

# Regional Spatial Development Framework for Saldanha Bay Municipality: Pursuing a more Ecologically Integrated Future

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Dissertation presented as part fulfilment of the degree of Masters of City and Regional Planning in  
the School of Architecture, Planning and Geomatics University of Cape Town

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2016

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Thank you

Yours sincerely

## **ABSTRACT:**

This study has sought to understand how spatial planning can be utilized as a tool to aid the transition to a more ecologically resilient future through better integrating natural resource management and spatial planning. Nature profoundly influences the structure and form of Saldanha Bay Municipality. This is based on the premise that nature is not situated at the forefront of development and is not adequately addressed in spatial planning - our relationship with nature needs to change. Strategic spatial planning is a long term future imagined. Unlike conventional land use management, spatial planning is well-positioned to resolve conflicts and tensions through in-depth analysis, direction, guidance and then strategic implementation. With the guidance of multiple policies, the personal beliefs of a planner and the incorporation of the interests of a variety of stakeholders, a future that is conducive to all is possible.

In light of this, the main objective of this study was to integrate the 2011 Spatial Development Framework and the 2015 Environmental Management Framework of Saldanha Bay Municipality in order to find gaps and contestations which will help produce an improved and better-integrated ecologically mindful Regional Spatial Development Framework for Saldanha Bay Municipality. This study has undertaken a review of international literature to theoretically locate this study. This is followed by a contextual spatial and policy analysis of Saldanha Bay Municipality, which was predominantly focused on the findings of the 2015 EMF and 2011 SDF in order to better understand the key priorities with regards to the environment in the region. Using this as a platform to guide appropriate intervention, a Regional Spatial Development Framework (RSDF) has been created to propose a new nature-based development path. This plan is governed by the principles of reverence, intergenerational equity, interconnectedness, intrinsic value and individual responsibility.

By recognizing the spatial relationships between people, their activities and nature this RSDF offers an opportunity to promote a more integrated and harmonized future. This is done using the key environmental layers of the 2015 EMF as the main platform to guide development towards better ecological resilience and adaption in the region. The key layers of the 2015 EMF are the "Keep Assets Intact", "Develop with Care: Valued Resources" and "Develop with Care: Restrictive Conditions or

Constraints" which indicate all the environmental attributes in the region. By understanding the environmental context, the researcher formulated three management frameworks from which key strategic interventions were developed in order to accommodate these environmental attributes and guide the vision of the RSDF.

The landscape and natural resource management framework consists of the strategies of ecological remnants, diversifying dryland agriculture, coastline protection and enhancement, and lastly catchment management initiatives. All these strategies are directed at and fundamentally pursue the protection, enhancement, conservation and regeneration of ecosystems and biodiversity in the region. The economic development management framework consists of the strategies of renewable energy, eco industries and the IDZ. These strategies focus on the advancement of the local economy through sustainable and ecologically adaptive strategies. The site and settlement management framework consists of the strategies of townscape, reduce point source pollution and sustainable human settlements. These strategies focus on the local sense of place and predominantly the upgrading of infrastructure within settlements in the region. They are placed within a phasing framework for optimized and strategic intervention. All these strategies aim to create a more life-sustaining region through integrating and harmonising the relationship between people and nature, by establishing the importance and qualities of nature.

Therefore, by implementing strategies that are spatially designated across the region and that focus on environmental prosperity and the integration of people and nature, it could be possible to transition to an increasingly ecologically secure future in Saldanha Bay Municipality where there is improved social and ecological health, local prosperity and a region where the natural landscape flourishes.

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## CHAPTER 1: INTRODUCTION

### 1.1 Context and Significance of this Study

Saldanha is located about 140 km from Cape Town along the R27 West Coast Road. The region lies between the Berg River mouth and the West Coast National Park, and stretches inland to Hopefield. Figure 1.1 shows the Saldanha Bay Municipal area in its regional context and includes the various surrounding towns (Western Cape Government, 2015).

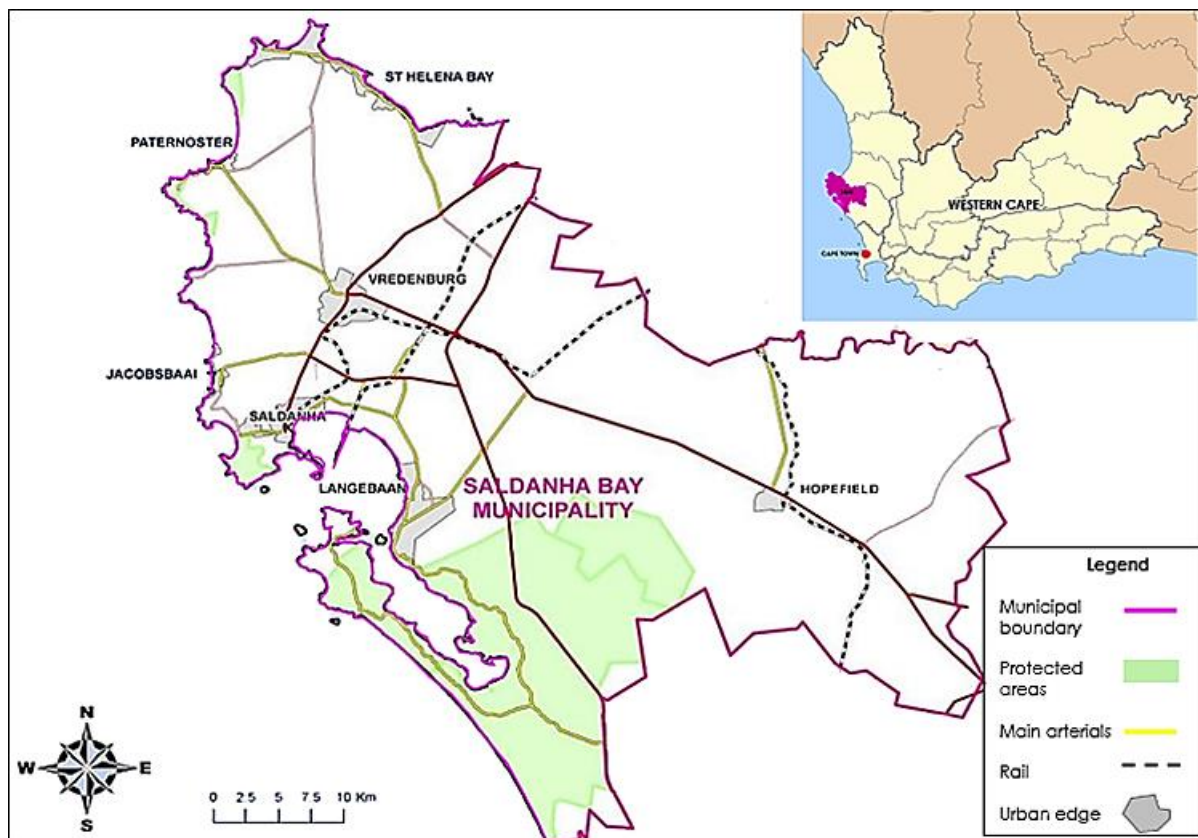


Figure 1.1: Map of Saldanha Bay Municipality Source: (Western Cape Government, 2015).

The study area forms part of a larger economic sub region, and is greatly influenced by the economic activities within neighbouring areas (i.e. Cape Town). In this regard, Saldanha Bay is heavily reliant on economic activities outside of its boundaries for specialized consumer products and services. Figure 1.1 illustrates that apart from Saldanha Bay, the economic sub-region comprises the towns of Hopefield, Langebaan, Jacobs Bay, Paternoster, St Helena Bay and Vredenburg which are located in close proximity to one another. Because the Saldanha Bay Municipality is

in close proximity to Cape Town, most of the services and products are rendered in Cape Town. Saldanha Bay Municipality's economy is strongly dependent on fishing, mussels, seafood processing, the steel industry and the harbour (Western Cape Government, 2015).

According to the 2015 Environmental Management Framework the main issues within Saldanha Bay Municipality are the growing tourism tendencies, the issues around water supply and demand, and also the problem around over utilizing the groundwater supply. Other issues include the ongoing loss of biodiversity and the increase of alien invasive species (land and sea) and the issue around coastal and human development. The region is negatively impacted by poor air quality, the source of which is the dust iron-ore particles from the steel mining. The region has great pressure to develop on sea and land. The industrial development zone is becoming ever-larger within Saldanha - especially with development at the port. The demand for housing and rapid urbanization is causing great pressure and stress on the environment, thus becoming a difficult task to resolve due to the extent and importance of the West Coast biosphere reserve (Western Cape Government, 2015).

The EMF also indicates brown development that is clashing with numerous green areas such as the Langebaan Lagoon (a Ramsar site), the West Coast National Park and also a critical biodiversity area. These areas are under threat due to an increase in big industries (Saldanha steel, oil/gas hub), port expansion, dredging of heavy metals, organic pollution and proliferation of residential/resort development to the water's edge. These environmental issues need to be addressed in the correct manner in order to ensure a prospering region within the minimal boundaries of Saldanha (Saldanha Bay, 2015).

The relationship between planning documents should be binding and cohesively constructed to ensure that critical decisions within spatially significant areas are not misguided. Therefore, as stated within the Municipal Systems Act 32 of 2000 there is a requirement for Spatial Development Frameworks to take into account the information provided by Environmental Management Frameworks (Western Cape Government, 2015). The difference between a SDF and an EMF is that one document focuses on land use and development, whereas an EMF focuses on environmental attributes.

*“A municipality that failed to consider an applicable EMF when compiling or reviewing an IDP or SDF would have failed to take into account a relevant consideration. Under these circumstances, the adoption of the SDF or IDP may well be reviewable in terms of the principles of administrative justice” (Western Cape Government, 2015).*

Therefore, it is imperative to ensure that this RSDF of Saldanha Bay Municipality runs in parallel with the new environmental management framework (2015) which was released last year for public comment. This dissertation will investigate the current SDF (2011) and the new EMF (2015), and after an informed analysis of the EMF, a harmonized planning document could be formed. The researcher will propose an integrated and enhanced SDF, which uses information from the current EMF. In other words, the researcher will find a solution on how to better integrate these two planning and environmental management documents. This could potentially help formulate a document that could possibly guide socio-economic development and simultaneously ensure environmental integrity.

## **1.2 Normative Standpoint of the Study**

This research will be conducted through interaction with those involved in the drafting of municipal spatial development frameworks, professional researchers and academic researchers. It will therefore be important to maintain an unbiased approach to the interviews and conversations to allow for unexpected research outcomes. I aim to engage in ethical research by requesting permission to use excerpts of the interviews as direct quotations in my research. I will respect the interviewee's decision as to the level of permission granted.

I will be conducting this research of my own accord; therefore there shall be no desired bias for my research outcomes. The final outcomes of my municipal spatial development framework will be conducted in a manner that respects the residents of Saldanha Bay. It is also important to remember that the final proposals made are not set in stone. They are merely observations made by the researcher based on the relevant findings and literature used which is available for the public to comment on.

### 1.3 Philosophical Underpinning of the Study

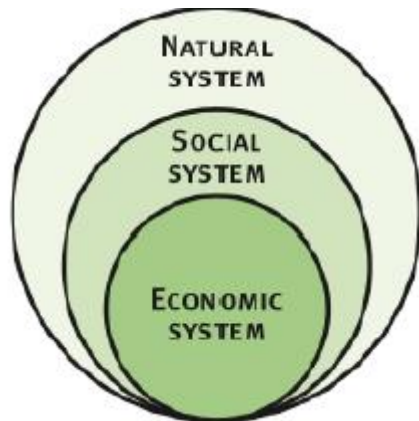


Figure 1.2: Dependency on the Natural System Source: (Pierce & Mader, 2006:11).

The philosophical position underpinning this dissertation is based on the dependency model, which is based on the work of Pierce and Mader (2006). Figure 1.2 indicates the dependency of humans on the natural systems. Since our social and economic systems function within the natural environment, and are completely dependent on it (see Figure 1.2), economic and social sustainability are only achievable if environmental sustainability is achieved. The literature of Pierce & Mader form the backbone of my own philosophical belief that society should live within a respectful and harmonized manner to ensure the longevity of our natural environment. Therefore, in order to ensure the future sustainability of our livelihoods, it is necessary to employ more holistic, integrated and strategic planning methods to positively intervene in a world of ever-increasing complexity and uncertainty.

According to Olsson (2014) the world has fallen into the urbanisation trap, considering that over 50% of the world's population resides within cities. This complements the ongoing problem of fractured urban spaces, with the ever-increasing problem of dysfunctional relationships between urban preferences and environmental needs. Cities within the modern era are trending towards a fractured reality in the sense that our systems are built within isolated environments (Olsson, 2014). This in reality has a detrimental effect on livelihoods and the ever-increasing problems of climate change. Our cities are becoming ever more vulnerable to the ongoing effects of climate change. Figure 1.3 shows the spatial impact of climate change on the world. It is therefore imperative to help change the outcome of the current destructive path society is following.

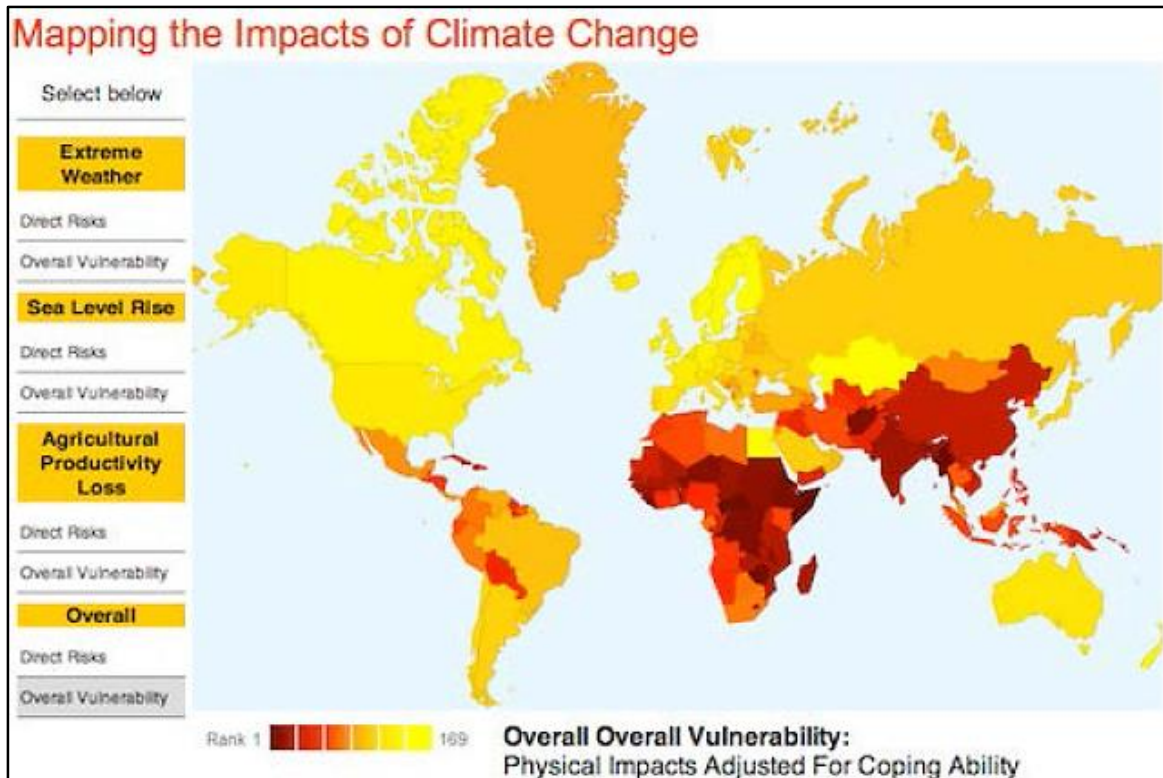


Figure 1.3 Climate Change Overall Vulnerability

Source: (Global Impacts, 2014).

#### 1.4 Scope of the Study

The aim of this research project is to investigate the 2011 SDF of Saldanha Bay Municipality and the new EMF of 2015 of Saldanha Bay Municipality. This will be done by investigating what is said within the EMF about the environmental state and probable future of the region, and aims to ensure that the proposed SDF runs in conjunction with the 2015 EMF. This will potentially help steer the region towards a state of enhancing life and ensuring ecological sustainability, while creating a region with decreased socio-economic problems. The study area under investigation, i.e. the greater Saldanha area, enables to work on a scale that is conducive to the whole region. Thorough investigation of the study area requires collaboration across sectors, such as with professionals and academics. This leads to research in different fields of spatial planning and environmental management, such as Regional development studies, human-nature relationships, social-ecological systems, regional planning theory and the green economy.

The primary and secondary research questions that are under investigation during the research process bound the extent of this study. The primary research question is:

*How can natural resource management and spatial planning be harmonized better within the Saldanha Bay Municipality?*

The secondary research questions include:

- What spatial planning issues impact natural resource management?
- How does one integrate and harmonize green integrity with brown development?
- What are the current threats to the environment posed by human development within the Saldanha region?
- How does one better ensure the future harmony of society and the environment?
- What does one incorporate when producing various economic, environmental and settlement frameworks?
- What are current international approaches to the integration of spatial planning and environmental planning, and how applicable are these in the context of Saldanha Bay Municipality?
- What and where are the sources and sinks of Saldanha Bay Municipality and what are the current or expected spatial planning threats and opportunities to these areas?

The research outcome of this dissertation is a Regional Spatial Development Framework (RSDF) for 2036 for Saldanha Bay Municipality, which has effectively integrated and harmonized the 2015 EMF of Saldanha Bay Municipality. This RSDF will promote environmental enhancement and conservation by implementing strategies that influence spatial planning decisions. This, in effect, will create a closed-loop system within the region, and will ensure that natural assets are kept intact, and spatial planning decisions are influenced through environmental needs. The purpose of this is to enable the people within the greater Saldanha Bay region to live within a responsible and respectable manner within the West Coast Biosphere reserve.

### **1.5 Limitations of Research Study**

This study has a few limitations in terms of producing a concrete and profound study for the Saldanha Bay Municipality. The first limitation in question is the limited time that

the researcher had available to undertake this study. The amount of research needed in order to produce an effective and efficient integrated resource management and planning document was restricted by having only five months to undertake this study. The various aspects of producing this study include conducting effective research, conceptual development and in-depth analysis of the region in question and lastly, the writing of the document. In depth analysis needs on-the-ground research and investigation which should include engagement from various stakeholders and public participation involvement in order to form a holistic and informed opinion. These methods are vital in order to form an opinion from local residents and communities. This ensures the effective formulation of an RSDF that will seek to intervene within all aspects of the region. The purpose of this dissertation is to formulate a document which will effectively act as a tool towards better ecological resilience by guiding land use decisions in the region. The researcher acknowledges that greater input is needed, especially within a local economic context. Inclusivity also needs to be ensured in terms of providing for informal settlements and the needs that locals have. As a consequence, the researcher understands what constitutes an RSDF and will make profound recommendations which will further help the municipality to engage with these problems.

## **1.6 Structure of the Study**

The structure of this dissertation is guided by the primary and secondary questions, and is presented in a series of chapters. This dissertation begins with an overview of the various methods used during this investigation. The second chapter is a thematic review of relevant international and national literature on spatial planning and environmental management. Through this review, the relevant theoretical discourse is contextualised in a manner that is understandable and applicable to the study in question. This creates greater depth and knowledge and acts as a framework in which to locate the contextual analysis of the greater Saldanha area.

In the third chapter, a case study is undertaken by means of a desktop study of national, provincial and municipal policies, plans and documents. The aim of this case study is to perform an in-depth analysis of the different variables that play a role in the final outcome, thereby ensuring future sustained livelihoods that live in harmony with

the natural assets the environment has to offer. This will also lead to the identification of the various opportunities and constraints that will have an impact on the interventions that are suggested. This study includes a review of the current spatial informants within the different spheres of government that have an impact within the region. This will help understand the current state of affairs in terms of land use planning and environmental protection.

This section of the research study will act as a foundation upon which to identify the design development of the RSDf for Saldanha Bay Municipality as a crucial instrument for improved implementation of the principles and practice of integrated environmental urban planning, as demonstrated in the fourth chapter. In this chapter, the dissertation will revisit international literature to identify a relevant precedent from which lessons can be learned for the benefit of sustainable livelihoods in the greater Saldanha region. In chapter five, the outline suggests an implementation for the RSDf through identifying different roles and responsibilities of the various actors and identification of the phasing layout plan. The concluding chapter includes the study and reflections on the various processes and lessons learnt.

## **1.7 Methods and Techniques of Research**

During the investigation of the topic in question, a case study method is used in order to successfully explore the greater region of Saldanha. A research method refers to the process used for gathering information and data. Both quantitative and qualitative methods will be used during this dissertation. Quantitative data methods are objective, precise and numerical, while qualitative data methods refer to analysis which is more subjective, interpreted and text or image based. These methods have value within this research in order to develop an integrated resource management and planning document for the future of the greater Saldanha region.

### **1.7.1 Case Study**

As mentioned, the primary method used within the research is the case study method. The research method used during this dissertation will be the case study method, where Saldanha Bay Municipality is the conducted case. According to Yin (2004) the

strength of the case study method is its ability to examine in-depth, a case within its real life. Case study research enables investigation into important topics not easily covered by other methods (Yin, 2004). This is particularly important when exploring the region of Saldanha because of the vast importance of the natural environment. An in-depth understanding of nature and nature's systems should be understood. This is particularly evident within the literature review where theoretical underpinnings will help the researcher form a holistic, unbiased and informed opinion.

The case study method is pertinent when a researcher addresses either a descriptive question or an explanatory question. The case study helps the researcher to make direct observations and collect data in natural settings, compared to relying on 'derived' data e.g. statistics maintained by government agencies (Yin, 2004). It is however evident, as stated within the limitations, that derived data will be used. This knowledge of derived data will help the researcher stay unbiased. This study will be directed progressively through the primary and secondary research questions provided in order to filter and ensure that the researcher does not stray off the topic and purpose of this dissertation.

When doing case studies, data collection and data analysis may need to be done together. Case study research is not limited to a single source of data, as is the case where questionnaires are used to carry out a survey study. A very influential observation of case study evidence, is that said evidence needs to be presented in the case study with sufficient clarity to allow the reader to judge independently the interpretation of the data (Yin, 2004). This method has, however, been criticised for not having a structured methodology to guide this study. Yin (2009) argues that this method has been accused of lacking academic thoroughness which leads to influenced outcomes. Therefore, the researcher acknowledges that a profound and unbiased representation of data and opinions needs to form the crux of this study.

### **1.7.2 Desktop Research**

This technique is used to undertake a literature review to understand the various theoretical underpinnings from contemporary authors on the topic of environmental management and of the integration of spatial planning and environmental management. Another desktop study is undertaken to gather knowledge and

information on environmental management within the greater Saldanha region. This will determine the current threats, trends, opportunities and constraints within the various analyses done within the existing SDF and EMF used within Saldanha Bay Municipality.

The strength of this technique is that large amounts of information can be investigated. Shortfalls do however exist within this technique in the form of self-referential and personal bias outcomes, considering that this is an individual exercise. This limitation can be addressed through rigorous and applicable research-driven justifications as responses to the research, which is incomprehensively informed through relevant sources and different theoretical standpoints.

### **1.7.3 Non-Participant Observations**

This research technique will have great emphasis and focus on mapping as the main tool for analysis. This technique allows for greater accuracy in data interpretation in order to spatially locate the analysis in order to synthesise the overlapping risks, opportunities and concerns within the Saldanha region. Spatially this is a very important component in order to formulate a regional spatial development framework which will ensure future sustainability.

### **1.7.4 Data Analysis and Interpretation**

Once the data has been collected, it is interpreted and used to determine tactical decisions. Mixed-methods are used during this research such as explanatory interpretations to explain the occurrence of certain phenomena and evaluative interpretations to assess the findings.

## 1.8 Conclusions

Nature, and the services that it provides, plays an intricate role in the survival of the human race. With this in mind, the need to preserve, conserve and regenerate our natural assets should be at the forefront of development planning. The transition towards a more sustainable future places ecological resilience and nature conservation at the backbone of spatial planning. The need to create integrated natural resource management and planning documents in order to guide land use decisions is paramount. In order to do this, academics place great emphasis on understanding the diverse and complex interrelationships between humans and society. Therefore, spatial planning needs to move away from conventional methods of planning. These place economic prosperity at the forefront of human development without exploring the system collectively and holistically. This leads to single-function developments which have no consideration of environmental impacts or consequences, such as luxury estates within a critical biodiversity area.

Therefore, it is incredibly important to understand nature and the role it plays within society. The planet's resources will not sustain its current rate of consumption which will inevitably have detrimental effects on the human race. Conversely, the effects on the environment can be minimised through innovative and sustainable solutions such as adopting and applying ecological approaches in spatial planning ideologies.

## CHAPTER 2: LITERATURE REVIEW

### 2.1 Introduction

*"There is a broad global consensus that we face the unprecedented twin challenge created by inter-linked economic and environmental crises. As the economic and environmental crises mutually reinforce one another, decision-makers across the public, private and non-profit sectors in both the developed and developing world intensify demands for practical solutions".*

(Swilling, 2010)

Swilling (2010) refers to the components of the natural systems as a restorative cyclical system comprising the biosphere, atmosphere and geosphere. The anthropogenic progression has, however, been in favour of a more linear system of resource consumption (Swilling, 2010). Within the current context of urban development, Western societies still live within a fragmented system of finite resources. Within this system development is still regarded as the primary means of growth without provoking capital accumulation, over-consumption and pollution by the wealthy (Cock, 2007). Therefore, the need to move away from conventional approaches towards more integrated human-nature approaches has to be implemented in order to combat challenges facing nature conservation.

Inherently, it seems to be clear that the pressing realities of human population growth, urbanisation and climate change pose special challenges for natural resource and landscape management, as well as for conservation policy and practice. A persistent question is how to make the case for biodiversity conservation in the twenty-first century? Adequate responses to this question might disrupt traditional conservation practice, values, and policy. This paradigm is called 'integrated human-nature resources management and planning'. When applied on a regional scale, it will create a harmonized and sustainable environment which is conducive for all to live in. The two disciplines, namely natural resources management and spatial planning, are not used interchangeably, but rather in a collective and collaborative manner. Conventional, single-function land use types need to be rethought and restructured towards a regional and more holistic approach, which comes in the form of 'integrated human-nature resources management and planning'. In order to gain greater insight and understanding on how to implement and formulate such a paradigm, this chapter reviews contemporary international literature on approaches that will help integrate nature conservation and spatial planning. The literature review explores

approaches such as ecological planning and bioregionalism in order to better understand and formulate an integrated Regional Spatial Development Framework for Saldanha Bay Municipality.

This review moves towards the importance of nature's services for ensuring balance on the planet and links this with the researcher's normative standpoint, which underlines the researcher's ideologies, views and beliefs based on a harmonized future between humanity and nature. The researcher's ideologies and beliefs on how to harmonize humanity and nature are based on the theory of urban ecology and ecological socialism. In addition, the work of Pieterse (2011) and Max-Neef (2005), which explains the dimensions of sustainability and the importance of transdisciplinary planning (integration of different disciplines), is also used as a point of departure towards more holistic and integrated planning.

*“Negotiating sustainability within this context is thus fundamentally a matter of value judgement as opposed to scientific-technical neutrality; and it therefore concerns, and must involve, the society at large as opposed to ‘expert’ committees only. The huge scale, global impact, and fundamental open-endedness of changes associated with the Anthropocene thus require societies to be correspondingly reflective in their decision-making, inclusive in their politics, and open and imaginative in developing new visions for the future”* (Hammond, 2016: n/a).

This thematic review then moves towards a spatial planning approach in the sense that it discusses ecological planning approaches towards creating an integrated environment between people and nature. The various theoretical sections discussed are green economy, green infrastructure, green planning, bioregionalism and ecosystem assessment. Not only will these approaches help to integrate people and nature better, they are intended to help combat the challenges faced by climate change through innovative green solutions. Various case studies, designs and methods are explored in order to learn and understand what could be needed within a regional context for the greater Saldanha Bay area. This chapter will be concluded with a review of the relevant findings in order to move towards a platform that will be conducive to ecological sustainability and human integrity. This acts as a launching pad from which to engage directly with the case study of the greater Saldanha Bay area and its specific context.

## 2.2 The Importance of Nature's Services

According to the Millennium Ecosystem Assessment (2005), ecosystem services are benefits provided by ecosystems. Ecosystems provide the following qualities and services: provisioning services- food, fiber, fuel, genetic resources, biochemical, natural medicines and pharmaceuticals, ornamental resources and fresh water (Millennium Ecosystem Assessment, 2005); Regulating services- air quality regulation, climate regulation, water regulation, erosion regulation, disease regulation, pest regulation, pollination and natural hazard regulation (Millennium Ecosystem Assessment, 2005); Cultural services- cultural diversity, educational values, inspiration, aesthetic values, social relations, sense of place, cultural heritage values and recreation and ecotourism (Millennium Ecosystem Assessment, 2005); Supporting services- soil formation, photosynthesis, primary production, nutrient cycling and water cycling (Millennium Ecosystem Assessment, 2005). Therefore, the need to ensure the natural functioning quality of nature's services is a high priority, because these functions create a life-support system for humanity to exist in.

Gasson (2007) explains that we currently live within an open system metabolism where we consume resources at a rapid rate, and do not allow for regeneration of these resources. Thus, we need to live in a more closed loop metabolism, where our life-support systems are not over consumed and our resources are not depleted at a non-regenerative rate. Erb (2012) explains that this concept has been adopted by biology, and aims to explain the exchanging relationship between the biophysical (material and energy) and societies within the natural environment.

Erb (2012) suggests that a socio-ecological metabolism approach will significantly contribute towards monitoring and observing the earth system. Interlinking relationships between society and nature in the form of socio-ecological metabolism approaches are great indicators for cities to critique themselves within the sustainability context. Capitalist and technological ideals have, however, caused communities to become privatized, sprawled and culturally disconnected from one another. Therefore, this has changed the biophysical processes, and provision for the renewal of the earth's ability to absorb and dilute waste has not been made. (Alberti, 1996). Integrated resource management is of vital importance to ensure a sustainable and regenerative environment for all to prosper in.

## **2.3 Symbiosis: Human Nature Relationships**

### **2.3.1 Urban Ecology**

Since the dawn of time, people have had profound relationships with nature. This is particularly apparent in the way that humans have used natural resources to fuel operations and development on earth. According to Fuller & Irvine (2010) this continuous use of valuable resources has left our planet in a state of chaotic dysfunctionality. The rate of extraction has led to extensive transformation and structure change within various ecosystems. Fuller & Irvine (2010) explain that human-nature relationships are two-way relationships, in that both nature and human action causes tangible change. These tangible changes can either have positive effects or lead to detrimental effects. Therefore, the continuous interaction between humans and nature is a more complex situation, so humans need to live more within a respected environment.

Wilson (1984) explains that 'biophilia' refers to the connection that humans have with nature, and the need to be exposed to the various functions nature has to offer. Fuller & Irvine (2010) argue that the relationships between humans and nature are many and various, and that most of them are poorly studied. This highlights one of the underlying problems with spatial planning: The different contexts and dynamics of people-nature interactions are not understood. Due to rapid global urbanisation, systems and relationships on earth need to be understood in greater depth (McKinney, 2005).

In the context of urban planning, studying the ecological significance of a certain region is of vast importance. Steiner (2016) argues that urban ecology can help people understand the significance of organisms and the different roles they play within multiple systems. This is especially important for planners when identifying different land use functions and the relationships these areas have with each other and with nature. Through ensuring in-depth analysis of nature's functions when planning for the future, greater sustainability for different regions and cities is ensured (Steiner, 2016).

According to Barton & Pretty (2010) already more than half of the world's population lives within urban areas. This figure is increasing a rapid rate as people flock towards cities and urban areas in search of better living conditions and job opportunities. This creates a vast amount of pressure on ecosystems and nature services in the sense that the natural environment can only accommodate a certain amount of people. When thresholds are

exceeded and development pressures increase, humans and nature are impacted detrimentally (Barton & Pretty, 2010).

According to Sadler et al (2010), urban green spaces have valuable significance within a town-regional context. They provide benefits for people and wildlife, and improve the urban environment. The first benefit is the creation of dynamic character and shaping of neighbourhoods and communities (Sadler et al, 2010). The second is the creation of a sense of place and belonging for people within a geographically defined area (Sadler et al, 2010). The third benefit is the provision of a range of health and psychological benefits which contributes towards improved lifestyles (Sadler et al, 2010). The fourth is creating a support system for different species within a designated epitome (Sadler et al, 2010) and the fifth benefit is important environmental functions that contribute towards various ecosystem functions (Sadler et al, 2010). Therefore, when formulating future plans, it is imperative to understand the extent and different dynamics of implementing urban greening especially the “what, where and how”. The researcher will explore in more detail how green planning can benefit regions better when the researcher discusses ecological planning approaches.

Given the current destructive path, modern western society has led researchers and academics to new and interesting research within the realm of sustainability. This has led to greater emphasis on new and improved urban design principles and ideas. Urban design and the field of ecological urbanism need to run in parallel in order to lead to a system that moves away from traditional ideology. Traditional ideology holds that human development was based on a capitalist system that was moving on a destructive path, depleting and damaging our natural resources. Today eco-design initiatives have helped change the outcome of human needs such as moving away from nuclear energy production towards more sustainable methods, such as renewable energy production (Mostafavi & Doherty, 2010).

Acosta (2010) argues that if society does not want to see earth collapse, people must stop considering natural resources as a prerequisite for economic growth or a mere object for development. The researcher shares his concern in that our current state is one of detrimental assurance. Current capitalistic ideologies have created a divide between people and nature, greed and consumerism have changed the natural flow of our planet. Therefore, in order to rectify current downfalls, people have to restructure economic and societal systems

to be compatible with natural laws. This can be done through incorporating more nature-based approaches such as those discussed in the literature. (Acosta, 2010).

Thus, according to Max-Neef & Etkins (1992), the idea of human scale development where humans need to be understood as a system. This 'system' does not agree with the dynamics of hierarchical linearities, which means that no person is more important than another person (Max-Neef & Etkins, 1992). This underlying ideology will also help the researcher on his quest for holism where everybody needs to be seen as equal within one coherent functional system.

Klein (2014) argues that our current economic model is the one system that is causing a slow death. The problem is capitalism, not carbon! People are told that the market will save us from our current state, but the truth is that our addiction to profit and growth is assuring us of a dark future. Klein (2014) explains a mass social movement against current corporations and capitalist ideologies is what is needed. The researcher agrees with Klein, but thinks realistically about our current situation and feels that this will never happen. People have lost their way and have no respect and care for what earth has provided. Soon it will be too late.

Ideally, holistic nature-based management is what we need to aspire to for a region in order to make informed decisions in terms of planning and development. This, however, is currently not the case as we see numerous failed states and radical weather pattern changes all over the world. Therefore, Pieterse (2011) explains his inherent concern with the generalized definition of 'sustainability' accumulated from the 1987 Brundlant Report. This report shows various flaws in the sense that it assumes that conflicts can be dealt with by rational democracies, and that economy is at the forefront of societal growth. Clearly, society needs a priority shift towards a more holistic approach and less egocentric capitalistic ideologies driving countries.

Pieterse (2011) emphasizes the importance of focusing away from the current 'meaning' of sustainability towards a version of sustainability that seeks inter-dependence or stabilizing and destabilizing effects between various components of the socio-ecological system. The researcher, thus refers to Allen's model of the five dimensions of sustainability.

## 2.4 Allen's Five Dimensions of Sustainability

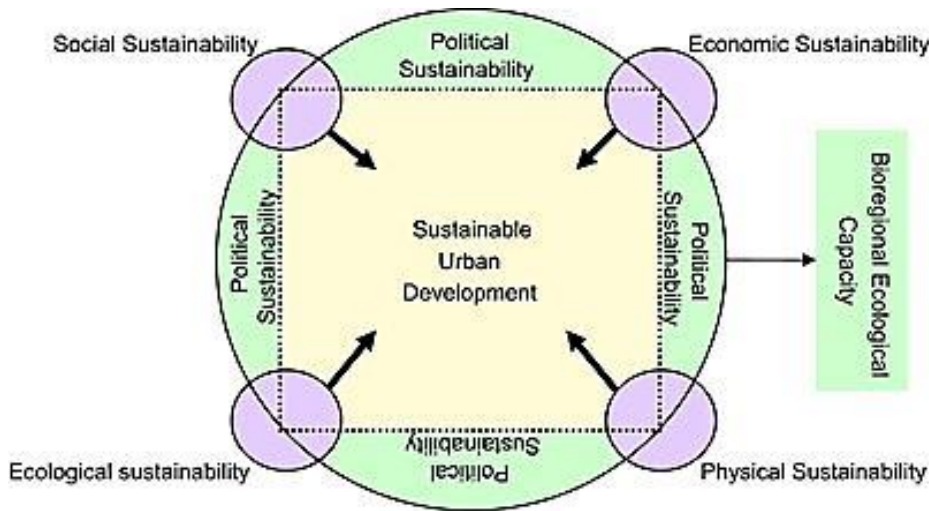


Figure 2.1: Allen's five Dimensions of Sustainability

Source: (Pieterse, 2011: 311)

Table 2.1: Definitions of the five dimensions of sustainability

Source: (Pieterse, 2011:311)

<b>Economic Sustainability</b>	The ability of local economies to sustain themselves without becoming detrimental to the environment.
<b>Social Sustainability</b>	Improving the quality of life and the fair access and distribution of individual and environmental rights.
<b>Ecological Sustainability</b>	The earth carrying capacity and ability to sustain impact in proportion of the health of city regions
<b>Physical Sustainability</b>	The abilities of socio-technical systems to support life and productivity.
<b>Political Sustainability</b>	The quality of governance systems and how they manage their relationships with the above mentioned components.

Pieterse (2011) understood that Allen's five dimensions of sustainability as indicated in figure 2.1 and defined in table 2.1 has successfully included global and economic factors within the sustainability debate. Emphasis is given to the dynamic role of power and decision

making between national and local governments. This model has clear and realistic targets set down for grass root level approaches. The importance of this model, and the confidence Pieterse (2011) has in it, lies in the trade-offs made between various competing entities such as private capitalist ideologies versus community and environmental needs. The researcher feels the dimensions described above create a conceptual model towards a more ecologically resilient region. This model can effectively be used as a generic platform in order to help guide planners in what Allen's version of sustainability is. The researcher acknowledges the model because of its emphasis on the environment within each dimension described.

## **2.5 Transdisciplinary Form of Planning and Leadership**

Society's quest for holism and an ethical approach towards modern day planning needs a transdisciplinary approach (integration of different disciplines) that will enable an understanding of multi-dimensional realities. Watson (2013) explains this in her writings of informality within the 'Global South', and how planning should change its thinking towards a more holistic understanding of society.

Planners are positioned amongst inter-disciplinary and cross-sector institutions that fall within the realm of economics, politics, social and environmental. Thus, planners have to minimize current world pressures such as climate change and the eradication of the earth's resources. Society therefore demands strong leadership, cooperative governance and a holistic approach in order to ensure future prosperity and coherent living between different cultures and communities (Swilling, 2010). In addition, the researcher's normative stance is one of environmental respect where society can live within a closed loop system that improves the daily living conditions of people on earth.

Max-Neef (2005) argues that within a world of complex realities one should incorporate a transdisciplinary mode where a diverse range of factors are incorporated within a multi-dimensional model. Therefore, Max-Neef (2005) introduces his transdisciplinary pyramid (See figure 2. 2 below).

## Transdisciplinary Pyramid of Max- Neef

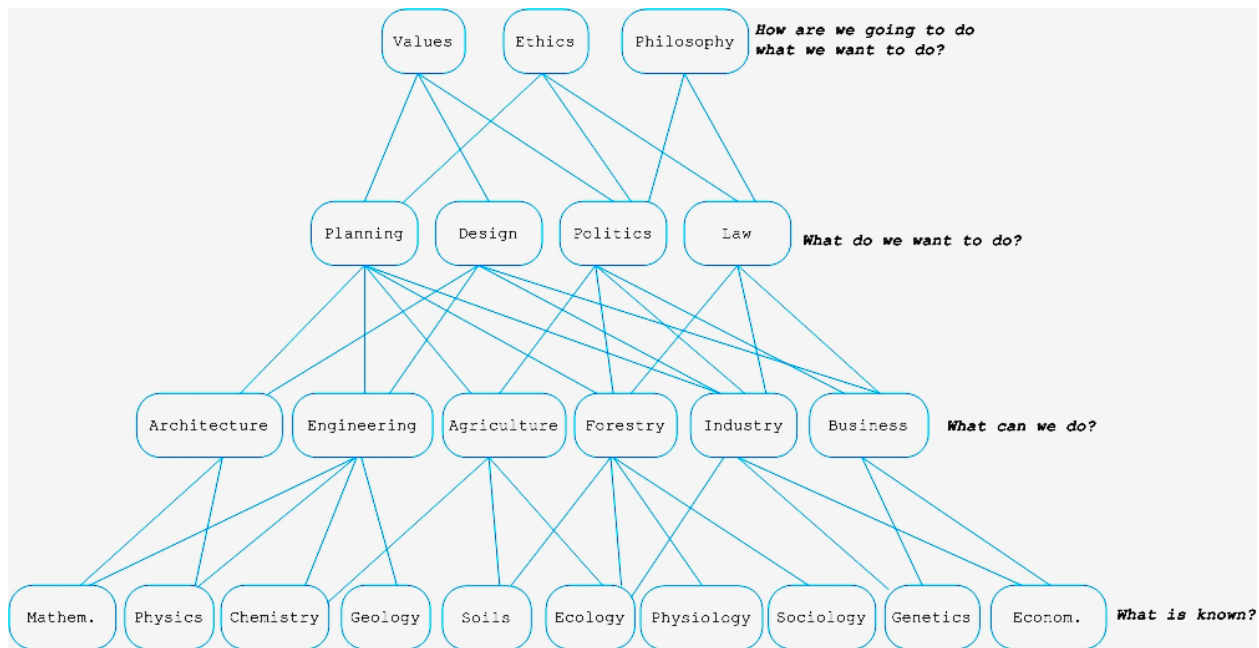


Figure 2.2: Max-Neef's Transdisciplinary Pyramid

Source: (Max-Neef, 2005:8).

The pyramid runs from the bottom to the top where the bottom layer refers to what is known. The second layer refers to what we can do, and is also known as the pragmatic level. The third layer refers to what we want to do, and the final layer refers to how we are going to do what we want to do. The effective outcome of this pyramid is that it helps us position ourselves in a way that is ethical. In addition, it gives us the opportunity to reflect on all levels at any given time. This helps the researcher as a prospective planner in the quest for holism. Therefore, from a management perspective, this model helps us create greater goals and agendas that will aid us towards a more holistic and inclusionary future.

Max-Neef (2005) identifies nine fundamental needs that are a consistent view from different cultures and timelines. These are identity, freedom, participation, leisure, understanding, protection, subsistence, creation and affection. These fundamental needs run in parallel with the model Max- Neef (2005) has created, therefore the researcher feels this model will successfully help him in his quest for a more holistic understanding of what planning means to him. The researcher feels that these fundamental needs cannot be seen in isolation, just as nature's different systems cannot be seen in isolation. Our planet is one gigantic system that we, as the inhabitants of planet earth, need to respect and understand in order to create a more sustainable future for everyone.

## 2.6 Integrated Resource Management & Planning

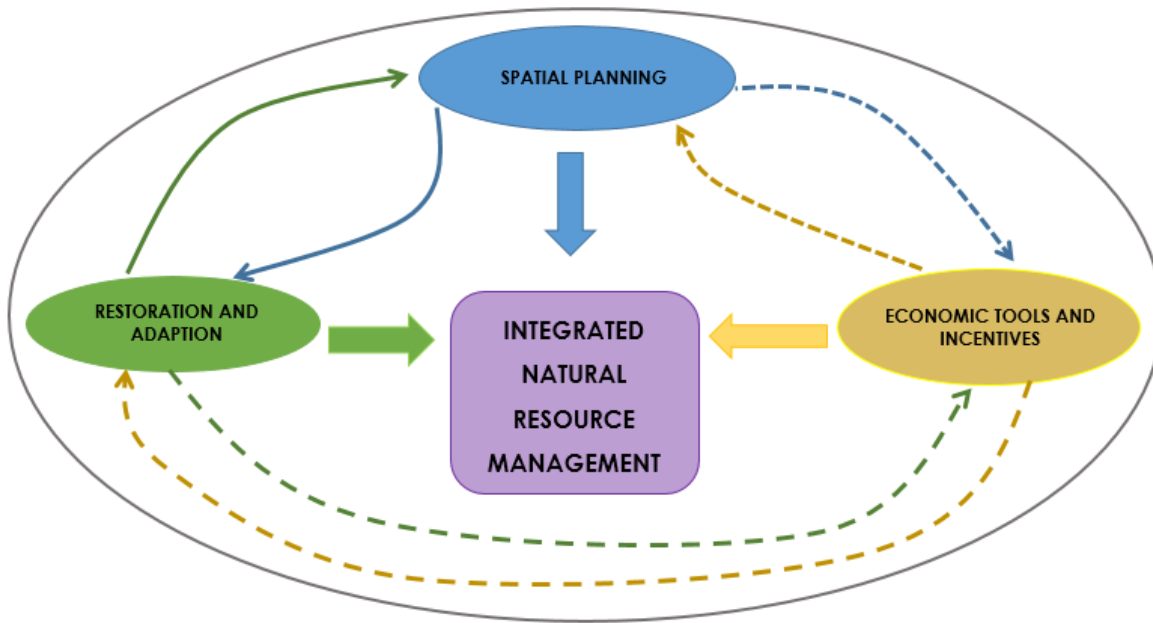


Figure 2.3 Dimensions of Integrated Natural Resource Management Source: (Author's own, 2016).

Integrated environmental management and planning has become a very important field within the 21<sup>st</sup> century (Mellody, 2014). Various nations and their respective organisations are adapting this process within their decision-making. According to Mellody (2014) integrated management has been regarded as a multidisciplinary approach to environmental stewardship which might represent the most important scientific and philosophical-based management principle yet developed. Lovell, Mandondo and Moriarty (2007) argue that sustainable resource management has led to various emerging problems in the sense that decisions are not integrated with the overall agenda. Lovell, Mandondo and Moriarty (2007) explain that the challenge lies with implementing short-term needs, while ensuring long-term resource capacity. Therefore, decisions require local independence within a larger scale of interdependence which will help devise an outcome that is just and fair. As seen in figure 2.3 integrated natural resource management consists of multiple dimensions and fields of discipline.

Gibson (2006) argues that the essence of sustainability is an integrated concept that needs a very detailed and specific sustainability assessment. This assessment should act as a facilitator in guiding the protection and enhancement of natural assets. In addition, a well-designed sustainability assessment could also ensure effective and efficient decision-making in all aspects - policies, plans and programmes. Sustainability assessments will therefore not

only ensure the longevity of natural resources, but also the livelihoods of people (Gibson, 2006).

In addition, Gibson (2006) refers to other positive effects of a well-designed sustainability assessment: *"It has great potential for encouraging stronger connections between strategic and project level assessments, better links among assessment methodologies, more effective inclusion of usually disadvantaged voices, improved means of combining formal and traditional sources of data and insight, and more successful combinations of anticipation and adaptation"* (Gibson, 2006:260). Conversely, it is also imperative to understand that this process should always be an integrative one, because some sustainability assessments have been critiqued for neglecting certain concerns (Ravetz, 2000).

Newsome, Moore & Dowling (2013) speak about human approaches to nature in which they refer to two examples, namely the anthropocentric view and the ecocentric view. The anthropocentric view is the current stigma within an industrial society where people assume that nature has an unlimited supply of natural resources, and that humans are the most important species. The ecocentric view, however, is underpinned by principles such as interconnectedness, conservation and intrinsic value. In addition, these principles create a society where nature and people can thrive within a harmonised environment and flourish from one another (Newsome, Moore & Dowling, 2013).

The platform of principles that the ecocentric view places great emphasis on is the cognisance that society needs to change too, especially as society moves towards the 22<sup>nd</sup> century and the earth's problems might become worse. It will be nearly impossible to make a mind shift for every person on this earth, but through effective integrated natural resource management, planners can provide the tools to help guide society.

In Stockholm, an inner city section which is predominantly industrial based, has had a major shift and breakthrough since adopting an integrated resource management approach. The Hammarby model shown in figure 2.4 is based on the concept of urban metabolism and functions as a closed loop system. This model has shown great success as results show a 30% reduction in non-renewable energy use and a 41% reduction in water use (World Bank, 2010). Although this approach is based within an urban industrial setting, various opportunities arise in terms of implementing the same systems approach within a regional setting. The transition towards a more integrated and nature-based future needs more examples like the Stockholm Resource Management Model. In the context of planning, regions will become

more resilient towards change and effects of climate change through understanding the interchangeable connections that different systems have.

Elgnatieva (2014) explains that this model has won international recognition based on its integration of several infra-systems (different infrastructure systems found within the city such as waste disposal, water provision etc) since the start of the planning. The various systems include technical infrastructure, mobility, communication infrastructure, building and blue-green infrastructure which is operated as one integrated system (Elgnatieva, 2014). In addition, this system has incorporated interdisciplinary planning of physical flows of water, waste and energy. This is also referred to as a closed loop system or circular metabolism (Gasson, 2007; Swilling, 2010; Elgnatieva, 2014). This cyclical approach is the ideal process needed within a regional context, where conventional planning approaches focus on single-function systems. This integrated multi-functional approach has substantial benefits for people and the environment through creating an ecologically resilient environment, while simultaneously creating awareness around sustainability and the effects of climate change.

*“The Hammarby model includes energy conservation measures in which the goal is to reduce heat consumption by 50% and use electricity more efficiently compared to the Swedish average. The share of renewable energy was also intended to be considerably higher than the Swedish average – using bioenergy and incineration of local waste to produce both locally generated heat and co-generated electricity. Large-scale local wastewater and storm water harvest and filtration were also implemented. Storm water devices have high aesthetical quality, which is an important factor in the liveability of the neighbourhood”* (Elgnatieva, 2014: 4)

## STOCKHOLM'S INTEGRATED RESOURCE MANAGEMENT

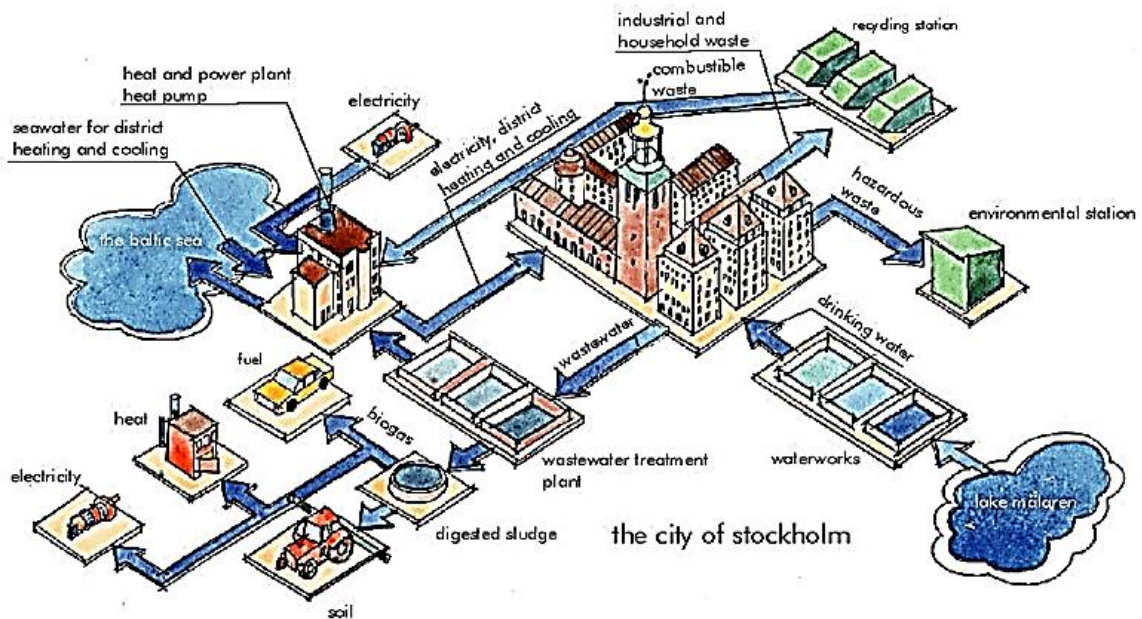


Figure 2.4: Stockholm's Integrated Resource Management Approach Source: (World Bank, 2010)

## 2.7 The Grass is Always Greener on the Other Side: Ecological Planning Approaches

### 2.7.1 Green Economy: The Green Perspective

The concept of green economy is thought of as the implementation of the integration of sustainable green infrastructure within the urban fabric. Tzoulas et al (2007) explain the concept of green infrastructure as an integrated system consisting of peri-urban and urban green spaces (and the quality and quantity of these spaces), the different roles they play and lastly the connection that different habitats have with each other. Tzoulas et al (2007) argue that green infrastructure has the potential to act as a guiding tool to provide a framework for economic growth and nature conservation. Walmsley (2006) argues that an approach like this will offer multiple opportunities to integrate urban development, nature conservation and public health promotion. According to Troyer (2002), ensuring the integrity and functioning of ecosystems will have direct positive effects on other urban functioning systems. Green infrastructure will ensure that ecological networks stay intact. The functioning of these systems will ensure biodiversity conservation by creating an urban fabric where people can flourish within the natural environment and are connected with green open spaces. This will have a positive psychological effect on people as they will enjoy their

surroundings, and communities will be able to connect and interact on a regular basis (Shah, 2011).

**Case Study: Green Infrastructure Approach Gauteng City-Region**

The scope and potential for the uptake of a green infrastructure approach in the GCR is extensive. The vast wealth of green spaces, both natural and man-made, together with the green corridors, inject life into urban nodes and create a prime canvas for the implementation of alternative infrastructure that builds resilience. Through maintaining and/or extending green networks in the GCR, using natural or combined grey-green engineered solutions, the direct benefits and cost savings can work to direct resources and funds into achieve GPG's Programme of Action. In the context of growing demand for services and development in the GCR, planners and policy makers are under pressure to ensure development and service provision at the lowest cost to people and the environment. Green infrastructure provides a unique and multi-functional solution for short-term problems with long-term benefits (Bobbins & Culwick, 2014: 70).




Figure 2.5: Green Infrastructure Approach for the GCR

Source: (Bobbins & Culwick, 2014).

Vegetation within a highly dense area can help by reducing air temperature, which can help with energy reduction and the cost of cooling buildings (Bolund & Sven, 1999). Plant species help with oxygen circulation, and provide shade as a means of cover. A study in Chicago has shown that the total energy for heating and cooling has reduced by 5 to 10 % through the increase of tree cover by 10% (Shah, 2011). Greening areas in urban environments has a positive effect on property values as people find green spaces aesthetically pleasing and attractive, and this attracts investors and people (Heidt & Neef, 2008). Conversely, these variables need to be managed in the correct manner, especially considering the rate that urban sprawl and population growth are taking place.

Integrating green spaces within the local fabric will not only have positive effects on the environment, but will also play an intricate role in contributing towards social, economic and cultural factors. With the increased demand for land for housing and other developments, it is essential to ensure that critical land is reserved for future use. As this demand will only increase as time passes, it is important that people protect the natural environment (Laforteza et al, 2013).

According to Benedict & McMahon (2002:13), green infrastructure can be defined “as an interconnected network of green space that conserves natural ecosystem values and functions and provides associated benefits to human populations”. Benedict & McMahon (2002) argue that this approach acts as the environmental framework that places direct emphasis on environmental, social and economic sustainability. This approach moves away from conventional approaches with single-function ideologies to open space planning, because it ensures conservation values and actions in terms of land development, growth management and infrastructure planning (Laforteza et al, 2013). As a result, such an approach towards spatial planning will not only ensure environmental conservation and protection, but will also help deliver goods and services at the same time.

Walmsley (2006) argues that the green infrastructure approach within the European Union (EU) has become a great tool with which to integrate environmental management and spatial planning. A green infrastructure approach has helped planners implement sustainable solutions in order to stabilize the natural processes within an urban setting. The concept within the EU has not only helped the EU to restore and protect the environment, but has ensured great advances regarding the adaption and mitigation of climate change (Walmsley, 2006). In addition, Walmsley (2006) also explains that the green infrastructure approach has promoted integrated spatial planning through identifying multifunctional zones, and the incorporation of habitat restoration. These elements have been integrated within various land-use plans and policies by creating linkage within peri-urban and urban-regional planning policies (Walmsley, 2006). Benedict & McMahon (2002), Weber et al (2006), Davies et al (2006) all agree that green infrastructure planning links various social and ecological factors, and places great emphasis on the values of these entities.

Green infrastructure will have substantive importance in terms of creating better livelihoods within regions and local neighbourhoods. Through creating a magnitude of open green spaces, people will have greater opportunities to engage within a safe, clean and cohesive manner (Davies et al, 2006). In addition, various plans, policies and strategies within the EU

have found that incorporating different tiers of green infrastructure on different scales has had a considerable effect on the cohesion of communities. (Laforteza et al, 2013). Figure 2.6 below shows the various benefits of green infrastructure to a region.

<b>Placemaking</b>	<ul style="list-style-type: none"> <li>• reinforcing the local landscape character</li> <li>• making places more beautiful, interesting and distinctive</li> <li>• giving places character and a strong identity</li> </ul>
<b>Economic</b>	<ul style="list-style-type: none"> <li>• improving the image of a place</li> <li>• boosting property values including house prices due to proximity to greenspace</li> <li>• helping developers get the most out of the site by combining uses, eg open space+ SUDS, helping development viability</li> <li>• attracting businesses and inward investors by creating attractive settings</li> <li>• making it cheaper and easier to deal with surface water by keeping it on the surface</li> <li>• saving energy and money for residents and end users</li> </ul>
<b>Climate change</b>	<ul style="list-style-type: none"> <li>• reducing CO<sub>2</sub> emissions by providing non-vehicular travel routes encouraging walking and cycling</li> <li>• providing carbon storage and sequestration in vegetation</li> <li>• providing shelter and protection from extreme weather</li> <li>• managing flood risk: living roofs, large trees and soft landscape areas absorb heavy rainfall</li> <li>• providing for storage of surface water in times of peak flow in SUDS and other water features</li> <li>• cleaning and cooling the air, water and soil, countering the 'heat island' effect of urban areas</li> <li>• saving energy: through using natural rather than engineered solutions</li> <li>• saving energy: living roofs insulate buildings, and large trees provide shade, reducing the need for air conditioning in the summer and raising ambient temperatures in the winter, reduction in heating costs in the winter due to slowing of wind speeds in urban areas</li> <li>• supplying locally sourced timber, biomass or other bio-fuels to replace fossil fuels</li> </ul>
<b>Environmental</b>	<ul style="list-style-type: none"> <li>• reducing pollution through use of SUDS and buffer strips</li> <li>• providing new and linking existing habitats or natural features, to allow species movement</li> <li>• protecting aquatic species through appropriate management of waterside habitats</li> <li>• preventing fragmentation of habitats</li> <li>• allowing diverse habitats to be created which are rich in flora and fauna</li> </ul>
<b>Community and social</b>	<ul style="list-style-type: none"> <li>• creating green spaces for socialising, interaction and events</li> <li>• more opportunities and places for children to play</li> <li>• providing improved physical connections through green networks to get between places; and to communities, services, friends and family and wider green spaces</li> <li>• providing spaces for practising and promoting horticultural skills</li> <li>• creating opportunities for community participation and volunteering</li> </ul>
<b>Health and Well-being</b>	<ul style="list-style-type: none"> <li>• encouraging exercise and physical activity by providing quality green spaces for walking, cycling, sports and play</li> <li>• providing better opportunities for active travel and physical activity</li> <li>• improving mental well-being by providing access to nature and attractive green spaces and breathing spaces</li> <li>• providing opportunities for growing food locally and healthy eating</li> </ul>

Figure 2.6: Benefits of Green Infrastructure Planning

Source: (Laforteza et al, 2013).

According to Davies et al (2006), the purpose of green infrastructure planning is as follows: Ensuring that current green areas are valued and preventing the deterioration of these areas; improving the quality and range of these areas in order to better serve the needs of the local community; ensuring green areas are connected as a strategic whole and not as a sum of the parts; and lastly considering the management of green areas, whether they are private or public entities (Davies et al, 2006).

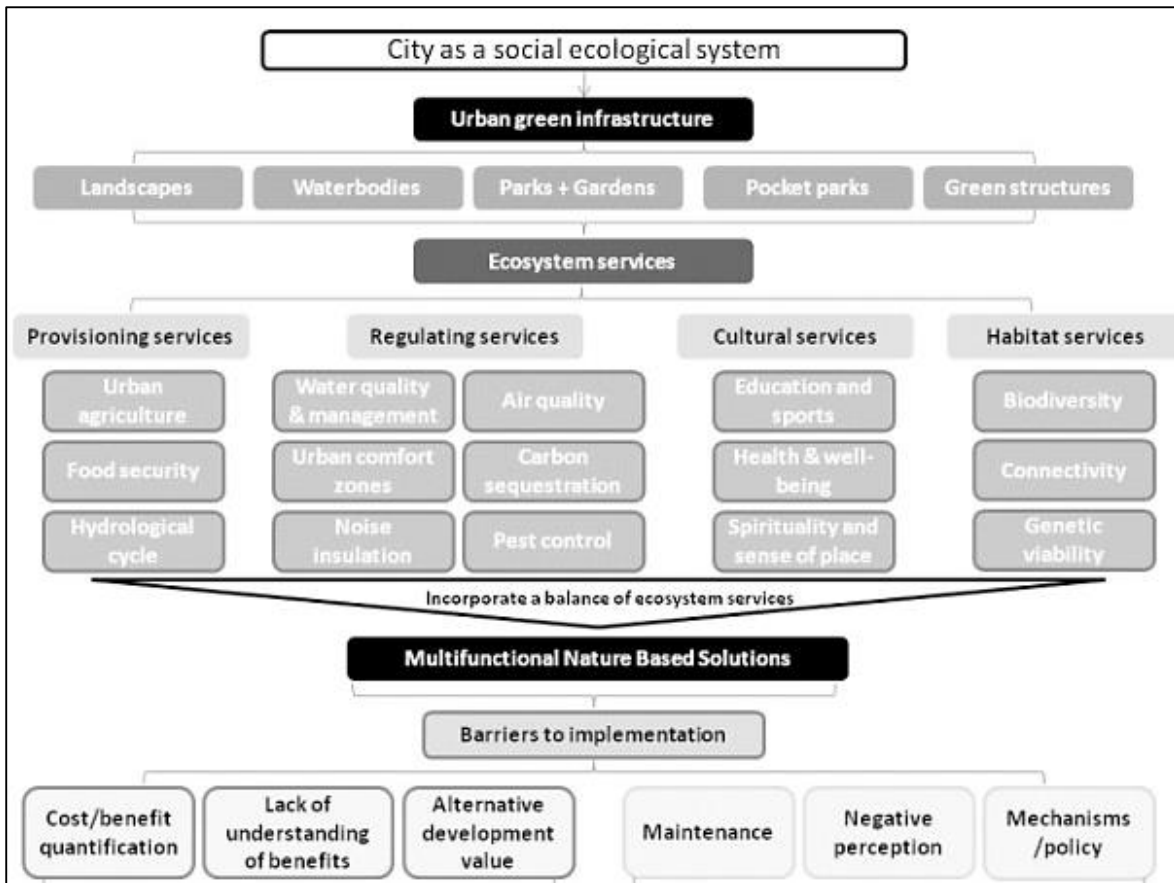


Figure 2.7 A framework of Green Infrastructure Planning Approach within a Region Source: (Connop et al, 2016)

Figure 2.7 indicates the connection between implementing a green infrastructure framework and ecosystem services, and what these services are. This framework also shows the solutions that a multifunctional nature based design offer a region or urban setting. According to Connop et al (2016), such a social-ecological approach promotes co-operation and co-ordination between multiple stakeholders. This creates a cohesive understanding of distributed knowledge guided by individuals, organisations, agencies and institutions. The design principle of such an approach is based on the concept called 'ecomimicry' – “which is the practice of designing socially responsive and environmentally responsible technologies for a particular locale based upon the characteristics of animals, plants and ecosystems of that locale” (Connop et al, 2016).

There have, however, been multiple contestations since the conceptualization of green infrastructure planning, especially regarding the role it plays in spatial planning. Wright (2011) argues that the capital gain associated with green infrastructure planning has caused policies to be rushed without holistic understanding and meaning within a specific context.

Thus, the existing conceptual ambiguity has raised questions on the long term effectiveness in terms of biodiversity conservation (Wright, 2011). Jones, Symons & Young (2015) explain that this is specifically relevant within local government as revenue is limited and the need for funds to upgrade or manage such infrastructure is neglected. Mell (2010) explains that local governments across Europe have implemented austerity measures due to funding pressures. This has created various forms of new governance such as privatization of parks, outsourcing of management companies and the creation of new urban commons (Mell, 2010).

*"This has led to a paradox, where on the one hand, we witness a de-politicisation of (public) urban green spaces as they are being transformed into Privately Owned Public Spaces (POPS), where political protest is prohibited and other civil rights are curtailed and, on the other, growing protest and contestation over their use, development or destruction (e.g. Gezi Park in Istanbul, Tempelhofer Feld in Berlin, and Go Ape in London Battersea). Can green infrastructure help to conserve biodiversity?"* (Salomaa et al, 2016: 13).

Therefore, Mell (2010) places great emphasis on appropriate integration of green infrastructure within planning frameworks or policies through understanding the dynamics, scale and context first. The different interrelated roles and systems need to be understood in-depth in order to apply the correct green infrastructure strategies.

The relationship between spatial planning and the natural environment should be an interrelated and cohesive process. Western societies, however, seem to operate on a hierarchy basis in terms of demand and needs, which is normally to the detriment of the environment (Cilliers et al, 2015). Ongoing land-use pressures on governments, such as demand for housing, create a plethora of complexities and pressures. Therefore, the relationships between societal needs and demands have to run in parallel through integrative and resilient solutions. Therefore, Cilliers et al (2015) argue the need for flexible and dynamic approaches towards change which will seek solutions for social problems, involve the local economy and conserve the environment. Farinha et al (2011) argue that green planning approaches can help change the dynamics and identity of town places and spaces. Green planning approaches will create an opportunity for people to interact in a safe, clean and integrated environment (Farinha et al, 2011).

Place-making and green planning approaches run in parallel through reinventing public open spaces via green initiatives. Cilliers et al (2015) explain that a simple green design initiative will generate economic growth and promote cultural bliss for tourism. Farinha et al

(2011:351) explain *"The idea is that it's not enough to have just one great place in a neighbourhood, you need a number of them to create a truly lively city or town. It's not enough to have only one superior neighbourhood in a city, you need to provide people all over town with close-to-home opportunities to take pleasure in public life. And it's not enough to have one liveable city or town in a region; you need a collection of interesting communities"*. Thus, place-making creates a vibrant and robust space for people to thrive in, especially by using green planning approaches as the main theme. The goal is to create networks of green functioning spaces where social integration is possible and ecosystem resilience thrives (Cilliers et al, 2015).

According to Cilliers et al (2015), the concept of green spaces refers to active and passive green open spaces such as parks, rivers or areas of natural vegetation and wildlife. Thus, the concept of green planning refers to the strategic planning and management of such areas and networks (Cilliers et al, 2015).

*"Green planning is gaining importance as the public's demand for green space is becoming stronger in terms of aesthetic enjoyment, recreation, and access to clean air or quiet environments"* (Cilliers et al, 2015: 352).

Green planning has helped city-regions gain considerable competitiveness and attractiveness to people, creating multiple investment opportunities, an increase in tourism and a unique town or regional identity (Farinha et al, 2011).

**Case study: 100 per cent biogas-fuelled public transport in Linköping, Sweden**

In the 1970s, the city of Linköping was suffering from air pollution as a result of emissions from its diesel-fuelled public buses. Methane-rich biogas was identified as a clean-burning substitute fuel that would save the city money by reducing the public transport system's dependence on expensive oil imports. The city's wastewater is combined with residues from local agricultural activities, meat processing industries and restaurants, and the methane this releases is captured and used to fuel its fleet of public buses. In addition to reducing air pollution, the process has cut the volume of waste sent for incineration in Linköping by around 3,400 tons annually, and the solid residues can be re-used as bio-fertilizer to allow nutrients to return to the soil in a useful form instead of being buried in toxic concentrations at a landfill. (Full case study in Section 6.)

Green planning initiatives such as the one described in figure 2.8 are part of a greater system, and should be incorporated within the whole city-region. This process is referred to as a circular metabolism (closed-loop system) (Gasson, 2007; Swilling, 2010; Elgnatieva, 2014). Regional ingenuity such as this will create a continuous sustainable process where services are distributed effectively, while systems function as an integrated sustainable process.

### **2.7.2 Bioregionalism**

The grounding ideologies of bioregionalism are based on the premise of a utopian philosophy that can be defined by Gray (2006:795) as *"its concern for 'place' and the strong connection between community and the biophysical environment that reinforces an ethic of ecological responsibility"*. The first configuration of this theoretical concept was based on a social movement in order to help organise social systems around natural systems within a defined region (Gray, 2006). Bioregions, in theory, are defined regions based on ecological characteristics such as water catchments, mountain ranges and vegetation congregations (Gray, 2006). According to Sale (2000), regions are further established through human geographic characteristics such as land-uses, history and culture and lastly towns, communities or cities. In order to cohesively sustain these two variables (social and natural), a basis of ethics and responsibility is needed (Gray, 2006). A bioregional approach towards spatial planning, especially on a local government scale, will help planners and spatial informants make informed decisions across the whole geographic location.

The fundamental rationale behind bioregionalism is based on the realisation that society needs to change its current pattern of consumption and general stigma towards nature's services (Gray, 2006). Bioregionalism and ecological modernisation agree that inherent change is needed within modern society in order to create a future that is conducive to all (Mol & Sonnenfeld, 2000). Sale (2001) argues that the value basis of bioregionalism recognises the existence of urban-rural symbioses. In addition, this refers to the vital importance of certain factors which exist within a regional community such as the provision of goods, the presence of a market place, an environment of self-expression and an oasis of anonymity (Sale, 2001). Bioregional ideologies embrace the ethos of "think global, act local", which places great emphasis on the ecological whole while simultaneously embracing the need of the individual. (McGinnis, 1999). McHarg (1967) argues that landscape character is visually subjective and modern management strategies have caused society to lose its cultural and

spiritual senses with nature. Empirical sciences have changed the way we are engaging with the natural system. Therefore, this explanation of McHarg (1967) directly relates to bioregionalism through understanding the whole region and the different systems and functions that define a region. Transition towards nature relationships, and understanding the role of different biotic systems will help create resilience and awareness. Within a developing country context, however, this realization is more complex due to the lack of understanding of what constitutes ecological resilience.

The bioregional model on a level of practicality and possibility is duly noted on the world stage, where countries are identifying regional problems and acting on a local scale (Sale, 2000). Sale (2001) explains that there are changing trends within Europe where there is an increase in regionalisation despite political centralisation. Jennings and Moore (2000) explain that local government jurisdictions within New Zealand have been rethought and redressed around watersheds within regions. In North America various governmental congresses have been held since the 1980's, advocating the bioregional movement (Jennings & Moore, 2000). Therefore, the researcher feels that various developing countries are moving towards this trend, which exemplifies the importance of such movement on a global stage. In other words, the researcher feels that if developing countries are adopting such change, a country such as South Africa can learn immensely from that change. South Africa can learn from the mistakes and ensure the right plan is implemented as South Africa is still in a developing stage.

Bioregional planning allows for a holistic understanding and interpretation within land use management through nesting various elements of society and resource use. Brunckhorst (2000) explains, however, within a spatial planning context that successful integration needs to be done on a scale across related ecosystems. This is particularly important for a region such as Saldanha because of the scale and diversity of the natural landscape. The region of Saldanha has not expanded tremendously at this point, and only consists of small pockets of development in the form of different towns. Vast landscapes with a diverse range of fauna and flora exist in between these towns, and play an intricate role in landscape identity and sense of place. The different ecosystems and sub-ecosystems such as the West Coast Biosphere and Langebaan Lagoon (Ramsar site) define the landscape character of the region. In addition, the region's aquatic and coastal identity is regarded as the backbone of most of the locals in terms of their livelihoods. Therefore, through a bioregional lens, the

researcher will be able to connect diverse aspects of Saldanha through ensuring prosperity and conservation.

### **2.7.2.1 Case Study: A Transition Strategy for the Armidale Plateau of New South Wales, Australia**

Armidale is a small regional town with 22 000 people who are predominantly involved with dry land agricultural activities. It is situated within an ecological significant bioregion (Gray, 2006). This transition strategy approach focuses on ensuring that Armidale becomes a practical bioregional society. This approach is based on a 25 year plan, which is based on continuous transformation within the region. There are five desired outcomes which will shape this town and community in order to become part of an ecologically, socially, economically sustainable society. It needs to be noted, however, that this process is still in progress, but the researcher feels that this approach will be effective, based on the involvement and drive from the local community. In addition, this bioregional plan is based on the Local Agenda 21 consultative process which is an internationally recognised strategy that helps local communities implement sustainable development initiatives (Aberdeen City Council, 2016).

The outcomes discussed below are based on the research findings by Gray (2006:795). The first outcome states: "A region with 'ecologised' urban and rural activities and protected natural areas". This strategy will be driven by the local community through local collaboration and coordination which will effectively find solutions for social and environmental problems. This programme will be driven by community empowerment and capacity building which is regarded as the vital tool for success. A strong educative role will be the key between local and expert knowledge in order to understand the sustainability imperative (Gray, 2006). The early stages of this 25 year plan will be driven by seeding projects which will be defined by community-driven-criteria. Examples of such pilot projects could possibly be community-supported agricultural schemes or an eco-design program to encourage innovative and locally appropriate technology (Gray, 2006).

The second outcome states: "A self-sustaining, enriching and physically stable economy" (Gray, 2006:795). Local government in retrospect will lead local economic development, but through decentralizing, the Armidale community will govern problems on a grass root level. By giving power to the people, the community will have a hands-on duty to take care of

certain factors that affect their livelihoods. Not only individual factors are referred to here, but also factors that affect the whole community, which can be dealt with through collective reasoning and expert advice from local government. Through the adoption of an alternative currency, people will be incentivised to invest and produce locally which will provide a substantive local economic boost. In addition, through public-private partnerships various stakeholders will have an incentive to invest within that region (Gray, 2006).

The third outcome states: "A regionally focused Armidale with a global perspective" (Gray, 2006:796). This can be achieved by introducing an educational platform where locals can learn and apply knowledge that has been used all over the world. Armidale has called it 'education for sustainability', where teachers and students can learn the science of sustainability. This type of platform creates awareness and practical knowledge which can be applied throughout the whole community (Gray, 2006).

The fourth outcome states: "A strong sense of bioregional identity" (Gray, 797). Armidale already has a strong sense of regional identity based on its unique landscape settings and educational institutions. However, with the help of experiential knowledge and local engagement, the identity of this bioregion could become inherently stronger through adopting awareness strategies and projects (Gray, 2006).

The fifth outcome states: "An engaged, responsive and resilient community" (Gray, 798). The community of Armidale will become inherently involved through the process of Local Agenda 21, which is used for the bioregional plan. In addition, through involvement of community-based projects, educational platforms and sustainability awareness this region will progressively move towards a sustainable region. In short, the researcher feels confident that this ecological approach will help create an ecological resilient community based on a collective approach and understanding of problems and solutions. This approach is exactly the type of approach that can be implemented within Saldanha Bay to create greater human-nature relationships and cohesion. By adopting a bioregional approach, planners and various stakeholders can make informed decisions based on a collective understanding of the significance of nature's services. By making nature-based decisions, the prosperity of different bioregions and ecological resilience within a region will be collectively assured.

### 2.7.3 Ecosystem Assessment

According to Valerie et al (2005), debates around ecosystem functions and land use functions have been around for ages. Valerie et al (2005) explain within the millennium ecosystem assessment some of the main challenges facing these two disciplines. On a global scale, human well-being has improved significantly by means of progress in development, innovation, technology and interconnectedness. This has created wealth increases, population growth, and increase in life expectancies (Valerie et al, 2005). These increases have, however, been to the detriment of certain groups of people, and these tendencies are seen all over the world. Inequality has created a gap between two completely different worlds for people.

According to the Millennium Ecosystem Assessment (2005), there are different classifications of ecosystems in terms of value (Valerie et al, 2005). This variation in degree has a significant effect on people's livelihoods, such as dry land crops versus cultivated systems. History has shown that populations have migrated towards high-productivity ecosystems where ecosystems have greater value. Conversely, this is not the tendency today, as signs show that people are moving towards less-productive ecosystems especially within Asia and Sub-Saharan Africa (Valerie et al, 2005). This is a worrying trend as over a billion people survive on one dollar a day (Valerie et al, 2015). Most of these people live in rural areas and are dependent on agriculture, grazing and hunting for subsistence (Valerie et al, 2005). The need to reduce vulnerability factors and externalities is therefore of great importance, because changes in ecosystems in the future will have a greater effect on human well-being (Valerie et al, 2005).

According to De Groot et al (2010), in order to make decisions regarding trade-offs involving land cover and land use change, a systematic account is needed to measure the relationship between ecosystem management and ecosystem services, and the values generated. This means that there must be a quantitative relationship between ecosystem management, land use and ecosystem services based on empirical information on a local and regional scale (De Groot et al, 2010). However, such evidence is very limited and no real examples do exist. Figure 2.9 below does, however, demonstrate a relevant conceptual framework on how to interlink ecosystem and landscape character. This framework was used in a research programme to help answer questions in an integrated manner on how to link ecosystem and landscape services.

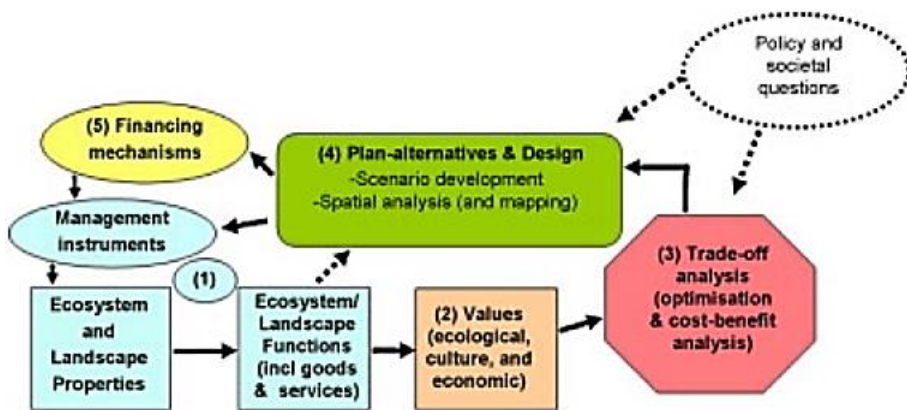


Figure 2.9 Framework for Integrated Assessment of Ecosystem and Landscape Services Source: (De Groot et al, 2010)

According to De Groot (2006), a large portion of earth's ecosystems has been converted to another type of land cover. This is characterized by the management or land use type within that ecosystem. The problem is that management systems differ, for example the manner of extraction, level of production, intended and unintended provision of services and the quality of biodiversity (De Groot, 2006). See figure 2.10 for transition phases between natural and human-dominated (eco) systems.

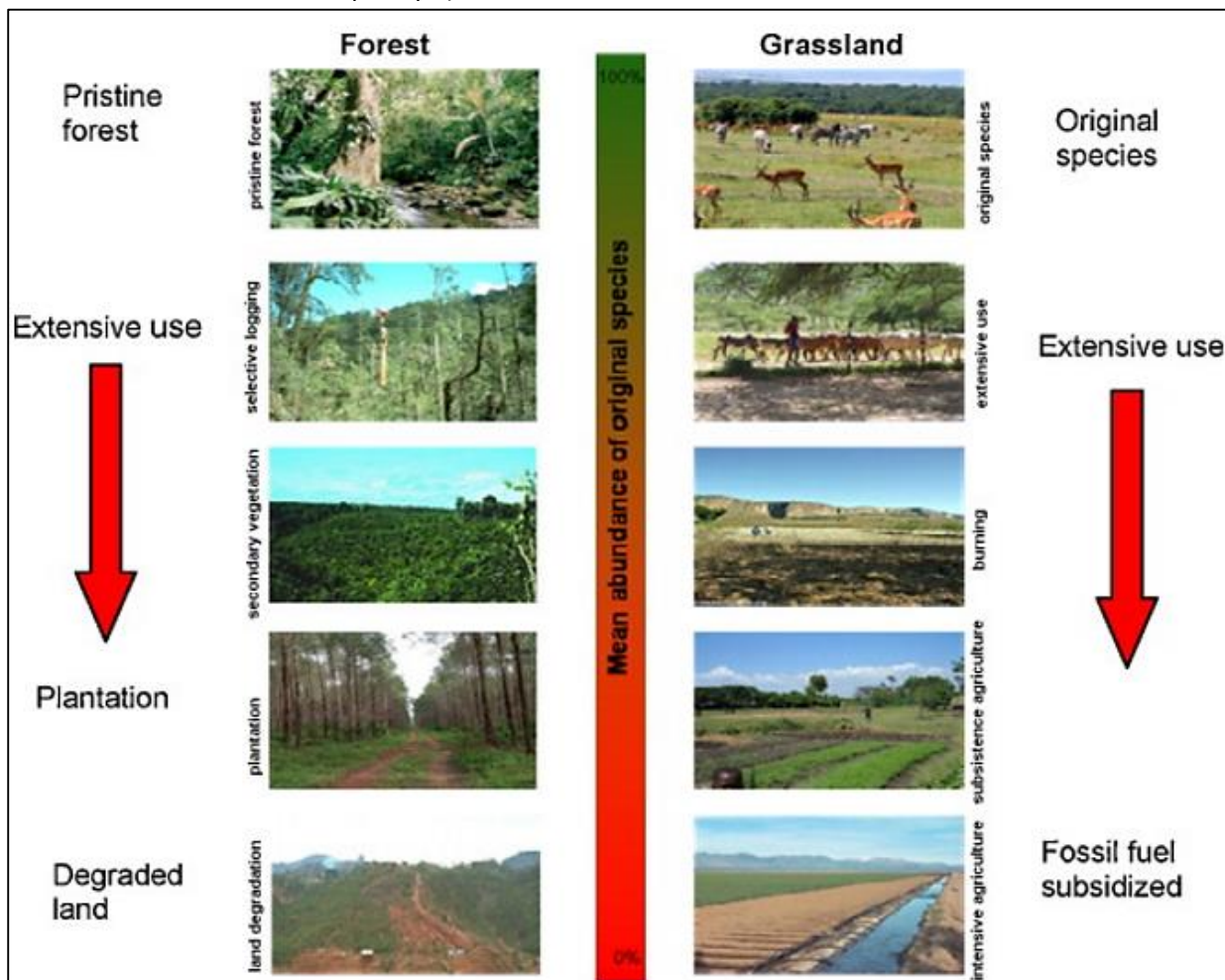


Figure 2.10 Transition phases between natural and human-dominated (eco) systems Source: (De Groot, 2006)

Berkes and Folke (1998) argue that a great increase in research regarding quantifying the capacity of multiple land-cover types and various associated management types is needed. This must be done in order to estimate a range of ecosystem services that can be integrated with land use functions. According to De Groot (2006), the use of multi-functional natural and semi-natural ecosystems and landscapes are regarded as ecologically more sustainable (see figure 2.11). This is not only deemed more ecologically sustainable, but is regarded as economically more viable because of the benefits when left intact. This service is neglected, however, within most land use planning decision-making, where single function land-use types are still the preferred method. As a consequence, most of these methods are for short-term economic profits, but in the long run will have a detrimental effect within that region.

Meyer and Grabaum (2008:164) state that *“An important remaining challenge is therefore to investigate the relationship between ecosystem management and the provision of the total bundle of ecosystem services and analyse the impact of changes in management state on ecosystem services and possible (critical) thresholds”*

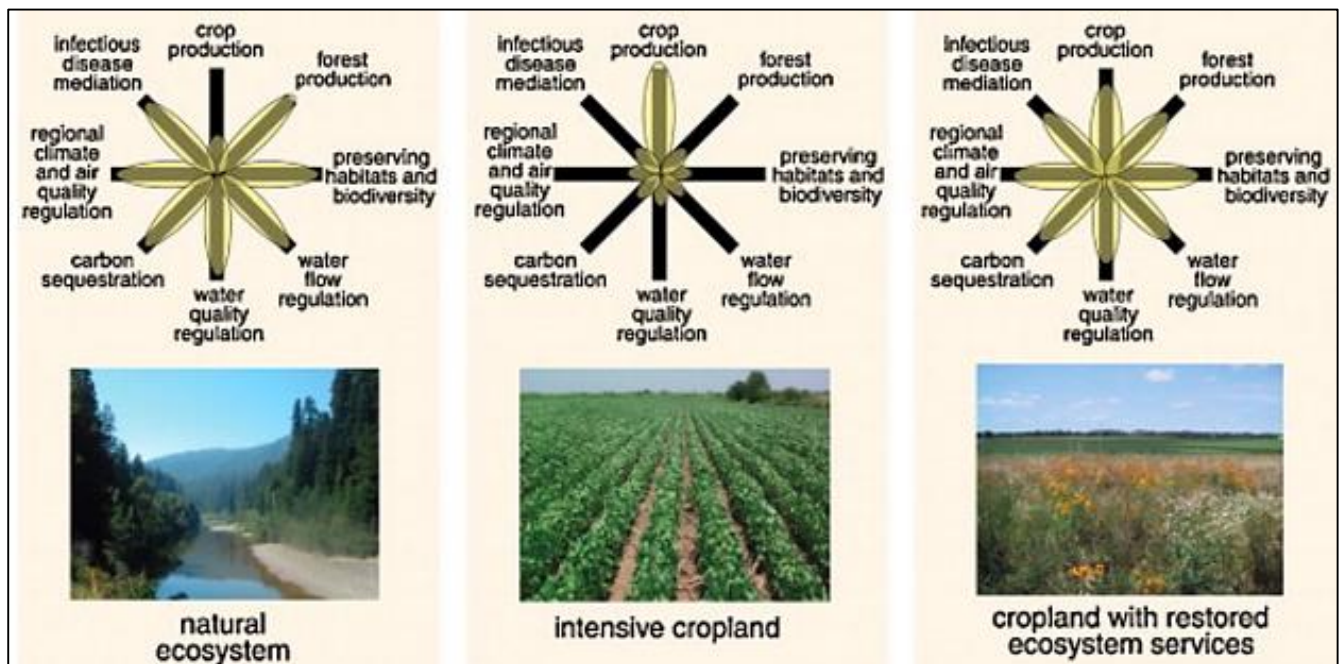


Figure 2.11 Impact of land use change on bundles of ecosystem services Source: (De Groot, 2006)

## 2.8 Conclusion

Within a 21<sup>st</sup> century context, development agendas have placed continuous strain on the environment, and preserving humanity's natural resources has become a universal concern. The rapid rate of extraction and consumption of natural resources, and the conversion of these resources into consumer goods and commodities has become an incremental concern. The natural environment needs to be protected and conserved while humanity's needs are to be upheld - this constitutes our daily activities and needs. Therefore, in order to obtain such a complex task, society needs to adopt integrated and resource management solutions in order to ensure a sustainable future for all.

Resource management and land use planning needs to be integrated in order to guide future development to ensure sustainability for people and natural resources. Consequently, integrated resource planning allows planners and practitioners to minimise problems during the process of development, or direct people where problems might be evident. In summary, planners need to ensure that the planet's natural assets are protected at all costs through understanding the different dynamics and interrelationships between different systems. By means of a holistic understanding of nature and the important role it plays in sustaining human life, collective decision making can help planners make informed decisions. Using approaches such as bioregionalism can help planners spatially within a geographic area to understand the relevant landscape connections and systems. Creating a foundation of nature-based decisions will guide planners and developers in terms of land use proposals. Bioregionalism celebrates the importance of local identity and landscape character which is inherently important within a region such as the Saldanha Bay Municipality. The vast, diverse landscape associated with rich, local culture defines the region of the West Coast. The researcher feels that an approach such as bioregionalism will help embrace and protect the local characteristics of the region through ensuring regional connection and conservation.

The researcher has thus investigated possible ways to integrate natural resource management with spatial planning. Through investigating various ecological planning approaches, the researcher feels confident that a bioregional approach will be most applicable to the research area. The researcher's philosophical underpinning, which was based on the concepts of urban ecology and ecological socialism, has laid down a theoretical platform. This platform has led the researcher towards practical solutions on how to better integrate natural resource management and spatial planning. Thus, through

implementing ecological planning approaches such as the ones discussed in this review, the researcher feels a future can be created where nature and humanity are better integrated. These approaches can not only help with integrating humanity and nature on a holistic manner, but can also help create awareness and change as far as climate change is concerned.

This review is based on various principles and theories focusing on the harmonisation of humans and nature, which helps to coordinate the existence of two disciplines in order to ensure the future prosperity of both without negatively impacting each other. Based on the literature reviewed, society needs a paradigm shift, and needs to move away from traditional and conventional ideologies. This thematic review of international literature has laid down a platform upon which a great understanding of human-nature relationships should be built. The shift towards a new paradigm incorporates various strengths and opportunities – should such a change be made. This is then the platform upon which various proposals will be based in order to create a spatial plan which has integrated natural resource management and land use planning. With the influence of the literature provided, a normative position has been developed from which to begin the contextual analysis of the case study. The explanation of the literature will create a strong foundation from which to interpret the analysis, which will then be synthesized in order to formulate a RSDF for Saldanha Bay.

## CHAPTER 3: CONTEXTUAL ANALYSIS

### 3.1 Introduction

*"The earth, the air, the land and the water are not an inheritance from our forefathers but on loan from our children. So we have to hand over to them at least as it was handed over to us. There is a sufficiency in the world for man's need but not for man's greed."*

-Mohandas Karamchand Gandhi (Wandering Mist, 2008: n/a).

Nature can be thought of as the foundation of all life, and without it our planet will not be able to function effectively. The presence of nature, and the services it provides, is vitally important in order to support generations in the future. This therefore makes the study in context a vitally important one in order to ensure a future where human-nature relationships are harmonized and integrated.

This research process has undergone a thorough literature review which has laid out a theoretical context for intervention. This chapter will now carry out a contextual analysis for Saldanha Bay Municipality in order to understand the current state and trends regarding integrated natural resource and landscape management. In addition, the chapter will explore the region in terms of creating a more sustainable future between nature and people within the region. This study is focused on integrating natural resource management and spatial planning as a platform that will guide land use decisions.

This chapter explores gaps and contestations between the 2011 SDF and the 2015 EMF of SBM in order to produce a more integrated RSDF within the intervention chapter later on. This study will start with an overview of SBM so that the geographic location and context of the region can be understood. Thereafter, there is a section where biophysical and socio-economic analysis is explored in order to understand the sources and sinks with regards to the region. In addition, to further understand the region, there is a section where landscape character and sense of place is explored in order to discover cultural, visual and aesthetic significance associated with this region. After the region has been explored, the researcher will investigate the key national, provincial and local spatial informants by investigating relevant acts, plans, policies and strategies.

Through understanding the biophysical and socio-economic context of the region, the researcher will then investigate the two most significant documents. The study will explore the 2015 EMF of SBM through an ecological lens in order to find the most prominent threats,

concerns and trends with regards to the environment. Further analysis is explored within the 2015 EMF through the three most prominent layers that will act as a foundation in order to guide spatial interventions within the next chapter. The following section will explore the 2011 SDF of SBM in order to find gaps and contestations in comparison to the 2015 EMF. This will allow the researcher to pinpoint incommensurability's that are present within these two documents in order to create a more integrated RSDF within the next chapter. The structure of this section is based on the multiple local area plans and strategies formulated in the 2011 SDF which will be viewed, examined and interpreted in order to show contestations based on the findings of the 2015 EMF. This section also includes current and future land use developments that have been proposed by the municipality.

By exploring both documents, the researcher will be able to spatially interpret the most prominent threats, trends and concerns within the region. This exploration has helped the researcher to formulate a sustainable assessment criteria based on the findings of this analysis. This allows the researcher to strategically devise opportunities and constraints based on the findings of this study. This analysis will be concluded by reiterating the most prominent findings of the study through spatially representing the various issues and pinpointing the priorities of the region. This allows the researcher to create a more integrated RSDF within the next chapter in order to guide land use decisions through a strategic regional lens. This chapter forms the foundation for transition in order to create a RSDF that focuses on integrating natural resource and landscape management with spatial planning.

### 3.2 Overview of the Study Area

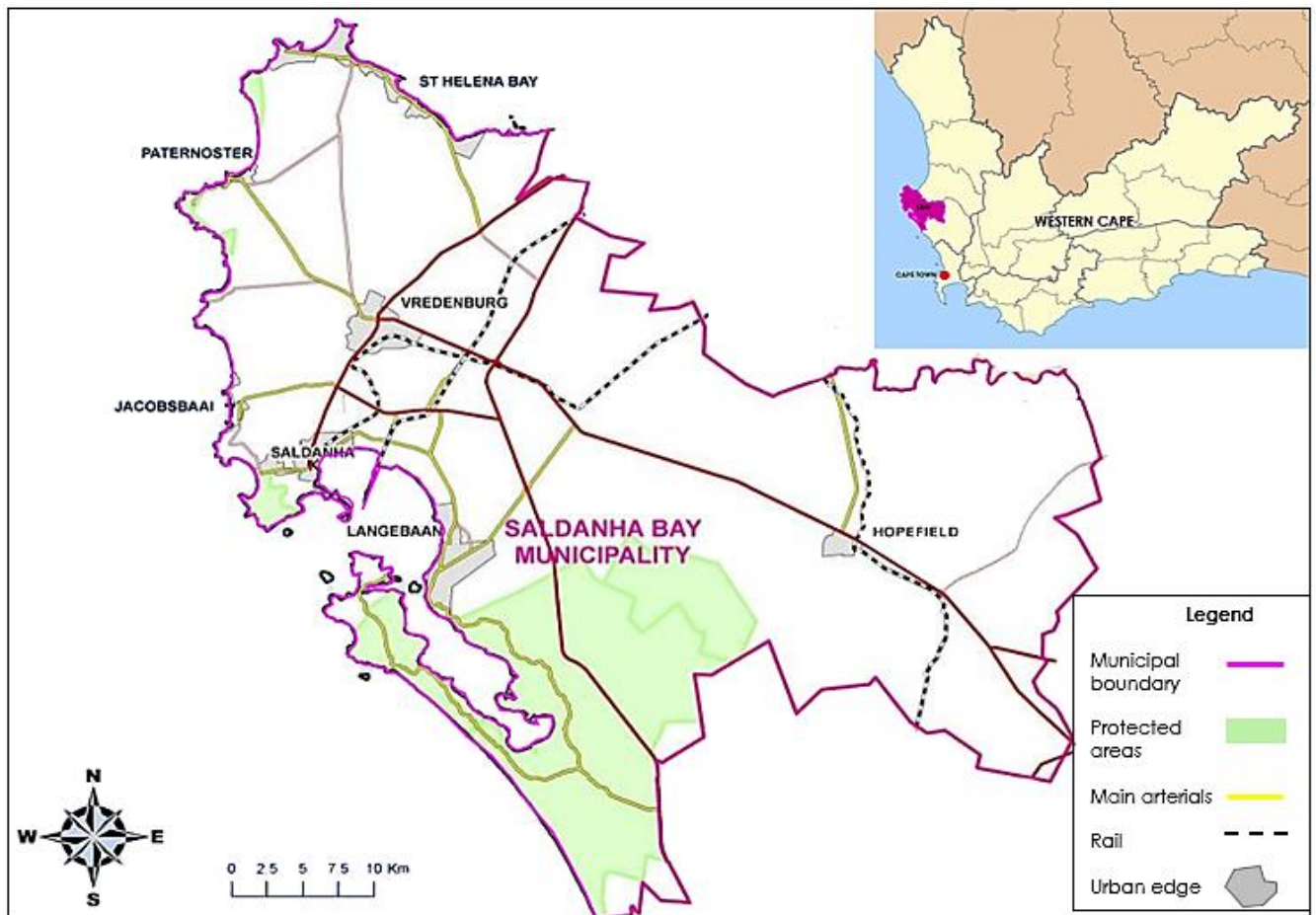


Figure 3.1 Site Location within the Western Cape Context Source: (WPG, 2015)

As identified in figure 3.1, the Saldanha Bay Municipality is located approximately 140 km north of Cape Town on the West Coast of South Africa (WCG, 2015). The region has several inland and coastal towns with the two largest being Saldanha Bay and Vredenburg. The region forms part of the Cape Floral Kingdom and is characterised by a diverse range of natural beauty with the most popular being the Langebaan Lagoon, West Coast Biosphere, the coastline and the spring flower season (WCG, 2015). The area is renowned for its quaint historic fishing villages nestled within ancient archeological fossil findings of the San people. (South African Tourism, 2016). This contributes towards the unique and tranquil experience of the region, Saldanha Bay is known for its range of eco-tourism and recreational activities that truly compliment the uniqueness of this majestic region. The unique landscape associated with the local sense of place and identity of the West Coast needs to be protected and conserved. This uniqueness, coupled with the local aesthetic of the West Coast region, is

under threat to urbanisation, coastal development and ecological degradation. The prosperity and longevity of this region lies in the ability of the relevant stakeholders to effectively manage the region so that it is conducive for all.

### 3.3 Biophysical Analysis

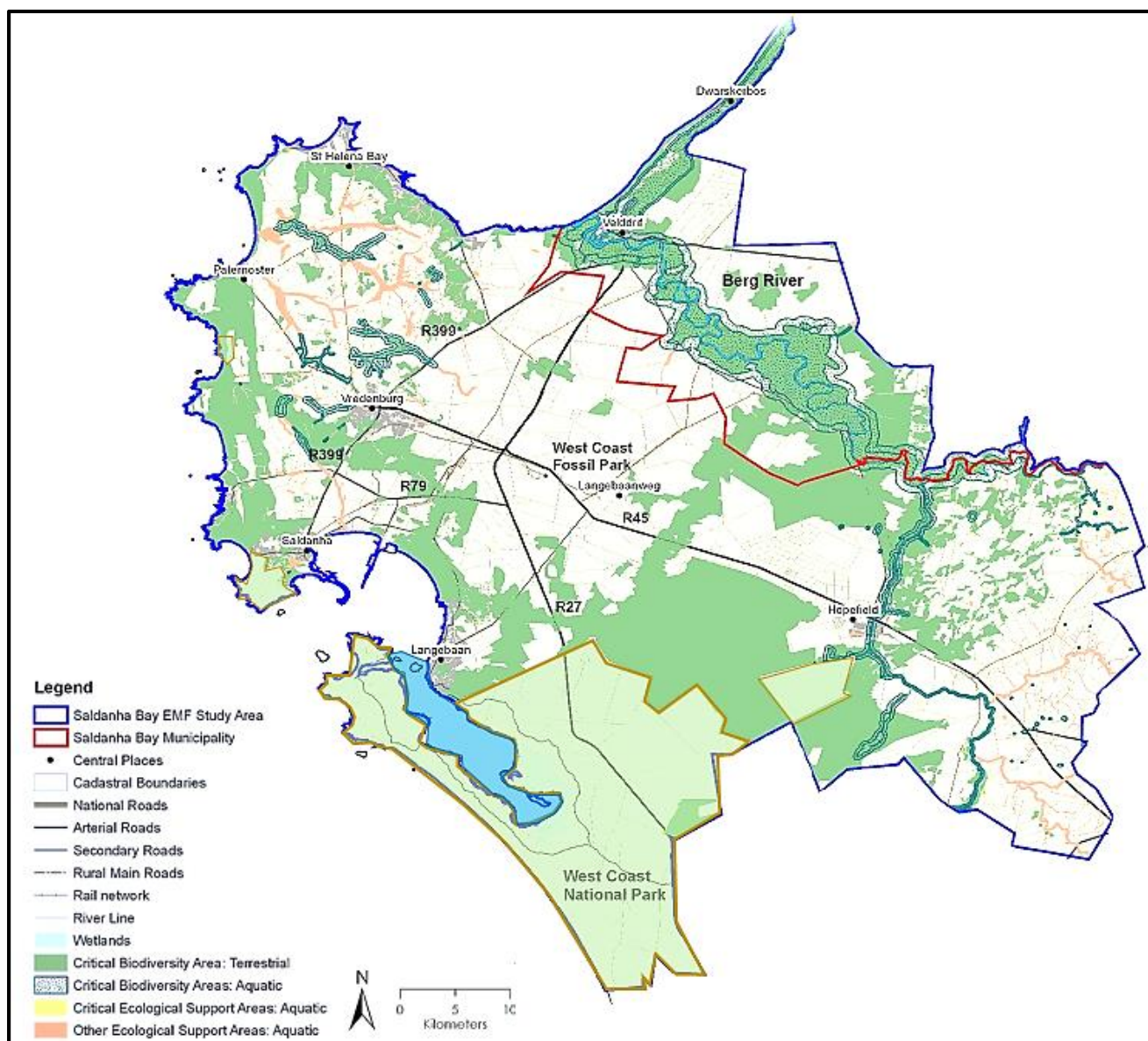


Figure 3.2 Biophysical Map of Saldanha Bay Municipality Source: (SBM, 2015).

The SBM is located within the West Coast region of South Africa which is better known for its delectable seafood, endless coastal plains and tranquil, breathtaking landscape and scenery as seen in figure 3.2 (South African Tourism, 2016). The three main environmental

attributes explored in this section will be water resources, biodiversity resources and agricultural resources. The region has a mean annual rainfall of approximately 300mm where most of the rain falls within the months between April and September (WCG, 2015). Conversely, the region has a high mean annual evaporation rate of 1300mm, which means it is a water scarce area (WCG, 2015). The most important water resource is the Berg River, although the region is also dependent on groundwater aquifers. According to the 2013 State of Environment Outlook Report for the Western Cape Province, the Berg River and other water resources within the region are under threat due to an increase in human activities (WPG, 2013).

The biodiversity of the West Coast region is associated with vast landscapes of predominantly fynbos, which also includes species of special concern and genera (WCG, 2015). The region of Saldanha is host to various endemic fynbos types with multiple fauna and flora found within the region. The region is also host to various important aquatic ecosystems such as wetlands, rivers, lagoons and estuaries (located outside SBM) (WCG, 2015). The region lies within the distinct Namaqua Marine Bioregion where the nutrient-rich Benguela current ensures some of the world's richest fishing grounds (WCG, 2015). 90 % of South Africa's fishing is done on the Western Cape Coast (WCG, 2015). 5 % of this diverse and abundant nature haven is formally protected. The protected areas include the West Coast National Park, Langebaan Lagoon (Ramsar Site), Cape Columbine Nature Reserve, SAS Saldanha Nature Reserve and also two marine protected areas (WCG, 2015).

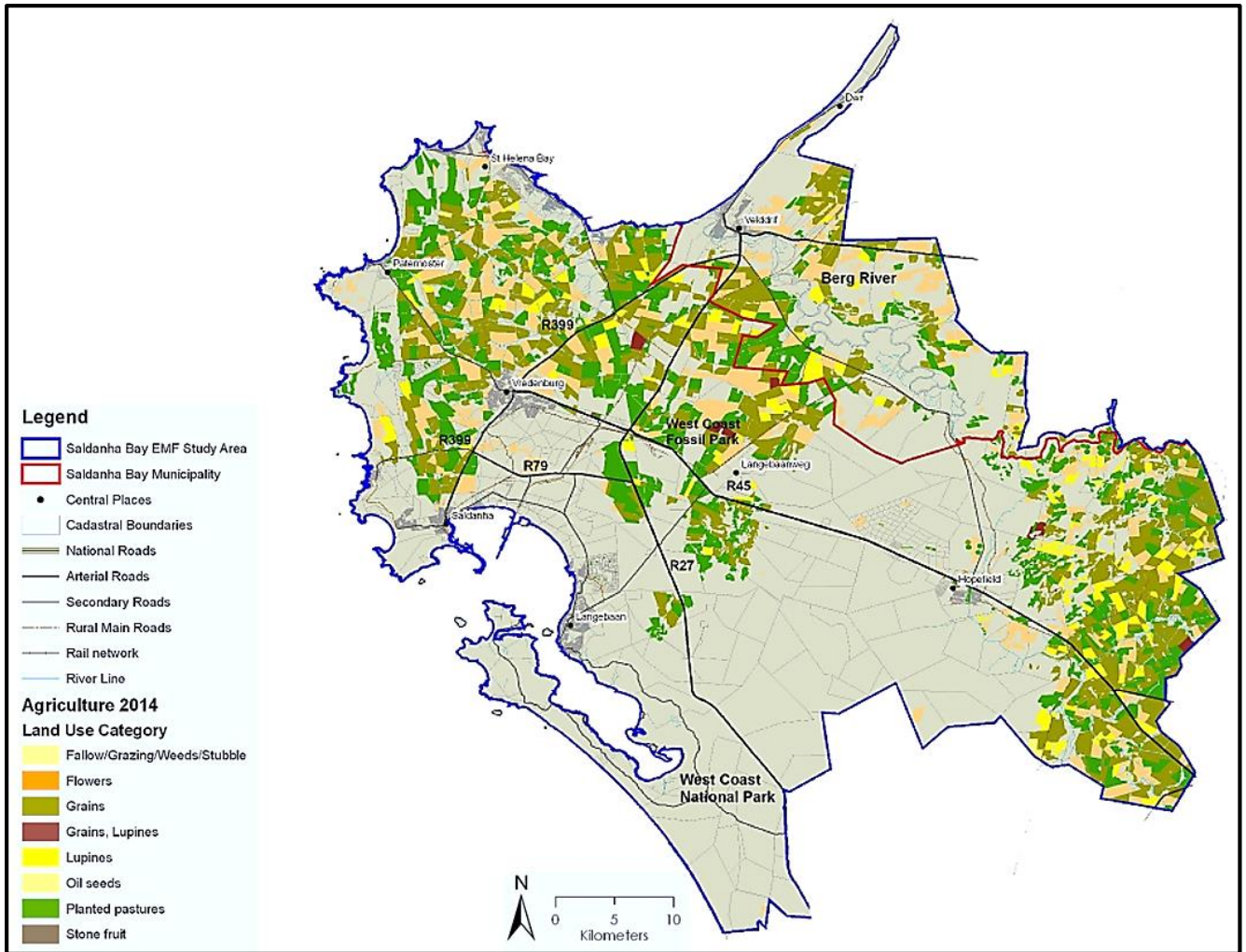


Figure 3.3 Agriculture map of SBM Source: (WCG, 2015)

The region is predominantly associated with dryland agriculture due to the poor soil types and limited water available for agriculture. Conversely, irrigated farmlands are found adjacent to the Berg River where water can be used from the river. The region is predominantly known for grazing, grain and mixed-farming practices in the Saldanha, Vredenburg and Hopefield area, as seen in figure 3.3 (WCG, 2015). In summary, figure 3.2 indicates the most important environmental aspects of the region through spatially locating the critical biodiversity areas, both terrestrial and aquatic. Figure 3.2 also indicates the most important ecological support areas, which are deemed critical to the regeneration of ecosystems within the region.

### 3.4 Socio-Economic Analysis

The Saldanha Bay Municipality is the second largest municipality within the West Coast District area in terms of population size, and has a steady increase in population growth each year (WCG, 2014). The population size is estimated to grow substantially in the next 50 years due to demand for residential homes next to the coast and investments by the South African government in renewable energy and expansion of the industrial development zone (WCG, 2014). This trend occurred in the early 90's when large steel and fishing factories were established in Saldanha Bay, but since the economic recession in 2009 most of the factories have had to be down-sized (WCG, 2015).

The summary in table 3.1 is a key indicator of the different variables that portray Saldanha Bay Municipality. There are a few concerning trends in the region which need to be addressed in order for the region to prosper in the future. Concerns include education levels that are not up to standard in terms of matric pass rates, quality of education, and educational facilities. Statistics provided in table 3.1 indicate that there is an increasing concern over children not finishing school on time. This could be because of poor quality education, poor living conditions or school being viewed in a derogative light, but the municipality needs to invest in quality education. Education is the most powerful tool available to create independence for young people, and to help them prosper in life. It also enables young people to help others within the community through teaching, and enables them to be an example to others, which could help minimise criminal activity (WCG, 2015).

The poor health conditions shown in the statistics provided in table 3.1 are another reason why young children don't finish school. Poor living conditions leave people vulnerable to disease and viruses that render them ineffective in terms of work productivity and helping their children with school work. A great concern in the region is the rate at which HIV/AIDS has increased due to poor living conditions and poor awareness as a result of insufficient community education on healthy living (WCG, 2014). In addition, alcohol and drug abuse are the dominant factors affecting an informal settlement or community. These trends lead to increased illegal activities and poor decision making, which once again affects the young population as they have poor role models (WCG, 2015). There is a large housing backlog of approximately 1841 houses . This, together with poor basic service delivery and poor infrastructure, will continue to create problems in the region (WCG, 2015).

Table 3.1: A trend showing key socio-economic statistics from 2001 to most available data within Saldanha Bay Municipality Source: (compiled and analysed by author, Original data from StatsSA, 2011 & WCG, 2014)

Key Socio-Economic Statistics	2001	Most recent data available	Trend (2001-most recent)
Population size	70 439	109 355 (2016)	10.3 %
Working age (65+)	3,9%	6% (2014)	Small increase
Working age (0-14)	28,9%	25% (2014)	Small decrease
Working age (15-64)	69,5%	69% (2014)	Small decrease
Dependency ratio	48,8%	44% (2011)	Small decrease
Sex ratio	98,4%	99,2% (2011)	Small increase
Growth rate	4,34%	3,45% (2011)	Large decrease
Literacy Rate	79%	86,7% (2011)	Large increase
Unemployment rate	21,5%	23,4% (2011)	Small increase
Human Development Index	0,67	0,71 (2011)	Small increase
ART patient load	1127 (2012)	1779 (2014)	Large increase
Youth unemployment rate	26,8%	30,4 % (2011)	Small increase
No schooling aged 20+	5,1%	2,4% (2011)	Small decrease
Higher education aged 20+	7,7%	9,3% (2011)	Small increase
Matric aged 20+	22,2%	28,4% (2011)	Small Increase
Matric pass rate	92,7% (2011)	90,5% (2013)	Small Increase
Number of households	18,663	28,835 (2011)	10,3%
Average Household size	3,7	3,2 (2011)	Small decrease
Female headed households	29,1%	30,4% (2011)	Stable
Formal Dwellings	84,5%	81,7% (2011)	Small decrease
Housing owned/paying off	65,2%	62,1% (2011)	Small decrease
Flush toilet connected to sewerage	90,5%	92,5% (2011)	Small increase
Water services	95%	99% (2011)	Small increase
Sanitation services	96,3%	97,1% (2011)	Stable
Energy services	95%	99,3% (2011)	Small increase
Weekly refuse removal	96,2%	96,6% (2011)	Stable
Housing	84,5%	81,7% (2011)	Small decrease
Piped water inside dwelling	67,2%	80,2% (2011)	Large Increase
Electricity for lighting	91,5%	97% (2011)	Large Increase
Real GDP growth		4,4% (2000-2013)	
No income		13,9% (2011)	

The Saldanha Bay region is predominantly involved with the finance and business sector, which seems to be linked with a large general government sector as seen in figure 3.4 (WCG, 2014). The fishing industry is also a strong contributor, but only has a few dominant companies such as Sea Harvest. The rest are all local fishermen who use the marine life for subsistence living (WCG, 2015). The industrial and mineral sectors are both large contributors, as large steel and iron-ore factories are based in Saldanha Bay (WCG, 2014). As previously mentioned the industry has not really recovered from the 2009 global recession. The possible expansion of the industrial development zone and the expansion of the port could, however,

have a tremendous boost for the economy, but to what extent will the environment suffer with such future plans?

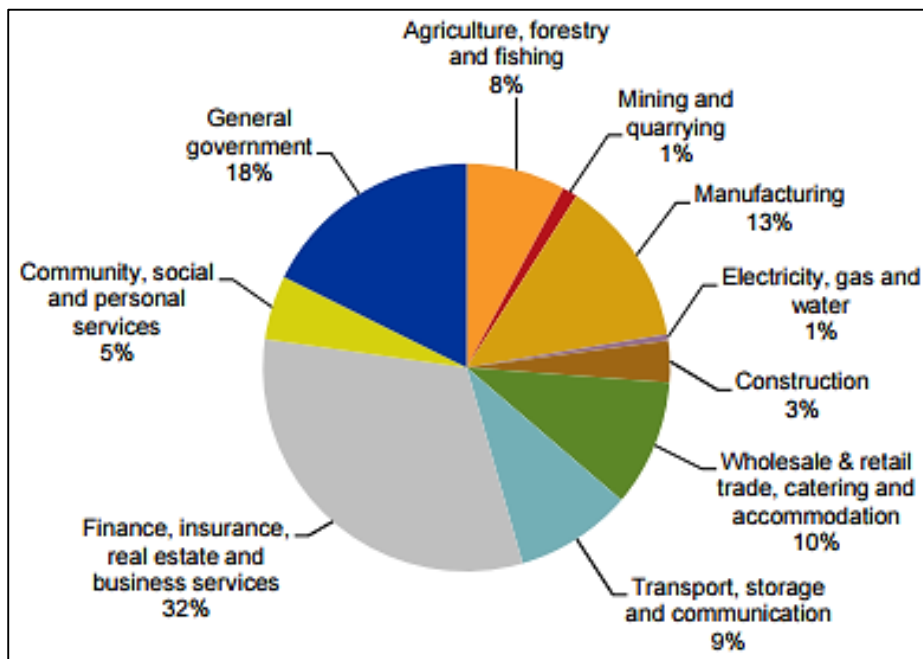


Figure 3.4 Saldanha Bay Municipality Sectoral Composition 2011 Source: (WCG, 2014)

### 3.5 Landscape Character Assessment

Tudor (2014) defines a landscape based on different variables which all have an effect on each other. Different landscape characteristics play an intricate role in how a region or place is perceived. The combination of different characteristics within a region, from natural to cultural and socio-economic, define the uniqueness of a place. Tudor (2014) displays the different variables / characteristics of a landscape in figure 3.5. An interesting aspect that should be noted is the inclusion of perceptions and aesthetics within landscape character assessment. Tudor (2014) describes people and nature through exploring factors based on natural, cultural / social and perceptions and aesthetic aspects. The researcher feels that this is a very important aspect to include if one is to really investigate or analyze a landscape region. The complex interrelationships between different factors within a defined landscape need to be understood in order to protect and conserve the uniqueness of a place (Tudor, 2014). The researcher was limited to a basic analysis of the study area due to time constraints, but a visual feel will be demonstrated in order to capture the uniqueness of the greater Saldanha region. The researcher has provided a visual representation of what he feels is

critically important to the identity and character of the region. This will help with further analysis in order to inform the proposed RSDf in chapter 4.

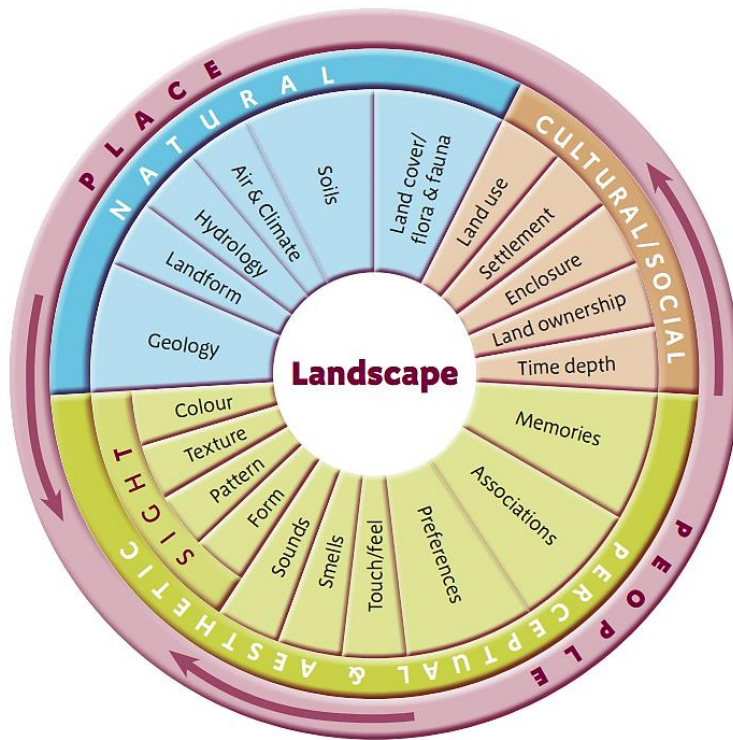


Figure 3.5 Different landscape variables

Source: (Tudor, 2014:8).

The region of Saldanha Bay is mostly dominated by local fisheries and eco-tourism in terms of livelihoods (WCG, 2015). The unique, diversified landscape of fauna and flora and multiple marine ecosystems really signifies the regional beauty this region has to offer. The landscape possesses unique biodiversity in particular the Langebaan Lagoon (Ramsar site), the Berg River estuary, breathtaking coastline and of course the spring flower season (of which a large portion is protected within the West Coast National Park) (WCG, 2015). The region has unique cultural and historic significant areas which include paleontological and archaeological features sites which suggest early human habitation before the Khoi people (WCG, 2015). Fig. 3.6 shows a variety of landscape attributes that define the region of Saldanha Bay which include scenic drives and hikes adjacent to the coast and within the biodiversity hotspots as mentioned above.

The region is defined by various small towns located inland and along the coast, which creates a feeling of appreciation for natural beauty and uniqueness of place. The areas are defined by dryland agriculture and a diverse range of West Coast fauna and flora which form part of the Cape Floristic Region. In addition, as unique as the inland landscape is, the

coastal and marine ecosystem also contributes to an even more diverse range of ecosystems found within the region. The marine and coastland are home to over 400 marine fauna species and a large range of birds that migrate to these areas for nesting and feeding (WCG, 2015). Figure 3.6 illustrates the visual beauty of the region, highlighting features such as picturesque coastlines, majestic mountain ranges, lush landscapes and unique ecosystems associated with SBM.

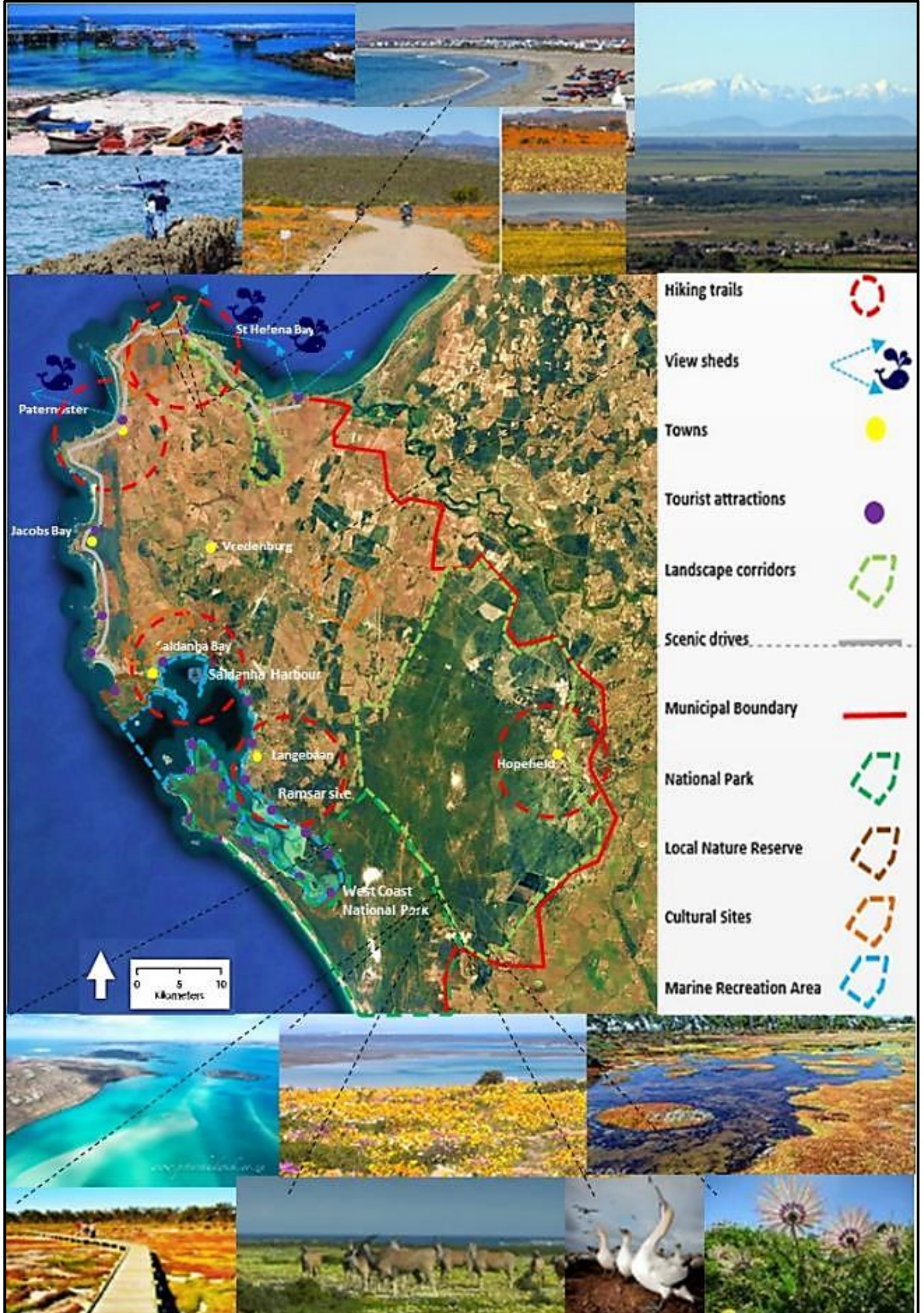


Figure 3.6 Landscape Character Map images from Cape West Coast 2014)

Source: (Map annotated by author image from Google Earth, 2016; all

### 3.6 National, Provincial and Local Spatial Informants

This section of the chapter will explore the various national, provincial and local policies, plans and strategies that inform decisions within environmental management and spatial planning in Saldanha Bay Municipality. This is based on legal requirements, strategic goals and local development plans. This section will start with the relevant national acts and then explore the various provincial strategies, and lastly look at local area plans for SBM.

#### 3.6.1 National Environmental Management Act of 1998

The following aspects are specifically relevant to the site under investigation: the principles of NEMA are celebrated and used as a guidance for developing sustainable criteria for natural resource management and land use decisions; principles such as sustainable development, holistic interpretation and evaluation help create a platform for integrated and holistic thinking where strategic decisions can be made (WPG, 2015); the various Integrated Environmental Management Objectives stated within NEMA are used as guidelines in order to make informed decisions about ecological resilience (WPG, 2015).

#### 3.6.2 Spatial Planning and Land Use Management Act of 2013.

Figure 3.7 indicates a conceptual diagram of the role that SPLUMA plays within the context of the country. SPLUMA is based on five main principles which shape the goal and outcomes set on the desired state of developments and land use. These principles consist of spatial justice, spatial sustainability, spatial efficiency, spatial resilience and good administration (Department of Rural Development and Land Reform, 2015). Each principle has a desired state or objective in terms of what the act represents. These principles are the binding foundation and act as a platform to help guide land use and planning decisions towards a more integrated and sustainable future. The laws and regulations stipulated within SPLUMA need to be respected and adhered to throughout the nation.

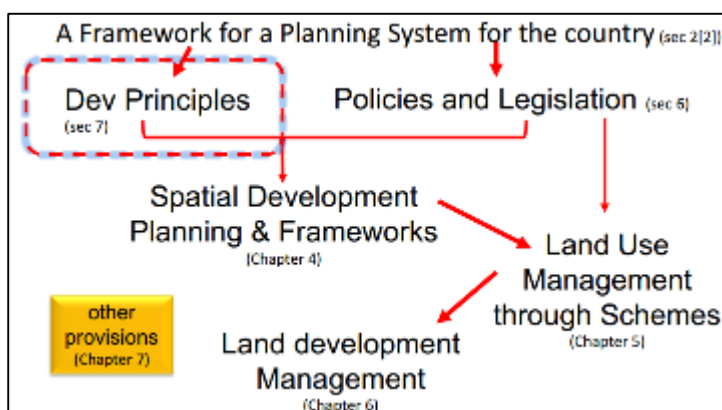


Figure 3.7: Conceptual diagram of SPLUMA (Department of Rural Land Reform and Development, 2015).

Source:

### **3.6.3 Municipal Systems Act 32 of 2000**

This act provides the necessary legislation to enable each municipality to improve its communities by guaranteeing access to necessary services. The act states that a municipality is legal when the community is included and executive and legislative powers are elucidated (Ossafrica, 2007). The focus is to boost local governments by providing a framework for municipal planning, performance management and use of resources. The Act responds to the needs of the poor through providing service tariffs and credit control policies, and encourages local participation within local governance (Ossafrica, 2007).

*"The Municipal Systems Act, Act No. 32 of 2000 (MSA) requires that each Municipality prepare an Integrated Development Plan (IDP) to serve as a tool for transforming local governments towards facilitation and management of development within their areas of jurisdiction"* (Ossafrica, 2007:n/a).

### **3.6.4 Western Cape Spatial Development Framework 2013**

The purpose of a spatial development framework is to guide private and public investment through obtaining the desired vision stated upfront. Within the Western Province Spatial Development Framework (WPSDF) the vision states *"socially just communities and settlements in the Western Cape through a sustainable development path"* (WCG, 2015:24). The principles that form the backbone of the WPSDF consists of the following: healthy environment, ecological integrity and resilience, social inclusivity and equity, economic prosperity and sufficiency, and cooperative governance (WCG, 2013:51). The overarching aim is based on the premise of rectifying the inequalities of the past and ensuring an ecologically resilient and protected environment. The ethos of the PSDF is part of the transition towards a more socially inclusive and environmentally protected future. The PSDF identifies the Saldanha region as a strategic growth point due to the growth potential of the port and the expansion of the industrial development zone. Increase in job opportunities and a boost to the local economy is predicted for the Saldanha Bay region in the future (WCG, 2013). Government is positive that it will unlock the economic potential of Saldanha Bay through large infrastructure projects and investing in renewables. Figure 3.8 spatially interprets the vision of the future of the Western Cape and points out the strategic economic growth points.

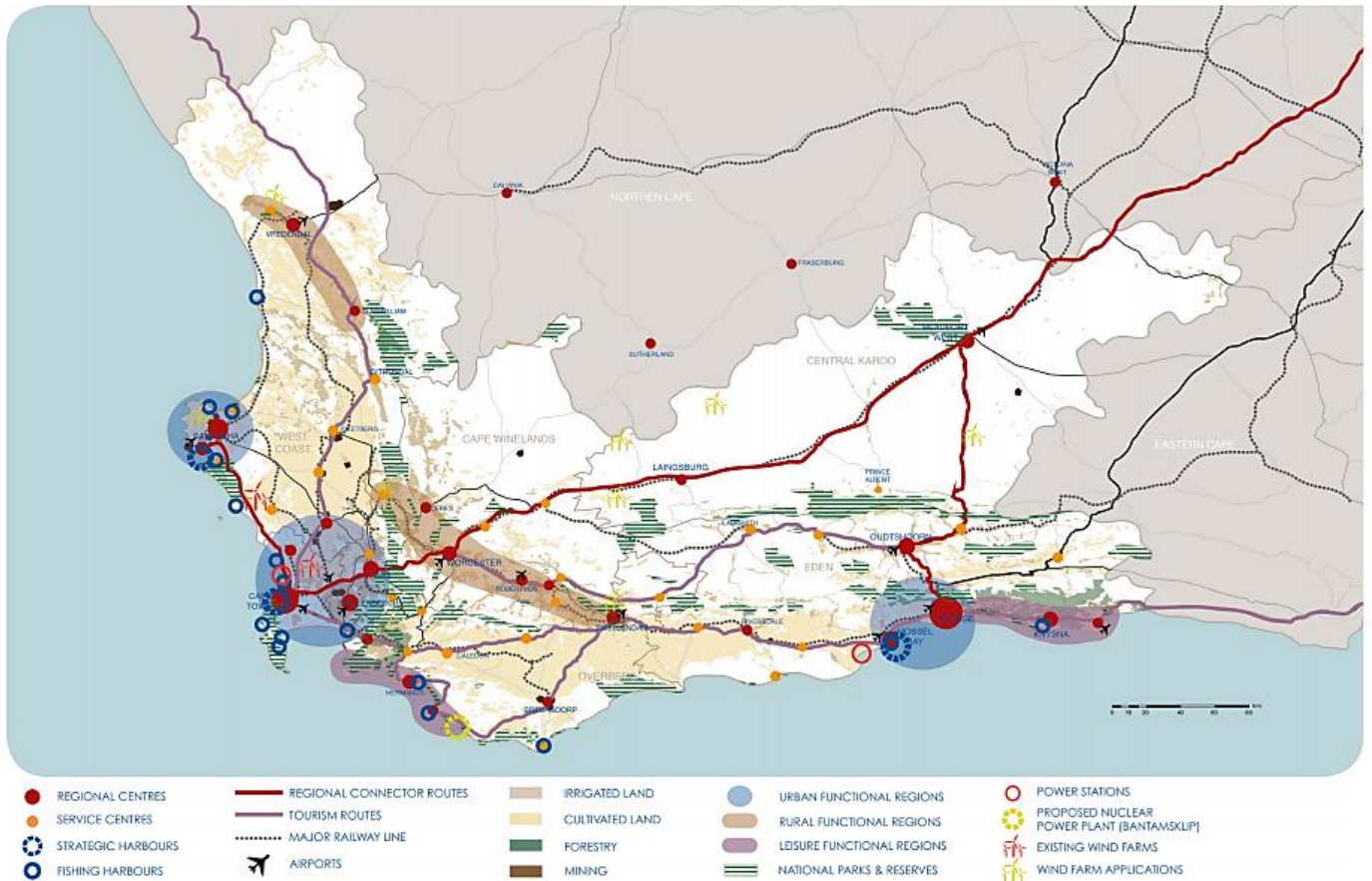


Figure 3.8: Western Cape- Economic Growth Potential

Source: (WCG, 2013:69).

### 3.6.5 Western Province Green Economic Strategy (WPGES) 2013

The Western Province Green Economic Strategy (2013:7) has identified five main principles that guide the vision of the province. These principles are: Market focus -based on green economic drivers; Private sector-driven – where investment in green growth potential is encouraged; Public sector-enabled- where various public entities are enabled through procurement of the green economy; Collaboration- collaborating and forming partnerships with various stakeholders in order to continuously stay innovative and expand on market capacity; and Inclusion- unforeseen events created through market failure or climate change in the future can create vulnerable circumstances for people. Therefore, inclusion will act as a safety net to help people that are vulnerable during those times. The strategy identifies various projects and programs to encourage the use of green design and technology within an emerging market. Renewable and sustainable innovation is the transition towards a more ecologically sustainable future, while simultaneously boosting the regional economy (WCG, 2013).

### **3.6.6 Western Cape Climate Change Response Strategy and Action Plan 2008**

The government of the Western Cape is determined to help strengthen resilience and adaptability against the effects of climate change. The goals of the strategy are specifically focused at targeting vulnerable communities and people, which will be most affected by this phenomenon. The strategy also strives for a low carbon footprint through reducing greenhouse gas emissions and implementing innovative green technologies and design. This strategy identifies smart solutions for the everyday consumer, and also identifies solutions within a region-wide context.

### **3.6.7 Saldanha Bay Municipality – Integrated Development Plan 2012- 2017**

The ethos by which SBM will strive to live is “*Serve, Grow and Succeed Together*” (SBM, 2015:4). The envisioned mission of the municipality is based on making the region the area of choice where one can live, work and relax (SBM, 2015). Objectives stated by the municipality include the following; provide quality services at affordable prices; ensure development opportunities for all; use available sea and land resources in a sustainable manner; and strive towards the three main pillars of sustainable development which is human well-being, economic success, and ecological responsibility (SBM, 2015:4). As obligated by government, an IDP is used as a guidance tool in every aspect of the municipality, thus SBM recognizes the need to balance resources effectively and efficiently.

### **3.6.8 Saldanha Bay Municipality- Integrated Transport Plan 2015-2020**

Local municipalities are obligated by legislation to compile ITP's, which are integrated within the IDP of the municipalities. The ITP in question has considered all modes of transport and has identified various issues and concerns surrounding the different modes of transport. The ITP process was based on data collection, planning and analysis in order to formulate the relevant strategies and area-specific projects which will combat the problems that the current system encounters (WCG, 2016). The main problem identified within SBM is the lack of sufficient public transport within the region, which is due to low densities and large distances between small towns (WCG, 2016).

### **3.6.9 Saldanha Bay Municipality- Integrated Human Settlements Plan 2016**

The purpose of the IHSP is to update the current housing and pipeline plan (plan which identifies where they will lay pipes down) by identifying future housing projects, and developing a 10 year pipeline plan. This is done in order to develop sustainable human settlements for the future of SBM. The plan is guided by National and Provincial policies in order to produce sustainable human settlements by 2030 (SBM, 2016). The plan identifies various strategic locations where human settlements will be upgraded through producing local area plans for every site. The municipality has a vast housing backlog which creates sustained pressure on the municipality to develop houses. Land has been identified for potential development of houses, which was based on the findings of the current SDF. This is potentially problematic for the environment because most of the sites are zoned for agriculture and are within CBA's (critical biodiversity areas). The spatial representations identified in the IHSP are outdated and need to be based on the most recent EMF, that of 2015.

### **3.7 Environmental Management Framework 2015: Saldanha Bay Municipality**

The 2015 Environmental Management Framework (EMF) for the greater Saldanha Bay area covers the region of the Saldanha Bay Municipality and a portion of the Berg River Municipality (WCG, 2015). The study area in question is, however, based within the boundaries of the Saldanha Bay Municipality. The reason behind the inclusion of the southern bank of the Berg River area and the northern bank of Saldanha Bay Municipality, is to include the river and estuary system which falls within the same catchment. This section of the EMF will only explore trends and concerns within the region in order to inform the proposed RSDF in the next chapter.

#### **3.7.1 Key Trends and Concerns**

The key trends, concerns and opportunities that are discussed within Saldanha Bay Municipality, based on findings provided within the 2015 EMF, are listed below. These are some of the main issues/priorities that need to be considered within land use planning and development. The different factors listed will be some of the main overarching focus points

for the researcher to consider in his quest to formulate an integrated RSDF. All the following trends and concerns are based on findings of the 2015 EMF which relate to environmental degradation, and will potentially also have socio-economic effects on local livelihoods within the region.

### **3.7.1.1 Availability of Water**

Water availability is a global crisis, which is increasingly becoming more paramount. The growth of urbanisation, increase in consumer goods and the plethora of negative effects associated with climate change has created a state of crisis. This is specifically evident within Southern Africa as severe drought conditions have been evident in 2016. According to a News24 article, Southern Africa will need \$1.2 billion in order to eradicate current and future problems, although the researcher feels that this might not even 'fix' all our problems. ("\$1.2 billion need for..." 2016). This emphasises the severity of the water crisis and the need to find practical solutions in order to eradicate the problems.

The Western Cape is already struggling to keep up with disparities between water supply and demand. In effect, this problem will only become increasingly more difficult because of climate change and the continuous growth in population numbers (The South African Government, 2015). The region of Saldanha Bay is water scarce and surface water is very limited (WCG, 2015). The main sources of water within the region are supplied through the Berg River (surface water) which stretches from the Franschhoek Mountains all the way through to Velddrif as seen in figure 3.9 (WCG, 2015).

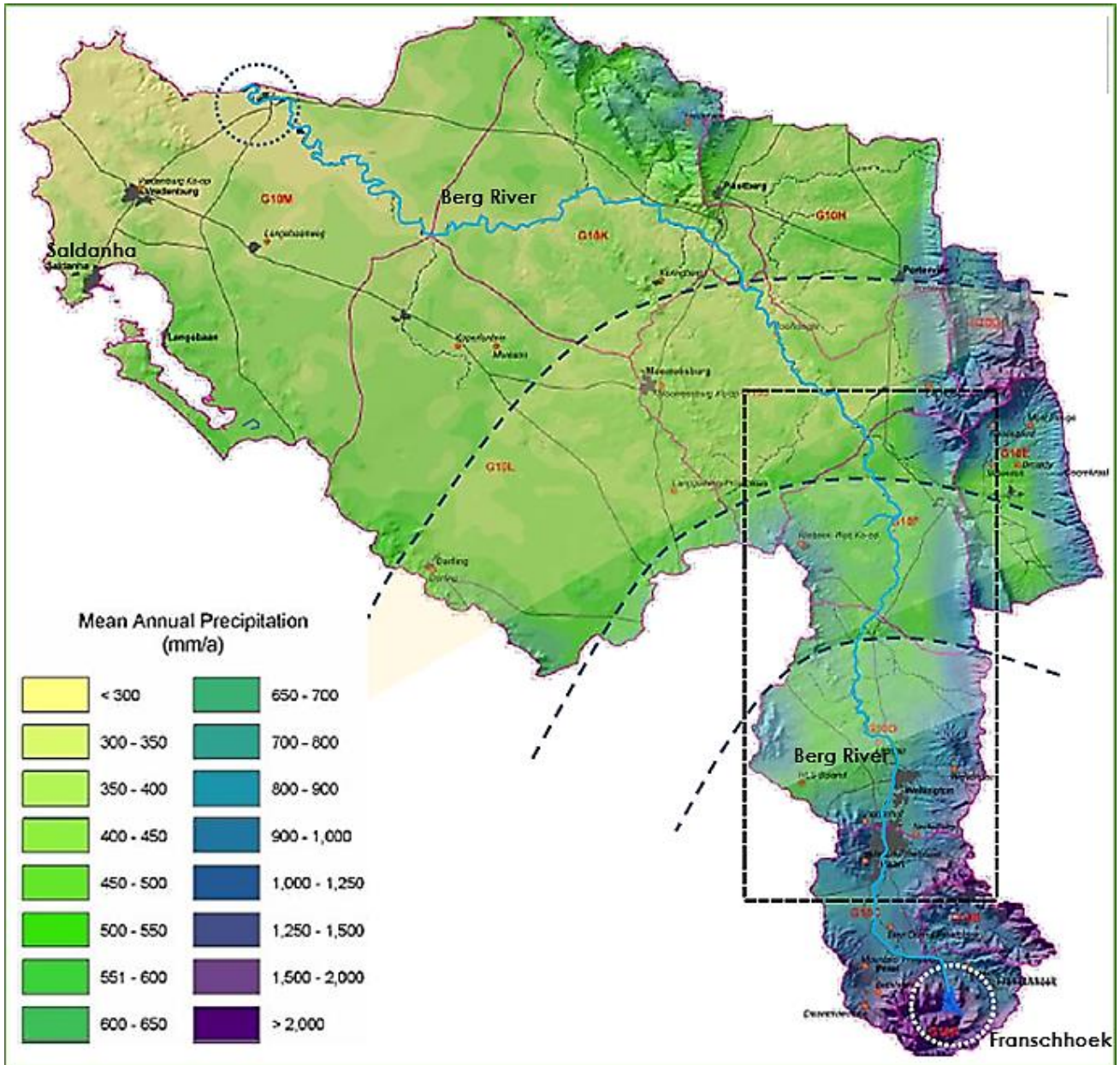


Figure 3.9 Berg River Catchment Area Source: (Bugan, Jovanovic, & De Clercq, 2015)

Groundwater is also extracted from the Langebaan Road Aquifer and Elands aquifer respectively (WCG, 2015). Potable water is scarce which creates a major challenge in terms of basic service delivery within the Saldanha Bay Municipality. Due to the projected industrial growth within Saldanha and the need for bulk water supply, this is regarded as a major constraint for the future (WCG, 2015). The industrial zone of Saldanha is already using almost half of the water within the region as indicated in table 3.2, which will be further exacerbated when the industrial development zone expands.

Table 3.2: Water use in Saldanha Bay for 2012-2013, based on SBMs billings Source: (Seyler, 2015:15)

Town	Total (million m <sup>3</sup> /a)	Total (m <sup>3</sup> /a)	Residential (m <sup>3</sup> /a)	Industrial (m <sup>3</sup> /a)	Farms (m <sup>3</sup> /a)	Other (m <sup>3</sup> /a)
Saldanha	6.75	6,749,565	624,558	6,002,527		122,480
Vredenburg	2.15	2,153,437	1,058,192	107,407	9,973	977,865
St Helena baai	1.09	1,094,379	532,142	516,633	15,255	30,349
Louwville	1.06	1,062,599	975,862	29,527		57,210
Langebaan	0.88	883,486	699,352	98,471	6,838	78,825
Rural	0.55	553,171	3,061	757	149,526	399,827
Hopefield	0.21	213,312	158,214	10,151	11,482	33,465
Long Acres	0.21	214,891	124,710	38,217	51,964	-
<b>Total</b>	<b>12.92</b>	<b>12,924,840*</b>	<b>4,176,092</b>	<b>6,803,690</b>	<b>245,038</b>	<b>1,700,021</b>

\*It is assumed that the difference between what is sold to the SBM (13.5 million m<sup>3</sup>/a) and what is sold by the SBM (12.9 million m<sup>3</sup>/a) reflects un-accounted for water (losses).

“Water demand projections are based on current available yields and do not take climate change into consideration” (WCG, 2015:27). Under current climate conditions, water delivery is already a problem. Thresholds are being breached and the rate of pollution within water systems is of great concern. Extraction of water within the catchment via dams has led to a reduction in fresh water inflow into estuaries, streams and rivers (WCG, 2015). Groundwater extraction will have vulnerable impacts on both the Berg River Estuary and Langebaan Lagoon systems.

### 3.7.1.2 Coastal Development

Residential developments can be very detrimental to local coastal towns, especially in the sense of changing the aesthetics and local character of a place. But, coastal developments can also lead to large investment opportunities and employment for local people. Property and industrial development is foreseen to increase within the next 50 years, especially industrial development at the port of Saldanha Bay and the investment of renewable energy in the region (Creamer Media, 2015). Trends associated with coastal developments normally have multiple concerns, however, which lead to negative impacts on a local scale. Associated concerns include ribbon development adjacent to the coast; local aesthetics lost; underutilised infrastructure leading to maintenance costs not being recovered; private restrictions on property on the coast creating a buffer or ‘exclusivity’ factor which has a negative impact on tourism and access (WCG, 2015).

Coastal development has always been controversial in terms of demarcated setback lines and coastal protection zones which are not respected or adhered to. Langebaan and Saldanha Bay extend almost to the water's edge, and with towns such as Paternoster and St Helena increasing in coastal residential property, this creates worry for the future of coastal and marine ecosystems. Developments near the coast lead to habitat loss, trampling, increase in pollution and increased storm water drainage (WCG, 2015). This EMF proposes a 30m setback line on the coast in order to protect the marine and coast environment from potential coastal developments as indicated in figure 3.10.

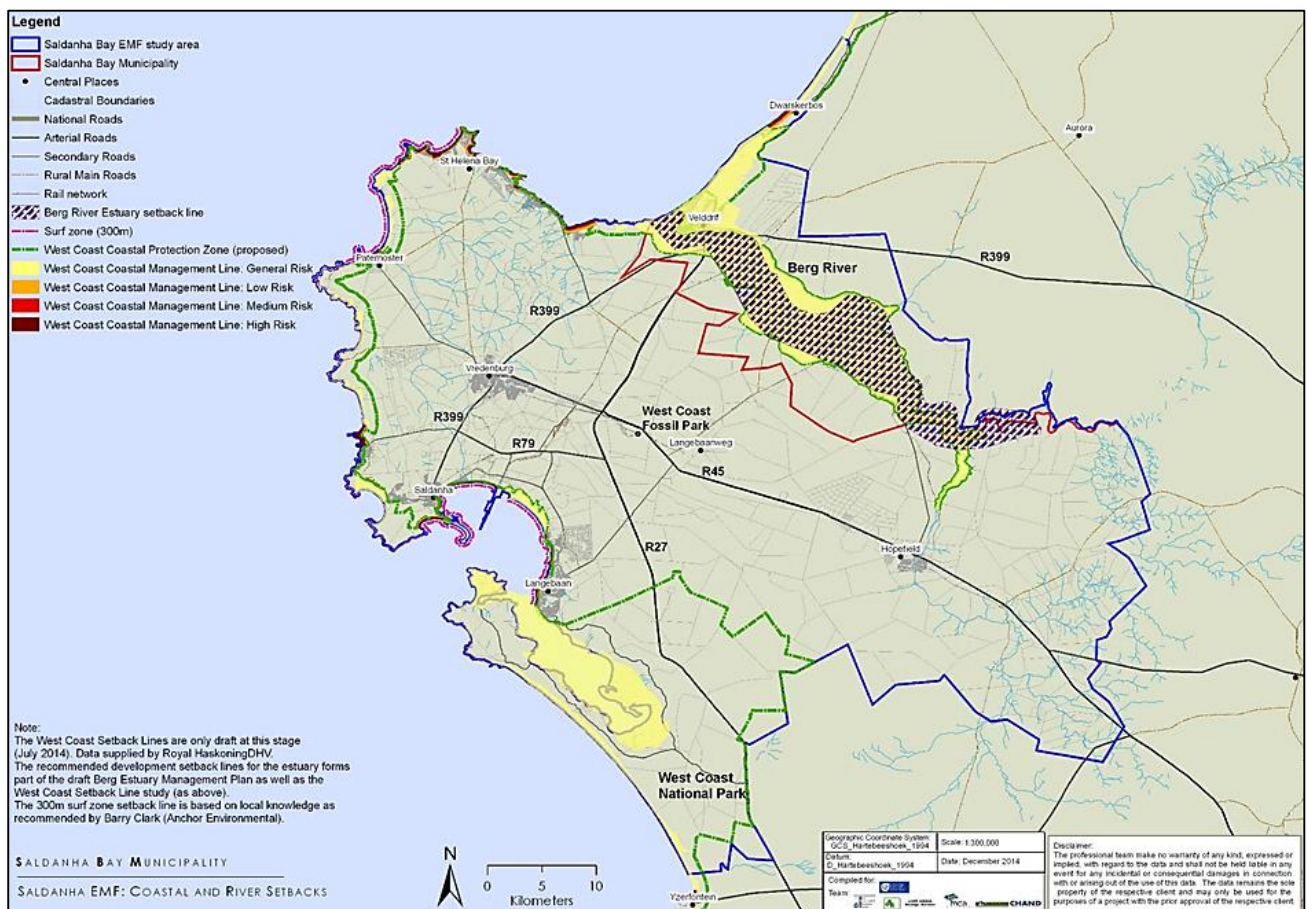


Figure 3.10 Saldanha Bay Municipality: Coastline and Setback Lines Source: (WCG, 2015).

### 3.7.1.3 Disturbance & Degradation of Terrestrial & Aquatic Ecosystems

Urban development within the greater region of Saldanha has created an irreversible trend in the consistent loss of biodiversity (WCG, 2015). This trend is particularly worrying along the coast where residential properties are being built right on the water's edge, which has considerable negative effects as previously discussed (WCG, 2015). With the region already

being water restricted, the increase of alien invasive species on land creates continuous difficulties. The spread of Rooikrans, Long-Leaf Wattle, Port Jacksons and various Eucalyptus species has created a maintenance and land issue for the municipality due to degradation of natural agriculture land (WCG, 2015).

Rivers within the region and rivers found up/down stream have lost most of their diversity due to human influence (WCG, 2015) The building of dams, over-consumption of water, alien invasive plant and fish species and river pollution have all had negative impacts on the whole catchment area (WCG, 2015). Various factors that influence the natural flow of rivers can occur as far as 100 km's away, which can lead to detrimental effects somewhere else (WCG, 2015). Therefore, the maintenance and protection of the natural flow of the river system is one of the main priorities for Saldanha Bay Municipality. The need for collaboration between other municipalities is equally important to ensure that clean and safe drinking water is available from the source to the outflow into the sea. In addition, the quality and flow of rivers are also largely dependent on the health of the natural vegetation that runs adjacent to it. Therefore, the need to protect wetlands and other ecosystems is equally as important as the river system itself.

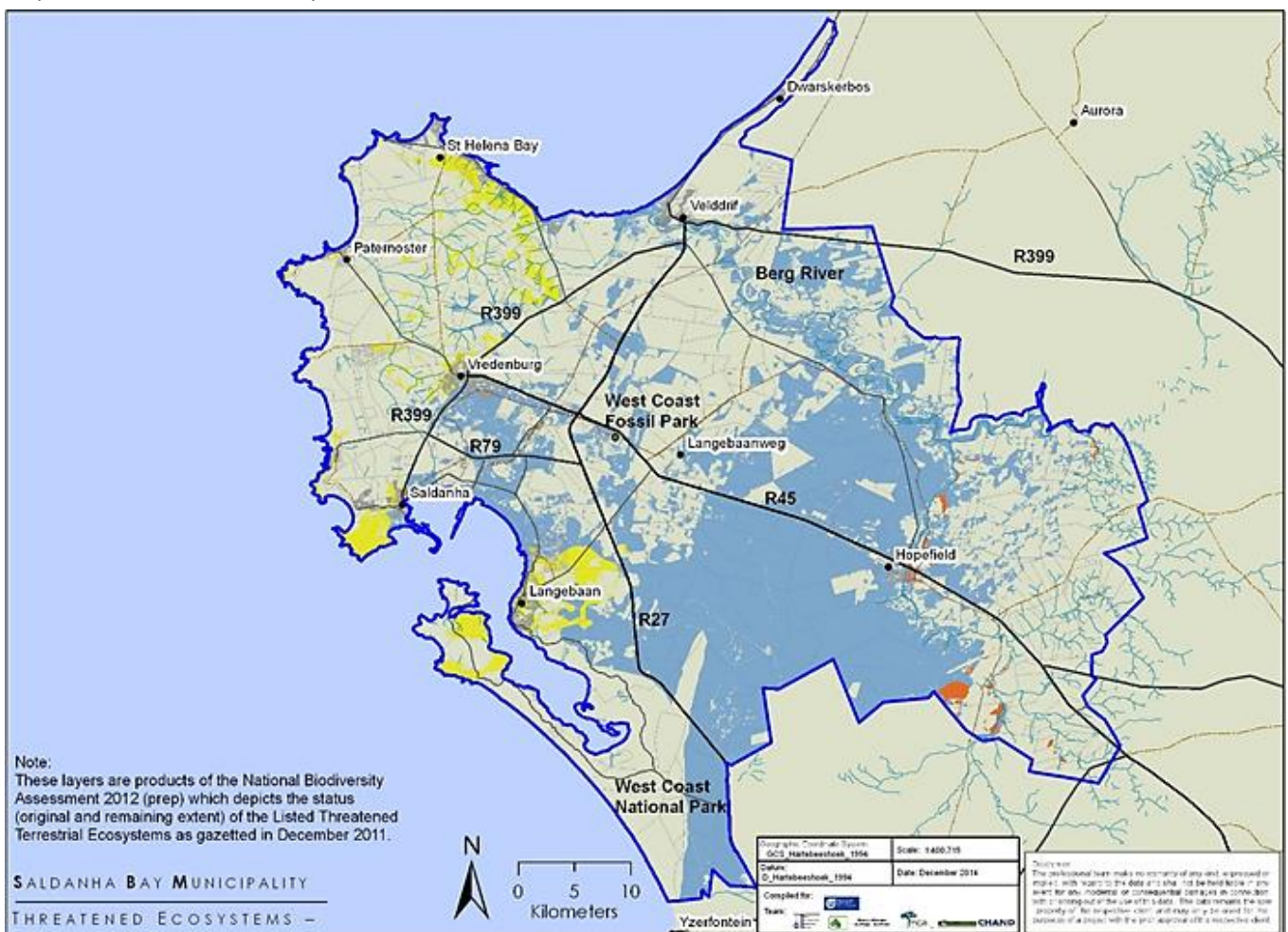


Figure 3.11 Threatened Ecosystems (vegetation) Current State in Saldanha Bay Municipality

Source: (WCG, 2015)

### 3.7.1.4 Marine Pollution & Pollution Risks

'Organic material' inflow into Small Bay and St Helena Bay is a direct result of fishing processing plants such as Sea Harvest (estimated between 50 – 90 thousand kL) (WCG, 2015). Various organic material inflow can have negative effects on marine aqua culture, such as eutrophication, growth in algae and anoxia, and change in marine species composition (WCG, 2015).

Faecal Coliform pollution (bacteria that forms in the faeces of animals and humans) is particularly evident in Bok River sewage outlet and Pepper Bay (WCG, 2015). Sewage discharge is one of the main issues that continuously affects the environment within Saldanha Bay. Water quality has improved, although contamination levels of Faecal Coliform are still above guideline regulations which need to be addressed (WCG, 2015). An upgrade to current sewage infrastructure, and more effective solutions for organic material disposal, are needed. In addition, various other concentrations of contaminants (nitrate, ammonia, metals) in Saldanha Bay contribute towards environmental and recreational degradation (WCG, 2015).

Heavy metal concentrations (Cadmium, Lead, Copper, Iron, Nickel) within Saldanha Bay, specifically the industrial port, has had associated problems in terms of mussel production and concentrations within the sediment (WCG, 2015). Levels are currently acceptable, but with the increase in industrial development for the region, this will become a problem. Within the Bay where sediments tend to accumulate, the level might exceed the threshold. This is either due to human activity (iron-ore and steel factories) or natural (high concentrations of cadmium in sediment) (WCG, 2015). These metals are inactive when buried within sediment, but through mechanic disturbance or activity they could potentially become active again, and are regarded as toxic to the environment. Small Bay is regarded as the spot with the highest concentration of metals, especially the yacht club. Benthic Fauna has almost been entirely destroyed within the Yacht club, which has created an imbalance within the marine sub eco-cultures (WCG, 2015).

With the increase in large ships within the bay, the volume of ballast water discharge has increased (WCG, 2015). Ballast water is used when loading and unloading cargo onto a ship, and enters at the one port and is deposited at the next. Ballast water holds various biological materials which could potentially have negative impacts when exposed within a new ecosystem (WCG, 2015). Trace metals have been found within Saldanha Bay which is

associated with ballast water, and this contributes towards metal contamination within the Bay. Sixty-two marine alien invasive species have been introduced within the ecosystem of Saldanha Bay, which is predominantly through shipping activity or marine aquaculture (WCG, 2015).

Oil spillage is a continuous concern, especially with the plan of expanding the current iron ore terminal within the port of Saldanha Bay. The plan of Transnet has been dually criticized for not having any oil spill contingency plan which is seriously needed (WCG, 2015). The quality of the water within the bay is very important, especially with various marine aquacultures being used for business. Poor waste water is entering the Bay, which is a concern for local fish farmers. Two of the seven waste water treatment plants were deemed to be acceptable according to the green drop assessment (WCG, 2015). Therefore, as previously mentioned, waste water and sewage infrastructure needs to be upgraded within the region as indicated in figure 3.12 as point source pollution.

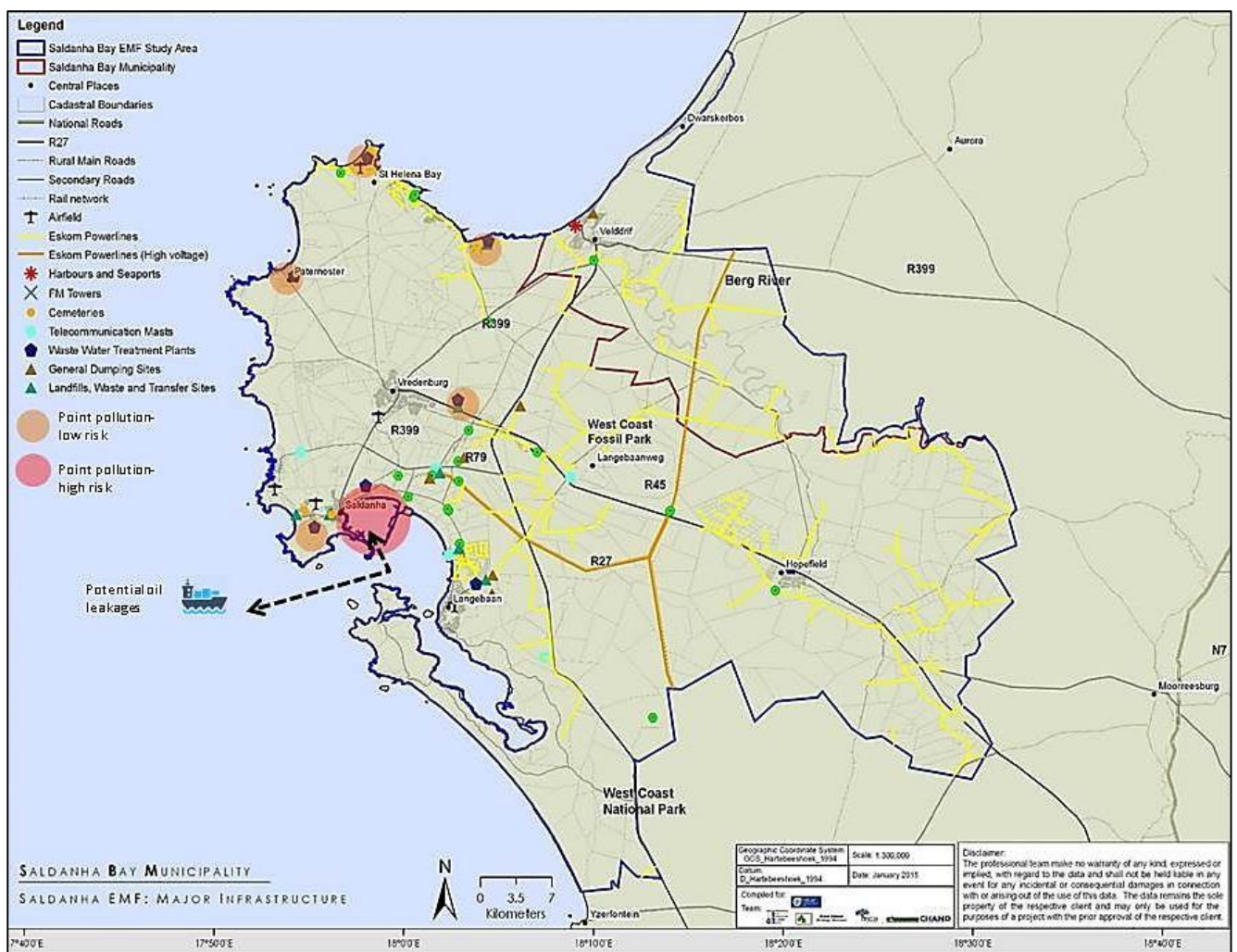


Figure 3.12 Infrastructure Saldanha Bay Municipality

Source: (WCG, 2015)

### **3.7.1.5 Disturbance and Degradation of Coastal & Marine Ecosystems**

The building of a breakwater in the 1970's between Marcus Island and the mainland has resulted in various changes in tide and flow dynamics in Saldanha Bay. Evidence has shown that the ecological integrity of Small Bay has been compromised and that there is a continuous tendency of pollutants that concentrate within Small Bay. This is because of the altered in- and outflow of water in the bay which is a direct result of the breakwater construction and the iron ore terminal (WCG, 2015). According to the Western Cape Government (2015), there is evidence that activities within the Bay are affecting the Langebaan Lagoon, which has been noted by the Ramsar secretariat. This has also been communicated with Transnet in terms of the negative environmental impacts the expansion of the port is going to have. Langebaan Lagoon is listed as a Ramsar site (international significant wetland) which means it is of high priority. If the Langebaan Lagoon is further degraded, the site will be listed on the 'Montreux Record' (list of wetlands which have been potentially degraded) (WCG, 2015).

*"Heavy industrial activity, increased urbanization and pollution from land-based sources entering the marine environment undoubtedly places strain on the supporting environment and ecosystem for fisheries. Increasing human exploitation places direct pressure on fish stocks. These factors have significant economic and social implications, given the importance of the fishing industry on the West Coast"* (WCG, 2015: 35).

### **3.7.1.6 Climate Change Effects**

Associated negative effects of climate change include increasing flood patterns and stormy seas which will be a challenge for port and marine activities (WCG, 2015). Coastal erosion and changes in weather patterns will affect tourism and recreation opportunities such as the annual flower watching on the West Coast (WCG, 2015). Net productivity of crops and agricultural farming land will decrease due to an increase in temperatures, drought and soil erosion. This will have a direct effect on farming activities in terms of crops grown within the region, which now have to be changed for food security reasons (WCG, 2015). Crops, especially in Hopfield and Saldanha-Vredenburg area, will be negatively impacted in the short-term due to a change in annual temperature which is not habitual for current crop types (WCG, 2015).

Biodiversity and ecosystem services will be impacted significantly during climate change, especially water resources and soil productivity. The increase of potable water within the region will mainly be due to an increase in temperatures and lower rainfall. This will have a constraining effect on rivers, estuaries and aquifers due to the increase in demand for water, which will slowly diminish wetlands and healthy biodiversity. The high intake of alien invasive species with their high water extraction rate will also negatively impact the environment.

*“A concern that is related to climate change is that of sea level rise and erosion. The coastline is a dynamic and sensitive environment affected by events such as coastal erosion, storm surges, sea level rise and storm wave run-up and dynamic ecological processes, for example mobile dune systems” (WCG, 2015:36).*

Dune erosion will have various detrimental effects on beach property in the future. Therefore, the need to stabilise the dunes and ensure a 30m buffer is laid down to effectively protect dune systems is imperative. It is noted within this EMF that the Langebaan main beach has been affected by dune erosion and loss of sediment (WPG, 2015). Erosion has exposed the sewage infrastructure, and poses risks to private property. Locals have constructed a granite breakwater in order to protect their properties (WCG, 2015).

Additional considerations that need to be taken into account due to the effects of climate change on the coastal zone include exposure to extreme events, raising groundwater tables and saltwater intrusion, stronger tidal influence, building constructions becoming more susceptible to breakage and coastal properties being damaged (WCG, 2015).

### **3.7.1.7 Air Quality**

Particle emissions within Saldanha Bay have created great concern which is identified within the industrial development zone (iron ore & steel factories). Iron ore dust pollution within Saldanha has been affecting the locals as well as the environment. These particles have potential health concerns if not regulated and monitored. Concern around food production and seepage leaking into the groundwater table has been a worrying factor for the locals. Most of the locals rely on fishing expeditions as their primary source of income, and the odour within the harbour can become a nuisance for tourists and pedestrians (WCG, 2015).

### **3.7.1.8 Inadequate Infrastructure**

Infrastructure within the region, especially for sewage and waste removal, is inadequate and poor which creates alternative problems for the municipality. Waste treatment plants have been found to be less than satisfactory, which could potentially lead to health problems and environmental degradation (WCG, 2015). The municipality needs to find long-term solutions, and not short-term solutions as they are insufficient. Problems occur more frequently during the peak-holiday times when these coastal towns become vibrant and full. Thresholds are reached and facilities can't keep up with the high demand during peak season which leads to various alternative problems such as leakage into the ocean or rivers.

The following section will discuss the most prominent environmental attributes listed by the 2015 EMF for SBM. These natural assets are represented spatially and also in terms of significance and importance for the region.

## **3.8 Key Environmental Layers: 2015 Environmental Management Framework**

### **3.8.1 EMZ 1-KEEP Assets Intact Framework**

The various attributes listed within the framework are regarded as irreplaceable and have intrinsic value for the region as seen in figure 3.13. Biodiversity resources play a critical role in sustaining ecological integrity and resilience, and support people and the economy through providing valuable ecosystem services (WCG, 2015). Resources are identified which have a significant role in food security, economic activity, job creation and quality livelihoods (relating specifically to irrigated agricultural land). Resources are identified which play a significant role in landscape characteristics and sense of place, which contributes towards the overall identity of the Saldanha region (WCG, 2015). All listed protected zones are mapped in figure 3.13.

Critical Biodiversity Areas (CBA's) identified within the Saldanha region need to remain intact and untouched from any development. These areas are identified as being critical to human well-being and maintaining a strong economy (WCG, 2015). Protected and Conservation Areas need to be maintained and remain untouched from any human activity. This includes terrestrial and aquatic conservation areas (WCG, 2015). Critically endangered and endangered ecosystems are considered to be at risk from imminent extinction or irreversible degradation (WCG, 2015). Freshwater ecosystem priority areas (FEPA's) include identified

water resources and the functioning of aquatic ecosystems, which are deemed to be critical to water resources' quality and quantity within the region (WCG, 2015).

Marine Protected Areas need to be sustained and protected from human activities as the vast majority of people in the region are dependent on fishing and harvesting marine species (WCG, 2015). Marine ecosystems that have been identified as critically endangered and endangered are deemed to be at risk of extinction and need to be protected. A one hundred metre coastal protection zone is identified in order to protect coastal ecosystems and properties from coastal erosion (WCG, 2015).

Irrigated agricultural land with water rights is regarded as a priority asset by the Department of Agriculture, and needs to be protected (SBM, 2015). National heritage sites and battlefields identified are of national importance, and form a strong part of our historic significance and culture, and need to be protected (WCG, 2015).

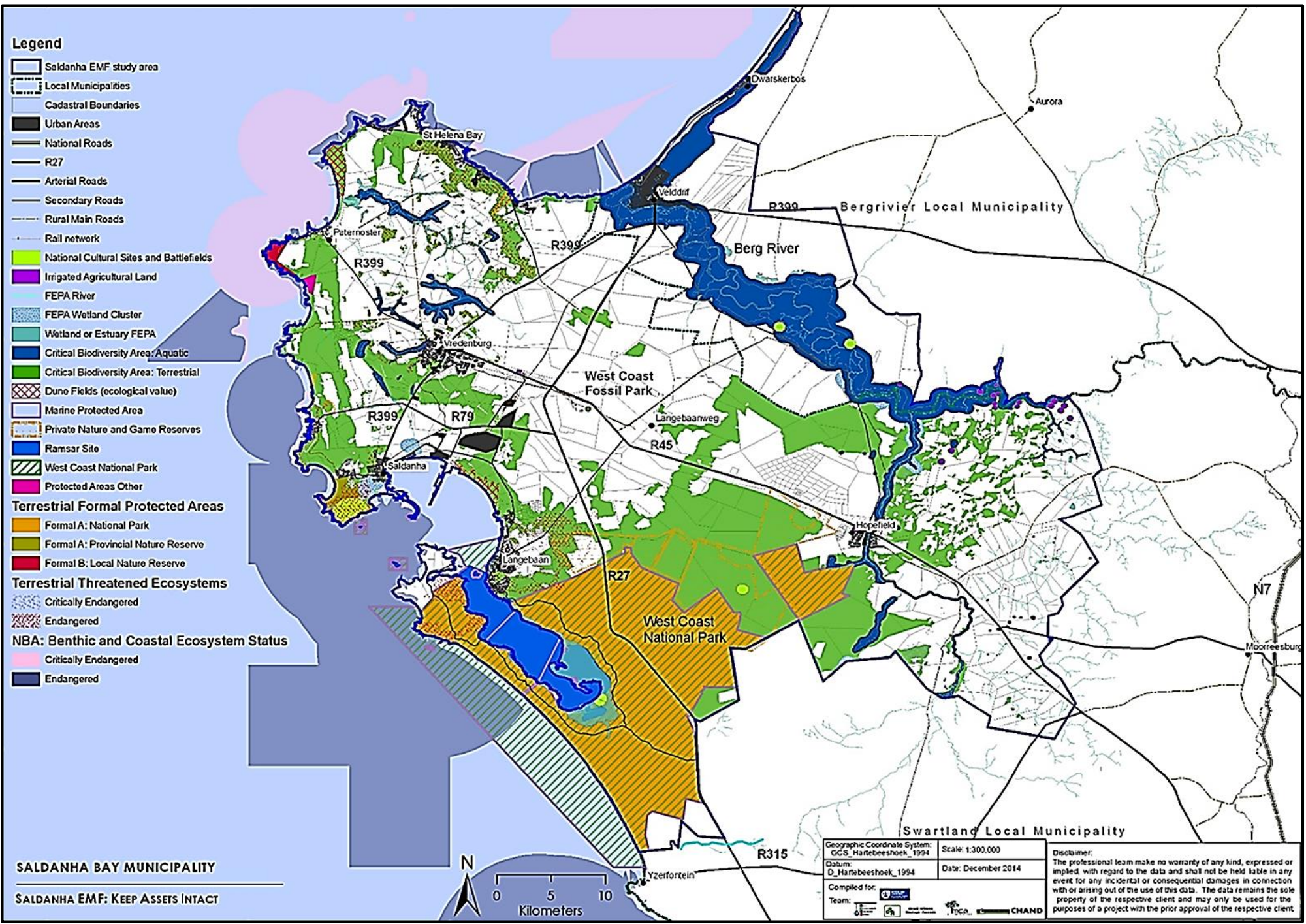


Figure 3.13 EMZ 1: Keep Assets Intact framework for SBM

Source: (WCG, 2015)

### **3.8.2 EMZ 2- Develop with Care: Valued Resources**

The attributes and areas identified within EMZ 2 are important resources, but the level of significance or vulnerability is not as great as those areas identified in EMZ 1. Figure 3.14 expresses the findings spatially on a map.

National park expansion in terms of conservation requirements stipulated for resources of national significance (WCG, 2015). FEPA sub-quaternary catchment areas identified that maintain runoff and discharge into river systems (SBM, 2015). Phase 2 FEPA Rivers the rivers identified have been moderately modified and therefore should not be degraded any further (WCG, 2015). Non-FEPA wetlands are wetlands that are identified as having important ecosystem functions (SBM, 2015). Listed vulnerable ecosystems are regarded as important biodiversity spots, and deemed threatened, but not at risk of extinction (WCG, 2015). Groundwater discharge areas are important for surface water systems that are dependent on them (SBM, 2015). Critical Ecological Support Areas are important for maintaining ecological processes that connect within CBA's (WCG, 2015). Rare Plants are identified, the habitats of which may be threatened, and the loss is deemed as irreplaceable (SBM, 2015). Sensitive lower vertebrate area sites of threatened species are identified, and are to be conserved (WCG, 2015). Important bird flight paths and areas. These areas and paths are significant to the balance of the regional biome and are also the habitat of vast amount of international bird species (SBM, 2015).

Vulnerable marine ecosystems that have important biodiversity functions are considered to be threatened, but not at risk of extinction (WCG, 2015). There is a coastal protection zone (up to 1km inland) in order to maintain the coastal character and ecological functioning of coastal systems (dunes need to be maintained) (WCG, 2015). Surf/littoral zone needs to be protected in order to maintain the ecosystem dynamics and function it provides. The surf zone is important for bird habitats and for recreational purposes (WCG, 2015). Big Bay needs to be protected, and plays an important role in terms of marine ecology. With development proposals in the future of Small Bay, the ecological role of Big Bay will become more important (WCG, 2015).

Dry land agriculture is important for grain crop production and food security within the region (WCG, 2015). Big and Small Bay is regarded as 'irreplaceable' in terms of

marine aquaculture production due to the fact that massive mussel and oyster farms are located in Saldanha Bay (WCG, 2015).

Paleontological sites of historical significance are identified for potential use in research, although sites can only be deemed important once actually excavated (WCG, 2015). Cultural landscapes, sites and scenic routes have great value and aesthetic for the region and need to be maintained (WCG, 2015). Mountains, ridges and prominent hills add great value in terms of landscape character and identity, and signify local aesthetic (WCG, 2015).

Public open space has tremendous value in terms of integrating communities and creating cohesion within the region. These areas normally have green open spaces or recreational or sporting facilities in order to facilitate the community's needs (WCG, 2015). West Coast National Park identifies an interactive view shed zone in which the wilderness and natural habitat can be celebrated and admired (WCG, 2015).

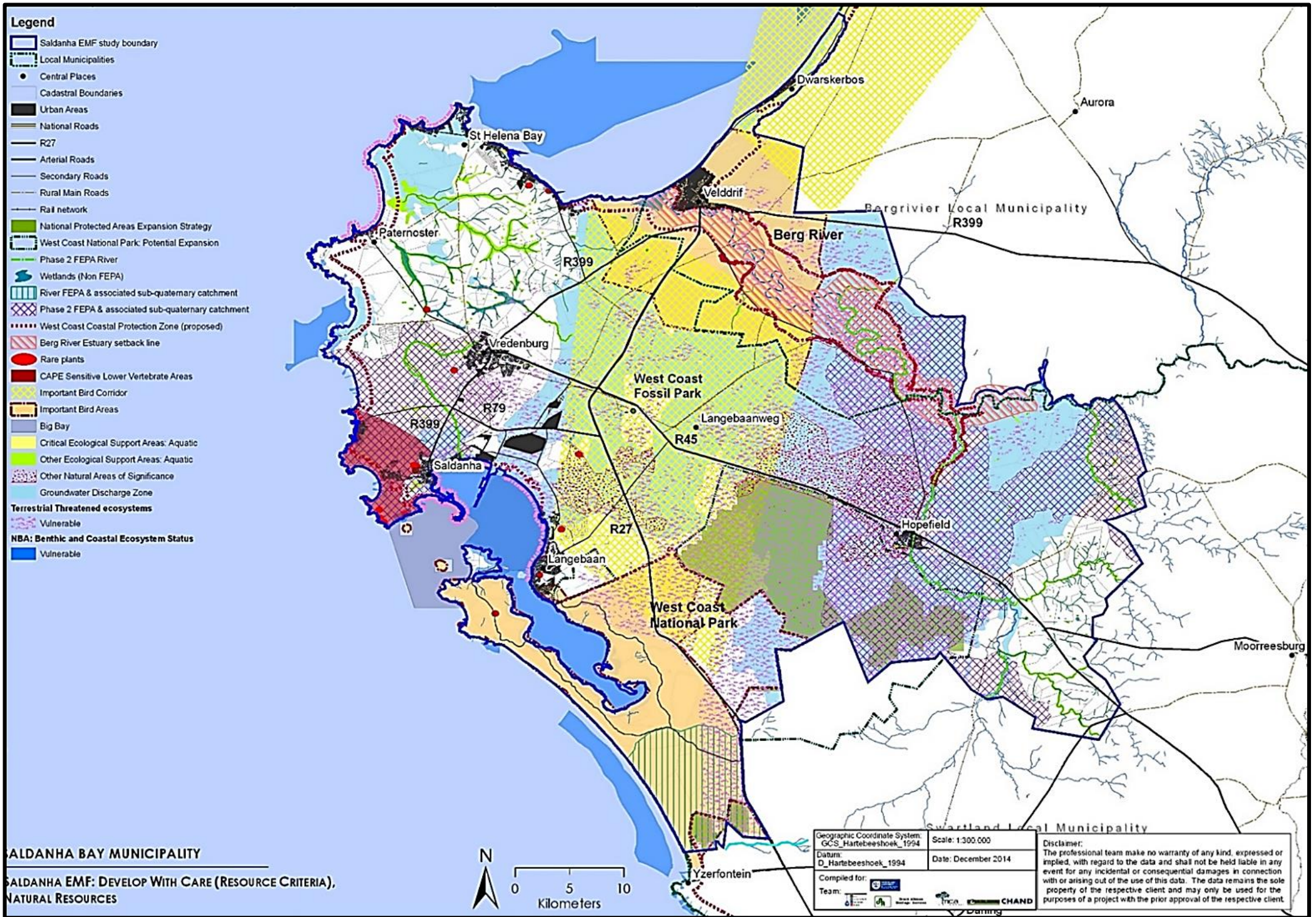


Figure 3.14 EMZ 2: Develop with Care: Vulnerable Resources

Source: (WCG, 2015)

### **3.8.3 EMZ 3- Develop with Care: Restrictive Conditions or Constraints**

The criteria set out in EMZ 3 is based on the concerning factor that possible restrictions of land use development may be evident due to environmental quality issues or potential environmental risks such as flooding (WCG, 2015). Figure 3.15 illustrates all findings explained within the EMZ 3 spatially.

Water pollution identified within Small Bay could potentially be problematic to humans and ecosystems within the bay. Therefore, the need to stop pollution at the source is very important by upgrading waste treatment plants. Saldanha has been susceptible to air pollution due to the industrial factories within Saldanha Bay. With the potential expansion of the industrial development zone, the whole bay is vulnerable to an increase in air pollution (WCG, 2015). Land uses identified have the potential to disrupt human activities through producing odours, dust, noise and other forms of pollution (WCG, 2015).

Coastal management lines are introduced in order to ensure dune stability and limit dune erosion. This is in order to protect dune ecosystems and prevent the development of property within areas that could potentially be impacted. Identification of mobile sand fields within fig. 3.15 portray the areas that might be susceptible to moving sand, which could be detrimental to property development (WCG, 2015). Steep slopes identified, specifically those in Langebaan and St Helena, could potentially have negative effects on residential property. Slopes identified have a ratio of 1:4 and greater, which is potentially problematic for new residential structures being constructed on these slopes. Coastal protection zones of 100 metres have been identified and act as a buffer between development and nature in order to ensure healthy ecosystems and protect people from coastal erosion (WCG, 2015).

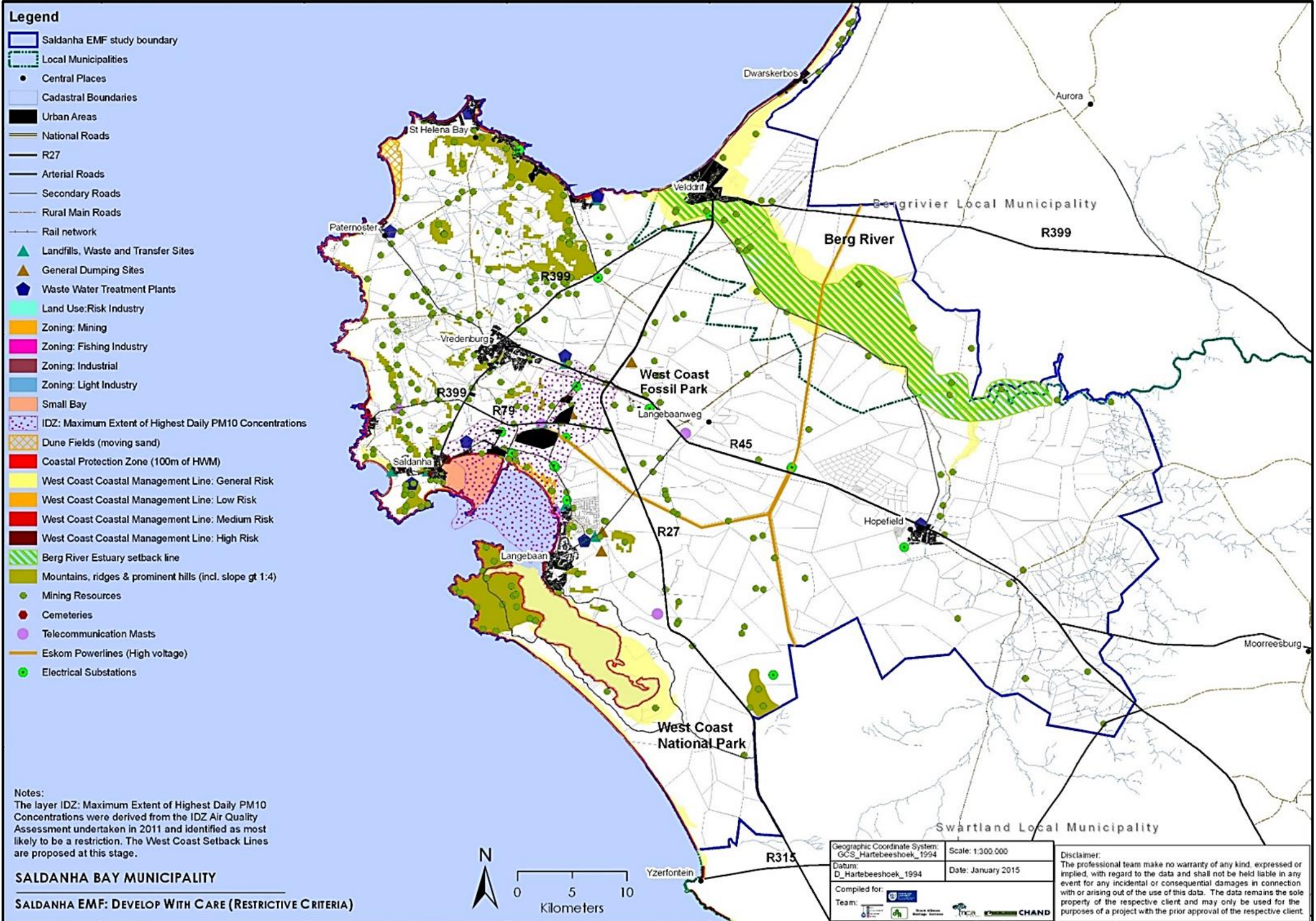


Figure 3.15 EMZ 3 Develop with Care: Restrictive Criteria Source: (WCG, 2015)

### 3.9 2011 Spatial Development Framework Saldanha Bay Municipality

The following section will provide an insight into the various challenges and constraints within proposed developments and land uses stated within the 2011 SDF of Saldanha Bay Municipality. The various constraints mentioned are based on the findings of the 2015 EMF of the municipality, which provides a composite map of assets that need to be kept intact, and is critically important for the ecological integrity of the region. The environmental attributes listed within the 'Keep Assets Intact' framework are regarded as irreplaceable and play an intricate role in the future prosperity of the region.

The various plans and proposals in the 2011 SDF are based on each town and are area specific. This approach already gives the researcher the impression that this SDF does not collectively analyse the region as a whole, but rather through a local area scale. This approach within the SDF leaves various ecosystems vulnerable to effects of development and other elements such as climate change. The SDF is also contradictory in the sense that it states upfront that it was compiled using a bioregional approach, but, as stated by Gray (2006:795), bioregionalism is defined as "*its concern for 'place' and the strong connection between community and the biophysical environment that reinforces an ethic of ecological responsibility*". This SDF does not successfully synthesise the various ecological and community connections between landscapes and people. Bioregionalism should have a holistic understanding of the various functions and systems that define a region. As stated within chapter two, these are the types of conventional planning approaches that need to change in order to create greater harmonisation between people and nature. Therefore, the findings of the EMF report are of great importance in order to ensure ecological resilience and to minimise development proposals which have detrimental effects on the environment.

The section will start with a composite map fig. 3.16 which geographically identifies the various urban edges found within the different towns, and identifies the various proposals made. Each plan identifies current land use and future proposals that look at local scale interventions, except that of the harbour and industrial development zone expansion in Saldanha Bay. The local plans are numbered from 1-8 within the composite map and each plan's map has been annotated in order to spatially identify contestations with 2015 EMF.

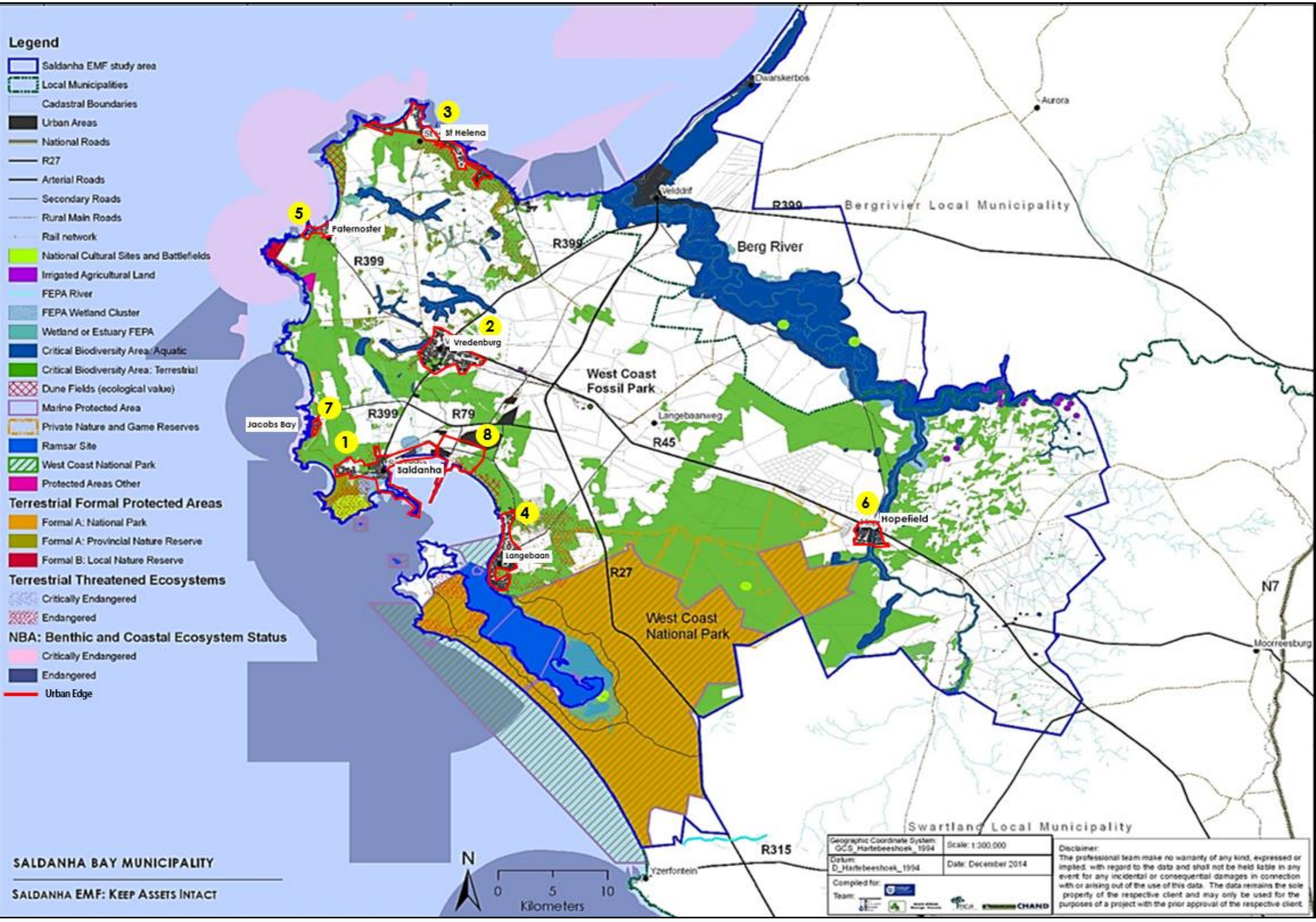


Figure 3.16 Composite map which identifies the various local area plans of the 2011 SDF Source: (Annotated by author, original data from WCG, 2015)



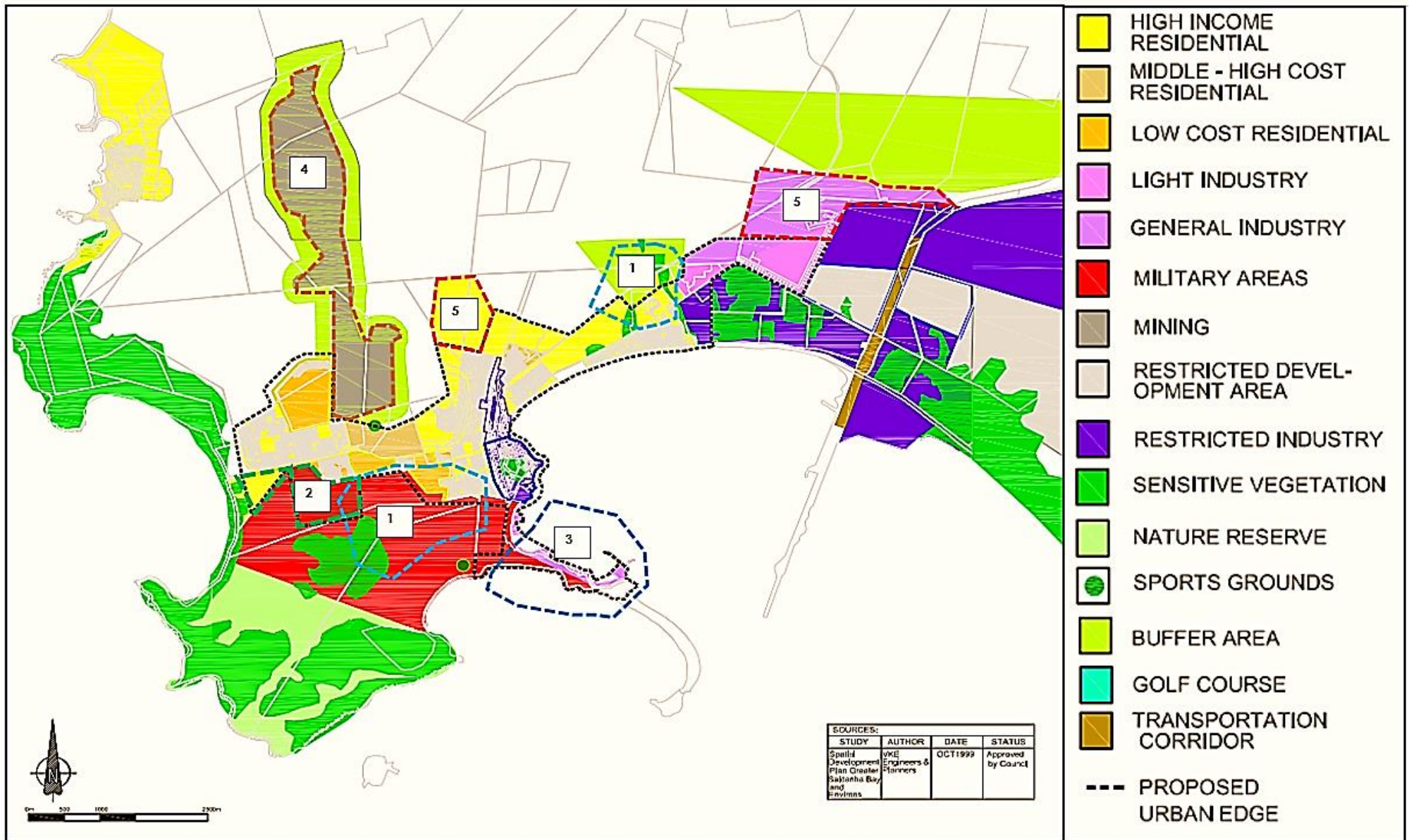


Figure 3.18 Saldanha Bay land use and proposals

Source: (SBM, 2011).

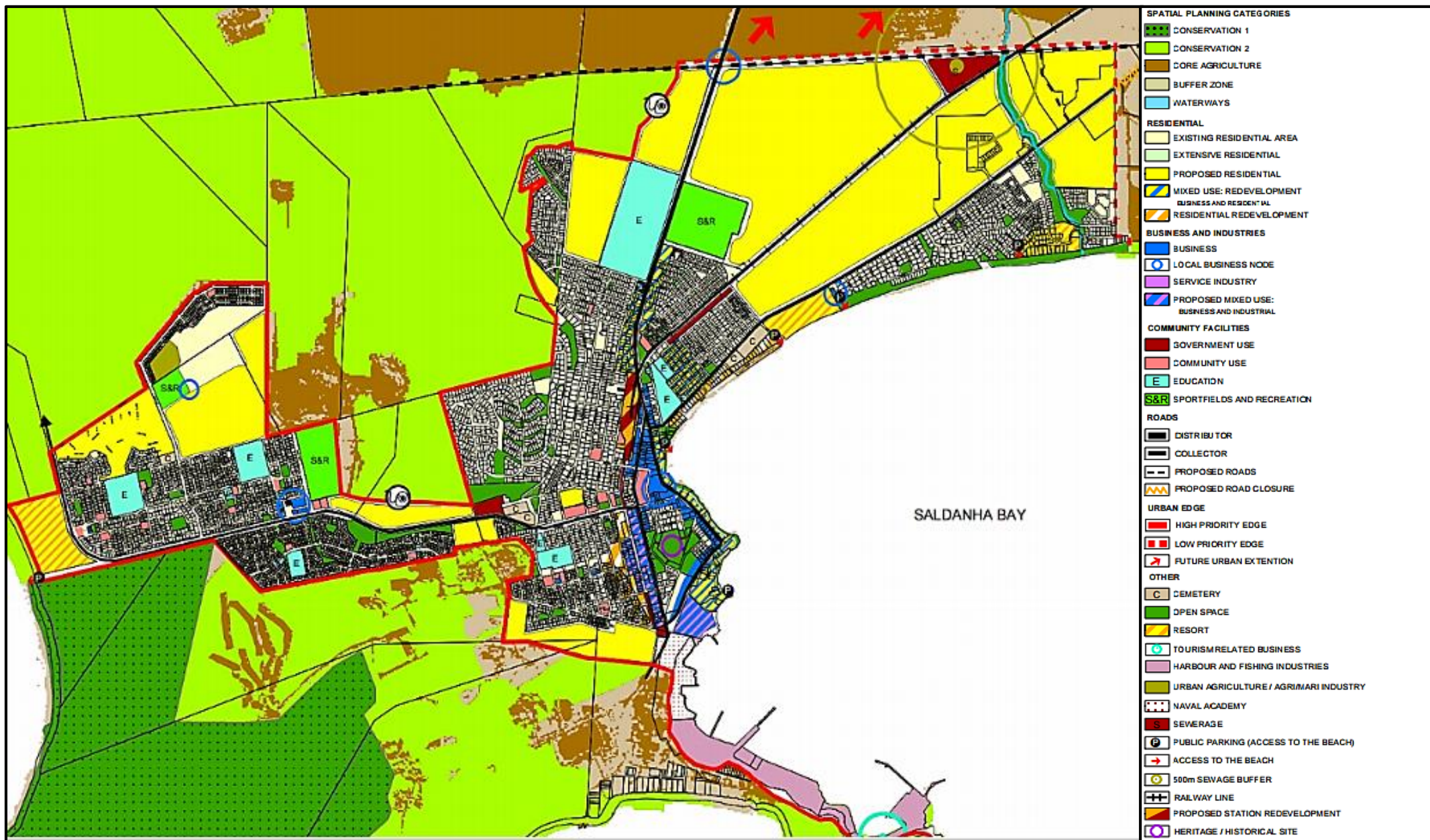


Figure 3.19 2011 SDF Saldanha Bay Land use and Proposals

Source: (WCG, 2015)

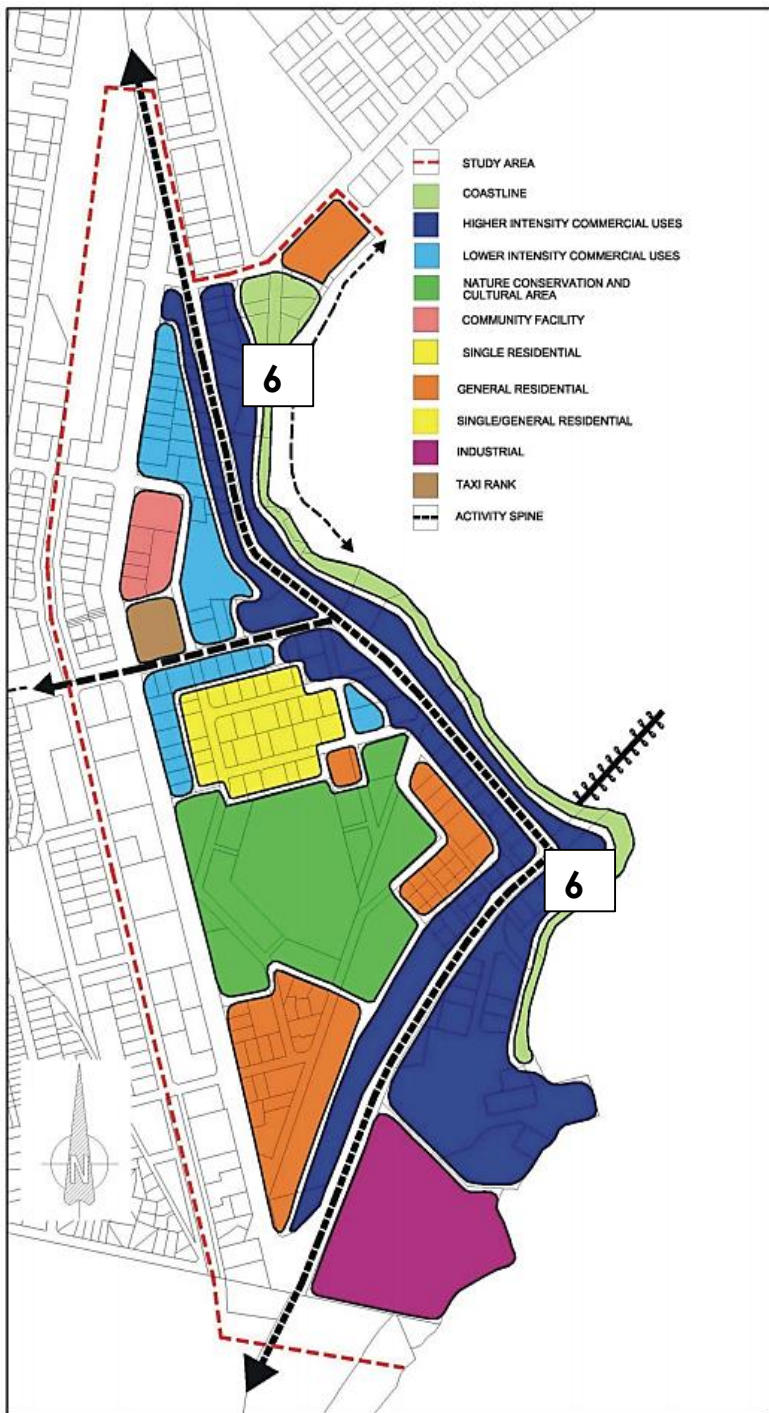


Figure 3.21 Aerial Image of Waterfront Proposal Source: (Google Earth, 2016).

Figure 3.20 Saldanha Bay Waterfront Land Use Proposals Source: (SBM, 2011)

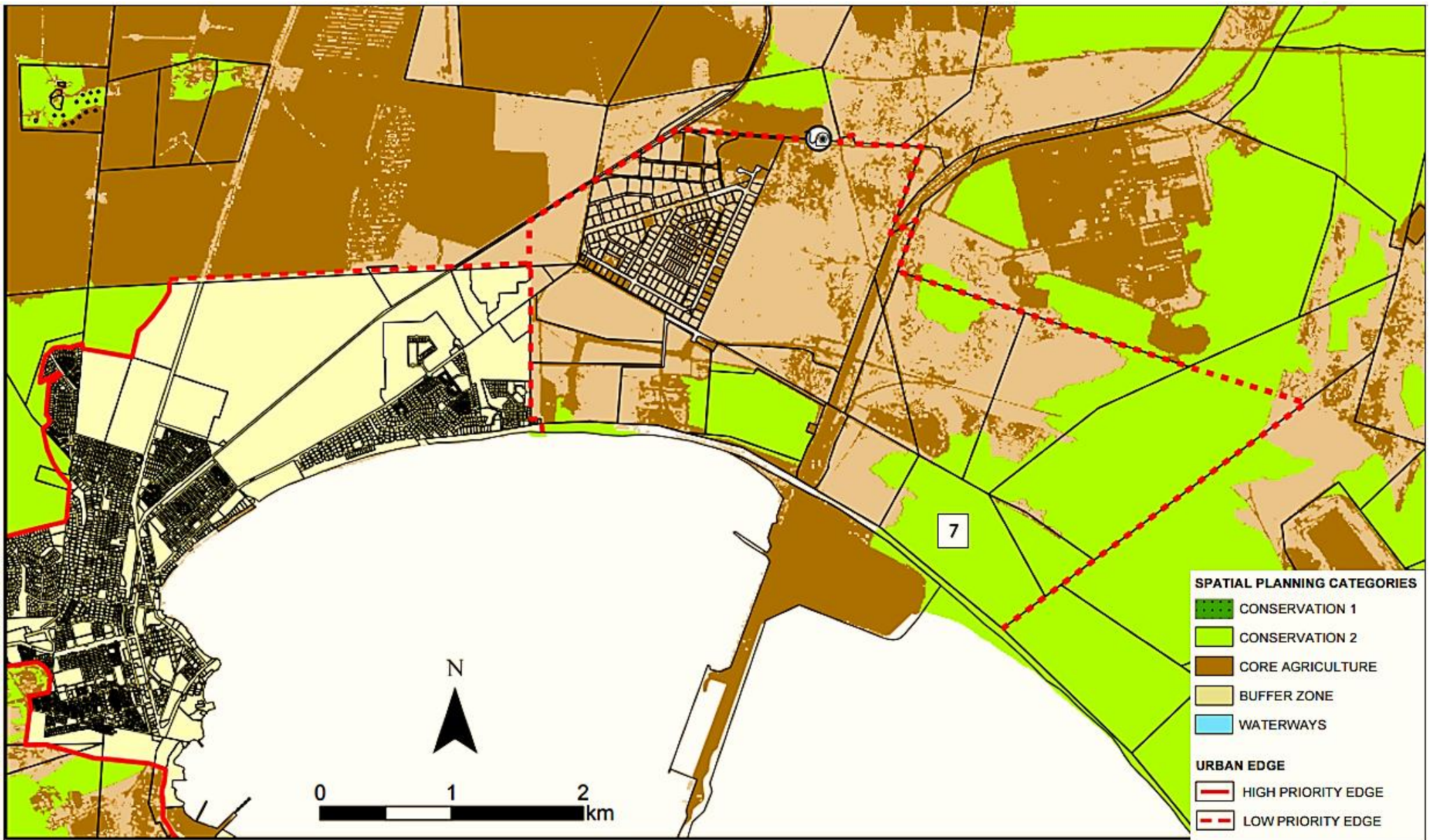


Figure 3.22 Expansion of the urban edge in 2011 SDF Source: (WCG, 2015)

### 3.9.1.2 Vredenburg Land Use Proposals 2

1. The new proposed residential, mixed use: business & residential is located within a critical biodiversity spot: terrestrial (fig 3.23).
2. Urban edge extension proposed within critical biodiversity area: terrestrial (fig 3.23).
3. Urban edge encroaching on critical biodiversity area: aquatic (fig 3.23).

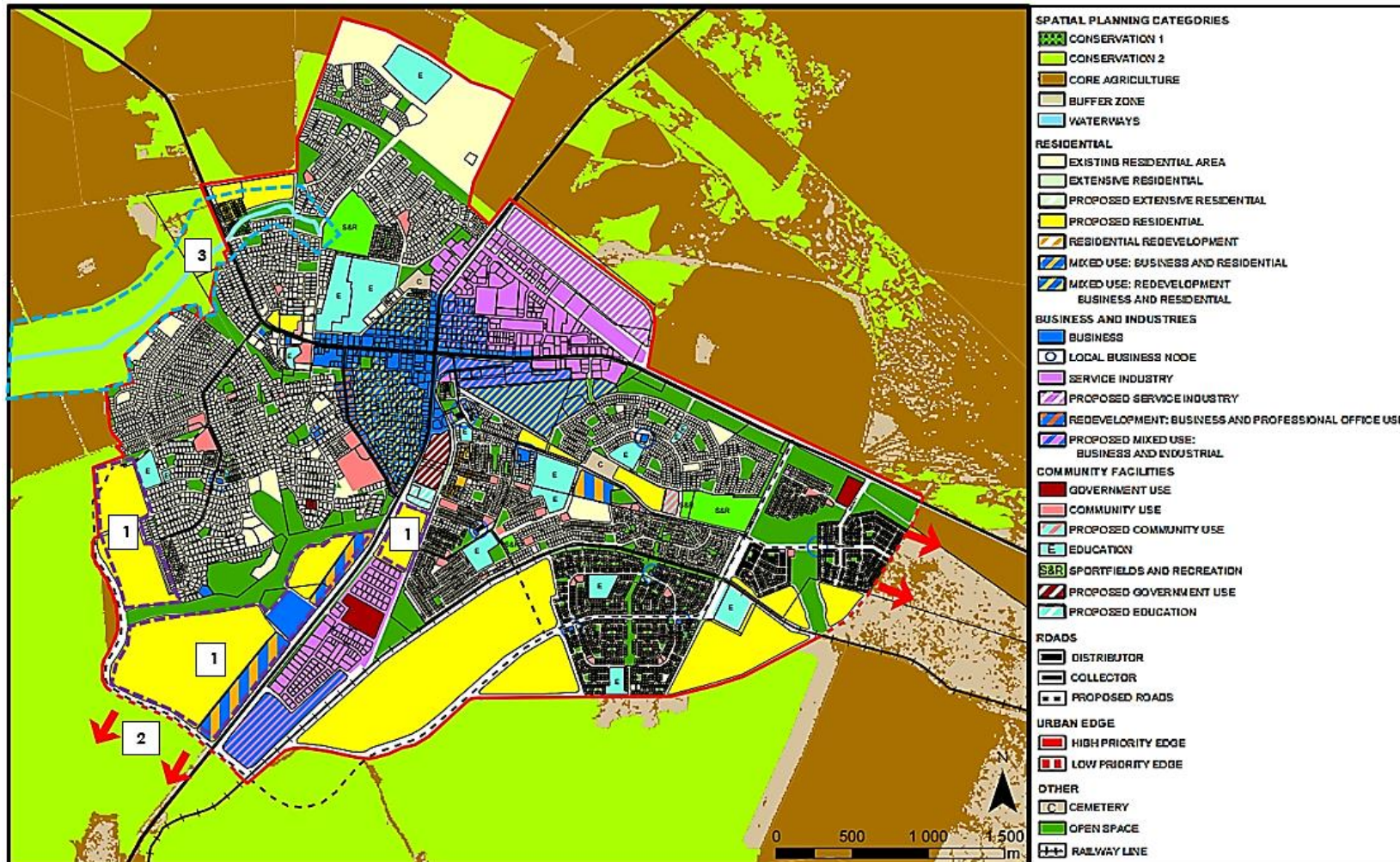


Figure 3.23 Vredenburg land use proposals Source: (WCG, 2015)

### 3.9.1.3 St Helena Bay Land Use Proposals 3

1. Proposed road within critical biodiversity area (fig 3.25).
2. Proposed residential encroaching on critical biodiversity: terrestrial (fig 3.25).
3. Golf course extension could potentially use large quantities of water for irrigation (fig 3.25).
4. Service delivery encroaching on critical benthic and coastal ecosystems which are deemed endangered (fig 3.26).
5. Proposed mixed use redevelopment encroaching on critical benthic and coastal ecosystems, and does not adhere to the suggested coastal setback line. The site is also located on a historical significant area (fig 3.26).
6. Proposed mix use development encroaching on coastal plain (fig 3.27)
7. Proposed business development on waterways and conservation area (fig 3.27)

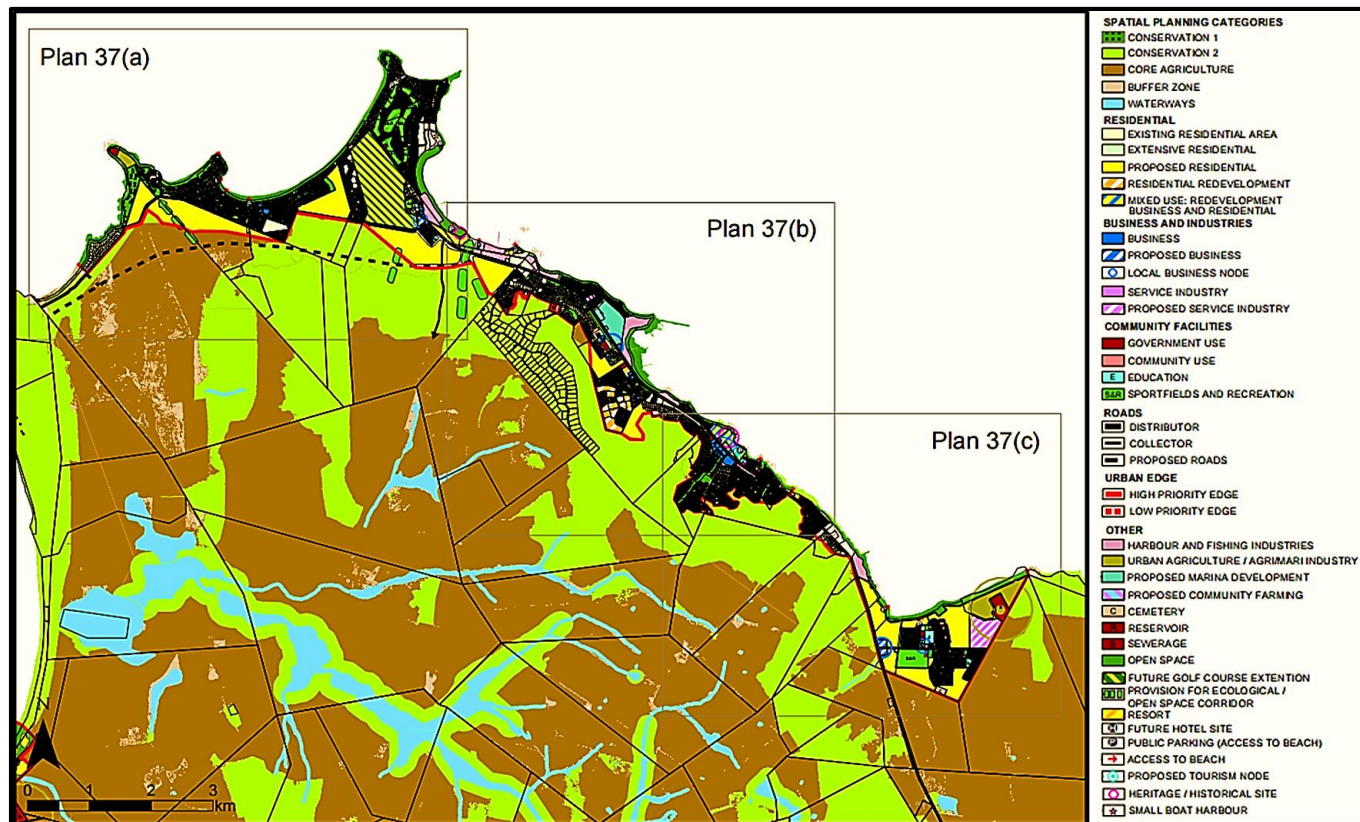


Figure 3.24 St Helena Land use and Proposals

Source: (WCG, 2015)

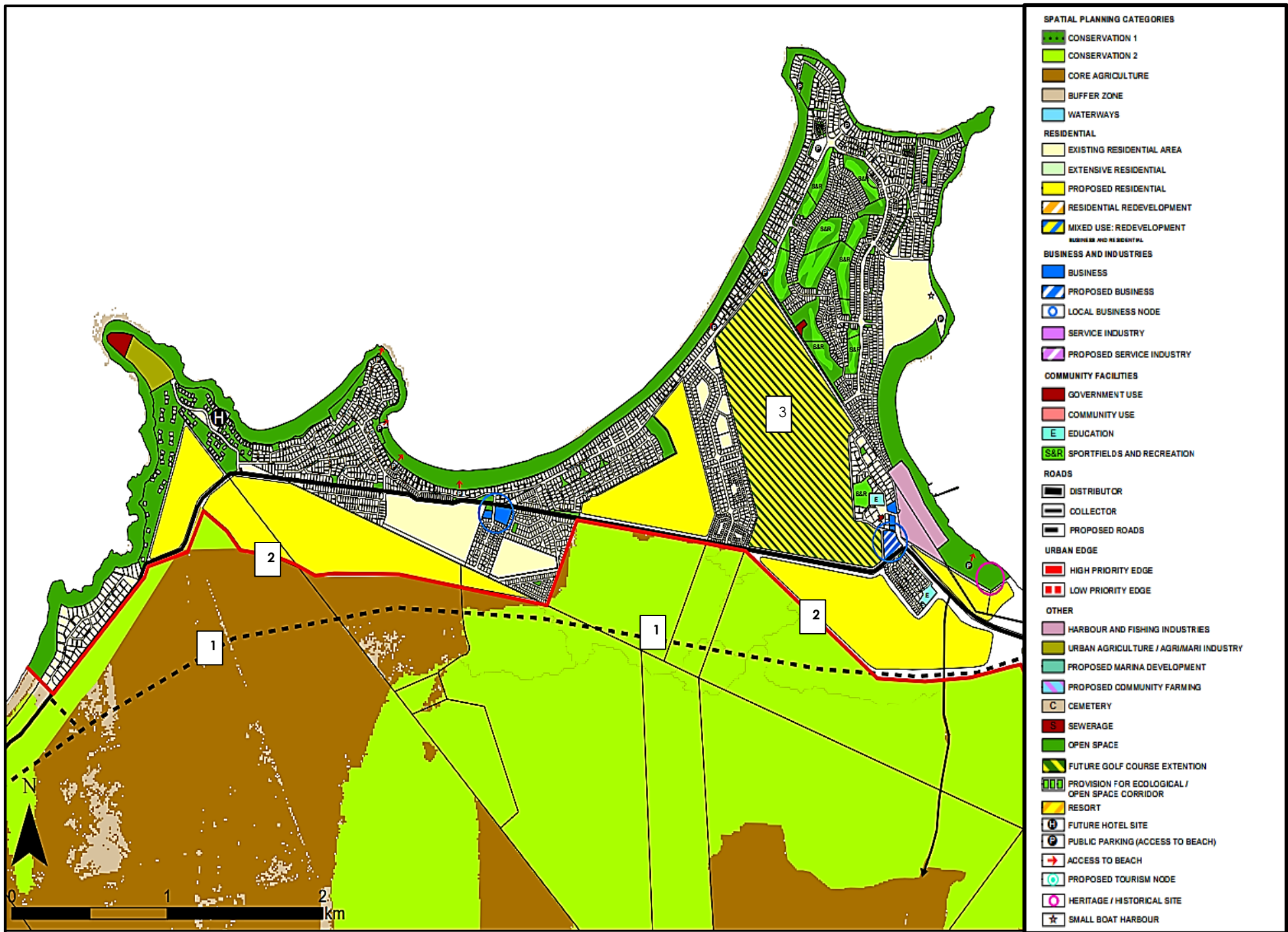


Figure 3.25 St Helena land use and proposals plan 37(a) Source: (WCG, 2015)

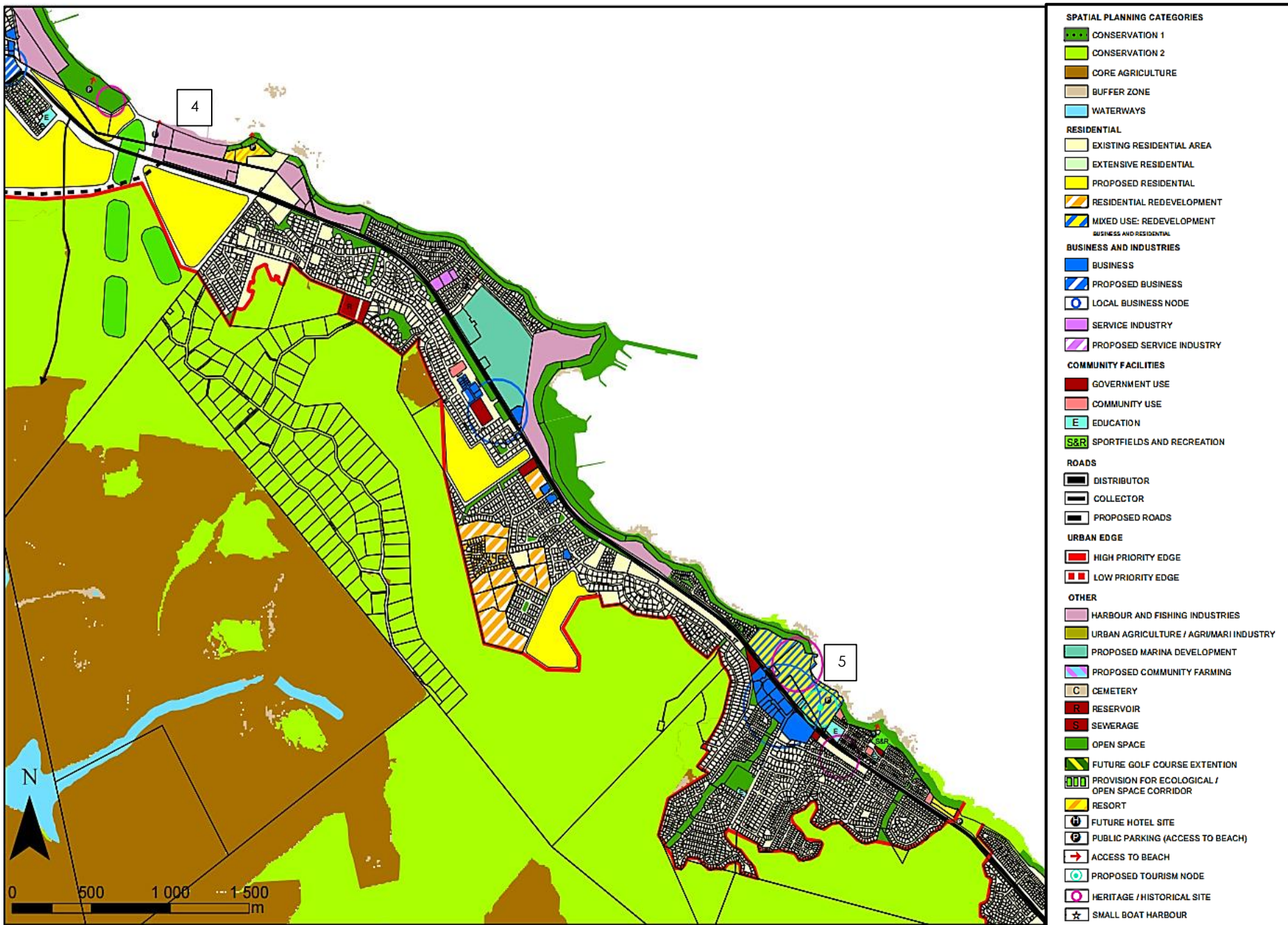


Figure 3.26 St Helena Land use and proposals plan 37(b) Source: (WCG, 2015)

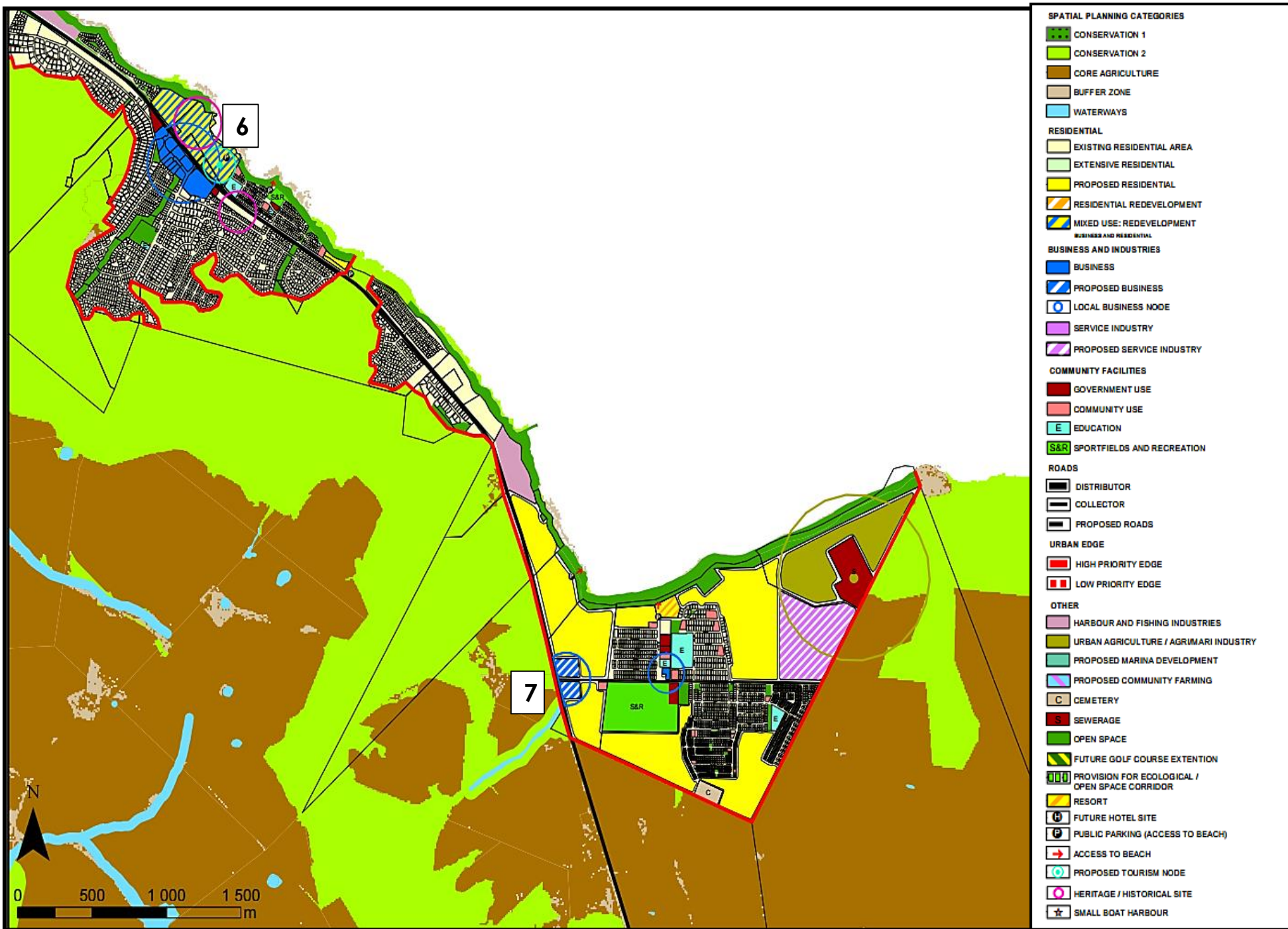


Figure 3.27 St Helena land use and proposals plan 37(c) Source: (WCG, 2015)

### 3.9.1.4 Langebaan Land Use Proposals 4

1. Proposed residential development encroaching on critical biodiversity area: terrestrial (fig 3.28).

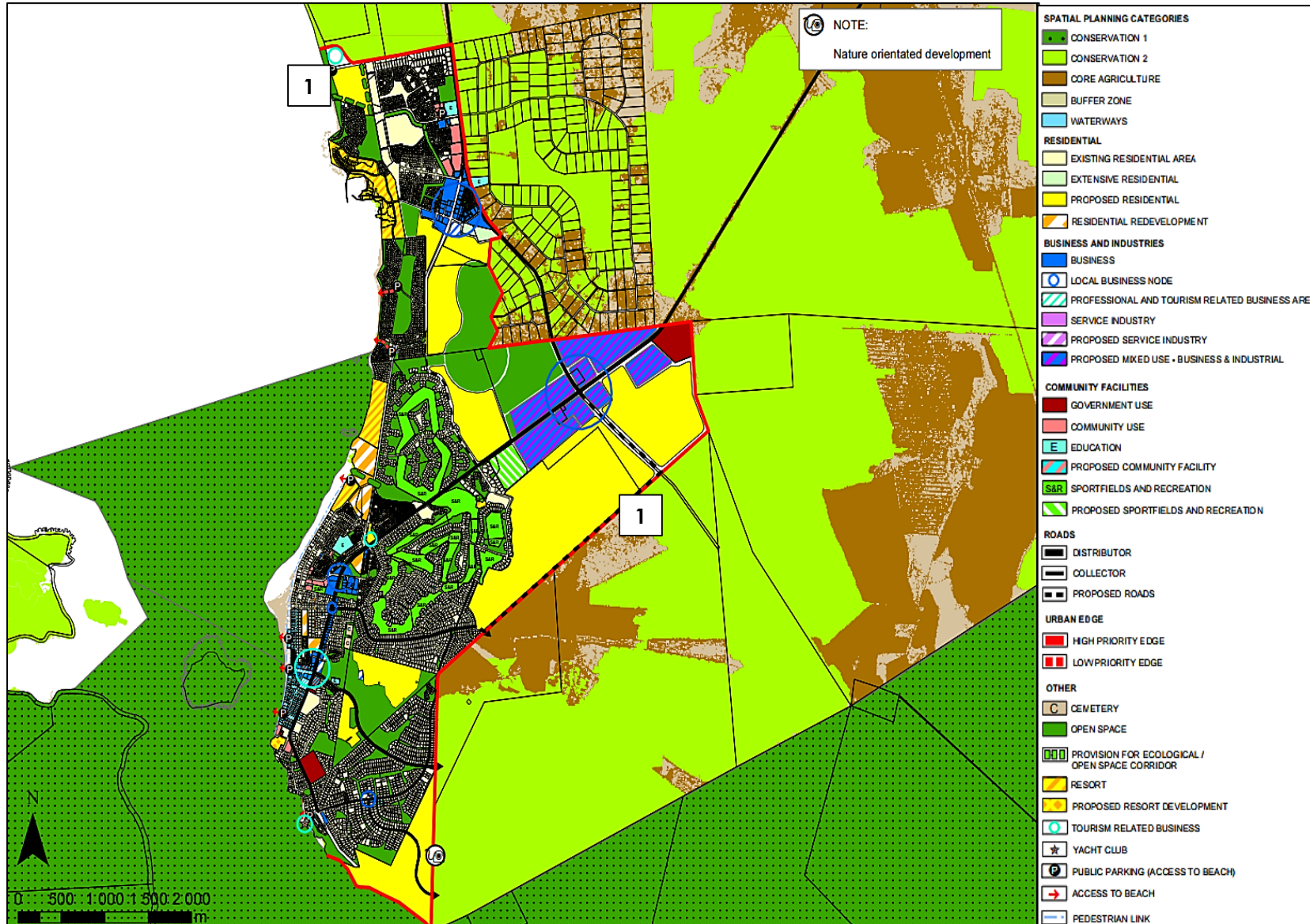


Figure 3.28 Langebaan land use and proposals Source: (WCG, 2015)

### 3.9.1.5 Paternoster Land Use Proposal 5

1. Proposed residential in critical biodiversity area: terrestrial (fig 3.29).

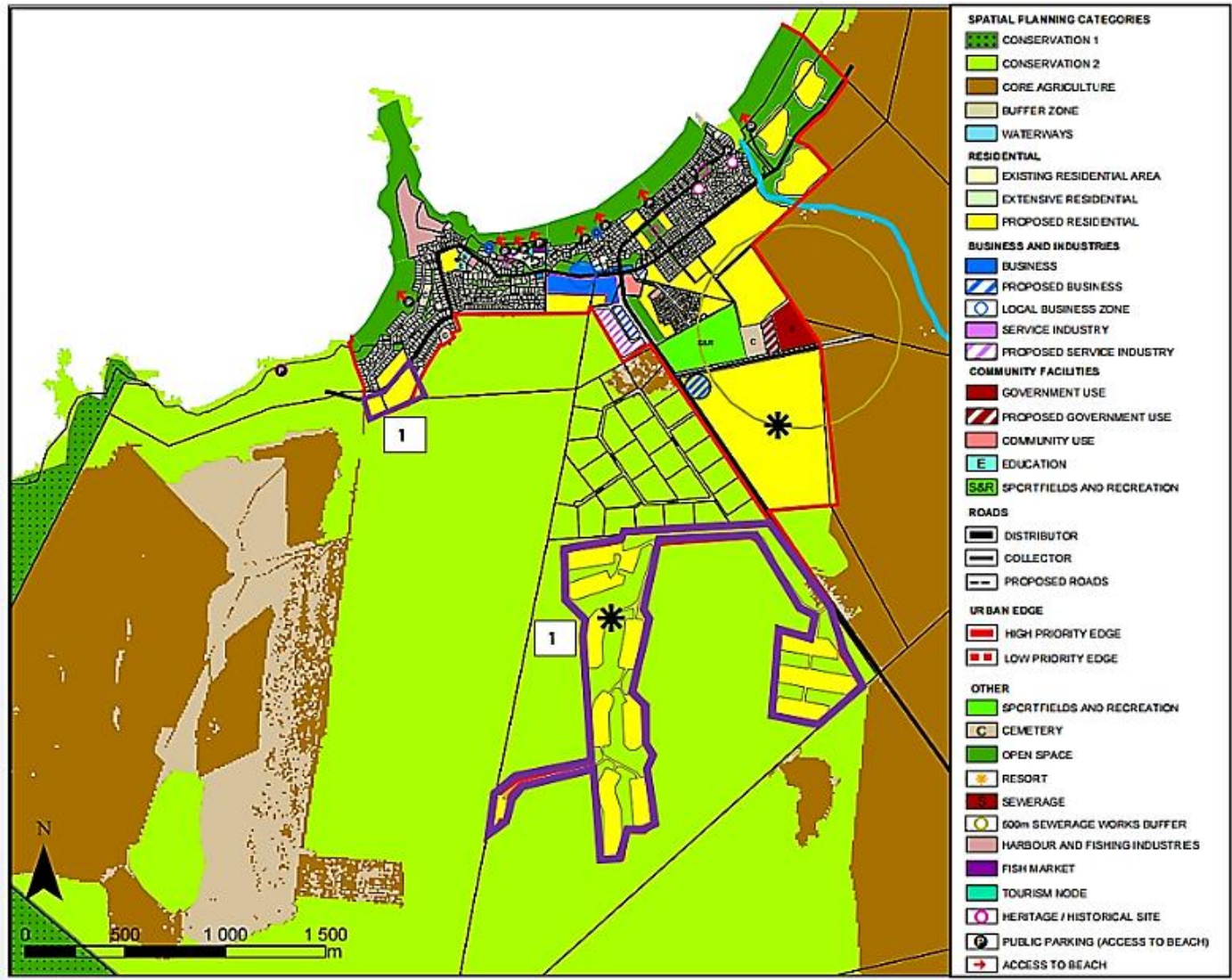


Figure 3.29 Paternoster land use and proposals Source: (WCG, 2015)

### 3.9.1.6 Hopefield Land Use Proposal 6

1. Residential development proposed within critical biodiversity area: aquatic (fig 3.30)
2. 30m river buffer needed, properties are encroaching on a critical biodiversity area: aquatic. Subdivision should not even be considered (fig 3.30).

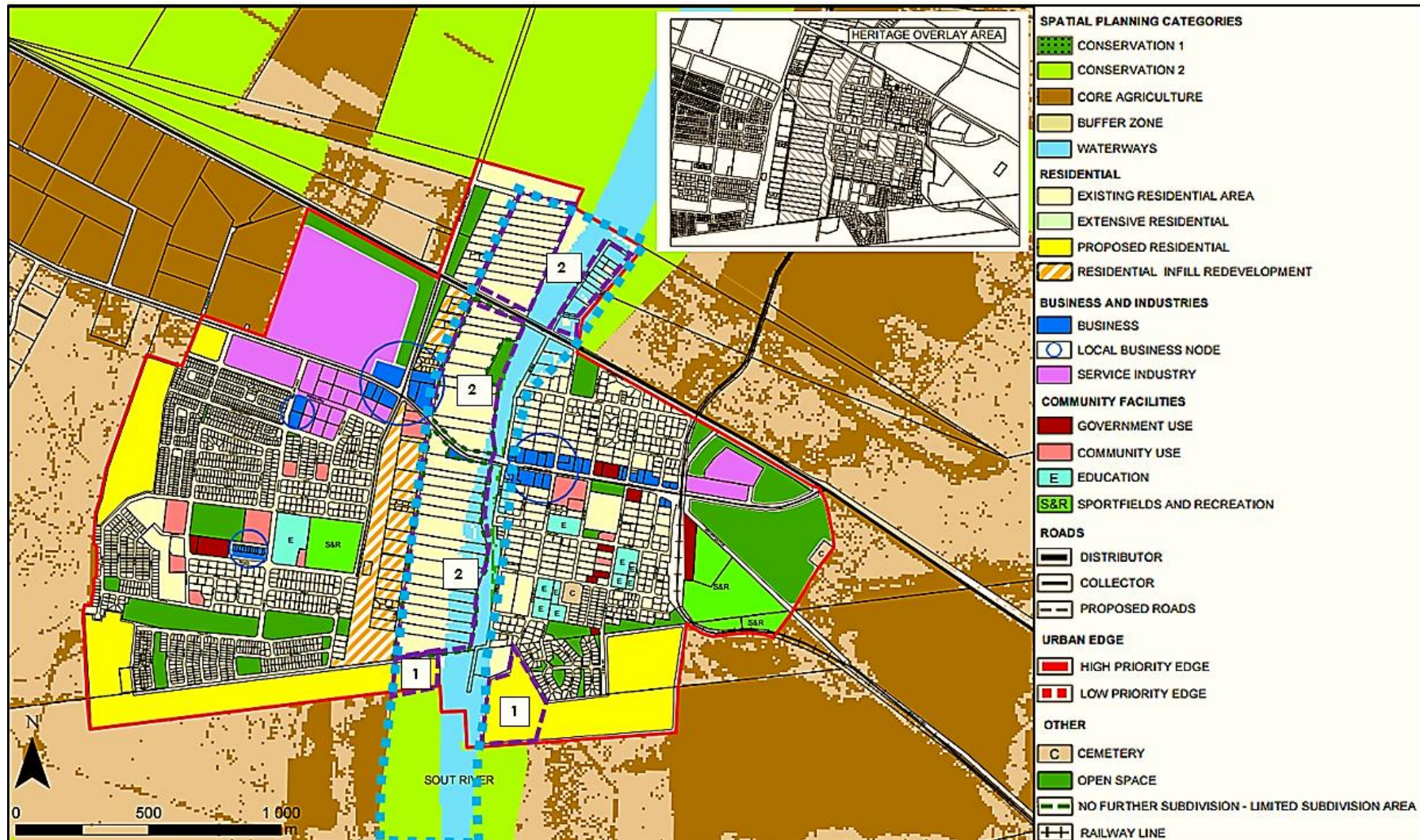


Figure 3.30 Hopefield land use and proposals Source: (WCG, 2015)

### 3.9.1.7 Jacobs Bay Land Use Proposal 7

1. Proposed residential development encroaching on critical biodiversity: terrestrial (fig 3.31).
2. Proposed residential development encroaching on endangered coastal ecosystems (fig 3.31).

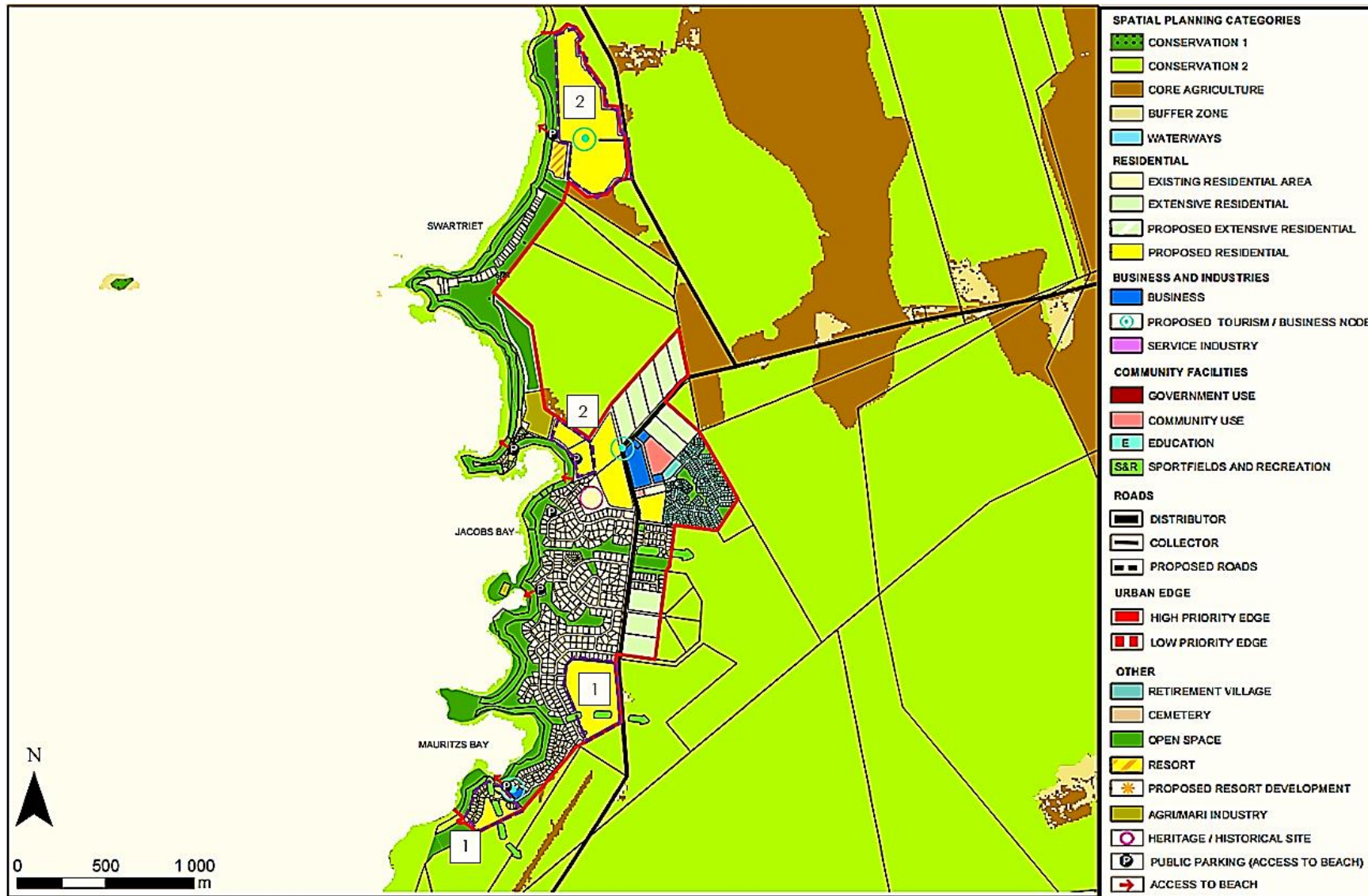


Figure 3.31 Jacobs bay land use and proposals Source: (WCG, 2015)

### 3.9.1.8 Industrial development Zone: Saldanha Bay proposal 8

1. The industrial development zone indicated in fig 3.34 indicates new land use applications applied for expanding the industrial zone. These areas are, however, zoned as critical biodiversity areas as indicated in the 2015 EMF (terrestrial and they are also currently zoned for agricultural purposes). This industrial development zone is categorised as a provincial and national strategic growth area. But, the EMF has indicated that the expansion of the zone will have various detrimental effects on the environment such as increased marine pollution, increased biodiversity degradation, increased air pollution, over-consumption of water -capacity, and degradation of marine and coastal ecosystems. Conversely, the expansion of the harbour and industrial development zone as seen in figure 3.32-3.33 could potentially have massive positive socio-economic effects which the region desperately needs as seen in figure 3.35.



Figure 3.32 New Proposed Harbour Expansion in Saldanha Bay Source: (Demacon, 2009)



Figure 3.33 New Proposed Harbour Expansion in Saldanha Bay Source: (Demacon, 2009)

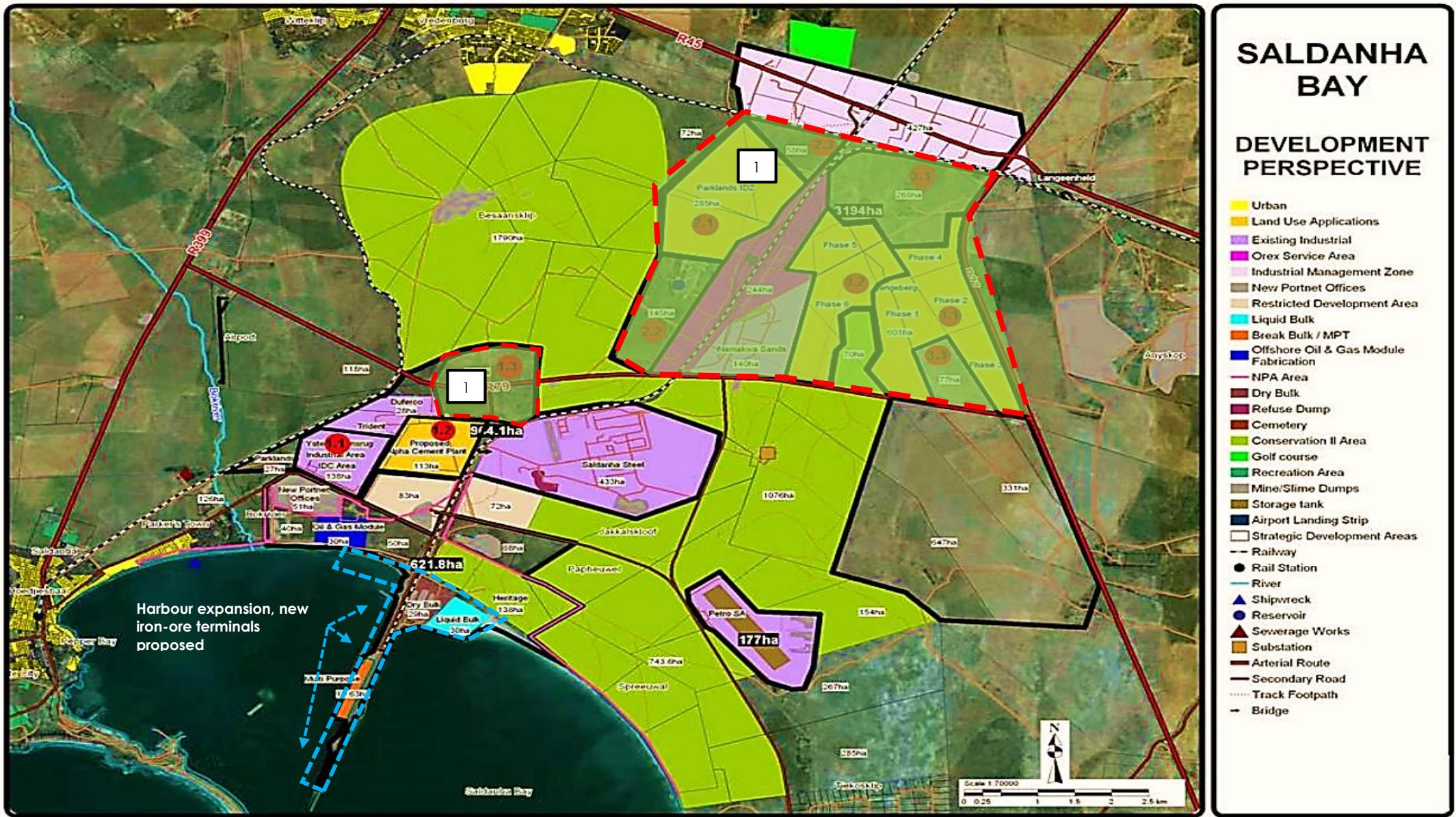


Figure 3.34 Industrial Development Zone Expansion Proposals Source: (WCG, 2015)

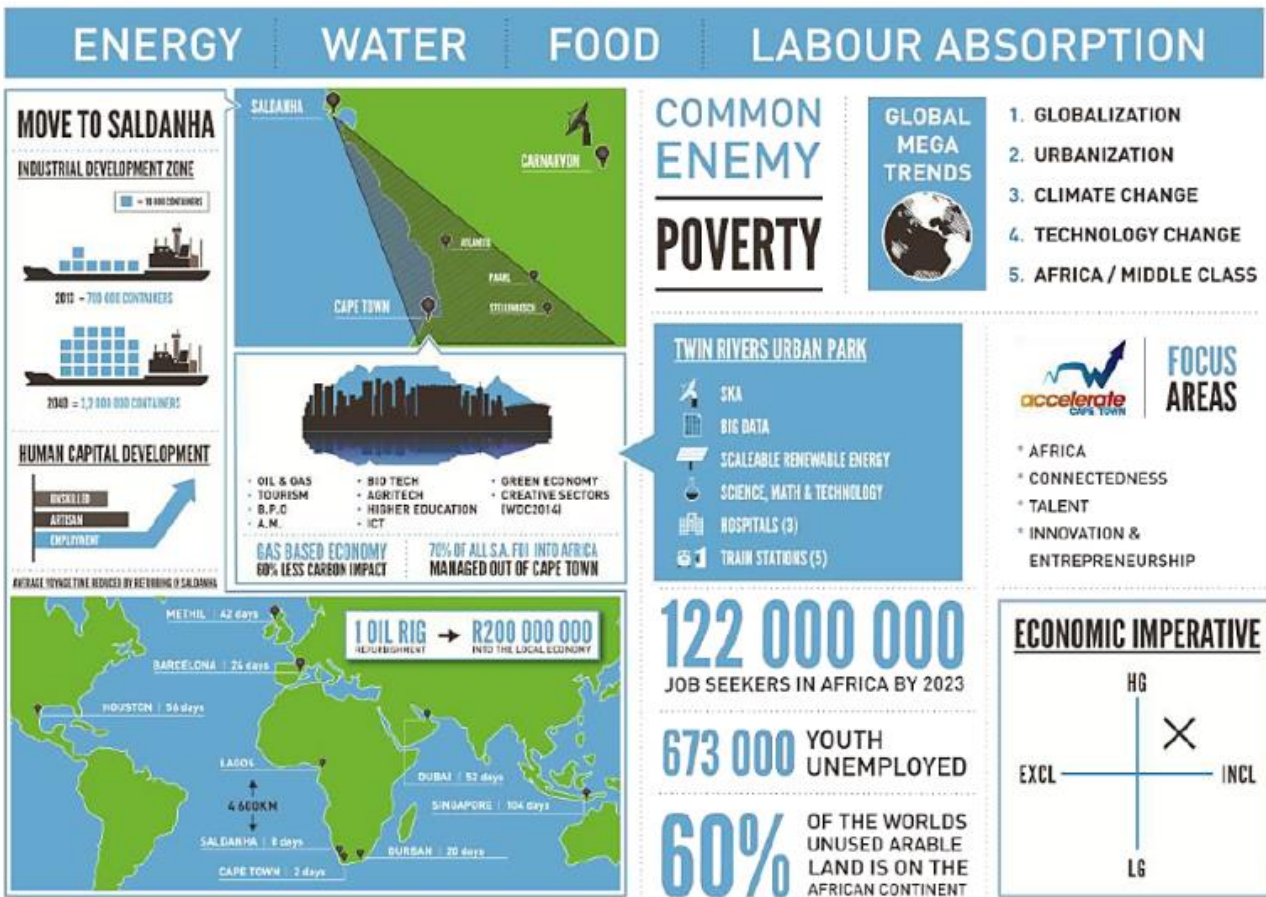


Figure 3.35 Economic Potential of Expanding the IDZ in Saldanha Source: (Demacon, 2009)

### 3.10 Sustainability Assessment Criteria

This section of the chapter lays down a range of sustainability assessment criteria in order to provide a solid foundation for long-term nature integrity and resilience. These different criteria measures are based on the researcher's normative standpoint combined with the sustainability criteria views of the 2015 EMF. In order to move towards a more sustainable future figure 3.36 lays down various sustainable criteria dimensions in order to assess the current context of SBM. These assessment criteria are in line with this RSDf's long-term vision in order to better integrate and harmonise spatial planning and natural resource management. This assessment is done in a table which includes the specific criteria, the definition of specified criteria, the context currently within the study area in terms of the criteria described and lastly, the level of sustainability. The level of sustainability is based on the current trends which have been explored within this analysis section.

SUSTAINABILITY ASSESSMENT CRITERIA			
CRITERIA	DEFINITION	CONTEXT IN STUDY AREA	LEVEL OF SUSTAINABILITY
Integrity & Resilience of social-ecological systems	Maintain the long-term integrity of ecosystems and associated social systems. Protect the irreplaceable life-support functions and diversity of life (biodiversity) that provides future insurance against change, and on which human as well as ecological well-being depends, and maintain or improve the ability of the ecosystems and dependent social systems to recover after disturbance or shocks.	<ul style="list-style-type: none"> <li>Poor understanding of bioregional systems, which focus on regional ecosystem functions.</li> <li>Large portion of ecosystems are vulnerable and under threat due to human activities and the effects of climate change.</li> </ul>	<ul style="list-style-type: none"> <li>Unsustainable trend within a regional context</li> </ul>
Social & livelihood sustainability	Support and improve sufficient services, resources and opportunities to contribute to sustainable livelihoods (e.g. access to basic resources and essential services, employment opportunities, reduced vulnerability to disease and economic insecurity, and opportunities to seek improvements in social, human and productive capital in ways that do not compromise future generations).	<ul style="list-style-type: none"> <li>Poor and inadequate infrastructure and services.</li> <li>Socio-economic trend within region is a concern</li> <li>Informal settlements are very vulnerable and will struggle to adapt in the future.</li> </ul>	<ul style="list-style-type: none"> <li>Unsustainable trend within a regional context</li> </ul>
Local economic <u>upliftment</u> & prosperity	Ensure all future development within the region have a pro-active action plan or strategy that will focus on local prosperity, job creation and distribution of opportunities.	<ul style="list-style-type: none"> <li>Local economic sector is insufficient and unable to support local livelihoods within the region.</li> </ul>	<ul style="list-style-type: none"> <li>Unsustainable trend within a regional context</li> </ul>
Integration, Precaution & Adoption	Respect uncertainty, avoid even poorly understood risks of serious, irreversible damage to the foundations of sustainability, or irreplaceable loss of resources, plan to learn, design for surprise and manage for adaptation. Do this within a collective, integrative and collaborative manner which ensures regional equity and distribution.	<ul style="list-style-type: none"> <li>Poor regional integration and long-term vision in order to adapt to the effects of <u>urbanisation</u>, climate change and economic uncertainty.</li> <li>Natural assets are being protected more pro-actively, but greater emphasis is needed.</li> </ul>	<ul style="list-style-type: none"> <li>Unsustainable trend within a regional context</li> </ul>
Transparency, Accountability & Good Governance	The municipality needs to be transparent and be held accountable for all decisions made. Promote good governance, appropriate and capacitated institutions, greater attention to fostering reciprocal awareness and collective responsibility.	<ul style="list-style-type: none"> <li>Municipality needs a stronger strategic vision in order to adapt for future uncertainties within a environmental, economic and social context.</li> </ul>	<ul style="list-style-type: none"> <li>Unsustainable trend within a regional context</li> </ul>

Figure 3.36 Sustainability Assessment Criteria for SBM Source: (Author's own, 2016).

### **3.11 Opportunities and Constraints for Saldanha Bay Municipality**

The opportunities map indicated as fig 3.37 and the constraints map indicated as fig 3.38 both reiterate the findings within the 2011 SDF and 2015 EMF for Saldanha Bay Municipality. The opportunities map includes current findings which the researcher feels contributes significantly towards the conservation and celebration of the region. The collective synthesis of the maps creates an engaging platform for the researcher to propose interventions within the next chapter. The findings of both the opportunities and constraints maps respectively increase or decrease the transition towards a more integrated and harmonized future for this region. Therefore, the findings are based on the trends explained previously in this chapter which need to be either celebrated or drastically altered.

The opportunities displayed in fig 3.37 include national, provincial and local conservation areas and nature reserves. The most prominent and significant protected areas are those of the West Coast National Park and the world renowned Langebaan Lagoon (Ramsar site). These vast ecosystems and landscapes play an intricate role in defining and creating a sense of place in the region. These protected areas are visited by an abundance of tourists each year when they come and enjoy the multiple aquatic and terrestrial landscape settings that are displayed (South African Tourism, 2016). In addition, these natural landscape settings accumulate great economic wealth through eco-tourism and recreational activities that are available for people (WCG, 2016). Tourist activities include hiking, whale watching, flower watching, fishing, water sports, bike riding, and plethora of local authentic restaurants etc. which all contribute to the local economy and create backward/forward linkages (South African Tourism, 2016). The natural aesthetic and ambiance displayed through diverse ranges of environmental habitats inherently defines this majestic place.

People are introduced to the unique marine aquaculture of the region as they move through terrestrial and aquatic beauty from the southern part towards the northern parts of the region. The multiple fish industries found within Saldanha Bay include abalone, oyster and mussel farming within protected marine areas that contribute towards the livelihoods of a large majority of people. The opportunities continue up the coast to the small towns of Jacobs Bay, Paternoster and St Helena where multiple

local fisherman celebrate the opportunities available from coastal ecosystems. The coast offers multiple opportunities for local people to sell marine produce, although the opportunities in these towns are mostly seasonal which create difficulties for people during the off-season.

In summary, the researcher feels that the two main industries that will contribute towards ecological resilience and nature conservation are eco-tourism and sustainable fisheries within the region. These industries will help create awareness of nature conservation, while simultaneously creating socio-economic opportunities for local people through celebrating the uniqueness and identity that this region has to offer.

The constraints map displayed in figure 3.38 spatially indicates the most profound findings argued within the 2011 SDF and 2015 EMF. The various constraints mentioned in figure 3.38 have the greatest contribution towards ecological degradation and contribute towards a decrease in ecological resilience. These constraints include expansion of the industrial port and the industrial development zone, poor infrastructure and basic service delivery and increased ribbon development adjacent to the coast. The expansion of the industrial port and the inclusion of a new iron-ore terminal as previously indicated will potentially have a positive socio-economic impact for local people through the creation of multiple jobs. This expansion is, however, associated with vast amounts of negative environmental effects which will inherently affect the local environment.

The EMF report does however state that this expansion will have various possible detrimental effects on the environment which will affect the integrity and prosperity of ecosystems in the region. The inclusion of the new port will increase the amount of large container ships which will contribute towards marine pollution and negatively affect marine aqua culture. Specific contributions include an increase in possible oil spills, introduction of foreign marine bacteria through ballast water released in the bay area, an increase in air pollution through expanding industrial factories and distribution, loss of marine habitat and ecosystems and damage to the ecosystem integrity of Langebaan Lagoon. In addition, the industrial development zone uses almost half of the water within the region and contributes the most towards environmental pollution. Therefore, the expansion of the industrial development zone will have the greatest effect on ecological sustainability within the region.

Small towns along the coast are vulnerable to the increase in large resorts and property developments due to the landscape beauty it provides. Ribbon development will negatively affect local sense of place and character due to the construction of luxury developments and large residential properties. The influx of wealthy residential estates will alter the local aesthetic through introducing eccentric housing and development typologies. These coastal towns have authentic historical heritage and cultural significance, which has always contributed to the uniqueness of the West Coast. The West Coast is in danger of following the same path as the South-East Coast where the coast is bombarded with large golf estates and luxury residential developments. This is a clear dichotomy and distinction that the West Coast does not want to adhere to. The West Coast needs to protect the different factors associated with urbanisation and wealth accumulation in order to protect the local inhabitants and what is precious to them.

Basic service delivery and poor infrastructure is the other major contributor to environmental degradation. As mentioned previously, poor and inadequate infrastructure contributes towards pollution within marine, terrestrial and aquatic ecosystems. Sewage that is not properly refined and removed runs into the Bay area and into critical biodiversity spots such as wetlands, streams, rivers and seeps into natural aquifers. Waste from residents, especially those located within informal settlements, is often not safely and cleanly removed due to inadequate infrastructure, which in the end contributes to natural vegetation and habitat loss. Poor basic service delivery has also contributed towards a decrease in socio-economic efficiency and productivity within the region.

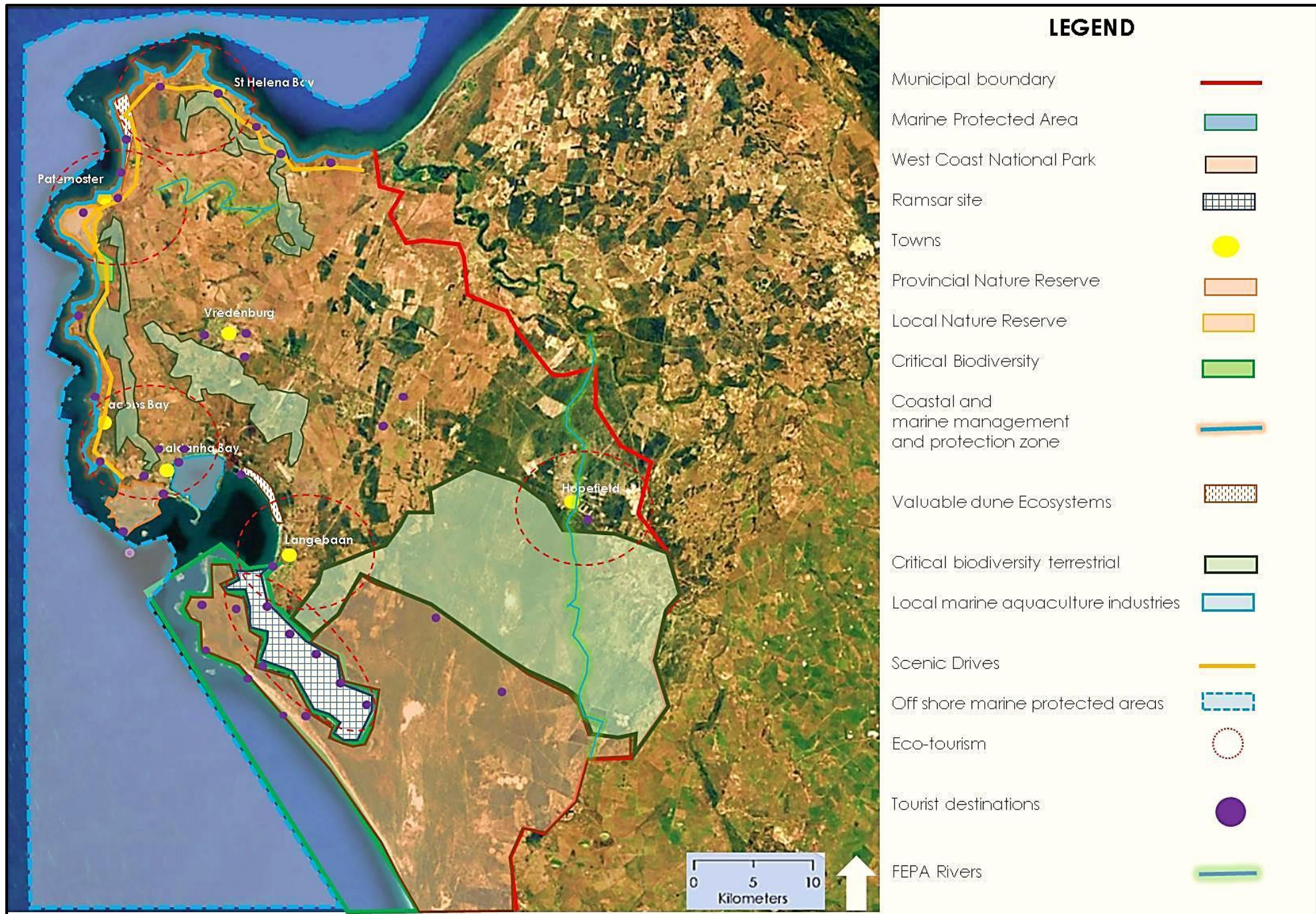


Figure 3.37 Opportunities Map of SBM Source: (Google Earth, 2016)



Figure 3.38 Constraints Map of SBM Source: (Google Earth, 2016)

### 3.12 CONCLUSION

This analysis has provided a strategic overview of the Saldanha Bay Municipality through a lens that focuses on ecological resilience and nature conservation. To understand the broader influences within this region, a brief explanation is provided on the various national, provincial and local plans, strategies and policies. In order to interpret the local context, a linkage needs to be understood of the different spheres of government and the agenda that is prioritised. Therefore, the various guiding tools that define the vision of the country need to be understood in order to pinpoint the disparities associated within different planning agendas. From this it is understood that multiple policies, strategies and plans exist which should profoundly shape the way people interact with nature and the resources it provides.

There are multiple plans advising that the unsustainable manner in which society uses and engages with the environment be addressed. This contextual analysis has, therefore, engaged with the findings within the 2015 EMF as they are considered the most important aspects towards the transition to a more ecological resilient region. The need for planning in order to engage collectively through integrating and harmonising nature and people is distinctively explained within the analysis. The most important strategic issues and findings are filtered from the two main contesting documents within this region.

This has given the researcher the opportunity to synthesise the main problems of the region in order to inform strategies that will guide the region towards an ecologically resilient region. The researcher has found conflicting ideologies and contradictories, especially within the SDF, which state that a bioregional approach towards land use decisions will be used. However, as illustrated within the analysis, these statements are generic and unsubstantiated due to the approach the SDF has. The SDF lacks collective interpretations based on theoretical underpinnings which should have been integrated and interpreted spatially within the regional context. Instead, this SDF adheres to short term solutions in the form of local area plans which address current problems based on demands and needs. This approach will provide short term solutions, but in the long run will become detrimental to the significance of the landscape and what the region symbolises.

The current SDF lacks a collective understanding of nature and the different connections that play an intricate and valuable role in terms of the region that should function as a whole. This has led to various development proposals and land use decisions that will affect the natural environment and the way it functions within the future. The SDF adheres to a tick-the-boxes stigma which is evident through the proposal of various local area plans without interpreting what these plans will mean for the region as a whole. The main strategic issues that need to be addressed within the intervention chapter is the increase in coastal ribbon development, the poor and inadequate infrastructure and basic services and lastly the proposed plans for the expansion of the industrial development zone and port. Therefore, through integrating the 2015 EMF and using the findings as the main strategic points of departure, the researcher will be able to formulate an RSDF that will guide planning decisions in the future which are more environmentally conscious and ecologically resilient.

## **CHAPTER 4: REGIONAL SPATIAL DEVELOPMENT FRAMEWORK FOR SALDANHA BAY MUNICIPALITY**

### **4.1 Introduction**

The contextual analysis has allowed the researcher to understand the current trends, constraints and challenges within the greater Saldanha region. Through investigating the 2015 EMF and 2011 SDF of Saldanha Bay Municipality, the researcher has gained a deeper understanding of the gaps and contestations within the current development framework in order to pursue a region that is ecologically resilient and adaptive. From this it is understood that the 2011 SDF of the municipality needs to be better integrated with the 2015 EMF in order to guide the region towards a more resilient future in the form of a new proposed RSDF for Saldanha Bay Municipality. As previously mentioned in chapter three, the municipality needs better guidance towards human nature relationships and ecosystem connections in order to make informed land use decisions.

This chapter will therefore provide an RSDF which aims to enable a transition towards a more integrated and harmonised relationship between humanity and nature. Thus, the need to provide a guidance tool in the form of a new proposed RSDF, which is based on natural resource and landscape management, to help ensure a more prosperous and life-sustaining future. This RSDF will not only help guide development and the needs of the people in the region, but will also help people to engage with nature and flourish within a life-sustaining society which is conducive to all.

The purpose of this RSDF is to guide the Saldanha Bay Municipality towards a more integrated natural resource management future which places the importance of nature at the forefront of decision making. This will enable the municipality to better reconnect people with nature through providing informed decisions that will collectively improve the livelihoods of the local people of the region. This RSDF acts as the primary spatial informant in a set of layered frameworks based on the findings of the 2015 EMF and the 2011 SDF, and will guide development within the Saldanha Bay Municipality. This RSDF will also strive to enable the region to be more resilient to the effects of climate change, urbanisation and development by protecting the regional environment, which includes the livelihoods of the locals. In addition, all of the local people are dependent on the provisions of nature. This includes local fishermen and

people in the tourism industry who rely on the flowers to attract large numbers of tourists to the region. This RSDF will provide various principles, goals and strategies upon which planning and development decisions can be based to achieve the desired integrated and spatially harmonised future of the region. The researcher feels that an RSDF should be the most prominent guiding tool with which environmentally sustainable development is secured. This can be attained by accessing and using natural resources, while promoting equal distribution of socio-economic development and prosperity. These outcomes and the desired vision for the future will help to spatially co-ordinate strategic public and private investment in order to steer the region towards a more resilient future. The researcher lives on the West Coast, and has deep concerns about the future of the diverse and beautiful landscape of the region. As such, this RSDF is of genuine personal importance to the researcher.

The structure of this chapter begins with a short summary of the priorities within the SBM that need to be addressed in order to create a region that is more resilient. This is followed by the long term vision which states the desired outcome of the region. This is based on the ethos of bioregionalism which identifies life as all-inclusive and interdependent, and places an emphasis on ecological responsibility. The various principles and goals discussed form part of this long term vision towards a more ecologically resilient region.

In order to enable a transition from the current state towards the various goals mentioned, different spatial interventions are provided. These are structured and organised within three layered management frameworks (Landscape and Natural Resources Framework, Economic Development Framework and Site and Settlement Framework). The spatial interventions are based on the most important findings within the 2015 EMF. These include three different frameworks: Keep Assets Intact; Develop with Care: Vulnerable Resources; and Develop with Care: Restrictive Criteria. These layers, as indicated within the contextual analysis, are the most prominent guiding tools and act as base maps from which all land use and development proposals need to be overlaid with. This will ensure that future development proposals, rezoning's or land use changes adhere to the ecological vision as stated within the RSDF. The section then moves towards key pilot projects or programmes which will help encourage conservation within the region, while simultaneously boosting the local economy through social and community upliftment. These interventions include sustainable fisheries, eco-tourism and education through conservation. The desired

state and interventions are then spatially represented on the RSDf maps that indicate the desired long-term spatial structure of Saldanha Bay Municipality.

## **4.2 Long Term Vision for Saldanha Bay Municipality**

The main issues identified within the municipality of Saldanha Bay include poor or inadequate infrastructure and basic service delivery, the threat of increased ribbon development along the coast, the effect of the expansion of the industrial development zone on the environment and lastly the poor living conditions within the informal settlements. These issues threaten the identity and sense of place within the region through progressively changing the natural context of the region. Within the current context, the region has not been developed extensively, but it has the promising qualities that will enable it to flourish in the next 50 years. This is what needs to be managed sustainably and accordingly.

Therefore, the long-term vision for Saldanha Bay Municipality is one where there is a transition towards a more integrated and ecologically resilient development path. The future of the region is one where an enshrined symbiosis between people and nature is celebrated. Therefore, the researcher has envisioned the future based on an ecocentric view which emphasises the fact that society needs earth, and without the services it provides, society will not exist. According to Newsome, Moore & Dowling (2013:5) *"In an ideal world our goals should be to design economic and political systems that encourage sustainable forms of growth and discourage or prohibit forms which cause degradation or pollution, a healthy economy depends on a healthy environment"*

## **4.3 Principles for the Regional Spatial Development Framework**

The future envisioned for Saldanha Bay Municipality is based on the principles of conservation, intergenerational equity, interconnectedness, intrinsic value and individual responsibility. These RSDf principles form part of a broader range of values that include ecological integrity, resilience, historical fidelity and autonomy of nature. According to Newsome, Moore & Dowling (2013), nature conservation needs a multifaceted approach with clear management objectives incorporating these

principles. These principles will help guide a more integrated and holistic strategic regional response towards current and future land use and development options in Saldanha Bay Municipality. They are a continuous foundation of the researcher's normative position. These principles are derived from the foundation provided by Pierce and Mader's (2006) dependency model as mentioned earlier in this study. The dependency model explains that both economic and societal systems are dependent on the natural environment, and therefore, in order to live sustainably, society needs to respect and conserve the environment unconditionally. This model has been the backbone and driver of this study and a similar type of model for intervention is envisioned for this RSDf. As seen in figure 4.1 below, reverence is considered a prerequisite, as it symbolizes the different layers of the 2015 EMF which is a non-negotiable in terms of striving for ecological resilience within SBM. Following on the core layers of the 2015 EMF are the rest of the principles which complement the researcher's normative position and ideologies. This will help the researcher in the transition process towards a region that is ecologically resilient, and will help produce a RSDf that is compatible with the envisioned future of SBM.

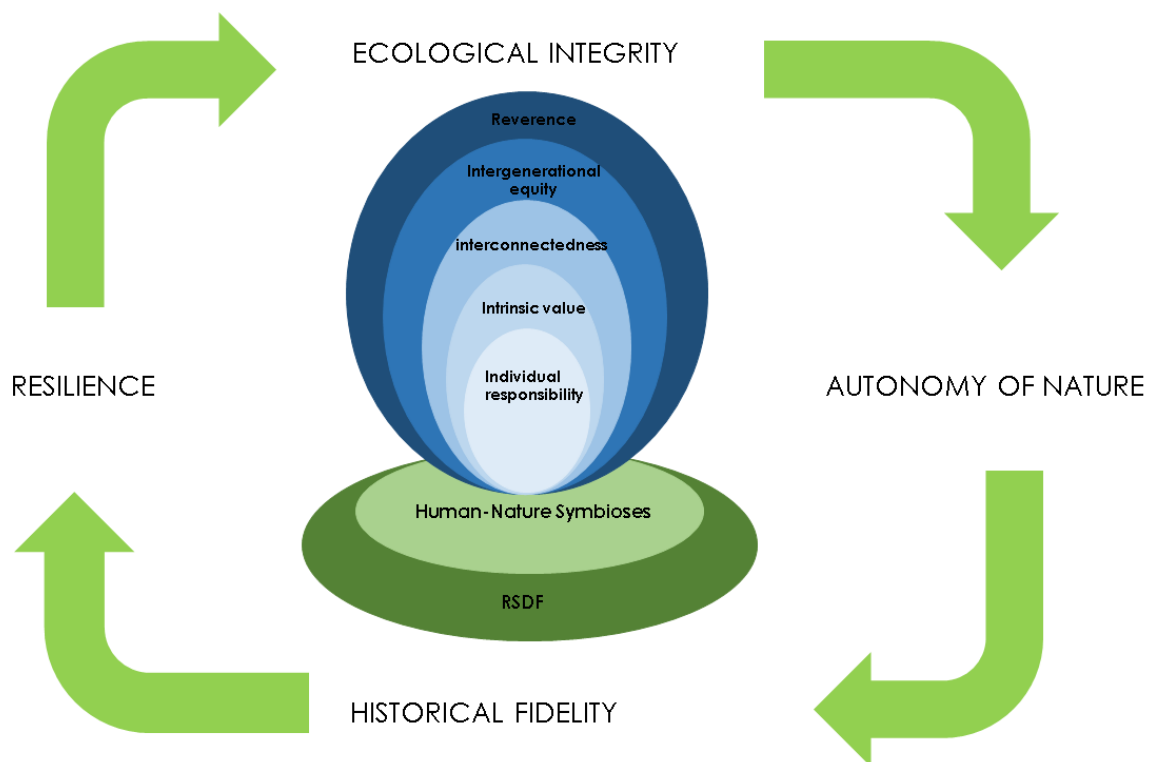


Figure 4.1 A conceptual diagram which identifies the desired principles in order to achieve the envisioned future. Source: (Authors own ideas adopted from Newsome, Moore & Dowling, 2013).

### **4.3.1 Reverence**

Conservation is placed at the forefront of this RSDF in the form of identified biodiversity priorities and targets which will conserve biodiversity within SBM. According to The Fynbos Forum (2016), biodiversity targets are a set of quantitative biodiversity target sets which indicate how much of a biodiversity feature needs to be conserved. This is also identified as an 'ecosystem threat' status on a map like an EMF map, which indicates areas as critical biodiversity areas (CBA's) or ecological support areas (ESA's). In other words, this is why a biodiversity target or the "Keep Assets Intact" layer of the EMF will form the foundation of this RSDF in terms of guiding land use decisions in the future of SBM. These layers will help ensure ecological integrity and resilience within the region by ensuring that minimal human activities or developments take place within the designated areas.

### **4.3.2 Intergenerational Equity**

This principle relates to sustainability in that society needs to focus on living cohesively and ensure that there are sustained relations with earth's systems. (Newsome, Moore & Dowling, 2013). Inherently, this notion also emphasises that society needs to protect earth's ecosystems from destructive human activities, rehabilitate/restore those ecosystems that have been degraded, use ecosystems only in a sustainable manner and lastly allow those ecosystems that have been abused to return to a state where they can flourish (Newsome, Moore & Dowling, 2013).

### **4.3.3 Interconnectedness**

Davis, Green & Allison (2009) argue that interconnectedness is the inherent idea that both nature and humanity are interdependent, and is the extent to which individuals include nature as part of their identity. According to Newsome, Moore and Dowling (2013) interconnectedness is a contested term, but in this RSDF it is viewed from an ecocentric standpoint. This means that people respect and value nature and place the importance of nature at the forefront of their thinking which, in retrospect, is the cornerstone philosophy of this plan.

#### **4.3.4 Intrinsic Value**

According to Miller and Spoolman (2008) intrinsic value means that every living thing on the planet has the right to live because of its existence on this planet. This notion implies that this right is not dependent on the actual value it has on society or humanity, but is purely based on its present existence. This principle assumes that it is wrong of humans to prematurely force the extinction or degradation of any wild species, ecosystems or habitats within the natural environment (Newsome, Moore & Dowling, 2013).

#### **4.3.5 Individual Responsibility**

This principle places emphasis on the individual in order to ensure that no physical, chemical and biological capital which supports humanity is depleted. All humans should be responsible for their own pollution and environmental degradation, but this is only realistic in a perfect world. In this regard, municipalities have a reasonable amount of authority to ensure this ethic, and individual leaders need to take action.

### **4.4 Goals for the Regional Spatial Development Framework**

The principles identified have formed a platform from which a set of spatial goals have been formulated. These goals aim to ensure that the core aspects of the 2015 EMF are included and integrated within the new proposed RSDF. These goals are based on the primary and secondary research questions formulated at the outset of the study in order to guide development towards a pro-life context. Each of these goals are complemented by a set of criteria and desired indicators in order to ensure that they are adhered to. These indicators will also help with the monitoring and evaluation of the proposed intervention strategies in order to pursue the desired future outcomes of the region.

The spatial goals identified in figure 4.2 are based on the three identified environmental management zone layers of the 2015 EMF. They form the basis of this proposed RSDF in order to guide development towards a sustainable future. The key pilot projects/programmes identified in figure 4.3 are based on interventions that the researcher believes will be conducive to the vision and outcome of this RSDF. These goals include sustainable fisheries, eco-tourism and conservation through education,

which in effect will help promote and nurture new attitudes and values within the region.

# SPATIAL

GOALS	CRITERIA	INDICATOR
EMF layer 1: Keep Assets Intact	<ul style="list-style-type: none"> <li>Resources that are critical to sustaining ecological integrity, which in turn is essential for human health and wellbeing, and for maintaining economic activity.</li> <li>Resources that are important for food security, livelihoods, economic activity and job creation.</li> <li>Resources that are important to communities, for society and for sense of place.</li> </ul>	<ul style="list-style-type: none"> <li>The following activities should not be considered for this layer: mining, industrial activities, bulk storage of minerals, infrastructure &amp; hazardous substances, intensive agriculture, livestock facilities, aqua culture facilities, forestry, dams &amp; water transfer schemes, solid waste disposal sites, recycling facilities, waste transfer stations, waste treatment facilities, liquid waste storage facilities, waste water treatment works, power generation, electricity distribution infrastructure, cemeteries, abattoirs, recreational tourism facilities, residential facilities, airports, linear infrastructure, bulk water supply infrastructure, infilling, excavation or deposition of material and marine facilities.</li> </ul>
EMF layer 2: Develop with Care: Vulnerable Resources	<ul style="list-style-type: none"> <li>This layer is made up of attributes that encompass important resources but are not as significant and/or as threatened, vulnerable or at risk as those in EMF layer 1.</li> </ul>	<ul style="list-style-type: none"> <li>The following activities should not be considered for this layer: mining projects, extraction or processing of oil or gas and power generation projects (fossil fuels or nuclear).</li> </ul>
EMF layer 3: Develop with Care: Restrictive Criteria	<ul style="list-style-type: none"> <li>The criteria that inform EMZ layer 3 are concerned with possible restrictions on land use and development either due to environmental quality issues or due to potential natural environmental risks such as flooding</li> </ul>	<ul style="list-style-type: none"> <li>The following activities should not be considered for this layer: residential projects, commercial or retail facilities, intensive agriculture, facilities for the concentration of livestock or for intensive commercial livestock production, forestry/afforestation, dams (in stream &amp; off stream) and water transfer schemes, recreational facilities and tourism facilities.</li> </ul>

Figure 4.2 Regional Spatial Development Framework Spatial Goals

Source: (Adapted from the 2015 EMF in WCG, 2015).

# Pilot Projects and Programmes

GOALS	CRITERIA	INDICATOR
Promote sustainable fisheries	<ul style="list-style-type: none"> <li>The maintenance and re-establishment of healthy populations of targeted species.</li> <li>The maintenance of the integrity of ecosystems.</li> <li>The development and maintenance of effective fisheries management systems, taking into account all relevant biological, technological, economic, social, environmental and commercial aspects.</li> <li>Compliance with relevant local and national laws and standards and international understandings and agreements.</li> </ul>	<ul style="list-style-type: none"> <li>It can be continued indefinitely at a reasonable level.</li> <li>Maintains and seeks to maximise, ecological health and abundance.</li> <li>Maintains the diversity, structure and function of the ecosystem on which it depends as well as the quality of its habitat, minimising the adverse effects that it causes.</li> <li>Managed and operated in a responsible manner, in conformity with local, national and international laws and regulations.</li> <li>Maintains present and future economic and social options and benefits.</li> <li>Conducted in a socially and economically fair and responsible manner.</li> </ul>
Promote eco-tourism	<ul style="list-style-type: none"> <li>The needs of the guests must be covered. The experience must trigger a desire to travel and should not be motivated by technology.</li> <li>Sensitive areas are to be taken into account (waste prevention, steering of visitors).</li> <li>The experience should have an awareness-raising/informative character and provide a better understanding of local conditions or culture.</li> <li>The focus is on rest and relaxation away from any mass tourism. The offer should be brought to life for the individual tourist.</li> <li>The experience promotes interactions between guests and locals.</li> </ul>	<ul style="list-style-type: none"> <li>Tourism that promotes conservation and celebrates the sense of place and landscape character of the region.</li> <li>Ensure tourists are monitored and activities are regulated in order to ensure ecological integrity of areas.</li> <li>Tourists respect and adhere to strict regulations of nature conservation and critical biodiversity areas.</li> <li>Monthly reports and environmental health should be provided and discussed in order to neutralise threats and ensure a sustainable future of the region.</li> </ul>
Conservation through education	<ul style="list-style-type: none"> <li>Promote educational nature-based lessons</li> <li>Getting schools and informal settlements involved with conservation programmes</li> <li>Promote social learning and create capacity building</li> <li>Provide opportunities for talented young learners and leaders of the region.</li> <li>Ensure partnerships with different organisations</li> </ul>	<ul style="list-style-type: none"> <li>Inform young learners and locals of the value of nature and nature conservation.</li> <li>Implement programmes and projects that will help locals become independent through creating and finding jobs within the field of nature conservation.</li> <li>Create private-public partnerships that will help fund and steer these programmes and projects in order to help alleviate poverty and create prosperity and self-worth.</li> </ul>

Figure 4.3 RSDf key projects and programmes Source: (Authors own, 2016)

## **4.6 Management Frameworks**

The following section is comprised of spatial intervention strategies in order to guide this RSDF towards a more ecologically resilient future. As previously mentioned, the three distinct layers of the 2015 EMF are used as a platform from which to launch the strategic interventions of this RSDF. As such, there will be a thorough understanding of the most contested realities of the region in terms of negative impacts on the environment and local sense of place. The researcher was able to construct adequate strategic interventions which aim to minimise the effects identified within the analysis. These strategic interventions are constructed within three distinct management frameworks, and all accommodate the bioregional ethos and long-term envisioned structure and form. These three management frameworks are labelled as landscape and natural resources framework, economic development framework and lastly, site and settlement framework.

### **4.6.1 Landscape and Natural Resources Framework**

The LNRF consists of a composite map which indicates the various interventions strategically across the region. The interventions proposed within this framework are all focused on achieving ecological resilience and ensuring environmental prosperity.

The first intervention is to enhance and connect ecological remnants of the region. The region contains very important ecological corridors as seen in figure 4.4 which should be protected and enhanced by ensuring that no human activities affect these areas. These ecological corridors play an intricate role in the prosperity and longevity of the biodiversity found in the region. Therefore, the role of the planner is to ensure that the appropriate land use is proposed or designated within these corridors to ensure that fragmented landscapes don't form. In addition, planners can help with appropriate design guidelines which include planning for open space linkages, ensuring policy procedures are followed and guiding pro-active action plans such as stipulating buffers and guiding catchment management procedures. Planners need to ensure that landscape management practices are well planned for in the future, and that a flexible guideline is followed in order to accommodate for unforeseen circumstances.

The SBM is associated with vast amounts of dryland agriculture due to the limited water supply in the region. In order for the region to become more resilient and to adapt to the effects of climate change, the region needs to diversify its croplands. Therefore, the second intervention is to diversify crops that are vulnerable to climate change as indicated in figure 4.4, which will ensure crops are grown in harsh conditions. This holds considerable market-value potential for the region. According to Shanker (2012) the productivity of dryland crops can only be increased if the problems are better understood and conversely combated. The region needs to collaborate in order to research new life sustaining methods, adaptive capabilities and find best practice solutions (Shanker, 2012). As mentioned in EMZ 1, local farmers have to be trained in order to produce climate resilient crops. Therefore, this intervention is about strengthening the local farming system which will include planting seeds or materials that will survive in hot and dry conditions such as olives. Farmers within the region need to assess their current farming practices and systematically move towards more resilient and adaptive farming practices and methods.

The third intervention is associated with coastline protection and enhancement as indicated in figure 4.4. The most fundamental aspect in order to secure healthy coastal ecosystems is the enhancement of the drivers that maintain ecosystem function. The coastal monitoring programme will include the following aspects: Variation in soil type; rainfall; dispersal of berries and seed by frugivorous bird species; wild fires; water drainage patterns and faunal movement within coastal corridors (The Fynbos Forum, 2016). These aspects form part of the coastal protection strategy which is predominantly a monitoring programme to ensure that continuous evaluation and up-to-date information is available to the municipality as well as the public. This coastal protection strategy will not allow the biggest threats to coastal ecosystems to become reality. These threats are: mining; large-scale habitat conservation for farm activities; over-use of groundwater; infestation of invasive alien species; altered fire cycles; resort and urban development and lastly habitat fragmentation (The Fynbos Forum, 2016). The land-uses identified form part of protecting ecological corridors - corridors of natural habitat should ideally be protected by a 200m buffer along a north-south gradient (The Fynbos Forum, 2016). Therefore, a designated coastal

protection zone should be identified especially in those areas indicated as endangered ecosystems - stretching from Stompneus Bay to St Helena Bay as seen in figure 4.4.

The region is associated with phase 2 FEPA sub-quaternary catchment areas which effectively maintain runoff and discharge into river systems. The role of the planner in the fourth intervention strategy is to ensure that the integrated catchment management initiative supports the ecological remnants in the region as seen in figure 4.4. The objectives of this initiative will be to create a strategic plan to manage wildfires and alien invasive plants; create an interactive platform which distributes data and information; establish fire wise communities and boost local economic development through involving locals; integrate policy such as Cape Nature's fire management policy and alien invasive management policy (The Fynbos Forum, 2016). In addition, expanding on possible economic growth potentials around and within catchment areas could include expansion or diversification of current landscape practices. This will include implementing appropriate green infrastructure designs or plans which could potentially attract investors within the areas. The municipality should collaborate with specialists in order to create 30m buffers within the river systems and to ensure that no human activities pollute or degrade the river system, such as the Sout River running through Hopefield which is currently being encroached on by residential properties. The rivers and wetlands found near St Helena, Paternoster, Hopefield, and Vredenburg (which is known as Koppiesveld), form part of the catchment management strategy. Planners should ensure that the ecological drivers are maintained in order to ensure ecosystem function, pattern and structure. This includes the continuous analysis of the following: climate, catchment geomorphology, geology, substrate (soils/sediment), water sources and hydrological regime, water quality and lastly biota and biological processes (The Fynbos Forum, 2016).

The 2015 EMF has identified a very important bird corridor within the region as shown in figure 4.4. The analysis has identified a diverse range of birds that migrate to this region to mate. According to De Villiers (2009) seabirds are excellent indicators of climate change as they rely on the ocean for food, and migrate according to temperatures. Therefore, the fifth intervention entails the need to monitor and create

an interactive knowledge platform where conservationists, scientists and tourists could potentially view the activities of the birds. This programme will need baseline studies, active involvement from the community and conservationists at the West Coast National Park, and scientists to perform specialist studies on bird activities and the potential effects of human activities within the designated bird corridor. Interactive involvement from the community and local people can help filter findings within the region, and also create an environment where local people engage within the uniqueness of the environment. The findings or sightings of the local people can be captured and that data can be incorporated into the interactive sharing platform.

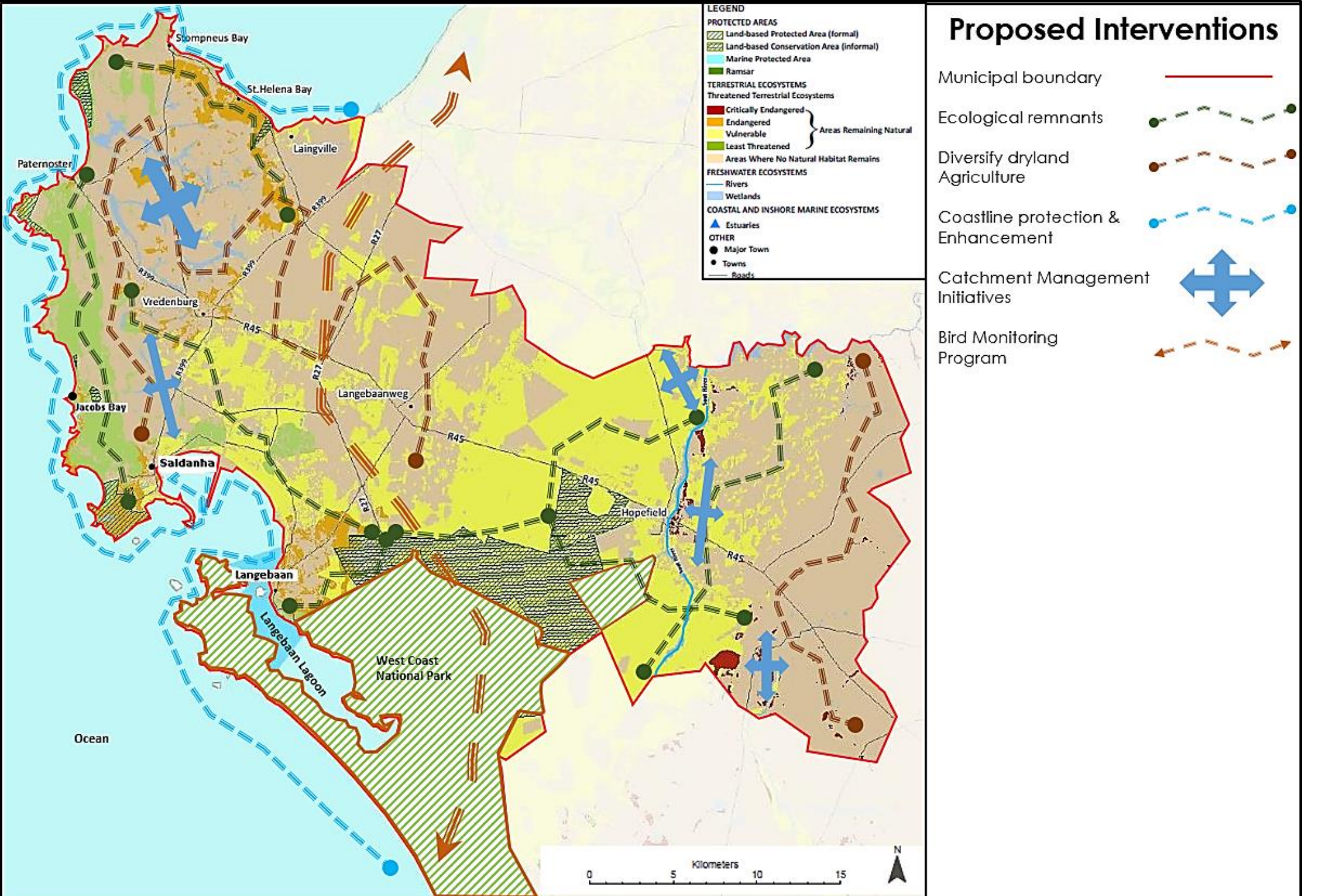


Figure 4.4 Landscape and Natural Resources Framework Map Source: (Annotated by author original information from WCG, 2015).

#### **4.6.2 Economic Development Framework**

The 2011 SDF of SBM has formulated a conceptual diagram of their local development strategy in order to combat poverty and unemployment in the region. The strategy proposes that Saldanha, Vredenburg and the back of the port form strategic nodes in order to connect the proposed economic industrial corridors. As indicated in figure 4.6 the area between Vredenburg and the area at the back of the port is located within a critical biodiversity area. As seen in figure 4.6 the first strategy proposes to move the expansion of the industrial development zone to a new location, which is situated between Saldanha and Vredenburg. The current infrastructure development path is starting to encroach on the "Keep Assets Intact" zone as stipulated within the 2015 EMF. Within the 2011 SDF the proposed expansion of the industrial development zone will take place within an important ecological corridor which is key for the survival of certain ecosystems in that area. The current site, according to the "Keep Assets Intact" zone, has no environmental significance. It is strategically located between Vredenburg and Saldanha (as seen in figure 4.6), and will still have the potential to create the economic development corridor. The site proposed is only another option which should be considered for in-situ industrial development upgrading throughout a period where flexibility is ensured for potentially new eco industrial technologies or more sustainable methods. The expansion of the IDZ is a very important inclusion from an economic perspective, but the governed authorities on this project should seriously consider all possible methods towards a more sustainable development path. In addition, a sound development policy should be formulated which includes accountability for pollution (water, soil, air); the consideration of a desalination plant in order to supply water, as the IDZ is currently consuming half of the water in the region; effective methods to protect affected ecosystems and biodiversity; and the creation of a dedicated municipal fund which is aimed at alleviating poverty and enhancing environmental protection within the region. Therefore, the municipality needs to ensure continuous specialist studies are done to monitor the effects of the industrial development zone and evaluate what needs to be done or how to go about it. The IDZ in Saldanha will always be a controversial topic, as the economic potentials outweigh the environmental risks in the eyes of the state. However, through progressive expansion guided by a sound policy, the IDZ could potentially generate vast economic wealth and could ensure regional environmental prosperity through the injection of alternative revenue.

The second intervention is based on enhancing eco-tourism within the region which includes various cultural and natural aspects associated with the area. Eco-tourism along the coast closest to Paternoster, St Helena & Langebaan Lagoon includes various recreational and adventure tourism activities. Various protected areas and parks create the opportunity for environmental awareness and conservation through exploring the local natural and cultural areas. The landscape and local sense of place accommodates eco-tourism initiatives such as introducing adventure tourism events, encouraging local communities to produce local foods or products and pursuing active outdoor involvement. In addition, a further discussion on eco-tourism is evident in the key pilot projects section (section 4.7.2).

The larger towns such as Langebaan, Vredenburg and Saldanha need to promote and encourage eco industries - this constitutes the third intervention. These towns are the largest and have the greatest opportunity to steer an industry or operate in the local market. Eco industries promote activities which produce goods and services to measure, prevent, limit, minimise or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems (Eco Industries Ltd, 2014). Eco industries which focus on farming use techniques such as hydroponic growing and vertical gardening, and use minimal water, air and soil in order to produce farm goods. These industries can be linked to local farmers and producers in order to effectively support local farmers.

Therefore, the fourth intervention is about promoting rural-urban interdependencies which consider and capitalise on the intense flow of public and private capital, people (migration and commuting), goods (trade), services, ideas and information between the urban and rural areas. Providing local produce to the regional supermarkets can enhance and encourage the informal economy to participate. This ensures a cyclical system where locals produce goods which are injected back into the region which in turn will reinvigorate the informal trading economy. This intervention directly relates to how the region can create better backward/forward linkages.

The region needs greater backward/forward linkages between towns in order to gain regional inclusivity and spread the distribution of opportunities and wealth. Therefore, the fifth intervention is about promoting backward/forward linkages within the region to contribute towards regional growth. Successful implementation of

backward/forward linkages could steer development within the whole region and create more inclusivity. The main goal of these links is to grow the local economy and ensure that if large industries are to move to this region, they have to inject wealth within the local economy. Therefore, in order to successfully create linkages between different towns, one needs to develop a production chain that has all the fundamental elements to operate within a market. In addition, planners need to create these elements of functionality if they do not exist by investing in areas, developing appropriate infrastructure, formulating policies that are predetermined to uplift local economic development and creating private-public partnerships with large corporations and industries. In the long run this could ensure that the towns have adequate access to large markets and access to supplies of goods in order to stay competitive in these markets. The region of Saldanha has a great opportunity to produce locally and act globally through the use of the harbour for shipments. Saldanha Bay Municipality is strategically located between a large agricultural region and an IDZ harbour which will be expanding within the next 20 years. This creates opportunity for linking agricultural practices to the region and integrating businesses from other parts of the country. The region will be able to expand local markets, create more jobs and distribute opportunities throughout the region. The distribution of opportunities could come in the form of expanding local niche markets which relates to the sixth intervention.

The region has a very interesting and culturally rich heritage which creates the opportunity to further exploit niche markets in the region. An example of this is the creation of unique fish products such as "Bokkoms" which is a type of snoek biltong originating from the West Coast. The opportunity to further exploit dryland crops can also create an opportunity for farmers to produce niche products. Expanding on local niche markets or products directly relates to interventions such as eco-tourism, eco-industries, diversifying croplands and enhancing townscape. Therefore, systematic collaboration and coordination of local resources, ideas and opportunities need to be integrated into the development ethos in order to help each other effectively throughout the region.

The region is associated with a magnitude of wind which creates a perfect opportunity to expand on renewable energy such as implementing wind farms in the region. Wind farms are a clean, safe and effective way to produce energy. As seen in fig 4.5 the Jeffrey's Bay wind farm has had great success since its implementation

in 2011, with the most significant being the amount of water saved which was 590 000 000 litres per year (Jeffrey's Bay Wind Farm, 2011). Therefore, given the region's limited water supply and the expansion of the industrial development zone, implementing wind farms will largely contribute towards supplying sufficient and effective clean energy throughout the whole region.



Figure 4.5 Jeffrey's Bay Wind Farm      Source: (Jeffrey's Bay Wind Farm, 2011)

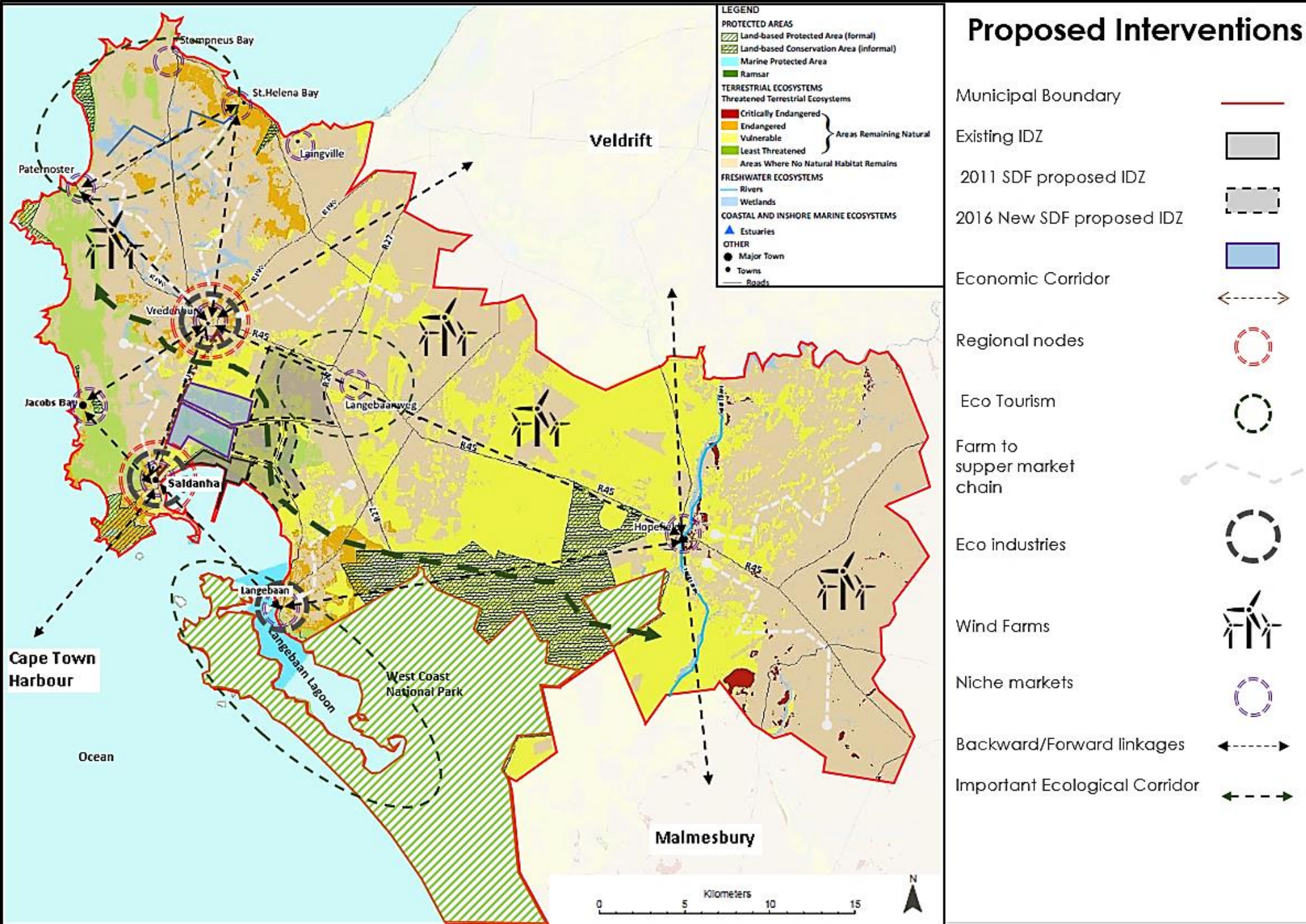


Figure 4.6 Economic Development Framework Map

Source: (Annotated by author original information from WCG, 2015).

### 4.6.3 Site and Settlement Framework

As indicated in figure 4, 9 the first intervention indicated on the map as enhanced townscape implies that these areas need to adhere to local architecture and aesthetic of the town. Planners need to collaborate with local architects and landscape designers in order to ensure that development proposals respect the appearance and qualities of each townscape area and maintain or enhance their distinctive character. This intervention directly relates to one of the biggest threats in terms of local sense of place and aesthetic being lost to development of luxury estates and homesteads adjacent to the coast (also known as ribbon development). Therefore, development should promote and adhere to town and landscape character through responding to and reinforcing local distinctive patterns of development, natural heritage and cultural significance, and local man-made designs (Planning Practice Guidance, 2014). Integrating new development proposals within the local urban fabric is an important design objective, irrespective of whether the land for this proposal lies next to the urban edge or at the centre of the town. Towns like Paternoster and St Helena are already threatened by large residential developments which do not adhere to local aesthetic and sense of place.

As explained in the analysis of this study, the region struggles with inadequate infrastructure and poor service delivery. Therefore, the second intervention is about reducing point source pollution within the region. The biggest areas of concern are those located within the bay of Saldanha Bay, most prominently those next to the industrial zone and waste treatment plant located next to the Bok River in Saldanha Bay. As explained in the analysis, the waste water treatment works and other general waste landfill and processing sites are outdated and inadequate. This has contributed to environmental degradation and poor living conditions for people close to these areas. The infrastructure within these sites need to be upgraded and appropriate buffer zones need to be stipulated. The need is great to upgrade these sites, but also to adequately dispose of the materials within these sites and areas where this is lacking. The poor removal and processing of materials, combined with poor management and lack of awareness, all contribute towards pollution within the environment. There is, therefore, a need to create an effective recycling plan, creating awareness towards recycling methods and upgrading existing infrastructure and services.

The region has limited water resources and with the magnitude of water being used within the IDZ currently, clean drinking water will become a problem in the future. Therefore, starting within the informal settlements, Warka Water Towers need to be implemented as the third intervention in this framework. The Warka Water Tower operates through gravity and collects water from the atmosphere. The canopy design of the Warka Water Tower allows it to be used as a place of gathering, praying or just keeping out of the sun as seen in figure 4.7 (Warka Water Towers, 2015).

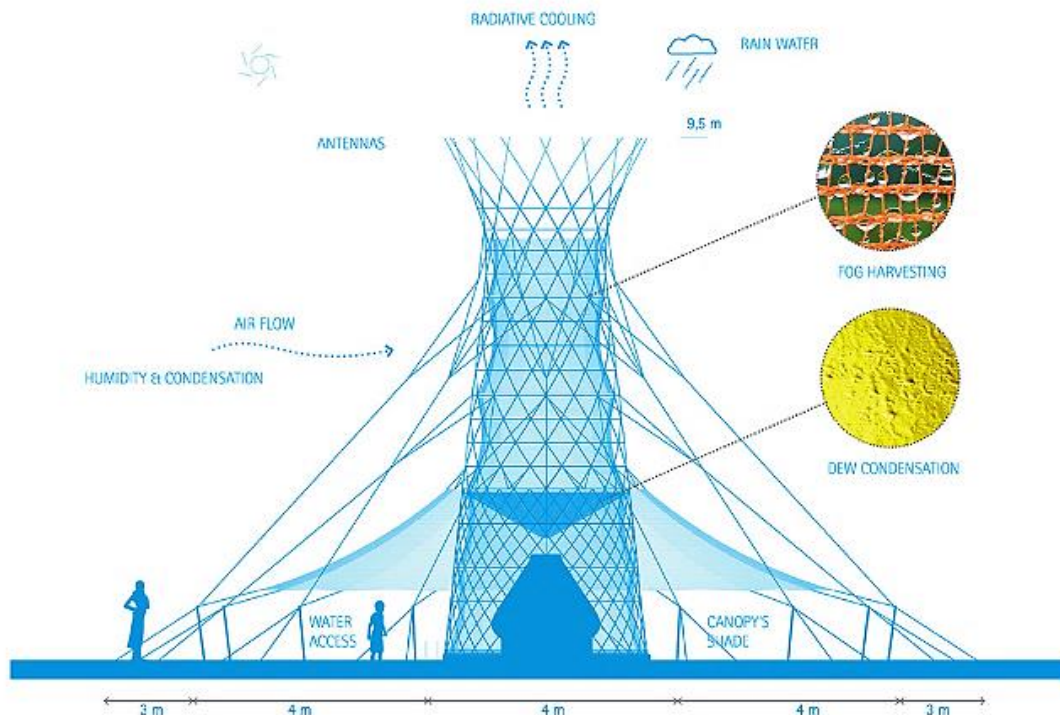


Figure 4.7 Warka Water Tower Source: (Warka Water Towers, 2015)

By expanding on the idea of the region being water scarce, the municipality needs to design and develop water wise settlements and infrastructure. Water wise settlements need to be equipped with the most sustainable solutions such as incorporating Sustainable Urban Drainage Systems (SUDS) in order to manage both formal and informal areas as seen in figure 4. 8 SUDS effectively manage runoff and storm water discharge in order to minimise damage to the environment and infrastructure (Cape Town Invasives, 2015). Both formal and informal settlements within communities in the region need to adapt, reserve and store water within the region. This includes managing current water demands, upgrading inadequate infrastructure

(leaking pipes, using grey and storm water effectively, and avoiding inappropriate use of clean drinking water in the household, such as using it in toilets) and educating people in the region on how to use less water within the house.

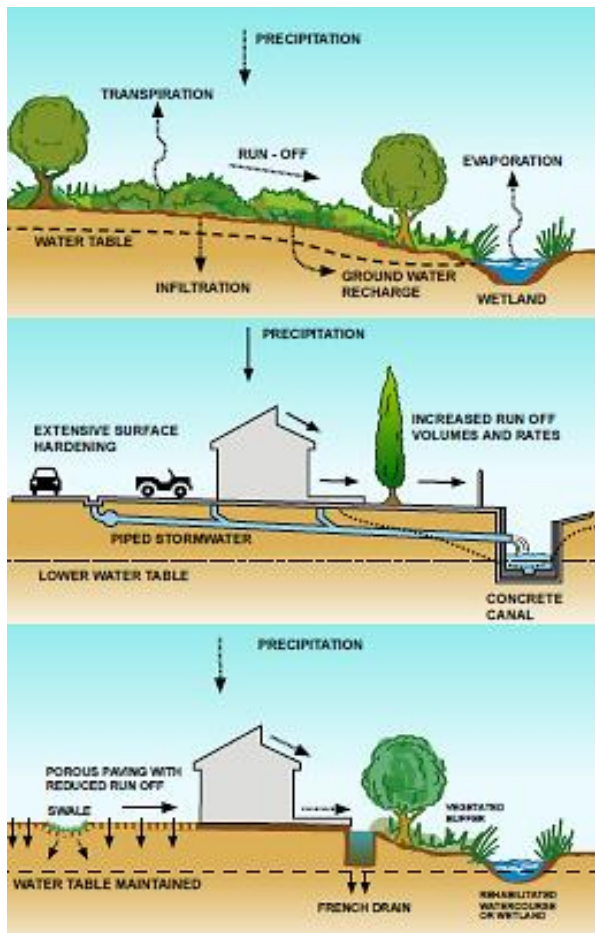


Figure 4.8 SUDS Source: (Cape Town Invasives, 2015).

Informal settlements in the region are associated with poor living conditions and a big housing waiting list. The municipality needs to effectively manage in-situ upgrading - the upgrading of an informal settlement is an ongoing process which can only be successful if there is continual engagement and dialogue with the community concerned. This will effectively help manage informal settlements while looking after the needs of the local people. Community-based planning is a very important aspect towards building sustainable human settlements.

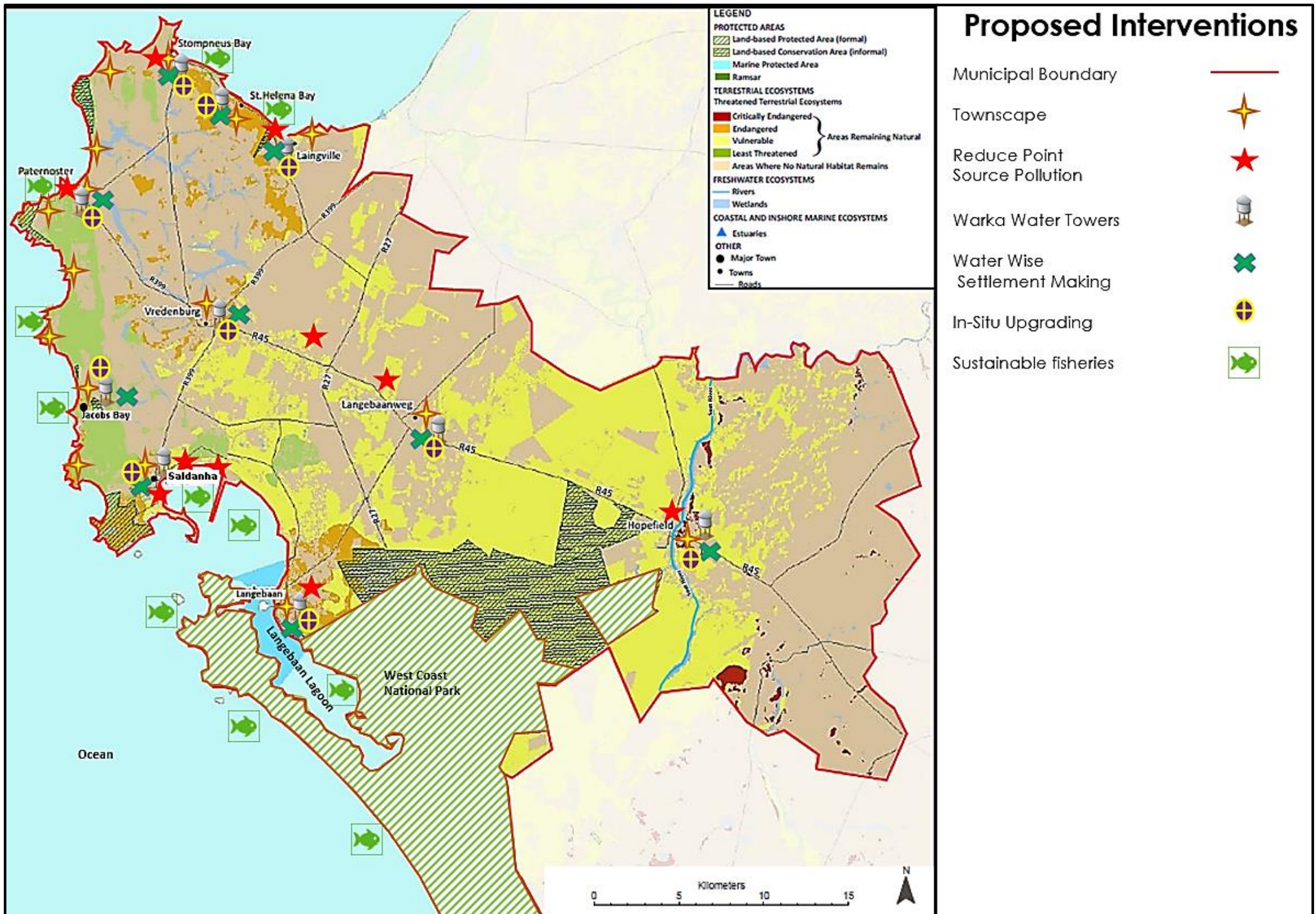


Figure 4.9 Site and Settlement Framework Source: (Annotated by author original information from WCG, 2015).

## 4.7 Key Pilot Projects and Programmes

The interventions formulated by the researcher are based on the findings of the EMF. These interventions run in parallel with the spatial interventions identified and are mainly focused on the livelihoods of the local people and the local sense of place. The various interventions identified will act as pilot projects/programmes which are in line with the vision for this RSDF. These projects/programmes place local livelihoods and nature at the forefront of regional prosperity. The natural landscape and cultural aesthetic play an intricate role in the livelihoods of the local people. This RSDF therefore places great emphasis on nature-based decisions and interventions that aim to socio-ecologically and socio-economically harmonize people and nature within the region.

### 4.7.1 Sustainable Fisheries

The West Coast of South Africa is renowned for its diverse and abundant range of marine ecosystems. Fishing has been part of the region for the past 300 years, and currently includes deep-sea fishing, line fishing, marine and aquaculture farms (WCDM, 2012). The region of Saldanha Bay, specifically the coastal towns of Langebaan, Saldanha Bay, Jacobs Bay, Paternoster and St Helena are historically renowned for being fishing villages. Local small-scale fisheries and subsistence farmers have, however, declined in the past decade due to environmental disruption and decline in marine ecosystems. The need for sustainable fishing solutions and strategies must therefore be seen as a prerequisite in order to conserve the local environment and protect local people that are dependent on the local environment. Greenpeace (2008:1) explains that *“a sustainable fishery is one whose practices can be maintained indefinitely without reducing the targeted species’ ability to maintain its population at healthy levels, and without adversely impacting on other species within the ecosystem – including humans – by removing their food source, accidentally killing them, or damaging their physical environment”*

According to Winza (2014) in a documented video about small-scale fishing within the West Coast, the problems explained are a two-way stream. The threats of expanded industrial development and the unsustainable manner that local fisherman are extracting marine life from the ocean are concerning. According to specialists in this video, the

marine life is just as threatened by the locals as it is by commercial fisheries. The problem facing locals within the region of Saldanha is that over the past decade, marine protection zones have been enforced. According to a local in the video, these protection zones are where they catch the most fish. However, considering that the marine ecosystems are so threatened, the designated authorities have had no choice but to declare these protection zones (WCG, 2015).

The region of Saldanha needs an intervention strategy that will focus on monitoring and evaluating current fishing industries. Considering that the coast and marine life is threatened, a pro-active action plan is needed in order to monitor and assess current marine practices. The Marine Stewards Council is an independent, global, non-profit organization whose mission is to contribute towards improving health of the oceans by rewarding sustainable fishing practices (Marine Stewards Council, 2013). The MSC program entitles fisheries to receive a blue ecolabel if the criteria set out in the action plan are met. This organization works with various stakeholders, partners and people from various organizations in order to pursue a sustainable future. In the context of multiple rationalities, the municipality needs to manage such an intervention in order to ensure the best intentions are based on the needs of the locals.

The need to monitor commercial and local fishing activities within the Saldanha region is a major priority. The MSC has formulated an action-plan template which can be used by the municipality and relevant stakeholders in order to monitor current marine activities. With regards to collaborating with local institutions, the MSC can partner with Fisheries' Community Development Workers (FCDM) whose role it is to address matters that affect local coastal communities (DAFF, 2016). The roles and responsibilities of this organisation include community outreach programs, establishing community fishing forums and providing continuous feedback and service delivery on matters (DAFF, 2016). In effect, with the help of the municipality, local fishermen can use this action plan in order to receive the certified blue ecolabel in order to justify their need to fish within the area. This will help the municipality monitor fishing activities while simultaneously conserving the marine environment.

The objective of this action plan is for the municipality to formulate its own action plan and policy in such a way that it accommodates the locals and ensures ecological resilience. As seen in fig 4.10, the development process of an action plan needs to be robust. These steps allow for community engagement, public participation and integrated collective involvement (Marine Stewards Council, 2013).

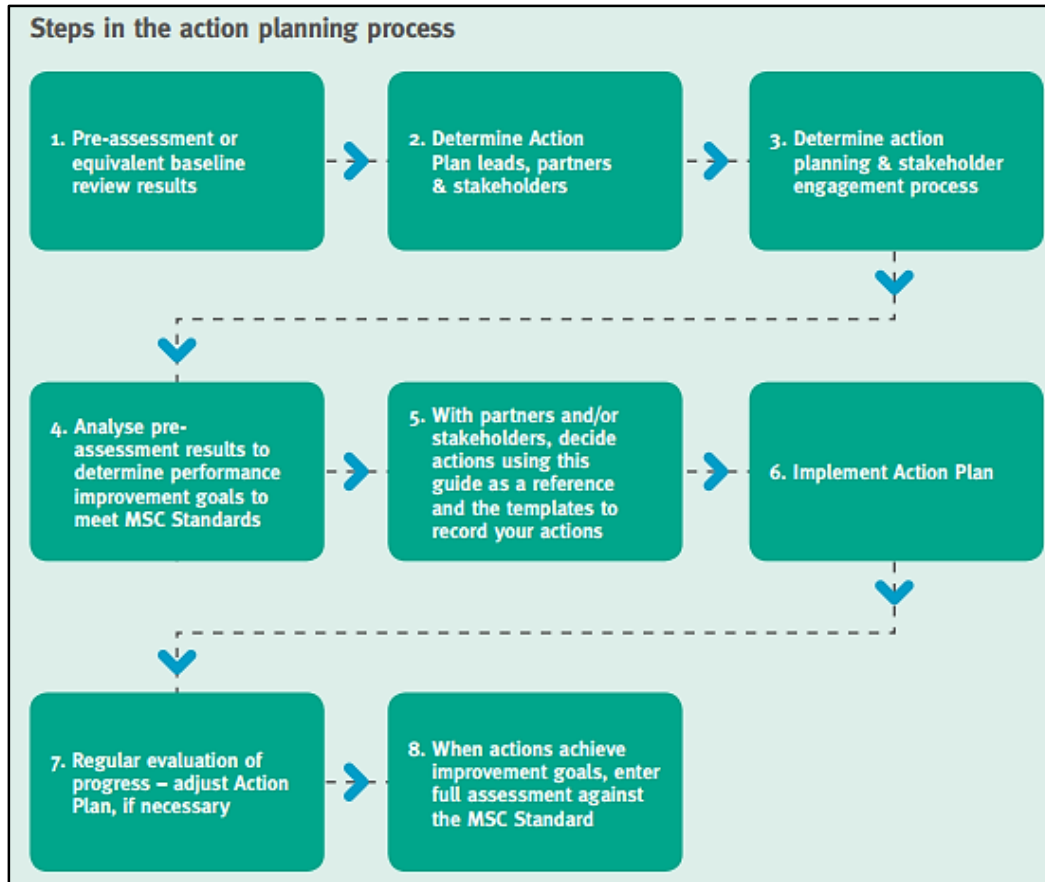


Figure 4.10 MSC Action Plan Steps Source: (Marine Stewards Council, 2013).

The MSC certification process has formulated performance indicators in terms of their fisheries assessment methodology which is used to score fisheries against the criteria set out for sustainable fishing (Marine Stewards Council, 2013). Figure 4.11 shows the table which includes the principles, the component of the specific principle and the performance indicator in order to evaluate the specific activity. In addition, fig 4.12

indicates the action plan template which needs to be filled by a relevant municipal official and a member of the relevant person or industry involved.

The only way this is going to work is if the relevant body assigned to this is transparent and accountable for all documentation and information provided. The success of this action plan lies with the relevant authorities that should monitor, evaluate and adapt on a continuous basis (Marine Stewards Council, 2013). Therefore, it is vitally important for the municipality to ensure guidance and provide the necessary council, information and resources in order to successfully adopt a strategy that is robust and flexible. This programme aims to ensure the long-term survival of marine ecosystems through an integrated and sustainable framework. As seen in fig 4.13 a case study is provided on how the municipality can formulate the appropriate action plan in order to ensure local livelihoods are sustained. With the help of independent organisations such as MSC and FCDW collaborating with the relevant stakeholders, a solution towards sustainable fisheries is possible for the region of Saldanha.

Principle	Component	Performance indicator		
Principle 1 Target fish stock(s)	Outcome	1.1.1 Stock status		
		1.1.2 Reference points		
		1.1.3 Stock rebuilding		
	Harvest strategy (Management)	1.2.1 Harvest strategy 1.2.2 Harvest control rules and tools 1.2.3 Information and monitoring 1.2.4 Assessment of stock status		
Principle 2 Ecosystem	Retained species	2.1.1 Retained species outcome 2.1.2 Retained species management strategy 2.1.3 Retained species information and monitoring		
		Bycatch species	2.2.1 Bycatch species outcome 2.2.2 Bycatch species management strategy 2.2.3 Bycatch species information and monitoring	
			Endangered, threatened and protected (ETP) species	2.3.1 ETP species outcome 2.3.2 ETP species management strategy 2.3.3 ETP species information and monitoring
	Habitats			2.4.1 Habitats outcome 2.4.2 Habitats management strategy 2.4.3 Habitats information and monitoring
		Ecosystem		2.5.1 Ecosystem outcome 2.5.2 Ecosystem management 2.5.3 Ecosystem information and monitoring
			Principle 3 Management system	Governance and policy
	Fishery-specific management system			

Fishery name:		Start date:
Fishery location:	Fishing method:	End date (anticipated):
Project leaders (organisation responsible for Action Plan):		Improvements recommended by:
Overview of the Action Plan		

Standard requirement	Actions	Resources required	Action lead	Action partners	Stakeholders	Timescale / milestones
1.						
2.						
3.						
4.						
5.						

Standard requirement	Actions	Timescale / milestones	Progress / outcome	Revised milestone
1.				
2.				
3.				
4.				
5.				

Figure 4.11 MSC principles, components and indicators towards a sustainable fishing future Source: (Marine Stewards Council, 2013).

Figure 4.12 MSC Action-Plan Template Source: (Marine Stewards Council, 2013).



Figure 4. 13 Case-study: Kleinmond Action Plan

Source: (Marine Stewards Council, 2013).

#### **4.7.2 Eco-Tourism Initiative**

Before this intervention is explained, one needs to understand the essence of what constitutes ecotourism in general. According to Weaver (2008) ecotourism or the term was used in the context of various platforms that had advanced from the field of 'tourism' post second world war. The platform or meaning of ecotourism had been advocated as being a predominantly knowledge-based approach towards tourism. Weaver (2008) argues that ecotourism has moved away from the traditional views of being either a

'type' or 'form' of tourism, but rather an approach to tourism. Therefore, ecotourism runs in parallel with the researcher's ideologies as predominantly being from an ecological perspective. Weaver (2008) explains the five key characteristics of ecotourism which are the following:

1. Ecotourism is a form of tourism.
2. Attractions within ecotourism are predominantly nature-based, although this can also include cultural resources and impacts.
3. Ecotourism motivates and fosters educational learning and pursues productive outcomes.
4. Ecotourism is managed in such a way that socio-cultural sustainability outcomes are obtained.
5. Although ecotourism pursues a sustainable conservation outcome, activities related to this also need to be financially feasible.

*"The primary goal of ecotourism is to foster sustainable use through resource conservation, cultural revival and economic development and diversification"*  
(Newsome, Moore & Dowling, 2013:16).

Ecotourism in the greater Saldanha region plays a very intricate role in the sense that large amounts of tourists flock to the various activities available in the region (South African Tourism, 2016). Some of the most prominent activities include hiking, whale watching, cycling, visiting archeological significant sites, exploring the abundance of Fauna and Flora in the region and all this while nestled within the picturesque landscape while enjoying some of the locally prepared cuisines. By actively motivating ecotourism within the region, tourists can enjoy what the region has to offer within a sustainable and environmentally conscious manner.

The region is associated with an inadequate and struggling working class where local people are struggling to find employment. People don't have the necessary skills and knowledge to find jobs, which contributes towards further inequality within the region. Therefore, the researcher feels that integrating knowledge and conservation within the

realm of ecotourism is a great opportunity to create better livelihoods for locals. In addition, this initiative will contribute towards better integrating people and nature in order to strive for a harmonised and celebrated future within an ecologically sustainable manner.

The purpose of this initiative is to create opportunity and guidance for people from disadvantaged backgrounds in order to pursue a better life path. People are struggling to find employment and this is normally associated with an increase in crime and illegal activities. Therefore, this initiative strives to help local communities to learn different skills to apply this within the environment. With the help of the municipality and various organizations such as IAIA (International Association of Impact Assessment), Cape Nature, and the working for programmes, people can become involved.

The West Coast National Park (WCNP) is governed by SANParks, which protects a large portion of landscape and wildlife within the region. Through a joint-initiative of the various organisations, the WCNP can build a unique conservation and teaching centre. This centre will allow local disadvantaged people to become eco guides. This programme has been initiated in Australia where people are being taught how to become eco guides. They are also taught how to assess an ecotourism company based on a set of criteria which enables monitoring of the type of activities that specific companies provide. This is done in order for companies to become eco certified, which means that these companies adhere to certain principles and guidelines that focus on nature conservation and ecological sustainability. As seen in fig 4.14 the Eco Guide Programme in Australia allows for a diverse range of skills and knowledge to be learnt through collaborating and joint-initiatives. These programmes will allow people from the region to become independent and involved within the majestic region of Saldanha. After the learning, the necessary skills and developed knowledge, these locals could possibly start their own ecotourism companies or NGO's to further this initiative within the region. The idea of this programme is also to develop young leaders and role models for the community in order to strive for prosperity and better livelihoods. The researcher feels that most of the informal settlements lack leaders, especially when it comes to young children that need guidance and help in life. Figure 4.15 shows a case study in Cairns, Australia

where local people had started an eco-tourism company with great success. The region of Saldanha with its vast and abundant landscape holds similar types of opportunities for local people to become independent.

## ECOGUIDE CERTIFICATION: Australia

### What does the program cover

- 1. Generic guiding skills**
  - Knowledge of the tourism industry; Knowledge of the roles and responsibilities of a guide and in particular an EcoGuide; Communication skills, Safety, workplace health and safety, and risk management; Group management; Developing and delivering tour activities; Knowledge of subject matter.
- 2. Eco guide specific skills**
  - Planning and implementing minimal impact principle; Commitment to ongoing professional development; Ensuring activities respect local culture and follow appropriate protocols for sharing information on local culture.
- 3. Guides can gain**
  - Practical guidance to implement sound business principles, ecologically sustainable practices and culturally responsible initiatives.
  - A recognised industry qualification which you can showcase via a certificate and certification logos for use on all of your print and digital marketing material.
  - A competitive edge in the tourism market by promoting your guiding services as genuine nature tourism, often rewarded by better job opportunities.
  - Promotion at international trade shows including the annual Australian Tourism Exchange.
  - A 25% member discount to our annual Global Eco Asia-Pacific Conference.
  - Opportunities to list work wanted for free on Ecotourism Australia's EcoJobs webpage.
  - Excellent networking and professional development opportunities with other certified EcoGuides or guides undergoing certification.
  - Opportunities to share your work with the world!
  - Once certified, you will be profiled in Ecotourism Australia's EcoBytes newsletter and can share news via our website and social media channels.
- 4. Natural tourism operators & protected area managers gain**
  - The opportunity to promote guide-based products as best practice nature and/or ecotourism guiding, creating greater product appeal and a marketing advantage.
  - Improved guiding practices that lead to fewer negative environmental and cultural impacts and increase client satisfaction.
  - Guides who are committed to providing front-line defence in environmentally sensitive areas.

Figure 4.14 Example of the Eco guide program in Australia

Source: (Ecotourism, 2016).

## Case study in sustainable tourism: Billy Tea Safaris-Cairns, Australia

**Billy Tea Safaris has been Advanced Ecotourism Certified for 11 years.**

They provide opportunities to experience nature in ways that lead to greater understanding, appreciation and enjoyment of the World Heritage areas their tours operate in. They give customers the opportunity to interact with the natural environment and, in varying degrees, develop their knowledge, awareness and appreciation. The aim is to provide an appropriate level of interpretation about the natural and cultural heritage of the areas visited without hitting that information overload level. They use local guides and National Park rangers on cave walks and boat cruises to reinforce their own guides' information and interpretations (Ecotourism Australia Limited, 2012).

### ROLE OF CERTIFICATION

Billy Tea Safaris began the certification process because they believe they are a leading tour operator within their region and wished to keep this strong position by gaining international recognition. Billy Tea Safaris also foresaw that government agencies were leaning towards certification as a level of competency required to be a good tour operator and a level required to hold permits to operate in World Heritage and other government controlled areas. The eco branding also represented a good marketing tool. The process of certification took longer than expected and it was an extremely long task for a small operator like them: they did not have other office staff and had to hire extra staff to compile the information, which was quite a time-consuming task. Certification allowed them to gather information about their business, which helped them plan things they could do to improve their business as an ecotourism product. Billy Tea Safaris can use the ecotourism branding to promote their business to the world. They have now achieved the status of Green Leader, which demonstrates their long-term commitment to ecotourism and offers many benefits when it comes to promotion and marketing. Getting certified did not require them to change their business but it helped them focus on tours more along environmental lines and helped guide training (Ecotourism Australia Limited, 2012).

### CONTRIBUTIONS TO ENVIRONMENTAL CONSERVATION

As an operator, they try to spread the conservation message to travellers and visitors. They clean up rubbish left behind by others, repair damage to areas they visit and work closely with National Parks. They also support local conservation groups with some financial contribution where possible. Billy Tea Safaris also partakes in studies of the areas they visit for James Cook University and Queensland National Parks, providing them with customer feedback and survey forms. Well-trained and knowledgeable guides are the key to the successful delivery of interpretation. The level and type of interpretation is planned, designed and delivered to meet the interests, needs and expectations of the visitor and includes a broad range of interpretive opportunities. In addition to information regarding the region and its history, culture, flora and fauna, all interpretation carries an awareness of relevant conservation issues (Ecotourism Australia Limited, 2012).

Figure 4.15 Case study of an ecotourism based company in Cairns, Australia  
(Ecotourism Australia Limited, 2012)

Source: (Ecotourism

### **4.7.3 Education through Conservation Initiative**

The Education through Conservation Initiative focusses on young children within informal settlements and their need to have a healthy and educated start in life. The rural poor have inadequate infrastructure with no mentors and leaders to help the children onto the correct path in life. The SBM really struggles with young children and adults who drop out of school early and pursue illegal gang related activities (WCG, 2015). Therefore, this initiative really focusses on children in primary school in order to start on the right path at an early stage in their lives. This initiative also runs in parallel with the researcher's ethos of striving towards a more harmonised future between people and nature. Educating young children about nature will create a better understanding, and will develop opportunities for them. Eco Children is an initiative of the Klaserie Private Nature Reserve in Mpumalanga that focusses on educating young children by learning about the environment and developing life skills (Eco children, 2015). The researcher will now explain and explore the Eco Children initiative further.

The Eco Children initiative believes in reducing the barriers of poverty, creating a safe and healthy environment and stimulating curiosity of nature (Eco children, 2015). All the children in the initiative will have the opportunity to flourish and become a catalyst of positive change in their communities, which in the end will contribute towards both environmental and socio-economic change. As seen in fig 4. 16 the initiative's vision, mission, principles, and what they are currently focusing on are further explained. The researcher feels such an initiative will really be productive and pro-active within the SBM. It will contribute towards the vision of this RSDF which is to better integrate and harmonise human-people relationships.

PRINCIPLES	VISION	WHAT THEY DO
<p><b>Accountability</b> – Eco Children is incorporated under section 21 Reg. No. 2007/012052/08 and is sanctioned by the South African Revenue Service as a Public Benefit Organisation, in terms of Section 18a of the Income Tax No. 930024822. We apply principles of good governance, complying with charitable regulations, undertaking annual audits and publishing annual reports. We ensure our beneficiaries are also accountable: our adopted schools must take ownership of their projects; our bursary students must take responsibility for their academic performance (Eco children, 2015).</p>	<p>To make a significant positive impact on education in our adopted primary schools in the Limpopo and Mpumalanga Provinces through whole school development, leading to better conservation and economic outcomes for South Africa.</p>	<p><b>SUPPORT A SCHOOL:</b> Eco Villages, developed in partnership with our sponsor Make A Difference Leadership Foundation, are the entry point in developing a broad-based relationship with a school. Eco Villages consist of a large vegetable garden plus refurbished classrooms with vibrant murals for conservation-based lessons. Once a school has shown that they value their Eco Village, Eco Children works with the school to improve essential infrastructure such as libraries, kitchens, toilets and school halls, transforming them into places that are conducive to learning (Eco children, 2015).</p>
<p><b>Integrity</b> – Eco Children’s reputation is its greatest asset and won’t be compromised. We know that we need to earn the trust of the communities in which we work, so we always do what we say we will do in order to gain and retain that trust (Eco children, 2015).</p> <p><b>Selectivity</b> – we will only work with schools who have Principals and educators that demonstrate leadership and that they will continue to care for and value the Eco Villages and school infrastructure, and are supportive of building capacity of educators (Eco children, 2015).</p> <p><b>Fun</b> – we love to join in the fun with the kids at our adopted schools and to celebrate with them and the community at the completion of our projects (Eco children, 2015).</p> <p><b>Sustainability</b> – our goal is long-term development and we strive to ensure all of our projects are sustainable and self-sustaining, not reliant on Eco Children’s ongoing support. Similarly our long-term goal is to build an organisation that generates its own income and is sustainable (Eco children, 2015).</p>	<p><b>MISSION</b></p> <p>To sow seeds of change, empowering the children in rural Limpopo and Mpumalanga Provinces by increasing their awareness of conservation; stimulating their desire to learn; improving their learning environment; improving the quality of their education; and providing opportunities for talented learners</p>	<p><b>KIT-A-KID:</b> While working on various projects in our community it became evident that many of the children in our adopted schools did not own a school uniform. The Kit-a-Kid initiative was born from this need; through donations and fundraising, children are supplied with a complete school uniform (Eco children, 2015).</p> <p><b>CAPACITY BUILDING:</b> The third phase of whole school development is working with our adopted schools to build the capacity of educators. We run regular and ongoing capacity building workshops for Level R educators as well as maths workshops, both areas of great need (Eco children, 2015)</p> <p><b>ECO TRAINING:</b> Eco Children facilitates workshops with different eco-based themes for children and adults to teach them about the environment they live in (Eco children, 2015).</p> <p><b>BURSARIES:</b> We work with our adopted primary schools to identify talented learners for our Bursary programme. Promising students are selected by Eco Children for consideration for scholarships and we mentor these students and monitor their progress to give them the best possible opportunity for academic success (eco children, 2015).</p>

Fig 4. 16 Eco children initiative model Source: (Eco children, 2015).

## 4.8 Conclusion

This chapter has put forward a Regional Spatial Development Framework for the Saldanha Bay Municipality. This RSDF has proposed various strategic interventions in order to enable a transition to a more integrated and harmonised future between people and nature in the region. This RSDF has been developed through the knowledge and research done within the literature review and contextual analysis. In addition, the researcher's main task was to formulate an enhanced RSDF based on the findings of 2015 EMF and 2011 SDF. Therefore, the researcher followed a thorough investigation between the 2011 SDF and the 2015 EMF of SBM in order to find gaps, clashes and contestations. This process allowed the researcher to formulate a new RSDF which was predominantly developed through an ecological lens in order to ensure protection and conservation of valuable environmental resources in the region. The ideologies and ethos of the researcher thread through the spatial interventions proposed within this RSDF in order to ensure a region that is ecologically resilient and adaptive.

Using the principles of reverence, intergenerational equity, interconnectedness, intrinsic value and individual responsibility, the researcher has placed the value of nature at the forefront of all decisions. In order to ensure a region that is ecologically resilient and harmonised, a development path needs to be formulated which places the importance of the local people and the environment at the forefront of decision-making. In order to do that the researcher has used the three most prominent findings of the 2015 EMF as the basis to steer development and land use onto a more life sustaining path. The three most prominent layers of the 2015 EMF explore the various environmental attributes that are intricate to this region. These three different layers not only have ecological significance, but hold the key to socio-economic prosperity as well. The three distinctive layers of the 2015 EMF are therefore used as a platform from which to launch the three management frameworks. Local residents and businesses depend on the environment in order to produce goods or provide a service. The spatial interventions proposed are flexible in order to accommodate change within the future.

The researcher has used the findings from the three most important layers of the 2015 EMF as a base map in order to formulate interventions to neutralise the three most prominent threats, and to create a region which follows a life-sustaining path towards ecological resilience. The researcher has found that the expansion of the industrial development zone, the increase in ribbon development and poor and inadequate basic services and infrastructure are the biggest threats to long-term sustainability in the region. Therefore, the spatial interventions proposed are all directed at minimising the threats as stipulated above. The spatial interventions are structured in such a way that they encourage cohesion between human activities and the natural environment within the region. The unique landscape character and sense of place needs to be preserved in order to ensure ecological resilience and regional prosperity. The key pilot project/programme interventions proposed in this RSDf also run in parallel with the researcher's vision for the future of this region.

Therefore, interventions such as sustainable fisheries, promoting eco tourism and conservation through education are proposed. These interventions are geared towards a future where people and nature are better integrated and harmonised, with the focus on the local people. These interventions are about creating opportunities for the locals and allowing them to make sound life choices in order to become independent and to allow them to become a role model or leader in their community. This can be done while simultaneously conserving the environment and making a difference in terms of environmental awareness and the importance of the natural environment of this region.

The following chapter will detail the implementation of this RSDf in terms of implementation responsibilities, strategic phasing and municipal governance. Overall, this RSDf has provided an alternative vision for the Saldanha Bay Municipality where the importance of nature is guarded for the enjoyment and survival of all locals in the region, both present and for the future.

## **CHAPTER 5: IMPLEMENTATION**

### **5.1 Introduction**

The previous chapter detailed the researcher's RSDf and intervention strategy. The focus will now be on the implementation of that intervention strategy. For the Saldanha Bay Municipality area to achieve the vision described in the previous chapter, an implementation strategy is required to drive the adoption of the various strategies. This section, organised in order of management frameworks, lays out such a strategy, and indicates the most important strategies that need to be implemented. It draws out key stakeholders in the processes, assigns them key performance indicators (KPI), describes the policy and/or legislative implementation vehicles and delineates a timeframe in which the issues should be handled. This chapter is concerned with the implementation of the RSDf over the next 20 years; therefore the need to be flexible, but also direct is a very important combination to find. The reason for the 20-year time frame is to provide a long-term spatial vision and allow enough time for adaption and change towards the long-term spatial structure and form. This chapter will seek to take the RSDf and make it implementable - this is where the institutional and policy context becomes critical. A fundamental aspect of any implementation strategy is where the funding is going to be prioritised and how much funding is available for implementation.

Within contemporary transition discourses there is agreement that we need a more comprehensive map to understand and solve the world's most intractable problems. There is a call for new ways of thinking about and responding to the ecological and environmental issues confronting us as we head into the 21<sup>st</sup> century. In this fast-changing time, where political, religious, and economic structures are failing to meet the need for a more equitable and caring world, new and radical approaches are called for. The challenges before us are unprecedented, both within our country, and globally. Never before has the pace of change – social, technological, economic, environmental and political - been so fast nor on such a large scale. Society is thus at a turning point where our whole outlook, our attitude towards the planet and ourselves, is changing and has to change. Society needs a deeper sense of connection, obligation, and responsibility during this transformative age. There is

increasing awareness of the severe externalities of our current production and consumption methods in terms of destroying our environment.

In order to be strategic, and considering that the future is unforeseen, this section of strategies discussed has been positioned in four 5-year phases, with the first phases being critical for implementation as soon as possible. This is because not all the phases can be done at once due to a variety of reasons such as resources, capacity and time constraints. Even though the vision of the RSDf is for 2036, it is necessary to intervene in such a manner that continuous progression is made within this transitioning period towards an integrated and harmonised future.

The first aspect this chapter addresses is the necessary phasing of the strategies discussed in the previous chapter in order to allow for a considered strategic implementation process. The process will begin with the most urgent interventions necessary to enable these strategies proposed for the region. In order to progressively steer the region towards its desired future, certain strategies need to be prioritised as not all strategies can be done simultaneously. This chapter will then move to the actors involved in the implementation process and those who will be responsible for the implementation of the strategies proposed. This section will focus on the importance of partnerships and public participation, as the scope and dynamics of intervention need holistic and democratic decision-making. This study has not undertaken a public participation process, but the researcher acknowledges that this is imperative, and a prerequisite before starting any implementation. In the final section of this chapter, a brief for local area planners and developers will be given in order to embrace the principles, goals and strategies envisioned in this RSDf. This will be done through stipulating development guidelines which need to be considered when intervening at this scale. This brief will allow for better guidance and will help planners and developers to become more mindful and understanding towards nature and ecological processes, and will help grow reverence for natural processes. The brief will enable plans to be guided in line with contextual ecological conditions and, in the future, to be more ecologically literate.

## 5.2 Phasing of Strategies in the RSDF for Saldanha Bay Municipality 2036

The ten strategies detailed in the previous chapter have been broken down into various projects, programmes and tasks as seen in figure 5.1. The phasing is broken down into four 5-year categories, which indicate what will happen during that time period. This must be done to ensure that the necessary upgrades and maintenance required on certain projects adheres to the requirements and regulations stipulated by law. This transition towards an ecologically resilient region will not always be forthcoming for all developers as economic gain has dominated the ideologies of most Western societies today (Conrad, 2016). But, due to the rich nature of the landscape, this region could be vulnerable to controversial developments in the future such as the Elandsfontein mining project which has been heavily criticised for its operations (Bamford, 2015). The projects described within the various strategies should be an iterative process that includes ongoing dialogue, public participation and clear stakeholder engagement and collaboration. This will enable the particular stakeholders to determine where the problems are and how to eradicate them.

The first phasing is laid out in figure 5.1 and shows the most important findings of the RSDF for SBM that have been prioritised. These strategies have been specifically proposed in order to combat the biggest threats (expansion of the IDZ, increase on ribbon development adjacent to the coast and lastly poor and inadequate infrastructure and service delivery) to the region based on the findings in the analysis. The most important strategies displayed in figure 5.1 are those that aim to directly neutralise the biggest threats to the region. They are the strategies of moving the IDZ in Saldanha, ensuring townscape, and lastly reducing point source pollution. It is important, however, to remember that these three strategies will not be possible to implement simultaneously, but they are the most important strategies to implement successfully in order to achieve the long-term vision. However, the phasing will be explained according to the management frameworks as laid out in the intervention chapter of the RSDF.

As indicated in figure 5.1, each strategy is listed, and within each strategy, the specific programme or project is laid out. This is done according to the phases of the project which refers to the timeline of each project. Therefore, the strategies that fall within the landscape and natural resources framework will be explained first. The "Ecological Remnants Strategy" which is about connecting and enhancing biodiversity within the

region falls within the phase 1 timeline. This includes a 5-year biodiversity pro-active programme that consists of pro-active action plans as explained in chapter 4.

The second strategy, which is "Diversifying Dryland Crops", is broken down in three phases which focuses on the key project of training for climate resilient crops. As seen in figure 5.1, the first phase will be about investigating the probability of implementing such an intervention, which means that the necessary homework must be done. This includes scope of the studies, detailed research on the area, methods and products, continuous dialogue with local farmers and creating agricultural forums where discussions can be held and possible partnerships can be formed. The second phase will entail developing the market forming actual partnerships between corporations and local farmers. This phase is predominantly about developing infrastructure and initiating the farming practices from the ground up. The last phase will be about expanding on existing farming practices and trying to develop the local market further.

The next strategy is about protecting and enhancing the marine ecology which focuses on coastal management and the local fishing industry. As seen in figure 5.1, the first phase is about establishing a coastal ecosystem strategy which identifies various pro-active actions that will be implemented, as explained in chapter 4. The municipality together with other management organisations will dedicate a coastal protection zone through which a multitude of local regulations and rules will be formulated in order to protect these areas. In addition, a range of pro-active actions will be included within this new strategy, which will reinforce the method of how management is implemented. The local fishing industry is a key project which will introduce a strategic action plan within the first phase. This plan is dedicated to creating opportunity, conservation and sustainable fishing. The success of this strategy will be through continuous involvement and integration of current practices, methods and industries. The strategy is better detailed in chapter four.

The last strategy of this framework is about catchment management initiatives which entails projects and programmes that are dedicated to improving and ensuring the long-term health of rivers and wetlands in the region. The first project is about identifying river and wetland buffers within the region. This is a phase 1 priority that also includes viable action plans and methods on how to sustain ecosystem health. The second project is about river rehabilitation and enhancement. This is also a phase one

project that includes multiple action plans and priorities as explained in chapter four. The last intervention is about creating a bird monitoring programme that will be able to track migrating birds and will expand on research. This is a phase two programme.

The strategies that follow fall within the economic development management framework, and moving the IDZ expansion is the first strategy as seen in figure 5.1. Therefore, this strategy proposes in-situ development and expansion in order to accommodate change in the future and allow for flexibility. Thus, phase one proposes specialist studies and intricate research on alternative methods and practices within the industrial industry. The key priorities would be to systematically shift the expansion of the IDZ towards Saldanha in order to connect the proposed economic development corridor between Vredenburg and Saldanha. This is proposed in order to find more sustainable methods or techniques to accommodate the current environment and to ensure less pollution in the environment in the future. The next phases will allow for infrastructure and development that will accommodate the economic development corridor between Vredenburg and Saldanha. This economic corridor development will pursue the expansion of eco industrial industries and create jobs through injecting investment within the IDZ.

The interventions that follow are based on the "Eco Industries Strategy" which includes "Niche Markets", "Farm to Supermarket Chain", "Eco Tourism" and "Creating Backward/Forward Linkages". "Niche Markets" is broken down in three phases within phase one, which is about research and feasibility of which products will be best suited for the region. The next phase is about creating partnerships and forming small businesses in the region in order to build capacity and penetrate the local market. The third phase will be about expanding on current practices and capacity in order to distribute throughout the region.

The next intervention, "Farm to Supermarket", connects to "Niche Markets"; the first phase is about creating partnerships in the region. The following phase will entail distribution of products and practices that have a high-demand and show success, with the last phase being expanding on those distribution networks. The third intervention is also a key project relating to "Eco Tourism". The first phase of this intervention is based on expanding the current eco tourism initiatives in the towns of Saldanha, Langebaan, Paternoster and St Helena. These towns focus on adventure

tourism and outdoor activities that, within the next phase, could be expanded across the region to less favourable destinations such as Vredenburg and Hopefield.

The next intervention is about connecting all of these new economic interventions through backward/forward linkages. Therefore, the first phase is about creating local markets within the towns of Saldanha, Vredenburg and Langebaan. The second phase will be connecting these strategic nodes to smaller towns in order to expand on the local markets in Paternoster, Jacobs Bay, St Helena and Hopefield. The last phase will focus on expanding on all of these towns to different regions and injecting investment to be distributed across the region.

The last strategy is about renewable energy with the key project being implementing wind farms across the region. The phasing will be as follows: the first phase is about scope and feasibility; the next phase will be about finding appropriate sites and areas for implementation. The third phase will be about constructing the wind farms and the necessary infrastructure with the last phase will focus on expanding on current practices.

The strategies that follow are all from the site and settlement management framework, with the first strategy being one of the most important in terms of reducing environmental degradation. The strategy of reducing point source pollution has a few key intervention projects in the form of upgrading current waste water treatment works and implementing better recycling and waste management plans. The first phase will be to upgrade current poor and inadequate infrastructure located in Saldanha IDZ, Saldanha town, Langebaan, Vredenburg, Paternoster and St Helena. The second phase will be to upgrade current recycling methods, plans and services in order to ensure more effective results in terms of removing waste.

The next strategy is about ensuring townscape, but considering that this is a regional framework, the only phasing will be to ensure that all local plans and developments adhere to the vision of the RSDF. The researcher has written a brief entailing some detailed points of departure for local area planners that needs to be adhered to for the next 20 years. This strategy is also regarded as one of the most important in terms of ensuring sense of place and local aesthetic, but no strict project is possible. Instead, it takes the form of a local policy which explains the vision of this RSDF.

The last strategy of this framework relates to sustainable human settlements and specifically focuses on informal settlements in the region. The intervention projects “Warka Water Towers”, “In-situ Upgrading” and the making of “Water Wise Settlements” are all phase one priority projects and need to be implemented as soon as possible. The making of “Water Wise Settlements” will focus on formal settlements in phase two and, once the most effective methods and solutions as described in chapter four are implemented, all future projects will be designed this way.

	PHASING OF IMPLEMENTATION					
	Strategies	projects	Phase 1 2016 - 2021	Phase 2 2021-2026	Phase 3 2026-2031	Phase 4 2031-2036
<b>Landscape and Natural Resource Framework</b>	Enhance connectivity of ecological remnants	Biodiversity monitor programme	Inland coastal systems and biodiversity networks			
	Diversify Croplands	Training for climate resilient crops	Scope, Research, Forums, dialogue	Partnerships, form agribusinesses, develop market	Expand and distribute	
	Protect & enhance marine ecosystems	Coastal monitor programme	Dune systems, coastal ecosystems			
		Sustainable fisheries	Introduce action plan	Monitor and review progress		
	Catchment management initiatives	Establish river and wetland buffers	Koppiesveld, Bok river, Sout river (hopefield)			
		River rehabilitation project	Bok River (Saldanha), Sout River (Hopefield), Koppiesveld (St Helena)			
		Bird monitoring programme		Bird corridor (see EMZ 2 map)		
<b>Economic Development Framework</b>	Renewable energy	Wind Farms	Research and scope	Site proposals	Infrastructure	Expand
	Eco industries	Niche market	Research and scope	Form partnerships	Build on current capacity	
		Farm to super market chain	Create partnerships	Distribute	Expand distribution network	
		Eco tourism	Patemoster, St Helena, Langebaan, Saldanha	Expand eco tourism businesses throughout region		
		Backward/forward linkages	Develop local markets	Create linkages between towns	Expand local markets	Inject investment and further expansion
IDZ	In-situ expansion project	Scope, research, specialist studies	Construction and infrastructure expansion	Construction and infrastructure expansion	Construction and infrastructure expansion	
<b>Site and Settlement Framework</b>	Townscape	Local developments and housing architecture projects	Housing and development projects need to accommodate local aesthetic and sense of place	Housing and development projects need to accommodate local aesthetic and sense of place	Housing and development projects need to accommodate local aesthetic and sense of place	Housing and development projects need to accommodate local aesthetic and sense of place
	Reduce Point Source Pollution	Waste Water Treatment Works upgrade, Recycling projects	Langebaan, Saldanha IDZ, Saldanha town, Vredenburg, Patemoster, St Helena	Expand general dumping sites and recycling methods		
	Sustainable Human Settlements	Warka Water towers	All informal settlements			
		In-situ upgrading	All informal settlements			
Water wise settlement making		All informal settlements	All formal settlements	New proposed housing projects		

Figure 5.1 Phasing of implementation strategies

Source: (Authors own, 2016)

PHASING OF IMPLEMENTATION					
	strategies	Regulatory/legislative actions	Government Institutions Responsible	Other Institutions/ Actors Responsible	funding
Landscape and Natural Resource Framework	Enhance Connectivity of Ecological Remnants	<ul style="list-style-type: none"> <li>National Environmental Management Act 62 of 2008</li> <li>National Water Act 36 of 1998</li> <li>NEMA: Biodiversity Act 10 of 2004</li> <li>Environment Conservation act 115 of 1992</li> </ul>	<ul style="list-style-type: none"> <li>Provincial Department of Environmental Affairs and Development Planning</li> <li>Proposed- Natural Resource Management: \$6M</li> </ul>	<ul style="list-style-type: none"> <li>Sanbi</li> <li>WWF South Africa</li> <li>Cape Nature</li> <li>Working for Wetlands</li> <li>Proposed: District Community Organisations</li> </ul>	<ul style="list-style-type: none"> <li>Sanbi</li> <li>WWF South Africa</li> <li>Local &amp; Provincial Government</li> </ul>
	Diversify Croplands	<ul style="list-style-type: none"> <li>National Water Act 36 of 1998</li> <li>Agricultural Research Act 86 of 1990</li> <li>Agricultural Development Rnd Act 175 of 1993</li> <li>White Paper on Agriculture (1995)</li> <li>Marketing of Agricultural products act 47 of 1996</li> <li>Environment Conservation Act 115 of 1992</li> </ul>	<ul style="list-style-type: none"> <li>National Department of Agriculture</li> <li>Provincial Department of Water and Sanitation</li> <li>Provincial Department of Environmental Affairs and Development Planning</li> <li>Proposed- Natural Resource Management: \$8M</li> </ul>	<ul style="list-style-type: none"> <li>African Farmers Association of South Africa</li> <li>Cape Nature</li> <li>Agriculture Research Council</li> <li>Agriculture Economics Association of South Africa</li> <li>Proposed: District Community Organisations</li> </ul>	<ul style="list-style-type: none"> <li>Public-Private Partnership</li> <li>Provincial Government</li> <li>African Agriculture Fund</li> <li>Land Bank</li> <li>National Government</li> </ul>
	Protect & Enhance Marine Ecosystems	<ul style="list-style-type: none"> <li>Marine Pollution and Prevention Act 2 of 1986</li> <li>National Environmental Management Act 62 of 2008</li> <li>White Paper on Environmental Management of the Ocean (2014)</li> <li>Environment Conservation Act 115 of 1992</li> </ul>	<ul style="list-style-type: none"> <li>Provincial Department of Environmental Affairs and Development Planning</li> <li>Proposed- Natural Resource Management: \$6M</li> </ul>	<ul style="list-style-type: none"> <li>South African National Biodiversity Institute</li> <li>Cape Nature</li> <li>South African Institute of Environmental Health</li> <li>WWF South Africa</li> <li>Proposed: District Community Organisations</li> </ul>	<ul style="list-style-type: none"> <li>Sanbi</li> <li>Cape Nature</li> <li>WWF South Africa</li> <li>Local &amp; Provincial Government</li> </ul>
	Catchment Management Initiatives	<ul style="list-style-type: none"> <li>National Environmental Management act 62 of 2008</li> <li>National Water Act 36 of 1998</li> <li>NEMA: Biodiversity Act 10 of 2004</li> <li>Environment Conservation Act 115 of 1992</li> </ul>	<ul style="list-style-type: none"> <li>Provincial Department of Environmental Affairs and Development Planning</li> <li>Proposed- Natural Resource Management: \$6M</li> </ul>	<ul style="list-style-type: none"> <li>Sanbi</li> <li>Cape Nature</li> <li>Working for Water</li> <li>Working for Wetlands</li> <li>Proposed: District Community Organisations</li> </ul>	<ul style="list-style-type: none"> <li>Sanbi</li> <li>Cape Nature</li> <li>WWF South Africa</li> <li>Local &amp; Provincial Government</li> </ul>
Economic Development Framework	IDZ Expansion	<ul style="list-style-type: none"> <li>Special Economic Zones Act 16 of 2014</li> <li>National Industrial Policy Framework</li> <li>Special Economic Zone Policy</li> </ul>	<ul style="list-style-type: none"> <li>National Department of Trade and Industry</li> <li>Provincial Department of Environmental Affairs and Development Planning</li> <li>Saldanha Bay Municipality: Office of Municipal Manager</li> </ul>	<ul style="list-style-type: none"> <li>Saldanha Bay Industrial Development Licensing Company</li> <li>The IDZ Business Forum</li> <li>South African Oil &amp; Gas Alliance</li> <li>Proposed: District Community Organisations</li> </ul>	<ul style="list-style-type: none"> <li>Special Economic Zone Fund</li> <li>Foreign Investment</li> <li>National Government</li> </ul>
	Eco Industries	<ul style="list-style-type: none"> <li>Environmental Conservation Act 73 of 1998</li> <li>Manufacturing Development Act 187 of 1993</li> </ul>	<ul style="list-style-type: none"> <li>Provincial Department of Environmental Affairs and Development Planning</li> <li>Saldanha Bay Municipality: Office of Municipal Manager</li> <li>Department of Economic Development and Tourism</li> <li>National Department of Trade and Industry</li> </ul>	<ul style="list-style-type: none"> <li>Wesgro</li> <li>West Coast Community Foundation</li> <li>Proposed: District Community Organisations</li> </ul>	<ul style="list-style-type: none"> <li>Private-public partnerships</li> <li>Department of Trade and Industry</li> </ul>
	Renewable Energy	<ul style="list-style-type: none"> <li>White Paper on Energy 1998</li> <li>White Paper on Renewable Energy 2003</li> <li>National Energy Act 34 of 2008</li> <li>National Energy Efficiency Strategy for South Africa 2005</li> </ul>	<ul style="list-style-type: none"> <li>National Department of Energy</li> <li>Provincial Department of Environmental Affairs and Development Planning</li> <li>Saldanha Bay Municipality: Office of Municipal Manager</li> </ul>	<ul style="list-style-type: none"> <li>South African Wind Energy Association</li> <li>South African Alternative Energy Association</li> <li>South African Renewable Energy Council</li> <li>Proposed: District Community Organisations</li> </ul>	<ul style="list-style-type: none"> <li>Public-private partnerships</li> <li>Green Fund</li> <li>Central Energy Fund</li> <li>Climate Investment Fund</li> </ul>
Site and Settlement Framework	Townscape	<ul style="list-style-type: none"> <li>Local area plan/policy</li> <li>SDF</li> <li>National Heritage Resource Act 25 of 1999</li> <li>Environment Conservation Act 73 of 1989</li> <li>The National Monuments Act 28 of 1969</li> </ul>	<ul style="list-style-type: none"> <li>Provincial Department of Environmental Affairs and Development Planning</li> <li>Saldanha Bay Municipality: Department of land use and development control</li> </ul>	<ul style="list-style-type: none"> <li>Architects, Developers, Construction Companies, Landscape Architects, Urban Designers</li> <li>Proposed: District Community Organisations</li> </ul>	<ul style="list-style-type: none"> <li>Private funding</li> <li>Local Government</li> </ul>
	Reduce Point Source Pollution	<ul style="list-style-type: none"> <li>Marine Pollution and Prevention act 2 of 1986</li> <li>National environmental management act 62 of 2008</li> <li>National water act 36 of 1998</li> <li>Land use planning act 2014</li> </ul>	<ul style="list-style-type: none"> <li>Provincial Department of Environmental Affairs and Development Planning</li> <li>Saldanha Bay Municipality: Engineering Services</li> </ul>	<ul style="list-style-type: none"> <li>Cape Nature</li> <li>Working for Water</li> <li>Working for Wetlands</li> <li>Sanbi</li> <li>South African Institute for Environmental Health</li> <li>Proposed: District Community Organisations</li> </ul>	<ul style="list-style-type: none"> <li>Local, Provincial and National Government</li> <li>Oil Pollution Control SA</li> </ul>
	Sustainable Human Settlements	<ul style="list-style-type: none"> <li>Land Use Planning Act 2014</li> <li>Human Settlements Vision 2030</li> <li>National Housing Act 107 of 1997</li> <li>Comprehensive housing plan 2012</li> </ul>	<ul style="list-style-type: none"> <li>Saldanha Bay Municipality: Community Support Services</li> <li>Department of Human Settlements</li> <li>Department of Social Development</li> </ul>	<ul style="list-style-type: none"> <li>Violence Protection through Urban Upgrading (VPUU)</li> <li>Slum Dwellers International</li> <li>Proposed: District Community Organisations</li> </ul>	<ul style="list-style-type: none"> <li>Local Municipality</li> <li>Department of Housing</li> <li>National Housing Financing Corporation</li> <li>National &amp; Provincial government</li> </ul>

Figure 5.2 Actors and Implementation Responsibilities

Source: (Authors own, 2016).

### 5.3 Actors and Implementation Responsibilities

As seen in figure 5.2 the second table, which relates to implementation of the various strategies proposed, identifies the relevant legislation, government institutions responsible, other organisations responsible and financial responsibilities. Figure 5.2 shows that there are various existing government bodies and other organisations. In order for these strategies to be implemented successfully, a strong integrated network of government bodies and officials, and other relevant officials, needs to be established. Therefore, effective co-operative governance is a very important element towards long-term success of this plan. The SBM should ensure that district community organisations (DCOs) are established in order to create transparency and to ensure holistic and collective thinking of projects and programmes. In addition, as seen in figure 5.2, a new department called Natural Resource Management needs to be established. This department consists of natural scientists, conservationists and ecologists. This department will work closely with SANBI, WWF South Africa and Cape Nature in order to assist and manage all aspects relating to the environment. Key role players from this department will also sit in on all meetings regarding development and future planning proposals. The objective of this key role player is that the appointed person should have a relative amount of authority in order to object to certain proposals that do not adhere to vision of the RSDF. The point of this is to ensure better integration of natural resource management within the other departments in order to pursue the long-term vision of the RSDF.

As seen in figure 5.2, the three management frameworks and the strategies are displayed. The key actors and role players within the "Ecological Remnants" strategy are the collaboration between local government and the Department of Environmental Affairs and Development Planning (DEADP). The key here is creating partnerships with Cape Nature and SANBI and connecting their "Working For" programmes within the region. The three most prominent "Working For" programmes are the Working for Wetlands, Working for Water and Working for Fire programmes. The key role players in the "Diversifying Dryland Crops" strategy will come from the respected government institutions as seen in figure 5.2 and the African Farmers Association of South Africa, and also the Agricultural Research Council. The strategy of protecting and enhancing marine ecosystems will predominantly be more effective through creating partnerships with WWF South Africa and SANBI terms of

directing management and formulating plans. The “Catchment Management” initiative will be most effective with the inclusion of Cape Nature and SANBI and the incorporation of their “Working For” programmes. The role of these organisations would be to help with identifying different classification of protected areas or identifying conservation priorities spatially (Cape Nature, 2012). Cape Nature and SANBI will provide comments and feedback in terms of operations of certain land uses and whether those operations perform legitimately under the relevant legislation as stipulated in figure 5.2. Figure 5.3 demonstrates the capabilities and involvement that an organisation such as Cape Nature can have through reactive conservation in action. More specifically, Cape Nature and SANBI can help with identifying river and wetland buffers, health and state of wetlands and rivers, and co-ordinating the bird monitoring programme.

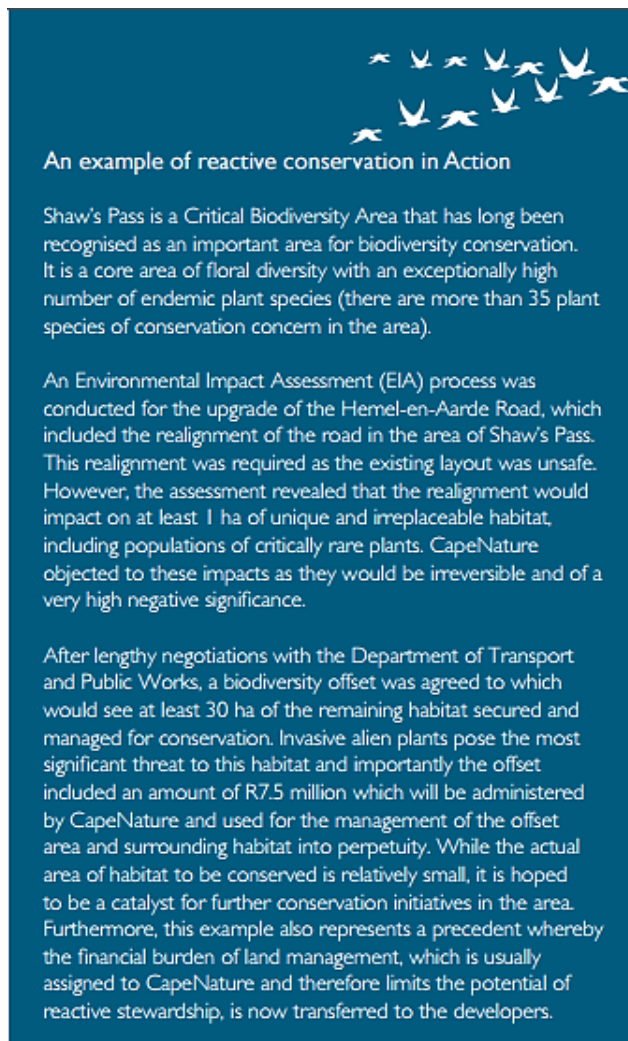


Figure 5.3 Cape Nature Reactive Conservation example Source: (Cape Nature, 2012)

The key role players and actors in the expansion of the IDZ will be the Department of Trade and Industry considering that this development is of national importance and was a directive from the president. The main drivers of this project will, however, be the Saldanha Bay Industrial Development Licensing Company which has been awarded the rights to this project in terms of steering the development project. In terms of steering local development, the importance of collaboration between SBIDLC and the IDZ business forum, and forming partnerships with possible small businesses, is very important. These key role players are also indirectly involved in the "Eco Industry" strategy, where collaboration with the West Coast Community Foundation in terms of engaging on a grass root level is important. The "Renewable Energy" strategy will need public-private partnerships between government and renewable energy corporations to steer the wind farm project.

The "Local Townscape Strategy" will almost solely rely on the SBM in terms of granting development rights and ensuring architects adhere to the local design guidelines and vision of this RSDF. The key role players in reducing point source pollution will be a combination of the designated provincial and local governments. In terms of long-term effectiveness of this strategy, the SBM is responsible for continuous mentoring and evaluating of infrastructure and waste. In terms of sustainable human settlements, the designated government institutions will need to work closely with entities such as Slum Dwellers International and Violence Protection through Urban Upgrading. Even though VPUU is based in Cape Town, collaboration and coordination of their expertise will help.

The municipality should ensure social process facilitators are involved in order to collaborate with stakeholders, organisations and communities, especially when it comes to protecting and conserving the environment. The district community organisations will be made up of a range of diverse and informed people from the district who will have the best interest of the community at heart. These people will include principals, community leaders, faith leaders, interested parties, business owners and representatives from public facilities. The goal of the DCO's is to listen to the concerns of the people and help with collaboration and mediating discussion between the community and other relevant organisations in order to ensure the incorporation of local knowledge. The integrated process of collaboration will ensure that a combination of voices is heard in order to ensure the needs of the community are taken into consideration. This can help steer the region towards a more socio-

economic resilient future through discussing ideas, forming opinions and collaborating on issues and possible solutions. SBM need to take the dominating role in mediating community involvement and collaboration in order to successfully engage with other stakeholders and organisations, in which national and provincial government will also play a guiding role.

Local government is the intermediary in possible partnerships being formed between the municipality, community and various NGO's. SBM needs to be pro-active in terms of involvement and collaboration in order to be effective and efficient. Co-operative governance across different spheres of government is vital to the success of a project or programme. Cooperative and adaptive management will provide the much needed resilience towards a sustained economy, supporting local livelihoods and improving the region's natural environment. According to the National Planning Commission (2013) stated within the National Development Plan 2030, the two most profound reasons for failure to deliver development expectations are the failure to form broad partnerships and failure to implement policy. Therefore, the efficiency of the RSDF depends on institutional integration, integrated development planning and co-operative governance. The success of these three interrelated processes depends on the effective way in which the three spheres of government will collaborate and interact (see figure 5.4).

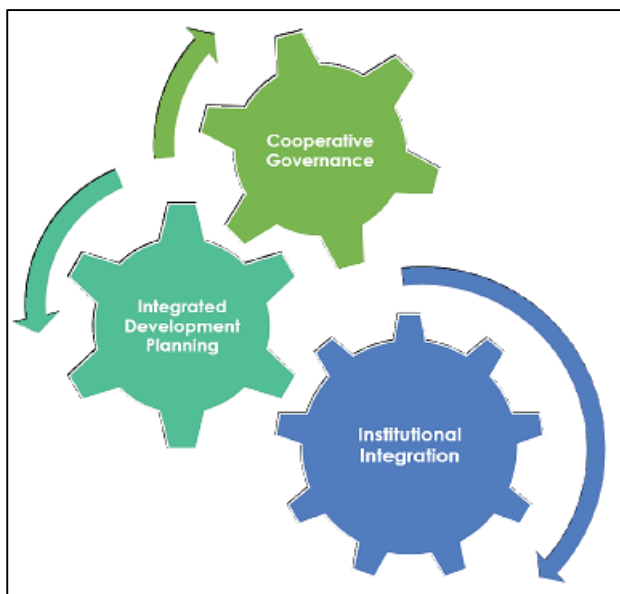


Figure 5.4: Imperatives for Efficient Implementation Source: (Stellenbosch Municipality, 2014).

Areas in the region that have conservation importance are located on private, mostly agricultural, land. Therefore, in order to successfully conserve the ecological corridors or biodiversity networks, the private sector is a key stakeholder in the search for ecological prosperity. Ecological prosperity refers to the establishment of conservancies, the management of conservation worthy habitats and striving towards principles of sustainable agriculture. SBM and the private sector play a fundamental role in creating effect to public-private-community partnerships that strive for and promote sustainable development (Stellenbosch Municipality, 2014).

Although the municipality, private sector and other stakeholders play an influential role, the local community members are really the custodians of the environment and key initiators in community based environmental management. The effective implementation of these strategic interventions relies on the effective involvement and collaboration of the community in the planning and management of this RSDF.

#### **5.4 Funding**

The financial aiding and distribution of funding often seems to be mismanaged and incorrectly prioritised in most municipalities, particularly when funds need to be allocated towards priority areas, or when the full amount of funds available needs to be used. Funding and resourcing of the various strategies will in the end determine how successful or sustainable a project's outcome might be. In order to successfully ensure long-term sustainability, funding should not only be considered for the physical development or construction of a project. Funding should be considered for pre-development engagement in terms of social and environmental development and involvement, as well as post construction in terms of ongoing monitoring, reviewing and evaluation.

In figure 5.2 (p.151), the table shows possible benefactors, government bodies and other organisations which could possibly contribute towards funding, donations and providing grants to enable the development of these strategies. In terms of accessing international funds, the responsibility lies with national government and private investors, especially for a project such as expanding the IDZ in Saldanha. As mentioned previously, SBM plays an intricate role in facilitating the implementation of

these strategies, but cannot be expected to fund all the projects for implementation. Therefore, it is expected that national and provincial government help provide financial aid together with the public-private partnerships created in order to provide funding options. As far as private funding is concerned, corporate institutions need to establish social investment funds in order to help with activities within a specific project, or local smaller firms need to collectively merge on certain projects in order to provide assistance during the period of implementation.

In terms of strategies that need upgrading and continuous maintenance, the provincial government is expected to assist during this period, especially with upgrading WWTW's (waste water treatment works) and providing assistance towards sustainable human settlements. The national government should aid in the implementation strategy for in-situ upgrading, developing water wise settlements and providing Warke Water Towers. Numerous national and provincial housing grants are available which could assist during this process. In terms of ensuring ecological integrity and monitoring the environment, organisations such as the "Working For" programmes, WWF South Africa and Cape Nature need to collaborate - but will also need financial aid and resources to successfully implement these strategies. Therefore, the importance of creating partnerships and collaborating during projects is of vital importance. Projects such as the "Training for Climate Resilient Crops" and "Farm to Supermarket" need the assistance of local farmers and businesses in collaboration to work together. Once these partnerships have been formed and the process is well underway, these projects will rely on the local government to assist and apply for further funding from provincial and national government.

Projects such as the "Renewable Energy Wind Farms" could potentially be a private project, where funding will be from large investment corporations. However, the local municipality needs to ensure when such projects are underway, a "terms of reference" document is signed which mentions supporting the local community as best as possible. The "Promoting Eco Industries" strategy will rely on private-public partnerships in which local government should aid and assist where it can, but private investors will potentially be the main contributors to this strategy. In summary, most of these strategies will rely on funding from the different spheres of government, but SBM needs to be continuously involved in creating partnerships and collaborating with different organisations. There is therefore a need to ensure the region creates potential in the industry and the market in order to re-direct and re-align funding. All

funds received need to be audited and a clear model of transparency needs to be obtained in order to ensure funds are used accordingly. Municipalities in general struggle with issues of corruption and mismanagement of resources, which contributes to poor and inadequate service delivery and infrastructure development.

## 5.5 Public Participation

Before this section starts, it is important to note that no public participation was possible during this study, but the researcher acknowledges the fact that this is an intricate part of planning and implementing strategies for the future. No plan is effective and successful without implementing a public participation process and integrating it into the overall agenda and proposed ideas. The following processes and methods are therefore ways to effectively involve or integrate public participation into a plan.

A holistic and collective approach towards this RSDF will involve the community meaningfully participating in environmental planning and management. In order to perform this successfully, it is important to build capacity to participate, negotiate and perform various tasks involving the community (Stellenbosch Municipality, 2014). The International Association for Public Participation (IAPP) provides a comprehensive framework in order to steer stakeholder engagement as seen in figure 5.5.

The spectrum of Public Participation (adapted from the IAPP)			
Increasing level of public		engagement	
INFORM	CONSULT	INVOLVE	COLLABORATE
Public participation goal			
Provides the public with balanced information to assist them in understanding the problem, opportunities, solutions and alternatives	Obtains public feedback on analysis, alternatives and decisions	Works directly with the public throughout the process to ensure that public concerns are consistently understood and considered	Partners with the public in each aspect of the decision-making process including the development of alternatives and the identification of preferred solutions

Figure 5.5 Spectrum of Public Participation Source: (Stellenbosch Municipality, 2014)

Public participation is a vital component in the success of effective implementation. In order to holistically understand a certain context and position of an individual, it is important to hear the voices of the local people and communities. Opinions are formed, issues are raised and collective understanding is distributed - which all forms part of the public participation process. An effective method that can accommodate this process of public participation within the RSDf is community mapping. According to missing maps (2015) community mapping aids direct engagement with a community, builds capacity and expands the knowledge of a certain area, and lastly enables data collection to be customized based on the needs of the community.

The RSDf's success depends on various elements and stakeholders working in collaboration in order to ensure a holistic and integrated approach towards development and conservation within the area. Therefore, by using public participation and the various building blocks of development, the RSDf strives for a holistic and inclusionary approach to environmental management and planning in SBM. It must be noted, however, that no community participation took place during the formulation of this study, therefore these are only guidelines, and are not set in stone.

It is internationally appreciated that South Africa has an enlightened Constitution (Theron & Mchunu, 2014). It lays the foundation for grass root democratisation and good governance, based on a developmental orientation as embodied in the vision of the national development plan (Theron & Mchunu, 2014).

From the RDP (1994) to the Municipal Systems Act (2000), fulfilling the will of the people, responsiveness to local needs and working towards the "common good" have been the ideals to achieve through decentralisation and good governance (Theron & Mchunu, 2014). If participation in decision-making, implementation and evaluation means that stakeholders can hold local government accountable for public policy and service delivery, one can expect problems if the country concerned lacks a "culture of public participation".

Theron and Mchunu (2014) warn that democratic governance must be predicated on an overall strategy and accompanying policy aimed at improving the welfare of all citizens, especially the poorest, and must not entrench existing patterns of inequality. For this to occur, the formation of strategies and policies aimed at

promoting sustainable human development needs to be premised on popular participation. This is the participation of citizens in all structures of government, at all levels, from agenda setting, through policy formulation, to implementation and evaluation (Theron & Mchunu, 2014).

Theron and Mchunu (2014) explain four public participation principles adopted from the Manila Declaration (1989) which is basic to people-centered development. The following principles are recommendations that need to be integrated and successfully communicated to all stakeholders involved before the public participation process starts:

1. Sovereignty resides with the people, the real actors of positive change.
2. The legitimate role of government is to enable the people to set and pursue their own agenda.
3. To exercise their sovereignty and assume responsibility for the development of themselves and their communities, the people must control their own resources, have access to relevant information and have the means to hold the officials of government accountable.
4. Those who would assist the people with their development must recognise that it is they who are participating in support of the people's agenda, not the reverse. The value of the outsider's contribution will be measured in terms of the enhanced capacity of the people to determine their own future.

In summary, effectively involving the local community in the process of public participation could potentially have a greater outcome on projects in the sense that citizens become more involved and take ownership of their tasks. The partnerships formed between different entities will determine the strength and institutional capacity of how our networks can enrich our own existence.

*"The natural world is the larger sacred community to which we belong. To be alienated from this community is to become destitute in all that makes us human. To damage this community is to diminish our own existence"*

Thomas Berry- (Berry, 2016: n/a).

This quote emphasises the importance of local people, local places and local knowledge. The only way to understand these sacred places is to incorporate what is

known by the locals and what they constitute as sacred to them within the bigger plan.

## 5.6 Monitoring and Review

This RSDf is a living document that should be revisited regularly to ensure responsible and effective management of the region's natural resources and landscapes. It is recommended that the RSDf be revised at least every 5 years to facilitate spatial planning inputs into the IDP planning cycles. Revision should be adaptive to respond to specific indicators of change and poor performance, before issues become real threats. It is suggested that environmental features be monitored through the course of the IDP reporting cycles and then compared to the findings and recommendations of the RSDf in order to inform changes to the way in which the recommendations are being implemented (KwaZulu-Natal Department of Agriculture and Environmental Affairs & iLembe District Municipality, 2013). It is essential that strategies of the RSDf are monitored and evaluated in light of the objectives, and that negative trends be brought to the attention of the municipality, other responsible authorities and the public (DEADP, 2012). Figure 5.6 below illustrates the iterative process required.

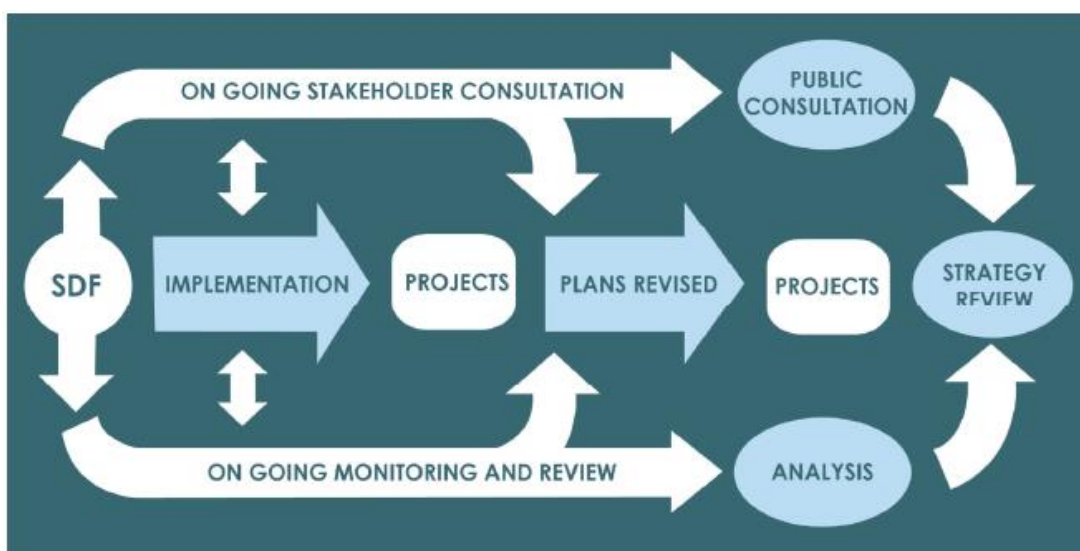


Figure 5.6 Monitoring and Reviewing Process

(Source: Authors own, 2016)

## 5.7 Brief for Local Area Planners

The vision, goals and objectives of this RSDf are all spatially proposed on a regional scale, but in order to successfully manage this region towards an ecologically resilient future, thought must be given to local area plans and projects. Therefore, final proposals will come in the form of a set of local area guidelines in order to facilitate the implementation strategies across scale where necessary. These guidelines are to be integrated and viewed according to the regional systems and ideologies proposed within this RSDf. The most important aspect and view, as previously mentioned in this study, is to incorporate, integrate and mesh different plans and projects as envisioned by the bioregional planning approach. Projects and plans may not be implemented in isolation, but it is important rather to find connections and networks between different systems and scales of intervention. The main focus of this RSDf is to integrate and harmonise nature and people through integrating natural resource management and spatial planning. The ethos and style of approach must be respected and adhered to across all scales in order to create a cohesive region and integrated future. Through understanding the context and vision of the RSDf, local area planners and developers will be able to form a more holistic and constructive approach towards projects.

As previously explored in the literature review Max-Neef (2008) explains the importance of a transdisciplinary and integrative approach towards planning and development. In this approach, there is the need to elaborate across disciplines and collectively find unified solutions which are directed at the good of the region and the people confined to it. In terms of collaboration, the teams designated to projects need to be inter-disciplinary, which would mean that, for example, for a project of in-situ upgrading in an informal settlement the team could potentially consist of landscape architects, planners, architects, engineers, project managers, municipal officials, community-leaders, developers, construction team, social scientists and other facilitators. Each person has a specific job to do, but must also be informed about the intentions and actions of the other members of the team. The municipal mediator and project managers will, therefore, have the largest facilitation role in terms of collaborating with public and private entities.

The most important aspect to remember during the implementation of a specific project is to what extent the project is affecting the environment and how it could be

done differently. It is important to question whether the necessary specialist studies have been done and whether all possible effects have been discussed and viewed. This is where the municipality should be held accountable for all tenders and projects approved.

## **5.8 Conclusion**

As an ongoing process of the RSDf for the SBM, this chapter has explored and described the process of implementation in terms of the strategies proposed within the RSDf. This RSDf acknowledges that an idea is only as good as the manner in which it is implemented, and the continuous involvement of that idea after the implementation process. The implementation process of this RSDf signifies the importance of the people of the region and enables them to collectively be involved in the strategies proposed. This chapter has described a phasing scenario in which projects, programmes and tasks will be performed - as spatially represented in the previous chapter. The strategies of this RSDf are based on the three most prominent layers of the 2015 EMF which identify the most significant environmental attributes of the region. Based on the findings of these environmental attributes, the researcher has formulated a range of strategies in order to accommodate or enhance these attributes.

The phasing of the strategies is divided into 4 five-year categories in which a hierarchy was developed based on the biggest threats and concerns in terms of environmental integrity. Therefore, projects in phase one have been directed spatially and accordingly towards neutralising the most prominent threats. These projects focus on pursuing a socio-ecological outcome which focus on environmental integrity and local livelihoods. In light of the phasing scenario described, the chapter moved towards identifying the relevant legislation, actors and funding involved during the implementation of the strategies. From this, the most important initiatives of the local government are to mediate, create partnerships and facilitate on local pilot projects. In addition, the researcher expresses his concern on how funds are spent within local government and greater efficiency is needed on how funds are spent and on what they are spent.

The chapter continued with a discussion on the need for multi stakeholder engagement and the importance on holistic decision-making. Social learning, local knowledge and capacity building are all vital instruments gained in the process of public participation. This contributes towards institutional capacity and transparency on future developments and projects. The chapter then moves towards a brief explanation on the importance of continuous monitoring and reviewing of strategic interventions. This is the holy grail towards long-term success and improvement within the region. In conclusion of this chapter, the researcher has briefed local area planners based on the vision and ideologies explained within the RSDF. The most prominent is that all precinct scale projects need to accommodate the regional vision and not be developed in isolation. This is especially important when it comes to luxury residential developments adjacent to the coast where the local sense of place is threatened.

In summary, the phasing of this RSDF has been formulated in order to accommodate change and needs to remain flexible especially during a time of uncertainty and modern progression. Ultimately, the strategies explored will encourage and help the transition towards a more harmonised and integrated socio-ecological future.

## CHAPTER 6: CONCLUSION

### 6.1 Introduction

*“There is pleasure in the pathless woods, there is rapture in the lonely shore, there is society where none intrudes, by the deep sea, and music in its roar; I love not Man the less, but Nature more”*

Lord Byron – (Brainy quote, 2016)

In the concluding chapter, the findings of this study across the chapters are synthesised to understand how the various aspects relate to one another. This is also done in order to understand the conceptual development of this study. Secondly, the implications of this research are discussed in terms of the contribution made to theory and policy, while positioning the study in response to the major theoretical and policy perspectives for the evolving paradigm of natural resource management and the role of spatial planning.

Following on from this, there is a section of recommendations for future research, plans and proposals to acknowledge further aspects of research, methods or techniques that have not been covered in this study, to help enhance the long-term vision within the proposed RSDf. The chapter is then concluded with a discussion on the overall importance of the study, which is linked to the philosophical underpinning and the hope of a way forward.

Environmental networks of biodiversity and ecosystems, which include interrelated networks of wildlife, rivers, streams, wetlands, regions and marine life, undeniably structure, carve and form the earth's landscape through a cyclical procedure of regeneration. The current development path of humanity is, however, threatening the existence of these interrelated processes. The transition towards a new paradigm shift is therefore paramount. The shift is towards a paradigm where ecological processes and nature-based decisions are placed at the forefront of development and planning ideologies. The time for conventional planning and development is over, and the time to move away from centralised infrastructure and capitalistic driven management systems that over-exhaust earth's natural resources, is now. The

environment must not be seen as a linear function where single use strategies are used to eradicate complex and interrelated processes.

With the complexities of climate change, rapid urbanisation and excessive growth in population numbers, the natural environment and the various systems pertaining to it are becoming ever more suffocated. The progression of modern society has resulted in the disconnection of people and their daily activities from supporting and accommodating the natural environment, both locally and globally. This crippling path has caused a disconnect in the way people engage, acknowledge and notice the effects human activities have on the environment. These negative impacts have resulted in a decline in the full potential of ecological processes and the ability of nature to flourish within the urban fabric.

The majestic and unique region of SBM is threatened by a combination of elements, but most profoundly the increase in ribbon development, the expansion of the industrial development zone and poor infrastructure and service delivery. These elements, coupled with the uncertainty of the future, have resulted in an urgent need to find alternative paradigms for spatial planning and development. Within the current context there is also a great need for people, and the interaction between people and nature, to change to a more secure, life-giving and equitable development path. This has been attempted in this research study through better integrating and harmonising natural resource management and spatial planning towards a more pro-life and ecologically resilient future. This paradigm aims to engage more holistically through incorporating all considerations of the environment as an integrated system and threading through the voices of multiple stakeholders.

Within a 21<sup>st</sup> century context, the transition towards a more life-sustaining development path has, however, been difficult. This is particularly noticeable in the unsuccessful implementation attempt to enable a sustainable transition pathway, evident within the current paradigm (Salafsky, Margoluis & Redford, 2016). In light of this, the researcher locates himself in the realm of sustainability with theorists such as Pierce and Mader, Max-Neef and Edgar Pieterse who informed the very essence of this dissertation. Applying multiple disciplines in this dissertation within a spatial context could potentially help the researcher better integrate the plans of Saldanha Bay Municipality. The current need for a shift in paradigm signifies a change in method, ideology and manner that society interprets and acknowledges the natural

environment. This is largely missing in current international and local discourse, in terms of successful action, practice and implementation. This study had sought to understand the role of spatial planning in natural resource management in Saldanha Bay Municipality.

Following from this, the study had sought to answer and explore the following questions;

*How can natural resource management and spatial planning be harmonised better within the Saldanha Bay Municipality?*

The secondary research questions include:

- What spatial planning issues impact natural resource management?
- How does one integrate and harmonize green integrity with brown development?
- What are the current threats to the environment posed by human development within the Saldanha region?
- How does one better ensure the future harmony of society and the environment?
- What does one incorporate when producing various economic, environmental and settlement frameworks?
- What are current international approaches to the integration of spatial planning and environmental planning, and how applicable are these in the context of Saldanha Bay Municipality?
- What and where are the sources and sinks of Saldanha Bay Municipality and what are the current or expected spatial planning threats and opportunities to these areas?

This is to recognise how integrated natural resource management can guide development in Saldanha Bay Municipality in order to enable the transition to an increasingly life-sustaining and ecologically resilient development path. Through the journey of this dissertation, the researcher has realised that within the field of planning or development, the people with the authority to enable change do not always enable change. The biggest downfall in my personal opinion is the problem of authority, and that it is only available to a select few. The select few are high-placed government officials or corporate leaders. This has raised questions around how to

decentralise authority and power. In the region of Saldanha, a potential development expansion such as the IDZ will see the bulk of resources, revenue and capital be spread between a select few, with a total disregard for the consequences on the environment or its people. The researcher isn't implying that nothing good will happen in the development of this project, but for too long has society seen how mega projects affect local environment with the success of these projects being predominantly focused on the corporate end with minimal influence on the local environment and its people. This is the biggest problem that the researcher feels is very evident in South Africa. As far as applying for certain permits, tenders or contracts is concerned, people have a total disregard for the theoretical evidence, but rather follow the capitalistic realities of development.

## **6.2 Findings of study**

This section will discuss the findings of this study across the various chapters where a literature review and contextual analysis was undertaken. This was followed by a proposed regional spatial development framework to better integrate natural resource management practices and to show how the use of spatial planning can improve the implementation of these evolving practices. The proposed framework also aims to reconcile people with their surrounding ecology for a better integrated and harmonised future in the Saldanha region.

Based on the findings of the 2015 EMF of SBM, the negative impacts on the environment in the region are coupled with a variety of socio-economic and biophysical conditions which aggravate the degradation of the ecological systems and local sense of place. As identified in the 2015 EMF, and reiterated in the contextual analysis, the current system within the region is not sustainable and, if the threats are not neutralised, could become very problematic for the region. Chapter three of this study identifies the following concerning trends as the most prominent in the region: Availability of water; inappropriate coastal development; disturbance and degradation of terrestrial and aquatic ecosystems; marine pollution and pollution risks; disturbance and degradation of coastal and marine ecosystems; effects of climate change, air quality, and inadequate infrastructure. The biggest threats to ecological integrity and local sense of place, as identified by the 2011 SDF and 2015 EMF, are the

expansion of the industrial development zone, increase in ribbon development adjacent to the coast and poor and inadequate infrastructure and service delivery.

From a review of national, provincial and local government policy documents and strategies, it is evident that there still remains an unsustainable focus on over-consumptive extraction of natural resources without the cognitive realisation that these extraction methods are sequentially damaging the environment. The attitude seems to allow for strategies that promote short-term gains to promote fast and high socio-economic gains which undermine the longevity and integrity of future generations. This is concerning as, while the rhetoric of sustainability permeates almost all policy, not enough is being done to implement changes which would allow South Africa to transition to an increasingly resource-secure, equal and life-giving presence on earth. Despite the backdrop of these energetic and media friendly contributions at an international level, there is evidence that processes of marginalisation, poverty, inequality, environmental degradation and a lack of sustainable outcomes remain; and, what's more, are entrenched by the very processes aiming to address them.

The key issues identified from this research study, as mentioned above and in chapter three, encapsulate the interrelated complexities within the region of Saldanha. The confluence of these issues within the Saldanha region brings to the fore the need to address local sense of place and regional ecological systems in such a way as to promote and enable symbiotic human-nature relationships that benefit and improve natural systems while meeting the socio-economic needs of all citizens. Saldanha will always remain the 'poster-child' clash with regards to narrative of environment versus development or significance of biodiversity (biodiversity hotspot) and industrial development zone pulling in different directions. Now questions arise that focus on the ethics and morals of developers or municipal officials who need to decide if what they are doing is in the best interest of the people/region or themselves.

In order to engage with this more holistically, and from a greater ecological perspective, the researcher has decided to use the 2015 EMF document as the guiding tool in which a new and improved RSDF was formulated. Through in-depth analysis and cross-tracking the 2011 SDF and the 2015 EMF, the researcher has helped with the transition to enable a paradigm shift towards a more integrated and life-sustaining development path. The researcher has realised in two short years of planning that nature-based development and planning has been taken for granted,

and that not enough emphasis is directed towards sustainability and the effects that humans have on the environment. As mentioned in the literature review, chapter two of this study, the realms of integrated natural resource management, urban ecology, and closed-loop systems are emerging fields which ascertain the reality of what is needed in order to live a more sustainable and cohesive life-style. The transition towards a more ecologically resilient and life-sustaining future acknowledges and allows the ethos and ideologies of these fields to be integrated within the current realm of development. These paradigms focus on the integration of nature and people within management systems that consider the elements of the life-cycle as a part of the natural systems, the inclusion of multiple stakeholders in decision-making processes, and demand-side management strategies that take into account the anthropogenic and environmental requirements of life.

Spatial planning can fall into the trap of being perceived as only land-use management and the rezoning of parcels of land for new developments, which in retrospect serve single-use functions. This is particularly evident where vulnerable land is being lost due to rapid urbanisation and increase in population growth numbers. The ideologies of planning can become lateral and there is a need for new effective and smart solutions in which to decouple these isolated environments, through integration and collaboration of different fields within the development realm. Through this study of integrated natural resource management and the growing critique, two key concerns have been identified. They are the lack of implementation, especially in the Global South, due to the definition being too vague with its origins focused in the social and governance discourse and context of the Global North, and that the ambiguity and the proposed integration has led to institutional paralysis (Ribot, 2016).

This study therefore proposes the use of natural resource management as a tool within the spatial planning paradigm to enable strategic, integrative interventions along with improved implementation of ecologically sensitive development in Saldanha Bay Municipality. Spatial Planning is a tool used for long term planning that brings together a variety of policy decisions from diverse sectors to resolve spatial and temporal conflicts through the spatial co-ordination and alignment of strategies and actions. It is therefore uniquely positioned to streamline the implementation of integrated natural resource management, as the use and development of land has both direct and indirect consequences on the quality and quantity of natural ecological systems.

In both natural resource management and planning literature, there is an increase in recognition of the relationship between humanity and natural ecologies. This has led to the call for improved and pro-active co-ordination between urban management sectors and the consideration of the environment in regions. Therefore, we need to work to remember, reclaim knowledge and ensure reverence and respect. Overall, these approaches, which are developing to integrate spatial planning and natural resource management in urban and regional areas, call for change in how services are delivered, both environmentally and economically, and how people are enabled to engage and participate through socio-political transition.

Using the literature review and the contextual analysis as a platform from which to guide intervention, this study puts forward a Regional Spatial Development Framework for Saldanha Bay Municipality 2036. The basis of this RSDF was formulated using the three most distinct environmental layers of the 2015 EMF and the findings of the 2011 SDF in order to find clear gaps and contestations. This created the opportunity to find clear clashes, threats and concerns from which to launch the interventions using the three most distinct layers of the 2015 EMF as a basemap. In this, the principles of reverence, intergenerational equity, interconnectedness, intrinsic value and individual responsibility are considered a nested system where an environment of cultivating reverence is a necessary precondition for establishing the presence of the other principles in the Saldanha region. Social and ecological health, connected communities and shared prosperity is thus promoted. To transition towards this, ten region-wide strategies are suggested to acknowledge the presence and priority of ecological systems and local sense of place by allowing them to become spatial structuring elements in the region. These ten strategies are systematically placed within each management framework i.e. the landscape and natural resource framework, economic development framework and lastly site and settlement framework. These management frameworks have been formulated specifically to accommodate the three distinct layers of the 2015 EMF, which was used as a platform from which to launch the ten strategies within their designated frameworks.

These strategies have been chosen to enable the transition towards a more ecologically resilient future, which accommodates the bioregional ethos and vision of the proposed RSDF. In addition, these strategies were purposefully directed and formulated towards eradicating the biggest threats and concerns in the region.

The landscape and natural resource management framework consists of the strategies of ecological remnants, diversifying dryland agriculture, coastline protection and enhancement, and lastly catchment management initiatives. All these strategies are directed at and fundamentally pursue the protection, enhancement, conservation and regeneration of ecosystems and biodiversity in the region. The economic development management framework consists of the strategies of renewable energy, eco industries and the IDZ. These strategies focus on the advancement of the local economy through sustainable and ecologically adaptive strategies. The site and settlement management framework consists of the strategies of townscape, reduce point source pollution and sustainable human settlements. These strategies focus on the local sense of place and predominantly the upgrading of infrastructure within settlements in the region. These strategies are placed within a phasing framework for optimized and strategic intervention. All these strategies aim to create a more life-sustaining region through integrating and harmonising the relationship between people and nature, by establishing the importance and qualities of nature.

### **6.3 Implications of Research**

This study has sought to engage with current and evolving practices of integrated natural resource management, spatial planning and ecological approaches - both theoretically and creatively - through rigorous academic research and a conceptual design development process. The interplay between these three theoretical fields allows for a more holistic response to the issues facing Saldanha Bay Municipality. The hope and intent of this study is to allow adequate contribution towards the improvement in the ecological literacy of spatial planning processes and outputs, such as a better integrated Regional Spatial Development Framework for Saldanha Bay Municipality. The regional context needs to be understood as an integrated and connected system. This will show how ecological and landscape settings should be honoured as spatial structuring devices within a regional setting. Acknowledging the way natural systems operate, and the way in which our relationship with them is spoken about, has an impact on how we interact with them. This recognition then highlights the need for intervention at a local and regional scale.

Firstly, through the contextual analysis undertaken, this study has contributed to the knowledge of the 2011 SDF and 2015 EMF of Saldanha Bay Municipality. By unpacking the two documents, various gaps and contestations were found which had arisen during the time of exploration. The 2011 SDF lacked a collective understanding of the natural systems of the region; the document stated that it would use a bioregional approach towards development, but there is no evidence of this approach throughout the document where connections and nature-based decisions are made. The 2011 SDF is compiled of a magnitude of local area plans with no composite or regional maps indicated in order to guide the reader. The 2011 SDF lacks a cohesive understanding of the future vision which is threaded through the various proposals, but rather adheres to conventional land-use designations and single function ideologies. The researcher feels that this is the opposite approach that the region needs in terms of protecting local sense of place and landscape. The region holds considerable market and land value for the future that needs to be managed and steered towards the vision of the RSDF.

As acknowledged by Mellody (2014), ongoing research is required in terms of understanding how spatial planning and natural resource management can be integrated and co-ordinated to promote positive interventions in regional environments that enable the development of sustainable livelihoods. Planning is an ongoing process where there is always more to learn and new things to be presented with. This study has, therefore, sought to add to this evolving knowledge within the spheres of planning and natural resource management by applying current transition ideologies, methods and plans in the context of Saldanha Bay Municipality. Firstly, the 2011 SDF of Saldanha demonstrates a lack of cohesive understanding within a regional context, which leads to short-term gains with possible detrimental effects in terms of the environment in the long run. However, according to the literature in chapter two, development needs to move away from these isolated and disjointed methods of planning towards greater cohesion and integration of methods, fields and disciplines. Therefore, this study presents the opportunities available at a regional scale of an area in its entirety to promote the co-ordination and balance of strategies.

Secondly, the thinking used in this study, especially within the suggested interventions of the RSDF, has been specifically chosen as a set of ideologies to frame the relationship between people, their activities and the environment. The thinking used refers to people being part of, rather than separate from, their environment; being

moulded by context rather than being disengaged consumers; viewing natural systems as something that should be cherished and honoured rather than simply being a tool for human growth; being participants rather than customers. This is specifically focused at improving the 2011 SDF towards greater integration and holistic thinking. This style of thinking moves away from the current dominant discourse in government policy and contributes to the need for a transition in development that reconnects people and the consequences their activities have on the local and global environment. The aim of this is to promote behavioural change in all citizens in order to conserve resources, to consider the needs of the most vulnerable and future generations in the greater Saldanha region, and to care for the ecological functioning upon which our survival depends.

Finally, with the presentation in this study of this RSDF for Saldanha Bay Municipality, there is the opportunity to re-imagine the region as one that acknowledges the significance of ecological systems and local sense of place, not only in terms of how the region is managed, but also in terms of how it is shaped. This is because, as people, the way in which we manipulate our environments through our activities, either deliberately or unintentionally, is evidence of what we care most about and how we relate to the systems around us. There is, therefore, an opportunity to make more of our natural resources through developing a better connection between people and nature, and by including the histories and stories of these natural resources as a part of those often told in our social history.

#### **6.4 Recommendation for Future Research**

This study presents a literature review, contextual analysis and an RSDF to address the primary and secondary research questions. However, this study has been undertaken by a single author within the limited time period of five months. There are further aspects which have not been covered or considered, which are necessary to investigate in order to support the realisation of the proposed RSDF to address the critical state of natural systems in Saldanha Bay Municipality.

Firstly, this includes the scope of stakeholder involvement in the research and design development process. It is critical to engage and explore both the research and design outcomes of this study together with professionals of other spheres of

knowledge, such as civil engineers, landscape architects, hydrologists, ecologists, and anthropologists, to gain a broader and hopefully more realistic understanding of the strategies presented. Furthermore, a study such as this would benefit from public participation in both the research and design processes where there could be the opportunity for co-production of space, and the development of strategies for water security and honouring natural systems in the region.

Secondly, further research is necessary in the provision and representation of sufficient and relevant data (accurate quantitative and qualitative data in which social, economic and environmental trends can be documented). For suitable interventions, and to allow for an adequate monitoring process, there needs to be enough data that is up-to-date and accessible to the public and to the professionals responsible for the various projects. The data that is available or produced needs to be available via interactive platforms, and this must be made available to all people across the region.

Thirdly, this RSDF is only focused on a regional scale and, in order to celebrate the vision of this RSDF, there is a need to thread these ideas down to a local neighbourhood scale. The municipality should, therefore, formulate a strict guiding tool in the form of a local area brief, as set out in chapter five, which needs to be adhered to. This will ensure that local townscape and heritage resources are respected and celebrated in a manner which complements the overall vision of the region.

Fourthly, in terms of a regional context, it is important that both neighbouring municipalities realise the importance of making an EMF the main driver of development. If neighbouring municipalities do not protect or conserve their natural environment there could be detrimental effects across regions. This also relates to professionals or consultants who work within the neighbouring municipalities in terms of consistency, ideas and how these plans relate to the plans proposed within Saldanha Bay's own municipality. Evidently, there is a need to communicate and collaborate across different scales and sectors, which will help with eliminating future problems and will also help with long-term sustainability.

## 6.5 Conclusion

Nature is essential to life. Without access to a certain quality of natural systems, people would cease to exist. Yet, even with this reality, the way in which certain people source, use and extract natural resources, exposes the undeniable truth that people exhaust the natural resources of the planet. This situation is only worsened in the face of anthropogenic climate change which, in the greater Saldanha region, will lead to drier and warmer conditions with less precipitation. This, however, does not have to be the future that we leave to the next generation. Currently, we are at a turning point where the opportunity to change our behaviour and systems could not only allow us to adapt, but mitigate these consequences too.

While there is currently a positive transition underway in the theoretical approaches towards improving the integration and co-ordination between spatial planning and natural resource management, there is little physical change manifested in the region. It is for this reason that this study has sought to address and investigate the role of spatial planning in Integrated Natural Resource Management in the Saldanha Bay Municipality. Spatial Planning is uniquely positioned as a tool that has the ability to engage with multiple sectors and co-ordinate the implementation of their policies to deal with the increasing complexity and conflict of intervening in urban environments. This study has shown that through a spatial restructuring according to ecologies and local sense of place of Saldanha Bay Municipality, there lies the opportunity to not only promote local subsistence and a cyclical use of resources, but also to reconcile the human-nature relationship. This is the foundation of the change that will power Saldanha Bay Municipality transition to an increasingly ecologically secure, equal and life-giving future.

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