Midmar Dam looking towards the snow covered Drakensberg
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uMgungundlovu District Municipality Strategic Environmental Assessment and Strategic Environmental Management Plan – STATUS QUO REPORT

Reference: **Tender No. 18/2010**

Date: **12 June 2012**

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uMgungundlovu District Municipality Strategic Environmental Assessment and Strategic Environmental Management Plan – STATUS QUO REPORT

Submitted to:

uMGUNGUNDLOVU
UMASIPALA WESIFUNDA
DISTRICT MUNICIPALITY
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Submitted by:

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12 June 2012

Indemnity and conditions relating to this report

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Acronyms

ASGI-SA	The Accelerated and Shared Growth Initiative
BRG	bioresource group
BRU	bioresource units
CBD	central business district
CoGTA	KwaZulu-Natal Department of Co-operative Governance and Traditional Affairs
CSIR	Council for Scientific and Industrial Research
CS	2007 community survey
DAEARD	KwaZulu-Natal Department of Agriculture, Environment Affairs & Rural Development
DEAT	Department of Environment Affairs and Tourism
DEDT	KwaZulu-Natal Department of Economic Development and Tourism
DRDLR	KwaZulu-Natal Department of Rural Development and Land Reform
DWA	Department of Water Affairs
EIA	environmental impact assessment
EKZNW	Ezemvelo KwaZulu-Natal Wildlife
EKZNW SCP	Ezemvelo KZN Wildlife Systematic Conservation Plan
EMP	environmental management programme
GIS	geographical information systems
GVA	gross value added
IDP	Integrated Development Plan
INR	Institute of Natural Resources
Isik	Isikhungusethu Environmental Services (Pty) Ltd
KZN	KwaZulu-Natal
NC	national census

NEMA	National Environmental Management Act
NSDF	National Spatial Development Framework
RDP	reconstruction and development programme
PDA	Planning and Development Act
PSEDS	Provincial Spatial Economic Development Strategy
SA	South Africa
SDF	spatial development framework
SEA	strategic environmental assessment
StatsSA	Statistics South Africa
ZEES	Zunckel Ecological + Environmental Services

uMgungundlovu District Municipality Strategic Environmental Assessment and Strategic Environmental Management Plan STATUS QUO REPORT

1 PROJECT DESCRIPTION

1.1 Introduction and Project Brief

The Terms of Reference for this project state that the aim is to develop a Strategic Environmental Assessment (SEA) that can be adopted by the uMgungundlovu Municipal Council, which will support planning and development decision making processes to ensure that development and land transformation activities are undertaken in a sustainable manner. A strategic environmental assessment is an important tool used to guide all planning and development processes, not only from a conservation perspective but also in acknowledgement of the vital role the natural environmental plays in providing free goods and services that support the social and economic components of this and neighbouring municipalities.

An SEA is a participative process that identifies the opportunities present and constraints that the environment places on development and can set the criteria for levels of environmental quality or limits of acceptable change. In addition to this the SEA will form the baseline on which future versions of land use management schemes and Spatial Development Frameworks are developed. It is envisioned that the SEA will further enhance the provincial Department of Agriculture, Environmental Affairs and Rural Development's (DAEARD) and the uMgungundlovu District Municipality's planning official's ability to accelerate the decision making process surrounding applications for environmental authorisation, while providing a sound basis upon which these decisions are made.

To this end Isikhungusethu Environmental Services (Pty) Ltd were appointed by the Municipality, in association with Zunckel Ecological + Environmental Services (ZEES) and Afzelia Environmental Consultants cc, to develop the SEA and produce a Strategic Environmental Management Plan (SEMP). The latter have been supported in this process by a number of specialsits and the full project team is represented in Table 1.

Table 1: The Project Team

TEAM MEMBER	ORGANISATION	ROLE
CORE TEAM		
Kevan Zunckel	Zunckel Ecological & Environmental Services	Project management, ecological and aquatic systems, biodiversity and ecological input, ground-truthing, assessment of ecosystem goods and services, stakeholder facilitation, contributions to the analysis and development of

TEAM MEMBER	ORGANISATION	ROLE
		the SEA, and strategic - and action planning.
Dee Walker	Isikhungusethu Environmental Services	Project admin and financial management.
Patrick Mbanjwa	Isikhungusethu Environmental Services	Analysis of social information and process facilitation, and and contributions to the analysis and development of the SEA.
Roger Davis	Isikhungusethu Environmental Services	Analysis of all current planning documents, socio-economic assessments, land use planning, agriculture and contributions to the analysis and development of the SEA.
Karen Zunckel	Zunckel Ecological & Environmental Services	Collation and review of existing terrestrial biophysical information, interpretation of existing spatial products, ground-truthing, gathering of addition biodiversity information, collation of specialist reports, drafting of reports, collation of comment and response report and contributions to the analysis and development of the SEA.
John Richardson	Afzelia Environmental Consulting	Capturing of spatial data and production of spatial products, and and contributions to the analysis and development of the SEA.
SPECIALISTS		
Marita Thornhill	Thorn-Ex	Strategic inputs into projet process and products.
Simon Bruton	Ground Truth: Water, Wetlands and Environmental Engineering	Specialist inputs on aquatic systems
Kelson Camp		Specialist input on agricultural and natural resource
Dr Jim Taylor	Wildlife and Environment Society of SA	Development of environmental education policy and programme.
Frans Prins		Specialist input on cultural heritage.
Dr. Mark Zunckel		Specialist input on air quality.

At the time that this project was launched Ezemvelo KZN Wildlife commissioned Ground Truth: Water, Wetlands and Environmental Engineering, to produce a Biodivesity Sector Plan for the uMgungundlovu District Municipal area and it was agreed that this product would be accessible for use in this project. Wherever this has been the case it has been referenced accordingly.

1.2 Overall Approach to Project Implementation

The overall approach to the implementation of this project is based on the steps that were outlined in the Terms of Reference and that were agreed to at inception. These steps, which are listed below, also adhere to the guidelines for SEAs provided by the National Department of Environmental Affairs (DEAT, 2007).

- Undertake a review of all relevant literature pertaining to the natural resources and the socio-economic features of the uMgungundlovu District Municipal (UMDM) area;
- Produce a series of draft Status Quo Reports to which role players and stakeholders can provide additional contributions in addition to their critical review;
- Interpret the Status Quo or current state of the environment according to the principles of sustainability in order to develop the SEA which will include:
  - A Desired State of the Environment as expressed in a Sustainability Framework which includes a vision and sustainability objectives;
  - The delineation of environmental control zones with related guidleines; and
  - A monitoring and evaluation framework to measure movement towards the Desired State of the Environment (although this can also be moved to the SEMP process);
- Subject the above to critical review and input by role players and stakeholders;
- Facilitate a process whereby an SEMP is developed together with the Municipality and its strategic partners and which will also be subjected to role player and stakeholder review and input; and
- Develop an Environmental Education Awareness Policy and Programme aimed at assisting the municipality to facilitate communication of the SEA and SEMP to key role players such as Councilors, and the public in general.

The project team were appointed on the 23rd of March 2011 and the aim is to have the SEA and SEMP completed within 18 months of this appointment.

1.3 The Role of the Status Quo Report in the SEA and IEMP Process

The role of the Status Quo Report is to capture all the relevant information pertaining to the natural and socio-economic environment of the UMDM and relevant adjacent areas. By subjecting this to broad role player and stakeholder participation it will be possible to ensure that the information encapsulated in the report will be as comprehensive as possible. It will then be used as a baseline from which the SEA and its components will be produced. Members of the core team and specialists, as illustrated in Table 1, were responsible for carrying out the review of all available literature within the various disciplines necessary to produce interim specialist reports for integration into the Status Quo Report. The disciplines covered were as follows:

- Legal framework;
- Natural capital including the categories of:
  - The geophysical environment covering the topics of topography, climate, geology and land types, hydrology and water resources, and air quality;

  - The biophysical environment covering the topics of vegetation and habitat types, species of special concern, protected areas and other conservation areas, biological corridors, sensitive ecosystems and the Biodiversity Sector Plan; and
  - Biological adaptation to climate change.
- Cultural Heritage;
- The socio-economic environment;
- Agriculture and land use; and
- The planning framework.

Each of these specialist contributions have been concluded with an indication of what the key issues and trends are and have been integrated as chapters into this report. The key issues and trends have then been drawn together in the conclusion. This has then provided the basis from which the reader can obtain an oveall picture of the current state of the environment and from which the project team can begin to build the desired state of the environment and the SEA.

It must be noted that no additional research and/or field work was carried out by the project team due to budget limitations, although key aspects were subjected to ground truthing. The comprehensiveness of this report has also counted on contributions from role players and stakeholders. The ground truthing that was undertaken was based on establishing if the spatial extent of the recommendations made in the Biodiversity Sector Plan were accurate. This process entailed an application of the project team's local knowledge of the study area to the Biodiversity Sector Plan and the selection of areas that required ground truthing based on the need for further certainty. The north eastern portion of the UMDM was covered by vehicle and on foot and the balance was done from the air in a light aircraft. Numerous georeferenced photographs were taken during both exercises to ensure a record is available for future reference if necessary. A CD of these images was submitted with this report.

The outcome of the ground truthing exercise was to confirm that the recommendations that have been made in the Biodiversity Sector Plan are accurate and appropriate. This is particularly relevant as the Biodiversity Sector Plan will be used as the foundation for the spatial product that supports the SEA and its sustainability framework.

1.4 Location of the Study Area

The uMgungundlovu District municipal area is just over 9 500 km^2 in extent and is comprised of the following Local Municipalities (Figure 1):

- Impendle
- Mkhambathini
- Mpofana
- Msunduzi
- Richmond
- uMngeni
- uMshwathi

The uMgungundlovu District shares borders with the following District municipalities: Ugu to the South, Sisonke to the South-West, uThukela to the North-West, uMzinyathi to the North-East, iLembe to the East and eThekwini Metro to the South-East (Figure 1). The District adjoins the Kingdom of Lesotho along its western boundary, and thus contains a significant portion of the uKhahlamba Drakensberg Park World Heritage Site (UDP WHS), namely the Kamberg, Highmoor,

Lotheni and Mkhomazi Nature Reserves. These areas are however under the jurisdiction of Ezemvelo KZN Wildlife as the management authority for the UDP WHS. As of 2007, 11.5% of the uMgungundlovu District fell under the jurisdiction of Traditional Authorities (Udidi, 2007), with almost 80% of the Districts' population being Zulu speaking. The seat of the District lies within Pietermaritzburg, the capital of the KwaZulu-Natal province.

Figure 1: Regional map of the uMgungundlovu District municipality (see map book)

1.5 Stakeholder Engagement and Participation Process

It is critical that the compilation of the Status Quo Report and the development of both the SEA and SEMP include significant consultation with both role players and stakeholder. The distinction between these two groups is that the former are representatives of organs of state who have a legal mandate to contribute to the process and implementation of the SEMP. Role players should therefore be seen as 'strategic partners' as without their commitment to the both the process and implementation of the SEMP, the project will fail. Stakeholders are those who either have an interest in the project and/or will be affected by its implementation. These include groupings such as conservancies, organized business, organized agriculture, rate payers associations, catchment management forums, etc.

A series of engagements with both the role players and stakeholders have been scheduled in the project's work breakdown schedule and these are essentially timed to provide critical review of draft products. However, at the outset of the project an open invitation was published in the Natal Witness and the Echo (19 May 2011). This served to inform readers of the initiation of the project and encouraged them to register on the Stakeholder Database and to contribute and participate in the process. The Stakeholder Database has been included in this report as Appendix 1 but is kept open to include anyone who indicates their wish to be registered at any time during project implementation.

The draft products that are produced by the project will be subjected to two iterations of critical review and input before being finalised and presented for signoff. The first iteration will be through the Project Steering Committee who will be provided between two to four weeks to review the draft products before meeting to discuss them and provide their inputs. Once the inputs have been considered and integrated, a second draft will be made available to the stakeholders. All stakeholders registered on the database will be informed of the availability of the draft products for review and an advert to this extent will be published in the Natal Witness and Echo. A period of thirty days will be allowed for review which will culminate in a public meeting aimed at providing stakeholders an opportunity to engage with the process and provide their inputs. Stakeholders will also be encouraged to provide their comments and inputs directly to the project team during the thirty day period and all comments received will be captured in a "Comment and Response Report" which will be completed for each iteration and will be included in the final deliverables that are provided at the end of the project.

The draft products that will be made available for critical review are as follows:

- Status Quo Report;

- Strategic Environmental Assessment; and
- Strategic Environmental Management Plan.

2 LEGISLATIVE FRAMEWORK

The aim of the legal section of the status quo report is to provide an outline of the various legislation that affects both planning for and management of the natural environment. The intention is that this information will serve as a reference in the production of the SEA in the uMgungundlovu District.

2.1 Overview

The legal and policy framework that needs to be understood in guiding the implementation of the SEA comprises:

- National legislation;
- Provincial legislation; and
- Local government powers and functions, plans, policies, land use schemes and by-laws.

The scope covers various suites of laws in the following sectors:

- Environmental and resource management, including water, forests and agricultural resources;
- Planning and land use;
- Mining and extractive industry;
- Infrastructure – water, sanitation, energy, transport and communications; and
- Underpinning legislation which guides the Constitution and finance management.

While the list of legislation in this section provides a reference guide, the implementation phase of the SEA will indicate how this legislation and policy can be used to deal with the following matters:

Air pollution
Alien plant control
Biodiversity conservation
Built environment regulations
Catchment conservation
Commercial forestry regulation
Conservancies
Conservation of water sources
Construction of dams & irrigation
Fire management
Ground pollution
High potential agricultural land
Land rights
Land use planning
Natural / cultural monuments
Noise pollution
Pest control
Pollution on and from roads
Protected areas management
Recreation and amenities
Soil erosion
Solid waste disposal
Spatial planning
Species protection
Theft of livestock / game
Waste management
Water pollution / water quality
Wetland conservation
Wilderness areas
Wildlife protection

2.2 Legislation

The key legislation and policies at provincial and national levels that need to be taken into account in terms of the SEA in uMgungundlovu are included in the tables below. As noted above interpretation of the key legislation for the SEA will occur in subsequent phases of the project. Most, if not all

pieces of legislation make provision for various institutional structures and governance aspects of the legislation, stipulating the responsible Ministry (and by implication Department or organ of state) who should administer the Act and stipulates where relevant, what the penalties are for contravention of the laws. The Acts in some cases make reference to additional Regulations or Schedules where greater detail is provided in terms of implementation of the legislation. Information in this section is derived from departmental websites as well as from various reports[1].

Table 2: National legislation

Act	Acronym	Act No.	Date
South African Constitution	The Constitution	Act No 108	1996
	Underpins and guides all legislation, organs of state and SA Citizens. In the Bill of Rights Ch 2(24), the Constitution states that everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected for the benefit of present and future generations by prevention of pollution and ecological degradation, the promotion of conservation and to secure ecologically sustainable development and use of natural resources		
ENVIRONMENT & RESOURCE MANAGEMENT (and related Acts)			
National Environmental Management Act & associated regulations	NEMA	Act No 107	1998
	Regulations	EIA Regulations GNR 543	18 June 2010
		EIA Regulations GNR 543	18 June 2010
		Listing Notice 1 GNR 544	18 June 2010
		Notice 2 GNR 545	18 June 2010
		Notice 3 GNR 546	18 June 2010
	Overarching piece of legislation governing environmental matters and protection of the environment for sustainability. NEMA is the framework that gives effect to the environmental right identified in the Constitution. The following is relevant to the SEA (Thorn-Ex 2011: Comments on the Status Quo): (a) The preamble to the Act specifies that "sustainable development requires the integration of social, economic and environmental factors in the planning, implementation and evaluation of decisions to ensure that development serves present and future generations'. (b) Environmental management principles in section 2 of the act must be used by local government to develop and test policy and subsequent actions including decision making, legislation, regulation, planning and enforcement. (c) Chapter 3 makes provision for promoting intergovernmental coordination and accountability. Local government "must adhere to the relevant environmental implementation and management plans and the principles in section 2 in the preparation of any policy program or plan including the preparation of Integrated Development Plans and land development objectives". (d) The objectives of integrated environmental management (Chapter 5 of the act) must guide and inform activities of local government. Chapter 5 further promotes the modes of environmental management best suited to ensuring activities are pursued in accordance with sound principles of environmental management. The SEA is acknowledges as best suited to mainstream environmental factors with integrated development planning.		
Environmental Conservation Act		Act No 73	1989
	This Act was promulgated to provide for the effective protection and controlled utilisation of the environment and for matters incidental thereto. Regulations No. 1183 of 5 September 1997 promulgated in terms of Sections 21, 22 and 26 of the Environment Conservation Act, 1989 (Act No. 73 of 1989) determined that an Environmental Impact Assessment Process should be followed for certain listed activities which may have a detrimental effect on the environment. The above environmental		

[1]These include: Isikhungusethu, 2006,Summary of legislation pertinent to Environmental Education: Maloti-Drakensberg, RSA; Olvitt,L, Malema,V. Lotz-Sisitka, H., 2004, Analysis of the Education and Training Needs implied in selected Key Environmental Legislation: An analytical study conducted for the Department of Environmental Affairs and Tourism, in collaboration with E.E. & Sustainability Consortium, the Rhodes University EE&S Unit, WESSA and the Environmental Justice Networking Forum (EJNF).

Act	Acronym	Act No.	Date
	regulations have been replaced by the Environmental Impact Assessment Regulations (2006) promulgated under NEMA.		
National Environmental Management: Biodiversity Act	NEMBA	Act No 10	2004
	Provides a framework for conservation of biodiversity. The national biodiversity framework must provide for an integrated coordinated and uniform approach to biodiversity management by organs of state in all spheres of government.		
National Environmental Management: Protected Areas Act	NEMPAA	Act No 57	2003
	Deals with a range of issues pertaining to protected areas from the use of biological resources, community resource use, access, development regulations for tourist activity, use of water, land and airspace in protected areas, prohibited or restricted activities		
National Environmental Management: Air Quality Act	NEMAQA	Act No 39	2004
	To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government		
Conservation of Agricultural Resources Act	CARA	Act No 43	1983
	To provide for the control of the utilisation of natural agricultural resources in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants		
Subdivision of Agricultural Land Act	Act 70 of 70	Act No 70	1970
	To prevent injudicious subdivision of agricultural land in order to protect the economic potential of agricultural land Alien weed control		
National Environmental Management: Waste Act	NEMWA	Act No 59	2008
	To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development, to provide for institutional and planning matters; to provide for national norms and standards for regulation the management of waste by all spheres of government, to provide for the licensing and control of waste management activities, to provide for the remediation of contaminated land, to provide for the national waste management information system and to provide for compliance and enforcement		
National Forests Act		Act No 84	1998
	To reform the law on forests, looks at natural forest management and protection as well as sustainable management of plantations, measures to control and remedy deforestation, the use of forests, community forestry, protection of declared tree species		
National Veld and Forest Fire Act		Act No 101	1998
	To reform the law on veld and forest fires, veld fire prevention through firebreaks, firefighting measures, enforcement, offences and penalties		
National Parks Act		Act No 57	1976
	Governs national parks and associated land use		
National Water Act		Act No 36	1998
	Threats to water resources such as irrigation, industrial use, pollution, water quality deterioration and water loss through plantations. The act makes provision for the protection of quality and integrated planning and management of water resources through preparation of Integrated Water Resource Management Plans for the land surrounding state owned dams aimed at protecting these water sources. The act makes specific reference to the following in its objects: meeting basic human needs; promote equitable access to water; facilitate socio-economic development; protect aquatic and associated eco-systems; promote dam safety; manage floods and droughts.		
Mountain Catchment Areas Act	MCAA	Act No 63	1970
	To provide for the conservation, use, management and control of land situated in mountain catchment areas		
National Heritage Resources Act	NHRA	Act No 25	1999
	To introduce an integrated and interactive system for the management of the national heritage resources.		

Act	Acronym	Act No.	Date
National Health Act		Act No 61	2003
	To provide a framework for a structured uniform health system within the Republic		
The Atmospheric Pollution Prevention Act	APPA	Act No 45	1965
	Aims to prevent the pollution of the atmosphere through the control of all forms of air pollution, including smoke, dust and vehicle emissions.		
Aviation Act		Act No 74	1962
	Prevention of nuisance arising from aircraft and airfields		
Mineral and Petroleum Resources Development Act	MPRDA	Act No 28	2000
	To make provision for equitable access to and sustainable development of the nation's mineral and petroleum resources		
Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act		Act No 36	1947
	Regulation of pesticides and herbicides; many have cumulative effects and can affect non-target organisms causing death / disability. The Minister published a South African policy on animal Feeds in 2008 (Notice 511 of 2008, Government Gazette 30 April 2008		
Hazardous Substances Act		Act No 15	1973
	To provide for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature		
National Health Act		Act No 63	1977
	To provide for measures for the promotion of the health of the inhabitants of the Republic; to that end to provide for the rendering of health services; to define the duties, powers and responsibilities of certain authorities which render health services in the Republic; to provide for the co-ordination of such health services; to repeal the Public Health Act, 1919; and to provide for incidental matters.		
Occupational Health and Safety Act	OHSA	Act No 85	1993
	To provide for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work; to establish an advisory council for occupational health and safety; and to provide for matters connected therewith.		
Road Traffic Act		Act 93	1996
	To provide for road traffic matters, Pollution from road transportation / vehicles		
World Heritage Convention Act	WHCA	Act No. 49	1999
	Deals with the incorporation of the World Heritage Convention into South African law and the enforcement of the WHC in South Africa; the recognition and establishment of World Heritage Sites, the establishment of authorities and the powers and duties of such authorities to safeguard the integrity of such sites, integrated management plans over World Heritage sites and land matters in relation to WHS		
Water Services Act	WSA	Act 108	1997
	The WSA compliments the National Water Act. Its aim is to provide a framework for water services provision consistent with local governments responsibility to deliver services. The main objects of the act include: the right of all south Africans to access a basic water supply; an environment not harmful to human health; setting of national standards and norms with regard to water services; preparation and adoption of water services development plans by authorized municipalities (i.e. WSAs); the promotion of effective water resource management and conservation by different levels of government.		
PLANNING, LAND USE & INSTITUTIONAL			
Local Government Municipal Structures Act	MSA	Act No 117	1998
	To provide for the establishment of municipalities and the appropriate division of functions and powers between categories of municipality and to regulate the internal systems, structures and office bearers of municipalities, and electoral systems		
Local Government Municipal Systems Act		Act No 32	2000
	To provide for the core principles and processes that are necessary to enable municipalities to move towards the social and economic upliftment of local communities and to ensure universal access to essential services that are affordable to all, to define the legal nature of a municipality, to establish an enabling framework for		

Act	Acronym	Act No.	Date
	planning, performance management, resource mobilisation and organisational change		
Municipal Planning and Performance Management Regulations		GNR 796	2001
	A Spatial Development Framework contained in a municipal IDP must contain a strategic assessment of the environmental impact of the SDF		
Development Facilitation Act	DFA	Act No 67	1995
	Although this Act has been suspended as of May 2010, its application since promulgation has had a considerable effect on land use and planning, and therefore, the environment		
Less Formal Townships Establishment Act	LEFTEA	Act No 113	1991
	Provides for the establishment of towns or residential areas with more relaxed town planning scheme controls		
Provision of Land and Assistance Act	Act 126	Act No 126	1993
	To provide for the designation of certain land, to regulate the subdivision of such land and the settlement of persons thereon; to provide for the rendering of financial assistance for the acquisition of land and to secure tenure rights; essentially this Act provides for land redistribution; this act has been responsible for the purchase of farms for beneficiary groups of varying sizes and has resulted in settlements becoming established, often uncontrolled, on former agricultural land		
Restitution of Land Rights Act		Act No 22	1994
	To provide for the restitution of rights in land in respect of which persons or communities were dispossessed under or for the purpose of furthering the objects of any racially based discriminatory law; to establish a Commission on Restitution of Land Rights and a Land Claims Court		
Extension of Security of Tenure Act	ESTA	Act No 62	1997
	To facilitate long-term security of tenure and regulation conditions of residence on certain land and to regulate evictions of people from land		
Interim Protection of Informal Land Rights Act	IPILRA	Act No 31	1996
	To provide for the temporary protection of certain rights and interests in land which is not otherwise adequately protected by law		
Labour Tenants Act		Act No 3	1996
	To provide for the security of tenure of labour tenants and those persons occupying or using land as a result of their association with labour tenants; to provide for the acquisition of land and rights in land by labour tenants		
Communal Land Rights Act	CLARA	Act No 11	2004
	To provide for legal security of tenure by transferring communal land, including KZN Ingonyama land to communities, to provide for the conduct of a land rights enquiry to determine the transition from old order rights to new order rights. This piece of legislation has been challenged and has never been enacted; it is probably that there will be major changes, with new legislation being drawn up to replace it		
Municipal Finance Management Act	MFMA	Act No 56	2003
	To secure sound and sustainable management of the financial affairs of municipalities and other institutions in the local sphere of government		
Municipal Property Rates Act	MPRA	Act No 6	2004
	To regulate the power of a municipality to impose rates on property, to make provision for fair and equitable valuation of properties		
Inter-Government Relations Act	IFRA	Act No 13	2005
	To establish a framework for the national, provincial and local governments to promote and facilitate intergovernmental relations and for settlement of disputes		
Promotion of Access to Information Act	PAIA	Act No 2	2000
	To give effect to the constitutional right of access to any information held by the State and any information that is held by another person and that is required for the exercise or protection of any rights		

Table 3: Provincial Legislation – KZN

Act	Acronym	Act No.	Date
KZN Nature Conservation Management Act		Act No 9	1997
	To provide institutional structures for nature conservation in KwaZulu-Natal; to establish control and monitoring mechanisms		
KZN Heritage Act		Act No 10	1997 (as amended in 2006)
	Section 27(1)(c)(i) of the Act requires a cultural heritage assessment in case of any development, or other activity which will change the character of an area of land, or water exceeding 10 000 m2 in extent.		
KZN Planning and Development Act	PDA	Act No 6	2008
	To govern the adoption, replacement and amendment of schemes, the subdivision and consolidation of land, the development of land outside schemes and to provide for general land use planning and development in KZN		
KZN Provincial Roads Act		Act No 4	2001
	To provide for the transformation, restructuring, establishment and control of the KZN provincial road network, to develop and implement provincial road policy, norms and standards the effective management and maintenance of road assets		

Table 4: Policy: International, national, provincial

POLICY	DATE	DEPARTMENT / BODY RESPONSIBLE / LEAD DEPT
Agenda 21 and Local Agenda 21	1992 LA21	International: Rio Conference 1992
	The delegates at the Rio Conference on the Environment drew up an Agenda 21 Programme of Action for Sustainable Development	
White Paper on Integrated Pollution and Waste Management for South Africa	2000	
	Sets out the parameters for waste management and pollution which led to the promulgation of the Act in 2008	
White Paper on Local Government	1998 WPLG	Dept of Provincial and Local Government
Strategic Environmental Assessment in RSA (DEAT 2000)	Guideline document on the preparation of SEAs	
Strengthening Sustainability in the IDP process (DEAT 2002)	National framework document on environment in the IDP.	
Environmental toolkit for IDP in KZN (DEAT & DAEARD 2007)	Toolkit for Integrated Development Planning	
SEA Guideline (DEAT 2007)	Strategic Environmental Assessment Guideline, Integrated Environmental Guideline (Series 4)	
White Paper on Spatial Planning and Land Use Management (2001)	The White Paper indicates that all municipalities must compile a spatial development framework of which one of the components must be a strategic environmental assessment.	
Ramsar Convention on Wetlands of International Importance Paris Protocol added additional Article 10 (1982) Regina Amendments (1987)	1971 Ramsar	Ramsar, Iran, 1971
	An intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources; identifies and declares specific wetlands to be Ramsar sites; embodies the commitment of signatory countries to plan for the wise use or sustainable use of all wetlands in their territories.	
Convention on International Trade in Endangered Species of Wild Fauna and Flora	1973 CITES	International agreement between governments
	IUCN initiated agreement whose aim is to ensure that international trade in specimens and wild animals and plants does not threaten their survival. There is a species list which is updated and member countries become signatories to the agreement	
Lusaka Agreement on Co-operative Enforcement Operations Directed at Illegal Trade in Wild Fauna and Flora	1974	International agreement
	Eliminate illegal trade in wild fauna and flora and to establish a permanent task force for this purpose.	
Convention on Conservation of Migratory Species of Wild Animals	1991 Bonn Convention	Intergovernmental treaty
	Aims to conserve terrestrial, marine and avian migratory species throughout	

POLICY	DATE	DEPARTMENT / BODY RESPONSIBLE / LEAD DEPT
	their range.	
Convention on Biological Diversity	1995	CBD International legally binding treaty
	Aims to develop national strategies for the conservation and sustainable use of biological diversity.	
Cartagena Protocol on Biosafety	2003	International agreement
	Aims to protect biological diversity from the potential risks posed by living modified organisms resulting from modern biotechnology.	
National Framework for LED in South Africa: 2006-2011	2006	DPLG
	The National Framework for LED in South Africa aims to support the development of sustainable local economies through Integrated government action.	
Accelerated and Shared Growth Initiative of South Africa	2004	ASGISA
	AsgiSA resulted from Government's commitment to halve unemployment and poverty by 2014.	
National Spatial Development Perspective		NSDP
	Provides for a national framework for spatial planning and development.	
Provincial Growth and Development Strategy	2006	PGDS KZN Dept of Cooperative Governance and Traditional Affairs
	Identifies certain growth and development corridors and various programmes to achieve the PGDS goals.	
Provincial Spatial Economic Development Strategy		PSEDS KZN Dept of Cooperative Governance and Traditional Affairs
	Provides a set of clearer economic strategies but places these spatially and highlights various challenges that KZN and local government structures need to address such as the inefficient spatial sprawl of rural settlements.	
KwaZulu-Natal Industrial Development Strategy		
	Review of all major regional economic development initiatives within the province and assessment of the appropriateness and effectiveness of provincial and national government interventions.	
New Partnerships for Africa's Development		NEPAD
	This deals with, among others, a commitment to good governance as a basic requirement for peace, security and sustainable political and socio-economic development.	
Millennium Development Goals	2000	MDG's United Nations
	A global action plan to achieve 8 anti-poverty goals by the target date of 2015. The UN Millennium Declaration is a blueprint agreed to by all the world's countries and leading development institutions.	
State of the Nation Address	annual	Office of the President
	Provides direction in policy in certain areas and announces new programmes such as the CRDP.	
State of the Province Address	annual	Office of the Premier
	Provides direction in policy in certain areas and announces new programmes such as the CRDP.	

2.3 SEA & EMP

Section 24(5) of NEMA lists 9 environmental management instruments of which the Strategic Environmental Assessment and Environmental Management Programmes are pertinent to this project. On the basis of the above legislation the nature and purpose of the Strategic Environmental Assessment and the associated programmes are briefly outlined below to provide a context within which the SEA for the uMgungundlovu District is prepared.

2.3.1 SEA

Michael Kidd (Environmental Law 2008, Juta [p195]) defines strategic environmental assessment as a '…process to ensure that significant environmental effects arising from policies, plans and programmes are identified, assessed, mitigated, communicated to decision makers, monitored and that opportunities for public comment are provided'.

The definition contained in the DEAT SEA Guidelines [(DEAT and CSIR 2000) quoted in Strategic Environmental Assessment (DEAT 2004)] focuses on the role of the SEA in facilitating the move to sustainability. 'This enables the proactive consideration of the objectives of sustainability at the earliest stages of decision making. It facilitates the development of a sustainability framework to guide the development of plans and programmes or to assess an existing plan or programme'.

It is further noted that the role of the SEA is to allow for the decision maker to proactively determine the most suitable development type for a particular area before development proposals are formulated. The EIA is used to evaluate impacts of development on the environment while the SEA can be used to evaluate the opportunities and constraints of the environment and socio-economic conditions on development.

The role of the SEA is determined by its place in the decision making process. It can be used to assess a proposed policy, plan or programme that has already been developed; or it can be used to develop, evaluate and modify a policy, plan or programme during its formulation. An SEA can furthermore have an advocacy role aimed at raising the profile of the environment. It can also have an integrative role where the aim is to combine environment, social and economic considerations. Through integration of the above elements into the policy and planning process the SEA has the potential to assist in the implementation of the concept of sustainable development.

2.3.2 Strategic Environmental Management Plan

While a SEMP is not specifically referred to in NEMA its purpose is to provide clear direction to the implementation of the SEA. The SEA and its sustainability framework is a policy document that provides a vision and high level sustainability objectives which are not specific enough to guide implementation. The process to compile an SEMP will prioritise the objectives that require implementation and formulate actions designed to move towards the achievement of the objectives and the attainment of the vision. The SEMP also provides the place where implementation of the SEA must reflect the capacity and level of resources available within the implementing agencies and thus reflect those actions that are achievable within a reasonable planning time frame. It is generally accepted that a strategic vision can relate to a time frame of approximately 20 years, while the specific action planning component that is the SEMP, can have a planning time frame of between three to five years.

2.3.3 EMP

In contrast to the SEA and SEMP, Environmental Management Programmes (EMP) can be described as a dynamic set of objectives, targets, actions and responsibilities prepared for the management of a particular project area (Saddler 1996). It is a post decision management tool to ensure compliance

with environmental protection provisions such as regulating the impact of mining activities on the environment.

3 NATURAL CAPITAL

The title of this section is significant in that while it reflects what would traditionally have been referred to as the natural environment or natural resources, the term 'natural capital' has been selected in order to portray the strategic linkage between the natural, social and economic components that require consideration and management within the context of sustainability. It is borne out of the reality that society's ability to exist and to prosper depends significantly on the nature and management of the renewable natural resources it has at its disposal. This is an important move from the traditional view that consideration of the natural resources, or biodiversity and ecosystems, is a luxury a developing economy cannot afford to entertain. The reality is that any economy, and especially a developing economy needs to take very careful consideration of the natural resources and by viewing this as natural capital, it may help to engender a better understanding that without it, there will be economic failure and the social fabric of society will become significantly stressed.

In order to save budget and duplication of effort it was recognised that Ezemvelo KZN Wildlife (EKZNW) had commissioned the compilation of a Biodiversity Sector Plan for the District Municipal area. Agreement was reached between EKZNW, the UMDM and DAEARD &RD that the Biodiversity Sector Plan (BSP), compiled by GroundTruth Water, Wetland and Environmental Engineering, could be replicated in this report provided that ground-truthing was carried out by the project team (Isikhungusethu Environmental Services (Pty) Ltd in association with Zunckel Ecological and Environmental Services). Much of Section 3.1.4 Hydrology and Water Resources was compiled by GroundTruth (2011b), Section 3.1.6 Air Quality was compiled by uMoya-NILU Consulting and Section 3.2.6. Biodiversity Sector Plan was extracted from GroundTruth, 2011a.

3.1 Geophysical Environment

3.1.1 Topography

Elevations across the District range from 530m above sea level in the south east, extending to a height of 3 320m at the Drakensberg escarpment along the western border of the Impendle Local Municipality (Table 5 and Figure 2).

The highly variable topography characteristic of KwaZulu-Natal and the District creates biophysical habitat and micro climatic conditions which support a range of habitats, ecosystems and biodiversity. North facing slopes are generally warmer and drier, supporting habitat types such as grasslands. South facing slopes, escarpments and sheltered kloofs on the other hand tend to be cooler and wetter, commonly providing conditions favourable for supporting more woody vegetation which often includes indigenous forest. This mosaic of habitat provides opportunity for a diversity of biota with different habitat requirements to exist within relatively smaller areas, in

comparison to regions with flat topography. The cool, damp scarps and sheltered kloofs also provide refugia, for example protection of important flora and fauna against fire and utilisation/damage from anthropogenic factors.

The Impendle municipal area is characterised by steep slopes, displaying the highest average slope and including the Drakensberg escarpment and foothills, with the uMngeni and Mpofana areas having a more gentler topography (Table 5).

A digital elevation model (DEM) of the District shown in Figure 2 (20m resolution DEM of KZN), highlights a distinct step in the topography (the so called "Hilton ridge"), between Pietermaritzburg and Howick running roughly in a north/south direction. This topographical variation has a notable influence on biodiversity, and as a result is recognised in the defining of ecological regions and biomes (i.e. ecoregions), e.g. South African river Ecoregions (Kleynhans *et. al*., 2005), the grassland biome (Mucina and Rutherford, 2006).

Table 5: Topological variables of the uMgungundlovu District per Local Municipality (derived from the KZN 20m DEM coverage)

Topographical variables	Local Municipalities							uMgungundlovu District
	Mkhambathini	Richmond	Msunduzi	uMshwathi	uMngeni	Mpofana	Impendle	
Area (km^2)	891	1 256	634	1 819	1 567	1 820	1 528	9 516
Elevation (meters above sea level)								
Minimum	53	141	453	221	645	815	1067	53
Mean	618	877	940	888	1297	1466	1690	1171
Maximum	1005	1602	1573	1752	2087	2505	3320	3320
Slope (degree)								
Mean	11	12	8	8	8	8	13	10
Maximum	71	74	56	74	61	68	79	79

Figure 2: Digital elevation model of the uMgungundlovu District (derived from the KZN 20m resolution DEM – see Map Book)

3.1.2 Climate

This Section provides a very broad description of the climate of the UMDM, but the Air Quality discussion in Section 3.1.6 includes a more detailed discussion which is relevant to understanding that discussion. There may be a degree of duplication, but it is appropriate to keep these discussions intact and not to remove the climate and meteorology discussion from Section 3.1.6.

The uMgungundlovu District falls predominantly within the summer rainfall area of South Africa, with the typical rainfall season extending from October to April. The highest rainfall months are typically December and January (Schulze, 2008).

The mean annual precipitation (MAP) averaged across each local municipal area varies from 785mm in Mkhambathini to 986mm in Impendle. The Impendle Municipality contains high rainfall areas associated with the high lying areas of the Drakensberg mountains and associated foothills, where the MAP reaches as high as 1324mm. South Africa experiences high temperatures and evaporation rates, which significantly reduces the effective volume of rainfall which becomes available to the environment, and which ultimately drives stream flow in rivers, with the uMgungundlovu District being no exception.

The drier areas within the District extend from Mooirivier to Muden within the Mpofana Local Municipality, and from the Eston to Camperdown/Ashburton area predominantly within the Mkhambathini Local Municipality; and the wetter areas extend from Hilton through the Karkloof to Blinkwater, with the Drakensberg areas west of Richmond showing higher rainfall (see Figure 3).

Table 6: Climate variables of the uMgungundlovu District per Local Municipality (after Schulze *et. al.*, 2008)

Climate variables	Local Municipalities							uMgungundlovu District
	Mkhambathini	Richmond	Msunduzi	uMshwathi	uMngeni	Mpofana	Impendle	
Area (km^2)	891	1 256	634	1 819	1 567	1 820	1 528	9 516
Precipitation (mm)								
Annual minimum	543	255	663	677	721	608	762	255
Annual mean	785	900	880	920	967	806	986	899
Annual maximum	1043	1383	1179	1558	1404	1403	1324	1558
Temperature (^oC)								
Annual minimum	-3	-5	-6	-5	-8	-10	-15	-15
Annual mean	19	18	17	18	16	15	14	16
Annual maximum	42	41	41	42	40	41	38	42

Figure 3: Mean Annual Precipitation (MAP) for the uMgungundlovu District (after Schulze *et. al.*, 2008 – see Map Book)

3.1.3 Geology and Land Types

As a result of the high change in altitude across the District, it contains a diverse range of geological forms (Figure 4). The Drakensberg escarpment is comprised of Drakensberg Group basalts, with the foothills being Stormberg Group sandstones. As altitude drops toward the coast these formations give way to the underlying Beaufort Group mud and sandstones and the Ecca Group shale and sand stones. A band of Dwyka Group tillite below Pietermaritzburg completes these formations of the

Karoo Supergroup stratigraphic unit extending from the Drakensberg escarpment. At the lowest altitudes within the east of the District, Natal Group sandstones and granites of the Natal Metamorphic Province are present.

The underlying geology gives rise to landforms (i.e. the surface of the landscape accounting for the topographical variations) which in turn provide geomorphology and a range of soil types. The arrangement of various climatic and landscape factors is the basis for determining land types. The land type map of the District is based on an account of soils, geology, climate and terrain to produce homogenous land type units (ARC, 2011). Each land type unit is a specific combination of biophysical characteristics thereby supporting a range of vegetation/habitats types and hence a specific variety of biodiversity. Detailed reports for each land type are available from the Agricultural Research Council if required and this includes detailed information on the climate zone, area, area suitable for agriculture, terrain units and soil series or land classes. This level of information has not been provided for the purposes of this report, but the land type map is provided to illustrate the diversity already alluded to in Section 3.1.1.

In the same vein this report excludes a discussion on soils as this is also integrated into the agricultural discussion in Section 6.

Figure 4: Geology underlying the uMgungundlovu District (see Map Book)

3.1.4 Hydrology and Water Resources

Water is a strategically important natural resource that is both produced and consumed within the UMDM and supports the economy of this District and the eThekwini Metro Municipality downstream. The discussion below provides information on the hydrology of the District, i.e. describes the way in which the water that flows into and through the District is channelled through the landscape, as well as how this resource is used and managed. According to DWA (2010) imminent water shortages for many areas in the country are a reality, unless immediate actions are taken. One of these areas is the KZN Coastal Metropolitan Area from Pietermaritzburg to Durban from west to east and from Kwadukuza (Stanger) in the north to Amanzimtoti in the south. It includes the eThekwini Metropolitan and the Msunduzi and Ilembe Municipalities (DWA, 2009) and a study undertaken to develop strategies to reconcile the supply of and demand for water in this area has suggested a number of actions that are required to assist with achieving reconciliation. These include the construction of further dams and inter-basin transfers, exploitation of groundwater, re-use of treated sewage effluent and desalination of sea water (see Figure 5 and Figure 6).

Figure 5: Potable water infrastructure (DWA, 2009 – see Map Book)

All of these options require capital intensive investments and provide only a temporary solution to the reconciliation challenge. The building of the Spring Grove Dam with related inter-basin transfers from the Mooirivier into the uMngeni promises to keep the system in a positive balance until 2016, i.e. for only three years after completion (DWA, 2010b). The absolute immediate requirements relate to what DWA term 'Water Conservation and Water Demand Management' (WC/WDM) which refers to the wise use of water and ensuring optimum management and rehabilitation of reticulation

infrastructure. DWA (2009) shows losses in eThekwini being in the region of 30% and eThekwini is recognised as one of the country's more efficiently managed municipalities. This thus illustrates how WC/WDM can contribute to alleviating the burden that demand is placing on supply. A further illustration of the situation is provided in Figure 7 which was sourced from the report produced by the reconciliation study (DWA, 2009).

A final point that needs to be made before moving into the specific discussion focus for this Section is that the judicious management of the catchment areas that supply this valuable resource have been mentioned in DWA strategies (DWA, 2009; DWA, 2010; DWA, 2010b), but have not been emphasised as a viable option as demand is already so much greater than supply. However, it is relatively well accepted that much work is required to address catchment integrity. It is also important to note that per cubic meter of water, this is the least cost option as far as water resource management is concerned. Figure 7 illustrates the relative cost of the various water resource management options that have been addressed in the reconciliation and other DWA strategies. This SEA will aim to ensure that the terrestrial and aquatic resource management strategies that will enhance catchment integrity are identified and are captured in the SEMP.

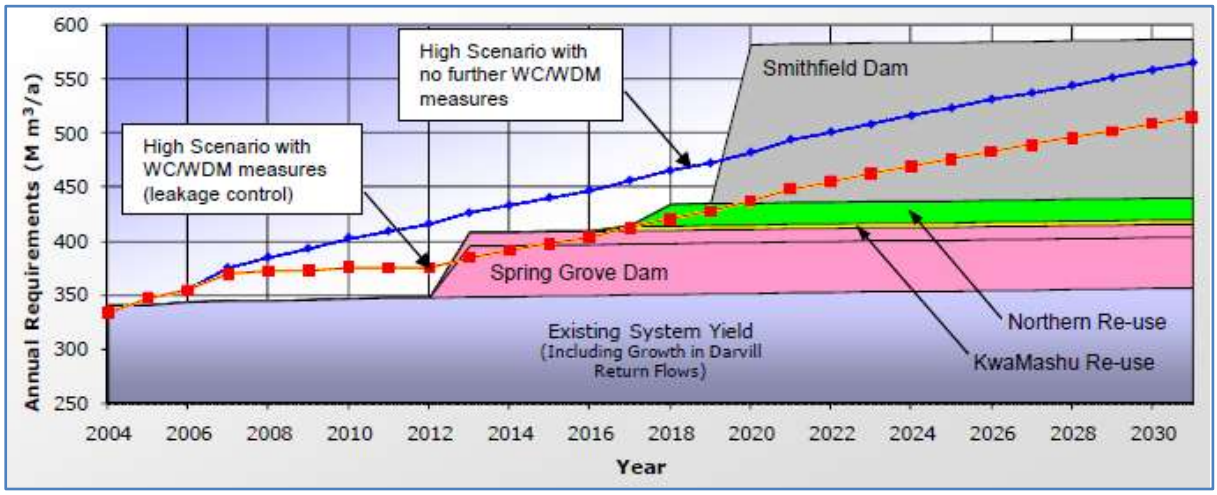


Figure 6: An illustration of the supply/demand projections with various water resource strategies for the uMngeni system (DWA, 2009)

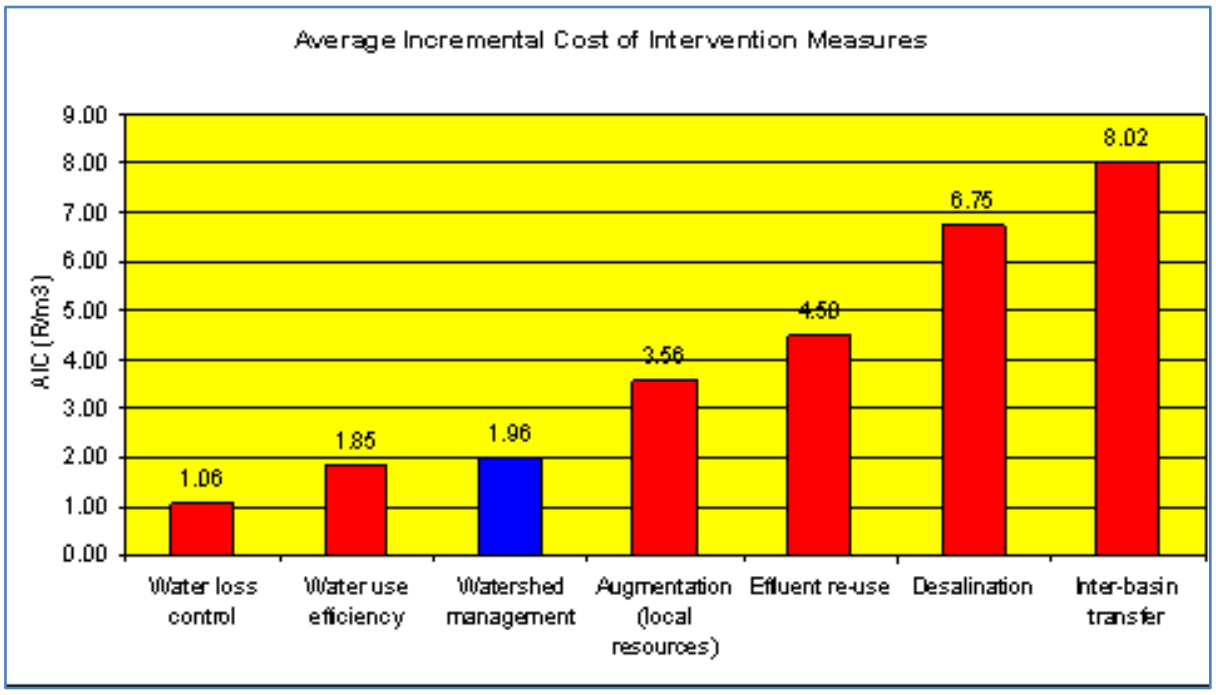


Figure 7: Comparative costs of alternative water resource management measures (Source: DWA Working for Water)

GroundTruth Water, Wetlands and Environmental Engineering (GroundTruth) compiled the following section as part of their specialist hydrological report to inform this SEA.

Key rivers which flow through the District include the uMngeni, uMsunduzi, Mooi, uMvoti, Lovu, Mlazi and Mkhomazi Rivers (see Figure 8). The uMngeni River and tributaries passing through the uMngeni and Msunduzi Local Municipalities form the strategically important water catchment for the critical water supply dams (Midmar, Albert Falls, Nagle and Inanda Dams) of the Pietermaritzburg-Durban urban development node. The area forms the second most important economic complex in South Africa after Gauteng, and supplies water to approximately 5 million people (DWA, 2011). The Impendle municipal area forms a significant portion of the headwater catchment for the Mkhomazi River, with the Mooirivier headwaters falling within the Mpofana municipality, and as such are primary water production areas.

The headwaters of the uMngeni catchment are comprised of mountain streams draining upland farming areas of the KwaZulu-Natal Midlands, of which a significant feature is the uMngeni Vlei, the principal source of the uMngeni River and which produces a sustained yield of high quality water. The core of the Vlei covers an area of approximately 300 ha, with the broader network of wetlands being over 950ha in extent. The entire catchment of the Vlei falls within protected areas, with the Vlei itself being a proclaimed nature reserve. This is in recognition of the valuable ecosystem services it provides, most notably that of water production and biodiversity conservation. The Vlei is home to numerous threatened and endemic species, and forms the most important Wattled Crane breeding site in the country (EKZNW, 2008).

Due to the high water demands of the Pietermaritzburg-Durban development node, the strategically important water supply of the uMngeni River catchment (already unable to meet the demand on its ability to supply) is supplemented by an interbasin transfer from the adjacent Mooirivier catchment to the north (Figure 5), with additional interbasin transfers planned in the future (WRC, 2002). The

first phase of the Mooi-Mgeni Transfer Scheme (MMTS-1) piped water from the Mearns weir on the Mooirivier system, to the Mpofana River, a tributary of the Lions River within the uMngeni River catchment (Figure 8). The second phase of the Mooi-Mgeni transfer (MMTS-2) involves the construction of Spring Grove Dam on the Mooirivier, allowing greater volumes of water to be transferred to the uMngeni River system (DWA, 2011). While there are numerous farm dams within the Mooirivier catchment, Spring Grove Dam forms the first large dam on the river. The source of the Mooirivier emanates from the Highmoor and Kamberg regions of the Drakensberg, with the headwater catchments extending into the Mpofana Local Municipality. The wide channelled valley bottoms and floodplains within the meandering middle reaches of the Mooirivier contain significant areas of wetland habitat, much of which has been transformed and lost through historic drainage and modification associated with agricultural activity.

The most likely candidate catchment for a second interbasin transfer into the uMngeni catchment is the Mkomazi River (Figure 5), which presently contains no major dams. Phase 1 of the Mkomazi Water Project (MWP-1) involves the construction of Smithfield Dam on the Mkomazi River near Lundy's Hill, with a 33km tunnel transferring the water to a balancing dam and treatment works in the Baynesfield area. Potable water from the treatment works will be piped into the Umgeni Water bulk water supply network at Umlaas Road. Phase 2 of the MWP would include construction of the larger Impendle Dam upstream on the Mkomazi River (Umgeni Water, 2011a). The Impendle and Richmond municipal areas contain significant portions of the headwaters for the Mkomazi River. The result is that land management within these catchment areas will not only impact on water users and river health downstream on the Mkomazi River, but in future will also impact on the water quality supplying the Pietermaritzburg-Durban urban node.

Figure 8: Water resources of the uMgungundlovu District (see Map Book)

3.1.4.1 Key catchment and water source areas within the uMgungundlovu District

The following key water source areas are present within the uMgungundlovu District. The protection and correct management of these catchment areas is critical to the maintenance of aquatic biodiversity, and the quality and quantity of water feeding the critical water supply dams of the Pietermaritzburg-Durban development node:

- The Drakensberg including the Little 'Berg and foothills.
- The uMngeni Vlei and the uMngeni River catchment headwaters.
- All catchments (particularly headwater) feeding the uMngeni River system, including degraded catchments which require rehabilitation and improved management to ensure sustainability of clean water supply to the Pietermaritzburg-Durban development node.
- Aquatic Critical Ecological Support Areas (CESAs) and Ecological Support Areas (ESAs) of the uMgungundlovu Biodiversity Sector Plan (see Figure 24).
- Any areas of predominantly natural vegetation cover in good condition.

The various assessments and monitoring data reviewed have highlighted numerous water quality problem areas and management issues within the uMgungundlovu District (GroundTruth, 2011b). Worrying and chronic trajectories in water quality and the potential impacts have also been

highlighted. Numerous monitoring activities and studies undertaken by various private, parastatal, non-government and government bodies continue to explore and document the water quality within the District at various scales, highlighting additional water quality problem areas and management needs. Stakeholders actively involved with the water quality problems both across the District, or within their area of activity, know the key problems and have contributed solutions yet water quality continues to deteriorate. An example is the Catchment Management Forums within the District, who interact with stakeholders and actively grapple with water quality and catchment management issues within their catchments, but who are not capacitated to effect change.

Umgeni Water has a vested interest in water quality within the District and dedicates extensive resources to water quality monitoring, but it is not within their mandate or power to manage catchment stakeholders. The regional office of the Department of Water Affairs covers the entire province, and has limited resources to tackle and police the problems within the District. Local municipalities and the District Municipality itself are in a key position to play an active role in water quality management at ground level. However municipalities are already over extended, having no dedicated resources for water quality and catchment management. The above statements highlight that management for the water sector is splintered between and among different tiers of government with different capacities and spheres of influence.

What is needed within the District (Figure 9) is a dedicated organisation which can:

- collate all water quality data and information from all sectors,
- interact with all stakeholders (i.e. agric, mining, forestry, industry and conservation),
- gain an integrated picture of water quality and management issues,
- glean solutions from public and private sectors,
- prioritise action and intervention,
- educate and create awareness of local water quality issues and correct practice, and
- enforce actions and penalties on catchment stakeholders (it is critical that the organisation is mandated and capacitated to enforce the required actions).

Government and legal structures (i.e. the National Water Act) make provision for such an organisation in the form of Catchment Management Agencies (CMAs). Bodies such as the Upper uMngeni River Catchment Management Forum have continuously highlighted the need for a CMA within the uMngeni River catchment, a critical water supply resource.

CMAs do not take away from the responsibilities of municipalities regarding the correct operation and maintenance of municipal infrastructure and management systems which impact on water quality, such as those highlighted previously within this document. Through having an integrated picture of water quality and stakeholder interaction, CMAs will inform the management and operational priorities in the catchment which the municipality is:

- legally responsible for,
- and best empowered to influence.

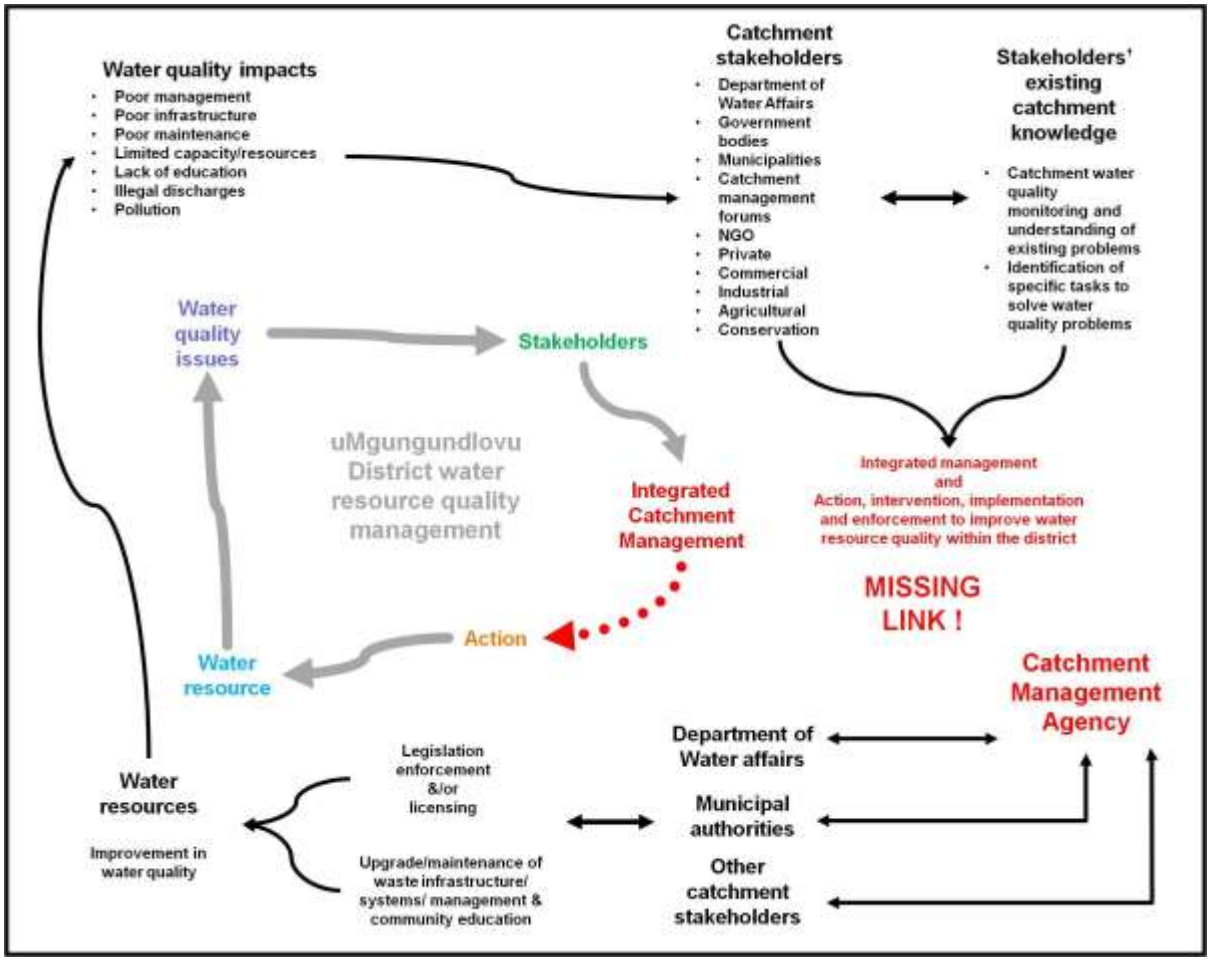


Figure 9: **Water resource quality management within the uMgungundlovu District and the integrated catchment management required (GrundTruth, 2011b)**

3.1.4.2 Key wetlands within the uMgungundlovu District

Of the physiographic regions of South Africa, the uMgungundlovu District falls predominantly within the inland margin zone, which is subject to some of the highest rates of wetland loss in South Africa (Kotze et al., 1995). Within a semi-arid, water-poor country with limited natural wetland extent, the loss of wetland habitat and associated biodiversity and ecosystem services is of great consequence for South Africa (Kotze et al., 1995). As a result, protection of the extent and functioning of all wetland areas is of priority within biodiversity and land management in the District, and is ratified as national policy through South Africa's signing of the Ramsar convention[2] in 1975.

The KZN priority wetland assessments (in progress EKZNW) highlight the following priority wetland systems as present within the uMgungundlovu District (see Figure 8):

- uMngeni Vlei.

[2] The Convention on Wetlands, held in Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources (www.ramsar.org).

- Stillerust Vlei.
- Nyamvubu Vlei.
- Priority wetlands upstream of the District, namely Hlatikulu[3] Vlei.

The protection, management, and where necessary, rehabilitation of these priority wetlands, and all wetland areas of the District, is critical to the maintenance of aquatic biodiversity, ecosystem services and the quality and quantity of water feeding the critical water supply dams of the Pietermaritzburg-Durban development node, as well as other water users within and downstream of the District.

3.1.4.3 Water quality and river health within the uMgungundlovu District

Within the uMngeni and Mooirivier catchments nutrients from agricultural activities, most notably crop fertilization, dairy operations, piggeries and feedlots, introduce excess nutrient loads (and sediments) to the River systems. The critical headwater areas have been significantly impacted by the historical drainage of wetland areas for cultivation, grazing and forestry (WRC, 2002). The farming and forestry areas also contain a considerable number of small dams which, in conjunction, act to regulate streamflows and reduce flow volumes. Investigations have shown that the small farm dams within the upper uMngeni catchment collectively result in up to a month's delay in the summer flow response as the dams successively refill, capturing the first rains of the wet season (Schulze 2011, pers. comm.). A study of the water quality and quantity impacts of small dams on South African rivers found that low flows were significantly reduced and certain physico-chemical water quality determinants were negatively impacted (Mantel *et. al*., 2010), illustrating that the cumulative impact of small dams must not be underestimated. The multitudes of small dams within the uMngeni and Mooirivier catchments have also inundated wetland and riparian areas which would have otherwise provided valuable ecological goods and services. Poor land and catchment management, particularly of wetland and riparian areas, remains a challenge. Partly due to the long history of forestry within the area, Invasive Alien Plants are a significant problem within the region, further impacting on stream flows, water quality and riparian habitat integrity.

As significant as these predominantly non-point source impacts collectively are within the upper catchment, it has been found that per unit area the water quality impacts of urban and settlement areas are significantly higher (GroundTruth, 2010a). In a study of pollution loads entering Midmar Dam from 1999 to 2009, it was found that while the sub catchment containing the Mpophomeni low cost housing settlement adjacent to Midmar Dam comprised only 2.4% of the dams' catchment area, it contributed 50.9% of the *Escherichia coli* (*E. coli)* loads and 15% of the Soluble Reactive Phosphorous loads (GroundTruth, 2010a). This impact was predominantly as a result of defective and surcharging municipal sewer systems within settlement areas. Examination of historical and current aerial imagery shows that informal settlements, with no formal sewage infrastructure, are

[3] While not situated within the uMgungundlovu District, the Hlatikulu Vlei is located within close proximity to the district boundary, with a portion of the vlei's headwaters draining from the district. The outflow of the Hlatikulu Vlei flows directly back into the district and the Mooi River via the Hlatikulu River.

expanding within the upper uMngeni catchment, draining into the critical water supply of Midmar Dam (GroundTruth, 2010a).

Downstream of Midmar Dam significant impacts include the Howick Waste Water Treatment Works (WWTW) and other point discharges from urban and industrial areas surrounding Howick, which discharge to the uMngeni River. The uMsunduzi River tributary of the uMngeni River is impacted by point and non-point pollution from informal settlements, low cost housing, formal urban and industrial areas, and the Darvill WWTW servicing Pietermaritzburg. The source and upper catchment areas of the uMsunduziRiver contain informal and low cost housing areas which contribute a high level of litter, sediments and nutrient loads to the uMsunduzi River, particularly following rainfall events. Illegal and unregulated discharges from industrial areas surrounding Pietermaritzburg are shown to have a significant impact on the water quality of the uMsunduzi River downstream of tributaries draining the industrial areas (WRC, 2002).

Before reaching the uMngeni River the uMsunduzi River flows through rural areas with relatively low population densities, with the river aquatic health shown to improve within this section (GroundTruth, 2010b and WRC, 2002). This highlights the value of:

- Protecting riparian areas from development by maintaining appropriate riparian buffers.
- Maintaining catchment areas which contain predominantly natural land covers and low intensity land use impacts, contributing cleaner waters to river systems.

The Pietermaritzburg (Darvill) and Howick WWTW routinely operate close to full capacity with the result that during intense rainfall events the works are regularly inundated by storm flows and surcharge untreated sewage directly to the receiving rivers. The 2011 Green Drop report states that "the Darvill plant is compromised by having reached its design capacity" with the Howick WWTW routinely operating at 74% of its capacity (DWA, 2011b).The expansion of formal housing areas with waterborne sewerage within the areas serviced by these WWTW places additional pressure on the respective works, increasing the risk and frequency of treatment capacity being exceeded, and untreated sewage being discharged to the Umgeni River system.

Within the Mooirivier Catchment areas key impacts to rivers and aquatic habitats are related predominantly to agriculture. Historic drainage, canalisation and cultivation of wetlands has reduced the functional area and health of wetland habitat, reducing the level of ecosystem services which the systems are able to provide. Sediment, nutrient and chemical laden runoff from irrigated and fertilised crops and pastures, and effluents from animal feedlots and urban/industrial areas around the town of Mooirivier itself, impact on water quality and aquatic habitat within the Mooirivier system.

The aquatic habitats and estuary of the Mkomazi River are negatively impacted by the high sediment loads generated by the catchment (Begg, 1978). As a result correct land management, particularly with regards to grazing and burning, is of particular importance to limit soil erosion within the Impendle Local Municipality.

Figure 10: Water Pollution Sources for the uMgungundlovu District (DUCT 2011) – see Map Book

3.1.4.4 Water Quality Hot Spots

This section highlights key water quality hot spots within the uMgungundlovu District.

Sewage Management

Mpophomeni and Khayalisha waste management

Numerous investigations have found that the Mpophomeni housing settlement within the uMgeni Local Municipality directly and indirectly results in negative impacts to the water quality of the Mthinzima River, Midmar Dam and the uMngeni River (Umgeni Water 2011b, Carte Blanche 2011, GroundTruth 2010a, GroundTruth 2010b, Natal Witness 2009, Simpson and Dickens 2006), predominantly as a result of:

- Surcharging and blocked sewer infrastructure within Mpophomeni.
- Malfunctioning solid waste disposal and collection infrastructure within Mpophomeni.
- Periodic leaking and surcharging of the sewer line transferring raw sewage to the Howick WWTW.
- Periodic malfunctioning of the raw sewage pump station at Mpophomeni.

During development of the Draft Upper uMngeni Integrated Catchment Management Plan (GroundTruth, 2010a) observations made within the Mpophomeni catchment in October 2009, with the potential to impact on water quality, included:

- Blocked and broken sewer piping and infrastructure.
- Surcharging sewer manholes.
- Raw sewage flowing directly into watercourses.
- A systemic severe solid waste problem with solid waste scattered throughout the catchment.
- Solid waste being dumped and washed into watercourses.
- Inadequate stormwater infrastructure with no litter or sediment traps apparent.
- Wetlands and other aquatic habitats in poor condition which would otherwise have the potential to significantly improve water quality if rehabilitated and correctly managed.

Historical data collected from 2003 to 2009 for the Mthinzima River directly downstream of the Mpophomeni WWTW indicates a river health status as being predominantly seriously modified for this period, usually indicative of loss of habitat and high levels of pollution (GroundTruth, 2010b).

Escherichia coli (*E. coli)* levels measured within the Mthinzima River adjacent to Mpophomeni, and flowing directly into Midmar Dam, between 1 September and 23 November 2009 significantly exceeded safe *E. coli* levels, reaching 660 000 counts/100ml. With the Department of Water Affairs' target water quality range for *E. coli* being 130 counts/100ml, the levels typically recorded adjacent to Mpophomeni pose a significant health threat for human contact with the water. The *E. coli* levels indicated severe faecal contamination, indicating the likelihood of raw sewage flowing directly into the Mthinzima River (GroundTruth, 2010a). High *E. coli* levels pose a significant threat to the public, including recreational visitors to the Midmar Dam resort. High *E. coli* levels would impact negatively on the Midmar Mile (the largest open water swimming event in the world – EKZNW, 2010), which contributes significant fiscal income to the KZN Midlands, and boosts the annual revenue of the

Midmar Dam resort. The financial viability of Ezemvelo KZN Wildlife's operation of the Midmar Dam resort rests heavily on income generated by the Midmar Mile (Brassell 2010, pers. comm).

The March 2011 water quality and environmental audit report by Umgeni Water classifies Midmar Dam as having a 'poor' water quality status due to high algal counts (Umgeni Water, 2011b). The finding that the Mpophomeni low cost housing settlement adjacent to Midmar Dam comprises only 2.4% of the dams' catchment area, but contributes 50.9% of the *E. coli* loads illustrates that sewer problems in Mpophomeni are the predominant cause of the high algal counts (GroundTruth, 2010a).

In a study of the potential water quality impacts of the proposed Khayalisha low cost housing development on Midmar Dam, Simpson and Dickens (2006) determined that runoff from the housing area in conjunction with effluent from the upgraded Mpophomeni WWTW would result in a 50% increase in phosphorous loads entering Midmar Dam.

The Draft Upper uMngeni Integrated Catchment Management Plan (GroundTruth, 2010a), prepared on behalf of the uMngeni Local Municipality by GroundTruth as a requirement of the Record of Decision for the Khayalisha housing development, is required by authorities to be expanded to investigate the impacts on water quality within the entire catchment. This expanded investigation will provide further insight into the water quality impacts of the agricultural and forestry sectors within the upper uMngeni River catchment.

Waste Water Treatment Works within the uMgungundlovu District

The Howick WWTW operates close to full capacity, with the result that unforeseen and extreme events (such as high rainfall flooding sewers or infrastructure malfunction/downtime) can create a scenario where sewage volumes inundate the works, requiring that raw sewage bypasses full treatment and be discharged directly to the uMngeni River at standards which do not meet compliance. The 2011 green drop report scored the Howick plant at 48% effluent quality compliance (DWA, 2011b).

The Darvill WWTW in Pietermaritzburg also operates close to full capacity, creating the risk that during extreme rainfall events the works are inundated resulting in effluent which does not meet compliance being discharged to the uMsunduzi River. Between April 2010 and March 2011 the Darvill WWTW did not meet the required effluent quality compliance levels 21.4% of the time (Umgeni Water, 2011b). The 2011 Green Drop report scored the Darvill effluent quality compliance at 48%, stating that compliance is compromised by the plant having reached its design capacity. The Lynnfield Park plant performed poorly with monitoring, operational and maintenance flaws, linked to a poor technical skills base, resulting in a 0% effluent quality compliance score (DWA, 2011b).

The March 2011 water quality and environmental audit report by Umgeni Water illustrates that between April 2010 and March 2011 the Albert Falls South WWTW did not meet the effluent quality requirements 45% of the time, with Albert Falls South not meeting requirements 25% of the time (Umgeni Water, 2011b). The 2011 Green drop report gave a score of 0% compliance regarding the effluent quality of the Mooirivier WWTW (DWA, 2011b). Effluent quality non-compliance results in

direct negative impacts on downstream aquatic habitat, water users and the quality trajectory of downstream water resources.

Increasing nutrient loads from WWTW and surcharging sewer systems (such as in Mpophomeni) are of grave concern as Total Phosphorus (TP) concentrations in Midmar, Albert Falls and Nagle Dams have increased greatly over the past 10 years (1999-2009) by 85%, 132% and 668% respectively. Analysis of increases in dam TP concentrations from 1999 to 2008, predict that by 2019, Midmar and Albert Falls Dams would reach eutrophic classification, while Nagle Dam, already eutrophic, would almost reach hypertrophic classification. Similar large increases in Chlorophyll 'a' levels of the three dams were found. These results illustrate that both TP and Chlorophyll 'a' concentrations are increasing, which is clearly an undesirable trend with potentially severe consequences (GroundTruth, 2010b). The increases in Chlorophyll 'a' concentrations indicate the potential for problematic growth of algal genera (i.e. blue-green algae). The problematic growth of such algal genera results in taste, odour and filter clogging problems, increasing the costs of water treatment to potable water standards. Increased nutrient loads also increase the growth of problematic aquatic weeds, such as water hyacinth.

Rivers and streams of Pietermaritzburg

Sections of the Baynespruit, Dorpspruit, Townbush stream and uMsunduzi River within Pietermaritzburg are all classified as being of 'unsatisfactory' water quality (highest impact class) within the March 2011 audit report by Umgeni Water due to elevated *E. coli* counts from sewer problems within upstream catchments (Umgeni Water, 2011b).

Industrial and Urban

The Baynespruit draining the Willowton industrial area in Pietermaritzburg is heavily polluted by legal and illegal point source discharges of industrial effluent, both directly to the river, or to the stormwater system draining to the river. Illegal discharges of polluted effluent also find their way into the sewer system which can impact on the ability of the Darvill WWTW to effectively treat waste waters to the required effluent quality for discharge to the uMsunduzi River. Polluted storm water runoff from paved areas containing industrial contaminants and automotive/ machine fuels and oils also contributes pollutants to the Baynespruit. The March 2011 Umgeni Water audit report (Umgeni Water, 2011b) classifies the quality of the Baynespruit as 'unsatisfactory' due to elevated *E. coli* counts from sewer problems within the catchment.

Runoff from Urban Centres

Polluted storm water runoff and effluent discharges from the Pietermaritzburg, Howick, Camperdown and Mooirivier town centres, formal and informal residential areas, and industrial areas negatively impact on the uMsunduzi, uMngeni and Mooiriviers respectively. Storm water runoff from paved areas, particularly associated with industrial and transport activity, and denuded

areas within informal settlements carry pollutants directly to stream flow with little buffering and trapping of sediments and pollutants by terrestrial or riparian vegetation.

Intensive Agriculture

Discharges and runoff from feedlots, dairies, piggeries and poultry operations, which are generally located at a greater density within the KwaZulu-Natal Midlands and Mooirivier area, negatively impact on rivers within those areas. The faecal wastes contribute high nutrient loads and bacterial pollution to the rivers. Bacterial pollution has the potential to be reduced, through biophysical processes, as rivers flow downstream. However nutrients generally accumulate downstream within river systems, increasing the potential for downstream water bodies to become eutrophic.

Cultivation and Forestry within Wetland Areas and in Close Proximity to Water Courses

Fertilizers, insecticides, herbicides and sediment washed and eroded off cultivated lands and commercial forests pollute rivers, particularly lands in close proximity to watercourses and with little natural terrestrial/riparian vegetation as a buffer to trap and absorb sediments and pollutants. Long established sugar cane lands (and forest plantations) within the District commonly extend into and through wetland areas and minor watercourses, negatively impacting on the level of ecoservices which these habitats can provide.

3.1.4.5 Ground Water

This Section was compiled by the project team and not Ground Truth.

There is a dependence on ground water within the UMDM but there is a lack of information as to the full extent of this dependence, the quantities abstracted and the quality of the resource. The DWA records of communities with the UMDM that draw on ground water indicate that the greatest dependence is within the Mkhambathini and Impendle Local Municipalities with 84 and 72 communities respectively drawing on ground water (DWA, Water Services Report Tool - http://www.dwaf.gov.za/dir_ws/WaterServices/reports/pg_reports.ASP?currentPage=25&FilterSelection=true&AlphaChar=&Prov=5&DMCode=All&LMCode=All&curReportID=10&cid=4&cursecAuthorityCode=&curLinkID=&curYear=8&SearchStr=&curLevelID=3). These records show water resource dependence per community per local municipality and the full picture for the UMDM in terms of ground water dependence according to this source is illustrated in Figure 11. The full data set shows 2021 communities within the UMDM which provides a better understanding of the relative dependence. Overall ground water contributes to 14.35% of the communities in the UMDM and at a local level the figure for Mkhambathini is just over 4%, per example.

An alternative illustration can be derived from the Water Safety Plans that were compiled for the UMDM by Jeffares Green (UMDM, 2010) and which provide data for each water supply scheme per Local Municipality within the District. From this data it has been possible to illustrate the extent to which groundwater contributes to supply within each of the Local Municipalities, with the exception of Msunduzi.

It must be noted that at the time of finalising this report, no further information had been provided by relevant stakeholders, and that which has been provided must be seen as the most current.

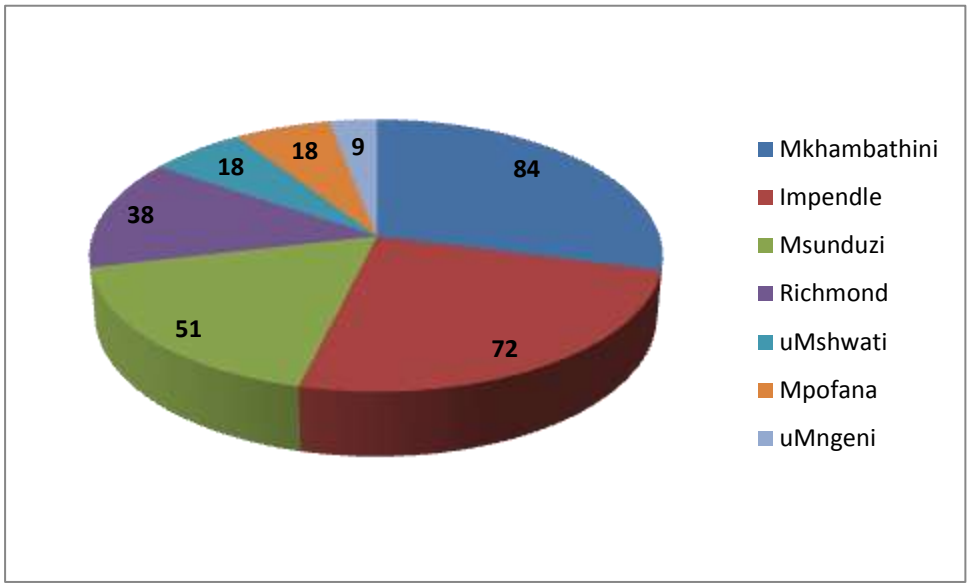


Figure 11: Number of communities drawing on groundwater per Local Municipality

Figure 12: Map showing yielding boreholes within UMDM against settlement type (see Map Book)

Table 7: An indication of ground water dependence per Water Supply Scheme per Local Municipality

Local Municipality	# communities drawing on ground water	# water supply schemes per community	# of water supply schemes drawing on ground water
Impendle	72	12	9
Mkhambathini	84	11	4
uMngeni	9	18	4
Mpofana	18	12	9
Richmond	38	14	5
uMshwati	18	22	9
Msunduzi	51		

The Water Services Development Plan compiled for the UMDM (UMDM, 2010) states that water use records (quality and quantity) are not being effectively managed especially in the rural areas (Impendle LM, Mpofana LM and Richmond LM). As a result, records are poor or non-existent. Therefore improved strategic water use and quality monitoring is required including areas around water sources for both groundwater and surface water throughout the UMDM. This therefore impacts on the ability of this report to provide further information on groundwater resources in the UMDM.

3.1.4.6 Summary of Key Impacts on Water Quality and River Health Within The District

Urban

- Polluted/contaminated storm water runoff from urban areas.
- Solid waste and pollutants entering storm water drains.
- Leaking private, but particularly municipal, sewer infrastructure
- Waste Water Treatment Works (WWTW) which are;
  - operating close to, or beyond, maximum capacity (results in regular overflow/surcharge to river – ie Howick),
  - managed incorrectly, or
  - do not meet discharge quality standards.

Industrial

- Legal and illegal discharges of polluted effluents both directly to rivers/storm water and to sewer/WWTW.

Agriculture and forestry

- Polluted runoff from cultivated areas (fertilizers, insecticides, herbicides, sediment).
- Runoff and (legal/illegal) discharges from intensive agriculture, such as feedlots, dairies, piggeries etc.
- Cultivated lands and forestry areas within or in close proximity to wetlands and watercourses.

Rural settlements

- Solid waste pollution (litter within catchments and dumping in rivers).
- Faecal pollution from livestock and human waste.
- Sedimentation of rivers from soil erosion (primarily linked to overgrazing, trampling and vegetation clearing).

The water quality pollutants associated with the above activities manifest in the following impacts within the uMgungundlovu District:

- *Eutrophication:* Trend analyses of historical Total Phosphorus concentrations indicate that by 2019 Midmar and Albert falls Dams will reach Eutrophic classification (utilising ranges given by van Ginkel *et. al.*, 2001), with Nagle Dam almost reaching Hypertrophic classification (GroundTruth, 2010b).
- *Water treatment problems:* Taste & Odour and Filter Clogging algal genera are problematic for Water treatment Plants as they increase the costs of water treatment[4] and can result in taste

[4] Since 2005 Wessex Water in the United Kingdom have facilitated improved catchment management practices amongst land users to reduce water quality impacts as an alternative to building additional water treatment infrastructure. Cost benefit analysis of the project illustrates that facilitating the correct management of water quality problems at source incurs one sixth of the cost of the water treatment alternative (Wessex Water, 2011). Farmers support the initiative as they gain expert advice and support covering best farming practice, with the potential to reduce their costs and improve

and odour problems. Release of toxins from these algal cells can result in health problems to water consumers. Predications are that at current rates of increase, Taste & Odour genera will comprise 67% and 82% of the total algal counts within Albert Falls and Nagle Dams respectively by the year 2017. It is predicted that by the same year raw water abstracted for the critical water supply of the Durban Heights Water Treatment Plant will show an 89% dominance by these problematic algal genera.

- *Water hyacinth / aquatic weed infestation:* As a result of the high nutrient loads accumulating within rivers of the District, the prolific growth of Water Hyacinth and other aquatic weeds is becoming an increasing problem, particularly within the uMngeni River in the vicinity of Nagle Dam. This is illustrated by organisers of the Dusi canoe marathon, and supporting NGO's, having to spend ever increasing sums of money each year on clearing paths through the aquatic weeds. The aquatic weeds also present a danger to adjacent communities and recreational users by providing potential habitat for Bilharzia carrying snails, and by presenting an increased drowning risk to people, livestock and wildlife. This impact is exacerbated by sand mining which creates unnatural pools and backwaters, with slow flow velocities, which are readily colonised by aquatic weeds.
- *Health of water users / surrounding communities:* The Mthinzima River near Mpophomeni, and selected rivers sampled within the Durban area have shown *E.coli* concentrations which would have a significant likelihood of causing gastrointestinal illness through human recreational contact with the water. Young children playing in the waters at one polluted site within Durban reportedly had welts and sores on their skin, which may be as a result of exposure to highly polluted waters (GroundTruth, 2007). Rivers within the District are used for washing, fishing, recreation, cattle watering and various cultural and spiritual activities, posing a risk to communities, particularly within urban centres and surrounds. It is rural communities and the poor who rely most directly on the water resources and ecosystem services provided by river systems and their catchments, and are thus most impacted by poor water quality and river health. The Millennium Ecosystem Assessment (2005) found that the poor are more significantly impacted by the harmful effects of ecosystem services degradation, and that degradation of these primary services is often the principal driver of poverty and social conflict.
- *Impacts on river health and biodiversity:* The range of pollutants and other impacts on river systems have a negative impact on the health and biodiversity of aquatic and riparian habitat within the uMgungundlovu District.

It must be noted that the information provided in this section on water resources reflects the most current available at the time of finalising this report. The efforts and contributions of the Duzi uMngeni Conservation Trust are acknowledged in the provision of all of their water quality data. It is possible that Umgeni Water could provide more up to date information and while they were approached for such, it was not forthcoming in time for inclusion in this final version of the report.

yields. The philosophy adopted is that land users and water supply companies have a shared responsibility to the public in providing and maintaining a quality water supply.

3.1.5 Air Quality

uMoya-NILU Consulting (Pty) Limited was appointed to provide baseline information on air quality in the UMDM for the SEA and to identify air quality gaps and issues. The climatology and meteorology of the UMDM is described using available information with an emphasis on the ability of the atmosphere to disperse air pollutants. Available information is used to describe the nature of air pollution sources in each of the local municipalities as well as the current status of air quality. This information is also used to identify information or knowledge gaps and issues relating to air quality and air quality management in the UMDM.

3.1.5.1 Climate and Meteorology

The climate of any given location is determined mostly by its latitude, relative location to the sea and altitude, with aspects such as topography and land cover also having an influence. The UMDM is located in sub-tropical latitudes with the altitude increasing steadily moving inland from about 700 m above sea level (ASL) at Camperdown to about 1 100 m ASL at Cedara and 1 400 m at Mooirivier. The climate in the UMDM therefore changes from being warm to hot and humid in the lower southeastern parts that are affected by the warm Indian Ocean to more a temperate climate in the northwestern parts where altitude has a stronger influence.

The South African Weather Service (SAWS) runs 3 meteorological monitoring stations in the UMDM. These are located at Mooirivier to the north; and Cedara and Pietermaritzburg to the south.

The Cedara station is located approximately 16 km to the north of Pietermaritzburg and is considered to be more representative of the central parts of the UMDM. The meteorology at Mooirivier is as representative of the northwestern parts of the UMDM. Due to its setting in a valley, the meteorology in Msunduzi is relatively localised and is strongly influenced by topography. It is not representative of the general meteorology of the southern parts of the UMDM.

The mean daily temperature at Cedara is 16.2 °C with the average monthly maximum of about 25 °C in summer and the minimum falling below 5°C in the winter months (Figure 13) (SAWB, 1998). The average annual rainfall for Cedara is 861 mm (SAWB, 1998). Most of the rain occurs in the summer, from September to March (Figure 13) and is associated with convective storms and occasionally cold fronts.

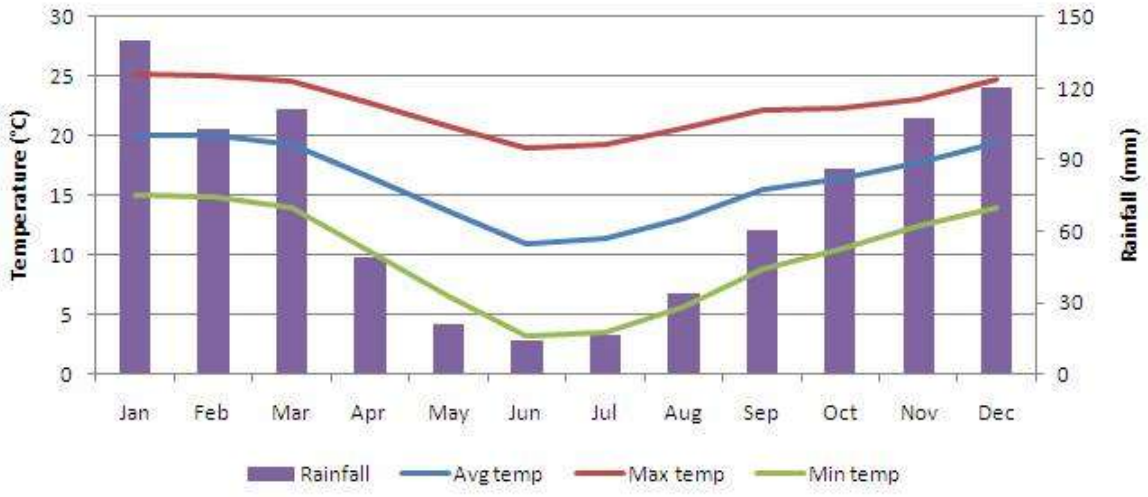


Figure 13: Monthly average maximum, minimum and mean temperatures (ºC); and monthly rainfall (mm) at Cedara for the period 1961-1990 (SAWB, 1998)

The wind over the northern and southern regions of the UMDM is described by means of windroses at Cedara and Mooirivier (Figure 14). Windroses simultaneously depict the frequency of occurrence of hourly wind from the 16 cardinal wind directions and in different wind speed classes. Wind direction is given as the direction from which the wind blows, i.e., southwesterly winds blow from the southwest. Wind speed is given in m/s, and each arc in the windrose represents a percentage frequency of occurrence (3% in this case).

The prevailing winds at Cedara are predominantly easterly to south easterly and south westerly. The annual frequency of occurrence of easterly to south southeasterly winds is ~32%; and ~8% for the south westerlies. The annual average wind speed is 2.67 m/s and the station experienced calm conditions for approximately 22.4% of the observation period.

The prevailing winds at Mooirivier occur predominantly in the sector north to north northwest (about 20%) and in the sector south to southwest (about 20%). The strongest winds (> 8.5 m/s) are from the north northeast and southwest. The annual average wind speed is 3.2 m/s and the station experienced calm conditions for approximately 27.6% of the observation period. On average, stronger winds with a higher frequency of calm winds is observed at Mooirivier as opposed to Cedara where winds are lighter with a lower frequency of calm winds.

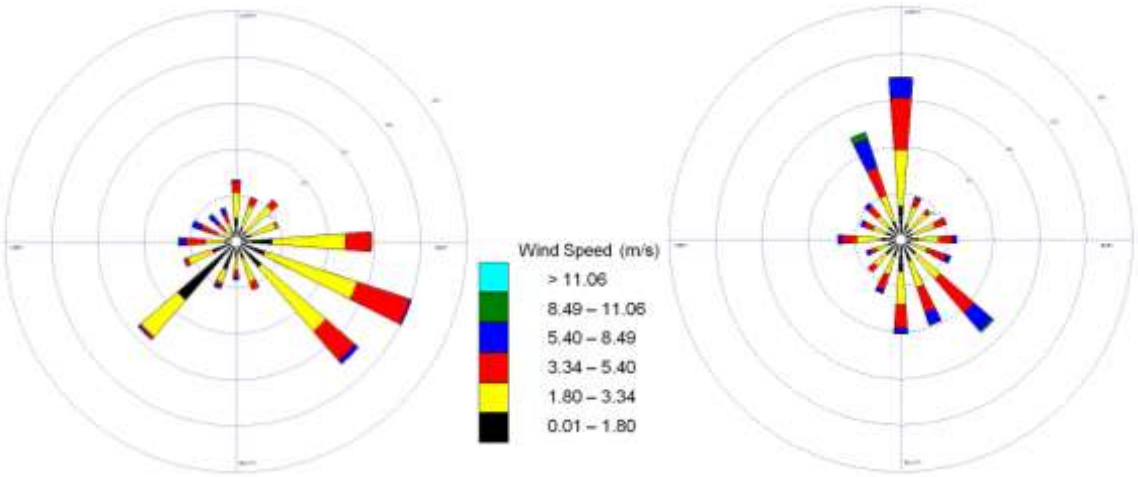


Figure 14: Annual windroses at Cedara (left) and Mooirivier (right) for the year 2010

The two primary meteorological factors that affect the dispersion and dilution of air pollutants are wind speed and atmospheric stability. Air pollutants are dispersed horizontally from the point of release by the wind with stronger winds being more effective, and they are diluted in the atmosphere by turbulence. The conditions that prevail during the winter throughout the UMDM is a stable nocturnal atmosphere due to the formation of surface temperature inversions, and these are not conducive to efficient dispersion and dilution. In these conditions pollutants tend to accumulate close to the source, particularly in valleys and topographical depressions, dispersing during the day when the earth's surface warms and the atmosphere becomes unstable. In summer the atmosphere is generally more unstable throughout the UMDM and the tendency for pollutants to accumulate is less.

3.1.5.2 Air pollution sources

Air pollution in the UMDM include *inter alia* industry that is regulated in terms of the National Environmental Management: Air Quality Act (Act no. 39 of 2004) (AQA), small industrial processes that do not require regulation in terms of the AQA, motor vehicles, biomass burning (sugar cane, forestry, etc.), residential fuel burning, water treatment works and landfill sites. These activities may result in the emission of sulphur dioxide (SO_2), oxides of nitrogen (NO_x), particulate matter (including PM_{10}), carbon monoxide (CO), volatile organic compounds (VOC) and odour amongst others.

The available information regarding emissions in the UMDM is relatively incomplete and exists in two compilations. These are the emission inventory report for KwaZulu-Natal (DAEARD , 2007) and the database of APPA Registration Certificates (DEA, 2010). The KwaZulu-Natal emission inventory considers emissions from industry and motor vehicles by local municipality and emissions from sugarcane burning for the province. A shortcoming of this information is not all industries provided information for the inventory. The DEA database was developed by capturing hardcopy Registration Certificates so the data may be dated as well as incomplete. Despite these shortcomings, these two resources provide valuable information on industrial emissions.

The KwaZulu-Natal emission inventory indicates that the UMDM is the third highest contributor to the total emissions in the province after the eThekwini metropolitan municipality and the Amajuba

district municipality. However, the relative contribution to the total emission in the province is relatively small (Table 8).

Table 8: Total annual emissions for KwaZulu-Natal and the uMgungundlovu District Municipality (adapted from DAEARD , 2007)

	Industry			Vehicles		
	KZN	UMDM*		KZN	UMDM	
	t/a	t/a	%	t/a	t/a	%
SO_2	59870	634	1.1	22798	959	4.2
NO_x	26614	516	1.9	227415	12765	5.6
PM	14709	2010	13.7	56790	2646	4.7
VOC	658	0.67	0.1	250923	16092	6.4
CO	176630	3498	2.0	1333539	85533	6.4

* Msunduzi sources only

The Atmospheric Pollution Prevention Act No. 45 of 1965 (APPA) Registration Certificate database indicates that there are 62 registered industrial processes in the UMDM, in 10 different manufacturing sectors (Figure 15). A range of different metallurgical processes are the highest in any sector, followed by large industrial boilers using biomass fuels for steam generation, charcoal manufacturing and wood processing. Msunduzi has the highest number of regulated industrial sources in the district followed by Mkhambathini with 8 and uMshwathi and uMngeni local municipalities with 7 each (Figure 16).

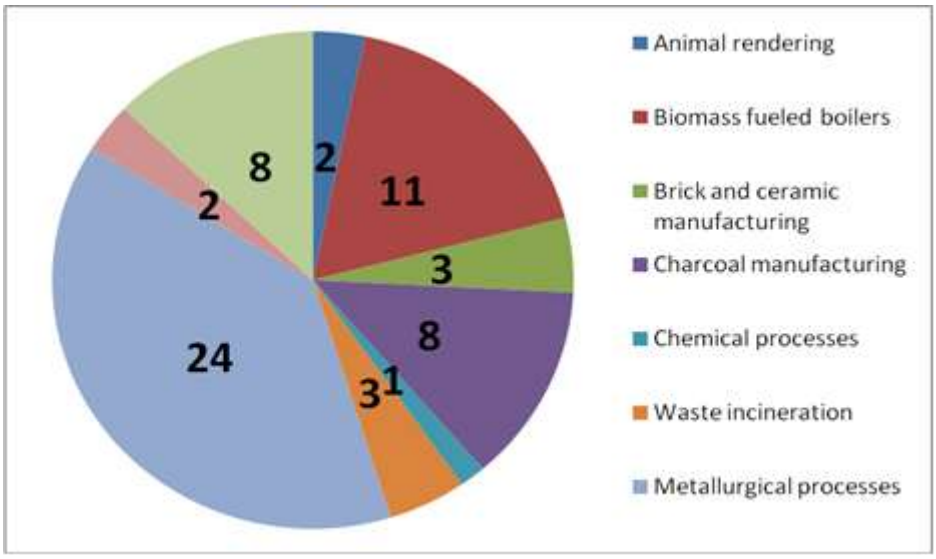
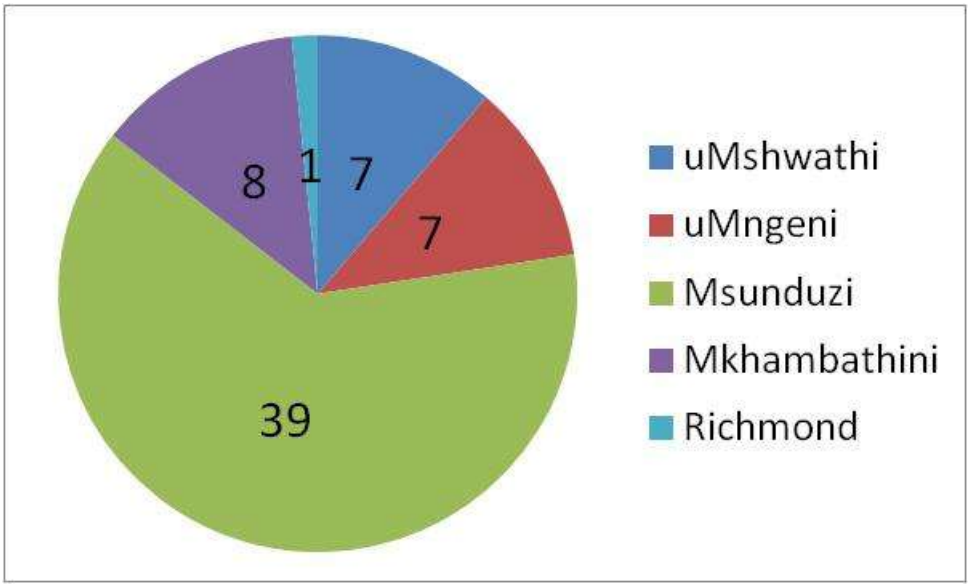


Figure 15: Distribution of industrial sources by process type in the UMDM (DEA, 2010)

Emission sources in the ***uMshwathi local municipality*** included 5 regulated industrial boilers and the medical waste incinerators at the Montobello and Appelbosch Hospitals. The 2007 Community Survey (Stats South Africa, 2008) reveals that 60% of the 22 110 households in the local municipality rely on wood, paraffin and gas for cooking and heating (Table 9). Paraffin and gas are relatively clean fuels, but emissions from wood burning include pollutants such as, carbon dioxide (CO_2),

particulates (smoke) and VOCs. Burning associated with agriculture such as residue burning, burning of fire breaks and sugar cane burning are seasonal sources of these same pollutants.



Process description	uMshwathi	uMngeni	Msunduzi	Mkhambathi	Richmond
Animal rendering	0	0	0	2	0
Biomass fueled boilers	5	0	2	4	0
Brick and ceramic manufac	0	0	1	2	0
Charcoal manufacturing	0	4	4	0	0
Chemical processes	0	0	1	0	0
Waste incineration	2	1	0	0	0
Metallurgical processes	0	0	24	0	0
Rubber processing	0	0	2	0	0
Wood processing	0	2	5	0	1
Total	7	7	39	8	1

Figure 16: Number of industrial processes with APPA registration certificates in the UMDM (top) and the distribution by process type in the local municipalities (bottom) (DEA, 2010)

Table 9: Energy/fuel use by households in the UMDM (Stats South Africa, 2008)

Municipality	Electricity	Gas	Paraffin	Wood	Coal	Animal dung	Solar	Other	Number of households
Cooking									
uMshwathi	8,910	947	3,632	8,519	0	0	51	51	22,110
uMngeni	13,738	1,266	4,661	1,892	32	0	0	0	21,589
Mpofana	4,359	273	455	2,698	18	0	0	0	7,803
Impendle	1,783	37	494	4,970	34	0	0	21	7,339
Msunduzi	117,051	2,088	10,209	4,592	250	69	59	71	134,389
Mkhambathini	4,720	125	1,673	5,425	0	0	28	0	11,971
Richmond	6,519	474	2,086	3,600	0	0	0	0	12,679
Heating									
uMshwathi	6,662	260	1,610	13,361	108	0	0	108	22,109
uMngeni	12,607	491	3,182	4,906	203	0	0	199	21,588

Municipality	Electricity	Gas	Paraffin	Wood	Coal	Animal dung	Solar	Other	Number of households
Mpofana	3,803	125	236	3,379	165	0	0	93	7,801
Impendle	836	112	170	6,009	0	21	0	190	7,338
Msunduzi	113,553	1,233	7,704	9,454	253	131	59	2,002	134,389
Mkhambathini	4,491	48	1,431	5,891	31	0	0	78	11,970
Richmond	5,465	50	1,599	4,706	33	0	0	826	12,679

The majority of the regulated industrial processes is in the UMDM are located in the ***Msunduzi local municipality*** (Figure 16). These include 24 different metallurgical processing facilities, 5 wood processing facilities, 4 charcoal manufacturing plants as well as a few other industrial processes. Non-regulated sources of air pollutants include smaller industries, the landfill near New England, sewage treatment works, the Oribi Airport and traffic, i.e. both within the city as well as that associated with the N3 highway. The distribution of the main sources is illustrated in Figure 17.

Msunduzi is largely urbanised and electricity is used in 87% of the 134 000 households for cooking and in 84% for heating. Despite the high percentage of homes that are electrified wood is however used in more than 4 500 homes for cooking and in nearly 9 500 homes for heating. The relatively large number of homes still using wood will contribute significantly to the total emission of particulates in the local municipality.

Figure 17: Distribution of air pollution sources in the Msunduzi local municipality (WSP 2009) – see Map Book

The ***Mkhambathini local municipality*** is largely rural with nearly half of the 11 790 households still reliant on wood as the primary energy source for cooking and heating (Table 9). There are eight regulated industrial sources according to the information in DEA (2010). These include four industrial boilers that use different biomass, a brick manufacturing plant and a ceramic industry which are sources of particulate and gaseous pollutants and the rendering of animal products at the chicken farms which is primarily a source of odour. The busy N3 highway passes thought the northern part of the local municipality and is a source of pollutants associated with motor vehicles. Agricultural burning in the southern parts of the local municipality particularly associated with forestry and sugar cane is a source of air pollutants.

The ***Richmond local municipality*** is largely rural and under agriculture, and the only regulated industry is a timber processing plant (DEA, 2010). Approximately 76% of households use relatively clean energy (electricity, gas, paraffin) for cooking and 56% use these fuels for heating. A relatively large number of homes are however still reliant on wood as their primary energy source. Agricultural burning associated with forestry and sugar cane is also a source of air pollutants in the local municipality.

The air pollution sources that occur in the UMDM are summarised by source category in Table 10 providing an indication of the common pollutants in each category.

Table 10: Summary of source categories and pollutants in the local municipalities in the UMDM

Source category	Industry	Domestic wood burning	Motor vehicle	Agricultural burning	Waste management
Common pollutants	SO_2, NO_x, particulates, VOC, CO, odour	particulates, VOC	NO_x, particulates, CO	particulates, VOC	VOC, particulates, odour
uMshwathi	✓	✓		✓	✓
uMngeni	✓	✓	✓	✓	✓
Mpofana		✓		✓	
Impendle		✓		✓	
Msunduzi	✓	✓	✓		✓
Mkhambathini	✓	✓		✓	
Richmond		✓		✓	

3.1.5.3 Current air quality status

In the UMDM ambient air quality monitoring has only been undertaken in the Msunduzi local municipality. This data is mostly historic and data from more recent monitoring initiatives is relatively incomplete (*Pers. Comm*., C. Anthony, Msunduzi local municipality). Despite this, the data are used to describe air quality monitoring and the state of air quality in Msunduzi in the specialist report on air quality for the Msunduzi Environmental Management Framework (WSP, 2009). In areas where no monitoring data exists, only speculation can be made on the state of air quality based on some understanding of the emission sources.

The concentration of air pollution sources in the ***Msunduzi*** local municipality together with poor air pollution dispersion induced by the topography are conducive to the accumulation of air pollution for considerable periods of the day. The accumulation is likely to be worse in winter when strong and shallow surface temperature inversions occur almost daily. Under these conditions it is likely that exceedances of ambient air quality standards occur, especially close to the sources. These may include the industrial zones where coal and heavy fuel oil are burnt in boilers, residential areas where coal and wood are still used for cooking and heating, and areas of high traffic volumes such as the city centre and along the N3 highway.

The EMF study (WSP, 2009) noted a decreasing trend in smoke concentrations at all monitoring stations in the ***Msunduzi*** local municipality over the thirty year period with the exception of the station in Northdale. Here there has been a growth in the number of coal burning industries, an increase in sugar cane burning and in the burning of surplus timber from plantation clearing activities. This coupled with poor atmospheric dispersion that results in an accumulation of pollutants, particularly at night and in winter, is likely to be identified as the possible cause (WSP, 2009).

SO_2 concentrations were however found to decrease at two of the monitoring sites with the increase at other stations attributed to the increased use of heavy fuel oil (HFO) by industry, with a sulphur content of between 3 and 4% (WSP , 2009). The increase in the SO_2 concentrations in the vicinity of

Mason's Mill is attributed to the formal and informal settlements around the Edendale valley where significant quantities of coal are still used for heating and cooking (Table 9). Average annual SO_2 concentrations are well below the National Ambient Air Quality standard of 50 µg/m^3 in Msunduzi (WSP, 2009).

The state of air quality in the other local municipalities in the UMDM is expected to be relatively good as there are a limited number of sources and these are well distributed throughout the respective municipalities. However, in the ***uMshwathi***, ***uMgeni*** and ***Mkhambathini*** local municipalities the potential exists for localised areas of elevated ambient concentrations of air pollutants around industrial facilities. In addition wood, coal and dung are used in villages and residential areas throughout the UMDM for heating and cooking (Table 9). Generally fires are made in the evenings and mornings coinciding with stable atmospheric conditions and poor dispersion. In these areas ambient air quality will be compromised when very high concentrations of particulates may occur. Seasonal burning associated with sugar cane harvesting, controlled fires for forest management, etc. will result in smoke, but these are typically for short periods and can affect relatively large areas.

It is recommended is that, in terms of the air quality act, all municipalities must include air quality management plans in their IDP's. This builds on the recommendation for greater environmental consideration in planning.

3.1.5.4 Summary of Key Air Quality Issues

Although the UMDM generates the third highest level of atmospheric pollution in the province, this level is relatively low. The aspect of primary concern though is the combination of the topographical and atmospheric conditions, and the concentration of pollution sources in the Msunduzi Local Municipal area. The daily development of a strong and shallow surface temperature inversion layer in winter traps pollutants causing an exceedance of ambient air quality standards. The density of industrial activities in the other local municipal areas is much lower than in uMsunduzi and the sources are predominantly domestic and agricultural, but are at levels that do not cause undue concern.

It must be noted that at the time of finalising this report, the information provided above was the most current. Even though efforts were made to access more current data and information, none was available and more resources would be required to provide such.

3.2 Biophysical Environment

3.2.1 Vegetation and Habitat Types

The uMgungundlovu District area contains a number of different vegetation types (Table 11); these are grouped into five biomes, namely, Forest, Grassland, Indian Ocean Coastal Belt, Savanna and Azonal Vegetation. These biomes provide the basic template for defining the extent of species-specific habitat that potentially supports a wide variety of biodiversity.

The Grassland biome dominates the District making up approximately 60% of its area, followed by Savanna, with about 38%. The remaining 2% comprises the Forest biome (~1.5%), the Indian Ocean Coastal Belt and Azonal Vegetation. Grassland is most significant supporting a greater proportion of Threatened vegetation types, namely Midlands Mistbelt Grassland (**Endangered**; ~21%) and Mooirivier Highland Grassland (**Vulnerable**; ~7%). Savanna is also an important biome with approximately 18 and 7% of the District comprising Ngongoni Veld (**Vulnerable**) and KwaZulu-Natal Sandstone Sourveld (**Endangered**).

Figure 18: Vegetation types of the uMgungundlovu District prior to transformation (after Mucina and Rutherford, 2006 – see Map Book)

Table 11: Vegetation types of the uMgungundlovu District per Local Municipality (after Mucina & Rutherford, 2006)

KZN Vegetation type	Conservation status	Local Municipalities							uMgungundlovu District
		Mkhambathini	Richmond	Msunduzi	uMshwathi	uMngeni	Mpofana	Impendle	
Area (km²)		891	1 256	634	1 819	1 567	1 820	1 528	9 516
Azonal Vegetation Biome									
Drakensberg Wetlands	Vulnerable							2	2
Eastern Temperate Wetlands	Least Threatened					<1	9	11	20
Temperate Alluvial Vegetation	Vulnerable						6		6
Forest Biome									
Drakensberg Montane Forests	Least Threatened					1	3	4	5
Eastern Scarp Forests: Southern Coastal Scarp Forest	Least Threatened[5]		22	10	42	48	2	14	138
Eastern Mistbelt Forests	Least Threatened	10			10				20
Grassland Biome									
Drakensberg Afroalpine Heathland	Least Threatened							11	11
Drakensberg Foothill Moist Grassland	Vulnerable			<1	32	542	443	629	1646
Drakensberg-Amatole Afromontane Fynbos	Least Threatened							<1	<1
KwaZulu-Natal Highland Thornveld	Least Threatened				<1		357		357
Lesotho Highland Basalt Grassland	Least Threatened							1	1
Midlands Mistbelt Grassland	Critically Endangered		400	284	328	756	2	128	1898

[5] Scarp Forests are considered **Least Threatened** where they occur within protected areas. Outside of protected areas they are overexploited.

Mooi River Highland Grassland	Vulnerable					32	618		649
Northern Drakensberg Highland Grassland	Least Threatened					2	80	8	90
Southern Drakensberg Highland Grassland	Least Threatened							317	317
Southern KwaZulu-Natal Moist Grassland	Vulnerable		60			86		237	383
uKhahlamba Basalt Grassland	Least Threatened						79	166	245
Indian Ocean Coastal Belt									
South Coast Bushland	Endangered	39							39
Savanna Biome									
Eastern Valley Bushveld	Least Threatened	152	210	37	64				463
KwaZulu-Natal Hinterland Thornveld	Vulnerable	175	2	113	191	68			549
KwaZulu-Natal Sandstone Sourveld	Critically Endangered	118	74		517				708
Dry Ngongoni Veld	Endangered	300	63	102	274	9			748
Moist Ngongoni Veld	Critically Endangered	97	425	87	345	8			962
Thukela Thornveld	Least Threatened						68		68
Thukela Valley Bushveld	Least Threatened						152		152

3.2.2 Species of Special Concern

The conservation status of species for all taxa groups is determined using categories[6] determined by the International Union for Conservation of Nature (IUCN) (IUCN, 2011). This system is designed to determine the relative risk of extinction, with the main purpose of the IUCN Red List to catalogue and highlight those taxa that are facing a higher risk of global extinction with those listed as Critically Endangered (CR), Endangered (EN) and Vulnerable (VU) collectively considered as Threatened. The IUCN Red List also includes information on taxa that cannot be evaluated because of insufficient information (i.e. Data Deficient) as well as taxa that are close to meeting the threatened thresholds (i.e. Near Threatened).

3.2.2.1 Flora

The uMgungundlovu District is known to support a number of Red Data species, including eight Critically Endangered, 12 Endangered, 36 Vulnerable, 20 Near Threatened and 12 Data Deficient species (Table 12). Majority of the Red Data plant species are small herbaceous pants, e.g. *Brachystelma* species. A detailed list of Red Data plant species used in Table 12 is provided in Appendix 2: List of Red Data plant species known to occur, or likely to occur, within the uMgungundlovu District Municipality (GroundTruth, 2011a).

Table 12: Summarised conservation status of floral groups within the uMgungundlovu District (after IUCN, 2011)

Group	Conservation status (IUCN)					Total
	CR	EN	VU	NT	DD	
Trees*	1	1	4	5		**11**
Shrubs	3	2	1	2	1	**9**
Climbers		1	3			**4**
Herbs#	4	8	26	13	11	**62**
Graminoids			2			**2**
Total	**8**	**12**	**36**	**20**	**12**	**88**

* Including species of cycad

Including geophytic herbs (e.g. Orchids) and aquatic herbs

3.2.2.2 Fauna

There are about 80 faunal species of special concern that are known to occur or likely to occur within the District (Appendix 2: List of Red Data plant species known to occur, or likely to occur, within the uMgungundlovu District Municipality (GroundTruth, 2011a)). An additional 14 species are considered rare and/or endemic to the region. In terms of Red Data fauna, there are three Critically

[6] **IUCN Categories:**

Critically Endangered (CR) – the species is considered to be facing an extremely high risk of extinction in the wild, based on IUCN criteria.

Endangered (EN) – the species is considered to be facing a very high risk of extinction in the wild, based on IUCN criteria.

Vulnerable (VU) – the species is considered to be facing a high risk of extinction in the wild, based on IUCN criteria.

Near Threatened (NT) – when evaluated against IUCN criteria, does not qualify for a Threatened category but is close to qualifying for or is likely to qualify in one of those categories in the near future.

Data Deficient (DD) – there is inadequate information regarding the species' population size, distribution or threats for an assessment to be made.

Endangered, nine Endangered, 26 Vulnerable, 30 Near Threatened and 4 Data Deficient species (Table 13). A detailed list of Red Data fauna used in Table 13 is provided in Appendix 2: List of Red Data plant species known to occur, or likely to occur, within the uMgungundlovu District Municipality (GroundTruth, 2011a).

Table 13: Summarised conservation status of faunal groups within the uMgungundlovu District (after IUCN, 2011)

Group	Conservation status (IUCN)					Rare and endemics	Total
	CR	EN	VU	NT	DD		
Amphibians		2	2	1		4	**9**
Reptiles			9*			9	**18**
Birds	3	2	17	18		1	**41**
Mammals	0	4	7	9	3		**23**
Fish				2	1		**3**
Invertebrates		1					**1**
Total	**3**	**9**	**26**	**30**	**4**	**14**	**95**

3.2.3 Protected Areas and other Conservation Areas[7]

Protected areas are areas of land that are, according to the National Environmental Management: Protected Areas Act (Act 57 of 2003), protected by law and as a result these areas are managed for the conservation of biodiversity. The protected areas include several categories, namely: special nature reserves, nature reserves and protected environments; world heritage sites; specially protected forest areas, forest nature reserves and forest wilderness areas declared in terms of the National Forests Act (Act 84 of 1998); and mountain catchment areas declared in terms of the Mountain Catchment Areas Act (Act 63 of 1970). South Africa's protected area network currently falls far short of sustaining biodiversity and ecological processes (Government of South Africa, 2010). This is largely due to the non-uniform distribution of protected areas across the country resulting in large gaps in the protected areas network.

It is important to differentiate protected areas from general conservation areas, which are areas of land not formally protected by law but informally protected by the current owners and users and managed at least partly for biodiversity conservation (Government of South Africa, 2010). As a result, conservation areas are not regarded as land having a strong form of protection due to their indefinite assurance as conservation areas. For this reason, many conservation areas are not targeted by national and provincial conservation organisations. However, informal conservation area arrangements can be useful as 'entry-level' biodiversity stewardship agreements, and over time may lead to contract agreements. Existing conservation areas can also provide a useful starting point for pursuing contract agreements, as long as they fall within important areas for protected area expansion.

[7] **Conservation Areas** are areas of land not formally protected by law but informally protected by the current owners and users and managed at least partly for biodiversity conservation. Because there is no long-term security associated with conservation areas, they are not considered a strong form of protection (NPAES, 2008).

The uMgungundlovu District contains a number of formally protected areas and other conservation areas (Figure 19). Most notable is the Ukhahlamba Drakensberg Park World Heritage Site (UDP WHS), an area with international recognition supporting important biodiversity and ecosystems assets. Through this recognition, the UDP WHS has become listed as a Ramsar site[8], thereby supporting wetlands of international importance.

Figure 19 and Table 14 summarise the formally protected areas within the District derived from the 2010 EKZNW protected areas coverage (i.e. provincial reserves, private reserves and stewardship sites with nature reserve and protected environment status) as well as informal conservation areas (i.e. biodiversity agreements between EKZNW and landowner in favour of conservation, game ranches, Natural Heritage Sites, Sites of Conservation Significance and Conservancies). This was also supplemented by the recently proclaimed (2011) Stewardship Sites. The uMgungundlovu District does not contain any formally protected state forests or Community Conservation Areas.

Figure 19a&b: Protected areas and other conservation areas within the uMgungundlovu District (EKZNW, 2010a – see Map Book)

Table 14: Protected areas and other conservation areas within the uMgungundlovu District (derived from the 2010 EKZNW protected areas coverage)

[8] The Convention on Wetlands, held in Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources (www.ramsar.org).

Protected / Conservation area category		Name	Label	Area (Ha)
Formal Protected Areas				
Provincial Nature Reserve		Blinkwater Nature Reserve	1	408.7
		Cobham State Forest	2	10678.7
		Doreen Clark Nature Reserve	3	5.8
		Fort Nottingham	4	130.1
		Highmoor State Forest	5	14652.5
		Kamberg Nature Reserve	6	6600.2
		Karkloof Nature Reserve	7	2082.6
		Lotheni Nature Reserve	8	4858.4
		Midmar Nature Reserve	9	2840.3
		Mkhomazi State Forest	10	28949.3
		Queen Elizabeth Park Nature Reserve	11	93.5
		Umgeni Vlei Nature Reserve	12	958.4
		Vergelegen Nature Reserve	13	1573.1
Private Reserve		Mbona Nature Reserve	14	731.8
		Minerva Nature Reserve	15	1018.3
		Umngeni Grassland Reserve	16	39.6
		Zinti Valley	17	575.4
Stewardship Site	Nature Reserve	Bill Barnes Crane and Oribi Nature Reserve	18	473.7
		Hilton College Nature Res	19	444.2
		Mbona Private Nature Reserve	20	688.8
		Mt Gilboa Nature Reserve	21	748.0
		Roselands Nature Reserve	22	395.8
	Protected Environment	Mpushini Protected Environment	24	669.3
Informal Conservation Areas				
Game Ranch		Duma Manzi	25	954.0
		Gwahumbe Game & Spa	26	208.7
		Highover Nature Reserve	27	651.0
		Highthorn Private Game Reserve	28	506.3
		Inhlanze Commercial Game Ranch	29	3426.8
		Killarney Isle	30	252.6
		Kwamawela Private Wildlife Reserve	31	2779.2
		Msinsi Albert Falls	32	697.1
		Msinsi Nagle Dam & Game Reserve	33	1894.1
		Tala Game Ranch	34	1678.0
		Zulu Falls	35	1917.7
Stewardship Site	Biodiversity Agreement	Boston View	23	828.1
Natural Heritage Site		Sensitve Point Source Data - Cannot include site names in the report	36 - 70	13791.3

Site of Conservation Significance		71	
	Barton Heights Indigenous Forest	72	
	Barton Heights Treefern Sites	73	
	Baynesfield Wetland Area	74	
	Beacon Hill	75	
	Bisley Nature Reserve	76	350
	BoschHoek Forest	77	
	Braeside	78	
	Cascades	79	
	Cedara Grassland	80	
	Cleveland Bush	81	
	Cliffside Aloe Site	82	
	Crowned Eagle Nest	83	
	Crowned Eagle Nest	84	
	Crowned Eagle Nest	85	
	Cycad Colony	86	
	Dargle Bush	87	
	Darvil Ponds	88	
	Denleigh Grassland	89	
	Diphini	90	
	East Meshlynn Orchid Vlei	91	
	East Meshlynn Protea Colony	92	
	Efaye Valley	93	
	Ematendeleni	94	
	Ferncliffe Nature Reserve	95	
	Flufftail Wetland	96	
	Fourdoun	97	
	Frans Oribi Area	98	
	Green Hill Wetland Site	99	
	Hawkstone Hill	100	
	Highfiled Road	101	
	Highlands Oribi Area	102	
	Hilton Quarry	103	
	Jesmond Dene	104	
	Karkloof Indigenous Forest	105	
	Keerom	106	
	Kenbirch Bird Sanctuary	107	
	Kildare bush	108	
	Klipfontein Vlei	109	
	Liff Bush	110	
	Lone Tree	111	
	Luiick Forest	112	

	Lynmouth	113	
	Malden	114	
	Maweni	115	
	Meyershoek Amphitheatre	116	
	Michaelhouse	117	
	Mill Cottage Wetland Area	118	
	Mount Desire Valley	119	
	Mount Desire Wetland Site	120	
	Mount Shannon Nature Reserve	121	
	Mount Shannon Wattled Crane	122	
	Mpofanyana	123	
	Nooitgedacht Wetland Area	124	
	Nyaka-nyaka Vlei	125	
	Onrust Fynbos Site	126	
	Onrust Mistbelt Forest Sites	127	
	Oribi	128	
	Pateni Forests	129	
	Safcol Dargle Indigenous Forest	130	
	Satellite Dam Bird Sanctuary	131	
	Shafton Hawkstone	132	
	Shafton Wetland	133	
	Solitude Forest	134	
	Tafuleni Gorge	135	
	Tala Conservation Site	136	
	Tedder's Farm	137	
	Thorvale Swamp	138	
	Tourgar	139	
	Tree Fern Valley	140	
	Treverton Wildlife Area	141	
	Umlaas Falls	142	
	Whitson Conservation Site	143	
	Windy Hill Cycad Site	144	
	Woodhouse Falls	145	
	World's View	146	
	Zinti	147	
Conservancies	Balgowan	153	3802.3
	Baynesfield	154	9941.7
	Beaumont-Eston	155	32658.7
	Boston	156	16156.7
	Broadmoor Estate	157	2778.1
	Byrne Valley	158	8117.0
	Clarendon/Wembley	159	684.9

	Cleland-Mkondeni	160	2993.6
	Dargle	161	19162.5
	Ferncliffe	162	1633.6
	Gongolo	163	14093.2
	Ifaye	164	14554.1
	Ka Hela Hele	165	0.3
	Kamberg	166	16795.8
	Karkloof	167	2410.8
	Lions Bush	168	8470.6
	Lowlands	169	609.7
	Mahwaqa Mountain Oribi	170	267.5
	Mgwempise	171	9531.8
	Mid Illovu	172	12896.1
	Mkuzane	173	9295.4
	Mooi River	174	9862.5
	Mpushini	175	3220.8
	Mshwati	176	2812.9
	Ngenyane	177	2308.7
	Nhlamvini Game Ranches	178	1.9
	Nyamakazi	179	1175.3
	Sappi	180	2850.6
	Sappi	181	1576.1
	Sappi	182	5656.8
	Table Mountain	183	2767.5
	The Valley	184	4116.2
	Thukela Biosphere	185	5.6
	Umvoti Vlei	186	4327.1
	Wartburg	187	4929.6
Protected Area Expansion			
Focus Area	Drakensberg and Midlands		12125.1
	Eastern Valley Bushveld		11453.1
	Thukela		13898.1
Proposed Stewardship Site	Baynesfield	148	281.0
	Dargle Valley	149	6498.1
	Hopedale	150	526.0
	Umgenyane Conservancy	151	1016.2
	Wedgewood	152	62.2

There are a number of additional conservancies in Msunduzi that need to be included in the EKZNW Protected Area coverage in order that Figure 19 and Table 14 accurately reflect the full suite of protected areas and other conservation areas within the uMgungundlovu District. These are: Bisley (350ha), Hesketh (60ha), Mpushini (656ha) & Worlds View (50ha).

3.2.3.1 Protected Area Expansion

According to EKZNW (Clinton Carbutt, *pers comm*.), UMDM does have opportunities for protected area expansion. Most of the PA expansion areas are the upland grasslands in the foothills of the Drakensberg, particularly around Umgeni Vlei Nature Reserve; Fort Nottingham Nature Reserve; Kamberg management unit of UDP WHS; Karkloof Nature Reserve; and other scattered patches in the KZN Midlands not linked to any protected areas, including the areas in the Eastern Valley Bushveld between Camperdown and the uMngeni River (see Figure 19a&b & Table 14: Protected areas and other conservation areas within the uMgungundlovu District (derived from the 2010 EKZNW protected areas coverage)).

3.2.4 Ecological Corridors

Ecological corridors are defined as 'networks of interconnected terrestrial and aquatic habitat areas which allow linkages and passage of species and ecological processes across transformed landscapes'. The maintenance of connectivity is essential to a number of movement-related ecological processes, including species migrations, seasonal and altitudinal dispersal, and range displacement in response to climate change.

3.2.4.1 Macro-ecological Corridors

SANBI's National Spatial Biodiversity Assessment (NSBA) has delineated a number of macro ecological corridors throughout the country which, Provincially Ezemvelo KZN Wildlife have refined into 17. The following macro ecological corridors form part of the uMgungundlovu DM:

- The **Tugela North Corridor** bisects a portion of the northern part of the UMDM;
- Further south, extending east west from Blinkwater, Karkloof, Nottingham Road to Karkloof is the **Tugela Corridor**;
- The **Midlands Corridor** more-or-less follows the southern boundary of the UMDM; and
- The **Berg Corridor** forms a large portion of the UMDM in the west.

These corridors relate to regional connectivity to ensure the persistence of ecosystem processes. A number of ecological principles formed the basis of the area selection process:

- Corridors located along major climatic and upland-lowland gradients, including east–west and north-south corridors, were selected in order to cater for potential impacts of climate change on the biota of the region.
- The principle of connectivity within and between vegetation types was a key principle in the selection of vegetation Critical Biodiversity Areas (CBAs).
- Large areas were selected in preference to small areas on account of the impact of fragmentation.

3.2.4.2 Micro-ecological Corridors

GroundTruth in their Biodiversity Sector Plan for UMDM (GroundTruth, 2011a) was briefed with delineating **micro ecological corridors** at a local process and connectivity level through expert input. Although no rationale is given in the text of their report, two micro-ecological corridors have been proposed in the UMDM:

- A link between the **Tugela and Tugela North Corridor** terminating in the south at the Karkloof Nature Reserve and Mbona Private and Mount Gilboa Nature Reserves.
- A large micro-ecological corridor links Kamberg in the west, via uMngeni Vlei Nature Reserve, Boston View Biodiversity Agreement, the south of Midmar Nature Reserve (priority wetland), Hilton College Nature Reserve, follows the uMngeni River to terminate at the Eastern Valley Bushveld protected area expansion area.

3.2.5 Sensitive Ecosystems

Biodiversity Hotspot

Conservation International recognises the Maputaland-Pondoland-Albany area, in which the uMgungundlovu District Municipality falls, as a Biodiversity Hotspot (www.biodiversityhotspots.org) (see figure alongside). The area lies along the east coast of southern Africa, below the Great Escarpment, extending from extreme southern Mozambique (south of the Limpopo River, where it abuts on the Coastal Forests of Eastern Africa Biodiversity Hotspot) and Mpumalanga province in South Africa (south of the Olifants River) in the north, through eastern Swaziland to the Eastern Cape province of South Africa in the south. The region is floristically, climatologically and geologically complex. There are at least three clear foci of high endemism and high diversity in the area, the names of which have been amalgamated as the name of this hotspot: Maputaland (Tongaland) in the north, Pondoland further south and Albany in the southwest. The topography of the region ranges from ancient sand dunes and low-lying plains in the north to a series of rugged terraces deeply incised by river valleys in the central and southern parts. The hotspot also incorporates several mountain ranges, including the Sneeuberg, Winterberg, Amatola Mountains, Ngeli Range, Lebombo Mountains and Ngoye Range. The area is bordered on the west by the Great Escarpment, which separates the elevated interior plateau of southern Africa from the coastal lowlands. The hotspot's vegetation is comprised mainly of forests, thickets, bushveld and grasslands. About 80% of South Africa's remaining forests fall within this hotspot. These warm temperate forests, which are home to nearly 600 tree species, have the highest tree diversity of any of the world's temperate forests. The area also has a remarkable succulent flora, principally in the Albany region; these are mainly stem succulents, as opposed to the dominant leaf succulents found in the Succulent Karoo in the western parts of southern Africa. One type

of forest (Licuáti forest), three types of thicket, six types of bushveld, and five types of grassland are restricted to the hotspot.

Threatened Terrestrial Ecosystems

The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA) provides for listing threatened or protected ecosystems. SANBI, at the request of DEAT (2009), has led the process of identifying threatened ecosystems to be listed, working in close collaboration with provincial conservation authorities, DEAT, Department of Water Affairs and Forestry (DWAF) and relevant experts. All listed threatened ecosystems have been identified based on carefully developed and consistently applied national criteria. Bioregional Plans, published in terms of NEMBA, will identify critical biodiversity areas, which will encompass Threatened Terrestrial Ecosystems as well as landscape-scale ecological features, i.e. ecological corridors and important catchments. GroundTruth (2011a) has incorporated Threatened Terrestrial Ecosystems into their Biodiversity Sector Plan. The purpose of listing Threatened Terrestrial Ecosystems is primarily to reduce the rate of ecosystem and species extinction. This includes preventing further degradation and loss of structure, function and composition of threatened ecosystems. It is therefore vital that Threatened Terrestrial Ecosystems inform municipal SEAs and EMFs for the same reasons.

The list of Threatened Terrestrial Ecosystems within the uMgungundlovu District Municipality are depicted in Figure 20 and summarised in the following table.

- The following threatened terrestrial ecosystems are **critically endangered** and the SANBI (2009) layer reiterates this: Blinkwater Valley, KwaZulu-Natal Sandstone Sourveld, New Hanover Plateau, Oakland and Townhill Ridge and Highover Nature Reserve and Roselands Farm Surrounds.
- **Endangered** threatened terrestrial ecosystems include: Cumberland Crest, Impendle Highlands, Karkloof Forest Collective, Loskop Grasslands, Pietermaritzburg South, Umgeni Valley Bushveld and KwaZulu-Natal Sandstone Sourveld.
- **Vulnerable** threatened terrestrial ecosystems, which inform the SANBI (2009) layer include: Eastern Temperate Freshwater Wetlands, KwaZulu-Natal Coastal Belt, Eastern Scarp Forest, Midlands Mistbelt Grassland, Beinn Mheadmon Mountain Grasslands, Boschhoek Forests, Boschhoek Plateau, Drakensberg Foothill Wattled Crane Habitat, Easingwold Grasslands, Fort Nottingham Lowland Grasslands, Glen Cairn Valley, Impendle Lowland Grasslands, KwaMncane North Plateau, Michaelhouse Grasslands, Midmar Valley, Mount Gilboa Plateau, Oakspring Valley, Sherwood Forest Collective, Warley Commons and Ngongoni Veld.

Figure 20: Threatened Terrestrial Ecosystems in the uMgungundlovu District Municipality (DEAT, 2009 – see Map Book)

Table 15: A summary of the threatened terrestrial ecosystems in the uMgungundlovu District Municipality (after DEAT, 2009)

Threatened Terrestrial Ecosystem	Map Label	Code	Criteria[9]	Conservation Status	Original area (ha)	Remaining natural area in UMDM		Proportion protected	Known of species of special concern	Key biodiversity features
						(ha)	(%)			
Eastern Temperate Freshwater Wetlands	1	Azf 3	A1	Vulnerable	56000	81.7	0.15%	~5%	1 endemic plant species	See Threatened Terrestrial Ecosystems (DEAT, 2009)
KwaZulu-Natal Coastal Belt	2	CB 3	A1	Vulnerable	633000	3501.2	0.55%	<1%	3 endemic plant species	
Eastern Scarp Forest	3	Foz V1	A2	Vulnerable	No data available	877.2	-	25%	2 Red Data plant species	
Midlands Mistbelt Grassland	4	Gs 9	A1	Vulnerable	658000	39358.5	5.98%	<1%	9 endemic plant species	
Blinkwater Valley	5	KZN 1	F	Critically Endangered	2000	201.8	10.09%	0%	2 threatened or endemic plant or animal species	
New Hanover Plateau	6	KZN 12	F	Critically Endangered	41000	10563.6	25.76%	0%	5 threatened or endemic plant and animal species	
Oakland and Townhill Ridge	7	KZN 17	F	Critically Endangered	2000	427.8	21.39%	5%	11 threatened or endemic plant and animal species	
Cumberland Crest	8	KZN 22	F	Endangered	4000	2088.0	52.20%	0%	4 threatened or endemic plant and animal species	
Impendle Highlands	9	KZN 28	F	Endangered	2000	2837.2	141.86%	0%	5 threatened or endemic plant and animal species	
Karkloof Forest Collective	10	KZN 29	F	Endangered	12000	7805.1	65.04%	14%	15 threatened or endemic plant and animal species	
Loskop Grasslands	11	KZN 30	F	Endangered	7000	2430.6	34.72%	0%	7 threatened or endemic animal species	
Pietermaritzburg South	12	KZN 34	F	Endangered	23000	12378.9	53.82%	0%	19 threatened or endemic plant and animal species	
Umgeni Valley Bushveld	13	KZN 38	F	Endangered	2000	308.3	15.42%	0%	5 threatened or endemic plant and animal species	
Beinn Mheadmon Mountain Grasslands	14	KZN 39	F	Vulnerable	5000	2517.3	50.35%	0%	13 threatened or endemic plant species	
Boschhoek Forests	15	KZN 42	F	Vulnerable	1000	987.3	98.73%	0%	9 threatened or endemic plant species	
Boschhoek Plateau	16	KZN 43	F	Vulnerable	4000	2025.3	50.63%	0%	11 threatened or endemic plant species	
Drakensberg Foothill Wattled Crane Habitat	17	KZN 47	F	Vulnerable	117000	70539.9	60.29%	3%	15 threatened or endemic plant species	

[9] A1: Irreversible loss of natural habitat - Remaining natural habitat = 60% of original area of ecosystem.
A2: Ecosystem degradation and loss of integrity - = 20% of ecosystem significantly degraded.
F: Priority areas for meeting explicit biodiversity targets as defined in a systematic biodiversity plan - Very high irreplaceability and high threat

Threatened Terrestrial Ecosystem	Map Label	Code	Criteria[9]	Conservation Status	Original area (ha)	Remaining natural area in UMDM		Proportion protected	Known of species of special concern	Key biodiversity features
						(ha)	(%)			
Easingwold Grasslands	18	KZN 48	F	Vulnerable	2000	1584.0	79.20%	0%	10 threatened or endemic plant species	
Highover Nature Reserve and Roselands Farm Surrounds	19	KZN 5	F	Critically Endangered	10000	3775.1	37.75%	5%	9 threatened or endemic plant or animal species	
Fort Nottingham Lowland Grasslands	20	KZN 52	F	Vulnerable	20000	12984.1	64.92%	<1%	15 threatened or endemic plant and animal species	
Glen Cairn Valley	21	KZN 53	F	Vulnerable	4000	2234.9	55.87%	0%	5 threatened or endemic plant and animal species	
Impendle Lowland Grasslands	22	KZN 60	F	Vulnerable	11200	9360.0	83.57%	0%	14 threatened or endemic plant and animal species	
KwaMncane North Plateau	23	KZN 63	F	Vulnerable	7000	3276.9	46.81%	0%	9 threatened or endemic plant and animal species	
Michaelhouse Grasslands	24	KZN 68	F	Vulnerable	13000	6569.7	50.54%	0%	13 threatened or endemic plant and animal species	
Midmar Valley	25	KZN 69	F	Vulnerable	14000	6959.2	49.71%	20%	13 threatened or endemic plant and animal species	
Mount Gilboa Plateau	26	KZN 70	F	Vulnerable	11000	5844.8	53.13%	9%	7 threatened or endemic plant and animal species	
Oakspring Valley	27	KZN 77	F	Vulnerable	2000	1028.9	51.45%	0%	6 threatened or endemic plant and animal species	
Sherwood Forest Collective	28	KZN 79	F	Vulnerable	2000	1330.5	66.53%	0%	7 threatened or endemic plant and animal species	
Warley Commons	29	KZN 84	F	Vulnerable	5000	2848.6	56.97%	0%	4 threatened or endemic plant and animal species	
Ngongoni Veld	30	SVs 4	A1	Vulnerable	1005000	52720.0	5.25%	<1%	-	
KwaZulu-Natal Sandstone Sourveld	31	SVs 5	A1	Endangered	135000	6341.5	4.70%	<1%	12 endemic plant species	

3.2.6 Transformation

3.2.6.1 Level of transformation affecting biodiversity

The use of the term "transformation" must not be confused with that used for political transformation. In the context of this report, the SEA and biodiversity conservation planning, this term refers to the change in land cover from the original indigenous vegetation types to one that has undergone change to another land cover type. In other words, the original vegetation types together with its associated suite of species, ecosystems and ecosystem goods and services; have been replaced by a land cover that is the result of anthropogenic influences which are either degradation through injudicious use and/or developments which range from extensive livestock grazing to urban centres.

According to the 2008 version 1.0 KZN land cover data (EKZNW, 2010b) and Table 16, a significant portion (~45%) of the uMgungundlovu District is already transformed and natural areas have been reduced from ~57% (2005 land cover) to ~51% (2008 land cover). Section 6.6 will show that of the local municipalities, Impendle is the least transformed (17%) followed by Mpofana (27%) with the Mshwathi and Msunduzi municipalities experiencing the highest level of transformation (68% and 59% respectively). Therefore limited areas are now available for further transformation. Table 17, Figure 21 and Figure 22 provide detail and illustrate the extent and spatial distrivution of the transformed and untransformed areas in the UMDM.

Table 16: Land cover transformation in UMDM

Land Cover	2008		2005	
	ha	%	ha	%
Natural (untransformed and pristine)	484628	51	546288	57
Natural degraded	43205	5	15337	2
Transformed	423627	45	389839	41

Figure 21: Map showing extent of transformation (EKZNW, 2010b – see Mapbook)

Figure 22: Current vegetation types after transformation (EKZNW, 2010b – see Mapbook)

While transformed areas cannot provide the same level of biodiversity value as natural areas, they can still play a role in providing for biodiversity and ecosystem services. The transformed areas of the district can be defined as either "soft" or "hard", with "soft" transformations having a smaller impact on ecological processes and biodiversity than "hard" transformations. "Soft" transformed areas include all forms of agriculture (e.g. plantations, sugarcane, orchards, etc.) whereas "hard" transformed areas refer to various types of built-up land uses (e.g. urban areas, rural dwellings, roads, mines, etc.). Certain "soft" transformations are known to provide more biodiversity value than others do. As an example areas under annual cultivation, ("soft" transformation but high intensity agriculture), may provide a higher value to biodiversity and ecosystem services provision than "hard" transformed areas, but less than other low intensity agricultural activities such as extensive livestock farming or plantations. As an example of the recognition for this extensive transformation both the Mooi and uMngeni catchments are 'closed' catchments, no longer open to streamflow reduction activities such as afforestation, expansion of irrigated agriculture or the

construction of storage dams (Umgeni Water, 2010) on the basis of the National Water Act (No. 36 of 1998).

3.2.6.2 Provincial Conservation Planning Targets

As a further illustration of the situation related to transformation in the UMDM is consideration of the extent to which the untransformed vegetation types within the UMDM can contribute to the achievement of the provincial conservation planning targets for KZN. The latter are the products of EKZNW's systematic conservation planning processes which help the organisation to identify where the most important areas are that require conservation intervention as well as the required extent of each vegetation type. Table 18 provides an indication of the provincial conservation targets per vegetation type, the potential to which the remaining portions of these vegetation types in the UMDM can contribute to the achievement of these targets, and an indication of where this contribution sits relative to the provincial conservation target. Of the 25 vegetation types represented in the UMDM; three of them, namely Mooi River Highland Grassland, Southern Drakensberg Highland Grassland and KwaZulu-Natal Hinterland Thornveld, have coverages which currently exceed the provincial conservation targets. The balance of the vegetation types are below the provincial targets and can therefore only contribute in proportion to that which remains. Certain of these, such as Midlands Mistbelt Grassland, Moist Ngongoni Veld and the KwaZulu-Natal Sandstone Sourveld, which are all criticalyl endangered, are well below the provincial target, and the fact that they are critically endangered provides the reason for this low level of contribution. However, other vegetation types such as Eastern Temperate Wetlands, Drakensberg Montane Forests and Thukela Thornveld; which are least threatened, also have a low potential to contribute to the provincial conservation targets. The reason for this is that their provincial extent is well represented outside of the UMDM. This broader context must be understood when this information is evaluated.

3.2.6.3 Invasive Alien Plants

Kotze *et al* (2010) produced an indication of the extent of invasive alien plant infestations at a national level and an extract from their national map has been included as Figure 23 to provide an illustration of this problem as it relates to the UMDM and neighbouring areas. This work used the national Water Management Areas and their quaternary catchments to structure the data and it is therefore not possible to extract that specifically relevant to the UMDM. However, considering the strategic linkages between this and neighbouring Municipalities it is probably more relevant to provide an extract of this data on the basis of the Thukela and Mvoti to Umzimkulu WMAs and this is provided in Table 19. According to this data just more than 2.1 million hectares of these two WMAs are infested by the invasive alien plants (IAPs) listed. It is well known that there are many more recognised IAPs that occur in the UMDM and that there are a plethora of emerging species as well. The species reflected in Table 19 only reflects those recognised as being the most important at this point in time.

Table 17: Historical and current extent of vegetation cover per type in the uMgungundlovu DM relative to that of the Province

KZN Vegetation type	Conservation status - KZN	Historical extent of vegetation type within KZN	Current extent of vegetation type within KZN	Historical extent of vegetation type within UMDM		Current extent of vegetation type within UMDM (2008 LC)		Extent of transformation in UMDM	
		(Ha)	(Ha)	(Ha)	%	(Ha)	%	(Ha)	%
Azonal Vegetation Biome									
Drakensberg Wetlands	Vulnerable	unknown	1009	172	-	168	98	4	2
Eastern Temperate Wetlands	Least Threatened	unknown	31072	2024	-	1550	77	474	23
Temperate Alluvial Vegetation	Vulnerable	unknown	5359	634	-	534	84	100	16
Forest Biome									
Drakensberg Montane Forests	Least Threatened	unknown	6842	847	-	835	99	13	1
Eastern Mistbelt Forests	Least Threatened	unknown	39650	13788	-	12308	89	1480	11
Eastern Scarp Forests : Southern Coastal Scarp Forest	Least Threatened	unknown	10728	1974	-	1913	97	61	3
Grassland Biome									
Drakensberg-Amathole Afromontane Fynbos	Least Threatened	1737	1366	83	5	83	100	0	0
Drakensberg Afroalpine Heathland	Least Threatened	6411	6401	1112	17	1112	100	0	0
Drakensberg Foothill Moist Grassland	Vulnerable	603217	425419	164569	27	113988	69	50581	31
Dry Ngongoni Veld	Endangered	269148	167857	74782	28	33957	45	40826	55
KwaZulu-Natal Highland Thornveld (37)	Least Threatened	501232	369276	35725	7	31106	87	4618	13
Lesotho Highland Basalt Grassland	Least Threatened	1216	1168	128	11	128	100	0	0
Midlands Mistbelt Grassland	Critically Endangered	577962	215380	189756	33	68029	36	121728	64
Moist Ngongoni Veld	Critically Endangered	448124	236153	96174	21	26016	27	70158	73
Mooi River Highland Grassland	Vulnerable	92418	59468	64931	70	38296	59	26636	41
Northern Drakensberg Highland Grassland	Least Threatened	73492	70128	9039	12	8989	99	50	1
Southern Drakensberg Highland Grassland	Least Threatened	84882	83667	31667	37	31446	99	221	1
Southern KwaZulu-Natal Moist Grassland	Endangered	255315	143868	37374	15	23213	62	14161	38
uKhahlamba Basalt Grassland	Least Threatened	121230	120370	24486	20	24465	100	21	0
Indian Ocean Coastal Belt Biome									
South Coast Bushland	Endangered	93734	71011	3880	4	3596	93	284	7
Savanna Biome									
Eastern Valley Bushveld	Least Threatened	292870	248929	46318	16	39151	85	7167	15
KwaZulu-Natal Hinterland Thornveld (38)	Vulnerable	113897	82088	54865	48	33487	61	21378	39
KwaZulu-Natal Sandstone Sourveld	Critically Endangered	162613	40009	70871	44	12722	18	58149	82
Thukela Thornveld	Least Threatened	231226	198099	6792	3	6321	93	471	7
Thukela Valley Bushveld	Least Threatened	270753	224946	15210	6	14272	94	938	6

Table 18: Potential contribution of untransformed vegetation in uMgungundlovu DM to the achievement of KZN conservation targets

Vegetation type	Conservation status - KZN	Conservation targets - KZN		Potential contribution UMDM to targets		Area Above or Below Target	
		(Ha)	%	(Ha)	%	(Ha)	%
Azonal Vegetation Biome							
Drakensberg Wetlands	Vulnerable	564	24	168	29.89	-395	-70%
Eastern Temperate Wetlands	Least Threatened	9247	24	1550	16.76	-7697	-83%
Temperate Alluvial Vegetation	Vulnerable	1604	24	534	33.28	-1070	-67%
Forest Biome							
Drakensberg Montane Forests	Least Threatened	4416	63.5	835	18.90	-3581	-81%
Eastern Mistbelt Forests	Least Threatened	29613	66.5	12308	41.56	-17305	-58%
Eastern Scarp Forests : Southern Coastal Scarp Forest	Least Threatened	7054	61.61	1913	27.12	-5141	-73%
Grassland Biome							
Drakensberg-Amatole Afromontane Fynbos	Least Threatened	370	27	83	22.51	-287	-77%
Drakensberg Afroalpine Heathland	Least Threatened	1731	27	1112	64.26	-619	-36%
Drakensberg Foothill Moist Grassland	Vulnerable	134939	23	113988	84.47	-20951	-16%
Dry Ngongoni Veld	Endangered	67006	25	33957	50.68	-33049	-49%
KwaZulu-Natal Highland Thornveld	Least Threatened	115610	23.22	31106	26.91	-84503	-73%
Lesotho Highland Basalt Grassland	Least Threatened	317	27	128	40.44	-189	-60%
Midlands Mistbelt Grassland	Critically Endangered	126995	23	68029	53.57	-58966	-46%
Moist Ngongoni Veld	Critically Endangered	110606	25	26016	23.52	-84590	-76%
Mooi River Highland Grassland	Vulnerable	21092	23	38296	181.57	17204	82%
Northern Drakensberg Highland Grassland	Least Threatened	19121	27	8989	47.01	-10132	-53%
Southern Drakensberg Highland Grassland	Least Threatened	22799	27	31446	137.93	8647	38%
Southern KwaZulu-Natal Moist Grassland	Endangered	56929	23	23213	40.78	-33716	-59%
uKhahlamba Basalt Grassland	Least Threatened	32541	27	24465	75.18	-8076	-25%
Indian Ocean Coastal Belt Biome							
South Coast Bushland	Endangered	22276	25	3596	16.14	-18680	-84%
Savanna Biome							
Eastern Valley Bushveld	Least Threatened	72802	25	39151	53.78	-33651	-46%
KwaZulu-Natal Hinterland Thornveld	Vulnerable	28336	25	33487	118.18	5151	18%
KwaZulu-Natal Sandstone Sourveld	Critically Endangered	36990	23	12722	34.39	-24268	-66%
Thukela Thornveld	Least Threatened	57806	25	6321	10.93	-51485	-89%
Thukela Valley Bushveld	Least Threatened	67675	25	14272	21.09	-53403	-79%

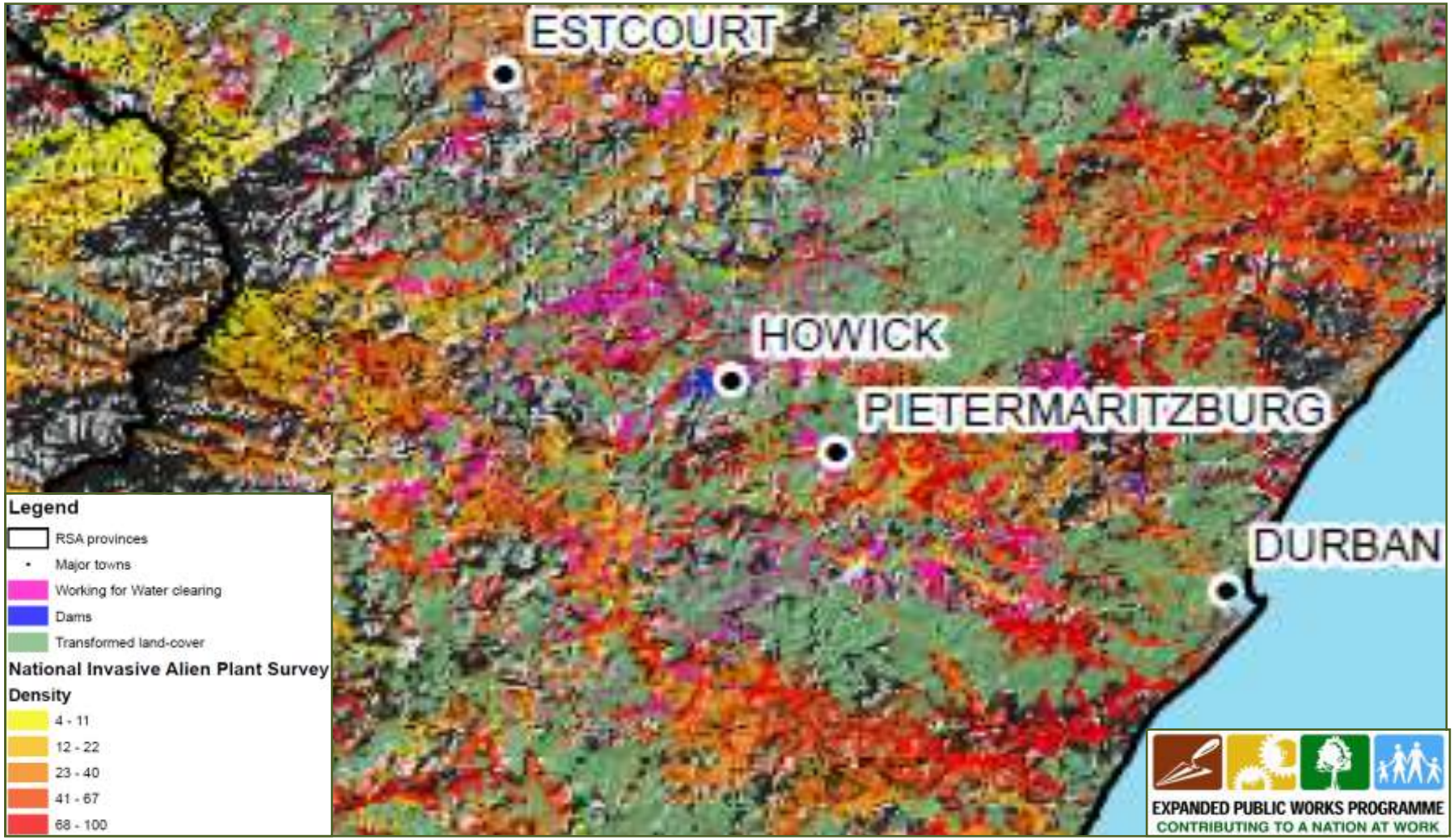


Figure 23: An extract from the national map of invasive alien plants illustrating the current situation related to the UMDM and neighbouring areas (Source Kotze *et al,* 2010)

Table 19: The coverage in hectares of the more prevalent invasive alien plant species in the Thukela and Mvoti to Umzimkulu Water Management Areas (extracted from Kotze *et al*, 2010)

INVASIVE ALIEN PLANT SPECIES	WATER MANAGEMENT AREAS	
	THUKELA	MVOTI TO UMZIMKULU
Acacia spp	638054	664294
Agave spp. (sisal)	15372	23722
Arundo donax (giant cane)		1718
Atriplex nummularia (salt bush)		
Caesalpinia decapetala (Mauritius thorn)	12834	33327
Cereus jamacaru (Queen of the night cactus)	18064	60721
Cestrum spp. (Poisonberry)		
Chromolaena odorata (Triffid weed)	61348	436674
Eucalyptus spp.	190374	449791
Hakea spp.		
Jacaranda mimosifolia		
Lantana camara	14035	57750
Melia azedarach (Syringa)	135241	601157
Opuntia spp. (Prickly pear)	175759	31098
Pinus spp.	73140	200097
Populus spp.	36828	9084
Prosopis spp.		
Psidium gaujava		
Rosa rubignosa (Rosehip)		
Salix babylonica (Willow)	61895	19419
Senna didymobotrya (Peanut butter cassia)	77449	263750
Sesbania punicea (Scarlet wisteria tree Tree)		
Solanum mauritianum (Bugweed)	101265	331676
Tamarix chinensis (Chinese tamarix)		
Total condensed coverage	78173	134640
Total uncondensed coverage	899700	989206
Total of both coverages	977873	1123846

The implications of the spread of invasive alien plant species are numerous and all negative. A classic example of this is the fact that the cost of clearing IAPs is now greater than the value of many properties in the UMDM. More specifically IAPs take over from indigenous vegetation cover which causes a loss of numerous ecoservices such as fodder, medicinal plants, soil holder capacity, watershed services such as maintenance of winter baseflow, etc. Essentially the spread of IAPs increases levels of vulnerability through compromising the integrity of natural capital. Van Wilgen *et al* (in press) record that the Working for Water programme has spent R3.2 billion on IAP eradication projects from 1995 to 2008. The success of these projects ranges from being marginally successful to having exacerbated the problem through poor design and lack of sufficient follow up. As an example of this statement van Wilgen *et al* (in press) confirm that in the grassland biome only 9% of the area invaded by *Acacia* spp. has been treated and there appears to be no detectable decline in the estimated extent of the infestations. This also suggests that the rate of spread may be greater

than the effectiveness of eradication efforts. What is adds to the significance of this information is that there are many other herbaceous IAPs that are associated with this biome that have not been treated and which are showing rapid rates of infestation. For example, the perennial herb *Campuloclinium macrocephalum*. (pompom weed), has recently undergone spectacular expansion in grasslands and it has been shown that it spread from 48 to 93 quarter degree squares between 2005 and 2010 (van Wilgen *et al*, in press).

It is unfortunate that at the time of finalising this report no information pertaining to the UMDM in particular was available.

3.2.7 Biodiversity Sector Plan

This section was extracted from GroundTruth's Biodiversity Sector Plan for the UMDM (2011a).

The primary purpose of characterising the uMgungundlovu District's biodiversity profile is to determine important areas for the conservation of biodiversity in order to guide sustainable development within the district. The uMgungundlovu BSP feeds the development of a Bioregional Plan covering the District, which forms a legislated requirement of the National Environmental Management: Biodiversity Act (Act 10 of 2004). The Bioregional Plan must feed into all land use planning and management decisions and tools within the district and its local municipal areas (DEAT, 2009). This process incorporated biodiversity planning criteria and mapping principles from other examples where biodiversity sector plans have already been developed (e.g. uThukela District in KZN and the Namakwa District in Northern Cape).

The uMgungundlovu BSP consists of a digital GIS spatial coverage (Figure 24) detailing the biodiversity profile of the District according to biodiversity priority and land management categories. The biodiversity and land management guidelines adopted were developed from the draft Critical Biodiversity Area Land Use Guidelines (EKZNW, 2011) which at the time of writing were under development by Ezemvelo KZN Wildlife to cover the 2011 Critical Biodiversity Area map for KwaZulu-Natal. The different categories are used within biodiversity sector plans and bioregional plans to designate biodiversity conservation priority areas and inform which land use practices and developments are appropriate for the area in question. The land use categories used in the biodiversity mapping are in accordance with those utilised by the South African Biodiversity Institute (SANBI) and Ezemvelo KZN Wildlife. Figure 24 illustrates the six land use categories which have most significance for biodiversity planning and management at municipal level.

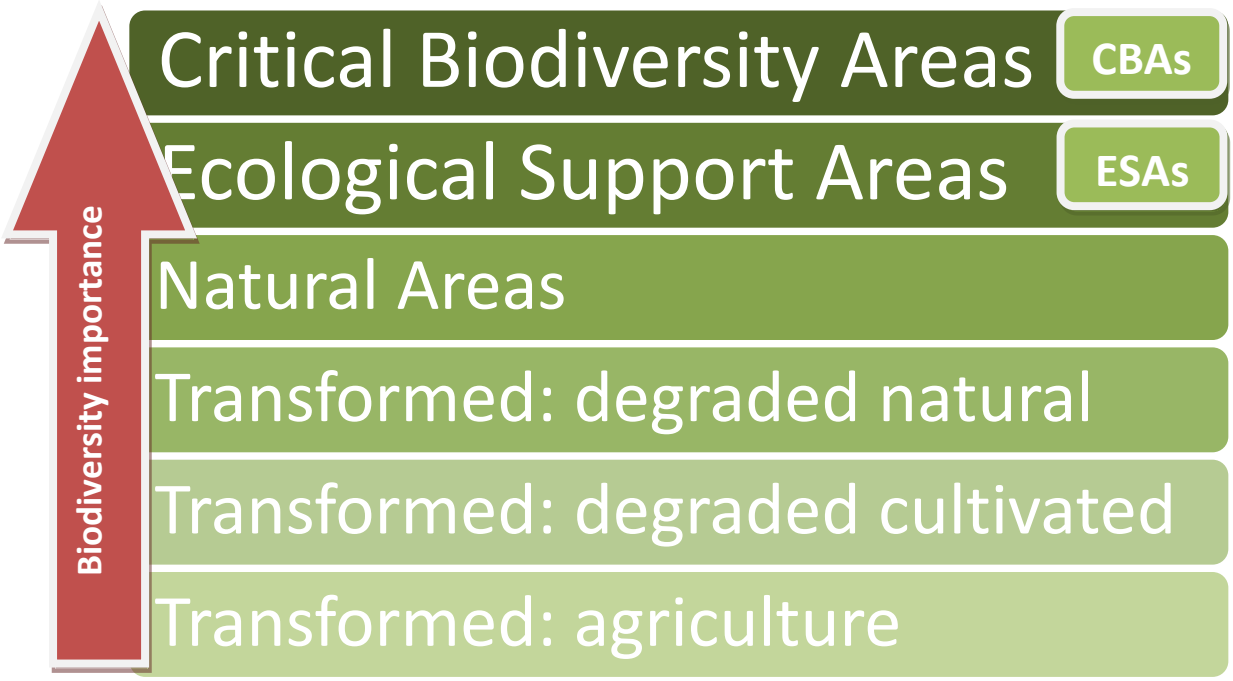


Figure 24: **Summary of the six key land use categories for biodiversity sector planning at municipal level (GroundTruth, 2011a)**

The two primary categories used in the biodiversity mapping, and which are the most critical for biodiversity management, are:

- **Critical Biodiversity Areas (CBAs) –** terrestrial and aquatic features that are crucial for supporting biodiversity features, ecosystem functioning and providing ecological services. CBAs are important for maintaining conservation targets and as such should be retained in a natural state to ensure the continued existence of species and that ecosystem processes and delivery of services from these systems are maintained.
- **Ecological Support Areas (ESAs) –** terrestrial and aquatic areas that are not necessarily important for ensuring that conservation targets are met, however they play a number of important roles in the landscape, including; supporting the ecological functions of CBAs, delivering ecological services (e.g. flood attenuation, provision and regulation of river flows, carbon sequestration, etc.). Developments within or adjacent to ESAs are only permissible if the land uses allow for the continued functionality of the ESAs.

The above principles follow a hierarchical process where areas of lower importance may be nested within areas of higher importance. Other categories, ranked in decreasing levels of biodiversity importance, included natural, degraded natural, old cultivated lands, agriculture and built-up areas.

Mapping the biodiversity profile of the uMgungundlovu District was achieved through detailed spatial mapping procedures to define areas that support terrestrial and aquatic biodiversity according to the above biodiversity categories/mapping levels (i.e. CBAs and ESAs). This process adopted a hierarchical approach of identifying and mapping biodiversity areas based on varying

levels of importance. A key component in the mapping procedures was the use of specific criteria for biodiversity mapping level, defined in an objective manner where provincial biodiversity conservation targets are supportive, but which include additional scope for enhancing biodiversity targets at a district municipal scale.

Geographical Information Systems (GIS) were used to integrate the specific biological characteristics of the uMgungundlovu District, which vary according to the biophysical characteristics of the district. Integrated spatial data was then analysed further through a process of spatial interrogation, using specialist and intuitive knowledge, to ensure that areas of biodiversity importance were included (i.e. sites of known biodiversity richness/value and areas providing vital functions for biodiversity conservation across the landscape, e.g. corridors connecting key areas).

Guiding principles to the mapping of the key biodiversity assets of the District:

- Protected areas are formally protected. As such their contribution to meeting conservation targets is automatically included within the minimum required CBA network. Areas of conservation importance represent the optimal minimal reserve design required (excluding protected areas) to meet conservation targets. National and provincial legislation enforces that these areas are managed sustainably.
- Flagship species provides the rationale for not only protecting individual species but also entire ecosystems that support multi-species complexes.
- Terrestrial and aquatic ecosystems are interdependent and hence naturally linked within the landscape context.
- Managing important habitats types within a matrix of other habitats (e.g. forest within a matrix of grasslands, wetlands, etc.) is an important component of biodiversity conservation. Conserving matrix habitats provides additional resilience through improving metapopulation processes, connectivity and species persistence.
- Corridors linking CBAs across the landscape and buffers adjacent to CBAs promote healthy ecosystems and ensure the continued existence of biodiversity within the uMgungundlovu District. In addition to connecting CBAs, mapping should highlight natural areas providing connectivity within the district and across into neighbouring districts. Altitudinal connectivity via ESAs is paramount in the context of climate change enabling species patterns to respond freely to a changing climate.
- Consideration of the “flow” of impacts due to catchment processes – terrestrial and aquatic areas located upstream of important aquatic systems can have negative impacts on biodiversity and ecological processes.
- Fragmentation of both terrestrial and aquatic habitats can have profound effects on biodiversity mainly through the isolation of species populations preventing/limiting gene flow, consequently compromising the viability of a species existence.
- Large natural areas are more likely to remain intact with lower influences of “edge-effects” from adjacent land uses. Intact areas will support ecosystem processes and functionality, which in turn improves biodiversity conservation. Conversely, land use transformation and impacts from anthropogenic influences increase the probability of “edge-effects” on important biodiversity areas.

3.2.7.1 Critical Biodiversity Areas

CBAs include all terrestrial and aquatic areas that are most important for biodiversity conservation and ecosystem functioning. Protected areas and sites of conservation importance (i.e. proclaimed provincial reserves, private reserves and stewardship sites), by virtue of their formally protected status, are used to guide the CBA selection process. Details of the spatial data used to derive the terrestrial and aquatic CBA areas are listed in GroundTruth (2011a).

Terrestrial CBAs

Terrestrial CBAs within the uMgungundlovu District were mapped and defined according to the following GIS data:

- Formally protected areas (see Section 3.2.3).
- Important biodiversity areas according to the EKZNW Terrestrial Systematic Conservation Plan (EKZNW, 2011c), which defines all mandatory and negotiated reserves (MinSet) – irreplaceable areas including all areas that are mandatory for achieving minimum biodiversity conservation targets for the KZN province.
- Areas proposed under the Protected Areas Expansion Programme, including the proposed Drakensberg and Midlands, Eastern Valley Bushveld and Thukela expansion areas.
- Proposed stewardship sites selected on the basis that such areas are selected according to the MinSet (see Section 3.2.3.1).
- Critically Endangered[10] and Endangered[11] ecosystems according to the draft threatened ecosystems of South Africa (SANBI and DEAT, 2009 – see Section 3.2.5).
- All indigenous forests based on the EKZNW forest coverage (EKZNW, 2005).

The spatial distribution and extent of terrestrial CBAs are shown in Figure 25. Details of spatial data used to derive the terrestrial CBAs are given in GroundTruth (2011a).

Aquatic CBAs

Aquatic CBAs within the uMgungundlovu District were mapped and defined according to the following GIS data:

- All aquatic systems (wetlands and riparian) within “earmarked" catchments based on EKZNW’s Freshwater Systematic Conservation Plan (EKZNW, 2007).
  Wetlands obtained from the KZN priority wetland assessments (Macfarlane *et. al.,* 2011). This included priority wetlands (Begg, 1989 and Kotze, 2004) located within the District, namely Mngeni, Stillerust and Nyamvubu and priority wetlands downstream of or directly adjacent to

[10] Critically Endangered (CR) ecosystems include: the Blinkwater Valley, Highover Nature Reserve and Roselands, New Hanover Plateau, and Oakland and Townhill Ridge.

[11] Endangered ecosystems include: Cumberland Crest, Impendle Highlands, Karkloof Forest Collective, KZN Sandstone Sourveld, Loskop Grasslands, Pietermaritzburg South, and Umgeni Valley Bushveld.

the District, namely the Mvoti Vlei and Hlatikulu[12] Vlei. All priority wetlands were buffered by 100m (precautionary approach as a minimum of 30m is typically adopted by authorities for the protection of water resources, with 100m seen as a minimum required buffer distance for the protection of wetland biodiversity within priority wetlands).

- Important, free-flowing river systems defined according to the National Freshwater Ecosystem Priority Areas (NFEPA) (CSIR, 2010). These include intact rivers (i.e. unmodified/natural, largely natural with few modifications and free flowing rivers with limited/no impoundment) that are able to contribute towards river ecosystem targets at a national level.
- Aquatic systems supporting flagship species that are dependent on healthy functional aquatic systems for their survival. This included aquatic systems within known and/or modelled range/distribution areas of the following aquatic flagship species:
    - Spotted-necked Otter – Red Data **Near Threatened**
    - Wattled Crane – Red Data **Critically Endangered**
    - Long-toed Tree Frog – Red Data **Endangered**

The spatial distribution and extent of aquatic CBA areas are shown in Figure 26. Details of spatial data used to derive the aquatic CBA areas given in GroundTruth (2011a).

3.2.7.2 Ecological Support Areas

Ecological Support Areas (ESAs) include all terrestrial and aquatic areas that are largely required to ensure ecological connectivity is provided across the landscape thereby promoting biodiversity conservation and ecosystem functioning. These areas include macro-ecological corridors (EKZNW, 2009a) that allow connectivity along altitudinal gradients (i.e. east to west between the coast and the Drakensberg mountains) as well as areas to the north and south (see Section 3.2.4). Evidence for KwaZulu-Natal shows that a number of birds (approximately 76 species) undertake altitudinal migrations and move to lower elevations in winter (Johnson and Maclean, 1994). The uMgungundlovu District covers a large altitudinal range and is therefore likely to support altitudinal migration by a number of species of fauna. ESAs are important for additional reasons such as buffering protected areas and other CBAs from land use impacts. Details of spatial data used to derive the terrestrial and aquatic ESAs are listed in GroundTruth (2011a).

Terrestrial ESAs

Terrestrial ESAs within the uMgungundlovu District were mapped and defined according to the following GIS data:

- Provincial macro-ecological corridors as provided by EKZNW (EKZNW, 2009a).

[12] While not situated within the uMgungundlovu District, the Hlatikulu Vlei is located within close proximity to the district boundary, with a portion of the vlei's headwaters draining from the district. The outflow of the Hlatikulu Vlei flows directly back into the district and the Mooi River via the Hlatikulu River.

- Areas proposed under the Protected Areas Expansion Programme, including the proposed Drakensberg and Midlands, Eastern Valley Bushveld and Thukela expansion areas (see Section 3.2.3.1).
- Critically endangered and Endangered[13] vegetation according to the vegetation types of South Africa classification system (Mucina and Rutherford, 2006).
- Other areas of conservation value, e.g. non-proclaimed nature reserves (e.g. Umgeni Valley Nature Reserve) and game ranches.
- Areas supporting terrestrial flagship species based on their known and/or modelled distributions/ranges. These included the following species:
    - Oribi (Red Data **Endangered**) – mapped grasslands within known localities.
    - Wattled Crane (Red Data **Critically Endangered**) – mapped grasslands within known localities.
    - Cape Parrot (Red Data **Endangered**) – mapped forest patches frequented by Cape Parrot as well as forest patches in close proximity (within 1km) of frequented forests.
    - Blue Swallow (Red Data **Critically Endangered**) – mapped grasslands within known localities.
    - Bourquin's Dwarf Burrowing Skink (Potential Red Data) – mapped grasslands within preferred altitude range (i.e. 900 – 1700 m.a.s.l.) within their known distribution range.
    - Long-toed Tree Frog (Red Data **Endangered**) – mapped grasslands within preferred altitude range (i.e. 1000 – 1800 m.a.s.l.) within their known distribution range.
    - Karkloof Blue butterfly (Red Data **Endangered**) – known and modelled locality data as provided by EKZNW.
    - Hilton Daisy (Red Data **Critically Endangered**) – mapped grasslands between 800 and 1800 m.a.s.l. within their distribution range as defined by known localities.
- Terrestrial corridors linking important biodiversity conservation areas such as protected areas, CBAs, etc.

Aquatic ESAs

These included other areas that are important for supporting biodiversity features and which provide a critical supportive role to biodiversity contained within CBA areas. Within the context of the uMgungundlovu District area, CBA areas have been mapped and defined according to the following GIS data:

- Aquatic systems upstream of the aforementioned priority wetlands.
- Aquatic corridors associated with priority perennial river systems as defined by NFEPA (CSIR, 2010).

Aquatic EGSAs

Ecosystem Goods and Service Areas (EGSAs) are areas wherein life-supporting and essential benefits to humans, from natural processes (ecosystem functions), are derived (Millennium Ecosystem Assessment, 2006). Aquatic EGSAs include all remaining aquatic systems not defined as CBAs and ESAs, both natural (i.e.

[13] Endangered vegetation types include: KwaZulu-Natal Coastal Belt, KwaZulu-Natal Sandstone Sourveld and Midlands Mistbelt Grassland

wetlands and riparian habitat) and artificial systems (e.g. man-made dams and river diversions), mapped within the uMgungundlovu District. All aquatic systems are buffered by 32m.

3.2.7.3 uMgungundlovu District Biodiversity Sector Plan Map

The map covering the Biodiversity Sector Plan for the uMgungundlovu District Municipality is illustrated within Figure 27. Terrestrial and aquatic CBAs and ESAs are incorporated into a single map, producing one output reference map for the uMgungundlovu BSP. The biodiversity land use management categories shown in the map are detailed. Appropriate land use guidelines will be detailed in the SEA.

Figure 25: Terestrial Biodiversity Sector Plan for UMDM (GroundTruth, 2011a – see Map Book)

Figure 26: Aquatic Biodiversity Sector Plan for UMDM (GroundTruth, 2011a – see Map Book)

Figure 27: uMgungundlovu Biodiversity Sector Plan Map (GroundTruth, 2011a – see Map Book)

3.2.7.4 Cross links with adjacent municipalities

It is an essential and legislated requirement (NEMA, Act 107 of 1998) that collaborative management between adjacent district municipalities ensures the sustainable protection and on-going consideration and management of CBAs, ESAs and biodiversity corridors that traverse municipal boundaries. When making land use planning decisions covering land in proximity to municipal boundaries, the adjacent municipality must be engaged, and their relevant biodiversity plan consulted, to ensure that biodiversity planning priorities within adjacent municipal areas are not compromised.

In the development of the uMgungundlovu BSP, existing available BSPs covering adjacent districts were accounted for in the determination of CBAs, ESAs and biodiversity corridors that traversed municipal boundaries. Any subsequent BSPs developed for districts adjacent to uMgungundlovu must take account of the CBAs, ESAs and biodiversity corridors of the uMgungundlovu District BSP.

3.3 Biological Adaptations to Climate Change

As the dominant driver of biodiversity loss by the end of the 21st century (Millennium Ecosystem Assessment, 2005), climate change impacts, such as more severe and unpredictable droughts, storms, floods, altered rainfall patterns, higher temperatures and higher evaporation and transpiration will place more pressure on biodiversity assets and ecosystems. Increased spread of diseases, increased fire risk and spread of exotic species are amongst the secondary impacts of climate change placing increased pressure on biodiversity. As a result biodiversity and ecosystem support areas need to be managed in such a way that their resilience to extreme events is maintained and enhanced. Resilience enables ecosystems to absorb both expected and unforeseen change, in order to retain ecological functioning (Cadman *et. al.,* 2010).

The healthier and more biodiverse an ecosystem, and the better the maintenance of biodiversity patterns, connectivity and ecosystem processes, the more resilient the biodiversity and ecological support areas will be to climate change impacts. As a result biodiversity planning and management needs to take account of the findings of climate change risk assessments (Laros and Jones, 2010). Ecological corridors and habitat buffer areas are important mechanisms for maintaining ecological networks, allowing plants and animals to migrate, disperse and adapt to the pressures of changing habitat conditions and climate (Cadman *et. al.,* 2010). This is of key importance within the uMgungundlovu District which contains critical aquatic and terrestrial biodiversity corridors as a result of its key location between the invaluable Drakensberg water supply and biodiversity conservation areas, and the KwaZulu-Natal coast.

3.3.1 Impacts of climate change on biodiversity and ecosystem services

The South African National Climate Change Green Paper (Government Gazette Notice no 1083 of 2010) details the following findings regarding the impacts of climate change on biodiversity and ecosystem services in South Africa:

Biodiversity: impacts of climate change

- A majority of endemic species may show contractions of geographic range and that up to 30% of endemic species may be at an increasingly high risk of extinction by the latter half of this century if climate change is unmitigated.
- Summer and all-year rainfall biomes (savanna, grassland and forest) may be susceptible to changes in tree/grass and shrub/grass balance and changes in fire regime, with likely substantive but poorly quantified implications for biodiversity and ecosystem processes and services.
- Rising atmospheric CO2 levels may be increasing the cover of shrubs and trees in grassland and savanna biomes at least, with mixed effects on biodiversity, and possible positive implications for carbon sequestration.
- Additional stresses to biodiversity that will interact with climate change include fire frequency (which appears already to show climate change-related increases in the Fynbos biome within the Cape) and invasive alien species. The combined effects of these and stresses relating to land use and fragmentation of habitats will further increase the vulnerability of biodiversity to climate change.
- With respect to invasive species, if climate change projections are borne out, even more serious invasions are expected with tropical species becoming a more significant component of the invasive biota, the distributions of many species currently limited by water availability expanding into previously drier areas and CO2 fertilization effects possibly increasing the impact of invasive woody plants. Furthermore, the future efficacy of biological control agents (one of the key interventions to control invasive alien species) under altered climates is an uncertainty that poses a major risk for future management and control.

Water resources: impacts of climate change

- Increased variability of stormflow and dry spells - By 2050 the frequency of storm-flow events and dry spells is projected to increase over much of the country, especially in the east (over

much of the Eastern Cape and KwaZulu-Natal, including some of the most crucial source regions of streamflows in southern Africa, such as the Lesotho highlands).

- Increased cost - The cost of providing water will rise. It is estimated that just a 10% decline in run-off could double the cost of new water schemes, raising the cost to the fiscus and users of new infrastructure developments. Already the cost of water from South Africa's new big dams may quadruple and result in even higher prices than users are accustomed to paying. In addition, Inter-basin transfer schemes, high levels of assurance of supply to key sectors of the economy and extensive local reticulation networks require extensive pumping, with rising energy costs.
- Rising temperatures - Climate change will bring higher average temperatures. This is projected to lead to more erratic weather, more flooding and greater rainfall variability. Higher temperatures will increase evaporation from dams and rivers, and will reduce run-off on the ground, so that less of the water that falls reaches our rivers and dams.

3.3.2 Mitigation of climate change impacts on biodiversity and ecosystem services

The climate change impact mitigation strategies proposed within the Green Paper (Government Gazette Notice no 1083 of 2010), and which have relevance to activities at a municipal level, include the following:

Biodiversity: mitigation of climate change impacts

- Encourage and facilitate the building of partnerships to enable effective management of areas not under formal protection and investment in the expansion of key protected areas (which were not originally designed with climate change trends in mind) in line with the most robust knowledge of climate change impacts.
- Expand existing programmes to combat the spread of alien and invasive species and the destruction of sensitive ecosystems including Working for Water, Working for Wetlands and Working on Fire.
- Promote efforts to conserve, rehabilitate and/or restore natural systems that reduce and/or improve resilience to climate change impacts, e.g. wetlands and their positive impact on storm surges.

Water resources: mitigation of climate change impacts

- Continue to develop and maintain good water management systems and institutions, from village through to national level, to ensure we achieve our equity objectives, and can sustain affordable provision of water to all.
- Accelerate the development and/or capacity of effective and accountable catchment management agencies that will: promote equitable and sustainable use of available water resources at local and regional level; strengthen water resources regulation at local and regional level; monitor developments and emerging stresses, and propose effective ways of addressing them. As groundwater grows in strategic importance as a result of increased surface water evaporation, they will have to manage the recharge of aquifers as an integral part of local water management where this is feasible.

- Invest in monitoring capabilities across a range of disciplines in order to spot trends and understand them as well as track the efficacy of adaptive strategies.
- Optimise the re-use of wastewater.
- Increase investments wastewater treatment capacity to meet stipulated norms and standards for waste discharge - to safeguard public health, river health and ecological services and to minimize environmental disasters and treatment costs.
- Increase investments in maintenance and renewals to minimize system losses in infrastructure networks, Maintenance deferred is infinitely more expensive, and the country needs the most efficient networks possible to optimize currently available resources.
- Develop and implement household rainwater harvesting incentive programmes.
- Implement integrated water resource management including protecting and restoring natural systems, increasing conjunctive use of surface and ground water, and learning through adaptive management experiments. Given South Africa's' inter-basin and trans-boundary transfer schemes integrated water resource management provides an important governing framework for anticipating and achieving successful adaptation measures across socioeconomic, environmental, and administrative systems.
- Vigorously enforce compliance with water quality standards to ensure that our water remains fit for use, and that clean water is available for blending to dilute pollutants. Contamination by salts, excessive nutrients, heavy metals and other pollutants must be restricted.
- Encourage and develop water-sensitive urban design as a means of capturing water within the urban landscape and minimising pollution, erosion and disturbance by ensuring that storm water is treated as a valuable water resource and not simply discharged to rivers or the sea.
- Ensure that climate models are appropriately downscaled to provincial and where possible metropolitan and district levels in order to provide climate information at a scale that can be integrated into medium and long term spatial and development plans.

At the time of writing the development of a climate change response strategy covering the uMgungundlovu District was out to tender. The findings of such reports must be taken account of during biodiversity and land use management and planning, and must be integrated into future biodiversity and environmental guideline documents covering the District and its Local Municipalities.

4 CULTURAL HERITAGE

Active Heritage was contracted to undertake a desktop heritage study for the uMgungundlovu District Municipality. This project is entirely based on the available literature and the consultation of accessible heritage databases and registers. The project seeks to assess the value and significance of the heritage resources found within the study area as well as ensure their protection and conservation. This study also promotes the view that development should take place in harmony with the sustainable use of heritage resources.

Several national and provincial legislative policies and guidelines that pertain to the management and protection of heritage resources within KwaZulu-Natal, as well as throughout South Africa were given cognisance during this study. These included:

- The National Heritage Council Act, No. 11 of 1999;
- The National Heritage Resources Act, No. 25 of 1999;
- The National Monuments Act, No. 28 of 1969;
- The National Environmental Management Act, No. 107 of 1998; and
- The KwaZulu-Natal Heritage Act, No. 4 of 2008.

There are currently no municipal bylaws for the study area that pertains specifically to heritage resources. The review of the applicable legislation undertaken during the study revealed that there are no specific legal limits applicable to the conservation and management of heritage resources. Based on the provisions contained in the various Acts, it is rather the responsibility of the local authorities to identify and manage heritage resources located within local Municipalities while it is the duty of the national heritage resource agencies and councils to coordinate the management of heritage resources by the local authorities.

Section 3 (2) of the National Resources Act 1999 (Act No. 25 of 1999) defines South Africa's heritage resources to include:

a. places, buildings, structures and equipment of cultural significance;
b. places to which oral traditions are attached or which are associated with living heritage;
c. historical settlements and townscapes;
d. landscapes and natural features of cultural significance;
e. geological sites of scientific or cultural importance;
f. archaeological and palaeontological sites;
g. graves and burial grounds, including-
    i. ancestral graves;
    ii. ii. royal graves and graves of traditional leaders;
    iii. graves of victims of conflict;
    iv. graves of individuals designated by the Minister by notice in the Gazette;
    v. historical graves and cemeteries; and
    vi. other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);

h. sites of significance relating to the history of slavery in South Africa;
i. movable objects, including-
   i. objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
   ii. ii. objects to which oral traditions are attached or which are associated with living heritage;
   iii. ethnographic art and objects;
   iv. military objects;
   v. objects of decorative or fine art;
   vi. objects of scientific or technological interest; and
   vii. books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

The National Heritage Resources Act, (Act No. 25 1999) also stipulates in Section 3 (3) that a place or object is to be considered part of the national estate if it has cultural significance or other special value because of:

   i. its importance in the community, or pattern of South Africa's history;
   ii. its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
   iii. its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
   iv. its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
   v. its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
   vi. its importance in demonstrating a high degree of creative or technical achievement at a particular period;
   vii. its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
   viii. its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
   ix. sites of significance relating to the history of slavery in South Africa.

4.1 Study Approach

4.1.1 Methodology

4.1.1.1 Literature Survey

A survey of the literature pertinent to the region, including archaeological and historical sources as well as various heritage studies by consultants was conducted to assess the potential of heritage resources within the area.

4.1.1.2 Databases

Available data sources were obtained and utilised in the compilation of the list of heritage resources. These included:

- The SAHRA web portal for gazetted sites objects and shipwrecks.
- The Heritage Register List of SAHRA.
- Msunduzi Municipal Environmental Management Framework.
- The Buildings of Pietermaritzburg, Volume One (Pietermaritzburg City Council, 1986).
- Environmental Atlas (The Town and Regional Planning Commission).
- KwaZulu-Natal Museum Database (Archaeological Sites).
- List of Proclaimed Sites from Amafa aKwaZulu-Natali (2008).
- List of Buildings located in Georgetown, Edendale from Amafa aKwaZulu-Natali (2008).

4.1.1.3 Field Survey

This is entirely a desktop based survey and no field or ground surveys were conducted.

4.1.2 Limitations

The following limitations characterise this study:

- This study did not include a field survey. Hence the fact that certain parts of the study area are void of heritage resources is not an accurate reflection of what is on the ground.
- The identification and mapping of the heritage resources within the uMgungundlovu District Municipality was based entirely on existing information and available data compiled from a variety of sources.
- Due to budget constraints, on-site investigations were not undertaken to identify any additional heritage resources which were not recorded in the information used, nor validate the accuracy and completeness of the existing data used for the study. As such, not all heritage resources present within the uMgungundlovu District Municipality were identified and mapped as part of the study, as only a limited selection of existing material on heritage resources within the Municipality was available.
- Not all of the available data used to identify heritage resources for the study is current, the mapping of heritage resources that no longer exist (particularly buildings and archaeological sites) may have occurred. This however can only be validated through on-site investigations;
- A GPS coordinate system was not available for all of the heritage sites identified and mapped, with the exception of the list of archaeological sites obtained from the KwaZulu-Natal Museum, which contained coordinates, but which were incomplete for some of the sites.
- Although street addresses and property numbers (erf numbers) were available for most of the heritage resources in the greater Pietermaritzburg region it was not available, with a few exceptions, for the greater Howick, Camperdown, Mooirivier, Impendle and Richmond areas. However, in some instances only the resource name (i.e. building or site name) was available. As a result, the accuracy of the positioning of the individual heritage site points on the map produced for this study cannot be guaranteed.

- Financial and methodological constraints also prevented access to oral histories that could point to possible heritage resources.

4.2 Description of heritage resources in the area

The heritage sites and structures that occur in the study area are shown in Figure 28. A total of 1050 heritage resources were identified and those with available coordinates were mapped. Sites identified but without any available GPS coordinates are listed in Table 21 at the end of Section 4.4. The heritage resources can be categorised according to four main groups, based on the resource type, as follows:

- Architectural resources;
- Archaeological resources;
- Historical resources; and
- Cultural resources.

Figure 28: Map showing heritage resources in the study area (see Map Book).

A brief overview of the key findings of the study for each resource group is provided below.

4.2.1 Architectural Resources

The greatest majority of the heritage resources located within the uMgungundlovu District Municipal area consist of built structures, mostly buildings, which are of great architectural (and also historical) significance. The City of Pietermaritzburg has arguably one of the finest remaining urban environments in South Africa, and each of the City's four main cultural groups has contributed to its architecture, namely Afrikaner, British, Indian and African (Oberholser 1972; Derwent 2006; Harrison & Holdcraft 2008). A number of the buildings located within the Pietermaritzburg Central Business District (CBD) are constructed out of red-clay bricks, such as the Pietermaritzburg City Hall, giving the city a recognisably unique architectural style. Similar buildings also occur elsewhere in the uMgungundlovu Municipal area such as at the 24 000 hectare Baynesfield Estate to the north of Richmond. A total of 76 Provincial and Heritage Landmarks (National Monuments). Of these, 72 are buildings. Most of the architectural resources that were identified and mapped as part of the Heritage Resource Study are concentrated within the Pietermaritzburg CBD and adjacent areas such as Georgetown in Edendale. Architectural resources also occur in the smaller towns of Mooirivier, Howick, Richmond, and Camperdown (Derwent 2006; Bizley *et al* 2007). These resources largely consist of buildings constructed in Voortrekker, British-Colonial, Indian and traditional African styles. Many of these buildings date back to the late 1800s and early 1900s, while examples of architecture from as early as the 1840s still exist within the Pietermaritzburg CBD and, more rarely, in its surrounds (e.g. Hollingwood and further a field at Fort Nottingham). Other buildings consisting of later, more modern architectural styles have also been identified as architectural resources, particularly in the suburbs surrounding the CBD of Pietermaritzburg, where fine examples of post World War 2 architecture can be found. The Georgetown area in Edendale contains a number of unique buildings consisting of a mixture of traditional African styles of architecture with British-Colonial and Indian influences. Some of the earliest buildings in Georgetown date back to the 1850s

and consist of rectangular houses of unfired mud brick, and brick and shale houses covered by lime plaster. Georgetown also provides rare examples of wood and iron buildings, while this building style was common in the 1900s, few examples still exist today. However, interesting individual examples of this building style also occur further afield at Merrivale Station, Lions River Station, and Mooirivier (ibid).

4.2.2 Archaeological Resources

A total of 421 archaeological sites were identified and mapped (Figure 28). These sites are scattered throughout the uMgungundlovu District Municipal area and contain archaeological resources that date from the Early Stone Age (1.5 million – 300 000 years ago), the Middle Stone Age (200 000 – 40 000 years ago), the Later Stone Age (ca. 30 000 – 200 years ago), the Early Iron Age (ca. 1 500 – 1100 years ago), Middle Iron Age (ca. 900 – 600 years ago), and the Later Iron Age (ca. 600 – 200 years ago) through to the beginning of the Colonial Period (1850s). It must however be noted that the archaeological sites recorded in the uMgungundlovu Municipality do not constitute a complete record of the archaeological heritage of the area (Maggs 1989; Mazel 1989; Huffman 2007). There has been no systematic archaeological survey of the Municipal area. Most of the identified sites were recorded by archaeologists associated with the then Natal Museum and independent heritage consultants during the course of development. As a result, many of the identified sites may no longer exist.

4.2.3 Historical and Cultural Resources

The area that falls within the uMgungundlovu Municipal boundary contains a rich and varied historical and cultural heritage. Of the 76 Provincial and Heritage Landmarks that occur within the Municipal area, five can be considered as historical and cultural resources. These are the Natal Botanical Gardens, Pietermaritzburg, the Old Voortrekker Road at World's View, the Howick Waterfall, and the Lynmouth Glacial pavement near Richmond (Oberholster 1976; Derwent 2006).

Places of worship constructed by religious communities form significant cultural resources. Christian denominations have built a large number of churches, chapels and mission stations throughout the Municipal area. Several of these structures are Provincial and Heritage Landmarks (e.g. the Christian Science Church and Old St Mary's Anglican Church in Pietermaritzburg, the St Johns Gowrie Presbyterian Church at Nottingham Road, the St Theresa Roman Catholic Church at Mooirivier, the Lutheran Church at New Hanover, and the Carnavon Masonic Lodge at Richmond) and are architecturally significant as well as being cultural and historical resources. There buildings are also a number of Mosques and Hindu Temples located within the Municipal area, this building hold value in terms of both their architectural style and cultural significance. These include the Surti Sunni Mosque in Church Street, the Nizamia Islamic School in East Street, and the Stri Sivia Soobramonair and Marriamen Temples in Longmarket (Langalibalele) Street in Pietermaritzburg. There are a number of cemeteries within the uMgungundlovu District Municipal area that have considerable cultural and historical significance. These include the Jewish and Muslim cemetery off Roberts Road in the Clarendon area, the Old Commercial Road Cemetery and the Fort Napier Military Cemetery in the Signal Hill area. Graves from the Anglo-Boer War, including those of concentration camp victims,

are located within the Commercial Road Cemetery in Pietermaritzburg the Military Cemetery at Mooirivier, and the Howick Cemetery. Graves from both the First and Second World Wars are located in the Commercial Road Cemetery and the Fort Napier Military Cemetery. The Commercial Road Cemetery also contains the graves of individuals spanning the early history of Pietermaritzburg including original Voortrekkers, Germans interned during the First World War, members of the Natal Mounted Police, prominent colonial figures and early Indian Christian converts. Examples of other sites of historical and cultural significance located within the uMgungundlovu Municipal area includes:

- Alexandra Park, and in particular, the Percy Taylor Rockeries in Scottsville which forms both an important natural feature as well as a significant historical resource.
- The Pietermaritzburg Railway Station located off Church Street at the edge of the Pietermaritzburg CBD which is both an architectural resource as well as an important historical and cultural resource as it was here, in 1893 that the incident that sparked Mahatma Gandhi's strategy of passive resistance, occurred (KwaZulu-(Natal Museum).
- However, the results of this study have also revealed that there is a significant lack of formally recognised sites of traditional African cultural and historical importance within the uMgungundlovu Municipal area (for instance see Wright 1989). Examples of such sites include the traditional Shembe worship circles within the Vulindlela and Lions River areas, waterfalls and prominent pools associated with living heritage values such as those adjacent to the R103 at Lidgetton, mountains or prominent hills associated with living heritage values such as those at Ingeleni near Mooirivier, and Inhlozane and Thaba Mpendle at Mpendle, sites associated with the liberation struggle against apartheid in the Edendale area near Pietermaritzburg, and Brandville adjacent to Mooirivier, and sites of cultural significance associated with African oral traditions. This lack of formally recognised traditional African sites within the Municipality is a serious gap in the available data and is highlighted as an urgent requirement for any future heritage resource work undertaken.

4.2.4 Freedom Struggle Sites

More recently the Pietermaritzburg Tourism Authority identified and developed Struggle era sites in the Municipal area. These have now been developed for tourism purposes and a pilgrimage route has been identified. Sites and places of significance include the Old Prison in Pietermaritzburg, the Gandhi statue opposite the Colonial Building, various houses and places of significance within the Sobantu township as well as the Edendale/Mbali sub-route. Of special interest in this region is the Mandela Capture site, near Howick, and the Alan Paton Centre and struggle archives at the University of KwaZulu-Natal at Pietermaritzburg. The Centre houses the famed author of 'Cry, the Beloved Country', and founder of the Liberal Party, Alan Paton's literary works, and documents relating to other institutions that struggled against racial oppression in South Africa.

4.2.5 Heritage Resource Zones

A study commissioned by the Msunduzi Local Municipality identified a total of 32 zones of heritage significance within the greater Pietermaritzburg area (Harrison & Holdcroft 2008). These zones were

categorised as areas of architectural, archaeological, historical and/or cultural significance. Sixteen zones of architectural significance were identified and mapped for the Msunduzi Local Municipal area. These are all located within the suburbs surrounding the Pietermaritzburg CBD, including Scottsville, Prestbury, Clarendon, Athlone and Pelham. The architectural resources located within these zones largely consist of buildings constructed in Voortrekker, British-Colonial and, to a lesser extent, Indian styles, as well as more modern, post World War 2 architectural styles. A number of these buildings date back to the mid-to-late 1800s and early 1900s. A further five zones were identified and mapped within the Municipality that contain both architecturally as well as culturally and/or historically significant resources. These include:

- The Pietermaritzburg CBD which contains a vast number of architecturally as well as historically important buildings and streets;
- A zone in East Street (between Loop (Jabu Ndlovu) and Church Streets in the Pietermaritzburg CBD which contains a number of mosques and Hindu temples of both architectural and cultural significance;
- A zone in Prestbury which contains a number of old city engineers workshops and railway infrastructure such as shunting yards which are both architectural and historical resources;
- Fort Napier in the Signal Hill area which contains old architectural resources such as the St George's Garrison Church as well as cultural and historical resources such as the old Fort Napier Military Cemetery; and
- Georgetown in Edendale which is an architectural, cultural and historical resource.

A total of nine zones of cultural and/or historical significance were identified within the greater Pietermaritzburg area. Due to the sparse and incomplete nature of heritage site distribution within the remainder of the uMgungundlovu District Municipality a similar exercise was not possible for these areas. The nine zones identified include:

- Zones along the Edendale Road, the Old Edendale Road, Plessislaer, Imbali and Masons Mill areas which are zones that have played important roles in the political and cultural history of Edendale and Pietermaritzburg. This area has recently been developed and incorporated within the Pietermaritzburg "Freedom Trail" a tourism initiative that highlights the struggle-era history of the area;
- Areas associated with the forced removals of Indian communities during the apartheid era in Pentrich in the Camps Drift area;
- The township of Sobantu, located adjacent to the Bishopstowe area in the north-eastern part of the Msunduzi Municipality, which has been identified as an area of cultural and historical significance as it was developed as the model township for South Africa in the 1920s;
- Alexandra Park which contains the Percy Taylor Rockeries in the Scottsville area. The rockeries were constructed by out-of-work soldiers that had just returned from the Second World War;
- Oribi Village, located along Oribi Road which was originally built as a military garrison;
- An area along Roynston Road in the Willowton area that contains one mosque and is recognised as an important religious zone for the Muslim community; and
- The old Commercial Road Cemetery, Masons Square and the Natal Carbineers area which is an important cultural and historical zone. The old Commercial Road Cemetery in particular contains

the graves of a wide sector of the early Pietermaritzburg community from soldiers killed in the Anglo-Boer, First and Second World Wars, Voortrekkers and prominent colonial figures.

Two zones of archaeological significance have been identified within the greater Pietermaritzburg area. These include the Old Polo Fields in Chatterton Road and the Dale's Park area in Prestbury. The Dale's park area was the location of an old outspan while a number of archaeological objects have been found in the Old Polo Fields area, particularly within the vicinity of the Dorpspruit stream (Harrison & Holdcroft 2008). However, as noted above, the archaeological sites recorded in this study do not constitute a complete record of the archaeological heritage of the area as there has been no systematic archaeological survey of the project area. As such, the meaningful identification of zones of archaeological significance within the Municipality is not possible until such time as a more comprehensive study on the Municipalities archaeological resources is undertaken.

4.3 Site Significance and Assessment

The significance of heritage resources is determined by various aspects, which may be viewed singly or as a collective depending on the nature and characteristics of the heritage resource. These include historical, social, aesthetic, technological and scientific value in relation to the uniqueness, condition of preservation and research potential of the heritage resources.

Heritage resources significance is determined through an assessment and grading criteria in terms of the National Heritage Resources Act, 25 of 1999 as set out in Section 7 of the Act. In 2005 SAHRA designed criteria (Table 20) to provide assistance and guidance for heritage resources rating and significance determination.

Heritage sites of low significance do not require further recording before destruction. Sites of medium significance call for recording before they may be destroyed. When sites are rated medium to high, they need to be mitigated before they are destroyed. Sites regarded of high significance locally should either be retained partly as heritage sites and or mitigated before destruction.

The significance of heritage resources of national and provincial heritage status has already been established. SAHRA is responsible for heritage resources of national significance while the Provincial Heritage Resources Authorities are responsible for provincial heritage resources. As yet there are no heritage sites of national significance in the project area although it is currently being investigated by SAHRA.

Table 20: Field rating and recommended grading of sites (SAHRA 2005).

Level	Details	Action
National (Grade I)	The site is considered to be of National Significance	Nominated to be declared by SAHRA
Provincial (Grade II)	This site is considered to be of Provincial significance	Nominated to be declared by Provincial Heritage Authority
Local Grade IIIA	This site is considered to be of HIGH significance locally	The site should be retained as a heritage site
Local Grade IIIB	This site is considered to be of HIGH significance locally	The site should be mitigated, and part retained as a heritage site
Generally Protected A	High to medium significance	Mitigation necessary before destruction
Generally Protected B	Medium significance	The site needs to be recorded before destruction
Generally Protected C	Low significance	No further recording is required before destruction

It is important to note that the assessment of significance of and rating of heritage resources depends on their state of conservation at the time of the assessment. Some of the rating and assessment of the heritage resources found within the project area is being done on heritage resources which were last evaluated about ten or more years ago.

4.3.1 Archaeological Resources Significance

Archaeological resources are protected under Section 35 of the NHRA. All the known archaeological resources in the study area, including those sites not yet discovered, as well as palaeontological resources that may occur are regarded as having a high to medium significance. This status calls for mitigation of sites before they can be destroyed. Therefore if a decision to develop in the study area is taken, foot surveys have to be undertaken where the recording and mitigation of heritage resources thought to be affected by the development takes place.

4.3.2 Provincial Heritage Resources

The Amafa inventory of provincial heritage sites in KwaZulu-Natal revealed 41 Provincial Heritage Site in the uMgungundlovu District Municipal area (Table 21) Provincial Heritage Sites are protected by the NHRA and if proposed development is thought to impact on these sites in any way, a permit would be required from Amafa. One grave yard, i.e. the Military Cemetery at Mooirivier, is also listed as a Provincial Heritage Site. Any development in the Municipal area that may alter or disturb this grave yard and others older than 60 years would require a permit from Amafa. Guidelines on what to do in the event that graves are discovered are given in the original report (Active Heritage, June 2011).

4.4 Summary of heritage resources in the region

A total of 1050 heritage sites were identified within the uMgungundlovu District Municipal area. These consisted of architectural resources, archaeological resources, historical and cultural resources. A large percentage of the heritage resources located within the Municipal area consist of architectural resources, in the form of built structures (mostly buildings). These are concentrated within the Pietermaritzburg Central Business District (CBD) and its surrounding suburbs as well as in the Georgetown area of Edendale, and the urban areas of Howick, Mooirivier, Camperdown and Richmond. A significant number of historical and cultural resources are also present within the uMgungundlovu District Municipality. These consist of places of worship such as churches, mosques and temples, cemeteries, open spaces, areas of political significance and areas of past economic significance, to mention but a few. A large number of archaeological sites were also identified in the uMgungundlovu District Municipality. However, as no systematic archaeological survey of the Municipal area has been undertaken to date, the extent of the Municipalities archaeological resource base is largely unknown. The results of this overview illustrate a significant lack of formally recognised sites of traditional African cultural and historical importance within the uMgungundlovu Municipal area. This has recently been addressed by Pietermaritzburg Tourism with the development of the "Freedom Trail", however, more sites need to be identified and developed for the rest of the Municipal area. The lack of formally recognised traditional African sites is a serious gap in the available data and needs to be highlighted as an urgent requirement for any future heritage resource work undertaken.

Table 21: Provincial and landmark heritage sites within study site.

No.	Heritage resource	Landmark status	Rating	GPS co-ordinates
1	Howick Waterfall	Provincial	Very high	S 29 29.192 E 30 14.306
2	Howick Museum	Provincial	Very high	S 29 29.326 E 30 13.629
3	Cedara College	Provincial	Very high	S 29 31.645 E 30 16.019
4	Owthorne House	Provincial	Very high	S 29 28 E 30 16
5	St Johns Church	Provincial	Very high	S 29 21.232 E 29 59.783
6	Tweedie Hall	Provincial	Very high	S 29 29.338 E 30 10.593
7	Fairfell farmstead	Heritage	High	S 29 28.722 E 30 14.388
8	Arid Farmhouse	Heritage	High	S 29 32.256 E 39 05.458
9	Umhlatuzana shelter	Provincial	Very high	S 29 48.280 E 30 45.220
11	Lutheran Church	Provincial	Very High	S 29 1.477 E 0 33.761
12	Helen Bridge	Provincial	Very High	S 29 21.477 E 30 33.761
13	Military cemetery, Mooirivier	Provincial	Very High	S 29 13.038 E 30 00.729
14	Weston College	Heritage	High	S 29 12.815 E 30 02.114
15	St Theresa Church	Heritage	High	S 29 12.437 E 29 59.361
16	Collingham shelter	Heritage	High	S 29 38.217 E 29 40.614
17	Blarney Cottage	Provincial	Very High	S 29 50.857 E 30 12.270
18	Dunbar Estate	Provincial	Very High	S 29 52.221 E 30 22.329
19	Richmond Museum	Provincial	Very High	S 29 52.326 E 30 16.212
20	Richmond Masonic Lodge	Heritage	High	S29 52.159 E 30 16.366
21	Glacial pavement	Heritage	High	S 29 48.941 E 30 24.502
22	Baynes house	Heritage	High	S 29 45.892 E 30 20.190
23	Old Nel's Rust dairy	Heritage	High	S 29 45.892 E 30 20.190

No.	Heritage resource	Landmark status	Rating	GPS co-ordinates
24	First cattle dip	Heritage	High	S 29 45.892 E 30 20.190
25	Joseph Baynes Masoleum	Heritage	High	S 29 45.892 E 30 20.190
26	Church of the Covenant	Provincial	Very High	S 29 35.937 E 30 22.968
27	Old Government House, Pietermaritzburg	Provincial	Very High	S 29 36.654 E 30 22.218
28	Old Natal Houses of parliament	Provincial	Very High	S 29 36.158 E 30 22.787
29	Old Voortrekker Road, Wolds View	Provincial	Very High	S 29 35.079 E 30 19.932
30	Pietermaritzburg City Hall	Provincial	Very High	S 29 36.089 E 30 22.781
31	Old Longmarket Street Girls School	Provincial	Very high	(Not available)
32	Clark House	Provincial	Very High	S 29 37.036 E 30 22.925
33	Publicity House	Provincial	Very High	S 29 36.155 E 30 22.810
34	Old Presbyterian church	Provincial	Very High	S 29 36.133 E 30 22.722
35	Voortrekker House Museum	Provincial	Very High	S 29 35.766 E 30 22.679
36	Russel High school	Provincial	Very High	S 29 36.156 E30 22.297
37	Old YMCA Building	Provincial	Very High	S 29 36.282 E 30 22.668
38	Natal Botanical Gardens	Provincial	Very High	S 29 36.268 E 30 20.874
39	Girls High School	Provincial	Very High	S 29 37.602 E 30 23.109
40	Old Natal University Central Block	Provincial	Very High	S 29 37.276 E 30 23.744
41	Main Post Office, Pietermaritzburg	Provincial	Very High	S 29 36.209 E 30 22.759
42	Reids Building	Heritage	Very High	S 29 36.234 E 30 22.733
43	Old Remedial Model primary	Provincial	Very High	S 29 36.121 E 30 23.012
44	Town Hill Hospital	Provincial	Very High	S 29 35.404 E 30 22.288
45	Old Pentrich Railway station	Provincial	Very High	S 29 38.109 E 30 22.443
46	Scottsville Primary School	Provincial	Very High	S 29 36.899 E 30 23.964
47	Old Harvard Boys School	Provincial	Very High	S 29 36.549 E 30 22.031
48	Loop Street Police Station	Provincial	Very High	S 29 36.276 E 30 22.808
49	Alexandra Road Police Station	Provincial	Very High	S 29 37.161 E 30 23.203
50	Fort Napier	Provincial	Very High	S 29 36.887 E 30 21.998
51	Fort Napier St Georges Garrison Church	Provincial	Very High	S 29 36.881 E 30 22.176
52	Fort Napier: historical Core	Provincial	Very High	S 29 36.887 E 30 21.998
53	Colonial Building	Provincial	Very High	S 29 36.115 E 30 22.710
54	Old State Veterinary Laboratory	Provincial	Very High	S 29 34.527 E 30 21.425
55	Tatham Art Gallery	Provincial	Very High	S 29 36.139 E 30 22.762
56	Old Supreme Court	Provincial	Very High	S 29 37.093 E 30 22.848
57	Old Merchiston School Building	Provincial	Very High	S 29 36.360 E 30 23.028
58	Old St Mary's Anglican Church	Provincial	Very High	S 29 36.310 E 30 22.964
59	Macrorie House	Provincial	Very high	S 29 36 .698 E30 22.304
60	Italian P.O.W. Church	Heritage	High	S 29 38.159 E 30 24.710
61	Christian Science Church	Heritage	High	S 29 36.445 E 30 22.641
62	Overpark	Heritage	High	S 29 36.475 E 30 22.602
63	Sans Souci	Heritage	High	S 29 38.180 E 30 22.791
64	Wayland	Heritage	High	S 29 36.237 E 30 22.423
65	Butine house	Heritage	High	S 29 36.234 E 30 22.426
66	Marian Villa	Heritage	High	S 29 37.769 E 30 23.036
67	Old Sataya Vardhak Sabha	Heritage	High	S 29 34.480 E 30 24.023
68	238 Boom street	Heritage	High	S 29 35.906 E 30 22.510
69	Conservatoire de Hammerstein	Heritage	High	S 29 37.267 E 30 23.191
70	Norfolk Villa	Heritage	High	S 29 36.345 E 30 22.743
71	Dorchester House	Heritage	High	S 29 36.346 E 30 22.741

5 THE SOCIO-ECONOMIC ENVIRONMENT (LIVELIHOOD STRATEGIES)

5.1 Introduction

5.1.1 Aims

The aim of this report is to profile social and economic conditions in the Umgungundlovu District. This is undertaken with the view to identifying issues that are likely to impact on the natural environment in different areas of the Municipality. The report is structured such that the profiles are dealt with, initially, at a district level and then at local municipal level. A brief summary of issues is included at the end of each municipal report. These issues are then drawn together in the final section of the report and provide an indication of what needs to be taken into account in the preparation of the SEA.

The following socio-economic indicators are used in this report:

- Population dynamics (population and population growth, number of households, age and gender breakdown).
- Employment statistics (employment status, employment sectors and household income).
- Education level.
- Access to services such as water, sanitation and electricity.

Data has been sourced from the 2001 national census (NC), the 2007 community survey (CS), Municipal IDPs, the N3 Corridor and its Urban Development Pressure Points, the 2008 Urban Edges Dataset (DRDLR, 2008) and the 2009 Rural Settlements Dataset (DRDLR, 2009).

5.1.2 Legal Framework

The legislative basis for the social, economic and infrastructural components of this project is listed in the Status Quo Legal Report. The listing of immediately relevant legislation is outlined below:

- The Constitution.
- NEMA (Regulations, Air Quality, Waste).
- Water Services Act.
- National Health Act.
- Municipal Structures and Systems Acts.
- Municipal Finance Management Act.
- Planning and Development Act.
- Land Reform legislation.

Governmental agencies responsible for the functions related to the above include:

- Local and district municipalities.
- The key provincial and national government line functions departments including:
  - Health.
  - Education.
  - Welfare and Pensions.

- Economic Development and Tourism.
- Sport.
- Justice.
- Finance.
- Transport.
- Roads.
- Water.
- Mineral and energy.
- Rural Development and Land Reform.
- Agriculture and Environment Affairs.

5.2 uMgungundlovu District Municipality

5.2.1 Demographics

Profile

Data from the 2001 NC and 2007 CS suggests that the district municipality has experienced an annual population growth of 1.1% between 2001 and 2007 (StatsSA, 2001 and 2007). In 2001 the population was recorded as 927842 people and in 2007 as 988839 people. The population in Umgungundlovu represents 2% of the national population and 10% of the provincial population (McCarthy, 2008).

In 2001, 36% of the population in the district was either below 15 or above 65 years of age, while in 2007, 35% of the population fell into these age categories and classified as dependents (StatsSA, 2001 and 2007). The age and gender breakdown for the district can be seen in Figure 29 and Figure 30 below.

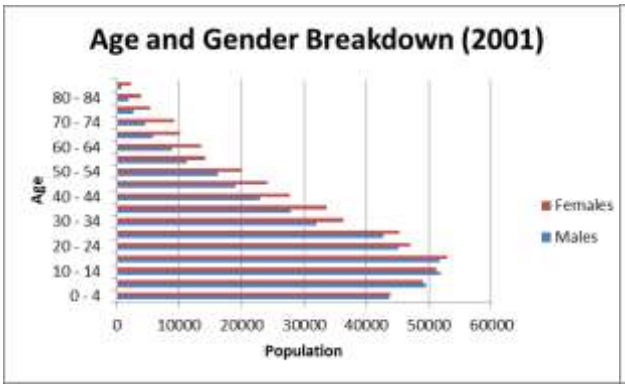


Figure 29: Age and Gender breakdown of the uMgungundlovu District Municipality 2001 (StatsSA, 2001)

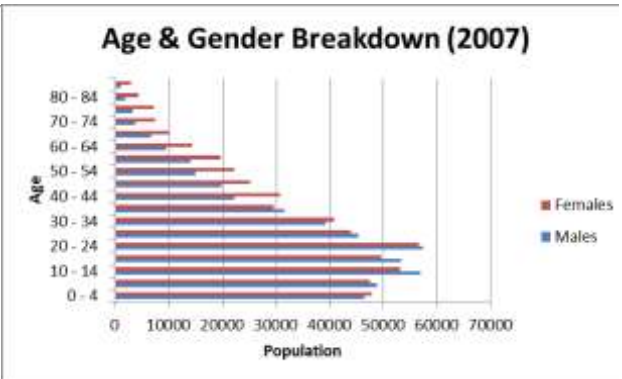


Figure 30: Age and gender breakdown of the uMgungundlovu District Municipality 2007 (StatsSA, 2007)

Spatial Location

Figure 1 shows the seven local municipalities within the Umgungundlovu District Municipality. Figure 31 shows the distribution of urban and rural households throughout the district.

Figure 31: Settlement distribution, uMgungundlovu District Municipality – see Map Book

Data from the 2008 Urban Edges Dataset (DRDLR, 2008) and the 2009 Rural Settlements Dataset (DRDLR, 2009) indicates that 33% of the households in the district are located in rural areas and a further 67% in urban areas. The urban households and are concentrated in a limited number of formal urban areas. In contrast rural households are scattered throughout the district with particularly high concentrations in Ingonyama Trust owned land that is controlled by Traditional Councils, black owned freehold, land reform and commercial farm land.

The environmentally sensitive areas of the municipality tend to be located in the higher lying areas and along ridge and drainage lines, (see Section 3.2). This includes the Impendle and Mpofana Municipalities where transformation is not yet as extensive as in the other municipalities. In the remaining municipalities where agricultural production conditions are more suitable, large areas are transformed (see Sections 6 - 8). Settlement concentrations tend to be highest particularly when linked to the regions' major transportation routes.

The majority of settlement in the district is located in and around the Msunduzi Municipality. In the remainder of the district formal urban settlement tends to be confined to small towns and their associated townships. In contrast rural settlement is scattered throughout traditional areas and private freehold black owned land areas such as Trust Feeds near Wartburg and Hopewell outside Thornville. Rural settlements also occur increasingly in areas with land reform projects, particularly those under restitution claims. The majority of rural settlement is located in the Msunduzi, uMshwathi, Impendle, Mkhambathini and Richmond Municipalities. As may be noted in the Land Use and Agricultural reports, settlement tends to be located in the high value agricultural land areas.

5.2.2 Employment

Profile

The uMgungundlovu District has the second largest economy in the province and contributes 10% of the total employment (Umgungundlovu District IDP, 2010/11). In accordance with data from the 2001 NC and 2007 CS, unemployment[14] in the district is recorded to have decreased from 28% in 2001 to 22% in 2007 (StatsSA, 2001 and 2007). Employment trends in the district are slightly higher than KwaZulu-Natal (KZN) as a whole with a marginally higher level of employment among the potentially economically active population [15](StatsSA, 2007). The employment status of the district compared with KZN can be seen in Figure 32 below:

[14]Unemployment is defined throughout this report using the StatsSA official definition, 'the unemployed are those people within the economically active population who: did not work during the seven days prior to the interview; want to work and are available to start work within a week of the interview; and have taken active steps to look for work or to start some form of self-employment in the four weeks prior to the interview'.

[15]The population reported to be in non-academic institutions are included in the not economically active portion of the population.

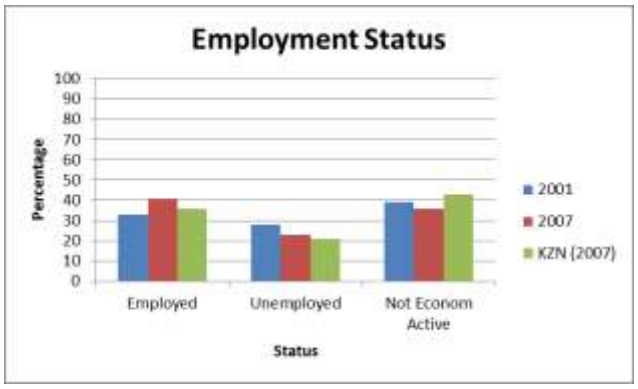


Figure 32: uMgungundlovu District Municipality Employment Status 2001 & 2007 compared with KZN.

uMgungundlovu is well located as an economic growth point on the major transport route between Durban, as a port city, and Gauteng which is the economic hub of Southern Africa (McCarthy, 2008). The location of the district contributes towards it being one of the more prosperous districts in the province with a diversified economic base.

Census data indicates that 33% of the potentially economically active population were formally employed in 2001 and 41% in 2007. The major employment sectors in the district were the community services sector accounted for 34% and 19% in 2001 and 2007 respectively, the manufacturing sector, 15% and 14%, and agriculture, 20% and 11% (StatsSA, 2001 and 2007). The employment trends suggest a reliance of the district's population on the community services sector for employment which has little scope for economic growth (McCarthy, 2008).

Spatial Location

Information allowing for spatial location of different levels and types of employment in the district and local municipalities was not available from official data sources. Hence census data has been used to inform sectors, levels and types of employment. Population distribution data (Section 2 above) in conjunction with the employment data has been used as the basis for informed assumptions to be made about employment distribution. The indications are that the majority of the employment in the district (unskilled, semi-skilled, skilled and professional), mainly in the secondary and tertiary sectors, is focused around the urban centres in the Msunduzi and uMngeni Municipalities and to a lesser extent the smaller urban centres in the district. In contrast the rural areas are characterised by a higher level of labour based (unskilled and semi-skilled) employment mainly in the agricultural (substance and commercial) and to a lesser extent the industrial sectors (sugar mills, saw mills etc.).

5.2.3 Education

Profile

Data from the 2001 NC and the 2007 CS suggest that there has been an improvement in the percentage of the population receiving education. The percentage of the population over the age of 20 that had not received education was lower than the provincial average, however, education levels in the district remain low. This is particularly the case in rural areas.

Education levels for the population over the age of 20 in the district and the province can be seen in Figure 33.

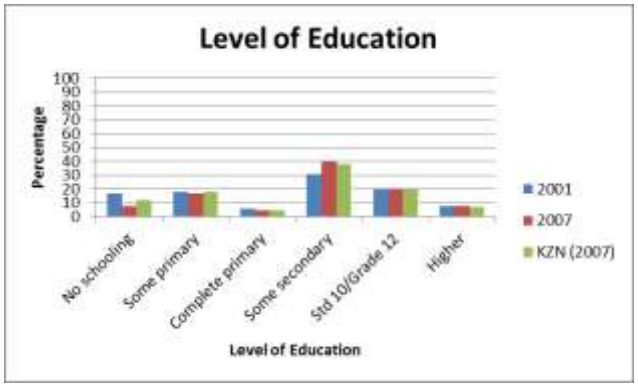


Figure 33: Highest level of education for the population over the age of 20, uMgungundlovu District Municipality and KZN (StatsSA, 2001 & 2007)

Spatial Location

Statistical information on access to educational facilities was not readily available in the official data sets used for this project. Consequently assumptions have been used here, based on a related project undertaken by CoGTA (Spatial Planning Sub-Directorate) earlier in 2011 (i.e. the Demonstration Project on Capital Investment (Isik, 2011b)) and the Rural Settlements Project (Isik, 2008), which included Impendle and uMngeni in the study area. These data suggested that populations in rural areas tend to have poorer access to senior school and post school facilities than their urban counterparts: that is further than walking distance (i.e. 5kms) and in fact in the majority of cases in excess of 20kms distant from settlements. In contrast most rural communities have access to primary facilities within 5kms of the larger settlements (DRDLR, 2008) with access to 'D' roads (provincial roads – mainly gravel). These assumptions will be used in the remainder of the report.

5.2.4 Access to Services

Profile

Data from the 2001 NC and 2007 CS suggests that throughout local municipalities in the district there have been improvements in access to an RDP level of service for: water[16]; sanitation and electricity provision. It should be noted that the district is above the provincial average in terms of the provisions of these services to households. Access to these services on a district and provincial level can be seen for the 2001 NC and the 2007 CS in the Table 22 below.

Table 22: Level of service uMgungundlovu District Municipality (Source: StatsSA, 2001 & 2007)

	RDP Water	VIP Sanitation	Electricity
2001	73%	59%	74%
2007	89%	74%	82%
KZN (2007)	79%	67%	71%

Spatial Location and Level of Service

Once again data on spatial location and access to infrastructure and services is not readily available at provincial and municipal levels[17]. Consequently, assumptions are based on the Demonstration

[16] 6kl per household per day within 200m of the household.

[17] An investigation into alternative sources of data on the spatial location of infrastructure and services was made with CoGTA GIS division, Premier's Office, Provincial Treasury and DEDT. It was established that only

Project on Capital Investment (Isik, 2011b), The Rural Settlement and Urban Edges projects (Isik, 2008 and 2009). It is assumed that households without access to services are located predominantly in isolated rural areas due to the logistical difficulties and costs of providing these areas with services. The more accessible rural settlements largely have access to RDP levels of services (infrastructure and social). Their urban counterparts tend to have higher levels of service (eg. house water connections, water born sewerage, schools, hospitals etc.) particularly in the higher order centres in the district. In the lower order centres the level of services provided by government tends to decline, although there are exceptions to this assumption (eg. hospitals in rural areas).

5.3 Local Municipalities

5.3.1 uMshwathi Local Municipality – KZ 221

5.3.1.1 Demographics

Profile

The population of uMshwathi Municipality was reported as 108412 in 2001 and 113051 in 2007, showing a population growth rate of 0.7% (StatsSA, 2001 and 2007). In 2001 males accounted for 47% and females 53% of the population, in 2007 the divide had increased with the population comprising of 46% males and 54% females (StatsSA, 2001 and 2007). It is of interest that the male age group of 35-64 experienced a negative growth rate between 2001 and 2007. This is potentially due to the outmigration of males in search of employment. The population density in uMshwathi is 60 persons per square kilometre (uMgungundlovu SDF Review, 2007).

In 2001, 41% and 2007 40% of the population was either below the age of 15 or over the age of 65 (StatsSA, 2001 and 2001), signifying a high dependency ratio. The high proportion of young people in the population can be seen in the complete age breakdown for 2001 and 2007 in Table 23 and gender, age breakdown in Figure 34 and Figure 35 below.

Table 23: Age profile as a percentage of the population

	0-4	5-14	15-34	35-64	65+
2001	11.0%	25.3%	35.4%	23.3%	5.0%
2007	11.1%	24.9%	37.3%	22.5%	4.2%

certain departments spatially locate facilities (eg health, education and transport), but the majority are only beginning to initiate the process (e.g. Dept of Housing). Hence comprehensive government services data is not readily available for review purposes.

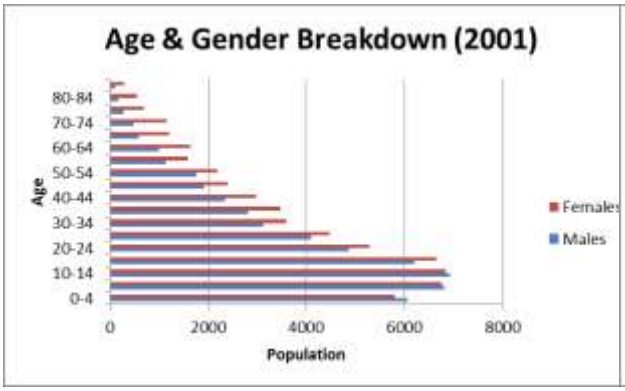


Figure 34: Age & Gender breakdown for uMshwathi Municipality (Source: StatsSA, 2001)

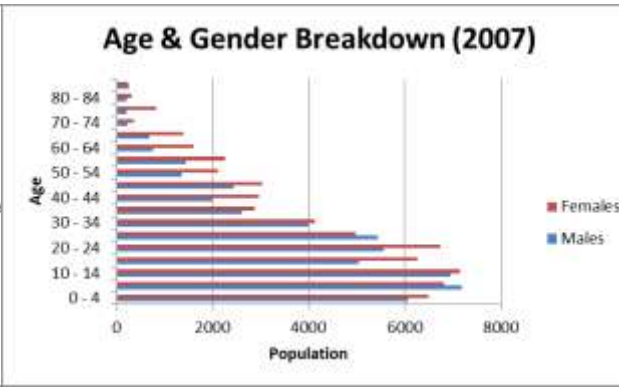


Figure 35: Age & Gender breakdown for uMshwathi Municipality (Source: StatsSA, 2007)

Spatial Location

Data from the2008 Urban Edges Dataset (DRDLR, 2008) and the 2009 Rural Settlements Dataset (DRDLR, 2009) shows that of the 16908 households in the municipality 10% (1691) are urban and 90% (15217) are rural. From Map 3 it is evident that there is a concentration of rural households in the south and north eastern areas of the municipality, much of which is Ingonyama Trust land. Settlement in the remainder of the rural settlements in the municipality is concentrated in urban areas and largely scattered on commercial farms. There are concentrations of settlement on freehold land such as Trustfeed near New Hanover.

Figure 36: Settlement Distribution, uMshwathi Municipality – see Map Book

5.3.1.2 Employment

Profile

Data from the 2001 NC reported that 24% of the potentially economically active population in the municipality were unemployed with 44% classified as not economically active (StatsSA, 2001). In 2007 unemployment in the municipality was estimated at 17%. 51% of the potentially economically active population classified as not economically active (StatsSA, 2007). Changes in the employment status of the potentially productive population can be seen in Table 24 below.

Table 24: Employment status of the potentially economically active population (Source: StatsSA, 2001 & 2007)

	Employed	Unemployed	Not Economically Active
2001	32%	24%	44%
2007	32%	17%	51%

The major sectors contributing to employment in 2001 were agricultural (44%), community services (24%) and manufacturing (15%) (StatsSA, 2001). In 2007 agricultural again accounted for the bulk of employment (33%), manufacturing 16% and community service 15% (StatsSA, 2007). In terms of

gross value added (GVA), agriculture contributed 49% and manufacturing 23% in the municipality (Mkhambathini IDP, 2010/2011).

Data from the 2001 NC shows that 83% of households earned less than R20 000 per annum, placing them close to the national poverty line[18]. 30% of these households reported no source of income (StatsSA, 2001).

The data on employment trends in 2001 and 2007 shows a small increase in the level of employment and a large decrease in unemployment. The reduction in unemployment is largely due to the majority of those people previously unemployed becoming classified as not economically active. The increasing proportion of the population who are not economically active increases dependency which further burdens existent wage earners.

Formal agriculture continues to be an important economic sector for employment in the uMshwathi Municipality. It is assumed that the majority of those not involved in formal and informal employment are engaged in some form of subsistence production to supplement grant income from the state.

Spatial Location

As noted above the majority of employment in this municipality is in the agricultural sector located on commercial farms. Manufacturing relates to agri-processing of timber and sugar products (e.g. Noodsburg Mill). Employment in the retail sector is located in the primary and secondary centres in the municipality.

5.3.1.3 Education

Profile

The 2001 NC reported that 29% of the population over the age of 20 had not received any schooling, 10% had received a matric and 3% some form of tertiary education (StatsSA, 2001). Data from the 2007 CS shows 13% of the population over the age of 20 reported to have not received any education, 11% a matric and 4% tertiary education. A complete summary of education levels for the population over the age of 20 can be seen in Figure 37:

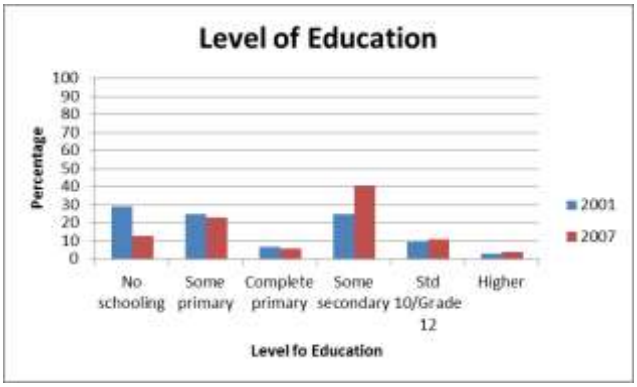


Figure 37: Highest level of education obtained by the population over the age of 20 (Source: StatsSA 2001 & 2007)

[18]The National Poverty Line of R322 per person per month at 2000 prices was estimated by Statistics South Africa, (A National Poverty Line for South Africa - Statistics South Africa, National Treasury, 2007). It is presumed that a household has an average of five persons.

Location

Refer to assumptions made in Section 5.2.3.

5.3.1.4 Access to Services

Access to Water

Data from the 2001 NC showed that 56% of households had access to a minimum RDP level water supply. Of those with access to RDP water 13% had access inside their dwellings, 33% connections in their yard and 10% a communal standpipe (StatsSA, 2001). The 2007 CS estimated that 70% of the population had access to piped water. This was made up of 17% having a connection in their dwelling, 43% in their yard and 10% from a communal standpipe (StatsSA, 2007). It should be noted that in the 2007 CS no distinction was made on the distance of the communal standpipe from dwellings thus an accurate comparison on RDP water between 2001 and 2007 data cannot be drawn. Data generated by DWA in 2011 using the Eskom dataset suggests similar trends with 26% of the population still needing a basic level of service in the municipality.

Access to Sanitation

In 2001 32% of households had access to a minimum RDP level sanitation, 19% waterborne and the remainder a minimum of VIP sanitation. Of the households without access to RDP level sanitation 3% of reported using the bucket system and 13% reported no access to sanitation (StatsSA, 2001). There was an overall improvement in access to a minimum of RDP sanitation in 2007 with 55% of the population having access, 20% waterborne and the remainder a minimum of RDP sanitation. 5% of the population reported no access to sanitation which was a noticeable improvement from 2001 (StatsSA, 2007).

Access to Electricity

The 2001 NC reported that 54% of the population in the municipality used electricity for lighting thus having an Eskom or municipal connection depending upon the location in the district (StatsSA, 2001). The 2007 CS suggests improvements in the provision of electricity in the municipality with 64% of the households reported to use electricity for lighting (StatsSA, 2007).

Location

Refer to assumptions made in Section 5.2.3.

5.3.2 uMngeni Local Municipality – KZ 222

5.3.2.1 Demographics

Profile

The 2001 NC reported that uMngeni Municipality had a population of 73888. The 2007 CS estimated the population of the municipality to be 84783 (StatsSA, 2001 and 2007). These figures give the municipality an annual population growth rate of 2.5%. The 2007 CS noted that the Municipality accounted for 9% of the uMgungundlovu Districts total population (uMngeni IDP, 2010/11). The population density of uMngeni is relatively low at 47 persons per square kilometre (uMgungundlovu SDF Review, 2007).

In both the 2001 NC and the 2007 CS the population was made up of 49% males and 51% females (StatsSA, 2001 and 2007). The 2001 NC and 2007 CS reported that 33% of the population were either under the age of 15 or over the age of 65 thus identifying a third of the population as dependants (StatsSA, 2001and 2007). In both years the majority of the population fell within the age bracket of 15 to 34 which is the age group at highest risk of HIV/Aids infection (uMngeni IDP, 2010/11). The age breakdown of the municipality can be seen in Table 25 and the age and gender profile in Figure 38 and Figure 39 below:

Table 25: Age profile as a percentage of the population

Year	0-4	5-14	15-34	35-64	65+
2001	8.0%	18.6%	38.0%	28.6%	6.8%
2007	8.7%	17.5%	35.9%	30.7%	7.2%

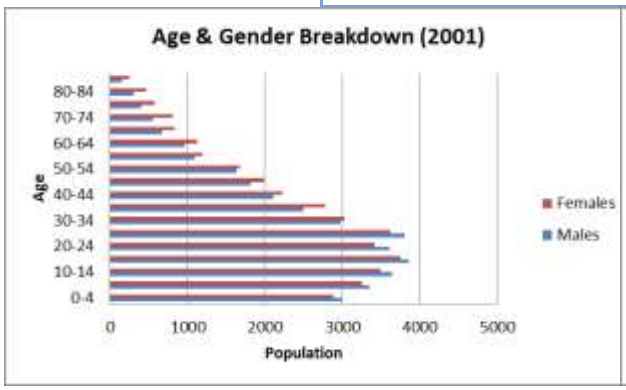


Figure 38: Age&Gender Breakdown for uMngeni Municipality (Source:StatsSa, 2001)

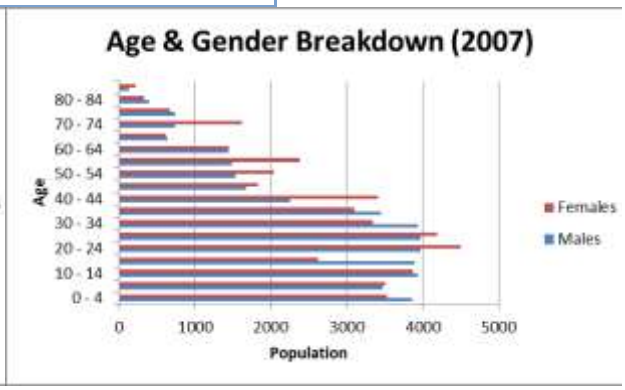


Figure 39: Age & Gender Breakdown for uMngeni Municipality (Source: StatsSA, 2007)

An overall review of the data from the 2001 NC and the 2007 CS indicates a predominance of woman over the age of 40 with a male majority under the age of 40. Such a trend may be attributed to migration of males into the area in search of work and the general trend of females having a greater life expectancy than males. However, further study should be conducted into these dynamics in order to establish possible causes.

Spatial Location

The spatial location of the population in uMngeni can be seen in Figure 40. Data from the 2008 Urban Edges Dataset (Isik, 2008) and the 2009 Rural Settlements Dataset (Isik, 2009) reported 20%, 3627, rural households and 80%, 14828, urban households in uMngeni Municipality. From Figure 40 it is evident that the majority of households are concentrated in the urban areas of Hilton, Howick and Mpophomeni. Comparatively, the rural households are sparsely distributed throughout the municipality with small concentrations in and around the smaller centres (Lions River, Nottingham Road, etc.).

Figure 40: Settlement Distribution, uMngeni Municipality – see Map Book

5.3.2.2 Employment

Profile

The 2001 NC showed 49563 people, 67% of the population, within the economically active age bracket (StatsSA, 2001). The 2007 CS estimated that 63% of the population fell into this category. Unemployment in 2001 was reported at 23% and in 2007 at 19%. In both 2001 and 2007 a high proportion of the potentially economically active population were not economically active, 32% in 2001 and 27% in 2007, resulting in over 50% of the potential work force not having formal employment (StatsSA, 2007). The employment status of the population in 2001 and 2007 is provided in Table 26:

Table 26: Employment status of the potentially economically active population (Source: StatsSA, 2001 & 2007)

YEAR	Employed	Unemployed	Not Economically Active
2001	45%	23%	32%
2007	54%	19%	27%

Data from the 2001 NC and 2007 CS identified the major employment sectors as agriculture, 31% in 2001 and 18% in 2007, and community services, 30% in 2001 and 16% in 2007. Other major employment sectors were manufacturing and wholesale, and retail both of which experienced an increase in the number of people they employ (StatsSA, 2001 and 2007). Despite the contribution to employment figures noted above, the finance sector contributes the majority to the municipal GVA, 31%, with agriculture contributing 22% (Mkhambathini IDP, 2010/2011).

Data on household income is not available from the 2007 census, thus only data from 2001 could be reviewed. In terms of this data 46% of households had an annual income of less than R20 000 placing them close to the national poverty line. 16% of households reported no income (StatsSA, 2001).

Despite the decline in the contribution made by the agricultural and community services sector to employment in the municipality there has been a trend of increased employment. This is likely due to the development of the secondary and tertiary sectors in the municipality and the resultant broadening of the economic base as noted by McCarthy (2008).

Spatial Location

The majority of employment in uMngeni is located in the Howick and Merrivale areas in manufacturing and retail sectors. Employment in agriculture, in contrast, is scattered throughout the commercial agricultural areas of the municipality. The focus on employment in tourism is along the midlands route, i.e. Howick to Nottingham Road via Lions River or Curries Post.

5.3.2.3 Education

Profile

The 2001 NC data indicated that 15% of the uMngeni population over the age of 20 had not received any formal education (StatsSA, 2001). The 2007 CS estimated that this had decreased to 9% (StatsSA, 2007). In the 2001 NC 22% of the population over the age of 20 reported having a matric level education while in 2007 this was 20%. In both years 12% of the population reported some form of tertiary education (StatsSA, 2001). A complete breakdown of the education levels are shown in Figure 41 below:

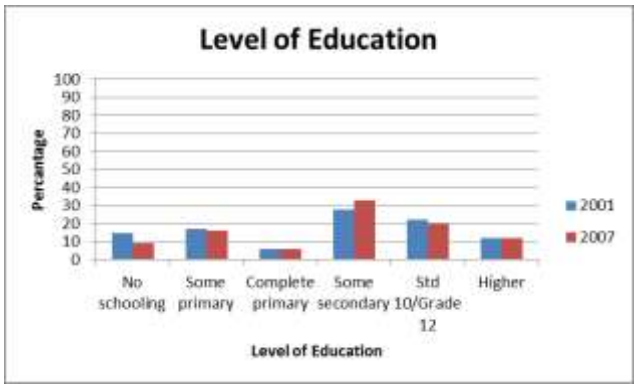


Figure 41: Highest level of education for the population over the age of 20 uMngeni Municipality (source: StatsSA, 2001 & 2007)

Location

Refer to assumptions made in Section 0.

5.3.2.4 Access to Services

Access to water

The 2001 NC reported that 48% of households had access to water inside their dwellings, 28% had a yard connection and 9% a communal standpipe (StatsSA, 2001). This means that 85% of households in uMngeni had access to an RDP level water supply. At the time of the 2007 CS 56% of households had access inside their dwelling, 18% inside their yard and 20% from a communal standpipe resulting in 95% of households having access to piped water.

The uMngeni Municipality IDP reported that there was an improvement in the number of households with access to potable water between 2001 and 2007 with 8% of households not having access in 2001, decreasing to 5% in 2007 (uMngeni IDP, 2010/2011).

Data from the DWA investigation in 2011 contradicts the information from the 2001 NC and 2007 CS. The Eskom dataset indicates that in the case of uMngeni 30% of households do not have access to a basic level of water service. The results of this investigation suggest that further research needs

to be conducted in order to ascertain what the current situation with regards to access to water services is in the municipality.

Access to Sanitation

79% of the population had access to a minimum of RDP sanitation, 68% waterborne and 11% a minimum of VIP sanitation, in 2001. Of the 21% of households that did not have access to RDP level of sanitation 1% reported using the bucket system while 3% reported no access to sanitation (StatsSA, 2001). The 2007 CS reported an improvement with 85% of the population having access to RDP level of sanitation, 68% waterborne and the remainder a minimum of VIP sanitation. Backlogs were still reported with 4% of the population not having access to sanitation or making use of the bucket system (StatsSA, 2007).

Improvements in the access to sanitation were evident between 2001 and 2007 with backlogs being reduced significantly. However there is still a need to address existent backlogs in the municipality as poor sanitation is likely to impact on the security of water sources as well as the sustainability of the environment.

Access to Electricity

The 2001 NC reported that 73% of households in uMngeni made use of electricity for lighting and are thus on the grid. In 2007 it was estimated that 72% of households made use of electricity for lighting (StatsSA, 2001 and 2007).

Spatial Location

Refer to assumptions made in Section 5.2.3.

5.3.3 Mpofana Local Municipality – KZ 223

5.3.3.1 Demographics

Profile

The 2001 NC recorded the population of Mpofana Municipality as 36820 (StatsSA, 2001). Data from the 2007 CS estimated the municipalities' population to be 31518 thus suggesting an annual population growth rate of 2.4% (StatsSA, 2007). Mpofana has the lowest population density in the district, 22 persons per square kilometre (uMgungundlovu SDF Review, 2007).

The 2001 NC data indicated a higher proportion of males (52%) than females (48%). The 2007 CS however estimates that the population is made up of 48% males and 52% females which is more in line with national averages (StatsSA. 2001 and 2007).

At the time of the 2001 NC 35% of the population were aged below 15 or over the age of 65 indicating that the municipality had a large proportion of dependants. The CS estimated that this

portion of the population had increased to 37% by 2007 (StatsSA, 2001 and 2007). In both the NC and CS 39% of the population were between the ages of 15 and 35 (StatsSA, 2001 and 2007). The age breakdown can be seen in Table 27 below while the population profile of the municipality can be seen in the Figure 42 and Figure 43 below. The high proportion of young people in the municipality is evident.

Table 27: Age profile as a percentage of the population

Year	0-4	5-14	15-34	35-64	65+
2001	9.9%	21.3%	39.1%	25.5%	4.2%
2007	10.6%	23.7%	38.9%	23.7%	3.1%

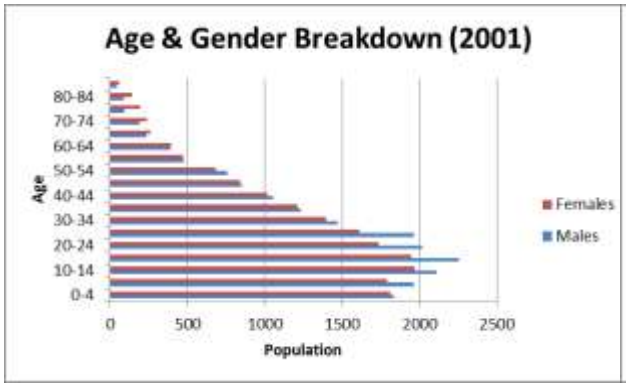


Figure 42: Age & gender breakdown for Mpofana Municipality (Source: StatsSA, 2001)

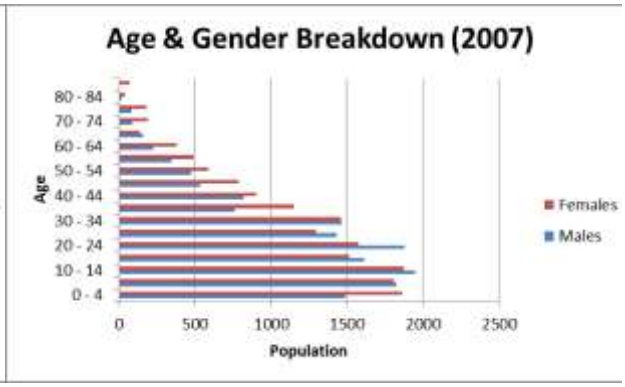


Figure 43: Age & gender breakdown for MpofanaMunicipality (Source: StatsSA, 2007)

While it is likely that changes in the population have been inflated by statistical adjustment they do suggest an uneven trend in population demographics. Such trends have been attributed to the closure of textile factories in the late 1990's leading to unemployment and the resultant outmigration of job seekers. In addition, high levels of HIV/Aids are thought to have contributed to the declining population which is likely to have been exacerbated by the high proportion of the population between the ages of 15 and 35, those at highest risk of contracting HIV/Aids (Mpofana IDP, 2010/11). Noticeable changes in the gender profile of the municipality occurred between 2001 and 2007 particularly in the age group of 35 – 64 i.e. in 2001 a greater proportion of males and in 2007 a greater proportion of females. As already noted this can be attributed to the lack of employment in the area and thus an outmigration of individuals, particularly males, in search of work.

Spatial Location

Data from the 2008 Urban Edges Dataset (Isik, 2008) and the 2009 Rural Settlements Dataset (Isik, 2009) reported that the municipality was composed of 36%, 2188, rural households and 64%, 3810, urban households. The majority of the urban population in the municipality resides in the Mooi River and Bruntville area. As observed in Map 5 the rural population is widely dispersed throughout the municipality with concentrations at Middelrus in the land reform areas and at Hlatikulu in the traditional areas.

Figure 44: Settlement Distribution, Mpofana Municipality – see Map Book

5.3.3.2 Employment:

Profile

Data from the 2001 national census measured unemployment at 31%, employment at 40% and the potentially economically active portion of the population who are not economically active at 29% (StatsSA, 2001). The 2007 community survey estimated unemployment in the municipality at 16%, employment at 48% and those not economically active at 36% (Mpofana IDP, 2010/11). The employment status for the municipality in 2001 and 2007 can be seen in Table 28:

Table 28: Employment status of the potentially economically active population (Source: StatsSA, 2001 and 2007)

Year	Employed	Unemployed	Not Economically Active
2001	40%	31%	29%
2007	48%	16%	36%

The sectors which accounted for majority of the employed population in 2001 were the agricultural sector (49%), community services sector (20%) and wholesale/retail (13%) (StatsSA, 2001). Data from the 2007 community survey varied from the 2001 data, 26% of the population was reported to be involved in agriculture, and 11% in both community services and wholesale/retail (StatsSA, 2007). Agriculture contributed the most to the GVA, 52%, with finance contributing 16% (Mkhambathini IDP, 2010/2011).

The majority of the households (77%) in Mpofana Municipality had an income of less than R20 000 per annum placing them close to the national poverty line, of these 26% had no income (StatsSA, 2001).

Spatial Location

Refer to assumptions made in Section 5.2.3.

5.3.3.3 Education

Profile

In 2001, 26% of the population over the age of twenty in Mpofana Municipality had no level of education, 15% a matric and 5% some form of tertiary education (StatsSA, 2001). In 2007, 15% of the population over the age of 20 reported not having received any formal schooling, 10% a matric level of

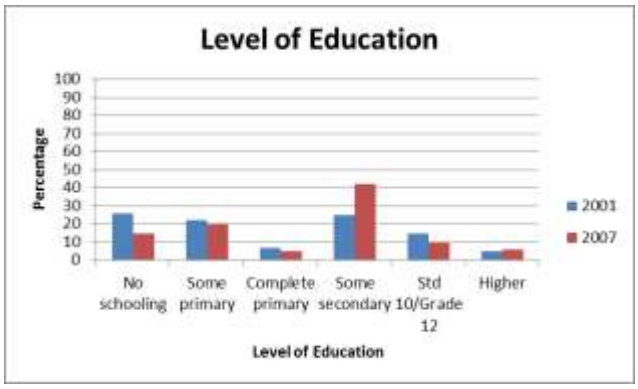


Figure 45: Highest level of education for the population over the age of 20 (Source: StatsSA, 2001 & 2007)

education and 6% some form of tertiary education. A complete summary of the level of education obtained by the population over the age of twenty in the municipality can be seen below in Figure 45.

Spatial Location

Refer to assumptions made in Section 5.2.3.

5.3.3.4 Access to Services

Access to Water

In 2001 71% of households in the municipality had access to an RDP level of water. This was made up of 30% having access in their dwelling, 37% inside their yard and 4% at a communal standpipe (StatsSA, 2001). The community survey in 2007 estimated that the percentage of households with water inside their dwelling was 44%, inside their yard 30% and access at a communal standpipe 8%. The percentage of the population without access to piped water was estimated to have reduced to 18% (StatsSA, 2007).

The data from the 2001 NC and 2007 CS shows an improvement in access to an RDP level of service in the municipality. However, data from the DWA investigation in 2011 contradicts this information with it indicating that 44% of the population do not have access to a basic level of water. The reason for the disparity in the information between the 2001 NC and 2007 CS is not clear. Further investigations need to take place in order to ascertain an accurate level of service in the municipality.

Access to Sanitation

The 2001 national census reported that 56% of the population in the municipality had access to RDP level sanitation, 50% waterborne and 6% a minimum of VIP sanitation. Of the 44% without an RDP level of sanitation, 5% reported using the bucket system and 19% reported no access (StatsSA, 2001). Data from the 2007 community survey suggests that there have been improvements in access to sanitation with 76% of the population having RDP level sanitation, 65% waterborne and 11% a minimum of VIP sanitation. Additionally the bucket system was eradicated and the percentage of the population without access to sanitation dropping to 9% (StatsSA, 2007).

Access to Electricity

In 2001, 53% of households in the municipality had access to electricity for lighting. The community survey in 2007 showed an improvement in access, estimating that 72% of households made use of electricity for lighting (StatsSA 2001 and 2007).

Spatial Location

Refer to assumptions made in Section 5.2.3.

5.3.4 Impendle Local Municipality – KZ 224

5.3.4.1 Demographics

Profile

The population of Impendle Local Municipality was recorded as 33561 at the time of the 2001 NC (StatsSA, 2001). The 2007 CS estimated the population at 39403, an annual population growth rate of 2.9% (StatsSA, 2007).

The gender breakdown for the municipality varied by 1% between the 2001 NC and the 2007 CS, with males accounting for 45% and 46% and females 55% and 54% in the respective years (StatsSA, 2001 and 2007). Data from the 2001 NC showed that 48% of the population were either below the age of 15 or over the age of 65 and thus classified as dependants (StatsSA, 2001). The 2007 CS showed a reduction in the dependency ratio to 45% (StatsSA, 2007).

Data from both the 2001 NC and 2007 CS shows that Impendle has a largely young population. It was recorded that 72.7% of the population in 2001 and 72.2% of the population in 2007 were under the age of 34 (StatsSA, 2001and 2007). The high proportion of young people in the Impendle population is shown in Table 29 and in the population profile for the municipality, Figure 46 and Figure 47 below.

Table 29: Age profile as a percentage of the population

Year	0-4	5-14	15-34	35-64	65+
2001	11.6%	29.5%	31.6%	20.7%	6.6%
2007	11.1%	28.3%	32.8%	21.9%	5.9%

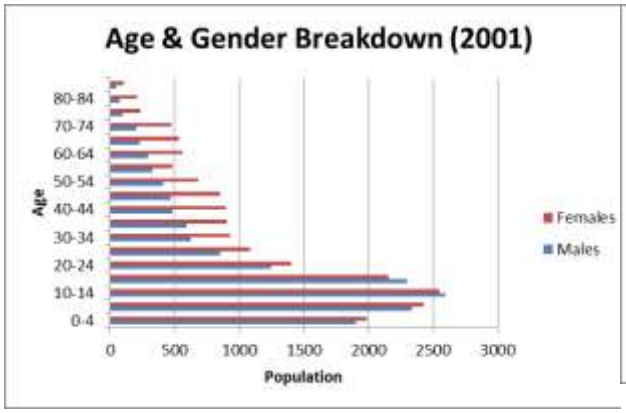


Figure 46: Age and gender breakdown for Impendle Municipality 2001 (Source: StatsSA, 2001)

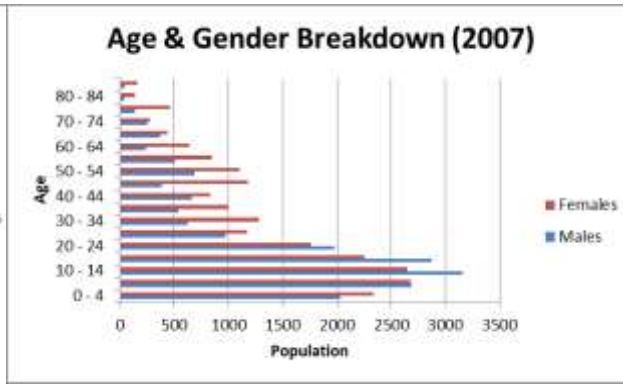


Figure 47: Age and gender breakdown for Impendle Municipality 2007 (Source: StatsSA, 2007)

There is a youthful population in the municipality with a small population in excess of 64 years of age. Females dominate the 34-84 year age categories while males dominate the younger age

groups. This may be attributed to the outmigration of males in search of employment opportunities. The majority of the population falls into the population sector with the highest probability of contracting HIV/Aids thus increasing the likelihood of associated social issues.

Spatial Location

Data from the Urban Edges Dataset (DRDLR, 2008) and the Rural Settlement Dataset (DRDLR, 2009) recorded 97% (5289) rural households and 3% (140) urban households in the municipality. Figure 48 indicates areas with a higher concentration of rural households which exist in closer settlements (betterment planned in the 1970s) at Mqatsheni, Stepmore, Ntwasahlobo, Compensation, Nzinga, and Enguga. These are located on state and Ingonyama Trust land areas. Other rural households are located on freehold land which extends from Ntwasahlobo to Stepmore along the major transport routes.

Figure 48: Settlement Distribution, Impendle Municipality – see Map Book

5.3.4.2 Employment

Profile

At the time of the 2001 NC 10% of the potentially economically active population in Impendle were employed, with 28% unemployed and the remaining 62% not economically active (StatsSA, 2001). These figures indicate that in 2001 there were 20 dependants for every wage earner (Impendle IDP, 2010/2011). The 2007 CS suggested that there was an improvement in employment in the municipality with 37% of the population employed, 16% unemployed and the remainder not economically active (StatsSA, 2007). A breakdown of the employment status for the municipality can be seen in Table 30 below:

Table 30: Employment status of the potentially economically active population (Source: StatsSA, 2001 & 2007)

Year	Employed	Unemployed	Not Economically Active
2001	10%	28%	62%
2007	37%	16%	47%

The 2001 CS indicated that two sectors accounted for the majority of employment in Impendle, these were agriculture (36%) and community services (39%). Other than these two sectors only wholesale/retail accounts for more than 5% of employment (StatsSA, 2001). These sectors were also identified as those employing the greatest portion of the population in the 2007 CS. Agriculture accounted for 31% and community services 17% of the employed population according to the 2007 CS (StatsSA, 2007). In terms of the GVA for the municipality agriculture contributed the vast majority, 78%, with trade and manufacturing contributing 6% each (Mkhambathini IDP, 2010/2011).

In 2001, 89% of households had an annual income of less than R20 000 per annum thus placing them close to the national poverty line. 40% of households appear to have had no source of income (StatsSA, 2001).

Spatial Location

Employment poses a major challenge to the people of Impendle. Other than for limited employment in the subsistence and commercial agricultural sectors in the municipality (around Impendle village, Insinga, Ntwasahlobo and Boston) there are very limited employment opportunities. Consequently working age people have little alternative, but to travel to the region's major centres at Underberg, Estcourt, Mooi River Howick, Pietermaritzburg and Durban to find employment. The elderly and infirm and those who are unable to find work rely on subsistence and state welfare grants in Impendle.

5.3.4.3 Education

Profile

The 2001 NC reported low education levels in Impendle with 36% of the population over the age of 20 not having received any schooling, 8% a matric, and 3% some form or tertiary education (StatsSA, 2001). The figures estimated in the 2007 CS differ from those in 2001. It was estimated that 9% of the population had no education, 14% a matric level of education and 2% some form of tertiary education (StatsSA, 2007). The complete breakdown of education levels for 2001 and 2007 can be seen in Figure 49:

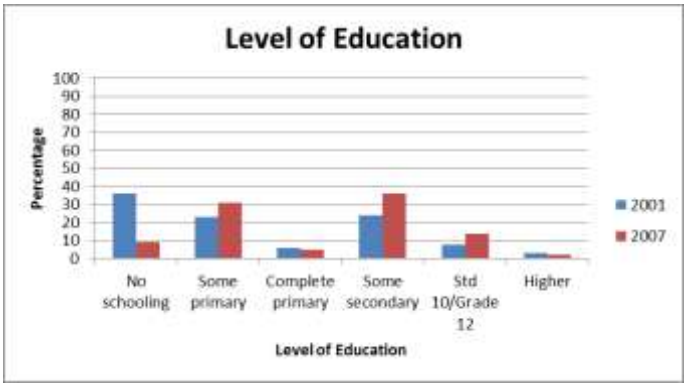


Figure 49: Highest level of education for the population over the age of 20, Impendle Municipality (Source: StatsSA, 2001& 2007)

Spatial Location

Refer to assumptions made in Section 5.2.3.

5.3.4.4 Access to Services

Access to Water

The 2001 NC noted that 66% of the population had access to an RDP level of water service, 6% in their dwelling, 52% in their yard, and 8% at a standpipe within 200m of their yard (StatsSA, 2001). The 2007 CS reported that 74% of households had access to piped water, 18% in their dwelling, 38% in their yard and 19% at communal standpipes (StatsSA, 2007). The municipal IDP notes that service connections are intermittent and that sources are unreliable in winter. The scattered nature of settlements in the area and poor infrastructure means that there is a backlog in sustainable potable water of over 50% (Impendle IDP, 2010/11).

The improvements in access to RDP level of water services noted in the 2001 NC and 2007 CS correlate with the findings from the 2011 DWA investigation. The DWA investigation, using Eskom

data, showed further gains in access to RDP level of water with 85% of households reported to have access to an RDP level of service.

Access to Sanitation

The 2001 NC reported that 43% of households had RDP level sanitation. This was made up of 7% waterborne and the remaining 36% a minimum of VIP sanitation (StatsSA, 2001). Results from the 2007 CS reported that 30% of households had minimum of RDP level sanitation with water borne sanitation remaining at 7% (StatsSA, 2007). This represents an overall decline in access to suitable sanitation in the municipality.

Access to Electricity

Impendle local municipality has electricity provided by Eskom. The 2001 National Census noted that 61% of the population had electricity for lighting (StatsSA, 2001). The 2007 community survey calculated that 78% of the population had access to electricity. A study conducted recently by Eskom found that 85% of households in Impendle are on the Eskom grid (Impendle IDP, 2010/11).

Spatial Location

Refer to assumptions made in Section 5.2.3. In addition to the above it is indicated in the Impendle SDF (Isik, 2010) that the major settlements (betterment planned closer settlements) around Impendle village have access to RDP level of service. However the more scattered less accessible areas do not have access to RDP level of service although there are plans by the municipality to extend services to certain of these areas.

5.3.5 Msunduzi – KZ 225

5.3.5.1 Demographics

Profile

The population of Msunduzi Municipality in 2001 was 553224 with the 2007 CS estimating the population to be 616730, giving the municipality an annual population growth rate of 1.2% during this time (StatsSA, 2001 and 2007).

In 2001 the population was made up of 47% males and 53% females and in 2007 48% males and 52% females (StatsSA, 2001and 2007). Msunduzi is the most urbanised of all the municipalities in the district and has by far highest population density, 873 persons per square kilometre (uMgungundlovu SDF Review, 2007).

In 2001 and 2007 34% of the population was under the age of 15 or over the age of 65 and thus classified as dependants (StatsSA, 2001and 2007). In 2001, 31% of the population was between the age of 15 and 35, compared with 2007 where 40% of the population fell into this age bracket (StatsSA, 2001 and 2007). The age breakdown of the municipality can be seen in Table 31 and the

population profile of the municipality in Table 31 and the population profile of the municipality in Figure 50 and Figure 51 below:

Table 31: Age profile as a percentage of the population

Year	0-4	5-14	15-34	35-64	65+
2001 (%)	8.9%	20.3%	39.2%	26.8%	4.8%
2007 (%)	9.0%	19.6%	40.2%	26.3%	4.9%

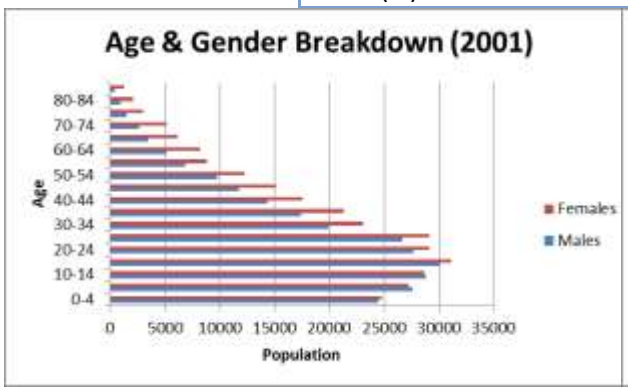


Figure 50: Age and gender breakdown for uMsunduzi Municipality (StatsSA, 2001)

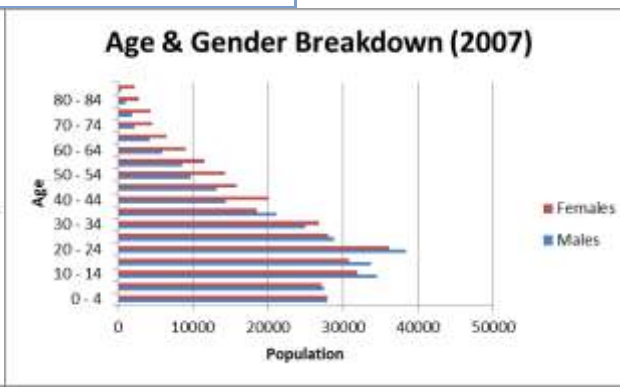


Figure 51: Age and gender breakdown for uMsunduzi Municipality (StatsSA, 2007)

Spatial Location

Data from the Urban Edges Dataset (DRDLR, 2008) and the Rural Settlement Dataset (DRDLR, 2009) recorded 15% (17000) of households classified as rural and 85% (93159) as urban households in the municipality. From Map 7 it can be seen that the urban population resides on either side of the N3 highway and around the CBD extending along major transportation routes (Greytown, Table Mountain, Edendale, Ashburton, Richmond etc.). The rural population is mainly located in the Vulindlela area extending to Bainesfield, Taylors Halt and Swaymani above Mpophomeni. The majority of this rural settlement is located on Ingonyama Trust and black freehold owned land.

Figure 52: Settlement Distribution, Msunduzi Municipality – see Map Book

5.3.5.2 Employment

Profile

Of the population classed as being potentially economically active, 33% were employed, 30% unemployed and 37% not economically active at the time of the 2001 NC (StatsSA, 2001). The 2007 CS indicated that employment increased to 38% in 2007, and unemployment decreased to 24%. Those not economically active increased to 38% (StatsSA, 2007). The employment status in the municipality can be seen in Table 32 below:

Table 32: Employment status of the potentially economically active population (Source: StatsSA, 2001 & 2007)

Year	Employed	Unemployed	Not Economically Active
2001	33%	30%	37%
2007	38%	24%	38%

The 2001 NC showed the majority, 40%, of the economically active population employed in the community services sector. Other major employment sectors were wholesale/retail and manufacturing which both contribute 17% (StatsSA, 2001). These trends were also evident in data from the 2007 CS with the community services sector (22%), the wholesale/retail sector (12%), and the manufacturing sector (16%) contributing the most to employment (StatsSA, 2007). The GVA of the municipality was contributed to predominantly by finance, 31%, and manufacturing, 19% (Mkhambathini IDP, 2010/2011).

In 2001 60% of households earned less the R20 000 per annum placing them close to the national poverty line, with 21% of households having no formal income (StatsSA, 2001).

Spatial Location

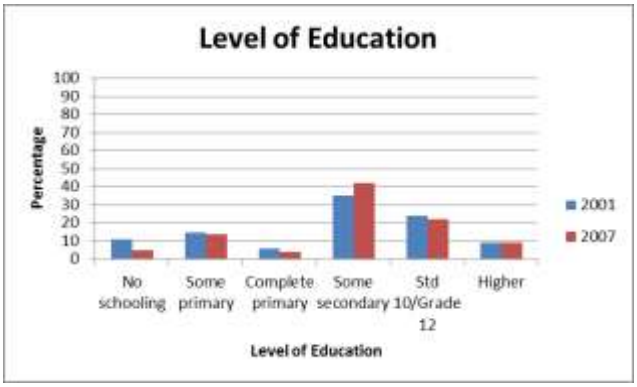
Refer to assumptions made in Section 5.2.3.

5.3.5.3 Education

Profile

Data from the 2001 NC reported that 24% of the population over the age of 20 had a minimum of a matric, 9% some form of tertiary education and 11% no formal education (StatsSA, 2001). The 2007 CS data shows similar trends with 22% of the population over the age of 20 having completed a minimum of matric and 9% some form of tertiary education. The percentage of the population with no schooling was lower at 5% (StatsSA, 2007). A complete summary of education levels for the population over the age of 20 can be seen in Figure 53:

Figure 53: Highest level of education for the population over the age of 20, uMsunduzi Municipality (Source: StatsSA, 2001 & 2007)



Spatial Location

Refer to assumptions made in Section 5.2.3.

5.3.5.4 Access to Services

Access to Water

In 2001 it was reported that 80% of households had access to an RDP level of water, 37% within their dwelling, 33% in their yard and 10% at a communal standpipe within 200m of their dwelling (StatsSA, 2001). The 2007 CS noted that 95% of households had access to RDP level of water, 59% had access in their dwelling, 25% access in their yard and 11% a communal standpipe (StatsSA, 2007). It is noted in the Msunduzi IDP that there is currently a backlog of 14063 individual water connections in the Vulindlela and Edendale areas (Msunduzi IDP, 2010/11). No DWA data is available for the Msunduzi area.

Access to Sanitation

The 2001 NC reported that 67% of households had access to RDP sanitation. Waterborne sanitation accounted for 56% and the remaining 11% was a minimum of VIP sanitation. Of the 33% without access to RDP level of sanitation 1% reported using the bucket systems and 3% reported no access (StatsSA, 2001). Data from the 2007 CS showed greater access to sanitation with 72% of households having a RDP level of sanitation, 65% waterborne and 7% a minimum of VIP sanitation. During this time the bucket system was eradicated while a reduced portion of the population, 1%, reported no access to sanitation (StatsSA, 2007).

The improvement in access to sanitation between 2001 and 2007 is positive. However the backlog in sanitation still poses an environmental challenge as there is the threat of water becoming contaminated.

Access to Electricity

Electricity is supplied by both Eskom and the municipality. In 2001 the national census reported that 14.4% of households did not have access to electricity (StatsSA, 2001). The community survey in 2007 estimated that 9% of households did not have electricity.

Spatial Location

Refer to assumptions made in Section 5.2.3. In addition to the above, Msunduzi provides an above RDP level of service in the formal urban areas of the municipality in terms of water, sanitation, electricity and refuse. In the rural areas reticulated water has been supplied to the majority of rural households under the Free Basic Water system by Umgeni Water on behalf of Msunduzi and the District Municipality (Msunduzi WSDP, 2010).

5.3.6 Mkhambathini – KZ 226

5.3.6.1 Demographics

Profile

The 2001 NC recorded the population of Mkhambathini Municipality as 59057. The 2007 CS survey estimated the population of the municipality to be 46562, showing a population growth rate of -3.5% (StatsSA, 2001 and 2007). Despite having large rural areas, Mkhambathini is the second most densely populated municipality in the district with 65 persons per square kilometre (uMgungundlovu SDF Review, 2007).

It should be noted that Global Insight data is referenced in the Mkhambathini 2010/11 IDP. The data contradicts the StatsSA data indicating that the municipality saw a growth in the population between 2001 and 2007 (Mkhambathini IDP, 2010/11). Due to the need for data standardisation with other municipalities the StatsSA dataset has been used for the remainder of this section.

The municipality comprised 48% males and 52% females in 2001. Data from the 2007 CS suggested a decline in males to 47% and an increase in females to 53% (StatsSA, 2001 and 2007). In 2001 41% of the population were either under the age of 15 or over the age of 65 and thus classified as dependants, in 2007 this had fallen to 36% (StatsSA, 2001 and 2007). 36% of the population in 2001 fell between the ages of 15 and 35. In 2007 39% of the population fell into this age bracket (StatsSA, 2001 and 2007). Table 33 shows the age profile in the municipality and Figure 54 and Figure 55 show the age and gender breakdown for 2001 and 2007:

Table 33: Age profile as a percentage of the population

Year	0-4	5-14	15-34	35-64	65+
2001	10.7%	25.4%	36.3%	22.8%	4.8%
2007	9.5%	21.9%	38.8%	25.3%	4.5%

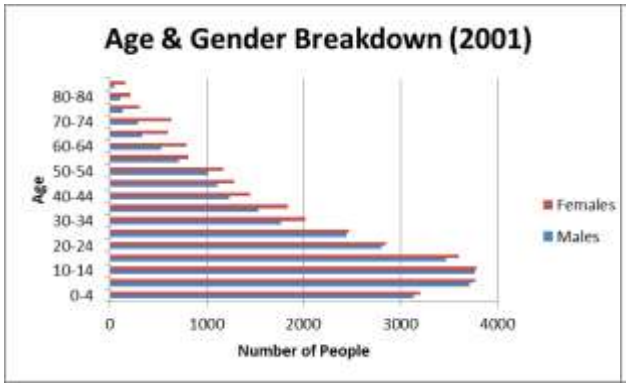


Figure 54: Age & gender breakdown in Mkhambathinin Municipality 2001 (Source: StatsSA, 2001)

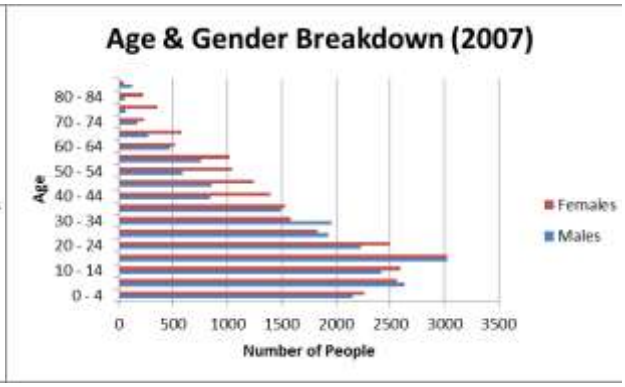


Figure 55: Age & gender breakdown in Mkhambathini Municipality 2007 (Source: StatsSA 2007)

From the figures above, it is evident that in 2001 there were noticeably more females over the age of 30 and in 2007 more females over the age of 35. This is most likely the result of the outmigration of males in search of work to bigger centres. This is further backed by the fact that between 2001 and 2007 the population in the municipality decreased suggesting the outmigration of people.

Spatial Locality

Data from the Urban Edges Dataset (Isik, 2008) and the Rural Settlement Dataset (Isik, 2009) recorded 92% (8270) rural households and 8% (749) urban households in the municipality. Map 8 displays the settlement distribution in the municipality. There is a concentration of rural households in the southern and northern portion of the municipality both of which are Ingonyama Trust areas. The urban households are concentrated around Camperdown, adjacent to the N3 highway.

Figure 56: Settlement Distribution, Mkhambathini Municipality – see Map Book

5.3.6.2 Employment

Profile

In 2001 unemployment in Mkhambathini Municipality was measured at 24%. Of the potentially economically active population 45% were classified as not economically active, adding to those reliant on a small base of employed people (StatsSA, 2001). Data from the 2007 CS estimated unemployment at 21% while 51% of the potentially economically active population were not economically active (StatsSA, 2007). Table 34 displays the employment status in the municipality:

Table 34: Employment status of the potentially economically active population (Source: StatsSA, 2001 & 2007)

Year	Employed	Unemployed	Not Economically Active
2001	31%	24%	45%
2007	28%	21%	51%

In both the 2001 NC and the 2007 CS agriculture was identified as the major source of employment accounting for 62% and 36% respectively (StatsSA, 2001 and 2007). In 2001 community services was the second biggest contributor to employment accounting for 15% with manufacturing accounting for 7%. In 2007 community services contributed 9% and manufacturing 14% to employment (StatsSA, 2007). Agriculture provided the majority to the GVA of the municipality with 28% while finance contributed 23% (Mkhambathini IDP, 2010/2011).

Data from the 2001 NC showed that in the municipality 85% of the households earned below R20 000 per annum placing them close to the national poverty line, 9% of which had no source of income (StatsSA, 2001).

Spatial Location

Refer to assumptions made in Section 5.2.3. In addition to the above it may be noted that the majority of employment in agriculture is located in the sugar producing areas around Mid-Illovo and Eston, in the fresh produce farms in and around Tala Valley and in the intensive chicken units around Camperdown.

5.3.6.3 Education

Profile

In 2001 29% of the population over the age of 20 reported not having received any formal schooling, 9% a matric and 3% some form of tertiary education (StatsSA, 2001). The data from the 2007 CS estimated that 18% of the population had no formal schooling, 11% a matric and 3% some form of tertiary education. A complete summary of the education levels for the municipality can be seen in Figure 57.

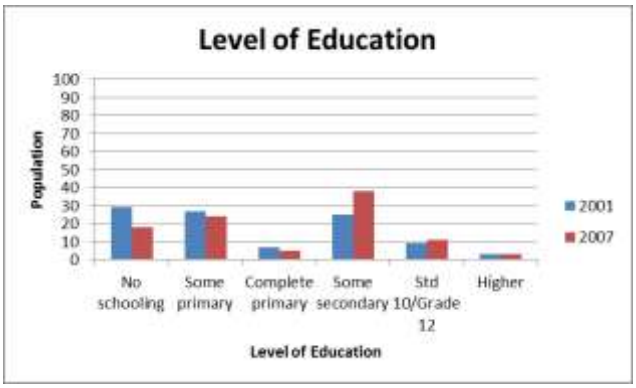


Figure 57: Highest level of education for the population over the age of 20 (Source: StatsSA 2001 & 2007)

Spatial Location

Refer to assumptions made in Section 5.2.3.

5.3.6.4 Access to Services

Access to Water

The 2001 NC reported 51% of households had access to RDP level of water, 10% in their dwelling, 35% yard connection and 5% a communal standpipe within 200m. A further 4% had access to a communal standpipe further than 200m from their dwelling (StatsSA, 2001). Data from the 2007 CS suggested that improvements had been made in the provision of water with 59% of the population having access to RDP level water. 15% had access in their dwelling, 36% a yard connection and 9% made use of a communal standpipe (StatsSA, 2007).

The DWA investigation in 2011 showed slight variations to the 2007 CS with 57.1% of households reporting no access to an RDP level of service. Both the CS and DWA investigation point to a low level of service in the municipality, an issue which needs to be addressed.

Access to Sanitation

In 2001 38% of households had access to a minimum of RDP sanitation, 20% with access to waterborne sanitation and 18% with access to a minimum of VIP sanitation. 20% reported no access to sanitation while 1% reported making use of the bucket system (StatsSA, 2001). Improvements were reported with the 2007 CS with 59% of households having access to a minimum of RDP sanitation, the population without access to sanitation fell to 6% and the bucket system was eradicated (StatsSA, 2007).

Access to Electricity

Data on the use of energy from the 2001 NC shows that 43% of households in the municipality had access to electricity (StatsSA, 2001). The 2007 CS reported that 52% of households made use of electricity (StatsSA, 2007). While there is a noticeable improvement here access still remains low.

Spatial Location

Refer to assumptions made in Section 5.2.3.

5.3.7 Richmond Local Municipality – KZ 227

5.3.7.1 Demographics

Profile

The population of Richmond Municipality was recorded as 63215 during the 2001 NC (StatsSA, 2001). The 2007 CS estimated the population to be 56772, a population growth rate of -1.6% (StatsSA, 2007). The population density of the municipality at that time was relatively low at 51 persons per square kilometre.

The gender breakdown at the time of the 2001 NC was 47% males and 53% females. The 2007 CS reported that the population was 49% male and 51% female (StatsSA, 2001 and 2007). In 2001, 40% of the population were classified as dependants i.e. below the age of 15 or over the age of 65. In 2007 39% of the population were classified as dependents (StatsSA, 2001 and 2007). A complete age breakdown can be seen in Table 35 while the population profiles for 2001 and 2007 can be seen in Figure 58 and Figure 59 below:

Table 35: Age profile as a percentage of the population

Year	0-4	5-14	15-34	35-64	65+
2001	10.3%	24.3%	36.9%	23.4%	5.1%
2007	10.9%	23.9%	39.2%	21.9%	4.1%

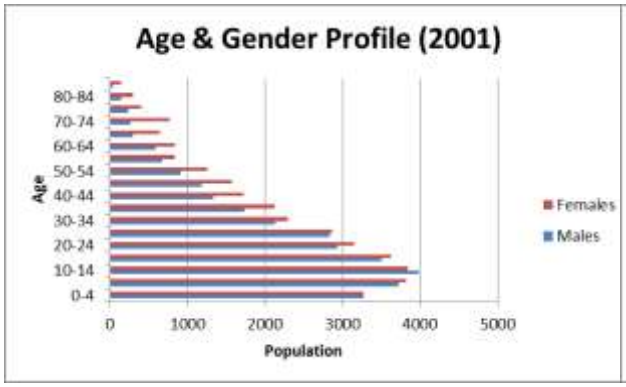


Figure 58: Age and gender breakdown Richmond Municipality (Source: StatsSA, 2001)

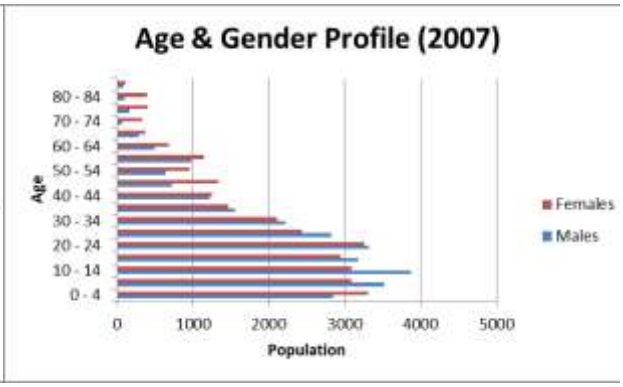


Figure 59: Age and gender breakdown Richmond Municipality (source: StatsSA, 2007)

Spatial Location

Data from the Urban Edges Dataset (DRDLR, 2008) and the Rural Settlement Dataset (DRDLR, 2009) recorded 59%, 7484, rural households and 41%, 5140, urban households in the municipality. As can be seen in Map 9 below, urban households in the municipality exist predominantly in the town of Richmond. There is a concentration of rural households around the town of Richmond while to the south west of the town and on the southern boundary there is Ingonyama Trust land which is heavy populated with rural settlements. With the exception of these areas the remainder of the municipality is relatively sparsely populated.

Figure 60: Settlement Distribution, Richmond Municipality – see Map Book

5.3.7.2 Employment

Profile

The 2001 NC reported that 24% of the population in Richmond was unemployed and the potentially economically active portion of the population who were not economically active stood at 45% (StatsSA, 2001). The 2007 CS suggested that there had been an improvement to the situation in the municipality with unemployment dropping to 12%. The non-economically active portion of the population remained at 45% (StatsSA, 2007). The employment status in the municipality can be seen in Table 36 below:

Table 36: Employment status of the potentially economically activepopulation (Source: StatsSA, 2001 & 2007)

Year	Employment	Unemployment	Not Economically Active
2001	31%	24%	45%
2007	43%	12%	45%

In 2001 the major employment sectors were agriculture accounting for 49% of employment, community services (20%), and manufacturing (11%) (StatsSA, 2001). In 2007 agriculture remained the major employment sector (21%) manufacturing second (12%) and community service third (11%) (StatsSA, 2007). The GVA of the municipality was contributed to predominantly by the agricultural sector, 52%, and the finance sector 16% (Mkhambathini IDP, 2010/2011).

In 2001, 84% of households had an annual income of less than R20 000 placing them close to the national poverty line, of these 23% reported no formal income (StatsSA, 2001).

Spatial Location

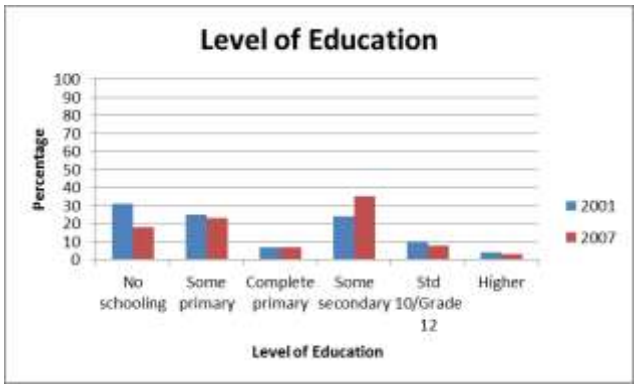
Refer to assumptions made in Section 5.2.3. In addition to the above, agricultural employment is located in the citrus, sugar and timber production areas in the high rainfall areas in the eastern and central areas of the municipality. There is also intensive veggie production in the Umkomaas valley farms. Tourism plays a role in employment particularly along the Umkomaas River (e.g. Umko Rafting, Duma Manzi, etc.).

5.3.7.3 Education

Profile

In 2001, 31% of the population over the age of 20 reported having had no formal schooling, 10% had a matric and 4% had some form of tertiary education (StatsSA, 2001). Data from the 2007 CS indicated that the population over the age of 20 who had not received any formal education had declined to 18%, whilst 8% of the population reported having a matric and 3% had some form of tertiary education (StatsSA, 2007). Complete education levels in the municipality for 2001 and 2007 are shown in Figure 61:

Figure 61: Highest level of education for the population over the age of 20 (Source: StatsSA, 2001 & 2007)



Spatial Location

Refer to assumptions made in Section 5.2.3.

5.3.7.4 Access to Services

Access to Water

Data from the 2001 NC indicated that 37% of the population had access to RDP level water, 16% had water in their dwelling, 13% with yard access and 8% with access to a communal standpipe within 200m of their dwelling. A further 12% made use of communal standpipes more than 200m from their dwelling (StatsSA, 2001). The 2007 CS estimated that 18% of the population had access in their dwelling, 31% a connection in their yard and 34% to a communal standpipe, although the distance from the dwelling was not specified. Despite this the 2007 data suggests that there have been gains in the provision of piped water in the municipality.

Data from the DWA investigation in 2011 provided similar results with the data suggesting improvements in access to water with only 21.6% of the population in the municipality not having access to piped water.

Access to Sanitation

In 2001, 27% of the population in Richmond reported having access to a minimum of RDP level sanitation, 18% of which reported having access to waterborne sanitation with the remaining 9% having access to a minimum of VIP sanitation. Of the 73% without access to RDP sanitation 1% made use of the bucket system and 7% reported having no access to sanitation (StatsSA, 2001). Data from the 2007 CS suggest that improvements were made in the provision of sanitation with 54% reported to have access to a minimum of RDP level sanitation, the bucket system was eradicated and 2% reported no access to sanitation (StatsSA, 2007).

Access to Electricity

56% of the population reported using electricity for lighting in 2001 (StatsSA, 2001). There was an improvement in the provision of electricity in the municipality with the 2007 CS estimating that 69% of the population had access to electricity (StatsSA, 2007).

Spatial Location

Refer to assumptions made in Section 5.2.3.

5.4 Summary

The following summary initially provides an overview, at district level, within which key trends are identified. This is followed by a brief summary of key issues in each of the local municipalities that need to be taken into account in the SEA.

5.4.1 District Summary

5.4.1.1 District Overview

The district is characterised by a growing youthful population, the majority of whom are located in urban areas with the remainder residing in scattered settlements in Traditional areas. The majority of formal sector semi-skilled and skilled employment opportunities are located in the districts' primary and secondary centres with rural areas providing limited unskilled and skilled opportunities. A large proportion of these people are without formal employment and are dependent on state welfare grants and those that are fortunate to have employment. A wide range of utility and social services are to be found in the district. The observation from related projects is that households in urban areas tend to be better off in terms of access to services and employment whilst those in rural areas experience hardships in this regard, particularly those in more isolated inaccessible areas.

Perhaps the greatest threats to the natural environment in the district relate, on the one hand, to industrialisation and urbanisation and on the other hand to poor levels of education, poverty and unemployment. The indications are that these threats have had an adverse effect on the natural environment in terms of pollution and exploitation of the available natural resources in built up areas. In rural areas people with limited access to services have little option, but to rely on their surrounding natural resources in order to sustain livelihoods which often leads to transformation and loss of biodiversity.

5.4.1.2 District Summary Profile

District Demographics

A review of the demographic data indicates a population increase of 1.1% per annum in the district from 2001 to 2007. The population demonstrates a youthful age-gender profile with the emphasis on the younger working-age groups and a dominance of females in the older age groups. This profile has implications for HIV-Aids infection levels and the negative impact that this could have on the economy and the younger generations.

District Spatial Location of Population

The highly concentrated nature of settlement in the primary and secondary centres of the district (particularly Pietermaritzburg) poses challenges in terms of the level of services provision and the quality of operation and maintenance of these services. Where services are poorly maintained, then problems arise in relation to human health and safety and these also have an impact on biodiversity. An example here is poorly maintained reticulated sewerage systems resulting in blockages which in turn lead to effluent leakage into river systems. Owing to the scale and density of population in

urban areas services failure has a much greater impact on the residents and environment than in scattered rural areas where people are largely self sufficient and densities are substantially lower.

The scattered nature and extent of rural settlement in the district poses challenges for different reasons to the urban areas. These relate to sustainability in terms of the provision of services in terms of logistics, costs and availability of natural resources (eg water and suitable land). This is particularly pertinent in the light of findings from the Land Use report where historic trends indicate an increase in areas under rural settlement and subsistence production, particularly in the traditional areas of the district.

District Employment Trends

- Unemployment has increased between 2001 and 2007, but still remains high.
- Despite high levels of unemployment, levels of employment are higher than those experienced in the province as a whole.
- The majority of the semi-skilled, skilled and professional employment opportunities are located in the districts' urban centres in secondary and tertiary sectors whilst the unskilled and semi-skilled employment are mainly located in rural areas in the primary sector.

District Education Implications

- Access to education between 2001 and 2007 improved for households in the district, however less than 30% of the population has matriculation or higher levels of qualification.
- Access to education has improved in urban areas particularly for senior schooling and post school educational facilities.
- It is assumed that senior education in rural areas is less accessible than in urban areas based on findings from related projects in the district.
- Access to primary education in rural areas tends to be within reasonable distance of larger settlements accessible by 'D' roads.

District Services

- Access to essential services in the district appears to be above those for the province.
- The type and level of services (infrastructure and social) provided in the district varies according to the following:
  - Order of urban centre;
  - Rural or urban location.

  The implication of this is that the more accessible rural settlements will generally have access to services at RDP level. In contrast services in urban areas will tend to be at a higher then RDP level depending upon the level of centre.
- It is assumed that the majority of backlogs for water, sanitation and electricity exist in isolated rural areas.

5.4.2 Local Municipal Summary

5.4.2.1 uMshwathi Municipality

Demographics

The municipality has experienced a relatively small population growth rate. This may be due to the impact of HIV-Aids and possibly outmigration of people in search of work. The majority of the population reside in remote rural areas which are difficult and expensive to service. The population of the municipality is characterised by a youthful profile predominantly in the 10-20 year age category with females dominating in the older age groups.

Employment

- The proportion of the population employed in the municipality has remained constant.
- Unemployment has decreased but remains high.
- The proportion of the population which is not economically active, but fall within 'working age' has increased.
- High levels of unemployment and economic inactivity potentially has far reaching social and environmental consequences.

Education

- Access to education has improved.
- There has been an improvement in the number of people receiving secondary schooling.
- There has been little improvement in the number of people completing matriculation or receiving tertiary education. However, education levels still remain low.
- Low education levels allied to poverty is likely to have implications for sustainability particularly in areas where people are dependent on locally available resources.

Infrastructure Services

- There has been an improvement in access to water, sanitation and electricity among the population in the municipality.
- However backlogs still exist, mainly in rural and to a lesser extent urban areas of the municipality.
- The continuing services backlogs have both social and environmental consequences as noted in Section 5.2.

5.4.2.2 uMngeni Municipality

Demographics

The municipality has a high population growth rate. The age-gender profile indicates a balanced male-female distribution with the majority of the population in the 14-44 year categories. This is

unusual when compared with other municipal age-gender profiles. The data indicates that the majority of households are located in urban areas which serves to enhance services provision. Despite the high level of urbanisation in the municipality there are still households located in dispersed rural locations which pose a challenge for service delivery.

Employment

- Despite improvements in levels of employment, unemployment remains high.
- The major sectors in the municipality generating employment include agriculture, manufacturing, retail-wholesale and public sector.

Education

- Access to education has improved in the municipality.
- The level of education achieved by the population has improved.
- The proportion of the population completing secondary schooling remains low.
- The proportion of the population receiving tertiary education remains low.
- Poor education reduces employment opportunities and has potential social and environmental consequences concerning sustainability in utilisation of resources.

Services

- An improvement in the provision of water, sanitation and electricity is evident, however backlogs still exist.
- The dispersed nature of the rural population in the municipality poses a challenge for service delivery.
- A lack of services has both social and environmental consequences.

5.4.2.3 Mpofana Municipality

Demographics

The age-gender profile of the population for Mpofana indicates a male dominated youthful population located in the 14-34 year age group. The population decrease identified in the municipality may be linked to a number of factors including:

- Outmigration to the region's major centres.
- The impact of HIV/Aids on the area.
- Reduction in natural population increase.

The indication is that majority of population is located in the primary and secondary urban centres of the municipality (primarily Mooi River-Brandville and Rosetta) with the remainder being located in: rural areas on commercial farms, traditional areas (Hlatikulu) and land reform areas (Middelrus).

Employment

- There was been a general increase in employment between 2001 and 2007.
- There has been a decline in the number of people employed in the agricultural sector over the 2001-2007 period.
- Unemployment remains high which is likely to have both social and environmental consequences.

Education

- Improvements in access to education are evident between 2001 and 2007.
- The proportion of the population completing secondary schooling or receiving some form of tertiary education remains low.

Services

- There have been improvements in electricity, water and sanitation services provision between 2001 and 2007, however backlogs still endure particularly in the rural areas of the municipality.

5.4.2.4 Impendle Municipality

Demographics

Population growth is occurring at a relatively fast rate in the municipality (compared to other rural municipalities in the district). The age-gender profile indicates a youthful balanced population under the age of 20 years of age (ie. school going). Females dominate in the over the above 24 age categories indicating that this may be described as a 'dormitory area' used for raising children and looking after older and unemployed people. The majority of the population is located in rural settlements along the major transport routes which traverse this municipality.

Employment

- There is a notable improvement in the level of employment in the municipality between 2001 and 2007.
- A high proportion of the potentially economically active population appear to be inactive resulting in higher levels of dependency on a small base of employed individuals.
- Numerous households appear to have no source of formal income other than for state welfare grants.
- High unemployment is likely to have social and resultant environmental impacts.
- Commercial and subsistence agriculture, retail and government sectors provide employment in the municipality.

Education

- There have been improvements in access to education.

- The level of education being achieved by learners has improved.
- Despite the above improvements, only a small proportion of the population has completed secondary school.
- The proportion of the population with tertiary education remains low.
- Poor education levels have social and environmental implications.

Services

- There are still numerous backlogs in access to electrical, water and sanitation services despite improvements that have been made in services delivery.
- Access to sanitation in particular remains low.
- The scattered nature of settlements in rural areas is likely to hinder service delivery in the area.
- A lack of access to services for low income households has social and environmental implications.

5.4.2.5 Msunduzi Municipality

Demographics

The population of Msunduzi is growing at a rate of 1.2% per annum. The youthful population profile in the municipality is in the 15 to 34 age categories. This is potentially a positive trend as this group is the driving force behind the economically active population (Coetzee et al, 2006). As noted in Section 5.2 of the report the population is concentrated into the primary and secondary centres in the district particularly those located along the N3. As may be noted in Map 2 of this report there are also large concentrations of settlement in rural traditional areas, land reform projects, freehold areas and to a lesser degree on commercial farms.

Employment

- There has been an increase in employment.
- The contribution made to employment by community services, wholesale/retail and manufacturing sectors in the municipality points to a consumer dominated economy (Coetzee et al, 2006).
- Despite improvements in employment the majority of the population are dependent on a small proportion of wage earners and social welfare grants from government.
- Unemployment is likely to have far-reaching social and environmental implications.

Education

- The data from 2001 and 2007 shows an improvement in the access to education.
- Education levels are relatively high in comparison with the surrounding rural municipalities: the majority of the population over the age of 20 has as a minimum level of education and some form of secondary schooling.

- Education levels impact on social and environmental sustainability.

Services

- Service levels are high in the formal urban areas.
- Service provision in terms of electricity, water and sanitation has improved in peri-urban and rural areas, however backlogs still exist in the more isolated areas.
- A lack of access to services has negative social and environmental implications.

5.4.2.6 Mkhambathini Municipality

Demographics

The balanced youthful population is located in the 10-24 age group. Females dominate in the older age groups, particularly in the older than 40s category. There is a negative population growth rate in Mkhambathini which could possibly be related to the following factors:

- The outmigration of people in search of employment.
- The impact of HIV/Aids.
- Reduction in natural population increase.

Urban population in the municipality is concentrated in and around Camperdown and the smaller centres in the municipality. Rural settlement is concentrated in two areas, one located in the north on traditional land adjoining uMshwathi and the other to the south on traditional land adjoining the coastal areas of Ugu district. Commercial farms are characterised by scattered low density settlement.

Employment

- Between 2001 and 2007 there was an increase in the proportion of the population who were not economically active.
- Agriculture continues to play an important role in the local economy as a GVA contributor as well as an employer.
- Despite the economic challenges in the municipality, the contribution made by secondary sector (business) is promoting growth and diversification in the local economy.

Education

- The proportion of the population not receiving education has decreased.
- Despite improvement there are still backlogs in access to education.
- There is an increase in the percentage of the population receiving and completing secondary schooling.
- Education levels have social and environmental consequences.

Services

- There have been improvements in access to electricity, water and sanitation services in the municipality, however backlogs still exist.
- Due to the remote nature of many rural settlements, serious challenges exist in the provision of sustainable services.
- A lack of services to these areas is likely to have social and environmental implications.

5.4.2.7 Richmond Municipality

Demographics

There is a balanced youthful population in the municipality in the 10-34 year category. Thereafter females predominate. The municipality has experienced a decline in population between 2001 and 2007 which may be attributed to rural-urban migration in search of employment opportunities and public services as well as the effect of HIV/Aids (Richmond IDP, 2010/11). The decline is noticeable in the economically active sector of the population. In Richmond the majority of the urban population is located in the town itself and in the adjoining Ndaleni area which extends into rural settlement. There is also low density settlement at Thornville and at Byrne as the secondary centres in the municipality. There are limited rural concentrations of settlement (Map 2) other than for those adjoining Mkhambathini in the south east and the 'overspill' from Msunduzi around the Bainesfield estate. There are areas of informal settlement in forestry areas (eg outside Byrne Valley). Settlement on commercial farms is low density and scattered throughout the municipality.

Employment

- There was an increase in employment between 2001 and 2007.
- Agriculture is the main employment sector followed by manufacturing, retail and government sector.
- There has been a decline in unemployment which could be attributed to improved opportunities in the municipality and the movement of unemployed people to other areas of the region.
- Despite the economic challenges in the municipality there has been an increased contribution made to the economy by manufacturing sector.
- Unemployment levels are likely to impact on the social and environmental dynamics of an area.

Education

- There have been noticeable improvements in the proportion of people receiving some form of schooling between 2001 and 2007.
- A greater percentage of the population is getting some level of secondary education.
- The percentage of the population obtaining a matriculation and/or higher level of education has declined.
- The education level of a population is likely to have social and environmental implications.

Services

- Access to electricity, water and sanitation services has improved in the municipality particularly in the primary urban centre and corridor.
- Backlogs still exist particularly in the case of water and sanitation in rural areas.
- A lack of access to good quality services has social and environmental implications.

6 LAND USE

6.1 Purpose

Owing to location in the province, the uMgungundlovu District is one of the municipalities in KwaZulu-Natal which is subject to pressures to accommodate economic and demographic growth. The purpose of this section of the Status Quo Report is to establish patterns of land use since 2005 in order to identify areas under pressure for transformation.

6.2 Structure of the report

The report is structured such that method is followed by an assessment of land cover in the district as at 2008. The dynamics in transformation of land use from 2005 to 2008 are then assessed in order to establish transformation trends. The scale and location of land reform is then reviewed in the district with a view to assessing impact on land use. A summary of findings is then provided and forms the basis of what needs to be taken into account in the formulation of the SEA.

6.3 Legal basis

Owing to its diversity in the district, land use and the management and control thereof is linked to a variety of legislation. As noted in the legal section of the Status Quo Report the following statutes apply:

- The
- Constitution.
- National Environmental Management Biodiversity Act.
- National Environmental Management Protected Areas Act.
- Conservation of Agricultural Resources Act.
- Subdivision of Agricultural Land Act.
- National Forests Act.
- s associated with Land Reform.
- National Veld and Forest Fire Act.
- National Water Act.
- Mountain Catchment Areas Act.
- National Heritage Resources Act.
- KwaZulu-Natal Development Planning Act.
- Municipal Planning Performance Management Regulations.
- A variety of act

6.4 Land Use Assessment Method

In this report land use in the uMgungundlovu district is based on a review of the 2005 and 2008 Land Cover Data sets provided by Ezemvelo KZN Wildlife (EKZN) and the bioresource groups provided by Natural Resources Section DAEARD (2011). The original data sets (land cover) are based on a rastor matrix and have had to be converted to vector format for interrogation as the basis of the assessment.

The original land cover data set (EKZN 2008) identified 28 categories for the district. These categories have been simplified to reduce the complexities of reviewing a large number of categories. The major land cover categories remained independent and include: plantation, sugarcane, subsistence agriculture, grasslands, degraded grasslands, urban settlement and rural settlement. The identification of these new categories was intended to reflect the importance of the land cover category, the large land area covered by the different categories and their location in the district. Transformed and untransformed areas were grouped and aggregate figures provided. The remaining four grouped categories were commercial agriculture, other grasslands, natural vegetation and natural features. Table 37 below provides a breakdown of the 12 different groups and the land cover categories which contributed to each group.

Table 37: Land Cover Categories

Land Cover Group	Original Land Cover Categories
Transformed	Airfields, annual commerical crops dryland, annual commerical crops irrigated, built up dense settlement, erosion, golf course, KZN main & district roads, KZN national roads, KZN railways, low density settlement, mines and quarries, old cultivated fields - bushland, old cultivated fields - grassland, permanent orchards irrigated, plantation, plantation clearfelled, smallholdings - grasslands, sugarcane - commercial, sugarcane - emerging farmer, subsistence - rural, water dams
Untransformed	Alpine grass-heath, Bare rock, bare sand, bushland, degraded bushland, degraded forest, degraded grassland, dense bush, forest, forest glade, grassland, grassland/bush clump mix, water natural wetlands, woodland
Plantations	Plantations and plantation clearfelled
Sugarcane	Sugarcane - commercial
Other Commercial Agriculture	Annual commercial crops dryland, annual commercial crops irrigated, permanent orchards irrigated, sugarcane emerging farmer
Subsistence Agriculture	Subsistence agriculture
Grasslands	Grassland
Degraded Grasslands	Degraded grassland
Grasslands (other)	Alpine grass-heath, grasslands/bush clumps mix, old cultivated fields - grasslands, small holding grasslands
Natural Vegetation	Dense bush, bushland, degraded bushland, forest, woodland, degraded forest, forest glade
Natural Features	Wetlands, natural fresh water, bare rock, bare sand
Urban Settlement	Built up dense settlement
Rural Settlement	Low density settlement
Other Transformed Areas	Airfields, erosion, golf course, KZN main & district roads, KZN national roads, KZN railways, mines and quarries, old cultivated fields - bushland, water dams

The hectares stated in each of the tables in Section 6.6 refers to the area of the particular land cover type in each municipality. The percentage columns refer to the percentage of the municipality that comprises that land cover. The 'difference' column in the table provides the difference in hectares of each land cover between 2005 and 2008. The final column '% change' provides the percentage growth or decrease of a particular land cover type within a municipality, i.e. if the urban area in a municipality were to double in size between 2005 and 2008 the '% change' would be 100%. It should be noted that this does not in any way refer to the area of the municipality made up of the particular land cover type.

The land use for each local municipality provided in Section 6.6 has been aggregated in Section 7 to provide a summary in order to draw land use together at the district level.

6.5 Bioresources Groups

The bioresource group (BRG) provides useful descriptions of indigenous land cover throughout KwaZulu-Natal. These descriptions have been used in this report to give an indication in each municipal area of the type of land cover that should have been there prior to major human intervention.

BRGs include a specific vegetation type controlled by an interplay of biotic factors such as geological parent material and soil, climate (mainly rainfall and temperature) and altitude. In particular the species composition, and dominance of certain species and association of species, helps define the different vegetation types - it consists of grouped BRUs which have the same vegetation type (K. Camp 2011).

A review of BRGs located in each of the municipalities has been included in the land use component of this project in order to provide an indication of the different types of vegetation which occur throughout the district. Comprehensive reports on the characteristics of each of the bioresource groups identified in the uMgungundlovu Municipality and associated Local Municipalities are available at Cedara Natural Resources Sub-Directorate of DAEARD . A map of the bioresource groups located in uMgungundlovu is included below to provide context within which agricultural potential at BRU level is considered in the remainder of this report.

Figure 62: Bioresource Groups in uMgungundlovu Municipality (see Map Book)

The main bioresource groups identified for the uMgungundlovu municipality include (see key in Figure 62 for the full list of BRGs):

- Coast;
- Highlands;
- Mistbelt;
- Tallgrass;
- Bushveld; and
- Thornveld.

6.6 Local Municipalities

6.6.1 Mshwathi Local Municipality – KZ221

6.6.1.1 Description of Land Use (2008 data)

uMshwathi Local Municipality has a total land area of 181802.17 hectares which accounts for 19% of the total area of the uMgungundlovu District. Of this, 67% (122532.67 hectares) is classified as transformed and 33% (59223.07 hectares) as untransformed land. Formal urban areas account for 1% (1457 hectares) of the total land in the municipality.

Commercial agriculture accounts for 56% of land use in the municipality. This is inclusive of timber plantations amounting to 28% (50033.89 hectares) of the land area and commercial sugarcane 26% (48045 hectares) of the land area. Sugarcane production and timber plantations occur throughout the municipality in the Moist Midlands Mistbelt and to a lesser degree Moist Coast Hinterland Ngongoni Veld BRGs. There is a higher concentration of timber plantations in the northwest with sugar production throughout the municipality except for the extreme northern and southern portions. Untransformed grassland makes up 7% of the land cover. A portion of this is used for livestock production (both commercial and traditional purposes).

Natural vegetation, predominantly dense bush and bushland, accounts for 18% (33498.15 hectares) of the total land cover. This area is made up predominantly of the Coast Hinterland Thrornveld, Dry Coast and Moist Coast Hinterland and Valley Bushveld BRGs which have little commercial agricultural potential other than for livestock and game production. Table 38 below shows the number of hectares, the percentage of land covered by the dominant land cover types and the percentage change in these land cover types between 2005 and 2008. Figure 63 illustrates the spatial location of the land cover types in the municipality.

Figure 63: uMshwathi Land Cover (2008) – see Map Book

6.6.1.2 Land Use 2005 - 2008

Between 2005 and 2008 there was a 2% (2368.99 hectares) increase in transformed land. Urban settlements expanded by (10%) (129.25 hectares) and rural settlements by 6% (396.56 hectares).

Land in the municipality under plantations increased by 3% (1516.42 hectares), other commercial agricultural areas decreased by 13% (442.23 hectares). Subsistence agriculture increased by 40% (1574.21 hectares). There was a 7% (2573.33 hectares) loss of natural vegetation.

During this time (25%) 4463.39 hectares, of pristine grasslands became degraded. The area covered by degraded grassland in the municipality increased by (261%) 4557.55 hectares. Detail of the land use changes are provided in Table 38 below.

Table 38: Land Cover Changes between 2005 and 2008, uMshwathi Local Municipality

Land Cover	2005	% of LM	2008	% of LM	Difference	% Change
Transformed	120163.68	66	122532.67	67	2368.99	2
Untransformed	61592.06	34	59223.07	33	-2368.99	-4
Plantations	48517.47	27	50033.89	28	1516.42	3
Sugarcane	48542.11	27	48045.00	26	-497.12	-1
Other Commercial Agriculture	3464.68	2	3022.45	2	-442.23	-13
Subsistence Agriculture	3936.98	2	5511.18	3	1574.21	40
Grasslands	17709.47	10	13246.07	7	-4463.39	-25
Degraded Grasslands	1744.86	1	6302.41	3	4557.55	261
Grasslands (other)	6027.49	3	6317.89	3	290.40	5
Natural Vegetation	36071.48	20	33498.15	18	-2573.33	-7
Natural Features	668.07	0	610.40	0	-57.67	-9
Urban Settlement	1327.77	1	1457.02	1	129.25	10
Rural Settlement	6111.45	3	6508.01	4	396.56	6
Other Transformed Areas	7633.9	4	7203.26	4	-430.64	-6
Total Area	**181802.17**	**100**	**181802.17**	**100.0**	**0.00**	

6.6.2 uMngeni Local Municipality – KZ222

6.6.2.1 Description of Land Use 2008

The total land area of uMngeni is 156682.29 hectares contributing 16% to the total land area of uMgungundlovu District. Of the land in uMngeni, 48% is classified as transformed and 52% untransformed. Urban areas account for 2% (3020 hectares) of the land cover.

Collectively commercial agriculture accounts for 39% (61448.65 hectares) of land use in the municipality. Timber plantations cover 21% of the land area and annual commercial crops a further 18% (11% dryland and 7% irrigated). Land under irrigation is used for the following types of agriculture:

- Pasture for dairy farming purposes, particularly in the Dargle Valley area;
- Maize in the Karkloof area; and
- Vegetables in the Midlands, Karkloof and Dargle Valley.

Untransformed grassland covers 36% (55728.27 hectares) of the municipality, a portion of which is used for livestock (both commercial and traditional). The overall agricultural potential of the area is classified as high with much of the municipality falling into the Moist Midlands Mistbelt bioresource group.

Natural vegetation covers 12% (19182.14 hectares) of uMngeni Municipality. This is predominantly areas of dense bush and bushland, part of the Coast Hinterland Thornveld BRG. The majority of these areas are located in the uMngeni River valley to the east of the municipality part of which is under conservation. Table 39 below shows the number of hectares, the percentage of land covered by the dominant land cover types and the percentage change in these the land cover types between 2005 and 2008. Figure 64 illustrates the location of the land cover types in the municipality.

Figure 64: uMngeni Land Cover – see Map Book

6.6.2.2 Land Use 2005 – 2008

Between 2005 and 2008, 7065.45 hectares of land which was previously untransformed became transformed. This translates to an 8% decrease in untransformed land and a 10% increase in transformed land.

Rural settlements in the municipality expanded by 13% in terms of area and urban settlements 8%.

The area covered by plantations increased by 9% (2728.4 hectares) and other commercial agriculture area increased by 12% (3019.73 hectares).

The area covered by grassland in the municipality decreased by 11% (7004.37 hectares). Degraded grassland increased by 215% (1745.78 hectares).

Table 39: Land Cover Changes between 2005 and 2008, uMngeni Local Municipality

Land Cover	2005	% of LM	2008	% of LM	Difference	% Change
Transformed	68698.14	44	75763.59	48	7065.45	10
Untransformed	87984.15	56	80918.70	52	-7065.45	-8
Plantations	30667.74	20	33396.14	21	2728.40	9
Sugarcane	641.02	0	626.14	0	-14.88	-2
Other Commercial Agriculture	24430.08	16	27449.81	18	3019.73	12
Subsistence Agriculture	14.39	0	16.24	0	1.85	13
Grasslands	62732.64	40	55728.27	36	-7004.37	-11
Degraded Grasslands	812.87	1	2558.65	2	1745.78	215
Grasslands (other)	1795.86	1	1956.13	1	160.27	9
Natural Vegetation	20642.09	13	19182.14	12	-1459.95	-7
Natural Features	2061.05	1	2003.06	1	-57.99	-3
Urban Settlement	2791.27	2	3019.97	2	228.70	8
Rural Settlement	2345.83	1	2656.00	2	310.17	13
Other Transformed Areas	7747.45	5	8089.73	5	342.28	4
Total Area	**156682.29**	**100**	**156682.29**	**100.0**	**0.00**	

6.6.3 Mpofana Local Municipality – KZ223

6.6.3.1 Description of Land Use 2008

The Mpofana Municipality includes an area of 182020.09 hectares, the largest municipality in the uMgungundlovu District. The Municipality comprises 19% of the total land area. 28% of the land in the municipality is classified as transformed and 72% untransformed. Urban areas cover 554.83 hectares or 0.3% of the municipal area.

Commercial agriculture accounts for 23% of the land use in the municipality. Annual commercial crops cover 17% of the land collectively, 10% dryland and 7% irrigated. Due to the climate of the

area (colder than the midlands and shorter growing period) commercial crops are limited to potatoes, maize and winter veggies. Irrigated land is set aside for pasture for dairy farming. Timber plantations only cover 6% of the total area in the municipality.

Untransformed grassland covers 52% of the municipality. The areas to the west, towards the 'little berg', are classified as Moist Highland Sourveld (BRG). The eastern areas of the municipality are characterised by Dry Highland Sourveld (BRG). Both of these BRGs are suitable for extensive beef production and intensive agriculture under irrigation on appropriate soil types. It is thus presumed that a large area of the untransformed grassland is used for both commercial and traditional grazing.

Natural vegetation accounts for 14% (24776.03 hectares) of land cover in the municipality. This is predominantly Valley Bushveld and Mixed Thornveld BRGs found in the north-eastern portion of the municipality. These areas are generally characterised by steep slopes only suitable for extensive stock and game farming. Table 40 below shows the number of hectares, the percentage of land covered by the dominant land cover types and the percentage change in these land cover types between 2005 and 2008. Figure 65 illustrates the spatial location of the land cover types in the municipality.

Figure 65: Mpofana Land Cover (2008) – see Map Book

6.6.3.2 Land Use 2005 – 2008

There was a 14% (6295 hectares) increase in transformed land in the municipality between 2005 and 2007. Urban settlements increased by 4% (22 hectares) and rural settlements by 12% (170 hectares).

The areas covered by both plantations and commercial agriculture increased by 8% (809 hectares) and 17% (4639 hectares) respectively.

There was a noticeable increase of 83% (2408 hectares) in degraded grasslands. Grasslands in pristine condition were reduced by 8% (8235 hectares).

A complete breakdown of land use and changes between 2005 and 2008 can be seen in Table 40 below.

Table 40: Land Cover Changes between 2005 and 2008, Mpofana Local Municipality

Land Cover	2005	% of LM	2008	% of LM	Difference	% Change
Transformed	44229.74	24	50524.87	28	6295	14
Untransformed	137743.40	76	131448.27	72	-6295	-5
Plantations	10298.78	6	11107.43	6	809	8
Sugarcane	59.04	0	0.60	0	-58	-99
Other Commercial Agriculture	26872.78	15	31511.75	17	4639	17
Subsistence Agriculture	391.10	0	667.87	0	277	71
Grasslands	103438.98	57	95203.53	52	-8235	-8
Degraded Grasslands	2900.02	2	5307.54	3	2408	83
Grasslands (other)	3799.85	2	3804.30	2	4	0

Land Cover	2005	% of LM	2008	% of LM	Difference	% Change
Natural Vegetation	25157.26	14	24726.03	14	-431	-2
Natural Features	2543.93	1	2503.50	1	-40	-2
Urban Settlement	533.07	0	554.83	0	22	4
Rural Settlement	1438.49	1	1608.05	1	170	12
Other Transformed Areas	4539.84	2	4977.69	3	438	10
Total Area	**182020.09**	**100**	**182020.09**	**100**	**0**	**0**

6.6.4 Impendle Local Municipality – KZ224

6.6.4.1 Description of Land Use 2008

Impendle Municipality has a total land area of 152879.16 hectares making up 16% of the uMgungundlovu District. Impendle is largely a rural municipality where only 17% of the total land is classified as transformed and 83% untransformed. Urban areas account for 593.3 hectares or 0.4% of the land area.

Commercial agriculture accounts for 11% of the land coverage in the area. Of this timber plantations make up 7% and dryland commercial crops 4%. Most of the plantations and commercial agriculture occurs in the Boston area. This is the area where the greatest agricultural potential is being realised in the municipality. It is classified as part of the Moist Midlands Mistbelt BRG. A limited amount of agriculture under irrigation (1%), takes place in this area which is used for pasture land for dairy farming. The prevailing climatic conditions, dry, cold and frosty winters, make large areas of the municipality difficult to farm with short growing seasons. Potatoes, cabbages, turnip and maize are the dominant commercial crops in the area. Additional land areas have been identified in Impendle near Inzinga and Ntwasahlobo with high value land, but are currently not under extensive production due to communal ownership issues.

The largest land cover type is untransformed grassland which includes 102854.97 hectares or 67% of the municipality. Most of the grassland is classified as Moist Highland Sourveld BRG which is suitable for intensive livestock grazing. Much of the untransformed grassland will be used to graze cattle for both commercial and traditional reasons.

Subsistence agriculture which accounts for 3% of land use in the municipality is located adjacent to the rural settlements and drainage lines. It should be noted that subsistence agriculture in Impendle accounts for 24% of all subsistence agriculture in the district. Table 41 below shows the number of hectares, the percentage of land covered by the dominant land cover types and the percentage change of these land cover types between 2005 and 2008. Figure 66 illustrates the location of the different land cover types in the municipality.

Figure 66: Impendle Land Cover (2008) – see Map Book

6.6.4.2 Land Use Changes 2005 – 2008

There was an increase of 20% (4447 hectares) in transformed land in Impendle between 2005 and 2008. This relates to a 3% decrease in untransformed land.

Urban settlements increased by 20% (97 hectares) and rural settlements by 10% (241 hectares).

During this time the land area under plantations increased by 14% (1329Ha) and the area under other commercial agriculture increased by 12% (644 hectares). Subsistence agriculture increased by 87% during this time.

Between 2005 and 2008 grasslands in pristine condition declined by 8% (8626 hectares) while degraded grasslands increased by 144% (3769 hectares).

Table 41: Land Cover Changes between 2005 and 2008, Impendle Local Municipality

Land Cover	2005	% of LM	2008	% of LM	Difference	% Change
Transformed	21933.20	14	26379.7	17	4447	20
Untransformed	130902.55	86	126456.06	83	-4446	-3
Plantations	9748.80	6	11078.04	7	1329	14
Sugarcane	0.00	0	0.00	0	0	0
Other Commercial Agriculture	5225.76	3	5870.17	4	644	12
Subsistence Agriculture	2256.66	1	4228.68	3	1972	87
Grasslands	111481.40	73	102854.97	67	-8626	-8
Degraded Grasslands	2616.96	2	6386.11	4	3769	144
Grasslands (other)	2150.28	1	2252.01	1	102	5
Natural Vegetation	10960.11	7	11274.66	7	315	3
Natural Features	3701.85	2	3696.32	2	-6	0
Urban Settlement	496.29	0	593.33	0	97	20
Rural Settlement	2452.83	2	2693.99	2	241	10
Other Transformed Areas	1744.79	1	1907.45	1	163	9
Total Area	**152879.16**	**100**	**152879.16**	**100**	**0**	**0**

6.6.5 Msunduzi Local Municipality – KZ225

6.6.5.1 Description of Land Use 2008

Msunduzi Municipality has a total area of 63408.36 hectares. Msunduzi is the smallest municipality in the district accounting for 7% of the entire land area. 59% of land in the municipality is classified as transformed and 41% as untransformed. The municipality houses the major urban centre in the district and thus the majority of the land cover is classified as urban. Urban settlement covers 24% (15089.12 hectares) of the municipality. This makes up the majority, 64%, of urban settlement in the district.

Commercial agriculture includes 10% (6593.9 hectares) of land in the municipality with timber plantations making up the majority, 7%. Timber plantations occur predominantly in the north east of the municipality with small pockets of commercial sugarcane and maize production also taking

place. This area falls into the Coastal Hinterland Thornveld BRG characterised by extensive agricultural cultivation. The veld is generally not suitable for livestock production.

Untransformed grassland covers 19% (11728.28 hectares) of the municipality. The majority of the grassland is located to the west of Edendale and is part of the potentially highly productive Moist Midlands Mistbelt BRG. Grasslands in the area are likely to be used for cattle grazing for traditional as well as commercial purposes while maize accounts for the majority of the dryland commercial crops in the area. This area is also where the majority of the rural settlement, which accounts for 11% of land cover, is located. Table 42 below show the number of hectares, percentage of land covered by the dominant land cover types and the percentage change in these land cover types between 2005 and 2008. Figure 67 illustrates the location of the major land cover types in the municipality.

Figure 67: Msunduzi Land Cover (2008) – see Map Book

6.6.5.2 Land Use Changes 2005 – 2008

There was an increase of 15% (4807 hectares) in transformed land in Msunduzi. Urban settlements increased by 13% (1710 hectares) rural settlements by 5% (298 hectares). Subsistence agriculture increased by 124% (1626 hectares).

Plantations, 9%, and sugarcane, 12%, experienced expansion during this time while other commercial agriculture declined by 3%.

Between 2005 and 2007 grasslands in pristine condition decreased by 27% (4282 hectares) while degraded grasslands only increased by 4% (54 hectares).

Table 42: Land Cover Changes between 2005 and 2008, Msunduzi Local Municipality

Land Cover	2005	% of LM	2008	% of LM	Difference	% Change
Transformed	32413.66	51	37220.61	59	4807	15
Untransformed	30993.02	49	26186.06	41	-4807	-16
Plantations	3784.14	6	4142.25	7	358	9
Sugarcane	1195.04	2	1338.79	2	144	12
Other Commercial Agriculture	1145.57	2	1112.85	2	-33	-3
Subsistence Agriculture	1306.35	2	2932.25	5	1626	124
Grasslands	16009.88	25	11728.28	18	-4282	-27
Degraded Grasslands	1475.02	2	1528.59	2	54	4
Grasslands (other)	2621.07	4	2641.79	4	21	1
Natural Vegetation	10755.75	17	10704.13	17	-52	0
Natural Features	357.89	1	361.74	1	4	1
Urban Settlement	13379.19	21	15089.12	24	1710	13
Rural Settlement	6581.05	10	6879.03	11	298	5
Other Transformed Areas	4795.74	8	4947.84	8	152	3
Total Area	**63408.36**	**100**	**63408.36**	**100**	**0**	**0**

6.6.6 Mkhambathini Local Municipality – KZ226

6.6.6.1 Description of Lands Use 2005- 2008

Mkhambathini Municipality has a total land area of 89091.88 hectares making up 9% of the district. 48% of the land is classified as transformed and 52% is untransformed. Urban areas cover 1177.9 hectares or 1%, of the land in Mkhambathini.

Commercial agriculture covers 33% (29370.21hectares) of the land in the municipality. Sugarcane production accounts for the majority of land coverage 27% (24478.75hectares). The majority of sugarcane production occurs south of the N3 highway in the Dry Coast Hinterland Ngongoni Veld BRG which is well suited to sugarcane production. There is a 'pocket' of commercial vegetable production, both dryland and irrigated, in the Tala valley area of the municipality. South of Mid-Illovo, sugarcane production declines accompanied by an increase in Coastal Hinterland Thornveld and Valley Bushveld. These areas hold little agricultural potential other than extensive livestock grazing.

North of Camperdown commercial chicken farming occupies areas of land with little else (other than game farming and conservation) viable due to the high proportion of Valley Bushveld and Coastal Hinterland Thornveld with little commercial agricultural potential linked to poor soils and low rainfall. Table 43 below show the number of hectares, the percentage of land covered by the dominant land cover types and the percentage change in land cover types between 2005 and 2008. Figure 68 illustrates the location of different land cover types in the municipality.

Figure 68: Mkhambathini Land Cover (2008) – see Map Book

6.6.6.2 Land Use Changes 2005 – 2008

Between 2005 and 2008 there was an 8% (3083 hectares) increase in transformed areas in the municipality. Urban areas grew by 23% (220 hectares) and rural areas by 9% (343 hectares).

During this time there was a 22% (343 hectares) increase in plantations, a 1% (260 hectares) decline in sugarcane and a 26% (652 hectares) increase in other commercial agriculture. Subsistence agriculture increased by 87% (1451 hectares).

There was a 24% (3764 hectares) decline in pristine grassland between 2005 and 2008. During this time there was also a 75% (1306 hectares) increase in degraded grasslands.

Table 43: Land Cover Changes between 2005 and 2008, Mkhambathini Local Municipality

Land Cover	2005	% of LM	2008	% of LM	Difference	% Change
Transformed	39244.05	44	42327.00	48	3083	8
Untransformed	49814.63	56	46731.68	52	-3083	-6
Plantations	1555.34	2	1898.16	2	343	22
Sugarcane	24738.34	28	24478.75	27	-260	-1
Other Commercial Agriculture	2547.43	3	3199.71	4	652	26
Subsistence Agriculture	1661.08	2	3111.69	3	1451	87

Land Cover	2005	% of LM	2008	% of LM	Difference	% Change
Grasslands	15930.75	18	12166.42	14	-3764	-24
Degraded Grasslands	1743.82	2	3049.73	3	1306	75
Grasslands (other)	3805.64	4	4066.91	5	261	7
Natural Vegetation	28416.31	32	27939.35	31	-477	-2
Natural Features	506.86	1	511.37	1	5	1
Urban Settlement	957.43	1	1177.90	1	220	23
Rural Settlement	3905.65	4	4248.24	5	343	9
Other Transformed Areas	3290.04	4	3210.46	4	-80	-2
Total Area	**89091.88**	**100**	**89091.88**	**100**	**0**	**0**

6.6.7 Richmond Local Municipality – KZ227

6.6.7.1 Description of Land Use 2008

Richmond Municipality has a total land area of 125575.33 hectares accounting for 13% of the district's total land area. 55% of the land is classified as transformed and 45% as untransformed. Urban areas account for 1% (1780.9 hectares) of the land area.

48% (60600.93 hectares) of the land in the Richmond Municipality is used for commercial agriculture. Of this timber plantations and sugarcane production account for most of the land cover, 32% and 11% respectively. Timber plantations exist throughout most of the municipality in both the Moist Midlands Mistbelt and the Coast Hinterland Thornveld BRGs with sugarcane production occurring almost exclusively at lower altitudes in the warmer Coastal Hinterland Thornveld BRG. Both irrigated and dryland agriculture take place throughout the municipality involving the production of maize, veggies, timber, sugar, citrus and pastures or diary.

Natural vegetation covers 25% (31645.31 hectares) of the municipality. Dense bush and bushland together account for majority of the natural vegetation. Much of this is Valley Bushveld with little potential for agricultural production due to steep slopes. Untransformed grassland accounts for 15% of land cover. As is the case elsewhere in the district it is presumed that areas of untransformed grassland are likely to be used to graze cattle for commercial or traditional purposes. Table 44 shows the number of hectares and percentage of land covered by the dominant land cover types for 2005 and 2008. Additionally the table shows the percentage change in land cover types between 2005 and 2008. Figure 69 illustrates the location of different land cover types in 2008.

Figure 69: Richmond Land Cover (2008) – see Map Book

6.6.7.2 Land Use Changes 2005 – 2008

Transformed areas in the municipality increased by 9% (5720 hectares) between 2005 and 2008. Urban settlement increased by 6% (109 hectares) and rural settlements by 7% (154 hectares).

Subsistence agriculture increased by 127% (558 hectares).

Plantations increased by 9% (3310 hectares) and the area under sugarcane declined by 665 hectares. Other commercial agriculture increased by 57% (2245 hectares).

There was a 15% (3330 hectares) decline in pristine grasslands between 2005 and 2008. During the same time there was a 47% (1287 hectares) increase in degraded grasslands in the municipality.

Table 44: Land Cover Changes between 2005 and 2008, Richmond Local Municipality

Land Cover	2005	% of LM	2008	% of LM	Difference	% Change
Transformed	63125.38	50	68845.46	55	5720	9
Untransformed	62420.99	50	56700.91	45	-5720	-9
Plantations	36786.08	29	40095.66	32	3310	9
Sugarcane	14973.52	12	14308.47	11	-665	-4
Other Commercial Agriculture	3952.12	3	6196.8	5	2245	57
Subsistence Agriculture	441.09	0	999.40	1	558	127
Grasslands	21728.01	17	18398.12	15	-3330	-15
Degraded Grasslands	2753.84	2	4040.49	3	1287	47
Grasslands (other)	2194.31	2	2056.72	2	-138	-6
Natural Vegetation	35250.46	28	31645.31	25	-3605	-10
Natural Features	788.31	1	885.20	1	97	12
Urban Settlement	1672.28	1	1780.90	1	109	6
Rural Settlement	2312.77	2	2466.97	2	154	7
Other Transformed Areas	2693.58	2	2672.33	2	-21	-1
Total Area	**125575.33**	**100.00**	**125575.33**	**100.00**	**0**	**0**

6.6.8 uMgungundlovu District

6.6.8.1 Description of Land Use in 2008

The uMgungundlovu District has a total land area of 951459.28 hectares of which 44.5% is classified as transformed and 55.5% untransformed land. Urban areas account for 23673.88 hectares or 2.5% of the district. The majority of urban development is located in the Msunduzi Municipality.

Grasslands (untransformed) covers 32.5% (309399.20 hectares), of the district. The majority of grassland is found in the higher altitude rural municipalities of Impendle and Mpofana as well as the north western portion of the uMngeni Municipality. Natural vegetation, excluding grassland, accounts for 21.8% of the land cover in the district.

Commercial agriculture accounts for 33.4% (318526.4 hectares) of land in the district of this area timber plantations include 15.9% (75882.96 hectares) and sugarcane 9.3% (88800.4 hectares). These crops account for the majority of the land under commercial agriculture in the municipality. The majority of the timber plantations are in the Richmond and uMshwathi Municipalities with smaller areas in uMngeni Municipality. Commercial sugarcane occurs predominantly in the uMshwathi and Mkhambathini Municipalities and to a lesser degree in the Richmond Municipality.

Commercial crops make up 7.9% of the land area with 4.7% (45172.72 hectares) made up of dryland and 3.15% (29955.84 hectares) of irrigated cultivation. Annual commercial crops, both dryland and irrigated, occur for the most part in Mpofana Municipality, with smaller pockets throughout the uMngeni Municipality. Subsistence agriculture covers an area of 17472.56 hectares (1.8%) in the district, the majority of which takes place in the Impendle Municipality. Different land use areas are illustrated in Figure 70 below while the areas covered by different land cover types as well as the percentage change are presented in Table 45 below.

Figure 70: Land cover of the uMgungundlovu District (after EKZNW, 2010 – see Map Book)

6.6.8.2 Land Use Changes 2005 – 2008

Between 2005 and 2008 there was a 9% (33787.8 hectares) increase in transformed areas in the municipality. As would be expected there was an increase in urban settlement at a faster rate than the increase in rural settlements.

Areas under plantation have increased by 7% (10393.9 hectares) and other commercial agriculture by 16% (10724.5 hectares). This is excluding sugarcane which has experienced a 1% (1351 hectares) decline during this time.

Grasslands have declined by 11% (39716.3 hectares). Degraded grasslands have increased by 108% (15126.0 hectares).

Table 45: Land Cover Changes between 2005 and 2008, uMgungundlovu District Municipality

Land Cover	2005	% of DM	2008	% of DM	Difference	% Change
Transformed	389839.24	41	423627.04	45	33787.8	9
Untransformed	561621.04	59	527833.24	55	-33787.8	-6
Plantations	141372	15	151765.92	16	10393.9	7
Sugarcane	90152.08	9	88800.40	9	-1351.7	-1
Other Commercial Agriculture	67640.28	7	78364.76	8	10724.5	16
Subsistence Agriculture	10011.56	1	17472.56	2	7461.0	75
Grasslands	349115.52	37	309399.20	33	-39716.3	-11
Degraded Grasslands	14053.96	1	29180.00	3	15126.0	108
Grasslands (other)	22408.48	2	23109.72	2	701.2	3
Natural Vegetation	167301.4	18	159015.20	17	-8286.2	-5
Natural Features	10645.32	1	10600.72	1	-44.6	0
Urban Settlement	21157.92	2	23673.88	2	2516.0	12
Rural Settlement	25152.04	3	27064.76	3	1912.7	8
Other Transformed Areas	32449.64	3	33013.08	3	563.4	2
Total Area	**951459.28**	**100**	**951459.28**	**100**	**0.0**	

6.7 Summary of Findings

6.7.1 Land use trends

Table 46 provides broad trends of land use in the district from 2005 to 2008. The detailed numeric data in Table 41 - Table 45 in this report was analysed, and an interpretation undertaken utilising the following criteria:

- Limited increase less than 10%
- Increase up to 50%
- Major increase 50-100%
- Dramatic increase above 100%
- Same applies to decrease

In order to gauge trends in land use, a ratio of numbers of municipalities involved in increase as opposed to decrease has been used in **Error! Reference source not found.**. Based on this assessment the following broad land use trends are noted:

- The majority of municipalities recorded transformation in land use (i.e. changes away from the original BRGs for the area). Only one of these was limited whilst the remainder recorded an increase (i.e. under 10%).
- The same trend (as for transformation) applies for commercial timber in the district.
- In the case of land under sugarcane it appears that there was only an increase in one municipality while in the remaining four (where sugar is cultivated) the area decreased.
- Commercial agriculture (veggies, fruit etc.) increased in five municipalities and declined in the remaining two.
- Subsistence agriculture increased throughout the district with four municipalities experiencing major increases and two dramatic increases.
- Land under grasslands in good condition declined throughout the district.
- Land under natural vegetation (forests, bushlands etc.) was subject to limited losses in six municipalities.
- Land areas under urban and rural settlement increased throughout the district up to the 10% level.

These trends are summarised under the “District” column in **Error! Reference source not found.** below.

Table 46: Summary of Changes in Land Cover Trends in the uMgungundlovu District

Changes in land Use	uMshwathi	uMngeni	Mpofana	Impendle	Msunduzi	Mkhambathini	Richmond	Increase:Decrease	District Summary
Transfromed	Limited increase	Increase	Increase	Increase	Increase	Increase	Increase	07:00	Increase
Commercial timber	Limited increase	Increase	Increase	Increase	Increase	Increase	Increase	07:00	Increase
Commercial sugar	Limited decrease	Limited decrease	No change	No change	Increase	Limited decrease	Limited decrease	04:01	Limited decrease
Other Commercial Agric (Cultivation)	Decrease	Increase	Increase	Increase	Limited decrease	Increase	Major increase	05:02	Increase
Subsistence agriculture	Major increase	Increase	Major increase	Major increase	Drammatic increase	Major increase	Drammatic increase	07:00	Major increase
Grasslands	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	07:00	Decrease
Degraded grasslands	Drammatic increase	Drammatic increase	Major increase	Drammatic increase	Limited decrease	Major increase	Major increase	06:01	Major increase
Natural vegetation	Limited Decrease	Decrease	Limited decrease	Limited increase	No change	Limited decrease	Decrease	05:01	Decrease
Urban settlement	Increase	Increase	Limited increase	Increase	Increase	Increasee	Increase	07:00	Increase
Rural settlement	Increase	Increase	Increase	Increase	Limited increase	Increase	Increase	07:00	Increase

Note: The column 'Increase/Decrease' refers to the ratio of the number of municipalities that have experienced an increase or decrease in changes of land use from 2005 to 2008 i.e. increase:decrease.

6.7.2 Observations

The following observations can be made from the outputs in this report:

- The district has experienced a 9% increase in transformed land.
- Impendle experienced the greatest proportional increase in transformed land, 20%, and uMshwathi the smallest, 2%.
- There is an increasing amount of transformed land in the district. This is split between various land use types identified in each municipality.
- Urban settlement has increased at a faster rate than rural settlement.
- Areas under plantation and other commercial agriculture (not sugar) have increased.
- The land area under commercial sugarcane has declined. It appears that contributory factors could relate land reform and the two year drought which the industry has experienced.
- There has been an increase in subsistence agriculture throughout the district. This trend may indicate that people are seeking greater food security in the face of unemployment and HIV-Aids as a means of mitigating risk.
- There has been a noticeable decline (loss) of grasslands throughout the district. This is possibly the result of urban, rural and agricultural expansion.
- There has also been a degradation of grasslands which may be attributed to poor veld management in both subsistence and commercial farming areas. Between 2005 and 2008 areas of degraded grassland doubled.
- 24% of the district is under land claim of which the majority was historically under commercial agriculture. The effect is that much of the land on these farms has been fallowed and in some cases settled by beneficiaries.
- There are financial, social and environmental consequences of land reform which need to be considered in the SEA and future planning and development of the district.

7 LAND REFORM

7.1 Overview

Data for this section was accessed from the latest land reform data provided by the KZN Department of Rural Development and Land Reform. There are currently 1952 land reform projects in the uMgungundlovu District. Restitution projects comprise 1658 claims and covers an area of 197034.7 hectares. Whilst redistribution projects comprise 294 claims cover an area of 29643 hectares. Overall 24% of land in the district is under some form of land reform claim.

Land reform claims per local municipality can be seen in Table 47 below while the spatial distribution is provided in Figure 71.

Table 47: Summary of Land Reform Projects in the uMgungundlovu District

Municipality	Restitution Projects	Restitution Projects Total Area	Redistribution Projects	Redistribution Projects Total Area	Total Land Reform Claims	Total Land Reform Area	% of LM
uMshwathi	455	39913.3	9	1332.6	464	41245.9	23
uMngeni	219	28432.7	5	678.6	224	29111.3	19
Mpofana	51	16273.5	75	19671.6	126	35945.1	20
Impendle	15	17164.5	169	3497.9	184	20662.4	14
Msunduzi	186	12642.4	2	297.4	188	12939.8	20
Mkhambathini	471	44108.1	11	1060.2	482	45168.3	51
Richmond	261	38500.3	23	3104.9	284	41605.1	33
Total	**1658**	**197034.7**	**294**	**29643.2**	**1952**	**226971.9**	**24**

7.2 Local Municipalities

7.2.1 uMshwathi Local Municipality

Many of the land reform claims in uMshwathi Municipality are taking place in areas where commercial sugarcane and plantations exist. Land reform in the municipality accounts for 23% of the municipal area.

7.2.2 uMngeni Local Municipality

Land reform in uMngeni Municipality makes up 19% of the municipal area. It is occurring predominantly around the Mphopomeni area and on the eastern side from the Umgeni Valley area up to and including areas of the Karkloof. The land is predominantly under grassland, plantations and areas of commercial cropping.

7.2.3 Mpofana Local Municipality

20% of land in Mpofana is under land reform claims which are almost exclusively taking place in the north eastern portion of the municipality around Middelrus. Much of this area is made up of

grasslands and bushland. There are however small areas of irrigated commercial agriculture in the Middelrus area that have not been taken over for land reform.

7.2.4 Impendle Local Municipality

Land reform claims in Impendle account for 14% of the municipal area. The majority of the land reform claims taking place in Impendle are focused around the Boston area to the south east of the municipality. This is the dominant commercial agricultural area of the municipality.

7.2.5 Msunduzi Local Municipality

The area of land reform claims in Msunduzi accounts for 20% of the total land area in the municipality. There is a large restitution claim to the west of the municipality occurring on predominantly grasslands and small areas of commercial crop land. Smaller areas exist in the east of the municipality, near Ashburton, on lands with sugarcane and other commercial crops.

7.2.6 Mkhambathini Local Municipality

Large areas of Mkhambathini, 51%, are under land reform claims. A large proportion of the land where there are restitution claims is currently under commercial sugarcane, this is to the south of the N3 highway. The remaining areas under land claim are areas of grassland, bushland and small areas of plantation.

7.2.7 Richmond Local Municipality

33% of land in Richmond Municipality is under some form of land reform and is largely taking place in areas of commercial sugarcane production and plantations.

7.3 Implications of Land Reform

The implications of land reform taking place on commercial agricultural land is that it impacts negatively on the agricultural sector and thus the local economy. This is largely due to poor planning, lack of post-settlement support and the slow implementation of land reform (Sisonke Area Based Plan, Isikhungusethu 2007). This is particularly pertinent to restitution claims, and given the high number of these claims on agricultural land in uMgungundlovu, this has already had negative impacts on the commercial agricultural sector (Isik, 2008). It is noted that commercial agriculture is an important sector in uMgungundlovu (see Section 5).

The potential effect of land reform on the natural environment of uMgungundlovu will only become apparent in the longer term. This largely depends upon the land use planned for each property included in a land claim and the commitment to that plan in post project support by the beneficiaries and implementing agencies.

8 AGRICULTURE

The Agricultural Assessment Potential Report was compiled by Isikhungusethu (Pty)Ltd and DAEARD Natural Resources Division (October 2011).

8.1 Purpose and Aims of Report

Natural agricultural resources (soil, water, vegetation and climate) comprise an integral part of the eco-systems that the people of the uMgungundlovu Municipality depend upon for their food, health, shelter and economic benefit. One of the key deliverables of this project is to identify the nature, extent and condition of natural resources (including agricultural) in the district. To this end an assessment will be made of the broad agricultural potential which in turn will be related to the areas currently under production to provide an indication of the *level of utilisation of agricultural resources* (actual versus potential) in the District. It should be noted that at best, the interpretation of available data can only be used to provide an indication of utilisation trends. Site specific investigations such as soils surveys are necessary to obtain detailed production potential (which is not the objective of this study).

8.2 Working definitions

A distinction has been drawn in this project between agriculture as an economic activity and the natural resources upon which this sector depends. The focus here is on identifying the state of natural resources which combine to produce agricultural outputs.

It should be noted after extensive investigation into the information available for this project that agricultural use in this report relates to 'current land use' and 'agricultural potential' relates to the natural resources available for production of agricultural outputs. As will be noted in subsequent sections of the report there are a wide variety of production conditions in each of the municipalities in the district. The data has been structured such that the inherent potential has been identified in the form of what is termed Bioresource Units (BRUs).

The potential to produce different types of crops on these BRUs has not been pursued in this project. The reason is that a variety of crops are identified in each of the BRUs as 'recommended' and further crops are identified as 'alternative'. Crops vary from one bioresource unit to the next. Furthermore, crops are rotated seasonally and according to markets and hence using crops as a measure of potential is not as reliable as working with the underlying natural resources themselves.

8.3 Legal basis

It may be noted in the legal report that there is a wide range of legislation related to agriculture. These are listed below and summarised in the legal report:

- The Constitution.
- National Environmental Management Act.
- Conservation of Agricultural Resources Act.
- Subdivision of Agricultural Land Act.
- National Forests Act.
- National Veld and Forest Fire Act.
- National Water Act.
- Water Services Act.
- Mountain Catchment Areas Act.
- Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act.
- Hazardous Substances Act.
- Planning and Development Act.
- Provision of Land and Assistance Act.
- Restitution of Land Rights Act.
- Extension of Security of Tenure Act.
- Labour Tenants Act.
- Communal Land Rights Act.

The institutions responsible for this legislation include:

- DAEARD
- DWA
- DRDLR
- CoGTA and Municipalities

8.4 Agricultural Potential Assessment

8.4.1 METHOD

8.4.1.1 Overview

Two different data sources have been used in this assessment to provide an indication of current land use and agricultural potential in each Municipality. It should be noted at the outset that these data sets derive from differing sources and areas (hectares) and hence direct comparison is not feasible. In order to overcome this limitation a proportional approach has been adopted. This allows for an indication to be established of the level of utilisation of arable resources. This method involves establishing areas under cultivation (land cover data) and the proportion of those areas suitable for arable (agricultural potential: bioresources data).

A further adjustment to the method has involved accommodating municipal boundary changes by the Municipal Demarcations Board. This applies to Impendle, Mkhambathini, and Mpofana where there are noticeable differences in the areas of these municipalities from the 2003 to the 2011 alignment. Areas included in the Bioresource Unit data are based on the 2003 municipal demarcation while those areas in the land cover data have been adjusted to include the new municipal boundaries. This further affects alignment of areas between the differing data sets and justifies the proportional approach.

8.4.1.2 Land Cover

2008 land cover data has been used to establish current land use in the Municipalities. The method here involved reviewing the different categories of land cover and then combining them into relevant groups to provide an indication of agricultural activity in the municipalities.

8.4.1.3 Bioresource Groups and Units

The method used in this assessment involved an in-depth review of the Bioresources Groups (BRGs) and Bioresource Units (BRUs) which comprise the district and its local municipalities. It should be noted that BRUs do not conform to Municipal boundaries. Hence a single BRU could extend over a number of Municipalities. In order to compute the extent of BRUs in each Municipality only those BRUs were selected that comprise an area greater than 2% of each Municipality. The selection of arable as opposed to non-arable areas within each BRU was based on the following criteria:

- Soil type;
- Slope less than 12%;
- Climate (precipitation, temperature, frost severity and humidity);
- Vegetation patterns;
- Environmental sensitivity (EKZNW SCP);
- Defined management levels of production.

The individual BRU data is then aggregated at Municipal level and then assessed to identify both the location and extent of areas with arable and non-arable potential in each municipality in the uMgungundlovu District. This is followed by an assessment of the actual areas under some form of agricultural useage versus those with potential in order to establish levels of utilisation of agricultural resources in Municipalities.

This review is undertaken with support from Mr P. Whitwell (Natural Resources Section DAEARD) and Mr K. Camp working in association with the team for this component of the project with the view to quantifying BRUs in each Municipality.

8.4.1.4 Bioresource Units

Bioresource Units are areas within which environmental factors such as climate, soils, vegetation,

altitude and terrain have a degree of homogeneity such that land use practices, farming enterprises, production and production techniques, can be clearly be defined and differ from adjacent BRUs. The BRUs can be used for farm or site planning purposes and, with the use of a GIS, a wide variety of maps can be produced illustrating natural resource information, the suitability of areas for particular crops and the levels of production that can be achieved (Camp, 2011 pers comm).

BRUs are located within selected Bioresource Groups occurring within the uMgungundlovu District. These BRGs are listed and discussed in the Land Use Report. Owing to the manner in which they are structured BRGs are also definitive of the BRUs which are sub-units within each BRG.

BRUs are included in this report as the basis for identifying different types of land for agricultural production purposes. In order to produce a summary of the hectares under different BRUs in each of the Municipalities only those which occupy more than 2% of each municipality were included. Maps of the BRUs in each Municipality and associated summary tables (areas with agricultural potential) are included in the report below.

In the tables below the BRUs are listed under 'brucode'. Those coloured in yellow are selected on the basis of their including an area in excess of 2% of the municipality in question. The 'OverlapArea' provides an indication of the area of the BRUs located in each of the municipalities. The remaining columns in the tables are used to provide an indication of the hectares of both potentially arable and non-arable as well as high potential land in the municipalities. Locality maps for each municipality containing the BRUs listed in the tables are also included in the report. The last column in the table which is titled 'Soils' indicates the % of the BRUs which are soils as opposed to rocky outcrops or riverine areas.

A comprehensive description of the characteristics of each BRU and its associated cropping and grazing potential are available in the bioresource programme and can be made available on request. BRUs are identified by an alphanumeric code in the tables for each municipality. Each of these codes is linked to a full report. The code is based on the following determinants:

- Upper Case Letters 'R - Z' denote the rainfall range
- Lower Case Letters 'a-f' denote the altitude range
- Certian BRUs occur in separate locations in the province although they have similar attributes. Examples include: Zc6 with Rainfall greater than 1100mm (Z), Altitude range 901 - 1400m (c), it's the 6th occurrence of the Zc code in KZN

Rainfall Symbols	Rainfall	Altitude Symbols	Altitude Range	Description
R	< 600mm	a	< 450m	Coast
S	601 - 650mm	b	451 - 900m	Lowland
T	651 - 700mm	c	901 - 1400m	Upland
U	701 - 750mm	d	1401 - 1800m	Highland
V	751 - 800mm	e	1801 - 2000m	Montane
W	801 - 850mm	f	> 2000m	Montane(Escarpment)

Rainfall Symbols	Rainfall	Altitude Symbols	Altitude Range	Description
X	851 - 900mm			
Y	901 - 1100mm			
Z	>1100mm			

A table is provided in the following section of the report for each Municipality indicating the location and code name of each BRU located therein. A map locating these BRUs is also included under each municipality. A summary table of agricultural potential for each municipality in the district is then included in the report with the view to providing a generalised indication of the high, moderate and low potential agricultural lands. Maps are included in the Map Book for this project providing an indication of location of land potential per municipality.

In the agricultural potential tables the BRUs located in each municipality are listed in column 1. This followed by an indication of slope gradients in the municipality with land in excess of 12% slope being of limited value for cultivation purposes other than for timber and sugar cane. Column 3 provides an index of climate capability for production purposes and combines rainfall, temperature, heat units etc) where C1 indicates climatic conditions are suitable for crop production and C8 indicates that climate poses severe constraints to production – C4 indicates moderate climatic conditions. In column 4 an indication is provided of the proportion of land suitable in each of the BRUs for cultivation purposes accounting for a variety of factors affecting production conditions such as soils. The types of crops best suited to these BRUs are summarised in columns 5 and 6. Timber and orchards have been set aside from crops as they are able to tolerate differing production conditions. In addition to cultivable land reference has also been made to the suitability of untransformed grasslands for livestock production in the form of condition of the veld and the recommended stocking rate. The last column provides an overall summary of the BRU for agricultural production purposes.

It should be re-emphasised that this information is only a summary of the detailed BRU data and cannot be used to accurately locate land suitable for agriculture in the field. At best it should only be used as a guide.

Note: In considering the findings of this project it should be borne in mind that the scale of mapping for the Bioresource Programme is 1:100 000 at best and that local level (1:50 000 and lower) data does not exist. Land can only be classified as arable (suitable for annual cultivation with no physical or severe chemical limitations) once a detailed soil survey has been conducted. This level of soil data is not currently available for the majority of KZN Province. Without this information, the economic value of land for production and the potential for various crops cannot be ascertained definitively. Broad agricultural potential is only possible for this report based on the Land Type Soil survey data mapped at 1:250 000.

8.4.2 Agricultural potential in local municipalities

8.4.2.1 Umshwathi Municipality

Current Agriculture

uMshwathi is predominantly a commercial agricultural area. Based on a review of the land cover data for uMshwathi at least 73% of the Municipality is under some form of agricultural production (See Land Use Report). As indicated in As may be noted in the Land Use section of the Status Quo report and the EMF for the uMshwathi City Development Node (2010) the main agricultural activities in the Municipal area include commercial timber , sugar cane, beef, dairy, game and high value production including vegetables and chicken farms. An indication of the spatial location of these different enterprises (excluding high value enterprises) is contained in the Land Use report and areas under cultivation are summarised in the tables below.

Table 48, 39% of the area under agriculture is used for arable production while a further 14% is used for livestock grazing. The remaining areas include both formal and informal urban development and areas of untransformed land.

As may be noted in the Land Use section of the Status Quo report and the EMF for the uMshwathi City Development Node (2010) the main agricultural activities in the Municipal area include commercial timber , sugar cane, beef, dairy, game and high value production including vegetables and chicken farms. An indication of the spatial location of these different enterprises (excluding high value enterprises) is contained in the Land Use report and areas under cultivation are summarised in the tables below.

Table 48: Areas of Land under Different Forms of Agriculture

Area Under Agriculture		
Land Use	**Hectares**	**%**
Forestry	50034	28
Grasslands	25866	14
Cultivation	56579	31
Total Area Under Agriculture	**132479**	**73**
Eroded Areas	1	0
Remaining Areas	49322	27
Total Area of Municipality	**181802**	**100**
% Under Grasslands		14
% Under Arable		59
% Remaining Areas		27

As may be noted in the Land Use section of the Status Quo report and the EMF for the uMshwathi City Development Node (2010) the main agricultural activities in the Municipal area include commercial timber , sugar cane, beef, dairy, game and high value production including vegetables and chicken farms. An indication of the spatial location of these different enterprises (excluding high

value enterprises) is contained in the Land Use report and areas under cultivation are summarised in the tables below.

Table 48 above indicates that up to 59% of the land area of the uMshwathi Municipality is under some form of arable production (mainly sugar and commercial timber). Grasslands constitute an additional area under agriculture in the form of livestock production. The remaining areas of the Municipality (27%) are accounted for in urban development (formal and informal and road infrastructure) and untransformed land which includes areas under different forms of indigenous vegetation.

Agricultural Potential

Table 49 provides a breakdown of the agricultural potential in uMshwathi in terms of BRUs in excess of 2% of the area of that Municipality.

Table 49: uMshwathi Municipality

BRU Areas								
BRU Code	Overlap Area	% Arable	Ha Arable	% Non-Arable	Ha Non-Arable	% High Potential	Ha High Potential	% Total
Yc20	4002	55	2201	45	1801	10	400	3
Xc16	11359	74	8406	26	2953	24	2726	7
Wc33	15359	40	6144	60	9215	10	1536	10
Zc6	15581	70	10907	30	4674	13	2026	10
Vc26	9974	78	7780	22	2194	9	898	6
Yb8	20446	82	16766	18	3680	32	6543	13
UVb5	4251	50	2126	50	2126	2	85	3
Wb18	4876	63	3072	37	1804	22	1073	3
Yc21	22926	80	18341	20	4585	37	8483	15
Vb19	3717	41	1524	59	2193	11	409	2
Wb11	4363	77	3360	23	1003	34	1483	3
Vb13b	10108	67	6772	33	3336	0	0	6
Ub14	13877	47	6522	53	7355	10	1388	9
VWb5	8660	52	4503	48	4157	3	260	6
Yb12	7415	79	5858	21	1557	32	2373	5
Total	**156914**		**104280**		**52634**		**29681**	

Table 50 provides a useful indication of the locality, in terms of place name, which is the best ‘fit’ for each of the BRUs located in uMshwathi municipality.

Table 50: Identification of BRUs

uMshwathi	Code Names
Ub14	Albert Falls
UVb5	Cameni
Vb13	Schroeders
Vb19	Brucklag
Vc26	Mount Elias
VWb5	Valley of a Thousand Hills
Wb11	New Hanover
Wb18	Appelbosch
Wc33	Wartburg
Xc16	Harden Heights
Yb8	York
Yb12	Mkabele
Yc20	Rustenberg
Yc21	Bruyn's Hill
Zc6	Karkloof Forest

Table 51: Summary Agricultural Potential

Agricultural Potential		
Land Area	Hectares	%
BRUs (>2%) of Land Area	156914	86
Areas of BRUs Arable	104280	57
Areas of BRUs non-Arable	52634	29
Remaining Area	24888	14
Total Area Municipality	181802	100
Areas of BRUs High Potential	29681	16

Table 51 indicates that 86% of the land area of uMshwathi is included in the 15 selected BRUs. The table further indicates the proportions of land area in uMshwathi included under the 15 listed BRUs: 57% of the land area of uMshwathi is potentially arable with a further 29% being non-arable owing to rockiness and inclusion of wetland and drainage areas. It should be noted that within the area suited for arable, 16% is what is termed high value land meeting all conditions necessary for cultivated crop production.

The remaining area indicated in Table 51 (14%) is regarded as non-arable owing to rockiness and the inclusion of wetland, drainage and riparian areas. The crops and associated yields (under defined management conditions) potentially achievable within these BRUs on certain soil associations, are contained in the BRU reports located in the Bioresource Programme.

The location of the different BRUs is provided in Figure 72 below.

Figure 72: uMshwathi Municipality Bio-resource Units (Source: DAEARD Bioresource Unit Report Writer Programme (Version 9-2011) - see Map Book)

Assessment

An assessment of the actual land use versus the agricultural potential data would seem to indicate the following:

- The outcome of this assessment is illustrated in Figure 73 where 86% of the total area of the municipality is incorporated into BRUs which are in excess of 2% of the land area of the municipality. Figure 73 further indicates that 57% of the land under BRUs in the municipality is potentially arable with 29% of it being non-arable. The remainder is land which falls into BRUs which individually comprise less than 2% of the land area.
- Where the land cover data for uMshwathi is compared, on a proportional basis, with the bioresource unit data in Figure 73, then it would seem that the available arable is currently fully utilised in the municipality (see Land Use report for maps). As concerns grasslands, comparative data (to land cover) is not readily available in the BRUs in that areas suitable for arable are also often well suited to grass production. Consequently it is noted that most if not all of the non-arable and certain of the arable (under BRUs) comprises the grasslands (using Land Cover) and is being used for grazing (Grasslands in Figure 73).

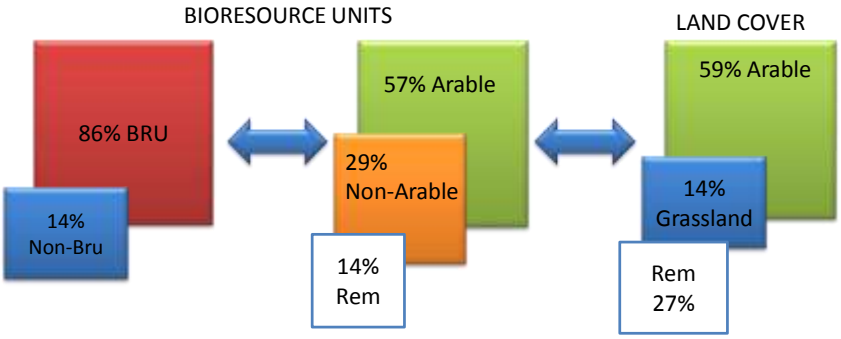


Figure 73: Agricultural Resource Utilisation - uMshwathi

Table 52 below provides an indication of the agricultural potential per Bioresource Unit per municipality. The maps in Map Book provide an indication of the location of each of the BRUs in the municipality and hence the agricultural potential associated therewith.

Table 52: uMshawathi Agricultural Potential

BRU	SLOPE	CLIMATE CAPABILITY	ANNUAL ARABLE	ORCHARDS & TIMBER	CROPS	VELD CONDITION	HA /AU	SOIL HAZARD	LAND POT
Yb8	Moderate 5-12%	C3	65%	80%	Cabbage, Dry Bean, Groundnut, Maize, Pinus Elliottii-taeda, Potatoes, Wattle	6o%	2.2	5.6	High
Zc6	Steep >12%	C3	27%	64%	Cabbage, Dry Bean, Maize, Pinus Elliottii-patula-taeda, Potatoes, Wattle, Wheat	60%	2.4	5.7	High

BRU	SLOPE	CLIMATE CAPABILITY	ANNUAL ARABLE	ORCHARDS & TIMBER	CROPS	VELD CONDITION	HA /AU	SOIL HAZARD	LAND POT
Vb13	Steep >12%	C4	60%	64%	Cabbage, Cowpeas, Dry Bean, Groundnut, Maize, Potaoes, Sugar Cane, Sorghum, Wattle, Wheat	60%	2.5	4.4	High
Ub14	Moderate 5-12%	C5	21%	36%	Cabbage, Cowpeas, Dry Bean, Groundnut, Maize, Potatoes, Sorghum, Sugar Cane, Wheat	60%	3	4.6	Moderate
Yc21	Steep >12%	C3	51%	70%	Cabbage, Dry Bean, Groundnut, Maize, Pinus Elliottii, Potatoes, Wattle, Wheat	60%	2.4	5.4	High
Wc33	Moderate 5-12%	C3	24%	33%	Cabbage, Cowpeas, Dry Bean, Groundnut, Maize, Potatoes, Wattle, Wheat	60%	2.8	4.0	High
Xc16	Moderate	C3	40%	66%	Cabbage, Dry Bean, Groundnut, Maize, Pinus Elliottii, Potatoes, wattle, Wheat	60%	2.4	5.3	High
Vc26	Steep >12%	C4	20%	29%	Cabbage, Cowpeas, Dry Bean, Groundnut, Maize, Potatoes, Wattle, Wheat	60%	3	3.5	High

8.4.2.2 Impendle Municipality

Current Agriculture

Impendle is predominantly a subsistence agricultural area with the majority of commercial production located in the Boston precinct. Based on a review of the land cover data for Impendle Municipality, 73% is under grasslands with a further 14% being under arable. Remaining areas of the Municipality (13%) include untransformed land and rural settlement.

As may be noted in the Land Use section of the Status Quo report the main agricultural activities in the Municipality include forestry, beef, dairy, maize, potatoes and cabbage. An indication of the spatial location of these different enterprises is contained in the Land Use report and areas under cultivation are summarised in the table below.

Table 53: Area under Agriculture

Area Under Agriculture		
Land Use	**Hectares**	**%**
Forestry	11078	7
Grasslands	111493	73
Cultivation	10099	7
Total Area Under Agriculture	**132670**	**87**
Eroded Areas	125	0
Remaining Areas	20084	13
Total Area of Municipality	**152879**	**100**
% Under Grasslands		73
% Under Arable		14
% Remaining Areas		13

Agricultural Potential

Table 54 provides a breakdown of the agricultural potential in Impendle in terms of BRUs in excess of 2% of the area of that Municipality.

Table 54: Impendle Municipality Agricultural Potential

BRU Areas								
BRU Code	Overlap Area	% Arable	Ha Arable	% Non-Arable	Ha Non-Arable	% Hi Potential	Ha Hi Potential	% Total
Ze2a	6479	38	2436	62	4043	0	0	7
Yd17	19567	46	9059	54	10507	6	1252	21
Ye5	8303	50	4160	50	4143	8	664	9
Yd18	30038	54	16221	46	13818	10	2884	32
Wc26	7322	51	3712	49	3610	13	959	8
Yc13	9041	54	4846	46	4195	0	0	10
Yc14	11855	67	7967	33	3889	0	0	12
Total	**92605**		**48401**		**44204**		**5759**	

Table 55 indicates the location which typifies each of the BRUs.

Table 55: Identification of BRUs

Impendle	Code Names
Wc26	Three River Valley
Yc13	Lundy's Hill
Yc14	Byrne
Yd17	Mqatsheni
Yd18	Impendle
Ye5	Mgeni Vlei
Ze2	Southern Little Berg

Table 56: Summary of Agricultural Potential

Agricultural Potential		
Land Area	Hectares	%
BRUs (>2%) of Land Area	92605	98
Areas of BRUs Arable	48401	51
Areas of BRUs non-Arable	44204	47
Remaining Area	2305	2
Total Area Municipality	94910	100
Areas of BRUs High Potential	5759	6

Table 56 indicates that 98% of the land area of Impendle is included in the 7 selected BRUs. The table further indicates 51% of the land area (included in the BRUs) of Impendle is arable with a further 47% being non-arable. It should be noted that within the area suited for arable, 6% is what is termed high value land meeting all conditions for optimum production. The non-arable is indicated in Table 56 as not being suitable for cultivation owing to rockiness, inclusion of wetland, drainage or riparian areas. However, this does not mean that it is not suitable for grazing. The crops and associated yields (under defined management conditions) associated with these BRUs on various soil types are contained in the BRU reports located in the BRU programme.

Figure 74: Impendle Municipality Bio-resource Units (Source: DAEARD Bioresource Unit Report Writer Programme (Version 9-2011) – see Map Book)

Assessment

An assessment of the actual land use versus the agricultural potential data would seem to indicate the following:

- The outcome of this assessment is illustrated in where 98% of the total area of the municipality is incorporated into BRUs which are in excess of 2% of the land area of the municipality. Figure 75 further indicates that 51% of the land under BRUs in the municipality is arable with 47% of it being non-arable. The remainder is land which falls into BRUs which individually comprise less than 2% of the land area.
- Where the land cover data for Impendle is compared, on a proportional basis, with the bioresource unit data in Figure 75, then it would seem that the available arable land is not fully utilised in the municipality (See Land Use report for maps). Whilst on the one hand this could be regarded as a loss of productive potential, un-developed land, on the other hand, represents an important asset in terms of delivery of ecosystems goods and services. It should be noted that the DMA is regarded as having high conservation status and thus some untransformed areas will have a number of threatened species which will preclude any form of development.
- As concerns grasslands, comparative data (to land cover) is not readily available in the BRUs in that areas suitable for cultivation are also often well suited to grassland production ie. land that has not been cultivated. Consequently it is noted that most if not all of the non-arable and certain of the arable (under BRUs) comprises the grasslands (under Land Cover) being used for grazing (Grasslands in Figure 75).

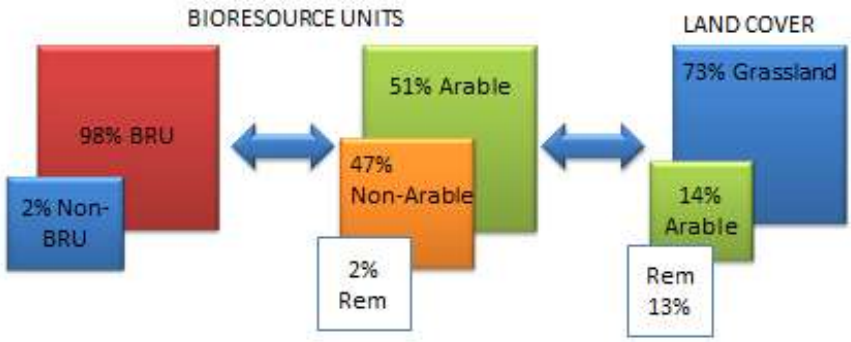


Figure 75: Agricultural Resource Utilisation - Impendle

Table 57 below provides an indication of the agricultural potential per Bioresource Unit per municipality. The maps in Map Book provide an indication of the location of each of the BRUs in the municipality and hence the agricultural potential associated therewith.

Table 57: Impendle Agricultural Potential

BRU	SLOPE	CLIMATE CAPABILITY	ANNUAL ARABLE	ORCHARDS & TIMBER	CROPS	VELD CONDITION	HA /AU	SOIL HAZARD	LAND POT
Ze2	Steep >12%	C4	8%	29%	Cabbage, Maize, drybean, potatoes, pinus patula	75%	2.2	5.0	Low
Zf2	Steep >12%	C4	49%	11%	Pinus patula	75%	2.3	4.6	Low
Yd17	Steep >12%	C4	14%	40%	Cabbages, Dry Bean, Pinus patula-taeda, potatoes	75%	2.1	5.2	Moderate
Ye5	Steep >12%	C4	16%	50%	Carrot, Soyabean	75%	2	5.6	Moderate
Wc26	Steep >12%	C4	28%	47%	Cabbages, Dry bean, Maize, Potatoes,	75%	2	4.6	High
Yc13	Steep >12%	C4	13%	46%	Cabbage, Dry Bean, Maize, Pinus patula-taeda, Potatoes	75%	2.1	5.3	Moderate
Yd18	Steep >12%	C4	19%	52%	Cabbage, Dry Bean, Maize, Pinus patula-taeda, Potatoes	75%	2	5.5	Moderate
Yc14	Steep >12%	C3	28%	64%	Cabbage, Dry Bean, Maize, Pinus Elliottii-patula-taeda, Potatoes, Wattle	60%	2.4	5.6	High

8.4.2.3 uMngeni Municipality

Current Agriculture

A large proportion of the land area in uMngeni Municipality is under commercial agriculture (78%) with the remainder being under urban and rural settlement and infrastructural development (22%). The area under different forms of arable production amounts to 39% of the area of the Municipality with grasslands amounting to 38%. The remaining area of the Municipality (22%) is likely to be under urban development (formal and informal), infrastructure and un-transformed land areas.

As may be noted in the Land Use section of the Status Quo report the main agricultural activities in the Municipality include commercial timber, beef, dairy, maize, potatoes, cabbage and high value crops. An indication of the spatial location of these different enterprises is contained in the Land Use report and Table 61 indicates that 94% of the land area of uMngeni is included in the 14 selected BRUs. It may be used to further demonstrate that arable in uMngeni includes 66% of the area with a further 28% being non-arable. It should be further noted that within the area suited to arable, 14% is what is termed high value land meeting all conditions for optimum production. The non-arable is indicated in Table 61 as not being suitable for arable owing to rockiness and inclusion of wetland, drainage and riparian areas. The crops and associated yields (under defined management conditions) associated with these BRUs are contained in the BRU reports located in the BRU programme.

The area of the Municipality not dealt with in Table 61 includes BRUs with less than 2% coverage in the Municipality. In other words up to 6% of the area of the Municipality is included under fragmented BRUs and is consequently difficult to assess agricultural potential.

It is important to note that the Moist Midlands Mistbelt (MMM) BRG is located in uMngeni (amongst others) and has an extremely high conservation priority. Less than 1% of this grassland is in protected areas and thus DAEA has indicated that no further development will be considered on land under well preserved MMM grassland.

Figure 76Areas under cultivation are summarised in the table below.

Table 58: Area under Agriculture

Area Under Agriculture		
Land Use	**Hectares**	**%**
Forestry	33396	21
Grasslands	60243	38
Cultivation	28092	18
Total Area Under Agriculture	**121731**	**77**
Eroded Areas	53	0
Remaining Areas	34898	22
Total Area of Municipality	**156682**	**100**
% Under Grasslands		38
% Under Arable		39
% Remaining Areas		22

Agricultural Potential

Table 59 provides a breakdown of the 14 BRUs located in uMngeni Municipality and the areas of arable and non-arable land located in these BRUs.

Table 59: uMngeni Municipality

BRU Areas								
BRU Code	**Overlap Area**	**% Arable**	**Ha Arable**	**% Non-Arable**	**Ha Non-Arable**	**% Hi Potential**	**Ha Hi Potential**	**% Total**
Vd4	3169	63.4	2009	37	1160	15	475	2
Wd14	6676	61.4	4099	39	2577	9	628	4
Yd16	29620	67.2	19905	33	9715	16	4650	19
Zc6	6775	100	6775	0	0	0	0	4
Wd9	6675	72	4806	28	1869	0	0	4
Yc11	48546	72.3	35099	28	13447	18	8738	31
Yd22	5183	77.9	4037	22	1145	0	0	3
Ub14	4811	46.8	2251	53	2559	10	500	3
Wc31	6627	87.8	5819	12	809	40	2624	4
Yd18	7595	54	4101	46	3494	10	729	5
Vc25	7715	68.5	5285	32	2430	23	1744	5
Zc7	5123	71	3637	29	1486	16	794	3
Wc30	5121	57	2919	43	2202	0	0	3

BRU Areas								
BRU Code	Overlap Area	% Arable	Ha Arable	% Non-Arable	Ha Non-Arable	% Hi Potential	Ha Hi Potential	% Total
Yc14	3556	68	2418	32	1138	0	0	2
Total	**147192**		**103160**		**44031**		**20882**	

Table 60 indicates the location which typifies each of the BRUs.

Table 60: Identification of BRUs

uMngeni	Code Names
Ub14	Albert Falls
Vc25	eMpophomeni
Vd4	Mooi River
Wc30	Broadacres
Wc31	Howick
Wd9	Nottingham Road
Wd14	Sherwood
Yc11	Lidgetton
Yc14	Byrne
Yd16	Kamberg
Yd18	Impendle
Yd22	Curry's Post
Zc6	Karkloof Forest
Zc7	Hilton

Table 61: Summary of Agricultural Potential

Agricultural Potential		
Land Area	Hectares	%
BRUs (>2%) of Land Area	147192	94
Areas of BRUs Arable	103160	66
Areas of BRUs non-Arable	44031	28
Remaining Area	9491	6
Total Area Municipality	156683	100
Areas of BRUs High Potential	20882	14

Table 61 indicates that 94% of the land area of uMngeni is included in the 14 selected BRUs. It may be used to further demonstrate that arable in uMngeni includes 66% of the area with a further 28% being non-arable. It should be further noted that within the area suited to arable, 14% is what is termed high value land meeting all conditions for optimum production. The non-arable is indicated in Table 61 as not being suitable for arable owing to rockiness and inclusion of wetland, drainage and

riparian areas. The crops and associated yields (under defined management conditions) associated with these BRUs are contained in the BRU reports located in the BRU programme.

The area of the Municipality not dealt with in Table 61 includes BRUs with less than 2% coverage in the Municipality. In other words up to 6% of the area of the Municipality is included under fragmented BRUs and is consequently difficult to assess agricultural potential.

It is important to note that the Moist Midlands Mistbelt (MMM) BRG is located in uMngeni (amongst others) and has an extremely high conservation priority. Less than 1% of this grassland is in protected areas and thus DAEA has indicated that no further development will be considered on land under well preserved MMM grassland.

Figure 76: uMngeni Municipality Bio-resource Units (Source: DAEARD Bioresource Unit Report Writer Programme (Version 9-2011) – see Map Book)

Assessment

An assessment of the actual land use versus the agricultural potential data would seem to indicate the following:

- The outcome of this assessment is illustrated in Figure 77 where 94% of the total area of the municipality is incorporated into BRUs which are in excess of 2% of the land area of the municipality. Figure 77 further indicates that 66% of the land under BRUs in the municipality is arable with 28% of it being non-arable. The remainder (6%) is land which falls into BRUs which individually comprise less than 2% of the land area.
- Where the land cover data for Impendle is compared, on a proportional basis, with the bioresource unit data in Figure 77, then it would seem that the available arable is not being fully utilised in the municipality (see Land Use report for maps).
- As concerns grasslands, comparative data (to land cover) is not readily available in the BRUs in that areas suitable for arable are also often well suited to grasses. Consequently it is noted that most if not all of the non-arable and certain of the arable (under BRUs) comprises the grasslands (under Land Cover) being used for grazing (Grasslands in Figure 77).

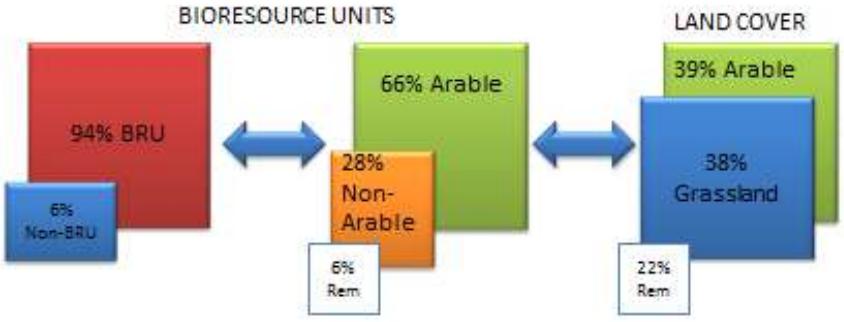


Figure 77: Agricultural Resource Utilisation – uMngeni

Table 62 below provides an indication of the agricultural potential per Bioresource Unit per municipality. The maps in Map Book provide an indication of the location of each of the BRUs in the municipality and hence the agricultural potential associated therewith.

Table 62: uMngeni Agricultural Potential

BRU	SLOPE	CLIMATE CAPABILITY	ANNUAL ARABLE	ORCHARDS & TIMBER	CROPS	VELD CONDITION	H A /AU	SOIL HAZARD	LAND POT
Yc11	Moderate 5-12%	C4	36%	58%	Cabbage, Dry Bean, Maize, Pinus Elliottii-patula-taeda, Potatoes, Wheat	60%	2.3	5.7	Moderate
Yd16	Steep >12%	C4	30%	60%	Cabbage, Dry Bean, Maize, Potatoes	75%	1.9	5.3	High

8.4.2.4 Msunduzi Municipality

Current Agriculture

Msunduzi Municipality largely comprises built up urban, peri-urban and rural settlement with a limited area of land available for agriculture. Based on a review of the land cover data for Msunduzi Municipality, 40% of the area is under some form of agricultural land use and the remainder urban and infrastructural development. The area under arable production amounts to 15% of the land area of the Municipality with grasslands amounting to 25%.

As may be noted in the Land Use section of the Status Quo report the main agricultural activities in the Municipality include: game, commercial timber, beef, dairy, maize and veggies. An indication of the spatial location of these different enterprises is contained in the Land Use report and areas under cultivation are summarised in the table below.

Table 63: Area under Agriculture

Area Under Agriculture		
Land Use	**Hectares**	**%**
Forestry	4142	7
Grasslands	15899	25
Cultivation	5384	8
Total Area Under Agriculture	**25425**	**40**
Remaining Areas	37984	60
Total Area of Municipality	**63408**	**100**
% Under Grasslands		25
% Under Arable		15
% Eroded		0
% Remaining Areas		60

Agricultural Potential

Table 64 provides a breakdown of the 13 BRUs located in Msunduzi Municipality and the areas of arable and non-arable land located in these BRUs.

Table 64: Msunduzi Municipality

BRU Areas								
BRU Code	Overlap Area	% Arable	Ha Arable	% Non-Arable	Ha Non-Arable	% Hi Potential	Ha Hi Potential	% Total
Zc7	2129	71	1511	29	617	16	332	3
Zb2	1678	82.8	1389	17	289		0	3
Yd18	1291	54	697	46	594	10	124	2
Yc14	13365	67.2	8981	33	4384	0	0	21
Yb9	1848	82.8	1530	17	318	25	462	3
Xc14	10125	73.9	7482	26	2643	0	0	16
Xb5	2066	81.4	1682	19	384	13	264	3
Wc32	2486	80.2	1994	20	492	17	415	4
Wb12	3182	70.3	2237	30	945	16	506	5
Vb15	2749	25.7	707	74	2043	5	129	4
Vb14	7482	48	3591	52	3891	35	2619	12
TUb10	11234	41.3	4640	59	6594	8.8	989	18
STb3	3715	48	1783	52	1932	6.5	241	6
Total	**63350**		**38225**		**25125**		**6082**	

Table 65 indicates the location which typifies each of the BRUs.

Table 65: Identification of BRUs

Msunduzi	Code Names
STb3	Ashburton
TUb10	Ukulinga
Vb14	Pietermaritzburg
Vb15	Cato Ridge
Wb12	Bishopstowe
Wc32	Ridgeway
Xb5	Signal Hill
Xc14	Taylor's Halt
Yb9	Chase Valley
Yc14	Byrne
Yd18	Impendle
Zb2	Oak Park
Zc7	Hilton

Table 66: Agricultural Potential

Agricultural Potential		
Land Area	**Hectares**	**%**
BRUs (>2%) of Land Area	63350	100
Areas of BRUs Arable	38225	60
Areas of BRUs non-Arable	25125	40
Remaining Area	43	0
Total Area Municipality	63393	100
Areas of BRUs High Potential	6082	10

Table 66 indicates that 100% of the land area of Msunduzi is included in the 13 selected BRUs. It may be used to further demonstrate that arable in Msunduzi includes 60% of the area with a further 40% being non-arable. It should be further noted that within the area suited to arable, 10% is what is termed high value land meeting all conditions for optimum production. The non-arable is indicated in Table 66 as not being suitable for cultivation owing to rockiness and inclusion of wetland and drainage areas. The crops and associated yields (under defined management conditions) associated with these BRUs are contained in the BRU reports located in the BRU programme.

Figure 78: Msunduzi Municipality Bio-resource Units (see Map Book)

Assessment

An assessment of the actual land use versus the agricultural potential data would seem to indicate the following:

- The outcome of this assessment is illustrated in Figure 79 where 100% of the total area of the municipality is incorporated into BRUs which are in excess of 2% of the land area of the municipality. Figure 79 further indicates that 60% of the land under BRUs in the municipality is arable with 40% of it being non-arable.
- Where the land cover data for Msunduzi is compared, on a proportional basis, with the bioresource unit data in Figure 79, then it would seem that the available arable is fully utilised for agricultural production (commercial and subsistence) in the municipality (see Land Use report for maps).
- Regarding grasslands, comparative data (to land cover) is not readily available in the BRUs in that areas suitable for arable are also often well suited to grasses. Consequently it is noted that most if not all of the non-arable and certain of the arable (under BRUs) comprises the grasslands (under Land Cover) being used for grazing (Grasslands in Figure 79).

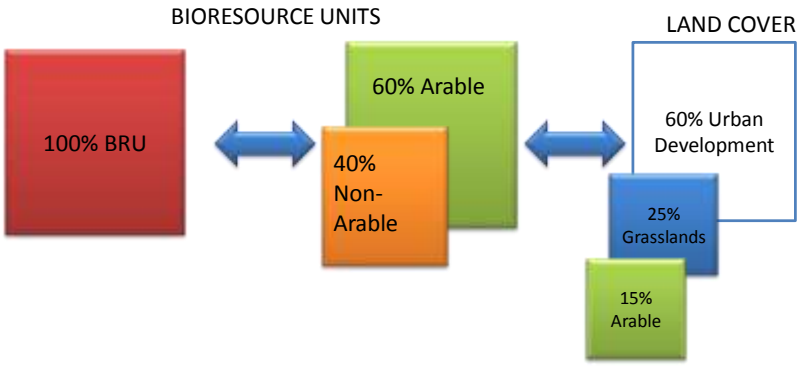


Figure 79: Agricultural Resource Utilisation: Msunduzi

Table 67 below provides an indication of the agricultural potential per Bioresource Unit per municipality. The maps in Map Book provide an indication of the location of each of the BRUs in the municipality and hence the agricultural potential associated therewith.

Table 67: Msunduzi Agricultural Potential

BRU	SLOPE	CLIMATE CAPABILITY	ANNUAL ARABLE	ORCHARDS & TIMBER	CROPS	VELD CONDITION	H A /AU	SOIL HAZARD	LAND POT
Yc14	Steep >12%	C3	28%	64%	Cabbage, Dry Bean, Maize, Pinus Elliottii-patula-taeda, Potatoes, Wattle	60%	2.4	5.6	High
Xc14	Steep >12%	C3	26%	73%	Dry Bean, Maize, Pinus Elliottii, Potatoes, Wattle, Wheat	60%	2.4	5.7	High
Wb12	Steep >12%	C3	27%	66%	Cabbage, Cowpeas, Groundnut, Maize, Potatoes, Sorghum, Wattle	60%	2.4	5.7	High
Vb14	Steep >12%	C4	35%	46%	Cabbage, Cowpeas, Groundnut, Maize, Potatoes, Sorghum, Sugar Cane, Wattle	60%	2.5	4.7	High
Tub10	Steep >12%	C5	19%	39%	Cabbage, Cowpeas, Dry Bean, Groundnut, Maize, Potatoes, Sorghum, Sugar Cane,	60%	3	4.7	Moderate

BRU	SLOPE	CLIMATE CAPABILITY	ANNUAL ARABLE	ORCHARDS & TIMBER	CROPS	VELD CONDITION	H A /AU	SOIL HAZARD	LAND POT
					Wheat				
STb3	Steep >12%	C6	13%	34%	Cabbage, Cowpeas, Groundnut, Maize, Potatoes, Sorghum, Sugar Cane, Wheat	50%	5	4.9	Low

8.4.2.5 Richmond Municipality

Current Agriculture

Richmond Municipality largely comprises of commercial agricultural areas with limited formal urban development and large areas of rural settlement. Based on a review of the land cover data for Richmond Municipality, 69% of the Municipality is under some form of agricultural land use and the remainder un-transformed land and urban development. The area under different forms of arable production amounts to 49% of the area of the Municipality with grasslands amounting to 20%.

As may be noted in the Land Use section of the Status Quo report the main agricultural activities in the Municipal include citrus, game, commercial timber, beef, dairy, maize and veggies. An indication of the spatial location of these different enterprises is contained in the Land Use report and areas under cultivation are summarised in the table below.

Table 68: Area under Agriculture

Area Under Agriculture		
Land Use	**Hectares**	**%**
Forestry	40096	32
Grasslands	24495	20
Cultivation	21505	17
Total Area Under Agriculture	**86096**	**69**
Remaining Areas	39475	31
Total Area of Municipality	**125575**	**100**
% Under Grasslands		20
% Under Arable		49
% Eroded		0
% Remaining Areas		31

Agricultural Potential

Table 69 provides a breakdown of the 14 BRUs located in Richmond Municipality and the areas of arable and non-arable land located in these BRUs.

Table 69: Richmond Municipality

BRU Areas								
BRU Code	Overlap Area	% Arable	Ha Arable	% Non-Arable	Ha Non-Arable	% Hi Potential	Ha Hi Potential	% Total
Yd18	2850	54	1539	46	1311	9.6	274	2
Yc14a	34976	36	12591.36	64	22384.64	14	4897	28
Yb7	12088	72	8703.36	28	3384.64	16	1934	10
Yb10	5849	49	2866.01	51	2982.99	18	1053	5
Xb6	4182	42	1756.44	58	2425.56	4.3	180	3
Wc27	5994	46	2757.24	54	3236.76	7.8	468	5
Wb14	2624	7	183.68	93	2440.32	1.6	42	2
Wb13	20989	69	14482.41	31	6506.59	13.2	2771	17
Wb10	3502	55	1926.1	45	1575.9	15.5	543	3
VWb3	2873	9	258.57	91	2614.43	1.8	52	2
UVb3	8929	36	3214.44	64	5714.56	6	536	7
UVa7	3771	26	980.46	74	2790.54	4	151	3
TUb9	3308	17	562.36	83	2745.64	9	298	3
Sa3	3117	28	872.76	72	2244.24	0	0	3
Total	**115052**		**52694**		**62358**		**13196**	**100**

Table 70 indicates the location which typifies each of the BRUs.

Table 70: Identification of BRU Codes

Richmond	Code Names
Sa3	Kweletsheni
TUb9	Nkobeni
UVa7	Kamampungushe
UVb3	Riverbank
VWb3	eNkumane
Wb10	Mahlatini
Wb13	Baynesfield
Wb14	Karlshaven
Wc27	Nkumba
Xb6	Inhlazuka
Yb7	Richmond
Yb10	Mid Illovo
Yc14	Byrne
Yd18	Impendle

Table 71: Agricultural Potential

Agricultural Potential		
Land Area	Hectares	%
BRUs (>2%) of Land Area	115052	93
Areas of BRUs Arable	52694	43
Areas of BRUs non-Arable	62358	51
Remaining Area	8093	7
Total Area Municipality	123145	100
Areas of BRUs High Potential	13196	11

Table 71 indicates that 93% of the land in the Richmond municipality is included in the 14 selected BRUs. It may be used to further demonstrate that arable land in Richmond includes 43% of the area with a further 51% being non-arable. It should be further noted that within the area suited to arable, 11% is what is termed high value land meeting all conditions for optimum production. The non-arable is indicated in Table 71 as not being suitable for cultivation owing to rockiness and inclusion of wetland and drainage areas. The crops and associated yields (under defined management conditions) associated with these BRUs are contained in the BRU reports located in the BRU programme. The area of the Municipality not dealt with in the BRUs amounts to 7% of the Municipality. As noted this includes BRUs with less than a 2% cover in the Municipality and hence they have not been included in this assessment.

Figure 80: Richmond Municipality Bio-resource Units (see Map Book)

Assessment

An assessment of the actual land use versus the agricultural potential data would seem to indicate the following:

- The outcome of this assessment is illustrated in Figure 81 where 93% of the total area of the municipality is incorporated into BRUs which are in excess of 2% of the land area of the municipality. Figure 81 further indicates that 43% of the land under BRUs in the municipality is arable with 51% of it being non-arable.
- Where the land cover data for Msunduzi is compared, on a proportional basis, with the bioresource unit data in Figure 81, then it would seem that the available arable is fully and possibly over-utilised for agricultural production (commercial and subsistence) in the municipality (see Land Use report for maps).
- Regarding grasslands, comparative data (to land cover) is not readily available in the BRUs in that areas suitable for arable are also often well suited to grasses. Consequently it is noted that most if not all of the non-arable and certain of the arable (under BRUs) comprises the grasslands (under Land Cover) being used for grazing (Grasslands in Figure 81).

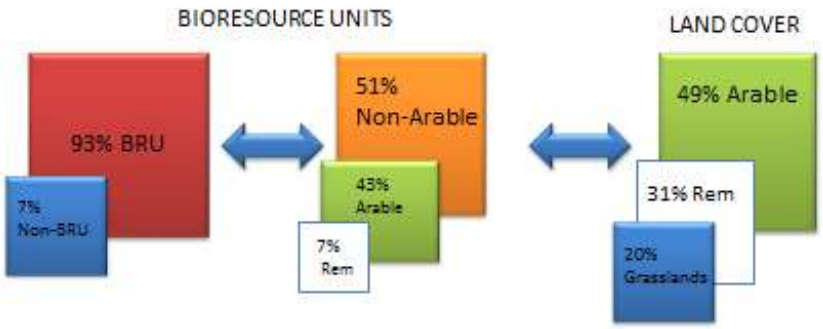


Figure 81: Agricultural Resource Utilisation – Richmond

Table 72 below provides an indication of the agricultural potential per Bioresource Unit per municipality. The maps in Map Book provide an indication of the location of each of the BRUs in the municipality and hence the agricultural potential associated therewith.

Table 72: Richmond Agricultural Potential

BRU	SLOPE	CLIMATE CAPABILITY	ANNUAL ARABLE	ORCHARDS & TIMBER	CROPS	VELD CONDITION	H A /AU	SOIL HAZARD	LAND POT
Yc14	Steep >12%	C3	28%	64%	Cabbage, Dry Bean, Maize, Pinus Elliottii-patula-taeda, Potatoes, Wattle	60%	2.4	5.6	High
UVb3	Steep >12%	C5	10%	32%	Cabbage, Cowpeas, Groundnut, Maize, Potatoes, Wheat	50%	4.8	5.0	Low
Yb7	Steep >12%	C3	30%	69%	Cabbage, Dry Bean, Groundnut, Maize, Pinus Elliottii, Potatoes, Wattle	60%	2.4	5.5	High
Wb13	Steep >12%	C3	24%	61%	Cabbage, Cowpeas, Groundnut, Maize, Potatoes, Sorghum, Wattle	60%	2.6	5.0	High

8.4.2.6 Mkhambathini Municipality

Current Agriculture

Mkhambathini Municipality largely comprises commercial agriculture with limited areas of urban settlement and large areas of rural settlement. Based on a review of the land cover data for Mkhambathini 72% of the Municipality is under some form of agricultural land use and the remainder un-transformed land and urban development (28%). The area under different forms of arable production amounts to 37% of the area of the Municipality with grasslands amounting to 35%.

As may be noted in the Land Use section of the Status Quo report the main agricultural activities in the Municipal include sugar cane, game, commercial timber, veggies and beef. An indication of the spatial location of these different enterprises is contained in the Land Use report and areas under cultivation are summarised in the table below.

Table 73: Area under Agriculture

Area Under Agriculture		
Land Use	Hectares	%
Forestry	1898	2
Grasslands	31595	35
Cultivation	30790	35
Total Area Under Agriculture	**64284**	**72**
Remaining Areas	24808	28
Total Area of Municipality	**89092**	**100**
% Under Grasslands		35
% Under Arable		37
% Eroded		0
% Remaining Areas		28

Agricultural Potential

Table 74 provides a breakdown of the 17 BRUs located in Mkhambathini Municipality and the areas of arable and non-arable land located in these BRUs.

Table 74: Mkhambathini Municipality

BRU Areas								
BRU Code	Overlap Area	% Arable	Ha Arable	% Non-Arable	Ha Non-Arable	% Hi Potential	Ha Hi Potential	% Total
Yb11	8629	58	4988	42	3641	11	984	9
Yb10	5960	49	2897	51	3063	10	584	7
Wb14	3299	7	241	93	3058	2	53	4
Wa5	4244	14	573	87	3671	1	59	5
VWb4	7242	7	500	93	6742	1	80	8
Vb16	5268	32	1680	68	3588	4	216	6
Vb15	10893	26	2800	74	8093	5	512	12
UVb4	4235	46	1957	54	2278	8	343	5
UVa7	5587	26	1436	74	4151	3	190	6
Ub16	3185	33	1038	67	2147	3	92	3
Ub15	2819	5	141	95	2678	4	107	3
TUb11	2047	21	438	79	1609	1	25	2
TUb10	2539	41	1049	59	1490	20	495	3
Tb11	2729	24	650	76	2079	4	98	3
Ta5	4132	64	2653	36	1479	46	1913	5
STb3	5369	48	2550	53	2819	7	349	6
Sb5	7404	25	1858	75	5546	3	230	8
Total	**85581**		**27447**		**58134**		**6330**	

Table 75 indicates the location which typifies each of the BRUs.

Table 75: Identification of BRU Codes

Mkhambathini	Code Names
Sb5	Tala Valley
STb3	Ashburton
Ta5	Nagle Dam
Tb11	Doornrug
Tub10	Ukulinga
Tub11	Killarney Isles
Ub15	Bovini
Ub16	Fair View
UVa7	Kamampungushe
UVb4	Table Mountain Slope
Vb15	Cato Ridge
Vb16	Eston
VWb4	Spring Valley
Wa5	Kwa Ndaya
Wb14	Karlshaven
Yb10	Mid Illovo
Yb11	Mbumbula

Table 76: Agricultural Potential

Agricultural Potential		
Land Area	**Hectares**	**%**
BRUs (>2%) of Land Area	85581	93
Areas of BRUs Arable	27447	30
Areas of BRUs non-Arable	58134	63
Remaining Area	5958	7
Total Area Municipality	91539	100
Areas of BRUs High Potential	6330	7

Table 76 indicates that 93% of the land area of Mkhambathini is included in the 17 selected BRUs. It may be used to further demonstrate that arable land in Mkhambathini includes 30% of the area with a further 63% being non-arable. It should be further noted that within the area suited to arable 7% is what is termed high value land meeting all conditions for optimum production. The non-arable is indicated in Table 76 as not being suitable for cultivation owing to rockiness and inclusion of wetland and drainage areas. The crops and associated yields (under defined management conditions) associated with these BRUs are contained in the BRU reports located in BRU programme.

The area of the Municipality not dealt with in the BRUs amounts to 7% of the Municipality. As noted this includes BRUs with less than a 2% cover in the Municipality and hence they have not been included in this assessment.

Figure 82: Mkhambathini Municipality Bio-resource Units (see Map Book)

Assessment

An assessment of the actual land use versus the agricultural potential data would seem to indicate the following:

- The outcome of this assessment is illustrated in Figure 83 where 93% of the total area of the municipality is incorporated into BRUs which are in excess of 2% of the land area of the municipality. Figure 83 further indicates that 30% of the land under BRUs in the municipality is arable with 63% of it being non-arable.
- Where the land cover data for Mkhambathini is compared, on a proportional basis, with the bioresource unit data in Figure 83, then it would seem that the available arable is fully utilised for agricultural production (commercial and subsistence) in the municipality (see Land Use report for maps).
- As concerns grasslands, comparative data (to land cover) is not readily available in the BRUs in that areas suitable for arable are also often well suited to grasses. Consequently it is noted that most if not all of the non-arable and certain of the arable (under BRUs) comprises the grasslands (under Land Cover) being used for grazing (Grasslands in Figure 83).

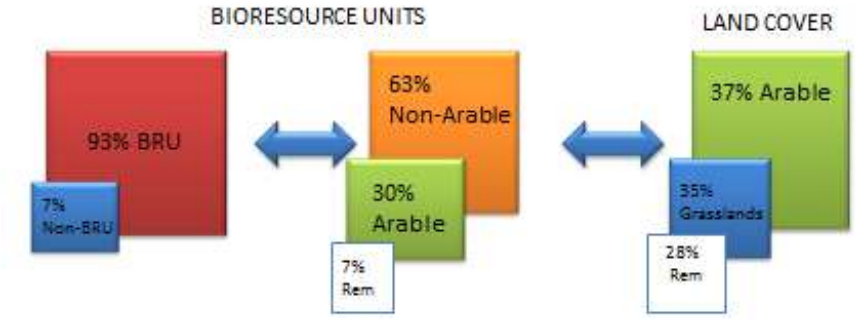


Figure 83: Agricultural Resource Utilisation – Mkhambathini

Table 77 below provides an indication of the agricultural potential per Bioresource Unit per municipality. The maps in Map Book provide an indication of the location of each of the BRUs in the municipality and hence the agricultural potential associated therewith.

Table 77: Mkhambathini Agricultural Potential

BRU	SLOPE	CLIMATE CAPABILITY	ANNUAL ARABLE	ORCHARDS & TIMBER	CROPS	VELD CONDITION	H A /AU	SOIL HAZARD	LAND POT
Vb15	Steep >12%	C4	9%	19%	Cabbage, Cowpeas, Dry Bean, Maize, Potatoes, Sorghum, Tomatoes, Wattle	60%	3.3	3.6	Moderate
Yb10	Steep >12%	C2	18%	40%	Bananas, Cabbage, Dry Bean, Maize, Pinus Elliotti, Sugar Cane, Potatoes, Wattle	60%	2.8	4.3	High
Yb11	Steep >12%	C2	21%	46%	Cabbage, Dry Bean, Groundnut, Maize, Pinus Elliottii & Taeda, Sugar Cane, Wattle	60%	2.6	5.2	High
UVa7	Steep >12%	C7	4%	15%	Bananas, Cabbage, Cowpeas, Groundnut, Maize, Potatoes, Sorghum, Sugar Cane, Wheat	50%	5.1	4.0	Low
Sb5	Moderate 5-12%	C6	11%	17%	Cabbage, Cowpeas, Groundnut, Maize, Potatoes, Sorghum, Sugar Cane, Wheat	60%	4.1	3.7	Moderate
VWb4	Moderate 5-12%	C4	1.1	3%	Bananas, Cabbage, Cowpeas, Dry Bean, Groundnuts, Maize, Potatoes, Sorghum, Sugar Cane	60%	3.7	2.7	High

8.4.2.7 Mpofana Municipality

Current Agriculture

Mpofana Municipality largely comprises commercial agriculture with limited areas of urban and rural settlement. Based on a review of the land cover data for Mpofana (Table 78), 81% of the Municipality is under some form of agricultural land use and the remainder un-transformed and urban development (18%). The area under different forms of arable production amounts to 18% of the area of the Municipality with grasslands amounting to 57%.

As may be noted in the Land Use section of the Status Quo report the main agricultural activities in the Municipality include dairy, beef, veggies and timber. An indication of the spatial location of these different enterprises is contained in the Land Use report and areas under cultivation are summarised in the table below.

Table 78: Area under Agriculture

Area Under Agriculture		
Land Use	Hectares	%
Forestry	11107	6
Grasslands	104315	57
Cultivation	32180	18
Total Area Under Agriculture	**147603**	**81**
Eroded Areas	885	0
Remaining Areas	33532	18
Total Area of Municipality	**182020**	**100**
% Under Grasslands		57

Area Under Agriculture	
% Under Arable	24
% Remaining Areas	18

Agricultural Potential

Table 79 provides a breakdown of the 14 BRUs located in Mpofana Municipality and the areas of arable and non-arable land located in these BRUs.

Table 79: Mpofana Municipality

BRU Areas								
BRU Code	Overlap Area	% Arable	Ha Arable	% Non-Arable	Ha Non-Arable	% Hi Potential	Ha Hi Potential	% Total
Tc4	4519	30.1	1360	69.9	3159	6.2	280	3
Tc5	6076	12	729	88	5347	1.6	97	4
Uc10a	8854	33.8	2993	66.2	5861	6.1	540	6
Ud1	11501	54.5	6268	45.5	5233	42	4830	7
Uc9	19489	42	8186	58	11304	19.3	3761	12
TUc7	6632	38	2520	62	4112	0	0	4
Tc6	4300	19.7	847	80.3	3453	4.1	176	3
Tc10	6223	69.1	4300	30.9	1923	6.2	386	4
Vd4	44282	63.4	28075	36.6	16207	15.1	6687	28
Wd8b	4627	60	2776	40	1851	10.6	490	3
Wd14	10901	61.4	6693	38.6	4208	9.4	1025	7
Ud2	6655	44.2	2941	55.8	3713	0	0	4
Yd16	21121	67.2	14193	32.8	6928	15.7	3316	13
Xd4	4266	65	2773	35	1493	0	0	3
Total	**159447**		**84655**		**74792**		**21589**	

Table 80 indicates the location which typifies each of the BRUs.

Table 80: Identification of Codes

Mpofana	Code Names
Tc4	uMkholombe
Tc5	Ntanyana
Tc6	Enlanzeni
Tc10	Stanger's Hoek
TUc7	Umniumba
Uc9	Middelrus
Uc10	Vermaakskraal
Ud1	Scottsberg

Mpofana	Code Names
Ud2	Weston
Vd4	Mooi River
Wd8	Tintern
Wd14	Sherwood
Xd4	Stagstones
Yd16	Kamberg

Table 81: Agricultural Potential

Agricultural Potential		
Land Area	Hectares	%
BRUs (>2%) of Land Area	159447	97
Areas of BRUs Arable	84655	51
Areas of BRUs non-Arable	74792	45
Remaining Area	5741	3
Total Area Municipality	165188	100
Areas of BRUs High Potential	21589	13

Table 80 indicates that 97% of the land area of Mpofana is included in the 14 selected BRUs. It may be used to further demonstrate that arable land in Mpofana includes 51% of the area with a further 45% being non-arable. It should be further noted that within the area suited to arable 13% is what is termed high value land meeting all conditions for optimum production. The non-arable is indicated in Table 80 as not being suitable for cultivation owing to rockiness and inclusion of wetland and drainage areas. The crops and associated yields (under defined management conditions) associated with these BRUs are contained in the BRU reports located in the BRU programme.

The area of the Municipality not dealt with in the BRUs amounts to 3% of the Municipality. As noted this includes BRUs with less than a 2% cover in the Municipality and hence they have not been included in this assessment.

Figure 84: Mpofana Municipality Bio-resource Units (see Map Book)

Assessment

An assessment of the actual land use versus the agricultural potential data would seem to indicate the following:

- The outcome of this assessment is illustrated in Figure 85 where 97% of the total area of the municipality is incorporated into BRUs which are in excess of 2% of the land area of the municipality. Figure 85 further indicates that 51% of the land under BRUs in the municipality is potentially arable with 45% of it being non-arable.

- Where the land cover data for Msunduzi is compared, on a proportional basis, with the bioresource unit data in Figure 85, then it would seem that the available arable land is not being fully utilised for agricultural production (commercial and subsistence) in the municipality (see Land Use report for maps). A caution is necessary in the interpretation of these findings: whilst it is indicated that there may be under-utilised land with agricultural potential in Msunduzi, this does not necessarily fully account for land under urban development. In other words it is not possible at this scale to precisely locate such land and thus in certain instances such high value land may no longer be available for agricultural purposes.
- As concerns grasslands, comparative data (to land cover) is not readily available in the BRUs in that areas suitable for arable are also often well suited to grasses. Consequently in this municipality it is noted that most if not all of both the non-arable and certain of the arable (under BRUs) comprises the grasslands (under Land Cover) being used for grazing purposes (Grasslands in Figure 85).

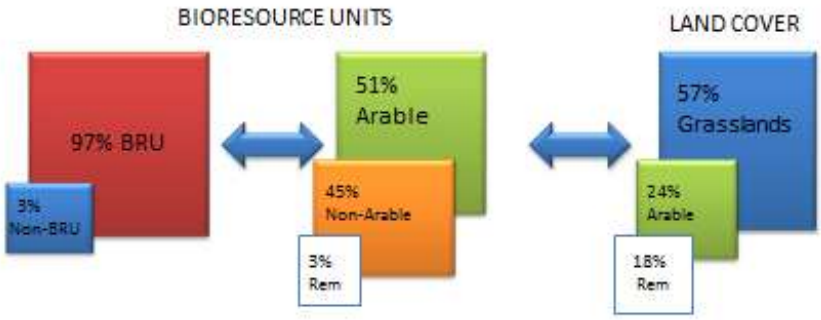


Figure 85: Agricultural Resource Utilisation: Mpofana

Table 82 below provides an indication of the agricultural potential per Bioresource Unit per municipality. The maps in Map Book provide an indication of the location of each of the BRUs in the municipality and hence the agricultural potential associated therewith.

Table 82: Mpofana Agricultural Potential

BRU	SLOPE	CLIMATE CAPABILITY	ANNUAL ARABLE	ORCHARDS & TIMBER	CROPS	VELD CONDITION	H A /AU	SOIL HAZARD	LAND POT
Ze1	Steep >12%	C4	52%	27%	Cabbage, Dry Bean, Maize, Pinus patula-taeda,	75%	2.1	5.2	Low
Ud1	Steep >12%	C5	22%	46%	Cabbage, Dry Bean, Maize, Potatoes, Dry Bean, Maize	75%	2.3	4.8	Low
Uc9	Moderate 5-12%	C5	16%	35%	Cabbages, Dry Bean, Maize, Potatoes,	60%	3.4	4.3	Low
Cd4	Moderate 5-12%	C4	31%	61%	Cabbages, Dry Bean, Maize, Potatoes,	75%	2	5.1	High
Yd16	Moderate 5-12%	C4	30%	60%	Cabbage, Dry Bean, Maize, Potatoes, Dry Bean, Maize	75%	1.9	5.3	High
Wd14	Moderate 5-12%	C4	22%	51%	Cabbage, Dry Bean, Maize, Potatoes, Dry Bean, Maize	75%	1.9	5.8	High

8.4.2.8 District Review

This section of the report is used to review findings at a district level and to take into account views of the challenges being experienced by the agricultural sector in this province and district.

Land Cover

A summary of land cover for all municipalities in the district is provided in Table 83 and allows for comparison on a hectare and a percentage basis. Based on the 2011 municipal boundaries Mpofana is the largest municipality in the district followed by uMshwathi, uMngeni and Impendle which are a similar order in size. Mkhambathini and Msunduzi are the smallest of the municipalities in the district.

Table 83: Land Cover Summary - uMgungundlovu District

Land Use	uMshwathi		Impendle		uMngeni		Msunduzi		Richmond		uMkhambathini		Mooi-Mpofana		uMgungundlovu	
	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Totals	%
Forestry	50034	28	11078	7	33396	21	4142	7	40096	32	1898	2	11107	6	151751	16
Grasslands	25866	14	111493	73	60243	38	15899	25	24495	20	31595	35	104315	57	373906	39
Cultivation	56579	31	10099	7	28092	18	5384	8	21505	17	30790	35	32180	18	184629	19
Total Area Under Agric	**132479**	**73**	**132670**	**87**	**121731**	**78**	**25425**	**40**	**86096**	**69**	**64283**	**72**	**147602**	**81**	**710286**	**75**
Remaining Areas	49324	27	20209	13	34951	22	37984	60	39479	31	24809	28	34418	19	241174	25
Total Area Municipality	**181802**	**100**	**152879**	**100**	**156682**	**100**	**63408**	**100**	**125575**	**100**	**89092**	**100**	**182020**	**100**	**951458**	**100**
% Under Grasslands		14		73		38		25		20		35		57		39
% Under Arable		59		14		39		15		49		37		24		35
% Remainder		27		13		22		60		31		28		19		25

In Table 84 five categories were identified for municipalities in terms of the percentage of hectares under cultivation. It will be noted that the least cultivated areas are, as may be expected, in the higher, colder and more mountainous areas as well as the most urbanised area of the district. In contrast the most intensively cultivated areas are located in the high rainfall, moderate temperature and gently undulating areas of the district (also mapped as having the highest agricultural production potential (in part) for these reasons). Co-incidentally these are also the most heavily settled areas in the district.

Table 84: % Land Arable Land Use

Municipality	% Arable
uMshwathi	>50%
Richmond	40-49%
uMngeni, uMkhambathini	30-39%
Mooi-Mpofana	20-29%
Msunduzi, Impendle	10-19%

Similarly 5 categories were identified for grasslands where the highland areas have the greatest grassland cover and concomitantly least arable. Similarly the lower lying areas, with increased levels of cultivation and settlement, have progressively less grassland.

Table 85: % Land Grassland

Municipality	% Grasslands
Impendle, Mpofana	>50%
Nil in this category	40-49%
uMngeni, uMkhambathini	30-39%
Msunduzi, Richmond	20-29%
uMshwathi	10-19%

An assessment of the land use throughout the district reveals 39% under grasslands, 35% arable and 25% under settlement, infrastructure and water courses.

Table 86: Summary of uMgungundlovu Land Cover

Land Use	uMgungundlovu	
	Totals	%
Forestry	151751	16
Grasslands	373906	39
Cultivation	184629	19
Total Area Under Agric	**710286**	**75**
Remaining Areas	241174	25
Total Area Municipality	**951458**	**100**
% Under Grasslands		39
% Under Arable		35
% Remainder		25

Agricultural Potential

Table 87 provides a summary of agricultural potential in the district with aggregated data from local municipalities on arable, non-arable and high potential land areas.

Table 87: Summary of Agricultural Potential in the uMgungundlovu District

District Summary of BRU Areas									
Municipality	No. BRUs	Ha in BRUs	%	Ha Arable	%	Ha Non-Arable	%	Ha Hi Potential	%
uMshwathi	15	156914	19	104280	23	52634	15	29681	29
Impendle	7	92605	11	48401	11	44204	12	5759	6
uMngeni	14	147192	18	103160	22	44031	12	20882	20
Msunduzi	13	63350	8	38225	8	25125	7	6082	6

District Summary of BRU Areas									
Municipality	No. BRUs	Ha in BRUs	%	Ha Arable	%	Ha Non-Arable	%	Ha Hi Potential	%
Richmond	14	115052	14	52694	11	62358	17	13196	13
Mkhambathini	17	85581	10	27447	6	58134	16	6330	6
Mpofana	14	159447	19	84655	18	74792	21	21589	21
uMgungundlovu		820141	100	458862	100	361278	100	103519	100

Agricultural Resource Utilisation

On the basis of the method used in this project (i.e. proportional comparison of potential versus actual) Figure 86 is used to establish an indication of agricultural resource utilisation at district level.

In Figure 86 it may be noted that 93% of the total area of the municipality is incorporated into BRUs which are in excess of 2% of the land area of the municipality. Figure 86 further indicates that 52% of the land under BRUs in the municipality is arable with 41% of it being non-arable.

Where the land cover data for the district is compared, on a proportional basis, with the bioresource unit data in Figure 86, then it would seem that the potential arable is being fully utilised (possibly over-utilised) for agricultural production (commercial and subsistence) in the municipality.

As concerns grasslands, comparative data (to land cover) is not readily available in the BRUs in that areas suitable for cultivation are also often well suited to grass production. Consequently in this municipality it is noted that most if not all of the non-arable and part of the arable (under BRUs) comprises the grasslands (under Land Cover) and is being used for grazing purposes (Grasslands in Figure 86).

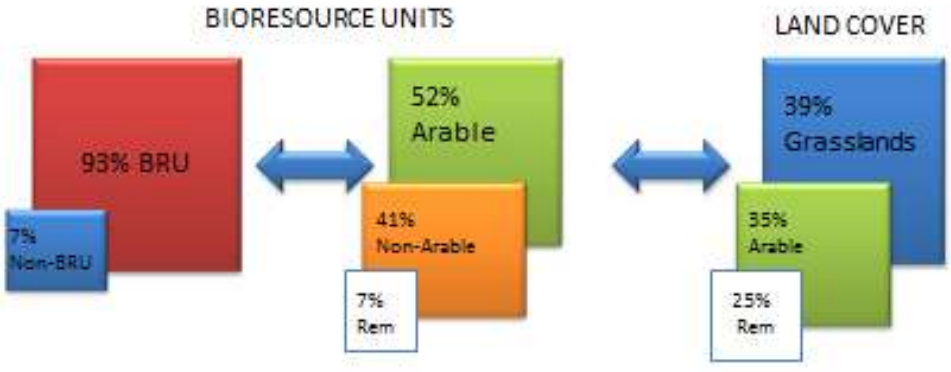


Figure 86: District Agricultural Resource Utilisation

Further to this assessment of resource utilisation provides broad indication of resource utilisation in each municipality. *It should be emphasised that these can only be viewed as a first approximation of indicators at this stage.* Further work is required to refone the method used in this project subject to better quality data being made available, particularly in relation to soils in the province.

Input from the Agricultural Sector

Following input from the project Steering Committee, for the Services Provider for this project to obtain comments on the state of agriculture in the district, a meeting was convened with the CEO of KwaNalu. This organisation represents: full scale commercial, entrant commercial and subsistence (arable and livestock) farmers. Based on this interview the following were noted as the challenges facing this sector in KwaZulu-Natal:

Unresolved land claims has led to the destabilisation of the sector in terms of uncertainty over future production and the associated down and upstream implications associated with this uncertainty. This has been resolved in other provinces through resolving all land claims and making such information public. This has served to stabilise the sector, reaffirm land values and encourage investment in infrastructure and improved cropping practises.

Failing infrastructure in rural areas particularly road and telecommunications: small businesses cannot function without effective communications and farmers (small and large scale) cannot afford to maintain rural roads which is critical to their business operation – movement of inputs and produce to markets.

- Access to water is becoming an increasing challenge where, in terms of the National Water Act, use of raw water for agriculture has to be paid for by farmers and licenses are required for abstraction. Whilst on the one hand this is a benefit to river health in the country by managing individual catchments, on the other hand the regulations are not applied equally to all water users and hence river systems, where oversubscribed due to un-authorised utilisation, run dry in low flow periods. Consequently the regulations need to be applied equally across all water users in a catchment and the price of raw water needs to be reviewed to accommodate the agricultural sector which uses 51% of all stored water nationwide and is highly dependent on water for irrigated crop and livestock production.
- Government's focus on subsistence agriculture has and continues to have a negative impact on large scale food production for the nation. This 'closing dwon' approach to the sector has resulted in the decline of government research into improved production practises and systems. In addition there has been a major shift in focus on extension services to subsistence production. In government, little remains of the commercial extension services on which that sector relied heavily for advice, land use planning guidance, natural resources and economic management strategies Some of the negative consequences of this shift in focus include : (i) difficulties for emerging farmers to enter into the commercial market without the appropriate and relevant research input and extension support; and (ii) Appropriate extension technologies being developed which are scientifically sound for support of emerging farmers; (iii) increasing loss of competent farmers to neighbouring countries , thus they can no longer act as mentors to emerging farmers nor can they provide food for a growing nation. This represents a loss of skills, experience and production potential. At this point, most emerging farmers can only produce enough to ensure household food security for a few months of the year, with very few moving up the development ladder to become commercial farmers in the true sense. This is also limited by the fluctuating quality and quantity produced, which tends to restrict market access and prices obtained.. As a consequence there is a real danger that South Africa will become a net

importer of food. This is particularly an issue for KwaZulu-Natal and uMgungundlovu, in particular, which was historically one of the highest producing agricultural areas of the country.

- The failure of the animal health (veterinary services) to adequately control movement of animal products in the province has seriously impacted on the livestock industry and the potential to export animal products to other countries. This in turn affects the viability of the entire livestock industry, both commercial and subsistence.
- Theft from agricultural properties (commercial and subsistence) has proven to be a major disincentive to production in certain areas of this province. Illustrative losses experienced by farmers include R 300 million for livestock and R 45 million for cropping over a 3 year period.
- Trade opportunities for agricultural produce on the global market are being brokered by the private sector with little (if any) support from government. This is contrary to international best practise where governments promote agriculture as an export opportunity. The poor image of commercial agriculture by government has and continues to have a negative impact on the sustainability of the resource at local, district and national level.

8.5 Summary

The following summary of key issues is noted for this report:

8.5.1 Profile of Agricultural Land Use

Cultivation of arable land predominates in the mid altitudinal areas of the district. Concomitantly these are also the areas with the highest levels of human settlement (urban and rural). The indications from the land use report are that agricultural land is being progressively lost to human settlement and non-agricultural development.

Grasslands and therefore livestock production predominate in the higher lying areas of the district and also the drier valleys under thorn and bushveld vegetation. The indications are that grasslands are under pressure in the district due to the expansion of : (i) human settlement; (ii) afforestation; (iii) inadequate range management particularly in traditional areas (eg. overstocking, inadequate rotation, limited fire management etc); (iii) expanding cultivation into areas that are not necessarily suited to this type of land use to compensate for land lost to other land uses; and (iv) rapidly encroaching land degradation and the loss of palatable species, bush encroachment and soils loss.

8.5.2 State of Agriculture in the District

It has not been possible to conclusively demonstrate the extent to which agricultural resources are at risk in this limited study. It is complex to define the limits to agricultural production at a district wide scale particularly if the notion of commercial and sustainable production systems are taken into account. Consequently it may be useful to review surrogate measures to establish the state of agricultural resources in the district.

It has been established in a number of studies (IDPs for all municipalities in the district) that agriculture continues to play a critical role in sustaining, particularly, the more rural municipalities and peoples in the district.

It has further been demonstrated in the Uthungulu Agricultural Plan (Isik 2010) that agriculture tends to have a multiplier effect on municipal economies : whilst agriculture as a sector may only contribute a relatively small percentage to the GVA of a municipality, the secondary sector (processing and packaging of produce) has a much greater and far reaching economic impact and hence the role and importance of agriculture is often seriously under-estimated as a primary sector driving economic growth. The agricultural sector is also a significant contributor to employment and to job creation. These factors are particularly true where there are limited alternative primary sector drivers[19] as in the case of uMgungundlovu which historically developed around farming. That agricultural economic core which gave rise to settlement and development in the district appears to have been overtaken, mainly by residential development and secondary and tertiary sector economic activities particularly in municipalities located along the development corridor and in the district nodes.

The land use data demonstrates the progressive transformation and concomitant loss of natural resources, including agricultural resources, to human settlement and related activities. The socio-economic report has demonstrated the inability of the district economy to fully integrate its population into the formal or first economy with the attendant maladies associated with informal settlement, lack of services, unemployment, poverty and destruction of the natural environment.

As noted, the indications are symptomatic of a situation in which agriculture has been replaced as a sector in the core growth areas (spatial) of the district. However, it retains its primacy in the rural municipalities which 'feed' the secondary and tertiary sectors of the district and provincial economy. The indications are, under current and future global economic trends (Coetzee 2011), that the nature of the economies of these rural municipalities is unlikely to change significantly despite claims to the contrary in their respective IDPs and LED sector reports. Hence the indications from this project are that future non-agricultural development in the district should focus on defined nodes and corridors and that remaining agricultural areas should be protected 'at all costs' since once land is transformed it is virtually impossible to return it to productive agricultural use.

8.5.3 Sustainable Management

The sustainability of the environment in the district and consequently agriculture as a sector is contingent upon awareness, at all levels of society and across all cultural groups, of its importance and equally its vulnerability. In other words whilst at risk in the district, the agricultural sector and its associated natural resource base are key to future survival of populations in rural municipalities and food production in the district and to a lesser extent on secondary and tertiary sector in the core areas.

[19] It has been noted by a number of industrialists in a study currently in progress by DEDT aimed at establishing economic drivers in the province, that '...it is not possible to grow a robust economy on shopping malls' (Isik 2011).

It is in this context that sustainable management practises are urgently required in the field of agriculture itself (the way in which farming takes place particularly in land reform and Ingonyama Trust Board areas) and equally importantly in land use allocation and management by municipalities and the private sector. This, allied to the need for national government to promote commercial agriculture through provision of certain incentives and simultaneously de-racialising its (governments) perception of the sector, would go a long way to stabilising rural municipal economies and thereby mitigating risk. In short, to survive, commercial agriculture and associated resources, needs a vote of confidence from the state and a 'hands off' from the private sector, particularly land hungry developers, who need to recognise that this land is out of bounds for golfing estates, housing and commercial developments.

8.5.4 Government Policy

The findings of this study indicate that current government policies associated with agriculture (or in cases lack thereof) and land reform have had a negative impact on commercial agriculture for both established and entrant farmers into this sector. This in turn is negatively impacting on perceptions relating to agricultural land and its value as a resource in the province. The issues raised by KwaNalu and those arising from the land reform programme itself need to be addressed by government at all levels to safeguard remaining resources, commercial food production and the sector as a whole.

9 PLANNING FRAMEWORK

9.1 Aims and Objectives

The aim of this document is to establish the status of spatial planning in the uMgungundlovu District and associated Local Municipalities. The objectives include establishing the following:

- The extent to which environmental issues (biodiversity, cultural, historic, socio-economic) have been taken into account and included into spatial plans: integration of environmental issues into the planning process.
- The commonalities and differences in spatial planning (zonation) between municipalities: alignment of planning processes between municipalities.
- The areas proposed for future economic growth and development (transformation) in each municipality: identifying proposed growth areas in terms of their biodiversity and agricultural importance (once identified in this report, assessment will take place in the next phase of the project).

The importance of these interventions is that spatial planning is an important vehicle for the inclusion of environmental issues in land use management and decision making and hence the identification of interventions could be used to inform future planning processes.

9.2 Review of planning legislation and policies

The main legislation underpinning planning in the province is listed in the Legal Report and includes:

- The Constitution.
- The Municipal Systems Act.
- The Municipal Structures Act.
- The Planning and Development Act.
- The Town Planning Ordinance (superseded).
- The Development Facilitation Act (Superseded).

These acts are administered by the following institutions:

- CoGTA; and
- Municipalities (District and Local).

The following planning policies are briefly reviewed as they provide the context within which district and local level spatial planning has taken place in the uMgungundlovu District and associated Local Municipalities. These policies allied to the historical development of the sub-region have contributed to shaping the spatial structure of the District.

The Accelerated and Shared Growth Initiative (ASGI-SA) has as its key focus poverty reduction. In order to address poverty, ASGI-SA indicates that opportunities in the following 3 priority sectors need to be identified including: tourism, business outsourcing and off-shoring and bio-fuels. The aim

is to ensure that the South African economy attains higher levels of economic growth in order to achieve poverty reduction.

The National Spatial Development Framework (NSDF) supports the development of sustainable local economies through integrated government action. This will be achieved by providing an overarching spatial and policy framework within which the objectives of ASGI-SA will be realised. In essence the spatial framework indicates that future settlement and economic development should be channelled into defined corridors and nodes adjacent or linked to major growth centres.

The Provincial Spatial Economic Development Strategy (PSEDS) is intended to guide spatial planning in the province and in the process gives effect to ASGI-SA and the NSDF. The following sectors are identified in PSEDS as the basis for 'driving' economic growth and development of the province: agriculture; a variety of forms of industry; tourism and services. PSEDS provides a differential spatial framework within which these sectors are located in the province (Figure 87).

In Figure 87 it may be noted that uMgungundlovu District and particularly the Msunduzi and uMngeni Municipalities form part of a level 1 node (Pietermaritzburg-Hilton-Howick) in the hierarchy. Furthermore these two Municipalities are located in the centre of all three types of corridor in the sub-region.

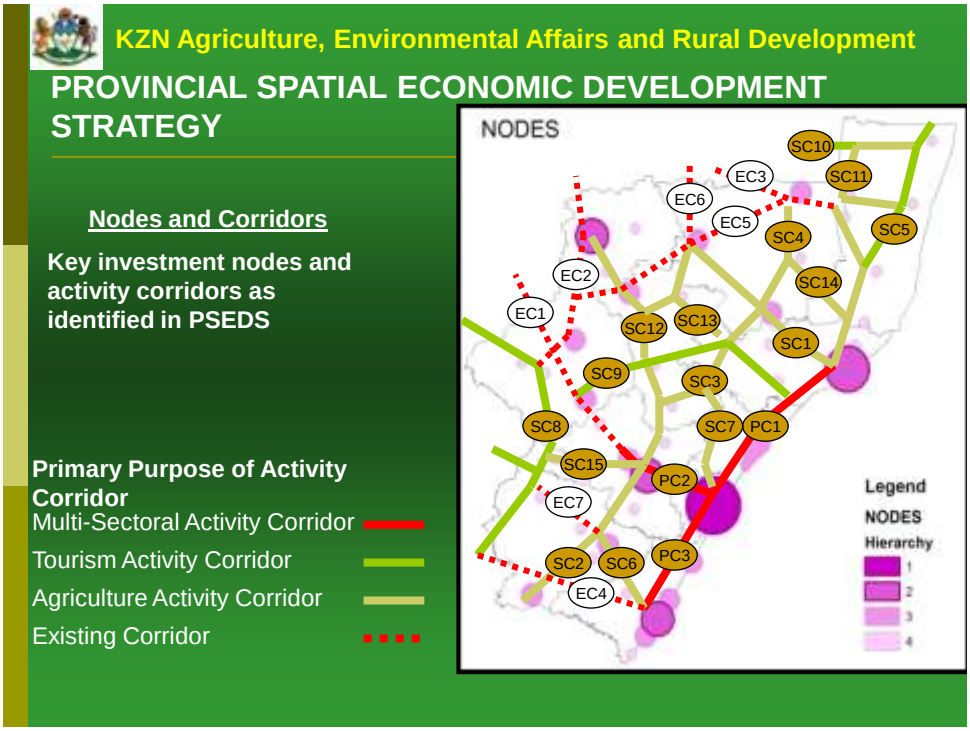


Figure 87: PSEDS Nodes and Activity Corridors (Mbangweni Project – DAEA/CoGTA 2009)

The PSEDS identifies the following priority sectors as being central to the sustained growth and development of the uMgungundlovu District:

- Expanding the agricultural sector to include emerging farmers in land reform at the same time safeguarding against the further loss of agricultural land to other uses;

- Extending the benefits of the existing tourism industry (Midlands Meander, Albert Falls Amber [INR 2010) to disadvantaged areas and communities; and
- Expanding and diversifying the industrial sector whilst at the same time ensuring availability of key inputs such as water, land and electricity.

The District Spatial Development Framework (SDF) is based on PSEDS in relation to the key economic sectors associated with the hierarchy of nodes and corridors in the District. Thus for example the corridor linking Ethekweni to Pietermaritzburg and Howick along the N3 is identified as a multi-sector activity corridor (Figure 87) in PSEDS and a Provincial corridor in the SDF (Figure 88). Similarly the Eastern Cape-Richmond-Msunduzi-Greytown corridor is identified as an agricultural activity corridor in PSEDS (Figure 87) and a Primary corridor in the SDF (INR (2010) and uMgungundlovu SDF (2007), Figure 88). In the PSEDS Pietermaritzburg is identified as a secondary node (Figure 87) whilst in the SDF it is a primary node (Figure 88) and Howick and Ashburton areas identified as a secondary nodes. Tertiary nodes are located at Richmond, Wartburg and Mooi-River. Future growth prospects are dealt with in municipal plans.

As noted these national, provincial and regional policies and plans provide the context within which this assessment of local spatial plans takes place.

Figure 88: uMgungundlovu SDF - see Map Book

9.3 Status of Plans

In this report reference is made to different types and levels of plans. The plans referred to have mainly been prepared by municipalities in terms of the requirements of the Municipal Systems Act and the Town Planning Ordinance/Planning and Development Act (Legal Report).It was necessary to visit Municipalities in order to obtain available planning materials. An initial telephonic survey indicated that the following material was available (Table 88).

Table 88: Status of Plans: IDPs and SDFs

Municipality	IDP	Comment	SDF	Comment
uMshwathi	Yes	2011/2012	Yes	October 2007
uMngeni	Yes	2011/2012	Yes	Adopted July 2010
Mpofana	Yes	2010/2011	Yes	Adopted in 2010
Impendle	Yes	2010/2011	Yes	SDF was done by ISIK (2010)
Msunduzi	Yes	2010/2011	Yes	June 2009 & Greater Edendale SDF also included
Mkhambathini	Yes	2010/2011	Yes	2007/2008 - prepared by Udidi
Richmond	Yes	2010/2011	Yes	2008 - prepared by UNP consulting
uMgungundlovu	Yes	2010/2011. 2011/2012 is still in draft form	Yes	June 2007. Prepared by Udidi

Table 89: Availability of LUMS, Schemes and Framework Plans

Municipality	Schemes	Comment	Precinct
uMshwathi	Yes	Scheme maps and clauses available in hard copy format for Camperdown and Cato Ridge	Urban Restructuring Project & Corridor Development Plan
uMngeni	Yes	Scheme maps and clauses available in hard copy format for Howick and Mphopomeni	Corridor Management Plan
Mpofana	Yes	Scheme maps and clauses available in hard copy format for Mooi River Barndville	
Impendle	Yes	We don't have them. They cover the Impendle town.	Impendle Village Urban Design Framework
Msunduzi	Yes	Yes and with the scheme clauses	Framework Development Plan 2009
Mkhambathini	Yes	Currently the LM is using the scheme which covers the area of Camperdown. We have a hardcopy map and the clauses	Municipal housing plan, adopted in 2009
Richmond	Yes	We don't have them. They cover the Richmond town area only	Framework plan for Thornville, Baynesfield and Hopewell
uMgungundlovu	NA	NA	NA

Table 88 and Table 89 indicate the status of the strategic and spatial plans that have been prepared by Municipalities dating back to 2007. Table 89 deals with the status of schemes and precinct plans in the Municipalities. It appears that schemes have been prepared for all formal urban areas in the Municipalities under the Town Planning Ordinance. At this stage no Municipalities have yet completed the 'wall to wall' schemes anticipated in the Planning and Development Act.

As may be noted in Table 90, a number of Municipalities have prepared framework plans (precinct plans) for detailed input at a more localised level. In the preparation of this report reference has been made to the planning documents that could be accessed digitally (mainly IDPs and SDFs) from municipalities in the District (Appendix 4: Assessment for inclusion of biodiversity issues into plans). The schemes located date back to the 1980s and early 1990s and were prepared in terms of the Town Planning Ordinance.

Table 90: Plans Made Available by Municipalities

Municipality	IDP	SDF	Scheme	Precinct
uMshwathi	✓	✓	✓	✓
uMngeni	✓	✓	✓	✓
Mpofana	✓	✓	✓	
Impendle	✓	✓	✓	✓
Msunduzi	✓	✓	✓	✓
Mkhambathini	✓	✓	✓	✓
Richmond	✓	✓	✓	✓
uMgungundlovu	✓	✓		

9.4 Assessment of Plans

The aim of this section of the report is to establish the extent to which environmental issues have been taken into account in the abovementioned plans. The Department of Agriculture, Environment Affairs and Rural Development assessment of the 2011/12 Integrated Development Plans for Municipalities in the uMgungundlovu District is included in Table 91 below. In addition an assessment has been undertaken by the team for this project and the outputs are included in Appendix 4: Assessment for inclusion of biodiversity issues into plans. The evaluation by DAEARD allied to this assessment has been used to indicate the type and level of intervention required to achieve integration of biodiversity issues into spatial and strategic plans.

Table 91: Integrated Development Plan Review (2011/12): Environmental Analysis - uMgungundlovu District (DAEARD, 2011)

Municipality	Trend	Score	Overall comments
Impendle	⟺	4	Following the significant improvement in the IDP seen in the previous review this IDP has maintained a good standard and sustainability led approach. Limitations in capacity in the municipality however may limit implementation and limited attention is given to waste management issues. Environmental management is acknowledged and integrated into key priorities, strategies and projects. The IDP and associated SDF are very good regarding environmental sustainability.
uMngeni	↓	3	No clear improvement in the IDP. Environmental management and sustainable development principles are acknowledged. Sustainable development not effectively integrated into IDP. SDF and draft LUMS provide a good practical planning approach to addressing environmental issues. Draft SEA and EMP referenced however not undertaken. IWMP not integrated into IDP.
uMshwathi	⟺	3	Could not review 2011/12 IDP against Environmental credibility framework as only an executive summary was produced. Review based on last year's score.
Msunduzi	↓	2	Overall deterioration in the IDP. Outcomes of the Msunduzi EMF and sustainability framework not integrated into IDP. Information included is outdated and has not used significant environmental information developed in the EMF. Some projects related to environmental management included in the IDP. Waste management plan not included.
Mpofana	⟺	2	Overall no change in IDP. SDF review process has not adequately updated environmental layers or taken into consideration environmental information into spatial planning.
uMgungundlovu	⟺	2	Overall there has been little change since last IDP review. Environmental management and sustainable development principles have not been sufficiently integrated into IDP. Significant mention and funding to IWMP and EMP and

Municipality	Trend	Score	Overall comments
			associated projects. Significant attention being given to waste water treatment works and waste disposal which is also commendable. However, the IDP should be informed more by the IWMP
Mkhambathini	⟺	1	No significant improvement in IDP. Mkhambathini Municipality includes environmental development in its vision statement but does not translate this into strategies, projects and actions. No budgetary allowance for environmental sector plans and projects. The high development pressure in the Municipality has made it integral for a higher priority to be placed on development that is environmentally sustainable
Richmond	⟺	1	No significant change has been noted in the IDP. Greater emphasis needs to be placed on resource management and incorporation of environmental management in spatial planning. There is indication of undertaking a SEA/EMP and LED process to inform the development of LUMS. It is recommended that this process be integrated in the same manner that Impendle undertook the same initiative.

KEY: TREND

Significant Deterioration	Deterioration	No-change	Improvement	Significant Improvement
↓	↓	⟺	↑	↑

KEY: SCORE

1	2	3	4	5
Poor – No reflection of environmental management or sustainable development.	Average (45-55%): Some reflection of environmental issues, and some strategies to address issues	Good (55 – 65%): Environmental issues identified and strategies outlined to address these issues	V-Good (65 - 75%): Environmental issues identified and strategies including clear projects and programmes included to address	Excellent (+75%): Environmental issues being addressed, environmental policies and plans in place, well capacitated and empowered municipality to implement

Based on the outcomes of the assessment by DAEARD the indications from Table 91 are that only 1 Municipality in the District achieved a score of 4 with 25% achieving a score of 3, a further 37.5% a score of 2 and 25% a score of 1. The DAEARD scoring system is used to make suggestions on the

type of interventions required to increase the integration of environmental issues into the planning process in all Municipalities in the District. The 'suggested interventions' in Table 92 involve reference to the score above that achieved in the DAEARD 2011/12 assessment. In other words the 'suggested interventions' are aimed at 'moving' all Municipalities to a progressively higher score in terms of integrating and actioning environment in the planning and development process.

Table 92: Assessment of Integration of Environmental Issues into the IDPS

Municipality	DAEARD	DAEARD Assessment	Suggested Interventions
Impendle	4	V-Good (65 -75%): Environmental issues identified and strategies including clear projects and programmes included to address	(i) Environmental issues need to be addressed (ii) Environmental policies and plans need to be set in place (iii)Capacity in municipality required to implement
uMngeni and uMshwathi	3	Good (55 – 65%): Environmental issues identified and strategies outlined to address these issues	(i) Environmental issues need to be addressed (ii) Strategies including clear projects and programmes need to be included and addressed
Msunduzi, Mooi-Mpofana and uMgungundlovu	2	Average (45-55%): Some reflection of environmental issues, and some strategies to address issues	(i) Environmental issues identified (ii) Strategies outlined to address these issues
Mkhambathini and Richmond	1	Poor: No reflection of environmental management or sustainable development.	(i) Reflection of environmental issues (ii) Some strategies to address issues

9.5 Review of SDFs

9.5.1 Rationale

This section of the report will be used to establish types of zonation, structuring principles, hierarchy of nodes and areas of planned growth and expansion within each of the Municipalities. It has been established in the other sections of the status quo report that the distribution of natural resources does not necessarily follow administrative boundaries. Consequently, it is deemed necessary to identify ways of standardizing zonation in the SDFs and the inclusion of biodiversity issues into land use management of each Municipality to ensure sustainability and in the process avoid resources depletion (eg. sustainable water production, soils for food production).

9.5.2 Review

Appendix 4: Assessment for inclusion of biodiversity issues into plans provides an extract of selected information from each of the municipal SDFs in uMgungundlovu. The intention is to establish the extent of alignment between the SDFs in terms of the following:

- Zoning systems used in urban and rural areas;
- Type and level of node identified for growth and development in the municipality;
- Corridors identified for transportation and development;
- Location for future growth.

Zoning:
The indications are that there is some commonality in zoning used in the SDFs, but the greatest variation occurs between those municipalities that are predominantly urban as opposed to those predominantly rural. The findings in this assessment indicate that there is a need for all municipalities in the district to work together to establish a common zoning system for urban, peri-urban and rural areas inclusive of private, state and Ingonyama Trust Board owned land.

Nodes:
The type and level of centres selected as nodes in the SDFs differ once again in terms of the urban versus rural nature of the municipalities. For example a secondary node in uMngeni differs from such a centre in Mooi-Mpofana or Impendle. Once again a hierarchy of centres common to all municipalities would enable standardisation on a cross boundary basis particularly in relation to identification of growth centres, provision of services and facilities.

Corridors:
A wide range of transportation routes in the SDFs are accorded priority corridor status and do not necessarily align on a cross boundary basis. There may be some confusion between 'corridor' and transportation route. The priority corridors need to be aligned between municipalities and accorded common status to achieve alignment for investment.

Future Growth:
All identified first, second and third order nodes are shown in the SDFs as centres for future growth in terms of housing, services provision, and services. The lower order centres provide lower order services and visa versa for the higher order centres. It is only in the primary and secondary centres that attention is given to industrial development and large scale commercial outlets. The SDFs are silent on development in traditional areas (e.g. housing upgrades) and the ongoing applications for estate and recreational developments in rural agricultural areas.

The implications of these findings will be dealt with under the summary section at the end of this report.

9.5.3 High profile growth areas: Provincial priority corridor

Owing to its scale and importance, the N3 corridor is identified as one of the major drivers for economic growth and development in the uMgungundlovu District. This is recognised as a Provincial Corridor (PC2) which extends from Mkhambathini, through Msunduzi and uMngeni to Mpofana Municipalities.

Mkhambathini make provision for a planned development node around Camperdown to take advantage of this development opportunity for the future. Camperdown is identified as a primary development node in the SDF with low impact mixed use planned for either side of the N3 (Diagram 1). The primary node is planned for administration, residential development, light industry, retail and services provision.

Msunduzi has identified 3 distinct areas for planning and development of the municipality including:

- The former borough of Pietermaritzburg;
- Greater Edendale;
- Vulindlela tribal area.

It is noted that location of the municipality on the N3 and other key provincial corridors is a key informant to the growth and development of the Msunduzi municipality (Diagram 1). Accordingly the municipality is structured around the following nodes: (i) Central Business District; (ii) Regional Multi-use-node (Liberty Mall); (iii) Multi-use node at Camps Drift; (iv) Community Multi-use nodes (Edendale and Ambleton); and (v) Administrative node on the edge of the CBD.

Future growth is promoted along the N3 corridor, but in a manner that does not impede the main purpose of the route i.e. long distance transportation.

uMngeni has identified Howick, Midmar Dam, Mpophomeni, Merrivale, Cedara, Hilton, Worldsview as its primary node in the SDF (Diagram 1). In addition a N3 Corridor Plan has been developed which identifies 5 interchanges from Hilton to Tweedie as sites for 'imminent and future development' (Udidi 2008). The 5 interchanges were assessed to establish those best suited to development in uMngeni. The Hilton, Merrivale and Tweedie interchanges scored highest in the assessment undertaken by Udidi (2008). It is noted in the uMngeni Corridor Management Plan that the above three interchanges are seen as being'... most advantageous for promotion of development'. (Udidi 2008, Pg 43).

In the assessment of these interchanges attention has been given to bulk utility infrastructure and it is noted that water and sanitation amongst other services pose challenges to future growth and development. These two utilities are particularly important to note owing to their being directly linked to state of the environment of the district.

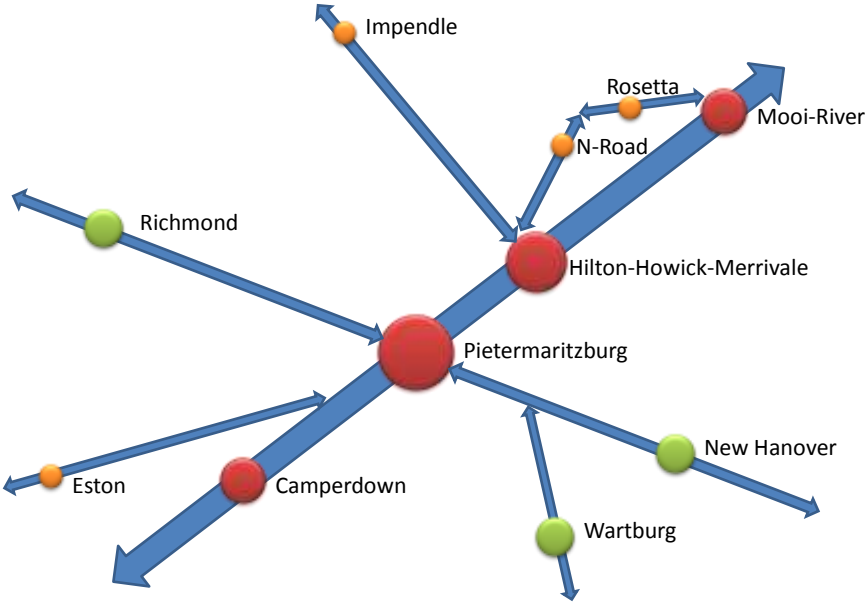


Figure 89: Overview of uMgungundlovu Nodes, Corridors and Growth Points

Figure 89 provides an overview of the spatial location of the different centres and corridors which 'make up' the basis for future growth and development of the region.

9.6 Spatial and Environmental Alignment

Spatial Development Framework maps for all Municipalities were 'merged' (Figure 88) by Mr G. Moore (GIS Shared Services Western Cluster) in order to establish commonalities and discrepancies at district level. At a meeting of the uMgungundlovu Planner's Forum (07/07/2011) one of the key observations is the different approaches (non-standardised) used in the preparation of these plans. This is linked to the difference in the years when these plans were produced as well as to the services providers who produced the plans. A further important observation made by Ms A. Ramnath of Umgeni Water (2011:Comments on the Status Quo) is that there have been municipal boundary changes over the period within which these SDFs have been prepared which in turn affects alignment. These differences apply to both the spatial planning and environmental inputs and hence there is a high degree of variability between the plans. A copy of the 'merged' SDF for the district is included in Figure 88.

In the spatial plans reviewed for this project, it was noted that limited reference is made in the SDFs to environmental sustainability issues as the underpinning factor determining how land (and therefore space) should be used in the municipality in the long term to ensure sustainability. The emphasis is rather on open space, green belts, wetlands and agricultural areas etc. Whilst these are critical elements for spatial structuring they do not provide the basis for a sustainable spatial structure for the future.

The following alignment issues are noted:

- The type and level of corridor identified in the SDFs varies from one municipality to the next;
- The priority rating of corridors also varies between municipalities based on their individual interpretations of the future for their areas;
- Broad land use zoning varies between municipalities: alignment requires standardisation;
- There is a disjuncture between corridors identified for biodiversity purposes and for tourism development in certain of the SDFs;
- Sub-regional tourism routes need to be identified and aligned at district level for inclusion in local municipal SDFs;
- There is no consistency in the identification or zoning of high priority agricultural lands in the SDFs;
- In a number of SDFs there is a mix of 'informant' and 'designation' material on the SDF maps which causes confusion in interpretation.

Table 93 provides a more detailed assessment of alignment issues.

Table 93: Inter-Municipal SDF Alignment Issues

Municipalities	Alignment Issues
Mkhambathini-Richmond	Conservation block does not extend into both municipalities
Richmond-Msunduzi	Corridor via Bainesfield not shown in the Richmond SDF
	Reserve in Richmond not shown in Msunduzi
Impendle-uMngeni	Primary corridor between municipalities is different
	The upper berg route is down played in Impendle and accorded tourism corridor status in uMngeni
Mpofana-uMngeni	The hierarchy of transportation corridors does not match
	The Mooi River to Greytown route (R622) is not aligned
Mshwathi - Msunduzi	The importance of Pietermaritzburg - Wartburg - Tongaat as a corridor route is not highlighted
uMngeni-Mshwathi	Future development plans for the Albert Falls and Spring Grove Dams need to be included in the SDFs
Mshwathi-Msunduzi	Non-alignment over the role of the R33 route and surrounding areas between the municipalities
Mkhambathini - Mshwathi	The transportation route between these municipalities is not clearly defined
Mshwathi-Mkhambathini-Msunduzi	There are differences in the SDFs concerning the role of the N3 corridor

9.7 Summary of issues

The summary of issues, followed by interventions, arising from this review are presented under each of the objectives identified in Section 9.1.

9.7.1 Integration of environmental issues into the planning process

Issue:

- In terms of the assessment by DAEARD, inclusion of environmental issues and considerations into the spatial planning process (by municipalities) has proven to be limited thusfar. Interventions are required to achieve progressive inclusion of environmental issues in the interests of sustainability.

Suggested Interventions:

- There is an opportunity in the preparation of 'wall to wall' schemes by 2015 in terms of the requirements of the PDA to incorporate environmental issues into the spatial plans in municipalities and in the process overcome alignment and definitional issues.
- Use of the district level SEA by municipalities will provide the basis for inclusion of a standardised environmental layer into the spatial plans as a point of departure in this process.
- Inculcate an understanding among planners and municipal decision makers that biodiversity and environmental matters are not solely tied to conservation and green open space: the social and economic health and sustainability of a municipality and people is reliant upon the state of the environment. This understanding needs to be fed into all aspects of spatial planning, land use management and decision making.

9.7.2 Reviewing proposed areas for growth and development in terms of their biodiversity and agricultural significance

Issues:

- There are differing interpretations in the spatial plans in relation to: zoning, nodes, corridors and environmental issues. To achieve meaningful alignment these aspects of the spatial plans need to be given common definitions at district level and then applied to local plans. Common definitions would serve to standardise the type and level of node, corridor etc. anticipated in the plans and the context in which they are located. This in turn would allow for the standardisation of environmental input required in the planning process to ensure sustainability. For example, rural nodes could have negative impacts on biodiversity (i.e. transformation) and positive social and economic impacts. In contrast urban nodes are likely to have limited negative impacts on biodiversity and positive impacts on social, economic and cultural aspects of a municipality.
- Different interpretations of land use zoning has resulted in the application of different conditions, at scheme level, to land use management by the municipalities. The issue here is that the distribution of natural resources is not confined to municipal boundaries and hence differential land use management could result in depletion and attendant consequences.
- It appears that none of the plans reviewed account for the environmental 'limits' to development in each of the municipalities. This involves taking into account the types, quantity and quality of environmental goods and services that can be delivered in a municipality, the limits to the provision of such goods and services and the threats associated therewith. Examples of goods and services[20] here include: clean water, clean air, agricultural products, mineral resources. There are direct and indirect costs associated with exceeding the limits of

[20] A good produced by the environment could for example include indigenous timber. A service could include water and air purification through wetlands and indigenous vegetation.

available local resources. Direct costs involve importation of scarce resources at additional costs to the end user (eg. water transfer schemes). Indirect costs involve for example negative impacts on community health eg. Msunduzi air quality.

- Interpretation of national and provincial planning policies for application at local level is important since there are instances where 'blind' application of these policies can have negative implications for both communities and the environment (Isik 2009). An example here includes high level infrastructural investment in urban centres aimed at housing people from rural areas. There is evidence to suggest that this has resulted in increased levels of hardship for these people in urban areas and difficulties for municipalities which are unable to sustain the increased costs associated with operating and maintain such developments (eg. Bruntville). It has been indicated in urbanisation studies conducted by DRD&LR (2009) that there is a high level of indirect subsidy taking place in rural areas where households depend on available ecological goods and services to augment their risk management strategies.

Suggested Interventions:

- There is a need to address non-alignment through standardisation of SEAs and schemes (land use management systems) at both district and municipal levels.
- Spatial plans need to take cognisance of the environmental limits to development through inclusion of sustainability criteria in identification of future growth areas. The concept of 'no-go' areas and 'no further development' needs to be included in identified high value areas many of which are located in a number of municipalities.
- National and provincial policies on economic development and spatial planning need to be examined carefully to establish possible positive and negative impacts on the environment. These concepts need to be adapted to suit local conditions.

9.7.3 Alignment of planning processes between municipalities

Issues:

- Bulk infrastructure in the form of water supplies and transportation routes in spatial plans do not always align from one municipality to the next. An example of this is that Impendle is suggesting the downgrading of the Himeville to Nottingham Road scenic route whilst uMngeni is promoting the route for tourism development.

Suggested Interventions:

- Non-alignment between the SDFs around transportation routes and bulk infrastructure needs to be resolved at district level.
- Ensure that spatial plans account for environmental issues that affect them beyond their boundaries: river systems, air, ground water, biodiversity corridors etc.

- Agreement needs to be reached among municipalities on a common approach to rural planning to avoid duplication, unnecessary loss of natural resources and rationalisation of cost in planning for the provision of services (Isikhungusethu 2011).

10 OPPORTUNITIES AND CONSTRAINTS TO DEVELOPMENT

10.1 Sustainability

According to DEAT (2007) opportunities and constraints for and against the achievement of the sustainability objectives need to be identified. It further states that these need to be identified during the status quo phase as a link between the current and desired state of the environment. Considering that the formulation of the sustainability objectives within the sustainability framework will take place in the development of the SEA phase, it is premature to identify and include a list of opportunities and constraints in this report. A discussion of considerations is however provided and which provides context for this component of an SEA.

Sustainability is pivotal to the development of an SEA and as will be seen in subsequent phases of this project, the sustainability framework with its overall vision and objectives will be the point of departure for the SEMP. All decision making that is based on the principles of sustainability will be economically viable, socially acceptable and within the bounds of what the natural capital can provide. It is therefore critical that it is understood that this project and its component parts, aims to ensure that the economy and economic growth of the UMDM and its adjacent municipalities, is nested within an understanding of the need to invest in its natural capital.

10.2 The Role of Natural Capital Restoration and Maintenance in Job Creation

In assessing the opportunities and constraints that the environment places on development in the UMDM it is important to summarise the context that has been provided by the information presented in the preceding sections. From these discussions it can be seen that there are a number of over-arching considerations which are as follows:

- The UMDM is strategically positioned between the water factory that is the KwaZulu Natal Drakensberg, and the coastal metro of eThekwini, which together with the UMDM, is placing huge demand on the water resources. In addition to the demand which exceeds supply, there are many sources of pollution which are impacting on water quality. Unsustainable land use practices in the upper reaches of the UMDM are contributing to the stress on the water resources as catchment integrity has been compromised.
- Close to 50% of the surface area of the UMDM has been transformed from its original vegetation cover, either through degradation and/or development.
- This implies that the UMDM has lost 50% of its natural capital and the related ecosystem goods and services it produces and delivers. While much of the development that has replaced this natural capital may have realised economic growth, there are many negative consequences that have resulted and have not been internalised by the developers and operators. This lack of internalisation has meant that many social costs have and are being passed on to society, and it is often the case that these opportunity costs far exceed the costs of maintaining the natural capital. The UMDM have thus foreclosed on numerous opportunities where the sustainable management of the natural capital would be the least cost option, especially as this relates to the delivery of services such as water and sanitation.

As a result of the situation summarised above the UMDM is in a position where the condition of the natural capital places more constraints on development than it offers opportunities. However, it is possible that the situation can be turned around in some instances. This is particularly relevant when considered within the context of the role and value of the natural capital is high and where government job creation projects such as Working for Water and the Extended Public Works Programme can invest in environmental rehabilitation projects. Figure 90 illustrates the relationship between the production of ecosystem goods and services (EGS) as a factor of natural capital value per local municipality in relation to poverty levels at the same scale. This highlights the opportunities inherent in the restoration and management of the natural capital of the UMDM.

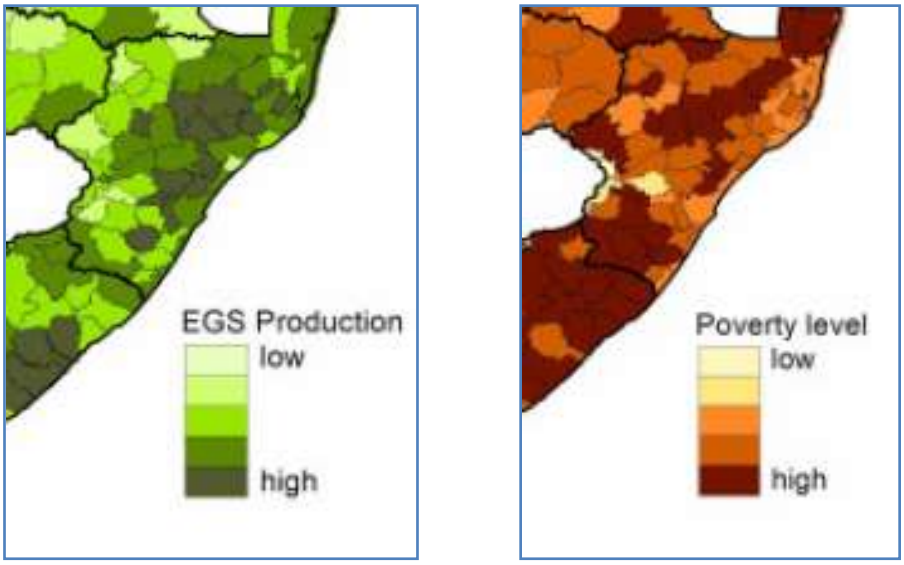


Figure 90: Maps of KwaZulu Natal showing the production of ecosystem goods and services (EGS) on the left and poverty levels on the right per local municipality (Source: Egoh *et al*, 2008)

This relationship is further clarified in Table 94 where the District's Local Municipalities have been listed together with the scores for EGS production and poverty, where the values range from 1 being low and 5 being high. From this comparison it can be seen that the potential for 'green jobs', i.e. employment in the rehabilitation and management of natural capital, is high is Mpofana, Msunduzi, Mkhambathini and uMshwati, while Impendle and Richmond also show good potential, although uMngeni cannot be discounted as its potential is average. The scores that have been used here reflect the expert opinion as captured in Egoh *et al* (2008) and provide a relative indication of the variables under consideration.

Table 94: A comparison of ecosystem service production and poverty levels per Local Municipality within the UMDM

Local Municipality	EGS Production	Poverty Level	Opportunity
Implendle	2	5	3.5
Mpofana	4	4	4
uMngeni	3	2	2.5
Msunduzi	5	3	4
Richmond	3	4	3.5
Mkhambathini	5	4	4.5
uMshwati	5	4	4.5

10.3 Climate Change and Opportunities for Job Creation

The UMDM has commissioned a project to produce a Climate Change Response Strategy and has recognised the synergy that is required between this project and the SEA and SEMP. However, there is another perspective associated with climate change that suggests that the unsustainable practices that are prevalent within the UMDM are contributing to climate change and that the latter is therefore simply a symptom of these practices. It is thus highly likely that the Climate Change Response Strategy will recommend that where natural capital has been abused and degraded, restoration and rehabilitation will be an appropriate response strategy. In addition to this, it may recommend that where natural capital is still intact, it should be well managed and maintained. In this way investments into the rehabilitation and management of the UMDM's natural capital will help to build resilience to negative implications such as climate change.

Within the context of the above and further to the illustrations provide in Section 8.1, work done by the Industrial Development Corporation (IDC), the Development Bank of South Africa (DBSA) and Trade & Industry Policy Strategies (TIPS) has shown that the potential for 'green jobs' in South Africa is going to become a significant player in the economy. The rehabilitation and management of natural capital therefore not only is feasible from the perspective of under-pinning the economy, but also for contributing to job creation. The projections made in the short, medium and long-term are illustrated according to various 'green economic' sectors in Figure 91.

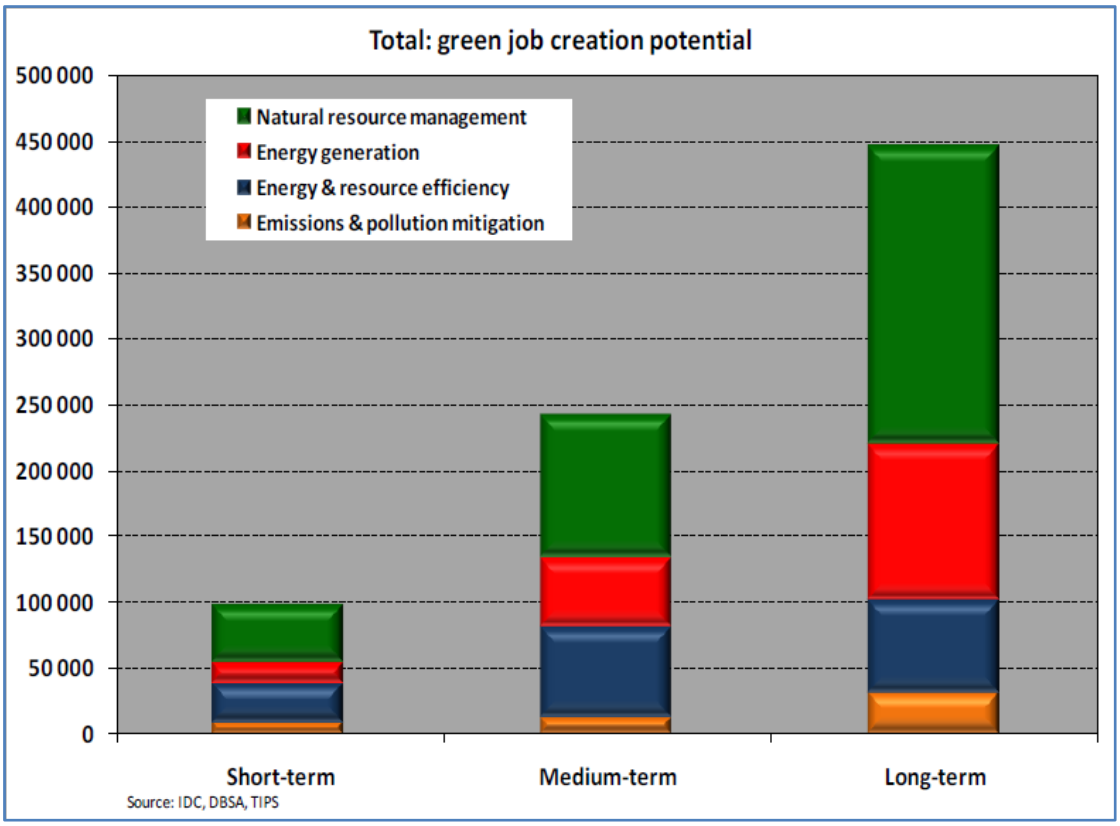


Figure 91: A projection of the number of jobs that will be created through the green economy

11 CONCLUDING SUMMARY

The locality of the UMDM is inclusive of a number of strategic features from the natural, economic and socio-economic perspectives. It is positioned between the water supply areas for the cities of Pietermaritzburg and Durban. The N3 highway enters the municipality at Camperdown and exits west of Mooi River after traversing major centres such Pietermaritzburg and Howick. These features reflect both natural, or green infrastructure, and built infrastructure that have significant bearing on the economic activities and livelihoods of the people in the UMDM, in the eThekwini Metro, and beyond. They reflect an inter-relatedness that needs to be well understood by decision-makers in order to ensure that the influences of one are not allowed to have detrimental impacts on the other. It is this balance that is being sought through the Strategic Environmental Assessment process, although it may be necessary to implement natural capital restoration in order to ensure that the sustainability objectives are achieved.

This concluding summary is a synthesis of the summaries from each of the chapters of this report that provides the reader with a final and overall view of the status quo or state of the environment in the UMDM and a platform from which the next phase of the project can be launched, i.e. the formulation of a desired state of the environment and the sustainability framework. These in turn will be used, together with their supporting spatial products, to identify the actions that are required by the UMDM and their strategic partners in order to move towards the desired state.

11.1 Natural Capital and Cultural Heritage

11.1.1 The Terrestrial Environment

According to the 2005 land cover data for the UMDM just over 57% was considered to be in a natural state with 1.6% being degraded natural cover and the just less that 41% being transformed. The 2008 land cover data reflects a negative trend in that approximately 51% was considered untransformed and still in relatively good condition with a significant increase to 4.5% of degraded natural cover and the area under transformed land increased to 44.5%. Considering the trends reflected in this data, a conservative estimate of the current situation may be that more than 50% of the pristine natural land cover of the UMDM has been lost to a combination of transformation and degradation. This has occurred as a result of all forms of agriculture, except sugar, increasing in their cover, and growth and expansion of both urban and rural settlement. . In conjunction with this has been a decrease in the cover of natural vegetation, primarily grasslands, and an increase in that which is considered degraded. It is important to note that the land cover data includes both aquatic and terrestrial categories.

There is a scattering of a variety of protected areas throughout the UMDM that range in size and status from a sizable portion of the uKhahlamba Drakensberg Park World Heritage Site, i.e. almost 67000 hectares, to the 530 hectares of the proposed Biodiversity Stewardship site known as Hopedale. These 33 protected areas make up close to 110000 hectares which is 11.5% of the UMDM surface area. Based on the international target of 10%, this coverage appears to be impressive. However, the Biodiversity Sector Plan for the UMDM and the Protected Area Expansion

Strategy for the province indicate that the current protected area coverage is not meeting the biodiversity conservation targets for the UMDM, and that additional coverage is required.

Although the two planning tools referred to above are bio-centric, it is important to understand that inherent within their outcomes are significant anthropogenic benefits. In other words, the biodiversity and ecosystem features that have been used to generate these targets all represent strategically valuable natural capital which produces ecosystem goods and services that underpin the socio-economic activities within and beyond the UMDM. This situation raises the issues of resilience and vulnerability in the sense that the more transformation that occurs, the more resilience is lost and vulnerability increases. While a climate change response strategy is being developed in parallel to this SEA, it is important to note that the consequences of this loss of resilience and increased vulnerability are in themselves significant and become even more relevant as the potential consequences of climate change become clearer.

11.1.2 The Aquatic Environment

The above discussion generally reflects the situation with regard to the terrestrial environment although mention has been made of the water sources for uMgungundlovu and eThekwini. More specifically the aquatic environment within the UMDM has become significantly compromised. The primary reasons for this relate to both the quantity of water in the systems and the quality of this resource, and the relationship between these factors exacerbate the situation, i.e. quantity is required to help address quality and the greater the demand on the systems, the more significant the reduced capacity to deal with the quality issues.

Essentially the aquatic systems in the UMDM are extremely stressed due to the fact that demand far exceeds supply to the extent that inter-basin transfer schemes have been introduced, are under construction and are planned to help meet the demand and augment the storage capacity of the four major dams already in the uMgeni system. Additional strategies such as water conservation and water demand management, and waste water recycling are also being implemented and considered respectively.

The upper reaches of the catchmentsthat provide the water are in a poor condition with alien plant infestations accounting for losses in water production together with incompatible land uses and degradation contributing to both a decrease in water production capacity as well as quality. Intensive agricultural practices such as dairies, poultry batteries and piggeries all contribute to releasing pollutants into the system in the upper reaches of the catchments, while the urban centres all contribute industrial and human waste. In the lower reaches of the catchments other agricultural activities such as sugar cane production contribute to reduced water quality through the leaching of agricultural chemicals.

11.1.3 Air Quality

Although the UMDM generates the third highest level of atmospheric pollution in the province, this level is relatively low. The aspect of primary concern though is the combination of the topographical and atmospheric conditions, and the concentration of pollution sourcesin the Msunduzi Local

Municipal area. The daily development of a strong and shallow surface temperature inversion layer in winter traps pollutants causing an exceedance of ambient air quality standards. The density of industrial activities in the other local municipal areas is much lower than in Msunduzi and the sources are predominantly domestic and agricultural, but are at levels that do not cause undue concern.

11.1.4 Cultural Heritage

One thousand and fifty heritage sites have been captured in this report but most of these are architectural in nature and are concentrated in the urban areas. In addition to these some historical and cultural resources were also recognised. Importantly these features are those that are on existing databases and the budget limitations did not allow any field work for the identification of sites that are currently unrecorded. This report states that the latter is a significant omission and that the UMDM is rich in cultural heritage resources. This will be recognised in the guidelines that form part of the SEA phase and outcomes.

11.2 The Socio-Econcomic Environment

11.2.1 Demographics

A review of the demographic data indicates a population increase of 1.1% per annum in the district from 2001 to 2007. The population demonstrates a youthful age-gender profile with the emphasis on the younger working-age groups and a dominance of females in the older age groups. This profile has implications for HIV-Aids infection levels and the negative impact that this could have on the economy and the younger generations.

11.2.2 Spatial distribution

The highly concentrated nature of settlement in the primary and secondary centres of the district (particularly Pietermaritzburg) poses challenges in terms of the level of services provision and the quality of operation and maintenance of these services. Where services are poorly maintained, then problems arise in relation to human health and safety and these also have an impact on biodiversity. An example here is poorly maintained reticulated sewerage systems resulting in blockages which in turn lead to effluent leakage into river systems. Owing to the scale and density of population in urban areas services failure has a much greater impact on the residents and environment than in scattered rural areas where people are largely self-sufficient and densities are substantially lower.

The scattered nature and extent of rural settlement in the district poses a range of challenges for different reasons to the urban areas. These relate to sustainability in terms of the provision of services in terms of logistics, costs and availability of natural resources (eg water and suitable land). This is particularly pertinent in the light of findings from the Land Use report where historic trends indicate an increase in areas under rural settlement and subsistence production, particularly in the traditional areas of the district.

11.2.3 Employment

- Unemployment has increased between 2001 and 2007, but still remains high.
- Despite high levels of unemployment, levels of employment are higher than those experienced in the province as a whole.
- The majority of the semi-skilled, skilled and professional employment opportunities are located in the districts' urban centres in secondary and tertiary sectors whilst the unskilled and semi-skilled employment are mainly located in rural areas in the primary sector.

11.2.4 Education

- Access to education between 2001 and 2007 improved for households in the district, however less than 30% of the population has matriculation or higher levels of qualification.
- Access to education has improved in urban areas particularly for senior schooling and post school educational facilities.
- It is assumed that senior education in rural areas is less accessible than in urban areas based on findings from related projects in the district.
- Access to primary education in rural areas tends to be within reasonable distance of larger settlements accessible by 'D' roads.

11.2.5 Services

- Access to essential services in the district appears to be above those for the province.
- The type and level of services (infrastructure and social) provided in the district varies according to the following:
  - Order of urban centre;
  - Rural or urban location.

    The implication of this is that the more accessible rural settlements will generally have access to services at RDP level. In contrast services in urban areas will tend to be at a higher then RDP level depending upon the level of centre.
- It is assumed that the majority of backlogs for water, sanitation and electricity exist in isolated rural areas.

11.2.6 Land Use

Land use trends were noted according to the following categories:

- Limited increase/decrease less than 10%;
- Increase/decrease up to 50%;
- Major increase/decrease 50-100%; and
- Dramatic increase/decrease above 100%.

Based on a comparison of data from 2005 and 2008 the following land use trends were noted:

- The majority of the local municipalities recorded transformation in land use (i.e. changes away from the original BRGs for the area). Only one of these was limited whilst the remainder recorded an increase.
- The same trend applies to commercial timber in the district.
- In the case of land under sugarcane it appears that there was only an increase in one municipality while in the remaining four (where sugar is cultivated) the area decreased.
- Commercial agriculture (vegetables, fruit etc.) increased in five municipalities and decreased in the remaining two.
- Subsistence agriculture increased throughout the district with four municipalities experiencing major increases and two dramatic increases.
- Land under grasslands in good condition decreased throughout the district.
- Land under natural vegetation (forests, bushlands etc.) was subject to limited losses in six municipalities.
- Land areas under urban and rural settlement increased throughout the district up to the 10% level.

In addition to the above trends 24% of the district is under land claim of which the majority was historically under commercial agriculture. The effect is that much of the land on these farms has been left fallow and in some cases, settled by beneficiaries.

11.3 The Planning Framework

The following is a list and brief discussion of the main issues pertaining to the planning framework relevant for the SEA in which it can be seen that there is a need for increased consideration of the natural environment in planning mechanisms and that these need to be aligned at the local level.

- Inclusion of environmental issues and considerations into the spatial planning processes of the municipalities has proven to be limited thus far. Interventions are required to achieve progressive inclusion of environmental issues in the interests of sustainability.
- There are differing interpretations in the spatial plans in relation to: zoning, nodes, corridors and environmental issues. To achieve meaningful alignment these aspects of the spatial plans need to be given common definitions at district level and then applied to local plans. Common definitions would serve to standardise the type and level of node, corridor etc. anticipated in the plans and the context in which they are located. This in turn would allow for the standardisation of environmental input required in the planning process to ensure sustainability. For example, rural nodes could have negative impacts on biodiversity (i.e. transformation) and positive social and economic impacts. In contrast urban nodes are likely to have limited negative impacts on biodiversity and positive impacts on social, economic and cultural aspects of a municipality.
- The distribution of natural resources is not confined to municipal boundaries and hence differential land use management between municipalities could result in depletion and attendant consequences.
- It appears that none of the plans reviewed account for the environmental 'limits' to development in each of the municipalities. This involves taking into account the types, quantity and quality of environmental goods and services that can be delivered in a municipality, the

limits to the provision of such goods and services and the threats associated therewith. Examples of goods and services[21] here include: clean water, clean air, agricultural products, and mineral resources. There are direct and indirect costs associated with exceeding the limits of available local resources. Direct costs involve importation of scarce resources at additional costs to the end user (e.g. water transfer schemes). Indirect costs involve for example negative impacts on community health e.g. Msunduzi air quality.

- Interpretation of national and provincial planning policies for application at local level is important since there are instances where 'blind' application of these policies can have negative implications for both communities and the environment (Isik 2009).
- Bulk infrastructure in the form of water supplies and transportation routes in spatial plans do not always align from one municipality to the next. An example of this is that Impendle is suggesting the downgrading of the Himeville to Nottingham Road scenic route whilst uMngeni is promoting the route for tourism development.

11.4 Agriculture

The indications are that agricultural resources are under threat in the Umgungundlovu district particularly in and around the nodal areas and the major transportation corridors. In this context agricultural resources include: (i) areas suited to cultivation; and (ii) natural grasslands (mainly used for livestock production). The indications from this project are that the district is inclusive of rich agricultural resources which have, in the past, been used to supply market demand in the district in the form of foodstuffs and raw materials for industry. However, as noted above, the resource is under threat.

Based on the findings of the land use report, some of the threats to agriculture in the district derive from urban 'sprawl', poor land use management by municipalities, economic recession and land reform. A further issue noted in this project was that agriculture and natural resources have not been assigned a realistic value by society. In other words the costs associated with the continued loss of both natural and agricultural resources in the district have not been fully quantified. One example is that this will mean that a greater proportion of our locally produced foodstuffs, building materials, etc. will have to be imported into the area at a greater cost to the end user. This view is supported by EKZNW at the recent launch of the Environmental Programme where it was noted that "...our natural environment (KwaZulu-Natal) is transforming so rapidly that unless we re-evaluate our management of it and begin to understand the economic value of the resources that sustain our society we are facing daunting costs replacing them" (Witness Saturday 5th November 2011).

Whilst it is noted that the future of agriculture is closely related to market forces, it is also noted in this project that in order for the resources and the sector to survive, there is an urgent need for the recognition of its importance by the state, associated provincial and local government agencies, the private sector and traditional institutions. Such recognition should provide the point of departure for the sector to tackle many of the serious challenges which it currently faces. In the process it is

[21] A good produced by the environment could for example include indigenous timber. A service could include water and air purification through wetlands and indigenous vegetation.

suggested that this would result in the apportionment of realistic values to agricultural resources which in turn would stimulate the need for the establishment of an effective regulatory framework for land use management and administration in rural areas of the district.

11.5 The Next Steps

From the above summary it can be seen that the extent and rate of development both within and associated with the UMDM has placed and continues to place the natural environment under stress. This is compromising its ability to support the socio-economic environment. From this baseline and understanding of the current situation it is possible to develop an understanding of what the condition of the natural environment needs to be in order to support and sustain the economy of the UMDM, and to express this as a "desired state". The format within which the desired state will be captured will be a sustainability framework which will set a long-term vision and a set of sustainability objectives aimed at moving the UMDM from the current to the desired state.

While every effort has been made to ensure that the Status Quo Report is as comprehensive as possible, within the limitations of the budget allocated to this project, and that the sustainability framework will endeavour to capture all that is necessary to bring about sustainable decision-making, it must be recognised that limited resources and capacity challenges within the UMDM and its strategic partners are key considerations in terms of implementation. As the process moves from the theory of the sustainability framework to the practicalities of implementation in the Strategic Environmental Management Plan, it is critical to ensure that latter is as achievable as possible. It is likely that the latter will be significantly less than what is captured in the sustainability framework and there will be implications which will have to be carefully considered. However, it is also important to remember that the time frames for these components of the project are different and that the SEMP will be reviewed and updated more frequently than the SEA and its sustainability framework.

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Appendix 1: Stakeholder Database

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Appendix 2: List of Red Data plant species known to occur, or likely to occur, within the uMgungundlovu District Municipality (GroundTruth, 2011a)

Family	Scientific name	Status
ACANTHACEAE	*Barleria argillicola*	Critically Endangered
	Barleria greenii	Critically Endangered
AMARYLLIDACEAE	*Clivia gardenii*	Vulnerable
	Nerine pancratioides	Vulnerable
ANACARDIACEAE	*Searsia rudatisii*	Endangered
APOCYNACEAE	*Asclepias bicuspis*	Critically Endangered
	Asclepias concinna	Vulnerable
	Asclepias woodii	Vulnerable
	Brachystelma franksiae subsp. *franksiae*	Vulnerable
	Brachystelma gerrardii	Endangered
	Brachystelma modestum	Near Threatened
	Brachystelma natalense	Critically Endangered
	Brachystelma petraeum	Vulnerable
	Brachystelma pulchellum	Near Threatened
	Ceropegia cycniflora	Vulnerable
	Mondia whitei	Endangered
	Schizoglossum bidens subsp. *hirtum*	Data Deficient
	Schizoglossum peglerae	Endangered
	Sisyranthus fanniniae	Vulnerable
	Woodia verruculosa	Vulnerable
APONOGETONACEAE	*Aponogeton ranunculiflorus*	Vulnerable
ASPHODELACEAE	*Aloe dominella*	Near Threatened
	Aloe kniphofioides	Vulnerable
	Aloe linearifolia	Near Threatened
	Aloe pruinosa	Vulnerable
	Kniphofia latifolia	Endangered
ASTERACEAE	*Cineraria atriplicifolia*	Vulnerable
	Cineraria glandulosa	Vulnerable
	Cotula paludosa	Near Threatened
	Gerbera aurantiaca	Endangered
	Helichrysum alticolum	Near Threatened
	Helichrysum citricephalum	Critically Endangered
	Senecio dregeanus	Vulnerable
	Senecio exuberans	Endangered
CELASTRACEAE	*Elaeodendron transvaalense*	Near Threatened
CORNACEAE	*Curtisia dentata*	Near Threatened
CUCURBITACEAE	*Gerrardanthus tomentosus*	Vulnerable
CYPERACEAE	*Carex subinflata*	Vulnerable
DIOSCOREACEAE	*Dioscorea sylvatica*	Vulnerable
DIPSACACEAE	*Cephalaria galpiniana* subsp. *galpiniana*	Vulnerable
ERICACEAE	*Erica natalensis*	Data Deficient
	Erica psittacina	Endangered
FABACEAE	*Argyrolobium longifolium*	Vulnerable
	Lotononis glabrescens	Data Deficient
	Macrotyloma coddii	Vulnerable

Family	Scientific name	Status
	Rhynchosia connata	Data Deficient
	Tephrosia inandensis	Endangered
GERANIACEAE	*Pelargonium woodii*	Data Deficient
GESNERIACEAE	*Streptocarpus* sp. nov. *'salpinx'*	Vulnerable
HYACINTHACEAE	*Bowiea volubilis subsp. volubilis*	Vulnerable
	Drimia cooperi	Vulnerable
	Drimia robusta	Data Deficient
	Eucomis bicolor	Near Threatened
	Merwilla plumbea	Near Threatened
HYDROSTACHYACEAE	*Hydrostachys polymorpha*	Vulnerable
IRIDACEAE	*Dierama luteoalbidum*	Vulnerable
	Dierama nixonianum	Endangered
	Dierama pallidum	Vulnerable
	Dierama pumilum	Vulnerable
	Dierama tysonii	Vulnerable
	Gladiolus cruentus	Critically Endangered
	Hesperantha gracilis	Vulnerable
	Moraea graminicola subsp. *graminicola*	Near Threatened
	Moraea hiemalis	Near Threatened
	Moraea unibracteata	Near Threatened
	Watsonia canaliculata	Endangered
ISOETACEAE	*Isoetes transvaalensis*	Near Threatened
	Isoetes welwitschii	Near Threatened
LAMIACEAE	*Plectranthus esculentus*	Data Deficient
	Stachys rivularis	Data Deficient
LAURACEAE	*Cryptocarya myrtifolia*	Vulnerable
	Ocotea Bullata	Endangered
LOBELIACEAE	*Cyphia corylifolia*	Data Deficient
MENYANTHACEAE	*Nymphoides forbesiana*	Data Deficient
MYRTACEAE	*Eugenia simii*	Vulnerable
ORCHIDACEAE	*Corycium tricuspidatum*	Data Deficient
	Cynorkis compacta	Vulnerable
	Disa maculomarronina	Near Threatened
	Huttonaea woodii	Vulnerable
POACEAE	*Colpodium drakensbergense*	Vulnerable
POLYGALACEAE	*Polygala praticola*	Data Deficient
PROTEACEAE	*Leucospermum gerrardii*	Near Threatened
	Protea comptonii	Near Threatened
	Protea nubigena	Critically Endangered
	Protea parvula	Near Threatened
RANUNCULACEAE	*Anemone fanninii*	Near Threatened
	Knowltonia bracteata	Vulnerable
RHIZOPHORACEAE	*Cassipourea gummiflua*	Vulnerable
ROSACEAE	*Prunus africana*	Vulnerable
RUBIACEAE	*Alberta magna*	Near Threatened
SALICACEAE	*Pseudoscolopia polyantha*	Near Threatened
SCROPHULARIACEAE	*Selago longiflora*	Endangered
ZAMIACEAE	*Encephalartos cerinus*	Critically Endangered
	Encephalartos ghellinckii	Vulnerable
	Encephalartos natalensis	Near Threatened

Appendix 3: List of Red Data fauna, and other species of significance, that occur, or likely to occur, within the uMgungundlovu District Municipality

Common name	Scientific name	Status
Amphibian		
Natal Leaf-folding Frog	*Afrixalus spinifrons intermedius*	Near Threatened
Natal Chirping Frog	*Anhydrophryne hewitti*	Localised endemic
Bilbo's Rain Frog	*Breviceps bagginsi*	Vulnerable
Cascade Frog	*Hadromophryne natalensis*	Localised endemic
Spotted Shovel-nosed Frog	*Hemisus guttatus*	Vulnerable
Sharp-nosed Reed Frog	*Hyperolius acuticeps*	Rare in KZN[1]
Natal Tree Frog	*Leptopelis natalensis*	SA Endemic
Long-toed Tree Frog	*Leptopelis xenodactylus*	Endangered
Kloof Frog	*Natalobatrachus bonebergi*	Endangered[2]
Reptile		
Thin-tailed Legless Skink	*Acontias gracilicauda*	Potentially important[1]
Emerald Dwarf Chameleon[1]	*Bradypodion 'Emerald'*	Localised endemic
Black-headed Dwarf Chameleon	*Bradypodion melanocephalum*	Potential Red Data species
Midlands Dwarf Chameleon	*Bradypodion thamnobates*	Potential Red Data species
Cape Grass Lizard	*Chamaesaura anguina*	Potential Red Data species
Large-scaled Grass Lizard	*Chamaesaura macrolepis*	Potential Red Data species
Siundevall's Garter Snake	*Elapsoidea sundewalli sundewalli*	Rare endemic
Common File Snake	*Gonionotophis (Mehelya) capensis*	Rare
Striped Harlequin Snake	*Homoroelaps dorsalis*	Potential Red Data species
Natal Hinged Tortoise	*Kinixys natalensis*	Localised endemic
Yellow-bellied House Snake	*Lamprophis fuscus*	Potential RD species
Spotted House Snake	*Lamprophis guttatus*	Uncommon in KZN[3]
Natal Black Snake	*Macrelaps microlepidotus*	Potential Red Data species
Cream-spotted Mountain Snake	*Montaspis gilvomaculata*	Localised endemic
Southern African Python	*Python natalensis*	Protected and uncommon
Bourquin's Dwarf Burrowing Skink	*Scelotes bourquini*	Potential Red Data species
Breyer's Long-tailed Skink	*Tetradactylus breyeri*	Potential Red Data species
Short-legged Seps	*Tetradactylus seps (KZN population)*	Possibly a localised endemic[1]
Red-sided Skink	*Trachylepis homalocephala (isolates)*	Isolated population[1]
Cottrell's Mountain Lizard	*Tropidosaura cotrelli*	Localised endemic
Natal Mountain Lizard	*Tropidosaura montana natalensis*	Possibly a localised endemic[1]
Bird		
Half-collared Kingfisher	*Alcedo semitorquata*	Near Threatened
Blue Crane	*Anthropoides paradiseus*	Vulnerable
Short-tailed Pipit	*Anthus brachyurus*	Vulnerable
Yellow-breasted Pipit	*Anthus chloris*	Vulnerable
Grey Crowned Crane	*Balearica regulorum*	Vulnerable
Eurasian Bittern	*Botaurus stellaris*	Critically Endangered
Southern Ground-Hornbill	*Bucorvus leadbeateri*	Vulnerable
Wattled Crane	*Bugeranus carunculatus*	Critically Endangered
Woolly-necked Stork	*Ciconia episcopus*	Near Threatened
Black Stork	*Ciconia nigra*	Near Threatened
Pallid Harrier	*Circus macrourus*	Near Threatened
Black Harrier	*Circus maurus*	Near Threatened

Common name	Scientific name	Status
African Marsh-Harrier	*Circus ranivorus*	Vulnerable
Eastern Bronze-naped Pigeon	*Columba delegorguei*	Vulnerable
Corn Crake	*Crex crex*	Vulnerable
Lanner Falcon	*Falco biarmicus*	Near Threatened
Lesser Kestrel	*Falco naumanni*	Vulnerable
Peregrine Falcon	*Falco peregrinus*	Near Threatened
Southern Bald Ibis	*Geronticus calvus*	Vulnerable
Bearded Vulture	*Gypaetus barbatus*	Endangered
Cape Vulture	*Gyps coprotheres*	Vulnerable
Ayres's hawk-Eagle	*Hieraaetus ayresii*	Near Threatened
Blue Swallow	*Hirundo atrocaerulea*	Critically Endangered
Bush Blackcap	*Lioptilus nigricapillus*	Near Threatened
Black-bellied Bustard	*Lissotis melanogaster*	Near Threatened
Denham's Bustard	*Neotis denhami*	Vulnerable
African Pygmy-Goose	*Nettapus auritus*	Near Threatened
Great White Pelican	*Pelecanus onocrotalus*	Near Threatened
Pink-backed Pelican	*Pelecanus rufescens*	Vulnerable
African Finfoot	*Podica senegalensis*	Vulnerable
Cape Parrot	*Poicephalus robustus*	Endangered[4]
Martial Eagle	*Polemaetus bellicosus*	Vulnerable
Greater Painted-snipe	*Rostratula benghalensis*	Near Threatened
Secretarybird	*Sagittarius serpentarius*	Near Threatened
Striped Flufftail	*Sarothrura affinis*	Vulnerable
Broad-tailed Warbler	*Schoenicola brevirostris*	Near Threatened
African Crowned Eagle	*Stephanoaetus coronatus*	Near Threatened
Black-rumped Buttonquail	*Turnix nanus*	Endangered
African Grass-Owl	*Tyto capensis*	Vulnerable
Black-winged Lapwing	*Vanellus melanopterus*	Near Threatened
Orange Ground-Thrush	*Zoothera gurneyi*	Near Threatened
Mammal		
Syke's Monkey	*Cercopithecus mitis labiatus*	Endangered
Sclater's Golden Mole	*Chlorotalpa sclateri*	Data Deficient
Rough-haired Golden Mole	*Chrysospalxa villosus*	Critically Endangered[5]
Maquassie Musk Shrew[5]	*Crocidura maquassiensis*	Vulnerable
Water Rat	*Dasymys imcomtus*	Near Threatened
Tree Hyrax	*Dendrohyrax arboreus*	Vulnerable
Cape Molerat	*Georychus capensis*	Endangered[1]
De Winton's Long-eared Bat	*Laephotis wintoni*	Vulnerable
Serval	*Leptailurus serval*	Near Threatened
Spotted-necked Otter	*Lutra macullicollis*	Near Threatened
Honey Badger	*Mellivora capensis*	Near Threatened
Lesser Long-fingered Bat	*Miniopterus fraterculus*	Near Threatened
Natal Clinging Bat	*Miniopterus natalensis*	Near Threatened
Temmick's Hairy Bat	*Myotis tricolor*	Near Threatened
White-tailed Rat	*Mystromys albicaudatus*	Endangered
Large-eared Free-tailed Bat	*Otomops martiennsseni*	Vulnerable
Slogget's Rat	*Otomys sloggetti*	Data Deficient
Oribi	*Ourebia ourebi*	Endangered
Blue Duiker	*Philantomba montiola*	Vulnerable
African Weasel	*Poecilogale albinucha*	Data Deficient

Common name	Scientific name	Status
Peak-saddle Horeshoe Bat	*Rhinolophus blasii*	Vulnerable
Geoffroy's Horseshoe Bat	*Rhinolophus clivosus*	Near Threatened
Bushveld Hourseshoe Bat	*Rhinolophus simulator*	Near Threatened
Fish		
Natal Mountain Catfish	*Amphilius natalensis*	Data Deficient
Longfin Eel	*Anguilla mossambica*	Data Deficient
Chubbyhead Barb	*Barbus anoplus*	
Golden Sleeper	*Hypseleotris cyprinoides*	Near Threatened
Mozambique Tilapia	*Oreochromis mossambicus*	Near Threatened
Invertebrate		
Karkloof Blue	*Orachrysops ariadne*	Endangered

1 May be specifically distinct if isolated from other populations

2 Possibly extinct in the region

3 Possible genetic variation from other populations

4 Highly threatened, should become **Critically Endangered** in future evaluations

5 Recently listed as **Vulnerable**

6 Potentially an undescribed species

Appendix 4: Assessment for inclusion of biodiversity issues into plans

TYPE OF PLAN	AREA	RELEVANT LEGISLATION	REFERENCE TO ENVIRONMENT
MKHAMBATHINI			
Intergrated Development Plan (2010-2011)	Entire Municipality	MSA	S2.7.3.3 Indirect reference to cholera and water quality
			S2.9 Enviromental services incl land reform, agriculture,bioresources, vegetation, soils, climate
CAMPERDOWN TOWN PLANNING SCHEME (Undated)	Proclaimed area of Camperdown	TPO/PDA	S4.3 (iii) Preservation of indigenous flora and protection of water courses
Spatial Development Framework 07/08	Entire Municipality	MSA	S3 Provides a strategic assessment of the environmental impact of the SDF
			S6.3.2 Conservation Areas
			S6.3.3 Culture & Nature Based Tourism
			S6.3.4 Agri-Eco Tourism
			S6.4 Areas of Conservation Significance & preferred and non-preferred activities
			S6.5 Commercial Agriculture & Tourism & protection of agricultural resources: preferred and non-preferred uses
			SDF Map
LUMS	Entire Municipality	Provincial Policy	No reference
MPOFANA			
Mooi River Town Planning Schme	Proclaimed area of Mooi River	TPO/PDA	No reference
Spatial Development Framework	Entire Municipality	MSA	SDF MAP
Integrated Development Plan (2010-2011)	Entire Municipality	MSA	S B4 Water and sanitation backlogs
			SB5 Energy sources reliance on natural fuels
LUMS	Entire Municipality	Provincial Policy	No reference
RICHMOND			
Intergrated Development Plan (2010-2011)	Entire Municipality	MSA	S B3 Spatial Analysis - Environmental Realities
			S B4 Institutional Analysis
Spatial Development Framework (2008)	Entire Municipality	MSA	SDF Map: Env sensitive areas & agricultural potential
			S 4.4 Environmental Context
			S5.5 The Environment
			S5.8 Agricultural Potential
			S6.1.8 Environmental Concern Areas
			S7.5 Approach
			S7.7 Natural Resource Base as a Structuring Element
			S8.4 Agricultural Land
			S8.5 Environmental Management
			S9.5 Environmental Service Areas
			S9.8 Management & Control of Enviromentally Sensitive Areas
Richmond Framework Plan (Undated)	Thornville, Baynesfield and Hopewell	Unstated	S10.1.2 Thornville Rivers Drainage Lines and Wetlands
			S10.1.3 Thornville Agricultutre & Agri-industries/Business
			S10.2.1 Baynesfiled Rivers Drainage Lines and Wetlands

TYPE OF PLAN	AREA	RELEVANT LEGISLATION	REFERENCE TO ENVIRONMENT
			S10.2.2 Baynesfiled Heritage Resources
			S10.1.3 Baynesfiled Agricultutre & Agri-industries/Business
			S10.3.1 Hopewell Wetlands
			S10.3.2 Hopewell Drainage Lines & Wetlands
			Hopewell Environmental Plan Map
			S11.1 Approaches - Environmental Resources
LUMS	Entire Municipality	Provincial Policy	Chapter 1: S2.5 Account for environmental, cultural & historical conservation
			Chpater 1: S10 Management Overalys - Biodiversity Areas & Agricultural Land
			Chapter 6: Active Open Space
			Chapter 7: Agricultral Zone
			Sect B: Agricultural Planning Scheme: Chapter 1 Definitions, Chapter 2 Agric Zones, Chapter 3 Env Management Zone, Chapter 4 Intensive Agric Production Zone, Chapter 5 Ecotourism/Environmental Interface Zone
UMNGENI			
Intergrated Development Plan (2010-2011)	Entire Municipality	MSA	S2.1.5-2.1.7 Agricultural Potential, Environmental Considerations, Water Resources
			S3.2.3 Municipal Strategic Objectives
			S4.6.3 Environmental Management
			S4.13.2 Environmental Priority Areas
			S4.17.3 proposed Zones in Rural Component of the Municipality
Spatial Development Framework (2011 - 2012)	Entire Municipality	MSA	SDF Map
MSHWATHI			
Intergrated Development Plan (2010-2011)	Entire Municipality	MSA	S4.4.1 Environmental Management
			S4.5 Strategic Environmental Assessment of the SDF
			S4.12 Environmental Management Framework
			SDF Map - environmental reference
			Section E Ref to EMF
Spatial Development Framework (2007)	Entire Municipality	MSA	S5.2 Environmental Management
			S8 Ref to SEA in progress for Municipality
			S12 Informants: Agricultural Potential, Agricultural priority Areas
			SDF Maps: Agric Potential, Reference to cons areas
Umshwathi Scheme (2007)	New Hanover, Cool Air/Dalton, Wartburg, Part of Applesbosch, Harburg, Schroeders, Trust Feed, Mtulwa, Efaye, Whispers, Claridge, Albert Falls/Crammond & Swayimana, Bhamshela	TPO/PDA	Section A: Developmental Controls: Environmental Management
LUMS (2007)	Entire Municipality	Provincial Policy	S4: Ingonyama & non-Ingonyama areas ref to environmentally senitive areas
			Annexure A: management of High Potential Agricultural Land
			Annexure A: Management of Environmentally Sensitive Areas. Land use category maps: no reference to

TYPE OF PLAN	AREA	RELEVANT LEGISLATION	REFERENCE TO ENVIRONMENT
			environment. Zoning maps: only certain maps refer to environment. Composite LUMS map reference to environmental areas
MSUNDUZI			
Spatial Development Framework (2009)	Entire Municipality	MSA	SDF Map (Oct09): No ref env issues
			SDF Maps incl C-Plan & Env Priority Areas
Msunduzi Scheme	Entire Municipality (S1.4)	TPO/PDA	S3.19 Special Area Zones 1-38: agriculture, environmental management & landscaping
			Part 4, S4.1 Reservation of Land - conservation, public open space, forestry commonage, passive public open space
			S7.2 buildings with historic or architectural interest
Physical Framework Development Plan (2009)	Caluza, Dambuza, Georgetown, Plessislaer	TPO	S3 Caluza Ss3.7 Conservation & open space areas
			S4 Dambuza Ss4.7 Conservation & open space areas
			S5 Georgetown Ss5.7 Conservation & open space areas
			S6 Plessislaer Ss 6.7 Conservation & open space areas
Intergrated Development Plan (2010-2011)	Entire Municipality	MSA	S3 Water, sanitation & electricity backlogs
			SD, Ss 4.1 Integrated Env Analysis: Env Health, EMF process, air quality, water quality, flooding, solid waste, natural resource degradation, urban greening, organisational & strtategic objectives
			Sj: Disaster Management
UMGUNGUNDLOVU			
Spatial Development Framework (2007)	Entire District	MSA	S1.5 Environmental Considerations
			S1.6 Water Management
			S3.1.3 development zones incl ecological & agricultural
			SDF Map ref to conservation, indigenous veg, river impact & agric zones
Intergrated Development Plan (2010-2011)	Entire District	MSA	SB.3 Water resources in the district major challenge to development
			SB.6 Water & sanitation backlogs
			SB.8 Land Use & Environment
			SC6 Spatial considerations & the environment: SEMP & env principles applied to all plans; preparation of SEA and SEMP in 2011
			Sc6 Stratgic focus GIS fully operational and accurate system for spatial & environmental planning and audit purposes

Appendix 5: Assessment for alignment of plans

	IMPENDLE	UMNGENI	UMSHWATHI	MSUNDUZI	MOOI MPOFANA	MKHAMBATHINI	RICHMOND
				ZONES:			
Urban:	Residential	Future residential	Residential	Residential (formal, informal and rural)	Settlement clusters	Residential	Residential
	Mixed use	Urban transition	Mixed use	Commercial	Urban edge	Mixed use	Services
	Education	Urban agriculture	Industrial	Economic opportunity	Residential and future residential expansion	Industrial	Industry
	Sport		Civil/social	Education	Industrial	Civil/social	Mixed use
			Education	Health	Commercial	Education	Tourism
			Open space	Transport	CBD	Open space	
				Restricted use	Proposed economic development		
				Conservation	Tourism and leisure		
				Forestry			
				Urban agriculture			
Rural:	Agriculture	Agriculture and tourism	Residential		Land reform	Nature-culture based tourism in traditional areas	Agriculture (sugar, timber, citrus and livestock)
	Tourism	Agriculture only	Mixed use		Wetland areas	Commercial agriculture and tourism	
	Grazing	Opportunity points	Open space		Conservation	Food security production	
			Education		Agriculture (good, moderate and low potential)		
			Agriculture				
Environmental	Environmental no-go areas	Protect priority areas	protect priority areas	Protection of active & passive open space	Protect priority areas	Conservation of identified areas	Protect priority areas
	Protected areas			Protection of defined areas			
				NODES:			
Primary	Impendle village	Howick	Wartberg-New Hanover	CBD	Mooi River-Bruntville	Camperdown	Richmond
			uMshwathi City	Northdale			
				Taylors Halt			
Secondary	Inzinga	Hilton	Cool Air	Masons Mill	Rosetta	Eston	Thornville
	Ntwasahlobo	Merrivale	Dalton	Scottsville-New England Rd complex	Rietveli-Cragie Burn	Ophokweni	Hopewell
	Stepmore	Lidgeton		Ashburton-Lynnfield Park			Inhlazuka
							Greater Ndaleni
	Boston	Nottingham Road		Ambleton-Shenstone			

	IMPENDLE	UMNGENI	UMSHWATHI	MSUNDUZI	MOOI MPOFANA	MKHAMBATHINI	RICHMOND
				CORRIDORS			
Primary	New route Underberg-Impendle-Nottinham Road	N3 Hilton-Merrivale-Howick	Pmburg-New Hanover-Greytown	N3 Provinvial corridor	N3 Provincial corridor	N3 Provincial corridor	Pmburg-Richmond-Ixopo
				Entry Corridor			
Secondary	Insinga-Lotheni	Howick-Boston-Underberg	Pmburg-Wartburg-Noodsberg-Tongaat	Edendale	Estcourt –Mooi River-Rosetta	South coast road via Eston	Thornville to N3
	Ntwasahlobo-Stepmore	Howick-Lions River-Nottinham Road		Ambleton (Richmond rd)	Mooi River-Rietvlei-Greytown	Thornville-N3 interchange	Richmond to coast
		Howick-Curries Post-Nottinham Raod		Northdale (Gerytown rd)	Settlements around Middlerus-Weenen possible cultural route	Lion Park - Maphumulo	Richmond to Bulwer
		Lions River-Impendle			Mooi River to Giants Castle		Richmond to Ixopo-Creighton
		Nottinhma Road-Fort Nottingham-Impendle			Rosetta to Kamberg		
		Nottingham Road-Giants Castle			Mooi River to Rietvlei		
Future Growth	Identified Nodes	Hilton-Merrivale-Howick cluster	Wartberg-New Hanover	Infill & consolidation	Mooi River-Bruntville	Camperdown	Richmond
	Traditional areas	Lidgeton-Lions River Cluster	uMshwathi City	Traditional areas	Rosetta	Eston	Thornville
		Nottingham Road	Cool Air		Rietveli-Cragie Burn	Ophokweni	Hopewell
		Midmar dam	Dalton		Land Reform areas (Middelrus)	Traditional areas	Inhlazuka
		Traditional areas	Traditional areas		Tendele		Greater Ndaleni
					Sierra Ranch		Traditional areas

Appendix 6: Comment & Response Report

CONTRIBUTOR	COMMENT	RESPONSE
3rd PSC Meeting feedback 25th August 2011	**Section 1 : Legal Framework** It was noted that the SEA/SEMP was designed to environmentally inform both strategic (IDP) and spatial planning processes in municipalities. It was accepted that the SEA/SEMP has no legal standing in terms of NEMA and hence cannot be used for regulation. This is dependent upon the EMF which it was noted is provincial and not local government legislation. The link between strategic planning (Municipal Systems Act) and the SEMP should be referenced in the legal framework to ensure that it (SEMP) is included as a sector plan and hence forms part of the PMS process in municipalities.	
	Section 2 : Natural capital and Air Quality: The separation of agriculture from natural capital was raised and it was noted that agriculture per se was an extractive industry and hence could not form part of this section. However, it was accepted that the resources upon which agriculture depended were natural resources. It was accepted that agriculture should remain as a separate section. It was noted that all of the elements of natural capital dealt with in the report need to be included in maps to assist in location on the district. The SP noted that this was dependent upon metadata being made available by Ground Truth as part of the Biodiversity Sector Plan. It was agreed that a follow up be made to establish status of data from GroundTruth. The status of the Biodiversity Sector Plan should remain as draft in the SQ report until such time as the BSP has been adopted by EKZNW. Point source data for air quality should also include information from monitoring stations beyond Msunduzi's borders including for example Mshwathi. These data should also be included in maps to give spatial expression to air pollution. Wetlands need to be given a high priority and treated as a separate entity because of their importance. The SP noted that it would be included immediately data was made available by Ground Truth. Similarly the ground truthing work on bio-diversity could not proceed until such time as finality had been reached with Ground Truth on areas and issues to be checked in the field. Heritage sites need to be included on a map to enable public comment. Each specialist area needs to be concluded with a section that summarises the main issues, threats and trends and answers the question "so what". The report then needs to conclude by showing the linkages between these specialist studies.	
	Section 3 : Agriculture: It was noted that this report differs from the others as it is a work in progress report extracted from research being conducted jointly by DAEARD Natural Resources Sub-Directorate and Isikhungusethu (Pty) Ltd on agricultural resources. The SP noted that research was in the process of being finalised and once compete would allow finalisation of the report for this project.	

CONTRIBUTOR	COMMENT	RESPONSE
	Extensive grazing should also be included as an enterprise along with the selected crops. Attempt to locate non-BRU specific agricultural activities such as chicken production units, feed lots etc if reliable data can be located? Link crop types and volumes to manpower requirements and employment opportunities associated with maintaining land under production. Attempt to identify constraints to agriculture e.g. land reform. What is hampering growth in a sector with the potential to create employment? What are the key threats to the sector? Clearly separate current agricultural land use from potential in the report. Clarify cropping deals with both current and potential. The tables under the BRG section do not add up to 100% for each Municipality – resolve in revision. The legends need to be standardised across all the maps.	
	Section 4 : Socio-economic: Rationalise the report by including socio-economic indicators for each municipality into a single table. Comment on the implications of the commonalities and differences between municipalities in relation to types and levels of need and the ability of the environment to meet these needs. The settlement maps are not at all clear and need to be resolved at local municipal level : the location and scale of urban and rural settlements maybe incorrect. This needs to be resolved in the revision to the SQ report. Make reference to the Prof J. McCarthy and District Economic reports to establish future economic trends in the district and the spatial and socio-economic implications with specific reference to the future growth areas (e.g. N3 corridor).	
	Section 5 : Planning Report Table 5.3 - Exclude the LUMs column it is no longer relevant only refer to schemes. Check with LM Planners to establish if they feel that the assessment is acceptable. Obtain copy of Mpofana SDF from Greg Moore Obtain copy of IDP review from an environmental perspective by Ian Felton for review and inclusion into this report.	
	Section 6 : Conclusions: An overall strategic summary needs to be included at the end of the SQ report providing a clear indication of key issues facing the district and what needs to be done to address these issues. This then feeds directly into the SEA process.	
	General Comments: **Assessment:** Reports in the status quo need to be standardised in terms of conclusions which deal with the following:	

CONTRIBUTOR	COMMENT	RESPONSE
	(i) Issues; (ii) Trends; (ii) Impacts; (iii) Strategic assessment; (v) Comment on actions to address these issues. **Governance and legislation:** Each section of the report should include a brief review of authorities responsible for different aspects of environment in terms of legislation contained in legal section and the structures that exist in these sectors to oversee implementation and regulation. **Maps:** Include all maps in the report into an A3 map folder to overcome current problems with definition in the report.	
Mrs Elaine Donaldson via Ms Sonja Britz, ssbritz@gmail.com Technical Services Department **Mkhambathini Municipality** 30 August 2011	In addition to various issues raised at the steering committee meeting held on 25 August 2011, the following points are highlighted for your consideration:	
	1. Certain maps are illegible.	All maps will be included in a separate map book in A3 format.
	2. Comparable tables to determine status of each LA are required. This would serve to amalgamate info and establish trends.	Roger to clarify with Elaine re: 'status'
	3. A section needs to deal with development pressures being experienced in certain localities.	Each specialist chapter will provide a summary of the issues and trends and these will be collated in the conclusion.
	4. There is a need to include the Dept of Rural Development & Land Reform in this process. Literally thousands of hectares of land in Mkhambathini are being transferred to Community Trust with no apparent restrictions on land use. Most parcels are within very sensitive areas as determined by KZN Ezemvelo's C-Plan	The appropriate department is Land Affairs and we will invite them to join the process. Roger to follow up with DRD&LR : SPI for up to date data on LR projects in KZN (RLCC, LRAD, PLAS etc)
	5. Mlazi/Umlaas River needs mention.	Request Elaine and Sonja to provide the information relevant to this system for inclusion in the SQR (email sent on 15/09/2011 to ssbritz@gmail.com).
	6. Contaminated/sewerage runoff from urban centre should include Camperdown.	Included.
	7. Fig 17 – numbers don't appear to correspond to map positions.	Request John to extract correct information from the biodiversity sector plan.
	8. Land mark heritage sites need to be identified within Mkhambathini.	Request Elaine and Sonja to provide the information relevant to this aspect for inclusion in the SQR (email sent on 15/09/2011 to ssbritz@gmail.com).
Mr Ian Felton Assistant Manager: Environmental Planning uMgungundlovu District Environmental Services **Department of Agriculture, Environmental Affairs & Rural**	Please note that the comments provided below are in addition to and in support of the issues and comments raised in the Project Steering Committee meeting held on the 25th August 2011.	
	1. In order for this project to meet its objectives and achieve the expected outcomes of the terms of reference, it is essential that the Status Quo phase of the project collects, interprets, analyses and presents information in a manner that feeds into and supports the further components of the Strategic Environmental Assessment	Each chapter will include a summary that provides an indication of the key issues and trends which will then be tied together in the conclusion. Further analysis will be undertaken as the project moves

CONTRIBUTOR		COMMENT	RESPONSE
Development 12 September 2011		[SEA] and Strategic Environmental Management Plan [SEMP]. The Department is of the opinion that the current structure and information presented within the draft Status Quo Report does not provide a logical flow of environmental information relevant to and necessary for the development of the SEA and SEMP.	into the SEA phase.
	2.	It is strongly recommended that the service providers consider the structure, layout and approach undertaken in the State of Environment Report (Status Quo Report) for the uMshwathi City Development Node Environmental Management Framework, and use this approach and structure as a framework outline for the Status Quo Report for this project.	Effort will be made to obtain a copy of this report, review its structure and consider application to the SQR.
	3.	The draft Status Quo Report lacks sufficient attention to establishing project focused spatial information. The spatial mapping of the current state of the environment is critical for the analysis phases to follow. These geo-referenced spatial layers need to be comprised of existing, and where necessary the collection of new, data. These layers provide a clear picture of not only what environmental issues the district faces, but also identify spatially where these environmental issues are found. The specialist studies and associated spatial mapping needs to verify and confirm the existing state of the environment and identify threats and trends.	The 1st draft SQR was produced without these products as there were delays that were outside of the service providers control in terms of the delivery of key information, i.e. the Biodiversity Sector Plan for uMgungundlovu. Subsequent iterations will have these products in the format agreed to by the municipal GIS personnel.
	4.	Some of the mapping may require the capturing of specialist knowledge in instances where spatially geo-referenced maps are not readily available. For example, the mapping of broad air quality buffers off known sources of air pollution such as the N3 or the allocation of relative water quality status to catchments based on the local knowledge of the specialist involved.	Response from air quality specialist: It is not feasible to develop a spatial representation of air quality as this is fundamentally dependant on a sound emission inventory and a good meteorological data. With these we could model the different pollutants and get a spatial picture. On the scale of the UDM it is a significant exercise, developing the emission inventory for industrial and non-industrial sources, and then modelling these. We did this for the Western Cape and the Highveld and it is the lion' share of the work. I suggest rather go a GIS route and used a source density as a proxy for air quality, i.e. where there is a high concentration of sources the air quality is likely to be poorer that where there are a few sources. This is not always going to be true as a single significant source could be bigger that a lot of little sources. Air quality is also likely to be poor at time in and near residential areas where

CONTRIBUTOR		COMMENT	RESPONSE
			wood is burnt, and the same along the main arterials. You could try something crude with a good, med and poor scale, but putting numbers to the scale is difficult and probably not going to be sensible, considering daily and seasonal variations. It makes good sense to leave it out. As a result of this response it is recommended that this request be seen as being outside of the scope and budget for the project, unless additional funds are made available.
	5.	Comments and issues relevant to the various environmental aspects including the agricultural, air quality, biodiversity, heritage resources, hydrology / water resources and socio-economic/planning specialist areas, were made within the project Steering Committee meeting held on the 25th August 2011, and for the sake of brevity are not repeated in this written comment. In order to ensure that a credible and useful base is established for the development of the SEA and SEMP, it is however essential that the issues raised in this meeting be appropriately addressed.	Noted.
	6.	A key element that does not appear to have been adequately addressed within the socioeconomic evaluation is the limitation on social and economic development posed by a limitation of available and sustainable services and infrastructure. The limitations pose not only a constraint to development but also a significant threat to the state of the environment. Attention needs be placed on the determination of the availability of services and the identification of environmental threats and risks, and where possible spatially representing these constraints and threats.	We are in the process of attempting to address the issues raised in the comments. Quantifying infrastructure as a limitation to social & econ development is a major challenge! Similarly finding data which allows us to conclusively demonstrate that there is an enviro risk associated with different levels of services is challenging, particularly at a spatial level.
	7.	In each of the specialist chapters it is essential that summary findings are established that clearly identify key environmental issues, key environmental impacts and establish pressures, threats and trends. This information is vital for the SEA and SEMP development phases.	Noted.
	8.	The specialist input should also address governance issues relevant to the particular environmental aspect and the study area. This will prove invaluable in the development of the SEMP through the identification of existing roles, responsibilities and governance structures available for the implementation of the outcomes of the SEA and SEMP process. The specialists involved would also be best	This will be done when we begin the SEMP.

CONTRIBUTOR	COMMENT	RESPONSE
	placed to identify existing governance structures, relevant legal frameworks and legal limits to change within their area of expertise.	
	9. It is also recommended that linkages and integration of the various specialist chapters be undertaken as summary findings of the Status Quo Report. The summary findings should begin to identify the overlaps and inter-relationships between the various environmental aspects and provide a clearer snapshot of the key environmental issues, impact and threats facing the district as a whole.	This will be done and pulled together in the conclusion of the SQR.
	It is essential that a comprehensive draft Status Quo Report be established before being released for public comment in order to establish and maintain credibility in the final products being developed. From the above comments, it is evident that a fair degree of work is still required to re-draft the report and develop the spatial framework necessary for the Status Quo assessment, before the draft report can be made available for public and authority consultation and review.	Comment noted and effort will be put into this to ensure as comprehensive a product as possible.
	It is necessary to ensure that the structure of the report and the process flows are aligned towards achieving the desired outcomes for the SEA & SEMP project. It is recommended that the service providers work together with their relevant specialists to clearly define what the final SEA and SEMP products will look like and then to work backwards from that understanding to ensure that the relevant information and data is collected to achieve that objective.	Comment noted.
Ms Alka Ramnath Planning Services **Umgeni Water** 15 September 2011	It is recommended that the administrative seats for each local municipality are shown on all the maps e.g. Figure 1 on pg. 2 does not show New Hanover and Camperdown.	Request John to insert these.
	Pg. 6, National Water Act. The description of this Act reads as "threats to water resources such as irrigation, industrial use, pollution, water quality deterioration and water loss through plantations". What is meant by this sentence? The descriptions for the other pieces of legislation state what the purpose of the relevant Acts are. However, the description for the National Water Act does not state the purpose of the Act. It instead refers to "threats" which include legitimate water uses and is therefore unclear and misleading.	Noted and corrected.
	Pg. 9, Section 2.3, last paragraph on the page. There should be a reference to the 2010 EIA regulations which also use an "urban edge".	Thank you, included.
	Pg. 10, Section 2.4, second paragraph. Is it the Municipal Systems Act or the Municipal Structures Act?	Will check and address.
	Pg. 10, Section 2.4, second paragraph. It is important to note that Chapter 5 of the Municipal Systems Act requires the Integrated Development Plan of which one component is the Spatial Development Framework (Section 23.(1)(e)). In terms of the Municipal Systems Act Regulations Section 2.(4)(f), a strategic environmental assessment of the impact of the SDF is required. Hence Figure 2 is lacking in that it does not show the IDP and what is required in terms of the Municipal Systems Act.	Will be addressed in next revision.

CONTRIBUTOR	COMMENT	RESPONSE
	Pg. 11, first paragraph. Umgungundlovu District Municipality has a number of dams and I think it is important to mention the National Water Act's requirements of Integrated Water Resource Management Plans for the land surrounding state-owned dams as the functions of these plans is to protect the water resource. Very few stakeholders are aware of this requirement which has implications for both the "planning" and "environmental" aspects and suite of plans.	Will be addressed in next revision.
	Pg. 11, second paragraph, second sentence. The KZN Planning and Development Act (PDA) is not located within the Municipal Structures Act and therefore the second sentence in this paragraph is incorrect.	Will attend to this in revisions.
	Pg. 11, second paragraph, last sentence. The KZN PDA does not have regulations. Norms and standards as required by Chapter 11 of the KZN PDA are due to be formulated soon.	Noted and also stated.
	Pg. 11 and pg. 12, last paragraph on page 11 which continues as the first paragraph on page 12. Please explain this paragraph because as it currently stands, I disagree with what it is stating. One can include environmental controls as part of the Scheme and if anyone violates the requirements of the environmental controls, which are part of the Scheme, they can be prosecuted. An example of a Scheme which one could say has an environmental control is eThekwini's Schemes which make allowance for the DMOSS system. This paragraph needs to be unpacked in clearer way as it is currently misleading.	Will check with our legal expert.
	Pg .13, first paragraph. The sentence reads "… GroundTruth could produce…". Is this correct or should it read "…GroundTruth could not produce…"?	Thank you – could not is correct and report has been amended.
	Pg. 20, Section 3.1.4, first sentence. It is recommended that the phrase "economic region of KZN" is inserted, as this emphases the impact of the water resources within Umgungundlovu.	
	Pg. 20, Section 3.1.4, third sentence. "Imminent" is spelt incorrectly – it is spelt as "immanent".	Corrected – thank you. With a report of this size, the Spell Check is unable to cope and has closed down.
	Pg. 20, Section 3.1.4, second paragraph, second sentence. "Mooi River" is spelt incorrectly – it is spelt as "Mooirivier". This incorrect spelling is carried throughout the report with a switching from the Afrikaans spelling to the English spelling.	Thank you – corrected throughout.
	Pg. 20, Section 3.1.4, second paragraph, last sentence. The last sentence has been split up…	Thank you – corrected.
	Pg. 22, second paragraph, second sentence. There is a preposition missing.	Thank you – corrected.
	Pg. 22, third paragraph. The Mooi-Mgeni Transfer Scheme is spelt as "Mooi-uMngeni Transfer Scheme". This is incorrect. The official spelling is "Mooi-Mgeni Transfer Scheme".	Thank you – corrected.
	Pg. 22, last paragraph. The closed bracket is missing after "Figure 8".	Thank you – corrected.
	Pg. 22, last paragraph. "Baynesfield" is spelt incorrectly. It is spelt as "Bainesfield" which	Thank you – corrected.

CONTRIBUTOR	COMMENT	RESPONSE
	is wrong.	
	Pg. 23, Figure 8. This figure shows the District Management Areas which no longer exist. "Mooi-uMngeni" should read "Mooi-Mgeni". "Mkomazi-uMngeni" should read "Mkomazi Water Project". Please refer to Umgeni Water's Infrastructure Master Plan 2011 for details on this project.	A more detailed map will be produced including wetlands. The 2011 master plan has been referred to in the report already.
	Pg. 24, first bullet point. "berg" should be with an upper case "B".	Amended to Little 'Berg.
	Pg. 24, fourth bullet point. The acronyms "CESA" and "ESA" are introduced for the first time in the report but the full name nor what they refer to is not explained. This is explained later in the report but for some readers, this will be the first time they encounter these acronyms and will not know what they refer to.	Written out in full with cross-reference to Figure 20.
	Pg. 24, third paragraph, last sentence. The sentence reads "… that authority for the water sector…". Should it be "authority" or "management"?	Correct – authority remains with National DWA. Amended accordingly.
	Pg. 31, Section entitled "Intensive Agriculture". "discharges" should be with a lower case "d" and not an upper case "D".	Disagree- this is the first word of the sentence.
	Pg. 34, first sentence. This sentence is misleading as it states that there was no data for Msunduzi. There would be no data for the Msunduzi WSA in the Umgungundlovu WSDP as Umgungundlovu's WSDP does not include Msunduzi as it is a WSA on its own. Hence in terms of the required data, was the data requested from Msunduzi?	Text has been amended to specify that Msunduzi data was not part of the dataset and an attempt has been made to access this data from Msunduzi LM.
	Pg. 71, Section 4.1.1.2, third bullet point. This statement is contradicted in Section 7.4 which states that the scheme is not done as yet. Further, it is indicated that the Scheme was consulted but no mention is made of consultation with Msunduzi's EMF which has a heritage resource section. Why was Msunduzi's EMF not consulted?	The information used for the Msunduzi EMF was obtained from the same sources.
	Pg. 73. Spelling of "Lions River" and "Mooi River" is incorrect.	Thank you – corrected throughout.
	Pg. 73, Section 4.2.2, first sentence. There is reference to "Figure 1" which is incorrect as "Figure 1" in the report does not show the archaeological sites and secondly, there is no map showing the archaeological sites which would have been extremely useful.	Should have referred to Figure 23 in section 4.2 which is outstanding and will be included in the next draft of the SQ Report.
	Pg. 74, Section 4.2.3, second paragraph, third sentence. It should read "… these buildings…".	Thank you for pointing out the omission.
	Pg. 74, Section 4.2.3, second paragraph, fourth sentence. This sentence has been split up. Should it be "Surti Sunni Mosque"? Is the mosque in Church Street? What about the one in East Street (Nizamia Islamic School)? It should read "… Sri Siva Soobramoiniar and Marriamen Temples". "Longmarket" should be in brackets.	Corrected thank you.
	Pg. 76, sixth bullet point. There is only one mosque in Royston Road… Which are the other mosques being referred to?	Corrected thank you.
	Section 4.4. Recommend that the details are in the tables are summarised on a map.	Heritage map provided.
	Section 5.2. There are reference to "DWEA". This is incorrect. If the relevant investigation was undertaken by the Department of Water Affairs, the acronym to use is "DWA".	Corrected thank you.

CONTRIBUTOR	COMMENT	RESPONSE
	Water Affairs and Environmental Affairs have two separate DG's but one minister and therefore are referred to separately. Which investigation is being referred to? Is it the information from the Water Services National Information System? Either way, the methodology used in the investigation should be mentioned so that the reader can understand the limitations in the information being compared.	
	Pg. 109, Section 5.2.6.5, second paragraph. Are these the correct boundaries as per the changes from last year?	Section amended accordingly.
	Pg. 120, Section 6.1. Check spelling of "Umgungungdlovu".	Amended throughout.
	Pg. 121, Section 6.2.1. Check spelling of "Umgungundlovu". "Raster" is spelt incorrectly – it's spelt as "rastor" in the report. Third sentence in first paragraph of this section does not make sense – what does the 6 refer to? "Isikhungusethu" spelt incorrectly. "DAEARD" acronym is incorrect.	Section amended accordingly.
	Pg. 152, Section 7.3. Cannot separate between "strategic" and "spatial" plans. The SDF is part of the IDP and is a strategic spatial plan. The distinction should be between "strategic" and "operational" i.e. the high-level and the detail. In practice, there is a great deal of confusion around what is meant by "LUMS" and where schemes fit into a "LUMS". The report demonstrates this confusion clearly by using LUMS and scheme interchangeably in certain instances whereas in other cases, as two separate terms e.g. in the first sentence of this section but in the diagram, the terms are shown as synonyms. It is recommended that the report explain what it means by a LUMS and a scheme and that it further goes back to all the municipalities to ensure that everyone was using a common understanding. This is important as different understanding would have influenced the type of answers provided. In this section, one representation of a continuum of plans is shown. It is recommended that the continuum as provided by the SDF guidelines and that used by eThekwini is also compared as there is value in the different representations of the continuum of plans and that other continuum of plans are based on a strong environmental base e.g. eThekwini's which may add value to the objectives of this study.	Noted.
	Pg. 153, Section 7.4. Table 51. "Mpofana" referred to by the old name. The comment for Msunduzi's LUMS contradicts the comment of Msunduzi in Table 52. The comment for Umgungundlovu's LUMS should be "N/A" if one is using a scheme interchangeably with that of "LUMS" as district municipalities do not have schemes.	Mooi-Mpofana amended to Mpofana throughout. The rest of your comments are noted.
	Pg. 153 and pg. 154, Table 52. "Mpofana" referred to by the old name. Please ensure that "Mpofana Municipality" is used throughout the report (including the maps) and that it is not referred to by the old name of "Mooi-Mpofana". Should read "copy" in the last sentence for the comment for Mkhambathini. Why does Umgungundlovu have a "yes" for schemes?	Mooi-Mpofana amended to Mpofana throughout. 'Copy' corrected.
	Pg. 154, Table 53. "Scheme" and "LUMS" seem to be regarded as separate in this table?	Noted.
	Pg. 155, Section 7.5. Why is no mention made of Msunduzi's EMF?	Noted.

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	Pg. 155, Section 7.6, first paragraph. The criteria are not listed in the legend of Figure 115.	Noted.
	Pg. 155, Section 7.6, second paragraph, third sentence. This sentence is slightly misleading as an SEA is required in terms of the Municipal Systems Act regulations. Which figure does "Figure x" refer to?	Will follow up.
	Pg. 156, Section 7.6.3. This section is misleading. The report does not indicate the age of the available schemes. A number of the available schemes are old and were created when there was not much understanding of the importance of environmental sustainability (although the concept of "amenity" was important). It is only with recent legislation that schemes are required for the entire area of the municipality and therefore the development of schemes are now reliant on a strong environmental base. The fourth sentence which states that NEMA runs parallel to the planning legislation is also incorrect as with the KZN PDA, environmental approval has to be obtained first before submission can be made under the PDA and if the RoD under NEMA has not been obtained, PDA approval will not be obtained.	Noted.
	Pg. 157, Section 76. "LUMS" is placed in the same level as "Framework Plans" in this section which contradicts the previous sections where it was placed in the same level as that of a "Scheme". This is extremely confusing. Please explain what "LUMS" is to you?	LUMS will be deleted throughout.
	Pg. 158, Table 54. A point on the method when trying to align the SDFs is that the different municipal SDFs were produced in different years and therefore there will be some mis-alignment in terms of boundaries as boundaries have changed over time.	Noted.
	Pg. 162, Table 55. How were the scores obtained? Without understanding this, this table is confusing.	It is stated in the report – will make it clearer.
Stefanie Schutte Chairperson **Upper Mpushini Conservancy** 02 February 2012	Thank you for an excellent report, which really highlight the poor state our environment is in. I especially liked the bit about natural capital.	
	Incorrect Conservancy details We would like to add regarding the conservancies in the area. On your list you have got the Mpushini Conservancy, which to my knowledge is defunct. However you have got two active conservancies on the eastern PMB side, the Upper Mpushini Conservancy and the Lower Mpushini Valley conservancy. Details regarding the LMVC you can get from the Chairperson, Pandora Long. Maybe you want to check details of the other conservancies with the KZN Conservancy Association, or Ezemvelo. Our Conservancy, the Upper Mpushini Conservancy has presently over 2000 hectares of member properties, and our target area can be seen on the attached map.	All spatial data will be integrated into the maps for the next phase.
	Ecological corridor We have been working for years on retaining a corridor between Bisley Nature Reserve and the LMVC (see map attached), and ultimately it is our vision is to create a link from	All spatial data will be integrated into the maps for the next phase.

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	Baynesfield to Cumberland. At present there is an existing green belt between Bisley Valley Nature Reserve and the LMCV, consisting of extensive grazing farms, game farms, conservation properties and small holdings. Please consider including this corridor on your map. This link is however severely threatened by proposed wall to wall development along the freeway.	
	Rates issues According to our knowledge there has been the issue that game farms were not classified by the Msunduzi municipality as agricultural, but rather residential. However the area is probably highly suitable for game farms, which will at the same time deliver various ecosystem services. You could consider taking this point up. Also according to our knowledge, properties falling under the Mpushini protected environment should be zero rated, which has not happened.	Noted
Pandora Long **Pietermaritzburg/ Mkhondeni/ Mpushini Biodiversity Corridor Project** 12 December 2011	Please let me know whether the UDM EMF Status Quo document is available for comments. I would like to request a meeting to discuss the following items relative to the UDM EMF. 1. Environmental Education Programme for UDM 2. Pietermaritzburg/ Mkhondeni/ Mpushini Biodiversity Corridor Project 3. Mpushini Protected Environment expansion. Please could you let me have a suggested date in January when we could meet.	Thank you for your enquiry as to the status of this project. We have completed a revised draft of the Status Quo Report which is to be discussed by a Technical Committee this afternoon. If they find the product acceptable it will be released for stakeholder review and a public meeting will be scheduled for early next year. The time that it has taken for us to complete this has related to the need for us to wait for the Biodiversity Sector Plan for uMgungundlovu to be completed. This was provided to us the week before last which enabled us to integrate it and complete the revised SQR. In response to your points below I am happy to meet to discuss these although we won't be able to do this until early next year. In the meantime I can tell you that our contract with the District includes the production of environmental education material associated with the SEA. Otherwise the other two initiatives you speak of may be included in the delineation of environmental control zones when we produce the SEA and the desired state of the environment. If we get the go ahead to release the SQR you will receive an email notification of its availability. If

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		you would like to secure a time to meet in January then we will be available again from the 9th.
SEA/Climate Change workshop 13 April 2012	It appears as if the maps illustrating both air and water pollution sources are not complete and that we need to approach Umgeni Water and Msunduzi Water Management to ensure that we complete the picture. Even though we have had substantial inputs from DUCT, it was confirmed that these have not been comprehensive (NB need to ensure that all the WWTW are included).	Noted and every effort was made to access up to date information, but none was made available within the timeframes set down for completion of this product.
	As far as air pollution sources are concerned it was felt that the data that we have used is outdated and that there have been some substantial changes in the distribution of air pollution sources. We also need to include landfill sites and feedlots as pollution sources. DAEA&RD have relevant air quality data	Information was provided by both DAEA&RD and UMDM, but unfortunately this was related to air quality monitoring data and did provide that which was requested, i.e. point sources of air pollution. It was also confirmed by the projects air quality specialist that such data is not available and even the GHG audit undertaken for the Climate Change Response Strategy is based on the use of surrogate data.
	Noise pollution is an aspect that needs to be taken into account.	Whilst this environmental issue is a relevant aspect that should be considered it unfortunately falls outside of the current scope of work.
	We need to include information on alien invasive plants – I have a data set that shows the latest information at a national scale from which we can extract that relevant to the District. Ian Felton referred to a Provincial AIP plan that can be accessed as well.	The data available at a national scale was used and included in the report. Unfortunately data at a provincial scale was not forthcoming within the timeframes of this report.
	There are two sources of information we need to access that will provide further inputs regarding pollution, i.e. Integrated Waste Management Plan and an investigation by German Banks which Kim van Heeden referred to – I'll follow up with her as to how we can access these.	The IWMPs for the Local Municipalities were provided but they did not include information on pollution sources. According to Kim van Heeded the report from the German Bank investigation could not be released.
	Areas in the District that show a deficit in terms of sanitation provision are a source of pollutants and need to be considered in the pollution map/s.	This aspect is covered in the Socio-economic section of the report. Unfortunately the lack of specific data that will link poorly serviced rural settlements to pollution issues does not allow us to include this in the pollution maps. However it needs to be noted that the provision of reticulated sanitation services could exacerbate the situation if the WWTWs are not upgraded and managed to DWA specifications.
	Visual pollution needs to be considered and can be an added motivation together with	Whilst this environmental issue is a relevant aspect

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	noise pollution, for environmental control zones and their buffers as well as in guidelines.	that should be considered it unfortunately falls outside of the current scope of work.
	The question was raised as to whether the SEA has legal standing. The DAEA&RD opinion is that once adopted by council, the SEA and its associated policies will have legal status as a policy document of the council in terms of Public Administrative law. Further to this is was stated that conversion of the SEA into an EMF would provide added legal standing.	Noted.