BEST AVAILABLE COPY

PN. ABZ-763

92623

INFRASTRUCTURE INVESTMENT PROFILE FOR THE GREATER NELSPRUIT AND WHITE RIVER AREAS

JULY 1995

DEPARTMENT OF MINING

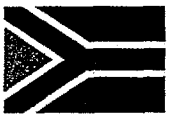
USAID

URBAN-ECON

capricorn DEVELOPMENT SPECIALISTS (PTY) LTD.

BEST AVAILABLE COPY

PREPARED FOR:



Eastern Transvaal
Provincial Government
Department of Housing
NELSPRUIT
1200

PREPARED BY:

Development Economists

Waterkloof Forum No 1
374 Milner Street
WATERKLOOF
0181

FUNDED BY:

United States Agency
for International Development
(USAID)

AND:

503 Medsen Building
P O Box 2446
NELSPRUIT
1200

THE INFORMATION CONTAINED IN THIS REPORT HAS BEEN COMPILED WITH THE UTMOST CARE AND ACCURACY WITHIN THE PARAMETERS SPECIFIED IN THIS DOCUMENT. INVESTMENT DECISIONS BASED ON THE CONTENTS OF THE REPORT ARE, HOWEVER, THE SOLE RESPONSIBILITY OF THE DECISION MAKER.

ACRONYMS AND ABBREVIATIONS

CSS	Central Statistical Service
DBSA	Development Bank of Southern Africa
GGP	Gross Geographic Product
GNWRA	Greater Nelspruit and White River areas
ha	hectare
kl	kilolitre
kV	kilovolt
km	kilometre
MEC	Member of the Executive Council
Ml	Megalitre
RDP	Reconstruction and Development Programme
RSC	Regional Services Council
SUDS	Shelter and Urban Development Support Project
TLC	Transitional Local Council
USAID	United States Agency for International Development

TABLE OF CONTENTS

SYNOPSIS i

1. INTRODUCTION 1

1.1 Purpose of the report 1
1.2 Background 1
1.3 Goal and Objectives of the study 2
1.4 Approach and Methodology 3
1.5 Report Structure 6

2. STUDY AREA 7

2.1 General location 7
2.2 Delimitation of study area 9
2.2.1 Existing urban settlements 9
2.2.2 Developable land 11
2.3 Administrative boundaries 16

3. PLANNING ASPECTS 18

3.1 General review of development 18
3.2 Spatial aspects 23
3.2.1 Zone 1 : KaNyamazane 23
3.2.2 Zone 2 : Msogwaba 25
3.2.3 Zone 3 : Clau-Clau 27
3.2.4 Zone 4 : KaBokweni 27
3.2.5 Zone 5 : Nelspruit 33
3.2.6 Zone 6 : White River 33
3.2.7 Zone 12 : Matsulu/Kaapmuiden 33
3.2.8 Salient spatial indicators 33
3.3 Infrastructure supply systems 37
3.3.1 Bulk infrastructure 38
3.3.1.1 Water 38
3.3.1.2 Sanitation 44
3.3.1.3 Roads and storm water drainage 49
3.3.1.4 Solid waste disposal 52
3.3.1.5 Electricity 53
3.3.2 Internal infrastructure network 57
3.4 Urban public finance 60
3.5 Summary 61

4. INVESTMENT PROFILE 64

4.1 Brief review of the model 64

4.1.1 Spatial model 64
4.1.2 Infrastructure model 65
4.1.3 Financial model 65
4.1.4 Other aspects 65
4.2 Investment scenario 67
4.2.1 Spatial indicators 67
4.2.2 Infrastructure cost 68
4.2.3 Financial implications 73
4.3 Findings 74
4.4 Conclusions and suggestions 75

TABLES

Table 3.1 : Development features of study area (1991) 19
Table 3.2 : Projected economic growth of the GNWRA (1990-2000) 22
Table 3.3 : Current and projected future urban population 23
Table 3.4 : Current spatial and demographic features of urban nodes (1994) 36
Table 3.5 : Projected future spatial and demographic features of urban nodes (2000) 36
Table 3.6 : Urban nodes ranked in terms of current densities (1994) 37
Table 3.7 : Service standards 58
Table 3.8 : Present service levels 59
Table 3.9 : Operational income budgets of local authorities in GNWRA (1994/95) 60
Table 4.1 : Accumulative total land budget for year 2000 67
Table 4.2 : Accumulative bulk infrastructure development cost 68
Table 4.3 : Present and future service levels 70
Table 4.4 : Upgrading costs for inhabited areas (Rands per hectare) 69
Table 4.5 : Total accumulative cost of upgrading per settlement (1996-2000) 71
Table 4.6 : Total accumulative cost of new developments 72
Table 4.7 : Financial impact of investment scenario for GNWRA 74

DIAGRAMS

Diagram One : Approach and methodology 5
Diagram Two : Integrated infrastructure planning model 66

MAPS

Map 1 : General Location 8
Map 2 : Existing settlements 10
Map 3 : Development potential 13
Map 4 : Existing and future settlements 14
Map 5 : Administrative boundaries 17
Map 6 : Zone 1 : Kanyamazane 24
Map 7 : Zone 2: Msogwaba 26
Map 8 : Zone 3 : Clau-Clau 28

Map 9 : Zone 4 : KaBokweni 29
Map 10 : Zone 4 : Gutshwa-Ngodini 30
Map 11 : Zone 5 : Nelspruit 32
Map 12 : Zone 6 : White River 34
Map 13 : Zone 12 : Matsulu/Kaapmuiden 35
Map 14 : Existing water infrastructure 39
Map 15 : Future water infrastructure 40
Map 16 : Existing sewer infrastructure 45
Map 17 : Future sewer infrastructure 46
Map 18 : Existing road infrastructure 50
Map 19 : Future road infrastructure 51
Map 20 : Existing electrical infrastructure 54
Map 21 : Future electrical infrastructure 55

ANNEXURES

Annexure A
Annexure B
Annexure C
Annexure D
Annexure E

SYNOPSIS

This document presents the results of the first phase of a study that has been undertaken on behalf of the **Department of Housing** of the **Eastern Transvaal Provincial Government** and funded under the South African **Shelter and Urban Development Support (SUDS)** project of the **United States Agency for International Development (USAID).**

The purpose of the study is to develop a **planning instrument** that can be used as a **political decision making tool** by the Provincial Government - in consultation with the community - to determine acceptable and affordable levels of infrastructure for the low-income, urbanised communities in the Greater Nelspruit and White River Areas (GNWRA) of the Eastern Transvaal Province.

The study consists of two phases. The **first phase** involves the development of an **integrated, computerised planning model** that can be used to identify, plan and simulate different investment options to meet current and future deficiencies in infrastructure supply. The model comprises of three interrelated **elements**, namely a **spatial model, infrastructure cost model** and **financial model**, and distinguishes between three priority categories of investment : (a) **upgrading** of infrastructure services at existing settlements, (b) development of infrastructure in **expansion areas** of settlements, and (c) development of infrastructure at **newly identified urban nodes.**

The **second phase** comprises of a **participative process** whereby the disadvantaged communities in the study area will be involved in the practical development and application of the planning model. During this phase the affected communities will be informed about the objectives of the study, while the needs and views with respect to infrastructure services will be established at grass-roots level. This information will be used to formulate realistic investment scenarios that will be simulated with the aid of the computerised model.

This report describes the **approach** and **methodology** that was followed during the first phase of the project and contains the results of a specific investment scenario - based on a particular set of assumptions - that was simulated with the aid of the computerised model.

The following important **findings** and **conclusions**, based on the simulated investment scenario and other assessments were made during the course of the study.

a) The study area is characterised by disparities in the level of development, with the western section reflecting a low population concentration and high living standards. In contrast the eastern section is characterised by high population concentration and markedly lower living standards. However, despite these disparities the two sections currently function as an integrated economic unit with the western section providing the majority of the employment opportunities. The low-income communities of the eastern section on the other hand, provides most of the labour force requirements.

b) The study area is characterised by huge discrepancies between the levels of infrastructure services found in the high-income and low-income communities respectively. High-income communities are served at full service standards. In contrast, most of the inhabitants of low-income communities are served at minimum or basic service standards, whilst a few settlements are characterised by intermediate service levels.

c) In order to accommodate the expected average annual growth of 4.6% in the population over the planning period of five years, a total number of 15 745 new stands will have to be developed. At current densities, a gross area of approximately 3 290 hectares will be needed for this purpose in expansion areas and new development nodes.

d) The total cost related to the upgrading of existing settlements and the development of new urban areas to acceptable infrastructure service standards, is estimated to amount to approximately R672 million over the next five years. This figure is the result of a specific investment scenario that was simulated with the aid of the computer model.

e) The required investment will have serious implications in terms of affordability if it is to be financed solely from the revenue base of existing local authorities and the inhabitants of the area. It is estimated that the annual income of local authorities will have to increase by as much as 56% in real terms by the year 2000 to finance the recurring costs. In terms of the impact on households, it is estimated that the disposable income of households will have to increase in real terms by an additional 6% per annum by the year 2000 if households would be required to pay for the full cost of infrastructure developments.

f) The aforegoing scenario suggests that the backlog requirements for addressing deficiencies, together with the investments associated with meeting the demand for new site development, will not be affordable if it is to be financed from the existing financial capacity of local authorities and households in the area.

8

g) In view of the above findings and conclusions, the following options could be further investigated to accommodate the financial pressure of infrastructure investment in the GNWRA:

- The broadening of the existing revenue base of local authorities by means of the exploitation of economic development opportunities in the area and the phasing-in of sales tariffs in areas that are currently provided with infrastructure services on a non-recovery basis.

- Cross-subsidisation of services in low-income communities by communities with a higher income and affordability level. The formation of Transitional Local Councils (TLC's) represents an important step towards creating an environment within which this will be possible.

- Active and continuous campaigns to access external (especially international) funding for infrastructure development. This Investment Profile represents an important instrument that can be utilised to facilitate this process.

1. INTRODUCTION

1.1 PURPOSE OF THE REPORT

This Investment Profile (Aide Memoire) presents the results of the first phase of an extensive planning exercise concerning the current and future infrastructure needs of low-income, urbanised communities in the Greater Nelspruit and White River areas (GNWRA) of the Eastern Transvaal Province.

1.2 BACKGROUND

More than 35% of the total black South African population, or at least 11 million people, are currently living in urban and semi-urban areas. By 2010, the number of urban black South Africans is estimated to rise to approximately 33 million, or about 70% of the total black population in that year. At present more than 7 million urban black South Africans are living in informal housing, including back yard dwellings in townships, and rapidly growing, unserviced squatter settlements. The existing housing backlog is calling for a ten-fold increase in formal sector production throughout the rest of the decade to produce that many housing units.

The net effect of this situation creates an enormous demand for new housing and basic public infrastructure services. A severe limitation in resources to address these needs, calls for the development of effective mechanisms and planning models that will ensure the extension of public services from high-income communities to surrounding low-income communities.

In 1992, the United States Agency for International Development (USAID) has launched a project in South Africa to assist in the above regard. The purpose of the project, generally known as the South African Shelter and Urban Development Support (SUDS) project, is to promote the provision of services, infrastructure and housing to low income communities in South Africa. The project's focus is on policy reform, supporting innovative housing delivery models, technical assistance, leveraging finance for housing and infrastructure and supporting the previously disadvantaged construction sector.

In September 1994, USAID agreed to fund the development of a community based planning model for the assessment of infrastructure deficits in the GNWRA and the structuring of options to meet the identified needs. The agreement, which is funded under the SUDS project, makes provision for the compilation of an Investment Profile for the area that will address these aspects.

10

During the course of 1992 and 1993, a team of World Bank consultants were responsible for the compilation of infrastructure investment profiles for the four metropolitan areas in South Africa, i.e. the Witwatersrand, Durban, Cape Town and Port Elizabeth. This Investment Profile for the GNWRA represents an extension of the work that was done by the World Bank consultants and the approach and methodology followed with this study are primarily based on the same principles upon which these studies were based. The same definitions, with minor changes to suit the particular planning conditions in the GNWRA, were adopted to distinguish between the different service levels.

1.3 GOAL AND OBJECTIVES OF THE STUDY

The study consists of an assessment of the current and future infrastructure needs of low-income, urbanised communities in the GNWRA. This assessment is carried out at the basic needs level, focussing on the demand for and supply of basic infrastructure services such as water, electricity, sanitation, roads, stormwater drainage and solid waste disposal.

The **overall goal** of the study is to develop a planning instrument that can be used as a political decision making tool by the Provincial Government - in consultation with the community - to determine acceptable and affordable levels of infrastructure for the low-income, urbanised communities in the GNWRA.

The study has the following **specific objectives:**

- To develop a **computerised planning and financial model** that can be used to identify and plan different options to meet current and future deficiencies in the supply of infrastructure services.

- To compile an **Investment Profile** - based on the results of the model - that can be used by local planning authorities in attempts to access external funding for infrastructural investments. The Investment Profile distinguishes between three **priority categories** of infrastructure investment:

  - **Upgrading of existing communities** - both informal and formal settlements - to appropriate levels of infrastructure standards. All existing settlements that are underserviced or comprise a significant lower-income population, falling within the GNWRA, have been included in the estimates.

- **Development of suitably located vacant land**, also to appropriate levels of infrastructure standards, for the supply of housing to lower-income households.

- **Expansion of bulk infrastructure systems** to satisfy existing deficiencies as well as meeting the demand generated by the proposed upgrading and new sites development requirements.

- A third important objective of the study is to **involve** the various **communities** within the urban conglomerate of the GNWRA in the process. This is essential to ensure that the results of the exercise is focused towards the real, prioritised needs of the target communities and their affordability levels. This objective will, however, be addressed during a next phase of the project and does not form part of the scope of this report.

1.4 APPROACH AND METHODOLOGY

The study consists of two phases. The **first phase** involved the development of an **integrated, computerised planning model** that can be used to identify, plan and simulate different investment options to meet current and future deficiencies in infrastructure supply. The **second phase** comprises of a **participative process** whereby the disadvantaged communities in the study area will be involved in the practical development and application of the planning model. During this phase the affected communities will be informed about the objectives of the study, while the needs and views with respect to infrastructure services will be established at grass-roots level. This information will be used to formulate realistic investment scenarios that will be simulated with the aid of the computerised model.

The end product of the entire study as described above, will consist of the following:

- A **technical document** (this report) that describes the approach and methodology that was adopted in developing the planning model. The report also contains a description of the spatial, cost and financial implications of a specific investment scenario - based on a particular set of assumptions - that was simulated with the aid of the computerised model.

- The **computerised model** itself which forms an integrated part of the technical document.

- A **document** describing the results of the **community participation process** and the results of investment scenarios that were formulated and simulated upon the information that was gathered during this process.

12

This report focuses on the first phase of the project as described above. The methodology that was followed during this phase consists of a number of elements that are briefly described below and visually presented in Diagram One.

The **first element** involved the compilation of a an **information system** containing relevant planning information with respect to the study area. The system consists of two elements:

- A **map** showing the boundaries of settlements; boundaries of developable land (expansion areas and new development nodes) catchment areas of bulk infrastructure and administrative boundaries.

- A **data base** consisting of a description of settlements (location, topography, level of development); current and future population per settlement; present densities; current level of infrastructure services; etc.

The **second element** comprised of the development of an **integrated infrastructure planning model**. The model, which forms the basis for the compilation of this Investment Profile, represents a useful planning instrument that can be used by planning authorities to assess the need for infrastructural services and to apply for external funding of infrastructure investments. The integrated model consists of the following components:

- A **spatial model** indicating the present and projected spatial distribution of population and densities.

- An **infrastructure model** indicating the proposed level of services for existing settlements, expansion areas and new development nodes; capital cost for the proposed level of services and cost of bulk infrastructure.

- A **financial model** identifying the investment period; the phasing of investment; repayment schedules and the affordability of these investments.

An important aspect of the model is that it provides a **dynamic planning instrument** whereby the cost and affordability of various combinations of planning variables can be simulated in order to determine the optimum level of services that can be afforded. The model is also **flexible** in the sense that it can be adjusted to accommodate changing planning conditions in the study area.

The **third element** involved the compilation of this document which serves the purpose of a technical **Investment Profile** for the GNWRA based upon the results of a specific investment scenario simulated with the aid of the model.

DIAGRAM ONE : APPROACH AND METHODOLOGY

1. INFORMATION SYSTEM

DIGITAL MAP
- Settlement boundaries
- Vacant land boundaries
- Catchment areas

DATABASE
- Settlement characteristics
- Population
- Densities
- Level of services

2. PLANNING INSTRUMENT

SPATIAL MODEL
- Population projections
- Land allocation

INFRASTRUCTURE MODEL
- Level of services
- Capital cost

FINANCIAL MODEL
- Investment period
- Repayment schedule
- Affordability

3. INVESTMENT PROFILE FOR THE GREATER NELSPRUIT AND WHITE RIVER AREAS

1.5 REPORT STRUCTURE

The rest of this report is structured as follows:

Section 2 deals with the **delineation** of the **urban boundary** of the study area and the existing and expected future **administrative boundaries.**

Section 3 starts off with a general description of the level of development in the study area. The rest of the section is devoted to a description of the **existing spatial, infrastructural** and **public financial** aspects of the various settlements and zones comprising the urban conglomerate of the GNWRA. The purpose of this section is to orientate the reader in terms of the current level of development and constraints experienced in the various settlements.

Section 4 describes the **results** of the planning model in terms of its **spatial implications, infrastructure cost implications** and financing and **financial affordability implications.** As such, this section outlines an **Investment Profile** for the GNWRA indicating the optimum level of services that can be provided within the shortest possible timespan, and taking due cognisance of the needs and affordability levels of the various communities. This section concludes with a summary of the main findings and conclusions of the study.

Section 5 comprises of various Annexures. Annexure A contains information with respect to high and medium level economic growth scenarios for the GNWRA. Annexures B, C and D respectively includes information regarding the spatial, infrastructure and financial models as well as the detail results of the simulated investment scenario. Annexure E provides information with respect to the operation of the computerised model and the hardware and software required to operate the model.

15

2. STUDY AREA

The **purpose** of this section is to **orientate** the reader in terms of the **location and boundaries** of the study area.

The aspects that are covered in this section are the following:

- **General location** of the study area within the Eastern Transvaal Province.
- **Geographical delineation** of the study area in terms of:
  - **Existing settlements** that are in need of upgrading of their current infrastructural services.
  - Suitable **vacant land** that was identified for future urban settlement and which require development of new infrastructure.

  Both these elements form integral parts of the study area.
- A description of the **demarcation criteria** that were used to delineate the boundaries of existing settlements and suitable vacant land.
- Cognisance is also taken of the current and future **administrative boundaries** and their potential impact on development in the study area.

2.1 GENERAL LOCATION

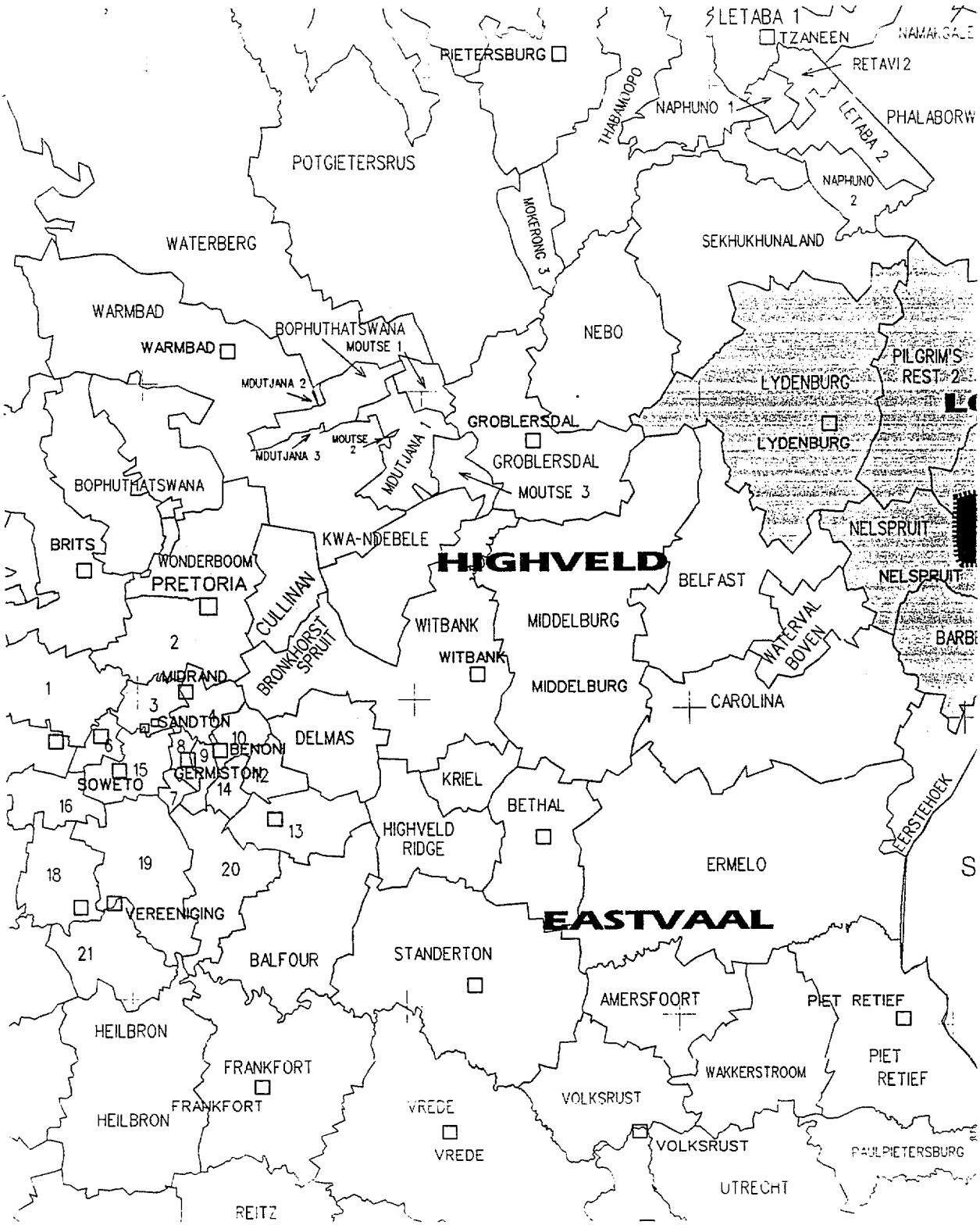
A broadly defined area, generally known as the Greater Nelspruit and White River Area (GNWRA) has been identified as the focus area for this study. The GNWRA is located in the Lowveld area of the far Eastern Transvaal Province, approximately 320 km to the east of Pretoria (See Map 1).

The N4 national road provides a direct link between the study area and Gauteng Province in the west and Mozambique in the east.

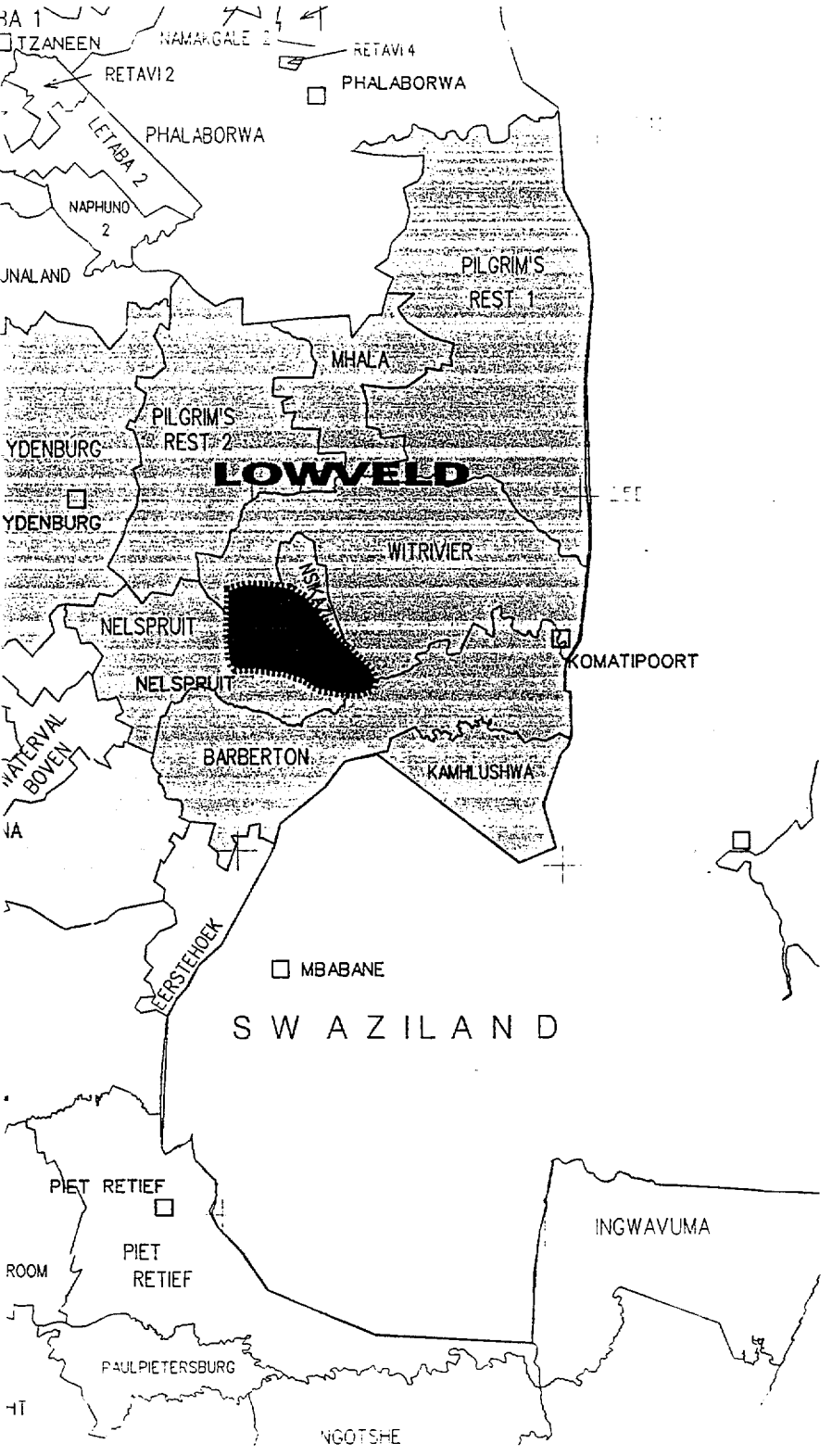
Nelspruit, which is also the capital of the Eastern Transvaal Province, forms part of the study area and serves the function of main service centre in the area.

16

EASTERN TRANSVAA



.NSVAAL



DEVELOPMENT SPECIALISTS (PTY) LTD.

SUITE 503 PO BOX 2446
MERSEN HOUSE NELSPRUIT 1200
14 TENSHALL STR TEL: (0131) 24474
NELSPRUIT FAX: (0131) 24457

US-AID INVESTMENT STUDY FOR GREATER NELSPRUIT AND WHITE RIVER AREAS

STUDY AREA

map 1

cadnet

18

2.2 DELINEATION OF STUDY AREA

The **focus** of this study is on existing and future **urbanised communities** only. Therefore, all rural areas within the boundaries of the broadly defined study area - except those that are later on in this section demarcated as developable land for urban settlement - fall outside the ambit of the study.

For the purpose of effective planning the urban/rural fringe of the GNWRA had to be clearly defined. The rest of this section is devoted to the delineation of urban boundaries, firstly for existing settlements and secondly for vacant land that is deemed suitable for urban development. The demarcation criteria applicable in each instance, will be highlighted.

2.2.1 Existing urban settlements

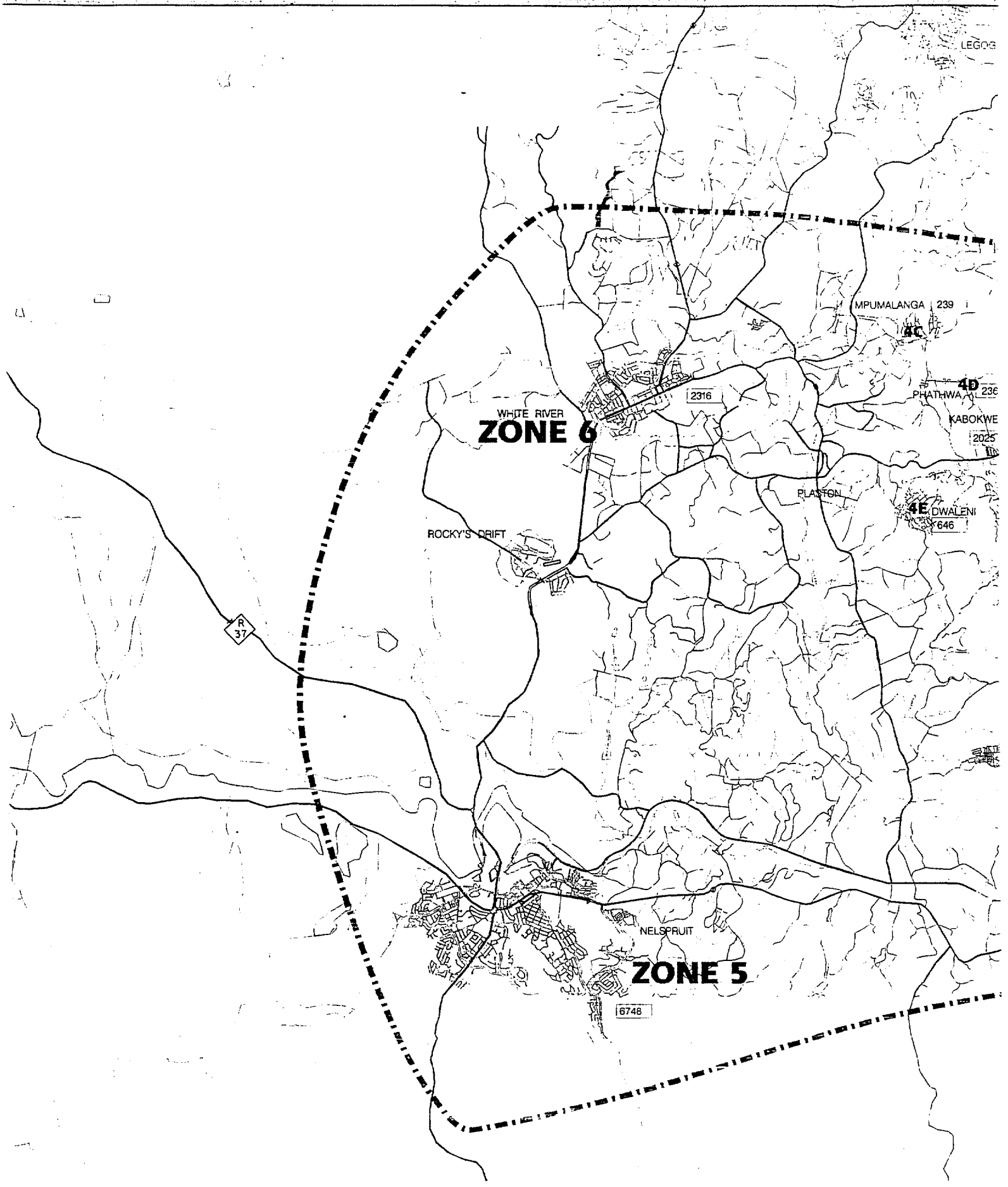
The following **demarcation criteria** were used to determine the existing urban settlements that form part of the study area:

- **Economic interaction** within a large, integrated urban economy.
- **Physical features** such as existing infrastructure.
- **Population distribution** and **densities.**
- Development **potential.**
- **Financial feasibility** for infrastructure services, community services, transportation, etc.

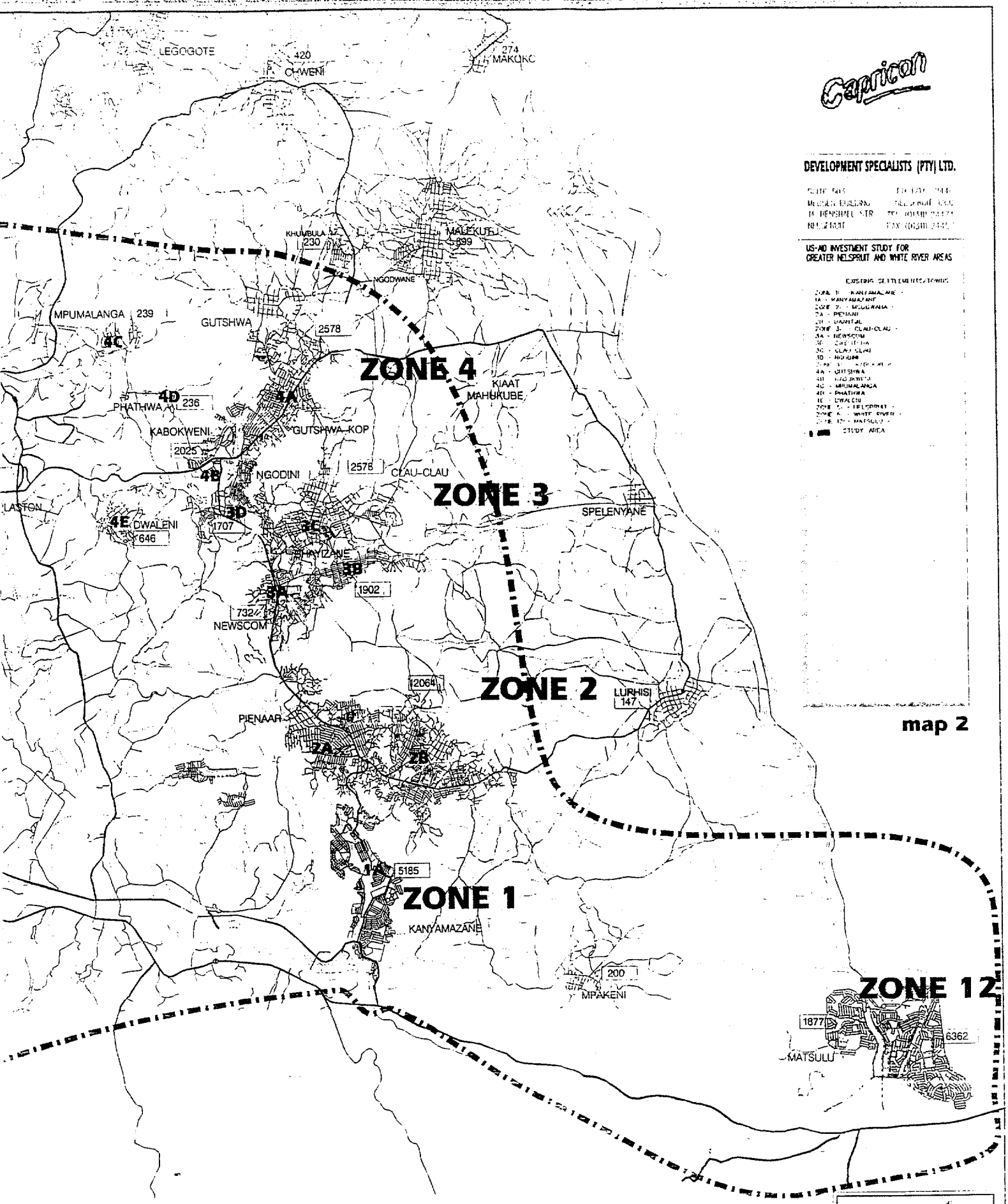
Through applying these criteria, the following **harmonised urban communities** were identified (categorised into zones to facilitate easy reference). The exact location of these settlements and their boundaries are portrayed by Map 2.

Zone 1: **KaNyamazane**
1A - KaNyamazane

Zone 2: **Msogwaba**
2A - Pienaar
2B - Daantjie



EXISTING SETTLEMENTS A



MENTS AND STUDY AREA

Zone 3: **Clau-Clau**
3A - Newscom
3B - Zwelitsha
3C - Clau-Clau
3D - Ngodini

Zone 4: **KaBokweni**
4A - Gutshwa
4B - KaBokweni
4C - Mpumalanga
4D - Phathwa
4E - Dwaleni

Zone 5: **Nelspruit**

Zone 6: **White River**

Zone 12: **Matsulu/Kaapmuiden**

With the exception of the urban settlements of Nelspruit and White River, the other settlements listed above are in need of **upgrading** of their infrastructure services. The **existing** urban areas of **Nelspruit** and **White River** are **excluded** for the purpose of this study since they already enjoy the highest level of infrastructure services.

2.2.2 Developable land

As mentioned before, the identification of **suitable vacant land** to accommodate the rapidly growing population of the study area, and the provision of appropriate levels of infrastructure services on that land, forms an integral part of the Investment Profile. Consequently, these areas, which will be referred to as developable land, forms part of the study area.

The following **urban development guidelines** were adhered to in the formulation of specific criteria for the identification of developable land:

- Urban development should be concentrated at **development nodes** that are economically, socially and environmentally viable.
- Uncontrolled **urban sprawl** should be discouraged and development should be directed towards existing and new development nodes.
- **High potential agricultural land** that is vital to sustainable economic growth and development in the area should not be threatened by urban development.

22

In accordance with the above guidelines, the following **criteria** were formulated and applied to identify suitable land for future urban development:

- **Desirable urban structures:** The area should assume a metropolitan character with a wide variety of goods and services comfortably accessible to all inhabitants.

- **Agricultural land:** Areas were identified in a manner that protects prime agricultural land. It is important to integrate the agriculture-based economy with urban development to allow more opportunities for all the inhabitants.

- **Availability and cost of bulk infrastructure:** These aspects pose certain restrictions to urban expansion and under-utilised infrastructure should be utilised optimally to provide a better and cheaper service throughout the area.

- **Physiographical characteristics:** Urban development is restricted in certain areas due to topography (e.g. steep slopes) and geology (rock outcrops and soil conditions).

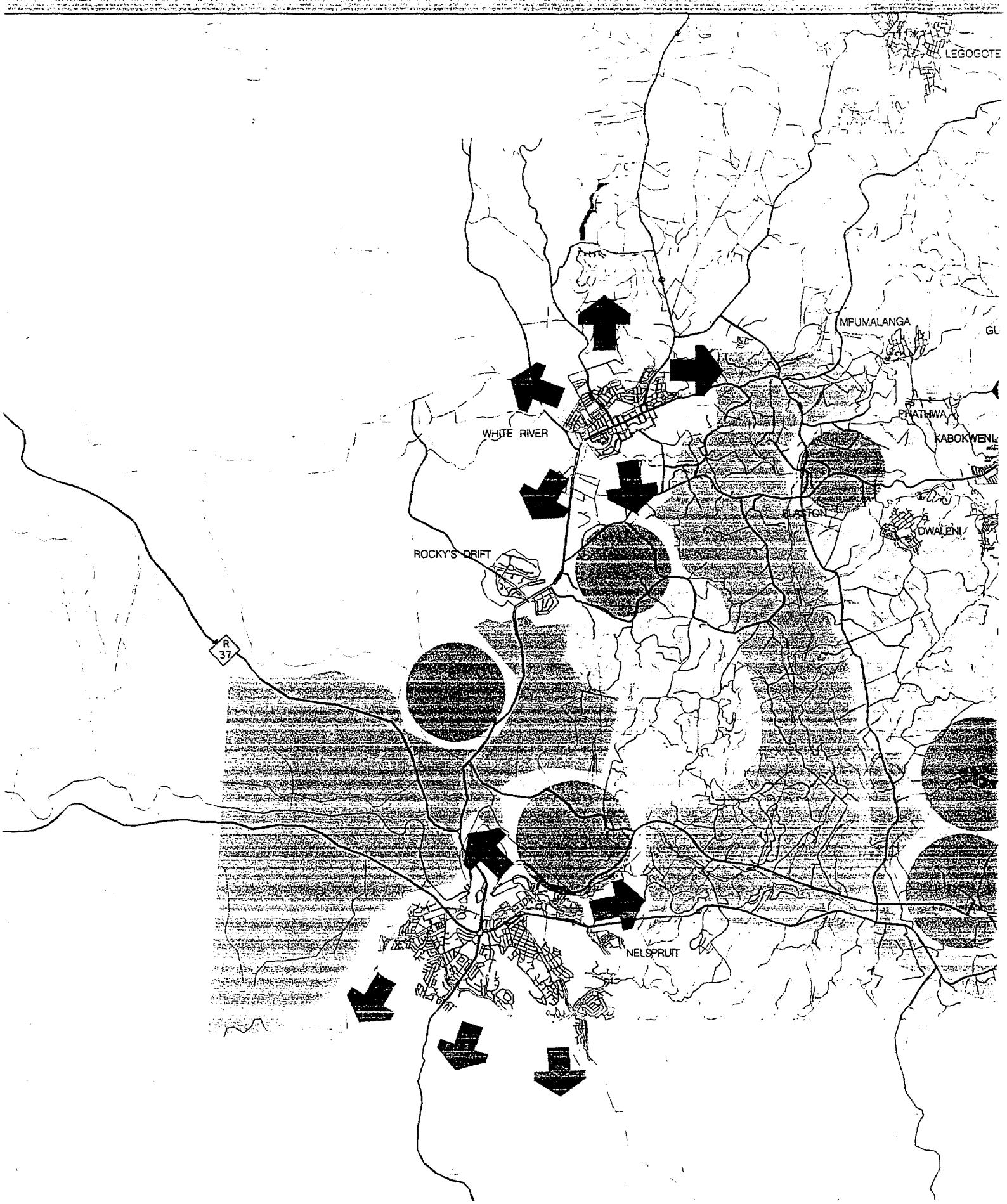
- **Densification considerations:** Densification of existing settlements should not exceed the optimal point - whereafter urban degradation sets in - before new developable land is identified. Average densities (stands per hectare and people per stand) in most of the existing settlements are already sub-optimal.

The areas of developable land that were identified in terms of these criteria are **categorised** into two distinct categories:

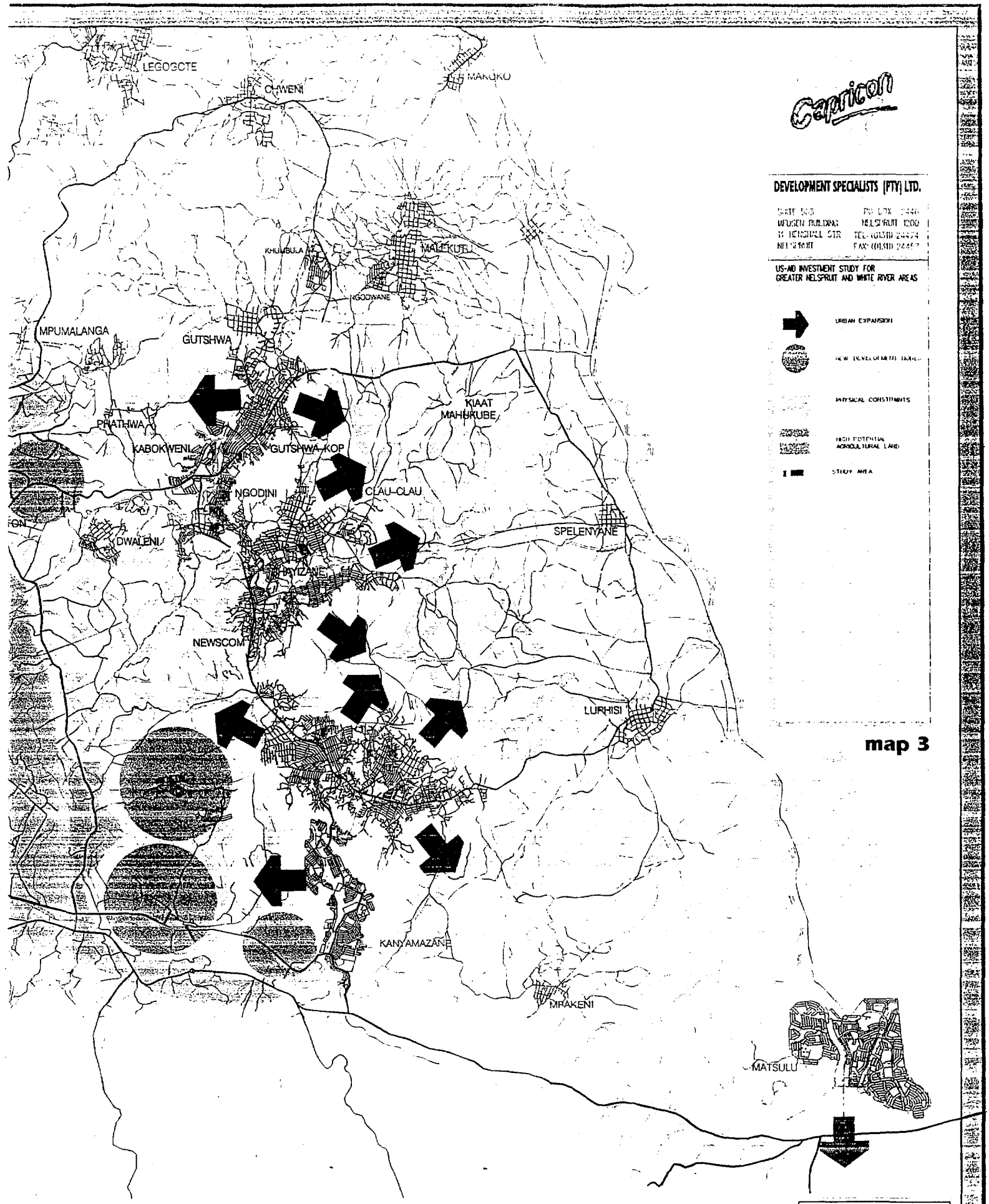
- **Expansion areas:** These areas represent the natural expansion of existing settlements. As indicated by Map 3, the expansion of towns and settlements beyond these areas are considered undesirable and in most cases impractical.

- **New developable land (Green Fields):** New development nodes provide development opportunities that are economically, socially, environmentally and politically more desirable. The development of these nodes should result in an improved urban structure.

The specific areas that were identified as developable land, are indicated below. The location of the areas in relation to development constraints and agricultural land are indicated on Map 3 whilst the boundaries of these areas are indicated on Map 4.



URBAN DEVELOPMENT PO



ENT POTENTIAL

Expansion areas:

Zone 1: **KaNyamazane**
1B - Tekwane East

Zone 2: **Msogwaba**
2C - Aldie
2D - Intersection
2E - Western Extension
2F - Eastern Extension
2G - Southern Extension

Zone 3: **Clau-Clau**
3E - Clau-Clau North
3F - Clau-Clau East
3G - Zwelitsha North
3H - Clau-Clau West

Zone 4: **KaBokweni**
4F - Gutshwa West
4G - Gutshwa East
4H - Backdoor

Zone 5: **Nelspruit**
5A - Nelspruit West
5B - Nelspruit South
5C - Nelspruit East

Zone 6: **White River**
6A - White River South
6B - White River West
6C - White River East

New development nodes:

Zone 7A: **Tekwane North**

Zone 7B: **Tekwane West**

Zone 7C: **Tekwane South**

Zone 7D: **Karino**

Zone 8A: **Oewersig A**

26

Zone 8B: **Oewersig B**

Zone 9: **Rocky's Drift**

Zone 10A: **Plaston A**

Zone 10B: **Plaston B**

Zone 11: **Boschrand**

Zone 12A: **Matsulu/Kaapmuiden**

2.3 ADMINISTRATIVE BOUNDARIES

Administrative boundaries usually have a major impact on the rate and pattern of development in a specific area.

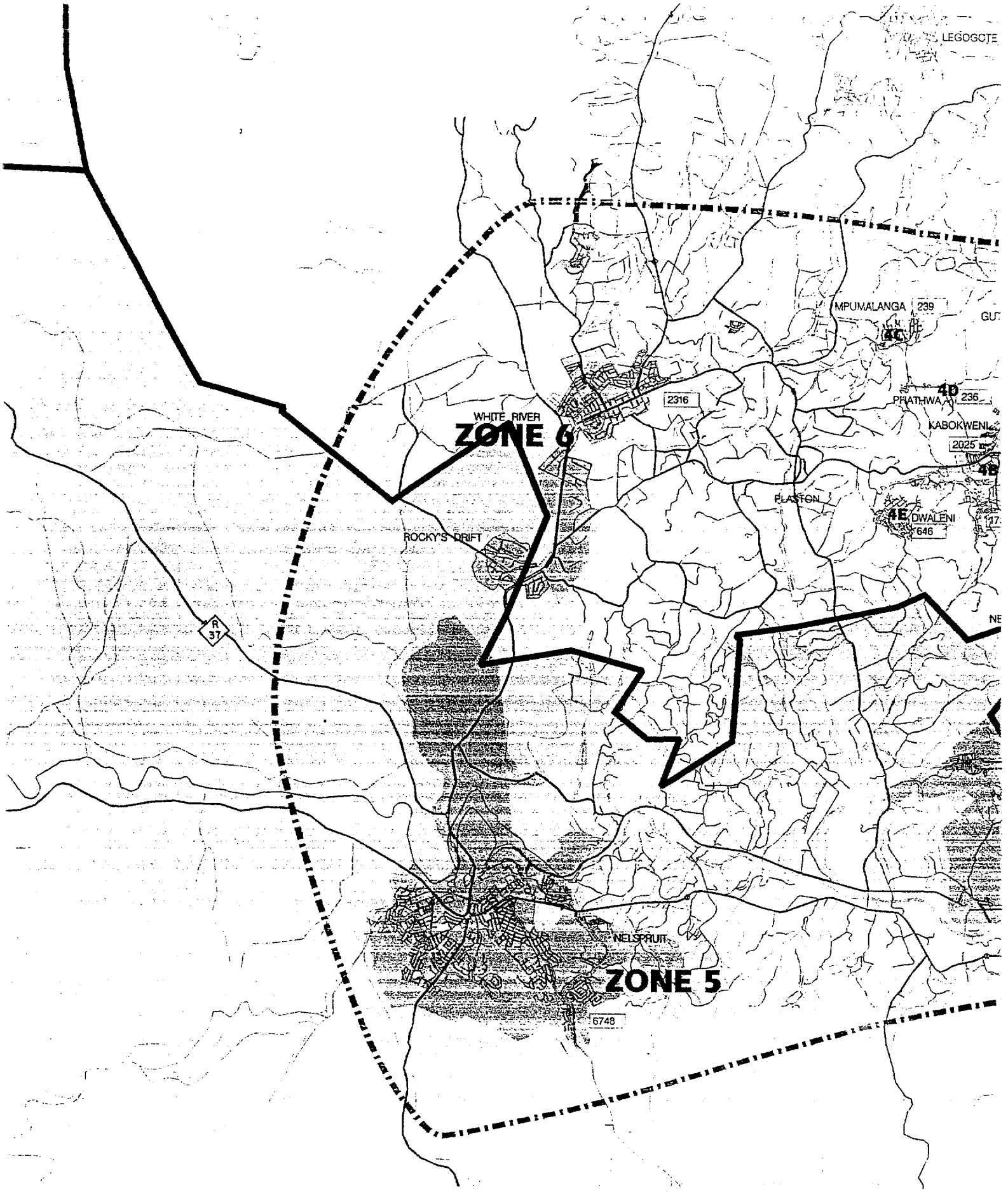
In terms of the Transitional Local Government Act (Act No.209, 1993), provision is made for the redefinition of existing local authority boundaries. The objective is to extend the jurisdictional boundaries of high-income communities to include surrounding lower-income communities in a bid to affect a more equitable distribution of infrastructure and services.

The Member of the Executive Council (MEC) for Local Government in the Eastern Transvaal Provincial Legislature, has announced by proclamation in the Eastern Transvaal Provincial Gazette No.27 of 26 January 1995, that the Transitional Local Council (TLC) boundaries as indicated by Map 5 should apply in the area.

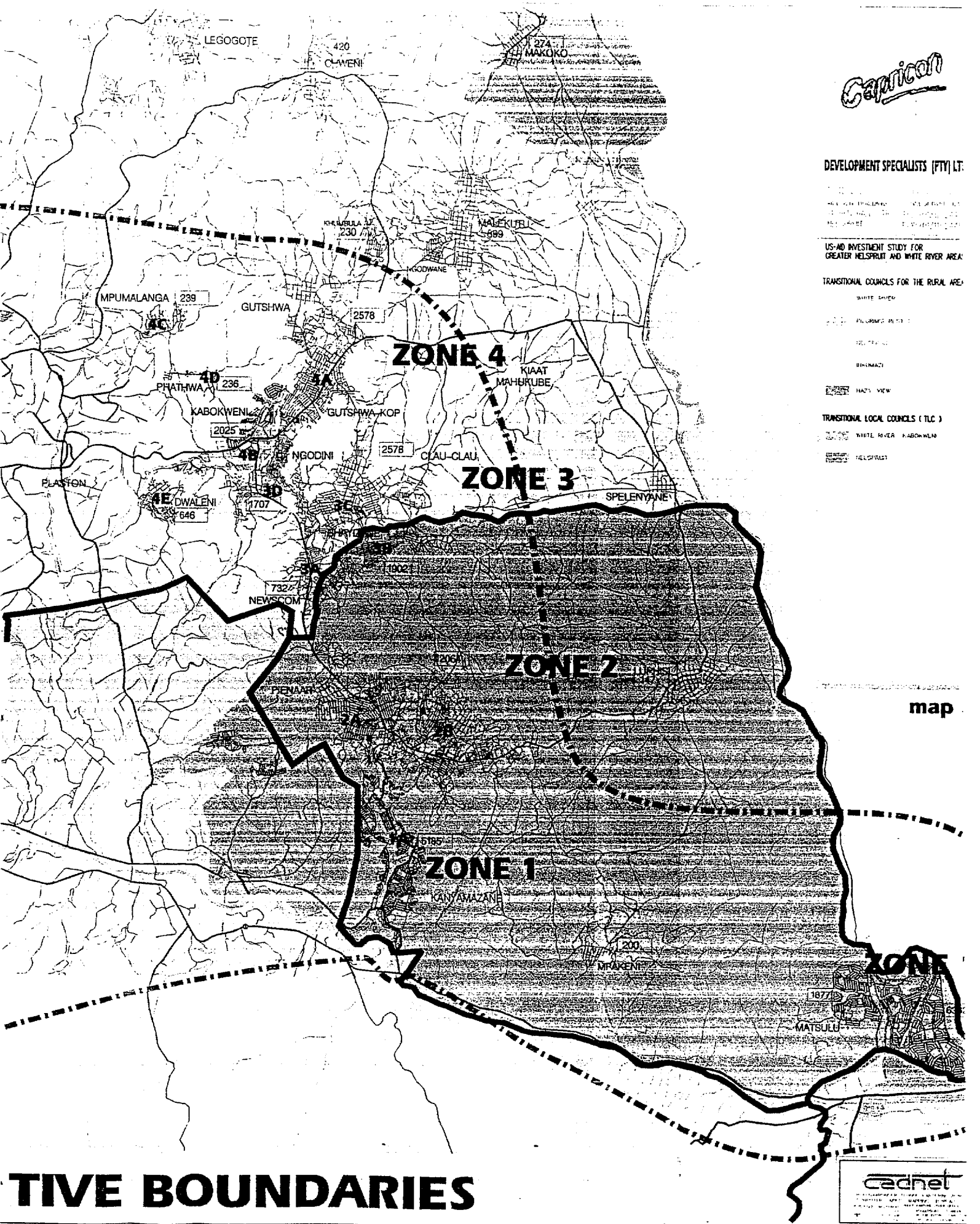
The boundaries of these TLC's were provisional by the time that this report was finalised and are subject to change, pending the outcome of investigations by the Demarcation Board.

Although the exact impact of the TLC boundaries on development cannot be determined at this stage, it is being foreseen that the various lower-income communities in these areas will benefit from more evenly spread infrastructural development in future.

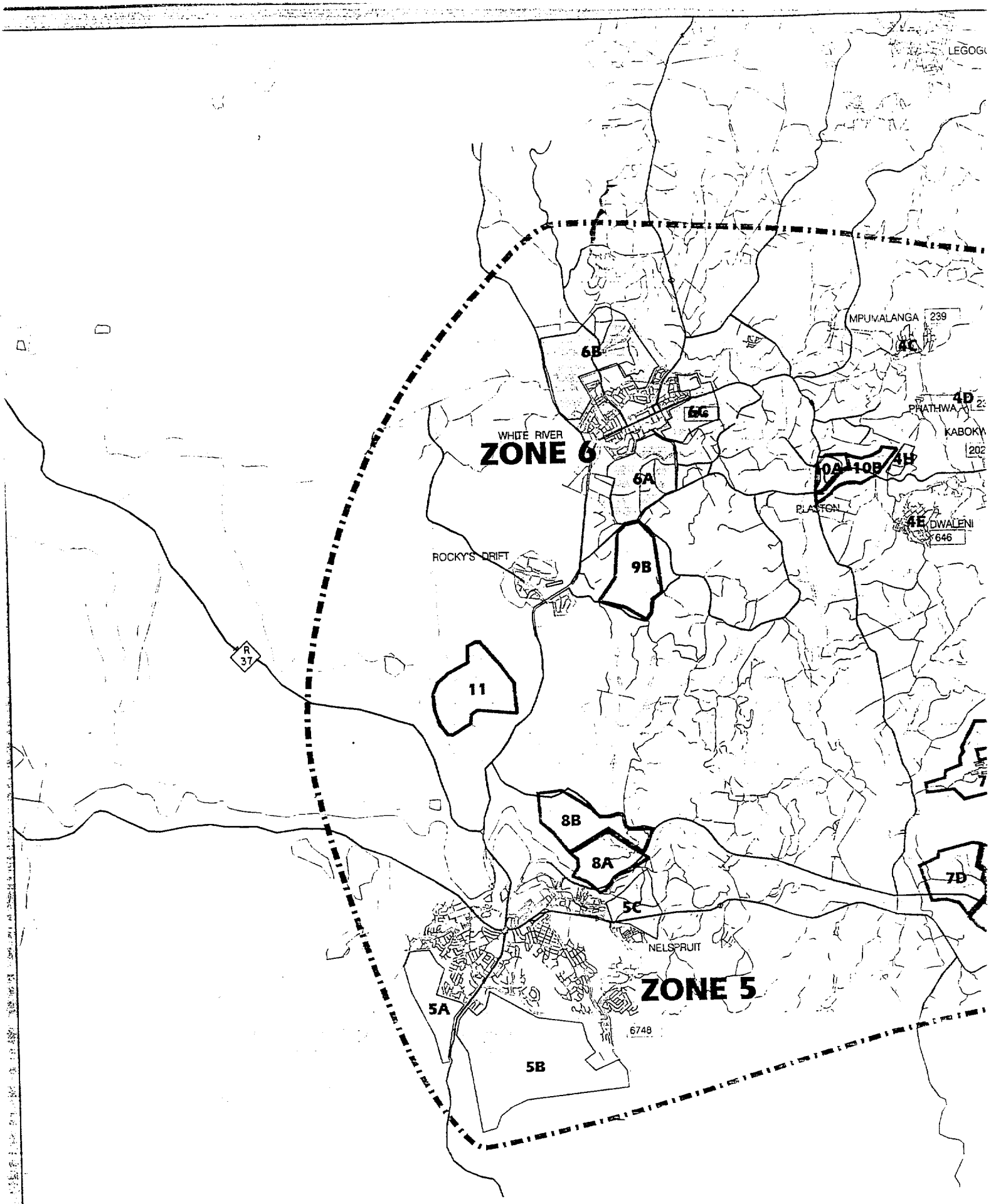
27



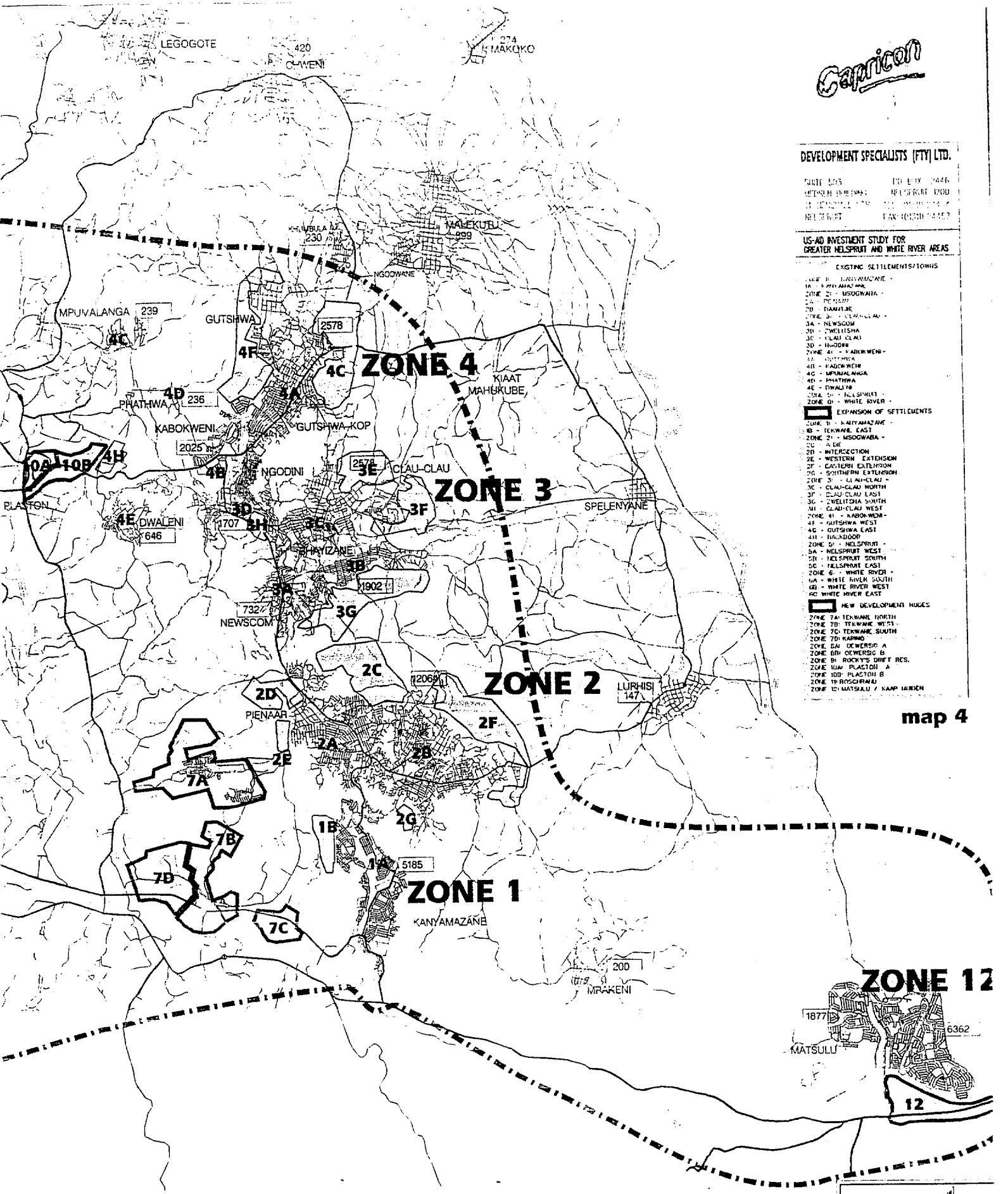
ADMINISTRATIVE BOU



TIVE BOUNDARIES



EXISTING AND FUTURE SI



TURE SETTLEMENTS

3. PLANNING ASPECTS

In this section the **development situation** in the study area is being examined with a view to establishing the extent of economic, social, infrastructural and urban financial **imbalances** that characterise the various development nodes in the area.

This section serves the purpose of providing the necessary **background information** required to understand the **development dynamics** of the area and to serve as a **platform** for detailed planning to address the existing and future **infrastructural needs** of the communities in the area.

In view of the above, this section addresses the following aspects:

- A **general review** of the **development situation** in the study area.
- A **focused analysis** of the **spatial, infrastructural** and **financial planning aspects** in the study area. This analysis focuses on each of the urban nodes (or zones) in the study area and describes the existing and future need for infrastructural development and the constraints that apply in this respect.

3.1 GENERAL REVIEW OF DEVELOPMENT

The study area is characterised by an uneven distribution of economic activity and population, leading to a generally unbalanced development pattern in the area.

For the purpose of a general assessment of the current state of development, the study area can be divided into two sections:

- The **Western Section**, comprising of the Nelspruit and White River areas.
- The **Eastern Section**, comprising of the KaNyamazane, Matsulu, KaBokweni, Msogwaba, Clau-Clau and Gutshwa areas.

TABLE 3.1: DEVELOPMENT FEATURES OF STUDY AREA (1991)

FEATURE	WESTERN SECTION	EASTERN SECTION	TOTAL
Population [1]	92 156	310 160	402 316
GGP (R1000)[2]	1 823 443	196 123	2 019 566
GGP per capita p.a.	19 786	632	5 020
% Share in total population	22.9	77.1	100.0
% Share in total GGP	90.3	9.7	100.0
Index of GGP per capita[3]	100.0	3.2	25.4

Source: Central Statistical Service

1) Urban and rural population

2) GGP - Gross Geographic Product consisting primarily of remuneration of labour and gross operating surplus (profit). GGP is measured at current (1991) prices.

3) Index - GGP per capita for Western Section = 100

The information in Table 3.1 clearly illustrates the huge disparity in the level of development between the highly developed western section and the relatively poor eastern section of the study area.

Political circumstances led to the eastern section being over-exploited to accommodate a large population. At more than 77% of the total population of the study area, the eastern section accommodates more than three times the number of inhabitants living in the western section. On the other hand, only approximately 10% of the economic activity of the study area - measured in terms of GGP - is generated in the eastern section. As a result, the GGP per capita in the eastern section amounted to only 3.2% of that of the western section in 1991, giving an indication of the extensive socio-economic disparity between the two areas. However, the two areas form an integrated economic unit with the western section providing the employment opportunities and the eastern section supplying the labour force.

The quality of the urban environment in the eastern section is deteriorating rapidly and living conditions are undesirable. Directly as a result of the political dispensation of the past, the eastern section had to accommodate the demands for residential expansion and serves the dormitory function, while the western section was primarily reserved for other urban uses such as business and industrial development.

Nelspruit, the capital of the Eastern Transvaal Province, is the economic hub of the study area. The town provides a wide range of goods and services to the communities in the GNWRA and is also responsible for the greatest concentration of employment opportunities in the area. These factors cause large numbers of people to commute on a daily basis from the eastern section to Nelspruit.

In stark contrast to the eastern section, the western section is characterised by a high quality of urban development, lower living densities and an abundance of infrastructure services. Physiographically speaking, the western section has the additional advantage that it can accommodate urban expansion more economically. However, high potential agricultural land will have to be sacrificed in such a scenario, which could harm the economic growth potential of the area.

In view of the foregoing, the distinct features of the study area can be summarised as follows:

- Economic imbalances between the main urban centres.
- Unequal distribution of social and infrastructural services within the area.
- A metropolitan character with distinct separation between urban and agricultural land which is threatened by urban sprawl.
- A high frequency of transportation between the urban nodes.
- An unbalanced urban structure and uneven distribution of economic opportunities, goods and services.
- A low level of property ownership among the majority of the population.

Given these general characteristics of the study area, the following constraints and threats were identified which currently have a negative influence on development in the area and which should receive priority attention in all development planning initiatives:

- Economic growth potential is threatened by urban expansion on quality agricultural land.
- A lack of economic diversification and a resultant income leakage due to the importation of goods and services.
- Low levels of education and training.

- Uneven distribution of trade, business, social and other services.
- Uneven participation of inhabitants in economic activities.
- Insufficient marketing of goods, services and development potential, both internally and externally to the area.
- High transportation costs due to distances between residential areas and nodes of economic activity.
- High cost of urban infrastructure development due to physiographical constraints.

A number of development opportunities were also identified that could be pursued to enhance the future development of the area:

- High quality agricultural soils and availability of water and labour create opportunities for expansion of the agriculture based economy.
- Further processing of agricultural produce creates opportunities for value-adding and employment.
- Export market opportunities and the availability of infrastructure internally and externally (Maputo) for export purposes.
- Unutilised tourism potential could benefit all sectors of the economy and the employment situation if optimally developed.

For the purpose of translating the aforementioned constraints and opportunities into an estimation of the economic development potential of the GNWRA, a few economic growth scenario's, comprising of a high growth projection and a medium growth projection, were developed by taking the following factors into consideration:

- Historical growth trends on a sectoral basis
- Identification and interpretation of a number of key factors that are likely to have a significant impact on economic growth and development in the GNWRA over the next five years.
- Estimation of the impact of the key factors on sectoral economic growth.

The results of the growth scenario's are presented in Table 3.2.

TABLE 3.2 : PROJECTED ECONOMIC GROWTH OF THE GNWRA (1990 - 2000)

SECTOR	GGP AT CONSTANT 1985 PRICES			% GROWTH p.a. 1990-2000	
	1990	2000 HIGH GROWTH	2000 MEDIUM GROWTH	HIGH GROWTH	MEDIUM GROWTH
Agriculture	110 691	169 837	149 103	4.4	3.0
Mining	3 861	3 827	3 827	-0.9	-0.9
Manufacturing	223 683	462 860	390 869	7.5	5.7
Electricity & water	18 044	30 634	27 690	5.4	4.4
Construction	52 474	111 540	92 497	7.8	5.8
Trade	109 787	211 380	175 464	6.8	4.8
Transport	67 418	124 750	93 388	6.3	3.3
Business services	62 062	91 323	82 135	3.9	2.8
Social services	14 725	27 471	22 093	6.4	4.1
Government	108 828	193 646	171 326	5.9	4.6
Other	16 728	28 248	24 533	5.4	3.9
Total	788 301	1 455 514	1 232 925	6.3	4.6

Source : Urban-Econ/Capricon database

The information in Table 3.2 suggest that the study area has strong growth potential, projected at an average growth of between 4.6% and 6.3% per annum over the period 1990 to 2000. If this growth can be distributed on an equitable basis among the inhabitants of the GNWRA, major progress can be made over the next five years towards addressing the economic and socio-economic disparities that are evident in the area.

A detailed exposition of the assumptions and methodology that these projections are based on, appears in Annexure A to this report.

Information with respect to the current and projected future population of the urban nodes in the study area is provided in Table 3.3.

TABLE 3.3 : CURRENT AND PROJECTED FUTURE URBAN POPULATION

URBAN NODE	1994	2000	% GROWTH p.a. 1994-2000
KaNyamazane	46 900	66 931	6.1
Msogwaba	77 491	88 686	2.3
Clau-Clau	50 424	65 394	4.4
KaBokweni	50 140	68 763	5.4
Nelspruit	24 600	36 821	7.0
White River	5 577	7 039	4.0
Matsulu	42 954	61 275	6.1
Total	298 086	394 909	4.8

Source : Urban-Econ and Capricon database.

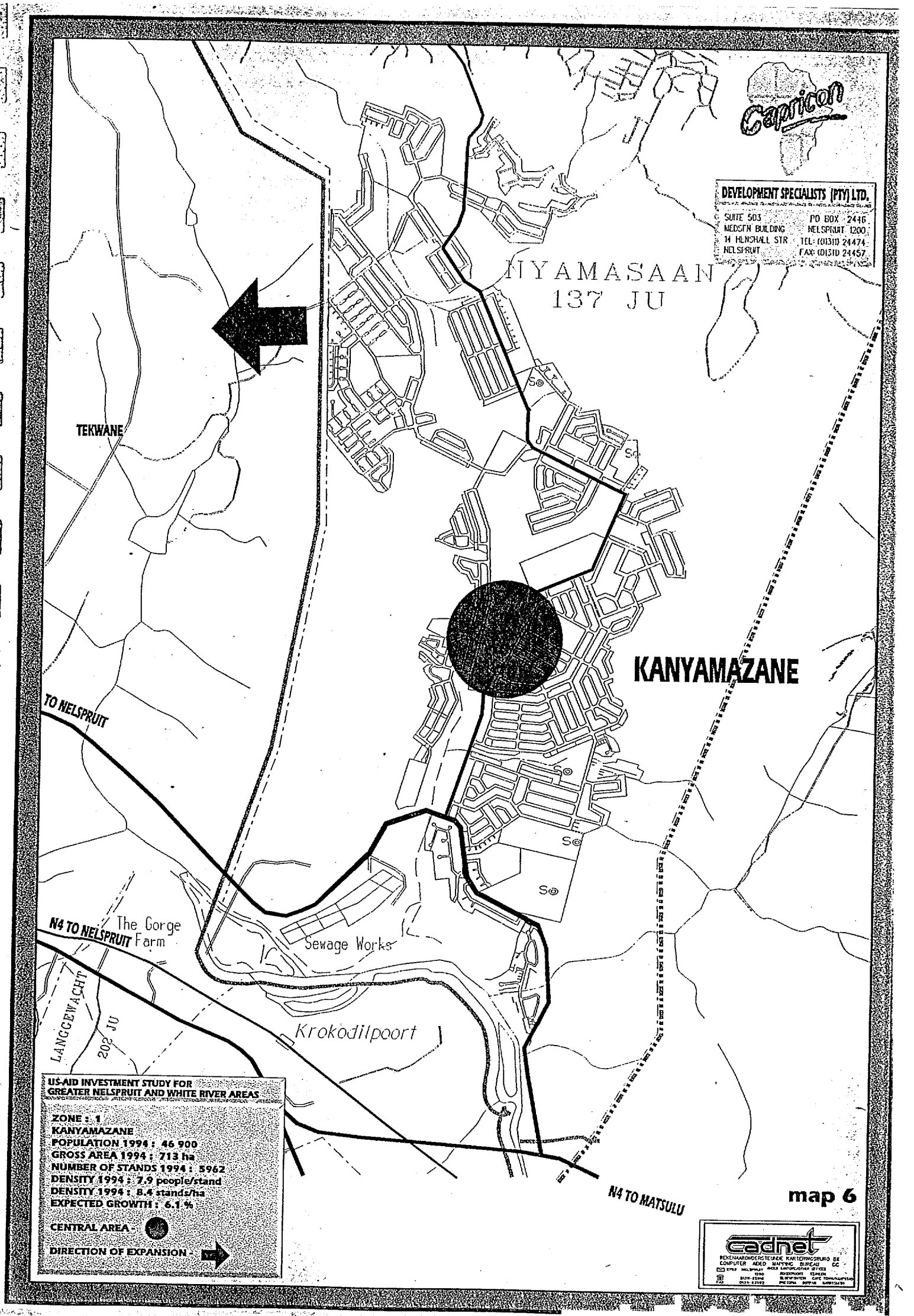
It is expected that the population of the study area will grow at an annual rate of 4.8% from 298 086 in 1994 to 394 909 in 2000. However, when compared to the expected growth in economic activity of between 4.6% and 6.3% per annum over the same period, it is evident that there is potential to improve the socio-economic conditions of the population, provided that economic opportunities will be made available to all the inhabitants of the area on an equitable basis.

Against the backdrop of this general description of the development situation in the study area, the spatial, infrastructural and financial planning aspects of the various urban nodes are highlighted below.

3.2 SPATIAL ASPECTS

3.2.1 Zone 1: KaNyamazane (Map 6)

The town of KaNyamazane was established to accommodate the people of a township which was situated north of Nelspruit. The forceful removal of these people in 1971 resulted in the development of KaNyamazane which was designed to accommodate only 5000 people. KaNyamazane is currently accommodating approximately 46 900 people at an average density of 7.9 people per stand. The town is a "proclaimed" town allowing ownership of stands by means of "Deed of Grant".


Capricon
DEVELOPMENT SPECIALISTS (PTY) LTD.
SUITE 503
MEDSTN BUILDING
14 HENSHALL STR
NELSPRUIT
PO BOX 2446
NELSPRUIT 1200
TEL: (0131D) 24474
FAX: (0131D) 24457
NYAMASAAN
137 JU
TEKWANE
KANYAMAZANE
TO NELSPRUIT
N4 TO NELSPRUIT
The Gorge
Farm
Sewage Works
LANGGEWACHT
202 JU
Krokodilpoort
N4 TO MATSULU
US-AID INVESTMENT STUDY FOR
GREATER NELSPRUIT AND WHITE RIVER AREAS
ZONE : 1
KANYAMAZANE
POPULATION 1994 : 46 900
GROSS AREA 1994 : 713 ha
NUMBER OF STANDS 1994 : 5962
DENSITY 1994 : 7.9 people/stand
DENSITY 1994 : 8.4 stands/ha
EXPECTED GROWTH : 6.1 %
CENTRAL AREA -
DIRECTION OF EXPANSION -
map 6
cadnet
COMPUTER AIDED MAPPING BUREAU CC

The town has limited expansion possibilities due to topographical limitations. The town is situated on the banks of the Kusabani spruit. Recently development has taken place in the flood-line area on very steep slopes since virtually all open spaces have been captured by township development. The town is serviced by only one main arterial road leading from north to south serving most of the Nsikazi South inhabitants. There is a notable absence of industrial and commercial land-users and most of the inhabitants are commuters that work in Nelspruit and surroundings. Space for business and community land-users is very limited and the town is operating as a dormitory town only. As in the case of the other towns and settlements in the former self governing territory of KaNgwane, KaNyamazane has a large backlog in infrastructure and community services. Socio-economic conditions are not desirable and upliftment and re-development is urgently required.

3.2.2 Zone 2: Msogwaba (Map 7)

The urban node of Msogwaba comprises of the settlements of Daantjie and Pienaar. Since these settlements are located on tribal land in the areas of Msogwaba and Mpakeni. Individual land ownership is not possible, posing a constraint to effective housing development in the area. The two settlements, which are also the result of forceful removal of people during the apartheid era, have developed rapidly to the extent that they form an integrated urban node.

Development took place on an ad-hoc basis, resulting in sub-standard housing conditions and a lack of basic infrastructure. Investment by individuals are, understandably, virtually non-existent and housing conditions are poor. The two settlements are situated on a high lying area which is characterised by rocky conditions, poor soils and steep slopes. Living densities are lower (average 6,2 persons per stand) due to the relatively large stand sizes. The majority of the urban population in the study area are living in these two settlements and people are totally dependant on work opportunities in the Nelspruit/White River areas. This dormitory function is strengthened by the fact that there are virtually no industrial enterprises while commercial uses are only partially serving the large population. Expansion possibilities of the settlements are limited to the western section (Tekwane). The low quality of the urban environment is of major concern. The sub-standard and mostly lacking infrastructure and community services require that this area be awarded a high priority in terms of re-development and investment.

Capricon
DEVELOPMENT SPECIALISTS (PTY) LTD.
SUITE 503
MEDSEN BUILDING
14 HENSHALL STR
NELSPRUIT
PO BOX 2446
NELSPRUIT 1200
TEL: (0131) 24474
FAX: (0131) 24457
DAANTJIE
KANYAMAZANE
MAMASAAN
137 JU
ALDIE 119 JU
136 JU
DIENAAR
BROEDERSVREDE
US-AID INVESTMENT STUDY FOR
GREATER NELSPRUIT AND WHITE RIVER AREAS
ZONE : 2
MSOGWABA (DAANTJIE, DIENAAR)
POPULATION 1994 : 70 881
GROSS AREA 1994 : 2360 ha
NUMBER OF STANDS 1994 : 12 341
DENSITY 1994 : 6.3 people/stand
DENSITY 1994 : 5.2 stands/ha
EXPECTED GROWTH : 2.6 %
CENTRAL AREA -
DIRECTION OF EXPANSION -
map 7
cadnet

3.2.3 Zone 3: Clau-Clau (Map 8)

The physical and socio-economic conditions of this area are very similar to those of the Msogwaba area. The area consists of the settlements of Newscom, Zwelitsha, Clau-Clau and Ngodini.

a. **Newscom**
This settlement is situated to the south of KaBokweni along the main Msogwaba/KaBokweni road. Settlement took place in this area due to the gentle slopes and high accessibility. The settlement has, however, expanded to such and extent that the outskirts accommodate sub-standard dwellings on steep slopes, mostly without any infrastructure.

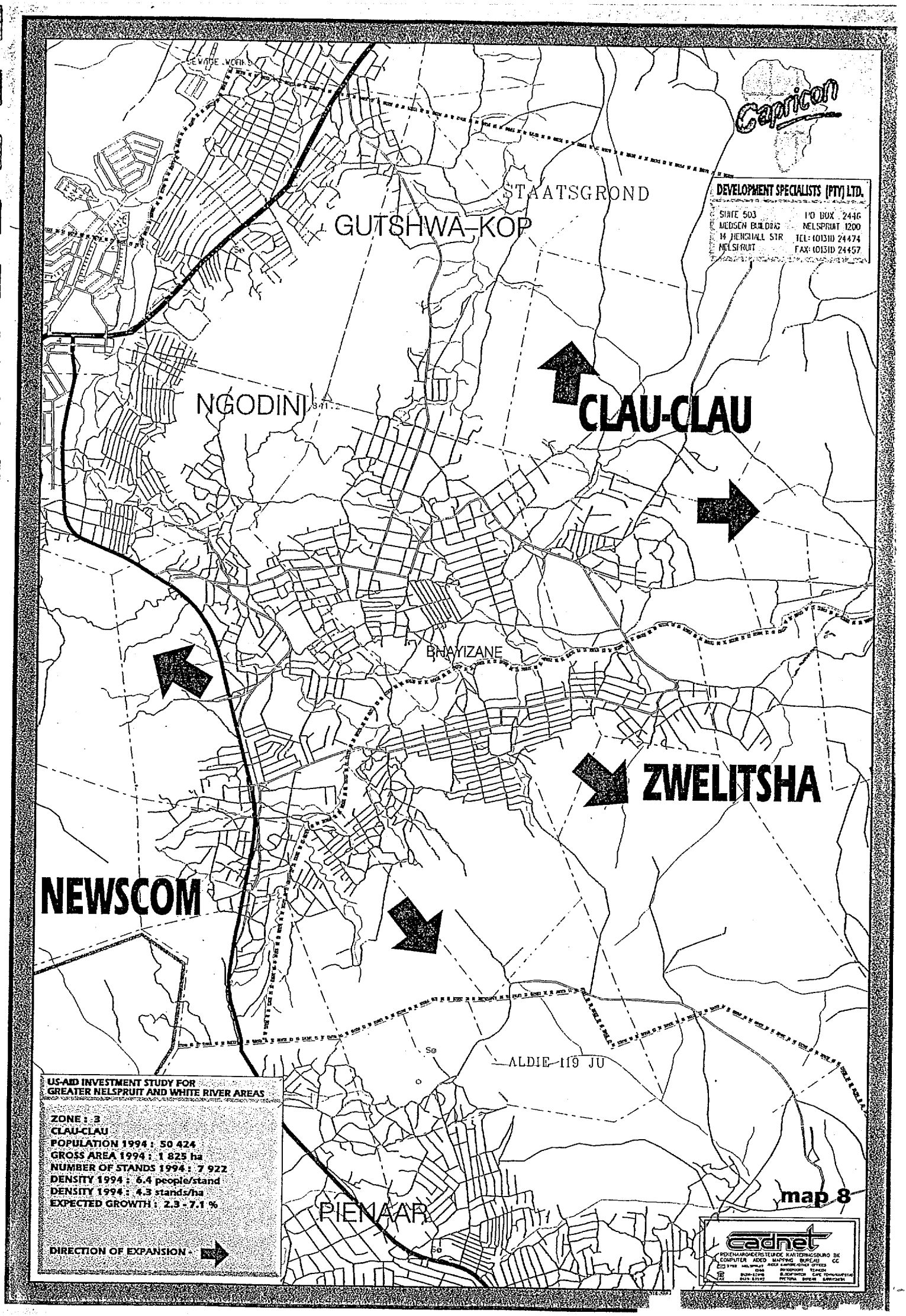
b. **Zwelitsha**
This is a relatively large settlement situated in the Mpakeni tribal authority. As in the case of most of the settlements in the area, this settlement started at the low-lying flood area and expanded onto the steep rocky area. Living conditions are poor and housing is sub-standard.

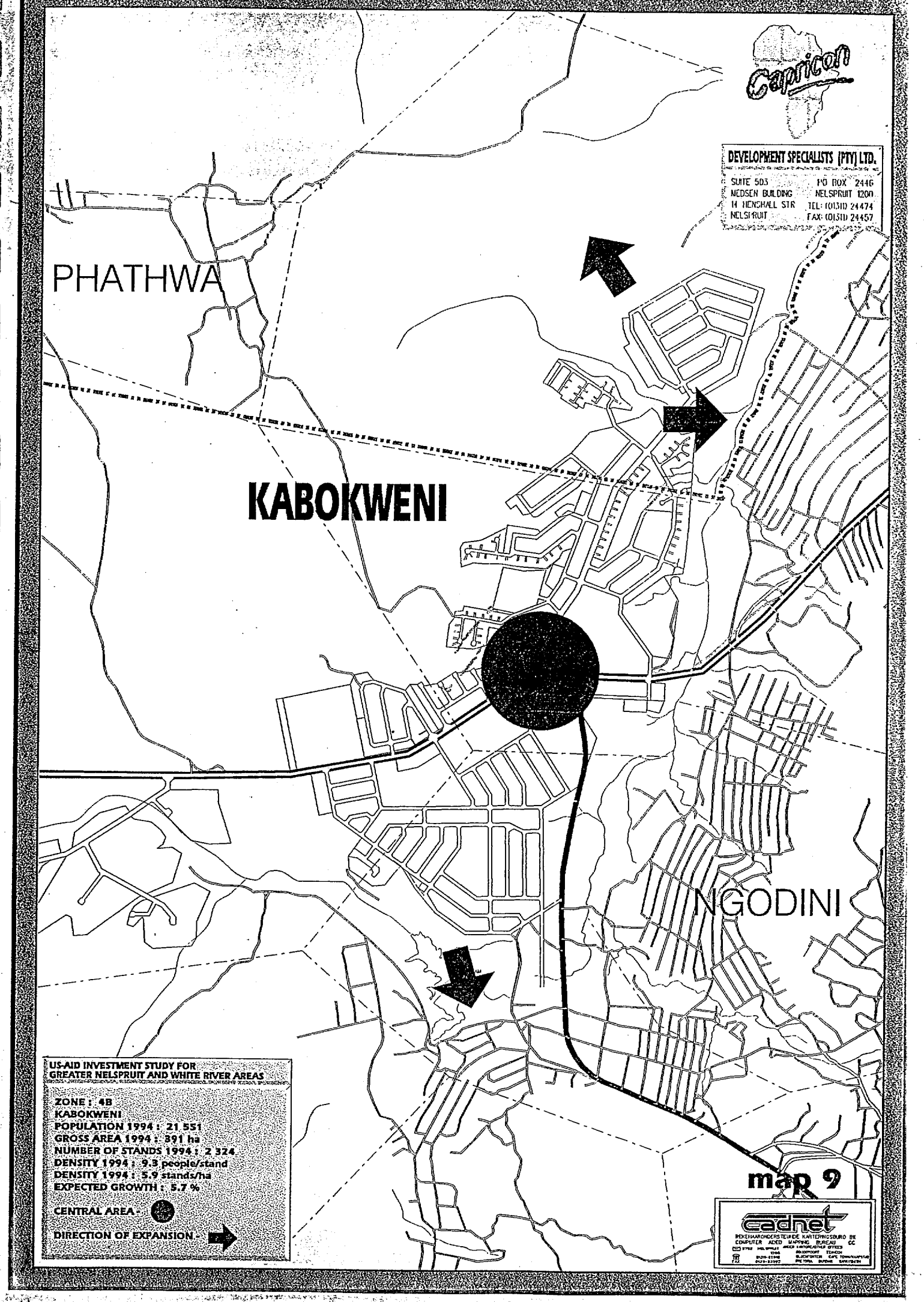
c. **Clau-Clau**
This settlement is situated in the Mbuane tribal area. The settlement is adjoining and to the north of the Clau-Clau spruit. The settlement is also characterised by a low quality of its urban environment, such as a lack of basic urban facilities and amenities and poor living conditions.

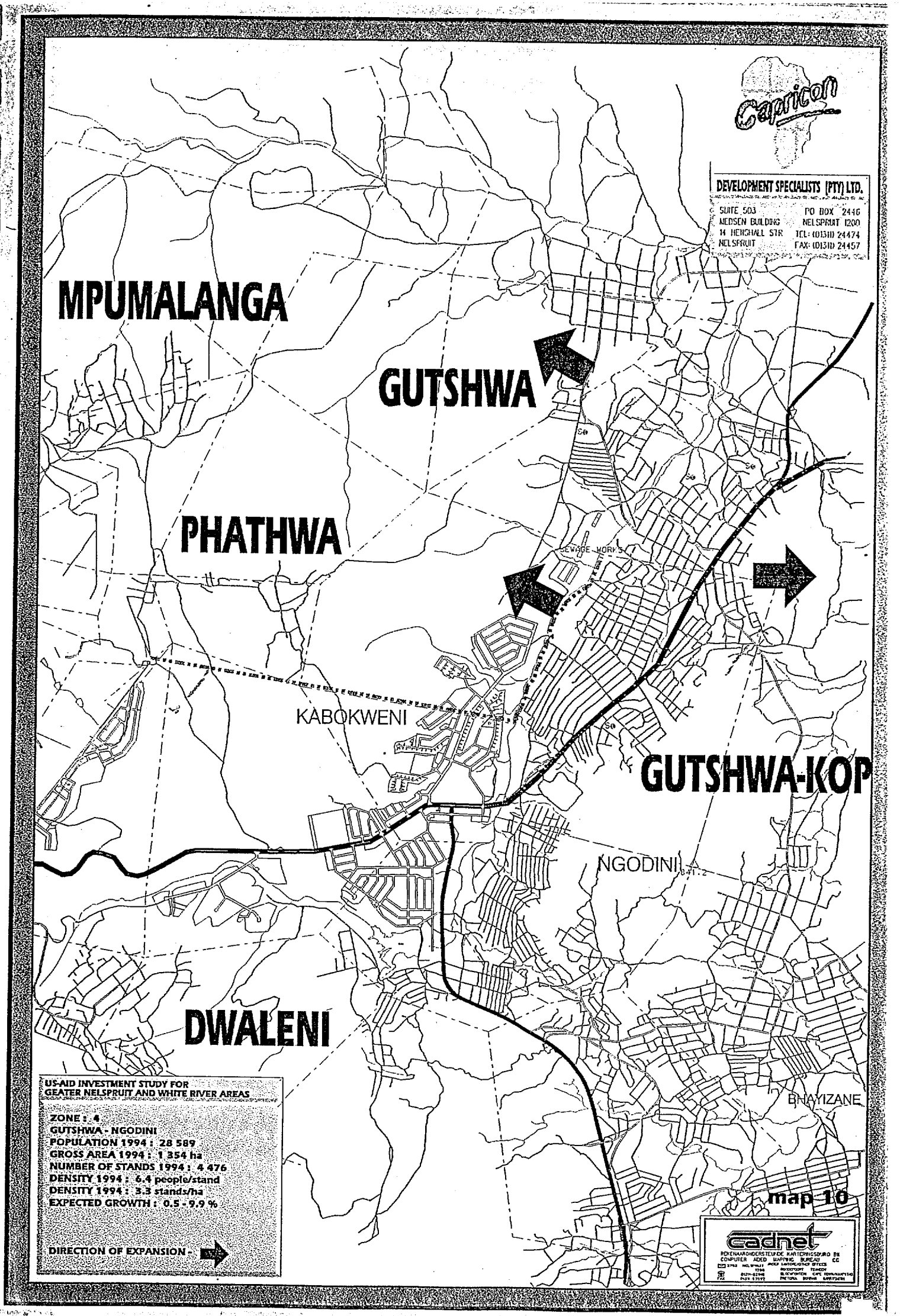
d. **Ngodini**
This settlement generally has the same characteristics as the other settlements in the area. Ngodini is, however, in a more advanced position insofar as urban Infrastructure is concerned.

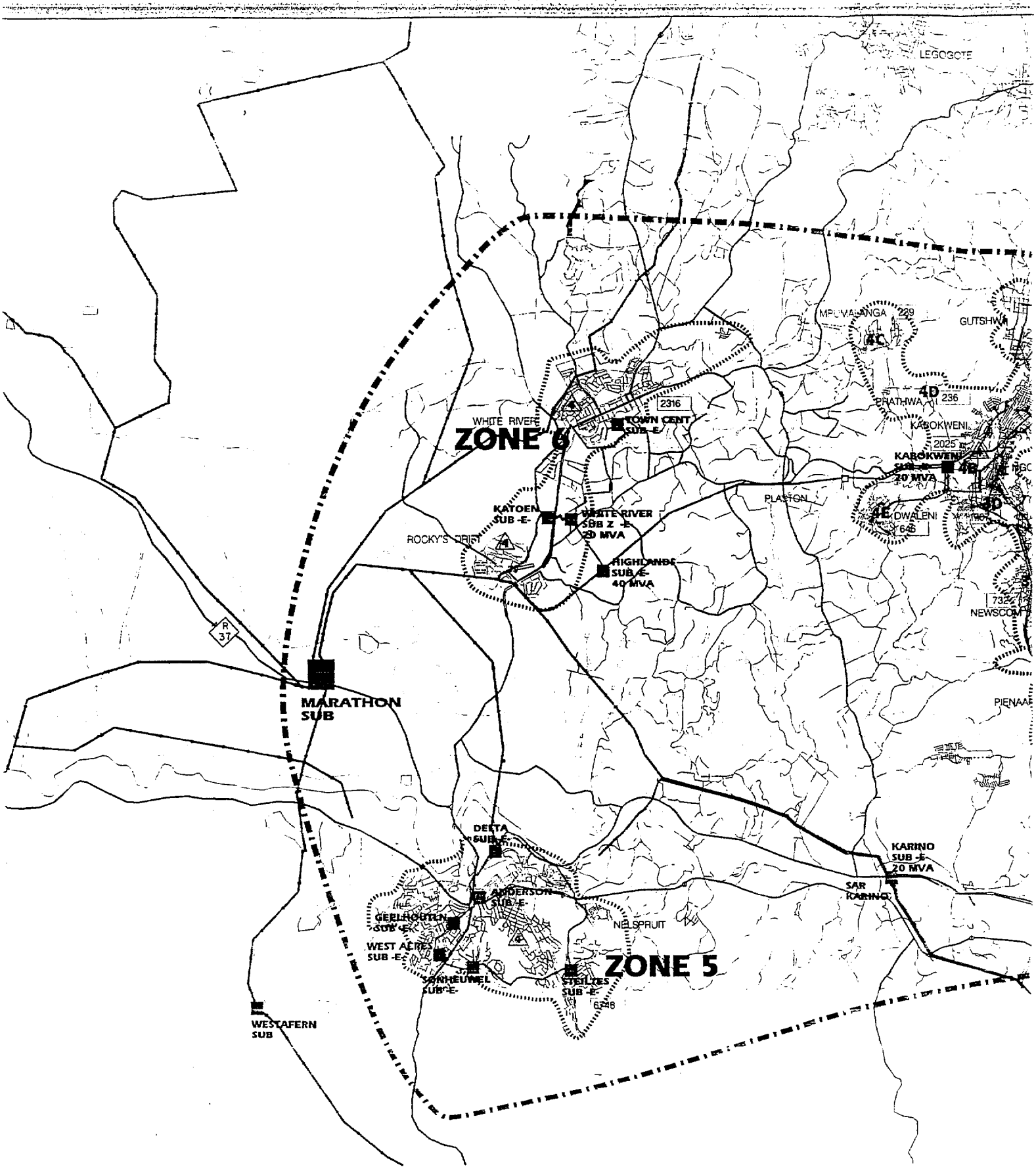
3.2.4 Zone 4: KaBokweni (Map 9 and 10)

The urban node of KaBokweni consists of the settlements of Gutshwa, KaBokweni, Mpumalanga, Phatwa and Dwaleni. The characteristics of these areas are described below.

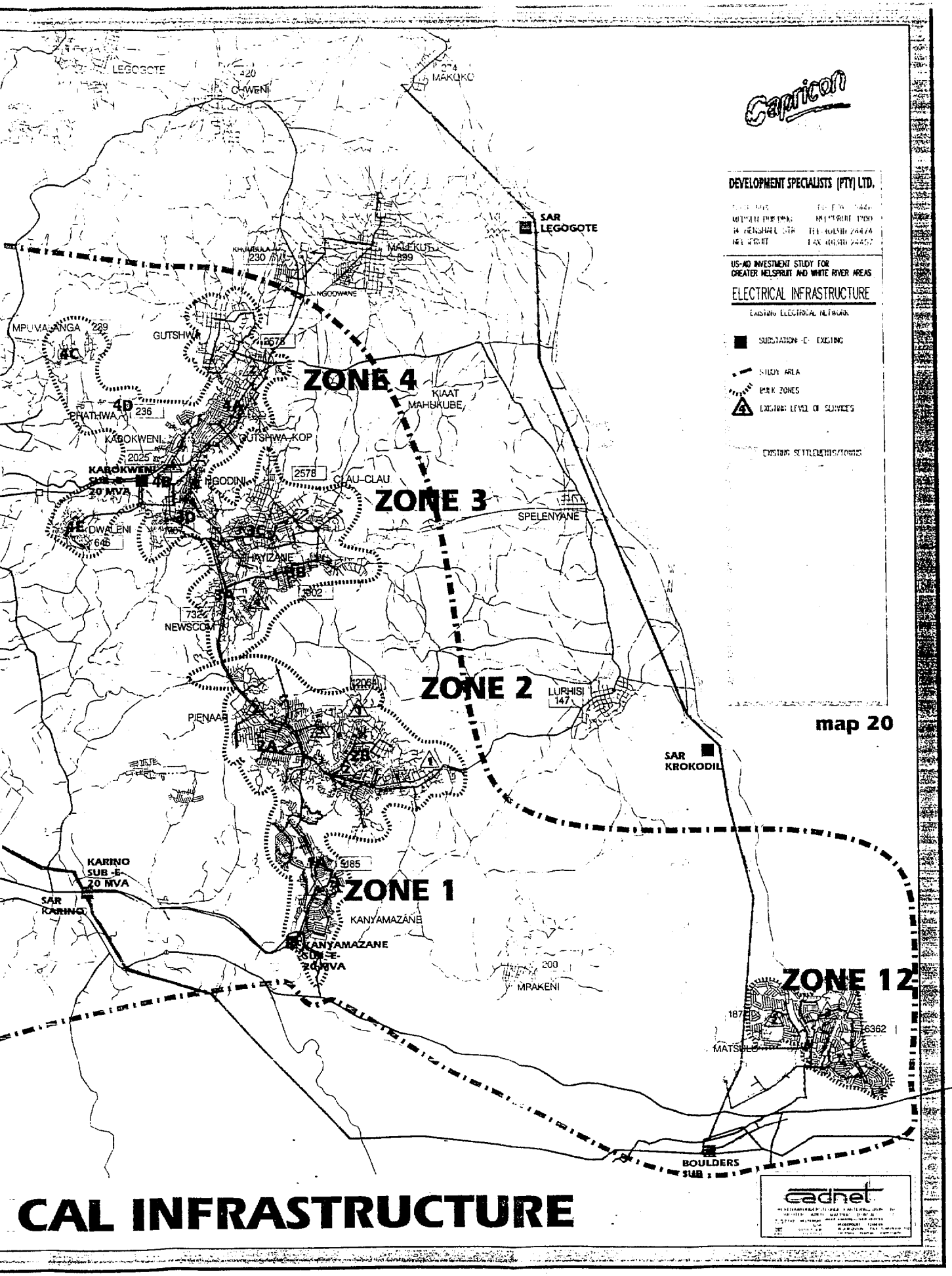

Capricorn
DEVELOPMENT SPECIALISTS (PTY) LTD.
SUITE 503
MEDSEN BUILDING
14 HENSHALL STR
NELSPRUIT
P O BOX 2446
NELSPRUIT 1200
TEL: (0131) 24474
FAX: (0131) 24457
STAATSGROND
GUTSHWA-KOP
NGODINI
CLAU-CLAU
BHAYIZANE
ZWELITSHA
NEWSCOM
ALDIE 119 JU
PIENAAR
US-AID INVESTMENT STUDY FOR
GREATER NELSPRUIT AND WHITE RIVER AREAS
ZONE : 3
CLAU-CLAU
POPULATION 1994 : 50 424
GROSS AREA 1994 : 1 825 ha
NUMBER OF STANDS 1994 : 7 922
DENSITY 1994 : 6.4 people/stand
DENSITY 1994 : 4.3 stands/ha
EXPECTED GROWTH : 2.3 - 7.1 %
DIRECTION OF EXPANSION -
map 8
cadnet
COMPUTER AIDED MAPPING BUREAU CC

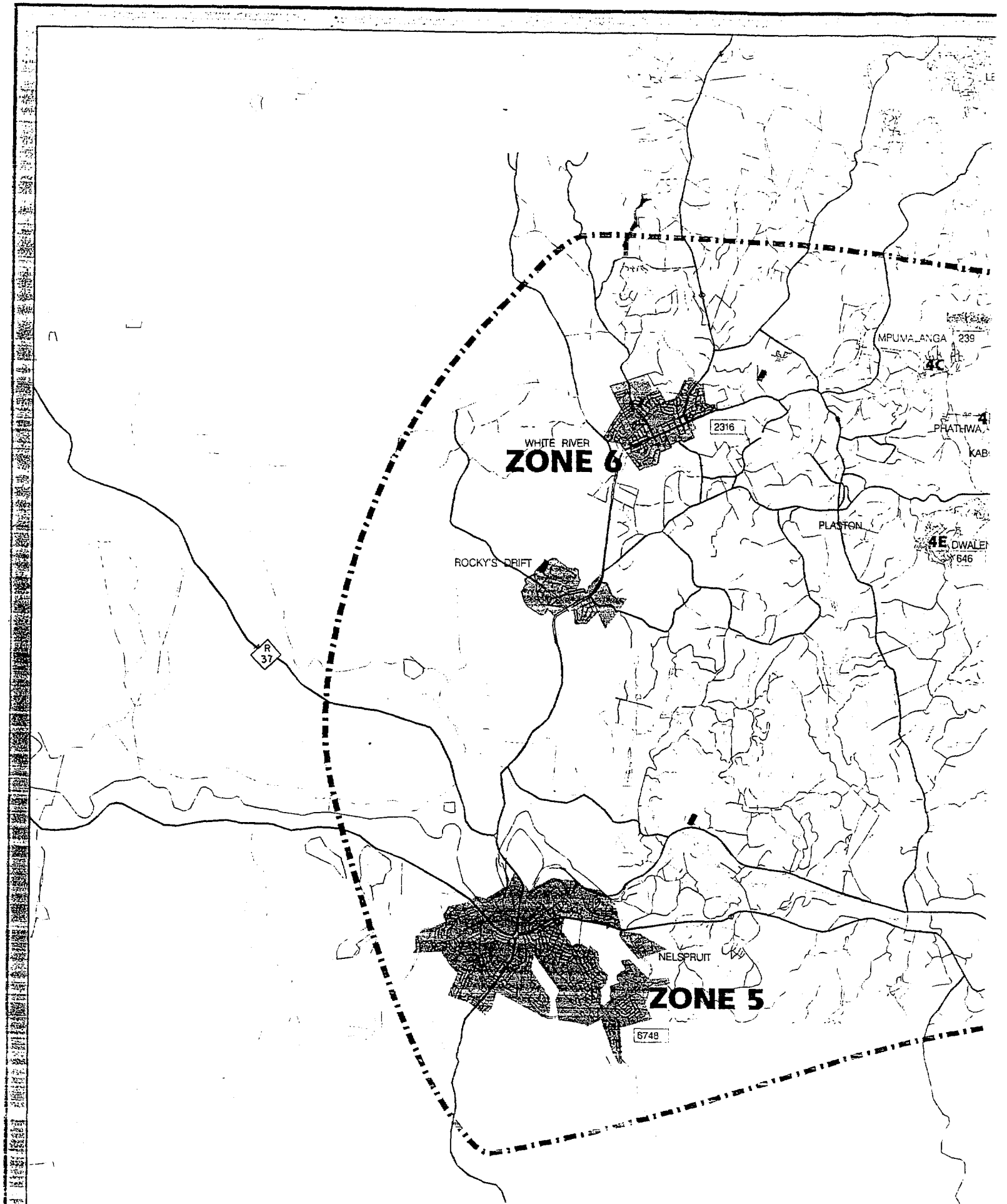

Capricorn
DEVELOPMENT SPECIALISTS (PTY) LTD.
SUITE 503
MEDSEN BUILDING
H HENSHALL STR
NELSPRUIT
P O BOX 2446
NELSPRUIT 1200
TEL: (0131D 24474
FAX: (0131D 24457
PHATHWA
KABOKWENI
NGODINI
US-AID INVESTMENT STUDY FOR
GREATER NELSPRUIT AND WHITE RIVER AREAS
ZONE : 4B
KABOKWENI
POPULATION 1994 : 21 551
GROSS AREA 1994 : 391 ha
NUMBER OF STANDS 1994 : 2 324
DENSITY 1994 : 9.3 people/stand
DENSITY 1994 : 5.9 stands/ha
EXPECTED GROWTH : 5.7 %
CENTRAL AREA -
DIRECTION OF EXPANSION -
map 9
cadnet


Capricon
DEVELOPMENT SPECIALISTS (PTY) LTD.
SUITE 503
NEDSEN BUILDING
14 HENSHALL STR
NELSPRUIT
PO BOX 2446
NELSPRUIT 1200
TEL: (0131) 24474
FAX: (0131) 24457
MPUMALANGA
GUTSHWA
PHATHWA
SEWAGE WORKS
KABOKWENI
GUTSHWA-KOP
NGODINI
DWALENI
BHAYIZANE
US-AID INVESTMENT STUDY FOR
GEATER NELSPRUIT AND WHITE RIVER AREAS
ZONE : 4
GUTSHWA - NGODINI
POPULATION 1994 : 28 589
GROSS AREA 1994 : 1 354 ha
NUMBER OF STANDS 1994 : 4 476
DENSITY 1994 : 6.4 people/stand
DENSITY 1994 : 3.3 stands/ha
EXPECTED GROWTH : 0.5 - 9.9 %
DIRECTION OF EXPANSION -
map 10
cadnet

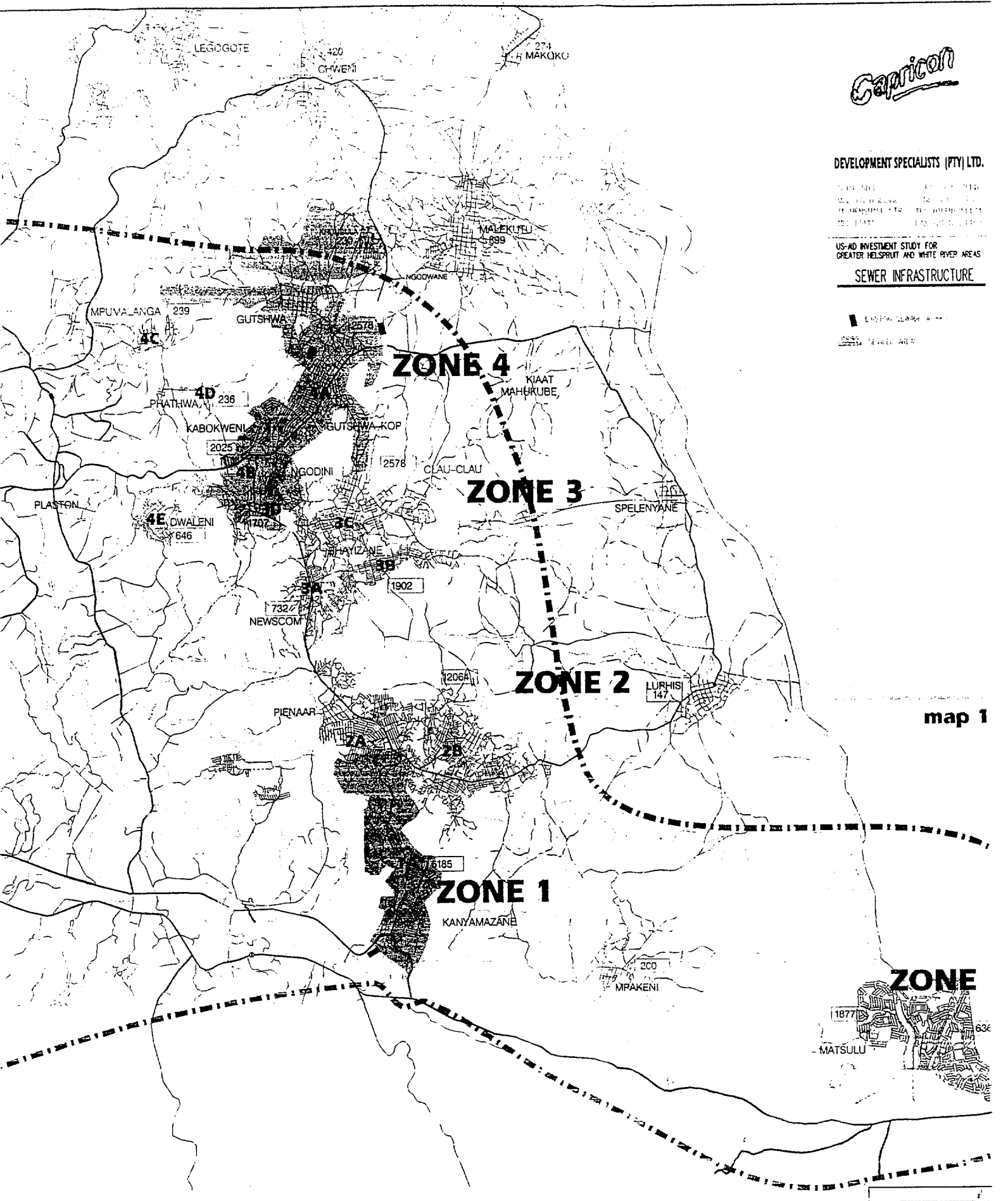


EXISTING ELECTRICAL INFI


Capricon
DEVELOPMENT SPECIALISTS (PTY) LTD.
US-AID INVESTMENT STUDY FOR
GREATER NELSPRUIT AND WHITE RIVER AREAS
ELECTRICAL INFRASTRUCTURE
EXISTING ELECTRICAL NETWORK
SUBSTATION -E- EXISTING
STUDY AREA
EPUK ZONES
EXISTING LEVEL OF SERVICES
EXISTING SETTLEMENTS/TOWNS
ZONE 1
ZONE 2
ZONE 3
ZONE 4
ZONE 12
map 20
SAR LEGOGOTE
SAR KROKODIL
SAR KARINO
KARINO SUB -E- 20 MVA
KANYAMAZANE SUB -E- 20 MVA
KAROKWENI SUB -E- 20 MVA
BOULDERS SUB
LEGOGOTE
CHWENI
MAKOKO
MALEKUDI
NGOODWANE
MPUMALANGA
GUTSHWA
PHATHWA
KAROKWENI
GUTSHWA-KOP
NGODINI
CLAU-CLAU
KIAAT
MAHLKUBE
SPELENYANE
DWALENI
HLYZANE
NEWSCOM
PIENAAR
LURHISI
KANYAMAZANE
MRAKENI
MATSULU
CAL INFRASTRUCTURE
cadnet



EXISTING SEWER INF



VER INFRASTRUCTURE

a. Gutshwa

The Gutshwa settlement is divided into two distinct zones, the northern section (also known as Gutshwa Kop) and the southern section, adjoining KaBokweni. The settlement appears to be more formally structured compared to other settlements in the study area. Housing appears more organized. The southern section which houses the Simango College, links functionally with the formal town of KaBokweni.

b. KaBokweni

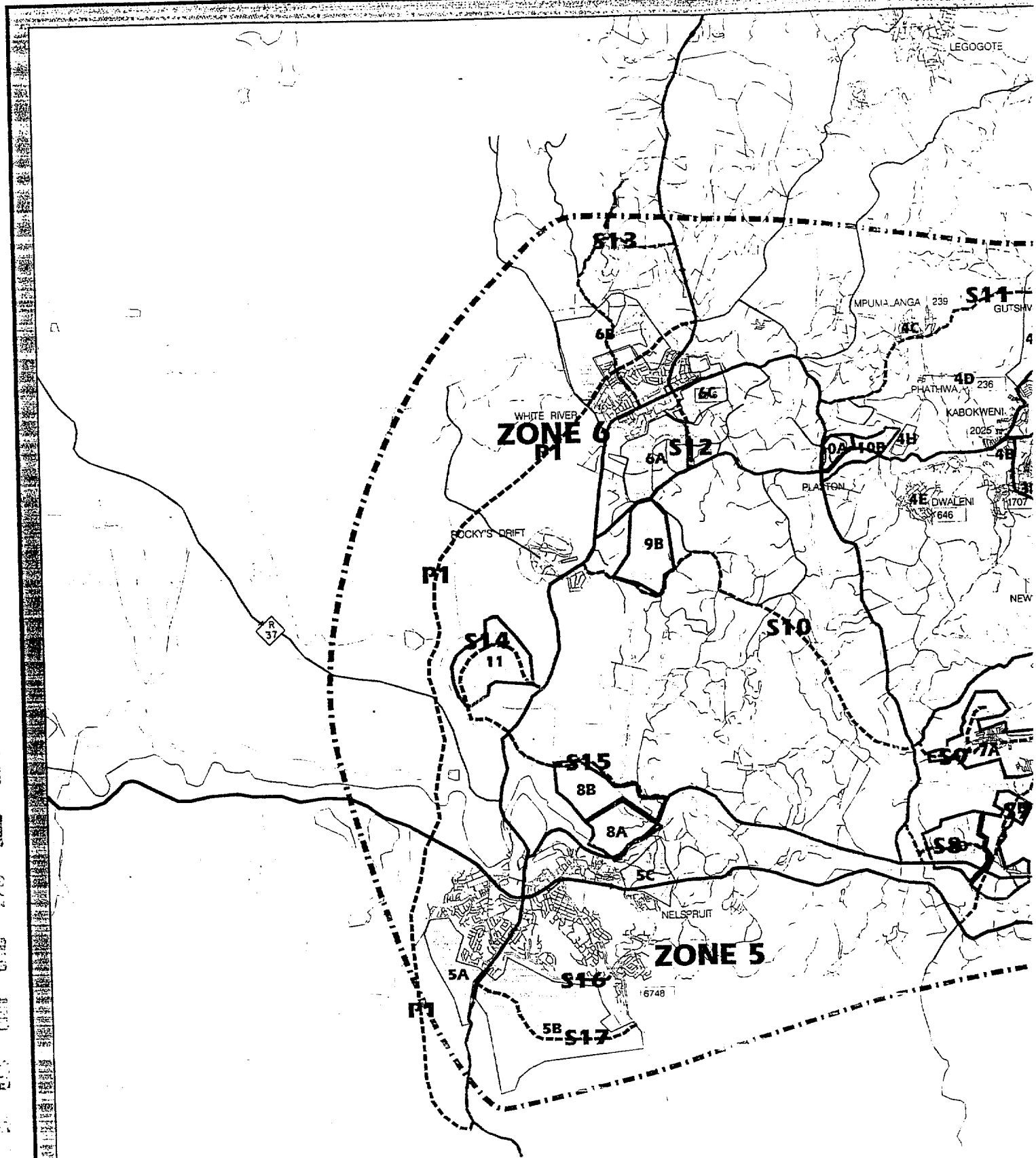
KaBokweni is a proclaimed town and serves as the main urban node of central Nsikazi. The town comprises of a wide variety of urban uses including Temba Hospital, Governmental Offices, formal housing and an industrial area. KaBokweni was declared an "Industrial growth point" in terms of the 1982 industrial development policy and industries are mainly directed towards the forestry industry. KaBokweni is a well structured town but the urban environment could be improved.

c&d. Mpumalanga and Phathwa

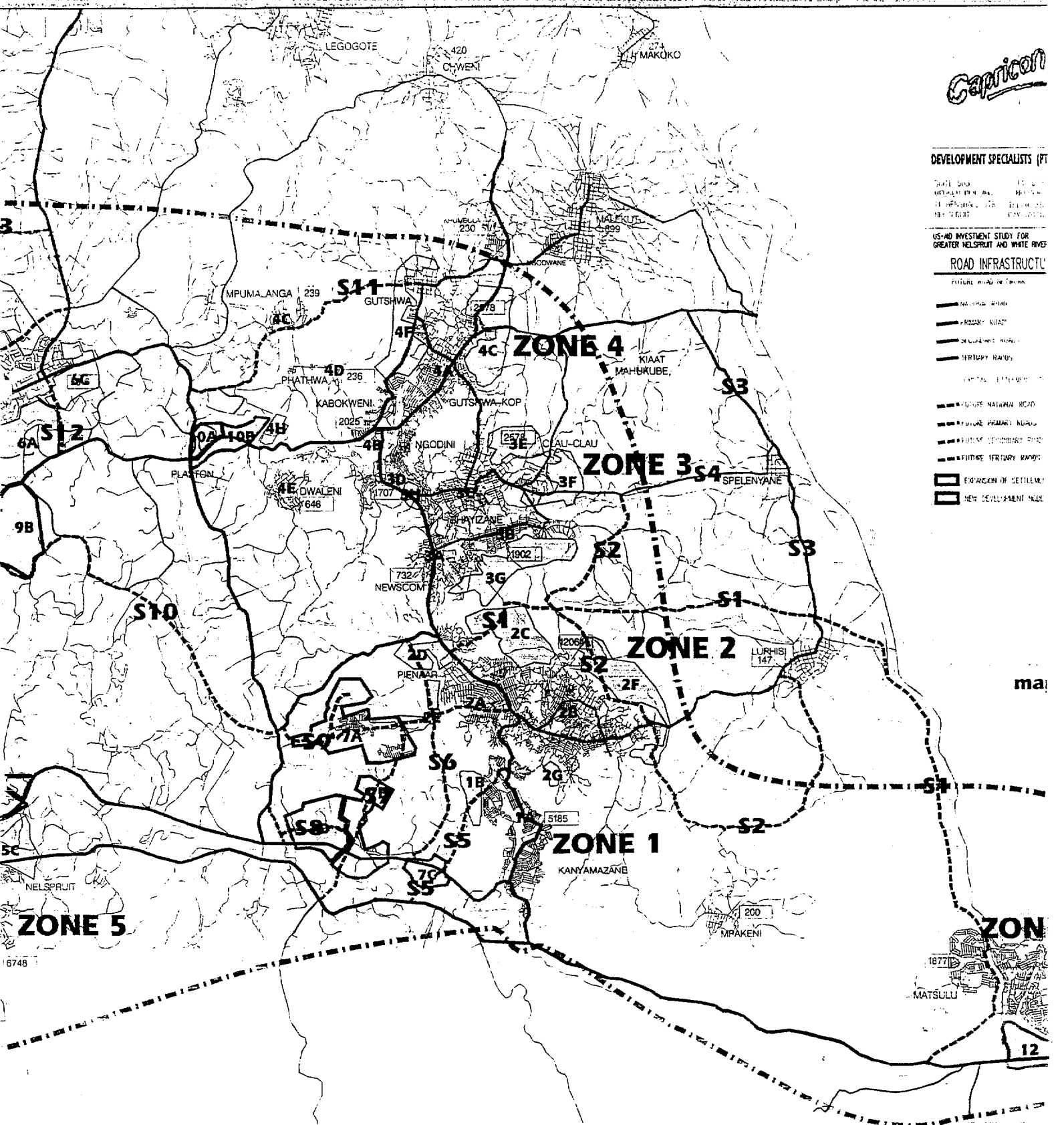
These two settlements, situated in the Gutshwa tribal area, are isolated and accessibility is poor. The settlements have limited expansion possibilities. The urban environment is not conducive to development and upgrading is important. These settlements are totally dependant on other centres for goods and services and function merely as dormitory suburbs.

e. Dwaleni

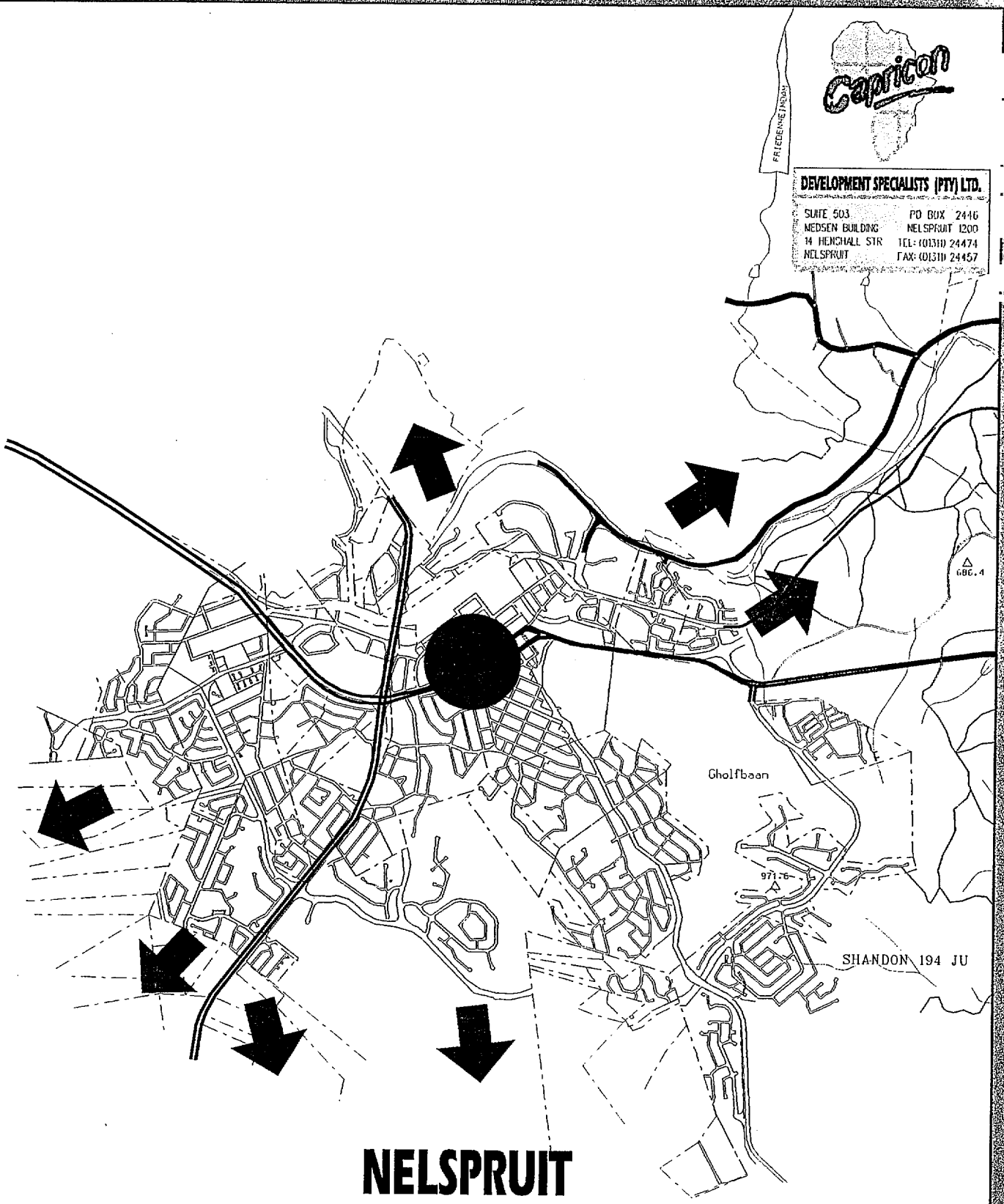
This settlement fall under the Mbujani tribal area. The settlement is situated on a mountain and is therefore very isolated. Expansion possibilities are very limited and the settlement also needs urgent attention in terms of upgrading of infrastructure and services.



FUTURE ROAD INFRAS



E ROAD INFRASTRUCTURE



US-AID INVESTMENT STUDY FOR GREATER NELSPRUIT AND WHITE RIVER AREAS

ZONE : 5
NELSPRUIT
POPULATION 1994 : 24 600
GROSS AREA 1994 : 2 030 ha
NUMBER OF STANDS 1994 : 5 947
DENSITY 1994 : 4.1 people/stand
DENSITY 1994 : 2.9 stands/ha
EXPECTED GROWTH : 7 %

CENTRAL AREA -

DIRECTION OF EXPANSION -

map 11

cadnet
REKENAARONDERSTEUNDE KARTERINGSBURO BK
COMPUTER AIDED MAPPING BUREAU CC

3.2.5 Zone 5: Nelspruit (Map 11)

The capital of the Eastern Transvaal Province has over time developed into a major urban centre servicing a relatively rich hinterland. The population of approximately 25 000 does not reflect the actual size and function. The average population growth of 6.5% over the past five years has increased to approximately 10% since the town obtained capital status. A wide variety of goods and services are found which are reflected in industries, commercial uses, housing and community services and government institutions. The quality of infrastructure is high and living conditions are of a high quality. The town is well structured with formal development. It is expected that growth in virtually all sectors and land-uses will continue, resulting in substantial pressure for further development.

3.2.6 Zone 6: White River (Map 12)

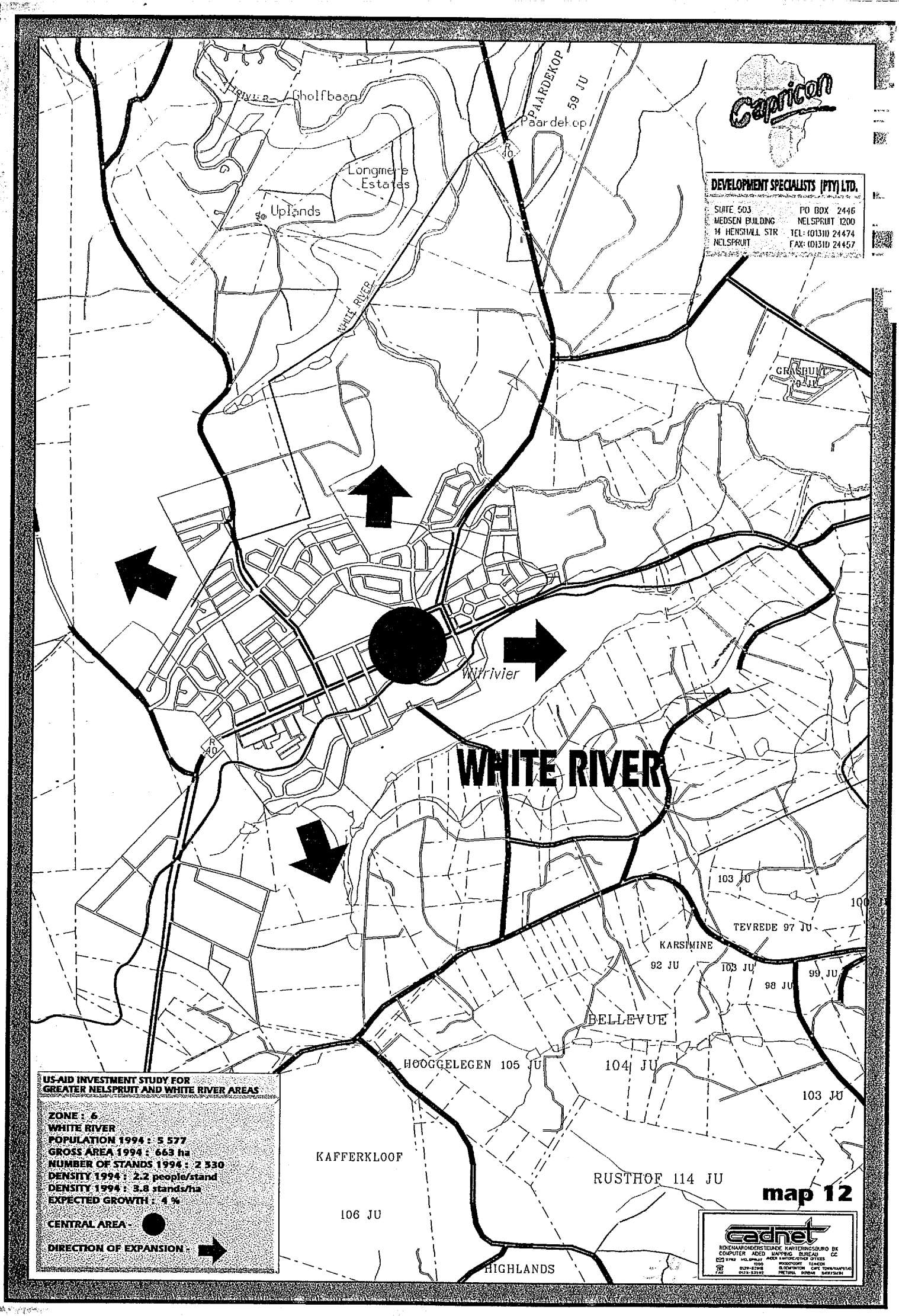
As in the case of Nelspruit, White River is a well structured, formal town reflecting high living conditions and high quality of infrastructure. Many of the residents are dependant on Nelspruit for goods and services and there is a strong economic linkage with Nelspruit. White River can be regarded as a rural town with high environmental qualities. The town accommodates the main industrial growth point of the subregion (Rocky's Drift), which focuses on forestry and agricultural industries. Due to the availability of developable land, White River has recently come under substantial pressure for re-development. The town functions as the main shopping area for the central Nsikazi inhabitants as well as for people coming from Lebowa and Gazankulu. Infrastructure and community services and amenities are abundant and of a relatively high standard.

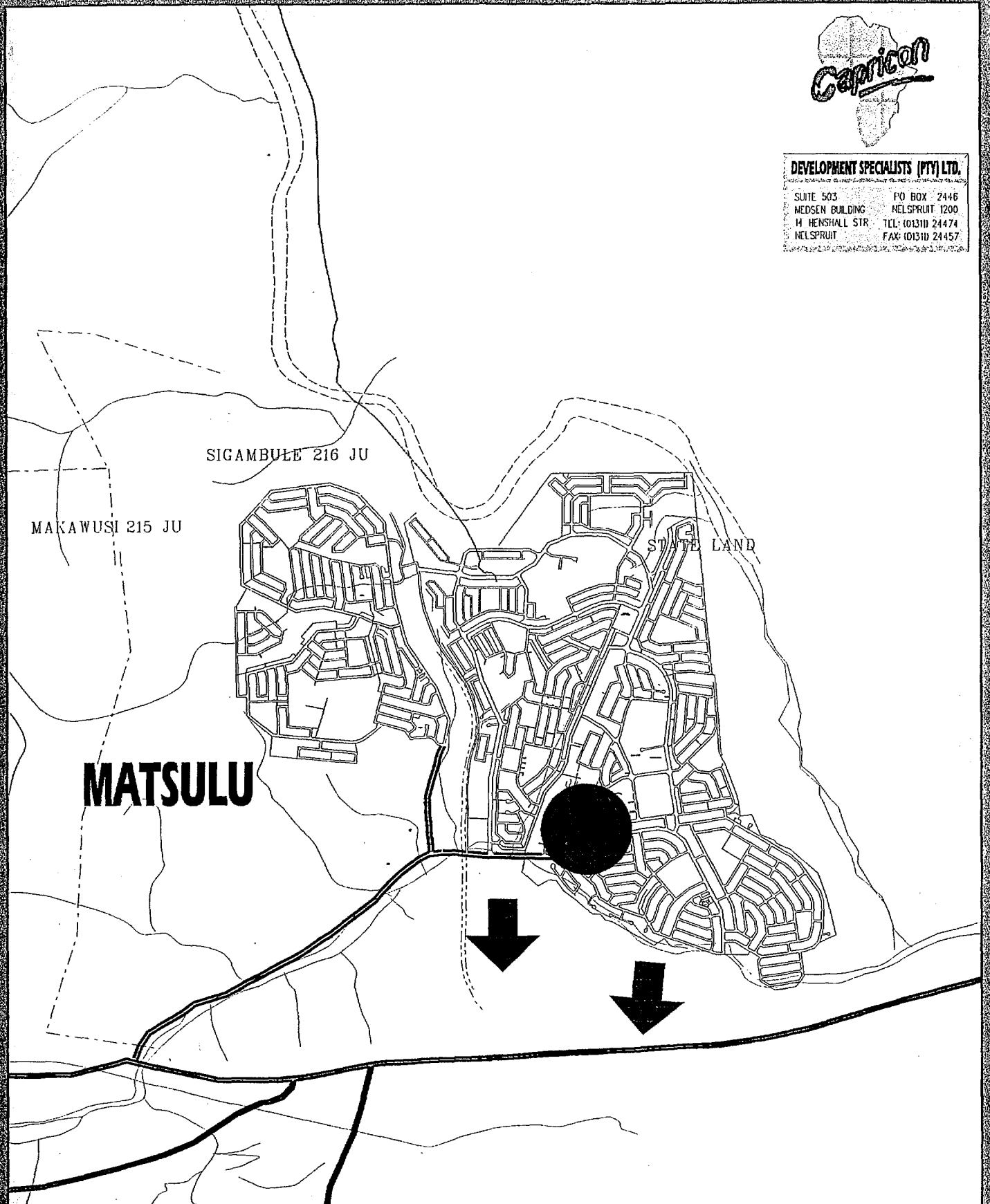
3.2.7 Zone 12: Matsulu/Kaapmuiden (Map 13)

Matsulu is another example of forceful removal of people in 1971. These people came from the Nelspruit area and were designated to work in the sugar fields of the Onderberg Region. Matsulu is divided into two areas namely the proclaimed town and the settlement (Lomshlyo Tribal Area). Matsulu was planned and developed in a formal manner. The location of the town is, however, not conducive to development, since it is divided by an inaccessible railway line and has only one entrance/exit. Matsulu does, however, show development potential, provided that a proposed development strategy be followed to link the town with Kaapmuiden. The urban environment is of a low standard and requires substantial development of infrastructure and community facilities and amenities.

3.2.8 Salient spatial indicators

The most significant current spatial and demographic indicators of the urban nodes in the area are summarised in Table 3.4.


Capricon
DEVELOPMENT SPECIALISTS (PTY) LTD.
SUITE 503 PO BOX 2446
MEDSEN BUILDING NELSPRUIT 1200
14 HENSHALL STR TEL: (0131) 24474
NELSPRUIT FAX: (0131) 24457
Golfbaan
Paardekop
59 JU
Longmere Estates
Uplands
WHITE RIVER
GRASFUIT
Witrivier
WHITE RIVER
103 JU
TEVREDE 97 JU
KARSMINE
92 JU
103 JU
98 JU
99 JU
BELLEVUE
HOOGGELEGEN 105 JU
104 JU
103 JU
KAFFERKLOOF
106 JU
RUSTHOF 114 JU
HIGHLANDS
US-AID INVESTMENT STUDY FOR
GREATER NELSPRUIT AND WHITE RIVER AREAS
ZONE : 6
WHITE RIVER
POPULATION 1994 : 5 577
GROSS AREA 1994 : 663 ha
NUMBER OF STANDS 1994 : 2 530
DENSITY 1994 : 2.2 people/stand
DENSITY 1994 : 3.8 stands/ha
EXPECTED GROWTH : 4 %
CENTRAL AREA -
DIRECTION OF EXPANSION -
map 12
cadnet
REKENAARONDERSTEUNDE KARTERINGSBURO BK
COMPUTER AIDED MAPPING BUREAU CC



Capricorn
DEVELOPMENT SPECIALISTS (PTY) LTD.
SUITE 503 PO BOX 2446
MEDSEN BUILDING NELSPRUIT 1200
14 HENSHALL STR TEL: (0131) 24474
NELSPRUIT FAX: (0131) 24457

US-AID INVESTMENT STUDY FOR GREATER NELSPRUIT AND WHITE RIVER AREAS

ZONE : 12
MATSULU / KAAP MUIDEN
POPULATION 1994 : 42 954
GROSS AREA 1994 : 666 ha
NUMBER OF STANDS 1994 : 6 829
DENSITY 1994 : 6.3 people/stand
DENSITY 1994 : 10.3 stands/ha
EXPECTED GROWTH : 6.1 %

CENTRAL AREA -

DIRECTION OF EXPANSION -

map 13

cadnet
REKENAARDIGERSTEUNDE KARTERINGSBURO BK
COMPUTER AIDED MAPPING BUREAU CC

TABLE 3.4: CURRENT SPATIAL AND DEMOGRAPHIC FEATURES OF URBAN NODES (1994)

FEATURE	ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 5	ZONE 6	ZONE 12
	KaNya-mazane	Msogwaba	Clau-Clau	KaBo-kweni	Nelspruit	White River	Matsulu
Population: - number	46 900	77 491	50 424	50 140	24 600	5 577	42 954
- % of total	15.7%	26.0%	16.9%	16.8%	8.3%	1.9%	14.4%
Gross area: - ha	713 ha	2 361 ha	1 825 ha	1 745 ha	2 030 ha	662 ha	666 ha
- % of total	7.1%	23.6%	18.2%	17.4%	20.4%	6.6%	6.7%
Number of stands	5 962	12 341	7 922	6 800	5 947	2 530	6 829
Density: - people/stand	7.9	6.3	6.4	7.4	4.1	2.2	6.3
- stands/ha	8.4	5.2	4.3	3.9	2.9	3.8	10.3
- people/ha	66.4	32.8	27.5	28.9	11.9	8.4	64.9

Source: Urban-Econ & Capricon database.

The projected future spatial and demographic indicators of the urban nodes are portrayed in Table 3.5.

TABLE 3.5 : PROJECTED FUTURE SPATIAL AND DEMOGRAPHIC FEATURES OF URBAN NODES (2000)

FEATURE	ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 5	ZONE 6	ZONE 12
	KaNya-mazane	Msogwaba	Clau-Clau	KaBo-kweni	Nelspruit	White River	Matsulu
Population: - number	66 931	88 686	65 394	68 763	36 821	7 039	61 275
- % growth '94-'00	6.1%	2.3%	4.4%	5.4%	7.0%	4.0%	6.1%
Gross area: - ha	1 018ha	2 718ha	2 388ha	2 342ha	3 039ha	836ha	950ha
- % increase '94-'00	42.8%	15.1%	30.9%	34.2%	49.7%	26.3%	42.6%
Additional stands required	2 546	1 780	2 418	2 470	8 902	3 193	9 742

Source: Urban-Econ & Capricon database.

If spatial densities are used as a proxy to indicate the need for urban expansion, the various urban nodes can be ranked as follows:

TABLE 3.6: URBAN NODES RANKED IN TERMS OF CURRENT DENSITIES (1994)[1)]

Rank	Urban Node	Density (People per ha)
1	KaNyamazane	66.4
2	Matsulu/Kaapmuiden	64.9
3	Msogwaba	32.8
4	KaBokweni	28.9
5	Clau-Clau	27.5
6	Nelspruit	11.9
7	White River	8.4

1) Highest density : Greatest need for expansion = 1
Lowest density : Least need for expansion = 7

In terms of current densities it appears as if KaNyamazane is in greatest need for urban expansion, closely followed by the Matsulu/Kaapmuiden area. Msogwaba, KaBokweni and Clau-Clau (in that order) are the next areas in greatest need for expansion. The relative attractiveness of Nelspruit and White River in terms of living conditions is likely to significantly increase the future pressure for urban expansion in those areas.

3.3 INFRASTRUCTURE SUPPLY SYSTEMS

In the following paragraphs the infrastructure supply systems for the greater urban concentrations of KaNyamazane, KaBokweni, Matsulu, Nelspruit and White River are assessed in terms of current capacity and constraints and projected future development potential. For the purpose of this assessment, the following categories of capital based infrastructure supply systems are distinguished:

- **Water** (water reticulation networks, storage capacity and purification works)
- **Sanitation** (sewage and effluent treatment works)
- **Roads and stormwater drainage** (access roads and stormwater channels)
- **Solid waste disposal** (refuse collection systems, dumps and treatment works)

- **Electricity** (distribution stations and substations and distribution networks).

  In this Investment Profile two broad levels are distinguished at which the above services are provided.

- **External bulk infrastructure services at regional level.** These services refer to services provided to the settlement, but generally not within its boundaries and includes facilities provided for the benefit of several settlements, such as major outfall sewers, access roads and water reservoirs.

- **Internal network infrastructure services at town/settlement level.** This infrastructure provides services to the stands, such as local water, sewer and electricity reticulation systems, streets and drains within the neighbourhood.

The capacity of the **bulk infrastructure systems** are firstly discussed in the following paragraphs. Thereafter the **internal networks** of the various urban centres will be assessed in terms of existing and future service levels.

3.3.1 Bulk infrastructure

The assessment of the bulk infrastructure capacity in the following paragraphs, is based on a measurement of the impact of total demand (residential and industrial) on the supply system.

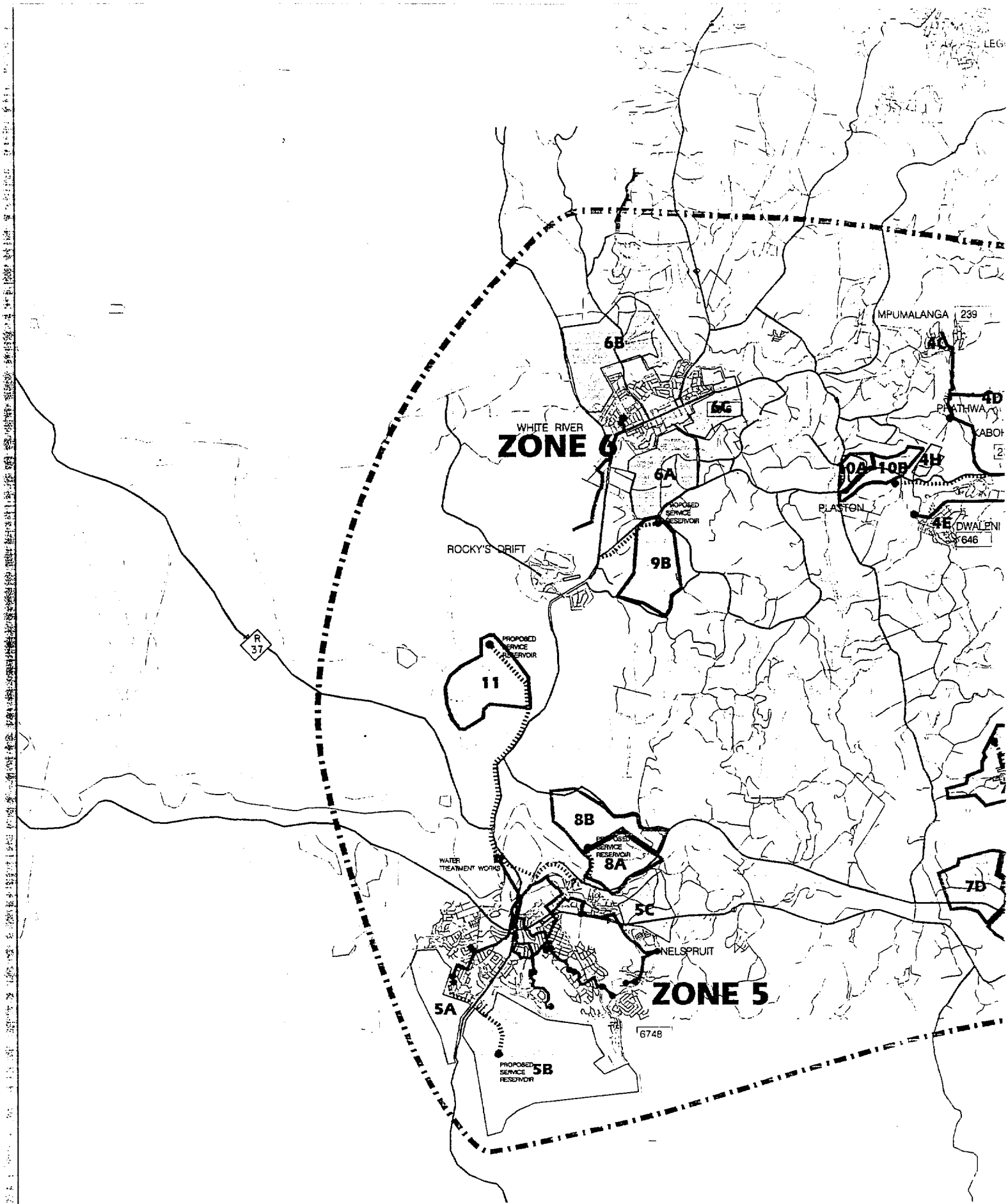
3.3.1.1 Water

The existing and projected future water supply networks are depicted on Maps 14 and 15.

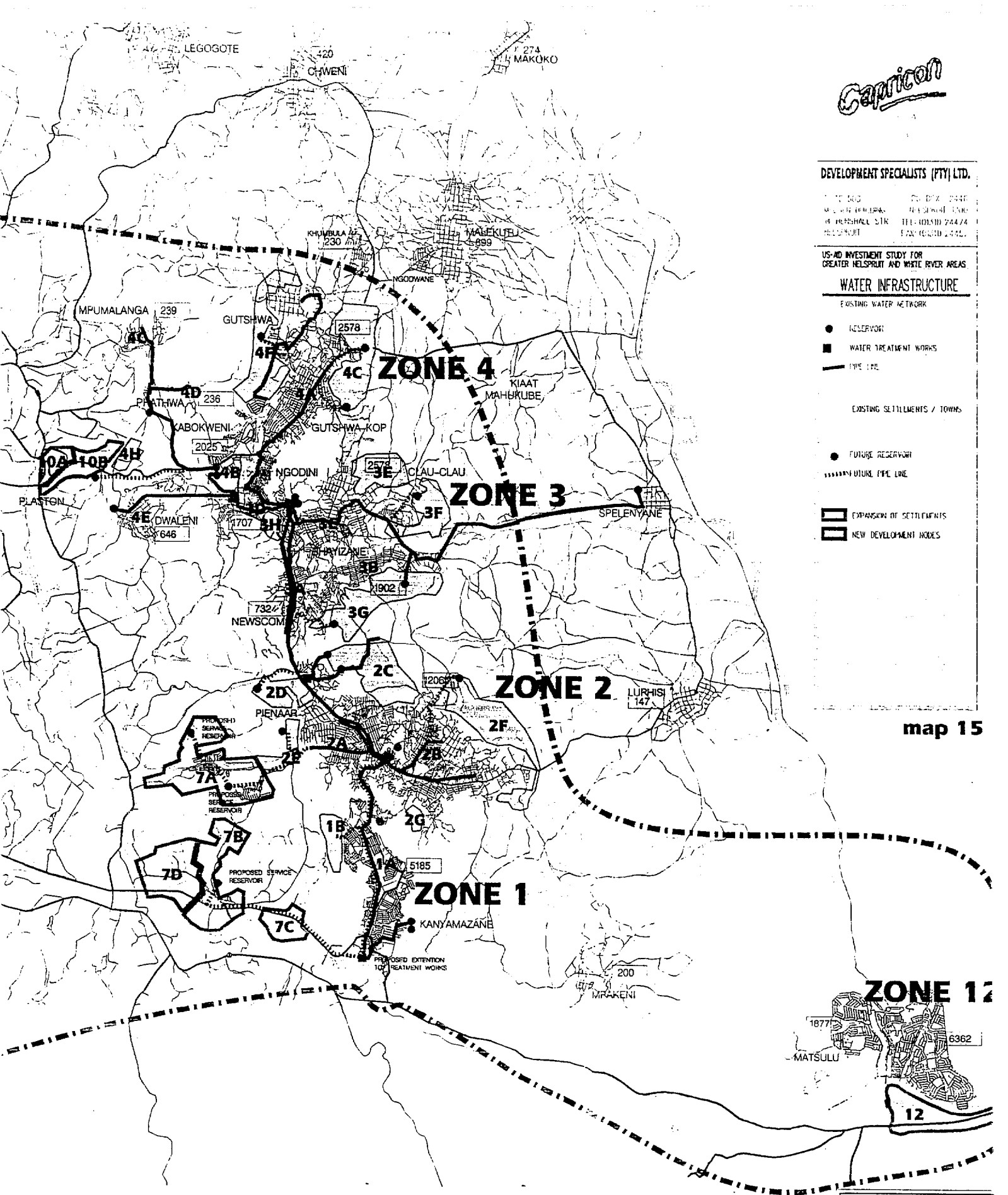
KaNyamazane

The KaNyamazane area referred to here, encompasses the town of KaNyamazane and the surrounding settlements of Daantjie and Pienaar.

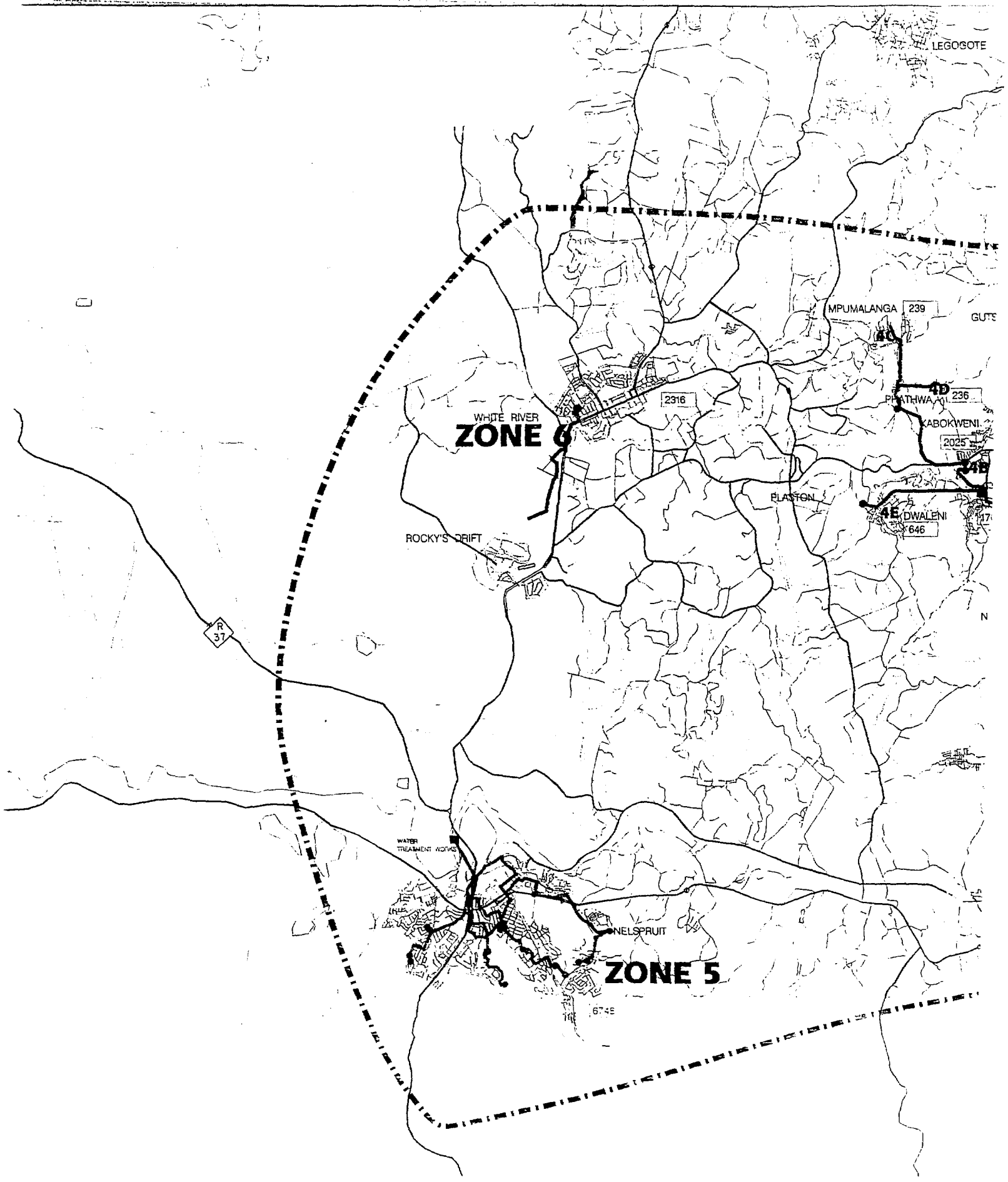
The KaNyamazane area is served by the Southern Nsikazi Regional Water Supply Scheme. Raw water is abstracted from the Crocodile River south of KaNyamazane and treated at the KaNyamazane Water Purification Works before distribution. A permit has been granted by the Department of Water Affairs to the former KaNgwane for the abstraction of 7.9 Ml/day from the Crocodile River. The maximum allowable peak extraction is 10.2 Ml/day.



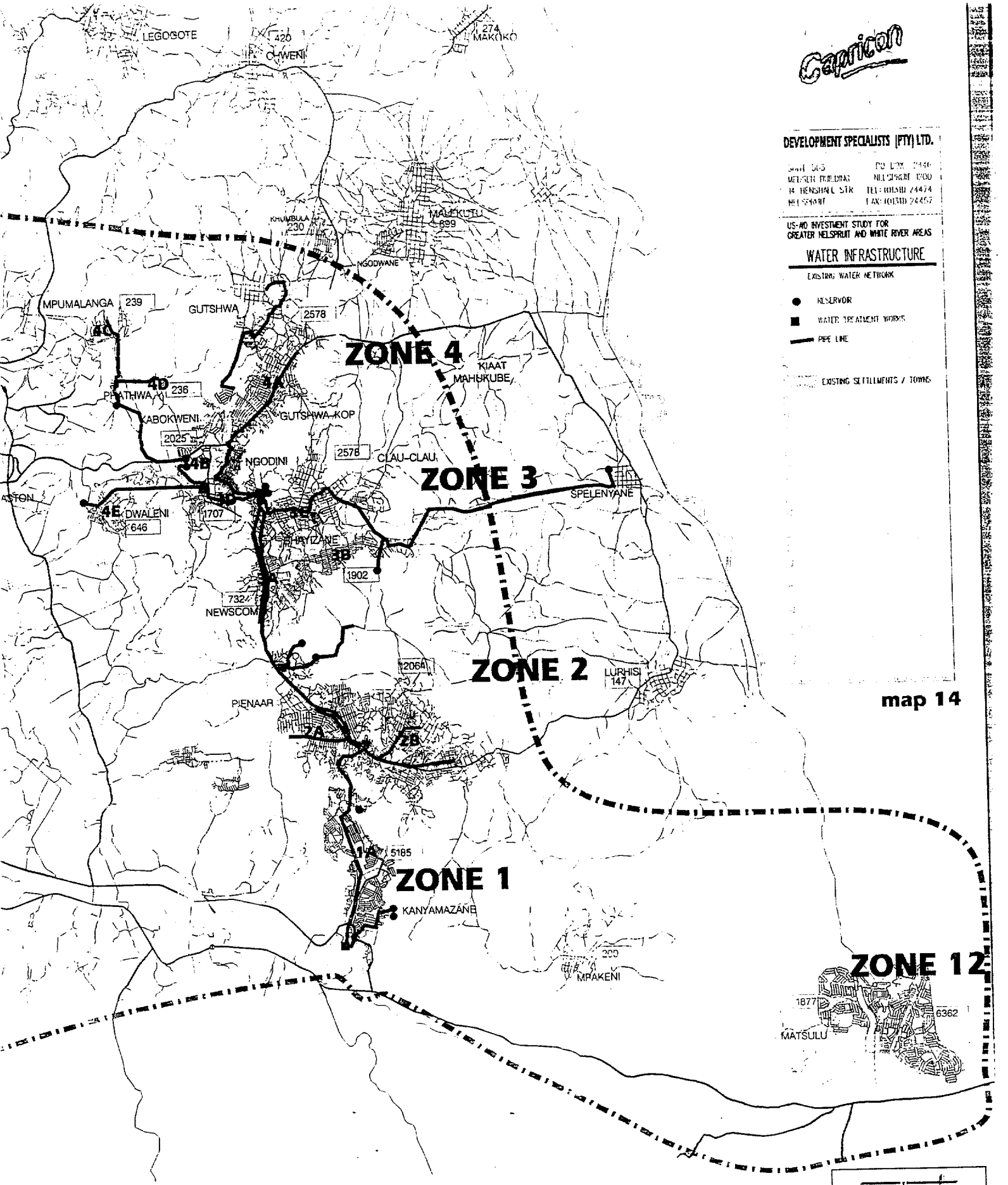
FUTURE WATER INFRAST


LEGOGOTE
420
CHWENI
274
MAKOKO
Capricon
DEVELOPMENT SPECIALISTS (PTY) LTD.
US-AID INVESTMENT STUDY FOR
GREATER HELSPRUIT AND WHITE RIVER AREAS
WATER INFRASTRUCTURE
EXISTING WATER NETWORK
RESERVOIR
WATER TREATMENT WORKS
PIPE LINE
EXISTING SETTLEMENTS / TOWNS
FUTURE RESERVOIR
FUTURE PIPE LINE
EXPANSION OF SETTLEMENTS
NEW DEVELOPMENT NODES
map 15
KHUMBULA
230
MALEKUTU
899
NGODWANE
MPUMALANGA
239
GUTSHWA
2578
4F
4C
ZONE 4
KIAAT
MAHUKUBE
4D
236
PHATHWA
KABOKWENI
GUTSHWA-KOP
2025
10A
10B
4H
4B
NGODINI
2576
3E
CLAU-CLAU
ZONE 3
PLASTON
4E
DWALENI
646
1707
3H
3D
3F
SPELENYANE
THAYIZANE
3B
1902
732
NEWSCOM
3G
2C
1206
ZONE 2
LURHISI
147
2D
PIENAAR
2F
2A
2B
2E
7A
PROPOSED SERVICE RESERVOIR
1B
2G
7B
7D
PROPOSED SERVICE RESERVOIR
5185
ZONE 1
7C
KANYAMAZANE
PROPOSED EXTENTION TO TREATMENT WORKS
200
MRAKENI
ZONE 12
1877
6362
MATSULU
12
NFRASTRUCTURE
cadnet

60



EXISTING WATER INFRAST



INFRASTRUCTURE

The Daantjie/Pienaar areas are reticulated from the Regional Water Scheme to communal stand pipes situated in road reserves at convenient points.

The purification works comprises two modules with a total capacity of 34 Ml/day.

Distribution of water in the South Nsikazi Regional Water Supply Scheme is achieved through a main supply line serving numerous reservoirs and branch lines as indicated on Map 14.

The current estimated demand from the KaNyamazane area is approximately 11 Ml/day at sustained summer peak demand.

The peak demand by the year 2000 is estimated as follows:

Demand from existing residential developments = 11.4 Ml/day
Demand from new developments = 2.7 Ml/day
Demand from non-residential areas = 0.7 Ml/day

Total estimated peak demand 14.8 Ml/day

The existing purification works therefore has sufficient capacity to accommodate the projected residential growth over the next five years. Extensions and expansion to the existing distribution system is currently under way and will have to be continued. An increase to the existing extraction permit will be required.

KaBokweni

For the purpose of this assessment, KaBokweni includes the urban areas of KaBokweni Town, Gutshwa and Ngodini.

The KaBokweni area is served from the Southern Nsikazi Regional Water Supply Scheme and to a lesser extent from the Ngodini Dam, which is used to augment the supply from the Regional Scheme.

The KaNyamazane Water Purification Works provides a treatment capacity of approximately 15.7 Ml/day for this region. The Ngodini works can supply 0.19 Ml/day potable water. Each stand in KaBokweni is supplied with water, whilst the smaller settlements are served by communal standpipes located at convenient spots.

The current estimated demand from the KaBokweni area is approximately 5 Ml/day at sustained summer peak demand.

The peak demand at the year 2000 is estimated as follows:

Demand from existing residential developments = 7.90 Ml/day
Demand from upgraded areas = 0.46 Ml/day
Demand from new developments = 0.53 Ml/day
Demand from non-residential areas = 0.44 Ml/day

Total estimated peak demand = 9.33 Ml/day

The above information suggests that the two purification plants have sufficient capacity to accommodate the projected residential growth over the next five years.

Matsulu/Kaapmuiden

Raw water for the Matsulu Water Purification Works is extracted from the Crocodile River. The works is located on the banks of the river and has a current treatment capacity of approximately 6.9 Ml/day. Plans are currently underfoot to expand this capacity to approximately 10.4 Ml/day.

The current estimated demand for the existing town is approximately 4.3 Ml/day at sustained summer peak demand. The peak demand at the year 2000 is estimated as follows:

Demand from upgraded areas = 6.39 Ml/day
Demand from new developments = 2.80 Ml/day
Demand from non-residential areas = 0.46 Ml/day

Total estimated peak demand = 9.65 Ml/day

Once the purification works has been upgraded, it should have sufficient capacity to accommodate the projected residential growth over the next five years.

Nelspruit

Raw water to the Council's water purification works is supplied from either the Crocodile Valley Citrus Estate Canal or from the municipal Hydro Canal, both of which draw water from the Crocodile River. The new purification works has a current capacity of 45 Ml/day. It can be extended to a capacity of 56 Ml/day at nominal cost. The old purification works has a capacity of 8 Ml/day, but will soon be closed down.

The approved maximum extraction rate from the Crocodile River is currently 19 000 Ml/annum which can also cater for the supply of potable water to the Rocky's Drift area near White River. Of this quota, 6 900 Ml/annum is granted free of charge. Any extraction exceeding this total subject to a levy of 8.4c/kl

The current estimated demand for the existing town is approximately 25 Ml/day at sustained summer peak demand.

The peak demand at the year 2000 is estimated as follows:

Demand from existing residential developments = 17.7 Ml/day
Demand from new developments = 1.8 Ml/day
Demand from non-residential areas = 17.5 Ml/day

Total estimated peak demand = 35.0 Ml/day

In view of the above, existing purification works appears to have sufficient capacity to accommodate the projected residential growth over the next five years. No increase to the existing extraction permit from the Crocodile River will be required.

White River

The White River area, as referred to here, encompasses the town of White River an the industrial area of Rocky's Drift.

Raw water is supplied from the Longmere Dam to the purification works adjacent to the White River - Hazyview link road via an open canal that belongs to and is managed by the White River Conservation Board.

The Council currently pays a levy of approximately 2c/kl to the Conservation Board. Other sources utilised by the Town Council is the Sand River Canal from the Witklip Dam. The existing water purification works has an existing capacity of 3.5 Ml/day which can be upgraded to 8.9 Ml/day.

The approved extraction quota from the existing sources are as follows:

Longmere Dam = 3 276 Ml/annum
Sand River Canal = 500 Ml/annum

Of the 3 276 Ml/annum from the Longmere Dam, 256 Ml has to be reserved for the Town council of White River. Additional available sources are 83 Ml/annum as an emergency supply from the White River and a future supply of 5000 Ml/annum from Nelspruit Town Council for Rocky's Drift.

The current estimated demand from the existing town is approximately 2.0 Ml/day at sustained summer peak demand.

The peak demand at the year 2000 is estimated as follows:

Demand from existing residential developments = 3.8 Ml/day
Demand from new developments = 0.3 Ml/day
Demand from non-residential areas = 0.8 Ml/day

Total estimated peak demand = 4.9 Ml/day

The existing purification works will have to be upgraded to accommodate the projected residential growth our the next five years. Due to the drought over the past number of years severe water restrictions have been enforced on residential consumers. The existing storage facilities are inadequate and will have to be upgraded.

The existing maximum approved extraction rates are however sufficient.

3.3.1.2 Sanitation

The current and proposed future sewer infrastructure works are shown on Maps 16 and 17.

KaNyamazane

The town of KaNyamazane is served by a waterborne sewage system draining to a sewage treatment works south of the town. Households in Daantjie and Pienaar are served mainly by pit latrine systems consisting of rudimentary and poorly constructed superstructures. The design and ventilation of the pipes are generally inadequate.

The treatment works has a current capacity of 5 Ml/day. Due to the topography the areas of Daantjie and Pienaar cannot be naturally drained by gravity to the treatment works.

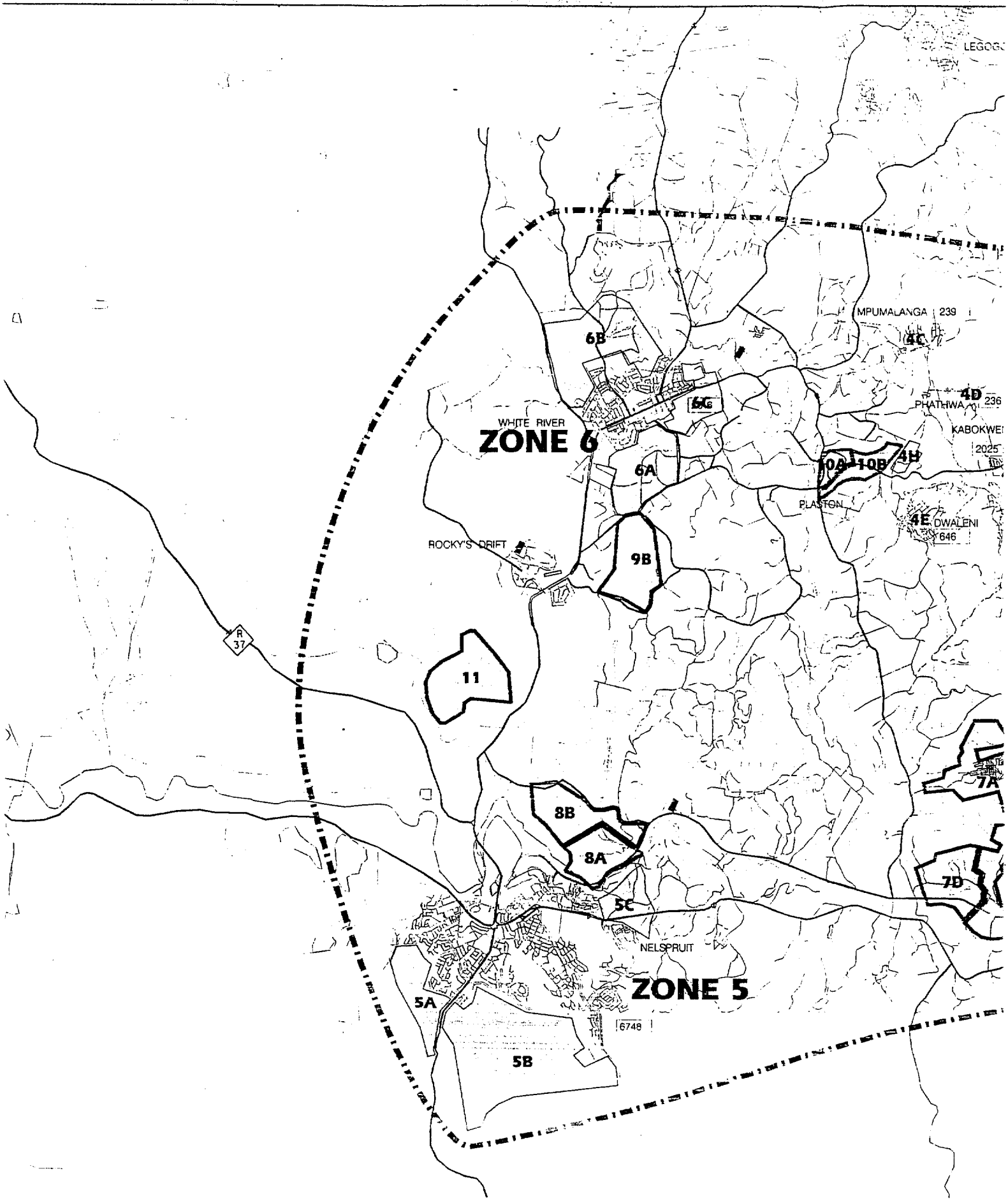
The current estimated effluent rate to the treatment works is approximately 2.5 Ml/day.

The estimated effluent rate by the year 2000 is approximately as follows:

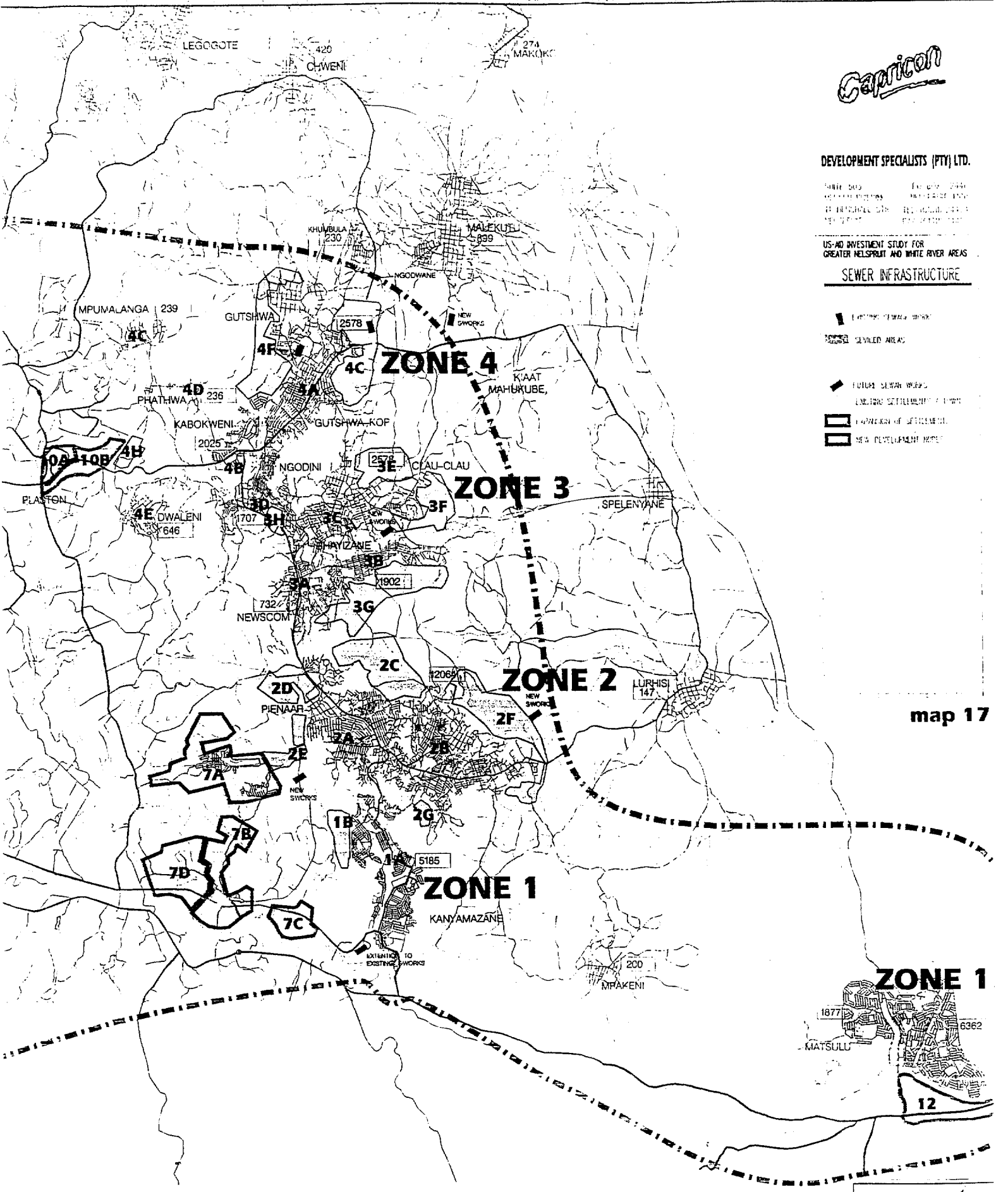
Effluent rate from existing residential developments = 2.4 Ml/day
Effluent from new developments = 0.9 Ml/day
Effluent from non-residential areas = 0.1 Ml/day

Total estimated effluent rate = 3.4 Ml/day

60



FUTURE SEWER INFRA



ER INFRASTRUCTURE

The capacity of the treatment works has therefore sufficient capacity to accommodate the projected residential growth over the next five years.

KaBokweni

KaBokweni has a waterborne sewerage system directing effluent to a sewage treatment works located near the Gutshwa River. The works has a capacity of 3.5 Ml/day. Sanitation in the adjoining settlements is by means of pit latrines. These structures are in general of poor design with inadequate ventilation and rudimentary superstructures.

The current estimated effluent rate from KaBokweni is approximately 1.4 Ml/day.

The estimated effluent rate by the year 2000 is approximately as follows:

Effluent rate from existing residential developments = 0.93 Ml/day
Effluent from new developments = 0.72 Ml/day
Effluent from non-residential areas = 0.08 Ml/day

Total estimated effluent rate = 1.73 Ml/day

The treatment works therefore has adequate capacity to cater for planned new developments and expansions in the future.

Matsulu

A large number of stands in Matsulu still have pit latrine sanitation systems, but a programme has been underway during the past number of years to change over to waterborne sanitation.

Effluent is treated at the Matsulu Sewage Treatment Works. The works entails an oxidation pond system with a treatment capacity of approximately 0.3 Ml/day.

The current effluent rate is approximately 2.5 Ml/day and a considerable volume of untreated effluent is over topping the ponds.

The estimated effluent rate at the year 2000 is as follows:

Effluent rate from upgraded areas = 2.73 Ml/day
Effluent from new developments = 1.44 Ml/day
Effluent from non-residential areas = 0.21 Ml/day

Total estimated effluent rate = 4.38 Ml/day

The upgraded treatment works will have sufficient capacity to accommodate the projected residential growth over the next five years.

Nelspruit

Effluent is purified at the Kingstonvale Sewage Treatment Works adjacent to the KaNyamazane - Nelspruit link road. The existing works has a current treatment capacity of 15 Ml/day which is currently being upgraded to a capacity of 26 Ml/day. The site will permit further expansion to as much as 48 Ml/day.

The current estimated effluent rate is approximately 10 Ml/day. The estimated effluent rate at the year 2000 is estimated as follows:

Effluent rate from existing developments = 5.5 Ml/day
Effluent rate from upgraded areas = 0.0 Ml/day
Effluent from new developments = 0.8 Ml/day
Effluent from non-residential areas = 13.3 Ml/day

Total estimated effluent rate = 19.6 Ml/day

The upgraded treatment works has sufficient capacity to accommodate the projected residential growth over the next five years.

White River

Effluent is purified by both existing treatment works adjacent to the White River, that caters for the town itself, and a new treatment works currently under construction at Rocky's Drift.

The capacities of these treatment works are as follows:

White River treatment works = 1.50 Ml/day
New Rocky's Drift treatment works 1.25 Ml/day

Total treatment capacity = 2.75 Ml/day

The existing effluent rate to each of the two treatment works are approximately 0.6 Ml/day and 0.2 Ml/day respectively.

The current estimated effluent rate at the year 2000 to each of the two works are as follows:

White River:

Effluent rate from existing developments = 0.51 Ml/day
Effluent from new developments = 0.15 Ml/day
Effluent from non-residential areas = 0.07 Ml/day

Total estimated effluent rate = 0.73 Ml/day

Rocky's Drift:

Effluent from new developments = 0.05 Ml/day
Effluent from non-residential areas = 0.19 Ml/day

Total estimated effluent rate = 0.24 Ml/day

Both treatment works have sufficient capacity to accommodate the projected residential growth over the next five years.

3.3.1.3 Roads and stormwater drainage

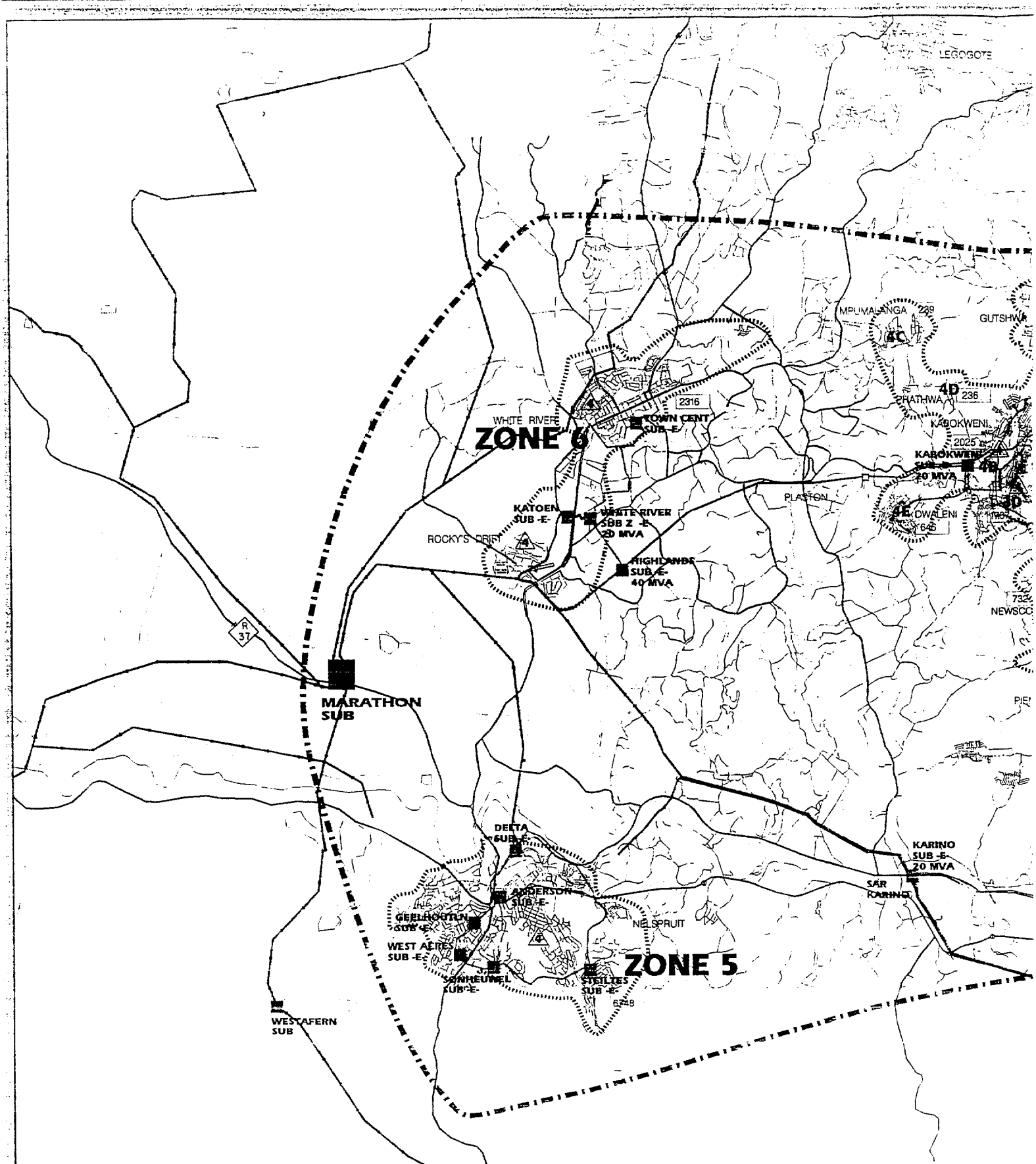
The existing and projected future road infrastructure networks are shown on Maps 18 and 19.

KaNyamazane

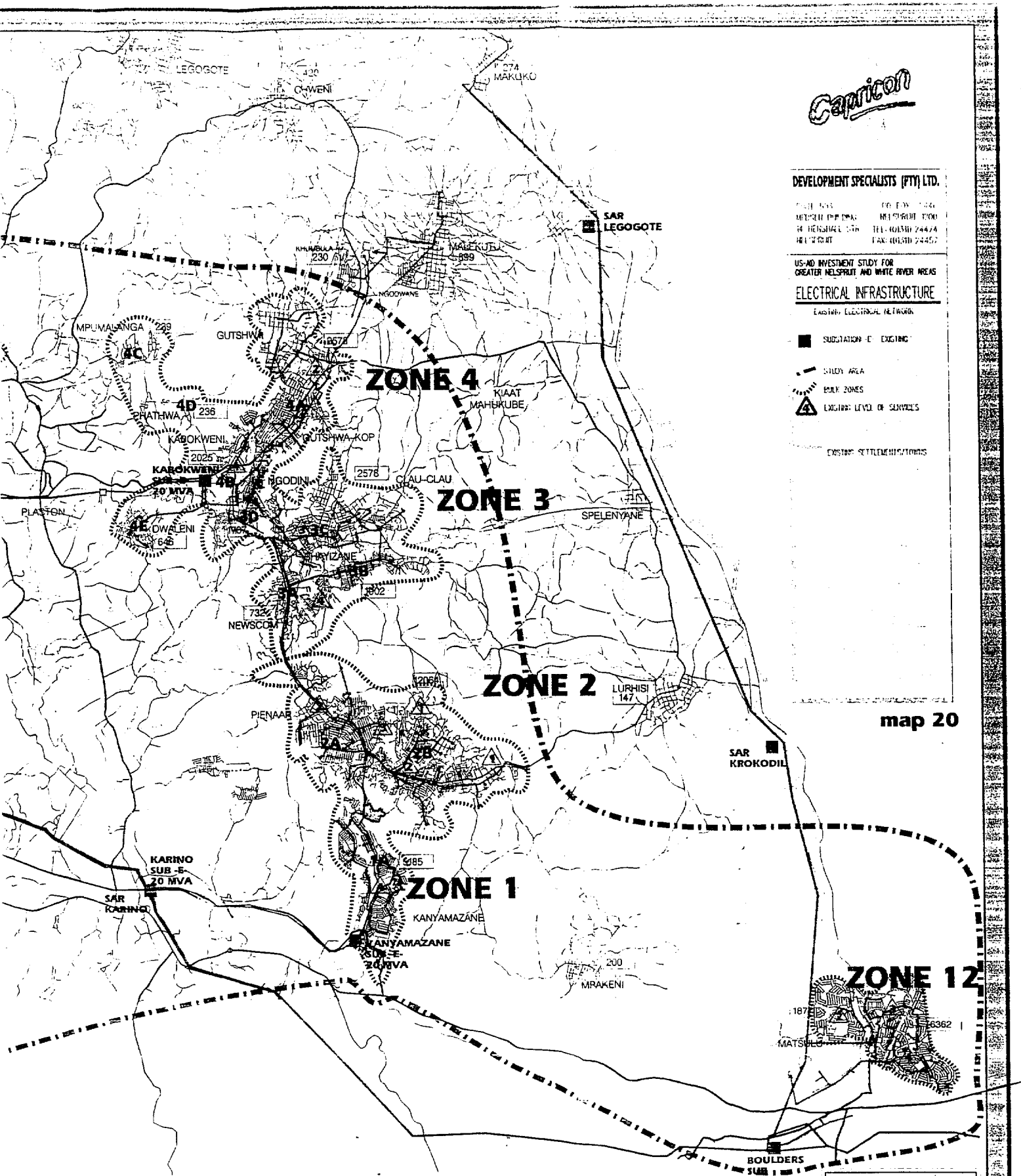
The main access road from Nelspruit, internal main roads and circular bus routes are surfaced and in good condition. Most of the other roads in KaNyamazane township have also been surfaced and equipped with a reasonably adequate storm water drainage system. Roads in the adjoining settlements have not been surfaced, are generally in poor condition and are subject to erosion due to inadequate or non-existent storm water drainage facilities.

KaBokweni

The main road through KaBokweni linking Plaston and KaNyamazane is surfaced and in good condition. A very small number of the internal roads in KaBokweni have been surfaced with little or no storm water drainage system. The roads in the adjoining settlements have not been gravelled and there is no storm water drainage system.



EXISTING ELECTRICAL INF



map 20

TRICAL INFRASTRUCTURE

Matsulu

Matsulu has a surfaced link with the N4 national road which is in good condition. Circular bus routes are also surfaced with unsurfaced gravel roads elsewhere that are in need of being upgraded.

Nelspruit

Nelspruit has an extensive and well established network. The N4 national road linking Mozambique with Gauteng runs through the centre of town and is currently being upgraded.

The capacities of the existing road network and storm water system is considered to be sufficient to cater for any new developments over the next five years.

White River

White River also has an extensive and well established road network level. Provincial Road P17-7 between Nelspruit and White River is currently being upgraded and it is expected that this will result in a substantial increase in the traffic volume through White River.

The capacities of the existing road network and storm water system is considered to be sufficient to cater for any new developments over the next five years.

3.3.1.4 Solid waste disposal

KaNyamazane

Refuse is infrequently removed from households and dumped at a waste disposal site north-west of the town. The site is however not managed as a landfill. No information is currently available as to the capacity of the existing waste disposal site. There is no refuse removal and disposal in the adjoining settlements and the bulk of the waste is burnt and disposed of on site. Plans are underway to have the existing site closed down once the planned Mara Regional Waste Disposal Site has been established near Karino.

KaBokweni

Refuse is removed infrequently from the households and deposited in an old burrowpit close to the old sewage treatment works. No information is available as to the capacity of the site. There is no refuse removal and disposal in the adjoining settlements and the bulk of the waste is burnt and disposed of on site. The site can be closed down once the Mara Regional Waste Disposal site has been established.

Matsulu

Refuse is removed from stands by a contractor and dumped at the Matsulu waste disposal site. The site is not managed as a landfill site. No information is currently available as to the capacity of the existing waste disposal site. Once the Mara regional waste disposal site has been established, this site will be closed down.

Nelspruit

Refuse removal is undertaken by the Nelspruit Town Council. Refuse is compacted at a special facility adjacent to the Motor Vehicle Testing Centre in the industrial area before being transported to the existing waste disposal site next to the airport. Due to its close proximity to the latter, plans are underway to close down the site in 1996 and to relocate to the planned regional Mara Solid Waste Disposal Site close to KaNyamazane.

The existing site can still accommodate the projected residential growth over the next 3 to 4 years if the development of the new site should be postponed.

White River

Refuse removal is undertaken by the White River Town Council and disposed of at a waste disposal site close to Plaston.

The site can comfortably accommodate the projected residential growth over the next five years.

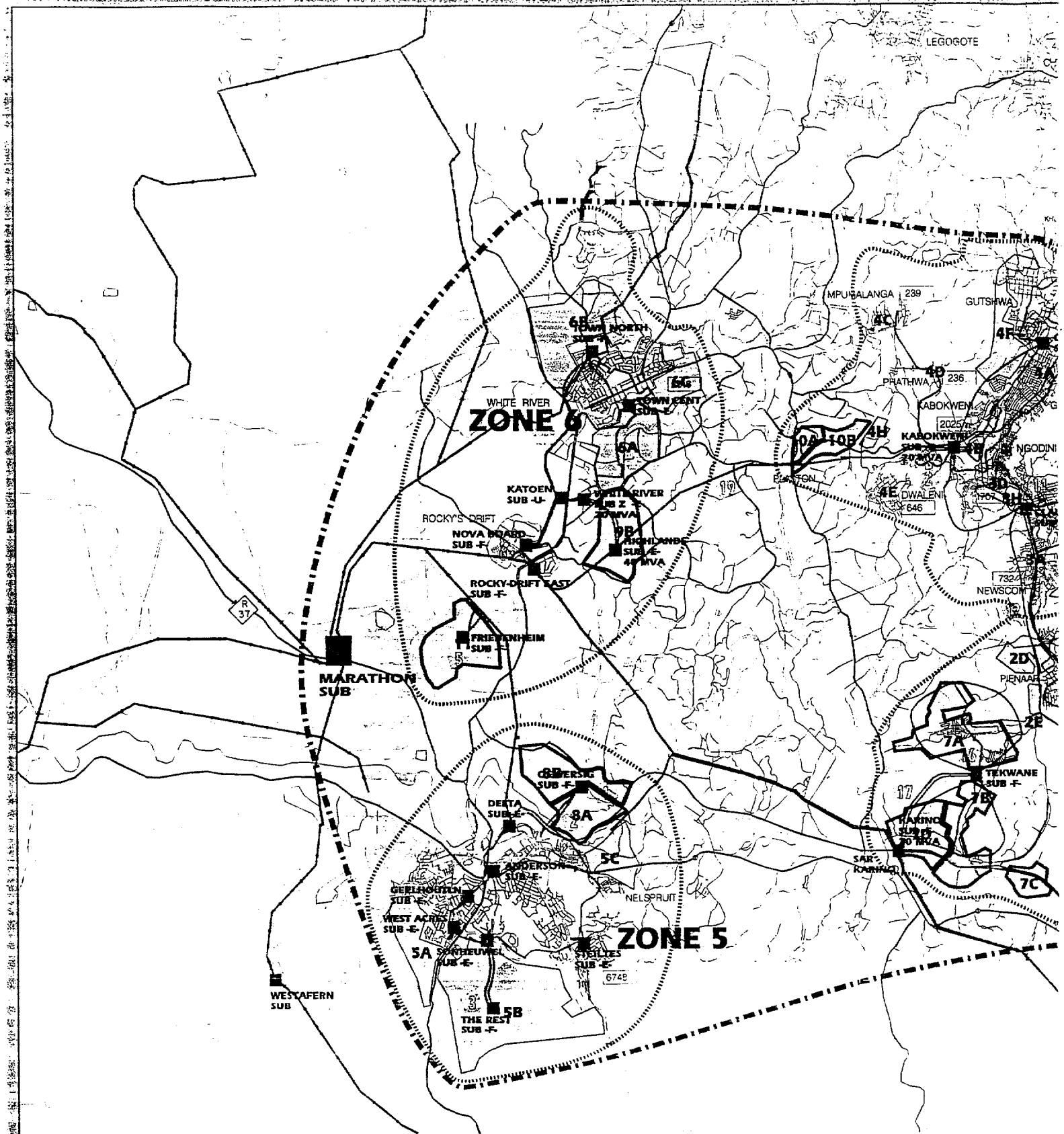
3.3.1.5 Electricity

The existing and envisaged future electricity supply infrastructure is shown on Maps 20 and 21.

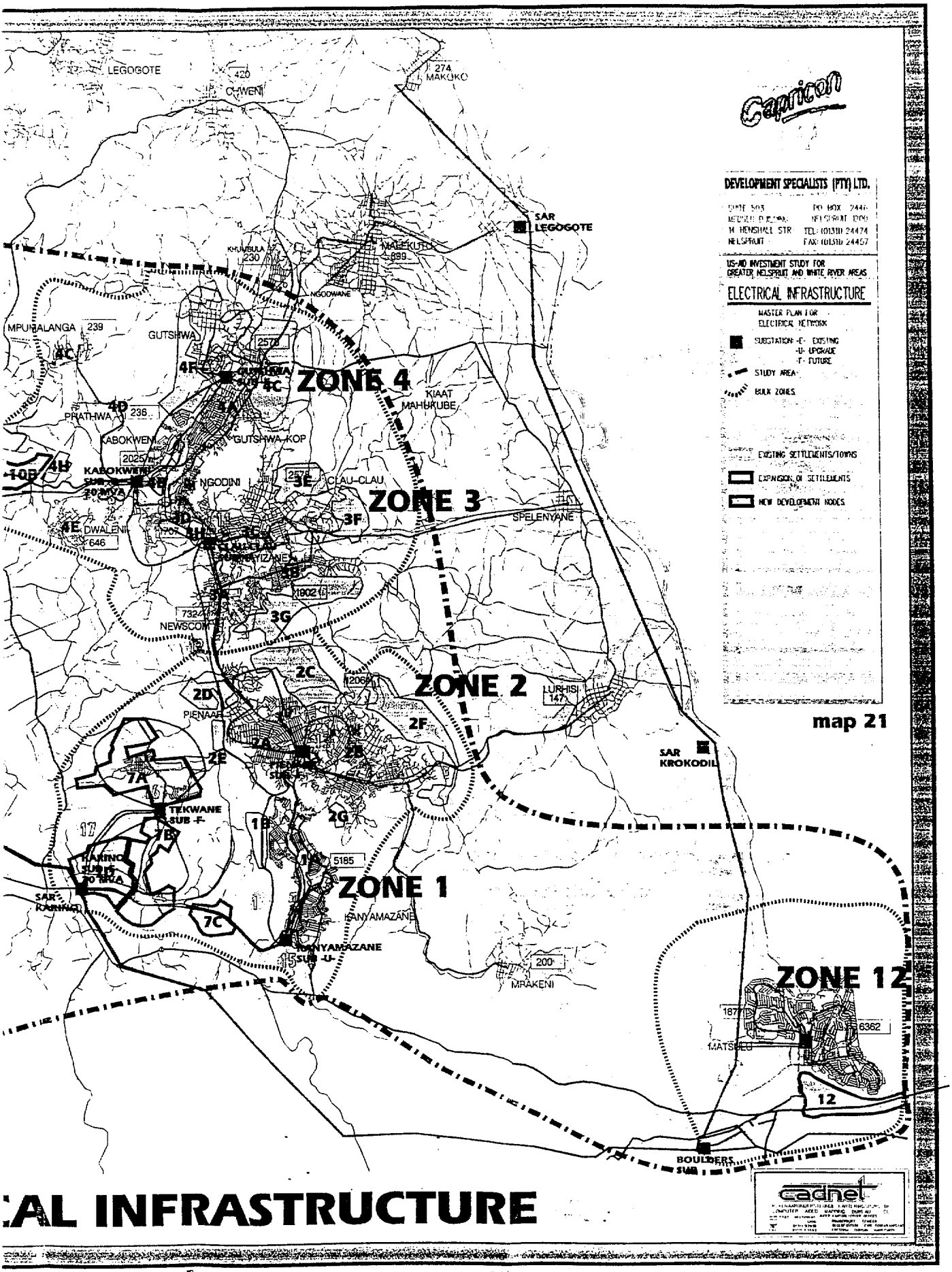
KaNyamazane

The KaNyamazane area is served from a newly built 132kV line currently operating at 23kV from the Karino substation.

75



FUTURE ELECTRICAL INFRA



CAL INFRASTRUCTURE

The town is fairly well serviced with electrical infrastructure but the Daantjie/Pienaar area still requires major upgrading. Existing service standards in KaNyamazane is approaching full service levels while the Daantjie/Pienaar area is serviced by an overhead rural system.

Capacities are frequently being exceeded and therefore warrants frequent upgrades. The overhead system is not as reliable as the underground system and more frequent power failures occur as a result of the exposed system.

The 11kV system backbone will eventually be replaced by 132kV systems feeding both Tekwane as well as the Daantjie/Pienaar area. Major expansions of the bulk infrastructures will have to be conducted in future to accommodate the anticipated growth.

KaBokweni

The proclaimed portion of KaBokweni is serviced with adequate, reliable electrical supply infrastructure.

The surrounding rural areas are, however, also supplied with overhead line conductors currently being stretched beyond capacity. The bulk systems feeding the town can still accommodate growth for a reasonable period of time, but the internal bulk 11kV supply systems are also being stretched beyond capacity.

Frequent minor upgradings to shift load from various infeed points are required. It is envisaged that the rural areas be electrified with overhead lines to supply 100% of all households.

The bulk systems will be upgraded to 132kV as soon as the 11kV systems are overloaded.

Matsulu

Major portions of the existing town are supplied with full services.

Extensions to this town are currently being supplied at overhead lines similar to the rural areas in KaNgwane. It is envisaged that these areas be supplied with overhead conductor systems until fully electrified.

The 132kV system feeding past Matsulu is envisaged to supply this town for a substantial period of time and no major upgrades are foreseen other than transformer capacity increases.

Nelspruit

Infrastructure is supplied at full service level over the whole of the Nelspruit supply area.

The older portions of the town still have overhead low voltage supply systems with these systems performing fairly well and no immediate upgrades are foreseen here.

The main substation has adequate capacity to supply the town in the foreseeable future. The town is being served by a 33kV ring, also with adequate capacity and reliability.

The current supply system can easily be extended to accommodate growth in new expansion areas. The areas identified in this study can be extended from the existing group with no major complications. It is only expected that backbone system be extended to the Oewersig areas as well to the areas currently known as The Rest.

White River

The White River supply areas are supplied with full services for the internal reticulated areas.

The bulk supply system consists mainly of a 22kV ring feeder system fed from the existing Highlands 132/22kV substation. Capacities of these systems are not exceeded yet but it is envisaged that if the current high growth rate continues, the systems will need to be upgraded soon.

The 22kV backbone system currently feeding the towns are not expected to address the demand for the substantial period of time. It is envisaged that a 32kV infeed point be supplied at the Nova Board infeed point in Rocky's Drift.

3.3.2 Internal infrastructure network

The evaluation of the existing **internal networks** was carried out by means of on the spot surveys and other existing documentation on the various settlements.

The internal networks of the various settlements were subsequently rated in terms of specific norms defined by the World Bank for this purpose. These norms - referred to as **service standards** - are generally used for estimating costs of new developments and the upgrading of existing services. The various service standards are defined in Table 3.7.

TABLE 3.7 : SERVICE STANDARDS

Standard levels	Service	Standards used to describe service levels
Minimum (Level 1)	**Water** **Sanitation** **Roads** **Drainage** **Refuse collection** **Electricity**	Informal source, no reticulated water supply Unventilated, informally constructed pit latrines Unsurfaced, informally aligned tracks and streets No drainage facilities No formal collection of refuse No electricity service, no street lights
Basic (Level 2)	**Water** **Sanitation** **Roads** **Drainage** **Refuse collection** **Electricity**	Communal standpipes Ventilated pit latrines Aligned and gravelled streets Rudimentary erosion protection Irregular collection Few lines to specific connections, no street lights - 10% serviced
Intermediate (Level 3)	**Water** **Sanitation** **Roads** **Drainage** **Refuse collection** **Electricity**	Yard standpipes, unmetered Less than 50% of stands with waterborne sanitation, balance with ventilated pit latrines. Paved bus routes, other streets aligned and gravelled Lined or piped drainage on paved routes, unlined drains and basic inlet structures on gravelled streets Regular collection from community collection points Restricted lines with restricted house connections, no street lights - 30% serviced
Full (Level 4)	**Water** **Sanitation** **Roads** **Drainage** **Refuse collection** **Electricity**	In-house metered water supply Full waterborne system to sewage treatment plant All streets kerbed and paved On-road drainage, lined open drains and fully piped stormwater system Regular collection from houses Fully covered with lines, 100% house connections and street lights

The present service levels of the various towns and settlements comprising the study area, are summarised in Table 3.8.

TABLE 3.8: PRESENT SERVICE LEVELS

Zone no.	Settlement	PRESENT SERVICE LEVELS					
		Water	Sanitation	Roads	Stormwater drainage	Electricity	Solid waste disposal
1	KANYAMAZANE						
1A	KaNyamazane	3	4	3	3	4	3
2	MSOGWABA						
2A	Pienaar	2	1	1	2	2	1
2B	Daantjie	2	1	1	2	2	1
3	CLAU-CLAU						
3A	Newscom	2	1	1	1	2	1
3B	Zwelitsha	2	1	1	1	2	1
3C	Clau-Clau	2	1	1	1	2	1
3D	Ngodini	2	1	1	1	2	1
4	GUTSHWA-NGODINI						
4A	Gutshwa	2	1	1	1	2	1
4C	Mpumalanga	2	1	1	1	1	1
4D	Phathwa	2	1	1	1	2	1
4E	Dwaleni	2	1	1	1	2	1
4	KABOKWENI						
4B	KaBokweni	4	4	3	2	4	3
5	NELSPRUIT						
	Nelspruit	4	4	4	4	4	4
6	WHITE RIVER						
	White River	4	4	4	4	4	4
12	MATSULU						
	Matsulu	3	3	3	2	3	3

Source : Urban-Econ/Capricon database

A cursory glance at the information in Table 3.8 reveal that Nelspruit and White River enjoy full service standards at present. For the purpose of this Investment Profile Nelspruit and White River are therefore excluded from the planning for upgrading of present infrastructure levels at existing towns and settlements.

Regarding the other settlements it is clear that KaNyamazane and KaBokweni enjoy the highest level of infrastructure services at present, followed by Matsulu at intermediate level.

The information in Table 3.8 furthermore indicates that the Msogwaba, Clau-Clau and Gutshwa-Ngodini areas are served only at the minimum and basic levels which imply that these urban settlements are in greatest need of upgrading of their infrastructure services.

3.4 URBAN PUBLIC FINANCE

The **affordability** of infrastructure development is an important consideration that was taken account of in the analysis for the preparation of this Investment Profile. Affordability, in the sense referred to here, is primarily a function of two elements:

- The **investment** and **operational cost** of infrastructure development.
- The **financial capacity** of the area and its inhabitants to pay for infrastructure services rendered.

In view of the predominantly weak economic and socio-economic conditions characterising most of the urban settlements in the study area, the **financial capacity** of the **inhabitants** of the area poses a major **restriction** to infrastructure development. Thus, whilst the needs are great, the financial restrictions are of equal magnitude.

The problem is further compounded by the restricted **financial capacity** of the main infrastructure supplying **authorities** in the area. These authorities include the only two existing operational town councils and the regional authority in the area, namely:

- Nelspruit Town Council
- White River Town Council
- Lowveld and Escarpment Regional Services Council (RSC)

The current joint financial capacity of these authorities - measured in terms of their provisional operational income budgets for 1994/95 - is outlined in Table 3.9.

TABLE 3.9 : OPERATIONAL INCOME BUDGETS OF LOCAL AUTHORITIES IN GNWRA (1994/95)

AUTHORITY	REVENUE (R'm)
Nelspruit Town Council	80.7
White River Town Council	26.3
Lowveld RSC	22.0
TOTAL	129.0

82

The information in Table 3.9 show that the combined income of the operating authorities in the GNWRA currently amounts to approximately **R130 million**. Although KaNyamazane and KaBokweni are proclaimed urban settlements, none of these areas currently have its own functioning local authority and infrastructure services are provided on a non-recovery basis. For all practical considerations these urban nodes can be regarded as having a zero public revenue base at this stage.

In recent times the administrative functions of KaNyamazane and KaBokweni were respectively being administered by the town councils of Nelspruit and KaNyamazane. The TLC arrangements for the study areas are in the process of being finalised and it is expected that the different TLC's will contribute to the establishment and development of sustainable public revenue bases within the low-income communities of the eastern part of the study area. Irrespective fo these arrangements it is expected that significant use will have to be made of external funding to develop the infrastructure services to an acceptable level over the short- to medium-term.

3.5 SUMMARY

A number of important characteristics and planning aspects concerning the study area were highlighted in this section.

- In terms of development, the study area can be divided into two distinct sections. The eastern section is characterised by a high concentration of population and a low level of economic activity, generally leading to undesirable socio-economic conditions. The western section, on the other hand, generally reflects a comparatively high level of economic activity, a considerably lower concentration of population and high living standards.

- The economic growth **prospects** for the GNWRA are encouraging and equitable distribution of opportunities could help to alleviate the economic and socio-economic imbalances.

- Relatively high population growth is forecasted for the study area, but effective management of economic development in the area could lead to a general improvement in the living conditions of disadvantaged communities.

- The physiographical characteristics, scattered urban layout and the presence of high-potential agricultural land in the study area, are restrictions that give rise to a number of other **development constraints**, such as:

  - An uneven distribution of trade, business, social and other services.
  - Poor living conditions and a lack of infrastructure development.

53

- High transportation costs due to distances between residential areas and nodes of economic activity.
- High cost of urban infrastructure development.

- From a **spatial** viewpoint, the greatest **limitation** to development in the eastern section of the study area, is the **lack of suitable land** for expansion of the existing settlements. These settlements generally started at low-lying flood areas with a gentle slope and high accessibility. Due to high population growth these settlements have expanded rapidly to the extent that the outskirts accommodate sub-standard dwellings on steep slopes, mostly without any infrastructure. Infrastructure development on these slopes will be extremely costly.

- An assessment of the **bulk infrastructure** supply systems in the area reveals the following:

  - Existing water purification works and current expansions underway will be sufficient to cater for the projected residential growth over the next five years in most areas. Existing purification and storage facilities in the White River area are, however, inadequate and will have to be upgraded as a matter of urgency.

  - Existing effluent treatment works have sufficient capacity to cater for the demands forecasted for the next five years.

  - Main access roads and stormwater drainage systems in the urban settlements of Msogwaba, Clau-Clau, Gutshwa and Ngodini urgently require upgrading. In the case of KaNyamazane, KaBokweni and Matsulu, these facilities are of intermediate standard and will require specific attention in terms of maintenance to remain at that level. Nelspruit and White River as serviced by high quality roads and stormwater facilities.

  - Regarding refuse removal, all the settlements, except for Nelspruit and White River, are currently served by completely inadequate systems that have a negative influence in terms of environmental quality and health.

  - Major expansions of the bulk electricity supply system for KaNyamazane will have to be undertaken in the near future to accommodate the expected future demand. Minor expansions will also be required at KaBokweni, Matsulu and White River. The main substation at Nelspruit has adequate capacity to supply the town in the foreseeable future.

- An evaluation of **internal infrastructure** networks in the study area shows that the urban centres and related settlements of Msogwaba, Clau-Clau, Gutshwa and Ngodini are completely underserviced, especially with regard to sanitation, access roads, stormwater drainage and solid waste disposal. Matsulu, KaNyamazane and KaBokweni are also in need of upgrading. White River and Nelspruit are served at full service level and require no further upgrading.

- The existing and planned future arrangements in respect of **urban public finance** suggest an acute lack of capacity to address existing backlogs and future growth in demand for infrastructure. Even though the establishment of TLC's in the area is expected to lead to the development of a revenue base in low-income communities, substantial external funding will still be required to address infrastructure deficiencies.

4. INVESTMENT PROFILE

This section summarizes the costs of an indicative **infrastructure investment profile** for the study area, and examines the impact of the investments in terms of the financial capacity of local authorities and the affordability levels of households.

The investment profile is based on the results of a specific **investment scenario** that was simulated with the aid of the **computerised planning model** developed for this purpose. As indicated in the introduction to this report, the model comprises of three inter-related and sequentially linked sub-models, namely a spatial model, an infrastructure model and a financial model.

The rest of this section is structured as follows:

- A brief review of the **elements** of the model - their purpose and inter-relationships - as an introduction to the investment profile.
- A description of the simulated **results** of the model in terms of the spatial, cost and financial implications of a specific **investment scenario.**

4.1 BRIEF REVIEW OF THE MODEL

4.1.1 Spatial model

The **purpose** of the spatial model is to determine the additional land area that needs to be developed to accommodate the housing needs of the growing population in the study area.

The main **inputs** into the model are the current and expected future population for each of the existing settlements, specific areas of developable land that were identified for future urban development and current and projected living densities for these areas.

The **output** of the spatial model consists of an allocation of the future population to the various identified areas and the presentation of the results in terms of the number of stands that need to be developed in each area.

A detailed **technical description** of the design and operation of the spatial model is provided in Annexure B to this report.

86

4.1.2 Infrastructure model

The **purpose** of the infrastructure model is to quantify the investment cost involved in developing the stands, identified by the spatial model, to certain predetermined service standards specified by the investment scenario. The upgrading cost of services in existing settlements are also quantified. Cognisance is taken of the cost related to both bulk and internal infrastructure developments.

The main **inputs** into the model are the number of new stands that need to be developed (from the spatial model), the number of existing stands that need to be upgraded, the service standard to which the various stands should be developed and the cost related to developing a stand to a specific service standard.

The **output** of the model consists of the quantified investment cost - per settlement and service type - for the development of new sites and the upgrading of existing sites.

The detailed **technical description** of the elements, structure and operation of the infrastructure model appears in Annexure C.

4.1.3 Financial model

The **purpose** of the financial model is to determine the affordability of various investment scenario's.

The **inputs** for the model consist of information on the existing financial capacity of the area, the total infrastructure cost (from the infrastructure model) and a variety of input variables such as the applicable interest rate, the phasing of capital investments, the choice of payback period for each investment, etc.

The **output** of the model consists of the calculation of the impact of the phased infrastructure investments on the financial capacities of the local authorities and households in the study area.

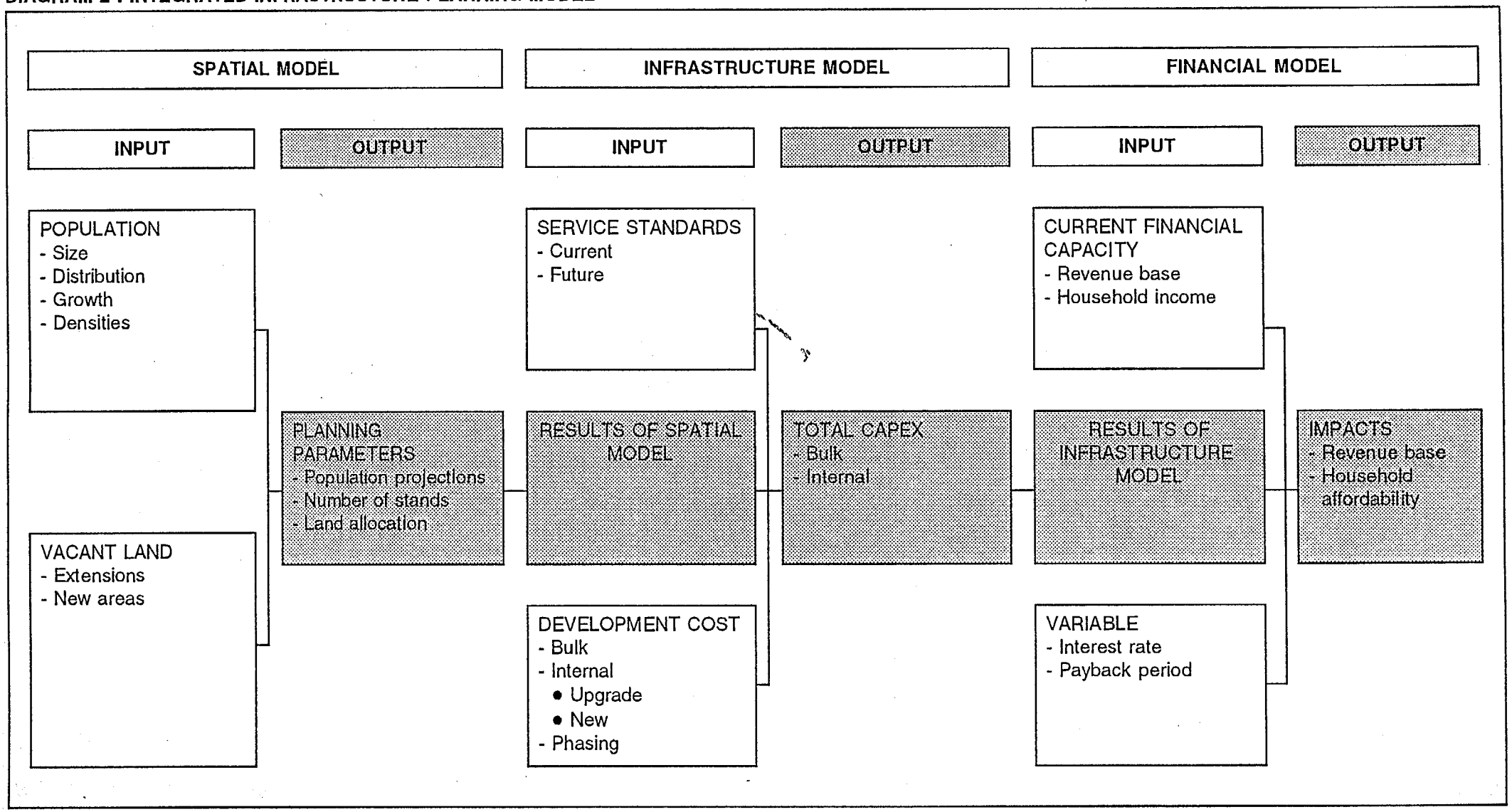
A detailed **technical description** of the financial model is provided in Annexure D.

4.1.4 Other aspects

An important aspect regarding the model is that it is **dynamic** in **nature**. This is illustrated by the fact that it can be updated to take account of changing development conditions and that it can be used to simulate the cost and financing implications of various investment scenario's.

The structure of the model and the interrelationships between the various elements of the model are portrayed in Diagram Two.

DIAGRAM 2 : INTEGRATED INFRASTRUCTURE PLANNING MODEL



4.2 INVESTMENT SCENARIO

The rest of this section describes the results of a **specific infrastructure investment scenario** that was simulated with the aid of the computerised planning model.

The scenario is based on conservative, yet realistic assumptions and estimations of input variables. The results are discussed in terms of the **output** of the three models comprising the integrated infrastructure planning model. Important **assumptions** and **input** variables are also discussed where applicable.

4.2.1 Spatial indicators

The number of additional stands required over the next five years - as a result of urban growth at the various existing areas and new development nodes are indicated in Table 4.1.

TABLE 4.1: ACCUMULATIVE TOTAL LAND BUDGET FOR YEAR 2000

ZONE NO.	URBAN AREA	ADDITIONAL STANDS REQUIRED AT CURRENT DENSITIES	ALLOCATION OF STANDS	
			EXPANSIONS	NEW DEVELOPMENTS
1	KaNyamazane	2 546	358	
2	Msogwaba	1 780	1 246	
3	Clau-Clau	2 418	1 741	
4	Gutshwa-Ngodini	1 546		
5	KaBokweni	924	1 113	
6	Nelspruit	2 955	2 300	
7	White River/ Tekwane	663	559	3 078
8	Oewersig			1 064
9	Rocky's Drift			227
10	Plaston			872
11	Boschrand			817
12	Matsulu	2 913		2 330
TOTAL AREA		15 745	7 357	8 388

Source: Urban Econ/Capricon database

From the information in Table 4.1 it is clear that a total number of 15 745 stands will have to be developed in the study area to accommodate the population growth of the next five years. Approximately 47% of these stands (7 357) can be developed in natural expansion areas of existing settlements while the rest (8 388) will have to be developed at new development nodes.

Refer to Annexure B for a detailed description of the assumptions and variables underlying these planning results, as well as the various tables containing the detail spatial results per settlement.

4.2.2 Infrastructure cost

The accumulative investment cost (over the next five years) related to the upgrading of the **bulk infrastructure** supply systems to levels that will be adequate to serve in the future demand, is depicted in Table 4.2. These estimates are based on a detailed assessment of the existing capacity of bulk infrastructure systems, the expected future demand for bulk services and the cost (in constant 1995 monetary values) of upgrading existing systems and developing new infrastructure where necessary.

TABLE 4.2: ACCUMULATIVE BULK INFRASTRUCTURE DEVELOPMENT COST

ZONE	Cost (R)
Zone 1 : Nelspruit	R 76 415 001
Zone 2 : White River	R 39 300 000
Zone 3 : KaBokweni	R102 350 000
Zone 4 : KaNyamazane	R 76 649 999
Zone 5 : Matsulu	R 15 500 000
TOTAL	**R310 215 000**

Source : Urban-Econ and Capricon database

Regarding the cost of the development of **internal infrastructure networks** a distinction is made between the **upgrading** of current infrastructure levels at existing settlements and the cost of developing infrastructure on **new stands** in the expansion areas and new development areas.

For the purpose of the specific investment scenario that was simulated, the current levels of infrastructure in existing settlements has been raised by one level for most of the low-income communities currently served by minimum and basic service levels. (See Table 4.3). Regarding KaNyamazane and KaBokweni, which are generally serviced at intermediate to high standards, only water infrastructure (in the case of KaNyamazane) and storm water infrastructure (in the case of KaNyamazane) are scheduled for upgrading. In the case of Matsulu both water, sanitation and stormwater drainage are considered for upgrading. Nelspruit and White River are already serviced at full standards and are therefore not considered for upgrading.

TABLE 4.4: UPGRADING COSTS FOR INHABITED AREAS (RANDS PER HECTARE)

LEVEL OF UPGRADING	COST PER SERVICE TYPE (Rands per ha)				
	WATER	SANITATION	ROADS	STORM WATER	ELECTRICITY
1 to 2	13 200	2 500	19 900	4 800	3 000
1 to 3	29 100	25 000	34 100	8 400	12 000
1 to 4	42 300	50 000	62 000	15 600	45 000
2 to 3	15 900	22 500	25 000	3 600	10 000
2 to 4	29 100	45 000	45 000	10 800	37 000
3 to 4	13 200	30 000	42 100	7 200	35 000

Source : Urban-Econ/Capricon database

The cost per hectare of upgrading existing areas are depicted in Table 4.4.

By relating the projected standards of upgrading (Table 4.3) to the cost per upgrading (Table 4.4) the total cost of upgrading the internal infrastructure, networks of existing towns and settlements can be determined. The total accumulative cost of upgrading up to the year 2000 is reflected in Table 4.5.

TABLE 4.3 : PRESENT AND FUTURE SERVICE LEVELS

Zone No.	Settlement name	Present service levels						Future service levels					
		Water	Sani-tation	Roads	Stormwater drainage	Elec-tricity	Solid waste disposal	Water	Sani-tation	Roads	Stormwater drainage	Elec-tricity	Solid waste disposal
1	KANYAMAZANE												
1A	KaNyamazane	3	4	3	3	4	3	4	4	3	3	4	3
2	MSOGWABA												
2A	Pienaar	2	1	1	2	2	1	3	2	2	3	3	2
2B	Daantjie	2	1	1	2	2	1	3	2	2	3	3	2
3	CLAU-CLAU												
3A	Newscom	2	1	1	1	2	1	3	2	2	2	3	2
3B	Zwelitsha	2	1	1	1	2	1	3	2	2	2	3	2
3C	Clau-Clau	2	1	1	1	2	1	3	2	2	2	3	2
3D	Ngodini	2	1	1	1	2	1	3	2	2	2	3	2
4	GUTSHWA-NGODINI												
4A	Gutshwa	2	1	1	1	2	1	3	2	2	2	3	2
4C	Mpumalanga	2	1	1	1	1	1	3	2	2	2	2	2
4D	Phatwa	2	1	1	1	2	1	3	2	2	2	3	2
4E	Dwaleni	2	1	1	1	2	1	3	2	2	2	3	2
4	KABOKWENI												
4B	KaBokweni	4	4	3	2	4	3	4	4	3	3	4	3
5	NELSPRUIT												
	Nelspruit	4	4	4	4	4	4	4	4	4	4	4	4
6	WHITE RIVER												
	White River	4	4	4	4	4	4	4	4	4	4	4	4
12	MATSULU												
	Matsulu	3	3	3	2	3	3	4	4	3	3	3	3

TABLE 4.5: TOTAL ACCUMULATIVE COST OF UPGRADING PER SETTLEMENT (1996-2000)

Zone No.	Settlement name	Estimated cost of upgrading
	NELSPRUIT	
5	Nelspruit	0
	WHITE RIVER	
6	White River	0
	CLAU-CLAU	
3A	Newscom	10 237 900
3B	Zwelitsha	16 382 755
3C	Clau-Clau	25 708 940
3D	Ngodinl	7 537 810
	GUTSHWA-NGODINI	
4A	Gutshwa	32 166 140
4C	Mpumalanga	2 991 295
4D	Phathwa	3 346 710
4E	Dwaleni	5 557 720
	KABOKWENI	
4B	KaBokweni	702 365
	KANYAMAZANE	
1A	KaNyamazane	4 705 210
	MSOGWABA	
2A	Pienaar	14 166 740
2B	Daantjie	61 840 575
	MATSULU	
	Matsulu	15 594 675
		200 938 835

Source: Urban Econ/Capricon database

The cost of developing infrastructure on **new stands** in expansion areas and new development nodes was determined in similar fashion. The results are presented in Table 4.6.

TABLE 4.6: TOTAL ACCUMULATIVE COST OF NEW DEVELOPMENTS

Zone No.	Settlement name	Estimated cost
	NELSPRUIT	
5A	Nelspruit West	8 258 046
5B	Nelspruit South	9 714 898
5C	Nelspruit East	8 365 394
	OEWERSIG	
8A	Oewersig A	12 224 436
8B	Oewersig B	
	BOSCHRAND	
11	Boschrand	9 345 915
	WHITE RIVER	
6A	White River South	2 883 146
6B	White River West	2 531 494
6C	White River East	3 234 798
	ROCKY'S DRIFT	
9	Rocky's Drift Res.	1 782 014
	CLAU-CLAU	
3E	Clau-Clau North	4 412 658
3F	Clau-Clau South	4 288 769
3G	Zwelitsha South	9 082 100
3H	Clau-Clau West	827 374
	GUTSHWA-NGODINI	
4F	Gutshwa West	5 819 699
4G	Gutshwa East	5 646 222
4H	Backdoor	825 690
	PLASTON	
10	Plaston A	2 797 047
10A	Plaston B	2 797 047
10B		
	KANYAMAZANE	
1B	Tekwane East	3 519 680
	MSOGWABA	
2C	Aldie	5 288 300
2D	Intersection	1 983 113
2E	Western Extension	1 542 420
2F	Eastern Extension	5 685 042
2G	Southern Extension	371 459
	TEKWANE	
7A	Tekwane North	9 752 595
7B	Tekwane West	10 730 650
7C	Tekwane South	8 949 035
7D	Karino	
	MATSULU	
	Matsulu	18 312 515
	TOTAL	R160 971 548

Source: Urban Econ/Capricon database

The accumulative total cost of all upgrading, new developments and bulk infrastructure development for the study area amount to R672 125 388 for the five year planning period.

In Annexure C a detailed description is provided of the assumptions and variables underlying the infrastructure model. Various tables, containing the detail results per service type and settlement are also included in Annexure C.

4.2.3 Financial implications

In Table 4.7 the impact is demonstrated of financing the investment scenario under the assumption that all investments (upgrading, new sites and bulk infrastructure) are borne by the local authorities and the households in the study area. The table translates the investments required (as discussed in section 4.2.2.2) into additional annual recurring costs - comprising the debt service and operations and maintenance costs.

The financial impact of the proposed investments is then examined by expressing the recurring costs as percentage increases required on the joint 1994/95 revenue base of the local authorities in the area. The affordability of these investments are also assessed in terms of the impact on disposable household income in the area.

A detailed explanation of the composition of Table 4.7 follows below:

a) "Investment cost"-The estimated needs phased in instalments over five years. In the model certain of the infrastructure investments are phased over longer periods. However, since the planning period of this investment profile is only five years, only the investments that will be undertaken during the first five years are shown here.

b) "Cumulative costs"- The annual investment cost accumulated at each year end to facilitate in the calculation of the estimated debt service and operations and maintenance costs.

c) "Debt service" - The interest and capital redemption charges assuming the investment is financed by borrowing, repayable over 20 years.

d) "Operations and maintenance"- The additional costs resulting from new infrastructure and calculated on the basis of current operations and maintenance cost levels in the area.

e) "Total recurring costs" - The aggregate of the debt service and operations and maintenance cost.

f) "Total revenues"- The existing aggregate operational income budget of the Lowveld and Escarpment RSC and the Town Councils of Nelspruit and White River (1995 monetary values).

g) "Total household disposable income"- The income of households afterdeduction of personal income tax calculated at R72 000 per annum for Nelspruit and White River, R20 300 for KaNyamazane and its associated urban settlements and R24 000 for all the rest of the settlements comprising the study area. Although the figures for the low-income communities may appear high, at first glance, they have been calculated from and confirmed with various official sources.

h) All calculations in Table 4.7 are in constant 1995 monetary values.

TABLE 4.7: FINANCIAL IMPACT OF INVESTMENT SCENARIO FOR GNWRA

ITEM	(R1000)				
	1996	1997	1998	1999	2000
Investment Cost	137 695	123 216	153 644	142 660	114 910
Cumulative Cost	15 353	260 911	414 555	557 216	672 125
Debt Service	16 085	26 438	40 745	50 811	57 139
Operations and maintenance		15 641	15 428	15 660	15 771
Total recurring costs	**31 438**	**42 079**	**56 172**	**66 471**	**72 910**
Total revenues	**130 000**				
Total Household disposable income	**903 418**	**964 409**	**1 022 148**	**1 118 650**	**1 226 194**
Impacts:					
a) % increase in revenue required to finance total recurring cost	24.18%	32.37%	43.21%	51.13%	56.08%
b) % impact of total recurring cost on total household income	3.48%	4.36%	5.50%	5.94%	5.95%

Source: Urban Econ/Capricon database.

4.3 FINDINGS

The following findings are based on the data and investment scenario generated by the model and other assessments made during the course of the study:

- More than 52% of the population living in the settlements included in the analysis have seriously deficient levels of service (level 1 or 2) for all types of basic infrastructure. This represents approximately 157 000 people who are inadequately serviced.

- Total investment requirements for the study area over the next five years to address existing deficiencies and future demand for infrastructure services, are estimated to amount to more than R672 million. The phasing of these investments are indicated in Table 4.7.

- By the fifth year, investments at the service levels chosen for this investment scenario (upgrading, new sites and bulk infrastructure) would require a real increase in total gross revenues of the local authorities serving the area, of about 56% more than those currently generated. This implies a significant burden which will, in all likelihood, require extensive external funding.

- The impact of these investments on the households in the area, expressed as a percentage of the total household disposable income, amounts to 3.5% in 1996 and increases steadily to 6.0% by the year 2000. This impact is based upon the assumption that all households would contribute in terms of the payment of sales tariffs. The situation in the study area is that services are currently being provided on a non-recovery basis in low-income communities. If it is assumed that only the residents of Nelspruit and White River (the high-income communities) are paying for services rendered, the burden of the 1996 investments would amount to 4.7% of the household income of those two areas, increasing to 8.4% by the year 2000. The aforegoing indicates that the real income of households will on average have to increase by an additional 3.5 to 8.4 percentage points per year by the year 2000 to afford these investments while maintaining current living standards. The fact that net increases in salaries and wages generally average much lower real margins above the inflation rate, indicate that these investments could pose a problem in terms of affordability.

4.4 CONCLUSIONS AND SUGGESTIONS

- It appears that the backlog requirements for addressing deficiencies, together with the investments associated with meeting demand for new site development, will not be affordable if it is to be financed solely from the existing financial capacity of local authorities and households in the area.

- The assumptions of the planning model are already extremely accommodating and cannot be realistically relaxed in a bid to improve affordability:

  - Upgrading of services are only done by one level in the most disadvantages communities.

  - Services at new sites are proposed at similar levels to upgraded areas.

  - Repayment schedules are set at 20 years.

  - Phasing of investments are done over more than five years in most instances.

- In view of the above conclusions, the following options are suggested that could be further investigated to accommodate the financial pressure of the proposed infrastructure investment profile:

a) The broadening of the existing revenue base by means of:

- The phasing-in of sales tariff collections in areas currently marked by non-payment of service tariffs.

- Investigating opportunities for further development and diversification of economic activities in the area. Specific opportunities in this regard are the possible expansion of processing of raw materials (agriculture and forestry), the development of the tourism potential of the Lowveld and the exploitation of export opportunities through the port of Maputo.

b) Active and continuous campaigns to access external (especially international) funding for infrastructure development.

c) Cross-subsidisation of services in low-income communities by communities with a higher income and afordability level. The formation of TLC's represents an important step in setting the scene for applying such measures.

P9402/ADT/hs/FD
29/06/1995

5. ANNEXURES

ANNEXURE A

ANNEXURE A

ECONOMIC GROWTH SCENARIO'S FOR THE GREATER NELSPRUIT AND WHITE RIVER AREAS

INTRODUCTION

Separate economic growth scenarios were developed for the Nelspruit, White River and Nsikazi areas. Due to the non-availability of specific required data on a micro-geographical basis within the Nsikazi subregion, no meaningful projections were possible for KaNyamazane, Kabokweni and Matsulu separately. For purposes of this study, the economic growth rate for Nsikazi as a whole is therefore also assumed for KaNyamazane, Kabokweni and Matsulu.

Two scenarios, namely a high growth and a medium growth scenario were projected for Nelspruit, White River an Nsikazi respectively. A low growth scenario was not included due to the evidently high natural economic growth potential of the area.

METHODOLOGY

The projections are based on three basic elements:

- Historical economic growth on a sectoral basis.
- Identification and interpretation of a number of key factors which area likely to have a significant impact on economic growth and development in the area over the next 5 years.
- Estimation of the impact of the key factors on a sectoral economic basis.

Based on the information obtained form the analysis of these elements, the historical growth rates were adjusted by the expected sectoral impact to arrive at the estimated future growth.

SCENARIOS

Scenario 1 : High growth

Key factor	Positive development effects	Major sectoral impacts
1. Construction of Driekoppies Dam	* Small farmer development (± 7000 farmers) * Dam construction activities	* Agriculture * Construction

2. Advanced farming technology and crop substitution	* Higher quality products * Increased commercial arming output	* Agriculture
3. Full utilisation of Maputo harbour	* Enhanced export opportunities * Upgrading of road/ rail/border post facilities	* Agriculture * Industry * Construction * Trade * Transport * Business services
4. RDP implemented effectively	* Infrastructure services provision on target * Education and health services provision on target * Housing provision on target	* Electricity and water * Construction * Social services
5. Nelspruit as provincial capital	* High growth as service centre * Fast expanding government sector in Nelspruit	* Government * Business services * Trade
6. Tourism potential fully utilised	* New accommodation facilities * Increased spending by tourists * Backward linkages/ input supplies to tourism operators	* Construction * Trade * Transport * Industry * Agriculture

Scenario 2 : Medium growth

In terms of this scenario, a less optimistic view was taken of the key growth factors.

Key factor	Positive development effects	Major sectoral impacts
1. Driekoppies Dam constructed but related farmer development not optimised	* Small farmer development below full potential * Construction activities	* Agriculture * Construction
2. Farming technology constant with no crop substitution	None	None
3. Maputo harbour not operational	None	None

4. RDP implementation not fully effective	* Infrastructure services provision below target * Educational and health services provision below target * Housing provision below target	* Electricity and water * Construction * Social services
5. Nelspruit as provincial capital	* Moderate growth as service centre * Government sector grows moderately * Declining government sector in Nsikazi	* Government * Business services * Trade
6. Tourism potential not fully utilised	* Moderate increase in tourist numbers * Impact in terms of backward linkages	* Trade * Transport * Industry * Agriculture

PROJECTIONS

GGP FOR THE STUDY AREA (At constant 1985 prices) R'000

SECTOR	1980				1990				% Growth 1980 - 1990			
	Nelspruit	Nsikazi	White River	Total	Nelspruit	Nsikazi	White River	Total	Nelspruit	Nsikazi	White River	Total
Agriculture	52442	10064	19892	82398	73548	13559	23584	110691	3.4	3.0	1.7	3.0
Mining	4789	340	180	5309	3446	274	141	3861	-3.2	-2.1	-2.4	-3.1
Industry	92713	10331	17228	120272	174306	16985	32392	223683	6.5	5.1	6.5	6.4
Electricity,water	10487	13	955	11455	15729	26	2289	18044	4.1	7.2	9.1	4.6
Construction	17672	7761	1488	26921	43361	5459	3654	52474	9.4	-3.5	9.4	6.9
Trade	52244	3536	14377	70157	84516	4338	20933	109787	4.9	2.1	3.8	4.6
Transport	41106	4227	7926	53259	47663	9769	9986	67418	1.5	8.7	2.3	2.4
Business services	35204	1837	7037	44078	47879	2083	12100	62062	3.1	1.3	5.6	3.5
Social services	2504	6025	230	8759	3585	10652	488	14725	3.7	5.9	7.8	5.3
Government services	39340	14344	14295	67979	51374	34285	23169	108828	2.7	9.1	4.9	4.8
Other	3398	495	4476	8369	7000	903	8825	16728	7.5	6.2	7.0	7.2
TOTAL	351899	58973	88084	498956	552407	98333	137561	788301	4.6	5.2	4.6	4.7

EXPECTED REAL GROWTH IN GGP UNDER VARIOUS SCENARIO'S (1990 - 2000)

SECTOR	% Scenario 1			% Scenario 2		
	Nelspruit	Nsikazi	White River	Nelspruit	Nsikazi	White River
Agriculture	4.0	8.0	3.0	3.0	4.0	2.5
Mining	-0.1	0.0	0.0	-0.1	0.0	0.0
Industry	8.0	3.0	7.0	6.0	2.0	6.0
Electricity,water	5.5	4.0	5.0	4.5	3.0	3.5
Construction	8.0	7.0	7.0	6.0	5.0	5.0
Trade	7.0	3.0	6.5	5.0	2.0	4.5
Transport	6.0	9.0	5.0	3.0	5.0	3.0
Business services	4.0	2.0	4.0	3.0	1.0	2.5
Social services	7.5	6.0	7.5	4.5	4.0	4.5
Government services	9.0	0.0	5.0	7.0	0.0	4.5
Other	6.0	4.0	5.0	4.5	3.0	3.5

RESULTS

PROJECTED GGP FOR THE STUDY AREA (At constant 1985 prices) R'000

SECTOR	Scenario 1 : 2000				Scenario 2 : 2000			
	Nelspruit	Nsikazi	White River	Total	Nelspruit	Nsikazi	White River	Total
Agriculture	108869	29273	31695	169837	98842	20071	30190	149103
Mining	3412	274	141	3827	3412	274	141	3827
Industry	376314	22826	63720	462860	312155	20705	58009	390869
Electricity, water	26867	38	3729	30634	24427	35	3229	27690
Construction	93613	10739	7188	111540	77653	8892	5952	92497
Trade	166256	5830	39294	211380	137668	5288	32508	175464
Transport	85357	23127	16266	124750	64055	15913	13420	93388
Business services	70873	2539	17911	91323	64345	2301	15489	82135
Social services	7389	19076	1006	27471	5567	15768	758	22093
Government services	121621	34285	37740	193646	101060	34285	35981	171326
Other	12536	1337	14375	28248	10871	1214	12449	24533
TOTAL	1073106	149344	233064	1455514	900056	124744	208125	1232925

PROJECTED ECONOMIC GROWTH RATE PER AREA

	Nelspruit	Nsikazi	White River	Total
Scenario 1	6.9	4.3	5.4	6.3
Scenario 2	5.0	2.4	4.2	4.6

ANNEXURE B

ANNEXURE B: SPATIAL MODEL

INTRODUCTION

Orientation

The spatial model represents the first of the three inter-related and sequentially linked elements of the integrated infrastructure planning model that was developed for the study area (the other elements being the infrastructure cost and financial models).

Objectives

The main purpose of the spatial model is to quantify the needs of the growing population for residential land and to determine a spatial development pattern (for developing vacant land identified for this purpose) that will effectively address these needs and result in an improved urban structure in the study area.

Approach

The spatial model was formulated through:

- Consultation with local expertise
- Utilisation of existing publicized secondary information
- Application of the consultants' own intimate knowledge of the study area
- Taking cognisance of other development studies in progress in the area
- Giving specific attention to the development policies of the provincial government.

METHODOLOGY

Basic Principles

The planning model is based on the following principles:

- Data is collated in matrix format on a spreadsheet allowing for computerised calculation and cross references.

- Inputs of existing data such as population figures serves as the main information basis on which projections and planning are based. A change in a specific input value will result in new information.

- The model is dynamic in nature, allowing for changes in development policies, prioritisation of development needs and changing circumstances.

- A five year planning period (1996-2000) is used.

Information Inputs (base input)

The following categories of existing information serve as inputs in the model:

- ***Population Figures per Settlement.*** Due to the non-availability of a single reliable source of population figures, the following sources were applied together to determine reliable base population figures:
  - 1980 Central Statistical Service DBSA
  - 1990 Central Statistical Service
  - Aerial Photography by Human Sciences Research Council
  - Revision of Information by former KaNgwane Government
  - 1994 Central Statistical Service
  - Recalculation by former KaNgwane Government
  - Aerial Photography

- ***Number of Stands.*** The number of residential stands were calculated for each settlement (1990 and 1994) using aerial photography.

- ***Gross Area.*** The gross area (hectare) for each settlement was calculated for 1990 and 1994.

Indicator Outputs

From the above information inputs the following indicators were calculated per settlement to be used for projection purposes:

- ***Growth Indicators.*** Average annual growth in population, area and number of stands (1990 to 1994) by using the compound growth rate formula.

- ***Population Densities.*** Past and present (1990, 1994) number of people per stand.

- ***Residential Densities.*** Calculated as number of stands per hectare (gross).

Projection Outputs

Through applying the indicator outputs to the base input the model yields the following projection outputs per year and per settlement:

- ***Population.*** Population projections for the year 1996 to 2000.
- ***Additional Stands Required.*** Projected number of additional stands required at current population densities for the period 1996 to 2000.
- ***Additional Area Required.*** Project additional hectares required at different gross and net residential densities for the year 1996 to 2000.

Projection Variables

The projection outputs of the model are dependent on a number of assumptions that warrant classification:

- Historical population growth rates (1990-1994) for the various settlements are assumed to remain unchanged over the projected period.
- No further densification of existing settlements will take place. Growth will be absorbed by expansions and new development nodes.
- Current residential densities of existing settlements (stands per gross hectare) are assumed to apply unchanged to the corresponding expansion areas.
- Population densities are assumed to change over time.
- Newly developable areas are assumed to have different densities.
- The ratio's of net to gross residential densities differ among the various settlements and were determined by the consultants based on their knowledge of the study area.

Land Allocation

The projected outputs of the model (required land area) are allocated to the identified expansion areas and new development areas in a manner that will contribute to an improved urban structure in the study area.

For this purpose a land allocation matrix was developed to distributed the future population to certain selected areas. The land allocation matrix was developed by taking the following aspects into account:

- Population distribution trends
- Population migration trends
- Urban capacities
- Equilibrium land allocation to accommodate growth.

RESULTS

The spatial results of the indicative investment scenario that was simulated with the aid of the model, appear in the following Tables: B-1 to B-26.

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

Calculation of growth rates

ZONES	SETTLEMENT	POPULATION			GROSS AREA (HA)			NUMBER OF STANDS			DENSITY People/stand		GROSS DENSITY Stands/ha		EXPECTED AVERAGE GROWTH NEXT 5 YRS.
		1990	1994	Calculated growth rate (past 4 yrs.)	1990	1994	Calculated growth rate (past 4 yrs.)	1990	1994	Calculated growth rate (past 4 yrs.)	1990	1994	1990	1994	
	EXISTING SETTLEMENTS														
ZONE 1:	KANYAMAZANE														
1A	KaNyamazane	37000	46900	6.1%	620	713	3.6%	5185	5962	3.6%	7.1	7.9	8.4	8.4	6.1%
	SUB-TOTAL	37000	46900	6.1%	620	713	3.6%	5185	5962	3.6%	7.1	7.9	8.4	8.4	
ZONE 2:	MSOGWABA														
2A	Pienaar	19108	20016	1.2%	420	440	1.2%	3072	3218	1.2%	6.2	6.2	7.3	7.3	1.2%
2B	Daantjie	51773	57475	2.6%	1730	1921	2.6%	8218	9123	2.6%	6.3	6.3	4.8	4.8	2.6%
	SUB-TOTAL	70881	77491	2.3%	2150	2360	2.4%	11290	12341	2.3%	6.3	6.3	5.3	5.2	
ZONE 3:	CLAU-CLAU														
3A	Newscom	3689	4798	6.8%	240	312	6.8%	732	952	6.8%	5.0	5.0	3.1	3.1	6.8%
3B	Zwelitsha	12097	16900	7.1%	380	499	7.1%	1902	2600	7.1%	6.4	6.4	5.0	5.0	7.1%
3C	Clau-clau	17143	18926	2.5%	710	784	2.5%	2578	2846	2.5%	6.6	6.7	3.6	3.6	2.5%
3D	Ngodini	9869	10800	2.3%	210	230	2.3%	1484	1624	2.3%	6.7	6.7	7.1	7.1	2.3%
	SUB-TOTAL	42798	50424	4.2%	1540	1825	4.3%	6696	7922	4.3%	6.4	6.4	4.3	4.3	
ZONE 4:	GUTSHWA-NGODINI														
4A	Gutshwa	16113	19038	4.3%	830	981	4.3%	2578	3046	4.3%	6.3	6.3	3.1	3.1	4.3%
4C	Mpumalanga	1494	1526	0.5%	100	102	0.5%	239	244	0.5%	6.3	6.3	2.4	2.4	0.5%
4D	Phatwa	1711	2494	9.9%	70	102	9.9%	236	344	9.9%	7.3	7.3	3.4	3.4	9.9%
4E	Owaleni	4244	5532	6.9%	130	169	6.8%	646	842	6.8%	6.6	6.6	5.0	5.0	6.9%
	SUB-TOTAL	23562	28589	5.0%	1130	1354	4.6%	3699	4476	4.9%	6.4	6.4	3.3	3.3	
ZONE 4:	KABOKWENI														
4B	Kabokweni	17241	21551	5.7%	340	391	3.5%	2025	2324	3.5%	8.5	9.3	6.0	5.9	5.7%
	SUB-TOTAL	17241	21551	5.7%	340	391	3.5%	2025	2324	3.5%	8.5	9.3	6.0	5.9	
ZONE 5	NELSPRUIT														
5	Nelspruit	18800	24600	7.0%	2000	2030	0.4%	4658	5947	6.3%	4.0	4.1	2.3	2.9	7.0%
	SUB-TOTAL	18800	24600	7.0%	2000	2030	0.4%	4658	5947	6.3%	4.0	4.1	2.3	2.9	
ZONE 6	WHITE RIVER														
6	White River	4775	5577	4.0%	611	662	2.0%	2316	2530	2.2%	2.1	2.2	3.8	3.8	4.0%
	SUB-TOTAL	4775	5577	4.0%	611	662	2.0%	2316	2530	2.2%	2.1	2.2	3.8	3.8	
ZONE 12	MATSULU / KAAPMUIDEN														
12	Matsulu/Kaapmuiden	33896	42954	6.1%	583	666	3.4%	5974	6829	3.4%	5.7	6.3	10.2	10.3	6.1%
	SUB-TOTAL	33896	42954	6.1%	583	666	3.4%	5974	6829	3.4%	5.7	6.3	10.2	10.3	
	TOTAL	248953	298086	4.6%	8974	10002	2.7%	41843	48331	3.7%	5.9	6.2	4.7	4.8	4.6%

Table B1

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

YEAR = 1995

ZONES	Settlement	Expected Population	Stands required at current densities (People per stand)		Area required at current gross densities (Stands / ha)		Area required at nett densities of x stands / ha
			Total Stands	Additional Stands	Total Area (ha)	Additional Area (ha)	Additional area (ha)
	EXISTING SETTLEMENTS						
ZONE 1:	KANYAMAZANE						
1A	KaNyamazane	49764	6326	364	757	44	24
	SUB-TOTAL	49764	6326	364	757	44	24
ZONE 2:	MSOGWABA						
2A	Plenaar	20250	3256	38	445	5	4
2B	Daantjie	58996	9364	241	1971	51	24
	SUB-TOTAL	79246	12620	279	2416	56	28
ZONE 3:	CLAU-CLAU						
3A	Newscom	5124	1017	65	333	21	6
3B	Zwelitsha	17025	2677	177	535	35	18
3C	Clau-clau	19400	2917	71	803	20	7
3D	Ngodini	11046	1661	37	235	5	4
	SUB-TOTAL	52595	8272	350	1907	81	35
ZONE 4:	GUTSHWA-NGODINI						
4A	Gutshwa	19849	3176	130	1022	42	13
4C	Mpumalanga	1533	245	1	103	1	0
4D	Phatwa	2740	378	34	112	10	3
4E	Dwaleni	5911	900	58	181	12	6
	SUB-TOTAL	30033	4699	223	1418	64	22
ZONE 4:	KABOKWENI						
4B	Kabokweni	22787	2457	133	413	22	9
	SUB-TOTAL	22787	2457	133	413	22	9
ZONE 5	NELSPRUIT						
5	Nelspruit	26311	6361	414	2171	141	28
	SUB-TOTAL	26311	6361	414	2171	141	28
ZONE 6	WHITE RIVER						
6	White River	5798	2630	100	688	26	7
	SUB-TOTAL	5798	2630	100	688	26	7
ZONE 12	MATSULU / KAAPMUIDEN						
12	Matsulu/Kaapmuiden	45574	7246	417	707	41	28
	SUB-TOTAL	45574	7246	417	707	41	28
	TOTAL A	312107	50610	2279	10477	475	180

Table B2

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

YEAR = 1995

ZONES	Settlement	Expected Population	Stands required at current densities (People per stand)		Area required at current gross densities (Stands / ha)		Area required at nett densities of x stands / ha
			Total Stands	Additional Stands	Total Area (ha)	Additional Area (ha)	Additional area (ha)
EXPANSION OF SETTLEMENTS AND NEW DEVELOPMENT NODES : ALLOCATION AND LAND BUDGET							
ZONE 1:	KANYAMAZANE						
1B	Tekwane East			53			4
	SUB-TOTAL			53			4
ZONE 2:	MSOGWABA						
2C	Aldie			67			7
2D	Intersection			25			3
2E	Western Extension			20			2
2F	Eastern Extension			78			8
2G	Southern Extension			6			1
	SUB-TOTAL			195			20
ZONE 3:	CLAU-CLAU						
3E	Clau-clau North			56			6
3F	Clau-clau South			59			6
3G	Zwelitsha South			126			13
3H	Clau-clau West			10			1
	SUB-TOTAL			252			25
ZONE 4:	KABOKWENI						
4F	Gutshwa West			73			7
4G	Gutshwa East			78			8
4H	Backdoor			9			1
	SUB-TOTAL			160			16
ZONE 5	NELSPRUIT						
5A	Nelspruit West			108			14
5B	Nelspruit South			108			14
5C	Nelspruit East			108			14
	SUB-TOTAL			324			41
ZONE 6	WHITE RIVER						
6A	White River South			30			4
6B	White River West			30			4
6C	White River East			30			4
	SUB-TOTAL			90			11
	TOTAL B			1074			116

Table B3

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

YEAR = 1995

ZONES	Settlement	Expected Population	Stands required at current densities (People per stand)		Area required at current gross densities (Stands / ha)		Area required at nett densities of x stands / ha
			Total Stands	Additional Stands	Total Area (ha)	Additional Area (ha)	Additional area (ha)
	NEW DEVELOPMENT NODES						
7A	Tekwane North			157			10
7B	Tekwane West			149			10
7C	Tekwane South			139			9
7D	Karino						
8A	Oewersig A			152			12
8B	Oewersig B						
9	Rocky's Drift Res.			33			2
10A	Plaston A			63			4
10B	Plaston B			63			4
11	Boschrand			116			15
12	Matsulu/Kaapmuiden			333			22
	TOTAL C			1205			89
	TOTAL B+C			2279			205

Table B4

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

YEAR = 1996

ZONES	Settlement	Expected Population	Stands required at current densities (People per stand) Total Stands	Stands required at current densities (People per stand) Additional Stands	Area required at current gross densities (Stands / ha) Total Area (ha)	Area required at current gross densities (Stands / ha) Additional Area (ha)	Area required at nett densities of x stands / ha Additional area (ha)
	EXISTING SETTLEMENTS						
ZONE 1:	KANYAMAZANE						
1A	KaNyamazane	52803	6712	386	803	46	26
	SUB-TOTAL	52803	6712	386	803	46	26
ZONE 2:	MSOGWABA						
2A	Plenaar	20486	3294	38	450	5	4
2B	Daantjie	60557	9612	248	2024	52	25
	SUB-TOTAL	81043	12906	286	2474	57	29
ZONE 3:	CLAU-CLAU						
3A	Newscom	5472	1086	69	356	23	7
3B	Zwelitsha	18229	2866	189	573	38	19
3C	Clau-clau	19886	2990	73	824	20	7
3D	Ngodini	11298	1699	38	240	5	4
	SUB-TOTAL	54884	8641	369	1993	86	37
ZONE 4:	GUTSHWA-NGODINI						
4A	Gutshwa	20694	3311	135	1066	44	14
4C	Mpumalanga	1541	247	1	103	1	0
4D	Phatwa	3011	415	37	123	11	4
4E	Dwaleni	6316	961	62	193	12	6
	SUB-TOTAL	31562	4934	235	1486	68	24
ZONE 4:	KABOKWENI						
4B	Kabokweni	24095	2598	141	437	24	9
	SUB-TOTAL	24095	2598	141	437	24	9
ZONE 5	NELSPRUIT						
5	Nelspruit	28140	6803	442	2322	151	29
	SUB-TOTAL	28140	6803	442	2322	151	29
ZONE 6	WHITE RIVER						
6	White River	6027	2734	104	715	27	7
	SUB-TOTAL	6027	2734	104	715	27	7
ZONE 12	MATSULU/KAAPMUIDEN						
12	Matsulu/Kaapmuiden	48354	7687	442	750	43	29
	SUB-TOTAL	48354	7687	442	750	43	29
	TOTAL A	326908	53016	2406	10979	502	190

Table B5

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

YEAR = 1996

ZONES	Settlement	Expected Population	Stands required at current densities (People per stand)		Area required at current gross densities (Stands / ha)		Area required at nett densities of x stands / ha Additional area (ha)
			Total Stands	Additional Stands	Total Area (ha)	Additional Area (ha)	
EXPANSION OF SETTLEMENTS AND NEW DEVELOPMENT NODES : ALLOCATION AND LAND BUDGET							
ZONE 1:	KANYAMAZANE						
1B	Tekwane East			55			4
	SUB-TOTAL			55			4
ZONE 2:	MSOGWABA						
2C	Aldie			69			7
2D	Intersection			26			3
2E	Western Extension			20			2
2F	Eastern Extension			80			8
2G	Southern Extension			6			1
	SUB-TOTAL			200			20
ZONE 3:	CLAU-CLAU						
3E	Clau-clau North			59			6
3F	Clau-clau South			63			6
3G	Zwelitsha South			133			13
3H	Clau-clau West			11			1
	SUB-TOTAL			266			27
ZONE 4:	KABOKWENI						
4F	Gutshwa West			78			8
4G	Gutshwa East			82			8
4H	Backdoor			9			1
	SUB-TOTAL			170			17
ZONE 5	NELSPRUIT						
5A	Nelspruit West			115			14
5B	Nelspruit South			115			14
5C	Nelspruit East			115			14
	SUB-TOTAL			346			43
ZONE 6	WHITE RIVER						
6A	White River South			31			4
6B	White River West			31			4
6C	White River East			31			4
	SUB-TOTAL			94			12
	TOTAL B			1130			122

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

YEAR = 1996

ZONES	Settlement	Expected Population	Stands required at current densities (People per stand)		Area required at current gross densities (Stands / ha)		Area required at nett densities of x stands / ha Additional area (ha)
			Total Stands	Additional Stands	Total Area (ha)	Additional Area (ha)	
	NEW DEVELOPMENT NODES						
7A	Tekwane North			166			11
7B	Tekwane West			157			10
7C	Tekwane South			147			10
7D	Karino						
8A	Oewersig A			161			12
8B	Oewersig B						
9	Rocky's Drift Res.			35			2
10A	Plaston A			66			4
10B	Plaston B			66			4
11	Boschrand			124			15
12	Matsulu/Kaapmuiden			354			24
	TOTAL C			1276			94
				2406			216

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

YEAR = 1997

ZONES	Settlement	Expected Population	Stands required at current densities (People per stand) Total Stands	Additional Stands	Area required at current gross densities (Stands / ha) Total Area (ha)	Additional Area (ha)	Area required at nett densities of x stands / ha Additional area (ha)
	EXISTING SETTLEMENTS						
ZONE 1:	KANYAMAZANE						
1A	KaNyamazane	56027	7122	410	852	49	27
	SUB-TOTAL	56027	7122	410	852	49	27
ZONE 2:	MSOGWABA						
2A	Plenaar	20725	3332	38	456	5	4
2B	Daantjie	62160	9867	254	2077	54	25
	SUB-TOTAL	82885	13199	293	2533	59	29
ZONE 3:	CLAU-CLAU						
3A	Newscom	5844	1159	74	380	24	7
3B	Zwelitsha	19518	3069	203	613	41	20
3C	Clau-clau	20384	3065	75	844	21	7
3D	Ngodini	11555	1738	39	246	5	4
	SUB-TOTAL	57301	9031	390	2083	91	39
ZONE 4:	GUTSHWA-NGODINI						
4A	Gutshwa	21575	3452	141	1111	45	14
4C	Mpumalanga	1549	246	1	104	1	0
4D	Phatwa	3309	456	41	135	12	4
4E	Dwaleni	6749	1027	66	207	13	7
	SUB-TOTAL	33181	5195	249	1557	71	25
ZONE 4:	KABOKWENI						
4B	Kabokweni	25477	2747	149	462	25	10
	SUB-TOTAL	25477	2747	149	462	25	10
ZONE 5	NELSPRUIT						
5	Nelspruit	30097	7276	473	2484	161	32
	SUB-TOTAL	30097	7276	473	2484	161	32
ZONE 6	WHITE RIVER						
6	White River	6266	2842	108	744	28	7
	SUB-TOTAL	6266	2842	108	744	28	7
ZONE 12	MATSULU/KAAPMUIDEN						
12	Matsulu/Kaapmuiden	51303	8156	469	795	46	31
	SUB-TOTAL	51303	8156	469	795	46	31
	TOTAL A	342537	55569	2541	11510	531	200

Table B8

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

YEAR = 1997

ZONES	Settlement	Expected Population	Stands required at current densities (People per stand) Total Stands	Additional Stands	Area required at current gross densities (Stands / ha) Total Area (ha)	Additional Area (ha)	Area required at nett densities of x stands / ha Additional area (ha)
EXPANSION OF SETTLEMENTS AND NEW DEVELOPMENT NODES : ALLOCATION AND LAND BUDGET							
ZONE 1:	KANYAMAZANE						
1B	Tekwane East			58			4
	SUB-TOTAL	0	0	58	0		4
ZONE 2:	MSOGWABA						
2C	Aldie			70			7
2D	Intersection			26			3
2E	Western Extension			20			2
2F	Eastern Extension			82			8
2G	Southern Extension			6			1
	SUB-TOTAL	0	0	205	0	0	20
ZONE 3:	CLAU-CLAU						
3E	Clau-clau North			62			6
3F	Clau-clau South			66			7
3G	Zwelitsha South			140			14
3H	Clau-clau West			12			1
	SUB-TOTAL	0	0	281	0	0	28
ZONE 4:	KABOKWENI						
4F	Gutshwa West			82			8
4G	Gutshwa East			87			9
4H	Backdoor			10			1
	SUB-TOTAL	0	0	179	0	0	18
ZONE 5	NELSPRUIT						
5A	Nelspruit West			123			15
5B	Nelspruit South			123			15
5C	Nelspruit East			123			15
	SUB-TOTAL	0	0	369	0	0	46
ZONE 6	WHITE RIVER						
6A	White River South			33			4
6B	White River West			33			4
6C	White River East			33			4
	SUB-TOTAL	0	0	98	0	0	12
	TOTAL B	0	0	1190	0	0	129

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

YEAR = 1997

ZONES	Settlement	Expected Population	Stands required at current densities (People per stand)		Area required at current gross densities (Stands / ha)		Area required at nett densities of x stands / ha Additional area (ha)
			Total Stands	Additional Stands	Total Area (ha)	Additional Area (ha)	
	NEW DEVELOPMENT NODES						
7A	Tekwane North			175			12
7B	Tekwane West			166			11
7C	Tekwane South			156			10
7D	Karino			0			0
8A	Oewersig A			171			13
8B	Oewersig B			0			0
9	Rocky's Drift Res.			37			2
10A	Plaston A			70			5
10B	Plaston B			70			5
11	Boschrand			131			16
12	Matsulu/Kaapmulden			375			25
	TOTAL C	0	0	1351	0	0	100
	TOTAL B+C	0	0	2541	0	0	228

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

YEAR = 1998

ZONES	Settlement	Expected Population	Stands required at current densities (People per stand) Total Stands	Additional Stands	Area required at current gross densities (Stands / ha) Total Area (ha)	Additional Area (ha)	Area required at nett densities of x stands / ha Additional area (ha)
	EXISTING SETTLEMENTS						
ZONE 1:	KANYAMAZANE						
1A	KaNyamazane	59449	7557	435	904	52	29
	SUB-TOTAL	59449	7557	435	904	52	29
ZONE 2:	MSOGWABA						
2A	Plenaar	20967	3371	39	461	5	4
2B	Daantjie	63805	10128	261	2132	55	26
	SUB-TOTAL	84772	13499	300	2593	60	30
ZONE 3:	CLAU-CLAU						
3A	Newscom	6240	1238	79	406	26	8
3B	Zwelitsha	20899	3286	217	656	43	22
3C	Clau-clau	20894	3142	77	865	21	8
3D	Ngodini	11819	1777	40	251	6	4
	SUB-TOTAL	59852	9443	412	2179	96	41
ZONE 4:	GUTSHWA-NGODINI						
4A	Gutshwa	22494	3599	147	1159	47	15
4C	Mpumalanga	1557	249	1	104	1	0
4D	Phatwa	3635	501	45	149	13	5
4E	Dwaleni	7211	1098	70	221	14	7
	SUB-TOTAL	34897	5464	264	1633	75	26
ZONE 4:	KABOKWENI						
4B	Kabokweni	26938	2905	158	489	27	11
	SUB-TOTAL	26938	2905	158	489	27	11
ZONE 5	NELSPRUIT						
5	Nelspruit	32189	7782	506	2656	173	34
	SUB-TOTAL	32189	7782	506	2656	173	34
ZONE 6	WHITE RIVER						
6	White River	6514	2955	112	773	29	7
	SUB-TOTAL	6514	2955	112	773	29	7
ZONE 12	MATSULU/KAAPMUIDEN						
12	Matsulu/Kaapmuiden	54433	8654	498	844	49	33
	SUB-TOTAL	54433	8654	498	844	49	33
	TOTAL A	359044	58258	2684	12070	561	211

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

YEAR = 1998

ZONES	Settlement	Expected Population	Stands required at current densities (People per stand)		Area required at current gross densities (Stands / ha)		Area required at nett densities of x. stands / ha
			Total Stands	Additional Stands	Total Area (ha)	Additional Area (ha)	Additional area (ha)
EXPANSION OF SETTLEMENTS AND NEW DEVELOPMENT NODES : ALLOCATION AND LAND BUDGET							
ZONE 1:	KANYAMAZANE						
1B	Tekwane East			61			4
	SUB-TOTAL			61			4
ZONE 2:	MSOGWABA						
2C	Aldie			72			7
2D	Intersection			27			3
2E	Western Extension			21			2
2F	Eastern Extension			84			8
2G	Southern Extension			6			1
	SUB-TOTAL			210			21
ZONE 3:	CLAU-CLAU						
3E	Clau-clau North			66			7
3F	Clau-clau South			70			7
3G	Zwelitsha South			148			15
3H	Clau-clau West			12			1
	SUB-TOTAL			297			30
ZONE 4:	KABOKWENI						
4F	Gutshwa West			87			9
4G	Gutshwa East			92			9
4H	Backdoor			11			1
	SUB-TOTAL			190			19
ZONE 5	NELSPRUIT						
5A	Nelspruit West			131			16
5B	Nelspruit South			131			16
5C	Nelspruit East			131			16
	SUB-TOTAL			393			49
ZONE 6	WHITE RIVER						
6A	White River South			34			4
6B	White River West			34			4
6C	White River East			34			4
	SUB-TOTAL			102			13
	TOTAL B			1253			136

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

YEAR = 1998

ZONES	Settlement	Expected Population	Stands required at current densities (People per stand)		Area required at current gross densities (Stands / ha)		Area required at nett densities of x stands / ha Additional area (ha)
			Total Stands	Additional Stands	Total Area (ha)	Additional Area (ha)	
	NEW DEVELOPMENT NODES						
7A	Tekwane North			185			12
7B	Tekwane West			176			12
7C	Tekwane South			164			11
7D	Karino						
8A	Oewersig A			182			14
8B	Oewersig B						
9	Rocky's Drift Res.			39			3
10A	Plaston A			74			5
10B	Plaston B			74			5
11	Boschrand			140			17
12	Matsulu/Kaapmuiden			398			27
	TOTAL C			1432			105
	TOTAL B+C			2684			241

Table B13

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

YEAR = 1999

ZONES	Settlement	Expected Population	Stands required at current densities (People per stand) Total Stands	Stands required at current densities (People per stand) Additional Stands	Area required at current gross densities (Stands / ha) Total Area (ha)	Area required at current gross densities (Stands / ha) Additional Area (ha)	Area required at nett densities of x stands / ha Additional area (ha)
	EXISTING SETTLEMENTS						
ZONE 1:	KANYAMAZANE						
1A	KaNyamazane	63079	8019	461	959	55	31
	SUB-TOTAL	63079	8019	461	959	55	31
ZONE 2:	MSOGWABA						
2A	Pienaar	21212	3410	39	466	5	4
2B	Daantjie	65494	10396	268	2188	56	27
	SUB-TOTAL	86706	13806	307	2665	62	31
ZONE 3:	CLAU-CLAU						
3A	Newscom	6664	1322	84	434	28	8
3B	Zwelitsha	22377	3518	232	703	46	23
3C	Clau-clau	21418	3221	79	887	22	8
3D	Ngodini	12088	1818	41	257	6	4
	SUB-TOTAL	62547	9879	436	2281	101	44
ZONE 4:	GUTSHWA-NGODINI						
4A	Gutshwa	23452	3752	153	1208	49	15
4C	Mpumalanga	1565	250	1	105	1	0
4D	Phatwa	3994	551	50	163	15	5
4E	Dwaleni	7705	1173	75	236	15	8
	SUB-TOTAL	36716	5748	279	1712	80	28
ZONE 4:	KABOKWENI						
4B	Kabokweni	28484	3072	167	517	28	11
	SUB-TOTAL	28484	3072	167	517	28	11
ZONE 5	NELSPRUIT						
5	Nelspruit	34428	8323	541	2841	185	36
	SUB-TOTAL	34428	8323	541	2841	185	36
ZONE 6	WHITE RIVER						
6	White River	6771	3072	117	804	31	8
	SUB-TOTAL	6771	3072	117	804	31	8
ZONE 12	MATSULU/KAAPMUIDEN						
12	Matsulu/Kaapmuiden	57753	9182	528	895	51	35
	SUB-TOTAL	57753	9182	528	895	51	35
	TOTAL A	376483	61100	2836	12663	593	223

Table B14

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

YEAR = 1999

ZONES	Settlement	Expected Population	Stands required at current densities (People per stand)		Area required at current gross densities (Stands / ha)		Area required at nett densities of x stands / ha Additional area (ha)
			Total Stands	Additional Stands	Total Area (ha)	Additional Area (ha)	
EXPANSION OF SETTLEMENTS AND NEW DEVELOPMENT NODES : ALLOCATION AND LAND BUDGET							
ZONE 1:	KANYAMAZANE						
1B	Tekwane East			64			4
	SUB-TOTAL			64			4
ZONE 2:	MSOGWABA						
2C	Aldie			74			7
2D	Intersection			28			3
2E	Western Extension			22			2
2F	Eastern Extension			86			9
2G	Southern Extension			6			1
	SUB-TOTAL			215			22
ZONE 3:	CLAU-CLAU						
3E	Clau-clau North			70			7
3F	Clau-clau South			74			7
3G	Zwelitsha South			157			16
3H	Clau-clau West			13			1
	SUB-TOTAL			314			31
ZONE 4:	KABOKWENI						
4F	Gutshwa West			92			9
4G	Gutshwa East			98			10
4H	Backdoor			11			1
	SUB-TOTAL			201			20
ZONE 5	NELSPRUIT						
5A	Nelspruit West			140			17
5B	Nelspruit South			140			17
5C	Nelspruit East			140			17
	SUB-TOTAL			420			52
ZONE 6	WHITE RIVER						
6A	White River South			35			4
6B	White River West			35			4
6C	White River East			35			4
	SUB-TOTAL			106			13
	TOTAL B			1320			143

Table B15

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

YEAR = 1999

ZONES	Settlement	Expected Population	Stands required at current densities (People per stand)		Area required at current gross densities (Stands / ha)		Area required at nett densities of x stands / ha Additional area (ha)
			Total Stands	Additional Stands	Total Area (ha)	Additional Area (ha)	
	NEW DEVELOPMENT NODES						
7A	Tekwane North			196			13
7B	Tekwane West			186			12
7C	Tekwane South			174			12
7D	Karino						
8A	Oewersig A			193			15
8B	Oewersig B						
9	Rocky's Drift Res.			41			3
10A	Plaston A			79			5
10B	Plaston B			79			5
11	Boschrand			149			19
12	Matsulu/Kaapmuiden			422			28
	TOTAL C			1517			112
	TOTAL B+C			2836			255

Table B16

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

YEAR = 2000

ZONES	Settlement	Expected Population	Stands required at current densities (People per stand)		Area required at current gross densities (Stands / ha)		Area required at nett densities of x stands / ha Additional area (ha)
			Total Stands	Additional Stands	Total Area (ha)	Additional Area (ha)	
	EXISTING SETTLEMENTS						
ZONE 1:	KANYAMAZANE						
1A	KaNyamazane	66931	8508	490	1018	59	33
	SUB-TOTAL	66931	8508	490	1018	59	33
ZONE 2:	MSOGWABA						
2A	Plenaar	21460	3450	40	472	5	4
2B	Daantjie	67227	10671	275	2246	58	28
	SUB-TOTAL	88686	14121	315	2718	63	31
ZONE 3:	CLAU-CLAU						
3A	Newscom	7117	1412	90	463	29	9
3B	Zwelitsha	23959	3767	249	753	50	25
3C	Clau-clau	21954	3301	81	909	22	8
3D	Ngodini	12364	1859	41	263	6	4
	SUB-TOTAL	65394	10340	461	2388	107	46
ZONE 4:	GUTSHWA-NGODINI						
4A	Gutshwa	24451	3912	160	1259	51	16
4C	Mpumalanga	1573	252	1	105	1	0
4D	Phatwa	4389	605	54	180	16	5
4E	Dwaleni	8233	1253	80	252	16	8
	SUB-TOTAL	38645	6050	296	1796	84	30
ZONE 4:	KABOKWENI						
4B	Kabokweni	30118	3248	176	546	30	12
	SUB-TOTAL	30118	3248	176	546	30	12
ZONE 5	NELSPRUIT						
5	Nelspruit	36821	8902	579	3039	198	39
	SUB-TOTAL	36821	8902	579	3039	198	39
ZONE 6	WHITE RIVER						
6	White River	7039	3193	122	836	32	8
	SUB-TOTAL	7039	3193	122	836	32	8
ZONE 12	MATSULU/KAAPMUIDEN						
12	Matsulu/Kaapmuiden	61275	9742	560	950	55	37
	SUB-TOTAL	61275	9742	560	950	55	37
	TOTAL A	394911	64104	2998	13290	627	236

Table B17

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

YEAR = 2000

ZONES	Settlement	Expected Population	Stands required at current densities (People per stand)		Area required at current gross densities (Stands / ha)		Area required at nett densities of x stands / ha
			Total Stands	Additional Stands	Total Area (ha)	Additional Area (ha)	Additional area (ha)
EXPANSION OF SETTLEMENTS AND NEW DEVELOPMENT NODES : ALLOCATION AND LAND BUDGET							
ZONE 1:	KANYAMAZANE						
1B	Tekwane East			67			4
	SUB-TOTAL			67			4
ZONE 2:	MSOGWABA						
2C	Aldie			76			8
2D	Intersection			28			3
2E	Western Extension			22			2
2F	Eastern Extension			88			9
2G	Southern Extension			6			1
	SUB-TOTAL			220			22
ZONE 3:	CLAU-CLAU						
3E	Clau-clau North			74			7
3F	Clau-clau South			78			8
3G	Zwelitsha South			166			17
3H	Clau-clau West			14			1
	SUB-TOTAL			332			33
ZONE 4:	KABOKWENI						
4F	Gutshwa West			98			10
4G	Gutshwa East			104			10
4H	Backdoor			12			1
	SUB-TOTAL			213			21
ZONE 5	NELSPRUIT						
5A	Nelspruit West			149			19
5B	Nelspruit South			149			19
5C	Nelspruit East			149			19
	SUB-TOTAL			448			56
ZONE 6	WHITE RIVER						
6A	White River South			37			5
6B	White River West			37			5
6C	White River East			37			5
	SUB-TOTAL			111			14
	TOTAL B			1390			151

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

YEAR = 2000

ZONES	Settlement	Expected Population	Stands required at current densities (People per stand)		Area required at current gross densities (Stands / ha)		Area required at nett densities of x stands / ha Additional area (ha)
			Total Stands	Additional Stands	Total Area (ha)	Additional Area (ha)	
	NEW DEVELOPMENT NODES						
7A	Tekwane North			207			14
7B	Tekwane West			196			13
7C	Tekwane South			184			12
7D	Karino						
8A	Oewersig A			205			16
8B	Oewersig B						
9	Rocky's Drift Res.			43			3
10A	Plaston A			83			6
10B	Plaston B			83			6
11	Boschrand			158			20
12	Matsulu/Kaapmulden			448			30
	TOTAL C			1607			118
	TOTAL B+C			2998			269

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

ACCUMULATIVE TOTAL FOR YEAR 2000

ZONES	Settlement	Stands required at current densities (People per stand)		Area required at current gross densities (Stands / ha)	
		Total Stands	Additional Stands	Total Area (ha)	Additional Area (ha)
	EXISTING SETTLEMENTS				
ZONE 1:	KANYAMAZANE				
1A	KaNyamazane	8508	2546	1018	305
	SUB-TOTAL	8508	2546	1018	305
ZONE 2:	MSOGWABA				
2A	Pienaar	3450	232	472	32
2B	Daantjie	10671	1548	2246	326
	SUB-TOTAL	14121	1780	2718	358
ZONE 3:	CLAU-CLAU				
3A	Newscom	1412	460	463	151
3B	Zwelitsha	3767	1267	753	253
3C	Clau-clau	3301	455	909	125
3D	Ngodini	1859	235	263	33
	SUB-TOTAL	10340	2418	2388	563
ZONE 4:	GUTSHWA-NGODINI				
4A	Gutshwa	3912	866	1259	279
4C	Mpumalanga	252	8	105	3
4D	Phatwa	605	261	180	78
4E	Dwaleni	1253	411	252	83
	SUB-TOTAL	6022	1546	1796	442
ZONE 4:	KABOKWENI				
4B	Kabokweni	3248	924	546	155
	SUB-TOTAL	3248	924	546	155
ZONE 5	NELSPRUIT				
5	Nelspruit	8902	2955	3039	1009
	SUB-TOTAL	8902	2955	3039	1009
ZONE 6	WHITE RIVER				
6	White River	3193	663	836	174
	SUB-TOTAL	3193	663	836	174
ZONE 12	MATSULU/KAAPMUIDEN				
12	Matsulu/Kaapmuiden	9742	2913	950	284
	SUB-TOTAL	9742	2913	950	284
	TOTAL A	64076	15745	13290	3289

Table B20

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

ACCUMULATIVE TOTAL FOR YEAR 2000

ZONES	Settlement	Stands required at current densities (People per stand)		Area required at current gross densities (Stands / ha)	
		Total Stands	Additional Stands	Total Area (ha)	Additional Area (ha)
EXPANSION OF SETTLEMENTS : ALLOCATION AND LAND BUDGET					
ZONE 1:	KANYAMAZANE				
1B	Tekwane East		358		
	SUB-TOTAL		358		
ZONE 2:	MSOGWABA				
2C	Aldie		427		
2D	Intersection		160		
2E	Western Extension		125		
2F	Eastern Extension		498		
2G	Southern Extension		36		
	SUB-TOTAL		1246		
ZONE 3:	CLAU-CLAU				
3E	Clau-clau North		387		
3F	Clau-clau South		411		
3G	Zwelitsha South		870		
3H	Clau-clau West		73		
	SUB-TOTAL		1741		
ZONE 4:	KABOKWENI				
4F	Gutshwa West		510		
4G	Gutshwa East		541		
4H	Backdoor		62		
	SUB-TOTAL		1113		
ZONE 5	NELSPRUIT				
5A	Nelspruit West		767		
5B	Nelspruit South		767		
5C	Nelspruit East		767		
	SUB-TOTAL		2300		
ZONE 6	WHITE RIVER				
6A	White River South		200		
6B	White River West		200		
6C	White River East		200		
	SUB-TOTAL		599		
	TOTAL B		7357		

Table B21

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

ACCUMULATIVE TOTAL FOR YEAR 2000

ZONES	Settlement	Stands required at current densities (People per stand)		Area required at current gross densities (Stands / ha)	
		Total Stands	Additional Stands	Total Area (ha)	Additional Area (ha)
NEW DEVELOPMENT NODES : ALLOCATION AND LAND BUDGET					
ZONE 7	TEKWANE				
7A	Tekwane North		1085		
7B	Tekwane West		1029		
7C	Tekwane South		964		
7D	Karino				
	SUB-TOTAL		3078		
ZONE 8	OEWERSIG				
8A	Oewersig A		1064		
88	Oewersig B				
	SUB-TOTAL		1064		
ZONE 9	ROCKY'S DRIFT				
9	Rocky's Drift Res.		227		
	SUB-TOTAL		227		
ZONE 10	PLASTON				
10A	Plaston A		436		
10B	Plaston B		436		
	SUB-TOTAL		871		
ZONE 11	BOSCHRAND				
11	Boschrand		817		
	SUB-TOTAL		817		
ZONE 12	MATSULU/KAAPMUIDEN				
12	Matsulu/Kaapmuiden		2330		
	SUB-TOTAL		2330		
	TOTAL C		8388		
	TOTAL B+C		15745		

Table B22

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

VARIABLES : Planning densities - stands per hectare (nett)

ZONES	SETTLEMENTS	1990	1994	1995 Stands / ha	1996 Stands / ha	1997 Stands / ha	1998 Stands / ha	1999 Stands / ha	2000 Stands / ha	Gross to nett conversion %
EXPANSION OF SETTLEMENTS : ALLOCATION AND LAND BUDGET										
ZONE 1:	KANYAMAZANE									
1B	Tekwane East			15	15	15	15	15	15	60%
ZONE 2:	MSOGWABA									
2C	Aldie			10	10	10	10	10	10	60%
2D	Intersection			10	10	10	10	10	10	60%
2E	Western Extension			10	10	10	10	10	10	60%
2F	Eastern Extension			10	10	10	10	10	10	60%
2G	Southern Extension			10	10	10	10	10	10	60%
ZONE 3:	CLAU-CLAU									
3E	Clau-clau North			10	10	10	10	10	10	60%
3F	Clau-clau South			10	10	10	10	10	10	60%
3G	Zwelitsha South			10	10	10	10	10	10	60%
3H	Clau-clau West			10	10	10	10	10	10	60%
ZONE 4:	KABOKWENI									
4F	Gutshwa West			10	10	10	10	10	10	60%
4G	Gutshwa East			10	10	10	10	10	10	60%
4H	Backdoor			10	10	10	10	10	10	60%
ZONE 5	NELSPRUIT									
5A	Nelsprult West			8	8	8	8	8	8	60%
5B	Nelsprult South			8	8	8	8	8	8	60%
5C	Nelsprult East			8	8	8	8	8	8	60%
ZONE 6	WHITE RIVER									
6A	White River South			8	8	8	8	8	8	60%
6B	White River West			8	8	8	8	8	8	60%
6C	White River East			8	8	8	8	8	8	60%

Table B23

BASIC AND PROJECTED POPULATION AND LAND BUDGET.

VARIABLES : Planning densities - stands per hectare (nett)

ZONES	SETTLEMENTS	1990	1994	1995 Stands / ha	1996 Stands / ha	1997 Stands / ha	1998 Stands / ha	1999 Stands / ha	2000 Stands / ha	Gross to nett conversion %
NEW SETTLEMENTS : ALLOCATION AND LAND BUDGET										
7A	Tekwane North			15	15	15	15	15	15	60%
7B	Tekwane West			15	15	15	15	15	15	60%
7C	Tekwane South			15	15	15	15	15	15	60%
7D	Karino			15	15	15	15	15	15	60%
8A	Oewersig A			13	13	13	13	13	13	60%
8B	Oewersig B			13	13	13	13	13	13	60%
9	Rocky's Drift Res.			15	15	15	15	15	15	60%
10A	Plaston A			15	15	15	15	15	15	60%
10B	Plaston B			15	15	15	15	15	15	60%
11	Boschrand			8	8	8	8	8	8	60%
12	Matsulu/Kaapmuiden			15	15	15	15	15	15	60%

Table B24

BASIC AND PROJECTED POPULATION AND LAND BI

LAND ALLOCATION MATRIX

ZONES	SETTLEMENT	1B	2C	2D	2E	2F	2G	3E	3F	3G	3H	4F	4G	4 H	5A	5B	5C	6A	6B	6C	7A	7B	7C	7D	8A	8B	9	10A	10B	11	12	TOTAL
EXISTING SETTLEMENTS																																
ZONE 1:	KANYAMAZANE																															
1A	KANYAMAZANE	7%													2%	2%	2%				27%	27%	26%		5%					2%		100%
	SUB-TOTAL																															
ZONE 2:	MSOGWABA																															
2A	PIENAAR	6%	24%	9%	7%	28%	2%								1%	1%	1%				6%	5%	5%		4%					1%		100%
2B	DAANTJIE	6%	24%	9%	7%	28%	2%								1%	1%	1%				6%	5%	5%		4%					1%		100%
	SUB-TOTAL																															
ZONE 3:	CLAU-CLAU																															
3A	NEWSCOM	3%						16%	17%	36%	3%				1%	1%	1%				3%	3%	2%		2%		3%	4%	4%	1%		100%
3B	ZWELITSHA	3%						16%	17%	36%	3%				1%	1%	1%				3%	3%	2%		2%		3%	4%	4%	1%		100%
3C	CLAU-CLAU	3%						16%	17%	36%	3%				1%	1%	1%				3%	3%	2%		2%		3%	4%	4%	1%		100%
3D	NGODINI	3%						16%	17%	36%	3%				1%	1%	1%				3%	3%	2%		2%		3%	4%	4%	1%		100%
	SUB-TOTAL																															
ZONE 4:	GUTSHWA-NGODINI																															
4A	GUTSHWA											33%	35%	4%	1%	1%	1%	1%	1%	1%	3%	3%	2%		1%		4%	4%	4%	1%		100%
4C	MPHUMALANGA											33%	35%	4%	1%	1%	1%	1%	1%	1%	3%	3%	2%		1%		4%	4%	4%	1%		100%
4D	PHATWA											33%	35%	4%	1%	1%	1%	1%	1%	1%	3%	3%	2%		1%		4%	4%	4%	1%		100%
4E	DWALENI											33%	35%	4%	1%	1%	1%	1%	1%	1%	3%	3%	2%		1%		4%	4%	4%	1%		100%
	SUB-TOTAL																															
ZONE 4:	KABOKWENI																															
4B	KABOKWENI														1%	1%	1%	2%	2%	2%	6%	5%	5%		3%		10%	30%	30%	2%		100%
	SUB-TOTAL																															
ZONE 5	NELSPRUIT																															
	NELSPRUIT														20%	20%	20%								20%					20%		100%
	SUB-TOTAL																															
ZONE 6	WHITE RIVER																															
	WHITE RIVER																	25%	25%	25%					10%					15%		100%
	SUB-TOTAL																															
ZONE 12	MATSULU/KAAPMUIDEN																															
12	MATSULU/KAAPMUIDEN														2%	2%	2%				4%	3%	3%		4%						80%	100%
	SUB-TOTAL																															
	TOTAL A																															

Table B25

BASIC AND PROJECTED POPULATION AND LAND BUDG

LAND ALLOCATION MATRIX : Projected required number

ZONES	Settlements	Total additional stands	1B	2C	2D	2E	2F	2G	3E	3F	3G	3H	4F	4G	4 H	5A	5B	5C	6A	6B	6C	7A	7B	7C	7D	8A	8B	9	10A	10B	11	12	Total
	EXISTING SETTLEMENTS																																
ZONE 1:	KANYAMAZANE																																
1A	KANYAMAZANE	2546	178													51	51	51				688	688	662		127					51		2546
	SUB-TOTAL																																
ZONE 2:	MSOGWABA																																
2A	PIENAAR	232	14	56	21	16	65	5								2	2	2				14	12	12		9					2		232
2B	DAANTJIE	1548	93	371	139	108	433	31								15	15	15				93	77	77		62					15		1548
	SUB-TOTAL																																
ZONE 3:	CLAU-CLAU																																
3A	NEWSCOM	460	14						74	78	166	14				5	5	5				14	14	9		9		14	18	18	5		460
3B	ZWELITSHA	1267	38						203	215	456	38				13	13	13				38	38	25		25		38	51	51	13		1267
3C	CLAU-CLAU	455	14						73	77	164	14				5	5	5				14	14	9		9		14	18	18	5		455
3D	NGODINI	235	7						38	40	85	7				2	2	2				7	7	5		5		7	9	9	2		235
	SUB-TOTAL																																
ZONE 4:	GUTSHWA-NGODINI																																
4A	GUTSHWA	866											286	303	35	9	9	9	9	9	9	26	26	17		9		35	35	35	9		866
4C	MPHUMALANGA	8											3	3	0	0	0	0	0	0	0	0	0	0		0		0	0	0	0		8
4D	PHATWA	261											86	91	10	3	3	3	3	3	3	8	8	5		3		10	10	10	3		261
4E	DWALENI	411											136	144	16	4	4	4	4	4	4	12	12	8		4		16	16	16	4		411
	SUB-TOTAL																																
ZONE 4:	KABOKWENI																																
4B	KABOKWENI	924														9	9	9	18	18	18	55	46	46		28		92	277	277	18		924
	SUB-TOTAL																																
ZONE 5	NELSPRUIT																																
5	NELSPRUIT	2955														591	591	591								591					591		2955
	SUB-TOTAL																																
ZONE 6	WHITE RIVER																																
6	WHITE RIVER	663																	166	166	166					66					100		663
	SUB-TOTAL																																
ZONE 12	MATSULU/KAAPMUIDEN																																
12	Matsulu/Kaapmuiden	2913														58	58	58				117	87	87		117						2330	2913
	SUB-TOTAL																																
	TOTAL A	15745	359	427	160	125	498	36	387	411	870	73	510	541	62	767	767	767	200	200	200	1085	1029	964		1064		227	436	436	817	2330	15745

Table B28

ANNEXURE C

ANNEXURE C: INFRASTRUCTURE MODEL

INTRODUCTION

Orientation

The infrastructure cost model builds on the output of the spatial model and represents the second main element of the integrated infrastructure planning model for the study area.

Objectives

An attempt was made to establish what the priority investments might be for the study area over the next five years. It was assumed that these priorities would be presented in a basic services approach primarily comprising:

- The upgrading of all existing settlements that were inadequately serviced.
- The provision of serviced sites for new housing supply for low-income households, to be developed on suitably located land.
- The provision of bulk infrastructure to ensure adequate capacity for existing and new developments.

Approach

The infrastructure model was developed with the aid of:

- Information obtained form previous study documentation of the area, field surveys and existing and past authorities.
- Professional staff with a background knowledge of the area.
- Interviews with operating personnel in the study area.
- The output of the spatial model.

METHODOLOGY

Basic principles

The infrastructure cost model was developed according to the following principles:

- Data is collated in matrix format in a computerised spreadsheet.
- Inputs of existing data such as service standards, service costs per stand, land allocation per settlement (from the spatial model), etc. forms the basis for calculating indicator outputs and projected costs per service category and settlement.
- The model is dynamic in nature allowing for the simulation of numerous combinations and permutations of input variables and values.
- A five year infrastructure investment period (1996-2000) is used.
- All money values are at 1995 prices.

Information inputs

The following inputs form the basis of the model:

- Net development area and required number of stands per year per settlement from land allocation matrix.
- Estimated cost per bulk infrastructure category per settlement.
- Present and desired future internal service standards per settlement.
- Upgrading costs per internal service category for existing inhabited areas.
- Internal service distribution for new developments at various service standards.
- Development costs per internal service and service standard for new developments at variable densities.

Output

The input investment costs are linked to the information from the land allocation matrix to obtain the following outputs:

- Total cost of bulk infrastructure per service category and main urban node.

- Cost of upgrading existing stands. Total cost per internal service category per settlement according to desired service level.

- Cost of developing new sites. Total cost per internal service category per settlement according to service level and density level.

Assumptions

The output of the model is subject to a number of assumptions and variables that need to be highlighted:

- The future service standards are variables which can be adjusted according to financial affordability levels.

- The phasing of capital investment costs is a variable that can be changed within the parameters of the five year development period.

- Variable densities can influence the cost of infrastructure development in new development areas.

RESULTS

The input and output of the infrastructure cost model that was obtained from the simulated investment scenario, appear in the following Tables: C-1 to C-28.

New Settlements

Land Allocation Model: Land required

Zone no.	Settlement name	Map loc.	Nett area allocated by Year 2000 (ha)	Gross/nett conversion factor	Total gross area required by year 2000	Implementation Starting year	Implementation Period (years)	YEAR 0 1995	1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005	11 2006	12 2007	13 2008	14 2009	15 2010
	NELSPRUIT																						
5A	Nelspruit West		96	0.6	58	1997	1			58													
5B	Nelspruit South		96	0.6	58	1998	1				58												
5C	Nelspruit East		96	0.6	58	1999	1					58											
	OEWERSIG																						
8A	Oewersig A		82	0.6	49	1995	1	49															
8B	Oewersig B			0.6		1996	1																
	BOSCHRAND																						
11	Boschrand		102	0.6	61	1998	1				61												
	WHITE RIVER																						
6A	White River A		25	0.6	15	1997	1			15													
6B	White River B		25	0.6	15	1998	1				15												
6C	White River C		25	0.6	15	1996	1		15														
	ROCKY'S DRIFT																						
9	Rocky's Drift Res.		15	0.6	9	1997	1			9													
	CLAU-CLAU																						
3E	Clau-clau North		39	0.6	23	1997	1			23													
3F	Clau-clau South		41	0.6	25	1998	1				25												
3G	Zwelitsha South		87	0.6	52	1998	1				52												
3H	Clau-clau West		7	0.6	4	1997	1			4													
	GUTSHWA-NGODINI																						
4F	Gutshwa West		51	0.6	31	1997	1			31													
4G	Gutshwa East		54	0.6	32	1998	1				32												
4H	Backdoor		6	0.6	4	1995	1	4															
	PLASTON																						
10A	Plaston A		29	0.6	17	1998	1				17												
10B	Plaston B		29	0.6	17	1998	1				17												
	KANYAMAZANE																						
1B	Tekwane East		24	0.6	14	1995	1	14															
	MSOGWABA																						
2C	Aldie		43	0.6	26	1996	1		26														
2D	Intersection		16	0.6	10	1996	1		10														
2E	Western Extension		12	0.6	7	1996	1		7														
2F	Eastern Extension		50	0.6	30	1997	1			30													
2G	Southern Extension		4	0.6	2	1998	1				2												
	TEKWANE																						
7A	Tekwane North		72	0.6	43	1995	1	43															
7B	Tekwane West		69	0.6	41	1995	1	41															
7C	Tekwane South		64	0.6	39	1996	1		39														
7D	Karino			0.6		1997	1																
	MATSULU																						
12	Matsulu/Kaapmuiden		155	0.6	93	1997	1			93													
			1414		848			152	96	263	280	58											

Table C1

New Settlements

Land Allocation Model : Stands required

Zone no.	Settlement name	Map loc.	Nett area allocated (ha)	Density (stands/ha)	Total number of new stands required	Implementation: Starting year	Implementation: Period (years)	YEAR 0 1995	1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005	11 2006	12 2007	13 2008	14 2009	15 2010
	NELSPRUIT																						
5A	Nelspruit West		96	8	767	1998	5				153	153	153	153	153								
5B	Nelspruit South		96	8	767	1999	5					153	153	153	153	153							
5C	Nelspruit East		96	8	767	2000	5						153	153	153	153	153						
	OEWERSIG																						
8A	Oewersig A		82	13	1064	1996	2		532	532													
8B	Oewersig B			13		1997	2																
	BOSCHRAND																						
11	Boschrand		102	8	817	1999	5					163	163	163	163	163							
	WHITE RIVER																						
6A	White River A		25	8	200	1998	5				40	40	40	40	40								
6B	White River B		25	8	200	1999	5					40	40	40	40	40							
6C	White River C		25	8	200	1997	5			40	40	40	40	40									
	ROCKY'S DRIFT																						
9	Rocky's Drift Res.		15	15	227	1998	5				45	45	45	45	45								
	CLAU-CLAU																						
3E	Clau-clau North		39	10	387	1998	5				77	77	77	77	77								
3F	Clau-clau South		41	10	411	1998	5					82	82	82	82	82							
3G	Zwelitsha South		87	10	870	1998	5					174	174	174	174	174							
3H	Clau-clau West		7	10	73	1998	5				15	15	15	15	15								
	GUTSHWA-NGODINI																						
4F	Gutshwa West		51	10	510	1998	5				102	102	102	102	102								
4G	Gutshwa East		54	10	541	1999	5					108	108	108	108	108							
4H	Backdoor		6	10	62	1996	5		12	12	12	12	12										
	PLASTON																						
10A	Plaston A		29	15	436	1999	5					87	87	87	87	87							
10B	Plaston B		29	15	436	1999	5					87	87	87	87	87							
	KANYAMAZANE																						
1B	Tekwane East		24	15	358	1996	5		72	72	72	72	72										
	MSOGWABA																						
2C	Akile		43	10	427	1997	5			85	85	85	85	85									
2D	Intersection		16	10	160	1997	5			32	32	32	32	32									
2E	Western Extension		12	10	125	1997	5			25	25	25	25	25									
2F	Eastern Extension		50	10	498	1998	5				100	100	100	100	100								
2G	Southern Extension		4	10	36	1999	5					7	7	7	7	7							
	TEKWANE																						
7A	Tekwane North		72	15	1085	1996	5		217	217	217	217	217										
7B	Tekwane West		89	15	1029	1996	5		206	206	206	206	206										
7C	Tekwane South		64	15	964	1997	5			193	193	193	193	193									
7D	Karino			15		1998	5																
	MATSULU																						
12	Matsulu/Kaapmuiden		155	15	2330	1998	5				466	466	466	466	466								
			1414		15745				1039	1414	1880	2783	2936	2429	2054	1056	153						

Table C2

UPGRADING COSTS FOR INHABITED AREAS

Costs in Rands / hectare

WATER RETICULATION		TO				
			1	2	3	4
	FROM	1		R13 200	R29 100	R42 300
		2			R15 900	R29 100
		3				R13 200
		4				

SANITATION		TO				
			1	2	3	4
	FROM	1		R15 000	R25 000	R50 000
		2			R22 500	R45 000
		3				R30 000
		4				

ROADS		TO				
			1	2	3	4
	FROM	1		R19 900	R34 100	R62 000
		2			R25 000	R45 000
		3				R42 100
		4				

STORMWATER DRAINAGE		TO				
			1	2	3	4
	FROM	1		R4 800	R8 400	R15 600
		2			R3 600	R10 800
		3				R7 200
		4				

ELECTRICITY		TO				
			1	2	3	4
	FROM	1		R3 000	R12 000	R45 000
		2			R10 000	R37 000
		3				R35 000
		4				

Table C3

New developments

Service distribution:

Service	level 2	level 3	level 4
Water	10%	17%	13%
Sanitation	22%	22%	25%
Roads	40%	27%	22%
Stormwater	16%	15%	18%
Electricity	12%	19%	22%

Service	level 2	level 3	level 4
Water	8%	17%	16%
Sanitation	25%	24%	30%
Roads	39%	25%	18%
Stormwater	16%	15%	14%
Electricity	12%	19%	22%

Service	level 2	level 3	level 4
Water	11%	17%	16%
Sanitation	41%	31%	24%
Roads	25%	22%	24%
Stormwater	11%	11%	14%
Electricity	12%	19%	22%

Estimated total development costs:

Density =	8	stands / ha
Level	Cost/stand	Cost/ha
2	R11 200	R89 600
3	R15 000	R120 000
4	R25 000	R200 000

Density =	10	stands / ha
Level	Cost/stand	Cost/ha
2	R10 200	R102 000
3	R13 600	R136 000
4	R18 200	R182 000

Density =	15	stands / ha
Level	Cost/stand	Cost/ha
2	R6 000	R90 000
3	R10 700	R160 500
4	R14 300	R214 500

Unit cost / ha:

	2	3	4
Water	R8 960	R20 400	R26 000
Sanitation	R19 712	R26 400	R50 000
Roads	R35 840	R32 400	R44 000
Stormwater	R14 336	R18 000	R36 000
Electricity	R10 752	R22 800	R44 000
Total	R89 600	R120 000	R200 000

	2	3	4
Water	R8 160	R23 120	R29 120
Sanitation	R25 500	R32 640	R54 600
Roads	R39 780	R34 000	R32 760
Stormwater	R16 320	R20 400	R25 480
Electricity	R12 240	R25 840	R40 040
Total	R102 000	R136 000	R182 000

	2	3	4
Water	R9 900	R27 285	R34 320
Sanitation	R36 900	R49 755	R51 480
Roads	R22 500	R35 310	R51 480
Stormwater	R9 900	R17 655	R30 030
Electricity	R10 800	R30 495	R47 190
Total	R90 000	R160 500	R214 500

Table C4

Present and future service levels

Zone no.	Settlement name	Administrative local authority	PRESENT SERVICE LEVELS						FUTURE SERVICE LEVELS					
			Water	Sanitation	Roads	Stormwater drainage	Electricity	Solid waste disposal	Water	Sanitation	Roads	Stormwater drainage	Electricity	Solid waste disposal
1	KANYAMAZANE													
1A	KaNyamazane	Nelspruit	3	4	3	3	4	3	4	4	3	3	4	3
2	MSOGWABA													
2A	Plenaar	Nelspruit	2	1	1	2	2	1	3	2	2	3	3	2
2B	Daantjie	Nelspruit	2	1	1	2	2	1	3	2	2	3	3	2
3	CLAU-CLAU													
3A	Newscom	White River	2	1	1	1	2	1	3	2	2	2	3	2
3B	Zwelitsha	White River	2	1	1	1	2	1	3	2	2	2	3	2
3C	Clau-clau	White River	2	1	1	1	2	1	3	2	2	2	3	2
3D	Ngodini	White River	2	1	1	1	2	1	3	2	2	2	3	2
4	GUTSHWA - NGODINI													
4A	Gutshwa	White River	2	1	1	1	2	1	3	2	2	2	3	2
4C	Mpumalanga	White River	2	1	1	1	1	1	3	2	2	2	2	2
4D	Phatwa	White River	2	1	1	1	2	1	3	2	2	2	3	2
4E	Dwaleni	White River	2	1	1	1	2	1	3	2	2	2	3	2
4	KABOKWENI													
4B	Kabokweni	White River	4	4	3	2	4	3	4	4	3	3	4	3
5	NELSPRUIT													
	Nelspruit	Nelspruit	4	4	4	4	4	4	4	4	4	4	4	4
6	WHITE RIVER													
	White River	White River	4	4	4	4	4	4	4	4	4	4	4	4
	MATSULU													
12	Matsulu	Nelspruit	3	3	3	2	3	3	4	4	3	3	3	3

Table C5

Upgrading of existing infrastructure : Water reticulation

Zone no.	Settlement name	Number of stands (1994)	Existing level of service	Next level of service	Estimated cost of upgrading	Implementation		YEAR									
						Starting year	Period (years)	1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005
	NELSPRUIT																
5	Nelspruit	5947	4	4		1996	10										
	WHITE RIVER																
6	White River	2530	4	4		1996	10										
	CLAU-CLAU																
3A	Newscom	952	2	3	R4 962 885	1996	10	R496 289	R496 289	R496 289	R496 289	R496 289	R496 289	R496 289	R496 289	R496 289	R496 289
3B	Zwelitsha	2500	2	3	R7 941 640	1996	10	R794 164	R794 164	R794 164	R794 164	R794 164	R794 164	R794 164	R794 164	R794 164	R794 164
3C	Clau-clau	2846	2	3	R12 462 566	1996	10	R1 246 257	R1 246 257	R1 246 257	R1 246 257	R1 246 257	R1 246 257	R1 246 257	R1 246 257	R1 246 257	R1 246 257
3D	Ngodini	1624	2	3	R3 654 000	1996	10	R365 400	R365 400	R365 400	R365 400	R365 400	R365 400	R365 400	R365 400	R365 400	R365 400
	GUTSHWA - NGODINI																
4A	Gutshwa	3046	2	3	R15 592 732	1996	10	R1 559 273	R1 559 273	R1 559 273	R1 559 273	R1 559 273	R1 559 273	R1 559 273	R1 559 273	R1 559 273	R1 559 273
4C	Mpumalanga	244	2	3	R1 623 264	1996	10	R162 326	R162 326	R162 326	R162 326	R162 326	R162 326	R162 326	R162 326	R162 326	R162 326
4D	Phatwa	344	2	3	R1 622 339	1996	10	R162 234	R162 234	R162 234	R162 234	R162 234	R162 234	R162 234	R162 234	R162 234	R162 234
4E	Dwaleni	842	2	3	R2 694 139	1996	10	R269 414	R269 414	R269 414	R269 414	R269 414	R269 414	R269 414	R269 414	R269 414	R269 414
	KABOKWENI																
4B	Kabokweni	2324	4	4		1996	10										
	KANYAMAZANE																
1A	KaNyamazane	5962	3	4	R9 410 416	1996	10	R941 042	R941 042	R941 042	R941 042	R941 042	R941 042	R941 042	R941 042	R941 042	R941 042
	MSOGWABA																
2A	Plenaar	3218	2	3	R6 995 379	1996	10	R699 538	R699 538	R699 538	R699 538	R699 538	R699 538	R699 538	R699 538	R699 538	R699 538
2B	Daantjie	9123	2	3	R30 536 184	1996	10	R3 053 618	R3 053 618	R3 053 618	R3 053 618	R3 053 618	R3 053 618	R3 053 618	R3 053 618	R3 053 618	R3 053 618
	MATSULU																
12A	Matsulu	6829	3	4	R8 796 996	1996	10	R879 700	R879 700	R879 700	R879 700	R879 700	R879 700	R879 700	R879 700	R879 700	R879 700
		46331			R106 292 540			R10 629 254	R10 629 254	R10 629 254	R10 629 254	R10 629 254	R10 629 254	R10 629 254	R10 629 254	R10 629 254	R10 629 254

Table C6

Upgrading of existing infrastructure : Sanitation

Zone no.	Settlement name	Number of stands (1994)	Existing level of service	Next level of service	Estimated cost of upgrading	Implementation		YEAR									
						Starting year	Period (years)	1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005
	NELSPRUIT																
5	Nelspruit	5947	4	4		1996	10										
	WHITE RIVER																
6	White River	2530	4	4		1996	10										
	CLAU-CLAU																
3A	Newscom	952	1	2	R4 681 967	1996	10	R468 197	R468 197	R468 197	R468 197	R468 197	R468 197	R468 197	R468 197	R468 197	R468 197
3B	Zwelitsha	2500	1	2	R7 492 114	1996	10	R749 211	R749 211	R749 211	R749 211	R749 211	R749 211	R749 211	R749 211	R749 211	R749 211
3C	Clau-clau	2846	1	2	R11 757 137	1996	10	R1 175 714	R1 175 714	R1 175 714	R1 175 714	R1 175 714	R1 175 714	R1 175 714	R1 175 714	R1 175 714	R1 175 714
3D	Ngodini	1624	1	2	R3 447 170	1996	10	R344 717	R344 717	R344 717	R344 717	R344 717	R344 717	R344 717	R344 717	R344 717	R344 717
	GUTSHWA - NGODINI																
4A	Gutshwa	3046	1	2	R14 710 124	1996	10	R1 471 012	R1 471 012	R1 471 012	R1 471 012	R1 471 012	R1 471 012	R1 471 012	R1 471 012	R1 471 012	R1 471 012
4C	Mpumalanga	244	1	2	R1 531 381	1996	10	R153 138	R153 138	R153 138	R153 138	R153 138	R153 138	R153 138	R153 138	R153 138	R153 138
4D	Phatwa	344	1	2	R1 530 508	1996	10	R153 051	R153 051	R153 051	R153 051	R153 051	R153 051	R153 051	R153 051	R153 051	R153 051
4E	Dwaleni	842	1	2	R2 541 641	1996	10	R254 164	R254 164	R254 164	R254 164	R254 164	R254 164	R254 164	R254 164	R254 164	R254 164
	KABOKWENI																
4B	Kabokweni	2324	4	4		1996	10										
	KANYAMAZANE																
1A	KaNyamazane	5982	4	4		1996	10										
	MSOGWABA																
2A	Plenaar	3218	1	2	R6 599 414	1996	10	R659 941	R659 941	R659 941	R659 941	R659 941	R659 941	R659 941	R659 941	R659 941	R659 941
2B	Daantjie	9123	1	2	R28 807 721	1996	10	R2 880 772	R2 880 772	R2 880 772	R2 880 772	R2 880 772	R2 880 772	R2 880 772	R2 880 772	R2 880 772	R2 880 772
	MATSULU																
12A	Matsulu	6829	3	4	R19 993 172	1996	10	R1 999 317	R1 999 317	R1 999 317	R1 999 317	R1 999 317	R1 999 317	R1 999 317	R1 999 317	R1 999 317	R1 999 317
		46331			R103 092 349			R10 309 235	R10 309 235	R10 309 235	R10 309 235	R10 309 235	R10 309 235	R10 309 235	R10 309 235	R10 309 235	R10 309 235

Table C7

Upgrading of existing infrastructure : Roads

Zone no.	Settlement name	Number of stands (1994)	Existing level of service	Next level of service	Estimated cost of upgrading	Implementation		YEAR									
						Starting year	Period (years)	1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005
	NELSPRUIT																
5	Nelspruit	5947	4	4		1996	10										
	WHITE RIVER																
6	White River	2530	4	4		1996	10										
	CLAU-CLAU																
3A	Newscom	952	1	2	R6 211 410	1996	10	R621 141	R621 141	R621 141	R621 141	R621 141	R621 141	R621 141	R621 141	R621 141	R621 141
3B	Zwelitsha	2500	1	2	R9 939 537	1996	10	R993 954	R993 954	R993 954	R993 954	R993 954	R993 954	R993 954	R993 954	R993 954	R993 954
3C	Clau-clau	2846	1	2	R15 597 802	1996	10	R1 559 780	R1 559 780	R1 559 780	R1 559 780	R1 559 780	R1 559 780	R1 559 780	R1 559 780	R1 559 780	R1 559 780
3D	Ngodini	1624	1	2	R4 573 245	1996	10	R457 325	R457 325	R457 325	R457 325	R457 325	R457 325	R457 325	R457 325	R457 325	R457 325
	GUTSHWA - NGODINI																
4A	Gutshwa	3046	1	2	R19 515 431	1996	10	R1 951 543	R1 951 543	R1 951 543	R1 951 543	R1 951 543	R1 951 543	R1 951 543	R1 951 543	R1 951 543	R1 951 543
4C	Mpumalanga	244	1	2	R2 031 632	1996	10	R203 163	R203 163	R203 163	R203 163	R203 163	R203 163	R203 163	R203 163	R203 163	R203 163
4D	Phatwa	344	1	2	R2 030 475	1996	10	R203 047	R203 047	R203 047	R203 047	R203 047	R203 047	R203 047	R203 047	R203 047	R203 047
4E	Dwaleni	842	1	2	R3 371 910	1996	10	R337 191	R337 191	R337 191	R337 191	R337 191	R337 191	R337 191	R337 191	R337 191	R337 191
	KABOKWENI																
4B	Kabokweni	2324	3	3		1996	10										
	KANYAMAZANE																
1A	KaNyamazane	5962	3	3		1996	10										
	MSOGWABA																
2A	Plenaar	3218	1	2	R8 755 223	1996	10	R875 522	R875 522	R875 522	R875 522	R875 522	R875 522	R875 522	R875 522	R875 522	R875 522
2B	Daantjie	9123	1	2	R38 218 243	1996	10	R3 821 824	R3 821 824	R3 821 824	R3 821 824	R3 821 824	R3 821 824	R3 821 824	R3 821 824	R3 821 824	R3 821 824
	MATSULU																
12A	Matsulu	6829	3	3		1996	10										
		48331			R110 244 908			R11 024 491	R11 024 491	R11 024 491	R11 024 491	R11 024 491	R11 024 491	R11 024 491	R11 024 491	R11 024 491	R11 024 491

Table C8

Upgrading of existing infrastructure : Stormwater drainage

Zone no.	Settlement name	Number of stands (1994)	Existing level of service	Next level of service	Estimated cost of upgrading	Implementation		YEAR									
						Starting year	Period (years)	1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005
	NELSPRUIT																
5	Nelspruit	5947	4	4		1996	10										
	WHITE RIVER																
6	White River	2530	4	4		1996	10										
	CLAU-CLAU																
3A	Newscom	952	1	2	R1 498 230	1996	10	R149 823	R149 823	R149 823	R149 823	R149 823	R149 823	R149 823	R149 823	R149 823	R149 823
3B	Zwelitsha	2500	1	2	R2 397 476	1996	10	R239 748	R239 748	R239 748	R239 748	R239 748	R239 748	R239 748	R239 748	R239 748	R239 748
3C	Clau-clau	2846	1	2	R3 762 284	1996	10	R376 228	R376 228	R376 228	R376 228	R376 228	R376 228	R376 228	R376 228	R376 228	R376 228
3D	Ngodini	1624	1	2	R1 103 094	1996	10	R110 309	R110 309	R110 309	R110 309	R110 309	R110 309	R110 309	R110 309	R110 309	R110 309
	GUTSHWA - NGODINI																
4A	Gutshwa	3046	1	2	R4 707 240	1996	10	R470 724	R470 724	R470 724	R470 724	R470 724	R470 724	R470 724	R470 724	R470 724	R470 724
4C	Mpumalanga	244	1	2	R490 042	1996	10	R49 004	R49 004	R49 004	R49 004	R49 004	R49 004	R49 004	R49 004	R49 004	R49 004
4D	Phatwa	344	1	2	R489 763	1996	10	R48 976	R48 976	R48 976	R48 976	R48 976	R48 976	R48 976	R48 976	R48 976	R48 976
4E	Dwaleni	842	1	2	R813 325	1996	10	R81 333	R81 333	R81 333	R81 333	R81 333	R81 333	R81 333	R81 333	R81 333	R81 333
	KABOKWENI																
4B	Kabokweni	2324	2	3	R1 404 729	1996	10	R140 473	R140 473	R140 473	R140 473	R140 473	R140 473	R140 473	R140 473	R140 473	R140 473
	KANYAMAZANE																
1A	KaNyamazane	5962	3	3		1996	10										
	MSOGWABA																
2A	Plenaar	3218	2	3	R1 583 859	1996	10	R158 386	R158 386	R158 386	R158 386	R158 386	R158 386	R158 386	R158 386	R158 386	R158 386
2B	Daantjie	9123	2	3	R6 913 853	1996	10	R691 385	R691 385	R691 385	R691 385	R691 385	R691 385	R691 385	R691 385	R691 385	R691 385
	MATSULU																
12A	Matsulu	6829	2	3	R2 399 181	1996	10	R239 918	R239 918	R239 918	R239 918	R239 918	R239 918	R239 918	R239 918	R239 918	R239 918
		48331			R27 563 075			R2 756 308	R2 756 308	R2 756 308	R2 756 308	R2 756 308	R2 756 308	R2 756 308	R2 756 308	R2 756 308	R2 756 308

Table C9

Upgrading of existing infrastructure : Electricity

Zone no.	Settlement name	Number of stands (1994)	Existing level of service	Next level of service	Estimated cost of upgrading	Implementation of upgrading: Starting year	Period (years)	YEAR 1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005
	NELSPRUIT																
5	Nelspruit	5947	4	4		1996	10										
	WHITE RIVER																
6	White River	2530	4	4		1996	10										
	CLAU-CLAU																
3A	Newscom	952	2	3	R3 121 311	1996	10	R312 131	R312 131	R312 131	R312 131	R312 131	R312 131	R312 131	R312 131	R312 131	R312 131
3B	Zwelitsha	2500	2	3	R4 994 742	1996	10	R499 474	R499 474	R499 474	R499 474	R499 474	R499 474	R499 474	R499 474	R499 474	R499 474
3C	Clau-clau	2846	2	3	R7 838 092	1996	10	R783 809	R783 809	R783 809	R783 809	R783 809	R783 809	R783 809	R783 809	R783 809	R783 809
3D	Ngodini	1624	2	3	R2 298 113	1996	10	R229 811	R229 811	R229 811	R229 811	R229 811	R229 811	R229 811	R229 811	R229 811	R229 811
	GUTSHWA - NGODINI																
4A	Gutshwa	3046	2	3	R9 806 749	1996	10	R980 675	R980 675	R980 675	R980 675	R980 675	R980 675	R980 675	R980 675	R980 675	R980 675
4C	Mpumalanga	244	1	2	R306 276	1996	10	R30 628	R30 628	R30 628	R30 628	R30 628	R30 628	R30 628	R30 628	R30 628	R30 628
4D	Phatwa	344	2	3	R1 020 339	1996	10	R102 034	R102 034	R102 034	R102 034	R102 034	R102 034	R102 034	R102 034	R102 034	R102 034
4E	Dwaleni	842	2	3	R1 694 427	1996	10	R169 443	R169 443	R169 443	R169 443	R169 443	R169 443	R169 443	R169 443	R169 443	R169 443
	KABOKWENI																
4B	Kabokweni	2324	4	4		1996	10										
	KANYAMAZANE																
1A	KaNyamazane	5962	4	4		1996	10										
	MSOGWABA																
2A	Plenaar	3218	2	3	R4 399 609	1996	10	R439 961	R439 961	R439 961	R439 961	R439 961	R439 961	R439 961	R439 961	R439 961	R439 961
2B	Daantjie	9123	2	3	R19 205 147	1996	10	R1 920 515	R1 920 515	R1 920 515	R1 920 515	R1 920 515	R1 920 515	R1 920 515	R1 920 515	R1 920 515	R1 920 515
	MATSULU																
12A	Matsulu	6829	3	3		1996	10										
		48331			R54 684 807			R5 468 481	R5 468 481	R5 468 481	R5 468 481	R5 468 481	R5 468 481	R5 468 481	R5 468 481	R5 468 481	R5 468 481

Table C10

Upgrading of existing infrastructure : Summary of costs

Zone no.	Settlement name	Number of stands (1994)	Estimated cost of upgrading	YEAR 1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005
	NELSPRUIT												
5	Nelspruit	5947											
	WHITE RIVER												
6	White River	2530											
	CLAU-CLAU												
3A	Newscom	952	R20 475 803	R2 047 580	R2 047 580	R2 047 580	R2 047 580	R2 047 580	R2 047 580	R2 047 580	R2 047 580	R2 047 580	R2 047 580
3B	Zwelitsha	2500	R32 765 510	R3 276 551	R3 276 551	R3 276 551	R3 276 551	R3 276 551	R3 276 551	R3 276 551	R3 276 551	R3 276 551	R3 276 551
3C	Clau-clau	2846	R51 417 881	R5 141 788	R5 141 788	R5 141 788	R5 141 788	R5 141 788	R5 141 788	R5 141 788	R5 141 788	R5 141 788	R5 141 788
3D	Ngodini	1624	R15 075 623	R1 507 562	R1 507 562	R1 507 562	R1 507 562	R1 507 562	R1 507 562	R1 507 562	R1 507 562	R1 507 562	R1 507 562
	GUTSHWA - NGODINI												
4A	Gutshwa	3046	R64 332 276	R6 433 228	R6 433 228	R6 433 228	R6 433 228	R6 433 228	R6 433 228	R6 433 228	R6 433 228	R6 433 228	R6 433 228
4C	Mpumalanga	244	R5 982 594	R598 259	R598 259	R598 259	R598 259	R598 259	R598 259	R598 259	R598 259	R598 259	R598 259
4D	Phatwa	344	R6 693 424	R669 342	R669 342	R669 342	R669 342	R669 342	R669 342	R669 342	R669 342	R669 342	R669 342
4E	Dwaleni	842	R11 115 443	R1 111 544	R1 111 544	R1 111 544	R1 111 544	R1 111 544	R1 111 544	R1 111 544	R1 111 544	R1 111 544	R1 111 544
	KABOKWENI												
4B	Kabokweni	2324	R1 404 729	R140 473	R140 473	R140 473	R140 473	R140 473	R140 473	R140 473	R140 473	R140 473	R140 473
	KANYAMAZANE												
1A	KaNyamazane	5962	R9 410 416	R941 042	R941 042	R941 042	R941 042	R941 042	R941 042	R941 042	R941 042	R941 042	R941 042
	MSOGWABA												
2A	Pienaar	3218	R28 333 484	R2 833 348	R2 833 348	R2 833 348	R2 833 348	R2 833 348	R2 833 348	R2 833 348	R2 833 348	R2 833 348	R2 833 348
2B	Daantjie	9123	R123 681 148	R12 368 115	R12 368 115	R12 368 115	R12 368 115	R12 368 115	R12 368 115	R12 368 115	R12 368 115	R12 368 115	R12 368 115
	MATSULU												
	Matsulu	6829	R31 189 348	R3 118 935	R3 118 935	R3 118 935	R3 118 935	R3 118 935	R3 118 935	R3 118 935	R3 118 935	R3 118 935	R3 118 935
		46331	R401 877 679	R40 187 768	R40 187 768	R40 187 768	R40 187 768	R40 187 768	R40 187 768	R40 187 768	R40 187 768	R40 187 768	R40 187 768

Table C11

New Settlements

Service: Water

Zone no.	Settlement name	Required level of service	Total development cost	Implementation		YEAR									
				Starting year	Period (years)	1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005
	NELSPRUIT														
5A	Nelspruit West	3	R1 955 248	1998	5			R391 050	R391 050	R391 050	R391 050	R391 050			
5B	Nelspruit South	3	R1 955 248	1999	5				R391 050	R391 050	R391 050	R391 050	R391 050		
5C	Nelspruit East	3	R1 955 248	2000	5					R391 050	R391 050	R391 050	R391 050	R391 050	
	OEWERSIG														
8A	Oewersig A	3	R2 232 779	1996	2	R1 116 390	R1 116 390								
8B	Oewersig B	3		1997	2										
	BOSCHRAND														
11	Boschrand	4	R2 858 111	1999	5				R531 222	R531 222	R531 222	R531 222	R531 222		
	WHITE RIVER														
6A	White River South	3	R509 495	1998	5			R101 899	R101 899	R101 899	R101 899	R101 899			
6B	White River West	3	R509 495	1999	5				R101 899	R101 899	R101 899	R101 899	R101 899		
6C	White River East	3	R509 495	1997	5		R101 899	R101 899	R101 899	R101 899	R101 899				
	ROCKY'S DRIFT														
9	Rocky's Drift Res.	3	R412 476	1998	5			R82 495	R82 495	R82 495	R82 495	R82 495			
	CLAU-CLAU														
3E	Clau-clau North	3	R894 393	1998	5			R178 879	R178 879	R178 879	R178 879	R178 879			
3F	Clau-clau South	3	R950 292	1999	5				R190 058	R190 058	R190 058	R190 058	R190 058		
3G	Zwelitsha South	3	R2 012 383	1999	5				R402 477	R402 477	R402 477	R402 477	R402 477		
3H	Clau-clau West	3	R167 699	1998	5			R33 540	R33 540	R33 540	R33 540	R33 540			
	GUTSHWA-NGODINI														
4F	Gutshwa West	3	R1 179 582	1998	5			R235 916	R235 916	R235 916	R235 916	R235 916			
4G	Gutshwa East	3	R1 251 072	1999	5				R250 214	R250 214	R250 214	R250 214	R250 214		
4H	Backdoor	3	R142 980	1998	5	R28 596	R28 596	R28 596	R28 596	R28 596					
10	PLASTON														
10A	Plaston A	3	R792 546	1999	5				R158 509	R158 509	R158 509	R158 509	R158 509		
10B	Plaston B	3	R792 546	1999	5				R158 509	R158 509	R158 509	R158 509	R158 509		
	KANYAMAZANE														
1B	Tekwane East	3	R650 442	1998	5	R130 088	R130 088	R130 088	R130 088	R130 088					
	MSOGWABA														
2C	Aide	3	R987 676	1997	5		R197 535	R197 535	R197 535	R197 535	R197 535				
2D	Intersection	3	R370 379	1997	5		R74 076	R74 076	R74 076	R74 076	R74 076				
2E	Western Extension	3	R288 072	1997	5		R57 614	R57 614	R57 614	R57 614	R57 614				
2F	Eastern Extension	3	R1 152 289	1998	5			R230 458	R230 458	R230 458	R230 458	R230 458			
2G	Southern Extension	3	R82 306	1999	5				R16 461	R16 461	R16 461	R16 461	R16 461		
	TEKWANE														
7A	Tekwane North	3	R1 973 959	1996	5	R394 792	R394 792	R394 792	R394 792	R394 792					
7B	Tekwane West	4	R2 354 405	1996	5	R470 881	R470 881	R470 881	R470 881	R470 881					
7C	Tekwane South	4	R2 205 449	1997	5		R441 090	R441 090	R441 090	R441 090	R441 090				
7D	Karino	4		1998	5										
	MATSULU														
12B	Matsulu	3	R4 236 728	1998	5			R847 746	R847 746	R847 746	R847 746	R847 746			
			R35 182 795			R2 140 747	R3 012 961	R3 998 553	R6 198 953	R6 590 003	R5 565 646	R4 693 432	R2 591 450	R391 050	

Table C12

New Settlements

Service: Sanitation

Zone no.	Settlement name	Required level of service	Total development cost	Implementation		YEAR									
				Starting year	Period (years)	1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005
	NELSPRUIT														
5A	Nelspruit West	4	R4 792 274	1998	5			R958 455	R958 455	R958 455	R958 455	R958 455			
5B	Nelspruit South	4	R4 792 274	1999	5				R958 455	R958 455	R958 455	R958 455	R958 455		
5C	Nelspruit East	4	R4 792 274	2000	5					R958 455	R958 455	R958 455	R958 455	R958 455	
	OEWERSIG														
8A	Oewersig A	4	R4 212 698	1996	2	R2 106 349	R2 106 349								
8B	Oewersig B	4		1997	2										
	BOSCHRAND														
11	Boschrand	2	R2 013 741	1999	5				R402 748	R402 748	R402 748	R402 748	R402 748		
	WHITE RIVER														
6A	White River South	4	R1 248 763	1998	5			R249 753	R249 753	R249 753	R249 753	R249 753			
6B	White River West	4	R1 248 763	1999	5				R249 753	R249 753	R249 753	R249 753	R249 753		
6C	White River East	4	R1 248 763	1997	5		R249 753	R249 753	R249 753	R249 753	R249 753				
	ROCKY'S DRIFT														
9	Rocky's Drift Res.	4	R778 239	1996	5			R155 648	R155 648	R155 648	R155 648	R155 648			
	CLAU-CLAU														
3E	Clau-clau North	2	R986 462	1998	5			R197 292	R197 292	R197 292	R197 292	R197 292			
3F	Clau-clau South	2	R1 046 116	1999	5				R209 623	R209 623	R209 623	R209 623	R209 623		
3G	Zwelitsha South	2	R2 219 541	1999	5				R443 908	R443 908	R443 908	R443 908	R443 908		
3H	Clau-clau West	2	R184 962	1998	5			R36 992	R36 992	R36 992	R36 992	R36 992			
	GUTSHWA-NGODINI														
4F	Gutshwa West	2	R1 301 010	1998	5			R260 202	R260 202	R260 202	R260 202	R260 202			
4G	Gutshwa East	2	R1 379 659	1999	5				R275 972	R275 972	R275 972	R275 972	R275 972		
4H	Backdoor	2	R157 698	1998	5	R31 540	R31 540	R31 540	R31 540	R31 540					
10	PLASTON														
10A	Plaston A	2	R1 071 832	1999	5				R214 366	R214 366	R214 366	R214 366	R214 366		
10B	Plaston B	2	R1 071 832	1999	5				R214 366	R214 366	R214 366	R214 366	R214 366		
	KANYAMAZANE														
1B	Tekwane East	2	R879 652	1996	5	R175 930	R175 930	R175 930	R175 930	R175 930					
	MSOGWABA														
2C	Aide	2	R1 089 349	1997	5		R217 870	R217 870	R217 870	R217 870	R217 870				
2D	Intersection	2	R406 506	1997	5		R81 701	R81 701	R81 701	R81 701	R81 701				
2E	Western Extension	2	R317 727	1997	5		R63 545	R63 545	R63 545	R63 545	R63 545				
2F	Eastern Extension	2	R1 270 907	1996	5			R254 181	R254 181	R254 181	R254 181	R254 181			
2G	Southern Extension	2	R90 779	1999	5				R18 156	R18 156	R18 156	R18 156	R18 156		
	TEKWANE														
7A	Tekwane North	2	R2 669 566	1996	5	R533 913	R533 913	R533 913	R533 913	R533 913					
7B	Tekwane West	4	R3 531 607	1996	5	R706 321	R706 321	R706 321	R706 321	R706 321					
7C	Tekwane South	4	R3 308 174	1997	5		R661 635	R661 635	R661 635	R661 635	R661 635				
7D	Karino	4		1998	5										
	MATSULU														
	Matsulu	4	R7 997 423	1998	5			R1 599 485	R1 599 485	R1 599 485	R1 599 485	R1 599 485			
			R56 112 794			R3 554 054	R4 828 557	R6 434 217	R9 421 564	R10 380 019	R8 932 315	R7 657 811	R3 945 802	R958 455	

Table C13

New Settlements

Service: Roads

Zone no.	Settlement name	Required level of service	Total development cost	Implementation		YEAR									
				Starting year	Period (years)	1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005
	NELSPRUIT														
5A	Nelspruit West	3	R3 105 394	1996	5			R621 079	R621 079	R621 079	R621 079	R621 079			
5B	Nelspruit South	3	R3 105 394	1996	5	R621 079	R621 079	R621 079	R621 079	R621 079					
5C	Nelspruit East	3	R3 105 394	1996	5	R621 079	R621 079	R621 079	R621 079	R621 079					
	OEWERSIG														
8A	Oewersig A	3	R2 889 479	1996	5	R577 896	R577 896	R577 896	R577 896	R577 896					
8B	Oewersig B	3		1996	5										
	BOSCHRAND														
11	Boschrand	3	R3 309 923	1996	5	R661 985	R661 985	R661 985	R661 985	R661 985					
	WHITE RIVER														
6A	White River South	3	R809 199	1996	5	R161 840	R161 840	R161 840	R161 840	R161 840					
6B	White River West	3	R809 199	1996	5	R161 840	R161 840	R161 840	R161 840	R161 840					
6C	White River East	3	R809 199	1996	5	R161 840	R161 840	R161 840	R161 840	R161 840					
	ROCKY'S DRIFT														
9	Rocky's Drift Res.	3	R533 792	1996	5	R106 758	R106 758	R106 758	R106 758	R106 758					
	CLAU-CLAU														
3E	Clau-clau North	3	R1 315 283	1996	5	R263 057	R263 057	R263 057	R263 057	R263 057					
3F	Clau-clau South	3	R1 397 489	1996	5	R279 498	R279 498	R279 498	R279 498	R279 498					
3G	Zweitsha South	3	R2 959 387	1996	5	R591 877	R591 877	R591 877	R591 877	R591 877					
3H	Clau-clau West	3	R246 816	1996	5	R49 323	R49 323	R49 323	R49 323	R49 323					
	GUTSHWA-NGODINI														
4F	Gutshwa West	3	R1 734 680	1996	5	R346 936	R346 936	R346 936	R346 936	R346 936					
4G	Gutshwa East	3	R1 839 812	1996	5	R367 962	R367 962	R367 962	R367 962	R367 962					
4H	Backdoor	3	R210 264	1996	5	R42 053	R42 053	R42 053	R42 053	R42 053					
10	PLASTON														
10A	Plaston A	3	R1 025 647	1996	5	R205 129	R205 129	R205 129	R205 129	R205 129					
10B	Plaston B	3	R1 025 647	1996	5	R205 129	R205 129	R205 129	R205 129	R205 129					
	KANYAMAZANE														
1B	Tekwane East	3	R841 748	1996	5	R168 350	R168 350	R168 350	R168 350	R168 350					
	MSOGWABA														
2C	Aldie	3	R1 452 465	1996	5	R290 493	R290 493	R290 493	R290 493	R290 493					
2D	Intersection	3	R544 675	1996	5	R108 935	R108 935	R108 935	R108 935	R108 935					
2E	Western Extension	3	R423 638	1996	5	R84 727	R84 727	R84 727	R84 727	R84 727					
2F	Eastern Extension	3	R1 694 543	1996	5	R338 909	R338 909	R338 909	R338 909	R338 909					
2G	Southern Extension	3	R121 039	1996	5	R24 208	R24 208	R24 208	R24 208	R24 208					
	TEKWANE														
7A	Tekwane North	3	R2 554 535	1996	5	R510 907	R510 907	R510 907	R510 907	R510 907					
7B	Tekwane West	3	R2 422 320	1996	5	R484 464	R484 464	R484 464	R484 464	R484 464					
7C	Tekwane South	3	R2 269 068	1996	5	R453 814	R453 814	R453 814	R453 814	R453 814					
7D	Karino	3		1996	5										
	MATSULU														
	Matsulu	3	R5 485 412	1996	5	R1 097 082	R1 097 082	R1 097 082	R1 097 082	R1 097 082					
			R48 041 239			R8 987 169	R8 987 169	R9 608 248	R9 608 248	R9 608 248	R621 079	R621 079			

Table C14

New Settlements

Service: Stormwater

Zone no.	Settlement name	Required level of service	Total development cost	Implementation		YEAR									
				Starting year	Period (years)	1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005
	NELSPRUIT														
5A	Nelspruit West	3	R1 725 219	1996	5			R345 044	R345 044	R345 044	R345 044	R345 044			
5B	Nelspruit South	3	R1 725 219	1996	5	R345 044	R345 044	R345 044	R345 044	R345 044					
5C	Nelspruit East	3	R1 725 219	1996	5	R345 044	R345 044	R345 044	R345 044	R345 044					
	OEWERSIG														
8A	Oewersig A	3	R1 444 739	1996	5	R288 948	R288 948	R288 948	R288 948	R288 948					
8B	Oewersig B	3		1996	5										
	BOSCHRAND														
11	Boschrand	3	R1 838 846	1996	5	R367 769	R367 769	R367 769	R367 769	R367 769					
	WHITE RIVER														
6A	White River South	3	R449 555	1996	5	R89 911	R89 911	R89 911	R89 911	R89 911					
6B	White River West	3	R449 555	1996	5	R89 911	R89 911	R89 911	R89 911	R89 911					
6C	White River East	3	R449 555	1996	5	R89 911	R89 911	R89 911	R89 911	R89 911					
	ROCKY'S DRIFT														
9	Rocky's Drift Res.	3	R266 898	1996	5	R53 379	R53 379	R53 379	R53 379	R53 379					
	CLAU-CLAU														
3E	Clau-clau North	3	R789 170	1996	5	R157 834	R157 834	R157 834	R157 834	R157 834					
3F	Clau-clau South	3	R838 493	1996	5	R167 699	R167 699	R167 699	R167 699	R167 699					
3G	Zwelitsha South	3	R1 775 632	1996	5	R355 126	R355 126	R355 126	R355 126	R355 126					
3H	Clau-clau West	3	R147 988	1996	5	R29 594	R29 594	R29 594	R29 594	R29 594					
	GUTSHWA-NGODINI														
4F	Gutshwa West	3	R1 040 808	1996	5	R208 162	R208 162	R208 162	R208 162	R208 162					
4G	Gutshwa East	3	R1 103 887	1996	5	R220 777	R220 777	R220 777	R220 777	R220 777					
4H	Backdoor	3	R126 159	1996	5	R25 232	R25 232	R25 232	R25 232	R25 232					
10	PLASTON														
10A	Plaston A	3	R512 824	1996	5	R102 565	R102 565	R102 565	R102 565	R102 565					
10B	Plaston B	3	R512 824	1996	5	R102 565	R102 565	R102 565	R102 565	R102 565					
	KANYAMAZANE														
1B	Tekwane East	3	R420 874	1996	5	R84 175	R84 175	R84 175	R84 175	R84 175					
	MSOGWABA														
2C	Aldie	3	R871 479	1996	5	R174 296	R174 296	R174 296	R174 296	R174 296					
2D	Intersection	3	R326 805	1996	5	R65 361	R65 361	R65 361	R65 361	R65 361					
2E	Western Extension	3	R254 181	1996	5	R50 836	R50 836	R50 836	R50 836	R50 836					
2F	Eastern Extension	3	R1 016 726	1996	5	R203 345	R203 345	R203 345	R203 345	R203 345					
2G	Southern Extension	3	R72 823	1996	5	R14 525	R14 525	R14 525	R14 525	R14 525					
	TEKWANE														
7A	Tekwane North	3	R1 277 288	1996	5	R255 454	R255 454	R255 454	R255 454	R255 454					
7B	Tekwane West	3	R1 211 160	1996	5	R242 232	R242 232	R242 232	R242 232	R242 232					
7C	Tekwane South	3	R1 134 534	1996	5	R226 907	R226 907	R226 907	R226 907	R226 907					
7D	Karino	3		1996	5										
	MATSULU														
	Matsulu	3	R2 742 706	1996	5	R548 541	R548 541	R548 541	R548 541	R548 541					
			R28 250 925			R4 905 141	R4 905 141	R5 250 185	R5 250 185	R5 250 185	R345 044	R345 044			

Table C15

New Settlements

Service: Electricity

Zone no.	Settlement name	Required level of service	Total development cost	Implementation		YEAR									
				Starting year	Period (years)	1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005
	NELSPRUIT														
5A	Nelspruit West	3	R2 185 277	1996	5			R437 055	R437 055	R437 055	R437 055	R437 055			
5B	Nelspruit South	3	R2 185 277	1996	5	R437 055	R437 055	R437 055	R437 055	R437 055					
5C	Nelspruit East	3	R2 185 277	1996	5	R437 055	R437 055	R437 055	R437 055	R437 055					
	OEWERSIG														
6A	Oewersig A	3	R1 444 739	1996	5	R288 948	R288 948	R288 948	R288 948	R288 948					
6B	Oewersig B	3		1996	5										
	BOSCHRAND														
11	Boschrand	3	R2 329 205	1996	5	R465 841	R465 841	R465 841	R465 841	R465 841					
	WHITE RIVER														
6A	White River South	3	R569 436	1996	5	R113 887	R113 887	R113 887	R113 887	R113 887					
6B	White River West	3	R569 436	1996	5	R113 887	R113 887	R113 887	R113 887	R113 887					
6C	White River East	3	R569 436	1996	5	R113 887	R113 887	R113 887	R113 887	R113 887					
	ROCKY'S DRIFT														
9	Rocky's Drift Res.	3	R266 896	1996	5	R53 379	R53 379	R53 379	R53 379	R53 379					
	CLAU-CLAU														
3E	Clau-clau North	3	R1 179 693	1996	5	R235 939	R235 939	R235 939	R235 939	R235 939					
3F	Clau-clau South	3	R1 253 424	1996	5	R250 685	R250 685	R250 685	R250 685	R250 685					
3G	Zwelisha South	3	R2 654 309	1996	5	R530 862	R530 862	R530 862	R530 862	R530 862					
3H	Clau-clau West	3	R221 192	1996	5	R44 238	R44 238	R44 238	R44 238	R44 238					
	GUTSHWA-NGODINI														
4F	Gutshwa West	3	R1 555 855	1996	5	R311 171	R311 171	R311 171	R311 171	R311 171					
4G	Gutshwa East	3	R1 650 149	1996	5	R330 030	R330 030	R330 030	R330 030	R330 030					
4H	Backdoor	3	R186 588	1996	5	R37 718	R37 718	R37 718	R37 718	R37 718					
10	PLASTON														
10A	Plaston A	3	R512 824	1996	5	R102 565	R102 565	R102 565	R102 565	R102 565					
10B	Plaston B	3	R512 824	1996	5	R102 565	R102 565	R102 565	R102 565	R102 565					
	KANYAMAZANE														
1B	Tekwane East	3	R726 964	1996	5	R145 393	R145 393	R145 393	R145 393	R145 393					
	MSOGWABA														
2C	Aldie	3	R1 302 733	1996	5	R260 547	R260 547	R260 547	R260 547	R260 547					
2D	Intersection	3	R488 525	1996	5	R97 705	R97 705	R97 705	R97 705	R97 705					
2E	Western Extension	3	R379 964	1996	5	R75 993	R75 993	R75 993	R75 993	R75 993					
2F	Eastern Extension	3	R1 519 856	1996	5	R303 971	R303 971	R303 971	R303 971	R303 971					
2G	Southern Extension	3	R108 561	1996	5	R21 712	R21 712	R21 712	R21 712	R21 712					
	TEKWANE														
7A	Tekwane North	3	R1 277 268	1996	5	R255 454	R255 454	R255 454	R255 454	R255 454					
7B	Tekwane West	4	R1 211 160	1996	5	R242 232	R242 232	R242 232	R242 232	R242 232					
7C	Tekwane South	3	R1 134 534	1996	5	R226 907	R226 907	R226 907	R226 907	R226 907					
7D	Karino	3		1996	5										
	MATSULU														
	Matsulu	4	R2 742 706	1996	5	R548 541	R548 541	R548 541	R548 541	R548 541					
			R32 926 110			R6 148 167	R6 148 167	R6 585 222	R6 585 222	R6 585 222	R437 055	R437 055			

Table C16

New Settlements

Summary

Zone no.	Settlement name	1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005
	NELSPRUIT										
5A	Nelspruit West			R2 752 682	R2 752 682	R2 752 682	R2 752 682	R2 752 682			
5B	Nelspruit South	R1 403 178	R1 403 178	R1 403 178	R2 752 682	R2 752 682	R1 349 504	R1 349 504	R1 349 504		
5C	Nelspruit East	R1 403 178	R1 403 178	R1 403 178	R1 403 178	R2 752 682	R1 349 504	R1 349 504	R1 349 504	R1 349 504	
	OEWERSIG										
8A	Oewersig A	R4 378 530	R4 378 530	R1 155 792	R1 155 792	R1 155 792					
8B	Oewersig B										
	BOSCHRAND										
11	Boschrand	R1 495 595	R1 495 595	R1 495 595	R2 429 565	R2 429 565	R933 970	R933 970	R933 970		
	WHITE RIVER										
6A	White River South	R365 638	R365 638	R717 290	R717 290	R717 290	R351 652	R351 652			
6B	White River West	R365 638	R365 638	R365 638	R717 290	R717 290	R351 652	R351 652	R351 652		
6C	White River East	R365 638	R717 290	R717 290	R717 290	R717 290	R351 652				
	ROCKY'S DRIFT										
9	Rocky's Drift Res.	R213 517	R213 517	R451 660	R451 660	R451 660	R238 143	R238 143			
	CLAU-CLAU										
3E	Clau-clau North	R656 629	R656 629	R1 033 000	R1 033 000	R1 033 000	R376 171	R376 171			
3F	Clau-clau South	R697 661	R697 661	R697 661	R1 097 563	R1 097 563	R399 682	R399 682	R399 682		
3G	Zwelitsha South	R1 477 866	R1 477 866	R1 477 866	R2 324 251	R2 324 251	R846 365	R846 365	R846 365		
3H	Clau-clau West	R123 155	R123 155	R193 688	R193 688	R193 688	R70 532	R70 532			
	GUTSHWA-NGODINI										
4F	Gutshwa West	R866 269	R866 269	R1 362 387	R1 362 387	R1 362 387	R496 119	R496 119			
4G	Gutshwa East	R918 770	R918 770	R918 770	R1 444 956	R1 444 956	R526 186	R526 186	R526 186		
4H	Backdoor	R165 138	R165 138	R165 138	R165 138	R165 138					
10	PLASTON										
10A	Plaston A	R410 259	R410 259	R410 259	R783 135	R783 135	R372 876	R372 876	R372 876		
10B	Plaston B	R410 259	R410 259	R410 259	R783 135	R783 135	R372 876	R372 876	R372 876		
	KANYAMAZANE										
1B	Tekwane East	R703 936	R703 936	R703 936	R703 936	R703 936					
	MSOGWABA										
2C	Aide	R725 336	R1 140 741	R1 140 741	R1 140 741	R1 140 741	R415 405				
2D	Intersection	R272 001	R427 778	R427 778	R427 778	R427 778	R155 777				
2E	Western Extension	R211 556	R332 716	R332 716	R332 716	R332 716	R121 160				
2F	Eastern Extension	R846 225	R846 225	R1 330 864	R1 330 864	R1 330 864	R484 639	R484 639			
2G	Southern Extension	R60 445	R60 445	R60 445	R95 062	R95 062	R34 617	R34 617	R34 617		
	TEKWANE										
7A	Tekwane North	R1 950 519	R1 950 519	R1 950 519	R1 950 519	R1 950 519					
7B	Tekwane West	R2 146 130	R2 146 130	R2 146 130	R2 146 130	R2 146 130					
7C	Tekwane South	R907 627	R2 010 352	R2 010 352	R2 010 352	R2 010 352	R1 102 725				
7D	Karino										
	MATSULU										
12A	Matsulu	R2 194 165	R2 194 165	R4 641 395	R4 641 395	R4 641 395	R2 447 230	R2 447 230			
	TOTAL	R25 735 277	R27 681 996	R31 876 425	R37 064 173	R38 413 677	R15 901 139	R13 754 420	R6 537 252	R1 349 504	

Table C17

Bulk services: Water

No.	Project	Estimated Cost	Starting year	Impl. period	YEAR 1 1996	2 1997	3 1998	4 1999	5 2000
1	**Zone 1 : Nelspruit**								
1.1	Bulk water supply to Nelspruit West	R5 000 000	1998	1			R5 000 000		
1.2	Bulk water supply to Nelspruit South	R500 000	1999	1				R500 000	
1.3	Bulk water supply to Nelspruit East	R500 000	2000	1					R500 000
1.4	Bulk water supply to Oewersig	R1 000 000	1996	1	R1 000 000				
1.5	Bulk water supply to Boschrand	R1 500 000	1999	1				R1 500 000	
1.6	Extension to Nelspruit waterworks	R100 000	1996	1	R100 000				
	Total cost - Zone 1 Water	R8 600 000			**R1 100 000**		**R5 000 000**	**R2 000 000**	**R500 000**
2	**Zone 2 : White River**								
2.1	Bulk water supply to White River South	R500 000	1998	1			R500 000		
2.2	Bulk water supply to White River West	R500 000	1999	1				R500 000	
2.3	Bulk water supply to White River East	R500 000	1997	1		R500 000			
2.4	Bulk water supply to Rocky's Drift	R10 000 000	1998	2			R5 000 000	R5 000 000	
2.5	Upgrade to existing storage	R3 000 000	1996	1	R3 000 000				
2.6	Extension to White River waterworks	R2 000 000	1996	1	R2 000 000				
	Total cost - Zone 2 Water	R16 500 000			**R5 000 000**	**R500 000**	**R5 500 000**	**R5 500 000**	
3	**Zone 3 : Kabokweni**								
3.1	Upgrading of existing SNRW Sceme	R60 000 000	1997	15		R4 000 000	R4 000 000	R4 000 000	R4 000 000
3.2	Bulk water supply to Clau-clau North	R700 000	1998	1			R700 000		
3.3	Bulk water supply to Clau-clau South	R700 000	1999	1				R700 000	
3.4	Bulk water supply to Zwelitsha South	R700 000	1999	1				R700 000	
3.5	Bulk water supply to Clau-clau West	R500 000	1998	1			R500 000		
3.6	Bulk water supply to Gutshwa West	R1 300 000	1998	1			R1 300 000		
3.7	Bulk water supply to Gutshwa East	R1 300 000	1999	1				R1 300 000	
3.8	Bulk water supply to Backdoor	R1 400 000	1996	1	R1 400 000				
3.9	Bulk water supply to Plaston A	R1 300 000	1999	1				R1 300 000	
3.10	Bulk water supply to Plaston B	R1 300 000	1999	1				R1 300 000	
3.11	Upgrading of bulk : Msogwaba	R20 000 000	1997	5		R4 000 000	R4 000 000	R4 000 000	R4 000 000
3.12	Upgrading of bulk : Clau - clau and surrounds	R10 000 000	1998	4			R2 500 000	R2 500 000	R2 500 000
3.13	Upgrading of bulk : Gutshwa - Ngodini	R16 000 000	1996	8	R2 000 000	R2 000 000	R2 000 000	R2 000 000	R2 000 000
3.14	Upgrading of SNRW purification works	R15 000 000	1997	8		R1 875 000	R1 875 000	R1 875 000	R1 875 000
	Total cost - Zone 3 Water	R130 200 000			**R3 400 000**	**R11 875 000**	**R16 875 000**	**R19 675 000**	**R14 375 000**
4	**Zone 4 : KaNyamazane**								
4.1	KaNyamazane bulk water reticulation	R8 500 000	1998	3			R2 833 333	R2 833 333	R2 833 333
4.2	Bulk water supply to Aldie	R500 000	1997	1		R500 000			
4.3	Bulk water supply to Intersection	R500 000	1997	1		R500 000			
4.4	Bulk water supply to Tekwane East	R2 500 000	1996	1	R2 500 000				
4.5	Bulk water supply to Tekwane North	R4 500 000	1996	3	R1 500 000	R1 500 000	R1 500 000		
4.6	Bulk water supply to Tekwane West	R5 000 000	1996	1	R5 000 000				
4.7	Bulk water supply to Tekwane South	R500 000	1997	1		R500 000			
4.8	Bulk water supply to Karino	R1 000 000	1998	1			R1 000 000		
	Total cost - Zone 4 Water	R23 000 000			**R9 000 000**	**R3 000 000**	**R5 333 333**	**R2 833 333**	**R2 833 333**
5	**Zone 5 : Matsulu**								
5.1	Extension to Matsulu waterworks	R2 500 000	1999	1				R2 500 000	
5.2	Bulk water supply to Matsulu Extension	R5 000 000	1996	1	R5 000 000				
	Total cost - Zone 5 Water	R7 500 000			**R5 000 000**			**R2 500 000**	
	TOTAL	**R185 800 000**			**R23 500 000**	**R15 375 000**	**R32 708 333**	**R32 508 333**	**R17 708 333**

Table C18

Bulk services: Sanitation

No.	Project	Estimated Cost	Starting year	Impl. period	YEAR 1 1996	2 1997	3 1998	4 1999	5 2000
1	**Zone 1 : Nelspruit**								
1.1	Upgrading of main outfall to Kingstonvale Works	R18 815 000	1996	3	R6 271 667	R6 271 667	R6 271 667		
1.2	Outfall sewer from Nelspruit West	R1 500 000	1998	1			R1 500 000		
1.3	Outfall sewer from Nelspruit South	R500 000	1999	1				R500 000	
1.4	Outfall sewer from to Nelspruit East	R500 000	2000	1					R500 000
1.5	Outfall sewer from Oewersig	R500 000	1996	1	R500 000				
1.6	Outfall sewer from Boschrand	R2 500 000	1999	1				R2 500 000	
	Total cost - Zone 1 Sanitation	R24 315 000			**R6 771 667**	**R6 271 667**	**R7 771 667**	**R3 000 000**	**R500 000**
2	**Zone 2 : White River**								
2.1	Outfall sewer from White River South	R500 000	1998	1			R500 000		
2.2	Outfall sewer from White River West	R500 000	1999	1				R500 000	
2.3	Outfall sewer from White River East	R500 000	1997	1		R500 000			
2.4	Outfall sewer from Rocky's Drift	R50 000	1998	1			R50 000		
2.5	Extension to White River treatment works	R4 000 000	1998	1			R4 000 000		
	Total cost - Zone 2 Sanitation	R5 550 000				**R500 000**	**R4 550 000**	**R500 000**	
3	**Zone 3 : Kabokweni**								
3.1	Outfall sewer from Clau-clau	R1 000 000	1998	1			R1 000 000		
3.2	Outfall sewer from Zwelitsha	R500 000	1999	1				R500 000	
3.3	Outfall sewer from Gutshwa	R500 000	1998	1			R500 000		
3.4	Outfall sewer from Backdoor	R1 000 000	1996	1	R1 000 000				
3.5	Main outfall sewer extension	R4 000 000	1996	1	R4 000 000				
3.6	Outfall sewer from Plaston	R2 500 000	1999	1				R2 500 000	
3.7	Extension to Gutshwa treatment works	R5 000 000	1996	2	R2 500 000	R2 500 000			
	Total cost - Zone 3 Sanitation	R14 500 000			**R7 500 000**	**R2 500 000**	**R1 500 000**	**R3 000 000**	
4	**Zone 4 : KaNyamazane**								
4.1	Main outfall sewer extension to KaNyamazane	R6 000 000	1996	2	R3 000 000	R3 000 000			
4.2	New works for Msogwaba area	R2 500 000	1997	1		R2 500 000			
4.3	Outfall sewer link from Intersection	R500 000	1997	1		R500 000			
4.4	Outfall sewer link from Western Extension	R500 000	1997	1		R500 000			
4.5	Outfall sewer link from Eastern Extension	R500 000	1998	1			R500 000		
4.6	Outfall sewer link from Southern Extension	R500 000	1999	1				R500 000	
4.7	New Rietbokloop sewage treatment works	R4 000 000	1996	2	R2 000 000	R2 000 000			
4.8	Outfall sewer from Tekwane North	R500 000	1996	1	R500 000				
4.9	Main outfall sewer extension to Tekwane	R1 000 000	1996	1	R1 000 000				
4.10	Outfall sewer from Tekwane West	R500 000	1996	1	R500 000				
4.11	Outfall sewer from Tekwane South	R200 000	1997	1		R200 000			
4.12	Outfall sewer from Tekwane East	R500 000	1996	1	R500 000				
4.13	Outfall sewer from Karino	R500 000	1998	1			R500 000		
4.14	Extension to KaNyamazane treatment works	R6 000 000	1996	2	R3 000 000	R3 000 000			
	Total cost - Zone 4 Water	R23 700 000			**R10 500 000**	**R11 700 000**	**R1 000 000**	**R500 000**	
5	**Zone 5 : Matsulu**								
5.1	Extension to Matsulu treatment works	R2 500 000	1996	1	R2 500 000				
5.2	Outfall sewer from new extension	R1 500 000	1996	1	R1 500 000				
	Total cost - Zone 5 Water	R4 000 000			**R4 000 000**				
	TOTAL	R72 065 000			**R28 771 667**	**R20 971 667**	**R14 821 667**	**R7 000 000**	**R500 000**

Table C19

Bulk services: roads

No.	Project	Estimated Cost	Starting year	Impl. period	YEAR 1 1996	2 1997	3 1998	4 1999	5 2000
1	**Zone 1 : Nelspruit**								
1.1	Rocky's Drift/Karino link road	R11 400 000	1998	3			R3 800 000	R3 800 000	R3 800 000
1.2	Boschrand distributor link road	R2 500 000	1999	1				R2 500 000	
1.3	Oewersig/P18 link road	R3 100 000	2000	1					R3 100 000
1.4	Piet Retief / Mostert Street upgrading	R6 000 000	1996	1	R6 000 000				
1.5	The Rest link road	R8 500 000	1998	2			R4 250 000	R4 250 000	
	Total cost - Zone 1 roads	R31 500 000			**R6 000 000**		**R8 050 000**	**R10 550 000**	**R6 900 000**
2	**Zone 2 : White River**								
2.1	Theo Kleynhans Street extension	R5 000 000	2000	2					R2 500 000
2.2	Longmere Dam link road	R3 500 000	1998	1			R3 500 000		
	Total cost - Zone 2 roads	R8 500 000					**R3 500 000**		**R2 500 000**
3	**Zone 3 : Kabokweni**								
3.1	Link Road S3	R8 475 000	2001	2					
3.2	Link Road S4	R4 250 000	1998	1			R4 250 000		
3.3	Link Road S11	R6 900 000	1999	2				R3 450 000	R3 450 000
	Total cost - Zone 3 roads	R19 625 000					**R4 250 000**	**R3 450 000**	**R3 450 000**
4	**Zone 4 : KaNyamazane**								
4.1	Link Road S2	R10 000 000	2001	3					
4.2	Tekwane East/West link road	R5 700 000	1996	2	R2 850 000	R2 850 000			
4.3	Link Road S6	R3 950 000	1997	1		R3 950 000			
4.4	Link Road S5	R2 750 000	1998	1			R2 750 000		
4.5	Link Road S7	R3 150 000	1996	1	R3 150 000				
4.6	Link Road S8	R1 400 000	1999	1				R1 400 000	
	Total cost - Zone 4 roads	R26 950 000			**R6 000 000**	**R6 800 000**	**R2 750 000**	**R1 400 000**	
5	**Zone 5 : Matsulu**								
5.1	Matsulu / Pienaar link road	R19 500 000	2001	3					
5.2									
	Total cost - Zone 5 roads	**R19 500 000**							
	TOTAL	**R106 075 000**			**R12 000 000**	**R6 800 000**	**R18 550 000**	**R15 400 000**	**R12 850 000**

Table C20

Bulk services: electricity

No.	Project	Estimated Cost	Starting year	Impl. period	YEAR 1 1996	2 1997	3 1998	4 1999	5 2000
1	**Zone 1 : Nelspruit**								
1.1	Oewersig 33/11 kV substation - 2 x 5 MVA	R2 000 000	1996	2	R1 000 000	R1 000 000			
1.2	Oewersig 33 kV line - 5km Wolf conductor	R500 000	1996	1	R500 000				
1.3	The Rest 33/11 kV substation - 2 x 10 MVA	R3 000 000	1999	2				R1 500 000	R1 500 000
1.4	The Rest 33 kV line - 10km Wolf conductor	R1 000 000	1999	2				R500 000	R500 000
1.5	Boschrand 132/11 kV substation - 1 x 5 MVA	R1 500 000	1999	1				R1 500 000	
	Total cost - Zone 1 electricity	R8 000 000			**R1 500 000**	**R1 000 000**		**R3 500 000**	**R2 000 000**
2	**Zone 2 : White River**								
2.1	White River 132/22 kV substation - 2 x 40 MVA	R7 000 000	1998	4			R1 750 000	R1 750 000	R1 750 000
2.2	White River North 22 kV line - 10km Wolf conduct	R1 000 000	1999	1				R1 000 000	
2.3	White River Town Northern substation - 2 x 10 MV	R3 000 000	1999	2				R1 500 000	R1 500 000
	Total cost - Zone 2 electricity	R11 000 000					**R1 750 000**	**R4 250 000**	**R3 250 000**
3	**Zone 3 : Kabokweni**								
3.1	Gutshwa 22/11 kV substation - 2 x 10 MVA	R3 000 000	1998	1			R3 000 000		
3.2	Gutshwa 22 kV line - 10 km Wolf conductor	R1 000 000	1998	2			R500 000	R500 000	
3.3	Clau-clau 132/11 kV substation - 2 x 10 MVA	R3 000 000	1998	2			R1 500 000	R1 500 000	
3.4	Clau-clau 132 kV line - 15 km Wolf conductor	R1 500 000	1998	2			R750 000	R750 000	
3.5	Kabokweni 132 kV line - 20 km Wolf conductor	R2 000 000	2000	2					
3.6	Kabokwni 132kV substation - 2 x 10 MVA	R4 000 000	2000	2					
	Total cost - Zone 3 electricity	R14 500 000					**R5 750 000**	**R2 750 000**	
4	**Zone 4 : KaNyamazane**								
4.1	Pienaar 132/11 kV substation - 2 x 10 MVA	R3 000 000	1997	2		R1 500 000	R1 500 000		
4.2	Pienaar 132 kV line - 10 km Wolf conductor	R1 000 000	1997	2		R500 000	R500 000		
4.3	KaNyamazane 132/11 kV substation - 2 x 10 MVA	R3 000 000	1997	1		R3 000 000			
4.4	Tekwane 132/11 kV substation - 2 x 10 MVA	R3 000 000	1996	2	R1 500 000	R1 500 000			
4.5	Tekwane 132 kV line - 10 km Wolf conductor	R1 000 000	1996	2	R500 000	R500 000			
	Total cost - Zone 4 electricity	R11 000 000			**R2 000 000**	**R7 000 000**	**R2 000 000**		
5	**Zone 5 : Matsulu**								
5.1	Matsulu 132/11 kV substation - 1 x 10 MVA	R2 000 000	1998	1			R2 000 000		
5.2									
	Total cost - Zone 5 electricity	R2 000 000					**R2 000 000**		
	TOTAL	R46 500 000			**R3 500 000**	**R8 000 000**	**R11 500 000**	**R10 500 000**	**R5 250 000**

Table C21

Bulk services: solid waste

No.	Project	Estimated Cost	Starting year	Impl. period	YEAR 1 1996	2 1997	3 1998	4 1999	5 2000
1	**Zone 1 : Nelspruit**								
1.1	Mara solid waste disposal site	R4 000 000	1996	1	R4 000 000				
	Total cost - Zone 1 solid waste	R4 000 000			**R4 000 000**				
2	**Zone 2 : White River**								
2.1	Extension to White River solid waste site	R2 000 000	1998	1			R2 000 000		
	Total cost - Zone 2 solid waste	R2 000 000					**R2 000 000**		
3	**Zone 3 : Kabokweni**								
3.1	Mara solid waste disposal site	R2 000 000	1997	1		R2 000 000			
	Total cost - Zone 3 solid waste	R2 000 000				**R2 000 000**			
4	**Zone 4 : KaNyamazane**								
4.1	Mara solid waste disposal site	R2 000 000	1997	1		R2 000 000			
	Total cost - Zone 4 solid waste	R2 000 000				**R2 000 000**			
5	**Zone 5 : Matsulu**								
5.1	Mara solid waste disposal site	R2 000 000	1998	1			R2 000 000		
	Total cost - Zone 5 solid waste	R2 000 000					**R2 000 000**		
	TOTAL	R12 000 000			**R4 000 000**	**R4 000 000**	**R4 000 000**		

Table C22

Bulk services: Summary

No.	Service	YEAR				
		1	2	3	4	5
		1996	1997	1998	1999	2000
1	Zone 1 : Nelspruit	R19 371 667	R7 271 667	R20 821 667	R19 050 000	R9 900 000
2	Zone 2 : White River	R5 000 000	R1 000 000	R17 300 000	R10 250 000	R5 750 000
3	Zone 3 : Kabokweni	R10 900 000	R16 375 000	R28 375 000	R28 875 000	R17 825 000
4	Zone 4 : KaNyamazane	R27 500 000	R30 500 000	R11 083 333	R4 733 333	R2 833 333
5	Zone 5 : Matsulu	R9 000 000		R4 000 000	R2 500 000	
	TOTAL	**R71 771 667**	**R55 146 667**	**R81 580 000**	**R65 408 333**	**R36 308 333**

Table C23

Nelspruit

Nett summary of new developments, upgrading and bulk infrastructure costs:

	1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005
Water reticulation	R2 216 390	R1 116 390	R5 391 050	R3 313 321	R2 204 371	R1 704 371	R1 704 371	R1 313 321	R391 050	
Sanitation	R8 878 016	R8 378 016	R8 730 122	R5 319 658	R3 778 113	R3 278 113	R3 278 113	R2 319 658	R958 455	
Roads	R8 482 038	R2 482 038	R11 153 117	R13 653 117	R10 003 117	R621 079	R621 079			
Stormwater drainage	R1 346 805	R1 346 805	R1 691 848	R1 691 848	R1 691 848	R345 044	R345 044			
Electricity	R3 128 900	R2 628 900	R2 065 955	R5 565 955	R4 065 955	R437 055	R437 055			
Solid waste disposal	R4 000 000									
Total	**R28 052 148**	**R15 952 148**	**R29 032 091**	**R29 543 900**	**R21 743 404**	**R6 385 662**	**R6 385 662**	**R3 632 979**	**R1 349 504**	

Table C24

White River

Nett summary of new developments, upgrading and bulk infrastructure costs:

	1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005
Water reticulation	R5 000 000	R601 899	R5 786 293	R5 888 192	R388 192	R388 192	R286 293	R101 899		
Sanitation		R749 753	R5 205 153	R1 404 906	R904 906	R904 906	R655 153	R249 753		
Roads	R592 278	R592 278	R4 092 278	R592 278	R3 092 278	R2 500 000				
Stormwater drainage	R323 112	R323 112	R323 112	R323 112	R323 112					
Electricity	R395 041	R395 041	R2 145 041	R4 645 041	R3 645 041	R1 750 000				
Solid waste disposal			R2 000 000							
Total	**R6 310 431**	**R2 662 082**	**R19 551 877**	**R12 853 529**	**R8 353 529**	**R5 543 098**	**R941 447**	**R351 652**		

Table C25

KaNyamazane

Nett summary of new developments, upgrading and bulk infrastructure costs:

	1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005
Water reticulation	R14 689 959	R9 460 274	R12 024 066	R9 540 527	R9 540 527	R5 711 432	R4 941 117	R4 710 659	R4 694 198	R4 694 198
Sanitation	R15 456 878	R17 681 629	R7 235 811	R6 753 967	R6 253 967	R4 837 802	R3 813 051	R3 558 869	R3 540 713	R3 540 713
Roads	R13 162 152	R13 962 152	R9 912 152	R8 562 152	R7 162 152	R8 030 680	R8 030 680	R8 030 680	R4 697 347	R4 697 347
Stormwater drainage	R2 166 901	R2 166 901	R2 166 901	R2 166 901	R2 166 901	R849 771	R849 771	R849 771	R849 771	R849 771
Electricity	R5 990 389	R10 990 389	R5 990 389	R3 990 389	R3 990 389	R2 360 476	R2 360 476	R2 360 476	R2 360 476	R2 360 476
Solid waste disposal		R2 000 000								
Total	R51 466 280	R56 261 346	R37 329 319	R31 013 936	R29 113 936	R21 790 161	R19 995 095	R19 510 455	R16 142 505	R16 142 505

Table C26

Kabokweni

Nett summary of new developments, upgrading and bulk infrastructure costs:

	1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005
Water reticulation	R8 483 952	R16 958 952	R22 407 287	R26 367 055	R21 067 055	R21 038 459	R14 538 459	R14 090 124	R10 930 356	R9 055 356
Sanitation	R12 300 744	R7 300 744	R6 795 231	R9 653 467	R6 653 467	R6 621 927	R6 621 927	R6 127 440	R4 769 204	R4 769 204
Roads	R8 678 110	R8 678 110	R12 928 110	R12 128 110	R12 128 110	R10 564 644	R10 564 644	R6 327 144	R6 327 144	R6 327 144
Stormwater drainage	R3 036 172	R3 036 172	R3 036 172	R3 036 172	R3 036 172	R1 666 618	R1 666 618	R1 666 618	R1 666 618	R1 666 618
Electricity	R5 053 777	R5 053 777	R10 803 777	R7 803 777	R5 053 777	R3 108 005	R3 108 005	R3 108 005	R3 108 005	R3 108 005
Solid waste disposal		R2 000 000								
Total	R37 552 754	R43 027 754	R55 970 576	R58 988 580	R47 938 580	R42 999 654	R36 499 654	R31 319 332	R26 801 328	R24 926 328

Table C27

Matsulu

Nett summary of new developments, upgrading and bulk infrastructure costs:

	1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005
Water reticulation	R5 879 700	R879 700	R1 727 445	R4 227 445	R1 727 445	R1 727 445	R1 727 445	R879 700	R879 700	R879 700
Sanitation	R5 999 317	R1 999 317	R3 598 802	R3 598 802	R3 598 802	R3 598 802	R3 598 802	R1 999 317	R1 999 317	R1 999 317
Roads	R1 097 082	R1 097 082	R1 097 082	R1 097 082	R1 097 082	R6 500 000	R6 500 000	R6 500 000		
Stormwater drainage	R788 459	R788 459	R788 459	R788 459	R788 459	R239 918	R239 918	R239 918	R239 918	R239 918
Electricity	R548 541	R548 541	R2 548 541	R548 541	R548 541					
Solid waste disposal			R2 000 000							
Total	R14 313 100	R6 313 100	R11 760 330	R10 260 330	R7 760 330	R12 066 165	R12 066 165	R9 618 935	R3 118 935	R3 118 935

Table C28

Nett summary of new developments, upgrading and bulk infrastructure costs:

	1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005
Water reticulation	R36 270 001	R29 017 215	R47 336 141	R49 336 541	R34 927 590	R30 569 900	R23 197 686	R21 095 704	R16 895 304	R14 629 254
Sanitation	R42 634 955	R36 109 459	R31 565 118	R26 730 799	R21 189 254	R19 241 550	R17 967 046	R14 255 037	R11 267 690	R10 309 235
Roads	R32 011 660	R26 811 660	R39 182 739	R36 032 739	R33 482 739	R28 216 403	R25 716 403	R20 857 824	R11 024 491	R11 024 491
Stormwater drainage	R7 661 449	R7 661 449	R8 006 493	R8 006 493	R8 006 493	R3 101 351	R3 101 351	R2 756 308	R2 756 308	R2 756 308
Electricity	R15 116 647	R19 616 647	R23 553 703	R22 553 703	R17 303 703	R7 655 536	R5 905 536	R5 468 481	R5 468 481	R5 468 481
Solid waste disposal	R4 000 000	R4 000 000	R4 000 000							
Total	R137 694 712	R123 216 430	R153 644 193	R142 660 274	R114 909 779	R88 784 740	R75 888 022	R64 433 353	R47 412 272	R44 187 768

Table C29

ANNEXURE D

ANNEXURE D: FINANCIAL MODEL

INTRODUCTION

Orientation

The financial model represents the third and final element of the integrated infrastructure planning model for the study area.

Objective

The model summarises the costs of the investment profile, derived from the infrastructure cost model, and examines the annual impact of the investments, on the financial capacity of authorities and households in the area.

Approach

The financial model was designed by means of:

- Utilising the output of the infrastructure cost model.
- Obtaining information in respect of operational budgets from existing and past authorities in the area to establish the base financial capacity of service providers.
- Determining household affordability levels from existing secondary sources.

METHODOLOGY

Basic Principles

The model is based on the following principles:

- A computerised cash flow sheet indicating the operational income and expenditures of local authorities in the area and the annual impact of total nett commitments of upgradings and new developments on the revenue base of authorities and the disposable income of households.
- Information inputs from the spatial and infrastructure cost models, as well as numerous other input variables serve as the basis of the model.
- Due to the large number of input variables, the model is extremely dynamic and flexible, allowing extensive simulation possibilities.
- All calculations are at constant 1995 prices.

Inputs

The following information and variables (internal and external to the integrated model) serve as inputs to the financial model:

- 1994/1995 Operational budgets of the various infrastructure providers (authorities) in the area.
- Annual capital expenditure per area on upgrading and new developments according to the results of the infrastructure cost model.
- Number of stands per service category and standard per area from infrastrucutre model.
- Annual operations and maintenance cost per service category.
- Length of loan/payback period is set at 20 years.
- Average disposable household income per area calculated from census information.
- Average household size per area calculated from census information.

Output

The various affordability impacts were calculated as follows:

- **Financial capacity of local authorities.** The annual capital redemption amount expressed as a percentage of the 1994/95 operational revenue of local authorities.
- **Affordability of households.** The annual capital redemption amount expressed as percentage of total annual household disposable income.

FINANCIAL IMPACT OF INVESTMENT SCENARIO FOR GREATER NELSPRUIT AREA

ITEM			(R 1000)		
	1996	1997	1998	1999	2000
Investment Cost	R137 695	R123 216	R153 644	R142 660	R114 910
Cumulative Cost		R260 911	R414 555	R557 216	R672 125
Debt Service	R15 353	R26 438	R40 745	R50 811	R57 139
Operations & maintenance	R16 085	R15 641	R15 428	R15 660	R15 771
Total recurring cost	**R31 438**	**R42 079**	**R56 172**	**R66 471**	**R72 910**
Total revenues	**R130 000**				
Total Household disposal income	**R903 418**	**R964 409**	**R1 022 148**	**R1 118 650**	**R1 226 194**
Impacts:					
a) % increase in revenue to finance total recurring cost	24.18%	32.37%	43.21%	51.13%	56.08%
b) % impact of total recurring cost on total household income	3.48%	4.36%	5.50%	5.94%	5.95%

ANNEXURE E

ANNEXURE E : TECHNICAL SPECIFICATIONS AND MODEL PROCEDURES

The spreadsheet model has been developed in order to expediate the extensive calculation procedures required for this investment study.

Software utilised:	Windows 3.1 Lotus 123 release 4 for Windows
Hardware utilised:	Pentium (90MHz), 16Mb RAM HP Laserjet printer

The spreadsheet model consists of the following nine separate spreadsheets, attached to this report as Disks 1 to 4. In order to safeguard against accidental erasure or file corruption, spreasheet cells have been switched to Protection Mode. This procedure will however still permit the viewing and printing of all files and cells.

The model consists of the following files:

Disk A:	9042-1.wk4 :	Spatial model
Disk B:	9042-2.wk4 :	Spreadsheet that calculates the stand and land requirements for new expansions and developments from data obtained from the Spatial Model.
	9042-3.wk4 :	Estimated unit development costs for the upgrading of existing and the development of new infrastrucutre.
	9042-4.wk4 :	Definition of existing and proposed future service levels for the upgrading of existing infrastructure.
	9042-5.wk4 :	Definition of service levels, costs and cashflow projections for new developments.
Diskl C:	9042-6.wk4 :	Costs and cashflow projections for the upgrading of existing infrastructure.
	9042-8.wk4 :	Summary of total investment costs regarding bulk services, new developments and the upgrading of existing services.
Disk D:	9042-7.wk4 :	Costs and cashflow projections for bulk services.
	9042-9.wk4 :	The estimated impact of the calculated investment needs on the average household income.