shall be guilty of an offence.

29. Prevention of atmospheric pollution by dust by owners or occupiers of land in certain circumstances.—(1) Whenever in the opinion of the chief officer dust originating on any land in a dust control area and in relation to which the provisions of paragraph (*b*) of sub-section (1) of section *twenty-eight* do not apply, is causing a nuisance to persons residing or present in the vicinity of that land, he may by notice in writing delivered or transmitted by registered post to the owner or occupier of the land require such owner or occupier to take the prescribed steps or (where no steps have been prescribed) adopt the best practicable means for the abatement of such nuisance.

(2) No requirement shall be imposed under sub-section (1) upon an occupier of land who is not the owner thereof, unless the chief officer is of the opinion that the dust in question is caused by activities carried on by such occupier or that it is equitable, having regard to the duration of the period for which he is entitled to remain in occupation of such land or other relevant circumstances, to require him to take any steps or adopt any means contemplated in that sub-section.

(3) In this section the expression "best practicable means" has the meaning assigned thereto in sub-section (2) of section *twenty-eight*.

TABLE 3.: Wind velocity and duration

Velocity m.p.h.	Aggregate January	Duration July	Observable description *
0 - 3	6,6%	15,5%	Calm to light air. Direction of wind shown by smoke drift, but not by wind vanes
3 - 8	15,6%	32,3%	Light to gentle breeze. Wind felt on face, leaves and small twics in constant motion
9-15	32,2%	32,4%	Gentle to moderate breeze. Raises dust and loose paper, small branches are moved.
16-20	27,8%	12,2%	Fresh breeze. Wavelets form on island water, small trees in leaf begin to sway
21-25	14,8%	5,2%	Fresh to strong breeze. Large branches in motion, umbrellas used with difficulty
26-30	2,8%	2,1%	Strong breeze. Whistling heard in telegraph wires.
30 +	0,2%	0,3%	Moderate gale. Whole trees in motion. Inconvenience felt when walking against wind

* Notes under Observable description were drawn from a Beaufort scale for wind as in "Weather and Climate" by De Long, & Koeppe, p. 86.

(4) Any person who fails to comply with the requirements of any notice under subsection (1) shall be guilty of an offence.

30. **Procedure where special circumstances exist.**—(1) If in any case where the provisions of paragraph (*b*) of subsection (1) of section 28 apply, the person liable to take any steps or adopt any means prescribed in that subsection is deceased or has (in the case of a corporate body) ceased to exist, or the Minister is of the opinion that it would in all the circumstances be impracticable or inequitable to require such person to take such steps or adopt such means, the Minister may, in consultation with the Minister of Finance, and after consultation with the Administrator of the province in which the dust control area is situated, the committee and any local authorities which in the opinion of the Minister may be concerned, cause such steps to be taken or such means to be adopted by the chief officer or any such local authority which is willing to do so or by any other person designated by the Minister, and direct that the cost involved, except so much (if any) as may be paid from any Dust Control Levy Account which may be established under section 31, shall be paid by the State, any such local authorities and the owner concerned to such an extent or in such proportions as may be determined by the Minister in consultation with the Minister of Finance and after consultation with the said Administrator, the committee and any such local authorities: Provided that the Minister may in consultation with the Minister of Finance exempt any such local authority or owner from payment of any amount in respect of such cost if he is of the opinion that such local authority or owner is not financially in a position to pay such amount or that it would be impracticable or inequitable to require such local authority or owner to pay such amount.

[Sub-s. (1) substituted by s. 11 (*a*) of Act No. 17 of 1973.]

(2) The Minister shall cause any such local authority or owner to be advised in writing of any amount which that local authority or owner is required to pay in pursuance of any determination under sub-section (1) and of the time at which such amount or (if it is to be paid in instalments) any instalment thereof shall be payable.

(3) Any amount or instalment payable as aforesaid may be recovered from the local authority or owner concerned by the Minister by action in any competent court.

(4) Any amount payable as aforesaid by the State shall be paid out of moneys appropriated by Parliament for the purpose.

(5) For the purpose of this section "owner", in relation to land on which any matter from which dust originates has been deposited, includes—

(*a*) if the matter was deposited on the land in question at any time by or on behalf of any person who was at the time of such deposit the holder of rights granted under any law relating to mining or prospecting for minerals to carry on mining or prospecting activities on the said land, the person who so was the holder of such rights; and

(*b*) if the matter was at any time processed on or removed from that land by or on behalf of any person who at the time of such processing or removal was the holder of any right to the use of the surface of the land in terms of any such law, the person who so was the holder of such right.

[Sub-s. (5) substituted by s. 11 (*b*) of Act No. 17 of 1973.]

31. Establishment of Dust Control Levy Account.—(1) The Minister may, if after consultation with the Minister of Mines, the Minister of Economic Affairs and the committee, he is satisfied that special provision is necessary to meet wholly or in part any expenditure required to be incurred for the more effective prevention of the pollution of the atmosphere by dust, establish an account to be known as the Dust Control Levy Account, hereinafter referred to as the account, into which shall be paid the contributions made in terms of sub-section (3) and any moneys which may be donated to the fund or may accrue thereto from any other source.

(2) Every person to whom any provision of section 28 or 30 applies shall contribute to the account as provided in this section: Provided that the Minister may, after consultation with the Minister of Mines, if the person liable so to contribute is or was the holder of the rights referred to in paragraph (*a*) or (*b*) of subsection (5) of section 30, or, in any other case, with the Minister of Economic Affairs, exempt any person from liability to contribute if he is of the opinion that it would for any other reason be impracticable or inequitable to require such person to contribute.

[Sub-s. (2) substituted by s. 12 of Act No. 17 of 1973.]

(3) (*a*) Any such contribution may consist of a single payment or of periodical payments on such a basis as the Minister may, after consultation as provided in sub-section (2), in each case consider appropriate, and may vary according to the nature or magnitude of the operations carried on or the quantities of matter deposited on any land by the person liable for payment, or any other circumstances relating to such operations.

(*b*) Where any such contribution consists of a single payment, the Minister may in his discretion permit the person concerned to pay the amount involved by instalments.

(4) The chief officer shall cause to be delivered or transmitted by registered post to every person liable for the payment of any such contribution, a notice signed by the chief officer setting out the amount payable by that person and the period within which payment shall be effected, or, in the case of contributions payable periodically or of a single amount payable by instalments, the times at which such periodical amounts or instalments shall be paid, and any such notice may require the person to whom it is addressed to furnish with any payment made such particulars in respect of the operations carried on by him as may be specified in the notice.

(5) All contributions for which any person is liable under this section shall be paid to the chief officer, who shall cause any amount so paid to him to be transmitted to the Secretary for Health to be deposited to the credit of the account.

(6) Any person who fails to pay on or before the due date any contribution for the payment of which he is liable under this section or to furnish any particulars required in terms of any notice under sub-section (4) when making payment of any amount in respect of any such contribution, shall be guilty of an offence.

(7) (*a*) The account shall be administered by the Secretary for Health, who shall cause proper records to be kept of all moneys received and expended, and any money in the account may subject to the directions of the Minister be applied—

(i) for the payment of any expenditure incurred in connection with any operations undertaken with the approval of the Minister for the purpose of the prevention of the pollution of the atmosphere by dust;

(ii) towards the payment wholly or in part of any expenditure incurred under section *thirty*; and

(iii) to meet wholly or in part any expenditure incurred or to be incurred by any person in complying with any provision of section *twenty-eight* or *twenty-nine*.

(*b*) Any moneys in the account which are not required for immediate use shall be invested with the Public Debt Commissioners.

State shall be so entered without the prior consent of the person in charge of such premises, which consent shall not be withheld except for reasons connected with the security of the State.

(4) Any person who fails to give or refuses admission to any such premises to the chief officer or any person so authorized or who obstructs or interferes with the chief officer or any such person in the performance of his functions under this Part, shall be guilty of an offence.

(5) The chief officer may at any time, with the approval of the Minister, withdraw any authority granted under sub-section (1) and shall notify the person concerned of such withdrawal and of the date on which it shall take effect.

35. Appeals.—(1) Any person who is aggrieved by any notice served upon him under this Part may within thirty days after the date on which such notice was served or within such further period as the board may for good and sufficient reason allow, lodge an appeal with the board against the notice, and the board may thereupon confirm, modify or set aside such notice and its decision shall be final.

(2) The operation of any notice which is the subject of an appeal under sub-section (1) shall be suspended pending the decision of the board on such appeal.

(3) Any person who lodges an appeal under sub-section (1) shall submit with his appeal written arguments or explanations of the grounds of his appeal and may further appear before the board in person or through a representative (who shall be an attorney or an advocate) and cause any evidence to be tendered or any argument or explanation to be submitted to the board in support of the written arguments or explanations of his grounds of appeal.

PART V

AIR POLLUTION BY FUMES EMITTED BY VEHICLES

36. Application of this Part.—(1) The provisions of this Part shall apply only in an area under the jurisdiction of a local authority in respect of which they have been declared to be applicable by the Minister by notice in the *Gazette* after consultation with the committee and the Administrator of the province in which such area is situated, and with effect from such date in the case of any such area as may be specified in the relevant notice.

(2) No such notice shall be issued in respect of any area except with the concurrence of the local authority having jurisdiction in that area.

(3) Subject to the provisions of sub-section (4), the powers conferred by this Part on local authorities shall, in respect of any area under the jurisdiction of a local authority which is the subject of a notice under sub-section (1), be exercised by that local authority.

(4) If after consideration of a report submitted to him by the committee the Minister is of the opinion that a local authority has not satisfactorily exercised the powers which it is in terms of sub-section (3) required to exercise, the Minister may, in consultation with the Minister of Finance and after consultation with that local authority, by notice in the *Gazette* direct that the said powers shall be exercised by the chief officer, and may in that event, in consultation with the Minister of Finance, recover from that local authority the costs incurred by the chief officer in the exercise of the said powers.

(5) The Minister may, after consultation with the committee, by notice in the *Gazette* withdraw any notice issued under this section.

APPENDIX VI

Proclamation of the Tygerberg Soil Conservation Area (1946)

PROCLAMATION

By His Excellency the Right Honourable Gideon Brand van Zyl, a Member of His Majesty's Most Honourable Privy Council, Governor-General of the Union of South Africa.

* No. 148, 1946.]

TYGERBERG CONSERVATION AREA.

Under the powers vested in me by section *five* of the Forest and Veld Conservation Act, 1941 (Act No. 13 of 1941), I hereby declare the area situated in the Cape Division, Province of the Cape of Good Hope and defined in the Schedule hereto a conservation area.

God Save the King.

Given under my Hand and the Great Seal of the Union of South Africa at Durban on this the Twenty-sixth day of July One thousand Nine hundred and Forty-six.

G. BRAND VAN ZYL,
Governor-General.

By Command of His Excellency the Governor-General-in-Council.

J. G. N. STRAUSS.

SCHEDULE.

DEFINITION OF TYGERBERG CONSERVATION AREA.

Description of Boundaries.

From the northernmost beacon of the property known as Bloemendaal (C.Q. 12.9) in an easterly direction along the boundaries of and including the following properties, viz. Lot No. 794 (C.Q. 13.2), Springfield (C.Q. 12.7) and Tygerberg (C.Q. 8.30) to the north-eastern beacon of the last-mentioned property; thence in a general southerly direction along the boundaries of and including the said Tygerberg and Witboom (1924.237.10623), to the easternmost beacon of the last-mentioned property, common to it and Portion 8 of De Bron (1940.30.1629); thence continuing in a general southerly direction along the boundaries of and excluding the following properties, viz.: the said Portion 8 of De Bron, Portion 9 of De Bron (1940.166.8118), Portion 7 of De Bron (1943.212.10600), Portion 6 of De Bron (1930.158.7886), Elsjes Kraal (C.Q. 6.10½), Lot A of Mon Repos (1936.80.4401) and Lot B of Mon Repos (1938.83.4410) to the southernmost beacon of the last-mentioned property; thence in general southerly and westerly and north-westerly directions; in succession along the boundaries of and including the following properties, viz.: Welgemoed (C.Q. 2.73), van Riebeeks Hof (1930.141.7451), Lot C Tygerberg (C.Q. 18.24), Maastricht (C.Q. 12.19) and Lot B Tygerberg (C.Q. 13.25) to the northernmost beacon of that property common to it and Lot A (C.Q. 36.13); thence in a north-easterly direction along the boundaries of and including the said Lot A, and Lot B (C.Q. 30.12) to the point of commencement.

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— TYGERBERG GRONDBEWARINGSGEBIED —