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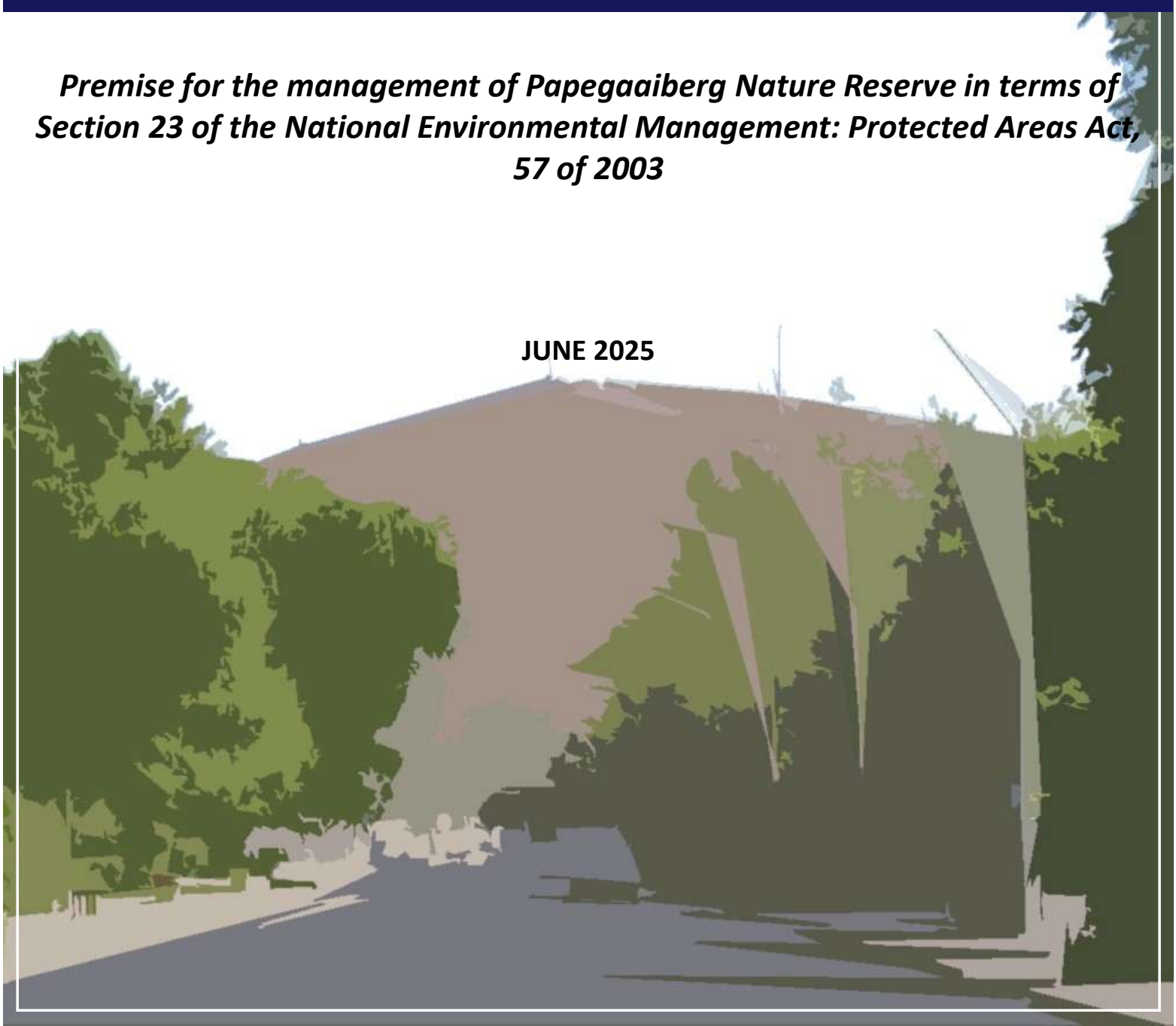
PAPEGAAIBERG

NATURE RESERVE

ENVIRONMENTAL MANAGEMENT PLAN

Premise for the management of Papegaaiberg Nature Reserve in terms of Section 23 of the National Environmental Management: Protected Areas Act, 57 of 2003

JUNE 2025



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The Environmental Management Plan for the Papegaaiberg Nature Reserve is a review of the 2011 Environmental Management Plan submitted and adopted as part of the process of declaring Papegaaiberg a Nature Reserve in terms of the National Environmental Management: Protected Areas Act (57 of 2003).

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1. BACKGROUND

This Environmental Management Plan (EMP) is a review of the 2011 Papegaaiberg Nature Reserve EMP submitted and adopted as part of the process of declaring Papegaaiberg a Nature Reserve (NR) in terms of the National Environmental Management: Protected Areas Act (57 of 2003).

1.1 PURPOSE

The purpose of the Papegaaiberg NR EMP is to:

- Provide a strategic tool for management of Papegaaiberg NR, informing the need for specific programs and operational procedures.
- Provide for capacity building, future thinking and continuity of management of Papegaaiberg NR.
- Enable Stellenbosch Municipality to manage Papegaaiberg NR in such a way that its values and the purpose for which it has been established are protected.

1.2 STRUCTURE

Section 1:	Introduction and background to Papegaaiberg NR and the EMP.
Section 2:	Vision and objectives for the management of Papegaaiberg NR.
Section 3:	Context and description of the biodiversity of Papegaaiberg NR.
Section 4:	Zonation of Papegaaiberg NR.
Section 5:	Description of the administrative structure established for the management of Papegaaiberg NR.
Section 6:	Operational Management Framework.
Section 7:	Annual Plan of Operation.

1.3 ADAPTIVE MANAGEMENT

The principles of adaptive management form the basis of the preparation of this EMP. Adaptive management is a structured, iterative process in which decisions are made using the best available information, with the aim of obtaining better information through monitoring of performance (Figure 1). In this way, decision making is aimed at achieving the best outcome based on current understanding, whilst accruing the information needed to improve future management. Adaptive management can lead to revision of a part or, if necessary, the whole management plan.

Adaptive management enables landowners and managers to:

i) Learn through experience.
ii) Take account of, and respond to, changing factors that affect the biodiversity stewardship site.
iii) Develop or refine management processes.
iv) Adopt best practices and new innovations in biodiversity conservation management.
v) Demonstrate that management is appropriate and effective.

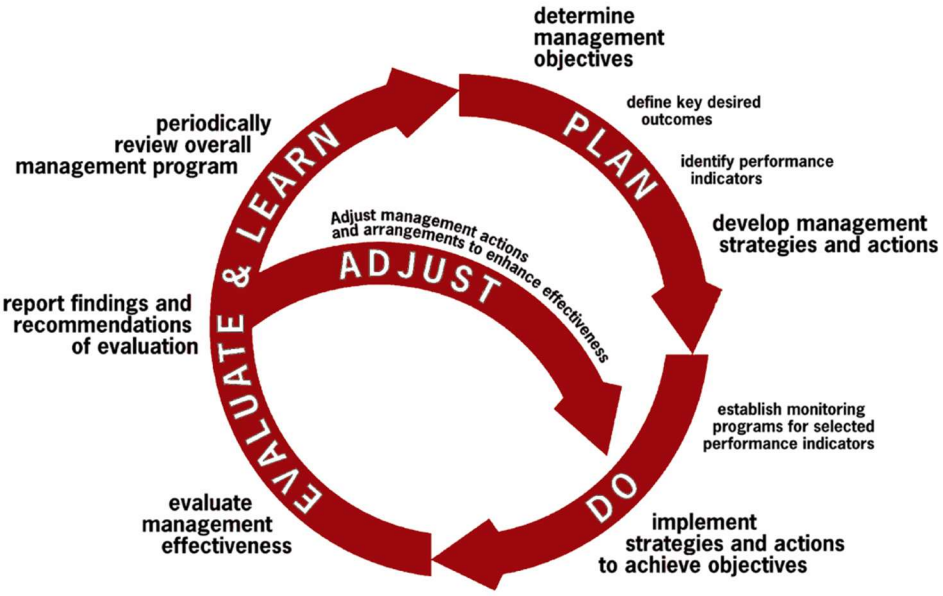

Figure 1: Adaptive Management Cycle (Management Strategy Evaluation, 2009).

1.4 INTRODUCTION

Papegaaiberg NR falls within the Stellenbosch Municipality, located within the town of Stellenbosch (Figure 2).

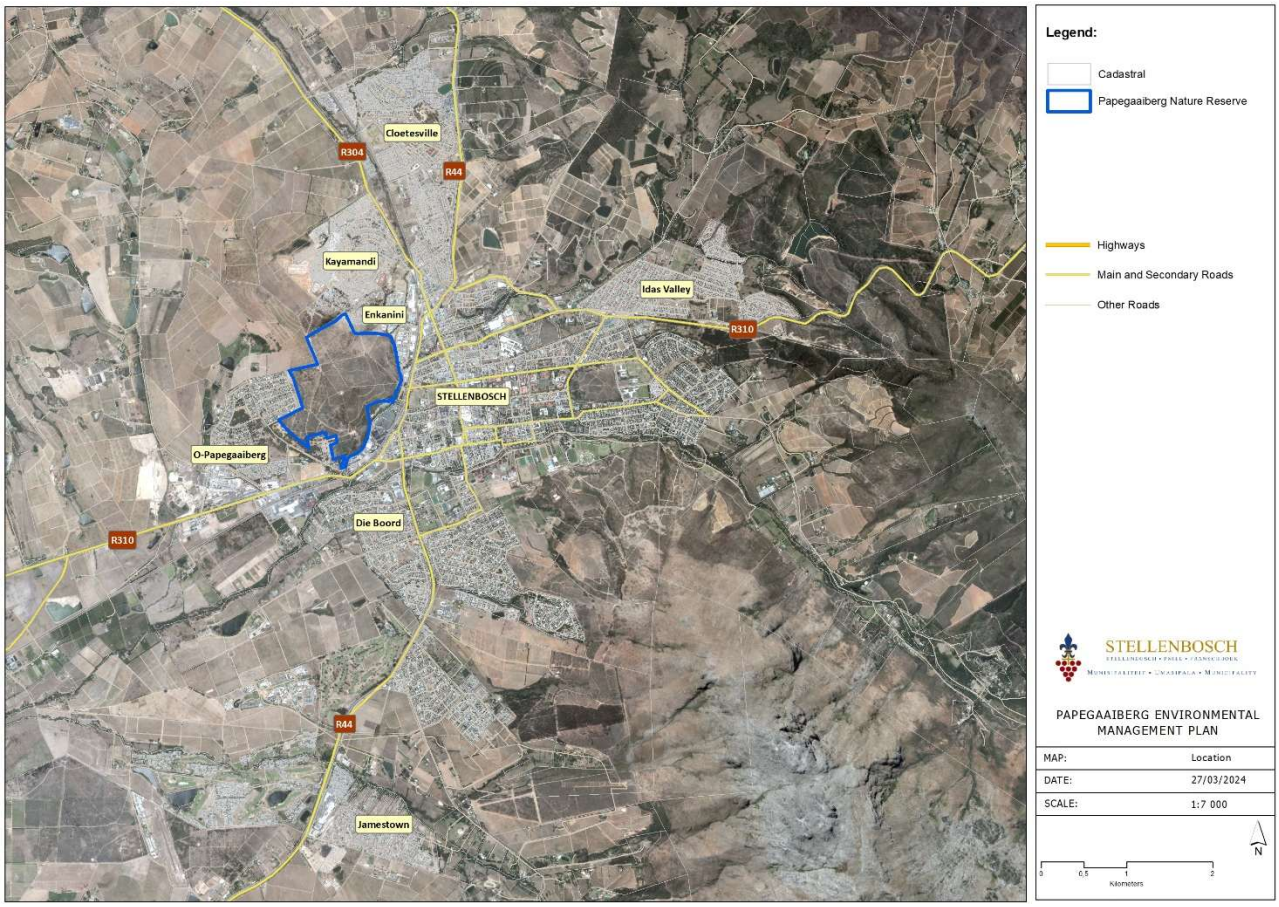

Figure 2: Local context of Papegaaiberg NR.

Papegaaiberg NR is bordered in the west by the Onder-Papegaaiberg residential area and the farm Middelvlei. Kayamandi and Enkanini forms the northern boundary while the industrial areas of Plankenbrug, Distell cellars, the Bergkelder, Bosman's Crossing and Oudemolen collectively form the eastern boundary of the NR. The Stellenbosch cemetery and Oude Libertas forms the southern boundary.

Papegaaiberg NR forms part of the Cape Winelands Biosphere Reserve (Figure 3) which was approved by UNESCO (United Nations Educational, Scientific and Cultural Organisation) and included in the World Network of Biosphere Reserve. The NR is located in the designated buffer area of the biosphere reserve forming vital linkages with *bona fide* conservation areas and, as is the case with Papegaaiberg NR, as stand-alone habitats and places of cultural value.

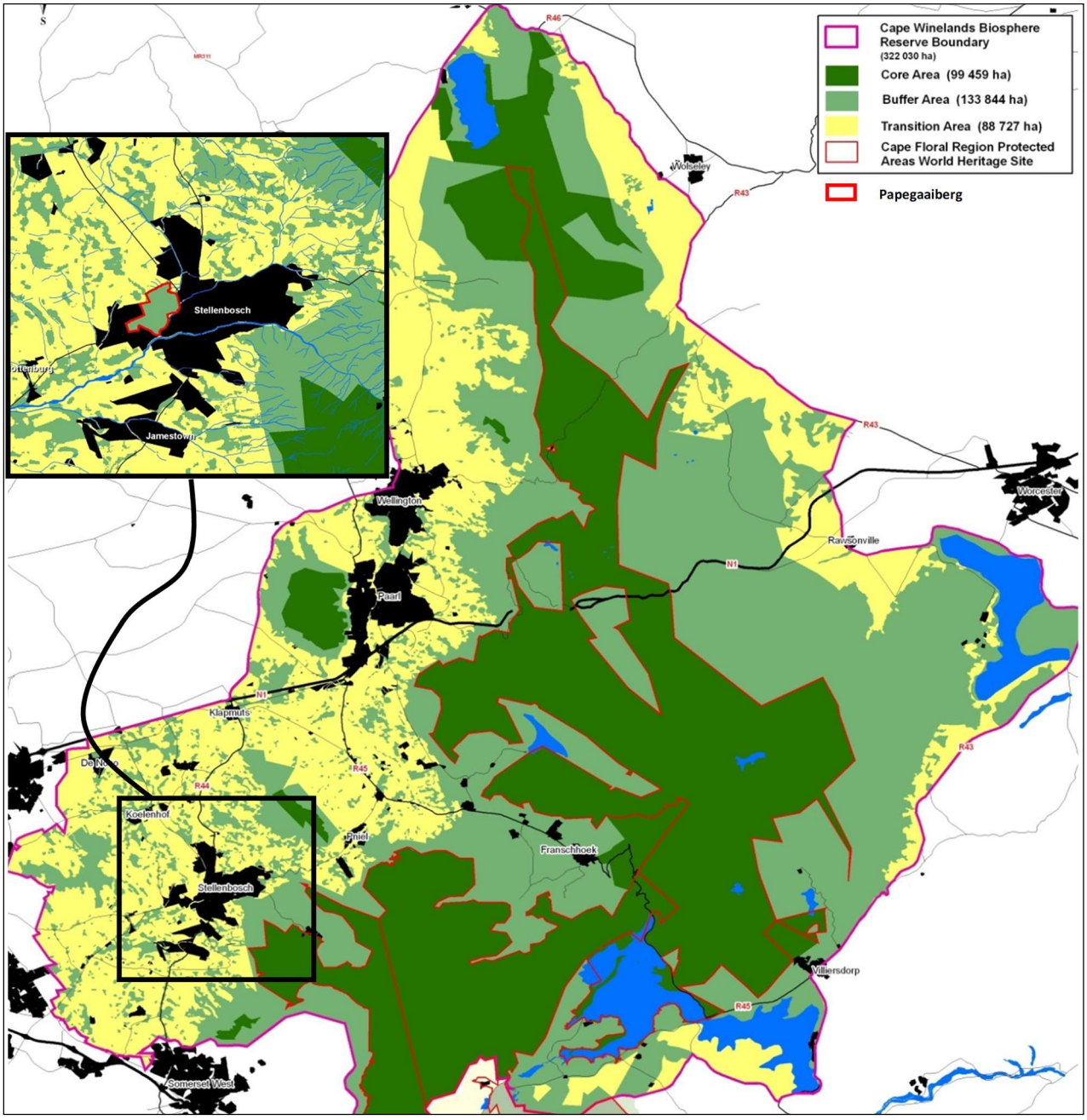

Figure 3: Papegaaiberg NR in context of the Cape Winelands Biosphere Reserve.

Papegaaiberg NR consists of an area of approximately 140 ha which comprises portions of four cadastral units indicated in Table 1 below and depicted by Figure 4. Papegaaiberg NR is partially fenced off, contains an ESKOM servitude, reservoir, water supply pipelines, telecommunication infrastructure and a system of internal roads.

Table 1: Papegaaiberg NR cadastral details.

Cadastral Unit	Zoning	Owner	Title Deed Nr
175/5	Local Authority	Municipality	
175/33	Local Authority	Municipality	
181	Agriculture Zone I	Municipality	T7723/940
183	Agriculture Zone I	Municipality	T10519/1927

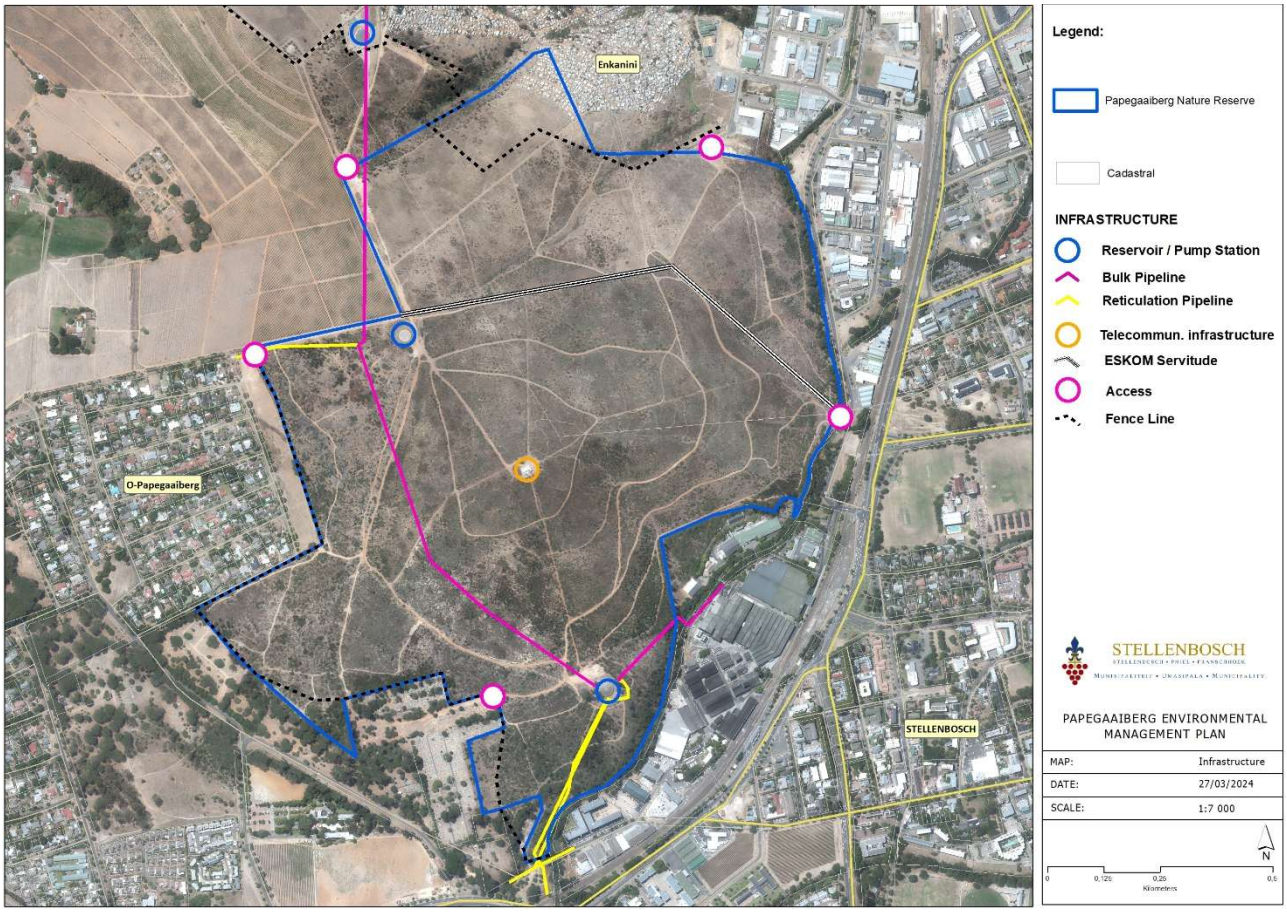

Figure 4: Cadastral boundaries and infrastructure of Papegaaiberg NR.

Papegaaiberg NR forms part of a system of *de jure* and *de facto* protected nature areas that collectively form the core and buffer areas of the Cape Winelands Biosphere Reserve. This system is based upon the principle that a system of protected areas is a key element of any strategy to maintain biodiversity and ecosystem functions on a larger regional scale. It is imperative that such a system be designed and managed to represent and protect the diversity of ecological processes, communities, species and gene pools (Global Biodiversity Strategy, 1992).

Various protected areas are found in the proximity of Papegaaiberg NR, include the Koopmanskloof Private NR, Jan Marais NR, Jonkershoek Conservancy, Bottelary Hills Renosterveld Conservancy, Hottentots-Holland NR and Simonsberg NR.

Rivers are of immense importance as part of the system of protected nature areas. This is largely due to their function as ecological corridors that link the various core conservation areas (refer to Figure 5). The Plankenbrug River forms the eastern boundary of Papegaaiberg NR.

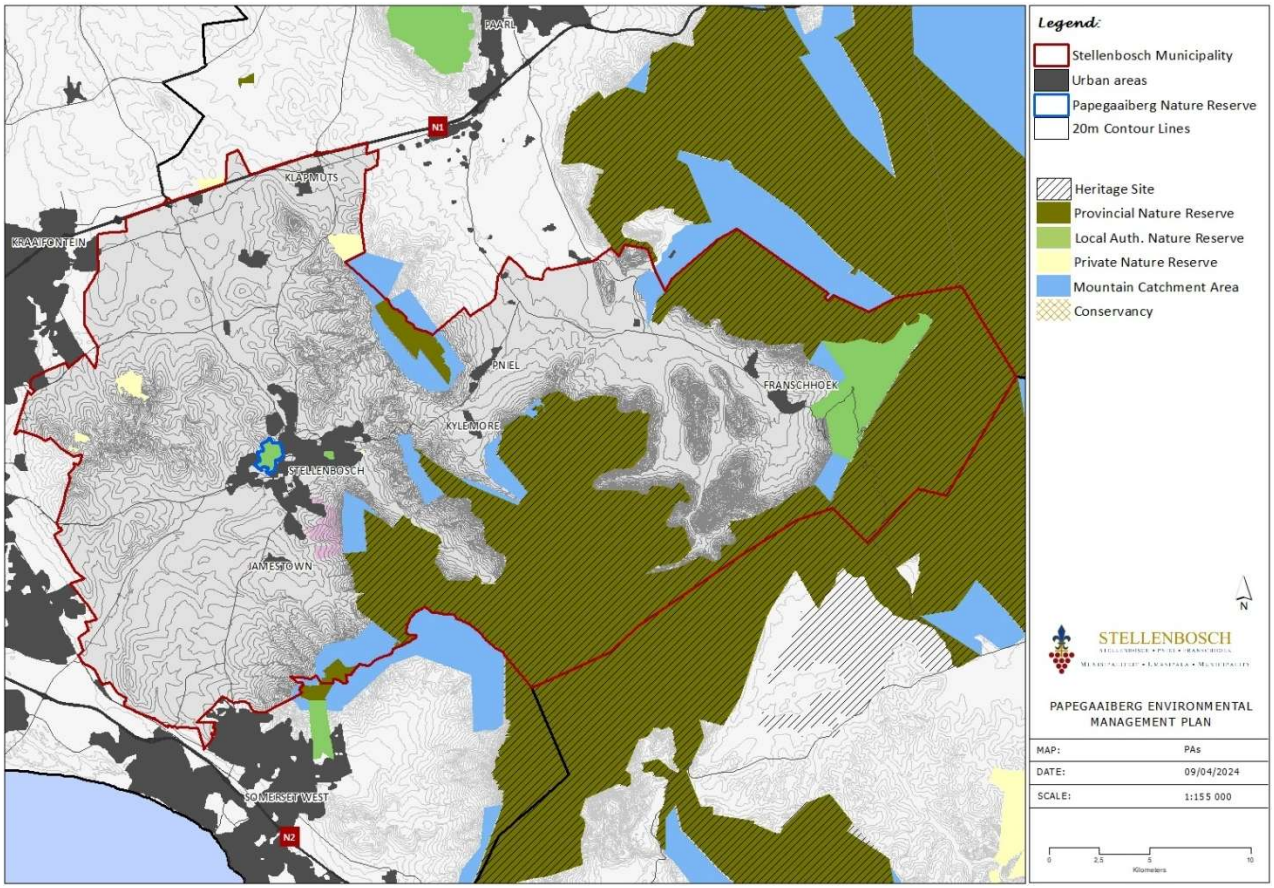

Figure 5: Papegaaiberg NR in context of surrounding protected areas.

1.5 PAPEGAAIBERG NATURE RESERVE VALUES

The values of a site are those attributes that has led to it being identified for formal conservation. The values are important in planning and management, as they are the aspects of the place that must be protected. The values of Papegaaiberg NR are listed in Table 2.

Table 2: Values of Papegaaiberg NR.

Natural	The area contains remnants of critically endangered Swartland Shale- and Swartland Granite Renosterveld.
Ecosystem Services	Papegaaiberg NR drains surface water towards the Plankenbrug River. As a long portion of the Plankenbrug River runs along the eastern boundary of the NR, it plays an important role in the dilution of pollutants in the Plankenbrug River.
Eco-Tourism	The area serves a recreational space for the surrounding areas.
Cultural / Historic	Papegaaiberg NR is of historical significance and forms an important part of Stellenbosch town's landscape and local psyche.

1.6 MANAGEMENT CHALLENGES AND OPPORTUNITIES

Papegaaiberg NR have been severely impacted upon by historic land-uses and current peripheral developments, with particular reference to the former forestry activities that have been phased out and informal settlements along its northern boundary. These activities resulted in:

(i) A number of security related challenges in the area.
(ii) Encroachment of informal residential structures into the NR.
(iii) Illegal farming within the boundaries of the NR.
(iv) Habitat fragmentation and degradation.
(v) Local extinction of species.
(vi) General loss of biodiversity.
(vii) Increased sheet erosion.

These, and other threats to the NR, are listed below.

Table 3: Papegaaiberg Nature Reserve Management Challenges.

Key Performance Area	Challenges
Urban Sprawl / Expansion	Papegaaiberg NR is located within the urban area of Stellenbosch. Urban sprawl, especially from the informal residential area of Enkanini, is a constant threat to the boundary and security of the NR.
Illegal Land Use	Illegal land use, in the form of informal structures and farming, is a risk to the NR.
Fire	Fire is a risk to the area. This is mainly due to its location within an urban area, its accessibility and location bordering an informal area.
Crime / Security (uncontrolled access)	Uncontrolled access and the occurrence of crime on Papegaaiberg have left the surrounding community with the perception that Papegaaiberg is not safe for recreational use. This is arguable the main threat to the NR becoming the recreational and educational asset it is intended to become.
Pollution	The Plankenbrug River flows along the foothill of Papegaaiberg and below Kayamandi. It flows through the Plankenbrug Industrial Park and into the Eerste River at the Adam Tas railway bridge. This river is heavily polluted and is regarded as a potential hazard to human health and negatively influences the Eerste River. The Plankenbrug River is one of the important ecological corridors of Stellenbosch and adds to the biodiversity of the bioregion as a whole and visual quality of the landscape.
Invasive Vegetation	The infestation of alien plant species poses a significant threat to the ecology and visual quality of Papegaaiberg. The alien vegetation has resulted in a modified floral composition which is conducive to high-intensity fires. In turn, these are immensely disruptive to the ecology of fynbos and ecosystem processes.
Erosion	Papegaaiberg NR's topography makes the area prone to erosion.
Legal Compliance	The constant pressure (noted above) on Papegaaiberg NR's boundary poses challenges for Stellenbosch Municipality, as Management Authority of the NR, to maintain legal compliance in the management thereof.
Infrastructure / Development of tourism opportunities	Uncontrolled access to the area, vandalism and crime makes the provision and maintenance of infrastructure in Papegaaiberg NR a challenge.

2. STRATEGIC MANAGEMENT FRAMEWORK

Through the EMP, the vision, goals and objectives of the Municipality for Papegaaiberg NR are given effect in context of the relevant legislation and associated regulations. Accordingly, the primary aims of the EMP include the following:

a) Facilitating the rehabilitation and long-term conservation of Papegaaiberg NR in a manner which is consistent with the objectives of NEM:PA.
b) Rehabilitation and long-term protection of the NR as a valuable cultural- and natural heritage site.
c) Promotion of a conservation ethos in the minds of the people of the area and the general public with the objective to create a shared responsibility to maintain the health, diversity and productivity of the NR in a spirit of stewardship and caring.
d) Implementation of management practices that will benefit current and future generations and will honour applicable obligations and undertakings at all levels of society.
e) Provision of sustainable outdoor recreational opportunities in the NR.
f) Ensuring that future growth and development proposals for Stellenbosch are compatible with the vision, goals and objectives for the NR and its associated ecological corridors.

The EMP assigns responsibility for management intervention within the NR, schedules such intervention and quantifies the cost associated with such intervention. In so doing, this document aims to be a mechanism whereby management intervention can be monitored and audited.

2.1 PURPOSE, VISION AND GOALS

2.1.1 Purpose

The purpose declaring areas as protected areas, as per Chapter 3, Section 17 of NEM:PA, are to:

(a) Protect ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes in a system of protected areas;
(b) Preserve the ecological integrity of those areas;
(c) Conserve biodiversity in those areas;
(d) Protect areas representative of all ecosystems, habitats and species naturally occurring in South Africa;
(e) Protect South Africa's threatened or rare species;
(f) Protect an area which is vulnerable or ecologically sensitive;
(g) Assist in ensuring the sustained supply of environmental goods and services;
(h) Provide for the sustainable use of natural and biological resources;
(i) Create or augment destinations for nature-based tourism;
(j) Manage the interrelationship between natural environmental biodiversity, human settlement and economic development;
(k) Contribute to human, social, cultural, spiritual and economic development; or
(l) Rehabilitate and restore degraded ecosystems and promote the recovery of endangered and vulnerable species.

Papegaaiberg is located in the Cape Floral Kingdom, an area of global biodiversity significance. The NR will conserve a unique combination of habitats, ecosystems and species. In conserving this unique biodiversity secondary objectives will include the conservation of Critically Endangered Swartland Shale Renosterveld and Swartland Granite Renosterveld.

2.1.2 Vision

The overriding mission of the IUCN[1] was adopted as a fundamental guideline in the formulation of the vision, goals and objectives for the nature reserve, namely:

a) *'The maintenance of essential ecological processes, the preservation of genetic diversity and the insurance of the sustainable utilisation of species and ecosystems that can only be achieved by the conservation of essential habitats and not individual species'.*

b) '*The management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations*' (IUCN, 1980).

In order to balance the conservation requirements of Papegaaiberg NR with the aspirations of the stakeholders and the identified place-specific environmental, social and economic constraints, the following vision was set for the nature reserve:

To restore and protect Papegaaiberg Nature Reserve as a safe and functional natural and cultural heritage that is supported by all concerned for its community-supporting functions.

2.1.3 Over-Arching Goal

The over-arching goal of the NR is to contribute towards environmental sustainability and the conservation of biodiversity as a prerequisite for the latter. The EMP builds on the recognition that for biodiversity conservation to succeed, the maintenance of environmental integrity (as defined by ecological, economic and social criteria) must be one of the primary determinants of land-use planning and the management.

The EMP supports the notion that sustainability, under present circumstances, cannot be achieved without any form of management intervention and that such investment has to be financed to a significant extent. Accordingly, sustainable development projects undertaken in the proximity of the nature reserve should ideally contribute towards the required financing of management activities in a spirit of partnership.

The CSIR (2002) states that sustainable development should *improve the state of any given situation.* Sustainable development requires a long-term, integrated, systems approach pertaining to economic, environmental, and social issues. Fostering a strong sense of community and building partnerships and consensus among key stakeholders are important elements of sustainable development (CSIR, 2002). The IUCN[2] defined sustainable development as '*development that meets the needs of the present generations without compromising the ability of future generations to meet their own needs*'.

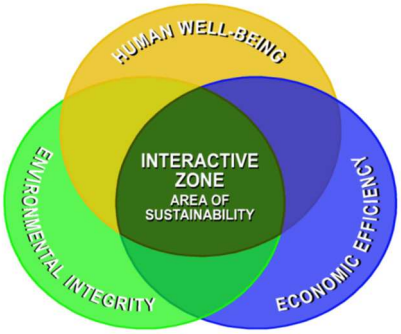

Figure 6: The interactive model of sustainability (Adapted from Mebratu, 1998).

[1] International Union for Conservation of Nature.

[2] International Union for the Conservation of Nature.

The International Institute for Sustainable Development (IISD) (1995) states that sustainable development occurs at the intersection of three global imperatives, namely *human well-being, environmental integrity* and *economic efficiency*. The interactive model of sustainability illustrates that sustainable development occurs where the three imperatives interact within an 'interactive zone' (refer to Figure 6). Development outside this 'interactive zone' will not be sustainable. Mebratu (1998).[3] The EMP builds on the following understanding of the three global imperatives:

2.1.3.1 Human Well-Being

Human well-being[4] refers to both *material* and *spiritual* well-being. Material well-being refers to the absence of poverty. Spiritual well-being *inter alia* refers to the absence of inequality and being in a position to obtain new powers, emotionally, intellectually and physically and to be able to play a meaningful role in promoting and achieving sustainable development. It is recognised that Papegaaiberg NR has a significant and impact on the well-being of the people of Stellenbosch in terms of a number of important aspects.

2.1.3.2 Environmental Integrity

Environmental integrity refers to the relative '*wholeness'* of the environment. 'Environment' is defined as the aggregate of all external conditions and influences affecting the life of an organism. In particular, 'environment' refers to the surroundings within which humans exist and that are made up of:

a) the land, water and atmosphere of the earth;
b) micro-organisms, plant and animal life;
c) any part or combination of (a) and (b) and the interrelationships among and between them; and
d) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental integrity is determined by the *value* of the environment or place (natural or human-made), with specific reference to its intrinsic, systemic, and/or instrumental value. The EMP builds on the recognition that the human-made environment is located within and 'contained' by the natural environment. The manner in which human settlements are developed, therefore, has an immense impact on the quality and integrity of the environment as a totality. It is therefore imperative that the human-made environment be planned, designed and developed in a manner that will ensure the maintenance of the values referred to above (i.e. intrinsic, systemic, and/or instrumental value). From a natural environmental perspective, ecological integrity is a key factor in the sustainable development equation. Ecological integrity *inter alia* requires that biodiversity is protected and essential ecological processes and services (e.g. water yield and quality, soil conservation, decomposition, etc.) are maintained. *Environmental health* is the key to sustainable development. The primary threat to environmental health is fragmentation of community-

[3] Mebratu, D. 1998: Sustainability and sustainable development: Historical and conceptual overview. *Environmental Impact Assessment and Review*, 18:493-520.

[4] Human wellbeing encompasses the overall state of a person's physical, mental, emotional and social health, including their sense of happiness, life satisfaction and ability to function well in daily life. It's a holistic concept that considers both subjective experiences like happiness and objective factors like physical health and social connections.

supporting ecosystems. Fragmentation generally leads to a cycle of environmental degradation, which subsequently influences the well-being of the dependent communities.

2.2.3.3 Economic Efficiency

Economic efficiency is understood as *the optimisation of benefit at the lowest cost*. It includes the innovative and efficient use of available resources. The nature reserve is an important public resource that has to be protected for the benefit of all concerned and in terms of best-practice.

2.2. OBJECTIVES

The objectives that follow are intended to provide the basis for the achievement of the vision. Table 4 sets out the key performance areas, the objective for each key performance area and the key deliverables required to realise the objectives.

Table 4: Objectives and deliverables for the management of Papegaaiberg NR.

Key Performance Area	Objective	Key Deliverable
Biodiversity Management		
Fire management	Ensure conservation of species and natural processes by maintaining and improving ecosystem functioning. Allow for natural fire processes to occur without impacting on safety and infrastructure. Implement effective Integrated catchment management.	Reduce/prevent the spread of fire. Maintain partnerships to improve fire management. Reduce wildfires due to human negligence and implement an ecological burn programme.
Invasive vegetation management	Enhance biodiversity protection and conservation. Ensure conservation of species and natural processes by maintaining and improving ecosystem functioning.	Eradicate alien and invasive species. Prevent further introduction of aliens.
Wildlife management	Ensure effective conservation of species and natural processes by maintaining and improving ecosystem functioning. Enhance biodiversity protection and conservation.	Prevent the introduction of alien fauna species. Control invasive alien fauna. Manage the introduction of fauna on the reserve. Evaluate and monitor impact of fauna on the reserve.
Erosion prevention and control	Ensure implementation of effective conservation management interventions.	Prevent and mitigate soil erosion.

	Enhance biodiversity protection and conservation.	
Biodiversity security	Enhance biodiversity protection and conservation. Ensure conservation of species and processes by maintaining and improving ecosystem functioning.	Improved security and safety of the biodiversity assets on the NR.
Water Management	Ensure the implementation of effective conservation management interventions. Enhance biodiversity protection and conservation.	Remove all forms of pollution and invasive vegetation.
Development		
Development of tourism opportunities	Evaluate potential tourism opportunities. Implement effective management systems. Ensure legal compliance and implementation of authorised development plans.	
Operational Management		
Legal compliance	Ensure legal compliance to all relevant legislation and policies.	Ensure that all legal requirements are met.
Access control	Ensure legal use of the NR.	Control access to the NR.
Security	Ensure legal use of the NR. Prevent all forms of illegal encroachment into the NR.	
Management effectiveness	Implement effective management systems.	Conduct annual audits. Auditing systems inform management and management plan revision.
Infrastructure	Ensure the implementation of effective conservation management interventions. Enhance biodiversity protection and conservation. Ensure conservation of species and processes by maintaining and improving ecosystem functioning.	All infrastructure on the reserve is adequately maintained.

3. DESCRIPTION OF PAPEGAAIBERG NATURE RESERVE AND ITS CONTEXT

3.1 THE LEGISLATIVE BASIS FOR THE MANAGEMENT OF PAPEGAAIBERG NATURE RESERVE

There is a large body of legislation that is relevant to the management of Papegaaiberg NR, but the primary legislation guiding the management of protected areas is the National Environmental Management: Protected Areas Act (57 of 2003) (NEM:PA). NEM:PA establishes the legal basis for the creation and administration of protected areas in South Africa, as its objectives include provisions "for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes". NEM:PA sets out the mechanisms for the declaration of protected areas and the requirements for their management.

3.1.1 Proclamation status

Papegaaiberg NR is proclaimed (June 2016) under Section 23(1) of the Act (Annexure 1).

3.1.2 Invasive Species Control

In terms of Section 76 of the National Environmental Management: Biodiversity Act (10 of 2004), the management authority of a protected area must incorporate an invasive species control plan in the protected area management plan. This is addressed in Section 6.1.2 below.

3.2 REGIONAL AND LOCAL PLANNING CONTEXT OF PAPEGAAIBERG NATURE RESERVE

The EMP is based upon and gives effect to a dedicated environmental management policy which is defined as *'a statement by the organisation* (i.e. the Management Authority) *of its intentions and principles in relation to its overall environmental performance, which provides a framework for action and for the setting of objectives and targets'* (SABS ISO 14004:1996{E}). This section documents the environmental management policy that will guide all management activities to be undertaken on the NR. The primary policy statements are as follows:

a) Cape Winelands Biosphere Reserve inter-governmental agreements: The NR, as part of the Cape Winelands Biosphere Reserve, will be managed in compliance with the applicable inter-governmental agreements upon which the Cape Winelands Biosphere Reserve is based.
b) Planning and management context: Management of the NR will be undertaken in context of all applicable levels of planning.
c) Biodiversity conservation: Biodiversity is an imperative for environmental sustainability. A key objective in the management of the NR is to ensure that biodiversity in the study area is protected and enhanced.
d) Papegaaiberg NR is an important part of a system of protected areas: The NR is to be managed as part of a system of protected areas.
e) Papegaaiberg NR is a public resource: The NR is a public resource and should be available for the sustainable use of the entire community.
f) The concept of adaptive management forms the basis of all management activities: Management strategies are to comply with international best practice and must embody the concept of adaptive management and continual improvement.

In the chapters below the above primary policy statements are addressed more comprehensively and guidelines are provided as to how to comply with these.

3.3 PLANNING AND MANAGEMENT CONTEXT

The Municipality has directed that the bioregional planning approach advocated by the Provincial Government of the Western Cape through its Bioregional Planning Policy and comprehensively described in the *Manual for application of Bioregional Planning in the Western Cape* (PGWC, 2003) be adopted in municipal planning projects.

The Municipality recognises that one of the critical determinants of the success of an EMP planned in term of the bioregional planning approach is the extent to which all spheres of government co-operate and co-ordinate their activities as it relates to the subject area (in this case, the Papegaaiberg NR). This EMP therefore gives effect to the requirement that the planning and management of land units such as the nature reserve should be undertaken within the context of distinct levels, namely the *international level, national level, provincial level, regional level* and the *local level.* Figure 7 indicates the various planning levels and the aspects addressed under each level in this EMP.

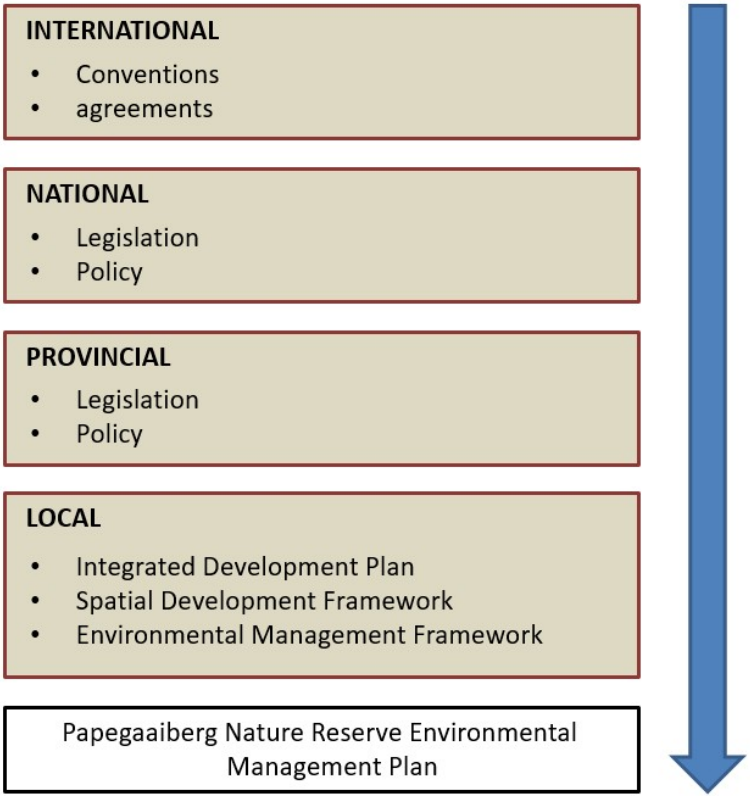

Figure 7: Planning levels applicable to the Papegaaiberg Nature Reserve EMP.

Effective integrated planning at these levels requires innovative forms of institutional integration and social co-operation. Dialogue amongst all stakeholders, participatory planning and institutional flexibility are, therefore, essential to plan and manage effectively.

The NR responds to the international protocols and conventions of which South Africa and, consequently, all lower spheres government are a signatory to, and the relevant legislation, policy and regulations, the most important of which are summarised below.

3.3.1 International Level

3.3.1.1 UNESCO's MAB Program and Cape Winelands Biosphere Reserve Inter-Governmental Agreements

Stellenbosch Municipality has played a leading role in the establishment of the Cape Winelands Biosphere Reserve, which aims to give practical effect to UNESCO's MaB (Man and the Biosphere) Program. This program was launched in 1971 by UNESCO, as a global initiative of international scientific co-operation dealing with people-environment interactions over the entire realm of bioclimatic and geographic situations of the biosphere. The MaB Program was designed to solve practical problems of resource management, and aims to fill gaps in the understanding of the structure and function of ecosystems, and of the impact of different types of human interaction. Key ingredients in the program are the involvement of decision-makers and local people in research projects, training and demonstration at the field level, and the bringing together of disciplines from the social, biological and physical sciences in addressing complex environmental problems. Stellenbosch Municipality is a signature to the inter-governmental agreement upon which the biosphere reserve is based and is consequently under the obligation to comply with and give effect to the terms of agreement, which are as follows:

a) Agreement pertaining to 'conservation' (Contribute to the conservation of landscapes, ecosystems, species and genetic variation)

The establishment of the biosphere reserve has played an important role in facilitating the conservation of the region's natural and cultural landscapes of international importance. The agency tasked with the conservation of the Western Cape, namely Cape Nature, is in need of support and conservation activities need to be co-ordinated and integrated. The biosphere reserve strives to fulfil this function.

b) Agreement pertaining to 'development' (Foster economic and human development, which is socio-culturally and ecologically sustainable)

A primary over-arching function of the biosphere reserve is to facilitate the development and management of the region as an *'area of excellence and good practice*'. The biosphere reserve builds on the premise that development can serve as a primary economic driver that unlocks funds to support, in a meaningful and sustainable manner, economic growth, social development and environmental rehabilitation. The biosphere reserve provides a coherent framework for the sustainable use of natural resources in order to enhance the key economic sectors of the district, in particular, agriculture, development and tourism, and as such promoting the comparative and the competitive economic advantages of the area. The objective will be to ensure that the principles of 'critical regionalism' be adhered to, which implies that all development in the biosphere reserve reflects a particular:

- sense of place;
- sense of history;
- sense of craft;
- sense of nature; and
- sense of limits.

c) Agreement pertaining to 'logistic support' (support for demonstration projects, environmental education and training, research and monitoring related to local, regional, national and global issues of conservation and sustainable development)

The biosphere reserve will provide a co-ordination framework and support for *inter alia* the:

- Land-Care Program advocated by the Department of Agriculture;
- Stewardship Program promoted by CapeNature;
- Biodiversity and Wine Initiative supported by, amongst others, the IUCN, CAPE (Cape Action for People and the Environment), Critical Ecosystems Partnership Fund, WWF-SA, Botanical Society of South Africa, Conservation International, and the South African Biodiversity Institute.
- Conservancy program implemented by private land-owners in collaboration with Cape Nature, for example in the Bottelary Hills, Franschhoek, Klapmuts-Delheim, Voëlvlei/Elandsberg, etc.

d) Agreement pertaining to 'bioregional planning and management'

Although various agencies and forums have been established to co-ordinate and reconcile the diverse land-uses in some areas within the Biosphere Reserve, land-use has, over the years, been largely un-coordinated, leading to degradation of the environment. It is, therefore, imperative for all development initiatives to be effectively integrated with existing land uses and with the aspirations of all the people of the area. The Biosphere Reserve is to provide *'the ecological and social framework within which government, community, corporate and other private interests, share responsibility for coordinating land-use planning, for both public and private land and for defining and implementing development options that would ensure that human needs are met in a sustainable way'* (WRI, 1992).

e) Agreement pertaining to 'promotion of UNESCO'S MaB Program' (Fostering sustainable economic and human development)

The Municipality is under obligation to promote UNESCO's MaB program. The Municipality will, in all respects, adhere to the goals and objectives of the biosphere reserve and the terms of agreement between all spheres of government and other stakeholders as described in the *Application for Nomination of the Cape Winelands Biosphere Reserve* (Cape Winelands District Municipality 2007)[5] and the *Cape Winelands Spatial Development Framework Plan* (Cape Winelands District Municipality 2009)[6].

3.3.1.2 Agenda 21

The Agenda 21[7] agreements reflect global consensus and political commitment on developmental and environmental co-operation. Underlying the above agreements is the realisation that the international world cannot continue with present policies, which increase poverty, hunger, sickness

[5] Cape Winelands District Municipality 2007. *Application for Nomination of the Cape Winelands Biosphere Reserve. Dennis Moss Partnership.*

[6] Cape Winelands District Municipality 2007. *Cape Winelands Spatial Development Plan. Dennis Moss Partnership.*

[7] Agenda 21 is an international program, adopted by some 178 governments, to put sustainable development into practice around the world. It emerged from the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992.

and illiteracy and cause continuing deterioration of ecosystems on which life on earth depends. Agenda 21 provides a broad overview of issues pertaining to sustainable development, including statements on the basis for action, objectives, recommended activities and the means of implementation. Of particular relevance for the EMP are the following principles of Agenda 21:

a) Integrated approach to the planning and management of land resources.
b) Promoting sustainable human settlement development.
c) Integrating environment and development in decision-making.
d) Establishing systems for integrated environmental management and auditing.

3.3.1.3 Convention on Biological Diversity

The EMP builds on and gives practical effect to the stipulations of the Convention on Biological Diversity the main objectives of which are the:

a) Conservation of biodiversity.
b) Sustainable use of biological resources.
c) Fair and equitable sharing of benefits arising from the use of genetic resources.

In meeting its international obligations the South African Government, together with the lower spheres of government, is required to develop strategies, plans or programs, or adapt existing ones, to integrate the conservation and sustainable use of biodiversity into sectoral and cross-sectoral plans, programs and policies.

3.3.2 National Level

3.3.2.1 South African Constitution

The South African Constitution, 1996 (Act 108 of 1996) places an obligation on all to ensure that sustainable development is promoted and that the integrity of the environment is respected. In Section 24(b)(iii) of the Bill of Rights chapter of the Constitution, it is stated that 'everyone has the right to have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that secure ecologically sustainable development and use of natural resources, whilst promoting justifiable economic and social development'. Of particular relevance to the EMP is that central to the objectives of the Constitution and the enabling legislation is the promotion of sustainable development, which requires that the three imperatives for achieving sustainable development, namely, *environmental integrity, human well-being* and *economic efficiency,* be promoted in a balanced manner.

3.3.2.2 National Environmental Management Act

Section 28 of NEMA creates a general duty of care on every person to *take reasonable measures to prevent significant pollution or degradation of the environment from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment*. The Act provides for the preparation of environmental management plans by the relevant national departments involved in the management of the environment. The purpose of such plans is to co-ordinate and harmonise the environmental policies, plans, programs and decisions of the various national departments that exercise functions that may affect the environment or are entrusted with

powers and duties aimed at the achievement, promotion, and protection of a sustainable environment, and of provincial and local spheres of government.

3.3.2.3 National Environmental Management: Protected Areas Act

As stated previously, Act 57 of 2003 provides the legislative premise for the declaration and management of a Section 23 Nature Reserve. It makes provision for the *protection and conservation of ecologically viable areas representative of South Africa's biodiversity and its natural landscapes.* It makes provision for the *establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards* and *for intergovernmental co-operation and public consultation in matters concerning protected areas.*

3.3.2.4 National Environmental Management: Biodiversity Act

The Protected Areas Act, 57 of 2003 must, in relation to a protected area, be read, interpreted an applied in conjunction with the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) which has the following objectives:

a) To provide for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998 (Act 107 of 1998).
b) To provide for the protection of species and ecosystems that warrant national protection.
c) To provide for the sustainable use of indigenous biological resources.
d) To provide for the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources.
e) To provide for the establishment and functions of a South African National Biodiversity Institute.

3.3.2.5 National Water Act

The purpose of the National Water Act, 36 of 1998 is to ensure that South Africa's water resources are protected, used, developed, conserved and controlled in a manner that takes into account, amongst others, basic human needs, equitable access thereto, the promotion of efficient, sustainable and beneficial use of water, facilitation of social and economic development, and protection of aquatic and associated ecosystems.

3.3.2.6 National Veld and Forest Fire Act

Veld fires in South Africa are dealt with under the National Veld and Forest Fire Act, 101 of 1998. The purpose of the National Veld and Forest Fire Act is *to prevent and combat veld, forest and mountain fires throughout the Republic*. The Act places the duty on land owners to make provision for the management of veld fires on their own land. Failure to do so may result in penalties being enforced (refer to Section 24 and 25 of the above Act) and claims lodged against a landowner if the above Act's requirements were not met. In terms of the National Veld and Forest Fire Act the following responsibilities apply to landowners:

a) The landowner on whose land a fire may start, or from whose land it may spread across boundaries, must have in place:

- *Such equipment, protective clothing and trained personnel required to extinguishing such fire as may occur as prescribed in the FPA* (Fire Protection Association) *regulations.*
- *If there are no regulations applicable, then as reasonably required in the circumstances.*
- *Take all reasonable steps to notify the Fire Protection Officer (FPO) of the local FPA should a fire break out.*
- *Do everything in their reasonable power to stop the spread of the fire.*

3.3.2.7 National Heritage Resources Act

South Africa' heritage is dealt with under the National Heritage Resources Act, 25 of 1999 which aims to *promote good management of the national estate, and to enable and encourage communities to nurture and conserve their legacy so that it may be bequeathed to future generations.*

3.3.2.8 Spatial Planning and Land Use Management Act

The Spatial Planning and Land Use Management Act, 16 of 2013 (SPLUMA), includes the following stipulations:

Land use planning principles and objectives
Section 59 (4): To promote environmental integration in land use planning, a competent authority must—

a) strive towards ecologically, socially and economically sustainable development, taking into account —
  (i) the economic potential of the relevant area or region;
  (ii) biodiversity;
  (iii) social needs;
  (iv) cultural heritage resources;
  (v) agricultural resources
b) ensure that development heeds the natural processes that control the relevant area;
c) strive to achieve development that is harmonised with the ecological characteristics of the environment;
d) promote the conservation and management of biodiversity;
e) discourage development in unsuitable environments such as —
  (i) areas with a high water table;
  (ii) swamps;
  (iii) flood plains;
  (iv) steep slopes;
  (v) areas sensitive to drift-sands and sea-level rise;
  (vi) areas with high biodiversity importance;
  (vii) areas with important cultural and scenic landscapes –
f) minimise the fragmentation of natural habitat in ecological corridors and areas with high biodiversity importance;
g) facilitate soil conservation and the control of pollution;
h) address the land use implications of —
  (i) the provision and conservation of energy;
  (ii) the management of the demand for energy;

(iii) climate change mitigation and climate change adaptation strategies;

i) protect the cultural heritage and tourism resources of the Municipality.

3.3.3 Provincial Level

3.3.3.1 Constitution of The Western Cape Province

The EMP supports and gives effect to the Constitution of the Western Cape (Act 1 of 1998). In terms of Chapter 10 of the Constitution, this province has to adopt and implement strategies to actively promote and maintain the welfare of the people and the environment of the Western Cape, including policies aimed at achieving inter alia the following:

a) Safety and security.
b) The protection or advancement of persons, or categories of persons, disadvantaged by unfair discrimination.
c) The promotion of a market-orientated economy.
d) The development of rural communities and the promotion of the welfare of rural workers.
e) The protection of the environment of the Western Cape, including its unique fauna and flora, for the benefit of present and future generations.
f) The protection and conservation of the natural historical, cultural historical, archaeological and architectural heritage of the Western Cape for the benefit of present and future generations.

3.3.3.2 Western Cape Provincial Spatial Development Framework

The Western Cape Provincial Spatial Development Framework (generally referred to as the PSDF) is aligned with the National Spatial Development Perspective (NSDP) and other national policy frameworks, and endorses the vision of the Western Cape Provincial Government to create *'A Home for All'.* The PSDF is purported to support the development growth path paved by the iKapa Elihlumayo Strategy and the other lead strategies.

3.3.3.3 Provincial Bioregional Planning Policy

As stated above, the PGWC is advocating a bioregional planning approach as described in the *Manual for application of Bioregional Planning in the Western Cape* (PGWC, 2003). The Stellenbosch Municipality has adopted the said approach for the planning, development, and management of its area of jurisdiction.

3.3.3.4 Land Use Planning Act

The Land Use Planning Act (LUPA), 3 of 2014, regulates land use in the Western Cape.

3.3.4 District Level

3.3.4.1 Cape Winelands District Municipality Integrated Development Plan

The Cape Winelands District Municipality set itself the broader goal of ensuring sustainable development through strategic management objectives. This will be achieved by adhering to the vision of the Municipality, namely to have *'a safe, prosperous and united Cape Winelands where all*

it's people enjoy high standards of living'. The Municipal IDP states that there is a dis-equilibrium between development initiatives and environmental sustainability. In order to address this problem the Municipality identified several strategies. One such strategy is '*to have data-driven sustainable livelihoods, premised on bioregional planning and in line with Agenda 21 that seeks to build and preserve the five forms of community capital (social, physical, natural, financial and institutional)'*.

3.3.4.2 Cape Winelands District Municipality Spatial Development Framework

The Cape Winelands District Municipality Spatial Development Framework conforms, to *inter alia, the provincially-endorsed bioregional planning principles, but adds the principles of consistency and vertical equity. The latter assumes that the disadvantaged should be favoured above more advantaged people and refers to the distribution of impacts (who receives benefits or bears costs).* The SDF classifies the Cape Winelands Biosphere Reserve as *a scale-informed value-adding management entity, operational within a sustainable paradigm, to support existing roles and responsibilities through structured participation and (scientific and local) knowledgeable input that responds to local conditions, needs and perceptions*. The SDF states that *on the regional and local level, the biosphere reserve is to facilitate coherent planning and land-use management in terms of the principles of sustainable development.*

3.3.4.3 Cape Winelands Biosphere Reserve Spatial Development Framework Plan

The Cape Winelands Biosphere Reserve Spatial Development Framework Plan includes plans, guidelines and strategies that give effect to the three functions of the Cape Winelands Biosphere Reserve namely, *development*, *conservation* and *logistical support*. As such this Spatial Development Framework Plan indicates which type of land-use should be undertaken in the Cape Winelands Biosphere Reserve, where it should take place, and how such land-use should be undertaken in order to be sustainable.

3.3.5 Local Level

3.3.5.1 Stellenbosch Integrated Development Plan

The Stellenbosch IDP (2022-'27) includes a needs-analysis, which puts forward a number of needs for Ward 11 and 12 (within which Papegaaiberg NR is located). Needs included, related to Papegaaiberg NR, are the:

- *Installation of a fence around Papegaaiberg NR*
- *Installation and monitoring of cameras in Papegaaiberg NR*
- *Repair and maintenance of the vandalized fence panels within Papegaaiberg NR*
- *Establishment of a "The Friends of Reserves" group*
- *Combatting of health risk and illegal structures in Papegaaiberg NR*
- *Removal of alien species in Papegaaiberg NR, Plankenburg and Eerste River*
- *Revision of the maintenance plan of the Papegaaiberg NR*
- *Deploy rangers to patrol the reserve in Papegaaiberg NR*

3.3.5.2 Stellenbosch Spatial Development Framework

The primary goal of the Stellenbosch SDF is to give practical effect to the mission statement of the people of the local municipal area, as expressed in the SDF of the Stellenbosch Municipality, namely:

'The spatial development framework of the Stellenbosch Municipality should be measured by the 'triple bottom line' of economic efficiency, environmental sustainability and social justice with an emphasis on the issues facing the rural and urban poor.'

3.3.5.3 Stellenbosch Environmental Management Framework

The Stellenbosch Environmental Management Framework (SEMF) is Stellenbosch Municipality's strategic environmental management policy that responds to and complies with the relevant statutes and directives. As such, the SEMF serves as a:

a) Spatial and strategic supplement to the SSDF.
b) Policy for ensuring environmental sustainability and for the aligning/integrating land-use activities in accordance with defined sustainability objectives.
c) Strategy towards enhancing the well-being of the people and the environment of the Municipality by providing for:
    (i) A uniform, effective and comprehensive system of environmental planning and management throughout the Municipality.
    (ii) Environmental and sustainability principles, norms and standards.
    (iii) Sustainable and efficient use of land and other forms of environmental capital.
    (iv) Providing for cooperative governance and intergovernmental relations within the sphere of the Municipality and between the latter and all other institutional spheres and the private sector.
d) A compilation of and alignment directive for the strategies and plans of the various sectoral departments and directorates of the Municipality.

3.3.5.4 Stellenbosch Municipality: By-Law Relating to Plantations, Parks, Gardens, Recreational Facilities and Nature Reserves (P.N. 373/1988)

The above by-law sets out the rules and conduct as it pertains to *premises, buildings, land, plantations, a commonage, enclosures, nature reserves, parks, gardens, open erven and spaces, picnic areas, nurseries, trees, sport and recreation facilities vested in or under control of the Council.*

3.3.6 Human Resources / Administration Legislation

Furthermore, human resources and administration legislation include the following:

- Occupational Health and Safety Act, 1993
- Basic Conditions of Employment Act 3 of 1997
- Labour Relations Amendment Act, 66 of 1995
- Local Government Municipal Systems Act 32 of 2000
- Promotion of Equality/Prevention of Unfair Discrimination Act 4 of 2000
- Criminals Procedures Act
- Civil Aviation Act 13 of 2009
- Hazardous Substances Act 15 of 1973
- Land Survey Act 8 of 1997
- Promotion of Access to Information Act 2 of 2000
- Promotion of Administrative Justice Act 3 of 2000
- Skills Development Act 97 of 1998
- State Land Disposal Act 48 of 1961
- Subdivision of Agricultural Land Act 70 of 1970

3.4 PHYSICAL ENVIRONMENT

3.4.1 Climate

Stellenbosch has a typically Mediterranean climate. Summers are dry and warm to hot. Daytime temperatures range from 24°C to 35°C, with some February and March days rising to over 40°C. A south easterly wind often blows in summer bringing cooler air from the nearby coast. Winter is typically wet, windy and cold with daytime temperatures range from 10°C to 20°C. Rains are brought with north westerly winds. Stellenbosch normally receives about 673mm of rain per year. Snow is usually seen a couple of times in winter on the surrounding mountains. Spring and autumn daytime temperatures hover in the 20°C's.

3.4.2 Topography and Terrain Morphology

Papegaaiberg rises approximately a 159 m above Stellenbosch and can at best be described as a hill at 250m above sea level sheltered in a valley flanked on the east by mountains such as Stellenbosch and Simonsberg Mountain, the Jonkershoek Mountains, the Great Drakenstein Mountains and Die Tweeling Pieke, of which the highest peak is estimated to be 1590 m above sea level. Papegaaiberg rises gradually from all sides towards its highest point more or less at the centre of Papegaaiberg (Figure 8).

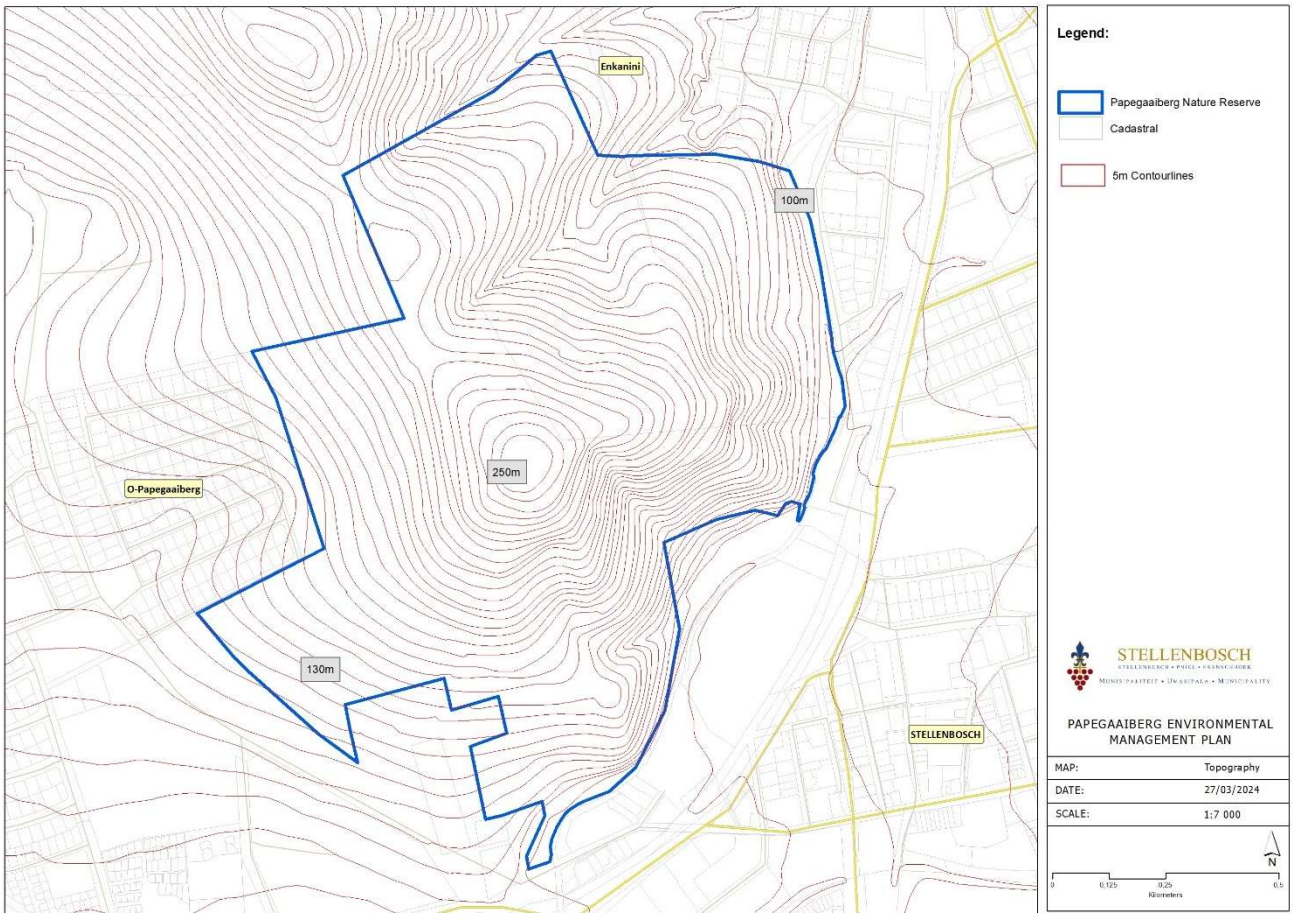

Figure 8: Topography of Papegaaiberg Nature Reserve.

3.4.3 Hydrology

The NR forms part of quarternary catchment[8] No. G22G and G22H (refer to Figure 9). The catchment functions of the NR may seem insignificant. However, it performs an important function as part of an integrated group of ecosystems that collectively determine the health of the entire catchment. A primary threat to environmental health is fragmentation of the community-supporting ecosystems. Fragmentation generally leads to a cycle of environmental degradation, which consequently influences the well-being of the dependent communities.

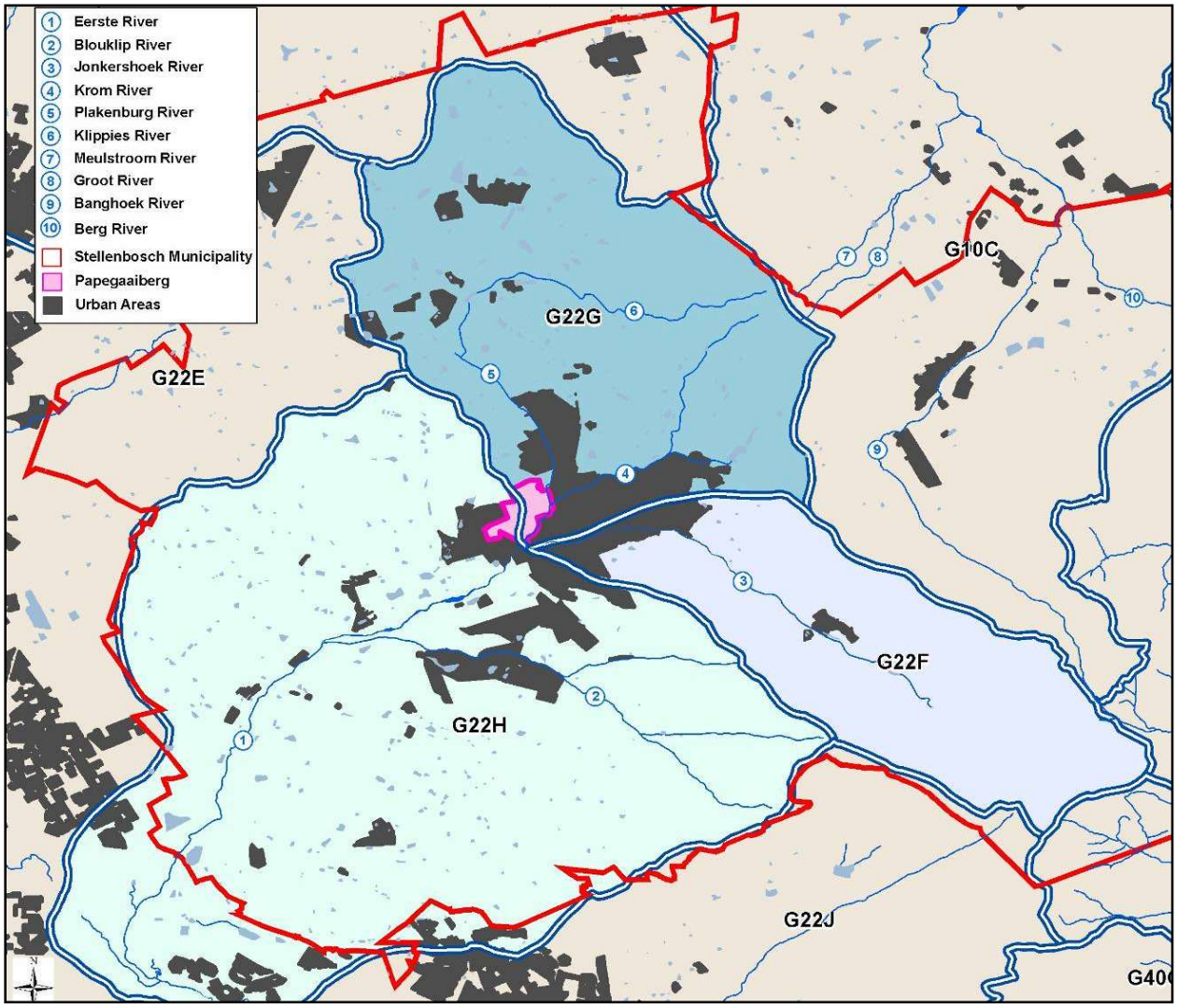

Figure 9: Papegaaiberg NR in catchment area context.

Ecosystems and/or catchments are mutually dependent on every natural component for their existence. The loss, or degradation, of one component thus affects all others, potentially leading to the collapse of the total system on which communities may depend for their livelihood. Hence the importance of conserving every natural part, or life form, of a system that forms part of the natural

[8] Catchment (or catchment area) is defined as the entire land area from which water flows into a river; catchments can be divided into smaller 'sub-catchments' which are usually the area which drains a tributary to the main river or a part of the main river.

water cycle[9]. Government policy, which forms the basis of the National Water Act, 1998 (Act 36 of 1998), states that *'since many land-uses have a significant effect on the water cycle, the regulation of land-use should, where appropriate, be used as an instrument to manage water resources'*.

The Plankenbrug River, which flows along the foot of Papegaaiberg, and which is fed by the latter, has its origin near Koelenhof approximately 9 km north-east of Stellenbosch and is approximately 10 km in length. The river flows through agricultural lands containing vineyards and orchards and then past Cloetesville and Kayamandi. Below Kayamandi, the river flows through the Papegaaiberg Industrial Park. The Plankenbrug Industrial area and Die Bergkelder are located on the east bank. The river joins the Eerste River at the Lower Eerste River Irrigation Board weir below Adam Tas Street (SRK Consulting Engineers and Scientists, 1999).

3.4.4 Soil

Papegaaiberg's soil are well-drained dark alluvial to clay soils (Figure 10).

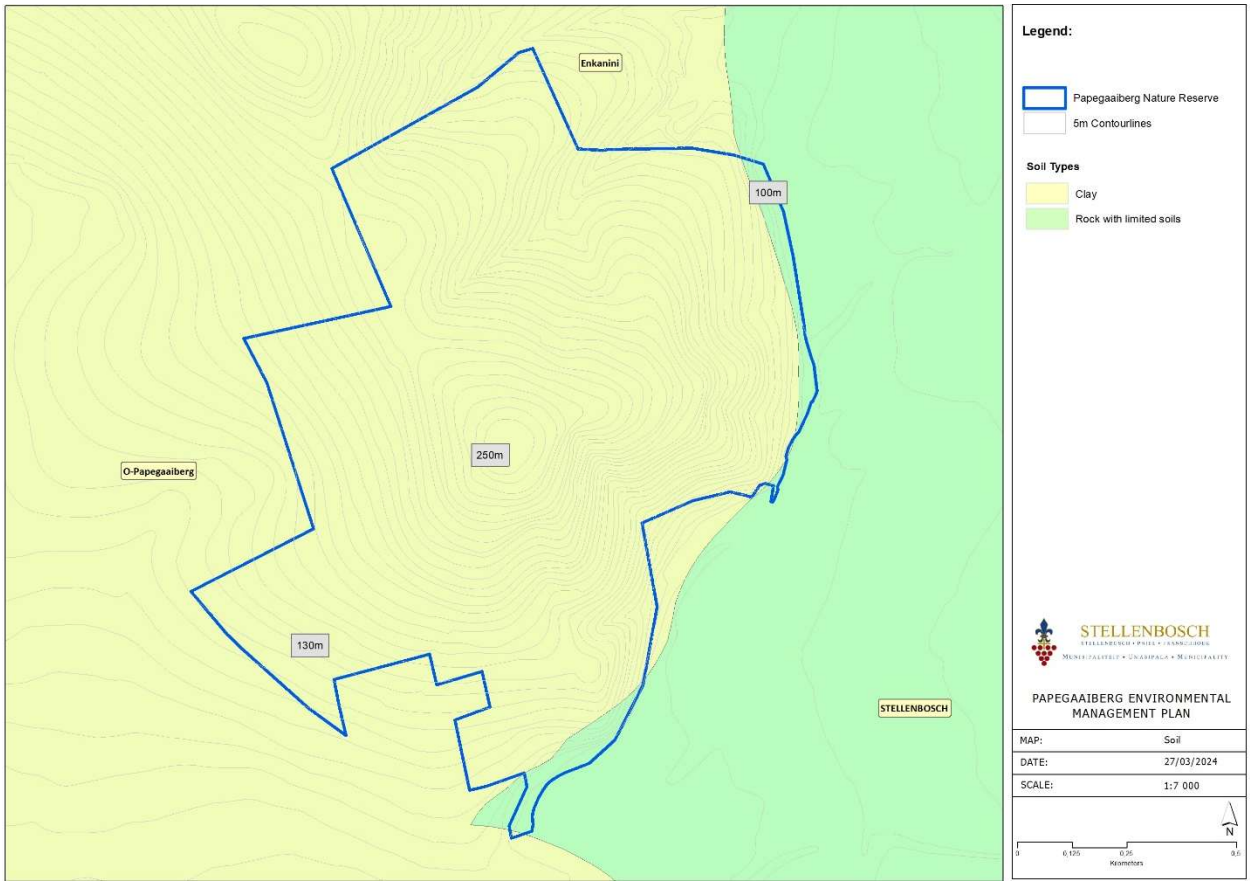

Figure 10: Papegaaiberg Nature Reserve soil.

[9] The water (hydrological) cycle describes the natural process of moving water out of the oceans, into the atmosphere, and back to the land and oceans.

3.5 BIOLOGICAL ENVIRONMENT

3.5.1 Flora

The primary reason for the conservation of the NR, and its inclusion into the Cape Winelands Biosphere Reserve, is that it forms part of the world-renowned Cape Floral Region. The latter is internationally recognised as one of the six Floral Kingdoms of the world. The Cape Floral Kingdom is the smallest, covering a mere 0,06% of the earth's surface, and is the only Floral Kingdom contained in its entirety within a single country. The Cape Floral Kingdom is characterised by its exceptional richness in plant species and its high endemicity. More than 8 700 species are known to occur, with more than 68% being endemic[10]. The Cape Floral Kingdom, thus, compares with some of the richest floras world-wide, surpassing many tropical forest regions in its floral diversity. The Cape Floral Kingdom is of immense scientific importance, both nationally and internationally. It covers only 4% of South Africa but contains 45% of all plant species of Southern Africa. Approximately 75% of all plants in the South African Red Data Book are found in the Cape Floral Kingdom. Of these species, 1 700 are threatened. Many Fynbos species are extremely localised in their distribution, with sets of such localised species organised into 'centres of endemism' (Low and Rebelo, 1996).

The information provided by CAPE (Cape Action for People and the Environment) with regard to the irreplaceability[11] of habitats indicates that Papegaaiberg NR is of significant conservation importance (refer to Figure 11). This is mainly due to the area containing remnants of almost extinct Renosterveld types. It is of global importance and it is also an over-arching conservation objective to ensure formal protection of all remnants of such vegetation types. The Renosterveld types in the NR are summarised below. A distribution map will be drafted once the vegetation has recovered to the extent that distinction can be made between the various types that occur.

3.5.1.1 Swartland Shale Renosterveld

Swartland Shale Renosterveld is a Critically Endangered vegetation unit (National Biodiversity Assessment, 2017). It is estimated that as much as 90% of the area in which this vegetation type occurs have been transformed. Remnants are found in isolated pockets, usually on steeper ground, such as Papegaaiberg. The nature reserve would serve as one of a handful of areas where patches of Swartland Shale Renosterveld have been included in a formal conservation scheme.

3.5.1.2 Swartland Granite Renosterveld

As is the case with Swartland Shale Renosterveld, Swartland Granite Renosterveld is an Endangered vegetation unit. Approximately 80% of the area in which this vegetation type occurs have been transformed due to agricultural expansion and urban sprawl. Only 0,5% of Swartland Granite Renosterveld enjoys statutory protection.

[10] Confined, or exclusive, to a particular specified area.

[11] The potential contribution of a site to a preservation or representation goal. It is a fundamental way of measuring the conservation value of any site. An irreplaceable site will appear in every analysis of alternative combinations of sites. In other words, it is one which must be included in a conservation area because significant options for preservation are lost if the site is excluded.

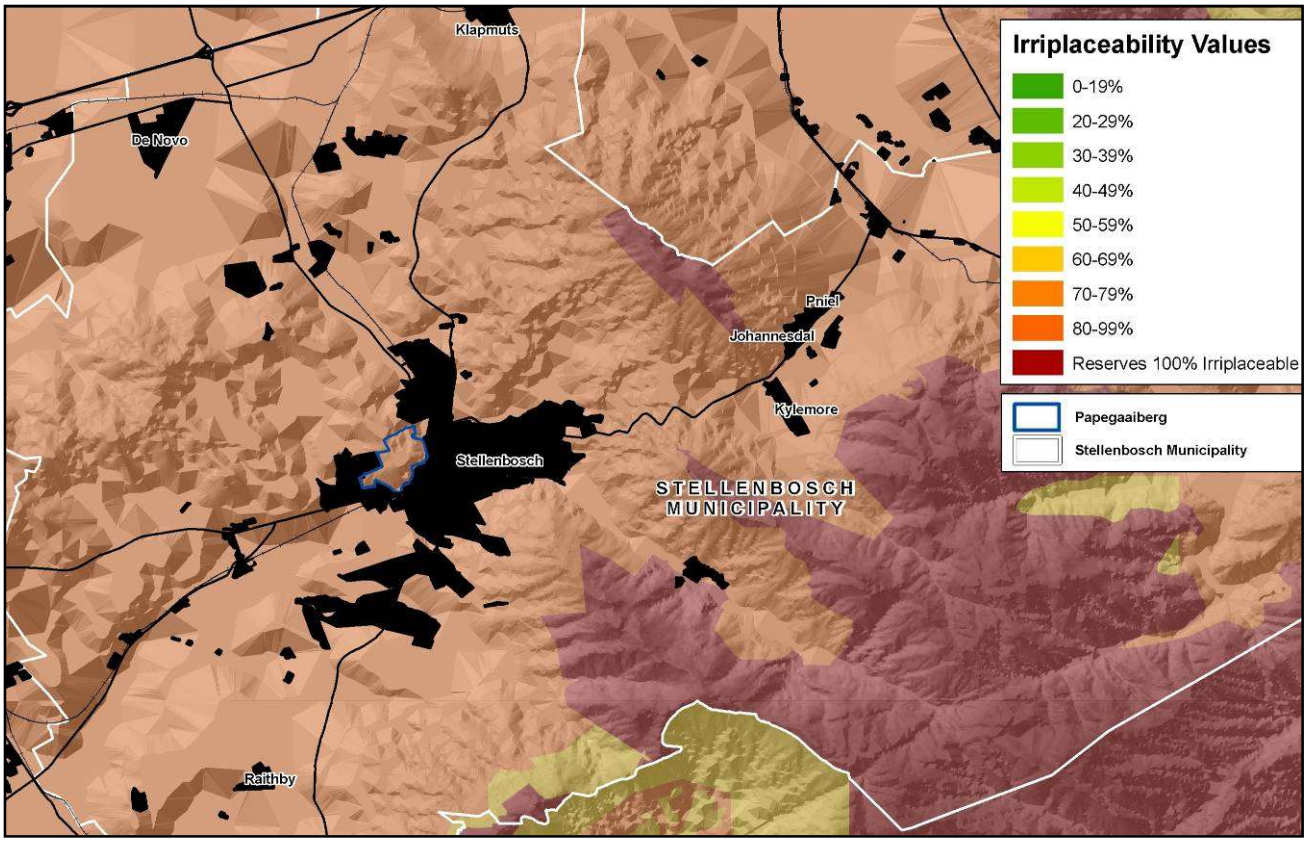

Figure 11: Irreplaceability status of habitats in the Stellenbosch area (Source: C.A.P.E.).

3.5.1.3 Riparian and Riverine Vegetation

The Plankenbrug River along the boundary of the NR is of conservation importance, being an ecological corridor that helps to link the Hottentots Holland Mountains with natural areas in the Cape Flats and the coast. In addition, these rivers provide habitats for a number of organisms that form part of the biodiversity of the area.

Remnants of indigenous vegetation persist in and along the river. These include trees such as the Cape Willow (*Salix mucronata*), Spoonwood (*Hartogiella schinoides*), Wild Peach (*Kiggelaria africana*), Rock Candlewood (*Maytenus oleoides*), and Breede River Yellowwood (*Podocarpus elongatus*). Some attractive indigenous shrubs also occur, including the Honey Bell Bush (*Freylinia lanceolata*) and Wild Sage (*Salvia africana-caerulea*).

The health of the river is largely dependent on the status of the riparian vegetation. The river is largely degraded due to the infestation of plants such as Grey Poplar (*P canescens*), Oak (*Quercus robur*), Weeping Willow (*Salix babylonica*), Stinkbean (*Paraserianthes lophantha*), Port Jackson (*Acacia saligna*), *Acacia implexa*, Black Wattle (*A. mearnsii*), Long-leaved Wattle (*A. longifolia*), Poplar (*Populus deltoides*), *Pittosporum* spp and Elephants Ear (*Colocasia esculenta*). Additional factors that have caused degradation of the river include pollution and eutrophication of the water due to over-fertilization of surrounding areas and upstream human activities.

The following key issues regarding the Plankenburg River were noted by SRK Consultants in the Stellenbosch River Management Plan (1999):

a) Water Quality

(i) Poor to very poor.

(ii) Elevated nutrient levels due to agricultural run off, stormwater from Cloetesville and Kayamandi and illegal dumping within the river channel and riparian zones.

(iii) Potential health hazard due to high E.coli counts, particularly where the river is utilised for recreational and domestic purposes.

(iv) Low water flow during summer months and lack of flushing flows.

b) Vegetation

(i) River channel is choked with Typha capensis and Phragmites australis in upper reaches due to poor water quality and lack of flushing flows.

(ii) Aquatic invasive species noted, including Azolla filiculoides.

(iii) Large numbers of alien trees including poplar, oak, black wattle and blue-gums along the entire length of the river.

c) Erosion

(i) Erosion associated with alien vegetation and access paths in the upper reaches.

d) Pollution

(i) Illegal dumping and littering in riparian zones and in river channel.

(ii) Use of river areas as a latrine, which is a potential health hazard particularly where the river is utilised by residents for recreational purposes.

(iii) Non-point and point sources of pollution from adjacent residential and industrial areas.

e) Recreational / Amenity

(i) Access potential good for much of the river, with broad zones of open space in the upper reaches.

(ii) Very low amenity value.

(iii) No existing facilities.

(iv) Lack of adequate security.

3.5.2 Fauna

Historically, species such as mountain zebra (*Equus zebra*), rhinoceros (*Rhinocerotidae*), lion (*Panthera leo*), leopard (*Panthera pardus*), elephant (*Loxodonta*), red hartebeest (*Alcelaphus caama*), hippopotamus, eland (*Taurotragus*), vaal ribbok (*Pelea capreolus*), steenbok (*Raphicerus campestris*), duiker (*Cephalophinae*), klipspringer (*Oreotragus oreotragus*) occurred in the district of Stellenbosch (Smuts, 1979).

Today, only species such as the Cape Grysbok (*Raphirus melanotis*), Grey Mongoose (*Galerella pulverulenta)*, Striped Polecat (*Ictonyx straitus),* Porcupine (*Hystrix africaeaustralis*), and Water Mongoose (*Atilax paludinosus)* are known to occur in the area. These animals are however under serious threat due to illegal human activities (including hunting) and the continuous presence of dogs and feral cats.

Various bird species have been noted, including Hamerkop (*Scopus umbretta*), Barn Owl (*Typo alba*), Cape Eagle Owl (*Bubo capensis*), Cape Sugarbird (*Promerops cafer*), and the Malachite Sunbird (*Nectarinia famosa*).

3.6 SOCIO-POLITICAL CONTEXT

3.6.1 Archaeology, History and Culture

Primitive man occupied the Stellenbosch Valley in prehistoric times. Dr. L. Peringuey, the then Head of the South African Museum in Cape Town, in 1911 discovered stone implements of stone age people under a layer of clay on the southern shoulder of Papegaaiberg, near Bosman's Crossing. These important archaeological discoveries demonstrated the high antiquity of the beginnings of the Stone Age in South Africa (Oberholster, 1972). An extensive investigation by Prof. A. J. H. Goodwin of the University of Cape Town led to the publication of a full description of the Stellenbosch I-V Cultures of the Acheulian Stone Age. These studies indicated that Acheulian occurrences, attributed to the Earlier Stone Age, are common in the area. Acheulian artefacts are associated with the coarse alluvium fan associated with the area. Such artefacts are dated to the earlier part of the Middle Pleistocene between 700 000 to 300 000 years ago.

For some time the particular Stone Age culture to which these implements belong was known to scientists as the 'Stellenbosch Culture' since artefacts of this kind occur in abundance in the vicinity of Stellenbosch. This term was afterwards abandoned when it was found to be inadequate in the light of comparative studies and correlations between South Africa and other archaeological material. In 1962 the Historical Monuments Council proclaimed the site on the southern shoulder of Papegaaiberg, near Bosman's Crossing, as an archaeological reserve to honour Dr. Peringuey's work and to preserve the deposits for future scientific research (Oberholster, 1972).

Papegaaiberg (initially called Hagelsberg[12]) is a cultural landmark with a rich history dating back more than three centuries to the era of Simon van der Stel. Papegaaiberg was probably named after the 'parrot' shooting that was initiated by Simon van der Stel in 1686. The apparent objective was to encourage the burghers to become proficient in the handling of firearms so as to become better soldiers. 'Parrot' shooting was not unique to the village of Stellenbosch - it was apparently an old custom which had already existed in the Middle Ages in Europe. The target shooting at a wooden parrot took place at the foot of Papegaaiberg as part of the festivities commemorating Simon van der Stel's birthday on October 14 and also coincided with the annual military exercise of the burgher militia. For the duration of the fair (*kermis*), which lasted from 1 to 14 October, the entire burgher militia had to be present in the village to train for the final parade and 'revue', which was also called the 'mobilisation day' (*optrekdag*). There were attractive prizes which varied according to which part of the wooden parrot was shot down. The marksmen who shot down the rump and so destroyed the target received a significant amount of money. As 'King of the Marksmen' the winner was escorted by the whole burgher force in festive manner to his house. If the parrot was not shot down by the 14th of October, the competition was resumed the next year with double the prize money.

In later years Papegaaiberg was the gathering place for the debating societies during the 1880's. Debating societies received enthusiastic support due to the fact that the student community has to arrange their own diversions and entertainments. The friendly rivalry between the College Debating Society and the Union Debating Society marked the great annual watermelon festival. The two societies gathered on Papegaaiberg and at the Eerste River respectively, to drink and pelt each other

[12] *Hagel* is the Dutch word for hail. The name, *Hagelsberg*, was given when Simon van der Stel first arrived in the Stellenbosch Valley under a heavy thunderstorm and he noticed the storm over the hill.

with the peels, eat fruit, and deliver speeches and recitations. They then met at the Steenebrug and raced each other to serenade the professors and girl's residences (Smuts, 1979).

The Plankenbrug River also has a rich history. Originally it was simply and descriptively denominated the 'diagonal river' (Dwars River) due to the fact that it flow at virtual right angles into the Eerste River, the one important river of Stellenbosch (Three Centuries, 1979). The Dwars River became the Plankenbrug River because of the wooden bridge ('plankenbrug') that formerly crossed it roughly at the site of the present road bridge over the river (Bridge Road off George Blake Drive).

In the early days rivers were (as far as transport was concerned) more of an obstacle than an asset for the pioneers of the Cape of Good Hope. Initially bridges were seldom erected except over small rivers or streams. In the winter fords became impassable. The Council of Landdrost and Heemraden very early became aware of this fact and, with the approval of the Governor, established a contract with the two master builders, Simon Janssen and Matthijs Diederick, to erect a '*vaulted stoned bridge including the dressing of the stones*'. Stellenbosch in 1691 thus, received its first officially erected bridge over the Plankenbrug River at the foot of Papegaaiberg, known as the *Steenebrug.* For a substantial period of time this was the most important bridge as the highway to Cape Town crossed over it. The *Steenebrug* was later replaced by a more permanent structure which today is known as the Adam Tas Bridge. The real 'Plankenbrug' was probably the second bridge erected by the Landdrost and Heemraden at a stage between 1707 and 1729. Both these bridges were, however, susceptible to flooding and collapse and required constant attention.

In addition to the above, the intrinsic value of Papegaaiberg is largely vested in its phenomenological[13] significance which is primarily determined by its unique aesthetic qualities and its subtle contribution to the Stellenbosch landscape. Papegaaiberg is an attractive natural feature in the landscape, the integrity of which could be construed as an indication of the general state of the communities that are the custodian of the site.

3.6.2 Socio-Economic Context

Papegaaiberg is located in an area with diverse values, needs and aspirations. As was described above, Papegaaiberg is bordered to the west by the Onder-Papegaaiberg residential area and the farm Middelvlei. Kayamandi and Enkanini form the northern boundary while an industrial area forms the eastern boundary of the NR. The Stellenbosch cemetery and Oude Libertas forms the southern boundary. The main aspiration of the residents of the Onder-Papegaaiberg Residential area is to have the value of their properties protected. Security on Papegaaiberg is considered a concern in this regard. The main aspiration of the landowner of the farm Middelvlei is to continue the current land use practice. The same applies for the industrial area to the east of Papegaaiberg. These too requires improved security on Papegaaiberg. Residents of Kayamandi have the need to conduct certain cultural and/or traditional practices on a portion of Pagegaaiberg. They also need to traverse Papegaaiberg as many of the residents of Papegaaiberg are employed in areas to the west and south of Papegaaiberg.

[13] Phenomenology refers to *how we experience ourselves and how we experience **things** outside ourselves, that is, 'all that is not self'*. It is based on the fact that all interrelated ecosystems and other phenomena are nested within one place, namely the biosphere. Thinking about a whole bioregion as part of the biosphere helps us to understand the interdependency and links between settlement and countryside, natural and cultural processes, water and land, communities and their surroundings. It also helps us to understand that in order to **dwell** in the biosphere in a sustainable manner, we need to understand the vital relationships that determine the ability of the biosphere to sustain life (Wagner, 1983).

4. ZONATION PLAN

The purpose of the zonation of Papegaaiberg NR is to control the intensity and type of use within it in an effort to ensure the main goal of biodiversity conservation is met. In terms of Cape Nature's zoning classification of protected areas Papegaaiberg will entirely be zoned as *Nature Access* (refer to Figure 12). This zonation implies the following:

- To manage and direct visitor use and plan infrastructure to minimise impact on sensitive environments.
- To actively manage users and visitor impacts.
- Allows for minimal or more intensive biodiversity management intervention.
- Provide additional protection to sensitive or threatened habitats, species or other features by Special Management Overlays.

In terms of the designated zonation, visitor activities permissible are:

- Guided or unguided nature observation.
- Running, hiking and cycling on dedicated trails.
- No accommodation or camping.

Figure 12: Papegaaiberg Nature Reserve Zonation.

5. ADMINISTRATIVE STRUCTURE

The long-term sustainability of the area largely depends on its effective administration. Of key importance in this regard is that the principle of economic efficiency be given effect through the general administration of the area and that its positive role and functions in respect of the promotion of environmental integrity and human well-being be understood and supported at all levels. Institutional commitment to achieving effective administration of the NR through, *inter alia*, the allocation of adequate budgets is of paramount importance.

Stellenbosch Municipality is acting in the capacity as Management Authority for Papegaaiberg NR. The functions of the Management Authority include the following:

(i) Implementation of the EMP.
(ii) Monitoring and auditing of management actions and environmental impact and facilitation of continual improvement of the EMP.
(iii) Ensuring that the strategies and implementation projects listed in the EMP are listed in the IDP.

In terms of the principle of *inclusivity* the management of the NR is an ongoing process that considers the changing and dynamic interests, needs and values of the people of Stellenbosch and those that have an interest in ensuring a prosperous future for the area. Accordingly, the Municipality is to facilitate the establishment of a representative body, such as a Protected Area Advisory Forum, that has the capacity to give effect to the above requirements in an inclusive and participative manner.

Cape Nature, who have been facilitating the process of establishing the NR in terms of the NEM:PA, will act in an advisory capacity to the Management Authority. Whilst the Management Authority is responsible for the general maintenance of the area and the implementation of this EMP it will rely on the Protected Area Advisory Forum for specific management activities as required (Figure 13) or where the municipality is limited through capacity constraints.

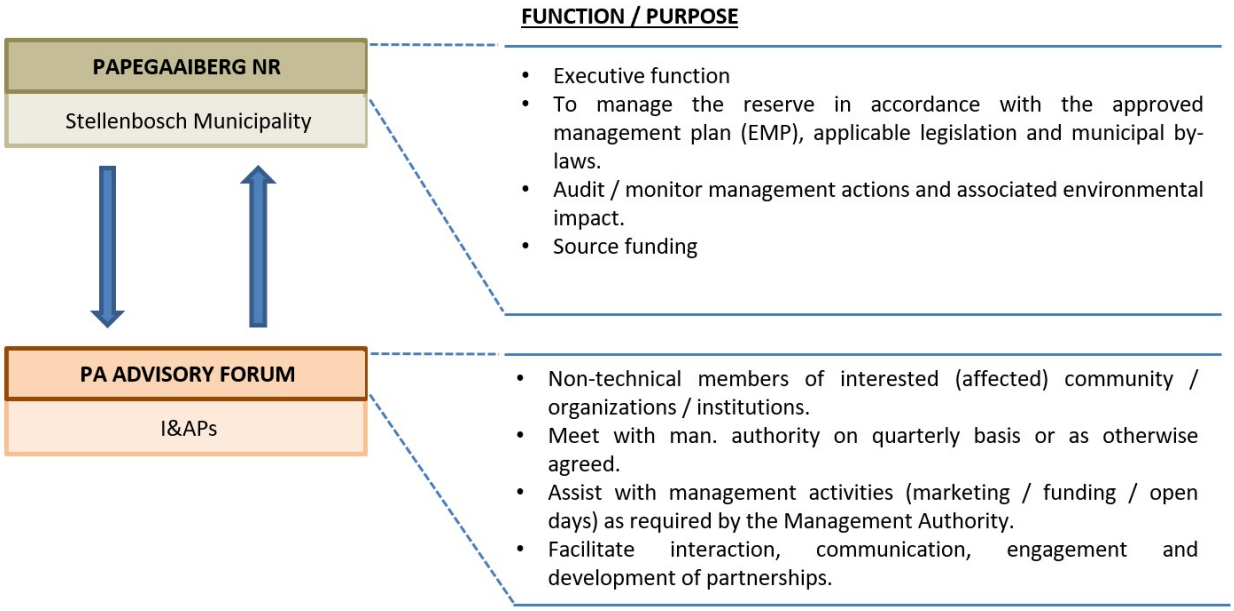

Figure 13: Papegaaiberg Nature Reserve management structure.

6. OPERATIONAL MANAGEMENT FRAMEWORK

This section translates the strategic framework described in Section 2 above into key deliverables and management activities, which will be used to inform annual plans of operation and the resources required to implement them. The management targets will form the basis for monitoring of performance in implementing the plan and are thus measurable.

6.1 BIODIVERSITY MANAGEMENT

The EMP recognises that biodiversity is an imperative for environmental sustainability. Ecological functions of the natural systems are directly related to biodiversity. Biodiversity is the primary element in the maintenance of the resilience of ecological systems to external shocks and, thus, the ability of these systems to sustain the dependent communities. Accordingly, the key objective in the management of the NR is to ensure that biodiversity is protected and enhanced.

6.1.1 Fire Management

Papegaaiberg is susceptible to wild fires due to land uses on adjoining properties and its ecological characteristics. The applicable fire management regime must therefore provide innovative measures to combat the occurrence and spread of wild fires. The overarching fire management goals as it pertains to the Papegaaiberg NR are to:

a) Protect people and property.
b) Protect natural and cultural resources from undesirable effects of fire.
c) Suppress unwanted fire.
d) Allow fire to assume its natural role in the ecosystem.
e) Use prescribed fire for resource management purposes.

The fire management regime of the nature reserve is premised upon the risk management strategies listed below.

Table 5: Risk Management Strategies

Management Strategies	Guidelines
a) Avoiding risk	Prohibiting high-risk human activities in close proximity to the NR.
b) Reducing hazards	Prescribed burning, preparation of firebreaks or manual clearing of fire hazards as well as regular inspections.
c) Reducing ignitions	Education and awareness programs, fire bans, reduction in activities during high-risk season or periods, efficient ignition investigation.
d) Reducing consequences	Contingency plans, community education programs for self-protection (lives and property), and building restrictions and standards for areas prone to veld fires.
e) Implementing an innovative artificial burning regime	Such regime and associated practices are to reduce the risk of wild fires spreading and causing extensive ecological and financial damage. Such artificial regime implies the creation of a mosaic of veld ages that will enhance the capacity of the area to and maintain its ecological functioning.

The EMP builds on the recognition that the threat of fires to the NR and the relevant reasons for such threat are unique. Due to surrounding land uses and human behaviour wild fires will probably not be prevented through any measures taken. The solution lies in a combination of options (a), (b) and (c) above.

6.1.1.1 Firebreaks

In accordance with the Stellenbosch Municipality Integrated Fire Management Plan (2024) Stellenbosch Municipality has been managing a system of firebreaks in and around Papegaaiberg NR. This system of firebreaks (Figure 14) must be maintained on an annual basis, completed by October each year. Along with the depicted firebreaks internal roads and road verges must be maintained to act as internal breaks and access to emergency vehicles. The need for additional firebreaks must be considered annually in consultation with the Fire Protection Association (FPA). Such firebreaks may include that along the northern boundary fence as well as along the Eerste River.

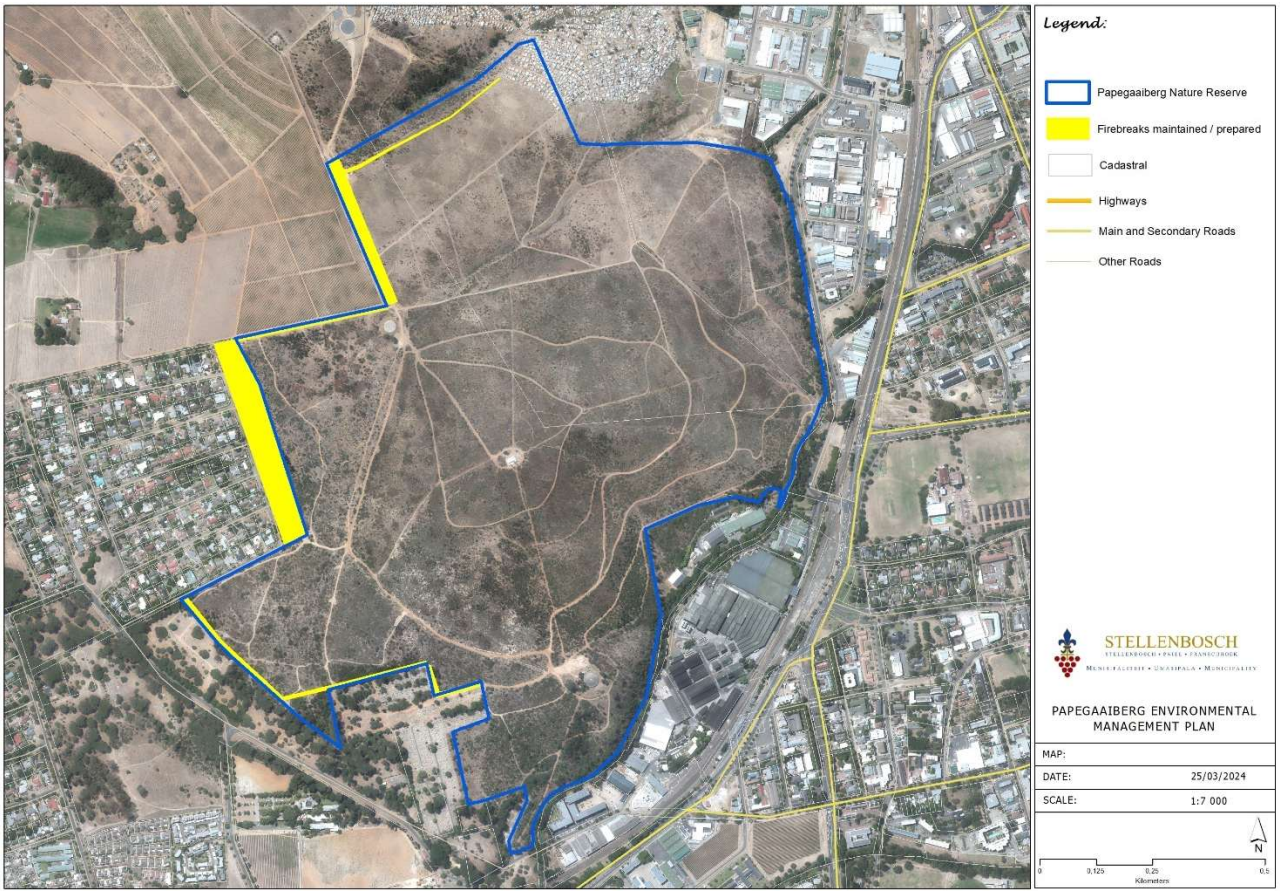

Figure 14: Papegaaiberg NR system of firebreaks.

6.1.1.2 Artificial Burning Regime

Implementing a combined solution of risk management strategy options (a), (b) and (c) implies the on-going modification of the NR in terms of an innovative artificial burning regime. The primary importance of natural or controlled fires is to help reinstate and maintain a viable population of Renosterveld by breaking up large tracts of old vegetation into a mosaic of different ages. This also contributes to the reduction of fuel load to prevent unmanageable wildfires, the control of invasive

alien plants and the safeguarding of infrastructure. Uncontrolled wildfires are one of the main threats to the protection of biodiversity in the NR and to the general integrity thereof.

The artificial fire regime for Papegaaiberg NR is based on the following key criteria and the associated guidelines:

a) Frequency:
It is generally accepted that Renosterveld should burn at a frequency of 12 to 15 years.

b) Intensity:
The intensity of a fire is a factor of fuel load, fuel moisture, relative humidity and wind speed. The intensity can be manipulated by either reducing the fuel load (i.e. burning more often) or by selecting conditions that will lead to the desired type of fire. Renosterveld generally requires higher intensity fires. Alien plants impact significantly on intensity (and consequently frequency) due to their flammable oils and the greater biomass created by the density of invasion. Pristine Renosterveld generally has a relatively low biomass and a low combustible fuel load. This factor should therefore not have a significant influence on the burning program.

a) Season:
Controlled fires must be undertaken during the optimum ecological period of March to early April. This period is generally the most suited in that it supports the ecology of all biodiversity components.

Accordingly, a scheduled block-burning approach is adopted with the objective to create a mosaic of veld ages ranging between 0 and 12 years. In order to implement the scheduled mosaic burning approach the NR is divided into three concentric rings roughly following existing contour roads. These are referred to as an *outer*, *middle* and *inner* zone. Each zone is further divided into blocks. The burning program will be undertaken in accordance with the sequence depicted in Figure 15 and 16 below. The mosaic of veld ages will ensure that there is always a source area to feed re-colonisation in burnt areas. The alien clearing program must correspond with the above burning sequence.

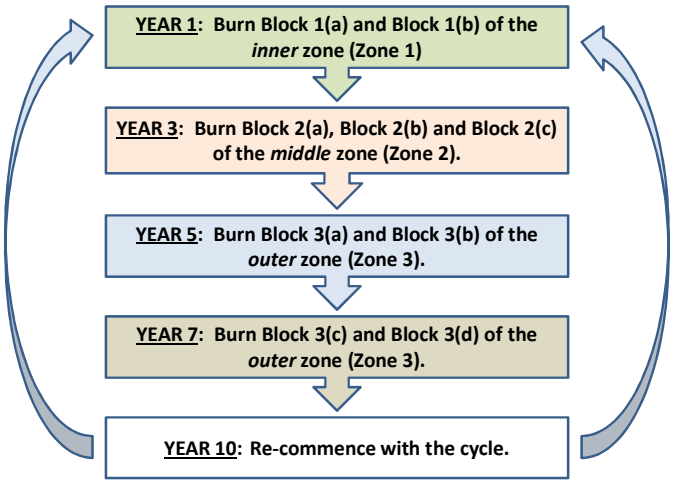

Figure 15: Burning program for Papegaaiberg NR.

It is important to note that the proposed burning regime could be upset by incidental wildfires. This will necessitate rescheduling – flexibility is therefore a key requirement of the burning program. Due to a number of such incidental fires and alien clearing undertaken within Papegaaiberg NR during the last two years (2022-'23) controlled fires have not been implemented.

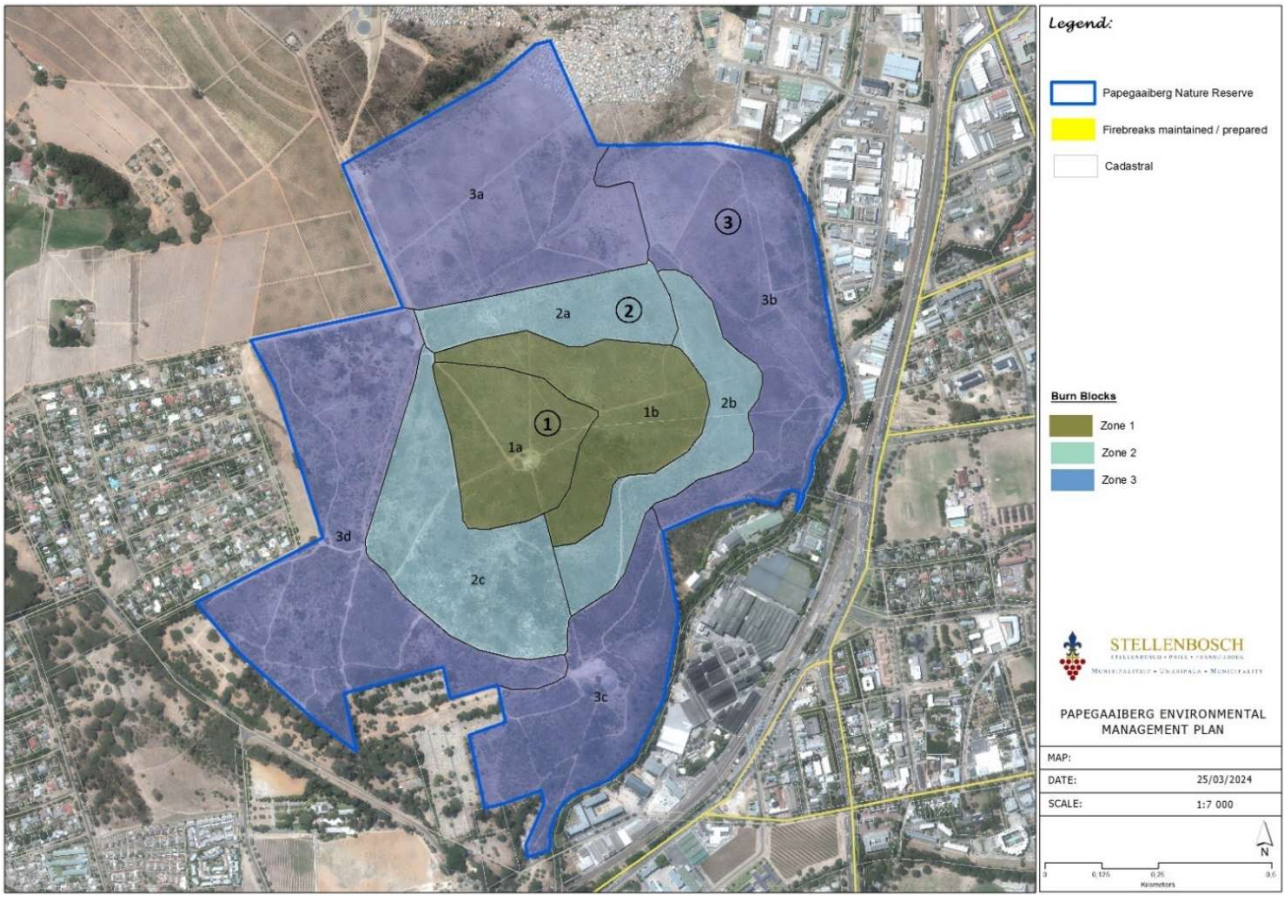

Figure 16: Block burning system for Papegaaiberg NR.

Table 6: Fire Management.

FIRE MANAGEMENT				
Objectives		• Ensure conservation of species and processes by maintaining ecosystem functioning. • Allow for natural fire processes to occur without impacting on safety and infrastructure.		
Ref.	**Key Deliverables**	**Management Activities**	**Responsibility**	**Timeframe**
1 2 3 4	Reduce / Prevent the spread of fire	• Maintain the existing system of firebreaks. • Evaluate the need for additional firebreaks in consultation with the FPA. • Undertake prescribed burning. • Mapping of all fires and capture on GIS (prepare and maintain a register of veld fires including the extent and date).	Management Authority	Annually by October
5	Maintain partnerships	• Maintain FPA membership.	Management Authority	Annually

6.1.2 Invasive Vegetation Management

Invasive alien plants (IAPs) are plant species that have been introduced, either intentionally or unintentionally, to South Africa. They can reproduce rapidly in their new environments and, as mentioned above, tend to out-compete indigenous plants. The result usually includes a variety of negative ecological, social, and economic impacts. Invasive alien species pose the biggest threat to biodiversity after direct habitat destruction.

IAPs located within Papegaaiberg NR include *Acacia implexa, Acacia saligna, Acacia mearnsii*, *Pinus pinea* and *Eucalyptus grobulus*. Of these *Acacia saligna* and *Acacia mearnsii* has the highest densities. Though invasion density on Papegaaiberg itself is less than 50%, there is a high invasion density at the foot of the mountain. This has largely been addressed with recent alien clearing work that has focused on the southern slopes of Papegaaiberg (Table 7 and Figure 17).

Table 7: Areas cleared during the previous (2020/'21 and 2021/'22) financial years.

	Blocks	Type / Implementer	Area cleared (ha)
Papegaaiberg NR	3	Focus on acacia implexa / SANBI	13.4

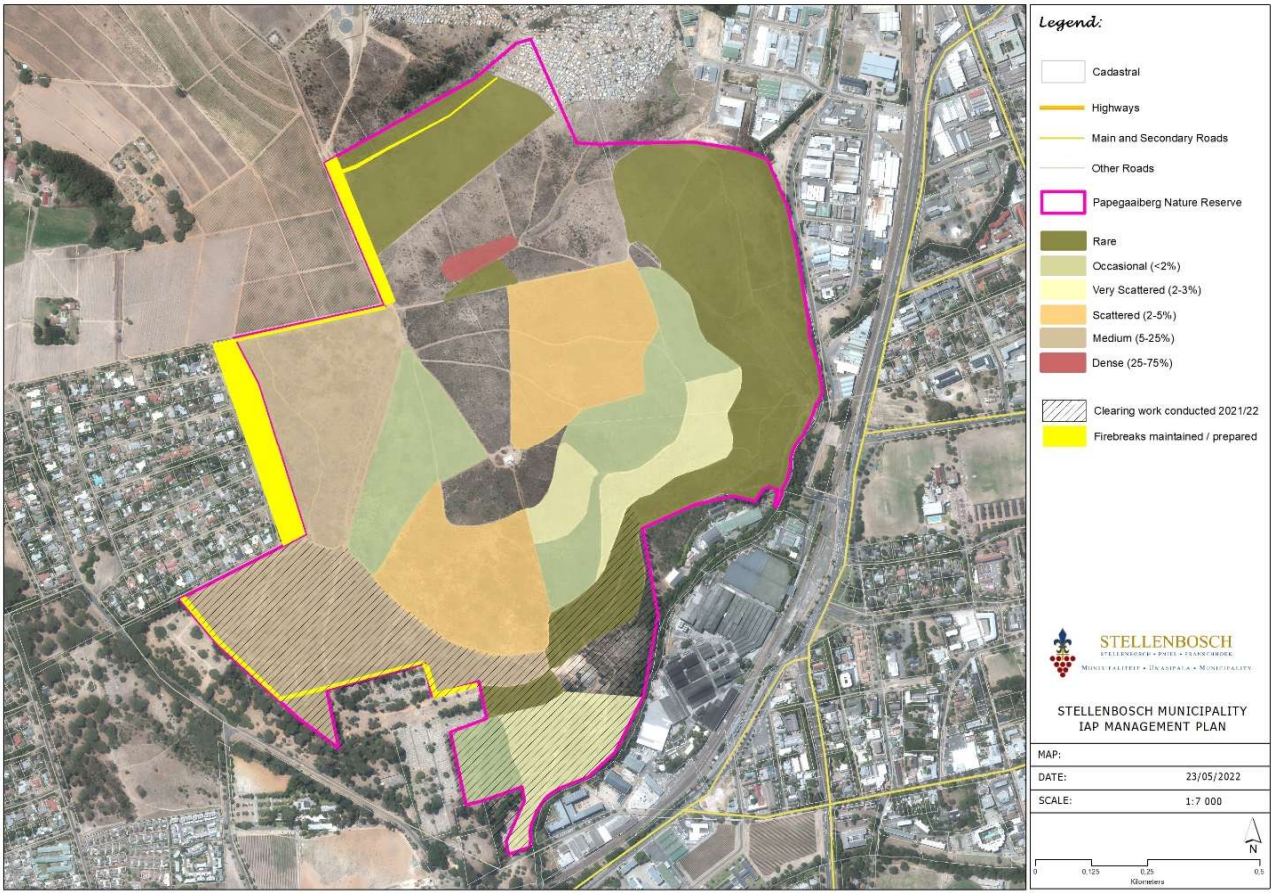

Figure 17: Alien invasive plant density (%) on Papegaaiberg Nature Reserve.

The western slope of Papegaaiberg contains both *Acacia saligna* and *Acacia mearsnii*. *Eucalyptus grobulus* is mostly contained along the southern slope. *E. grobulus* also occurs on the previously burnt western slope. *P. pinea* densities are relatively low, with several large pine trees located along

the foot of Papegaaiberg. The zonation map included as Figure 18 (Stellenbosch Municipality IAP Management Plan [2022]) is to aid clearing IAPs on Papegaaiberg NR. Roads on the property are used for zone boundaries. The property is divided into 5 large zones (A-E) and divided into smaller zones to assist clearing strategies. To prevent spread of alien invasive plants down the slope into cleared areas during clearing and follow-up efforts, clearing and maintenance should start at the summit of Papegaaiberg marked as zone A. When zones A1-A5 are cleared, continue downward to zones B, followed by C. Zones E1-E3 should be cleared last. Given the occurrence of unplanned fire in the NR the timing of prescribed burn will be assessed annually, depending on veldt age.

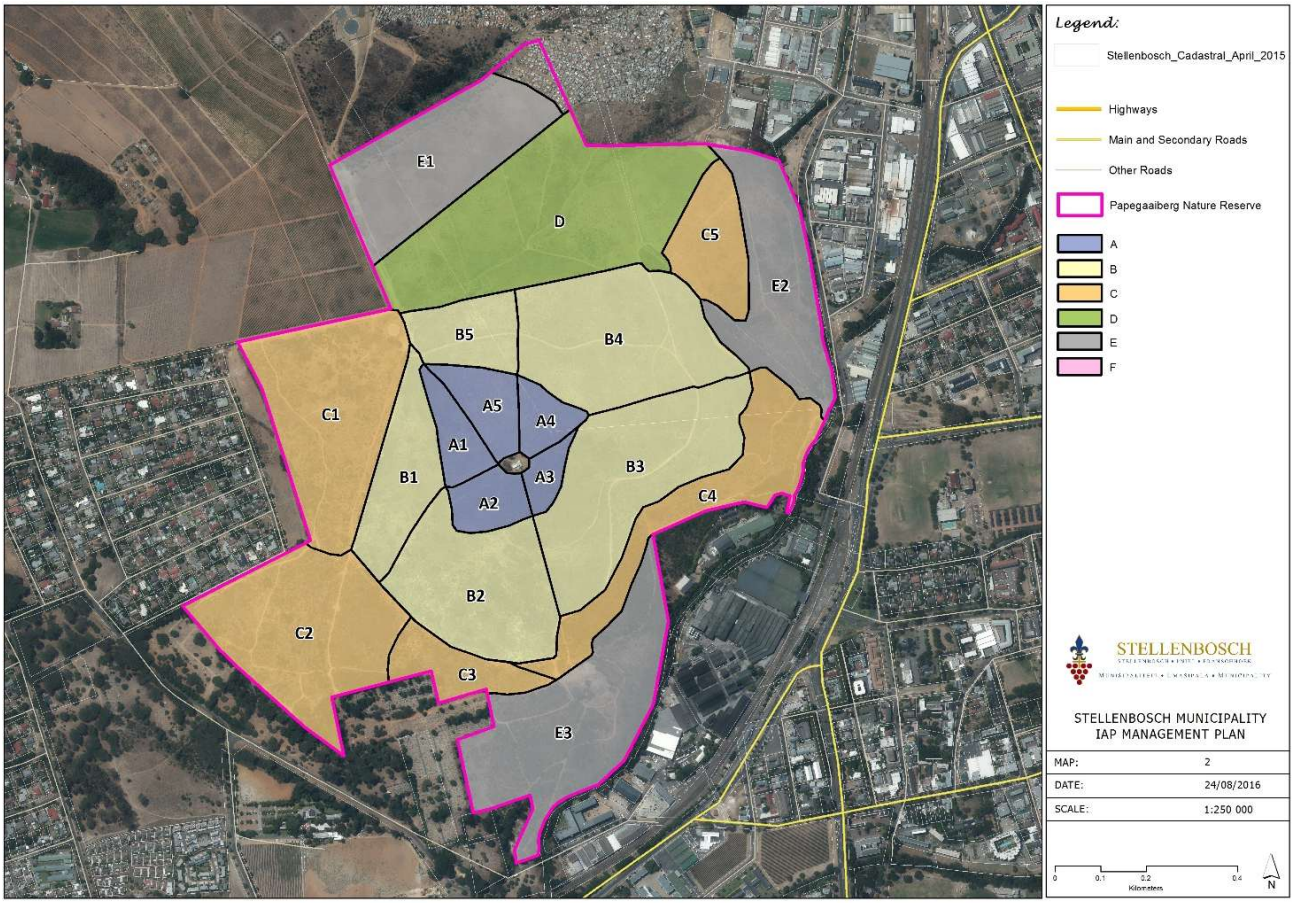

Figure 18: Zonation of Papegaaiberg as an aid for IAP clearing.

In terms of the Stellenbosch Municipality Invasive Alien Plant Management Plan (2022) all alien species on Papegaaiberg must be removed mechanically by uprooting young plants and tree felling of larger trees followed by the application of chemical herbicides to the cut surface to prevent resprouting. Biomass accumulated from clearing work should be chipped and/or burned (subject to a burn-permit acquired).

Table 8: Invasive Vegetation Management

INVASIVE ALIEN PLANT MANAGEMENT				
Objectives		• Enhance biodiversity protection and conservation. • Ensure conservation of species and processes by maintaining and improving ecosystem functioning. • Implement effective integrated catchment management.		
Ref.	**Key Deliverables**	**Management Activities**	**Responsibility**	**Timeframe**
6 7	Eradicate alien and invasive species	• Implement follow-up action in areas cleared during previous year. • Initiate clearing within identified areas.	Management Authority	Annually

6.1.3 Wildlife Management

Biodiversity conservation essentially means conserving all the elements ('parts') of the natural environment. The mix of species in an ecosystem enables that system both to *provide* a flow of ecosystem services under given environmental conditions, and to *maintain* that flow if environmental conditions change. The loss of biodiversity, therefore, limits the resilience of the affected ecosystem, which in turn, may have direct negative economic implications. Therefore, in order to promote biodiversity conservation in the NR it is imperative that the conservation of the faunal component receives appropriate attention. The table below provides strategies and management guidelines for the conservation of the fauna that occur on Papegaaiberg.

Table 9: Wildlife Management

WILDLIFE MANAGEMENT				
Objectives		• Enhance biodiversity protection and conservation. • Ensure conservation of species and processes by maintaining and improving ecosystem functioning. • Implement effective integrated catchment management.		
Ref.	**Key Deliverables**	**Management Activities**	**Responsibility**	**Timeframe**
8 9 10	Prevent the introduction of alien species	• Monitor and record occurrence of wildlife. • Remove alien animal species and feral domestic animals in terms of applicable municipal policy. • Prevent unnatural predation through ongoing law-enforcement.	Management Authority	Ongoing
11 12 13	Control alien and invasive species	• Identify the occurrence of alien fauna on the NR. • Monitor populations of alien fauna on the NR. • Implement control measures where appropriate.	Management Authority	Ongoing

6.1.4 Biodiversity Security

'Natural vegetation is the visual expression of the environment; it is a product of the action of environmental factors over time and hence can be a valuable indicator of potential productivity of ecosystems' (Bayer, 1970). As stated previously the natural vegetation in the reserve has been severely impacted upon by former land-uses land-uses (e.g. forestry) and the infestation of alien plants, such as *Pinus*, *Eucalyptus* and exotic *Acacia*. The most important focal point of the NR is the restoration and long-term protection of the near-extinct and irreplaceable Renosterveld types that occur on the site.

Rehabilitation will be achieved through natural succession. Management intervention will be limited to the implementation of management strategies aimed at enhancing natural succession. Guidelines in this regard are listed in the table below.

Table 10: Biodiversity Security

BIODIVERSITY SECURITY				
Objectives		• Enhance biodiversity protection and conservation. • Ensure conservation of species and processes by maintaining and improving ecosystem functioning.		
Ref.	**Key Deliverables**	**Management Activities**	**Responsibility**	**Timeframe**
14 15	Research	• Institute research to verify existing botanical reports. • Scheduled research and monitoring to determine recurrence of species.	Management Authority	Annually by October
16 17 18	Biodiversity Protection	• Undertake scheduled burning in accordance with Section 6.1.1 above. • Remove and control all infestations of alien plants in accordance with Section 6.1.2 above. • Map the areas cleared of alien plants indicating the date of operations, species removed and current status.	Management Authority	Ongoing

6.1.5 Erosion Control

Appropriate measures must be taken to protect areas susceptible to erosion by installing all the necessary temporary and permanent drainage works. Steep slopes and other areas prone to erosion must be maintained or restored according to the following guidelines:

a) Warning signage displaying NO ENTRY, must be installed on all roads, trails or walkways that are permanently or temporarily closed. Physical barriers, using local natural material, may be constructed were NO ENTRY signs are not respected to prevent users from accessing such roads, trails or walkways.
b) Existing erosion areas must be back-filled (using on-site material), compacted and restored to a proper condition.
c) Roads, trails or walkways, permanently closed for use, must be:
    i) ploughed,
    ii) the top soil scarified (to make sure that no downhill trenches or drainage lines are created),

iii) water diversion walls created by hand at a distance of 10m apart (depending on the slope) leading 5m into the natural vegetation,

iv) and revegetated by either soughing or transplanting appropriate material.

d) Areas, where the above measures are not sufficient, must be logged, parallel to the contour in order to prevent further soil erosion. Logs must be laid in lines 15m apart, depending on the slope (the steeper the slope the closer the barriers must be laid to each other). Logs must be secured by means of steel pegs hammered through a drilled hole on each end of the log (logs longer than 2m must be secured by an additional steel peg through the middle of the log). Where logs are laid across a road, the log must be laid up to a minimum of 1m past the edge of the road.

e) Roads (to stay in use) must be graded to have a slight gradient to the inside (up-hill) (refer to Figure 19). A drainage ditch must be created on the inside of the road. Gravel humps must be created at an angle across roads to drain water from the road surface into to the drainage ditch. At selected locations (depending on the slope) furrows must be created across the roads surface to discharge the water collected in the drainage ditch. The guiding principle behind the creation of a drainage ditch and discharge furrows is to not allow water to reach a speed at which it will create erosion. After a rain event all roads must be inspected to determine if any maintenance is required.

f) Erosion sites on bicycle tracks and walking trails must be logged following the contours and spaced vertically 0.8-1.2m apart, depending on the steepness of the slope.

g) Logs must be untreated pine (or gum) poles of not less than 150mm with a taper of not more than 75mm over its length.

h) Cut and fill slopes will be shaped and trimmed to approximate the natural condition and contours as closely as possible and be undulating. Levels, incongruous to the surrounding landscape, will be reshaped using a grader and other earthmoving equipment.

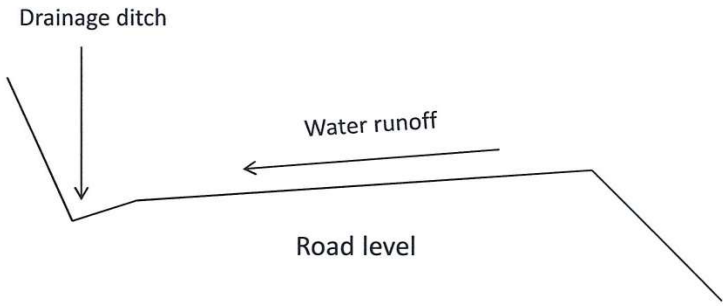

Figure 19: Road surface slope with a drainage ditch

Table 11: Erosion Control

EROSION CONTROL				
Objectives		• Enhance biodiversity protection and conservation. • Implement effective Integrated Catchment Management.		
Ref.	**Key Deliverables**	**Management Activities**	**Responsibility**	**Timeframe**
19 20 21 22	Prevent and mitigate soil erosion	• Conduct a soil erosion assessment. • Restore erosion sites in accordance with the guidelines above. • Monitor site recovery. • Inspect drainage ditches on all roads after exceptional rain events to	Management Authority	Annually

23		determine whether maintenance is required • Prevent overuse of routes and sites susceptible to erosion through appropriate signage.		

6.1.6 Water Management

The Plankenbrug River is in a degraded state primarily due to run-off from industrial-, informal- and urban areas, pollution and inappropriate human uses of the river and its riparian areas. The role and potential impact of Papegaaiberg NR seems negligible when considered against the scale of the catchment as a whole. However, in terms of the environmental policy the NR is recognized as one of the vital components of the catchment and should therefore be managed accordingly. The table below provides objectives and strategies in respect of water management and river rehabilitation on and in the periphery of the nature reserve.

Table 12: Water Management

WATER MANAGEMENT				
Objectives		• Ensure the implementation of effective conservation management interventions. • Enhance biodiversity protection and conservation.		
Ref.	**Key Deliverables**	**Management Activities**	**Responsibility**	**Timeframe**
24 25	Maintain ecological corridors	• Remove all forms of pollution. • Remove all invasive weeds from the Plankenbrug River.	Management Authority	Ongoing

6.2 DEVELOPMENT AND INFRASTRUCTURE

Due to a number of security concerns (addressed under Section 6.3.1 and 6.3.2 below) development, with specific reference to amenities, is not possible. Once security of the NR has been effectively established and all forms of vandalism contained such opportunities can again be considered. Even so, the following guiding principles for the consideration of tourism related development within Papegaaiberg NR remains applicable:

- Tourism products must be appropriate to the site's values and must not threaten its biodiversity or ecological function.
- Tourism products should be designed to capitalise on the unique beauty and biodiversity features of the site.
- Tourism products should be developed in response to tourism market demands and opportunities within the site and should be carefully assessed to determine their viability.

Table 13: Infrastructure Development and Management

MANAGEMENT DEVELOPMENT AND MANAGEMENT				
Objectives		• Evaluate potential tourism opportunities. • Implement effective management systems. • Ensure legal compliance and implementation of authorised development plans.		
Ref.	**Key Deliverables**	**Management Activities**	**Responsibility**	**Timeframe**
26	Ensure that all infrastructures on the NR is adequately maintained.	• Implement a scheduled maintenance programme to maintain facilities and infrastructure in a condition that meet relevant environmental, health and safety requirements.	Management Authority	Ongoing
27	Development of tourism opportunities that generate revenue for the NR.	• Plan and develop hiking routes and mountain bike trails.	Management Authority	As required

6.3 OPERATIONAL MANAGEMENT

6.3.1 Access Control

Uncontrolled/open access is one aspect that have left local communities with the perception that Papegaaiberg is generally not safe. This is arguable the main threat to the NR becoming the recreational and educational asset it is intended to become.

Uncontrolled/open access and the occurrence of crime on Papegaaiberg is a challenge. As described under the socio-economic context section above, whilst a portion of surrounding residence have a need to use the NR for recreational purposes, it is traversed on a daily basis by community members from Kayamandi and Enkanini employed in areas to the west and south of Papegaaiberg. This aspect can, to a large degree, be addressed with the implementation of the measures listed in the table below.

Table 14: Access Control

BOUNDARY SECURITY				
Objectives		• Ensure legal use of the NR. • Ensure the safety of all users of the NR.		
Ref.	**Key Deliverables**	**Management Activities**	**Responsibility**	**Timeframe**
28 29 30 31	Improved security and user safety	• Establish appropriate entry points. • Erect notice boards and signs to ensure that recreational users only use dedicated routes. • Monitor existing fence lines. • Identify the need for the construction of additional fence lines.	Management Authority	Ongoing

32		• React to any form of illegal or unauthorised use within the NR.		

6.3.2 Securing the boundaries of Papegaaiberg Nature Reserve

Papegaaiberg NR borders the informal residential area of Enkanini. Since the formal declaration of Papegaaiberg as NR in 2016 there has been a number of challenges with securing the boundary in the area towards the north of the NR. Illegal residential structures have encroached upon the NR along with farming activities. Having considered all possible options in addressing this matter Stellenbosch Municipality are in the process of withdrawing a section of the original NR most affected by these activities, securing and amended boundary. The area to be withdrawn constitute an area of approximately 3ha of highly transformed land, following the delineation of the 2023 constructed fence to the north of the NR (Figure 20).

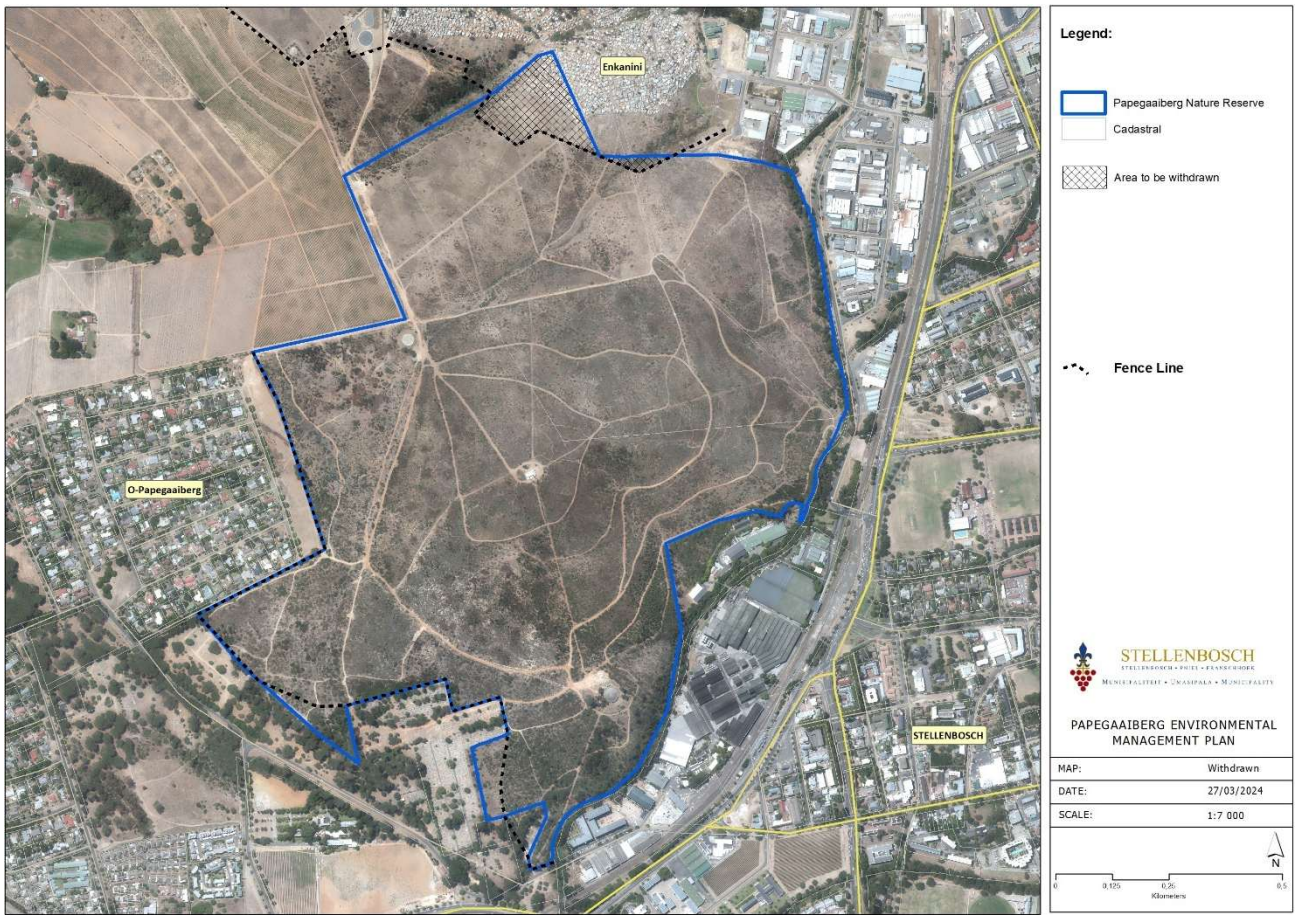

Figure 20: Portion of Papegaaiberg NR being withdrawn.

An integrated security strategy for the NR are being finalized with appointed contractors assisting Municipal Law Enforcement with monitoring the NR fence line and reacting to any form of further encroachment. Access to the NR needs to be controlled and conditions of entry clearly stipulated on signboards at access points.

Table 15: Security

SECURITY				
Objectives		• Prevent all forms of illegal encroachment into the NR. • Enhance biodiversity protection and conservation. • Ensure conservation of species and processes by maintaining and improving ecosystem functioning.		
Ref.	**Key Deliverables**	**Management Activities**	**Responsibility**	**Timeframe**
33 34 35	Security	• Initiate the withdrawal of the relevant transformed sections with the establishment of the amended boundary. • Monitor existing fence lines. • React to any form of illegal encroachment within the NR.	Management Authority	Ongoing

6.3.3 Legal Compliance

As Management Authority, Stellenbosch Municipality is mandated to enforce laws related to the conservation of Papegaaiberg NR. The following guiding principles must be adhered to at all times:

- Law enforcement efforts should be coordinated with the relevant authorities including Cape Nature and the South African Police Service in addressing offences and breaches of the law.
- Law enforcement at the site will be undertaken through surveillance, monitoring and appropriate reaction in the event of an offence.

Table 16: Legal Compliance

LEGAL COMPLIANCE				
Objectives		• Ensure legal compliance to relevant legislation and policies.		
Ref.	**Key Deliverables**	**Management Activities**	**Responsibility**	**Timeframe**
36 37	Ensure that all legal requirements are met	• All development needs to be done according to the NEMA principles and follow the applicable legislation and procedures of all relevant stakeholders. • Water management within the Reserve must comply with the National Water Act (No 36 of 1998).	Management Authority	Ongoing

6.3.4 Management Effectiveness

As stated above, the long-term sustainability of the area largely depends on its effective administration and management. Stellenbosch Municipality, as Management Authority, must measure- and hold itself accountable for the effective implementation of the EMP and strive for continual improvement through adaptive management described under Section 1.3 above

Table 17: Management Effectiveness

MANAGEMENT EFFECTIVENESS				
Objectives		• Implement effective management systems.		
Ref.	**Key Deliverables**	**Management Activities**	**Responsibility**	**Timeframe**
38	Annual audit completed	• Conduct annual audits.	Management Authority Cape Nature	Annually
39	Auditing systems inform management	• Update the EMP following annual audit results.	Management Authority Cape Nature	Annually

7. COSTING PLAN

The following represents an in principle costing plan to guide the preperation of annual budgets for the management of Papegaaiberg NR:

Management Action	**Estimated cost 2026**	**Estimated cost 2027**	**Estimated cost 2028**	**Estimated cost 2029**	**Estimated cost 2030**
Appoint a reserve manager.	From appointed staff.	-	-	-	-
Provide adequate logistical and administrative support for the reserve manager.	From existing fleet	-	-	-	-
Remove and control alien plants.	R150 000	R100 000	R100 000	R100 000	R100 000
Restore defined erosion sites.	R15 000	R15 000	R15 000	R15 000	R15 000
Implement preventative measures on potential erosion sites.	R15 000	R15 000	R15 000	R15 000	R15 000
Prepare a 15 meter firebreak along the boundaries of the nature reserve.	R150 000	R100 000	R80 000	R60 000	R60 000
Maintain firebreaks.	R60 000	R60 000	R60 000	R60 000	R60 000
Erect notice/entrance boards and signs.	R25 000	R25 000	R10 000	-	-
Subtotal	R415 000	R315 000	R280 000	R250 000	R250 000
Total					**R1 510 000**

8. ANNUAL PLAN OF OPERATION REVIEW

Monitoring and reporting enables the effective assessment of management interventions. If necessary it can be used to direct modifications of management in an effort to achieve the outcomes required.

8.1 ANNUAL PLAN OF OPERATION

The Annual Plan of Operation (APO) gives life to the Operational Management Framework on an annual basis and allows for progress to be tracked. The APO is attached as Annexure 2.

8.2 MANAGEMENT PLAN REVIEW

The purpose of undertaking an annual review of implementation of the EMP will be to:

- Determine how effectively the management plan has been implemented.
- Assist in determining the focus for the annual plan of operation and the setting of appropriate time frames and budgets.
- Enable effective adaptive management by identifying changes and modifying management interventions.

The annual audit will form the basis of the management plan review. This should include records of recommendations for update/changes to the annual revision of the management schedules as well as the five-year plan. The Annual Plan of Operation (APO) is in a similar format to the Annual Audit

9. REFERENCES

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Annexure 1:

Papegaaiberg Nature Reserve proclamation (June 2016)

10 June 2016 Province of the Western Cape: Provincial Gazette 7628 855

P.N. 238/2016 10 June 2016

WESTERN CAPE NATURE CONSERVATION BOARD

NOTICE

PROVINCE OF THE WESTERN CAPE

NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT, NO. 57 OF 2003: DECLARATION OF THE PAPEGAAIBERG NATURE RESERVE

I, Anton Bredell, Provincial Minister of Local Government, Environmental Affairs and Development Planning in the Western Cape, under section 23(1) of the National Environmental Management: Protected Areas Act, No. 57 2003, declare a nature reserve on:—

- Remainder of Farm No. 183, Situated in the Stellenbosch Municipality, Division of Stellenbosch, Western Cape Province;

  In extent: 291, 3792 (Two Hundred and Ninety One comma Three Seven Nine Two) Hectares;

  Held by Stellenbosch Freehold Grant No. 8–15/1908;

- Remainder of Farm No. 181, Situated in the Stellenbosch Municipality, Division of Stellenbosch, Western Cape Province;

  In extent: 1, 7359 (One comma Seven Three Five Nine) Hectares;

  Held by Stellenbosch Freehold Grant No. 5–36/1887;

- Portion 5 of the Farm Kromme Rivier No. 175, Situated in the Stellenbosch Municipality, Division of Stellenbosch, Western Cape Province;

  In extent: 4476 (Four Thousand Four Hundred and Seventy Six) Square Metres;

  Held by Title Deed No. T11602/1927;

- Remainder of Portion 33 of the Farm Kromme Rivier No. 175, Situated in the Stellenbosch Municipality, Division of Stellenbosch, Western Cape Province;

  In extent: 22, 8712 (Twenty Two comma Eight Seven One Eight Five Two) Hectares;

  Held by Deed of Transfer No. T69537/2001.

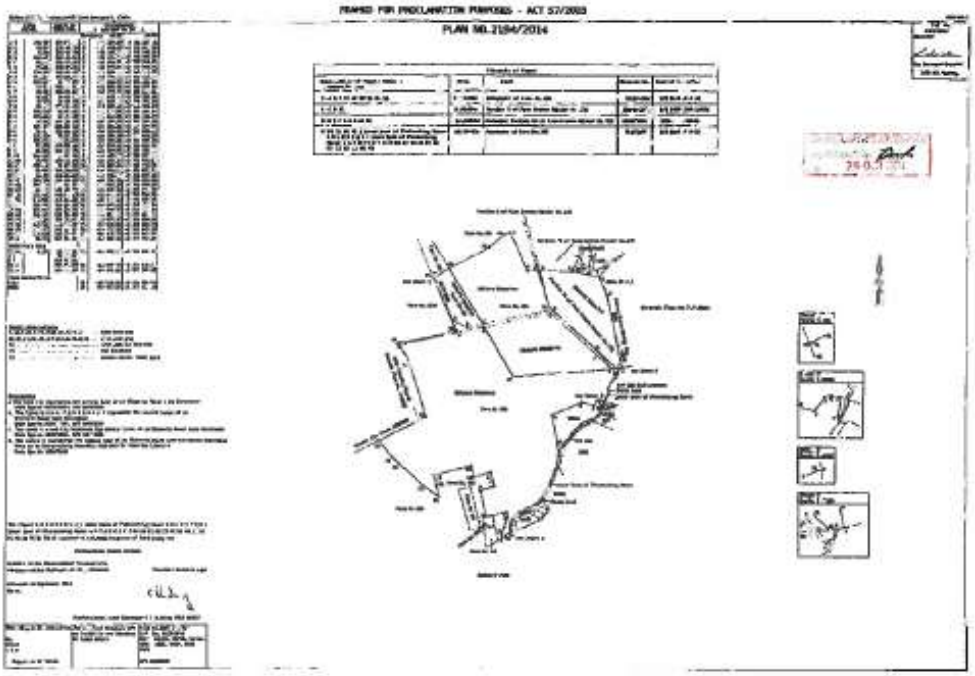
The boundary of the nature reserve is reflected on Diagram No. 2194/2014 as set out in the Schedule, and I assign the name "**Papegaaiberg Nature Reserve**" to it.

Signed at Cape Town this 2nd day of June 2016.

A BREDELL, MINISTER OF LOCAL GOVERNMENT, ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING

SCHEDULE

DESCRIPTION OF PROPERTY



Annexure 2:

Papegaaiberg Nature Reserve Annual Plan of Operation

FIRE MANAGEMENT				
Ref.	**Management Activities**	**Responsibility**	**Resource**	**Timeframe**
1	• Maintain the existing system of firebreaks.	Management Authority	Internally (Environmental Management) / Through Firebreak Tender	Annually by October
2	• Evaluate the need for additional firebreaks in consultation with the FPA.		Internally (Environmental Management) with FPA	Annually by October
3	• Undertake prescribed burning.		Internally (Environmental Management) with FPA, Local and District Fire Services.	As identified, annually by April
4	• Mapping of all fires and capture on GIS (prepare and maintain a register of veld fires including the extent and date).		Internally (Environmental Management)	Annually by October
5	• Maintain FPA membership.	Management Authority	Internally (Environmental Management) R6 200 From Operational Budget	Annually by April
INVASIVE ALIEN PLANT MANAGEMENT				
6	• Implement follow-up action in areas cleared during previous year.	Management Authority	Internally (Environmental Management) / Through Alien Clearing Tender	Annually
7	• Initiate clearing within identified areas.		Internally (Environmental Management) / Through Alien Clearing Tender	Annually
WILDLIFE MANAGEMENT				
8	• Monitor and record occurrence of wildlife.	Management Authority	Internally (Environmental Management)	Ongoing
9	• Remove alien animal species and feral domestic animals in terms of applicable municipal policy.		Internally (Law Enforcement)	

10	• Prevent unnatural predation through ongoing law-enforcement.		Internally (Law Enforcement)	
11	• Identify the occurrence of alien fauna on the NR.	Management Authority	Internally (Environmental Management)	Initially by June 2024
12	• Monitor populations of alien fauna on the NR.		Internally (Environmental Management)	Ongoing
13	• Implement control measures where appropriate.		Internally (Environmental Management)	As required
BIODIVERSITY SECURITY				
14	• Institute research to verify existing botanical reports.	Management Authority	Internally (Environmental Management)	Annually by October
15	• Scheduled research and monitoring to determine recurrence of species.	Management Authority	Internally (Environmental Management) with relevant partners (Cape Nature /SANBI/CREW)	
16	• Undertake scheduled burning.	Management Authority	See #3 above	
17	• Remove and control all infestations of alien plants.	Management Authority	See #7 above	
18	• Map the areas cleared of alien plants indicating the date of operations, species removed and current status.	Management Authority	Internally (Environmental Management)	Annually by July
EROSION CONTROL				
19	• Conduct a soil erosion assessment.	Management Authority	Internally (Environmental Management)	Annually by end of August
20	• Restore erosion sites in accordance with the guidelines above.	Management Authority	Internally (Environmental Management)	As required
21	• Monitor site recovery.	Management Authority	Internally (Environmental Management)	As required, following site recovery.
22	• Inspect drainage ditches on all roads after exceptional rain events to determine whether maintenance is required	Management Authority Management Authority	Internally (Environmental Management)	As required

23	• Prevent overuse of routes and sites susceptible to erosion through appropriate signage.		Internally (Environmental Management)	
WATER MANAGEMENT				
24	• Remove all forms of pollution.	Management Authority	Internally (Environmental Management / Area Cleaning)	Ongoing
25	• Remove all invasive weeds from the Plankenbrug River.		Internally (Environmental Management) / Through Alien Clearing Tender	
MANAGEMENT DEVELOPMENT AND MANAGEMENT				
26	• Implement a scheduled maintenance maintain facilities and infrastructure in a condition that meet relevant environmental, health and safety requirements.	Management Authority		Annually
27	• Plan and develop hiking routes and mountain bike trails on existing access roads.	Management Authority		As required
ACCESS CONTROL				
28	• Establish appropriate entry points.	Management Authority	Internally (Environmental Management)	Ongoing
29	• Erect notice boards and signs to ensure that recreational users only use dedicated routes.	Management Authority	Internally (Environmental Management)	
30	• Monitor existing fence lines.	Management Authority	Internally (Law Enforcement)	Ongoing
31	• Identify the need for the construction of additional fence lines.	Management Authority		
32	• React to any form of illegal or unauthorised use within the NR.	Management Authority	Internally (Law Enforcement)	Ongoing
BOUNDARY SECURITY				
33	• Initiate the withdrawal of the relevant transformed sections with the establishment of the amended boundary.	Management Authority	Internally (Environmental Management)	Process initiated by July 2024
34	• Monitor existing fence lines.	Management Authority	See #30	Ongoing
35				

	• React to any form of illegal encroachment within the NR.	Management Authority	Internally (Law Enforcement)	
LEGAL COMPLIANCE				
36 37	• All development needs to be done according to the NEMA principles and follow the applicable legislation and procedures of all relevant stakeholders. • Water management within the Reserve must comply with the National Water Act (No 36 of 1998).	Management Authority	Internally with DEADP Internally with DWS	Ongoing
MANAGEMENT EFFECTIVENESS				
38	• Conduct annual audits.	Management Authority Cape Nature	Internally with Cape Nature	Annually
39	• Update the EMP following annual audit results.	Management Authority / Cape Nature	Internally	Annually