

**ESTABLISHING A GREENBELT POLICY FOR THE
CONSERVATION AND DEVELOPMENT
OF THE CROCODILE RIVER IN NELSPRUIT**

by

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**SUPERVISOR
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DECLARATION

I the undersigned, hereby declare that the work contained in this thesis is my own original work and that I have not previously in its entirety or in part submitted it at any University for a degree.

ABSTRACT

The Crocodile River Greenbelt area, located along the northern edge of Nelspruit, is a unique ecological system that must be protected from encroaching urbanization and invasive alien vegetation. The writer has attempted through policy intervention to achieve this goal. A policy for a *greenbelt* was compiled to allow for limited development along the Crocodile River Greenbelt area. The first step was to compile a policy for the Crocodile River Greenbelt area, and to contextualise the legislative requirements to compile such a policy. The second step was to discuss the State of Environment Report, which was compiled for the Crocodile River Greenbelt area and reflects directly the physical environment of the policy area. The third step was to lay the foundation of the policy by discussing guiding principles for open space systems. These principles form the basis of the policy. The fourth step was the compilation of the policy itself, which is underpinned by a spatial framework to guide the future physical development of the area. As conservation of the Crocodile River Greenbelt area is the main objective of the policy as well as allowing for limited development within the urban area, a management structure was proposed as Step 5 to achieve these objectives.

OPSOMMING

Die Krokodilrivier-groengordelgebied is in die noordelike deel van Nelspruit geleë en is 'n unieke ekologiese stelsel wat beskerm moet word teen verstedeliking en indringer plante. Die skrywer poog deur 'n beleidsintervensie om hierdie doel te bereik. Die beleid vir 'n groengordel is saamgestel om voorsiening te maak vir beperkte ontwikkeling in die Krokodilrivier-groengordelgebied. Die eerste stap om so 'n beleid saam te stel vir die Krokodilrivier-groengordelgebied was om dit te kontekstualiseer binne die wetlike vereistes vir so 'n beleid. Die tweede stap was om die resultate van die Omgewings-toestandsverslag, wat vir die Krokodilrivier-groengordelgebied opgestel is en die fisiese omgewing van die beleidsgebied opsom, te bepreek. Die derde stap was om die rigtingewende beginsels van oopruimtes te bespreek wat die grondslag van die beleid vorm. Die vierde stap was die saamstel van die beleid self, wat gerugsteun word deur die grondgebruik plan wat toekomstige fisiese ontwikkeling van die gebied rig. Omdat bewaring van die Krokodilrivier-groengordelgebied die hoofdoel van die beleid is, tesame met beperkte ontwikkeling binne die stedelike gebied, is in Stap 5 'n bestuurstruktuur voorgestel om hierdie doel te bereik.

To my husband, Riaan

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CHAPTER 1

A GREENBELT FOR NELSPRUIT

1.1 THE CASE FOR GREENBELTS

A compact sustainable city need not be a sterile one. Indeed, sustainable communities seek the greening of urban life and emphasise such design features as extensive tree cover and landscaping, urban parks and community gardens, and connected systems of regional open space.

There are a variety of ways in which existing cities and towns can be made “greener”, many requiring only modest cost and effort. One of the most straightforward strategies is to look for ways to increase the amount of vegetation and green areas within the urban landscape. There is increasing evidence that trees and vegetation provide benefits that are even profound, i.e. positive psychological benefits other than those considerable aesthetic and environmental benefits usually cited (Beatley & Manning 1997).

People are recognising the psychological and ecological importance of green spaces in everyday life. Open space is emerging as an alternative park system in many towns and cities worldwide and “... is any green place designed, developed or managed by local residents for the use and enjoyment of those in the community” (Francis, Cashdan & Paxson 1984:1).

A *greenbelt* is such an open space. “A greenbelt is a special policy defining an area within which only a highly restrictive schedule of changes constituting development under the planning acts will normally be permitted. The basic greenbelt concept has remained largely unaltered since 1955” (Elson 1986:xxv). Its function is to:

- Check further growth of a large built-up area.
- Prevent neighbouring towns from merging into one another.
- Preserve the special character of a town.
- Assist in urban vegetation by encouraging the recycling of derelict and other land.

- To assist in urban regeneration, by encouraging the recycling of derelict and other land.
- Safeguard the surrounding countryside from further encroachment (Department of the Environment 1995).
- Form part of a larger ecological system in terms of bioregional planning principles.

Spatially, greenbelts are large parcels of land in and around cities where urban development is totally prohibited through zoning, public ownership or development restrictions. Greenbelts provide such environmental benefits as noise and air pollution reduction, climate amelioration, bio-diversity, watershed protection and wildlife habitat. Greenbelts are open space buffers amid the congestion and pollution of most large cities (Netherlands Government 2000).

Related to greenbelts, *greenways* are narrower vegetated corridors that can have multiple uses and functions such as improving environmental quality, providing recreation and serving as alternative transportation routes (bicycle trails and footpaths). Greenways are often defined along natural systems such as rivers, ravines, ridgelines and floodplains (Netherlands Government 2000).

Soft open spaces take the form of public gardens, parks and recreation walkways. Soft public open spaces should be linked to form inter-connected webs of recreational space, threading through the built-up environment. Linked open spaces provide opportunities for the creation of continuous walkways and greater levels of urban bio-diversity. Linear arrangements of soft open spaces should be located along watercourses and floodplains (Behrens & Watson 1996).

A greenbelt is one of the most enduring and widely supported planning instruments. According to Munton (1983:1) "greenbelts are a key element in the structural plans of all local authorities in and around major cities." A greenbelt proposed for the Crocodile River zone located along the northern edge of Nelspruit is depicted in Figures 1.1 and 1.4.

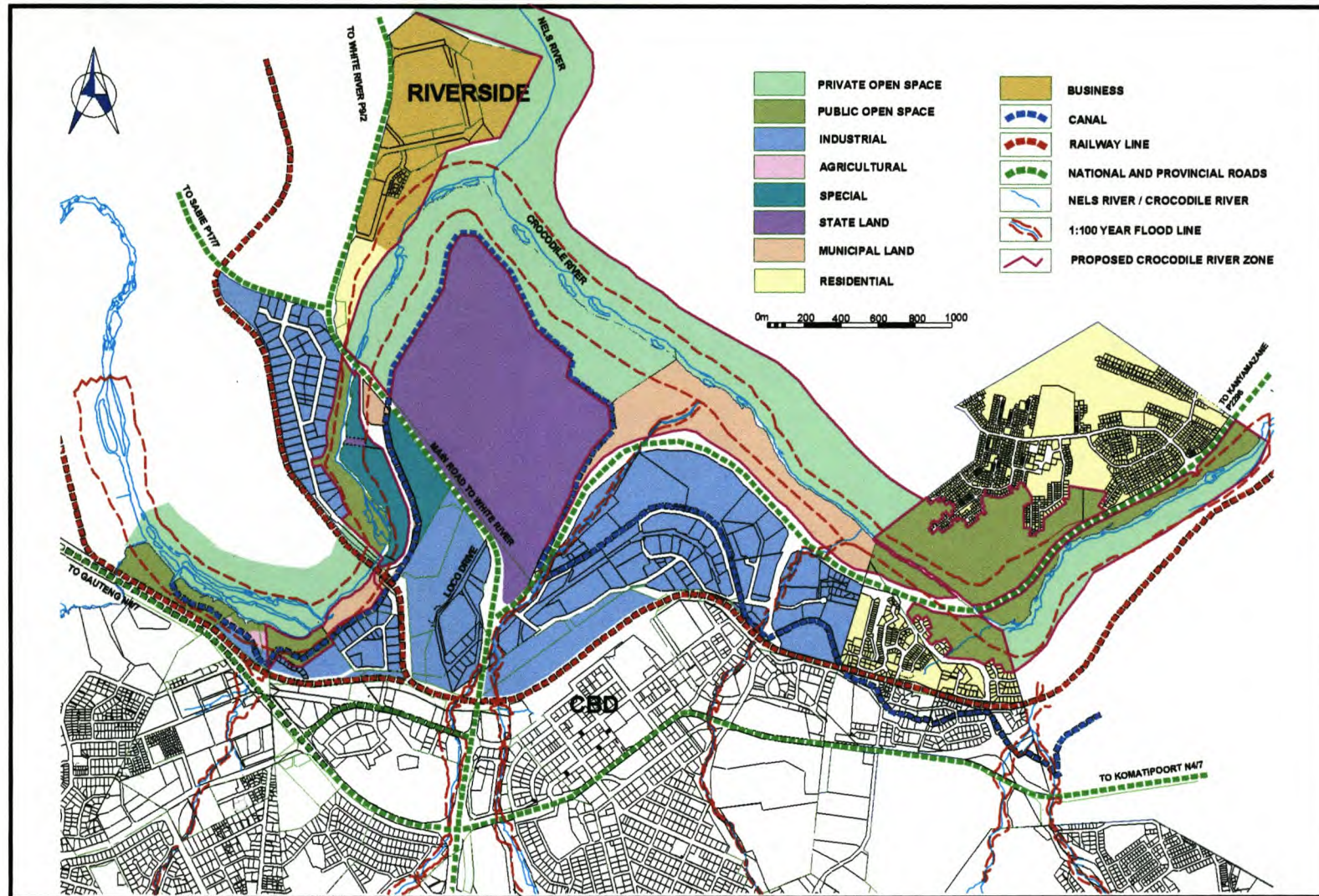


FIGURE 1.1 EXISTING LAND USE / ZONING ALONG THE PROPOSED CROCODILE RIVER ZONE

This river area is a unique ecological system that must be protected from encroaching urbanisation degrading its natural environment, as can be seen in Figure 1.2.



Figure 1.2: Urban encroachment along the Crocodile River in Nelspruit

The river area is threatened by invasive alien plant species such as *Lantana*, (Figure 1.3) castor-oil bushes and various other lesser-known invasives. These alien plants, according to Zunkel (1990:26-29), can be defined as "... organisms introduced from foreign countries and environments. Given the slightest opportunity, aliens grow faster than indigenous species as the latter have to compete with a host of other organisms in a completely natural relationship not affecting the alien."



Figure 1.3: Invading *lantana camera*

The Crocodile River zone is one of the largest natural assets of the area and should be preserved for the use by future generations. The zone is not only of local importance but it also has an impact on a regional basis. The degradation of this natural environment and the consequences will have a dire effect on the community of Nelspruit and surrounding areas, as this is the main river for water supply to Nelspruit, and therefore must be protected.

1.2 RESEARCH PROBLEM STATEMENT

The natural environment of the Crocodile River zone near Nelspruit is threatened by urbanisation and invasion by alien vegetation. It needs to be protected from these threats for the benefit of the larger community of Nelspruit and its future generations. In the absence of a proper planning framework and the concomitant policy directives, the establishment of a greenbelt zone is imperative.

1.3 RESEARCH AIM AND OBJECTIVES

The aim of the study is to place in context the development of a process for the compilation of a greenbelt policy for the Crocodile River zone that would create a spatial framework allowing limited development to contain urbanisation and ensure protection of the environment. This is to be achieved through limited public participation, and had to allow for the rehabilitation of the area through the creation of an effective management structure. The Crocodile River zone will be transformed by a greenbelt through the city, and because it will be classified as such, will become a special policy defined zone.

The objectives through which this aim was to be met, are to –

- Compile a state of the environment report (SOER) of the Crocodile River greenbelt area as required by legislation through a summary of the ecological conditions, riverine regime, botanical invasions and agricultural activities.
- Formulate a policy and spatial framework to guide limited developments.
- Propose a management structure for the Crocodile River greenbelt area to ensure sustainable development and rehabilitation of the area.

1.4 STUDY AREA

The Council's departments of Urban Planning and of Sports and Culture determined the boundary of the study area. The study area is the 1in100 year flood-line area alongside the Crocodile River within the boundaries of the current jurisdiction of the Nelspruit City Council. The study area is 186,73 hectares in size. Figure 1.4 depicts the proposed Crocodile River greenbelt area.

1.5 RESEARCH APPROACH

Rudestam & Newton (1992) define the primary role of research as linking theory to the empirical. Research plays a significant role in putting diverging views into perspective. It is essential as a means to break new ground and make new discoveries. It is equally important to advance what was discovered and to keep the subject updated.

In research textbooks, according to Mouton (1996), it has become accepted practice to distinguish between predominantly academic (basic) research on the one hand and predominantly applied research on the other. The main purpose in academic research is to contribute to the existing body of scientific knowledge. The point of departure is the world of science. Applied research, such as policy research and social problems research, takes a certain problem in the social world as its point of departure. Its primary purpose is to solve a social problem or to make a contribution to real-life issues. This thesis reports on predominantly applied research as it evaluates the impacts of urbanisation and of invasive vegetation on the Crocodile River greenbelt. It addresses these impacts by promulgating a policy to curb the impact of urbanisation and by proposing guidelines on how to address, manage and rehabilitate the environment.

This study is mainly qualitative in nature. Mouton (1996) defines qualitative research as a wealth of rich descriptive data, collected through methods such as group participation, participant observation, in-depth interviewing and document analyses. To formulate a policy for the greenbelt area a SOER is compiled. This report provides the sensitivity indicators that measure the impact of alien invasive vegetation and urbanisation, and

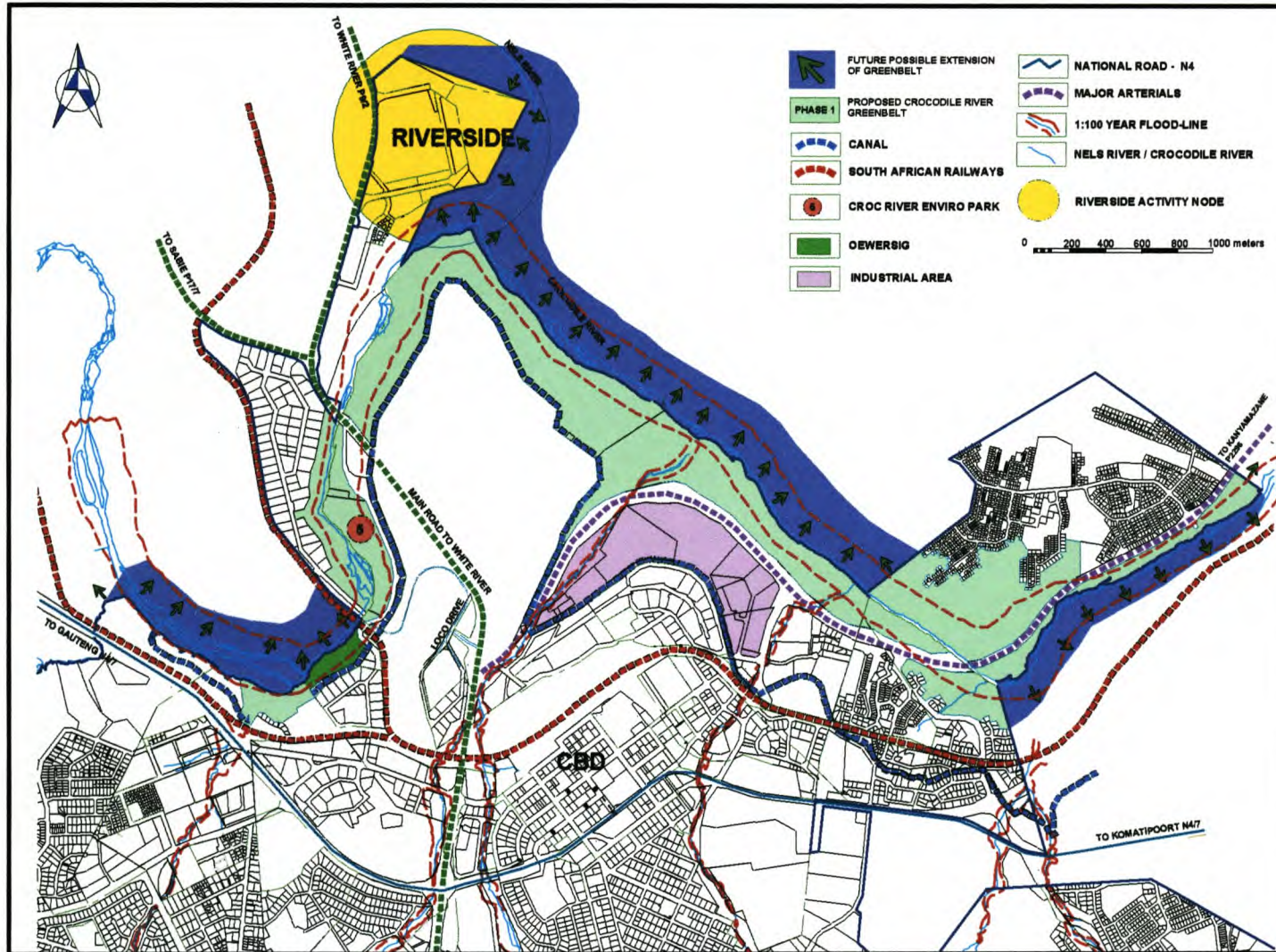


FIGURE 1.4 THE PROPOSED CROCODILE RIVER GREENBELT AREA

determines areas suitable for limited development. A further method used in social research is exploratory studies. According to Mouton (1996) the aim of such studies, which include pilot studies and other qualitative research, is to establish facts, to gather new data and to determine whether there are interesting patterns in the data. The focus of the greenbelt study is explanatory in nature, but it also entails a replication study, since there is a well-developed body of knowledge on greenbelts that needs to be replicated or validated. Finally, it is an explanatory study because it establishes the facts and adopts them to form a new policy and development guidelines for the area.

1.6 RESEARCH DESIGN

The research design was dictated by the statutory requirements for a policy design at local government. This process is outlined in Figure 1.5, which shows the chronological deployment of policy in distinct sets of steps.

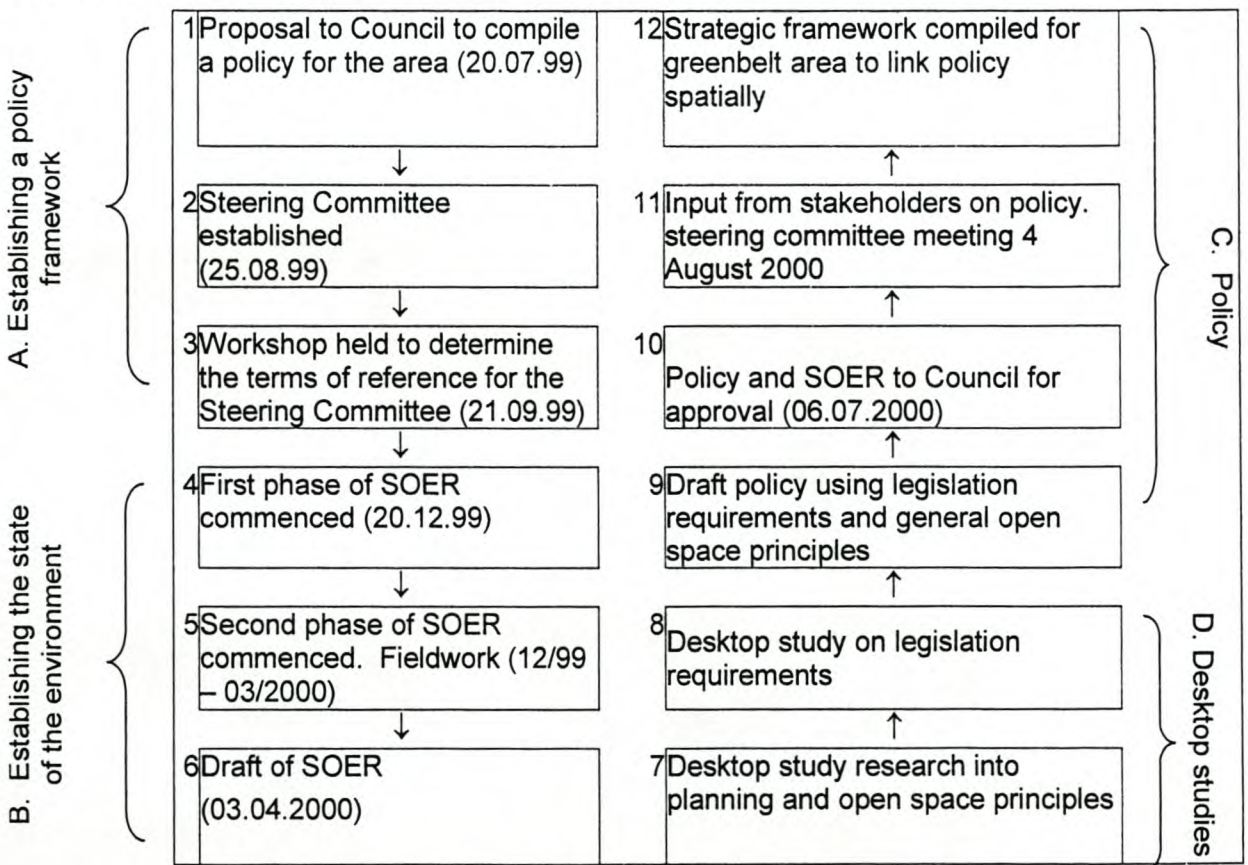


Figure 1.5: The process to compile a policy for the greenbelt area

These sets of levels are broadly sketched in the three sections to follow.

1.6.1 Obtaining council mandate and terms of reference

In Step 1 the proposal recommending policy compilation was taken to Council and the resulting Council resolution is attached as Addendum A. An invitation in writing (attached as Addendum B) to affected stakeholders and landowners within the Crocodile River greenbelt area to attend the first meeting of the Steering Committee was sent out on 21 September 1999. The Steering Committee was established as Step 2 in the process. The first Steering Committee meeting was held on 21 September 1999. At this meeting the broad principles and objectives for the potential greenbelt area were discussed, as well as the future procedures to be followed. It was agreed that a workshop (as foreseen in Step 3 in Figure 1.5) would be held to discuss the main issues and to draw up Terms of Reference (TOR - attached as Addendum C) for the Steering Committee, as well as its work programme.

The TOR defined the Crocodile River area within the current municipal boundary, and targeted the broader community of Nelspruit as the beneficiaries of the project through improved quality of life. It also spelt out who the various role players and stakeholders in the greenbelt area would be, mostly landowners, various Provincial government departments and the public. The purpose and objectives for the project were outlined as:

- Compilation of the SOER
- Demarcation of the policy area
- Results expected from the project in terms of
 - * Policy
 - * Institutional arrangements
- Methods to be employed
 - * Mainly a participatory approach
- Time-frames for the process, set as:
 - * One month to complete the SOER
 - * Two months to complete guideline documents and the final policy.

The TOR also defined the performance milestones like the SOER, policy, the greenbelt policy, management structures, and the spatial development framework. The operational levels of authority, reporting, required competencies like town planners and environmentalists, as well as the budget and costs for the project, were determined. The workshop (agenda attached as Addendum D) was held on 21 September 1999. The schedule and TOR identify the compilation of a SOER as the first step to be undertaken in the process and this was confirmed by the Steering Committee. The work schedule for this task is attached as Addendum E.

1.6.2 Benchmarking the state of the environment

Step 4 in Figure 1.5 commenced as a desktop study for the first phase of the SOER. Officials from the Council's Department of Urban Planning launched a landowner enquiry using the valuation role of all the properties within Nelspruit's jurisdictional boundaries. This list included the seven landowners as shareholders that were to be affected by the proposed greenbelt area bordering on the Crocodile River. They were Nelspruit City Council, the National Department of Land Affairs, HL Hall & Sons, (farmers and property developers), Colliers RMS (Pty) Ltd (property development company), Hydrflex Eastern Transvaal (Pty) Ltd. (industrial property development company), Besters Last (Pty) Ltd (industrial property development company) and Croc River Reptile Park (Pty) Ltd (recreational display). Officials were sent letters (the example is attached as Addendum G) on 20 December 1999 – the due date for information was set for 28 March 2000 – requesting these affected stakeholders to provide the necessary information on the environmental state of the area. Information items for the parcel of land included:

- (i) establishment date of the relevant portion of land;
- (ii) environmental quality of the air, soil, water, fauna and flora;
- (iii) the occurrence (past and present) of any type of environmental pollution;
- (iv) a list of the fauna and flora on the portion of land;
- (v) a description of the current land use activities (business, recreational, etc.);
- (vi) the economic/market value of the portion of land (figures, estimates, indications);
- (vii) proposed future development plans; and
- (viii) other related information significant/necessary for the SOER.

A public participation process was instituted to involve the seven affected stakeholders and the community of greater Nelspruit in the development of the policy and the proposed management structure of the area. Workshops and participation in a Steering Committee were co-ordinated by the Department of Urban Planning of the City Council of Nelspruit. Public participation was done by inviting the seven stakeholders to give their input into designing the policy guidelines and spatial framework. Furthermore, the policy was sent to relevant Provincial government departments, namely Department of Environmental Affairs, Agriculture and Forestry and the Mpumalanga Parks Board for comments. It was also published for comments from the community to guide limited development along the Crocodile River and the management of the rehabilitation of the area.

Step 5 involved a questionnaire survey (attached as Addendum F) to establish the state of the environment and this information was used in the compilation of a SOER for the Crocodile River area. The questionnaire is a site survey for bio-monitoring of riparian vegetation. Descriptive information on natural features such as the river and its channel, riparian zone, extent of ground cover, invasion of the riparian zone by vegetation, dimensions of the riparian zone, surrounding land uses and the occurrence of the dominant five species was gathered. To facilitate efficient fieldwork, the study area was firstly divided into two main zones and then each into a further five sub-areas. The criterion used to divide the areas was that the largest owners of the tract of land each formed a zone. A qualified botanist, Mr R Britz, (Nelspruit National Botanical Gardens) surveyed Area 1, while Mr J Louw (Department of Parks, Sport and Culture, Nelspruit City Council) surveyed Area 2.

The survey was conducted over a three-month period from November 1999 to February 2000. The SOER is not a scientific report, but is rather intended for layman's use in describing the areas and making information accessible to the non-ecologist. A relative quality rating scale was used to classify the area ecologically, namely:

Rating Scale	Description of conditional attributes
Very good (5)	Minimal disturbance

Good	(4)	Some disturbance that can be repaired
Average	(3)	Fairly disturbed, but can be repaired with cost and effort
Fair	(2)	Major disturbance by development, service infrastructure and erosion
Poor	(1)	Probably irreparably disturbed.

This scale was designed by the Nelspruit National Botanical Gardens and concentrates more on the disturbances caused by invasive alien plants and urbanisation. The final task (Step 6) was to compile a draft SOER based on these survey results. Mrs A Colyn of the National Department of Water Affairs compiled the SOER report as her and the Department's contribution towards the project (Colyn 2000).

1.6.3 Drafting policy and obtaining council approval

Having benchmarked environmental conditions in the study area, the next set of tasks required the preparation for and eventual drafting of the policy, along with its final approval by Council.

Firstly (Step 7 in Figure 1.5), a desktop report on what other councils used as basis to compile policies on open space systems was completed, based on a literature review of planning principles and open space principles that might influence the compilation of such a policy. A further desktop study (Step 8) established national and provincial legislative requirements that might prescribe to the policy. These two stages were completed over a three-month period up to March 2000.

Next, a draft greenbelt policy was compiled (Step 9) by the officials of Council's Department of Urban Planning, using the SOER, the desktop results from the legislative study and also the planning and open space principles uncovered by the literature review. This draft policy was submitted for comments to the Steering Committee on 4 August 2000.

The final policy and SOER (Step 10) were submitted to Council for approval (see Addendum G). The final steps (11 and 12) were to operationalise the policy and SOER in spatial format. Maps were compiled reflecting the state of environment, current land uses and a spatial framework to guide future land use allocation.

1.7 LITERATURE REVIEW

The research methodology largely entailed a focused search on greenbelt policy and principle and means to establish such a policy in reality. McMillan & Schumacher (1992:112) stipulate that “An interpretative review of literature is exactly that – a summary and synthesis of relevant literature on a research problem.” Moreover, a literature study is a critical review of the status of knowledge on a carefully defined topic that enables a reader to gain further insights from the purpose and the results of a study. Levels in reviewing the literature that were adhered to in this study include:

- “Analyse the problem statement
- Search and read primary and secondary literature
- Select the appropriate index for a reference service
- Transform the problem statement into a search language
- Conduct a manual and/or computer search
- Read the pertinent primary literature
- Write the review” (McMillan & Schumacher 1992:112).

Various primary and secondary sources provided the theoretical foundation of the research. Primary literature sources were obtained from:

- Professional journals
- Reports
- Scholarly books
- Government documents
- Existing dissertations.

Secondary sources (textbooks and articles in encyclopaedias and magazines) provided overviews of the field of study, general knowledge of what has been done on the topic of research and a context for placing current sources into a framework that summarise the above sources.

During this study the researcher was mostly concerned by the necessity to ensure the validity of the research results. McMillan & Schumacher (1992:118) define validity as: "Validity of qualitative designs is the degree to which the interpretation and concepts have meanings between the participants and researcher". As will become clear, the results measure up to these requirements.

1.8 REPORT STRUCTURE

This chapter established the greenbelt concept as a valid policy option and set out the research strategy and approach that were to be followed. The foundation for the search into primary and secondary sources was established. Chapter 2 addresses the legal requirements for the compilation of the SOER and a policy for the Crocodile River greenbelt area. It then discusses the SOER in detail to provide the foundation for policy formulation. Chapter 3 deals with the formulation of the policy and the principles contained therein. In Chapter 4 specific proposals for development and their spatial implications are dealt with. Chapter 5 summarises and evaluates the thesis and provides some guidelines for future research foci.

CHAPTER 2

LEGISLATIVE REQUIREMENTS AND STATE OF THE ENVIRONMENT REPORT

To establish a foundation to formulate a policy for the Crocodile River greenbelt area, one requires an understanding of the relevant legislation and policy requirements to fulfil this objective. The major requirement is the compilation of a SOER that reflects the status of the natural environment and what impact urbanisation and alien vegetation invasions have on it. This chapter firstly sketches out the legislative framework within which policy was formulated and concludes with the main results and guidelines obtained from the SOER.

2.1 THE LEGISLATIVE FRAMEWORK

One of the main requirements for development and environmental management in terms of the legislation is that the policy guidelines for the greenbelt area must endeavour to be sustainable in its objectives. All the relevant legislation is underpinned by a notion of sustainable development. It is thus important to explain the concept and linkages within the various pieces of legislation.

2.1.1 General legislative framework

Figure 2.1 explains the legislative framework and its requirements by firstly compiling a SOER, secondly a greenbelt policy and thirdly a spatial framework to guide limited development. Figure 2.1 also shows the sequential interconnections in compiling a policy for the greenbelt area. Overarching all the various sections of legislation is Agenda 21, a blueprint for sustainable development adopted in June 1992 at the United Nations Conference on Environment and Development (UNCED). The challenge of sustainable development is to balance the needs of the community and economic well being with the protection of the environment. This objective underpins the policy for the greenbelt area (Du Plessis, Lundy & Swanepoel 2000).

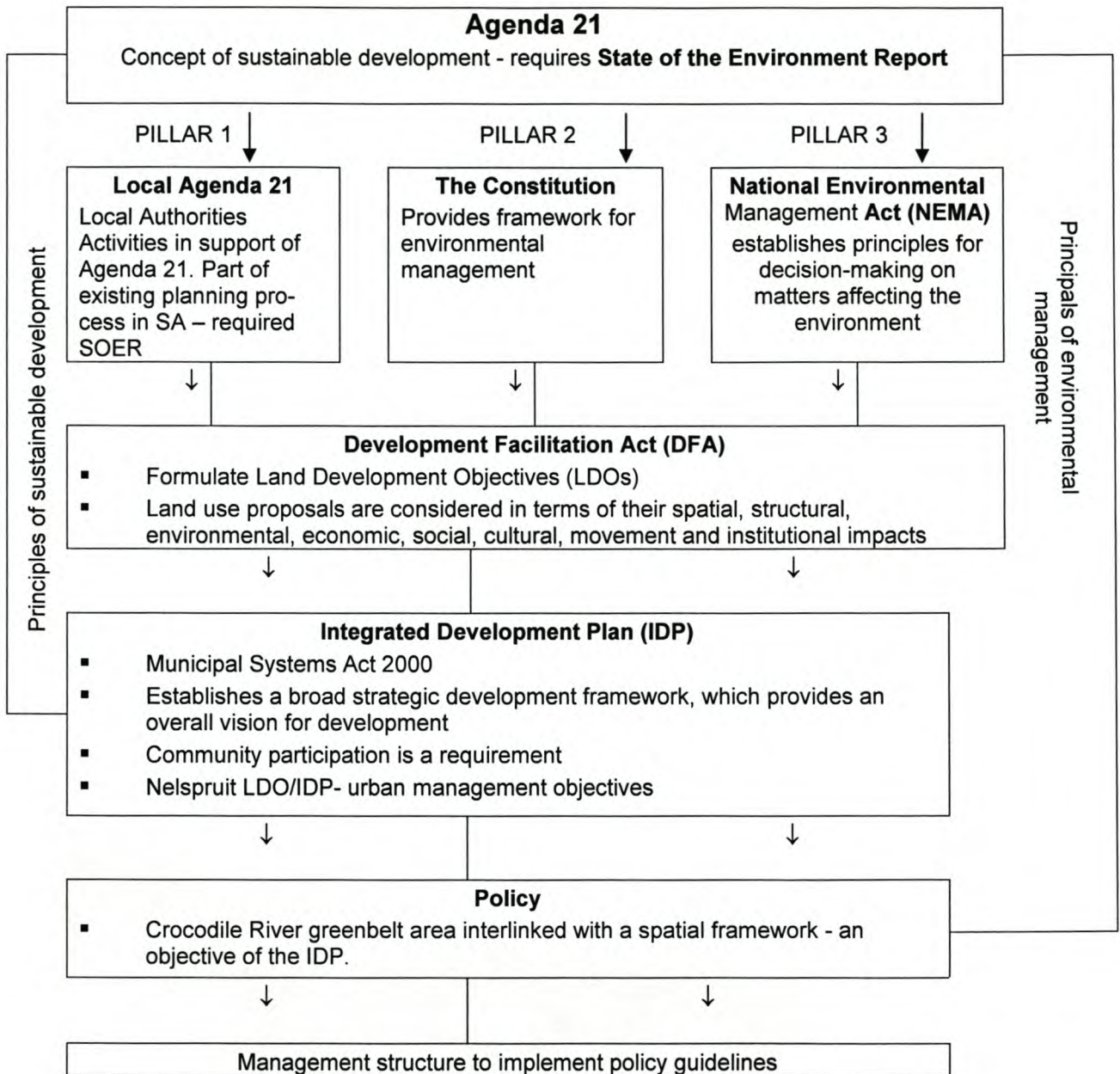


Figure 2.1 Flow diagram of the legal process to formulate a policy for a sustainable greenbelt area

At the UNCED conference cities and local authorities were recognised as particularly important to achieving sustainable development. Chapter 28 of Agenda 21 clearly spells out the role of local authorities (United Nations 1992). Agenda 21 forms the basis of the three pillars of legislation upon which the greenbelt policy is based as reflected in Figure 2.1. The other two pillars are the South African Constitution (Act 108 of 1996) which provides guidance principles of the right to a clean environment in Article 24, and the National Environmental Act (Act 107 of 1998), which established principles and frameworks for decision-making and management on matters affecting the environment.

2.1.2 Agenda 21 as guide

According to Chapter 28 of Agenda 21, local authorities construct, operate and maintain economic, social and environmental infrastructure, oversee the planning process, establish local environmental policies and regulations, and assist in implementing national and sub-national policies. As the level of governance closest to the people, they play a vital role in educating, mobilising and responding to the public to promote sustainable development (Van der Merwe & Van der Merwe 1999).

The Canadian-based International Council for Local Environmental Initiatives (ICLEI 1996) went a step further and formulated the Local Agenda 21 guidelines to enable Local Environmental Initiatives (LEI) as a framework within which local authorities worldwide could implement the directives of Agenda 21. This is the first pillar in Figure 2.1. It is a comprehensive and participative process, seeking better ways to integrate environmental, social and economic concerns at the local level through the analysis of the environmental conditions, prioritisation of issues and implementation of action plans. The need to analyse the environmental conditions is a prerequisite to enable the integration of the attributes of the natural environment with the social and economic dimensions of development. Therefore a SOER had to be completed to assess the quality of the environment of the Greenbelt area, which highlights the various factors impacting on it.

2.1.3 The Constitution

The second pillar is provided by Section 24 of the Constitution of the Republic of South Africa (Act 108 of 1996) which, as part of the Bill of Rights, guarantees citizens “an environment that is not harmful to their health or well-being” (South Africa 1996). It specifically states that the environment must be protected through legislation and other measures, that pollution and degradation of the environment must be prevented, conservation must be promoted and there must be secure ecological development and the use of the natural resources, while promoting justifiable economical and social development (South Africa 1996).

The main objectives of a greenbelt policy are to promote compatible development of the area and to protect the natural environment. Further objectives of the policy are to promote ecologically sensitive development through partnerships and to rehabilitate the degraded natural areas of a greenbelt. All of these objectives stated by the policy are aligned with the principles prescribed by the Constitution.

2.1.4 The National Environmental Management Act

The third pillar of the process, the National Environmental Management Act (Act 117 of 1998), states that the main purpose is to establish principles and the framework for decision making on matters affecting the environment. It also determines that "Sustainable development requires the integration of social, economic and environmental factors in the planning, implementation and evaluation of decisions to ensure that development serves present and future generations" (South Africa 1998:2).

One of the principles of the Act is that it must serve as the general framework within which environmental management and implementation plans must be formulated. It further states that development must be socially, environmentally and economically sustainable. As discussed in the previous paragraph this is the main objective of the policy. The act and its principles thus provide a framework for integrating good environmental management principles into all development activities along the greenbelt (South Africa 1998).

2.1.5 Acts guiding management of local development

The broad principles of the three pillars feed into the Development Facilitation Act (Act 67 of 1995)(DFA). The key objective is to provide for a beginning to overhaul all existing planning and land development frameworks. Local authorities in South Africa have more power and freedom than ever to plan their own futures and to effect the necessary changes to achieve their envisioned futures. The consensus consultative process of Local Agenda 21 can be tied to the formulation of Land Development Objectives (LDOs) in terms of the Development Facilitation Act (South Africa 1995). It can also facilitate the development of Integrated Development Plans (IDPs) in terms of Chapter 5 of the Municipal Systems Act (Act 32 of 2000), as well as the implementation of the Urban Development Framework. The DFA has various principles which

reorganise the importance of human actions on the landscape while being respectful of the requirements of the natural systems upon which those actions take place. Furthermore the DFA principles demand that a land use proposal needs to be considered in terms of its spatial, structural, environmental, economic, movement, social, cultural and institutional impact (Van der Merwe & Van der Merwe 1999).

The DFA has, in sub principle 3(1)(c)(ii), the promotion of integrated land development in rural and urban areas in support of each other as goal. This principle is important for achieving continuities of green space for two reasons: One is obtaining access to primeval or productive green space by urban dwellers, while the other relates to the importance of promoting bio-diversity. Sub-principle 3(1)(c)(viii) of the DFA stresses that human settlement on unique natural habitats of flora and fauna should be avoided (South Africa 1995). The focus of the greenbelt policy is that it should succeed to promote the continuity of green spaces and also limit development within the riparian zone of the Crocodile River Area. The riparian zone is defined as a 20m zone alongside the river's edge (National Development and Planning Commission 1999).

According to Chapter 5 of the Municipal Systems Act (Act 32 of 2000) a local council is obliged to prepare an IDP for its area of jurisdiction. The IDP, which flows from the DFA as depicted in Figure 2.1, establishes a broad strategic framework, which provides overall vision for development. The Act directly links the IDP to the DFA by stating that the Act must be read along with Chapter 1 of the DFA. The DFA calls for the formulation of LDOs. This must be incorporated into the IDPs of local municipalities. In terms of Section 29, the Act requires community participation when a local authority compiles the IDP and spatial framework for its area (South Africa 2000).

Spatial and infrastructure planning is a key output of a municipality's IDP. Section 26 of the Act stipulates that an IDP must reflect:

- (a) The municipal council's vision for long term development;
- (b) A spatial development framework, which must include the provision of basic guidelines for a land use management system for the municipality (South Africa 2000).

2.1.6 Application of legislation in Nelspruit

As required by legislation the Nelspruit City Council embarked on an IDP process at the end of 1998. The outcome was a combined LDO and IDP document. Council approved the IDP in April 2000. Contained in the IDP are LDOs pertaining to environmental management which create the key action to formulate a policy to protect and guide development in the Crocodile River greenbelt area. This is reflected in level 4 of Figure 2.1.

The development goal for Nelspruit urban management is that "Within 5 years the Greater Nelspruit will be an integrated, environmentally sustainable, healthy city, enhancing the quality of life, recognising and managing increasing urbanisation, which will deliver the full range of security of tenure and housing options" (Nelspruit IDP 1999:10).

The specific objective formulated for environmental management is as follows: "To develop and implement a sustainable integrated environmental management system for the Greater Nelspruit Area" (Nelspruit IDP 1990:10). The IDP identified from the LDO specific projects to be implemented. One such project is to: "Develop, implement and promote environmental policies, regulations, standards and guidelines" (Nelspruit IDP 1999:10).

The Crocodile River greenbelt policy is one of the first policies to be formulated to fulfil the requirements and objectives stated in the Nelspruit IDP. This is reflected as level 5 in Figure 2.1, (Nelspruit IDP 2000).

The legislation further requires an analysis of the environment. This requirement was complied with by compiling an SOER which is discussed in the rest of this chapter.

2.2 STATE OF THE ENVIRONMENT OF THE CROCODILE RIVER GREENBELT AREA

The Rio Summit of 1992 called for improved environmental information for decision-making. State of environment reporting has since become the globally accepted means of reporting on environmental issues, and of measuring progress towards sustainable

development in the countries which have adopted the principles contained in Agenda 21.

A SOER therefore:

- Improves the understanding of environmental processes and the impact of human activities on these processes;
- Improves understanding of the causes and effects of environmental change and can therefore provide recommendations for responses to such change;
- Provides data for developing and monitoring sustainable development strategies, programmes and projects; and
- Integrates information from various sources on different aspects of the environment (Ballance & King, 1999).

The Crocodile River area will ultimately form a greenbelt through the Nelspruit city area. This conservation area will allow for minimum development only so as to ensure a safe, secure and sustainable greenbelt along the Crocodile River by conserving and improving the natural resource base.

This section is divided into two main sub-sections: Firstly the monitoring of the Crocodile River system is described and secondly the state of the environment and the riparian zone of the Crocodile River area are discussed.

2.2.1 The river health programme in the Crocodile River system

It is important to understand the role of rivers as fresh water systems in the environment. It is not just about the river as a fresh water system, but also the environment, the quality of the environment and its impact on the river systems and the need to protect these environments.

Although South Africa is richly endowed with natural resources, water, one of the most strategic resources, is unfortunately in short supply. Rivers constitute our only substantial source of fresh water. The multiple uses to which rivers have been put, have had severe impacts upon systems. Activities such as agriculture, urbanisation, human population concentration in rural areas, industrial use of water, aquaculture, road-building and recreation all have an impact on rivers (Rabie & Day 1994).

The Department of Water Affairs and Forestry, the Water Research Commission and the Department of Environmental Affairs and Tourism have combined forces to develop the River Health Programme (RHP). This programme aims at using standardised and proven scientific techniques to measure the health of all major rivers in South Africa.

From 1996 to early 1997 the implementation of the RHP in the Province of Mpumalanga began with the monitoring of the Crocodile River and some of its tributaries. This monitoring exercise focused on the community characteristics of fish, invertebrate organisms (for example snails, worms, insect larvae, mussels, beetles and riparian vegetation, such as reeds, grass, shrubs and trees). In addition to these biological indicators, scientists collected information on the diversity and quality of aquatic habitats (Engelbrecht & Deacon 1998).

In this report an index was created to reflect the river health, namely “good”, “fair” and “poor”. This was used to classify the health state of the fish communities, invertebrates, riparian vegetation and river habitats (Engelbrecht & Deacon 1998). Since the methodology to compile this index is not explained in the report, these results are quoted directly to show what the condition of the Crocodile River Area is. The middle Crocodile River area was found to be in a fair condition with regard to its fish communities, riparian vegetation and river habitats, but the invertebrates were classified to be in a poor condition (see Figure 2.2).

The various river health conditions are elaborated on briefly in the next section to highlight some of the threats to the state of health of the Crocodile River.

2.2.2 River health indicators

Water hyacinth can pose a threat to **aquatic habitats** and hence aquatic organisms in the middle part of the Crocodile River are retarded, especially in slow flowing water where weirs have been constructed. Hyacinth occurs abundantly in the lower parts of this reach prior to the 1996 floods (Engelbrecht & Deacon 1998).

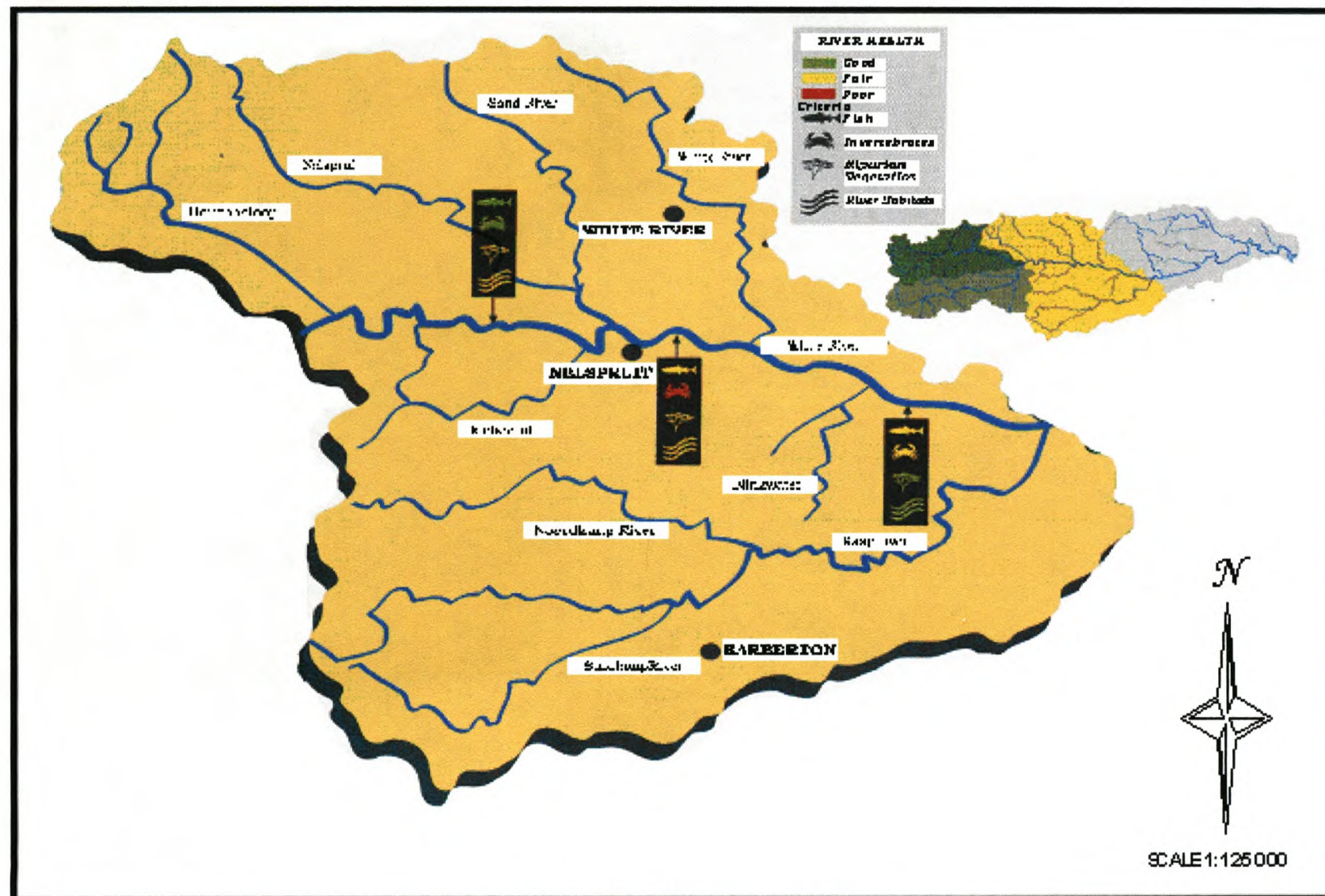


FIGURE 2.2 : RIVER HEALTH CLASSIFICATION ALONG THE MIDDLE CROCODILE RIVER AREA

Concerning **invertebrate organisms** downstream from Nelspruit, scientist sampled between five and ten invertebrate families per site. In general these families showed some intolerance to pollution. The low density can be attributed to a combination of pollution, from industrial and domestic origin and relatively the poor habitat availability in this area (Engelbrecht & Deacon 1998).

A high diversity of **fish species** is normally found in this reach of the river. Specialists collected 24 different fish species during the survey. Amongst these were the southern barred minnow, a red data specie unique to South Africa and with a very limited distribution. Other sensitive species include the orangefin carp and the shortspine suckermouth. This implies good river conditions. Fish specialists could not find the Incomati suckermouth in the section around and immediately upstream of Nelspruit, an area that forms part of their original distribution. This implies a loss of fish species because of increasing urbanisation in the surrounding Nelspruit area (Engelbrecht & Deacon 1998).

A total of 47 **water quality** monitoring points are or have been in operation in the Crocodile River catchment. Records indicate that the water quality in the catchment generally complies with the guidelines set by the Department of Water Affairs and Forestry (DWAF), but there have been temporal and spatial trends of decreasing water quality due to increased land and water use.

According to DWAF the Crocodile River catchment's water quality situation assessment of February 1995 indicates that the assimilative capacity of the Crocodile River is exceeded with regard to ammonia in all reaches of the river (Department of Water Affairs 1999). Manganese, contributed by the natural character of the soil in the area as well as by industrial effluent, poses a problem in the middle reaches of the Crocodile River. High *E-coli* counts were detected sporadically throughout the Crocodile River catchment. The main sources are sewage works with inadequate disinfecting systems and runoff from dense settlements (Department of Water Affairs and Forestry, Mpumalanga 1999). The rapidly growing town of Nelspruit and its associated industrial development areas, informal settlements and the intensive irrigation along the banks of the Crocodile River, contribute to the gradual deterioration in downstream water quality (Department of Agriculture, Environmental Affairs and Tourism 1998).

The integrated spatial framework for Mpumalanga identified **water as a critical and scarce resource** which is essential for socio-economic growth and development in Mpumalanga. Water in the Crocodile River system (with Nelspruit being the major node in the area) is used for irrigation, forestry, domestic and industrial purposes. Water quality problems exist in the catchments and the establishment of any further irrigation and water intensive industries is likely to be a constraint for the town of Nelspruit. Topographical constraints like narrow river gorges limit the construction of further larger dams. The N4 road, as depicted on Figure 1.2, runs through the catchment and creates runoff from the road surface. The river is vulnerable to road runoff and developments alongside the road. According to Rabie & Day (1994) the construction of roads along rivers and bridges and causeways across may have negative impacts on riverbanks and riverbeds as well as on stream flow. Furthermore, urban complexes like the town of Nelspruit, generate large amounts of sewerage which, even if treated, give rise to effluents that are high in salts, phosphate and nitrate content. When effluents containing high levels of nutrients reach rivers, according to Rabie & Day (1994), they stimulate plant growth leading to accelerated eutrophication, increased biochemical oxygen demand and a reduction in faunal diversity. This must be prevented, as there is a problem of invasive alien vegetation spreading along the Crocodile River's banks. The strategic environmental management plan (SEMP) recommends that this river system should be classified as a high protection area and that stringent water quality objectives should be met (Department of Agriculture, Environmental Affairs and Tourism 1998).

2.2.3 Riparian zone rating of the Crocodile River

Since the greenbelt concept is by nature spatially expressed, the whole zone under study needs to be sub-divided into functionally and morphologically distinct areas. For this purpose the project Steering Committee divided the zone into ten smaller areas and a bio-riparian survey questionnaire was completed for each of them. These ten smaller areas were further divided into functional sub-areas. Sub-areas A-E fall within the boundaries of the botanical gardens and sub-areas F-J outside the botanical gardens. Figure 2.3 indicates the ten different areas (A - J). Each area will be discussed briefly in terms of its ecological rating (see Section 1.6.2 for the scale) disturbances and proposed management in the sections to follow. In all cases the source document is Colyn (2000).



FIGURE 2.3 CROCODILE RIVER GREENBELT AREA STATE OF ENVIRONMENT

2.2.3.1 Condition of Area A: Staff housing tract

As Table 2.1 indicates, this area gets a “good” ecological rating. However, some disturbances in the form of alien vegetation infestation (notably *Lantana*) are evident. This necessitates continual removal strategies. This area may be suited for the purpose of informal education.

Table 2.1 Condition of Area A: Staff housing tract

Ecological rating	Disturbances recorded	Proposed management recommendations
Good (4)	<p>Mainly due to invasive alien plant species.</p> <p>Some oil seepage from the main road traversing the Crocodile River area.</p> <p>Litter from the main road and River Road that bisects the area.</p> <p>The riverine section is severely infected by <i>Lantana camera</i> (Figure 1.3), cats claw and various other lesser-known invasives. <i>Lantana camera</i> has recently been manually removed from the open woodlands and vlei areas.</p>	<p>To continue mowing the grass component of the open woodlands on an annual or bi-annual basis.</p> <p>Continue to manually remove <i>Lantana camera</i>, jacaranda and silky oak from the open woodland on an annual basis.</p> <p>The riverine section should be cleared of alien vegetation and ecotonal areas with the grass component of the open woodland to be re-established.</p> <p>This area can be used as an interpretational area along a riverine footpath for informal education (Colyn 2000).</p>

2.2.3.2 Condition of Area B: Riverside trail estate

As Table 2.2 indicates this area gets a “very good” ecological rating. However, as Figure 2.4 attests, there is some disturbance in the form of littering by path users and the hydroelectric power station has become overgrown and derelict. This necessitates the upgrading of the Riverside Trail by specific intervention strategies such as placing litterbins along the path and education of the path users to carry all their litter with them on a continuous basis.

Table 2.2 Condition of Area B: Riverside trail estate

Ecological rating	Disturbances recorded	Proposed management recommendations
Very Good (5)	<p>The main disturbance in this area is the Riverside Trail itself. The trail can be seen on Figure 2.4. There is some littering by the path users.</p> <p>Few invasive aliens occur.</p> <p>An old hydro-electric power-station is situated in the west, at the start of the trail. This has now become overgrown and derelict – it may represent some danger to visitors.</p>	<p>Continue to manage as is, upgrade the path.</p> <p>There is also a need for visitors to place litter somewhere, although path users should be educated to carry all their litter with them.</p> <p>Instructional signage should be put into place.</p> <p>Visitors must be kept out of the old power station (Colyn 2000).</p>

**Figure 2.4 The Riverside trail provides a quality environmental experience**

2.2.3.3 Condition of Area C: Riverside Estate

According to Table 2.3 this area scores a “poor” ecological rating. The area is irreparably disturbed, as Figure 2.5 indicates, by the development of the Riverside Mall and Parliament buildings. The Parliament buildings have been built in the 1:50 year flood-line area. The erection of these buildings has had serious impacts (burning of vegetation, littering, sewerage disposal (outfall)) on the surrounding areas including the cliff vegetation. The developer has agreed to donate funding to develop a new garden adjacent to its properties. Council and the Botanical Gardens should ensure that no further damage occurs to the area by enforcing stringent control measures for the further development of the area in order to minimise the disturbances and impacts.

Table 2.3 Condition of Area C: Riverside estate

Ecological rating	Disturbances recorded	Proposed management recommendations
Poor (1)	<p>These areas have been heavily disturbed by the development of the Riverside Mall and Parliament Buildings.</p> <p>Figure 2.5 shows the position of the Parliament building; built in the 1:50 year flood-line area.</p> <p>A storm-water pipe has been built in an old vlei area.</p> <p>Total disregard by the developers for the adjacent property has led to large-scale impact (burning, littering, sewerage, etc.) on all areas including cliff vegetation.</p>	<p>The area is proposed to form part of a new developed garden.</p> <p>Care should be taken not to damage the area any further (Colyn 2000).</p>

**Figure 2.5 Parliament buildings in Area C****2.2.3.4 Condition of Area D: Eastern estate**

This area has an “average” ecological rating (see Table 2.4). As Figure 2.6 shows, the northern outfall sewer line has been constructed through the area without any attempt to mask it by means of natural vegetation or any other method. A further disturbance in the form of alien vegetation infestation (notably *Lantana*) is evident. This necessitates a controlled burning programme and that the Nelspruit City Council rehabilitates all dumping and excavation sites by restoring the natural vegetation.

Table 2.4 Condition of Area D: Eastern estate

Ecological rating	Disturbances recorded	Proposed management recommendations
Average (3)	<p>Previous garden curators have used the area as a dumping ground for garden refuse and rubble.</p> <p>Gravel and topsoil have also been removed for garden use. This impact can be rehabilitated.</p> <p>A sewerage pipeline (Figure 2.6) was recently constructed through the area. This can be masked by planting around it.</p> <p>Pristine riverine forest exists as well as other interesting communities in shallow ravines and granite outcrops.</p> <p>The area is heavily infested with <i>Lantana camera</i>.</p> <p>Open woodland communities are becoming closed due to bush encroachment and should be properly managed.</p>	<p>The area along the river in the riverine forest could be linked to the Riverside Trail.</p> <p>A controlled burning programme should be investigated for the woodland area. All dumping and excavation sites should be rehabilitated.</p> <p><i>Lantana camera</i> should be controlled (Colyn 2000).</p>



Figure 2.6 Northern outfall sewer line

2.2.3.5 Condition of Area E: NNE estate

As Table 2.5 indicates this area gets a “good” ecological rating. However, some disturbances in the form of logging, hunting, and dumping by surrounding neighbours all pose a threat. These necessitate that the area be fenced with a limited access to ensure that the area be conserved as a reserve area.

Table 2.5 Condition of Area E: NNE estate

Ecological rating	Disturbances recorded	Proposed management recommendations
Good (4).	<p>Illegal logging, hunting, rock slab mining, fires, littering, dumping and surrounding neighbours pose serious threats.</p> <p>The gathering of medicinal plants has recently also become a problem.</p>	<p>The area must be fenced as a priority.</p> <p>The area should be conserved as a reserve area with limited access (Colyn 2000).</p>

2.2.3.6 Condition of Area F: HL Hall and Sons weir

As Table 2.6 refers and Figure 2.7 indicates, this area is rated “fair” ecologically. Some disturbance in the form of alien vegetation infestation (notably *Lantana camera*) is evident as well as constructed canals, farming activities and industries which encroach the riparian zone. These necessitate continual removal strategies and the constant monitoring of the other activities to ensure that they are not extended further.

Table 2.6 Condition of area F: HL Hall and Sons weir

Ecological rating	Disturbances recorded	Proposed management recommendations
Fair (2)	<p>Invasive alien vegetation such as <i>Lantana camera</i> and <i>Ricinus communis</i> with human-made canals and industry with farming activities on adjacent banks the greatest threats (Figure 2.7).</p>	<p>This area is to be maintained by the continual removal of invasive alien plants and monitoring the other activities along the riparian zone (Colyn 2000).</p>



Figure 2.7 Sugar cane fields as indication of riparian deterioration

2.2.3.7 Condition of Area G: Sewerage line to Oewersig

Table 2.7 shows and Figure 2.8 indicates this area gets a “good” ecological rating. However, some disturbance in the form of alien vegetation infestation is evident as well as soil erosion that has occurred because of the sewer line that runs through the area. This necessitates continual removal strategies and rehabilitation of the disturbed area by planting of indigenous vegetation.

Table 2.7 Condition of Area G: Sewerage line area to Oewersig

Ecological rating	Disturbances recorded	Proposed management recommendations
Good (4)	<p>Remains of farming activities e.g. forestry, occur at the edge of the riparian zone.</p> <p>With the other side having all types of invasive alien vegetation due to the sewerage line (Figure 2.6), which has led to soil erosion (Figure 2.8) with only part of the riparian zone still in existence.</p>	<p>The invasive alien plants are to be removed.</p> <p>The disturbed area is to be rehabilitated by planting indigenous vegetation (Colyn 2000).</p>



Figure 2.8 Example of soil erosion occurring in Area G

2.2.3.8 Condition of Area H: Oewersig recreation/community hall to steel bridge

As Table 2.8 indicates and Figures 2.9 and 2.10 attests, this area gets a “good” ecological rating. However, some disturbances in the form of a human-made park-like environment in the Oewersig recreational area exist. In this recreational area there is no riparian zone and most of the vegetation is alien or lawns. This necessitates continual removal strategies. This area will be managed as a park.

Table 2.8 Condition of Area H: Oewersig recreation/community hall to steel bridge

Ecological rating	Disturbances recorded	Proposed management recommendations
Good (4)	<p>The disturbances are human-made with a park-like environment with a few remaining trees from the riparian zone.</p> <p>On the opposite side of the riparian zone the only disturbances are caused by old forestry activities behind this zone. In Figure 2.9 the rusted steel bridge in this area is depicted.</p> <p>There are invasive alien plants, <i>Lantana camera</i> and <i>Passiflore sabpeltata</i>.</p> <p>On the Oewersig side there is no riparian zone and most of the plants are alien species and lawn areas (Figure 2.10).</p>	<p>In the riparian zone the invasive alien vegetation must be removed on a continual basis so that the riparian zone can be maintained intact.</p> <p>The Oewersig side has been disturbed beyond repair and will only be managed as a park and recreational facility (Colyn 2000).</p>



Figure 2.9 Steel bridge spanning the river with no evident riparian zone



Figure 2.10 Park-like environment at Oewersig

2.2.3.9 Condition of Area I: The Botanical Garden (Boundary pipeline to Kanyamazane bridge)

As Table 2.9 shows and Figure 2.11 indicates this area gets a “fair” ecological rating. Some disturbances in the form of infrastructure (notably a pipeline and overhead power lines) pass through the riparian zone. Furthermore substantial soil erosion occurs in the area. This necessitates that the area be continually monitored and rehabilitation strategies be adapted to repair the eroded areas.

Table 2.9 Condition of Area I: The Botanical Garden boundary (Pipeline) to the Kanyamazane bridge

Ecological rating	Disturbances recorded	Proposed management recommendations
Fair (2)	<p>The higher plateaus have the main disturbances with a pipeline passing through and overhead power lines, with the riparian zone largely undisturbed.</p> <p>Illegal dumping and erosion also occurs in this higher plateau (Figure 2.12).</p>	<p>The area must be continually monitored and invasive alien vegetation removed. The erosion damage requires rehabilitation and maintenance (Colyn 2000).</p>

**Figure 2.11 Erosion in the higher plateau****2.2.3.10 Condition of Area J: The Kanyamazane bridge to Kamagugu (Lions club)**

As Table 2.10 refers, this area gets an “average” ecological rating due to disturbances in the form of alien vegetation infestation (notably *Lantana camera*), informal vegetable gardens and pipelines and a pump station in the riparian zone. This necessitates continual removal strategies. The informal vegetable gardens are to be moved to a more suitable area and the riparian zone is to be rehabilitated with indigenous vegetation.

Table 2.10 Condition of Area J: The Kanyamazane bridge to Kamagugu (Lions club)

Ecological rating	Disturbances recorded	Proposed management recommendations
Average (3)	<p>The main disturbances are human-made such as pipelines and pump station.</p> <p>The other disturbances are the informal farming/vegetable gardens in the riparian zone and invasive alien plants such as <i>Lantana Camera</i>.</p>	<p>The continuous monitoring and removal of invasive alien plants.</p> <p>Alternative areas for informal vegetable garden to be identified and the area to be rehabilitated with indigenous vegetation (Colyn 2000).</p>

2.3 SUMMARY OF RIPARIAN IMPACTS

In the preceding sections the state of the environment in the riparian zone of the Crocodile and Nelsriver was highlighted by sub-area. In summary some concluding implications regarding the impact of alien vegetation and urbanisation are provided.

2.3.1 Alien vegetation

The most serious impact on the riparian zone of the Crocodile and Nels Rivers can be attributed to invasive alien vegetation associated with urbanisation. The negative impact of alien vegetation needs to be spelt out to understand the problem that has to be dealt with. Le Maitre (1999) observes that the impact of the widespread invasions by alien vegetation in South Africa is increasingly recognised. The potential of invading alien woody vegetation to impact on water resources is known to be serious. In the Mpumalanga escarpment area invasion by alien vegetation (including pine plantations) in the different primary catchments already covers 2 857 157 ha.

The replacement of indigenous vegetation by alien vegetation not only transforms the flora and the landscape, but affects runoff water quality, soil properties, birds, rodents and insects in their roles as pollinators, predators and dispersors of the seeds of indigenous vegetation. *Lantana camera* is the invasive alien species found most pervasively in the greenbelt area. According to Graaff (1986) its seeds are easily spread by animal agents, especially birds. *Lantana camera* will grow well in most soils, thriving in sandy, disturbed areas that are not too cold. The Crocodile River area is an ideal environment for these alien species. Graaff (1986) states that mechanical removal of the plant remains the best way to control invasion. *Lantana camera* has a shallow,

spreading root system, which lends itself to their removal with tools such as lantana levers or mandy-picks. This method involves slashing the plants 200mm to 300mm above the ground and then physically prising the remaining root stack from the ground. Mechanical control if carried out on a regular, sustained basis, will clear an area of *Lantana camera* with minimal effort.

2.3.2 Urbanisation

Urbanisation is the second most serious factor impacting on the greenbelt area. Rabie & Day (1994) state that seepage from urban refuse disposal sites frequently contains a variety of pollutants that often find their way into rivers, thereby contributing to water pollution. Urban complexes also generate large amounts of sewerage which, even if treated, give rise to effluents with high concentrations of salts, phosphates and nitrates. When these nutrient-rich effluents reach rivers they stimulate plant growth. Urbanisation leads to increased runoff from surfaces that are often polluted, thus eventually leading to the pollution of rivers. The greenbelt area is under strong threat by urbanisation as the city of Nelspruit is located less than 2km from the river's edge. Figures 1.1 and 1.2 clearly show how urbanisation is creeping closer to the river's edge and encroaching on the riparian zone around the river. The municipal sewerage works are situated in the greenbelt area, which could lead to pollution of the river if the water is not treated sufficiently before release into the river.

This chapter stipulated the international environment convention and national legislation guiding the formulation of the greenbelt policy as a spatial planning framework. Also the SOER was discussed in terms of the environmental rating of ecological zones and management guidelines for their improvement. The next chapter will address the open space principles adhered to and the proposed policy for the greenbelt area.

CHAPTER 3

THE CROCODILE RIVER GREENBELT POLICY: PRINCIPLES AND GUIDELINES

Taking into consideration the outcomes of the SOER, the guidelines and requirements for open spaces and the requirements for a spatial framework, a policy was compiled for the greenbelt area of the Crocodile River. The policy incorporates the urban open space principles to guide the urban structure alongside the Crocodile River area, its urban context, the development, objectives, guidelines and proposals. It also gives evaluation guidelines for new development proposals within the greenbelt area. These issues are addressed in the next two chapters.

3.1 A GREENBELT AS FRAMEWORK POLICY

In this chapter the policy for the Crocodile River greenbelt area will be discussed with the open space principles, which underpin such a policy. Furthermore, the importance of a spatial framework will be highlighted.

Greenbelts continue to be regarded as instruments of strategic planning policy and are a means of shaping the general pattern of urban growth at regional and subregional scales. Greenbelts are one of the most enduring and widely supported planning instruments (Munton 1983). As a policy instrument, a greenbelt intervenes in market processes in order to shape and channel urban development. To be fully effective, greenbelts must be incorporated into structure and local plans and must be approved by local authorities. Planning policies should derive from a process that is accountable to local populations that may want far less development than proposed by outside interests (Elson 1986).

Framework greenbelt policies assume particular importance. No other policy has such a strong presumption against development. Once plans are approved, greenbelts may only be altered in exceptional circumstances. A greenbelt policy is therefore desirable for a local authority seeking to retain or enhance its power to affect local events. Within greenbelts the intention is to retain the open rural character of the areas. To achieve this goal the purposes for which new buildings and changes of use will be permitted, are agriculture, forestry, sport, cemeteries, leisure, institutions, standing in large ground, or

other uses appropriate to a rural area. Although this implies severe restrictions, it does not imply development of any sort. In general the presence of a greenbelt places the onus of proof on the applicant to show how a proposed development will not infringe greenbelt criteria. The policy invites negotiation and allows the possibility of some proposals, which may result in a material improvement in the appearance of a greenbelt or the economy of an area (Elson 1986).

A policy for the Crocodile River greenbelt area was compiled according to this guiding framework. The policy is underpinned by the legal requirements set out in Chapter 2. Also contained in the greenbelt policy, is a spatial framework that is a requirement of the Municipal Systems Act (Act 32 of 2000). Proposed land uses have been formulated for the greenbelt area and spatially linked to a framework. This framework will guide future land use applications for their suitability or not.

3.2 PRINCIPLES GUIDING URBAN OPEN SPACE POLICY

A set of general open space principles is discussed in this section. These open space principles form the basis for the policy that is to be compiled for the greenbelt area of the Crocodile River.

3.2.1 General open space principles

The general principles underpinning open spaces are functional, morphological and environmental requirements. These requirements go hand in hand with the principles used to identify land for the utilisation thereof.

3.2.1.1 Functional requirements

The lack of open space and greenbelts in urban settlements can impoverish the life of residents both physically and psychologically. People need areas where they can relax from the stresses of daily life. In urban areas where small patches of the natural environment remain, these areas should be protected in a system of open spaces (Sowman & Urquhart 1989). Greenbelts, open spaces and parks are necessary for the maintenance of bio-diversity, as well as for human psychological health forming an integral part of environmental planning (Department of Housing 1997).

The role of the environment is a key area of concern in urban affairs. However, there is still limited understanding of the role that open spaces could and should play in cities. Unmanaged growth has two destructive manifestations. The first is using the wrong land (for development) and the second is using the land the wrong way. Both result in problems such as congested greenways, destruction of the natural environment, the ill-siting of low-income areas and the creation of communities lacking in character and opportunities for social interaction.

Major parks and large open spaces should be established and located to take advantage of, as well as to protect, natural processes and unusual landscape features and also to provide for a variety of outdoor recreational and other activities. Environmentally critical areas of land and water should be protected against incompatible uses and pollutants generated by urbanisation in the vicinity (Chapin & Kaiser 1985).

3.2.1.2 Morphological and environmental requirements

Soft open spaces take the form of public gardens, parks and recreation walkways. Soft public open spaces should be linked to form inter-connected webs of recreational space, threading through the built-up environment. Linked open spaces provide opportunities for the creation of continuous walkways and greater levels of urban biodiversity. Linear arrangements of soft open spaces should be located along watercourses and floodplains (Behrens & Watson 1996).

The following areas should be included in a natural open space system:

- water bodies such as wetlands, rivers, drainage channels, lakes, ponds and springs
- natural vegetation around water bodies
- areas that provide a link between natural areas of high conservation value
- as many different environmental conditions or habitats as possible
- areas of cultural significance
- areas of social interaction (Sowman & Urquhart 1989: 68-69).

Planning for maximum environmental quality must be accepted and applied as part of development and must find expression on a co-ordinated basis in spatial planning frameworks. An environmental management policy in respect of environmental matters must form part of the spatial plan (Council for the Environment 1989b).

3.2.1.3 Land use objectives

The identification of land for open space and the identification of land for development are two interrelated aspects of growth management. The following key principles from Council for the Environment (1989a) should underpin the design of an open space system and should guide more detailed design, implementation and monitoring:

- Integrated system of open space as opposed to haphazard development of parks
- An hierarchy of open space systems should be developed for urban areas
- An open space system can be classified in the following hierarchy, namely:
 - linkage and continuity between various open space systems
 - accessibility to all people in the community
 - open space standards like stipulating the minimum amount of urban land to be allocated to open space for recreation
 - ecological systems where urban open space should serve to safeguard ecological systems and processes through protective action and regulations
 - people must be able to use the space functionally for recreation
 - visual amenity must be retained, because scenic landscapes and land marks contribute to the character of urban places and should be protected against any actions that may detract from their scenic integrity and quality
 - noise abatement must be affected by open space providing separation between unavoidable noise sources
 - environmental education
 - retain land in agriculture, forestry and related uses.

Land use planning is concerned not only with the more utilitarian features of urban land, but also with the perceptual aspects of the urban environment. Its aesthetic qualities and the preservation and development of natural features in a manner calculated to

enhance them for the enjoyment of city residents should be borne in mind (Chapin & Kaiser 1985).

The Steering Committee decided that the greenbelt policy for the Crocodile River area should make provision for limited development. This implies changing the rural character of the greenbelt for other land users, to allow for leisure, economic and recreation activities. These proposed land uses will be contained in a spatial framework that will guide all future development in the greenbelt area. A spatial development framework deals with a city's physical structure and must include a land use policy to guide the desired patterns of land use. A spatial framework is a plan which visually indicates, or where appropriate, describes the desired spatial form of an area in a municipal boundary. The spatial framework is the basis of how a city is structured and organised and affects every area of urban development – social, political, economic and environmental (South Africa 2001).

Planning for maximum environmental quality must be accepted and applied as part of development and must find expression on a co-ordinated basis in spatial planning frameworks. A management policy in respect of environmental matters must form part of the spatial plan (Council for the Environment 1989b).

Once a greenbelt has been defined, the use of the land has a positive role to play in fulfilling the following objectives, namely to:

- provide opportunities for access to the open countryside for the urban population
- provide opportunities for outdoor sport and outdoor recreation near urban areas
- retain attractive landscapes
- enhance landscapes near to where people live
- improve damaged and derelict land around towns
- secure nature conservation interest
- retain land in agricultural, forestry and related uses.

3.2.2 Urban open space policy principles

Guiding principles with regard to the natural environment in terms of the spatial development framework for the Greater Nelspruit area are key to developing a better urban structure along the Crocodile River area. These are:

- The quality of the urban environment depends largely on the provision and protection, as well as on the sound planning and management, of urban open space.
- If open space is provided on an ad hoc basis due to a lack of a goal orientated open space policy, the result would be space and facilities lacking any meaningful functional, physical and visual integration into the overall urban structures.
- Planning and management of open spaces without adequate consideration for the protection of the physical environment and ecological systems may create conditions under which vitally important ecological processes cannot operate effectively. This will be detrimental to environmental quality and human well-being.
- Neglect to take the recreational needs of communities into account in the planning process can lead to under-utilised facilities and frustrated demand.
- Urban open space is also vulnerable to fragmentation or replacement by other land uses unless adequately protected.
- Once the space is lost it cannot recover its former use and value (Council for the Environment 1989a).

3.3 FUNCTIONAL ATTRIBUTES OF THE NELSPRUIT GREENBELT

The key urban open space principles for greenbelt policy identified in the beginning of this chapter underpin the design of an open space system such as the Nelspruit greenbelt area.

3.3.1 Accessibility and related attributes

Located on the northern edge of Nelspruit, the Crocodile River area forms a potentially sustainable urban edge for containing growth and discouraging sprawl. It is strategically located in terms of the existing road infrastructure. The greenbelt area is situated between two main arterials, the N4 and Road P9/2 (see Figure 1.1). The area is visible to motorists entering Nelspruit from White River. The Crocodile River area is also within walking distance of the Riverside Activity Node.

Access to the Crocodile River area is currently obtained via the White River Road P9/2 through the Botanical Gardens and via Loco Drive through the Croc River Enviro Park and Oewersig Club. Direct access from the Main Road, as seen on Figure 1.2, from White River to the Croc River Enviro Park should be investigated in order to make the Crocodile River area easily accessible to visitors. The Crocodile River area is also accessible by railway connections. Suitable sidings and stations along the area could therefore be negotiated with the relevant authorities. The Crocodile River area forms the interface between the Nelspruit industrial areas and the Riverside Activity Node. The proposed Crocodile River greenbelt area is therefore accessible to the population of the Greater Nelspruit area and to the regional communities.

The context of this policy only deals with the Crocodile River area within the current municipal boundary of the immediate Nelspruit proper as Phase 1 of the greenbelt area development process (see Figure 1.4). Further phases, propose extending the principles and objectives contained in the policy along the Crocodile River area outside the boundaries of Nelspruit depicted in Figure 1.4, namely along the Crocodile River area within the boundaries of the newly demarcated local authority area.

3.3.2 Environmental attributes

The Crocodile River catchment area contains a variety of fauna and flora. The gorge area has a high conservation value and could be included in further phases of the initiative.

The rapidly growing city of Nelspruit, its associated industrial development and informal settlements and the intensive irrigation along the banks of the Crocodile River, contribute to the gradual deterioration in downstream water quality. This river system is likely to have a “high protection class” and stringent water quality objectives will have to be met.

A catchment management agency (CMA) for the Crocodile River is in the process of being established in terms of the Water Act. It is recommended that the proposed management company for the Crocodile River greenbelt area liaise with the CMA regarding relevant matters.

The Crocodile River area should be developed as a regional park as Nelspruit is the capital of Mpumalanga and serves as regional centre for the province.

3.3.3 Future potential open space linkages

Linkages to other open spaces must be established to create a web of open spaces. The system will include a wide range of scales and types of open spaces, from large regional parks to small neighbourhood green spaces. With the new trend in extension of urban and industrial development in Nelspruit, the Lowveld National Botanical Garden plays a vital role, together with other properties along the Crocodile River, in the establishment of a functional “green lung” for Nelspruit.

3.4 LIMITED DEVELOPMENT IN THE GREENBELT

Since the policy allows limited development to take place along the greenbelt, proper objectives and guidelines for such development must be spelt out.

3.4.1 Development objectives

The proposed Crocodile River greenbelt policy must provide a clear understanding of the nature and form of the proposed developments in the particular area. Particular attention must be paid to the natural environment, its accessibility and conditions and stipulations relating to the building format and the conservation of the sensitive environments in the Crocodile River area.

Achieving the objectives stated in the spatial development framework will ensure that the proposals for the Crocodile River greenbelt area described in this policy, conform to the overall policy objectives. These are to establish and manage a sustainable development area with a natural environmental theme, by:

- protecting the natural environment;
- promoting compatible development, maintenance and use of the area as a functional open space system;
- promoting ecologically, sensitive development through public/private partnerships;
- promoting environmental education and awareness;
- rehabilitating degraded natural areas;
- promoting ecotourism and nature orientated recreation; and
- promoting and improving safety and security.

3.4.2 Guidelines for limited development in the greenbelt

The demands of sound planning and management require guidelines to safeguard nature, recreation, tourism and environmental amenities along the greenbelt and to utilise the unique educational opportunities offered.

3.4.2.1 Ecological systems in the greenbelt area

The ecological systems and processes in the Crocodile River area should be safeguarded by protective actions and regulations and the stringency relating to the ecological, scenic and recreational importance of this area. The guidelines proposed to protect the ecological system and process in the Crocodile River area are:

- To afford protection to plants and animals. The Crocodile River area should be planned and managed in such a way that plant and animal life are protected in general with priority given to plant and animal communities of particular ecological scenic and recreational and educational importance.
- To base decisions on ecological research, surveys and inventories of the biophysical environment in the area.

- To afford protection to topographical features of ecological, scenic and recreational importance, especially those areas easily disturbed or destroyed by development.
- To protect water systems and water quality by the provision of adequate natural areas, especially wetlands, to facilitate the absorption and containment of storm water run-off, with controls on erosion, water pollution and over utilisation of surface and subterranean water.
- To include the systematic eradication of declared and potential invader plants and weeds.
- To provide for interconnection of the Crocodile River area with other open spaces through spatial corridors, to facilitate fauna and flora migration, to protect water systems and ridges, to provide visual continuity and continuity of habitats.

3.4.2.2 Enhancing recreational and tourism opportunities

The recreational and tourism opportunities of the greenbelt should be enhanced by consulting the community and interconnecting spaces to create harmony and co-existence of the natural environment and the people using the space. This is ensured by implementing these rules:

- The real recreational needs and preferences of the community should be established. The spatial framework and the annual revision of the LDO/IDP will indicate community needs in terms of age group, vital social interaction, cultural group specifics, crime protection and educational requirements.
- In detailed planning and management, the suitability and carrying capacity of the land with respect to different types of recreational activities should be taken into account to avoid irreversible environmental damage.
- The placing of facilities should be aimed at the separation of incompatible recreational activities and land uses.

- In the provision of facilities, priority should be given to both active and passive recreation.
- Sufficient recreation space and facilities should be provided to commuters. This should include pedestrian and cycle paths, hiking trails and jogging routes.
- Safety of people should be taken into account in the design, planning and management of open space and facilities.
- The interconnection of open spaces should be aimed at to maximise their accessibility and the utilisation of the recreational potential. Each open space should not be seen in isolation but as part of a continuous system which forms a network across the city and its surrounding areas via the various wetland systems and the Crocodile River catchment area.
- Areas in the Crocodile River catchment area having high conservation value, which is sensitive to development, should be identified and included into the context of the policy as further phases of the initiative.

3.4.2.3 Maintaining and enhancing visual amenity

Access to and passage along the greenbelt area must be adapted and planned in such a manner that high visual amenity of the natural features are enhanced and protected. Effort must also endeavour that structures blend in and enhance the natural and visual amenity of the area by ensuring that:

- Scenic landscapes and landmarks such as hills and ridges that contribute to the character of Crocodile River area should be protected against any actions that may detract from their scenic integrity and quality.
- Structures within the Crocodile River area should be planned and designed as an integral part of the open space, using elements of diversity, uniformity, textures and colours of nature to contrast or blend with the natural environment.

3.4.2.4 Noise abatement

Noise abatement measures must be introduced to ensure that the natural surroundings and their unique sounds are kept intact and isolated from unavoidable noise sources. Noise abatement measures, such as sloped and landscaped berms, must be visually acceptable and compatible with other forms of open space utilisation in the Crocodile River area and unavoidable noise sources and noise sensitive areas should be separated.

3.4.2.5 Environmental education

It is important to make the greenbelt an active living space, which is part of the community. This can be achieved by educating the community on the importance of natural environment, its role and function and why it should be protected for them and their children to come. Opportunities should include:

- The educational potential of the Crocodile River area should be utilised, developed and managed to enhance environmental awareness by means of educational trails, centres, exhibitions and activities.
- Educational organisations and institutions, as well as the public, could be usefully employed in this regard.

This chapter stipulated the principles and guidelines that underpin the greenbelt policy. The next chapter will address the spatial development proposals and management guidelines for the greenbelt.

CHAPTER 4

SPATIAL DEVELOPMENT PROPOSALS AND MANAGEMENT GUIDELINES FOR THE GREENBELT

In terms of the Municipal Systems Act (South Africa 2000) a spatial framework must be compiled to guide all future land development in a municipal jurisdiction. This framework is provided by the bio-regional planning model and its morphological zones discussed in this chapter, together with practical guidelines for its local implementation.

The guiding principles used as a basis to safeguard the natural environment are that certain limited development can be allowed in the greenbelt area. This area can be classified as an environmental protection zone or an environmental conservation zone. Building activity in conservation zones is allowed, but only if unavoidable and then subject to mitigation requirements. Development in protection zones involves much more stringent approval criteria and is, therefore, virtually prohibited (Beatley & Manning 1997).

4.1 THE BIO-REGIONAL PLANNING MODEL

There are six primary spatial planning categories reflecting increasing levels of conservation intensity according to bio-regional planning principles. These categories and basic purposes were used to define the greenbelt area and the basic purposes were expanded upon to develop guidelines for each of the categories within the greenbelt policy. Table 4.1 sets out these planning categories, namely core areas, buffer zones, agricultural areas, urban-related areas, industrial areas, and surface infrastructure and buildings.

These development proposals are categorised in terms of the bio-regional planning categories. The latter provide an appropriate model for land management that promotes sustainable development, and the basic purposes of each category are highlighted. Not all of these categories are formally included in the development proposals discussed further on since the greenbelt is largely located within urban boundaries.

Table 4.1: The six primary spatial bio-regional planning categories

CATEGORY	DESCRIPTION	BASIC PURPOSES
Category A	Core area (consistent with UNESCO's Biosphere Reserve 'Core areas').	Comprising areas of high conservation importance that must be protected from change. Only non-consumptive land uses allowed.
Category B	Buffer zone (consistent with UNESCO's Biosphere Reserve 'Buffer Zone' and 'Transition Zone 1').	Serving as a buffer between Category A areas and Category C areas.
Category C	Agricultural areas (consistent with UNESCO's Biosphere Reserve 'Transition Zone 2').	Constituting rural areas where extensive and intensive agriculture is practised. Including forestry areas.
Category D	Urban-related areas (consistent with UNESCO's Biosphere Reserve 'Transition Zone 3').	Representing a broad spectrum of nodal urban-related settlements and their associated services and infrastructure.
Category E	Industrial areas	Representing the industrial areas where the highest intensity of human activity occurs.
Category F	Surface infrastructure and buildings.	Consulting all surface infrastructure and building not catered for in the above categories. Including roads, railway lines, power lines, communication structures, etc.

Source: Dennis Moss Partnership Inc. 2000.

Although the conservation of the Crocodile River area is the ultimate goal of development in this area, planning must also address the use of land that is to a certain extent suitable for limited development. Given its unique location it is logical that the Crocodile River area would be ideally suited for ecotourism and nature orientated developments. However, the area's location also indicates that passive and active recreation developments, as well as residential development would be suitable in this area. Although this is a divergence from the formal model, in this way a more dynamic and unique environment could be created. Commercial land uses, which comply with the Spatial Development Framework for the Greater Nelspruit area, could locate on the fringe of the Crocodile River area.

These development proposals are categorised below in terms of the bio-regional planning categories. The principle of bio-regional core-buffer transition categorisation applies to all developments within the Crocodile River area as stipulated below for the various zones.

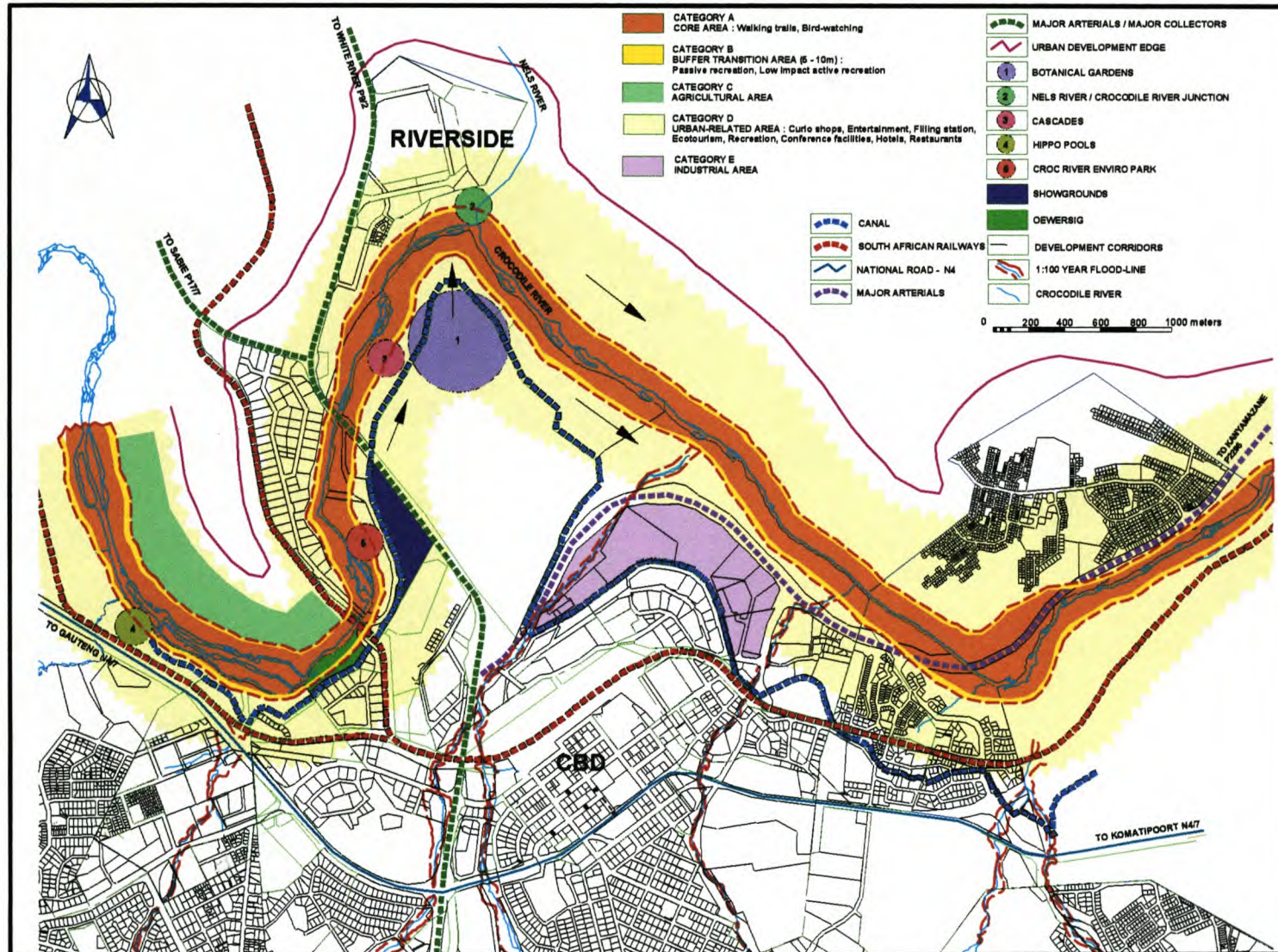


FIGURE 4.1 SPATIAL DEVELOPMENT FRAMEWORK FOR THE CROCODILE RIVER GREENBELT AREA

4.2 THE CORE AREA OF THE GREENBELT

The core area constitutes all land below at least the 1:100 year flood-line as indicated in Figure 4.1. It includes the riparian habitat, the physical structure and associated vegetation of areas associated with a watercourse. These are commonly characterised by alluvial soils and are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas. Besides the 1:100 year flood-line zone, other areas with high visual amenity, steep slopes and pristine and sensitive areas are included in the core area. Guidelines for its maintenance are:

- Maintain core areas within the Crocodile River area and allow no development of any kind whatsoever unless authorisation has been granted in terms of Section 22 of the Environment Conservation Act (Act 73 of 1989).
- In the case of authorisation, enforce compliance of the development with all environmental management measures as identified and set out in the Environmental Impact Assessment (EIA) for such proposed development.
- Require environmental management plans with specific attention given to the ecological state of the biophysical environment to be prepared for proposed developments, that address issues like impact mitigation measures, revegetation and rehabilitation.
- Council, as the responsible authority, will manage, maintain and monitor development in conjunction with developers allowed to operate along the zone.
- Address pollution in terms of the relevant environmental legislation and manage through a continuous programme.
- Eradicate alien vegetation and substitute with indigenous plants.
- Attention must be given to the rehabilitation of any degraded areas.
- Consider allowing only activities like low impact walking trails and bird lookout points.

4.3 THE BUFFER/TRANSITION ZONES OF THE GREENBELT

This area (see Figure 4.1) is located between the core area and the existing development zone and is subject to the following development guidelines:

- A landscaped or natural area of between 5m and 20m, approved by Council for each proposed development, must be maintained.
- A landscape/environmental plan with specific attention to the planting of indigenous trees and vegetation must be submitted to Council for approval.
- The only activities that may be considered for the buffer/transition area are passive and low impact active recreation activities.

4.4 SITE-RELATED GUIDELINES IN THE URBAN-RELATED AREAS

The development/building area is identified as the site (erf) on which the actual physical development can take place within the greenbelt area (see Figure 4.1). This area is located next to the buffer/transition area. Guidelines for such development are:

- A detailed site development plan together with a landscape plan must be submitted to Council for approval prior the submission of building plans.
- The elevational treatment of buildings along the Crocodile River area must face onto the natural open area.
- Should parking areas face onto the natural area (buffer), they must be sufficiently screened with indigenous trees and vegetation.
- Floor area and height controls for individual sites will be determined at a time when proposals have progressed to the design stage.

- Activities and land uses that may be considered in this area are ecotourism and recreational activities and nature orientated land uses, including conference facilities, hotels, restaurants, curio shops, places of entertainment and filling stations which are related to the main uses.
- The urban development edge along the greenbelt area will not allow development beyond this edge. This is to contain urban sprawl and to compact the city. The main development within the area is indicated in Figure 4.1 and includes the Botanical Garden, Nelsriver/Crocodile River Junction, Cascades, Hippo Pools and Croc River Enviro Park. The major arterials, N4 and P9/2, are the main feeders into and out of the Crocodile River greenbelt area. The development corridors have been indicated with arrows pointing in the direction for growth and expansion. This spatial framework, in conjunction with the policy, will guide the approval or non-approval of all future development applications received within the Crocodile River greenbelt area.

4.5 GUIDELINES FOR SURFACE INFRASTRUCTURE AND BUILDINGS

It is important that guidelines be given for vehicular and pedestrian access and parking to indicate where in future development like this may take place to ensure that damage and impact on the natural environment will be negligible.

Concerning vehicular and pedestrian access and parking, it is recommended that:

- Tourist walkways should be established along the Crocodile River area, linking the various ecotourism activities.
- The old railway station be upgraded and a scenic train experience between the Kruger National Park and Nelspruit and other areas in the Lowveld be investigated.
- The siting and construction of a direct access road and traffic lights from the White River Road P9/2 into the Crocodile River area be investigated.

- Access from the N4/7 National Road into the Crocodile River area be investigated and the comments of TRAC be obtained in this regard.
- Parking must be provided at the proposed developments according to the standards and requirements of the Nelspruit Town Planning Scheme of 1989.

Concerning service infrastructure it is determined that:

- Services will be in accordance with the standards of Council and will be finalised at the site development plan level.
- Security and cleansing will be arranged between the proposed Section 21 Company and Council. As refuse points have not been identified, private access roads must allow refuse vehicles to service individual buildings using these roads.

4.6 DEALING WITH DEVIANT DEVELOPMENT PROPOSALS

As is standard procedure in any area, deviations from the stipulated requirements would have to be fully motivated by the potential developer and would have to be accepted by both the proposing company and Council. The policy allows for a flexible range of development proposals and is thus primarily a guiding document dealing with development policy for an individual development in the Crocodile River greenbelt area. It provides the basis for establishing the desired physical characteristics of the area, which will be spelt out in the site development plans. The site development plans will provide the basis for more detailed control of individual buildings and activities.

This policy is therefore not a final statement of development. The policy should be regarded as a statement of intent, which elaborates on the Spatial Development Framework and defines the broad parameters expected of any proposal in the Crocodile River greenbelt area. The site development plans will detail the physical characteristics for the Crocodile River greenbelt area including detailed services, landscaping, building footprints, etc. Applications for development must, nevertheless, also comply with evaluation guidelines in the Crocodile River greenbelt area.

4.7 EVALUATION GUIDELINES FOR DEVELOPMENT IN THE CROCODILE RIVER GREENBELT AREA

Guidelines to determine how Council can evaluate future applications for development in the Crocodile River greenbelt area are required to ensure compliance with the policy for the Crocodile River greenbelt area. The proposed guidelines include requirements for evaluation, application standardisation and site development plans.

4.7.1 Evaluation guidelines for development

The evaluation process must ensure that the development does not:

- endanger plant and animal communities of particular ecological, scenic, recreational and educational importance;
- destroy topographical features of ecological, scenic and recreational importance, especially those areas easily disturbed or destroyed by development;
- impact the occurrence of surface and sub-surface water systems and water quality;
- exceed the carrying capacity of the land with respect to different types of recreational activities in the case of recreational developments;
- prevent the location and the interconnection of open spaces with other open spaces in the Crocodile River greenbelt area;
- allow insufficient access to the proposed development;
- visually impact the character of the Crocodile River greenbelt area;
- create possible noise sources as a result of the proposed development;
- require unavailable bulk engineering services; or
- disregard environmental educational value/potential of proposed development.

4.7.2 Requirements for applications

To ensure a proper, fair and systematic evaluation process, all applications must comply with the required inclusion of:

- An ecological survey of the biophysical environment on the property with reference to at least the following aspects:
 - the plant and animal communities of particular ecological, scenic, recreational and educational importance;
 - identification of water systems and impact on water quality (appropriate methods are to be used to delineate a water system);
 - identification of topographical features of ecological, scenic and recreational importance;
 - evaluation of the state of the biophysical environment and the occurrence of disturbed or destroyed areas;
 - a traffic impact study.
- A recreational needs analysis in the case of recreational developments;
- An evaluation of the environmental impact of the proposed development on the Crocodile River greenbelt area;
- Proposed measures to strengthen the positive impacts and prevent/mitigate negative impact/disturbance of the proposed development.

4.7.3 Requirements for a site development plan

Similarly, to ensure that all relevant spatial and terrain aspects are taken into consideration, the following requirements must be incorporated in a successful plan:

- the siting, height, total floor area, floor area ratio, coverage of buildings and structures;
- the 1:100 year flood-line;
- the proposed core, buffer, and development zone based on information obtained from the ecological survey and an appropriate delineation method;
- indication of open spaces and landscaping with specific attention to the protection of existing indigenous vegetation and trees and the planting of indigenous vegetation and trees;
- entrances to and exits from the property, internal roads, vehicular movement on the property and parking bays;
- entrances to buildings and parking areas;
- building restriction areas;
- elevational treatment of all buildings and structures, specifically:

- outside wall specifications;
- roof finishes;
- position and specifications with regard to fences;
- position and specifications with regard to advertising signs;
- position of engineering services and service connections;
- position of refuse areas.

4.8 MANAGEMENT OF THE CROCODILE RIVER GREENBELT AREA

The greenbelt has a unique spatial and management status. Its long-term success requires community involvement and dedicated management structures and procedures. The policy makes provision for these in the following sections.

4.8.1 The principle of community participation

There is a growing movement toward resident involvement and management of neighbourhood parks, playgrounds and open spaces, which has occurred because of increased community participation in local affairs. Community involvement in open spaces has occurred in several ways, including (1) user and resident involvement in design and planning; (2) user involvement in site development and construction; (3) community management and maintenance, and (4) community ownership of open space projects through neighbourhood land trusts. Frequently, these techniques have been applied in combination. It is important that land be used by those who own it. Ownership of land can be defined as the right to assume control, enjoyment, and responsibility for a place. Francis, Cashdan & Paxton (1984:14) state that “symbolic ownership” as well as legal ownership can be used as a tool to increase the sense of community control over open space. Among several assumptions regarding the social and environmental benefits of community participation in the design and management of open spaces, the salient ones are that:

- community participation “solves” the problem of limited city resources for open space development and maintenance by transferring management responsibility from the city to local residents;

- community developed sites result in neighbourhood stability because residents feel a sense of ownership over their neighbourhood open spaces;
- community use and satisfaction are greater in settings where residents develop and manage themselves than in publicly provided and controlled open spaces (Francis, Cashdan & Paxton 1984).

The proposed management structure for the area is a public/private partnership initiative. A management structure is proposed for the greenbelt, which is based on the as listed principles above. The community will be directly responsible for the management and rehabilitation of the greenbelt area through a public/private partnership initiative. Funding will be generated by grants, membership fees, concession revenue and admission fees. This funding will be used by the community to rehabilitate and manage the area. The functions of the various role players are highlighted, the structure is graphically outlined (Figure 4.2) and the various roles are discussed in more detail below.

4.8.2 An association for management responsibility

A voluntary association should be set up in a similar manner as the Botanical Society. This association perhaps named - "The Crocodile Greenbelt Association" - should be the umbrella organisation. A constitution will be drawn up and include all the objectives and powers of the association. The members of the association would be bound by all the provisions in the constitution and all the resolutions, regulations and decisions of the association and its executive committee.

4.8.3 Functions of the association

The key functions of the association would be to:

- set policy and strategy for the reserve, including evaluating and considering the optimal exploitation of development and business opportunities in consistency with the sustainable long-term conservation of the fauna and flora of the reserve and preservation of its natural beauty;

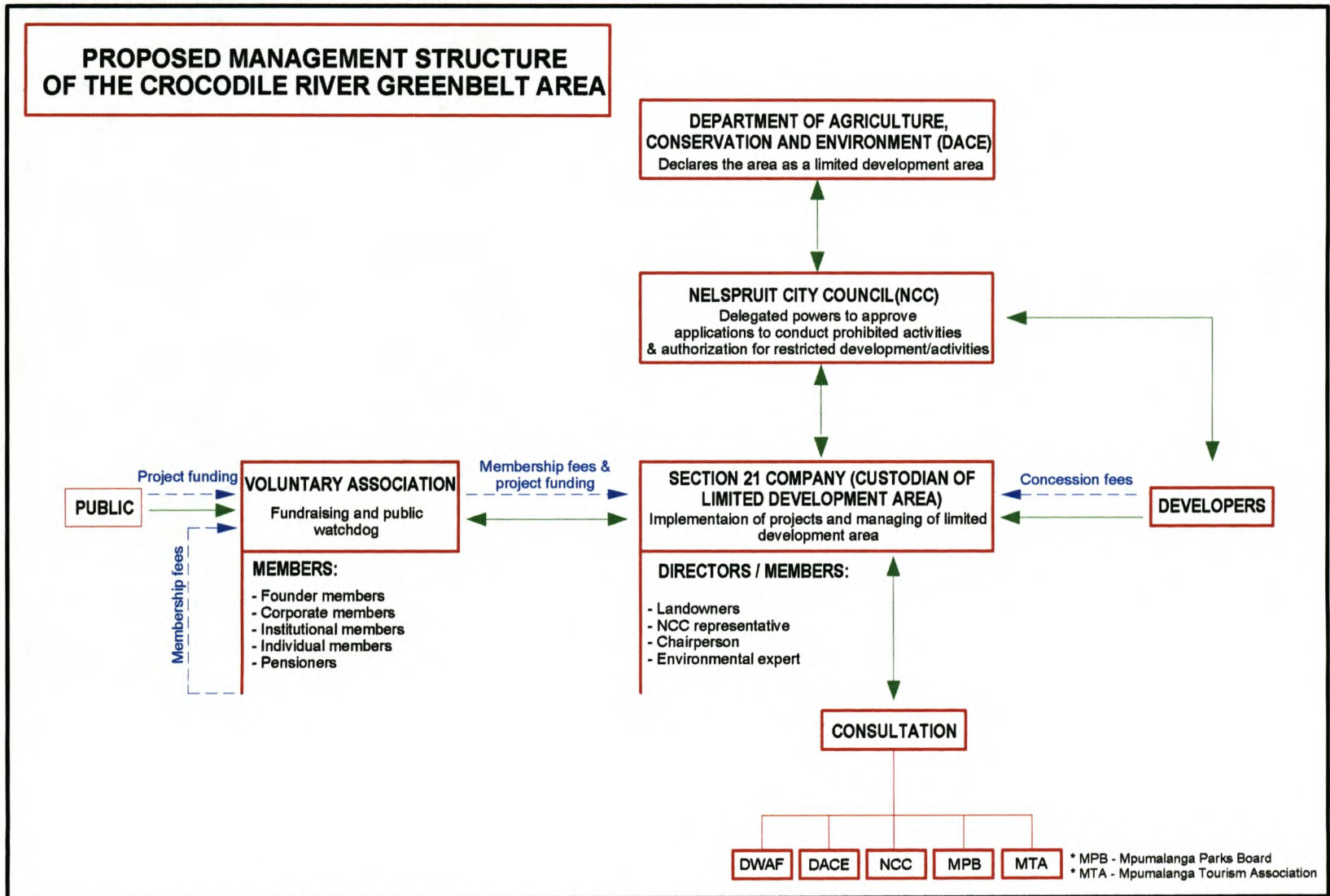


FIGURE 4.2 PROPOSED MANAGEMENT STRUCTURE OF THE CROCODILE RIVER GREENBELT AREA

obtain the necessary legal protection for the reserve;

- mobilise funding from various sources (public and private);
- market and promote the reserve and association, including the recruitment of members;
- monitor and evaluate the to-be-founded operational company.

4.8.4 Representation and membership of the association

It would be important to obtain the right level of representation on the executive committee of the association. High profile individuals from the business sector, local government and other institutions such as the Botanical Gardens should be represented on the executive committee.

Membership should be open to the general public and the following categories of membership are proposed:

- Founder members who will make a meaningful contribution (in kind or financial or both) to the establishment of the reserve and its organisations. A suitable membership fee and benefit structure should be established for these members;
- Corporate members who should mainly include private businesses;
- Institutional members will include schools and other social/welfare/cultural organisations;
- Individual members from the general public, either as individuals or families; and
- Pensioners.

The membership fee and benefit structure will need to be determined for all of the above membership categories.

4.8.5 Funding the association

The association will have limited operational funding requirements as it is proposed that the executive committee will be voluntary. There will, however, be a requirement for secretarial and administrative, as well as travel, entertainment and marketing expenses. The raising and allocation of funds will focus on:

- mobilising donor and grant funding for the establishment and development of the reserve;
- gathering membership fees for the operational expenses of the association and operating company;
- further steps to generate funds for the rehabilitation of the area, such as that all new developments will pay a concession fee to the Section 21 Company for the upliftment of the area.

4.8.6 A section 21 Company for operational responsibility

It is proposed that, for operational purposes, a Section 21 company be set up. The company could initially contract the services of an established organisation to provide the management services until critical mass has been achieved. The company will have representation on the executive committee of the association.

The **key functions** of the operational company will include:

- the day to day physical and financial management of the reserve;
- rehabilitation and conservation activities including monitoring and control;
- physical development of the reserve, including the procurement and provision of infrastructure such as fencing, trails and paths, public services and amenities as well as the maintenance thereof;
- pollution control and monitoring in conjunction with other agencies such as the Department of Agriculture, Conservation and Environment (DACE); and
- evaluation, appraisal, issuing and monitoring of development concessions.

The company will be responsible for its own **financial management** and will have to report to the executive committee on finances on a quarterly basis and have the financial statements audited annually. The sources of revenue will include:

- grants or donor funding from the association or other organisations for development/capital expenditure;
- membership fees;
- concession revenue from rentals and/or concessions awarded;

- admission fees to public sections of the reserve;
- concession fees for rehabilitation by new development projects.

4.8.7 Role of the Nelspruit city council

The Council will oversee the total development process. It will have delegated powers to approve applications in line with policy and the authorisation to restrict development and activities. It will serve as a board member of the association to protect and ensure the entrenched rights of the broader community it serves.

CHAPTER 5 SYNTHESIS

5.1 SUMMARY OF RESULTS

Chapter 1 states the problem and outlines the research approach as a golden thread that runs throughout this thesis. Emphasis was firstly placed on the importance of protecting the natural environment threatened by urbanisation and invasion of alien vegetation. This was to be achieved by the compilation of a greenbelt policy for the Crocodile River zone to effectively manage the area. The research was mainly qualitative in nature with extensive interpretative review of existing literature.

Chapter 2 established the legislative foundation to formulate a policy for the Crocodile River greenbelt area. The chapter started with a general background of interventional requirements for such a policy, i.e. the Agenda 21. From here the national requirements for the policy were outlined looking at the requirements set in the Constitution of the Republic of South Africa, the National Environmental Management Act and the Municipal Systems Act. These requirements were then applied in a local context at municipal level with a discussion on the integrated development plan for the Greater Nelspruit and the general requirements for a state of environment report. The outcomes of the specific state of the environment report for the Crocodile River greenbelt area were then discussed in detail ending the chapter with a summary of riparian impacts.

Chapter 3 firstly dealt with defining the concept of a greenbelt. Secondly principles guiding the policy were discussed. The discussion on the principles was general in nature, which was then related to the functional attributes of the Nelspruit greenbelt.

Chapter 4 dealt with the spatial development proposals that flowed from the policy in the previous chapter. The greenbelt area was divided spatially into a core area and a buffer/transition area and the guidelines to follow for development in these areas were discussed in detail. Further guidelines in terms of the urban-related areas, surface infrastructure and buildings were outlined. Guidelines were also outlined to deal with deviant development proposals and evaluation guidelines and formats to use when considering future development applications were suggested.

The chapter ended with a proposal on the management structure for the Crocodile River greenbelt. It recommends that this serves as a model for similar future policy initiatives within the greenbelt or greenway area within the Nelspruit City Council's jurisdictional area.

5.2 EVALUATION OF THE NELSPRUIT GREENBELT POLICY

It is anticipated that the proposed future developments will have no negative impact on the Crocodile River due to the fact that the proposed greenbelt area is an environmental area underwriting the principles of conservation. Water quality problems due to point sources within the industrial area will be identifiable within a short period and can be rectified. The bio-diversity of the river will be improved due to the frequent monitoring. Fish identified as scarce species might return to the water.

With regard to the riparian zone it is anticipated that a small loss in riparian habitat might occur with certain developments. The impact would, however, be negligible. In such cases, environmental impact assessments will be done. Positive impacts that are anticipated vary from the better control over alien invader species to the minimisation of storm erosion through sound engineering practices. Scenic routes along the river area will become accessible to tourists as well as local residents of Nelspruit. Limited development of a hiking trail could contribute to the conservation of the area. The greenbelt development will prevent any forestation near the riparian zone of the river. No impact is foreseen on the agricultural potential of the Crocodile River greenbelt area and its surroundings.

No impact is foreseen with regard to the socio-economic issues, however, non-development will result in the closure of the Croc River Enviro Park and subsequent loss of employment. The establishment of a tourist information centre, bird watching points, environmental park, walking trails, youth enviro centre and Botanical Gardens, all under one umbrella, will be unique in South Africa. The development of the old show-grounds and the construction of the new access road to the Croc River Enviro Park will open up new possibilities for the utilisation of the old show-grounds.

No negative impact is foreseen with regard to water and sanitation, as the existing infrastructure will be able to handle future developments. The areas around the

greenbelt area are well serviced and the capacity exists to extend these services. No impact on waste is foreseen, as the volume of waste generated by the development will be relatively small in the entire area. The existing permitted landfill site of the Council still has enough space available. The volume of waste to be created by the proposed developments within the Crocodile River greenbelt area will be negligible. The development will have no effect on the air quality in Nelspruit.

The proposed future development of a demarcated area for touring busses in the greenbelt area will alleviate current problems with regard to tourism attraction to Nelspruit. The greenbelt development will therefore not have a negative impact with regard to transport.

Detailed Environment Impact Assessments (EIAs) must be compiled for certain developments according to the criteria and conditions of Council's newly established guidelines in this regard.

5.3 RECOMMENDATIONS FOR POLICY IMPLEMENTATION

A major pitfall one has to avoid is not ensuring proper community participation from the start of the process. If there is not sufficient buy-in of the process it may hamper the effective implementation of the project.

It is furthermore important to have full commitment from the stakeholders driving the project as it takes time and the effort of all individuals singularly or collectively to get a finalised product and policy on the table. This is especially so if there is no funding available to make use of consultants to do the work and individuals and companies have to give time and human resources in supporting the initiative.

The policy as proposed has a major impact on future development and the individuals that would want to develop within this area. The purpose, objectives and needs for such a restricted development area need to be highlighted and explained from the onset of the project to the major landowners. It is necessary to obtain their buy-in otherwise it could amount to obstacles in the process that could have been avoided.

One also needs to ensure that one has the right project team members. It will be a learning curve for most of the individuals on the steering committee to undertake functions which they have not done before although they have been trained for it professionally.

When putting together a project team one needs to ensure that there is a mix of enthusiasm but also the necessary experience. If there is a lack of experience, the project takes longer to complete, as one always has to retrace the steps, and correct and learn from the mistakes.

5.4 RECOMMENDATIONS FOR FUTURE RESEARCH

Future research should concentrate on community participation, institutional structure and marketing.

It is important that researchers develop models or frameworks to ensure proper community participation in such a process. Such research should allude to what the best method or structure should be for community participation.

Research should also be done on the most appropriate institutional structure to manage such a greenbelt area. The management structure proposal has not been tested in practice to ascertain if it is the best instrument to use.

Finally, research should be undertaken on what the most appropriate marketing strategy should be for such a policy to ensure its long-term implementation and sustainability. A marketing policy or framework should be compiled to enhance the unique proposals combined in the policy document.

5.5 FINAL PRONOUNCEMENT

The formulation of the policy for the greenbelt area has created a unique process of interlinking the natural environment, its protection and conservation with land uses to enhance and use the attributes of the environment. This whole concept is underpinned

by sustainability in the management structure of the area. This initiative has created a project, which complies with the international and national vision for environmental management by being self-sustainable when implemented in practice. The policy should serve as a role model for similar projects. The policy has set a framework for a holistic approach to integrated planning and partnerships between public and private institutions.

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ADDENDA

- A. COUNCIL RESOLUTION TO COMPILE A POLICY – 20 JULY 1999
- B. OFFICIAL NOTICE CONCERNING THE ESTABLISHMENT OF A PROJECT STEERING AND PLANNING COMMITTEE
- C. STEERING COMMITTEE TERMS OF REFERENCE
- D. WORKSHOP AGENDA AND ATTENDANCE RECORD 21 SEPTEMBER 1999
- E. WORKSHOP SCHEDULE FOR A TASK TEAM
- F. BIO MONITORING OF RIPARIAN VEGETATION SITE SURVEY FORM
- G. COUNCIL RESOLUTION APPROVING POLICY AND SOER.

ADDENDUM A

26.07.99

A(39). TOWN PLANNING AND CONTROL: PROPOSED FRAMEWORK FOR A POLICY REGARDING THE CROCODILE RIVER GREENBELT AREA (15/3/1) (59322)

RESOLVED

THAT

- (a) Council adopts the draft framework for the policy regarding the Crocodile River Greenbelt Area, as contained in annexure 063/99;
- (b) the proposed Crocodile River Greenbelt policy be compatible with the Environmental Policy that is being developed for the Greater Nelspruit;
- (c) a Project Steering and Planning Committee, consisting of stakeholders and other sectors, according to the discretion of the Head: Urban Planning, be established;
- (d) the sale and future development of Oewersig Club, Erf 27 Vintonia Extension 2 be handled as a pilot project that can be embarked upon in conjunction with the formulation of the policy framework mentioned in (a) above.

ADDENDUM B

15/3/1 (BB:59495)Q14m Crocodile River Greenbelt (S1113)

L van Niekerk (013) 7592225]

17 August 1998

H L Hall & Sons
P O Mataffin
MPUMALANGA
1205

ATTENTION: James Ailing

**TOWNPLANNING AND CONTROL: ESTABLISHMENT OF PROJECT
STEERING COMMITTEE AND PLANNING COMMITTEE – CROCODILE
RIVER GREENBELT INITIATIVE**

You are hereby informed that the Nelspruit Town Council, on 26 July 1999 in terms of Item A(39), resolved that:

- “(a) Council adopts the draft framework for the policy regarding the Crocodile River Greenbelt Area, as contained in annexure 063/99;
- (b) The proposed Crocodile River Greenbelt policy be compatible with the Environmental policy that is being developed for the Greater Nelspruit;
- (c) A project Steering Committee, consisting of stakeholders and other sectors, according to the discretion of the Head: Urban Planning, be established;
- (d) The sale and future development of oewersig Club, Erf 27 Vintonia Extension 2 be handled as a pilot project that can be embarked upon in conjunction with the formulation of the policy framework mentioned in (a) above.”

- Please find attached hereto the framework for the policy regarding the Crocodile River Greenbelt Area for your information.

You are hereby invited to attend the first meeting of the project steering committee. The meeting will be held on the 25 August 1999 at 14:00 in Room 204, Department Urban Planning (Second Floor, Civic Centre). Please confirm attendance two days in advance.

Should you have any further enquiries, please do not hesitate to contact us.

Yours faithfully

S A OOSTHUIZEN
HEAD:URBAN PLANNING

ADDENDUM C

STEERING COMMITTEE CROCODILE RIVER GREENBELT TERMS OF REFERENCE

It is the intention of the Nelspruit Town Council in conjunction with the private sector to develop a sustainable and integrated environmental policy for the Crocodile River Area. A steering committee will assist the Nelspruit Town Council to develop such a policy. This Terms of Reference will form the basis of the project.

1. BACKGROUND

It has become apparent that both developers, investors and Council require a general policy guideline for the Crocodile River Area as a point of reference for taking informed decisions on matters and new developments which may have an environmental impact on this important eco-tourism resource.

2. PROJECT DESCRIPTION

The context of the policy only deals with the Crocodile River Area within the current municipal boundary of the immediate Nelspruit Proper as Phase 1. As further phases, it is proposed to extend the principles and objectives contained in the policy along the Crocodile River Area outside the boundaries of Nelspruit, such as Gladdespruit.

2.1 BENEFICIARIES

At the present moment the natural resource is being degraded. By promoting this policy, the degradation of the natural resource will be reduced and the living quality of the residents of Greater Nelspruit will improve by promoting environmental conservation and co-ordinated eco-tourism developments.

2.2 STAKEHOLDERS

- Public (Residents and Tourists)
- Nelspruit Town Council
- Provincial departments
- All adjacent land owners

2.3 LOCATION

The "Greenbelt" area is defined as a zone of at least up to 1:50 year flood line on either side of the Crocodile River as well as possible open space linkages with

other significant and potential natural and Eco-tourism resources and significant hilltops along the Crocodile River Area.

2.4 ROLE PLAYERS

- Public
- Nelspruit Town Council (Department of Urban Planning and Department of Parks, Sport and Culture)
- Department of Agriculture, Conservation and the Environment
- Department of Water Affairs
- Mpumalanga Parks Board
- Lowveld Botanical Gardens
- H L Hall & Sons
- Croc River Reptile Park
- Planpractice Town and Regional Planners

3. PROJECT PURPOSES

The purpose of this project is:

- To ensure a safe, secure and sustainable green belt along the Crocodile River by conserving and improving the natural resource, reducing degradation and promoting urban quality and facilitating restoration where necessary.
- To provide developers and investors with general guidance on the environmental issues, which they may need to address in their applications or proposals to Council.
- To provide evaluation and performance criteria for the development activities involved.

The objectives of the project is:

- 1) Protect the natural environment
- 2) Promote the compatible development, maintenance and use of the area as a functional open space system
- 3) Promote ecologically, sensitive development through public private partnerships
- 4) Promote environmental education and awareness
- 5) Rehabilitate degraded natural areas
- 6) Promote Eco-Tourism and nature orientated recreation
- 7) Promote and improve safety and security

4. POLICY

It is constitutional, and in accordance to the new environmental legislation as well as the overall environmental management objective formulated for Nelspruit in terms of the Land Development Objectives, namely to "*development, implementation and promotion of environmental policies, regulations, standards and guidelines.*"

5. STATEMENT OF WORK

ACTIVITIES

The following activities have to be done in execution of the planning process:

- Demarcation of Area
- State of Environment Report
- Determine compatible land uses and activities
- Investigate legalities
- Determine need for specialist studies
- Public participation programme
- Determine organisational structures and arrangements for the ongoing management of the area
- Identify initial funding
- Compile a financial plan for operation and maintenance requirements
- Determine evaluation and monitoring criteria
- Develop integrated Environmental Management Programme

6. RESULTS OF THE PROJECT

The following results have to be achieved by the planning process:

- general guidelines on the environmental issues which must be addressed in future land development applications
- evaluation and performance criteria for the development activities
- establishment of organisational structures and arrangements for ongoing management of the area
- proclamation as "limited development area" in terms of Environmental Conservation Act (Act 73 of 1989)
- Policy guidelines

7. METHODS

- Participatory methods
- Information collection methods

8. TIME FRAMES

The following times frames are envisaged:

- 1 month to complete State of Environment Report
- 2 months to complete guideline documents and policy

- 3 months to proclaim area
- 6 months to develop an environmental management system
- 2 months to establish municipal by-laws

9. PERFORMANCE MILESTONES

The following are the fundamental milestones, which must be achieved in order to ensure the success of the project:

- 1) State of Environment Report
- 2) Creation of legal entity and organisational structures
- 3) "Spatial Development framework" for proposed land use activities
- 4) Environmental Management Programme

10. LEVELS OF AUTHORITY

The Crocodile River Greenbelt Steering Committee will be directly responsible to the Environmental Committee. The Department Urban Planning will be the project co-ordinator and will be responsible for feedback to the Town Council and all the relevant stakeholders.

11. REPORTING

The Crocodile River Greenbelt Steering Committee will meet once a month until project is completed and will report to the Environmental Committee at its meetings once a month.

12. REQUIRED COMPETENCE

The following skills or expertise will be required from the steering committee:

- Project management
- Town Planning
- Environmentalist
- Lawyer

13. BUDGET AND COSTS

The Nelspruit City Council will make available funding for immediate costs.

Additional funding will be requested via advertising the project in the local press for donations from the business community and other interested organisations as well as donations from overseas companies.

ADDENDUM D

CROCODILE RIVER GREENBELT INITIATIVE

Notice is hereby given that the workshop concerning the project, will be held on **21 SEPTEMBER 1999** at **10:00** in **ROOM 322, THIRD FLOOR, CIVIC CENTRE.**

PROGRAMME

10:00 – 10:15 OPENING, WELCOMING AND ATTENDANCE REGISTER

10:15 – 10:45 DISCUSSION: PROJECT BRIEF AND STATUS QUO INFORMATION

- Demarcation of Area
- Existing Land Uses
- Stakeholders
- State of Environment Report
- Proposed Land Uses and Activities

10:45 – 11:30 DISCUSSION: INSTITUTIONAL ARRANGEMENTS

- Terms of reference of steering committee
- Roles and responsibilities of key role players
- Legalities
- Public Participation

11:30 – 12:15 DISCUSSION: FORMULATION OF ACTION PLANS

- Determine Action Plans & Time frame
- Specialist Studies

12:15 – 12:45 LUNCH

12:45 – 13:30 DISCUSSION: RESOURCE AND FUNDING

- Immediate funding
- Available resources
- Identification of funders
- Financial Plan

13:30 – 14:00 DISCUSSION: WAY FORWARD & SUMMARIZE

...oooOooo...

ADDENDUM E

CROCODILE RIVER GREENBELT INITIATIVE

SCHEDULE

ROLES AND RESPONSIBILITIES OF KEY ROLE PLAYERS
AND TIME FRAME

ACTION	RESPONSIBLE DEPARTEMENT/ORGANISATION/ PERSON	LEVEL OF INVOLVEMENT	TIME FRAME
STATUS QUO INFORMATION			
Demarcation of Area	Department: Urban Planning Nelspruit City Council (L van Niekerk)	Compile Map	Already Completed
Identification of Adjacent Properties	Department: Urban Planning Nelspruit City Council (L van Niekerk)	Compile list & include the following: - Property description - Registered owner - Current land use - Zoning	Already Completed
State of Environment Report	Department: Parks, Sports and Culture (S Jones) Department: Urban Planning (S Oosthuizen) (L van Niekerk) Department of Water Affairs (F Combrinck) Department of Agriculture, Conservation and Environment (R Naidoo) Parks Board (K Zunckell, A Linström) Botanical Gardens (R Brits)	Action coordinator, expertise Administrative & technical assistance Technical Assistance, expertise and information Technical Assistance, expertise and information. Technical Assistance, expertise and information. Technical Assistance, expertise and information.	February 2000

ACTION	RESPONSIBLE DEPARTEMENT/ORGANISATION/ PERSON	LEVEL OF INVOLVEMENT	TIME FRAME
STATUS QUO INFORMATION			
Proposed land uses and activities	Department: Urban Planning Nelspruit City Council (S Oosthuizen) (L van Niekerk)	Action coordinator	February 2000
INSTITUTIONAL ARRANGEMENTS			
Terms of reference of steering committee & Roles and responsibilities of key role players	Department: Urban Planning (S Oosthuizen) (L van Niekerk) H L Hall & Sons (J Aling)	Action coordinator Assistance	30 November 1999
Public participation (Appoint facilitator)	Department: Urban Planning (inform land owners) Department: Parks, Sports and Culture (S Jones) H L Hall & Sons (J Aling)	Action coordinator Assistance	End of November 1999 Ongoing
Organisational structure	H L Hall & Sons (J Aling) Croc River Reptile Park (F Natividade) Legal Consultant	Action coordinator Assistance Review from legal point of view	Mid December 1999 (Draft framework)
Investigation of legalities	Planpractice Town and Regional Planners (H van Rensburg) – Draft document H L Hall & Sons (J Aling) Department Urban Planning (L van Niekerk)	Action coordinator Assistance Assistance Assistance	Mid December 1999

ACTION	RESPONSIBLE DEPARTEMENT/ORGANISATION/ PERSON	LEVEL OF INVOLVEMENT	TIME FRAME
FUNDING			
Immediate funding	Department: Urban Planning (S Oosthuizen) Department: Parks, Sports and Culture (S Jones)	Action coordinator Assistance	February 2000
Balance of funding issues	Department: Urban Planning (S Oosthuizen) Department: Parks, Sports and Culture (S Jones) H L Hall & Sons (J Aling)	Action coordinator Assistance Assistance Assistance	February 2000
REPORT TO COUNCIL			
Report to Nelspruit City Council: - Outcome of State of Environment Report - Draft document/policy - Land use proposals	Department: Urban Planning (L van Niekerk) Planpractice (H van Rensburg) Croc River Reptile Park (F Natividade)	Action coordinator Assistance Assistance	March 2000 (Council Resolution at the end of March)
MARKETING			
Press Release	Department: Parks, Sport & Culture (S Jones) Steering committee	Action coordinator Assistance and approval	Mid January 2000

Left

BIOMONITORING - RIPARIAN VEGETATION SITE SURVEY FORM

Ver. 3/08/99

RIVER: Crocodile Date: 18 / 02 / 2000 GUT SCORE 2/5

Site/Segt No: 3 Site Name: Pumpstation to Kama-gugu. LatLong: S: ° ' "

Assessor names(print): Johan Louw. E: ° ' "

CHANNEL DESCRIPTION (tick)

Type: Single Multiple: Braided Anabranching Mixed anabranching

Approximate total channel width (m) 120.

Score percentage of each (Where 0 - 0% 1 - <5% 2 - 5-25% 3 - 26-50% 4 - 51-75% 5 - 76-100%) Note: Total = 100%

Substrate: Bedrock 4 Rocks/cobbles Gravel / Sand 3 Sediment

RIPARIAN ZONE DESCRIPTION

* Width of potential riparian zone: LHB 25 (m) RHB 50 (m) Islands 20 (m)

Score percentage of each (Where 0 - 0% 1 - <5% 2 - 5-25% 3 - 26-50% 4 - 51-75% 5 - 76-100%) Note: Total = 100%

* Percentage of zone occupied by veg: LHB 100% RHB 100% Islands 100%

Reason(s) why less than 100% (list)

Substrate: Bedrock Rocks/cobbles Soil Gravel/Sand Sediment

Score (0/L/M/H)

* Growth form of vegetation: Trees M Shrubs L Forbs Reeds L Grasses L Sedges

Score (continuous - co; scattered - sc; clumped - cl)

Vegetation distribution: Trees cl Shrubs cl Forbs Reeds cl Grasses sc Sedges

* EXTENT OF GROUND COVER (percentage canopy cover for vegetation):

Cover: score (0-5: Where 0 - 0% 1 - <5% 2 - 5-25% 3 - 26-50% 4 - 51-75% 5 - 76-100%) Problem Score (0/L/M/H)

Bare ground: Reason/problem: Problem score:

Grasses: Reason/problem: Problem score:

Sedges: Reason/problem: Problem score:

Reeds: 2 Reason/problem: Invasion Problem score: L

Forbs: Reason/problem: Problem score:

Shrubs: 2 Reason/problem: lantana Problem Score: H

Trees: 2 Reason/problem: Jacaranda seringa Problem score: H

Silver oaks.

INVASION OF RIPARIAN ZONE

Score (0/L/M/H) Area invaded: banks, bed, islands, bars NB. Species listed in order of abundance

Exotics:

Species: lantana camara Score: M Area invaded Banks Invasive? Yes

Species: Solanum mauritanicum Score: M Area invaded Banks Invasive? Yes

Species: Ricinus communis Score: M Area invaded Banks Invasive? Yes

Species: Morus alba Score: L Area invaded Banks Invasive? NO

Species: Tithonia diversifolia Score: L Area invaded Banks Invasive? NO

Species: Tecoma stans Score: M Area invaded Banks Invasive? Yes

Species: Silver oaks. Score: L Area invaded Banks Invasive? NO

Species: Eucalyptus grandis Score: L Area invaded Banks Invasive? NO

Terrestrial: Species: Jacaranda mimosifolia. Score: L Area invaded Banks

Species: Melia azedarach Score: L Area invaded Banks

Species: Bsidium guava Score: L Area invaded Banks

Reeds: Species: Arundo donax Score: L Area invaded Banks + Islands.

Species: _____ Score: _____ Area invaded _____

DISTURBANCES WITHIN RIPARIAN ZONE Score (0/L/M/H)

Browsing & grazing: Grazing: _____ Browsing: _____ Trampling: _____ Animals: _____

Other disturbances: Road score M.

_____ score _____

_____ score _____

_____ score _____

SURROUNDING LAND-USE: (List)

Farming, Industrial, Suburbs

DOMINANT / TOP 5 SPECIES

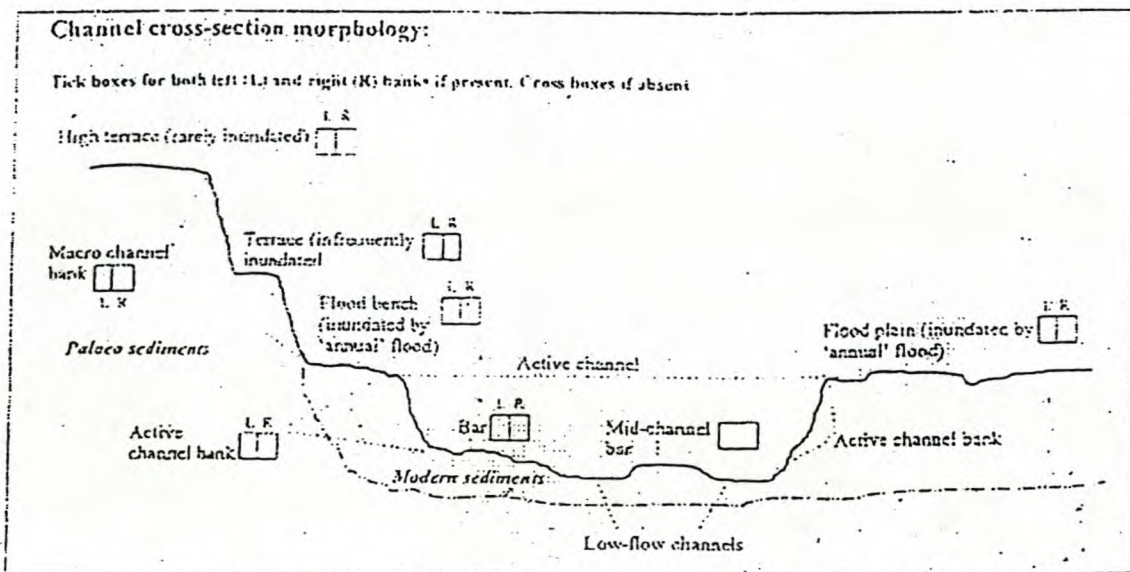
Score (0,L,M,H) for abundance of individuals in each height class per species

Note: Includes only woody species, reeds, and large forbs. NB: Exotics species are also included.

Order - refers to order of abundance of species and is only ordered after the dominant 5 have been listed.

Order	Species	Height class					
		<1m	1-2m	2-4m	4-8m	8-12m	12m+
1	<i>Bretonadia salicina</i>						X
2	<i>Ficus species</i>					X	
3	<i>Acacia karroo</i>				X		
4	<i>Acacia sieberiana</i>					X	
5	<i>Terminalia sericea</i>						X
6	<i>Dombeya rotundifolia</i>				X		
7	<i>Combretums</i>					X	
8	<i>Celtis africana</i>					X	

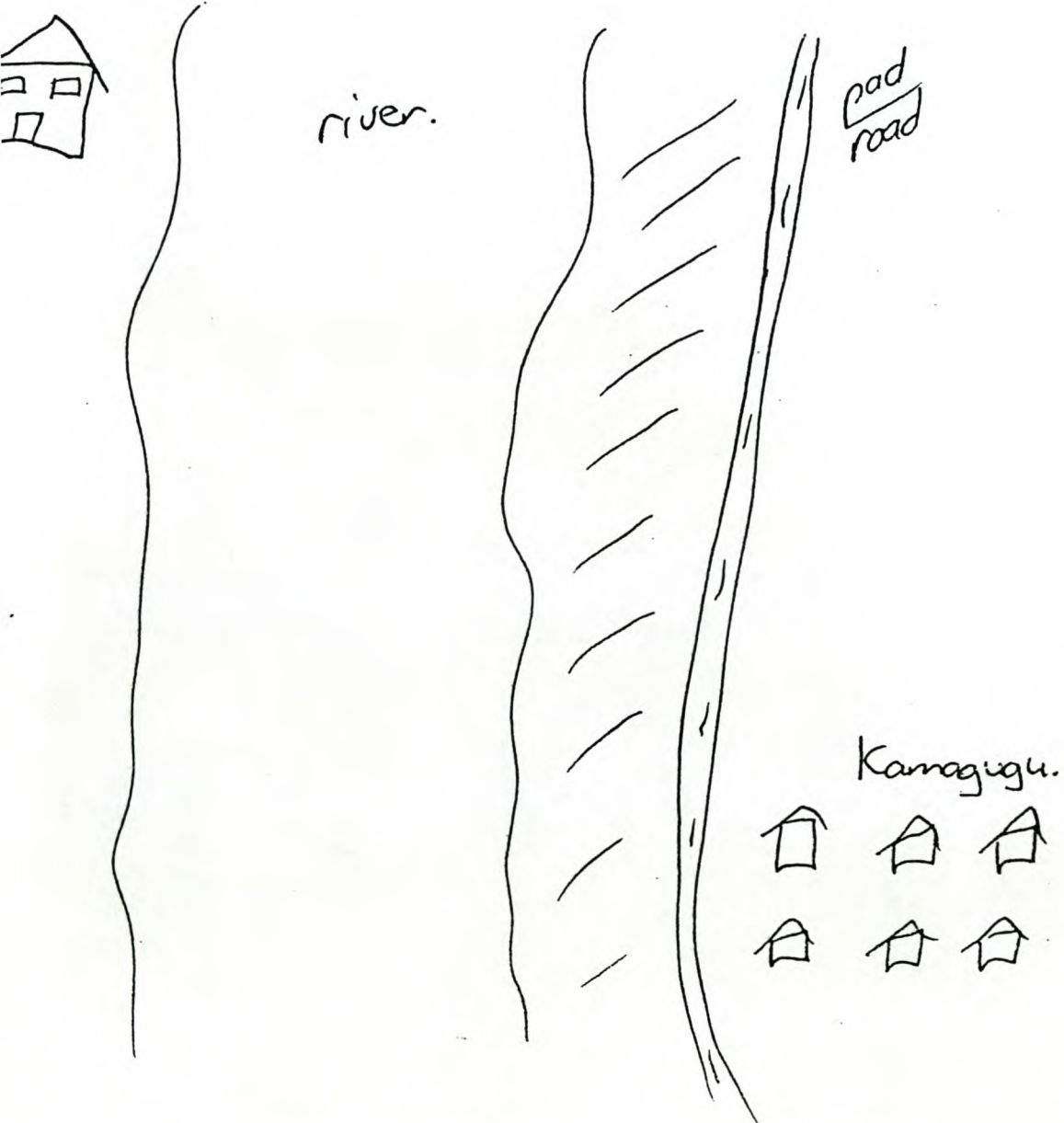
Approx. number of tree/shrub species present: 20



SITE MAP:

Hand drawn map including pertinent details of river course, direction of river flow, banks, vegetation communities/clumps, reference points, north arrow, infrastructure such as bridges, roads, fences. Point of access to site etc.

/// → left side -



ADDENDUM G

TOWN PLANNING AND CONTROL: PROPOSED DRAFT POLICY REGARDING THE CROCODILE RIVER GREENBELT AREA (15/3/1) (59495)

Comments of the Head: Urban Planning

---- The report attached as Annexure 368/00 was submitted to Council during July 1999.

Council at its meeting held on 26 July 1999 resolved in terms of Council Resolution A(39) that:

- (a) *Council adopts the draft framework for the policy regarding the Crocodile River Greenbelt Area, as contained in annexure 063/99;*
- (b) *the proposed Crocodile River Greenbelt policy be compatible with the Environmental Policy that is being developed for the Greater Nelspruit;*
- (c) *a Project Steering and Planning Committee, consisting of stakeholders and other sectors, according to the discretion of the Head: Urban Planning, be established;*
- (d) *the sale and future development of Oewersig Club, Erf 27 Vintonia Extension 2 be handled as a pilot project that can be embarked upon in conjunction with the formulation of the policy framework mentioned in (a) above.*

It was identified that Council in conjunction with the private sector need to develop a sustainable and integrated environmental policy for the Crocodile River Area. The purpose of the policy is to ensure a safe, secure and sustainable green belt along the Crocodile River Area by conserving and improving the natural resource, reducing degradation and promoting urban quality and facilitating restoration where necessary. The proposed policy it to provide developers and investors with general guidance on the environmental issues, which they may need to address in their applications or proposals to Council.

A steering committee was established during August 1999 that consists of a few important role players, inter alia the Department of Agriculture, Conservation and Environment, Mpumalanga Parks Board, the Lowveld Botanical Gardens, H L Hall & Sons, CrocRiver Enviro Park and the relevant council departments.

All adjacent landowners to the Crocodile River Area were also identified as important stakeholders. They were informed regarding the initiative and their input and comments on the proposed development were obtained.

A working group compiled a State of Environment Report. Information regarding the environmental quality of the Crocodile River Area was obtained and the area was categorised into zones varying from poor to very good environmental quality, based on soil types, vegetation types and disturbances.

A preliminary legal investigation indicated that the environmental benefits of declaring an area a limited development area in terms of the Environmental Conservation Act (Act 73 of 1989) are obvious. It was identified that if a fully inclusive process is followed prior to a limited development area being declared, and all relevant issues have been discussed and thrashed out, a limited development area for the Crocodile River Area can have a positive affect on the management of the area, such as promoting the harmonious interaction between people and the environment and creating the potential for the area to be developed for educational, recreation, inspirational and conservation purposes.

With regard to the organisational structure, two organisations are proposed, namely an Association or Trust that would be the umbrella organisation of the Crocodile River Area and a company that would manage the organisational aspects pertaining to the Crocodile River Greenbelt Area.

---- The proposed draft policy is attached as Annexure 369/00. It contains a more detailed elaboration of the planning framework, the state of environment report and proposals identified in the Integrated Spatial Development Framework for the Western Nelspruit Development Zone. It provides the basis for the Council to evaluate development proposals for the Crocodile River Greenbelt Area. This conservation area will allow for minimum development and will form a reference for taking informed decisions on matters and new developments, which may have an environmental impact on this important conservation and eco-tourism resource.

---- Maps concerning the proposed Crocodile River Greenbelt Area will be tabled during the meeting.

Detailed Environmental Impact Assessments must be compiled for certain developments according to the criteria and conditions of Council's newly established guidelines with regard to EIA's.

This department therefore recommends that Council approve the proposed policy. This policy is however not a final statement of development but rather a statement of intent. Potential developers and investors will have to submit detailed proposals and site development plans that will provide the basis for more detailed control of individual buildings and activities.

Council also received proposals from developers intending to develop in the Crocodile River Greenbelt Area. It is recommended that the proposals, which are in line with the policy, be approved in principle and that final approval be granted after the detailed site development plans and the necessary EIA's have been approved.

In order to ensure effective future environmental management of the proposed Crocodile River Area, this department recommends that an information system that integrates the tourism, development and environmental elements of the Crocodile River Greenbelt Development be created and that it be developed into a single management system (user-friendly GIS database).

RECOMMENDATION BY THE CHIEF EXECUTIVE/TOWN CLERK

THAT

- (a) Council approves the Draft Crocodile River Greenbelt Policy attached as Annexure 369/00;

- (b) potential developers and investors in the Crocodile River Greenbelt Area submit detailed proposals and site development plans for approval;
- (c) development proposals which Council already received and which are in line with the policy, be approved in principle, subject to (b);
- (d) the necessary Environmental Impact Assessments be compiled according to the criteria and conditions of Council's recently established guidelines with regard to EIA's
- (e) an information system that integrates the tourism, development and environmental elements of the Crocodile River Greenbelt Development be created and that it be developed into a single management system (user-friendly GIS database);
- (f) Council's legal advisor together with the steering committee for the project proceeds with the setting up of the proposed organisational structure for the proposed Crocodile River Greenbelt Area.

LVN/lvn (S2940)
06.07.2000