

ENVIRONMENTAL MANAGEMENT FRAMEWORK

for the

NEWCASTLE LOCAL MUNICIPALITY

KwaZulu-Natal, South Africa



DESIRED STATE OF THE ENVIRONMENT REPORT

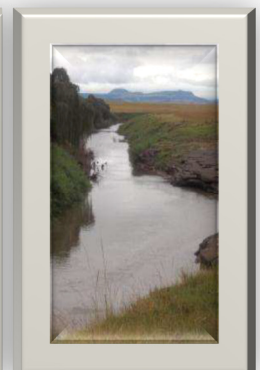
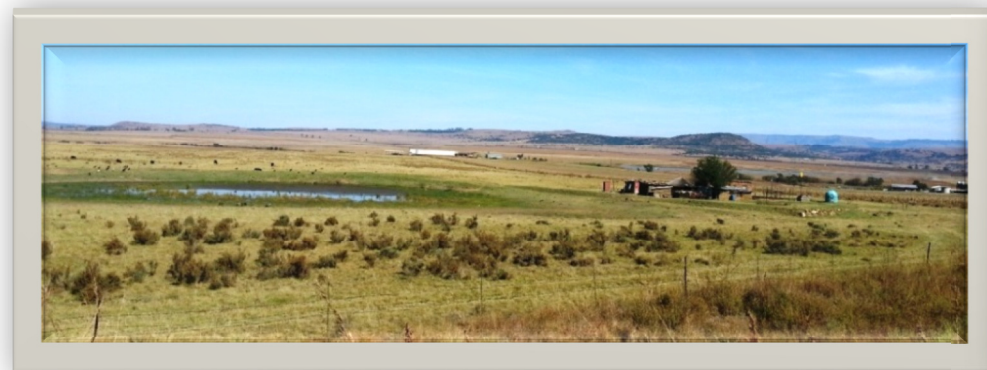
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of the National Environmental Management Act
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This report forms part of the Newcastle EMF. It confirms the opportunities and constraints of the area, identifies potential land use conflicts, defines a desired (spatial) future for the study area and introduces management principles for achieving such a future.

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EXECUTIVE SUMMARY

A decision was made by the relevant authorities to develop an Environmental Management Framework (EMF) for the Newcastle Local Municipality. The need for the EMF is motivated by local environmental problems, development pressures on sensitive ecological areas, resource conservation trends, land use conflict and the demand for credible information to inform decision-making. The EMF is prepared in terms of the National Environmental Management Act (1998) and the EMF Regulations (2010) and will provide the control against which future decisions should be gauged. Ultimately the expectation is that more informed decisions will facilitate change in society, the environment and the economy.

The information which was collected during the status quo phase of the EMF was used as the benchmark for this report. This information was assessed in conjunction with contributions from stakeholders to create a desired future view of the study area.

ACRONYMNS

ADM	Amajuba District Municipality
CARA	Conservation of Agricultural Resources Act
CCS	Carbon capture and storage
CMA	Catchment Management Agency
DAEA	Department of Agriculture and Environmental Affairs
DEA	Department of Environmental Affairs
DSOE	Desired State of Environment
DWA	Department of Water Affairs
EIA	Environmental Impact Assessment
EKZNW	Ezemvelo KwaZulu-Natal Wildlife
EMF	Environmental Management Framework
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
EMZ	Environmental Management Zone
ERM	Environmental Risk Management
FEPA	Freshwater Ecosystem Priority Area
GIS	Geographical Information System
IAP	Invasive Alien Plant(s)
IAPs	Interested and Affected Parties
IEM	Integrated Environmental Management
IUCN	International Union for the Conservation of Nature
LUMS	Land Use Management Scheme
MBO	Madadeni-Blaaubosch-Osizweni area
NEMA	National Environmental Management Act
NFEPA	National Freshwater Ecosystem Priority Areas
NFSD	National Framework for Sustainable Development
NLM	Newcastle Local Municipality
NRA	Newcastle Rate Payers Association
NSSD 1	National Strategy for Sustainability and Action Plan
PGDP	Provincial Growth and Development Plan
PGDS	Provincial Growth and Development Strategy
RoD	Record of Decisions
RQS	Resource Quality Service
SAAWU	South African Association of Water Users
SAWS	South African Weather Service
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SEMP	Strategic Environmental Management Plan
SoE	State of Environment
SWSA	Strategic Water Source Areas
WS	Water Services
WSA	Water Services Authority
WUA's	Water Use Authorities

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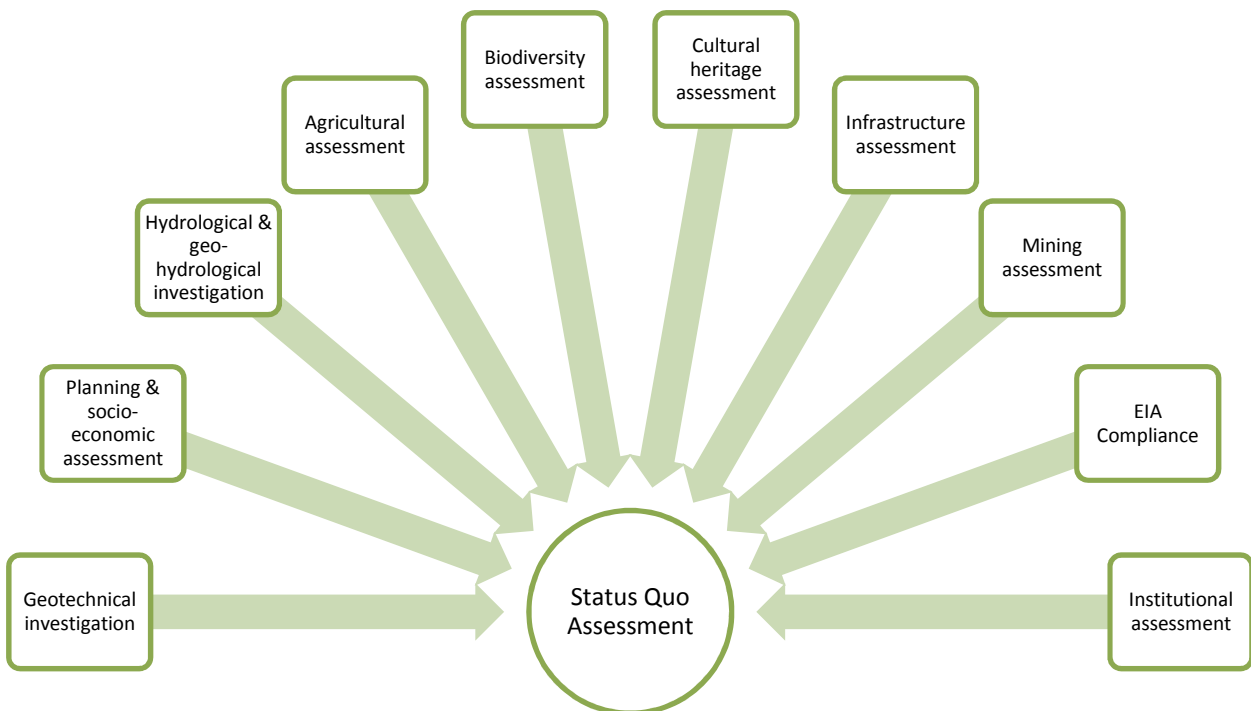
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1. INTRODUCTION

1.1 Background

A decision was made in 2010 by the relevant authorities to develop an Environmental Management Framework (EMF) for the Newcastle Local Municipality. The reason for this decision was that the environmental authorities realized that the state or condition of environmental systems in the municipal area is deteriorating as a result of human activities, and that intervention is required to address the specific development pressures of the area. Preparation of the EMF started in 2011 with a status quo assessment supported by a suite of specialist studies:



The EMF progressed to a point where the responsible authorities decided to revisit the project for various reasons. Amongst these were concerns about the level of engagement between key stakeholders, the fact that new EMF Regulations came into effect which did not inform the original terms of reference of the project, and concerns about the quality and detail of the available data. As a result the EMF project was revitalised in 2013 to address some of these shortcomings and to ensure a credible and legitimate product for informing future decisions regarding land use applications.

An updated status quo assessment was undertaken to strengthen the baseline for the Newcastle EMF, and a **Final Draft Status Quo Report** was produced in January 2014. The data used for this report, which constitutes the framework and platform upon which the EMF is further developed, is contained in a Geographical Information System (GIS) database which will ultimately be packaged in a user-friendly spatial tool (a GIS Viewer) to enable its distribution and use by all interested stakeholders.



1.2 The EMF area

The EMF area comprises of the Newcastle Local Municipality (KZ252) which is situated in the north-western corner of KwaZulu-Natal. It is one of three (3) local municipalities of the administrative district of Amajuba. The Utrecht Local Municipality lies to the east and Danhauser Local Municipality to the south. The Free State Province borders the Newcastle Local Municipality to the west and the Mpumalanga Province lies to the north of the area.

The major centres are Newcastle West, and Madadeni and Osizweni in the east. The established rural town areas of Charlestown and Ingogo (North of Newcastle) serve as important service centres.

The N11 national route, as well as the Durban-Johannesburg railway line runs through the area.

The municipality lies in the headwaters of the Thukela River System. The western boundary of the area is characterized by mountainous terrain with restricted road access while the urban component is found in the flat terrain in the east. Most of the rivers rise in the high-lying areas in the north-western and western parts of the area and drains into the Buffalo River, which defines the eastern boundary of the area, and into the Thukela basin.

The main development sectors in the area include mining, manufacturing, agriculture and tourism.

95% of the population is urbanized, while only 5% of the population lives on farms.



Map 1: The EMF area

1.3 What is an EMF and what must it do?

An EMF is a study of the biophysical and socio-cultural systems of a geographically defined area to reveal where specific land-uses may best be practiced and to offer performance standards for maintaining appropriate use of such land. The character of an EMF is explained in more detail below.

Table 1: The character of an EMF

THE CHARACTER OF AN ENVIRONMENTAL MANAGEMENT FRAMEWORK	
A statutory instrument	An EMF is undertaken in terms of Chapter 5 of the National Environmental Management Act (1998) and the EMF Regulations (2010) to promote the objects of integrated environmental management.
A spatial tool	An EMF is a depository of spatial data and information in a Geographical Information System (GIS) format. The data and information that is collected in an EMF is packaged in a user-friendly spatial tool called a GIS Viewer that can be used by any person that is not familiar with GIS technology.
A decision tool	<p>An EMF must be used to support decisions in the environmental impact assessment (EIA) process. It can also be used to inform:</p> <ul style="list-style-type: none"> • Planning processes such as Spatial Development Frameworks (SDFs) and Integrated Development Plans (IDPs) • Open space planning • Sector plans of other organs of state. <p>The Minister/MEC can also use an EMF to:</p> <ul style="list-style-type: none"> • Delineate geographical areas within which additional specified activities are to be identified for regulation under the NEMA EIA Regulations; • Delineate geographical areas within which activities listed under the NEMA EIA Regulations may be excluded by identifying areas that are not sensitive to the potential impacts of such activities. <p>EMFs support decisions by explaining the environmental attributes of an area, the issues that are important and the priorities to be taken into account in sustainable development.</p>
A governance framework	An EMF integrate policies and frameworks, and align different government mandates in a way that will streamline decision-making to improve cooperative governance and guide future development in an environmentally responsible manner.
A sustainability tool	An EMF contributes to environmentally sustainable development by anticipating potential impacts and by providing early warnings in respect of thresholds, limits and cumulative impacts, and by identifying existing impacts to be addressed. It is developed with future generations in mind.

In accordance with the EMF Regulations (2010) the EMF must provide detailed spatial information about the environmental attributes of the area, including the sensitivity, extent, interrelationship and significance of such attributes. It must show the parts in the area to which those attributes relate, articulate the conservation status of those parts, and identify the environmental management priorities of the area. Furthermore the EMF must:

- Indicate the kind of development or land uses that would have a significant impact on those attributes and those that would not;
- Indicate the kind of development or land uses that would be undesirable in the area or in specific parts of the area; and
- Indicate the parts of the area with specific socio-cultural values and the nature of those values.

The EMF is therefore a useful mechanism to influence the spatial development patterns of the municipal area as it can inform where development should proceed to prevent further pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

1.4 Why does the Newcastle Local Municipality need an EMF?

Newcastle is the third-largest urban centre in KwaZulu-Natal, and the biggest municipality in the Amajuba District. It is categorised as a secondary or intermediary city which means that it plays an important role as a catalyst for development and a driver of economic growth. It is therefore important that urban strategic planning initiatives are well informed, mindful of the underlying biophysical environment and protective of ecological infrastructure that will support sustainable development of the City in the future.

The municipality faces “legacy pollution” issues - primarily associated with the long history of mining in the area - which may be evident in abandoned facilities or contaminated land and which causes polluted surface and groundwater. There are also uncontrolled discharges of effluent in the area, air pollution associated with industrial development, and solid waste disposal challenges which produce harmful materials which are known to be toxic to humans or destructive to the environment. These and other environmental issues have potential to cause impacts on the health and wellbeing of local communities and significant and unsustainable damage to the environment.

Legacy pollution refers to pollution that remains from past activities where there is no immediately responsible party who can be held liable for the pollution and compelled to carry out remediation.

The growth of Newcastle will be associated with additional pressures on the natural resource base in line with the area’s needs which include, amongst others, the following:

- Human settlements – housing must be delivered.
- Transport and other infrastructure must be upgraded and expanded.
- Poverty and unemployment must be addressed.
- Rural communities must be developed and urban environments renewed.
- Land tenure must be addressed.
- Mining, manufacturing and agricultural growth must be promoted.

The EMF is needed to avoid undesirable environmental outcomes in city growth. It must make information available that will help control the pressures from development that may compromise the environment, and it must assist decision-makers to achieve the social and economic goals of the area without compromising the natural systems on which it is based.

The area of main concern to the relevant authorities is the highly urbanised Newcastle town area which comprises Newcastle West, a central industrial area, and Madadeni and Osizweni to the east. These areas are experiencing a number of environmental challenges and are under severe development pressure. The expectation is that the EMF will provide focused land use guidance and performance standards to promote sustainable development in these areas, while not neglecting the needs of the remainder of the municipal area.

1.5 How is an EMF developed?

The process and content of an EMF is prescribed in the EMF Regulations (2010) and guided by the National EMF Guidelines (DEAT, 2012). The technical process of formulating the EMF is illustrated in **Figure 1** below which also shows the current status of the project.

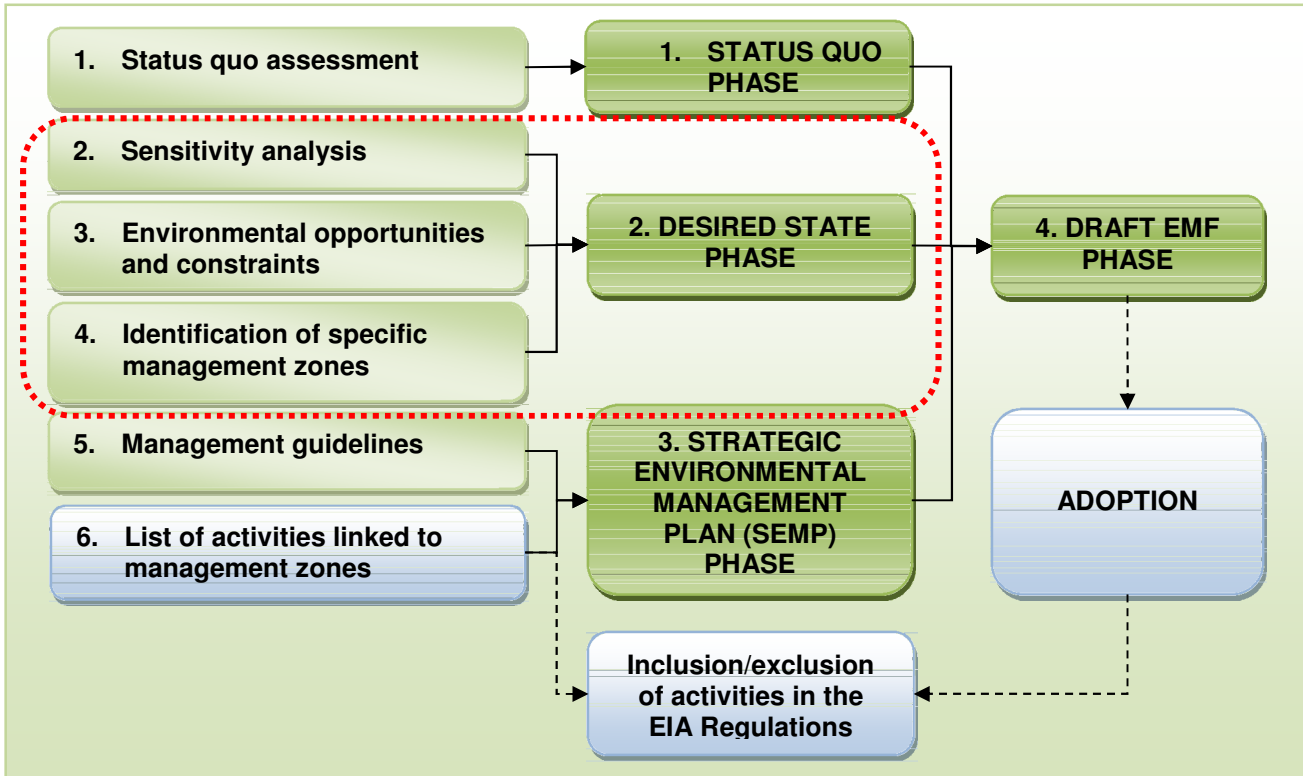


Figure 1: Overall EMF Technical Phases (after DEAT, 2012)

The status quo phase analysed the baseline situation upon which the EMF will be built. This analysis was aimed at answering some pertinent questions and it created an understanding of the dynamics of the existing environment in the Newcastle Local Municipality. All the data that was collected was incorporated in a Geographical Information System (GIS) and the Status Quo Report represented it spatially where applicable and possible. The diagram in **Figure 2** below shows the components that were analysed and for which data was collected, as well as some of the key questions that were addressed. It also shows that the baseline analysis has integrated social, environmental and economic factors, and that it explored the connections between people and the environment in order to create and understanding of the area's sustainability needs.

The Newcastle EMF is now in the Desired State of Environment Phase. This purpose of this phase is to confirm the environmental priorities of the area, set environmental objectives and establish principles for managing the environmental resources in the area. The departure point is to consider the 'basket of assets' comprising functioning ecosystems in the landscape, and to rely on the status of those features to estimate suitability for development. The EMF then considers the needs of society to offer guidance on how development should respond to the current status of the environment.

Once the Desired State is decided with the support of the stakeholders a Strategic Environmental Management Plan comprising guidelines and strategies for the implementation of the chosen objectives will be developed.

The status quo, desired state and SEMP are the buildings blocks for the draft EMF which will be published for public comment before it is revised and presented to the Minister/MEC for adoption.

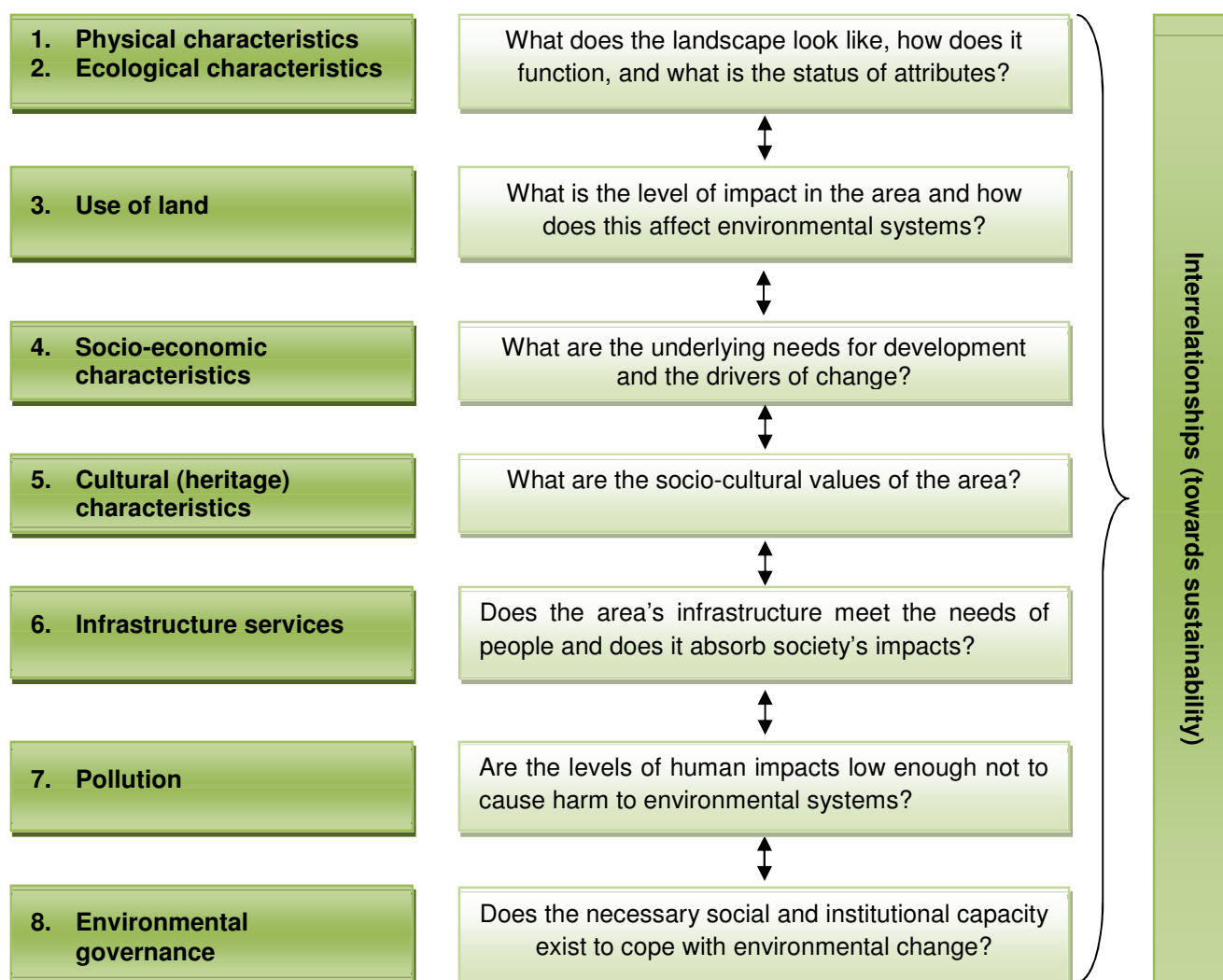


Figure 2: Overview of the baseline analysis

1.6 Stakeholder participation process

One of the key aims of an EMF is “promoting cooperative environmental governance¹” which implies that the process of developing the EMF must be a combined effort of political and public institutions in conjunction with the private sector. In practice this means that there must be constructive involvement or dialogue between government, society and science. The result of such dialogue is a credible product (the final EMF) that provides services to society.

In order to achieve the above, clear governance structures and mechanisms have been put in place to facilitate the required involvement of potential interested and affected parties (IAPs)² in the process. Sadly, the lack of interest shown by organs of state and the weak interest of the public in general required a re-think in approach and the preparation of a new plan of action for facilitating the required participation.

¹ Section 2(3)(c) of the EMF Regulations (2010)

² The EMF Regulations define IAPs as (a) any person, group of persons or organization interested in or affected by an environmental management framework; and (b) any organ of state that may have jurisdiction over any aspect covered by the environmental management framework.

A full report on the process followed, the IAPs who have participated, their contributions and how this was incorporated in the final EMF will form part of the final recommendation to the Minister/MEC to support the EMF adoption process. The following stakeholder engagement activities were undertaken since finalisation of the first draft Status Quo Report (2013):

- A Project Steering Committee (PSC) was arranged to present the updated status quo report to key organs of state and organised community groups. This meeting was well presented by all the authorities who specified their requirements. Formal written comments were also received and addressed. A Final Draft Status Quo Report (January 2014) addressed the additional requirements of members of the PSC.
- All IAPs on the project's stakeholder register were notified about the availability of the Status Quo Report.
- A new Background Information Document (BID) was prepared to inform registered and potential new IAPs of the status of the project.
- The status of the project was advertised in English and isiZulu in the local newspaper on 7 March 2014 to encourage potential new IAPs to register and partake in the project, to inform stakeholders about the availability of the Status Quo Report and to announce a public open day.
- A Public Open Day was arranged for 18 March 2014 in the Amajuba District Municipality Council Chamber in Madadeni.
- Focus group sessions were held in Newcastle on 19 March, 8 April, and 9 April 2014.
- One-to-one meetings were held with specialists in private practice and government to support further analysis of the baseline information in order to inform the desired state.
- The draft Desired State of Environment Report was circulated to all IAPs on the project's database.



Photo 1: Focus group session with traditional leaders

The following **process concerns** are noted:

- The public open day was advertised in isiZulu and held in the Madadeni area to facilitate better access to local interests and groups but a weak response was received.
- The responses received from the Newspaper advertisements included an enquiry about work opportunities and a request for bicycles. This may be an indication of need but also a reflection on the levels of environmental awareness in the area.
- With exception from local authorities, information about the policies and planned activities of various provincial and national organs of state for this EMF area are not readily available.
- Despite concerted efforts to involve stakeholders, the lack of interest shown by organs of state in the agricultural, mining and water sectors remain a concern.

1.7 The purpose of this report

The purpose of this report is to build onto the status quo information to establish an environmental vision for the EMF area. The report shows:

- How the key findings of the baseline analysis were summarised into a management framework for advancing sustainability in the EMF area;
- How the baseline information that was collected to date was translated to estimate the environmental sensitivity of the area and its suitability for development;
- How the needs of society were taken into account in determining what can realistically be achieved in the area and how the EMF must go about to guide the selection and implementation of the best practicable sustainable development options;
- How the environmental management priorities of the area were identified and translated into spatial objectives; and
- The principles that were agreed with stakeholders on how the environmental resource in the area should be managed.

2. KEY ISSUES AND MANAGEMENT FRAMEWORK

2.1 Overview

The key findings from the baseline analysis can be summarised as follows:

- The state or condition of environmental systems in the Newcastle municipal area is deteriorating as a result of human activities. This can be seen in the deteriorating quality of the area's air and water, the level of land degradation (donga and sheet erosion), and the loss of terrestrial (vegetation) ecosystems.
- The level of human impacts is high and it causing significant harm to the environmental systems in the area. This became very evident in the area's air pollution load which is associated with industrial development activities, and the water stress which is associated with mining pollution, sanitation, solid waste disposal and alien invasive plants.
- The socio-economic status of the area shows that much is still to be done to achieve social sustainability. This can for example be seen in the highly urbanised and young population which is associated with low levels of income, high levels of unemployment, an increasing number of indigent households, and the high mortality rates due to HIV/AIDS. There are also huge backlogs in service delivery.
- Questions were raised about the environmental hazards that are being created to people as a result of deteriorating water resource systems, the high pollution load in the area, threats associated with climate change and the inability to meet the demands for infrastructure and services. The underdeveloped townships areas were of specific concern to some stakeholders, and questions remain about issues of environmental justice and the ability of the urban poor to cope with potential environmental disasters and hazards.
- Further investigation into the state of environmental governance in the area revealed a situation that is far from the ideal. The area does not display the necessary institutional capacity to facilitate effective responses to environmental change and/or to address the pollution load in the area. This became evident in the weak monitoring data, the inability of organs of state to control mining pollution and/or to coordinate licensing and compliance monitoring actions, the non-compliance of certain industries with environmental laws, the level of environmental awareness amongst communities and various other factors. Of specific concern is the inability of the local authority to meet the demands for infrastructure and services in areas of social vulnerability and/or areas where the pollution load is high.

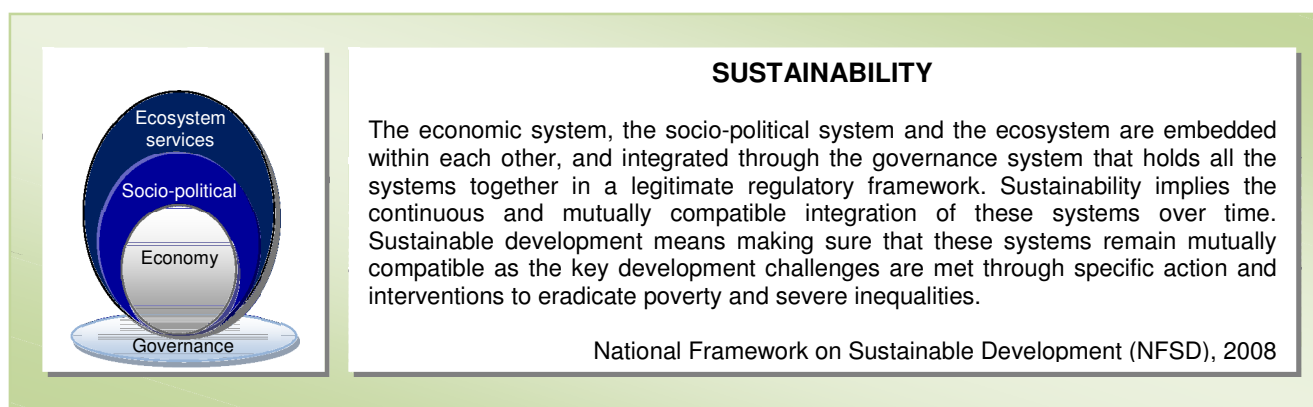
These findings are reason for environmental concern and many stakeholders held the perspective that it indicates an area that is struggling with sustainability. They reiterated the need to promote the EMF "*as a sustainable development tool rather than an environmental management tool*", often used the word "*unsustainable*" when expressing their concerns about the area, and encouraged an EMF that promotes "*true sustainability*". Within this context it was accepted that:

- In accordance with the EMF Regulations (2010), the EMF must promote sustainability, secure environmental protection and promote cooperative environmental governance in order to meet the objects of the National Environmental Management Act.
- The concept of sustainability holds different meanings to different stakeholder groupings, and the needs and values of different groups of society will have a bearing on their interpretation of sustainability.
- In order to find common ground, the EMF must be clear on the meaning of sustainability and sustainable development and what the EMF must contain to steer decision-making towards a common goal or a desired future state.

It was also accepted that, in order to provide strategic context for the EMF, the key findings of the baseline analysis and the stakeholder issues of sustainability concern should ideally be interpreted within a basic management framework that is able to:

- Contextualise the concepts and principles of sustainability and sustainable development in the EMF as expected from stakeholders, and as informed by prevailing policy,
- Explain the connections between people and the environment;
- Facilitate the integration of social, environmental and economic factors into decision-making; and
- Support the Newcastle Local Municipality to monitor whether it is moving towards environmental sustainability, or not.

2.2 Management framework for sustainability



The concepts of sustainability and sustainable development are clearly explained in the National Framework on Sustainable Development (2008) which explains that.

- Sustainability (or a sustainable society) is the overall goal or the desired state for society.
- Sustainable development is the process by which we move towards that goal.
- Ecological sustainability recognises firstly that the maintenance of healthy ecosystems and natural resources are preconditions for human well-being, and secondly that there are limits to the goods and services which they can provide. It also acknowledges that human beings are part of nature and not separate from it.
- Sustainable development implies the selection and implementation of a development option which allows for the achievement of appropriate and justifiable social and economic goals (based on meeting basic needs and equity) without compromising the natural system on which it is based.

The National Strategy for Sustainable Development and Action Plan (NSSD1, 2011) provides additional focus for the EMF as it defines the country priorities which must inform the desired state of environment for the Newcastle area at a strategic level, and the performance standards for development at a project level. These priorities are summarised in **Figure 3** below.

SOUTH AFRICA'S SUSTAINABILITY PRIORITIES AND OBJECTIVES (NSSD1, 2011)

- 1. ENHANCING GOVERNANCE SYSTEMS FOR INTEGRATED PLANNING & IMPLEMENTATION:**
 - Enhance effective governance and institutional structures and mechanisms to achieve sustainable development and meet the MDG and the JPOI goals and targets.
 - Strengthen monitoring and reporting for improved environmental performance by government and the private sector.
- 2. SUSTAINING ECOSYSTEMS AND USING NATURAL RESOURCES EFFICIENTLY:**
 - Value, protect and continuously enhance environmental assets and natural resources.
- 3. TOWARDS A GREEN ECONOMY:**
 - A just transition towards a resource-efficient, low-carbon and pro-employment growth path.
- 4. BUILDING SUSTAINABLE COMMUNITIES:**
 - Create community awareness and participation, and work together to protect the environment through changing attitudes and behaviour in consuming resources sustainably and responsibly.
 - Develop and support quality housing programmes, including building community self-sufficient farming strategies, indigenous knowledge, the sustainable production of herbs and traditional medicines, and businesses to secure societal equity and cohesion.
- 5. RESPONDING EFFECTIVELY TO CLIMATE CHANGE:**
 - A fair contribution to the global effort to achieve the stabilisation of greenhouse gas concentrations in the atmosphere at a level that prevents dangerous anthropogenic interference with the climate system.
 - Effectively adapt to and manage unavoidable and potential damaging climate change impacts through interventions that build and sustain South Africa's social, economic and environmental resilience and emergency response capacity
 - Develop various adaptation strategies with climate sensitive sectors.
 - Strengthen key sectors such as water, agriculture, health etc to be more resilient and also have the ability to adapt to climate variability and change.

Figure 3: South Africa's strategic sustainability priorities

The National Environmental Management Act (1998) prescribes principles to be taken into account by all organs of state in order to facilitate integration of social, environmental and economic factors into decision-making. These principles support the process of sustainable development. Although they inform the desired state of environment for the Newcastle EMF and the performance standards for future development activities, the principles will be of specific relevance during the implementation phase of the EMF.

A basic sustainability framework for the Newcastle Local Municipality is outlined in **Figure 4** below. The purpose of this framework is to provide strategic context for the EMF. Its structure draws from an environmental sustainability framework that was designed by the National Department of Environmental Affairs (DEA, 2009), and the five strategic sustainability priorities as defined in NSSD1 (2011). The value of this approach is that it explains the connections between people and the environment, and it helps to integrate social, environmental and economic factors in decision-making.



The framework separates the concept of environmental sustainability into five (5) components which are considered necessary conditions for environmental sustainability:

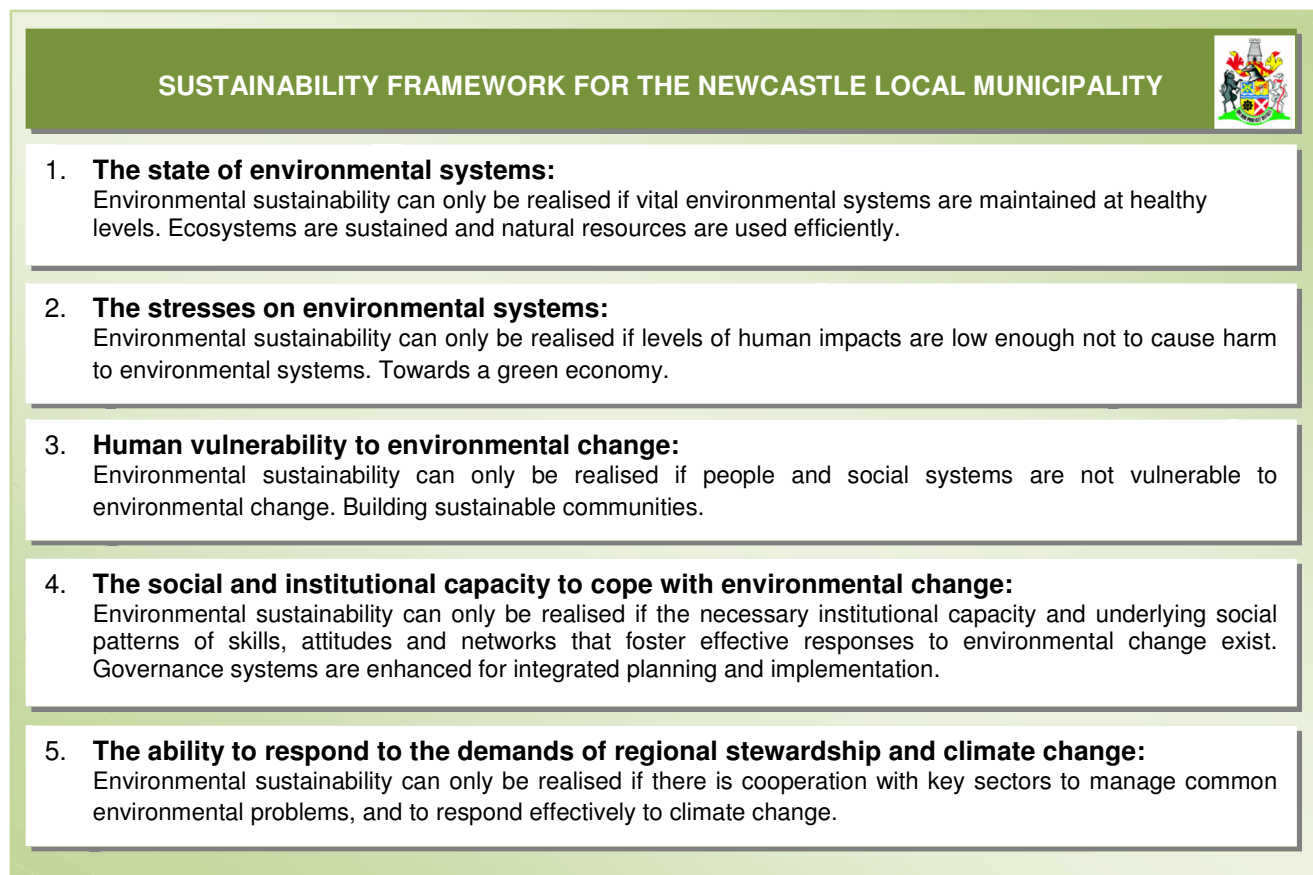


Figure 4: Sustainability Framework for the Newcastle Local Municipality

The above sustainability framework could also be used to strengthen the local municipality's performance management system. This would require the selection of performance indicators of environmental sustainability that can provide information on the ability of society in the Newcastle area to protect the environment over the next decades and whether the people residing over this area are moving towards environmental sustainability or not. The further development of this framework is the subject of the next phase in the EMF process.

2.3 Summary of key issues

The key issues that were identified from the baseline analysis and by stakeholders are summarised below. The Newcastle Sustainability Framework is used as the structure within which to interpret these issues in order to contextualise the concern about sustainability. These issues form the basis for establishing the environmental management priorities of the area.

2.3.1 State³ of environmental systems

The provincial and national departments of environmental affairs who decided to initiate this EMF in conjunction with the Newcastle Local Municipality, realised that the state or condition of environmental systems in the Newcastle municipal area are deteriorating as a result of human activities. Key findings from the baseline analysis and issues of stakeholder concern include the following:

Water resources

The municipality falls within the primary catchment area of the Thukela River system and should therefore be well endowed with water resources. Most stakeholders however agreed that the water resources of the area are under threat and that water security is a major concern. The area's drainage net has been disturbed, the availability of water in the landscape has diminished and the quality of surface water is deteriorating. The majority of the rivers in the area are characterised by poor water quality; they drain into the Buffalo River which is one of the most polluted rivers in the Thukela system. The alteration of wetlands which are associated with many of these rivers is a major concern because it affects the storage capacity of the area. There are also concerns about the deteriorating water quality of the Ntshingwayo Dam which is the main water source of the Newcastle town. The state of the area's groundwater resource is not certain because of data deficiencies. There is potential to harvest groundwater resources but there are also clear indications that this resource may be contaminated.

Air quality

The condition of the area's airshed is a major concern to stakeholders. Local weather conditions prevent the dispersion of pollutants. There are also clear threats on a local scale which ranges from aesthetic damage and nuisance odour and noise, to poor local air quality that may be compromising public health. Stakeholders also expressed concern about gaps in information and believe that pollutant levels may have reached saturation level in several parts of the municipality. The authorities (DAEA in particular) noted that Newcastle was identified as a national air quality hotspot in 2008 and it would therefore be necessary to determine whether the state of air quality has improved since then or not. An air quality management plan is in the process of being prepared for the area and will shed more light on the local state of air quality.

Land degradation

Landscape transformation and fragmentation are most prevalent in the southern and eastern parts of the area. These patterns are not reversible but some habitats may recover if they have not yet reached threshold levels. The key environmental concern relates to soil erosion which damages drainage networks and causes a decrease in surface water quality due to sedimentation. Concern was also raised about soil erosion in the Vulintaba tourism area. The contamination of soil from old mine dumps also degrades the environment.

Biodiversity

The state of terrestrial biodiversity is a concern considering that there are four (4) terrestrial ecosystem types in the area that have a national threatened conservation status and which are in need of protection. The extent to which the area is contributing to the formal protection of representative and viable samples of the province's biodiversity is also a concern.

³ It is important to note that an EMF is not a "State of Environment Report" that aims to identify issues and indicators within a specific reporting framework in order to report on changes in the environment over time. An EMF focuses more on the status of environmental attributes (i.e. relative importance in relation to others) and the development pressures of an area in order to reveal where specific land-uses may best be practiced, and to offer performance standards for maintaining appropriate use of such land.

2.3.2 Stresses on environmental systems

The baseline analysis suggests that the level of human impacts is very high. This is particularly evident in the high air and water pollution loads of the area. These human-induced stresses will cause significant harm to the environmental systems in the area, and the systems beyond the boundaries of the municipality, if not controlled. The EMF is particularly interested in the spatial location and extent of development pressures and the extent to which these pressures may threaten the development potential of the area or cause unfavourable changes that may negatively affect the future growth path of the Newcastle Local Municipality. Key findings from the baseline analysis and issues of stakeholder concern include the following:

Water stress

Water stress is primarily associated with mining and industrial pollution, sanitation, solid waste disposal, the use of fertilizers by the agricultural sector, and presence of alien invasive plants in the upper water catchment areas. There is a high level of stakeholder awareness about acid mine drainage as a result of past mining activities, and concern about coal mine dumps which were left uncontrolled. Concerns were also expressed about the location of cemeteries and waste disposal sites, the state of Newcastle's storm-water infrastructure, the overloaded municipal wastewater treatment works, and the wastewater treatment facilities of certain industrial developments. Water losses due to aging infrastructure have been identified as a key priority for action by the municipality. Community concern was also raised about the poor management of the Free Basic Services Policy where favouritism and poor public participation eventually produce community vandalism of water infrastructure.

Air pollution

Local air pollution is primarily associated with industrial development but transport systems, waste facilities; domestic burning of fuel and emissions from the mining sector also contributes to ambient air quality. Transboundary stresses (pollution transmitted into the area from other airsheds) also occur via air circulation.

Ecosystem stress

Land transformation through agriculture and urban development has significantly altered terrestrial ecosystem types while the mining sector also contributes to the degradation of ecosystems. Pollution from these sectors is affecting the health of aquatic ecosystems. Unsustainable management practices in the area have caused an invasion of alien plant species which have a detrimental effect on environmental systems.

Population pressure

High levels of poverty, the increase in the number of households and informal settlements, and the increase in sprawling of settlements will increasingly place pressures on the available natural resources and environmental conditions of the area. It also creates demands for more infrastructure and basic services. The key concern is whether the municipality will have the resources to meet these demands and the consequences for the environment if the demands could not be met, particularly in areas with high levels of degradation and/or pollution. Stakeholders are particularly concerned about the continuous development of new housing projects to meet population demands without increasing the capacity of current treatment works to process increased sewage volumes. Suitable space for cemeteries to meet demands is also a concern.

2.3.3 Human vulnerability to environmental change

The status quo assessment revealed that a large proportion of the urban population may be vulnerable to environmental change because of their socio-economic status and their exposure to environmental hazards. Indications of human vulnerability that are raising concern include:

Poverty

The socio-economic profile of the area includes high levels of poverty and low levels of income. The dependency ratio is high and there are high mortality rates due to HIV/AIDS. Poverty and unemployment is concentrated in the areas to the east of Newcastle town where access to services such as sanitation or drainage is far from the ideal. These households tend to be more reliant on natural resources to meet their livelihood needs which in turn lead to environmental degradation. Their socio-economic status also means that they have little ability to cope if they are exposed to deteriorating environmental conditions which makes them more vulnerable to environmental hazards such as air pollution, water pollution and inadequate sanitation facilities.

Access to basic services

The general trend in Newcastle is a substantial improvement in access to basic household services such as piped water and electricity since 2001. However, stakeholders raised concern about the state of access to sanitation and refuse removal and the impacts this may be having on the water resource systems of the area. The majority of backlogs occur in the areas to the east of Newcastle town. The impacts of inadequate sanitation on environmental health are also a concern.

Community exposure to toxic air pollutants

Stakeholders were most concerned about air pollution in the area and the inability of people to avoid exposure to toxic air pollutants due to the location of industries in relation to settlements. The impacts may ultimately reflect amongst the vulnerable poor who are already susceptible to various health hazards. The area which is most under pressure is the highly urbanised Newcastle area, and in particular the townships to the east which includes Madadeni and Osizweni.

Community exposure to groundwater pollution

Stakeholders were concerned about seepage from underground mines, and from areas such as the Drycut cemetery. Groundwater is visibly percolating out of the ground and flowing into settlement areas. There are also households with access to reticulated water but who prefer to use borehole water. Regular outbreaks of enteric diseases have also occurred in the past and are believed to be directly linked to groundwater pollution. Exposure to such environmental hazards makes poor people vulnerable. Inadequate levels of basic services such as water and sanitation worsens the situation.

Community exposure to flood risk

Concerns were raised about flood risk, communities that have settled within flood risk areas, and the threats associated with an increase in flood events as a result of climate change.

2.3.4 Social and institutional capacity to cope with environmental change

The baseline analysis suggests that, despite good environmental legislation and extensive regulations on pollution, the Newcastle municipal area does not have the required social and institutional capacity to realise environmental sustainability. Indications that are raising concerns include:

Community awareness, skills and attitudes

High poverty levels force people to make livelihood decisions that cause environmental degradation but the overall low level of education in the area may also contribute to choices that affect the environment. One stakeholder reiterated the need for an environmental awareness programme “as people need to realise the impact that their refuse dumping and littering will have on the environment and the importance of a clean environment”. Suggestions were also made in respect of training the youth and strengthening environmental training in the foundation phases in schools.

Environmental management capacity of government

The local municipality does not have the required institutional capacity to fulfil their environmental management functions and concern was raised about political interference in decision-making which may compromise the environment. Plans are in place to establish an environmental planning unit within the municipality to drive and coordinate the implementation of the EMF. The key environmental concern relates to the infrastructural capacity of the municipality and the impacts this may have on the environmental systems in the area.

The provincial environmental authorities have not recorded significant institutional capacity challenges but are concerned about the level of intergovernmental cooperation around environmental matters in the area, particularly in respect of waste licensing and compliance monitoring, and mining pollution control. In this regard the impact of institutional capacity challenges on the area's water resources is the main concern. Stakeholders also raised concern about the poor water monitoring data for the area and the weak regulatory controls that are apparent in the mining sector.

Communities raised concern about the lack of constructive responses received from the agricultural department when they were approached for assistance to manage invasive alien plants.

Private sector responsiveness

Although most large industries in the area reflect corporate institutional support for environmental management through, for example, adopting the ISO 14001 Environmental Standards, there are isolated examples where actions to reduce significant environmental impacts are not effective. Of key concern is the non-compliance behaviour of important job creators such as ArcelorMittal.

Investment in biodiversity conservation

Investment in biodiversity conservation in the area is minimal and the opportunity to contribute to the protection of threatened ecosystems has not yet been exploited. Less than 2% of the land area in the municipality is under formal protection.

2.3.5 Capability to respond to regional stewardship and climate change

The EMF area shares its borders with other provinces and municipalities and should therefore be sensitive to cross-border environmental impacts. The municipality also has an obligation to respond effectively to climate change. In this regard there are two issues of significance that need attention in order to advance environmental sustainability:

Cross-boundary water governance

One of the more important issues that were distilled from the baseline analysis is cross-border water governance. The EMF area falls within the primary catchment of the Thukela River System which is of strategic significance as this system is used to alleviate water scarcity in other parts of the province and/or the country through inter-catchment transfer schemes. As most rivers in the study area drain into the Thukela Basin, the water stress that is being caused by development activities from within the Newcastle municipal area affects the rights of downstream users. In this regard there is concern about the efficiency and effectiveness of the actions being taken to mitigate or prevent negative downstream environmental impacts and whether the relevant institutions have the capability to respond to the demands for regional stewardship.

Climate change responses

The baseline analysis did not include a specialist study on the potential impacts of climate change in the area but underlined the natural patterns of local climate variability which regularly produce extreme wet or dry periods with associated impacts on land use and the environment. Regular extreme floods occur in the area and are likely to become more noticeable in the future because of degradation of natural abatement systems such as floodplains and wetlands, and settlements that occur within flood risk areas. The study area is therefore vulnerable to climate change and stakeholders did express their concern about the adequacy of the municipality's climate adaptation strategies. There was also a call for the identification of areas that should be protected and/or rehabilitated through community projects to build ecosystem resilience.

Stakeholders also noted the Newcastle area's contribution to global carbon dioxide emissions as a result of its economy being mostly reliant on coal to meet its primary energy needs. There was also a call for more efforts to reduce the area's contribution to global greenhouse gas emissions.

2.4 Sustainability vision and first principles

The issues of sustainability concern inform the vision for the EMF area. In this regard the country's vision for a sustainable society serves as a reminder of the overall goal or the desired state for society in the Newcastle Local Municipality:

VISION FOR A SUSTAINABLE SOCIETY

South Africa aspires to be a sustainable, economically prosperous and self-reliant nation state that safeguards its democracy by meeting the fundamental human needs of its people, by managing its limited ecological resources responsibly for current and future generations, and by advancing efficient and effective integrated planning and governance through national, regional and global collaboration.

Source: National Framework on Sustainable Development (NFSD), 2008.

The strategy for achieving this vision within the EMF area must at least adopt a much longer term approach than local planning frameworks are accustomed to, considering the impact that today's policy decisions may have on the future. Within the context of sustainability planning and decision-making the EMF must therefore keep principles of equity in mind, both **intra-generational** (between groups of people who are currently alive) and **inter-generational** (between today's generations and future ones).

EMF PLANNING HORIZON

The EMF promotes a much longer-term approach to planning and the incorporation of long-term sustainability objectives into the decision-making process.

Today
(2013-14)

Immediate future
(2020)

Short-term
(2030-2050)

Medium-term
(2050-2099)

Long-term
(2099+)

The strategy for achieving a vision for a sustainable society must also translate the key issues of sustainability concern into spatial objectives; and highlight the importance of institutions, systems of governance and environmental accountability in decision-making.

The following set of principles, which reflect the dynamics, nature and context of the study area, will inform the further preparation and implementation of the Newcastle EMF:

PRINCIPLES FOR THE NEWCASTLE EMF

Sustainable development

- Meet basic requirements for the functioning of the hydrological system.
- Meet biological conservation targets in the area.
- Protect or use the natural resource base optimally to ensure long-term benefits.
- Promote development that would secure long-term sustainable income.

Pro-poor

- No activity that impacts on the poor in any manner or way in the area should be allowed.
- Planned activities should be biased towards the poor even if it requires intervention of the state.
- The poor should be at the centre of strategies and guidelines for the development of the area.

Capture value

- Public investment in infrastructure and services should be directed to increase the value of local private land and the potential value of entrepreneurial enterprises that can occur on such land.
- Public policy and investment should support the creation of competitive advantages for local communities.

Support local economic development

- Develop local skills for new employment opportunities.
- Obtain supplies for enterprises locally or through local agents.
- Form partnerships with local entrepreneurs.

Focus on what is important, appropriate and possible in the area

- Make sure that development initiatives and conservation proposals are feasible.
- Ensure that conservation initiatives contribute to national and provincial targets or to the development potential (e.g. tourism) of the area.

Internalise externalities

- Implement the polluter pays principle in its widest meaning.

3. SENSITIVE ENVIRONMENTAL ATTRIBUTES

3.1 Overview

During the status quo phase of the EMF spatial information was collected about the sensitive environmental attributes of the area. The status of these attributes gives an indication of the potential or suitability of an area for development, and whether a resource has the ability to absorb more change or impact. This section shows how the information was analysed to produce a composite site sensitivity plan of the study area. The purpose of this technical analysis was to confirm the opportunities and constraints of the area; and to identify areas which are important from a resource conservation perspective and which may need stringent development control.

The method to produce sensitivity was based on ‘summing’ physical and biological parameters that have a bearing on environmental sensitivity and it included:

■ **The identification of key data categories and features that should be evaluated:**

This involved consideration of elements that are ‘sensitive’ to development impact such as biodiversity priority areas, areas with high erosion potential, primary water production areas, rivers, streams and wetlands including appropriate buffers; high value agricultural land and heritage factors. Only good quality data was considered in this selection process.

■ **The evaluation of each feature in terms of current policies and best available science:**

This involved consideration of the status of each feature and weighting it in terms of sensitivity. Subjectivity was largely reduced by involving specialists in the assessment. The following ratings and values were used in this exercise:

Sensitivity	Description	Weighting
Neutral	The inherent feature status is unlikely to be influenced by change.	0
Low	The inherent feature status is susceptible to change but the risk of serious damage to ecological infrastructure or socio-cultural values is low.	1
Medium	The inherent feature status is susceptible to change and there is a risk of damage to ecological infrastructure or socio-cultural values.	2
High	The inherent feature status is highly susceptible to change. The risk of damage to ecological infrastructure or socio-cultural values is high. Feature protection is required to achieve specific policy objectives, or to safeguard benefits that people obtain from ecosystems.	3

■ **The integration of data layers (‘Spaghetti Layer’⁴):**

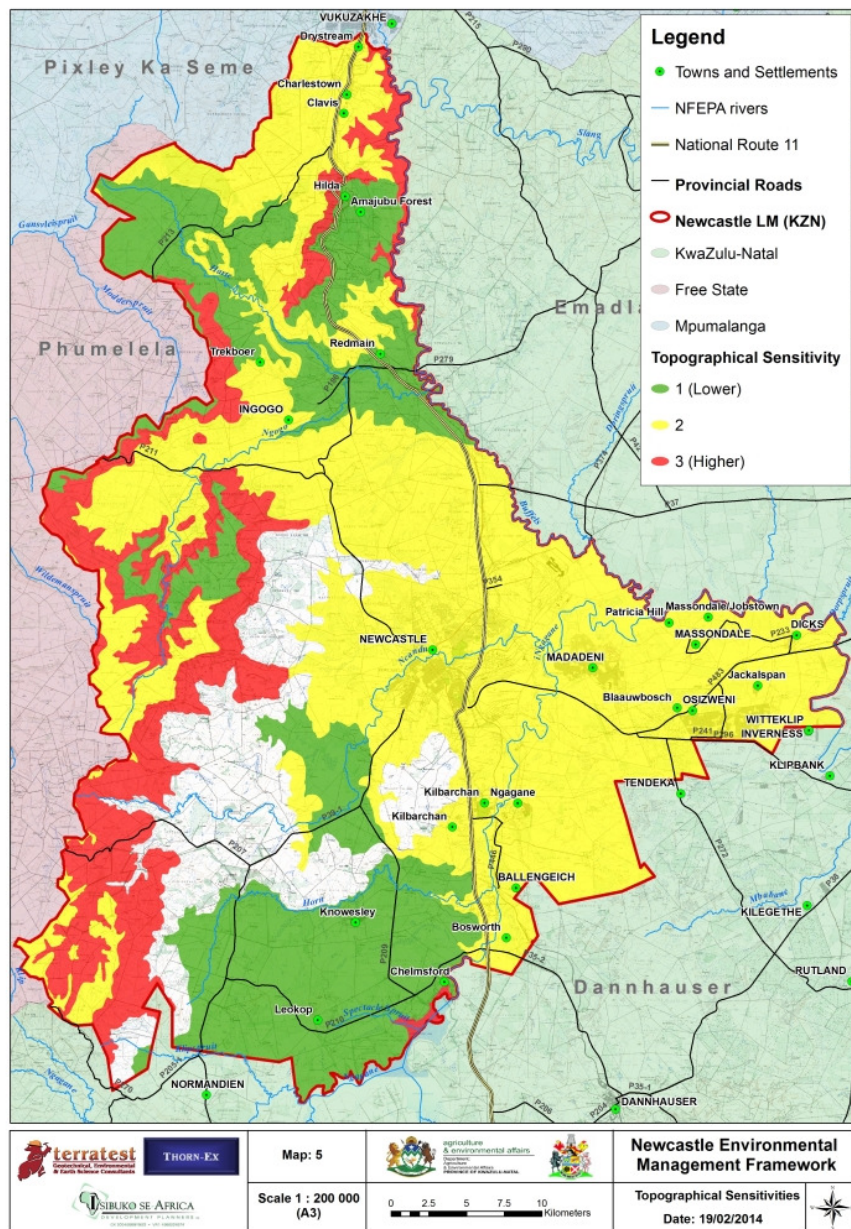
This involved a technical GIS exercise that integrated all the data layers into a single spatial data layer with the respective ratings and values combined into a single record for each spatial facet.

The results of the environmental sensitivity analysis and the spatial objectives for the area are presented below. There are six (6) environmental sensitivity zones or land use constraint zones.

⁴ A ‘spaghetti layer’ is also referred to as a ‘facet map’. It is a GIS term to describe the sum and integration of all the baseline information into a single spatial layer.

3.2 Topographical sensitivity

The character of the terrain drives functionality in the landscape and the ecosystems of the area. The disturbance of the natural landscape character must be avoided, minimised and/or remedied. Land that contains steep slopes are sensitive to change and present land use constraints. However, the steepness of the land is not the only indicator of sensitivity. Relatively permanent land characteristics such as slope gradient and length, soil erodibility and rainfall erosivity, determine the susceptibility of land to water erosion. The best available data set (DAFF, 2012)⁵ that deals with these land characteristics were used to compile the sensitivity map below. It does not deal with relatively variable factors such as vegetation cover and management practices which, if used in conjunction with the former, will determine an area’s erosion hazard.



The steep terrain in the western parts of the area (indicated in red) is the most sensitive to development impact because water erosion risk is very high.

Their conservation status indicates that the current vegetation cover and land use in these areas should be maintained or carefully managed in order to avoid land degradation. Development in these areas is likely to cause unacceptable environmental impacts and should therefore be discouraged.

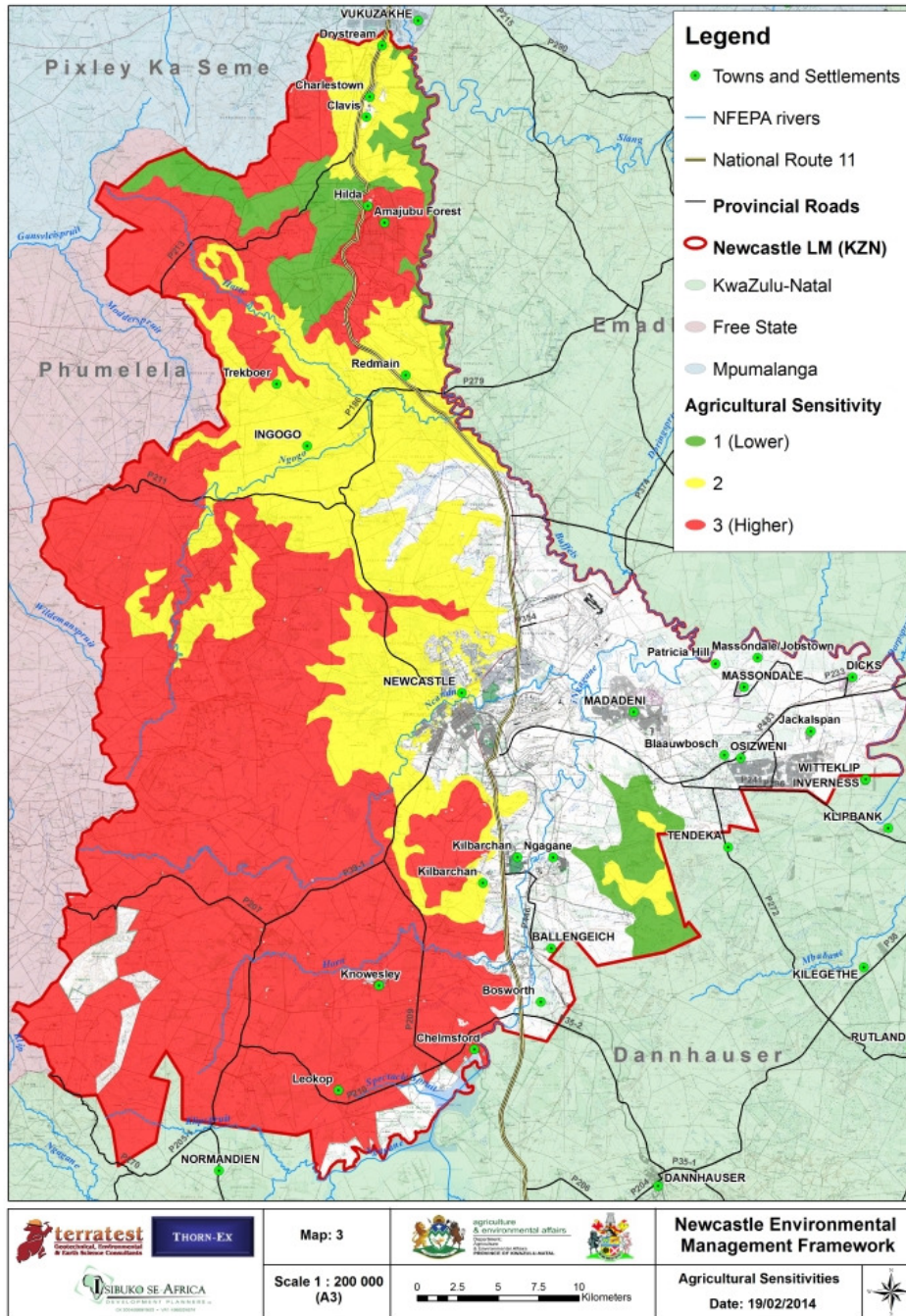
Areas with a lower rating (green and yellow) are also susceptible to water erosion. If the vegetation cover and management practices of these areas are taken into account, it will indicate the area’s erosion hazard. Development proposals in these areas must adhere to erosion control measures in order to protect the area’s soil and prevent further land degradation.

Map 2: Topographical sensitivity

⁵ This dataset consist of eight (8) erosion susceptibility classes. They were grouped into four (4) classes to denote sensitivity: Class 1: Neutral; Class 2 & 3: Low; Class 4 & 5: Medium; and Class 6, 7 & 8: High.

3.3 Agricultural land resource sensitivity

Scarce non-renewable agricultural resources must be protected and used in a sustainable manner. The sensitivity map below used the agricultural land categories data from the KZN Agricultural Land Zoning System (DAFF & DAEA, 2012) to indicate the areas that are most sensitive to development impact. The areas indicated in red include land that are classified as Category A (irreplaceable) and/or Category B (threatened). These areas are most sensitive to development impact. Non-agricultural development activities in these areas are likely to impact negatively on the country's food security objectives and will undermine sustainability objectives. Areas with a lower sensitivity, especially those indicated in yellow, may need some development control to buffer land with a higher agricultural potential value.



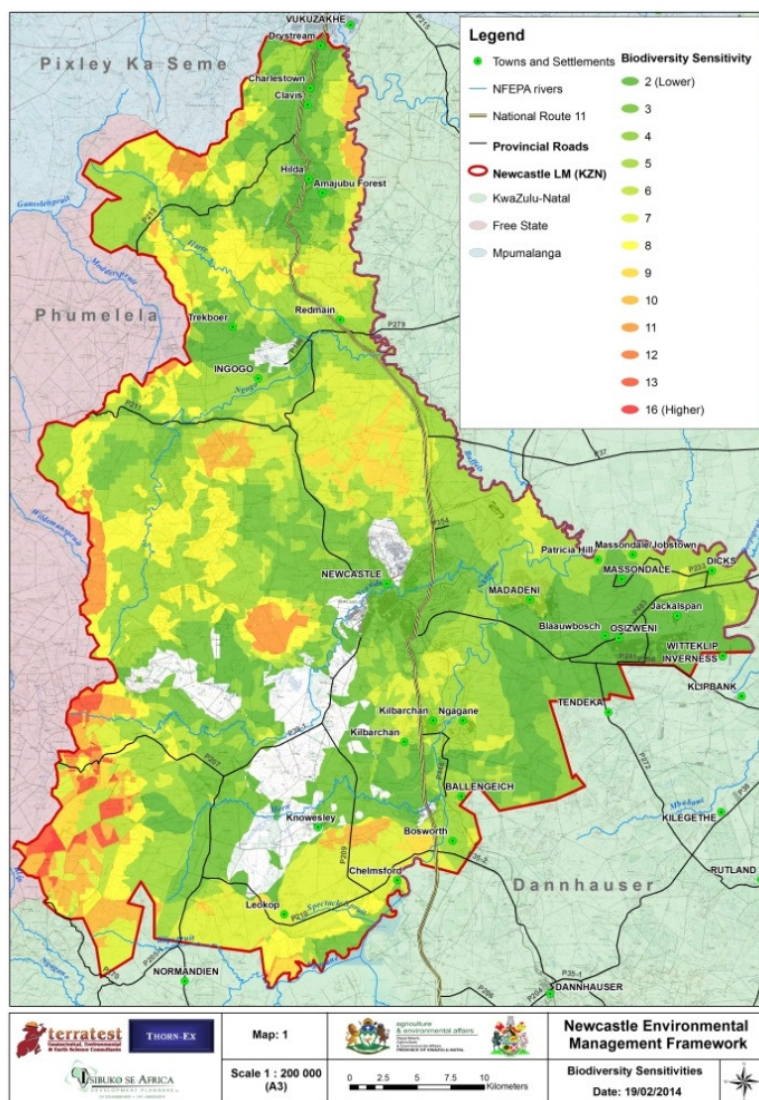
Map 3: Agricultural land resource sensitivity

3.4 Biodiversity sensitivity

South Africa’s biological diversity must be managed and conserved and the use of such resources must be sustainable. Land that contains important biodiversity assets is sensitive to development impact and therefore presents potential constraints to development. The following data features were used to compile an integrated dataset for biodiversity:

BIODIVERSITY CONSTRAINTS (data features)

Terrestrial biodiversity priorities	Biodiversity Priority Areas as identified by KZN Conservation Plan (MINSET)
	Protected areas
	Stewardship sites
Landscape-level corridor	Macro-level ecological corridor network/ Critical Biodiversity irreplaceable corridor linkages
Aquatic biodiversity priorities	Earmarked catchments
	NFEPA: Fish corridors
	NFEPA: Fish support areas and associated catchments



When interpreting the biodiversity map it is important to understand that a range or spectrum of sensitivity is presented. Care must be taken not to interpret a specific area as less sensitive than another.

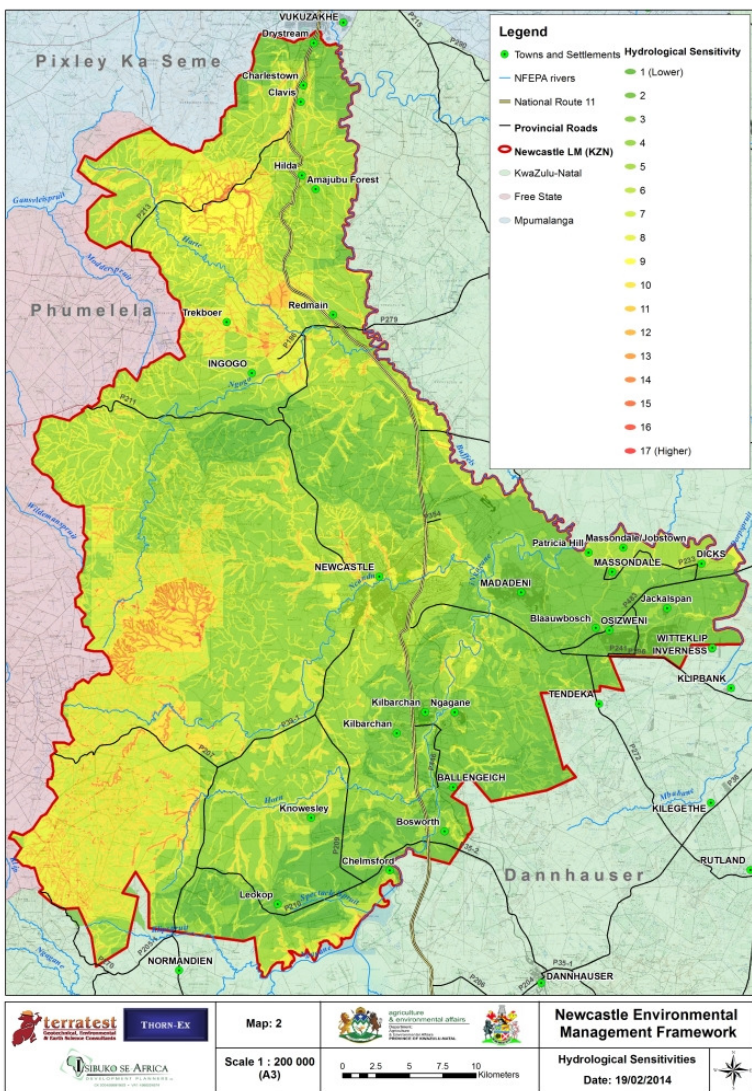
A higher value must be interpreted as an area that contains ‘more biodiversity issues’ than another area with a lower “combined total”.

For example, the MBO area is in itself sensitive but there may be fewer issues relating to this area than for example the mountainous areas (indicated by red).

The extent to which development control must be implemented depends on the status of the specific attributes of the area in question. For example some priority areas should remain in a natural state with limited to no biodiversity loss in order to contribute to national biodiversity goals, while others may accommodate some loss of biodiversity.

Map 4: Biodiversity sensitivity

3.5 Hydrological sensitivity



South Africa’s water resources⁶ must be protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner.

Land that contains important water resource assets presents constraints to development.

The sensitivity map shows that there is a range or spectrum of sensitivity across the study area which means that it will be relatively easy to inflict damage to the area’s water resource.

There are more water resource issues in the western parts of the area than in the MBO area. However, the water resources in the MBO area are inherently sensitive to development impact and it will need stringent development control.

Areas with a higher combined total value of sensitivity are of particular concern. These areas present more land use constraints, and hence more stringent development control.

Map 5: Hydrological sensitivities

The following data features were used to compile the integrated dataset for hydrology:

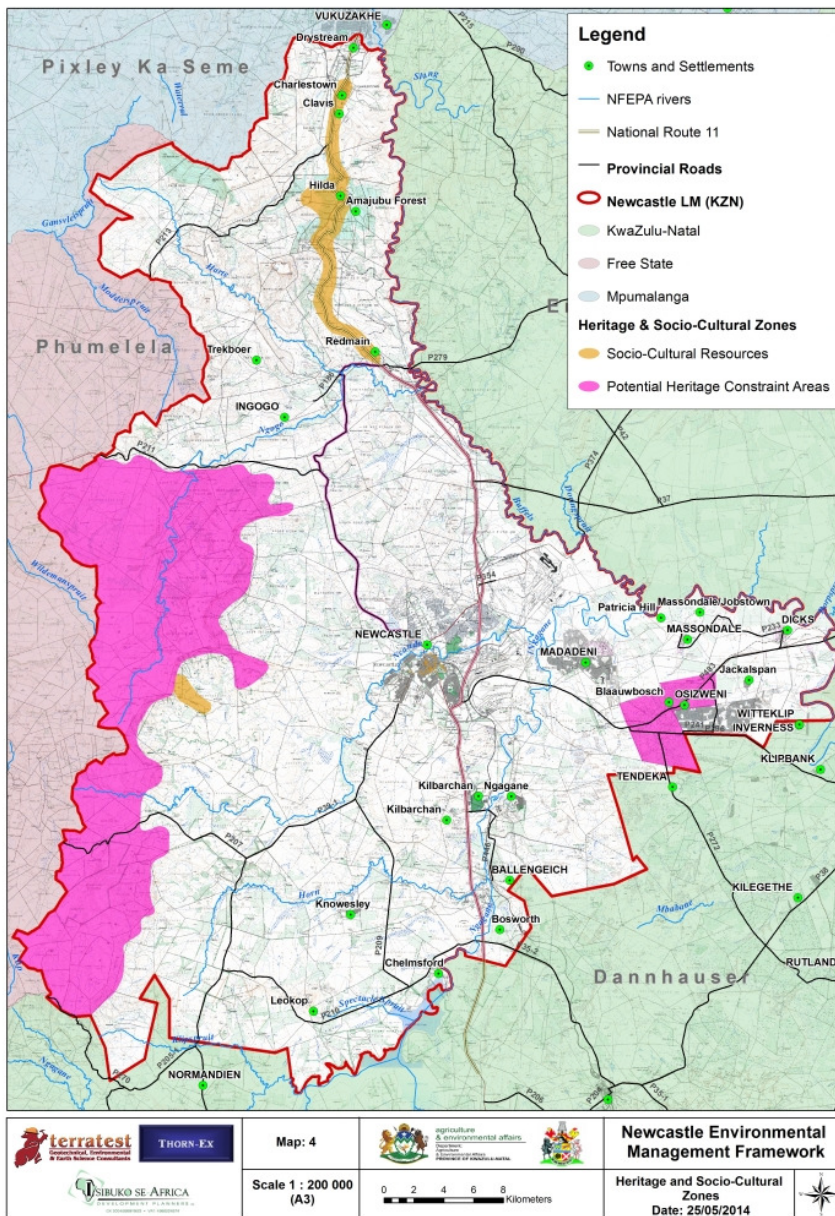
WATER RESOURCE CONSTRAINTS (data features)	
Surface hydrology/water resources	NFEPA: Strategic Water Source Areas
	NFEPA: River FEPA and associated sub0quaternary catchments.
	NFEPA: Upstream Management Areas
	KZN Wildlife Important Water Yield Areas
	Rivers, dams and wetlands
Groundwater / aquifer sensitivity	Water quality sensitive areas
	Lineaments and Dykes
	High Groundwater Yield Areas (groundwater recharge areas)
	Groundwater depth

⁶ The National Water Act (1998) defines a water resource to include a watercourse, surface water, estuary, or aquifer. A watercourse means a river or a spring; a natural channel in which water flows regularly or intermittently; a wetland, lake or dam into which, or from which, water flows; and any collection of water which the Minister may declare to be a watercourse. An aquifer is a geological formation which has structures or textures that hold water or permit appreciable water movement through them.

3.6 Socio-cultural sensitivity

Heritages resources of cultural significance or other special value for the present community and for future generations must be protected and managed as part of South Africa’s national estate. Land that contains heritage features is therefore sensitive to development impact and may present land use constraints.

The data features that were used to compile the integrated dataset for socio-cultural sensitivity include features that are formally protected by provincial and national heritage legislation. It includes buildings/structures older than 60 years, archaeological and paleontological sites, battlefields and associated cemeteries, and provincial and heritage landmarks.



Stakeholders raised concern about data gaps and the risk of unacceptable environmental impacts in areas where heritage features are known but not yet formally recorded and/or mapped. They also emphasised the tourism value of the area’s heritage resources, and mentioned local heritage studies⁷ that are underway to improve the area’s baseline data.

While this EMF is unable to improve the heritage resources data, a risk averse and cautionary approach should be adopted in development.

The areas of heritage value that were identified by stakeholders were broadly defined as “*Potential heritage constraint areas*”.

The next reiteration of the EMF should afford priority to cultural resource attributes.

Landscapes

Map 6: Socio-cultural sensitivities

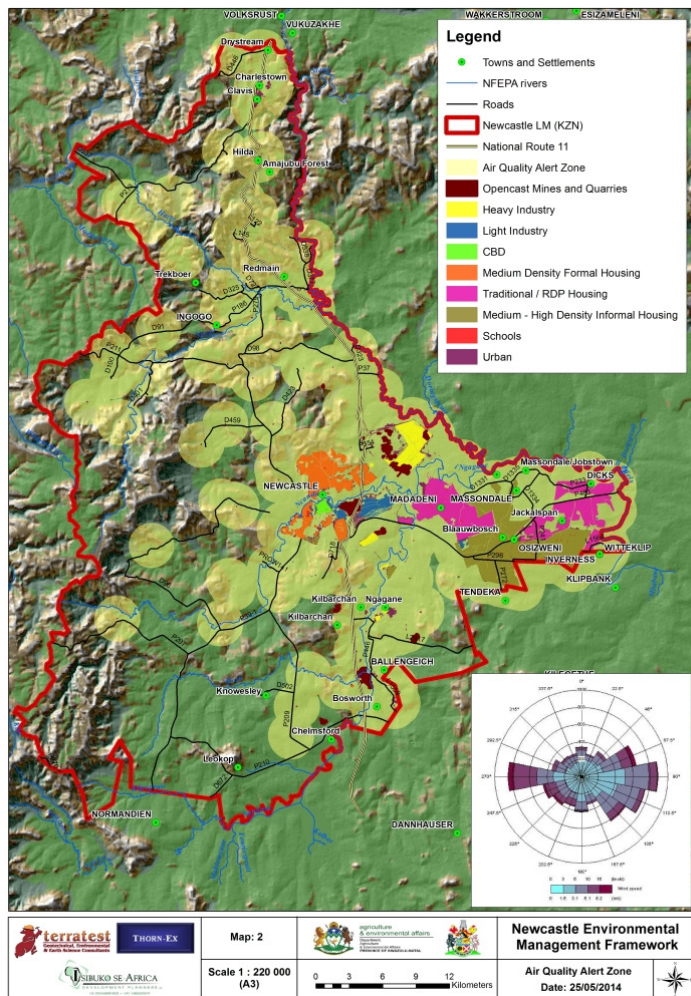
⁷ These include studies of the Chief Albert Luthuli and the Amakholwa Community of Blaauwbosch, and other survey work being undertaken by the Fort Amiel Museum (Eksteen, 2013).

3.7 Airshed sensitivity

The quality of the air in the study area must be protected and enhanced to secure an environment that is not harmful to the health and well-being of people, and air pollution and environmental degradation must be prevented.

Land use constraints may arise if there are excessive local emissions of pollutants and/or public health threats. Such constraints have been identified for the study area but the existing baseline information on the area's airshed⁸ is not reliable enough to delineate accurate buffer zones for the control of pollution emissions. This was raised as a key concern by stakeholders during the engagement process, but it was also acknowledged that local air quality studies⁹ are underway to improve the ambient air quality data that is needed to inform appropriate airshed modelling, and hence the spatial delineation of air quality zones.

In the absence of an integrated dataset for airshed sensitivity, the EMF has identified the areas that are important from a resource conservation and public health perspective and which may need to be subject to stringent development control. The areas of potential air quality constraints were broadly termed "Air quality alert zone" and was delineated as follows:



Map 7: Airshed sensitivities

AIR QUALITY CONSTRAINTS (data features)

Sources of pollution	Main sources of pollution (use of land data layer) which includes heavy industries, light industries, CBD, opencast mines and quarries etc.
Sensitive receptors	Population distribution and population densities.
Buffers	A 2 km buffer that reflects the need for a risk averse and cautionary approach as requested by stakeholders.

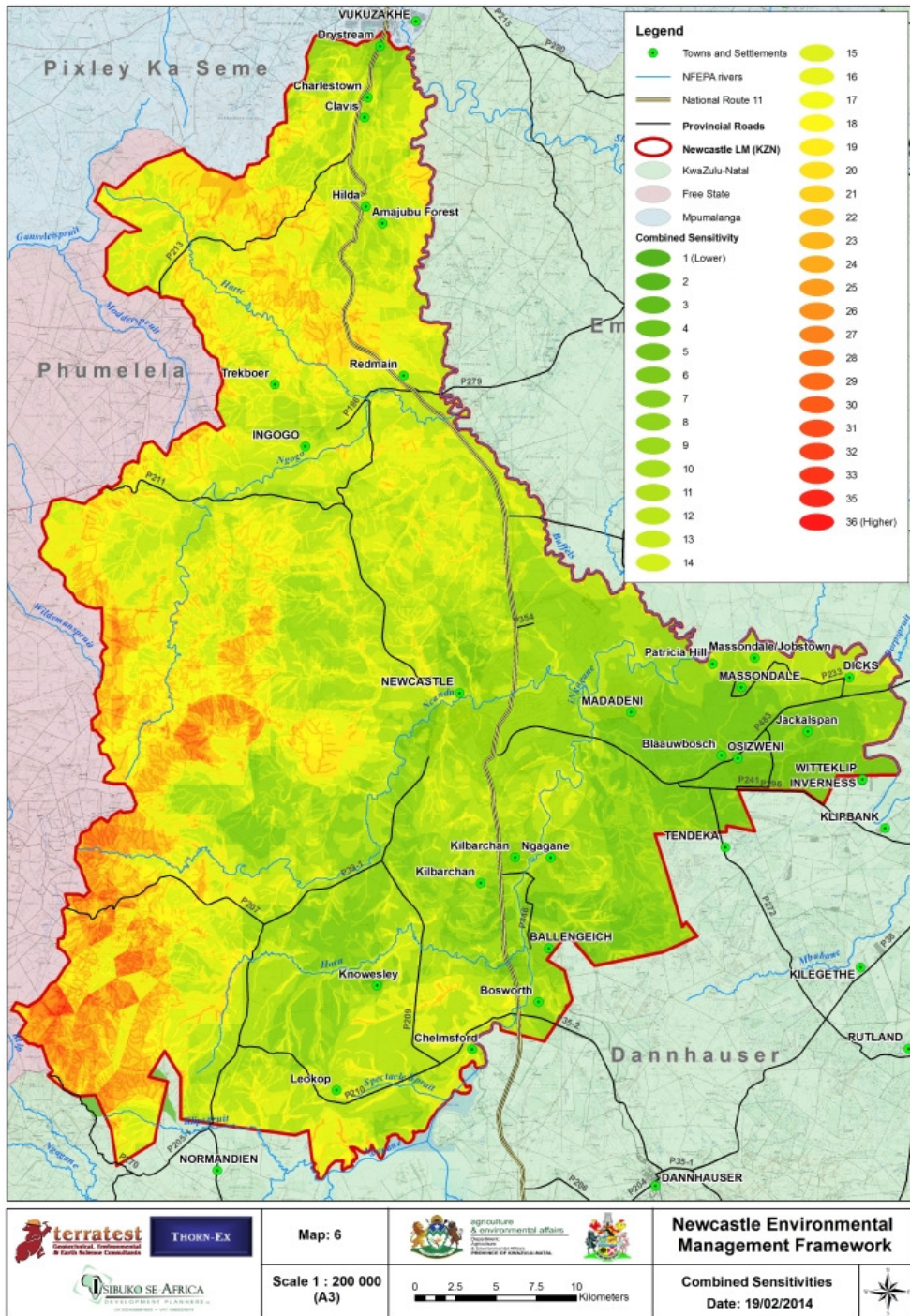
While this EMF is unable to improve the air quality data, a risk averse and cautionary approach should be adopted in development, and the next reiteration of the EMF should afford priority to the delineation of air quality zones.

⁸ The airshed is a geographical area or a region within which an air pollution problem is largely "contained" because of the combined effect of the topography and local atmospheric conditions.

⁹ The Amajuba District Municipality is in the process of finalising an Air Quality Management Plan for the District (near completion in April 2014). The Department of Development Planning and Human Settlements of the NLM has also commissioned a local air quality study to inform future reviews of the IDP and SDF and to form part of the municipality's package of plans (as of April 2014 the status of this project was reported as "Inception Phase").

3.8 Combined environmental sensitivity

The final result of the environmental sensitivity analysis is shown in **Map 8** which represents an integration of all the data layers into a single spatial data layer with the respective ratings and values combined into a single record for each spatial facet. This 'environmental sensitivity index' provides an overview of the relative sensitivity of different areas in the municipality. The new data that is created in this way helps to evaluate and understand the study area and is the first step in the process of defining the future of the area.



Map 8: Combined environmental sensitivity

The inherent environmental sensitivity shows the areas that would be most affected by land use (change) if development is allowed to proceed in an uncontrolled manner. When interpreting the sensitivity map it is important to understand the following:

- A range or spectrum of sensitivity is presented and not single values (i.e. a spatial facet may contain various features of sensitivity).
- Care must be taken not to interpret a specific area as less sensitive than another. A higher value must be interpreted as an area that contains ‘more resource issues’ than another area with a lower “combined total”.
- The extent to which development control must be implemented depends on the status of the specific attributes in question.

The results of integration show that there are more sensitive attributes in the western mountainous areas than in other areas of the municipality which imply that these parts of the study area may be more susceptible to change with a higher risk of resource damage than the eastern parts. As such development control in areas with high sensitivity values are likely to be more stringent. On the other hand the whole area is inherently sensitive from a water resource perspective which means that stringent development control will be required to protect water resources.

3.9 Geographical areas

The environmental sensitivity zones provide the basis for identifying geographical areas¹⁰ in which specified activities may not commence without environmental authorisation, or in which specified activities may be excluded from environmental authorisation¹¹. In other words, the status of natural features is used to estimate suitability for development, and the EMF needs to offer guidance on how development should respond to the current status of environmental attributes. In this approach it is important to remember that:

- The sensitivity analysis does not explain how resources relate to and interact with each other but merely offers a snap-shot view of the intrinsic environmental attributes of the area. For example, it does not explain the interrelationship between biodiversity and hydrology, and the importance of maintaining ecological infrastructure for water production.
- The different environmental features are structural landscape elements. Although individual elements may be inherently sensitive to change, they are also **interconnected** and collectively form ‘the environmental system’ of the area. It is this network of elements that offer **ecosystem goods and services** to humans upon which they build their livelihoods. The material and energy flows in the landscape, and the relationship between pattern and function, should therefore not be neglected in impact assessment.

¹⁰ The DEA EMF Guideline (2012) defines this as “a logical spatially demarcated area defined by an EMF as being sensitive, requiring specific management intervention to ensure its future environmental integrity”

¹¹ Section 24(2) of NEMA enables the MEC with the occurrence of the Minister to identify geographical areas based on environmental attributes, and as specified in spatial development tools adopted in the prescribed manner by the environmental authority, in which ... (b) specified activities may not commence without environmental authorisation from the competent authority ...or (c) specified activities may be excluded from authorisation from the competent authority, and (d) activities contemplated in (b) above that may commence without an environmental authorisation, but that must comply with prescribed norms and standards.

3.10 Summary of opportunities and constraints

The EMF must secure environmental protection and promote ecological sustainability for achieving a sustainable society in the future. Within context of the Newcastle Sustainability Framework as proposed in section 2.2 of this report the desired environmental sustainability outcomes for the environmental systems in the area can be summarised as follows:

DESIRED SUSTAINABILITY OUTCOMES

- 1. TOPOGRAPHY:**
The disturbance of the natural landscape is avoided, minimised and/or remedied.
- 2. AGRICULTURAL RESOURCES:**
Scarce non-renewable agricultural resources are managed and conserved and the use of such resources is sustainable.
- 3. BIODIVERSITY:**
South Africa's biological diversity are managed and conserved and the use of such resources is sustainable.
- 4. HYDROLOGY/WATER RESOURCES:**
Water resources are protected, used, developed, conserved, managed and controlled in a sustainable manner.
- 5. SOCIO-CULTURAL (HERITAGE):**
Heritage resources of cultural significance or other special value for the present community and for future generations are protected and managed as part of South Africa's national estate.
- 6. AIRSHED:**
The quality of the air is protected and enhanced. The environment is not harmful to the health and well-being of people, and air pollution and environmental degradation is prevented.

In order to achieve these outcomes every bit of the available land has to be used in the most rational manner, which means that development must respond to the status of environmental attributes and the desired spatial objectives which are informed by policy requirements.

However, the desired future state for the area must also acknowledge that human beings are part of nature and not separate from it. The next section of the report therefore considers the development pressures, trends and needs of the area in order to determine what can realistically be achieved in the area and how the EMF must guide the selection and implementation of sustainable development options (i.e. options which allows for the achievement of appropriate and justifiable social and economic goals without compromising the natural systems on which it is based).

4. DEVELOPMENT PRESSURES, TRENDS AND NEEDS

4.1 Introduction

Understanding human needs, the activities that are designed to meet these needs, and how such activities are modifying the land's surface, is an important first step in being prepared to deal with issues (stresses) related to environmental management. The purpose of this section is therefore to consider:

- The underlying socio-economic needs of society;
- The general direction of change;
- The key factors (issues) that reduce the development potential of the area; and
- The areas that are under pressure and which may need development control.

The main method of assessment used in this section was to compare the sensitivity (potential) of the area with the existing and desired spatial patterns of various sectors to identify the opportunities and constraints associated with the key development sectors in the area, and to identify areas of potential land use conflicts¹².

4.2 Drivers of environmental change

Development potential and challenges

The local climate regime, scenic landscapes, the abundance of water, and agricultural potential created an area that is highly suitable for human settlements. The occurrence of minerals, especially coal, and the introduction of steel manufacturing in the 1970s by the former government (i.e. ISCOR) to promote industrialization in the area, played an important part in human development and growth in the area. The rich cultural history of the area also influences the opportunities for growth in the tourism sector.

Today Newcastle is the third-largest urban centre in KwaZulu-Natal, and the biggest municipality in the Amajuba District. It is categorised as a secondary or intermediary city which means that it plays an important role as a catalyst for development and a driver of economic growth.

The area has good road network connectivity via the N11 Road and R34 with linkages with the main economic hubs in KZN and Gauteng, and the Durban-Johannesburg railway line also traverses the city. In addition to these advantages the city offers higher order commercial services, industrial infrastructure for clothing manufacturing, good electricity infrastructure, abundant land, agricultural and mineral resources, and planned housing projects for decent living conditions in sustainable settlements.

It is evident that Newcastle has huge potential for further growth. It also has the population thresholds to support development. However, the area is facing a number of developmental challenges that drive change and will influence local socio-economic activities with a direct positive or negative impact on the environment. Some of the key challenges include:

- A large population with a high dependency ratio¹³ and a high unemployment rate
- High mortality rates due to HIV-AIDS
- High urbanisation
- Undiversified economic base
- Unstable economic environment
- Funding and internal capacity problems
- Community needs that exceed available resources
- Huge backlogs in service delivery (housing, water, sanitation)

¹² The information that is collected in this way will be used by the EMF to steer growth and development to areas that are not environmentally sensitive and/or under significant pollution pressure, and to design performance standards for maintaining the use of such land.

¹³ The dependency ratio is an age-population ratio of those typically not in the labour force.

The state of bulk water services is also a key development challenge with the following constraints to future development:

- Bulk Water Infrastructure
- Water sources inadequate
- Water purification plant needs upgrade
- Waste water treatment plant need upgrade
- Ageing Infrastructure

The development challenges, which reflect the underlying needs of society, will drive environmental change in the area. The need to provide infrastructure and basic services to increase people's standard of living and to grow the local economy will influence the overall patterns of consumption and production, exert pressures on the environment, and be the sources of potential conflicts in the use of land.

Political agents of change

The political agents of change include the policies and programmes at a national, provincial and local level. Some of these policies are pro-growth (make South Africa globally competitive) while others adopt a more socially orientated approach to development. Similarly there are a range of environmental policies that have a direct bearing on sustainable environmental management and resource protection. The extent to which these policies will drive environmental change in the EMF area will depend on their translation into the local policy. To this end the local municipal council has localised these policies¹⁴ in its Integrated Development Plan (IDP) and has set a long-term development vision for the area that reads as follows:

BY 2030 NEWCASTLE MUNICIPALITY WILL BE A SUSTAINABLE ECONOMICALLY VIBRANT CITY REGION THAT AFFORDS ITS CITIZENS A HIGH QUALITY OF LIFE

The IDP also reflects the development strategy of the area and the goals that seek to address local development challenges. Environmental sustainability is included as a development goal and the 2013-2014 IDP recognises the EMF as a key instrument to facilitate environmental quality and sustainable development. The application of the EMF in the processes by which council makes decisions in future will therefore be critical in driving positive change in the area.

The municipality's Spatial Development Framework (SDF) is a strategic spatial development plan to assist in the execution of the IDP. Once approved by council the SDF can be a powerful agent of change as it provides a useful tool with which to guide and inform all planning, land management, development and spatial decision-making in the municipality. However, the SDF must reflect the spatial environmental priorities of the area, and it must contain a strategic assessment of the environmental impacts of the SDF to ensure that it drives change towards environmental sustainability. The EMF will enable the municipality to strengthen the SDF.

Other political agents of change include policies and sector plans from national and provincial organs of state that may not yet for some reason be aligned with the municipality's IDP and/or SDF. The uncertainty of government's plans for mining in the EMF area is an example of such misalignment. The extent to which this sector will drive environmental change is yet to be seen.

¹⁴ A description of the national and provincial policies that informed the municipality's IDP for 2012-2017 can be found in section 2 of its IDP (2013/2014 review). This review did not include environmental policies that have a bearing on municipal governance.

4.3 Key sectors

The Newcastle Local Municipality's economy is underpinned by a number of sectors that need to grow in order to meet the needs of society. The manner in which these sectors exploit the opportunities in the landscape is important as it may drive change with a direct positive or negative impact on the environment. The expectation is that every bit of the available land has to be used in the most rational manner in order to make a positive contribution to sustainable development

The key development sectors in the landscape are shown in **Map 9**¹⁵ and include:

- The built environment (urban areas)
- Industry
- Agricultural
- Conservation and protected areas
- Mining
- Open space

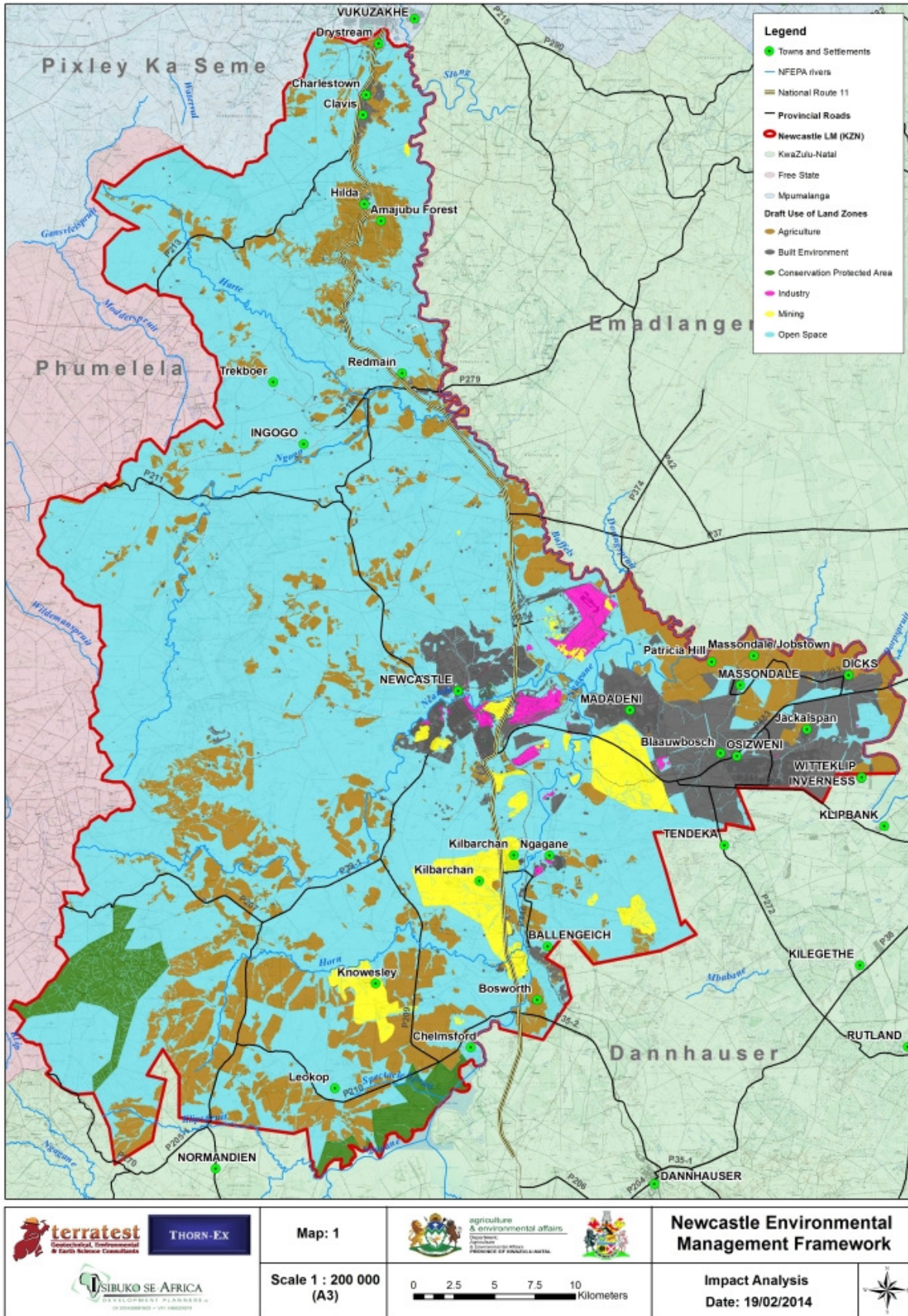
The desired future use patterns of the various sectors, as depicted in the Newcastle Local Municipality's Spatial Development Framework (SDF) are shown in **Map 10**. It includes information about the tourism sector (i.e. a proposed tourism corridor) but excludes the desired future use patterns of the mining sector. Further analysis was therefore undertaken to predict potential environmental change associated with the mining sector.

Map 11 shows the key areas that were identified by the municipality for development intervention in the short to medium term (i.e. 5-10 years in spatial planning terms). As such they represent areas that will be modified by development with a direct positive or negative impact on the environment. These areas will be the subject of Local Area Development Plans (LADPs) as part of the hierarchical planning system of the municipality to facilitate practical implementation of the SDF¹⁶. Because it is important that the EMF support development planning in the area, the intervention areas offer an opportune entry point for proactive environmental input into the SDF.

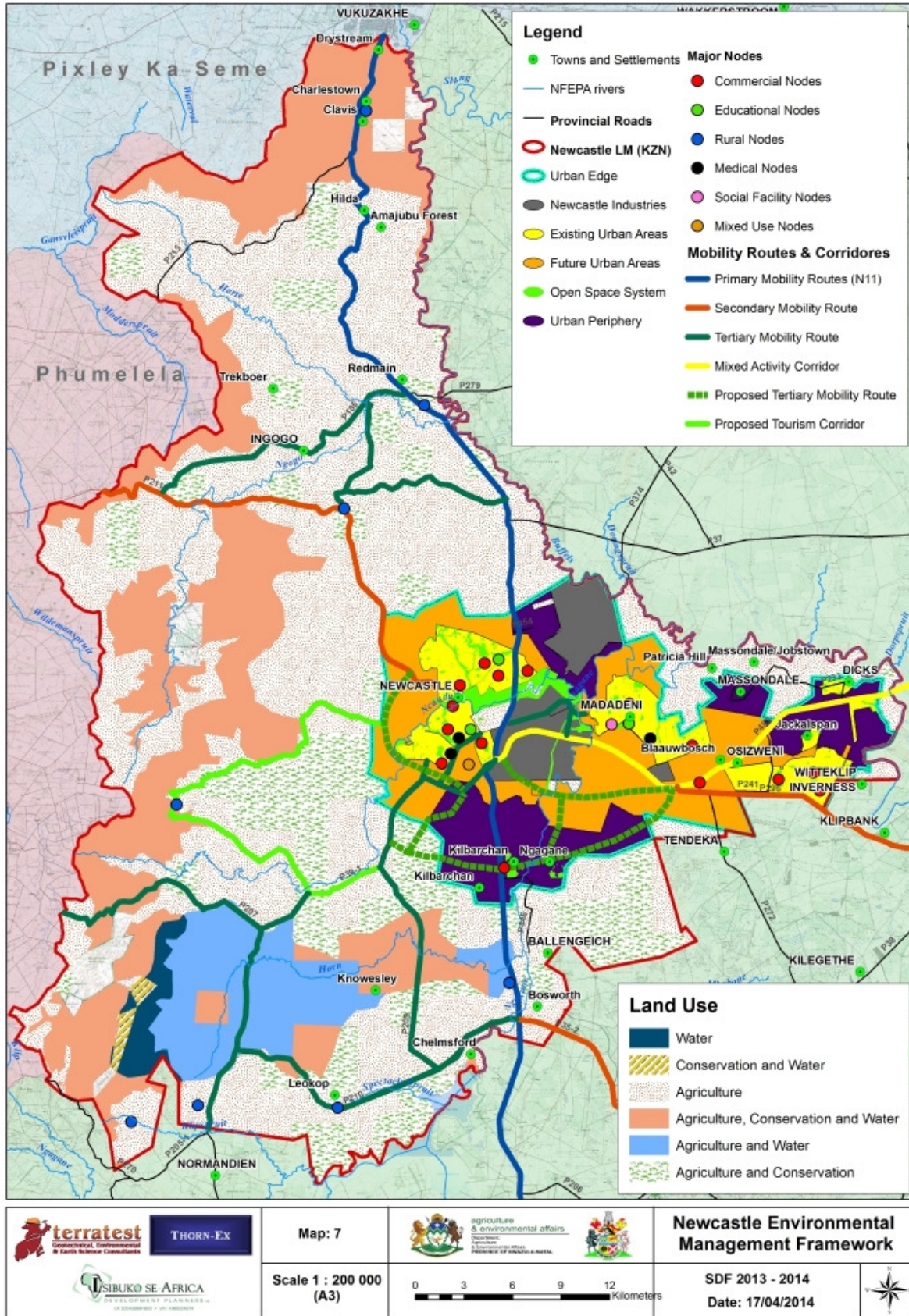
A strategic assessment was undertaken of these existing and potential future use patterns against the inherent sensitivity (potential) of the area to identify the opportunities and constraints and areas of potential land use conflicts. The results of this assessment of the key sectoral trends are presented below.

¹⁵ The use of land coverage was consolidated into this basic framework of land use zones to facilitate a strategic assessment of the existing spatial patterns in the area against the inherent sensitivity (potential) of the area

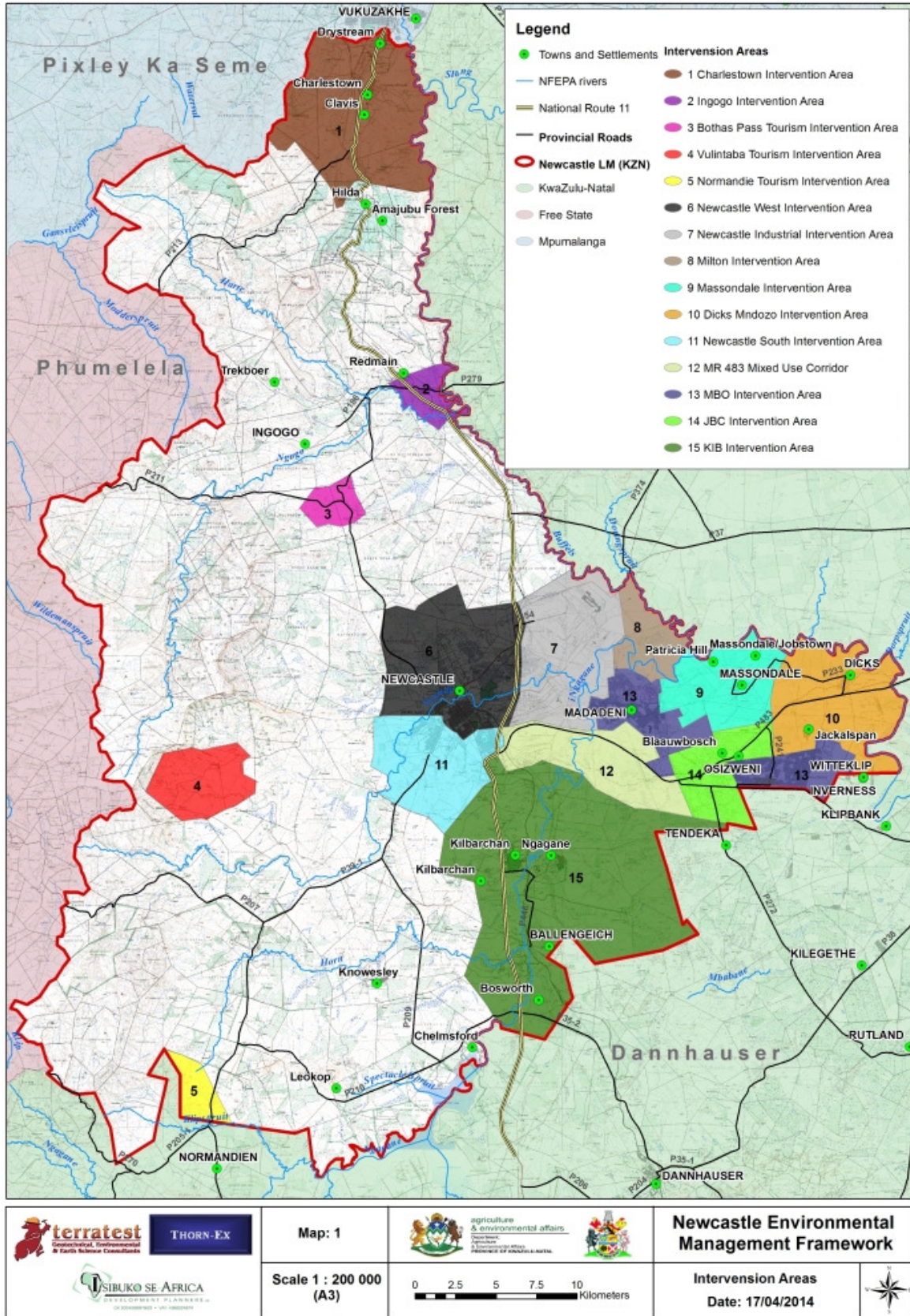
¹⁶ The LADP for each area will set out a development planning vision and serve as a base for guiding planning policies of an area. The plan (LADP) also provides a strategy for proper planning and sustainable development of an area. The EMF can therefore influence the framework on how an area will develop moving forward in the next 5-10 year period.



Map 9: Existing use of land (impact analysis)



Map 10: Proposed use of land – SDF, 2014 (impact analysis)



Map 11: Municipal Wide Intervention Areas (SDF, 2013)

4.3.1 The built environment (urban areas)

The built environment provides the setting for human activity and encompasses places and spaces created or modified by people including buildings, parks, neighbourhoods and cities, for the benefit of society. It is also the setting for supporting infrastructure such as water supply, energy networks and transportation systems. In the study area, settlements vary from a highly urban Newcastle town, peri-urban settlements and small isolated farm-dweller or rural settlements such as Charlestown and Ingogo in the north, and Kilbarchan, Ingagane and Ballengeich in the south-east. The highly urbanised component comprises three distinct sections, namely Newcastle West, a central industrial area, and Madadeni and Osizweni to the east. According to the 2008 land cover approximately 11 600 ha (6.28%) of the land area is urban.

**The central industrial area was historically developed as a buffer between the former white areas in the Newcastle West and the former black only townships of Madadeni and Osizweni. For the purpose of this sectoral use of land classification/assessment the industry sector has been excluded from this use zone but is addressed as a separate sector in the next section.*

Opportunities

This use zone plays a major role as provider of employment, shelter and services; centres of culture, learning and technological development. The built environment is also a dynamic scenario that changes over time and which represent the 'product' of urban planning, architectural design processes, and construction and processing activities. The key opportunity for advancing sustainable pathways therefore lies in good urban planning that reduces the concentration of environmentally negative impacts by using the available land in the most rational manner. In this regard there is an opportunity to mainstream the environmental objectives as identified by the EMF with the hierarchical planning system of the municipality in order to avoid undesirable impacts on the sensitive environmental attributes of the area.

Positive trends and opportunities in the built environment (urban areas) include:

- The primary footprint of the built environment is located on relatively flat terrain where water erosion risk is generally low.
- Planned settlements are generally not located in areas with irreplaceable and/or threatened agricultural land. There is an opportunity to avoid urban encroachment onto scarce agricultural resource areas.
- Critical biodiversity areas are located outside existing settlement areas. There is an opportunity to integrate these areas into spatial planning and to promote urban expansion that is compatible with the biodiversity objectives of such areas.
- Public health can be improved by promoting better integration between communities and the remaining natural features in urban areas. This is of specific relevance to the highly urbanised Newcastle town and the townships of Madadeni and Osizweni which are subject to pollution pressures. The integration of natural features into spatial planning can aid carbon sequestration and air quality enhancement.
- Public health can also be improved by prioritising the development of infrastructure in areas that are subject to severe pollution pressures. For example, there are areas in Madadeni-Osizweni where polluted water seep from underground sources into the landscape where it is exposed to school children.
- The abundance of features with cultural value and historic significance can be valued parts of the built environment and the local economy, especially in the Newcastle town. There are also cultural heritage-based tourism opportunities in the larger MBO area.
- There are open spaces in urban areas with densification potential because it is highly degraded. The use of such land for infill development should be encouraged.

Constraints

The following factors are substantially influencing the development potential of the area and/or may have a significant future impact on the environmental attributes of the area:

- The level of land degradation in open spaces is a concern, particularly in the MBO area. The erodibility of the soils in these areas is high and the current management practices increases the area's erosion hazard.
- Unplanned informal settlements are creeping onto areas with agricultural potential and/or areas with important natural resources.
- The level of transformation in the eastern MBO areas is a concern. Approximately 72% of the Income Sandy Grassland that historically occurred in the area has been transformed (the ecosystem status of this vegetation type is now endangered) and urbanisation has impacted negatively on wetland vegetation types. The degraded status of the remaining land in this area in conjunction with the current status of development, and the proposal for future development is likely to cause adverse effects on aquatic biodiversity priorities in the area.
- The expansion of the urban environment will be restricted by land that contains biodiversity priorities and/or high value agricultural land.
- Urbanization has altered the hydrology of the area. The prevailing stormwater strategies in the central urban area are not suitable to mitigate environmental impacts because property damage from flooding occurs regularly, channel erosion is taking place and habitat is being degraded. Settlements also occur in areas at risk from floods.
- Pollution from urban run-off, sewage and untreated discharges of wastewater treatment works and industries are adversely affecting many water bodies, leaving the area with unsafe water supply. Pollution of waterways and groundwater resources also occur as a result of past mining activities.
- The availability and use of water is a key concern. The intensity of demand has potential to quickly exceed local supply. Households and industries have little incentive to conserve water, primarily because of the low price of water.
- The vulnerability of the shallow aquifer in the MBO area to pollution is a concern. The state of infrastructure and services that are supposed to absorb impacts and protect the aquifer intensifies this concern.
- There is vacant land or under-utilised areas in the central urban area that are undermined or potentially contaminated as a result of past environmentally damaging production techniques and inadequate waste disposal. This restricts infill development
- Settlement planning may be constraint by pollution levels in the area, primarily as a result of industrial activities. Urban transport contributes to air pollution.
- The deteriorating condition of the environmental systems in the MBO area in conjunction with the lack of adequate water, sanitation, roads and stormwater infrastructure creates environmental hazards to the urban poor. Human vulnerability is therefore a key concern.

Stakeholder needs and potential land use conflicts

The following needs were expressed during the second round of stakeholder consultation:

- Settlements occur in areas at risk from floods. This issue was raised as a key concern by local leaders who claim they have no control over the choices made to settle in such areas.
- Water-borne diseases such as diarrhoea and other infections were mentioned by stakeholders who are concerned about the state of sanitation in areas with shallow aquifers. The impact of cemeteries on groundwater quality and acid mine drainage is also of concern to stakeholders.
- There is a need to improve the availability of water for livestock in the MBO area.
- There is also a need for improved lighting (“Apollo lights”) to curb crime.
- The state of information about the heritage features in the eastern parts of Newcastle must be improved as there may be resources with heritage significance that warrant protection.
- The “dual planning system” in the area, which refers to the formal land use management of local government vs the informal land use management of traditional leaders, was raised as a concern.

Urban expansion will compete with other sectors for natural resources. The following areas of potential land use conflicts may arise:

■ **Urban expansion and biodiversity:**

The municipality’s SDF shows that the future direction of growth will encroach onto Biodiversity Priority Areas. As the conservation status of these areas indicates that they should remain in a natural state with limited to no biodiversity loss, land use conflicts are to be expected. The areas that will be most affected include the Newcastle South Intervention Area and the north-western parts of the KIB Intervention area. The transformation of these areas for the benefit of urban expansion will not enable the achievement of biodiversity targets but will contribute to urban growth.

■ **Urban expansion and agriculture:**

The municipality’s SDF shows that the future direction of growth will encroach into high value agricultural land areas which are deemed irreplaceable or threatened. As the conservation status of these areas indicates that they should be reserved for food production, land use conflicts are to be expected. The areas that will be most affected include the Newcastle West and South Intervention Areas and the Vulintaba and KIB Intervention areas. The transformation of these areas for the benefit of urban expansion will compromise the country’s food security objectives. Reduced contributions of the agricultural sector to the local economy, and potential loss of job creation opportunities must also be taken into account.

Sector priorities and desired state

The built (urban) environment disturbs the natural landscape through land transformation and due to land degradation as a result of soil erosion which damages drainage networks and causes a decrease in surface water quality due to sedimentation. It also contributes to the declining quality of the air as a result of transport systems, waste facilities and domestic burning of fuel. Expansion is also associated with a risk of damage to heritage resources and local values. However, the most significant pressures originating from this sector are causing, and are likely to cause:

- Deterioration of the region’s water resource;
- Ecosystem stress through biodiversity loss; and
- Loss of high potential agricultural land.

The socio-economic status of a large portion of the population, their level of access to basic services and their exposure to environmental hazards such as toxic air pollutants, groundwater pollution and flood risk is also a major concern. This makes human vulnerability the overarching development priority in the built (urban) environment.

The desired sustainability outcome for the built (urban) environment, as informed by prevailing policy, is sustainable communities. This implies a future where:

- Human settlements meet the needs of their residents while being sensitive to the surrounding ecosystems and natural resources;
- Poverty has been reduced;
- Human vulnerability has been reduced; and
- All residents are enjoying a decent quality of life.

4.3.2 Industry

This use zone provides the setting for manufacturing and trade and it includes a range of light and heavy industrial activities. Light industries include manufacturing of textile, clothing and leather goods; glass and aluminium; and furniture. Heavy industries in this area include steelworks, synthetic rubber, chemicals, and cement.

Opportunities

This use zone is of economic interest and plays a major role as provider of employment. Manufacturing is the largest contributing sector within the local economy. The '*metals, metal products, machinery and equipment*' industry contributes 53% to total manufacturing output within Newcastle, followed by '*petroleum products, chemicals, rubber and plastics*' with 16%. This is largely due to the contribution of major manufacturers such as ArcelorMittal, Siltech, and Karbochem. The '*textiles, clothing and leather goods*' industry is the largest contributing employment sector, followed by the '*metals, metal products, machinery and equipment*' industry, and the '*furniture and other manufacturing*' industries. The prospects for growth in the manufacturing industry are good, despite local economic challenges and negative employment trends. The key opportunity for advancing sustainable industrial development lies in an approach that enhances the human potential of the area ...with production methods and technologies that optimise the inputs required by industry (e.g. energy and water) and minimise and manage the outputs of industry (e.g. various forms of waste).

Positive trends in the industry sector include:

- Industry areas are generally not located in areas with irreplaceable and/or threatened agricultural land. There is an opportunity to avoid industrial expansion onto scarce agricultural resource areas.
- Areas identified with terrestrial biodiversity priorities are not in close proximity of existing industrial areas. There is an opportunity to avoid industrial expansion onto land that is required for achieving biodiversity targets.
- Most heavy industries, which are the main polluters in the area, subscribe to best practice environmental management systems such as ISO 14001 and there is evidence of information disclosure in the interest of public health.
- The sector has taken positive steps to 'decarbonise' their activities. Examples include the CO₂ carbon capture project by Lanxess and the Newcastle co-generation plant.

Constraints

The following factors are substantially influencing the environment and/or may have a significant future impact on the environmental attributes of the area:

- Inadequate stormwater strategies cause land degradation. The Riverside Industrial Area is an example where stormwater strategies are unable to mitigate environmental impacts because channel erosion is taking place.
- Polluted water from uncontrolled effluent is negatively affecting the health of surface and groundwater resources. The effects are primary being felt by downstream water users.
- Industrial pollutants are contaminating land, potentially sterilising such land for future use by other sectors. The land adjacent to ArcelorMittal is an example where land may be contaminated as a result of groundwater and air pollution.

- Industrial development has altered the hydrology of the area. An example is the Ballengeich Industrial Area where the flow of the Ngagane River was altered to accommodate industry's needs. Ongoing water pollution occurs because of the proximity of industrial activities to the river edge. The effect of pollution in the Ngagane River is felt by the water sector that needs to upgrade the Ngagane Water Treatment Works to increase the treatment capacity to treat the deteriorating raw water quality.
- Industrial development occurs in areas of hydrological sensitivity and where the aquifer is highly susceptible to pollution. An example is ArcelorMittal which has been built in an area with relatively shallow groundwater levels. Effluent discharges from this plant are released into a stream that flows into the highly polluted Buffalo River, and there are indicators of groundwater pollution, such as crystallised seepage in the areas adjacent to the plant, that are a concern. Industrial activities such as these place significant pressures on surface and groundwater systems and compromise plans to protect aquatic biodiversity priority areas in the region.
- The combined effect of industrial activities as sources of water pollution, and the impact this may have on the integrity of water systems over time is a concern.
- Pollution from stationary industrial sources is a major component of urban air quality management. Certain industry groups generate routine emissions of hazardous air pollutants (toxic air pollutants) that cause or may cause serious health effects, or adverse environmental and ecological effects.
- Solid waste management practices may substantially influence the environment if appropriate controls are not adhered to.
- Non-compliance with environmental laws due to aging infrastructure or outdated production processes and technologies compromises the ability of the sector to meet best practice environmental standards.
- Weak coordination between the national and provincial environmental agencies, particularly in respect of waste licensing and compliance monitoring, are promoting non-compliance.

Stakeholder needs and potential land use conflicts

The following needs were expressed during stakeholder consultation:

- The emission levels from heavy industries are a concern to the authorities who believe that it is a major health threat to society, especially to the vulnerable poor. Transboundary migration of pollutants from outside the study area is worsening the situation raising concern about the cumulative impacts of air pollutants. A health study must be commissioned for the area.
- The proposed expansion of heavy industry is a concern. The location of future industrial development areas in proximity to residential areas, and specifically vulnerable people, is likely to cause serious health effects. The most suitable land for heavy industries will be away from sensitive receptors and in areas where the pollution load is less significant.
- The state of air quality data is a concern. Decisions cannot only rely on the monitoring data received from industries, who claim they are within limits, while information on the cumulative atmospheric conditions is absent. The data must be improved and local air quality standards should be developed.
- Non-compliance with environmental laws by ArcelorMittal is a major threat. Of bigger concern is this industry's lack of responsiveness in respect of non-compliance.
- There is uncertainty about Siltech's closure plans. Clarity is needed on their rehabilitation plans.
- While light industry typically causes little pollution, particularly when compared to heavy industries, some light industries can cause significant pollution or risk of contamination. The impacts of light industries should not be neglected.

The following specific areas of potential land use conflicts may arise:

■ **Areas that are potentially contaminated:**

It is very likely that industrial pollution has caused contamination of land in the areas surrounding large industrial plants. The exact location of such areas is not known but there are indicators that point to areas of potential contamination such as the land adjacent to ArcelorMittal. The effects of such contamination will be felt by the agriculture sector that uses this land. An inventory of such areas must be prepared and further investigated in terms of the requirements of the National Environment Management: Waste Act (2008). A risk averse and cautionary approach should be applied to any development proposals in such areas.

■ **Industrial expansion in the central industrial area:**

Industry (Karbochem) has apparently expressed interest to expand operations onto land adjacent to the current plant as indicated on the aerial image below. This land is zoned for cemetery with plans to expand over time. According to stakeholders a mining right application has also been lodged in the same area but the exact location could not be established. The area in question is highly sensitive from a water resource perspective and the optimal use of land should be informed by the proposal which would have the least impact on the natural system. The cumulative effects of the proposed development footprint on the area's water resources must also be taken into account.



Photo 2: Aerial image of the Karbochem-Lanxess Industrial Complex

Sector priorities and desired state

The most significant pressures from the industrial sector are causing, or are likely to cause:

- Deterioration of the region's water resource;
- Ecosystem stress through (primary aquatic) biodiversity loss; and
- Pollution of the atmosphere and public health threats.

The desired sustainability outcome for the industrial sector includes a future where:

- Pollution levels will be within legal and best practice standards;
- Nuisance factors such as noise and lighting will not affect the aesthetic quality of the area;
- There will not be threats to human health, livestock and other living organisms; and
- Water and energy use is efficient.

4.3.3 Agriculture

This use zone focuses on farming activities which includes the cultivation of the soil for the growing of crops and the rearing of animals to provide food, fibre, biofuel, medicine and other products used to sustain and enhance human life. It includes forestry and agronomic (field) crops, as well as agro-processing activities such as poultry (broiler and layer production), abattoirs, grain mills and soya processing for biofuel. According to the 2008 land cover classes approximately 12900 ha (7%) of the land areas is used for dryland cropping, and 3800 ha (2%) for irrigated agriculture.

**Grazing lands (open grasslands used for grazing purposes) are excluded from this use zone to facilitate impact assessment but is addressed in the open space use zone (section 4.2.6).*

Opportunities

This use zone plays a major role in the local economy and is expected to play an equally important role in the district, provincial and national economies for some years to come because of the area's production value and the employment opportunities it provide. The key opportunity for the agricultural sector is to optimise the availability of high agricultural development potential in the area by using the resources in a sustainable manner.

Positive trends in this sector include:

- The commercial cultivation of land generally does not occur on land with high erosion susceptibility, primarily because the Conservation of Agricultural Resources Act (1983) strictly controls the cultivation of steep slopes. There is an opportunity to maintain this practice.
- Intensive cropping systems generally coincide with high potential land which are highly compatible with the production potential of the area and which promote national food security objectives. These activities should therefore be supported and encouraged to promote sustainability objectives.
- The forestry sector is well-regulated and implements good forestry practices that should be encouraged.
- The change in agricultural practices to adopt no-till agriculture for agronomic crop production is realising significant benefits in the form of increased yields, reduced soil erosion, improved water efficiency and improved efficiency of fertiliser. These management practices should therefore be supported and encouraged to promote sustainability objectives. Conventional tillage should be discouraged.
- Progress has been made in terms of land reform whereby high potential agricultural land has been transferred to communities in support of achieving the national objective of 30% black ownerships. Land reform projects that will optimise the agricultural resource potential should be encouraged.

Constraints

The following factors are substantially influencing the environment and/or may have a significant future impact on the environmental attributes of the area:

- Previously cultivated areas that lie fallow increase the area's erosion hazard. This is of specific concern in areas to the east of Newcastle on the Buffalo Flats (along the Buffalo River) including Madadeni and Osizweni) where the soils are highly erodible.
- Some subsistence agricultural activities coincide with low (restricted) potential land. These activities represent a risk to sustainable development because they promote land degradation which undermines the productivity of the land.

- The level of fragmentation of Northern KwaZulu-Natal Moist Grasslands (which have a ‘vulnerable’ conservation status) in the south-western parts of the area is significant. Any further transformation and/or fragmentation will increase the risk of damaging biodiversity.
- The expansion of commercial agricultural activities onto land that contains biodiversity priorities is a risk to sustainable development and should be discouraged.
- Intensive cropping systems that involve irrigation are affecting water quality through saline and nutrient enriched return flows. The impact of such irrigation activities on the water quality upstream of the Ntshingwayo (Chelmsford) Dam has been noted.
- Sedimentation as a result of erosion from croplands also affects water quality.
- The use of land for timber plantations reduces hydrological flow. This is specifically significant in the upper catchment of the Ntshingwayo (Chelmsford) Dam which is the primary source of raw water for the municipality.
- The quality of water for irrigation purposes has deteriorated, primarily as a result of past and present mining and industrial activities in the area (and poorly managed mine dumps). Stakeholders also concerned about the presence of heavy metals in the water which makes it unsafe for irrigation.
- The availability of water for on-going agricultural development, in particular irrigated agriculture, is a key constraint to the sector. With the exception of the Ngagane River, the major rivers in the study area presently have no water available for direct irrigation abstraction irrigation. The quality of the water from the Ngagane is however a concern.
- The lack of coordination between organs of state with a mandate and/or interest in agriculture results in duplication of efforts and hampers effective agricultural development in the area. Weak governance is a risk to sustainable development.
- The land reform programme in this area will have significant spatial impact and there is a risk of locating new settlements on high value agricultural land. Land reform projects that will compromise the resource potential or undermine the area’s ability to contribute to the country’s food security objectives should therefore be discouraged.
- The promotion of large-scale irrigation schemes, and agricultural activities such as feedlots and abattoirs present risks to the water resource which are already under stress.

Stakeholder needs and potential land use conflicts

The following needs were expressed during stakeholder consultation:

- Concern was raised about the lack of constructive responses received from the agricultural department when they were approached by communities for assistance to manage invasive alien plants that threatens their resources.
- There is a need to know where the water for the large-scale irrigation proposals in the area will be sourced from, and how the building of additional dams will intensify prevailing water stress in the area.
- The lack of effective leadership in communal areas is a concern to stakeholders who highlighted the informal allocation of land for housing on agricultural land, and conflict between cattle owners and crop farmers.
- A better understanding of the effect of air pollution on food crops is needed.

The agricultural sector will compete with other sectors for natural resources, especially for water to support irrigation. The following areas of potential land use conflicts may arise:

■ **Agriculture and urban expansion:**

The municipality's SDF shows that the future direction of growth will encroach onto high value agricultural land areas which are deemed irreplaceable or threatened. As the conservation status of these areas indicates that they should be reserved for food production, land use conflicts are to be expected. The areas that will be most affected include the Newcastle West and South Intervention Areas and the Vulintaba and KIB Intervention areas. The transformation of these areas for the benefit of urban expansion will compromise the country's food security objectives. Reduced contributions of the agricultural sector to the local economy, and potential loss of job creation opportunities must also be taken into account.

■ **Agriculture and land reform projects:**

Land use conflicts may arise in instances where land reform projects are proposed on high value land for purposes of residential (settlement) development.

■ **Agriculture and biodiversity:**

Land use conflicts may arise in instances where intensive cropping systems are proposed on land that contains biodiversity priorities. Although transformation of such areas will contribute to the country's food security objectives it will compromise the ability of the authorities to achieve biodiversity objectives and to protect a representative sample of all ecosystem types in the country. There may be more alternatives available to support agricultural production than achieving biodiversity targets.

■ **Agriculture and mining:**

There are areas with coal potential located in Category A (irreplaceable) and B (threatened) agricultural land.

Sector priorities and desired state

The most significant pressures from the agricultural sector are causing, or are likely to cause:

- Disturbance of landscape processes through land degradation (soil erosion);
- Ecosystem stress through biodiversity loss; and
- Deterioration of the water resource system.

The sustainability outcome for the agricultural resource base, as informed by prevailing policy, is that scarce non-renewable agricultural resources must be managed and conserved and the use of such resources must be sustainable. Sustainable agriculture implies that:

- Human food and fibre needs are satisfied;
- Environmental quality and the natural resource base upon which the agricultural economy depends is continuously enhanced;
- Non-renewable resources and on-farm resources are used in the most efficient manner and natural biological cycles and controls are integrated where appropriate;
- Economic viability of farm operations are sustained; and
- The quality of life for farmers and society as a whole is continuously enhanced.

The key opportunity for the agricultural sector is to optimise the availability of high agricultural development potential in the area in the interest of the local economy and national food security objectives. Despite the constraints associated with the availability and quality of water for irrigation, there is potential to expand the sector. The shortage of water for irrigation is an opportunity for farmers to reconsider how critical water, land,

and ecosystem resources can be used to boost crop yields. The change in agricultural practices to adopt no-till agriculture for agronomic crop production is a positive change that is producing results for farmers, the environment and society and should therefore be encouraged. But there are still indicators of unsustainable use patterns and more effort would be needed from the sector to internalise the external costs that is being imposed on society through pesticides, nutrient runoff, excessive water use, and other problems.

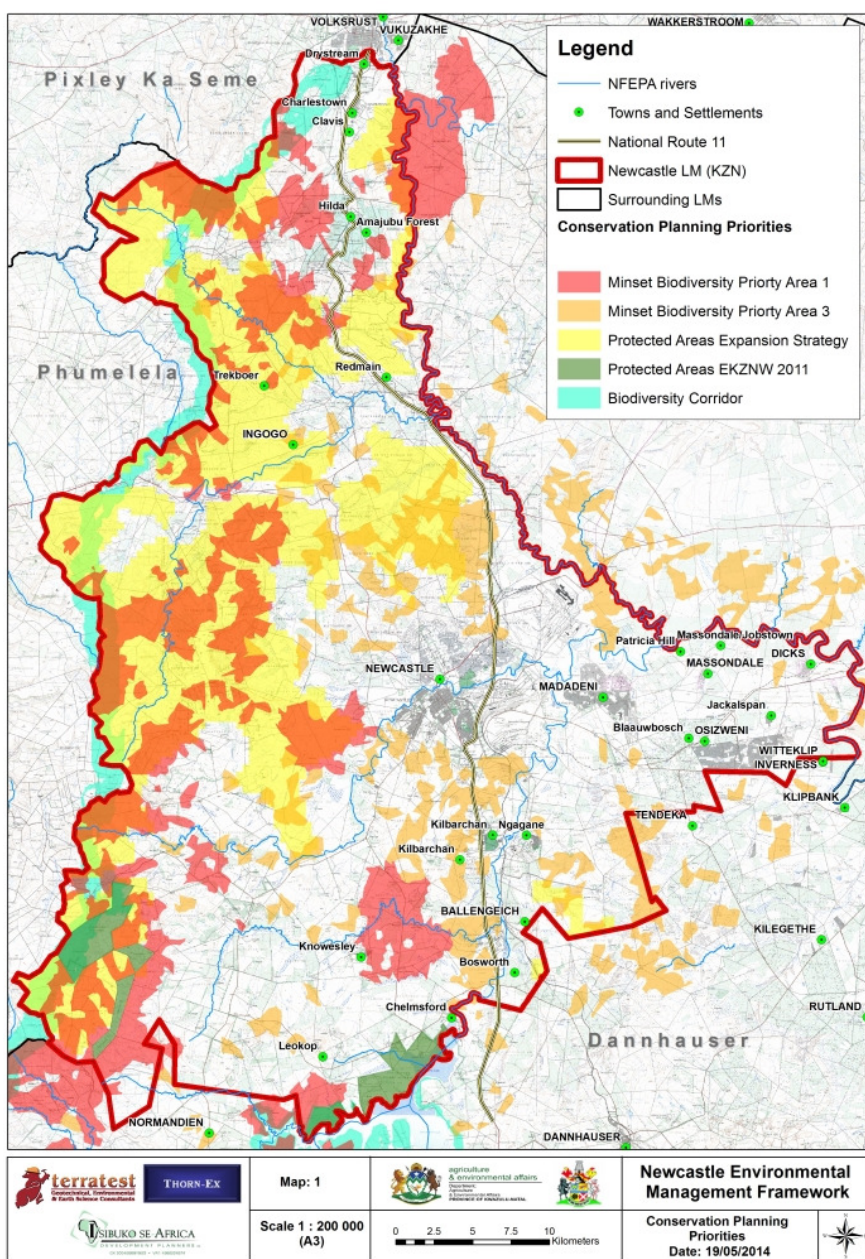
The needs of other sectors must also be taken into account when expanding agriculture. To this end the farming sector needs to consider the need to protect the critical ecosystems upon which the sector depends for services (such as pollination for crops) and make all efforts to avoid the transformation of areas that have been earmarked for conservation planning, or at least use such areas in a manner that can positively contribute to biodiversity conservation.

4.3.4 Conservation and protected areas

This use zone primarily focuses on areas that are formally protected in terms of the National Environmental Management: Protected Areas Act (2003) and biodiversity priority areas that were identified through systematic biodiversity planning in terms of the National Environmental Management: Biodiversity Act (2004). According to the use of land coverage approximately 3450 ha (less than 2 %) of the total land area of the municipality is under formal protection.

Opportunities

This use zone plays an important role in the country's integrated conservation strategy to protect and conserve ecologically viable areas representative of South Africa's biological diversity and its natural landscapes, and in the mitigation of climate change impacts on biodiversity. It is expected to play an increasing important role in the future.



The map shows the areas that are formally being conserved (existing protected areas) and the areas with potential for achieving national conservation objectives. It only includes terrestrial biodiversity areas.

The only formally protected areas are found in the south adjacent to the Ntshingwayo Dam (Chelmsford Nature Reserve), and in mountainous terrain along the western boundary of the area (Ncandu Nature Reserve).

The key opportunity for the conservation sector is to expand the protected areas network in this area over the next 10-20 years in order to achieve national protected area targets.

Map 12: Conservation planning priorities

Positive trends in this sector include:

- The systematic biodiversity planning process in KwaZulu-Natal is well advanced. The planning process encourages efficiency (i.e. achieving biodiversity targets in the smallest area possible) and allows for conflict avoidance. The identified biodiversity priority areas were therefore selected in areas where there are few competing land uses.
- Progress has been made in terms of refining the biodiversity priority areas through the development of a Biodiversity Sector Plan for the Amajuba District Municipality. This plan, which included ground-truthing of the selected areas, is in the process of finalisation and the data will improve planning in the Newcastle municipal area and increase the likelihood of achieving national protected areas and biodiversity targets.
- Progress has been made in terms of voluntary conservation options through the establishment of new stewardship sites in the area.

Constraints

The following factors are substantially influencing the ability of the sector to exploit the opportunities and/or may have a significant future impact on the integrated conservation strategy for the area:

- The timeous availability of data is a constraint. EKZNW is in the process of finalising the Biodiversity Sector Plan for the area. This process has refined the data and identified local corridors. Unfortunately this data could not be used for this EMF because the Board has not yet approved the plan.
- The opportunities for creating protected areas are rapidly lost by the rate of transformation and fragmentation of habitats.
- They key constraint is the lack of long-term security associated with the biodiversity priority areas and the lack of effective mechanisms for assuring that these areas are managed for biodiversity conservation.

Stakeholder needs and potential land use conflicts

The following needs were expressed during stakeholder consultation:

- The Protected Areas Expansion Strategy reduces the thresholds for activities in Listing Notice 3 of the EIA Regulations (2010). For example, for a development within 32m from a watercourse the threshold is reduced from 50m² to 10m² before triggering a Basic Assessment. This means that development activities within areas such as the Botha's Pass Tourism Intervention Area will be subject to stricter development control than is currently the case. This intervention area should ideally be identified for exclusion.

The areas of conservation opportunity were compared with the existing and proposed spatial patterns of the area to identify areas of potential land use conflicts. The following potential land use conflicts are likely to arise:

- **Urban expansion and biodiversity:**
The municipality's SDF shows that the future direction of growth will encroach onto Biodiversity Priority Areas. As the conservation status of these areas indicates that they should remain in a natural state with limited to no biodiversity loss, land use conflicts are to be expected. The areas that will be most affected include the Newcastle South Intervention Area and the north-western parts of the KIB Intervention area. The transformation of these areas for the benefit of urban expansion will not enable the achievement of biodiversity targets but will contribute to urban growth.

■ **Agriculture and biodiversity:**

Land use conflicts may arise in instances where intensive cropping systems are proposed on land that contains biodiversity priorities. Although transformation of such areas will contribute to the country's food security objectives it will compromise the ability of the authorities to achieve biodiversity objectives and to protect a representative sample of all ecosystem types in the country. There may be more alternatives available to support agricultural production than achieving biodiversity targets.

■ **Mining and biodiversity:**

Land use conflicts may arise if mining is proposed in areas that have been earmarked for biodiversity conservation. This is further addressed in the next section that deals with mining.

4.3.5 Mining

This use zone comprises activities of mining, which are defined as the setting of extraction of mineral resources from the earth. The region has a history of opencast and underground coal mining, most of which have been abandoned or decommissioned, and there are several prospecting projects that are currently being carried out within the EMF area. The only coal mining that appears to be taking place is related to dump/stockpile reclamation and there is a char plant and siding stockpiles within the Ballengeich area. Aggregate (dolerite) and sand mining also occurs. Mining of brick clay, in combination with the production of clay-fired and concrete bricks, is also undertaken on a smaller scale.

Opportunities

This zone is of economic interest although the mining sector only contributes 0.7% to total employment in the area. The minerals contained within this zone are vital for construction, manufacturing and energy industries.

Environmental trends in the mining sector are primarily negative because of the residual environmental impacts that have occurred as a result of mining activities, and in particular the pollution of water resources due to mine waste. The key opportunity for this sector is therefore to increase the efficiency of operations throughout the exploration, development and construction, operation, closure and decommissioning stages. The following opportunities could also be used to the benefit of sustainable development and should be exploited by a proactive management approach:

- The Newcastle area is located within the Klip River coal field which is considered economically to be the most important of the KwaZulu-Natal coal fields. Current markets are making previously unviable operations more attractive, and there is potential to yield a generally high grade product which ranks from bituminous coal to anthracite. Torbanite (a form of sapropelic or 'humic' coal) also occurs with potential for exploitation.
- Dump/stockpile reclamation activities occur on old defunct mines because the coal now meets certain low-grade coal specifications. The added advantage of it being located on surface makes this type of operation economically viable, as well environmentally desirable because it assists in the cleaning up and rehabilitation of old mines. The reworking of coal dumps may be feasible for the smaller mining concerns, and highly suited to small Broad Based Black Economic Empowerment (BBBEE) companies.
- There are also potential to extract other minerals such as dimension stone, aggregate, sand and brick clay (all opencast). The environmental risks associated with mining of these minerals are generally low or can be mitigated, and are highly suited as a local economic development activity if the correct regulatory controls are enforced.

Constraints

The following factors are substantially influencing the environment and/or may have a significant future impact on the environmental attributes of the area:

- The legacy of past mining activities is that it has been undertaken with little concern for the environment. Acid mine drainage occurs and it is unlikely that the polluted water resources will ever be completely restored.
- The high potential to exploit coal in the area is associated with high environmental risk, particularly in respect of post closure impacts on the area's water resource which are already under significant stress.

- Abandoned mines are the biggest environmental risk facing the municipality. They pose a health and safety risk, has a detrimental impact on the environment, and encourages illegal mining. A number of decommissioned or abandoned coal mining operations occur in the area. Many of these are underground and their exact footprints are not known. This has an impact on potential land use.
- The decrease in formal mining within the area has led to an increase in the informal mining sector. This often results in the disturbance of rehabilitated ground making it difficult for the mining right holder to obtain a closure certificate. There are number of areas where mining has ceased through decommissioning or abandonment but rehabilitation has either not taken place or is incomplete. This has implications for the environment and for management.
- Many of the quarry activities in the area appear to be uncontrolled with a lack of monitoring of the mining method, plan or rehabilitation. Many quarry activities have resulted in un-rehabilitated depressions that are used as rubbish dumps and/or create health and safety risks for adjacent land uses.
- The mining of sand takes place within large tracts of wetland areas adjacent to water courses. It impacts biodiversity, negatively affects the area's water resources and creates a host of other undesirable consequences. There seems to be a lack of control over these activities.
- The mining of brick clay is undertaken on an informal basis within built settlement areas and adjacent to water courses within the Madadeni and Osizweni areas.
- The lack of accurate mining information, particularly proposed mining, and the general unwillingness of the Department of Mineral Resources to provide access to such information compromises forward planning.
- Despite some evidence of reclamation activities, most of the old mining sites that were investigated for the purpose of this EMF show evidence of off-site drainage breach in pollution control systems. This suggests that regulatory controls in this area are not in place and/or are not effective.

Stakeholder needs and potential land use conflicts

The following needs were expressed during stakeholder consultation:

- General housekeeping rules for managing mines must be improved. The EMF must give guidance.
- The reclamation or reworking of old defunct mines and stockpiles was identified by stakeholders as a desirable activity.
- Leachate from the dump/stockpile reclamation site along the N11 outside Newcastle into the surrounding water courses is a concern.
- Acid Mine Drainage is a major concern and residents have a right to know what government's plans are to address this issue in the region.
- The presence of un-rehabilitated quarries is a concern to residents in the MBO area because it creates safety risks to people and animals. There is a need to fence opencast and abandoned mining areas.
- The Shanduka (Springfield) mine is an undesirable activity because it sustains the negative impacts on the area's water resource. It should ideally be reclaimed and rehabilitated and moved to another site.

Further analysis was undertaken to predict potential environmental changes that may be associated with coal mining in the area by making use of the available data of areas that may hold coal development potential (information on prospecting rights were not shared to inform this EMF). **Map 13** compares the areas with mining potential with the combined environmental sensitivity of the area. The following areas of potential land use conflicts may arise:

■ **Mineral development and agriculture:**

The further development of the mining sector may be constraint by the need to protect certain areas for agricultural production. **Map 14** shows the areas where mining may affect high value agricultural land which are deemed irreplaceable or threatened (i.e. Category A and B). The potential for land use conflicts will depend on the mining method.

■ **Mineral development and biodiversity:**

Land use conflicts may arise if mining is proposed in areas that have been earmarked for terrestrial biodiversity conservation. **Map 15** shows areas where mining proposals are likely to trigger significant conflict¹⁷. The conservation status of the terrestrial biodiversity attributes in these areas indicates that they should remain in a natural state with limited to no biodiversity loss. Mining proposals within the 5km buffer from the Chelmsford Nature Reserve is also likely to trigger use conflicts. In this regard the areas towards the west of Ballengeich will be affected. It is also likely that areas towards the south of Newcastle may contain critical biodiversity areas but this can only be confirmed once Ezemvelo KZN Wildlife has released the Biodiversity Sector Plan for the area.

■ **Mineral development and water resources:**

The legacy of past mining activities, notably the acid mine drainage impacts on the area's water resource, and the hydrological sensitivity of the area may place limits on the extent to which mining development can be advanced in the area. **Map 16** shows the hydrological priorities of the area¹⁸. The conservation status of the attributes in these areas indicates that there are restrictions for mining and prospecting activities because it may lead to the deterioration in the current conditions of attributes.

■ **Mineral development and urban expansion:**

The municipality's SDF shows that the future direction of growth is also likely to create land use conflicts with the mining sector. Areas to be affected include the Newcastle South Intervention Area and the KIB Intervention Area.

Sector priorities and desired state

Although the mining sector contributes to the declining quality of the air, affects high value agricultural land, and has direct and indirect impacts on the area's cultural values, the most significant pressures from the mining sector are causing, or are likely to cause:

- Disturbance of landscape processes through land degradation (soil erosion);
- Ecosystem stress through biodiversity loss; and
- Deterioration of the water resource system.

Pollution of the region's water resources is the overarching concern, and the contribution this sector makes to the deterioration of the area's water resource system will demand tough choices on the extent to which mining should be allowed to exploit the remaining mineral potential in the area.

¹⁷ This map only shows the following biodiversity features: Biodiversity Priority Areas 1 (Minset), protected areas, stewardships sites, threatened ecosystems and macro corridors.

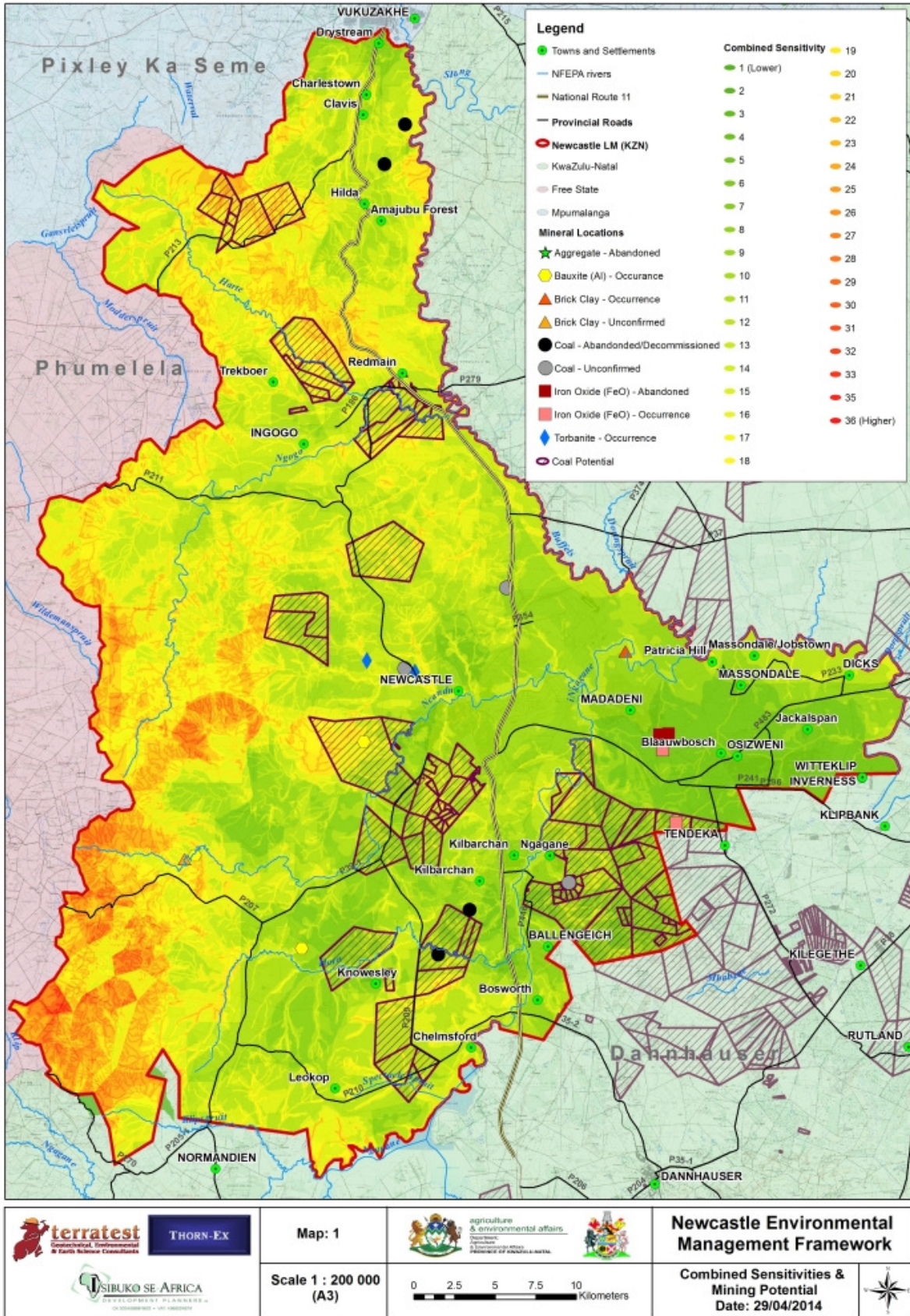
¹⁸ This map shows the following data features: strategic water source areas, dams, rivers, wetlands, dykes and ground water less than 10m from surface

The environmental history of mining activities in this area suggests that this sector's behaviour is far from the ideal. Past mining activities have left the landscape scarred, has caused (and continuously are causing) erosion of drainage networks, and continuously pollutes the water resource through contaminated seepage run-off that threatens people and environmental systems. Illegal mining activities prevail and weak regulatory controls exacerbate the situation.

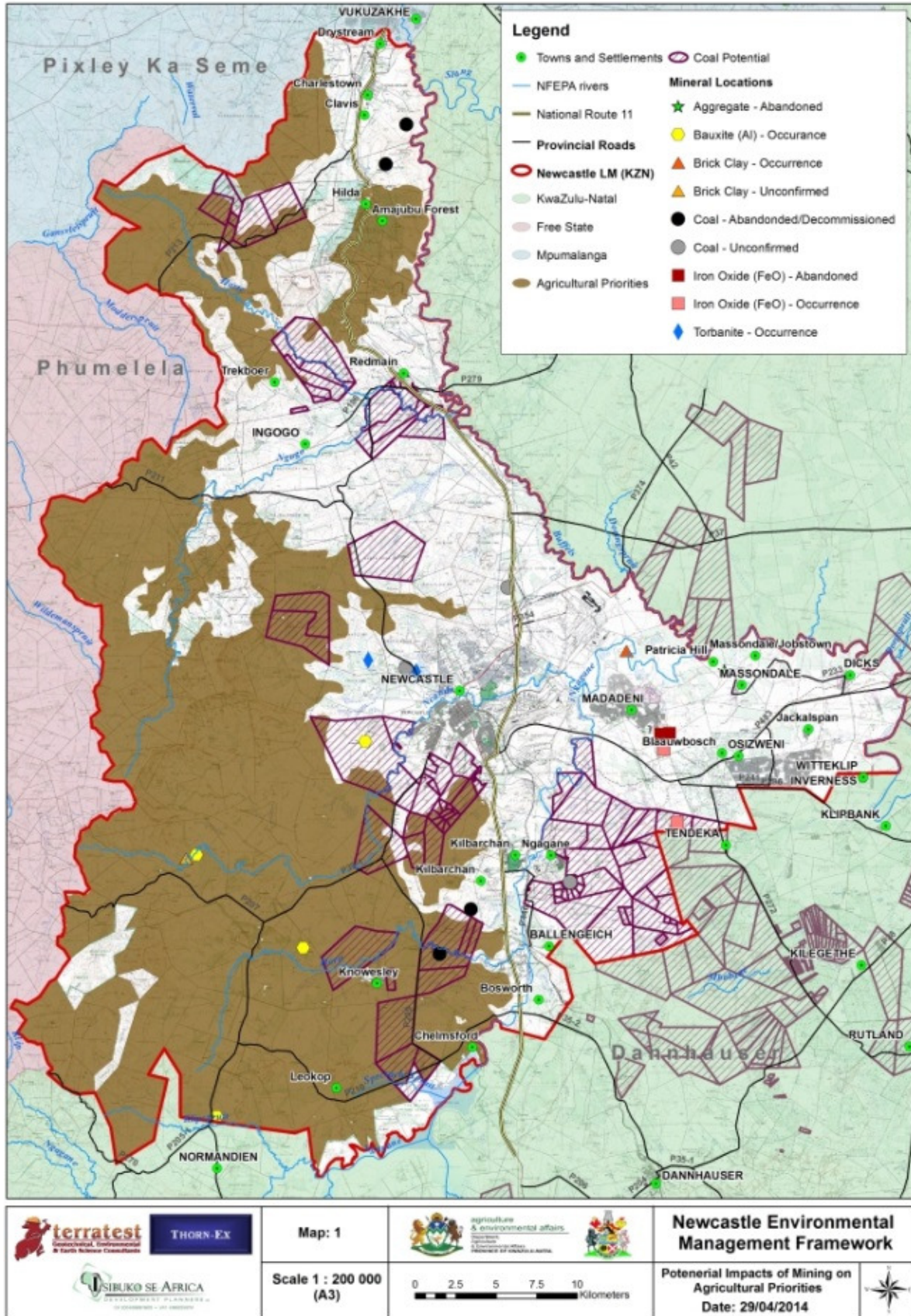
Sustainable development implies the selection and implementation of development options which allows for the achievement of appropriate and justifiable social and economic goals (based on meeting basic needs and equity) without compromising the natural system on which it is based. The observed trends in the sector suggest that mining is not a sustainable activity under the prevailing governance system, and new mining activities are likely to encourage this undesirable trend which will continue to compromise vital environmental systems. The informal mining sector can also not be justified if it is associated with unacceptable environmental, health and safety risks; irrespective of demand and the value it provides to local economic development.

The fact that there is potential to grow the sector, especially for the benefit of smaller mining concerns, needs a risk-averse approach and consideration of the following strategy options:

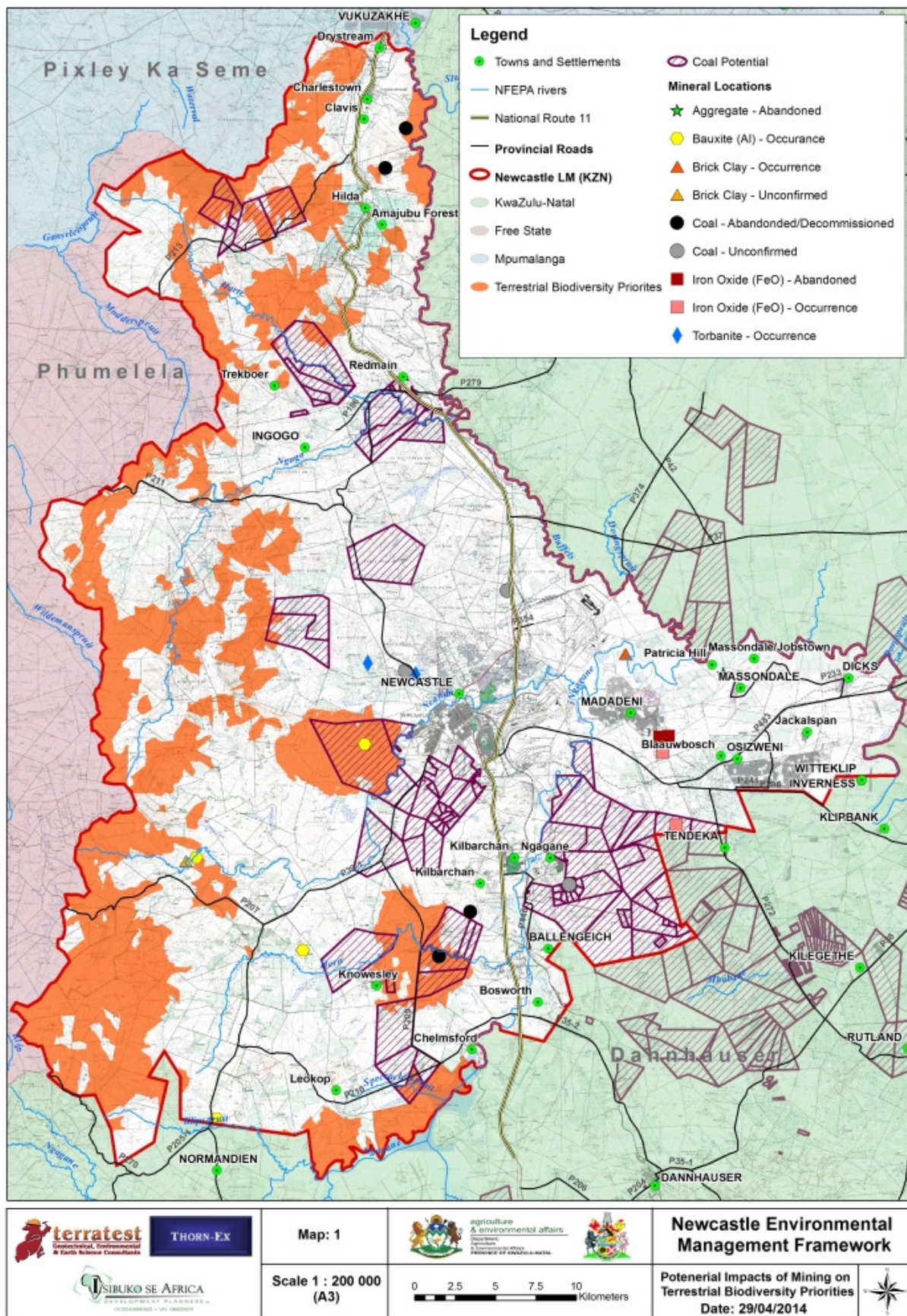
- Reinforcing regulatory controls to address weak pollution control systems at old mining sites;
- Formalising the informal mining sector or facilitate closure of illegal activities;
- Discourage new mining activities in conservation planning areas where the desired state is to keep such areas in tact (no transformation unacceptable); and
- Implement strict performance standards in areas where mining may cause further deterioration of the water resources.



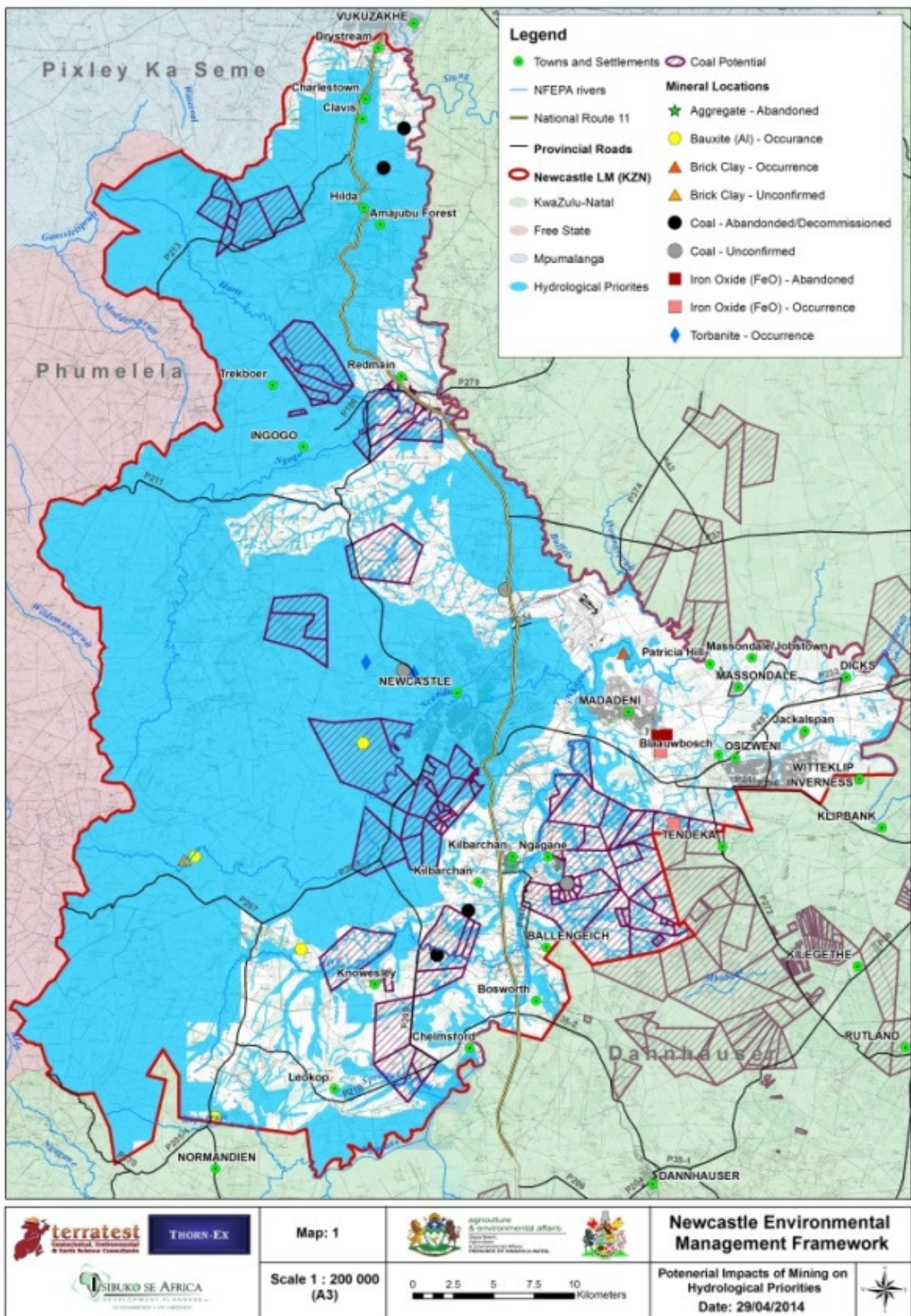
Map 13: Mining potential and environmental sensitivity



Map 14: Potential land use conflicts between mining and agriculture



Map 15: Potential land use conflicts between mining and terrestrial biodiversity priorities



Map 16: Potential land use conflicts between mining and water resource priorities

4.3.6 Open space

The open spaces are the areas of land and water that either remains in its natural state or is used for agriculture. It is primarily privately owned, with some communally owned land in the east and south-east, and is free from intensive development for residential, commercial, industrial or institutional use. According to the 2008 land cover approximately 106200 ha (57.27%) of the total land area is covered with grasslands. Most of these open grasslands are used for animal production (grazing).

Opportunities

This use zone is of economic interest because it offers:

- Rangelands that support commercial and subsistence farming;
- Heritage resources that support cultural tourism;
- Scenic landscapes that support tourism; and
- Ecological infrastructure that produces clean water, stores carbon (to counteract climate change) and enhances air quality.

The commercial farming sector's contribution to the local economy is low (0.7%) but there is potential for growth. Subsistence farming also contributes to the local economy but the benefits from community access to communal lands for wild products and ecosystem grazing services to support their livestock remains unaccounted in economic terms. The tourism sector is currently a small contributor the region's economy but holds 'potential for growth. The contribution of ecosystems goods and services also remains unaccounted.

The key opportunity in this zone is to optimise the "basket of assets" it contains. The following **opportunities** could be used to the benefit of sustainable development and should be exploited by a proactive management approach:

- The general character and quality of the landscape, areas of particular scenic beauty and the rural sense of place provides opportunities for expanding the tourism sector. This is especially true for areas in the north and along the western parts of the area.
- The rich history of the area and well-preserved heritage resources provides opportunities for expanding the tourism sector
- The condition of grazing lands on private land is generally good due to prevailing grazing practices.
- The area contains important water production assets that could be protected and used in the interest of the local economy and the region.
- The area contains a number of vegetation types which are important for conservation. For example, Northern KwaZulu-Natal Moist Grassland and Amersfoort Highveld Clay Grasslands both have a vulnerable conservation status which means there are opportunities to contribute to national biodiversity objectives.
- The area also contains a variety of other ecological assets that could be used to maintain landscape functioning and ecosystem resilience through an interconnected network of protected lands and water. There is an opportunity to integrate these areas into spatial planning and to promote development that is compatible with the natural resource objectives of such areas.

Constraints

The following factors are substantially influencing the environment and/or may have a significant future impact on the environmental attributes of the area:

- Degraded lands occur throughout the area but are more profound in the upper catchment of the Harte and Ngogo Rivers, the areas east of Newcastle and in the KIB Intervention Area. The degraded status of the land is disturbing the landscape through soil erosion which damages the drainage networks and causes a decrease in surface water quality due to sedimentation. Some of these areas coincide with good potential agriculture land classes.
- The condition of grazing lands on communal property is poor.
- High degrees of infestation of alien invasive plants (mostly wattle) occur in the area, especially in the northern parts, along waterways and on the Drakensberg catchment. They displace indigenous species, disturb habitats and disrupt freshwater ecosystem functioning.
- Decommissioned or abandoned underground coal mines occur along the banks of the Buffalo River, west of Kilbarchan, in the KIB Intervention Area and in the eastern MBO area. The areas within which they occur contain sensitive hydrological features such as wetlands and river freshwater ecosystem priorities. It is therefore expected that these areas may already be under water stress due to mine pollution.
- The extent of underground mine areas in this zone is uncertain. They present constraints to land use.
- There are open spaces that are potentially contaminated by leachates from industrial activities and old mine dumps. The areas surrounding ArcelorMittal and the old mine dump within Newcastle town shows indicators of contamination. These areas present constraints to land use.
- The City's open space system is fragmented.

Stakeholder needs and potential land use conflicts

The following needs were expressed during stakeholder consultation:

- The Amahlubi community are concerned about development plans that may affect the areas they utilize for cattle grazing. The grazing areas of concern include Mafuhlawane, Mata, Emoyeni, Drycut, 42, Hudulu and Ntendeka. They are also concerned about water for livestock and expressed a need for livestock dams.
- There are various heritage features in this zone which have not yet been recorded and which are at risk of being damaged.
- The use of land in this zone must be retained to protect the sustainability values it contains. Tourism should be more aggressively pursued in the area and development must not be allowed to encroach onto high value agricultural land and/or biodiversity areas which also have tourism value.
- A wall-to-wall open space system should be developed by the city to accommodate important ecological infrastructure of the region.

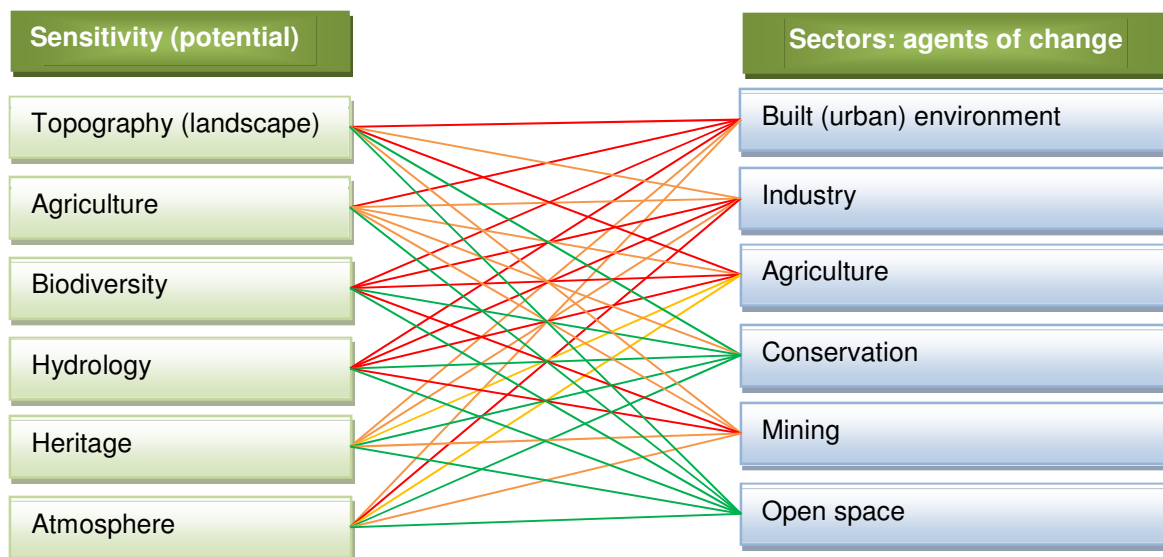
5. ENVIRONMENTAL MANAGEMENT PRIORITIES

5.1 Overview

The strategic assessment identified the sensitive environmental attributes and the relative sensitivity of different areas in the municipality. There are six (6) environmental sensitivity zones that indicate the development potential and/or the land use constraints of the area. These are illustrated on the left in the diagram below.

The key development sectors in the EMF area are illustrated on the right in the diagram. These sectors facilitate environmental change. The manner in which the sectors use, or proposes to use, the resource potential in the area were then explored to create an understanding of how and where land use activities are, or may in future modify the environmental systems in the region.

The diagram serves to illustrate the direct positive (green) or negative (red and orange) impacts on the environment as a result of socio-economic activities. The outcome of these combined impacts is of interest to the EMF whose task it is to secure ecological sustainability by steering development into areas where land uses may best be practiced to promote long-term sustainability.



The sections below distil the environmental management priorities that must underscore this specific EMF and which must become the focus of identifying critically important areas that require effective decision-making.

5.2 Water Resources

The strategic assessment clearly showed that the water resource systems in the EMF area are the most sensitive to change and that it is under severe pressure from development activities. The most significant pressures on the hydrology/water resource systems originate from the mining and industry sectors, while the urban environment and the agricultural sector also contributes to the deterioration of this resource base.

Stakeholders also agreed that water is the primary natural resource challenge in the Newcastle municipal area and water security¹⁹ the overall development concern. Water resources management must therefore be the overarching EMF priority and it must focus the attention of the relevant authorities on the critically important areas within which effective decision-making is required.

The sensitivity analysis showed that there are more issues of water resource sensitivity in the western parts of the area than in the east, but it also showed that there is a range or spectrum of hydrological sensitivity across the whole study area. This is primarily because the EMF area falls within the headwaters of the Thukela catchment and the majority of the rivers in the area drain into the Buffalo River which is the main northern tributary of the Thukela River. All of the drainage basins within the area are therefore of strategic significance to downstream users and substantial disturbance of the area's drainage net is likely to result in undesirable downstream impacts.

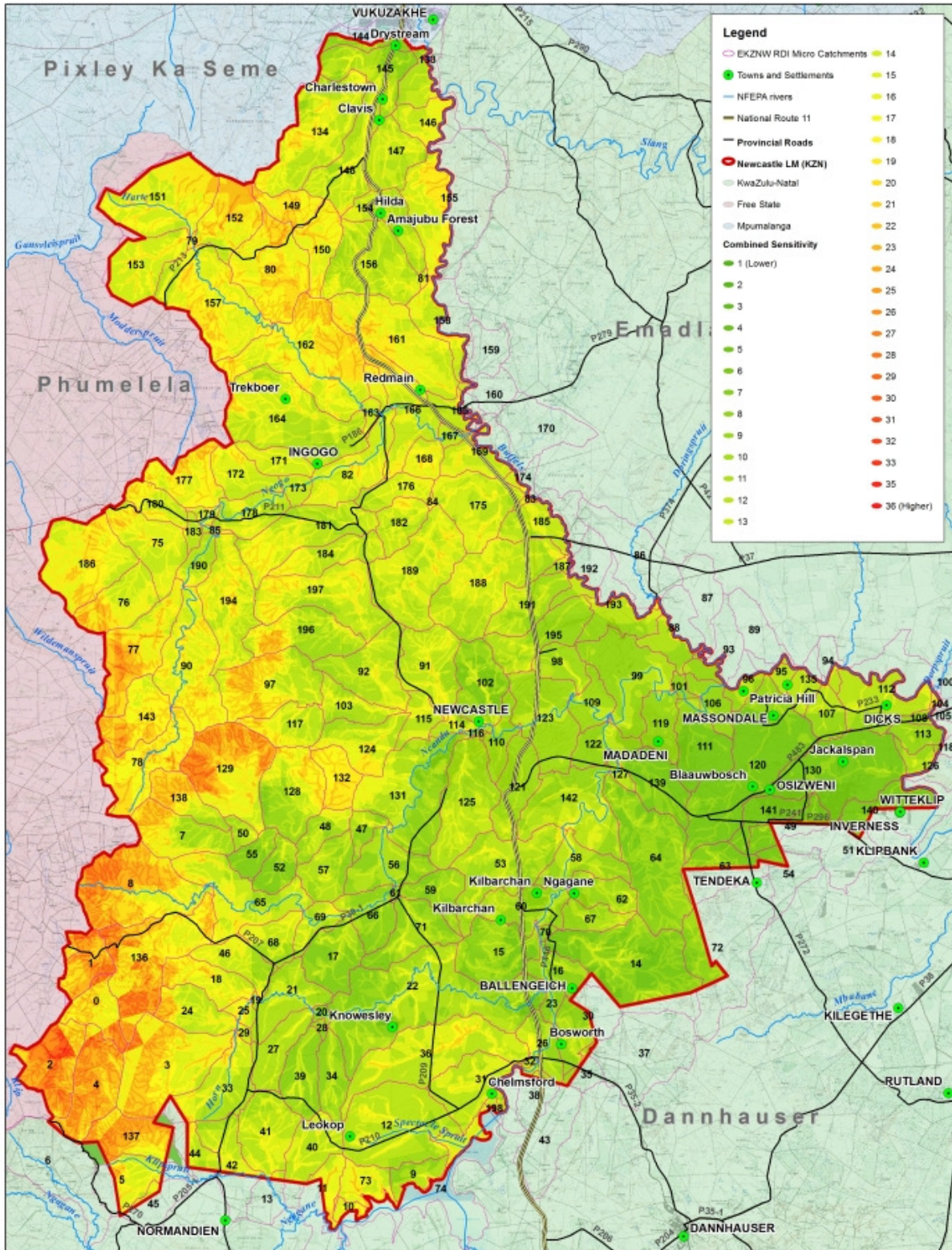
However, there are geographical areas in the west that are critically important for water production and which must be protected for this purpose. There are also areas that are under significant stress that warrant specific management intervention and/or within which development pressure must be controlled to minimise detrimental downstream impacts. These areas are predominantly associated with the municipal-wide intervention areas as identified by the SDF.

In order to inform the exact boundaries of critically important areas for water production it was decided to focus on the small drainage basins of the area which are the building blocks of larger drainage systems. The micro catchments of the area are shown in conjunction with the combined sensitivity analysis in **Map 17** below. These catchments are basic hydrological units which were modelled by Ezemvelo KZN Wildlife (2010) for application in the River Disturbance Index²⁰. They present landscape units which are very suitable for environmental planning purposes because they were modelled based on topography and can therefore be used to create an understanding of the true character of the landscape: the way the land functions, changes and interacts with the life it supports. It is also at this level where the terrain's capacity and the impacts of human activities on landscape features and natural processes can be better understood.

The micro-catchments were used to select critical hydrological constraint attributes to inform the delineation of areas that are important for water production. Recognising the constraints and opportunities associated with each of these micro-catchments is an important step toward forming development guidelines. It can also provide the rationale for defining the spatial patterns of land units, including developable land, open space areas, special use areas, and the urban edge. The added advantage is that these units create linkages between datasets (e.g. biodiversity) and will facilitate policy integration (e.g. COGTA is considering a landscape characterisation project that will also make use of these same planning units).

¹⁹ *Water security is the reliable availability of an acceptable quantity and quality of water for health, livelihoods and production, coupled with an acceptable level of water-related risks.*

²⁰ *River Disturbance Index – an index used to determine the relative condition of the drainage network within one catchment relative to another. This EKZNW data coverage looks at a series of surface land-cover categories and determines a cumulative weighted impact of these land-cover categories within the primary water catchment on the estuarine 'pour-point'.*



	Map: 6		Newcastle Environmental Management Framework	
	Scale 1 : 200 000 (A3)			Combined Sensitivities Date: 19/02/2014

Map 17: Combined sensitivity with micro-catchments

5.3 Air pollution

The second most important issue in the EMF area is air quality which is a major concern to stakeholders. The Newcastle area has been identified as a national air quality hotspot in 2008, and although stakeholders believe the airshed may have reached saturation levels in the central urban area of the municipality, this cannot be confirmed due to gaps in information. There is also not enough information to determine whether the state of air quality in the area has improved since 2008 or not.

The most significant pressures on the atmosphere originate from the industry sector and the built (urban) environment (transport systems, waste facilities and domestic burning of fuel), while the mining sector also contribute to ambient air quality through fugitive dust. Transboundary stresses (pollution transmitted into the area from other airsheds) also occur via air circulation. The result is poor local air quality that creates aesthetic damage, nuisance odour and health threats. The key environmental concern relates to the capacity of the airshed to accommodate more pollution and the potential consequences for sustainability and human-wellbeing if the status quo persists or gets worse. The impacts may ultimately reflect amongst the vulnerable poor who are already susceptible to various health hazards. The areas which are most under pressure include the highly urbanised Newcastle area, and in particular the townships to the east which includes Madadeni and Osizweni.

5.4 Biodiversity

The strategic assessment showed that sensitive terrestrial and aquatic biodiversity attributes are distributed across the greater part of the landscape. The most significant pressures on the terrestrial biodiversity of the area originate from the agricultural sector, the built (urban) environment and the mining sector. The most significant pressures on aquatic biodiversity originate from the mining and industry sectors while the built (urban) environment also contributes to the degradation of aquatic biodiversity systems.

The key environmental concern relates to the ecosystem status of terrestrial ecosystem types occurring in the area, and the limited extent to which the municipal area contributes to the formal protection of representative and viable samples of the country's biodiversity resource base. The extent of transformation and degradation in the central urban areas is also of concern. If the municipality wants to reduce human vulnerability and respond effectively to climate change it needs to incorporate sensitive and degraded biodiversity features into the urban open space system to build ecosystem resilience and reduce the risk of natural disasters .

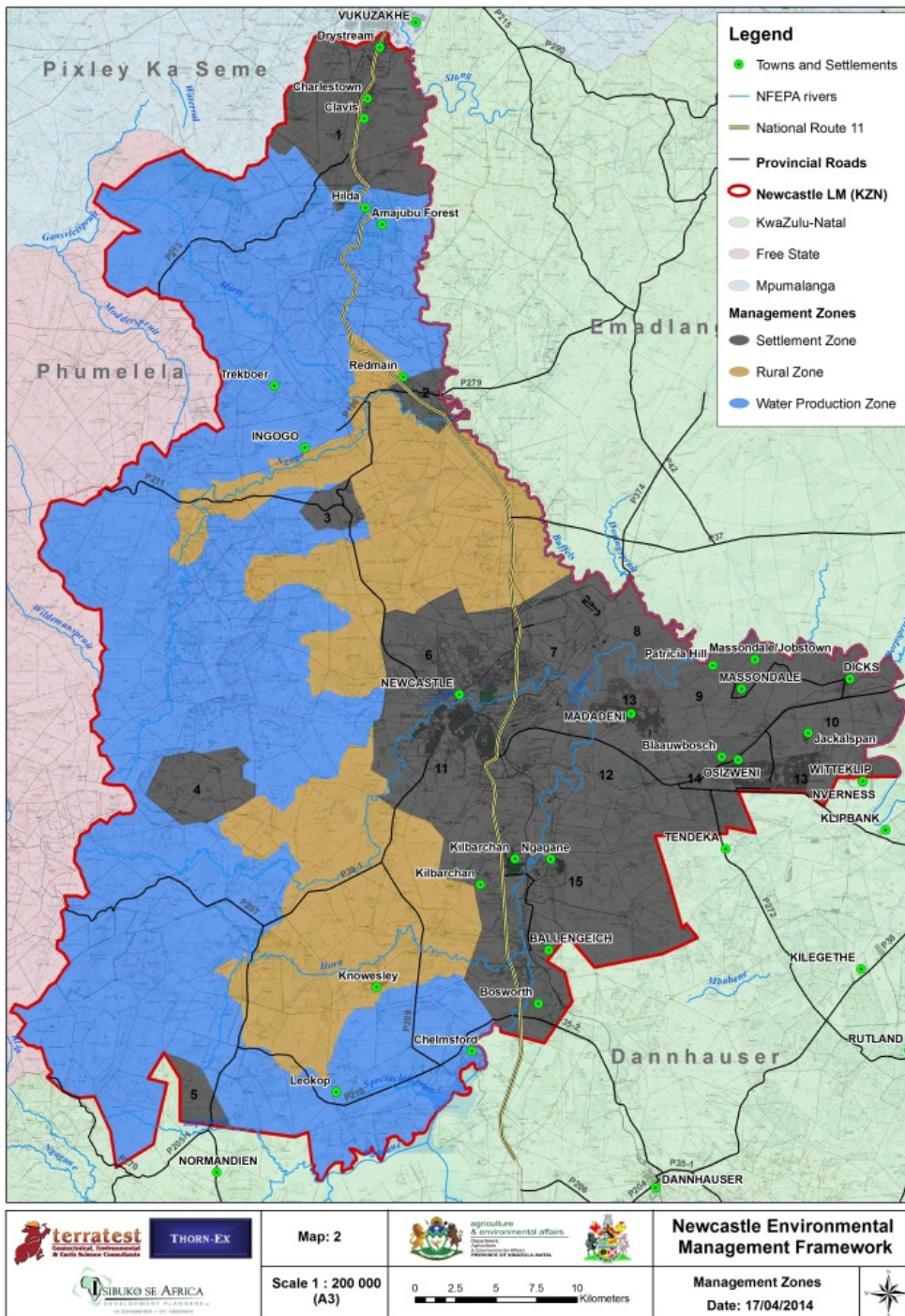
5.5 Human vulnerability

The consequences of the pressures being placed on environmental systems are primarily experienced by the urban poor who have little ability to cope if they are exposed to deteriorating environmental conditions. Community exposure to water pollution, air pollution and other environmental hazards is a major sustainability concern in this area and should therefore be at the forefront of the EMF. The key environmental concern relates to settlements within flood risk areas, and the inability of the authorities to provide access to services such as water and sanitation. The exposure of communities to seepage from underground mines is also of major concern. The areas which are most under pressure include the townships to the east which includes Madadeni and Osizweni. While the authorities must adopt a development approach for meeting the basic needs of underserved communities it must also foster places that are healthy. Ignoring communities that are exposed to human-induced environmental hazards neglects the objectives of environmental justice.

6. ENVIRONMENTAL MANAGEMENT ZONES

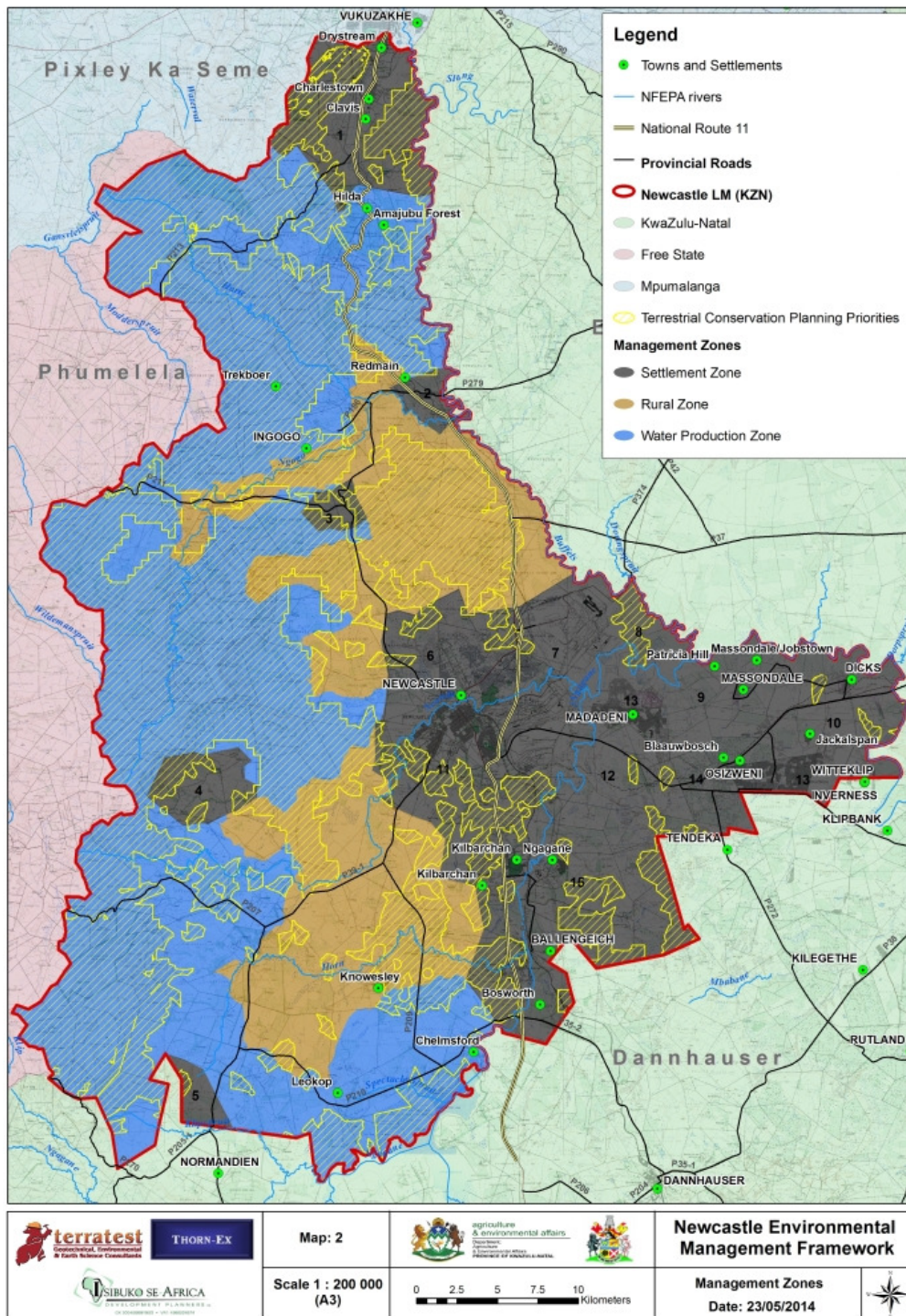
6.1 Overview

The environmental management priorities were spatially translated into broad environmental management zones as indicated in **Map 18** below. The purpose of these zones to focus the attention of decision-makers on the critically important areas for water production, which is the overarching EMF priority, and the geographical area that is most under development pressure.



Map 18: Strategic environmental management zones

The terrestrial conservation planning areas is shown in **Map 19** below. The purpose of this overlay is to demonstrate the interrelationship between biodiversity and water production, to focus the attention of decision-makers on critically important terrestrial biodiversity areas within which effective decision-making is required, and to identify potential strategic land use conflicts.



Map 19: Terrestrial conservation planning overlay

6.2 Water production area (Keep-in-tact zone)

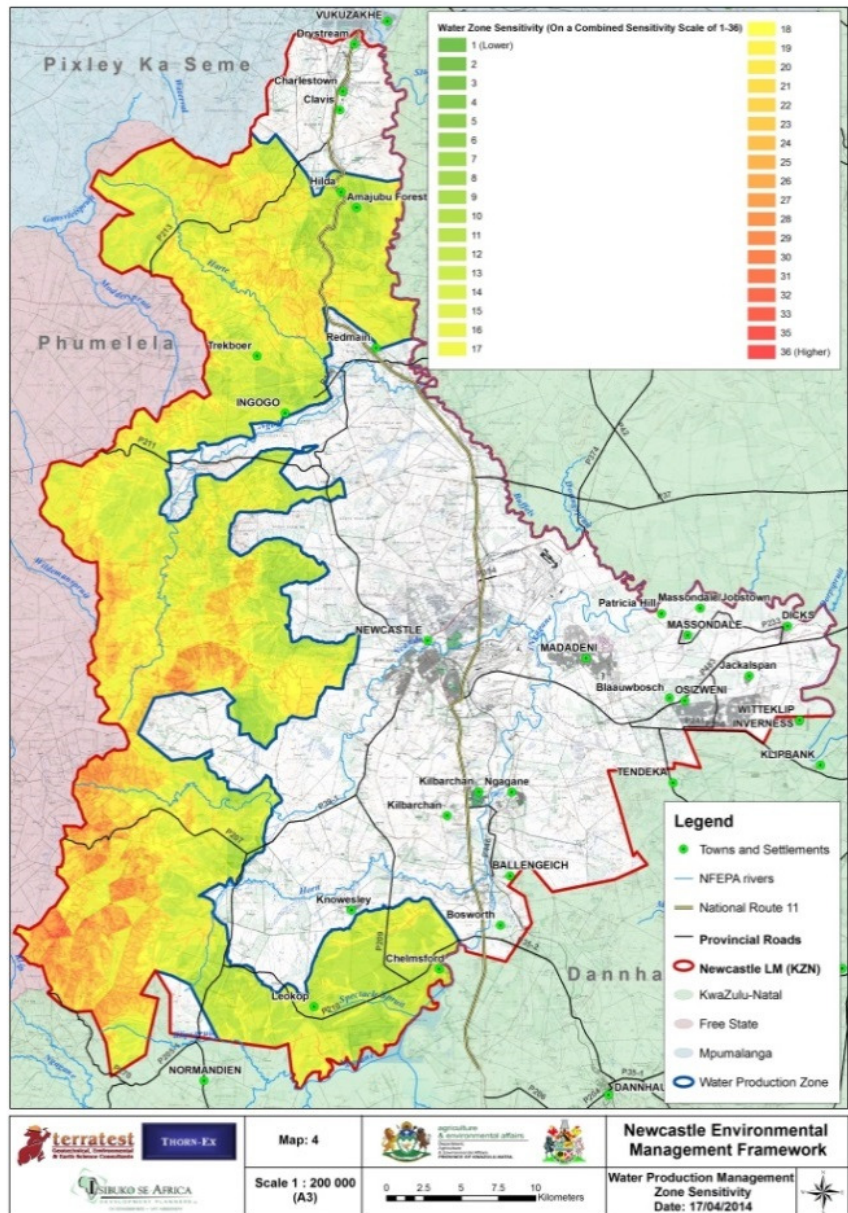
This management zone is primarily characterised by steep mountainous terrain in the north and along the western boundary of the area, but it also includes areas of undulating hills and some flat plains. It comprises the geographical area that is **most sensitive to development**. As such it is an immediate priority for the EMF in terms of environmental protection. The boundaries of this zone were informed by various hydrological constraint attributes and the selection of micro-catchments as explained in section 5.2 of this report.

The combined sensitivity of this zone is shown in **Map 20** and the following environmental sensitivities will place restrictions or limits (constraints) on development in this area:

- High water erosion risk areas.
- High value agricultural land.
- Biodiversity priority areas.
- Critical water resource features.
- Heritage features.

The most significant land use pressures that are or may have a significant future impact on the environmental attributes of the area include:

- Alien invasive plant species (predominantly in the north).
- Areas of degraded land associated with agriculture (especially in the north).
- Roads (mainly access and dirt roads).
- Forestry activities (mostly in the southern areas).
- Agriculture (field crops)
- Irrigation.



Map 20: Water production zone

6.3 Settlement area (Environmental innovation zone)

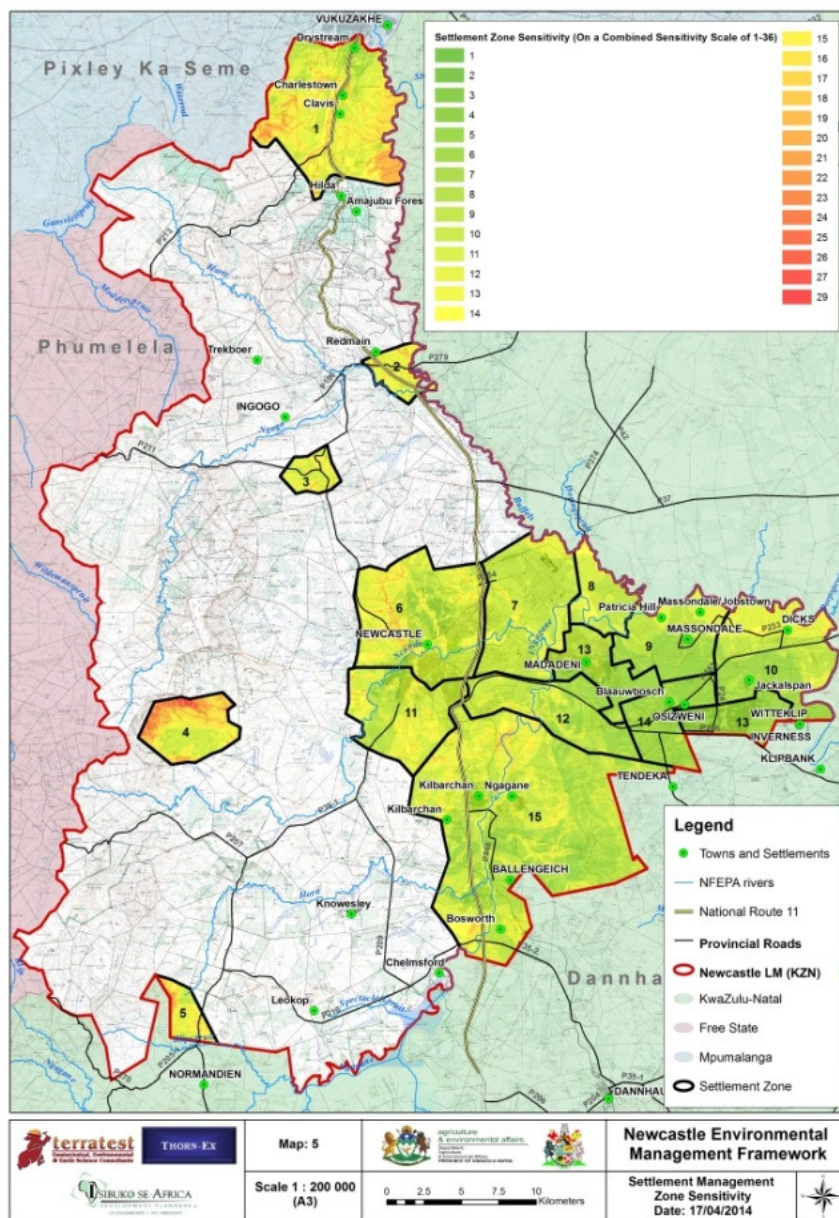
This management zone is primarily characterised by flat terrain, dense urban and rural settlement patterns, and high levels of landscape transformation and fragmentation. It comprises the main focus area for development in the Newcastle Local Municipality and is therefore the geographical area that is **most under development pressure**. As such it is an immediate priority for the EMF in terms of influencing development patterns. The boundaries of this zone were informed by the “Municipal Wide Intervention Areas” as defined in the municipality’s SDF.

The combined sensitivity of the area is shown in **Map 21** and the following resource sensitivities will place restrictions or limits (constraints) on development:

- Erosion hazards due to land degradation.
- High value agricultural land (only in selected areas).
- Biodiversity priority areas.
- Critical surface and groundwater resource features.
- Heritage features.
- Airshed sensitivity.

The most significant land use pressures that are or may have a significant future impact on the environmental attributes of the area include:

- Informal settlements.
- Illegal mining activities.
- Abandoned/decommissioned underground mining areas.
- New mining activities.
- Expansion activities associated with the SDF.
- Infrastructure (especially stormwater, sanitation and waste water treatment works).
- Roads (main access roads and dirt roads).
- Industrial / manufacturing activities.



Map 21: Settlement zone

6.4 Rural development area (Be cautious zone)

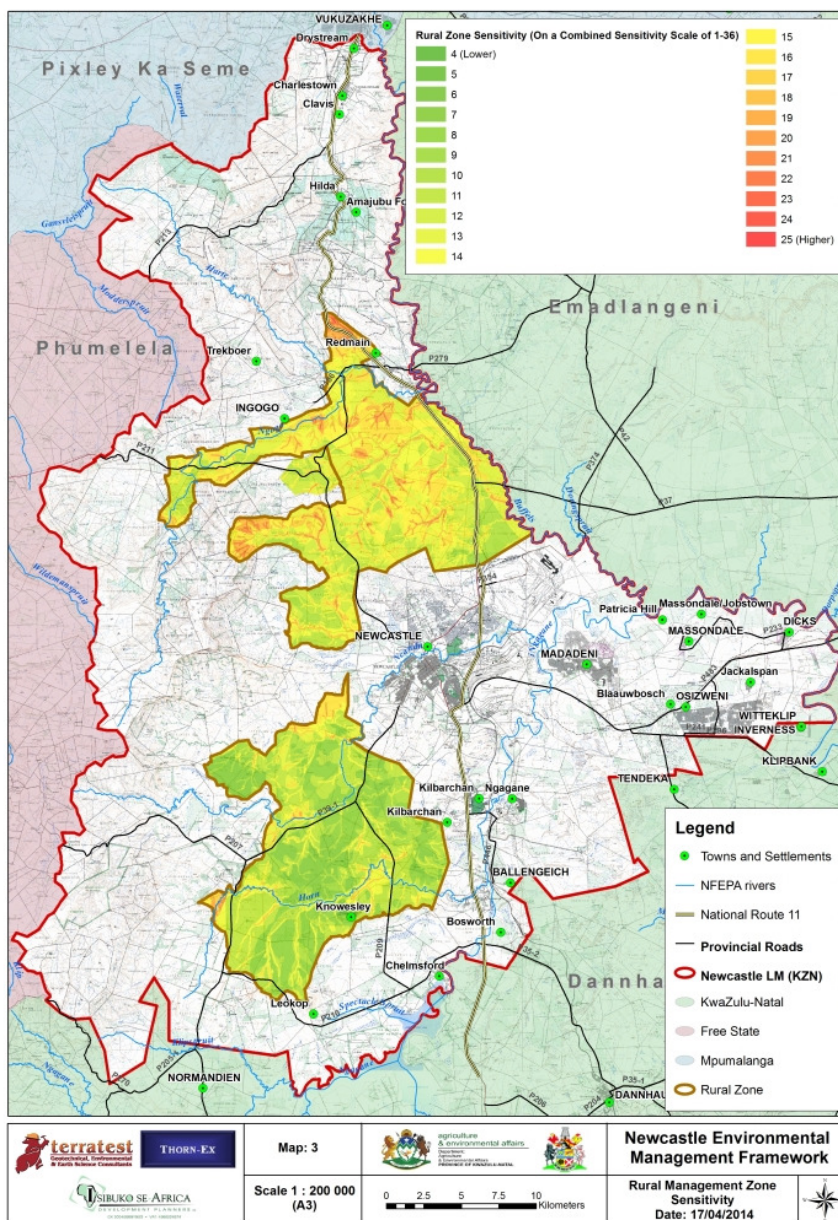
This management zone is primarily characterised by grasslands and agricultural activities while the terrain varies from flat plains to undulating hills to local ridges. It falls outside urban areas. As far as can be ascertained this area is not currently under significant development pressure although a number of abandoned and/or decommissioned mines occur in the zone, as well as areas with coal mining potential. A number of conservancies²¹ also occur in this area.

The combined sensitivity of this zone is shown in **Map 22** and the following environmental sensitivities will place restrictions or limits (constraints) on development in this area:

- Water erosion risk.
- High value agricultural land, especially in the south.
- Biodiversity priority areas.
- Critical water resource features.
- Heritage features (including battlefield route)

The most significant land use pressures that are or may have a significant future impact on the environmental attributes of the area include:

- Alien invasive plant species.
- Abandoned/decommissioned underground mining areas.
- Agricultural associated with land degradation.
- Agriculture (field crops)
- Irrigation.



Map 22: Rural development zone

²¹ A **conservancy** is a vehicle and platform for community-based conservation. It is a voluntary association of environmentally conscious landowners and land-users who choose to cooperatively manage their natural resources in an environmentally sustainable manner without necessarily changing the land use of their properties.

7. SUMMARY AND NEXT STEPS

This report confirmed the opportunities and constraints of the area, identified potential land use conflicts, defined a desired (spatial) future for the study area and introduced management principles for achieving environmental sustainability in the EMF area.

In order to ensure that IAPs are afforded sufficient opportunity for engagement in the EMF development process this draft report must be shared to solicit response and final inputs. The input from stakeholders will confirm the environmental priorities and sector needs of the area, and the specific management objectives for each zone, after which management guidelines would be developed for the environmental management zones.

The next phase of the project will also focus more on the municipal-wide intervention areas which were identified by the municipality for development intervention in the short to medium term (i.e. 5-10 years in spatial planning terms). Because it is important that the EMF support, rather than conflict with development planning in the area, the aim would be to define environmental management parameters to inform the Local Area Development Plans that would be developed by the municipality for each of the intervention areas.

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GLOSSARY OF TERMS

Attribute	An attribute means the quality ascribed to an element in the environment that distinguishes it in character, form or nature from other elements in the environment (EMF Regulations, 2010).
Constraints	The sensitivity of a resource, or combination of resources, will determine the extent to which it will be able to support sustainable development. High resource sensitivity presents low potential and place restrictions or limits (constraints) on development because the risk of damage or harm to sustainable development is high; there may be consequences if the resource is damaged. A specific activity or man-made situation may also be a constraint if it contains attributes that constitute a risk to sustainable development (e.g. it pollutes the environment or causes damage to important resources). Constraints are unfavourable situations that should be eliminated with proactive management.
Decarbonisation	To remove carbon from. For example, opportunities to decarbonise energy supplies include improved energy efficiency, implementing cleaner coal technologies, deploying renewable and nuclear energy.
Development conflicts	Strategic development conflicts occur where more than one development opportunity requires the allocation of the same resources.
Ecological infrastructure	It refers to those naturally functioning ecosystems that deliver valuable services to people, such as water and climate regulation, soil formation and disaster risk reduction. It is the nature-based equivalent of built or hard infrastructure, and can be just as important for providing services and underpinning socio-economic development. It includes, for instance, healthy mountain catchments, rivers, wetlands, and nodes and corridors of natural habitat, which together form a network of interconnected structural elements in the landscape.
Environment	Section 1 (xi) of the National Environmental Management Act (1998) defines the environment as an ecological and cultural concept that creates conditions that influence human health and well-being.
Environmental management	Refer to the definition of Integrated Environment Management.
Environmental sensitivity	Environmental sensitivity is a measure of how easy it is to inflict damage on a particular area or produce serious consequences from actions on a limited scale. The inherent sensitivity (potential) of a resource is its ability to sustain the ecological goods and services it provides and/or whether the resource has the ability to absorb more change/impact. It is used when determining opportunities and constraints (low sensitivity/high development potential or high sensitivity/low development potential)
Feature	A feature is defined as a distinctive and characteristic part of something else. In the EMF data is translated into categories (e.g. hydrology) which can consist of a number of data features (e.g. a wetland, a river course, and a flood plain), sub-features or attributes. A feature could therefore refer to the finer, individual environmental elements that comprise a data category.

Geographical area	A spatially demarcated area with unique characteristics (attribute data) that distinguishes it from another area. These areas require specific management intervention to ensure its future environmental integrity.
Integrated Environmental Management	DEAT, 2004.
Interested and affected party	The EMF Regulations (2010) define it as: (a) Any person, group of persons or organization interested in or affected by an environmental management framework: and (b) any organ of state that may have jurisdiction over any aspect covered by the environmental management framework.
Opportunities	The sensitivity of a resource, or combination of resources, will determine the extent to which it will be able to support sustainable development. Low resource sensitivity presents high potential and identifies situations that could be beneficial for development because the risk of damage or harm to sustainable development is low. A specific activity or man-made situation may also be an opportunity if it presents attributes that could be used to the benefit of sustainable development. Opportunities are favourable situations that could be exploited by a proactive management approach
Infill development	Development of vacant land or under-utilised land within existing settlements in order to optimise the use of infrastructure, increase urban densities and promote integration.
Legacy pollution	Legacy pollution refers to pollution that remains from past activities where there is no immediately responsible party who can be held liable for the pollution and compelled to carry out remediation.