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Report Submitted to:
Msunduzi Municipality

Vulindlela Ward 39 Draft Status Quo

DRAFT

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CITY OF CHOICE
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EXECUTIVE SUMMARY

INTRODUCTION

This report provides an executive summary of the findings of the Status Quo phase of the Local Area planning process for ward 39 of the Msunduzi Municipality. The intention of this summary is to highlight the most pertinent findings of this phase of the project and the implications for the planning process.

The executive summary is based on the full Status Quo report. This document comprises the identification and assessment of key natural, social, economic, and infrastructural issues which characterize this area. These have been captured in the form of informants and constraints to the future development of the area and will inform the next phase of the project involving the formulation of the Local Area Plan.

BACKGROUND

Ward 39 was promulgated by the Demarcations Board in 2016 and represents a 135km^2 extension to the area of jurisdiction of the Msunduzi Municipality on its western boundary. Ward 39 adjoins the areas administered by the municipalities of Impendle to the ward's north-northwest, Dr Nkosazana Dlamini-Zuma to its west and south, and Richmond to its south-east.

This new ward comprises portion of the ex-Ingwe municipality ward 7, together with lesser portions of what was Msunduzi's wards 7 and 8. The majority of the ward comprises the ex-Ingwe component. Land in the ward is predominantly owned by the state and by the Ingonyama Trust Board. ITB land in the east is administered by 2 traditional councils (TCs), i.e., Funze TC and Mpumuze TC (portions of ward 7 and 8 Vulindlela). Similarly, in the west of the ward land is administered by the Qadi traditional council. The land between these traditional areas is administered by the state and is largely un-occupied.

The settled areas located to the west include, Mbambane, Ncwadi, Mdutshini, Songozini, Ezibomvini, Gudlintaba and Furth. The densely settled areas in the north east formed part of Vulindlela prior to the 2016 ward boundary adjustments and include Songozima, Mafunze, Mbumbane and Mkheshekweni. There are scattered low density rural settlements in the central and western areas of the ward.

Ward 39 is situated adjacent to the western boundary of what was the Vulindlela Area Based Management Area. The project Terms of Reference recommends that Ward 39 be considered as an extension of the Vulindlela area and hence this plan is intended as an extension of the Vulindlela Local Area Plan.

The majority of the settled areas (portion of Ward 7 and 8 Vulindlela and Ncwadi node), as mentioned above, are located on land administered by traditional councils where land ownership is under the Ingonyama Trust Board. Planning of this area is a municipal function and land use administration is a joint responsibility of the municipality and Traditional Councils, as noted in the project briefing document and the Vulindlela Local Area Plan (Isik 2016).

HIGH LEVEL OVERVIEW

The 2017 draft Municipal SDF review (p 111) identifies the current development restrictions in respect of the Ingwe portion of the newly created Ward 39, citing the road, electricity and housing needs in respect of this area, also reflected in the 2016/17 Ingwe SDF Review (160 -163). Owing to its relatively isolated located and limited population, it would appear that this area has had limited exposure to the provision of services and infrastructure. Furthermore, there is a differential in the type and level of services that have been provided in the new Ward 39. The more formal or peri-urban areas in the east are better serviced and more connected than the rural areas in the south-west of the ward.

A review of the findings of the Status Quo indicate that the greatest challenges relate to this ward being relatively isolated, traditional and rural in nature. The ward is furthest of all wards from the economic hub and associated services of Msunduzi (126kms).

The summary findings of the status quo are profiled in this document.

SUMMARY OF STATUS QUO ANALYSIS FINDINGS

Regional Setting

In the status quo investigations were undertaken into the functional linkages (social, economic) between ward 39 and surrounding centres in order to establish where residents secure services, employment and commercial services. The following summarises key findings.

Section 4 of the Status Quo report deals with the regional spatial perspective which defines the linkages between Vulindlela and the Richmond, Dr Nkosazana Dlamini Zuma and Impendle municipalities.

In respect of Richmond, Byrne Village is recognised as a Rural Service Node. This is accompanied by plans to promote Byrne to a central area for local convenience shops and manufacturing activities. This may potentially provide for employment opportunities for communities in the South of Ward 39. The Richmond SDF highlights the need to geographically define nodes in order to set limits so as to limit residential expansion onto productive agricultural and biodiversity land areas.

In respect of Dr Nkosazana Dlamini Zuma municipality there is a need to engage regarding cross-border agricultural land management as well as cross-border critical biodiversity area management. The 2017 Dr Nkosazana Dlamini Zuma municipality SDF Review further identifies the strategic position of the town of Bulwer along the R617. A closer node of some relevance in terms of services used by Ward 39 residents, is that at Pholela/ Hlanganani. This administrative and services centre is located 40km from Elandskop Station and 23,5kms from Ncwadi respectively and includes schools, a community health centre, pension pay point, community halls and limited commercial services.

In respect of Impendle Municipality, Impendle town has been identified as the principal development node of the municipality. The node is well located within the Municipality to serve the needs of the majority of the residents of settlements in the western area. It also houses a modern Thusong centre which is inclusive of a wide range of government services, a developed commercial and sports centre

and also a maize mill erected within the industrial area. A number of large housing projects have been implemented in the town precinct.

Boston is located to the north west of ward 39. This is a small commercial and social centre mainly servicing the commercial agricultural community in the area. There are limited governmental and commercial services and no housing projects in Boston. It consequently has limited importance as a services centre for the residents of ward 39, particularly those located in Ncwadi.

A further important link is Bulwer (although distant), a secondary node in the Nkosazana Dlamini Zuma Municipality. Bulwer mainly performs the role of a local government administrative centre (clinics, pension pay point, police station, library, schools). It also performs a limited commercial centre function linked to tourism and a hospitality sector. Agricultural services are also provided in this centre with extension services using this as a base station. It also has a well-developed Non-governmental Organisation (Turn Table Trust linked with the Valley Trust) based at Bulwer which operates in this area and includes a variety of developmental functions.

Mention is also made by residents of ward 39 of Underberg as a higher order services centre and trading outlet for livestock. However, this is distant as a centre from ward 39.

The East Street precinct of Msunduzi and downtown Howick continue to perform the major service sector functions for residents of ward 39, particularly in relation to higher order services not provided in the smaller centres surrounding ward 39.

Land Ownership

This section of the status quo deals with the question of land ownership in ward 39. The importance of land ownership is that it has a major influence on land use and land management which in turn affects the future economic potential of an area and the institutional arrangements necessary for sustained development.

Investigations into land ownership have revealed that there are three major land owners in ward 39 including: the Ingonyama Trust, the Qadi Traditional Authority and the South African Development Trust ("SADT": under the auspices of the National Department of Rural Development and Land Reform [DRDLR"]) (see Figure 73, pg 138), the first three areas being administered, in addition to the municipality, by Traditional Councils and their structures. Important to note is that the SADT land does not fall within the boundaries of any traditional council. The land held by SADT, comprises. up to 90 properties. It was expropriated from the previous owners (commercial farmers) by government in the 70s-80s and placed in the ownership of the SADT. Based on a review of land claims in ward 39 it appears that the majority of these properties are subject to Redistribution land claims. The status of these claims and the claimants involved needs to be further investigated in order to establish likely state funded residential and agricultural developments on these properties and the impact it could have on future planning of the ward

Socio-economic Profile

An evaluation of the socio-economic situation in Ward 39 revealed that:

- The majority of households live within Traditional Council areas
- The majority of the population resides in the north-eastern area, in particular within the Funze Traditional Council administered area
- Densities in settled areas, with the exception of Funze area, are relatively low
- The population is a relatively youthful population
- There are low levels of education
- High unemployment levels
- Historical population growth trends are relatively low.
- There appears to be an increase in the population growth over the past four years.

A comparison with the Vulindlela report yields similar findings, i.e., -

- Ward 39 has a youth population of 47% in comparison with 45% in Vulindlela (2% difference).
- The population percentage of age groups above the age of 41 is the same.
- The gender profile has a difference of 1% in favour of women.
- Both Vulindlela and Ward 39 have low education levels.
- Both Vulindlela and Ward 39 have high levels of un-employment.

The income levels in Ward 39 are lower than those in Vulindlela. This was to be expected as Ward 39 comprises a more rural community with a low level of economic opportunities, particularly being 63 km away from the Pietermaritzburg CBD, would contribute to the lower economic profile.

Settlement Patterns and Implications

It was established that the settlement patterns in Vulindlela, were similar to those in Ward 39 with settlements being rural, peri-urban and transformative in nature, generally as a consequence of dislocation from the centre owing to apartheid planning.

The bulk (98%) of the settlements are found in four areas (described in more detail in section 6.1.3), as detailed below:

- Mpumuza TC (portion of Vulindlela Ward 7), with 314 dwellings representing 12% of the total number of dwellings,
- Funze TC (portion of Vulindlela Ward 8), with 1 083 dwellings representing 42% of the total number of dwellings,
- Qadi TC (portion of ex-Ward 7 Ingwe), with 813 dwellings representing 32% of the total number of dwellings and
- State Land (portion of ex-Ward 7 Ingwe), with 313 dwellings representing 12% of the total number of dwellings.

The absence of major settlement on state land immediately adjoining the densely settled areas at Mafuze, Songizini and Mkeshekene demonstrates the dislocation principle outlined above. This is

compounded by the inclusion of the relatively inaccessible and isolated (topographically) Qadi traditional area located to the extreme west of Ward 39 (approximately 63 km from Pietermaritzburg).

The findings of this component of the status quo would seem to indicate that the inclusion of Ward 39 into Vulindlela has added yet further elements on to the continuum of settlement identified in the Vulindlela Local Area Plan. This involves inclusion of the following:

- Low density and largely un-serviced rural traditional settlement in both Ncwadi and on state land.
- A largely non-functional village in the form of Ncwadi in the Qadi traditional area.
- Limited economic capacity of the resident population to support or 'grow' a local resilient economy under current conditions – i.e. dependency on state grants and subsistence production.
- A relatively large area of un-developed and un-settled state-owned land forming a solid block of land between the old wards 7 and 8 of Vulindlela and the Qadi traditional area.
- Un-coordinated administrative responsibility for the different components of this area relating mainly to land ownership and land administration.

These additional areas are topographically and infrastructurally (excluding rail) divided from what comprised the old Vulindlela. Thus, for example, the extension of the Msunduzi bulk water system into the central and western areas of Ward 39 poses a challenge due to volumes, infrastructure, costs and distance. Similarly, topography limits the potential for improved road accessibility to Edendale and Pietermaritzburg. The historical rail link would be ~~an~~ ideal link if upgraded and restored to passenger transport, as argued in the Vulindlela LAP, but this does not form part of the capital investment priority of the government agencies involved.

Local Economic Development

It was not feasible to estimate the Gross Value Added (GVA) to the sub-regional economy by enterprises operational in ward 39 due to the paucity of economic information available. However, the indications are that it is primarily state welfare grants, income from migrant labour and indirect income generated from subsistence agriculture that sustains the local population. There is limited small scale commercial activity in the area, no manufacturing and no real evidence of a functional service or tourism sector save for transportation.

The majority of the residents in Ward 39 have low levels of employment within the working age groups. Furthermore, income generated from employment appears to be lower than the national average and minimum wage determinations. The Provincial SDF maps appearing in Section 4 of the Status Quo report establishes that this is an area in which social facility/ service provision falls below the level of existing population need/ requirement.

Business and Retail

Ward 39 is served by fewer than 30 retail outlets, largely shops, but with some taverns and bottle stores too, and also a builder's yard (at the intersection of M70 and P137/P402). The total floor area of the functional establishments is approximately 1700m² this to serve a population of approx. 15000 in 2017. Typically, the shops are very poorly stocked and then largely with non-perishable items and these in small numbers over a narrow range. Elsewhere this report has noted that this is generally an area of social need and it is thus not surprising for this to be reflected in the low buying power of the dispersed residents.

Agriculture

Agriculture, as identified in the 2016 IDP Review has the potential to be ~~is~~ an important land use and economic activity in Ward 39. Currently findings reveal that this is not the case due to a range of factors. Furthermore, whilst the area has good agricultural potential, realization of this is limited due to communal tenure arrangements, traditional farming practices, poorly developed infrastructure, lack of local capital and commercial farming expertise and uncontrolled settlement sprawl. Notwithstanding these, the following high-level opportunities and constraints are mentioned, but subject to improved management practices:

Opportunities	Constraints
1. Ward 39 would appear to have under-utilised agricultural potential in the areas where settlement has not yet taken place. 2. The potential for extensive development lies in the following sub-sectors of agriculture: 2.1 Expanding areas under extensive arable, particularly: maize, soya bean, dry bean, potatoes. 2.2 Expanding areas under Intensive cultivation of vegetables. 2.3 Introduction of timber production including: Eucalypt, Pine, Wattle. 2.4 Enhancing and upgrading local cattle for commercial beef production. 2.5 Introduction of dairy. 2.6 Commercialization of poultry. 3. There appears to be un-realised potential for expanding food security production around households	1. Limited access to traction services in Ward 39 by smallholder farmers. 2. Distances, costs and logistics associated with accessing main centres in the region to secure inputs into production. 3. Lack of access to irrigation for smallholder production, particularly in relation to high value crops such as vegetables, maize and pastures. 4. Challenges associated with production in volumes sufficient to generate surpluses which can be invested in expansion of each enterprise

Forestry

There is no evidence of large scale commercial forestry taking place in ward 39 at the present time. There clearly was forestry in this area in the past, but this now seems to have been replaced by 'scrub wattle' which is used predominantly for fire wood and traditional housing construction. Ward 39 has the climatic and soils conditions for the establishment of commercial forestry. However, establishment and sustainable production of commercial timber requires farmer training and

experience in this sector which takes many years to develop. Thus there is forestry potential (soils, climate), but it is unlikely that the expertise, equipment and financial resources are available local to realise this potential without some type of external intervention. Whilst the extension of Forestry is unlikely due to water demand, it is believed that there are downstream beneficiation opportunities which have not been fully realized.

Tourism

In spite of no tourism being known to occur within Ward 39, this area has, as indicated from the maps and observations made early in Section 4 with regard to Landscape Corridors, potential were these assets to be capitalized upon. The open areas lend themselves to mountain biking using existing game or cattle tracks, possibly with some additional single-track construction in parts. The wetlands and scenic areas would be suitable for guided hiking trails which might link well with the conservation efforts in the Impendle Nature Reserve of which a lesser, but still significant, portion lies within this ward.

As a consequence of the relative isolation of Ward 39 in terms of location, topography and history, opportunities outside of agriculture, tourism and human resources to sustain economic development are limited.

Surrounding Economic Activities

The locales within which economic activities occur include:

- Pietermaritzburg CBD
- Edendale CBD
- Richmond town centre
- Bulwer town
- Impendle Town

The implication of transportation in respect of spending patterns

A meeting with community representatives in December 2017 shed light on the low level of commercial activity in Ward 39. The ~~vast~~ majority of shopping occurs in Pietermaritzburg CBD (approximately 80%), with an un-estimated very low volume of purchases occurring in Richmond.

A critical issue which impacts on buying patterns relates to transport provision and restrictions. Taxis and busses essentially commute between Ncwadi and Pietermaritzburg. Very limited transportation is available to Hlanganani, Impendle, Boston, Bulwer, Creighton and Richmond. Private transport, offered by LDV owners, is the transport of choice to Richmond. Although Boston and Impendle are in reasonable close proximity, this is not a preferred route for taxis and is thus costly.

Natural Environment

The status quo assessment considered geology and soils, topography and slope, hydrology, air quality and biodiversity. The aspects which had the most significant impact were slope and transformation of the natural environment, dealt with under biodiversity.

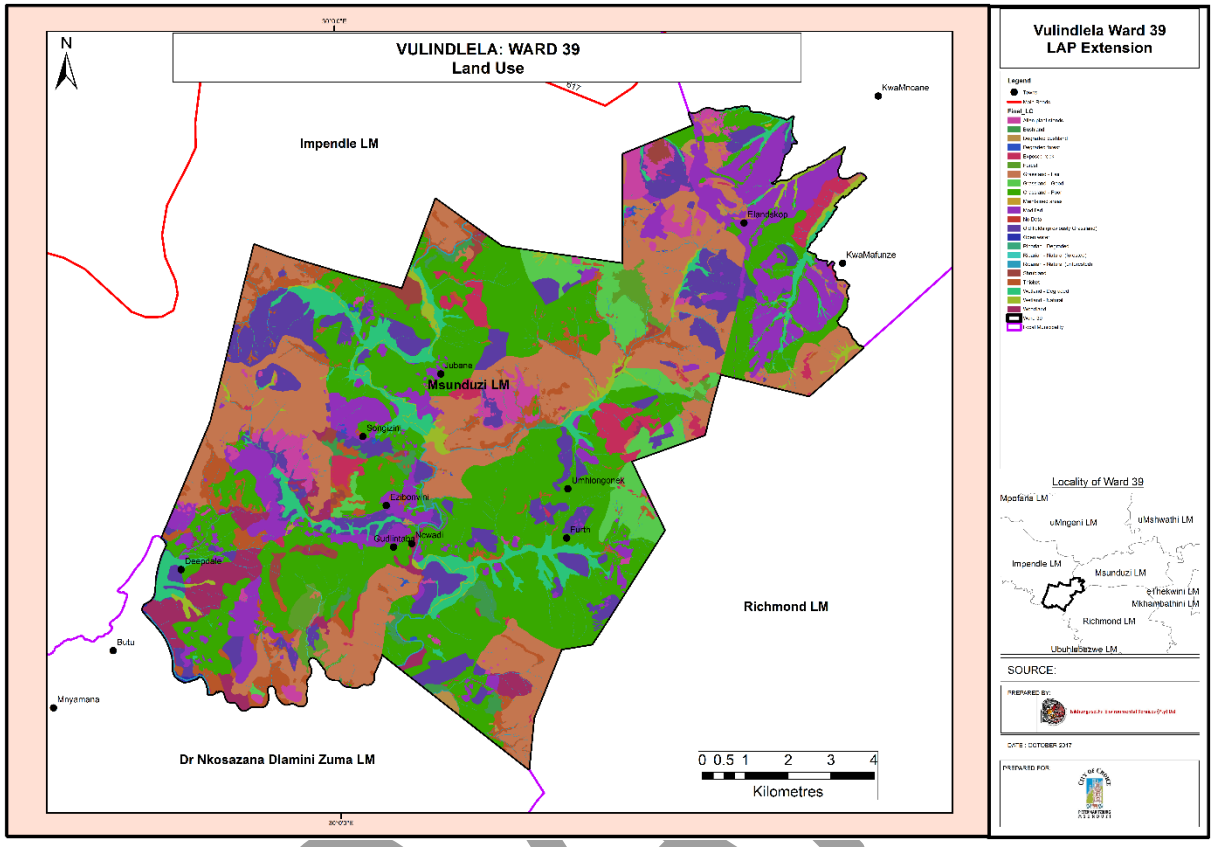
Topography

The rugged nature of the topography of this area is highlighted in Figure 34, on page 70 of the status quo report. This topography needs to be taken into consideration in the planning of future settlement development and the implementation of infrastructure, particularly roads, bridges, water supply, sanitation etc. This is particularly important for the land which is located between the Qadi TC in the west and the major settled areas in the east. This is currently State owned land (DRDLR) and due to it being less rugged than that in Qadi TC and less heavily settled that the eastern areas, it may need to be considered for future managed agriculture and properly demarcated settlement, but the latter only in specifically demarcated, and limited, areas. In this part of Ward 39 there is the potential for this type of development to be located on provincial transport routes to enhance accessibility.

Transformation of the natural environment

One of the critical considerations in respect a status quo assessment is the consideration of transformed areas (Figure 1). In respect of Ward 39, most of the transformed areas are grasslands, as the forested areas tend to be on the slopes, many of which are too steep for most agricultural activities and are not suitable for development nodes. At present the fragmentation between habitats is manageable, however, if ~~into~~ the future development trajectory of Ward 39 continues along the present path, and cognisance is not taken of the biodiversity areas, then it is likely that this fragmentation will become more significant. This will prevent the free movement of biota within this area, thereby preventing proper disbursement of populations and could, in extreme circumstances, result in populations being cut off. Furthermore, those grasslands that have not been transformed for agricultural purposes are being put under pressure through the poor land use management practices such as over-grazing or fire burning. Unfortunately, only a small portion of ward 39 (5%) form a conservation area protected by EKZNW as well as a stewardship area. This land is protected and cannot be utilised for agricultural, residential, commercial or industrial purposes.

Figure 1: Present land use based on the work undertaken by the Msunduzi Municipality



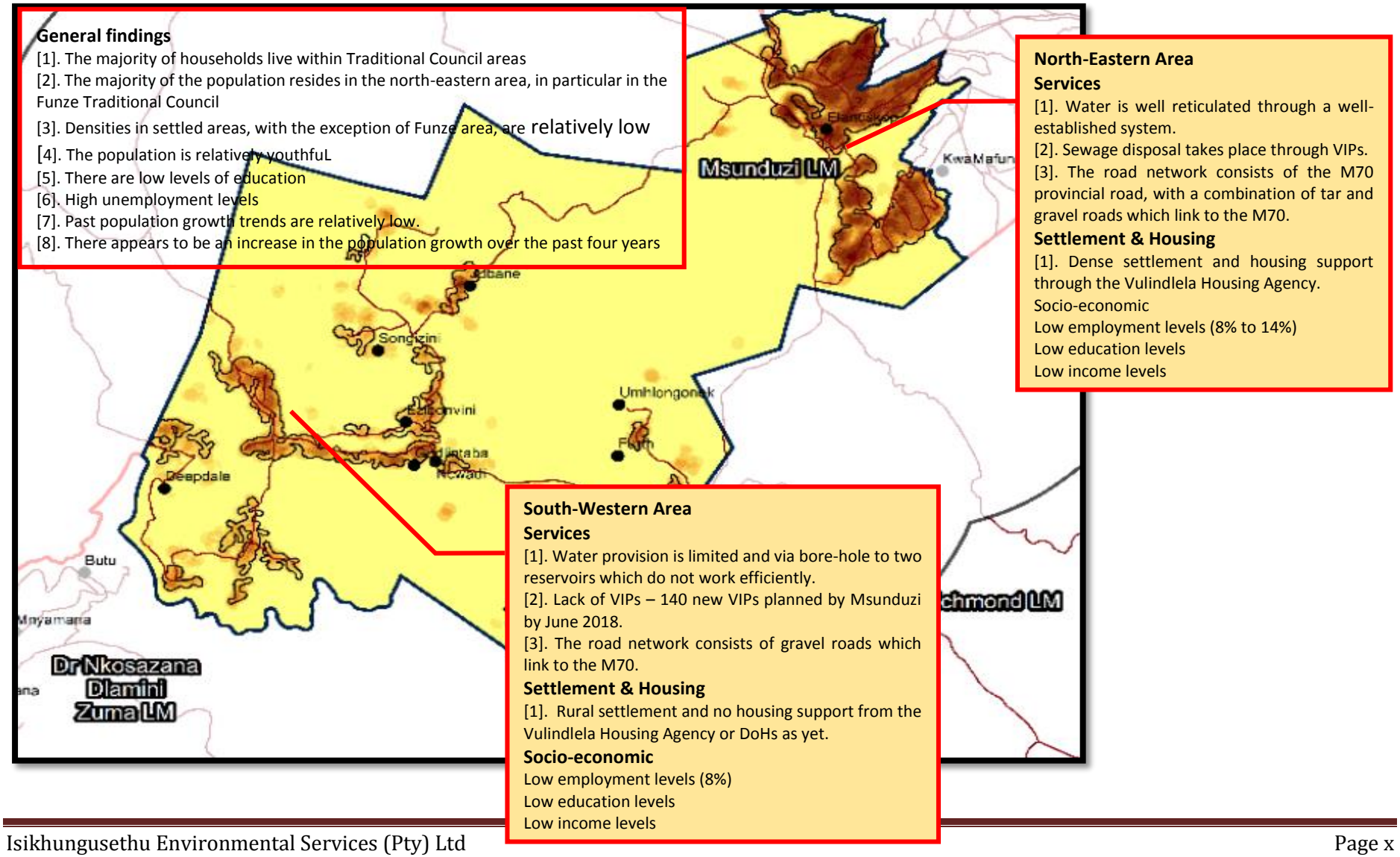
Services and infrastructure

This area has largely been neglected in the provision of services and infrastructure. In addition, services have not been proportionately distributed across the new Ward 39. The more formal or urban areas in the east are better serviced and more connected than the peri-urban or rural areas in the south-west of the ward.

The eastern part of Ward 39, which essentially refers to the Mpumuza TC (ex-Vulindlela Ward 7) and the Funze TC (ex-Vulindlela Ward 8) are well endowed in respect of services such as water provision, sanitation, some "RDP" housing and roads in comparison with settlements in the central and western sections of ward 39 at Deepdale and Ncwadi which have limited water supply, no municipal supplied VIP's, no formal housing development programmes and which are serviced by Department of Transport maintained gravel roads.

This disparity in the provision of services will form one of the core elements of the eventual Local Area Plan for Ward 39.

Figure 2: Main findings in respect of the Status Quo Report



Projects and initiatives

There are a number of projects and initiatives in respect of Ward 39, which will assist in addressing some of the gaps identified as part of the Status Quo assessment. This is summarised below:

- Proposed Smithfield dam on the Mkomazi river
- Recently completed new bridge over the Mkomazi river connecting Deepdale with the Dr Nkosazana Dlamini Zuma
- An on-going road maintenance plan
- Improved water provision in the Ncwadi area linked to improved water supply to the current reservoirs in the area, even prior to the Smithfield dam completion.

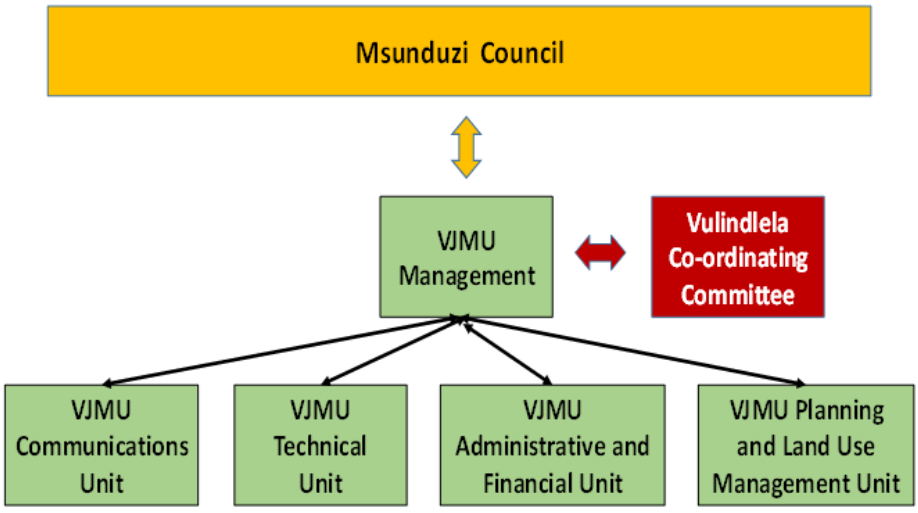
Settlement of gazetted land claims and investment by the state in infrastructure provision in the development inherent in settled land claims.

Management of Ward 39

The Vulindlela Local Area Plan, based on the above requirements and the comments by key role-players found that there is a need for a locally-based Joint Management Unit (JMU) to assume responsibility for implementation of the plan, provision of services (utility) and land management in Vulindlela and of which Ward 39 is now part.

Fortunately, since this ward is an *extension* of the much larger *adopted* LAP (2015) for the entire Vulindlela, the land management processes set forth in that document merely need to be extended to this new geography. That Vulindlela project conceived of a multi-body agreement being instituted in terms of which (based on Figure 3 below), after consultation, the existing, long-standing, and legally-mandated municipal planning and building plan consideration and approval processes shall be honoured and hold sway. Importantly, that multi-body proposal has already achieved municipal endorsement and it is now merely a matter of instituting, and institutionalizing, it.

Figure 3: Suggested structure and reporting lines for the Vulindlela Joint Management Unit



The establishment of the Joint Management Unit was approved by a sitting of full Council in March 2016. One of the consequences of this Council Approval was the appointment of Mr Sipho Zimu to manage and oversee the implementation and gradual assumption of responsibilities, as *per* the recommended structure.

Whilst progress has been made, there is a need for the signing of agreements with the ITB, the Traditional Authority and Msunduzi municipality to formally implement this JMU. In the case of Ward 39, this must necessarily include the SADT/ DRDLR.

Summary

This ward clearly has intrinsic potential for positive development, in the northeast and western areas in terms of densifying urban development. Unfortunately, there is an inherent conflict of interest in land use in the northern and eastern areas of the ward since this is also the best agricultural land. Thus, any further unplanned settlement development in these areas will negatively impacts on agricultural and water production potential of the ward.

As noted, future agricultural development and expansion will not be without its difficulties. Urban expansion onto productive agricultural land is one issue and that will be dealt with in the plan. The potential of the area is reflected in the contoured fields/ lands (largely for grazing) sculpted by the previous owners and visible in what is now the SADT area.

The real limitations around commercial agriculture in ward 39 are alluded to in the status quo and in the Vulindlela LAP. Until, and unless, these limitations are addressed either through land reform or a comprehensive extension service, sustainable commercial production is unlikely to succeed and will, as in the majority of land reform projects, revert to low level subsistence production. In order to limit the risks associated with expansion of urban development through land reform and/or land invasion, specific interventions to address enhancement in agriculture are needed.

It is noted in the status quo that fundamental to the future sustainable development of ward 39 is the question as to what productive functions this area can perform in relation to the whole (i.e. within the Msunduzi municipal area). This will be addressed in the analysis of the status quo and should include functions that add value to the social economy of the municipality such that ward 39 does not become a further economic drain on municipal coffers.

Further fundamental issues relate to loss of agricultural resources through uncontrolled urban expansion, questions associated with effective land use management, institutional arrangements designed to regulate development of the area and the costs and logistics associated with extending services to identified areas, especially those intended, by this LAP, for urban densification/ infill.

CHALLENGES

Based on the preliminary findings of the status quo the key challenges facing future development of ward 39 include:

- Gross value added to the sub-regional economy by inhabitants of ward 39 limited to employment by a relatively small proportion of the working age population in the agricultural, government and commercial sectors on a mainly migrant basis.
- Fragmented administration of the land area comprising ward 39.
- Lack of services.
- Current land use characterised by rural settlement, subsistence cultivation and livestock production and transformed natural habitat.
- Poorly defined hierarchy of centres in ward 39 and reliance by residents on surrounding small towns and Msundusi for services.
- Relative isolation of the western Ncwadi settlements from those in the east in the Funze and Mpumuza traditional areas.
- Uncertainty over future land reform developments planned on the state-owned land in ward 39: settlement of land claims could have a major positive or negative impact on future development of this ward depending upon what is being planned for each area.
- Limitations around economic development potential of ward 39 under current forms of land ownership and land management.
- Under current land use practises and those which characterise most land reform projects in RSA the potential to realise the full agricultural potential of the area is very limited.
- Difficulties associated with provision of utility services to the settlements in the western areas of ward 39 owing to logistics, costs and distance from Msunduzi.
- Linkages and reliance of the inhabitants of ward 39 for services on small towns surrounding this area owing to distance and costs.
- Access to the western settlements is challenging in terms of topography and locality although this is being partially addressed with the construction of a bridge.

CONCLUSIONS AND PRELIMINARY STRATEGIC QUESTIONS

In conclusion it may be noted that inclusion of ward 39 into the Vulindlela Management Area poses a number of serious challenges to the Msunduzi Municipality. These will need to be overcome in order for development to sustain in ward 39 in those sectors with the greatest potential to succeed. The main questions that will need to be addressed in the formulation of the local area plan for this ward are as follows:

- In the current and future local economy of the sub-region, in which ward 39 is located, what is the development potential of the area?

What are the preconditions that need to be set in place by the municipality in order for this potential to be realized given the current limitations around sustainable development in the area?

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1. INTRODUCTION

Isikhungusethu Environmental Services (Pty) Ltd was contracted by the Msunduzi Municipality to prepare a local area plan (LAP) for the newly created Ward 39.

Ward 39, as more fully described in section 2, was promulgated by the Demarcations Board in 2016 and essentially represents a 135km^2 extension to Msunduzi's western boundary. Ward 39 is situate at this municipality's interface with the areas administered by the municipalities of Impendle to the ward's north-northwest, Dr Nkosazana Dlamini-Zuma to its west and south, and Richmond to its south-east. This ward comprises portion of the ex-Ingwe municipality ward 7, together with lesser portions of what was Msunduzi's wards 7 and 8. The vast majority of the ward comprises the ex-Ingwe component.

Ward 39, as mentioned, is situate on the Western border of Msunduzi and adjacent to the Vulindlela Area Based Management Area. As this area in many respects in homogeneous to Vulindlela, the Terms of Reference recommends that Ward 39 be considered as an extension of the Vulindlela area and its institutional and management, as further noted in the terms of reference, these are essentially traditional areas where land ownership is under the Ingonyama Trust Board. Planning of this area is a municipal function and land use administration is a joint responsibility of the municipality and Traditional Councils, as noted in the project briefing document and the VLAP (Isik 2016).

In terms of phase 2 of the Terms of Reference, the appointed Services Provider requires to prepare a status quo assessment of conditions in Ward 39 as the basis for analysis and the preparation of a vision, objectives and the LAP itself.

It should be noted that this report represents work in progress and that as additional information is made available by different government agencies and communities at local level, they will be updated accordingly. This will continue until such time as phase 4 of the project commences and a final analysis of the materials is required prior to embarking on production of the Local Area Plan itself.

1.1. Structure of the report

Section reference	Section heading	Section description
1	**Introduction**	Discussion of the background, the objectives of the study and the methodology applied.
2	**Study area**	Discussion of the geographical context, the history of the Ward 39 area, the character of the area as well as the management of the area.
3	**Policy review**	Review of the relevant policies and legislation.
4	**Strategic Spatial Perspective**	This assessment will commence with a regional analysis in respect of Ward 39, both in respect of Ward 39 and its influence on surrounding areas. This will be followed by the suggested linkages with surrounding areas and acknowledgment of the hierarchy of current centres.
5	**Natural environment**	Consideration will be given to: ▪ Geology and soils ▪ Topography ▪ Hydrology and climate ▪ Biodiversity ▪ Air quality

6	**Built environment and human development**	This assessment will include the following: - ▪ The socio-economic profile for Ward 39 ▪ Settlement patterns ▪ Services and Infrastructure *- Transport and utility services* *- Social services and facilities* ▪ Economic structure and productivity - *Local economic Profile* - *Commercial Services and Accessibility* - *Economic activities (Agriculture, Tourism, Manufacturing and other)*
7	**Current and planned projects and initiatives**	Section 7 is to address the following: ▪ Projects and initiatives ▪ Impacts on the natural environment ▪ Impacts on the built environment and service provision ▪ Mitigation actions This will culminate in the identification of issues, informants and constraints.
8	**Institutional arrangements**	This section will focus on the Joint Management Unit conceived through the Vulindlela LAP and now under development and full implementation. Consideration will be given to the integration of Ward 39 into this institutional model
9	**Status Quo Key Findings, Informants and Constraints**	Section 9 will focus on the key findings, informants and constraints.
10	**Alignment with the Vulindlela LAP**	An important aspect of the Ward 39 LAP is its integration with the Vulindlela LAP.

1.2. Problem statement

An assessment of the findings of the Status Quo component of the Ward 39 planning process has indicated a variety of natural, physical, economic, infrastructural, social and economic political and policy issues that have been identified in the planning process and that will in turn need to be taken into account in the formulation of the plan such that these can be meaningfully addressed.

A review of these issues has revealed that perhaps the central greatest challenges to be addressed include the fact that this Ward is essentially rural and under-developed in nature, located furthest of all Management Areas from the economic hub and associated services of Msunduzi (126kms). Furthermore whilst the area has good agricultural potential, realization of this is limited in terms of communal tenure arrangements, traditional farming practices, poorly developed infrastructure, lack of local capital and commercial farming expertise and uncontrolled settlement sprawl. As a consequence of its relative isolation in terms of location, topography and history, opportunities outside of agriculture, tourism and human resources to sustain economic development in this area are limited at this time.

It is against this background that the following questions need to be addressed, from a planning and development perspective, as a meaningful point of departure in the planning process and include:

- As a principle, is it feasible that local municipal boundary adjustments can continue to be accommodated by Msunduzi without resulting in a further drain on municipal resources?
- Is there sufficient inherent developmental potential in this ward to be able to promote, establish and sustain economic development initiatives that benefit and sustain its local people?

- What pre-conditions need to be in place in order to catalyze development in Ward 39 in what is a relatively isolated and fragmented area with its inherent opportunities and constraints?

- Recognizing that the overall nature and shape of Vulindlela, as part of Msunduzi, is likely to change over time (accompanying further boundary changes) and that the development potential of Ward 39 is limited in its own right the next set of questions are posed to better focus the goals and objectives of this planning project:

    - 'what can Msunduzi do to meaningfully develop this new addition to Vulindlela'?

      or alternatively:

    - 'what meaningful role can Ward 39, and/ or its future derivatives, play in the growth and development of Msunduzi as one of the major municipalities in KwaZulu-Natal'?

1.3. Point of Departure

It may be argued that if Msunduzi adopted the view that Ward 39 was an additional responsibility it would in time simply become an unsustainable drain on the municipal fiscus. If however, in this planning process, the municipality adopted the view that Ward 39, as part of Vulindlela, had a unique contribution to make to the whole, then the essential purpose of this plan would be to identify strategic investments that can be used to unlock the development potential of this area.

This follows the approach and structuring principles adopted in the planning of Vulindlela prior to the incorporation of Ward 39. In essence in order to unlock the development potential it was established that a defined hierarchy of centres needs to be established in Vulindlela. Each of these centres needs to be geared to both accommodate and sustain households involved in urbanization around major metropolitan areas in south and southern Africa. Furthermore these centres need to be linked and integrated into the metropolitan economy in terms of connectivity, rapid transport, industrial decentralization and training and skills development. The notion is that the centre invests in the preconditions for development of the peripheral areas which in turn take the initiative and capitalize on their unique local conditions to the benefit of the whole.

Having defined the role of the centres the next challenge in the planning process was to define that of the rural areas in contributing to meaningful development of the centres and ultimately the whole. This was achieved by redefining the role of traditional rural areas in this municipality: in essence the notion of import replacement for all types of foodstuffs for the urban residents of the municipality provides the opportunity and catalyst for the sustained growth and development of these rural areas subject to a range of important conditions. Given the high quality of agricultural resources available in the more rural areas of Vulindlela, including Ward 39, there is a unique opportunity to harnass this potential in both food and materials production which in turn can be used to give rise to both up and downstream processing and manufacturing in and around defined urban centres.

If this, as a point of departure, is adopted for the planning of Ward 39 (and any other subsequent inclusions), then as noted, the structuring principles are already in place in the VLAP and integration into the Vulindlela Management Area could be achieved with limited adjustment to the original plan.

The implication of this for the Status Quo component of the planning process is that it should be used to focus in on identifying important and unique economic opportunities accompanying the accommodation of urbanization pressures in defined urban centres. As noted, opportunities for urbanization should be accompanied by seeking opportunities to transform high potential agricultural resources into production areas of food and natural resources necessary to sustain urban populations and at the same time promote processing and manufacturing for export.

1.4. Background

Msundusi Municipality, as planning authority for its areas of jurisdiction, has the responsibility in terms of the Municipal Systems Act (Act 117 of 1998) to prepare spatial framework plans to guide development of the municipality. Accordingly the municipality has divided its area of jurisdiction into a number of management areas. Spatial frameworks, termed Local Area Plans (LAP) by Msunduzi, have been prepared for each of these areas over the last 5 years. The LAP for Vulindlela was completed towards the end of 2015.

Since completion of what was known as the Vulindlela Local Area Plan (VLAP) there has been an adjustment to municipal boundaries. This is as a consequence of municipal elections in 2016 which resulted in Ward 39 being absorbed into the Vulindlela Management Area of Msunduzi.

Ward 39 comprises a relatively large area of land (13485 ha) which is densely settled in the north east and sparsely settled in the central and western areas. The main settled areas located in this ward include: Ncwadi, Maqadeni, Songizini, Sibomvini, Gudlintaba and Furth. The densely settled areas in the north east formed part of Vulindlela prior to the 2016 ward boundary adjustments. The scattered rural settlements in the central and western areas of the ward originally formed part of what was known as the Ingwe municipality which in 2016 became the Nkosazana Dlamini Zuma Municipality.

Owing to the origins of Ward 39, questions over municipal allegiance have been raised at local community meetings. The responses have indicated a preference for linkages to Msunduzi despite the historical connections to the Harry Gwala District and Nkosazana Dlamini Zuma local Municipalities. This may be linked with the perception that Msunduzi is better resourced than its rural counterpart municipalities and hence this perception is accompanied by raised expectations amongst local residents.

It is against this background that a LAP now has to be prepared for Ward 39 and in the process aligned with the VLAP such that there can be spatial integration of these areas over the short, medium and longer term. In the process of gathering information for the preparation of the LAP for Ward 39 it has become apparent to the planning team, appointed for the project, that owing to the origins of the area there is limited readily available data which can be used to compile a spatial framework. Consequently, reference has been made to information gathered from a variety of sources and 'pieced together' to create a meaningful understanding of what is currently taking place in the Ward. This in turn will form the basis for identifying informants and constraints to future planning and development of the area as an integral part of Vulindlela and the greater Msunduzi Municipality.

One of the key findings to emerge in the early stages of the planning process is that owing to the paucity of data there is an urgent need for the Msunduzi municipality to conduct a number of local

surveys and audits in Ward 39. The purpose would be to establish the current nature and condition of infrastructure, social services and socio-economic profile with the view to enabling detailed project planning and budgeting as the basis for promoting development in this area following guidelines provided by the LAP.

The local area plan in the hierarchy of plans

In terms of the hierarchy of plans envisaged in SPLUMA, the LAP is located between the spatial development framework (SDF) and the precinct plan (diagram 1, below). Thus the role of the LAP is to inform content of the intervention areas, detailed layout plans and schemes. The content of these plans should be the subject of the more detailed work prepared subsequent to the completion of the LAP. This subsequent level of investigation should give rise to formalisation of land rights, establishment of cadastre and the determination of cost for implementation of the proposed centres.

In order to provide this overarching framework to guide future development of Ward 39 Vulindlela, the intention is for the LAP to be 'pitched' at sub-regional context to guide future development for intervention at local level. This is to ensure that it is contextualised and provides a framework to achieve the following:

i. Guide the type and location of future development in urban, peri-urban and rural areas of Ward 39.

ii. Inform the preparation of land use schemes and the introduction of land use management throughout Ward 39.

Diagram 1: Hierarchy of plans

1.5. Purpose of the Study

The situational analysis or status quo phase of the project represents the 2nd phase of the project, as per the diagram below.

Diagram 2: Ward 39 Local Area Plan Phases

The objective of the situational analysis is to secure information in respect physical attributes, infrastructure (water, roads, electricity etc), social facilities (Schools, churches, community halls etc), the environment, socio-economic opportunities and constraints, agricultural practices, the management of land use together with cultural heritage, as well as securing input from relevant role-players, linkage with capital investment plans, utility services, housing provision and economic activities.

Table 1: Status Quo Assessment Components

Physical Analysis	Infrastructure	Social Infrastructure	Environment	Socio-economic	Agriculture	Other
Topography	Water provision	Churches	Sensitive areas	Employment	Agricultural potential	Management of land use
Rivers/ streams	Sanitation	Community Halls	Wetlands	Economic activity	Agicultural practices	Cultural heritage
Settlements	Roads	SASA	Rivers and buffers	Income	Agricultural support	
Dwellings	Electricity	SAPS	Dams	Education		
	Waste Management	Clinics				
		Hospitals				

Securing information from all relevant role-players in respect of project support, capital investment, infrastructure and housing provision and economic activities

The purpose of the of the situational analysis, as alluded to above, is to analyse the natural resources, settlement patterns, densities, service provision, social infrastructure, socio-economic opportunities and constraints, agriculture practices and environmental infrastructure and constraints.

The above analysis will identify the sensitive "no-go" and "tread lightly" areas, high potential agricultural land, critical corridors and municipal infrastructure plans. The aforementioned, combined with settlement patterns together with population growth analysis and economic opportunities will start to inform the spatial planning framework in respect of Ward 39. This analysis, in phases to follow, will inform the identification of centres, nodes and corridors, housing, utility service needs and economic opportunities. Agriculture is a critical land use in respect of Ward 39 and the identification of settlement edges would be an important outcome of the LAP to avoid the further degradation of agricultural land.

It is important to recognise that the Ward cannot be considered in isolation. It forms part of an intricate network of existing centres, transportation routes and networks, economic and employment connectivity together with a government services provided within a hierarchy of centres. To understand this intricate network, the situational analysis includes an overview of the regional context and linkages. Also interweaved in this network is the National, Provincial, Local and Traditional Institutional arrangements and networks which need to be acknowledged and understood.

Finally, development and spatial frameworks in South Africa is informed by a hierarchy legislation and policies, such as the National Development Plan, Provincial Growth and Development Strategies. District Growth and Development Plans, Municipal level Integrated Development Plans together with Spatial Development Frameworks

1.6. Methodology

The methodology applied during the situational analysis consisted of a multi-pronged approach, occuring concurrently.

Data gathering methodology

The data gathering consisted of two main components.

The first related to desktop analysis of the various aspects covered in the status quo analysis including legislative and policy directives.

This was augmented by securing mapped information and GIS data relating to:

- Physical attributes such as topography, river drainage systems
- agricultural potential, bio-resource groups,
- environmental sensitive areas, protected areas
- existing and future infrastructure
- geology
- Settlement patterns

Fieldwork

A further important contribution to research undertaken was fieldwork.

The field work was made up of various components. This included reconnaissance visits by the project team members to become *au fait* with the environment, a guided tour by an old resident of the area to determine the historic agricultural value of the area, a field trip by the Project Steering Committee. The Project team, accompanied by Mr Hlongwane, the ABM officer situate at Taylors Halt, undertook a field visit through the whole of Ward 39 to determine all non-residential land uses, including schools, creches, shops, and similar non-residential development in Ward 39.

This field work is used to verify the data collection and to provide accurate mapping in respect of land use.

Research and analysis methodology

The research component of this section was complicated in that the newly created Ward 39, as mentioned earlier is, is an amalgamation of 3 portions of 3 previously exiting wards, i.e., portion of Wards 7 and 8 Vulindlela both of Msunduzi Municipality and portion of Ward 7 of Dr Nkosazana Dlamini Zuma Municipality (previously Ingwe Municipality). This has required careful analysis of data sources and searching for data which relates to the newly created Ward 39.

This is particularly the case in respect of household counts, demographics and socio-economic information. As a consequence, a physical house count had to be done, using up to date aerial imagery and data in respect of demographics had to be obtained from more than one source to ensure benchmark testing.

The fact that the Ward is a new creation, also means that very limited information is available from a socio-economic perspective, as is also the case with agriculture, which is a major land use activity and survival based income generator. The limited information has required the research to also include focussed meetings with key stakeholders, such as the Department of Agriculture, Forestry and Fisheries Extension Officers to fill the gaps identified.

Communications and consultations

Communications

In terms of communications, the program has included communication with the Mayor, the Ward Councillor, the Chairman of the Economic Development Portfolio Committee, the Traditional Leaders in Vulindlela and Ward 39 and an Introductory meeting with the Nkosi and Isinduna on the ground.

Consultations

Consultations have been undertaken with a number of key role-players including:

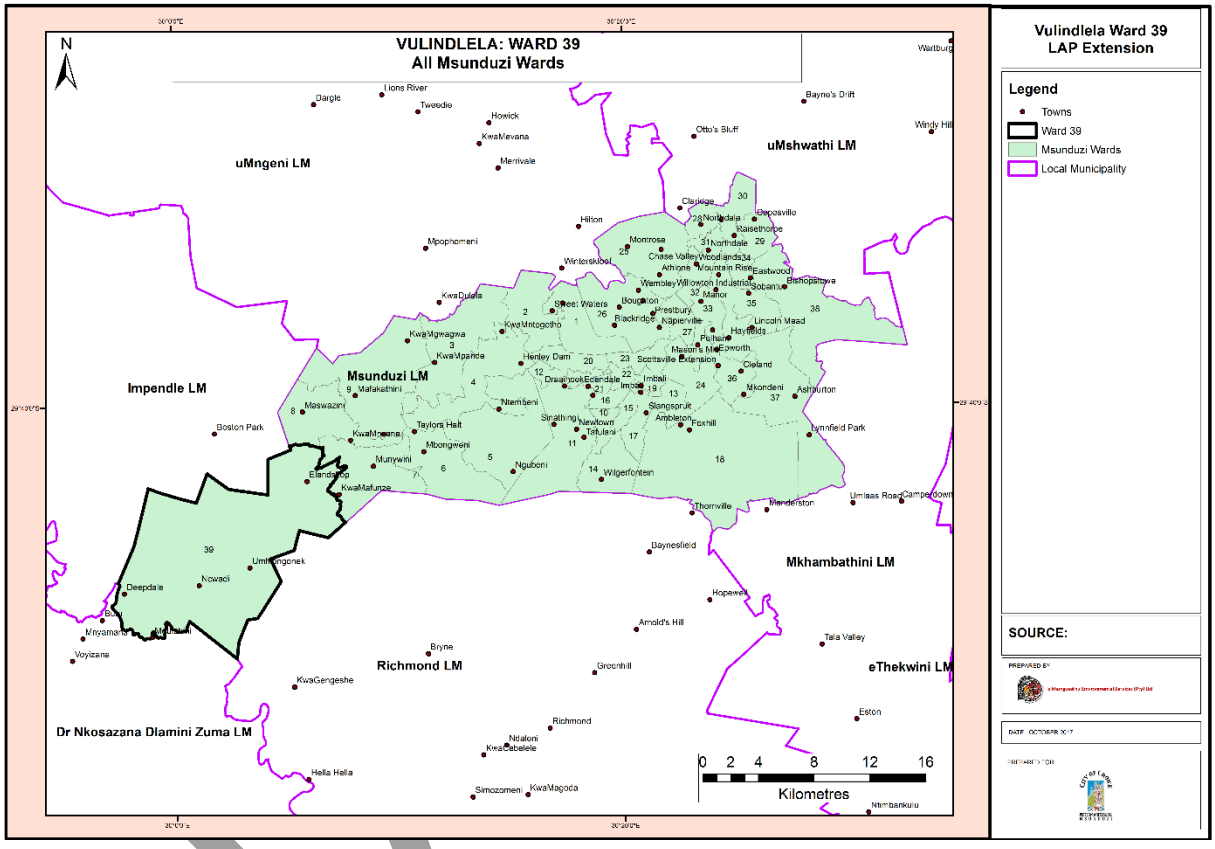
Organisation/ Institution	Aspect addressed	Date
Department of Agriculture, Forestry and Fisheries: Mr Magwaza	Agricultural Practice and in particular agricultural support to the Ward 39 community	
Department of Rural Development and Land Reform: Mr Denver Ince	Ascertain whether there are any pending land claims and whether there are land reform projects under consideration	29 November 2017
Dr Nkosazana Dlamini Zuma Municipality: Mr Joel Mazibuko	Determination of historic information in relation to erstwhile Ward 7 Ingwe including water provision, housing provision, outstanding infrastructure projects and linkage with Dr Nkosazana Dlamini Zuma municipality.	
Richmond Municipality: Mr James Sithole	Determination of linkages with Richmond Municipality	19 November 2017
Harry Gwala District Municipality : Mr Cele	Determination of water provision and management plans in respect of the erstwhile Ward 7 portion of Ward 39.	24 November 2017
Department of Co-operative Governance and Traditional Affairs	Determination of support of Traditional Leaders	Various meetings
Ingonyama Trust Board Mr T Botath	Establishment of planned development/ interventions by the Ingonyama Trust Board as the owner of large tracts of the land.	Various meetings

2. STUDY AREA

2.1 Geographical Context

Ward 39 is a recently-created ward [1] (approx. 135km^2) as an extension to Msunduzi's western boundary. It lies at this municipality's interface with the areas administered by the municipalities of Impendle to the ward's north-northwest, Dr Nkosazana Dlamini-Zuma to its west and south, and Richmond to its south-east.

Figure 1: Locality Map



The ward is close to certain significant nodes within this municipality and in other municipalities as may be appreciated from Figure 1 and Table 2.

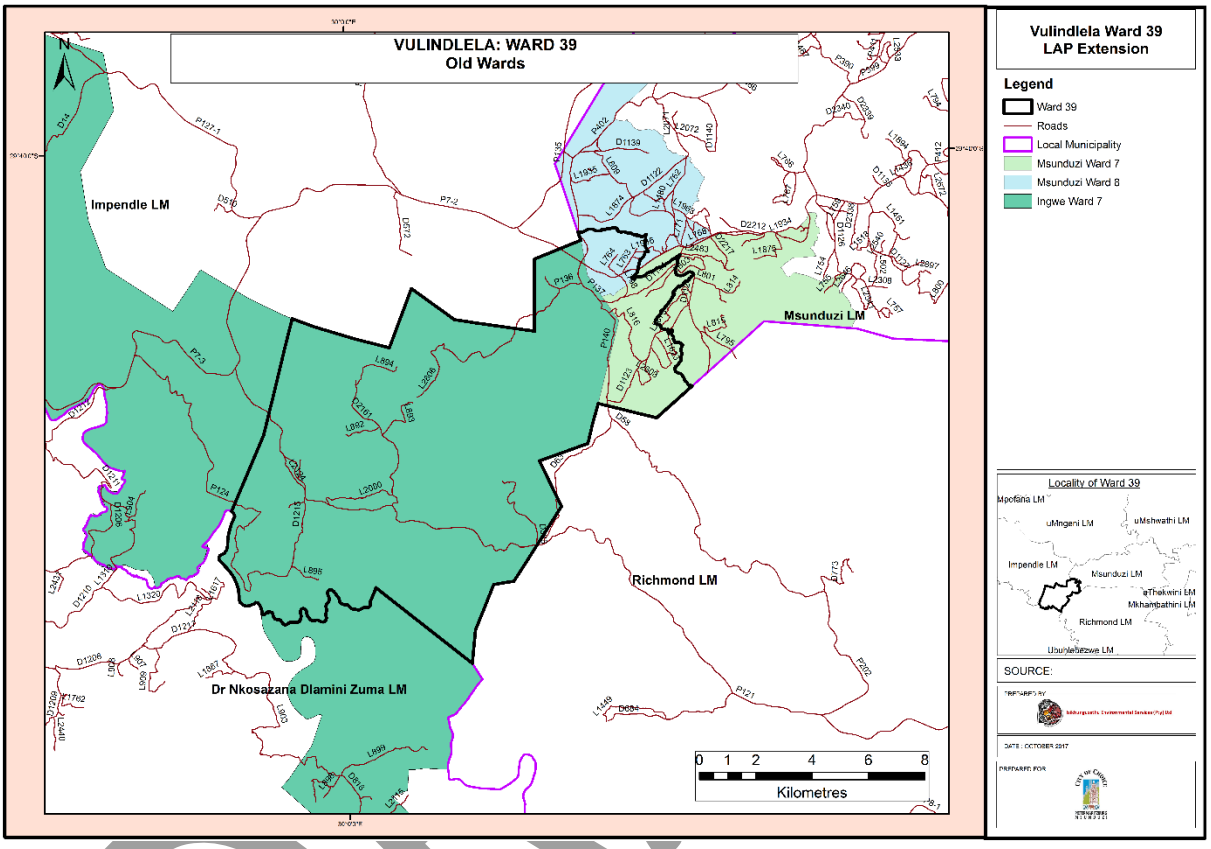
Table 2: Shortest road distances (km) to nearby/ significant nodes

From	To									
	Boston	Bulwer	Pholela/ Hlanganani	Impendle	Taylor's Halt	Edendale CBD	Pmb CBD	Howick CBD	Byrne	Rich-mond
Elandskop Sta	8.3	47.5	34.7	25.2	14.9	34.6	41.4	38.1	19.0	33.3
Ncwadi	39.2	32.8	20.3	33.5	36.6	56.3	63.1	65.0	27.5	34.0

[1] The Demarcations Board delineated and created this ward in 2016.

This ward comprises portion of the ex-Ingwe [2] municipality ward 7, plus lesser portions of what was Msunduzi's wards 7 and 8 as depicted in Figure 2. The vast majority of the ward comprises the ex-Ingwe component and from which it was, in effect, separated by the Mkomazi River, save for the major bridge on the R617 west of this ward.

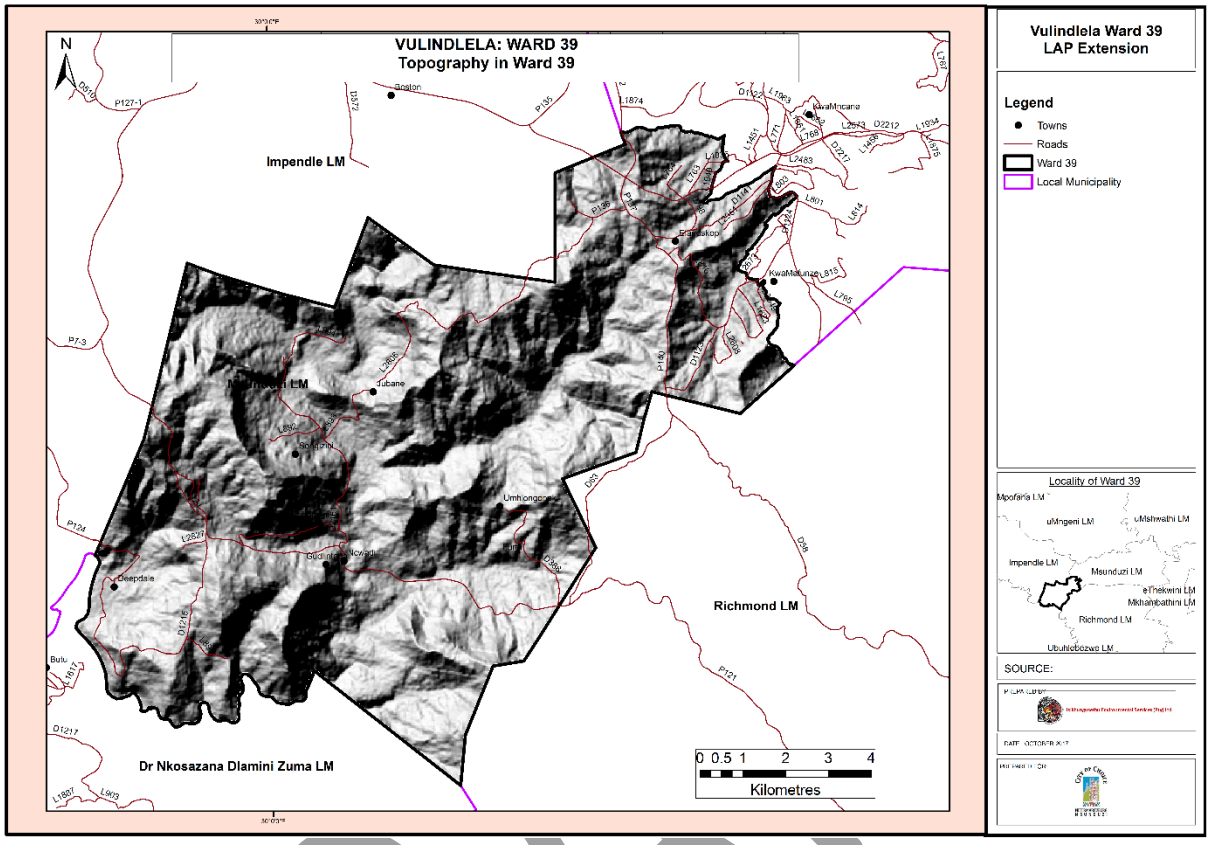
Figure 2: Ward 39: Pre-2016 Constituent Wards



The ward's configuration is such that the majority of it could be said to be separated from the bulk of the former Msunduzi municipal area by topography. Almost all of the northern, ex-Vulindlela, portion drains, from the Elandskop ridge (altitude approx. 1460m), towards the Msunduzi River, whereas south of that ridge the land falls, *via* a series of valleys, some of them steep-sided, towards the Mkomazi River (altitude approx. 814m at its southeastern extremity) and as depicted at Figure 3. This topography, as will be shown later within this report, has implications not only for transportation and accessibility, but also integration with functional Msunduzi municipal area and services. Interestingly, the Demarcations Board chose not to include approx. 23km^2 of land on the ward's southeast, which land is really an extension of the valley lying south of Ncwadi Station and which land is separated from the rest of the Ingwe municipality by the 14.4km of Mkomazi River and from the Richmond municipality by 2.1km of rugged terrain with an average slope of 46%.

[2] Now called Dr Nkosazana Dlamini-Zuma

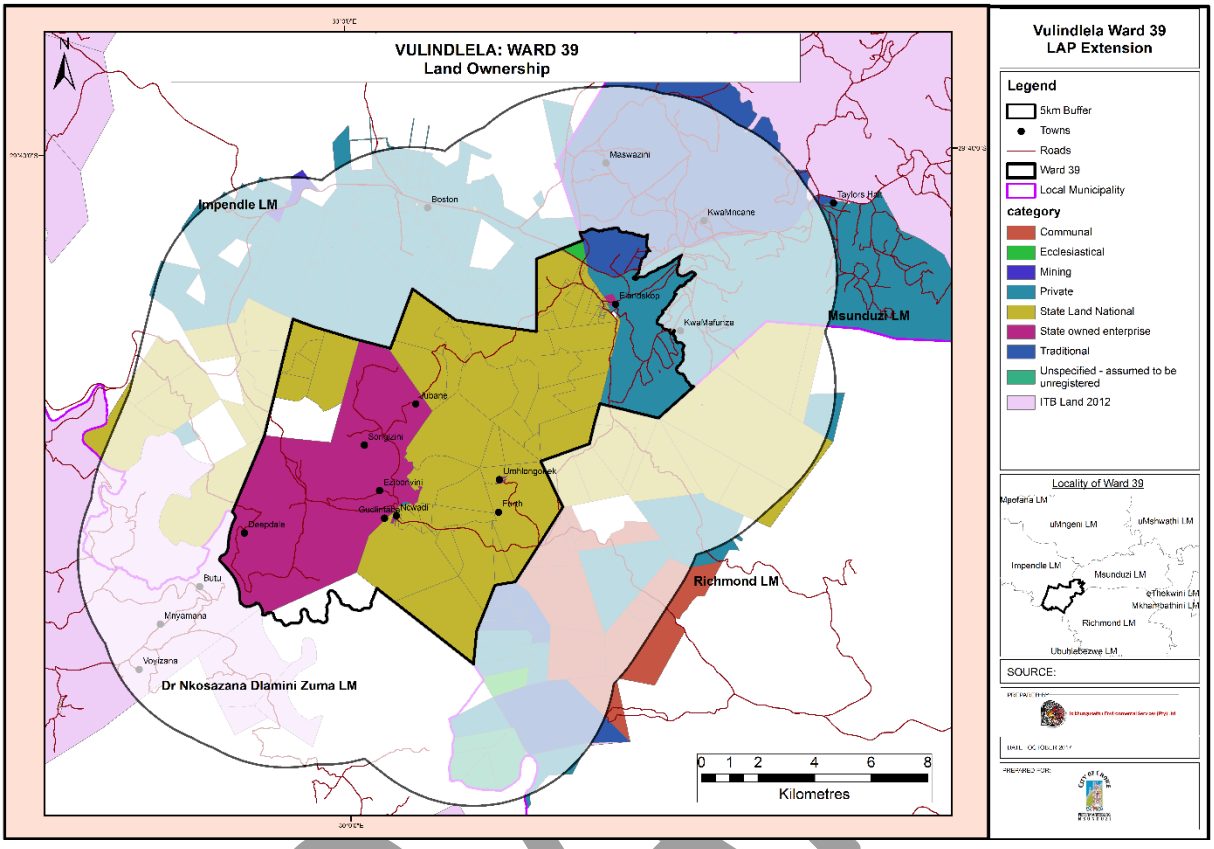
Figure 3: Ward watersheds



Essentially, there are three major registered land owners: the Ingonyama Trust, the Qadi Traditional Authority, and the South African Development Trust ("SADT" : under the auspices of the National Department of Rural Development and Land Reform [DRDLR"]), the first two areas being administered, in addition to the municipality, by Traditional Councils and their structures and as depicted at Figure 4. Important to note is that the SADT land [3] does not fall within the boundaries of any isigodi administered, in terms of land allocation, by an Nkosi. This SADT land, comprising approx. 90 properties, was expropriated from the then owners and placed in the ownership of the SADT in the late 1970s/ early1980s and provided to new occupants. [The underpinning rationale for this acquisition is still being sought from the files of the National Dept of Rural Development and Land Reform, previously Dept of Land Affairs]

[3] Approx 95km^2, approx. 70% of the ward area

Figure 4: Land Ownership



2.2 History of the area

Colonial government allocated the Elandskop area, and much of the area to its south, to white farmers. The original farms' low grant numbers (in the 1000 mark) give clue to how early in the land allocation process this took place. It is not known at what point the Qadi Traditional Area was created [4] but it existed substantially before WW2. One of the first attractions to the area was the abundance of timber (much of it yellowwood) for construction purposes and a saw-mill was established at Deepdale. Indeed, the level of timber extraction in 1856 was so high that the Richmond magistrate felt sent the coronet to to slow it. Crossing the Mkomazi River was problematic and a pont was first established and this was followed by a wooden bridge in 1890 very near the existing R617 bridge. This bridge was attempted to be burned down in 1902 during the Bambatha Rebellion, but this was thwarted. Deepdale became an established node for social and sporting activities, and accommodation in a well-run hotel.

The ward was a productive agricultural area and sustained an active farming community contributing significantly to the output [5] of the Boston district of which it formed an integral part. The Boston

[4] if it was actively created, as opposed to simply having left undisturbed, in terms of occupation and ownership, by the colonials

[5] Beef production, dairy, pigs, and crops such as maize (largely dried on the cob, some ground and sold for local consumption), sorghum, and lucerne.

Farmers' Association [6] was formed on 11th July 1890. Primarily cattle, but other animals too, were sold in Boston. Integral to the functioning of the area was the railway line which largely bisects the ward and which, in 1906, connected the Cape with Pietermaritzburg, the provincial capital. Interestingly, the Sevontein Prison was established just east of this ward, in order to provide convict labour in the construction of a significant portion of this railway line. However, the Pietermaritzburg-Elandskop line was formally opened on 3rd November 1904. This connectivity provided by the railway line brought development and Elandskop became a significant node. Guest farms were established for week-end and holiday get-aways. Produce in the form of live poultry, eggs, milk and cream were transported by train [7] to Pietermaritzburg for sale in its Market Square (where the library and Council car park and open air taxi parking now is). The Association built sales yards at Elandskop shortly after the opening of this station and this continued until the land was expropriated by the state. For this period, the monthly stock sale was the social and economic highlight of the month. The railway line became an artery in that it used, until the 1960s, to transport much produce from these valleys to the Pietermaritzburg Market, pigs to the large butchery at Baynesfield and cattle to the Pietermaritzburg municipal abattoir just near the Pietermaritzburg station. Within the ward there were 6 railway stations with sidings [8], all now de-commissioned, but one still proudly boasts its weathered name board: Figure 5.

[6] the objects of the Association were: (a) to discuss all questions affecting the agricultural and pastoral industries and other matters concerning the common welfare of the community; and (b) to conduct sales and auctions of livestock of all descriptions and all classes of produce, implements, or other requisites pertaining to farming interests.

[7] Instead of ox-wagon

[8] Mafunze; Elandskop; Umhlongonek; Ncwadi; Mdutshini; and Deepdale

Figure 5: Umhlongonek Station remnants

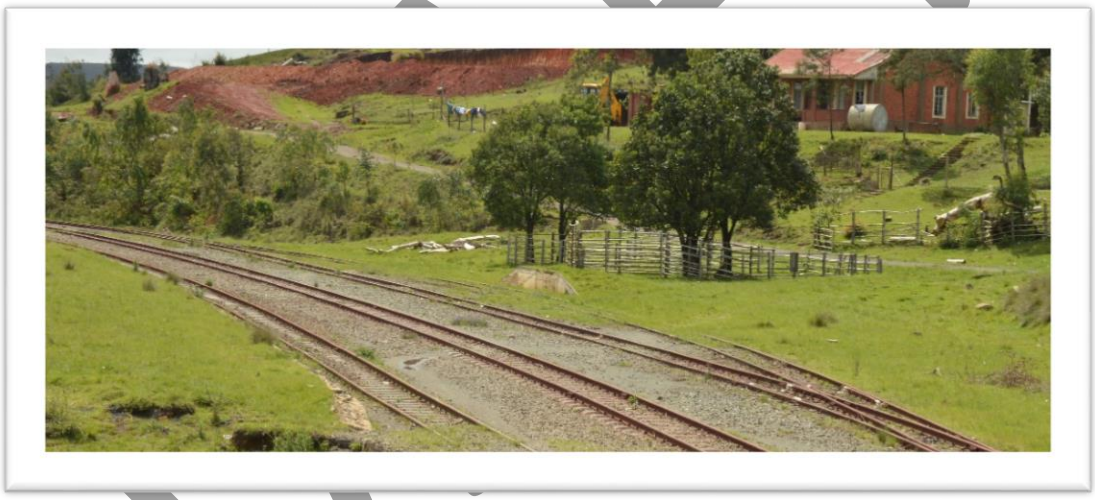
These agricultural outputs were transported primarily by train for example, cattle being corralled 560m southwest of Elandskop Station (where the still structurally sound remnants of the sale yard remain yet, and whence cattle were auctioned: (Figure 6) and herded to the pens at the station (Figure 7) where they could be loaded onto railway trucks and transported elsewhere.

It is important to note that although there was, and still is, a Boston Farmers' Association, and which has that town as its centre, the cattle sale yards at Elandskop served the whole Boston "district". Because of the certainty relating to expropriation, and the length of time it took for expropriation to be achieved, little/ no investment in farming was undertaken over a protracted period and agricultural production in this area was adversely affected. As a result of that loss in momentum, primarily beef production, but sheep production too, in this area slumped [9], but a contributing factor was also the tendency for slaughter animals to be sent directly to terminal markets. As a result, what had been the district's sale yards at Elandskop, ceased to be used and a replacement, lesser, sale yard was established in Boston win 1975. Because the quantum of beef production and sale had fallen so sharply, the Boston cattle sales drew fewer buyers who, in turn, came to prefer attendance of the larger beef cattle sales at Lions' River (Black and Holmes, year unknown, b, and c; Holmes, Year Unknown).

[9] As shown by the following selected sales revenues: 1918: £6,840; 1919: £8,584; 1942: £28,274; 1953: £41,800; 1962: £165,956; 1973: £218,922; 1975: £412,385; and 1980: £195,904 (probably converted from the original base value in £s and, after 1960s decimalization, on the basis of £1 = R2, and without regard to the effects of inflation).

Figure 6: Elandskop cattle sale yard: largely stripped building and cattle pens [10]

Figure 7: Cattle loading pens at Elandskop Station



Just as agriculture was an important activity in this area, it was underpinned by a number of factors:

- a very active District Soil Conservation Committee of farmers comprised a valuable forum for cross-pollenation of ideas and joint working on projects;

- the Dept of Agriculture was active in the area in terms of the top quality extension services which it provided. In addition to that input, senior staff from Cedara would visit a number of farmers in the area more or less each year and would provide guidance on a range of aspects of farming specific to each farm during those visits. Soil conservation and the combatting of erosion were important foci; and

[10] Interestingly, some of the cattle pens have been re-purposed. Whereas they were built to confine cattle, some have had mesh fencing attached to them so as to keep grazers out, away from the vegetables grown within.

- a conservancy was declared in the 1980s and the committee, with then-Natal Parks Board input, was very active in environmental conservation issues, including the creation of corridors for the free passage of wildlife within, and through, the area.

Some measure of the economic activity of those former times is to be found in the remaining - and remains of – buildings. Significant commercial buildings [11] (including the ex-Elandskop Post Office, now a shop: (Figure 8) stand immediately west of the station

Figure 8: Ex-commercial and related buildings immediately west of Elandskop Station

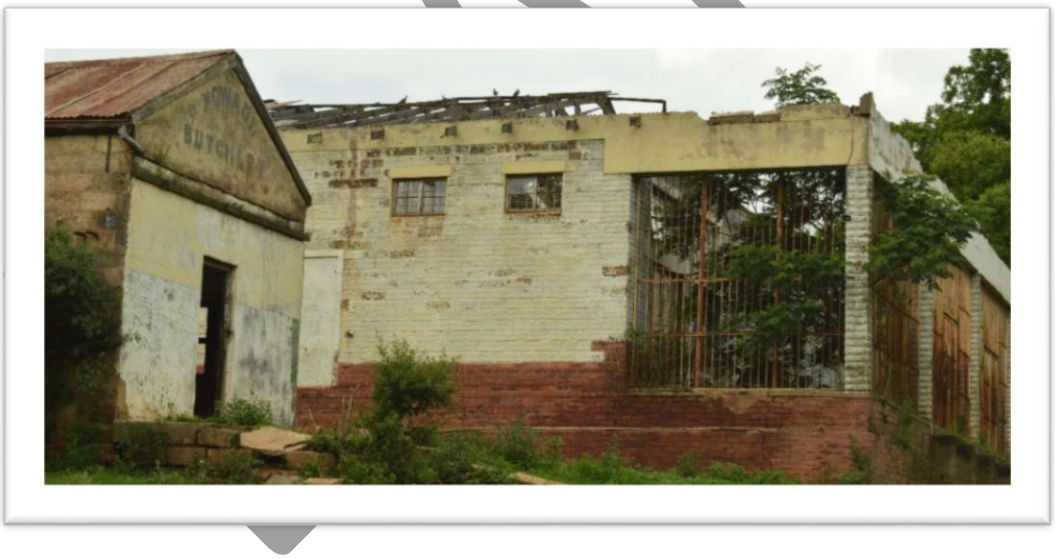
Across the road to the north of these commercial buildings [12], stood a petrol filling station and motor garage and two large buildings of not presently known use [13]. One stands yet, the others have been "reduced", even to slab level, and are derelict (Figure 9). A hotel was situated in this vicinity but its position has not been determined.

[11] Approx 900m^2
[12] Approx 1300m^2
[13] These buildings still stood as recently as 2014

Figure 9: ex Petrol Filling Station and Motor Garage workshops north of Elandskop Station

But commercial activity was not confined to Elandskop. The Ncwadi Station area was another focus point where a set of three buildings [14] comprised hotel-cum-hardware and grocery store, butchery [15] and shed: Figures 10, 11 and 12.

Figure 10: Ncwadi Butchery and Hotel, Hardware and Grocery store



[14] Approx floor area: 830m^2
[15] An ex-butchery is also to be found near Deepdale Station

Figure 11: Hotel portion of commercial building at Ncwadi Station

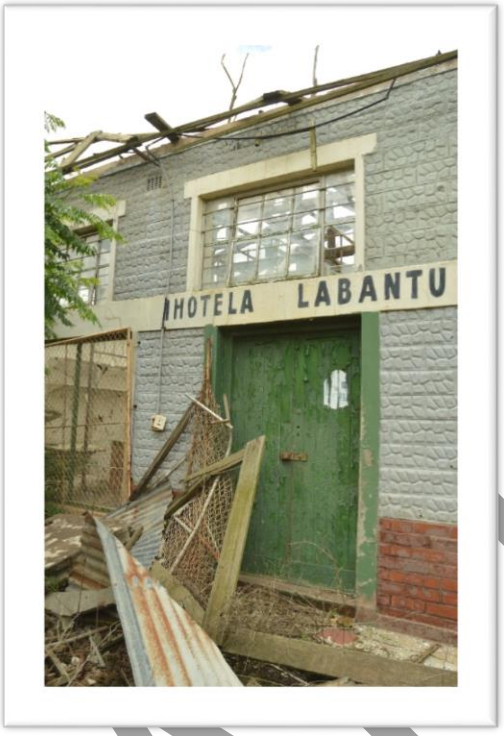


Figure 12: Commercial portion of commercial building at Ncwadi Station

Vitally important historical landmarks in the Ncwadi node are the two school buildings constructed on behalf of, and paid for, by the illustrious John Langabalele Dube: Figure 13.

Figure 13: Ncwadi Primary School buildings

2.3 Geographical Context of the Area and General Settlement Pattern

Perhaps before turning to the specifics of Ward 39, it might be instructive to recall what the Msunduzi IDP states generally about Vulindlela and which is largely true of Ward 39.

It consists of rural, peri-urban and fairly dense typologies as described hereunder. Vulindlela is considerably less developed and less economically active than the other management areas in Msunduzi. The land use of the area comprises a pattern of scattered settlement, grazing land, cultivated lands (both large individually managed and farmed areas and smaller irrigated community gardens), [and] *pockets of indigenous forest. Due to increasing population pressure some previous areas of grazing and arable land have been converted into residential land.*

(Msunduzi IDP Review 2016/17: P62) (excerpt edited)

This area is under traditional authorities, and is predominantly rural with largely traditional settlements. There are, however, pockets of informal settlements. This area is the largest of the ABMs, and houses the majority of the city's population, yet it is highly underdeveloped and under-serviced. The majority of people are unemployed and dependant on government grants, while some live off the land through subsistence farming. There are also pockets of Active/Passive Open Spaces, Grasslands, and Natural Bush. The education facilities are scattered around [the] *area, and the lack of health facilities is clear.*

(Msunduzi IDP Review 2016/17: P76.) (excerpt edited)

In terms of development [16] and settlement, four general areas may be described:

[16] One must take care in the use of the term "development", for one must avoid referring to land which has not been largely occupied by residential or other structures as "undeveloped". Agricultural development, in the

Msunduzi ex-ward 7 and 8 areas, generally to the east and southeast of Elandskop and comprising approx. 14.9km^2 (11% of the ward 39 area), which are fairly densely settled (largely in the 10 – 15 structures *per* hectare range where settled) and where the greater proportion (approx 67%) of the population/ households (approx. 13586/ 2544 in 2011 [17]) are settled in apparently unplanned neighbourhoods and where, in many areas, urban/ subsistence agriculture is practised (see Figures 14 and 15). In addition, there are still substantial areas within these areas which may yet support further settlement (significant portions at the cost of agriculture), whilst other unsettled areas comprise steep slopes.

Figure 14: Agriculture practised a short distance north of Elandskop Station

form of grazing lands, contoured fields (as noticeable in Figure 16), ploughed fields, irrigation schemes, permanent fencing to keep animals within, or without, and worked fields themselves are all components of "development". The development of cycling trails or hiking trails and the erection of interpretation kiosks within natural forests all comprise "development".

[17] WaziMap website
https://wazimap.co.za/profiles/ward-52205039-the-msunduzi-ward-39-52205039/

Figure 15: Agriculture practised a short distance north of Elandskop Station

The slightly less densely settled area along the Elandskop northwest-southeast ridge (along road P137 which connects Elandskop station to the R617 some 2km to the north);

The settled area [18], largely north of Ncwadi node, in close proximity to L2124 which road connects that node with the R617 some 5.7km to the north; and

The rest of the ward which has scattered homesteads and which is characterised by huge tracts of land largely devoid of structures.

Apart from the first three above-mentioned, the vast majority of the area may be described as rural and pastoral, some of the lower-lying flatter lands, and areas closer to the larger streams and the Elands River, being tilled, higher and less accessible areas being predominantly given over to grazing, many lands having been contoured to retain moisture and soil: Figure 16.

[18] unplanned, as with the first-mentioned

Figure 16: Grazing contoured lands in the Furth area

As to services, the upper Vulindlela and Elandskop areas are electrified by Msunduzi and enjoy water provision by Msunduzi, whereas the rest of the area receives electricity *via* Eskom. Water is presently provided within the Qadi Traditional Authority area in a few ways. A small reservoir [19] in the more elevated area above Ncwadi serves that node as well as the Songozini area to its north east, two wells have been constructed a short distance from the right bank of the Elands River [20] and six JoJo tanks [21] provide supplementary water in certain areas.

Along with the strongly agricultural nature of the vast majority of the area, one must emphasise that it has a particular character endowed, as it is, with many natural areas and large tracts of environmental assets (indigenous grassland and bush) including wetlands. However, one must, in the same breath, note wattle infestation and that many areas, some extensive, suffer environmental degradation in the form of erosion.

2.4 Management of Ward 39

This ward clearly has intrinsic potential for positive development, in the northeast and east of Elandskop area in terms of densifying urban development, and in the areas generally south and southwest of Elandskop, primarily in terms of agricultural production.

The history sketched shows that agriculture has been and, affirmed by some of the recent photographs, still is, a productive and important pursuit within the ward, whether that be for subsistence agriculture, for part sale of the produce, or as part of a more substantial revenue-generating stream. However, it is not without its difficulties. Urbanisation and its appetite for land, productive agricultural land included, is one issue and that will be dealt with shortly. But agriculture here is compromised by serious soil erosion in places whether that be as a result of possible over-

[19] 770m NNW of the Ncwadi intersection.
[20] 2km west of Ncwadi intersection
[21] according to the Traditional Council, are incorrectly positioned as a result of non-consultation with it.

stocking, other poor agricultural practices, or of the very geology, or a combination of these. Large sections of the afore-mentioned expropriated land were contoured, but that is not true on Nooitgedacht farm within the Qadi Traditional Authority area. In addition, agriculture, as a farming enterprise, requires capital for investment in plant and equipment and structures, but the very lack of substantive tenure severely hamstrings such investment. This project will suggest specific interventions and approaches to directly address an enhancement in agricultural performance.

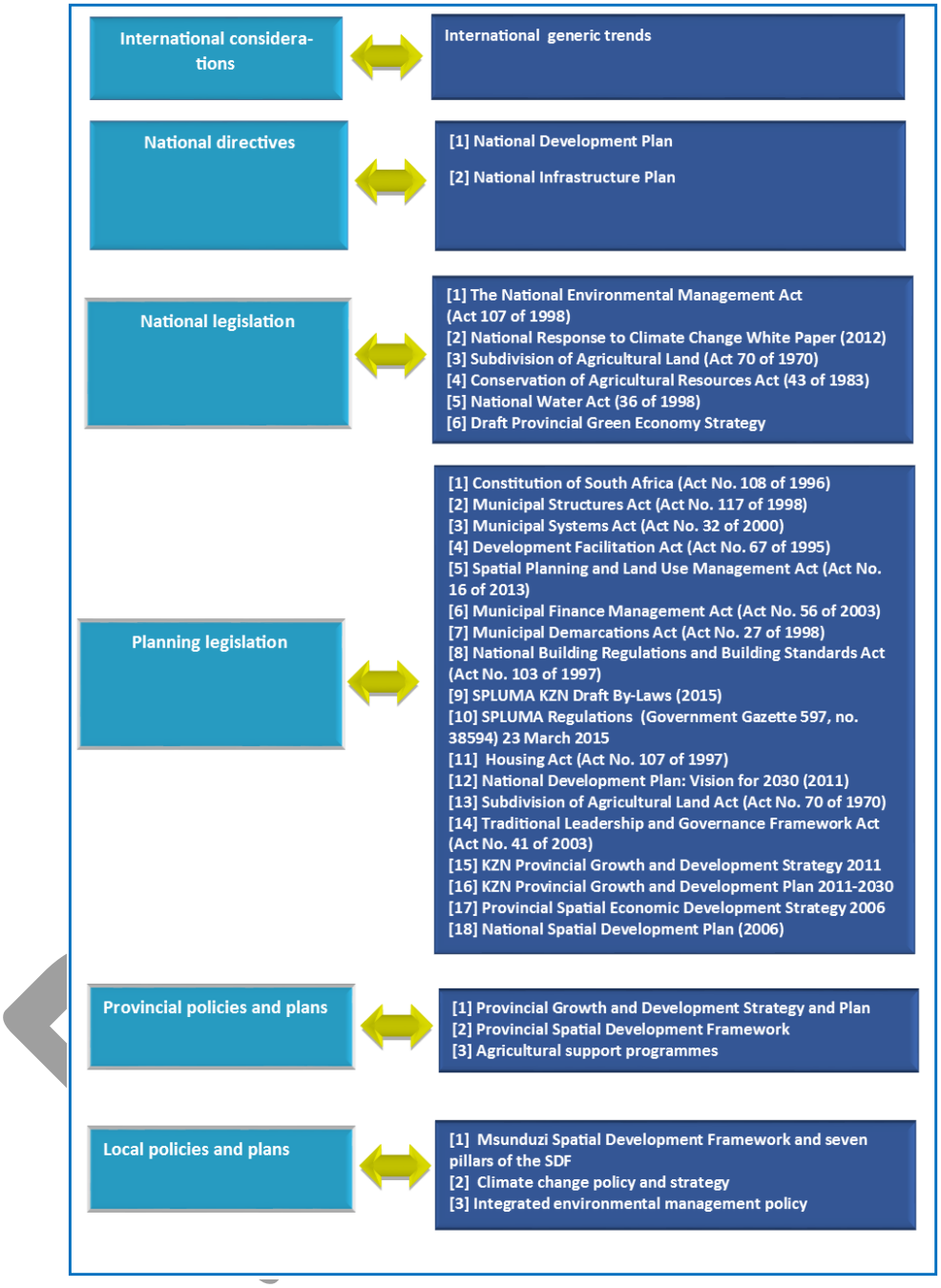
Absolutely fundamental to that development will be the harnessing, and guiding, the forces of urbanisation so that the loss of valuable agricultural land to urban sprawl development is profoundly arrested. Those forces need first to be accurately identified and responding mitigating and ameliorating policy approaches formulated. Fortunately, since this ward project is an *extension* of the much larger LAP for the entire Vulindlela in 2015, the land management processes set forth in that document merely need to be extended to this new geography. That Vulindlela project conceived of a multi-body agreement being instituted in terms of which, after consultation, the existing, long-standing, and legally-mandated municipal planning and building plan consideration and approval processes shall be honoured and hold sway. Importantly, that multi-body proposal has already achieved municipal endorsement and it is now merely a matter of instituting, and institutionalizing, it.

3. POLICY CONTEXT

The purpose of this section is to identify particular national, provincial and local policies relevant to the future development of Ward 39 as an integral part of Vulindlela. A review of these policies is particularly important given the challenges (relatively isolated and rural nature of Ward 39) that Msunduzi now faces in ensuring that Ward 39 plays a meaningful role in the development of the municipality.

The section commences with a brief high level overview, to capture some of the international trends. A number of relevant themes have been identified, and the sections of plans selected have been extracted, in most cases verbatim, and the principles embodied in these plans will find expression in the Local Area Plan for the area. A summary of the relevant policies and legislation is provided in Figure 17 below.

Figure 17: Relevant legislation and policies



3.1. International trends

In order to contextualise this and other plans, it is important to consider the impact of international tendencies and perspectives on regional planning which include the following:

(i) **Population growth**

Population growth is uneven internationally, from negative in certain regions and countries to extremely high in the poorest parts of the world. It is becoming increasingly difficult to cope

with this exponential population growth and the implications in terms of the resources and services required.

(ii) **Economic globalisation and structural unemployment**

Unemployment is increasing in the formal and informal economies, and there is no potential solution in sight. It is imperative to address the causes of this issue, particularly in the field of sustainable job creation and "green economy" development.

(iii) **Climate change**

Climate change is one of the most critical issues facing the global community today – it is driven by a multitude of causes from the use and exploitation of fossil fuels to pollution and to loss of biodiversity. In particular, it is now well established that there is an increase in catastrophic events. Regions vary, but in the KwaZulu-Natal region the expectation is that drier and warmer conditions will prevail, with shorter and more intensive rainfall events and which has implications for runoff, sustainable water supply and flooding. A conservative approach must be undertaken in relation to planning, urban design and local food security, regarding climate change.

(iv) **Water scarcity**

The world climate is currently causing extreme droughts and flooding in different parts of the world. However, even with areas experiencing a wet cycle, water scarcity remains a constant issue of concern for all authorities which have to source and distribute potable water. In addition, the quality of water is frequently compromised due to high pollution levels.

(v) **Food security**

A household is considered food secure when its occupants do not live in hunger or fear of starvation. With population growth, climate change, water scarcity, long-term structural unemployment and mass migration due to war and conflicts, ensuring food security for all is becoming increasingly difficult.

(vi) **Sustainability**

Population growth is outstripping resources available at local, national and global levels. It is imperative that the ecological footprint of human impact be reduced in order to attempt to achieve some level of environmental sustainability. Without this, it will be nearly impossible to achieve economic and social sustainability.

These international trends are all relevant at local and district levels and for some of them, such as fossil fuel depletion and climate change, it is imperative that the phrase "think global, act local" forms a guiding principle of local plans with respect to these global trends.

In South Africa, as with many parts of the world, there is a general trend of rural depopulation, particularly amongst working age population, as people move towards urban centres in search of

better opportunities. This increases pressure on the urban centres to provide essential services, particularly water and sanitation.

Increasing risks associated with local food production in Vulindlela are linked to a wide range of factors (including drought, lack of expertise, lack of production capital, rising input costs and loss of productive land to urban sprawl). For local sustainability, the containment of urban and rural settlement sprawl is essential to protect the catchment – both water and land resources – and to leave sufficient space available for agriculture (in particular crops) to assist with ensuring food security.

Climate change is a global issue which needs to be addressed, in a very practical way in Vulindlela by looking at localised renewable energy and water collection systems, and at spatial planning which takes into account the need to reduce travel and encourage local work opportunities and local food supplies. The importance of such responsible guiding development is reinforced by the National Development Plan ("NDP") as set out below.

3.2. National Policy

Development and strategic infrastructure provision in South Africa is guided by the NDP which was adopted in 2012/13, and is therefore a critical consideration in spatial planning. Sections of the NDP which are of particular importance to this plan are recorded here.

3.2.1. Implications of the National Development Plan in respect of Ward 39 Local Area Plan

The following provides key issues from the NDP relevant to the Ward 39 LAP.

Table 3: Key issues in respect of the NDP

Key issue	Description
Urbanisation and the importance of settlement centres	The need for proper planning is based on a number of aspects. In terms of demographic trends, 60% of the South African population was living in urban areas by 2011. The NDP suggests that this percentage will increase to 70% by 2030. Although urbanisation in South Africa is slower than other parts of Africa, a further 7,8 million people will need to be accommodated in South African cities by 2030, and a further 6 million by 2050. This will bring about more pressure on municipalities to provide services (NDP 2012, 238). Recognising the importance of urban centres or nodes and the services they provide are therefore essential considerations of any future planning.
Increase in density	The NDP further recognises that settlement patterns and settlement extension need to change. One of the intentions is to reduce the distance between employment opportunities and home. This will naturally require densification of settlements. The NDP also seeks strategic capital investment which will improve efficiency, particularly in respect of communication and movement. The influx of people into urban areas will create significant demands on settlement and town boundaries. An important planning tool to be used to balance and counter this notion is development of policies, plans and controls to limit urban sprawl

Land ownership patterns	The NDP also recognises that the distorted land ownership and land use patterns associated with apartheid still need to be addressed particularly in areas such as Ward 39. Securing land ownership in respect of Ward 39 is not presently possible, as the majority of land is either owned by the Ingonyama Trust Board or the South African Development Trust. Access to land is gained through different forms of communal tenure.
Accessibility	The NDP further recognises the importance of transportation of persons and goods as an important contributor to social and economic upliftment. Transport and access is therefore a critical factor in the improvement of the livelihood of people.
Structured infrastructure investment	There is a need for municipalities to adopt growth management strategies to prioritise infrastructure investment where growth is desired. This approach requires spatial plans to incorporate a growth management approach that will align areas of population and economic growth with investment in bulk infrastructure.

3.2.2. Strategic Infrastructure Programme

The National Infrastructure Plan (2012) has the intention of transforming the economic landscape, creating jobs and strengthening the delivery of basic services. Under the guidance of the Presidential Infrastructure Co-ordinating Committee, eighteen strategic integrated projects (SIPs) were identified throughout the country. These SIPs were categorised into the following groups:

- Geographic (SIPs 1 – 5)
- Energy (SIPs 8 – 10)
- Spatial (SIPs 6, 7 and 11)
- Social infrastructure (SIPs 12 – 14)
- Knowledge (SIP 15 and 16)
- Regional (cross border) (SIP 17)
- Water and sanitation (SIP 18)

The SIP's which relate to the development of Ward 39 are detailed:

- **SIP 6: Integrated municipal infrastructure project**

  Developing national capacity to address maintenance backlogs and upgrades required in water, electricity and sanitation bulk infrastructure. The road maintenance programme enhances service delivery capacity thereby impacting positively on the population.

- **SIP 7: Integrated urban space and public transport programme**

  Co-ordinating planning and implementation of public transport, housing, economic and social infrastructure and location decisions into sustainable urban settlements connected by densified transport corridors. This will focus on the 12 largest urban centres of the country, including Pietermaritzburg in Msunduzi Municipality. Significant work is underway on urban

transport integration, with new improved interchanges to Pietermaritzburg in advanced planning stages.

- **SIP 11: Agri-logistics and rural infrastructure**
  Improving investment in agricultural and rural infrastructure that supports expansion of production and employment, small-scale farming and rural development which includes the following:
  - Facilities for storage (silos, fresh-produce facilities, packing houses).
  - Transport links to main networks (rural roads, branch train-line, ports).
  - Fencing of farms.
  - Irrigation schemes to poor areas.
  - Improved education on rural issues (including expansion of agricultural colleges).
  - Processing facilities (abattoirs, dairy infrastructure).
  - Rural tourism infrastructure.

- **SIP 18: Water and sanitation infrastructure**

  This relates to a 10 year plan to address the backlog of adequate water to supply 1.4 million households and basic sanitation to 2.1 million households. This involves provision of sustainable supply of water to meet social needs and support economic growth. The programme includes the provision for new infrastructure, rehabilitation and upgrading of existing infrastructure, as well as improvement in the management of water infrastructure.

It is important that the projects arising from the intended development of Ward 39 are aligned with these SIPs in order for the Msunduzi Municipality to qualify for funding for implementation thereof.

3.2.3. Environmental legislation

A set of environmental principles have been developed by the Msunduzi Municipality to promote environmental sustainability in the implementation of its integrated development plan (IDP). These are based largely on the environmental management principles contained in Chapter 1 of the National Environmental Management Act (Act 107 of 1998) (NEMA), but also incorporate the principles of Local Agenda 21 (Cotter, B et al, 1999) and the KwaZulu-Natal Environmental Implementation Plan (DAEA, 2002)[22]. These principles while formulated some time ago, still hold true, as all good principles should.[23]

The environmental sustainability principles are divided into the following six themes:

- Sustainable development.
- Environmental justice and equity.

[22] http://www.enviroleg.co.za/acts/National%20Environmental%20Management/REGS/862-04%20KZN%20EIP%20First%20Edition.pdf

[23] This plan was a first edition, intended to give effect to environmental governance in the province, based on NEMA. These provincial plans are supposed to be produced every four years, focusing on the DAEA's environmental management functions, policies and laws and how it ensures compliance by other departments.

- Participation, empowerment and transparency.
- Co-operative governance.
- Ecological and cultural integrity.
- Environmental decision-making.

The KwaZulu-Natal environmental landscape, in terms of governance and legislation, has undergone recent changes where the environmental affairs component was transferred from the Department of Agriculture to the Department of Economic Development and Tourism, now the Department of Economic Development, Tourism and Environmental Affairs (DEDTEA). The DEDTEA produced a strategic plan for 2014 to 2019 (DEDTEA 2014) in which the priority areas of environmental affairs for 2009 to 2014 are discussed. Table 4 below provides a summary of relevant environmental legislation and policies.

Table 4: Summary of legislation and policies in respect of the natural environment (eThekwini SDF, 2014/15)

Act / Policy	Summary of relevant legislation
The National Environmental Management Act (Act 107 of 1998)	NEMA requires that planning and development be undertaken in accordance with a number of principles. The principles applicable to spatial planning are: ▪ Sustainable development – environmentally socially and economically, ▪ Natural resource and systems protection, and ▪ The provision of access to resources and environmental management that puts people and their needs first.
National Response to Climate Change White Paper (2012)	This Paper is the South African Government's response to the threat of climate change. It is a document that is intended to provide guidance in terms of policy development and implementation. The document focuses on mitigation, and includes a chapter on adaptation.
Subdivision of Agricultural Land (Act 70 of 1970)	This Act seeks to protect the integrity of agricultural land, and is applicable areas outside of schemes, but it is not applicable to Ingonyama Trust land.
Conservation of Agricultural Resources Act (43 of 1983)	This Act seeks to protect all agricultural resources from inappropriate forms of development and utilisation.
National Water Act (36 of 1998)	This Act aims to establish sustainable use and management of water resources throughout South Africa.
Draft Provincial Green Economy Strategy	DEDTEA drafted this Green Economy Strategy of which the key initiatives implemented thus far include: the development of solar and wind resource maps for the province; a Municipal Waste to Energy Protocol and Technical Assistance Programme; and a Green Economy Technical Assistance Fund worth R 2,5 million were established to assist green economy initiatives (DEDTEA Strategic Plan 2014-19, p.5)

3.2.4. Planning legislation

The planning legislation from which LAPs derive their direction, are embodied in a number of laws and policies such as the Municipal Systems Act (Act No. 32 of 2000), the Spatial Planning and Land Use

Management Act, 2013 (Act No. 16 of 2013) (hereafter "SPLUMA") and the NSDP. A summary of the laws and policies pertaining to planning is included in Table 5 below. The common set of performance qualities or measures which underpin these laws and policies are central to an understanding of a spatially sustainable future in Ward 39.

Table 5: Summary of planning legislation and policies environment (eThekwini SDF, 2014/15)

Act / Policy	Summary of Relevant Legislation
Legislation	
Constitution of South Africa (Act No. 108 of 1996)	The Constitution sets the framework for all legislation stipulating the three spheres of government and who is responsible for various aspects of planning and development, among others.
Municipal Structures Act (Act No. 117 of 1998)	This Act established the 'wall to wall' municipalities, the municipal councils and the internal structures, functions and powers of municipalities.
Municipal Systems Act (Act No. 32 of 2000)	This Act confirmed the municipal functions and powers, stipulating various procedures such as by-laws and internal legislative procedures. Chapter 5 set up the framework for IDPs and what regulations and guidelines should flow from this. Section 73 (1) and (2) of Chapter 8 of the MSA sets out the following: 73. (1) A municipality must give effect to the provisions of the Constitution and- a) give priority to the basic needs of the local community; b) promote the development of the local community; and c) ensure that all members of the local community have access to at least the minimum level of basic municipal services. (2) Municipal services must- a) be equitable and accessible: b) be provided in a manner that is conducive to- i. the economic, efficient and effective use of available resources and ii. the improvement of standards of quality over time; c) be financially sustainable; d) be environmentally sustainable; and e) be regularly reviewed with a view to upgrading, extension and improvement.
Development Facilitation Act (Act No. 67 of 1995)	This Act is no longer in use, although the Chapter 1: Land Development Principles have been carried through into other legislation and are still referred to.
Spatial Planning and Land Use Management Act (Act No. 16 of 2013)	This Act provides for a framework for spatial planning and land use management in the country; it specifies the relationship between spatial planning and land use management system and other kinds of planning; it provides for inclusive, developmental, equitable and efficient spatial planning in the different spheres of government, it provides a framework for policies, principles, norms and standards for spatial development planning and land use management; to create greater consistency and uniformity in application procedures and decision-making by authorities responsible for land use decisions and to provide for the establishment, functions and operations of Municipal Planning Tribunals.

Municipal Finance Management Act (Act No. 56 of 2003)	The purpose of this Act is to secure sound and sustainable management of the financial affairs of municipalities and other institutions in the local sphere of government.
Municipal Demarcations Act (Act No. 27 of 1998)	This Act provides for criteria and procedures for the determination of municipal boundaries by an independent authority.
National Building Regulations and Building Standards Act (Act No. 103 of 1997)	This Act provides for the promotion of uniformity in the law relating to the erection of buildings in the areas of jurisdiction of local authorities and for the prescribing of building standards
SPLUMA KZN Draft By-Laws (2015)	These draft by-laws have been provided to local municipalities for adaption and adoption as their own internal regulations and by-laws governing planning and development applications, procedures etc.
SPLUMA Regulations (Government Gazette 597, no. 38594) 23 March 2015	These regulations set out various stipulations for municipal planning tribunals. Land development and land use applications, appeals, exemptions etc.
Housing Act (Act No. 107 of 1997)	Provides for the facilitation of a sustainable housing development process and to lay down general principles applicable to housing development in all spheres of government; to define the functions of national, provincial and local governments in respect of housing development.
National Development Plan: Vision for 2030 (2011)	The NDP was drawn up to chart a new direction for the country's development in terms of the changing needs of the 21st Century and the need to address some of the burning issues still prevalent such as poverty and spatially divided communities, as well as addressing some of the global trends as they find expression locally.
Subdivision of Agricultural Land Act (Act No. 70 of 1970)	Replaced by the Subdivision of Agricultural Land Act Repeal Act of 1998. The intention of this Act is to control the subdivision of agricultural land and matters connected to this.
Traditional Leadership and Governance Framework Act (Act No. 41 of 2003)	This Act provided for the recognition of traditional communities and for a statutory framework for leadership positions as well as the functions and roles of traditional leadership. It set out traditional leadership roles and functions in relation to land allocation and administration which needed to be done in consultation with municipalities as part of the cooperative governance framework. This is national legislation.
KZN Traditional Leadership and Governance Act (Act No. 5 of 2005)	This Act gave provincial expression to the National Traditional Leadership Governance Framework Act, providing greater detail as to the structures and functions of KZN traditional leadership.
KZN Provincial Growth and Development Strategy 2011	The PGDS sets out the Province's commitment to achieving the vision of KZN as a prosperous province with a healthy, secure and skilled population, acting as a gateway to Africa and the world. It aimed to build this gateway by growing the economy for the development and improvement of quality of life for all people in the province. It provides for a strategic framework to achieve accelerated and shared economic growth through catalytic and developmental interventions, with a coherent equitable spatial development structure and building sustainable communities, livelihoods and living environments.

KZN Provincial Growth and Development Plan 2011-2030	The PGDP sets out seven strategic goals for the Province: job creation, human resource development, human and community development, strategic infrastructure, environmental sustainability, governance and policy and spatial equity.
Provincial Spatial Economic Development Strategy 2006	The PSEDS looked at the spatial expression of an economic development strategy for the Province. It strongly endorsed the NSDP directives concerning limiting urban and rural settlement sprawl in order to provide more cost-effective and sustainable services, and to provide for economically sustainable human settlements.
National Spatial Development Plan (2006)	The NSDP provided a clearly articulated set of spatial priorities and criteria to guide government choices about investment and development spending. It looked at the national space economy and saw the NSDP as a critical instrument for policy coordination with regard to the spatial implications of infrastructure programmes at national, provincial and local government levels.

3.2.5. A set of performance qualities/ measures

A set of well-established performance qualities should give direction to the LAP. The qualities have evolved over time and are embodied in national and provincial planning legislation, such as the DFA, the MSA and the SPLUMA. It is a legal requirement that the directives contained in these pieces of legislation are carefully considered in any planning or development initiative in Ward 39.

The qualities contained in these pieces of legislation are interlinked, and influence each other. It is important to note that they cannot be applied individually, or mechanically, or converted into a rigid set of rules. They need to be translated creatively into meaningful spatial constructs which are sympathetic to, and informed by, local contextual conditions. Generally, these qualities are not well understood, and in many instances they have become mere clichés. It is thus important here to explain their application in this plan. The key performance qualities that provide a foundation for the Ward 39 LAP are elaborated as follows.

SUSTAINABILITY

The SPLUMA (Section 7(b)) sets out sustainability as follows:

'Spatial sustainability, whereby spatial planning and land use systems must:

- *promote land development that is within the fiscal, institutional and administrative means of the Republic;*
- *uphold consistency of land use measures in accordance with environmental management instruments;*
- *promote and stimulate the effective and equitable functioning of land markets;*
- *consider all current and future costs to all parties for the provision of infrastructure and social services in land developments;*
- *promote land developments in locations that are sustainable and limit urban sprawl; and,*
- *result in communities that are viable.'*

An important consideration is the long term view, reconciled with immediate needs, that is embodied in this quality of spatial sustainability. It is also inclusive of both local and national interests and resources so that all current and future costs of both public and private initiatives are taken into consideration. It is common practice to count only the direct and immediate costs in development and infrastructure projects, whilst excluding most of the indirect ones, such as costs to the environment, longer term impacts on transport costs and so forth.

To achieve sustainability and equity, there will need to be more funding channelled into municipal coffers, booth from Government and other agencies. The fact that the KwaZulu-Natal Provincial Growth and Development Plan (herein referred to as the KZN PGDP) provides Msunduzi Municipality with the leverage to apply for such additional resources.

EFFICIENCY

The principle of efficiency is set out in SPLUMA (Section 7(c)), as follows:

'The principle of efficiency, whereby –

- *land development optimises the use of existing resources and infrastructure;*
- *decision-making procedures are designed to minimise negative financial, social, economic or environmental impacts; and*
- *development application procedures are efficient and streamlined and timeframes are adhered to by all parties.'*

It is important that maximum benefit be derived from every rand of capital expenditure both private and public, and that where possible, investments support one another to achieve effects that are greater than the sum of the parts. Infrastructure particularly that which amounts to a large portion of annual expenditure, should be located where its use can be optimised.

As indicated above, application and decision-making procedures should be resource conscious, and designed to minimise negative impacts.

EQUITY

Equity in spatial structure implies that all inhabitants have reasonable access to the opportunities and facilities which support living in settlements. **It is neither possible nor desirable for all parts of settlements to be the same**, in the sense of being provided with the same level of social services and commercial and economic activities. So the principle of **equity does not connect to uniformity,** but rather equity of access.

The current patterns of development were largely set in the 1970s, particularly in respect of the two ex-Vulindlela portions of Ward 39. This resulted in scattered peri-urban settlement, the consequences of which are wastage of resources, inefficiencies and an unintended spatial structure which lacks sustainability and resilience.

There is also a tendency for urban areas to be planned radially from a central point and this often results in a spatial structure which is inherently inequitable, with increasing numbers of poorer people being spatially and economically marginalised. Greater levels of equity can be achieved through the framework of a grid structure, where points of intersection of movement routes provide an intrinsic opportunity for services and facilities over time. Development at each of these opportunity points may vary, but a more equitable spread of opportunities and access to these, results from such a structure.

At the heart of this principle is the idea that situations should not be created where more advantaged groups benefit at the expense of less advantaged ones. In equitable settlements all inhabitants have reasonable access to the opportunities and facilities which support living there. It is important to ensure that each tranche of new investment is directed at meeting the greatest amount of need.

INTEGRATION

Planning tends not to consider systems in totality. It tends to be applied to issues in a silo manner and so cumulative or interactive impacts are not considered. Thus, integration implies a way of thinking about planning, about the whole, and a way of managing the budgeting and implementation process. There is a need for integration in many spheres: institutional, spatial, and financial, amongst others.

Important to this plan is spatial integration, and there are a number of forms (DFA 1995 Chapter 1 *Principles of the DFA*):

> *(i) Integration between rural, urban and primeval landscapes for example, the urban system providing markets for produce from the rural system, and social, cultural and economic services for rural dwellers; and the compaction of settlement that this implies.*
>
> *(ii) Integration between elements of spatial structure, for example between different movement nodes; between public transport and social facilities; integration of settlement with movement; integration of different modes of movement etc.*
>
> *(iii) Integration of new development with old.*
>
> *(iv) Integration of different classes – wealthier and poorer people are all part of the same settlement system and should benefit from the resources and energies brought by others.*

Critical to the successful implementation of the Ward 39 LAP is the integration and co-ordination across government departments, each responsible for their budgets and programmes, especially the

public capital investment programmes which have a profound effect on the development of the area (also highlighted at meeting with the Mayor and Amakhosi on 13 November 2017). Over time, increasingly consistent and integrated actions and investments should occur across scales of planning and across spheres of government, to ensure co-ordination and efficient use of resources.

It is the common intention that IDPs tie public agency plans to governmental budgetary processes, i.e. plans relating to the development of public spatial structure involving movement, public space, public facilities and utility services. Plans and budgetary processes need to be fully integrated and co-ordinated at the district and local municipality level. In general, there are insufficient integrating mechanisms, both spatially and institutionally, to give sufficient direction to capital investment plans of line departments.

This is necessary for two reasons:

- To integrate these elements in order to create a clear spatial framework or capital web.
- To create a proactive planning system rather than one which is reactive. This will prevent responding to needs in an unplanned manner.

It is in the interests of the private sector to co-ordinate its investment programmes with public sector investment programmes. This co-ordination is made possible by the clear commitment about the spatial patterns of future public spending contained in the IDPs which should be informed through the municipal SDFs, LAPs and other municipal plans.

RESILIENCE

The SPLUMA sets out the principle of spatial resilience as follows:

> *'The principle of spatial resilience, whereby flexibility in spatial plans policies and land use management systems are accommodated to ensure sustainable livelihoods in communities most likely to suffer the impacts of economic and environmental shocks.'*

(SPLUMA, Section 7(1) p.15)

Resilience derives from generality, implying that planning is not directed only at a specific set of unique circumstances prevailing at a point in time. The best systems are structurally neutral, and able to adapt to changing situations.

In the present context, the plan should establish the inherent structure in an existing system and use it as the basis for accessibility and implementation of capital investment projects into the future. The regional plan should get settlement to respond to the neutral system. The neutral system is more balanced in the landscape, and is able to accommodate change over time. The 'neutral system' in this sense means that resilience, adaptive capacity and transformability are neither 'good' nor 'bad' but describe the capacity of the system to meet defined goals – it is the sustainability goal which defines what is 'desirable' or 'undesirable'. (CISRO 2015)

3.2.5.1. SPLUMA requirements of SDF

Sections 20 to 22 of the SPLUMA set out the requirements and procedures for municipal SDFs. Section 21 includes 16 specific requirements, including adherence to the principles set out in Chapter 2

of the Act. In the preparation of the Ward 39 LAP these requirements must be imbedded into the future spatial structure of Ward 39.

3.2.6. Rural development and the role of traditional leaders

The NDP promotes better integration of the country's rural areas into the space economy of South Africa. It argues that this should be achieved by developing rural economic opportunities to sustain long term growth. One of the key components that needs to be considered in rural development involves transforming human settlements which is a large and complex agenda with far reaching policy implications with shifts in household, business and institutional practises. In respect of Ward 39, this applies particularly to traditional institutions which allocate land.

One of the key elements associated with promoting sustainable development involves enhancing institutional capacity in rural areas especially reforms to resolve contested relationships between indigenous and constitutional institutions. Such reforms should involve:

- Promoting better land use practises in traditional areas; the role of traditional structures will come under scrutiny when new urban and agricultural proposals are tabled for implementation.
- Overcoming accessibility to land though the introduction of undifferentiated forms of land use management and land rights allocation.
- Work with traditional structures to secure individual tenured rights. So often lack of such tenure is a fundamental barrier to economic development on account of inability, absolute or relative, to secure finance for agriculture, housing development or business establishment.

Identifying mechanisms to resolve the challenges associated with use of traditional land for structured social and economic development. The aim in the establishment of such mechanisms should be to eliminate the ambiguity in the developmental role of traditional structures.

Allied to these implications are the policy imperatives included in the Medium Term Strategic Framework (National Treasury 2015). Included in Appendix 7 of the Medium Term Expenditure Framework are provisions which deal with the pre-requisites for development in rural areas and include the following:

- Improved land administration and spatial planning **for integrated development in rural a**reas.
- Sustainable **land reform** (agrarian transformation).
- Improved **food security**.
- Smallholder **farmer development** and support for agrarian transformation.
- Increased **access to quality basic infrastructure and services**, particularly in education, healthcare and public transport in rural areas.
- Growth of sustainable **rural enterprises and industries** characterised by strong rural-urban linkages, increased investment in agro-processing, trade development and access to markets and financial services – resulting in job creation.

Finally, there is need for a spatial vision and the need to guide infrastructure development and which needs are effectively captured in the extract hereunder from the NDP.

South Africa needs a spatial vision to inform development policy specifically to:

- Tackle inherited spatial divisions – South Africa's spatial structure perpetuates exclusion. Distorted growth patterns cannot be ignored. They also worsen economic and logistical inefficiencies.
- Unlock development potential – Many places are not growing economically because of a lack of infrastructure, inadequate skills, poor innovation capacity and weak governance. The locked-in potential of these areas could be released through targeted investment in economic and social infrastructure and institutional support.
- Guide and inform infrastructure investment and prioritisation – A spatial investment framework is needed to support growth and inform the long-term infrastructure investment strategy.
- Manage contemporary economic and demographic shifts – Economic dynamism is produced by concentrating productive activity, entrepreneurs, workers and consumers in a place without congestion.
- Facilitate coordination between parts of government and other agents - Spatial policy could be used to bring different actors and interests together to define a common future binding all spheres and sectors.

Source: NDP, November 2011. p. 259

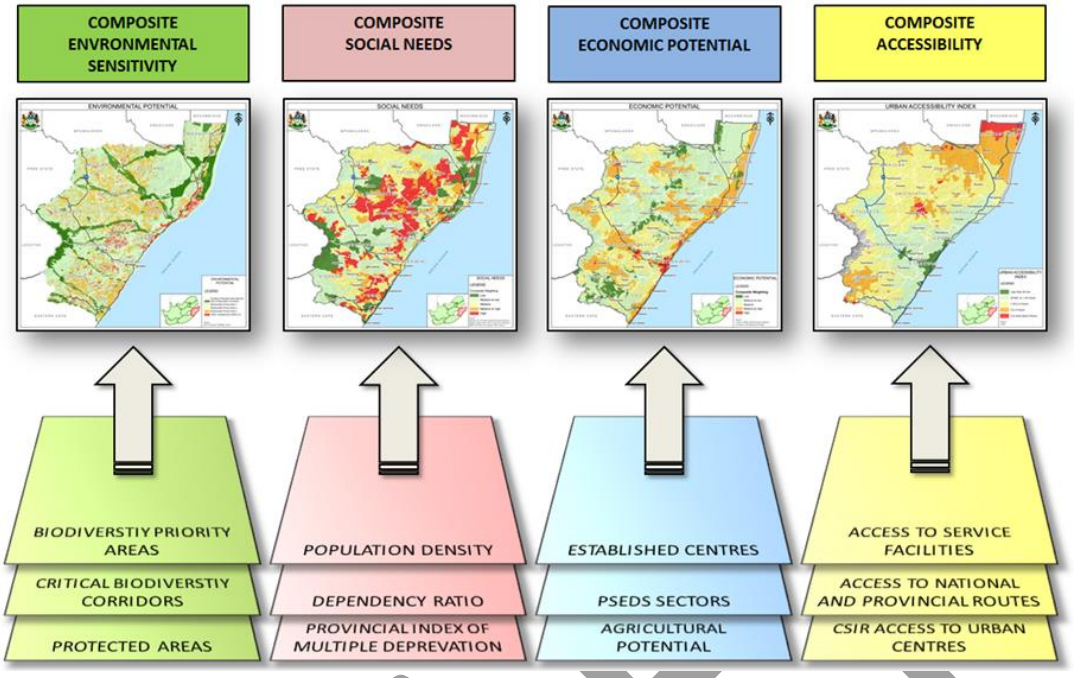
The availability of service centres is therefore an important backbone of the NDP and plays a critical role in the future of Ward 39 and Vulindlela.

3.3. Provincial policies and plans

3.3.1. Provincial Growth and Development Strategy and Plan

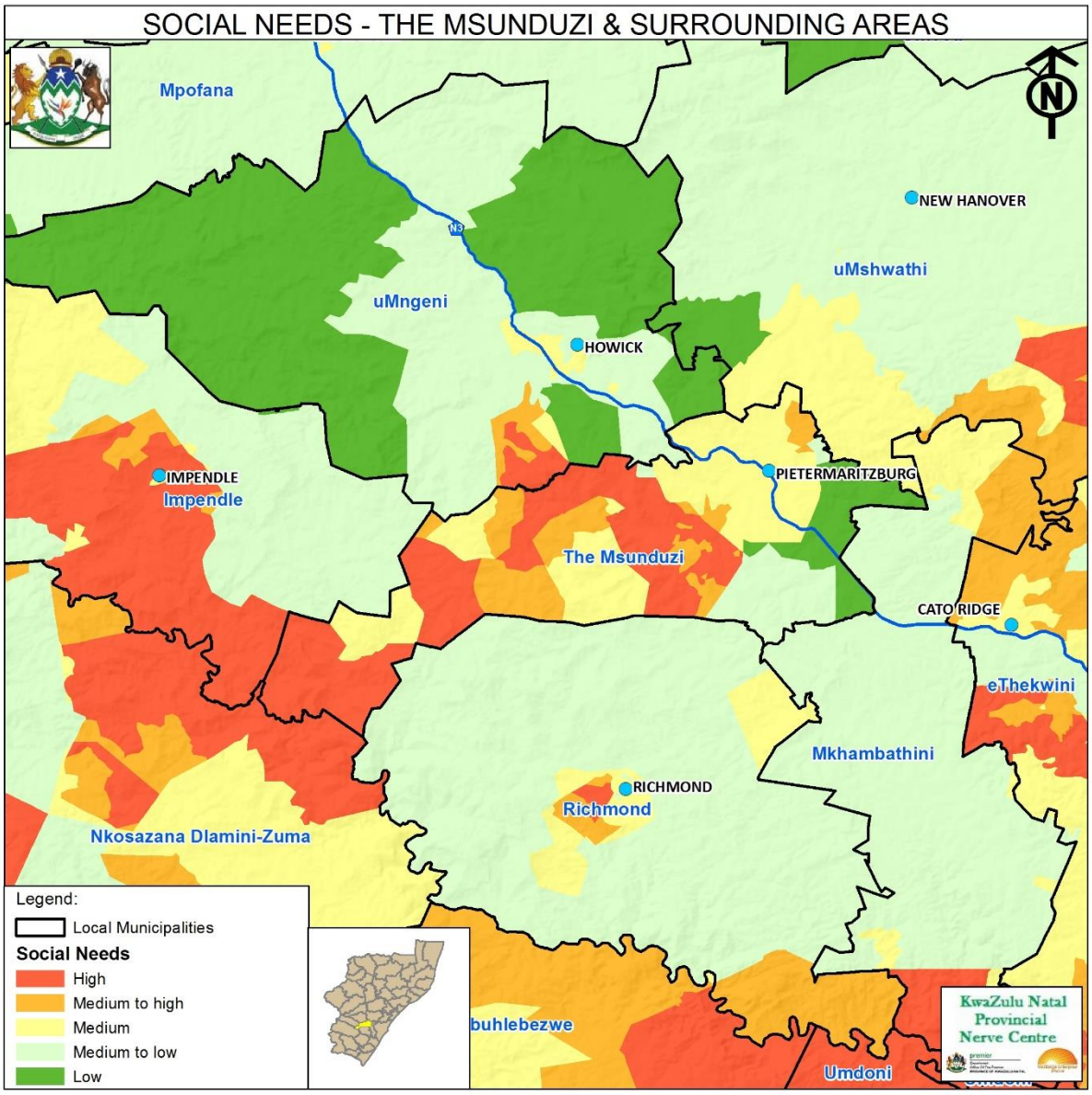
The KwaZulu Natal Provincial Growth and Development Strategy (PGDS) was developed in 2011 and led to the KwaZulu Natal Provincial Growth and Development Plan 2011 – 2030 (PGDP) produced in 2014. The 2011 PGDP, and now the 2016/17 PGDP are informed by four main spatial principles that furthermore inform the provincial SDF. The four fields are:

Figure 18: PGDP variables (Planning Commission, 2013: PGDP, 17)



In terms of social needs Ward 39 and Vulindlela are identified as social deficient areas, as illustrated in Figure 19 below.

Figure 19: Social needs analysis (Dept of Premier, 2017)



These principles are represented by a number of spatial factors. The areas where highest social need, high economic potential, low environmental vulnerability and low accessibility are identified as the high priority intervention areas.

The recognition of hierarchy of service centres is a theme that is found in the NDP and the PGDS and carried forward in the PGDP, as will be demonstrated later in this document. These planning principles provide the underlying rationale for the approach adopted in preparation of the Vulindlela LAP and will in turn be applied to the inclusion of Ward 39 in this planning process.

3.3.2. Provincial Spatial Development Framework

A component of the PGDS is a provincial spatial development framework which sets out spatial principles, spatial variables and identifies priority intervention areas *per* district municipality. Various

catalytic projects were identified within each district with the 2017/18 focus in Umgungundlovu District being on industrial, commercial and infrastructure development to benefit the growing population in the district's major urban centres and adjoining traditional areas such as Ward 39 (KwaZulu-Natal Planning and Development Commission, 2017).

3.3.3. Agricultural support programmes

It is important to be able to link with agricultural support programmes that are provided by either provincial or national departments. This ties in directly with the global imperatives of food security and climate change, promoting local agricultural initiatives and local markets. Such programmes include the following:

- The Comprehensive Agricultural Support Programme.
- The National Agricultural Production Strategy.
- The Million Trees Programme.
- Community seed production schemes.
- Agricultural Starter Pack Programme.
- The Veggie Tower Programme.
- Fencing programmes.

In addition, there are other programmes such as Working for Water, Working for Forests and Working on Fire which should be tapped into as they perform dual roles of controlling, for instance, alien invasive plants and thus protecting water supplies, as well as providing employment through the expanded public works programme known as EPWP.

3.4. Local policies and plans

3.4.1. Msunduzi Spatial Development Framework and seven pillars of the SDF

One of the main informants to the LAP, as depicted in diagram 1 of this document, is the Msunduzi Municipality SDF Review (Msunduzi 2015). It is therefore important to understand informants to the SDF development and the strategic directives contained in the SDF which should cascade into the Ward 39 LAP.

The SDF is based on seven pillars (Table 6) which form the backbone of sustainability for the future of the Msunduzi municipal area, as detailed below.

Table 6: The seven pillars of sustainability (Msunduzi Municipality, 2015)

Pillar	Intervention
Global connectivity	Improved local, regional and national physical connectivity of the municipality via road, rail, non-motorised transport (NMT) and air transport, as well as bridging the digital divide with a strategy for enhanced ICT connectivity.
Productive systems	Developing a strategy for land release along the N3 corridor, reviving the CBD and other secondary and tertiary centres of economic activity, introducing new economic centres in previously neglected areas (particularly those previously considered 'rural'), and making the most of productive agricultural land.

Ecological infrastructure	Enhancing the open space network in the city for improved natural service provision and ecological functionality, through the protection of formal and informal nature reserves, open spaces, enhancing linkages across catchments and increasing setback lines in key areas such as those adjacent to watercourses.
Sustainable transport	Spatially identifies and promotes an equitable movement structure across the city, through an enhanced public transport backbone (e.g. the IRPTN and possible future NMT (Non-motorised Transport) routes.
Quality urbanism	Creating functional, well-serviced neighbourhoods, building a polycentric city structure with secondary major centres (such as in Edendale), identifying areas for future smaller sustainable urban centres, promoting densification and public place making in the aforementioned areas and along public transport trunk routes.
Social inclusivity	Identifying areas for new housing opportunities, areas where informal housing needs to be addressed and/or upgraded on-site, and areas requiring the equitable distribution of public amenities.
Sustainable services	Enhancing existing infrastructure based on findings per ABM, identifying areas for future infrastructure installations and mechanisms for achieving infrastructure-related efficiency through economies of scale (at densified urban centres and along key transport routes, using resource-efficient technologies where appropriate).

Directives from the SDF are at the centre of the development of the Ward 39 LAP, and these include the following:

- The need to ensure integration of Ward 39 into Msunduzi, not as a further dependency, but rather and as a contributing part of the dynamic whole, comprising this municipality.
- Connectivity via transport, job opportunities and ecological infrastructure (open space networks).
- Identification of growth centres, interventions and striving for quality in urban form.
- Increasing urban densities to cater for population increase, particularly in respect of the identified centres.
- Enhancing infrastructure and the provision of sustainable services.

Land use management options which will support economic development.

3.4.1.1. Msunduzi Draft 2017 Spatial Development Framework

The draft 2017 SDF review recognises that Ward 39 is predominantly rural comprising of sparse settlements along the P121 road. In terms of natural resources, the agricultural potential is recognised, although only assessed at a cursory level. The review refers to two housing projects contained in the 2016/17 Ingwe SDF Review, i.e., the Impendle Restitution Claim (500 units) and the Mvutshini Housing Project (500 units). These project, based on discussions with the Department of Human Settlements (Yengwa, 28 November 2017, Personal comm), have however been shelved and will need to be resubmitted.

With regard to nodes, Ncwadi is identified as a secondary node, based on its role as a service centre in the 2016/17 Ingwe SDF review.

3.4.2. Climate change policy and strategy

Msunduzi Municipality adopted a climate change policy in 2014 and a climate change strategy in 2015. The policy sets out strategic responses to climate change with adaptive mitigating measures in respect of biodiversity, water resources, food security and agriculture, stormwater, waste, energy utilisation and transportation.

Of importance for the LAP are the goals which have been set as part of the strategy, and which must influence future planning to reflect these goals. It is submitted that the following goals need to be reflected in the LAP plans for the future:

- The protection of ecosystems and biodiversity resources.
- Water quality and management.
- Waste management and technology.
- Making infrastructure resilient against disasters.
- Stormwater management.
- Agricultural food security.
- Address inappropriate land uses.

3.4.3. Integrated environmental management policy

The Msunduzi Municipality adopted an environmental management policy in 2015. The policy seeks to:

- Formulate and implement principles and underlying approaches supporting sustainable development within the Msunduzi administrative area;
- Ensure access to natural resources and their sustainable use.
- Uphold the environmental rights as provided for in section 24 of the Constitution of South Africa.
- Formulate relevant approaches to address specific environmental issues within the Msunduzi administrative area.
- Conserve biodiversity.
- Priorities legal environmental responsibilities and raising awareness in respect of environmental legislation and its compliance;
- Facilitate responsible stewardship of resources within the municipal area.
- Build partnerships with other role players.
- Undertake continuous monitoring, evaluation and empowerment of all primary growth points
- Identify and implement best environmental practices and activities.
- Integrate environmental considerations in planning, construction and any other municipal function or activity and making informed decisions about the development of its citizens.
- Ensure that impact assessments are carried out for developments to reduce, prevent or mitigate environmental and social impacts.
- Develop strategies to manage resources sustainably.
- Recognize the importance cultural heritage, and developing protection and enhancement strategies.

(Msunduzi Integrated Environmental Management Policy, 2015. pg. 8)

The policy includes specific measurable goals and targets in respect of the biophysical environment and the socio-economic environment. This creates a useful tool and critical base for the development of any plan. These goals and targets can be separated into strategic planning and implementation and monitoring actions. It would ccordingly be important to ensure that the strategic directives are encapsulated in the Ward 39 LAP. The following is submitted as important in this regard:

- complying with the commercial forestry guidelines;
- undertaking green awareness and programmes;
- using and managing water sustainably;
- undertaking rehabilitation programmes;
- undertake waste management planning;
- protecting and managing environmentally-sensitive areas; and
- recognizing the importance of cultural heritage.

3.5. Summary

The above legal and policy framework forms one of the main cornerstones of the LAP and informs the nature and content of the Status Quo assessment - and subsequent planning framework - and how this area should be integrated into Vulindlela. The NDP and SIP program, inter alia, recognizes the importance of urbanization, the importunate of connectivity, environmental management and integrated infrastructure development. The KZN PGDP recognizes that Vulindlela and Ward 39, as previously mentioned as socially deprived. This document is therefore a strategic and political recognition, that this area needs to be supported through resources and active programs to develop the area in a bid to over tine secure equity.

The above critical strategies are underpinned by a legal framework which must be considered and followed during the development of the LAP.

4. STRATEGIC SPATIAL PERSPECTIVE

4.1. Sub-regional Considerations

It is instructive to learn what the provincial SDF has to say about this area. Figures 20, 21 and 22 provide valuable information at, what is in effect, policy level.

Figure 20: Provincial SDF: Nodes and Corridors

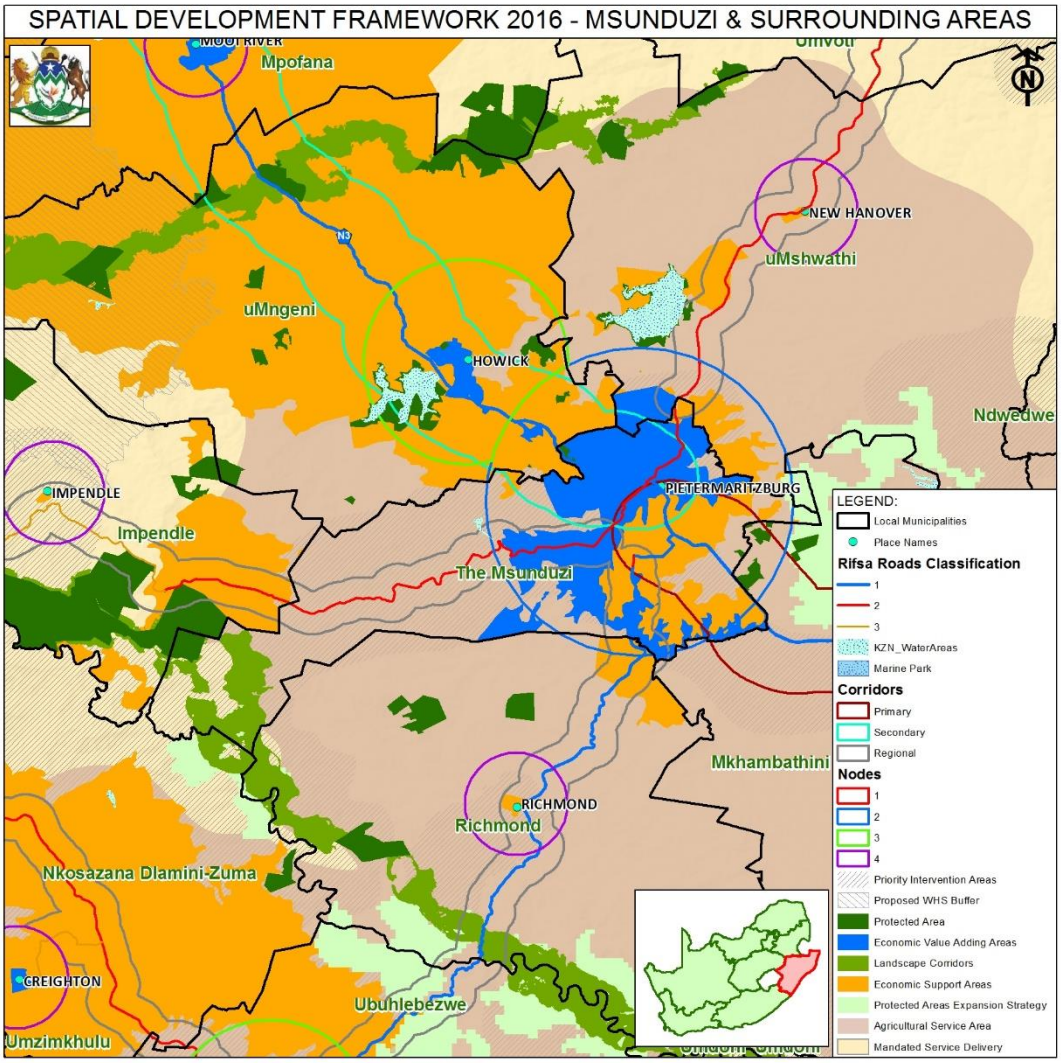


Figure 21: Provincial SDF: Economic Framework

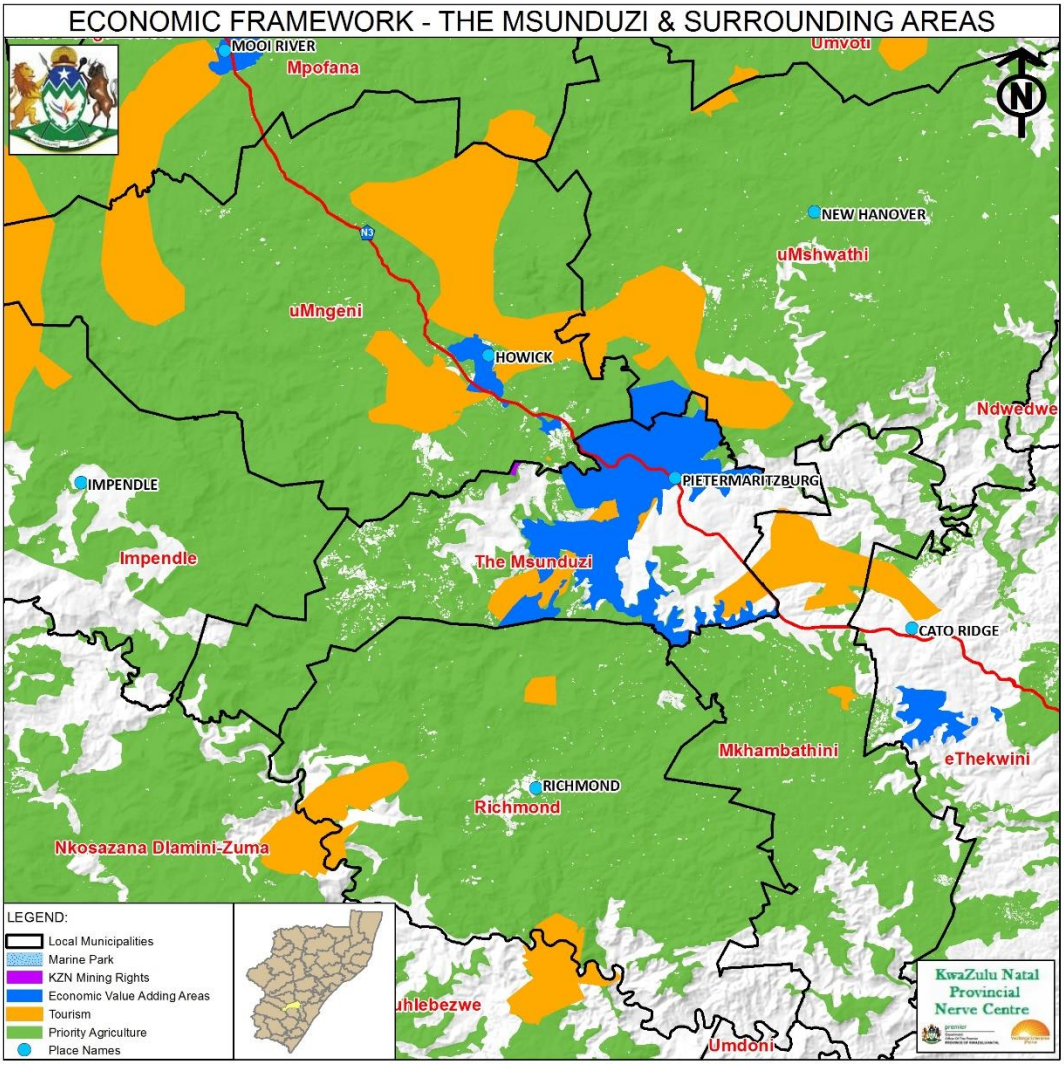
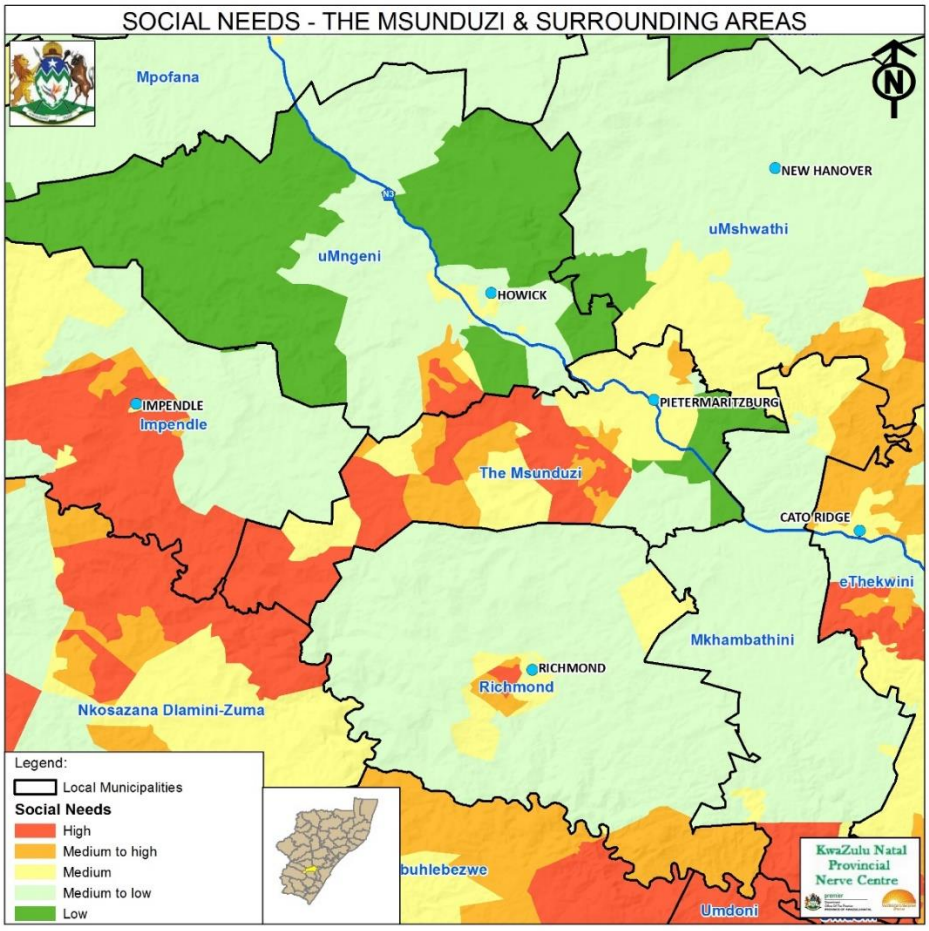


Figure 22: Provincial SDF: Areas of Social Need



From these three, one may readily appreciate that Ward 39:

- is richly blessed with quality landscape corridors closely associated with, on the one hand, a protected area and, on the other, its valuable agricultural land asset;
- has extensive areas where priority intervention should take place; and
- more than half the ward is identified as being in a state of social need,

and that, as a consequence, whatever is mooted for this area needs to responsibly secure these assets and address these issues.

Even at a superficial level one may conclude that agricultural productivity enhancement could well be an important part to the meeting of the social needs and that agriculture is integrally related to the retention of the landscape corridors.

4.2. District Level Analysis

4.2.1. Msunduzi Municipality SDF (2015)

The most recent adopted SDF is dated 2015 and which date precedes the birth of Ward 39, the vast bulk of which, at that time, abutted its western boundary. One must look, therefore, to what the SDF

says about Vulindlela generally for the required cues and, particularly what might be said about the ex-ward 7 and 8 areas.

The SDF makes a number of statements and observations, and derives responses thereto. Table 7 sets out the most salient of these:

Table 7: Main relevant references to Vulindlela within the Msunduzi Municipal SDF (2015)

Page	Text
6	There must be an increasing trend to integration of the area into the life and functioning the rest of the Msunduzi municipal area
7	The undulating topography impacts upon movement
16	The area is less developed than the rest of the municipal area
20	Sanitation and water services are in shortfall
	That the land is owned by the Ingonyama Trust presents challenges;
21	In truth the area is suburban, not rural, and it should be seen in this context
	There is a need to ensure that needs are met and that services and facilities are provided to make the area truly liveable
35	The estimated/ projected population growth rate is 2% *pa*
36	There is a need to provide for population growth within the municipal area, specifically in Vulindlela
64	Agricultural land: retain productive land and intensify and expand agricultural activities
	Adhere to the sound underpinning principles embodied in the Subdivision of Agricultural Land Act (Act No 70 of 1970)
90	Activity clusters should be developed where three or more public facilities are located
109	There is a need to undertake service intervention
134	Two centres, of the same scale as that for Edendale, plus smaller nodes, should be developed.
136	Boston, within the Impendle municipal area, is a recognized service node
157	Key projects must be the identification of, and retention of, Agricultural and Conservation lands
158	There is a shortfall in social amenities
168	As an implementation strategy, there must be an investigation into the situation of Agricultural land and also Conservation land.
	An investigation must be undertaken into the Edendale-Vulindlela railway link
169	There is a need to plan for sustainable urban centres [24]
172	As an implementation project, R1million should be provided for the Agricultural and Conservation land investigation
174	As an implementation project, R1million should be provided for an investigation into having the Edendale-Vulindlela rail link decommissioned and that route used for the IRPTN [25]
210	High mast lights should be erected

It is this thinking which gave rise to the development of the design set out in the SDF, the relevant part of which is depicted below. The key elements within, and in the surrounds of, Ward 39 are:

- Three nodes, the largest at the intersection of the M70/ P7-2 and D1124 (just near the Songozini Clinic), plus one at Mafakathini, plus one at the intersection of the M70/P7-2 and P399;
- Roads: Primary network; Secondary route;
- Rail: the Edendale-Elandskop railway line

[24] This should be extended to consider the need to plan for sustainable rural areas

[25] At the workgroup meeting held with municipal officials on 6th December 2017, it was concurred that the railway line ought not to be de-commissioned: the existing infrastructure is a substantial asset.

- Conservation along river and tributary networks;
- Agriculture [26];
- Existing residential development;

Ideally, the Msunduzi SDF (2015) ought to have been developed prior to the Vulindlela Local Area Plan (2015), the former informing the latter. Although there was a degree of cross-pollenation between these two largely contemporaneous projects, the LAP was obliged, to a large degree, to set its own course.

In respect of the "High Density Residential Area", it should be noted that this is a relative statement made in the context of the peri-urban nature of the place. It is not known, with any certainty, how many dwellings there are *per imuzi*, or how many households there are *per imuzi*, in these areas, but if one were to take the number of structures as a proxy for dwellings (using the definition used by Eskom for its "dwellings and structures" count), then residential density is not more than 15 units *per* hectare (gross, that is, including streets and open areas etc within a sub-neighbourhood in which perhaps 100 or more structures are counted). Within areas where it is hoped levels of infrastructure service efficiency might be achieved, especially public transport, and thresholds exceeded for the support of more and higher-order goods and commercial services, substantially higher densities than those will need to be achieved. Such will be dealt with later in this project.

4.2.2. Richmond Municipality SDF (2017)

As mentioned in Section 2, the Richmond municipal area lies to the south-west of Ward 39. The prime intended land use set along this boundary, and for some substantial distance/ depth, is "Environmental Management" [27].

The Richmond SDF draws attention to its geographic interface with the Msunduzi municipal area in the following terms:

> "*The interface areas between Msunduzi and Richmond Municipality are characterized with conflicting land use activities. This is purely a result of different tenure arrangement and ownership dissimilarities such as the southern parts of Msunduzi is mostly communal land which is under Ingonyama Trust while it adjoins the privately owned commercial farms and conservation areas of Richmond Municipality. Both SDFs have generally acknowledged the importance of conservation within these edges, the pressing challenge though is the management of rural settlement expansion (Msunduzi's rural settlements i.e. Nkabini, Esinyaneni, Esigodini etc.) to these conservation areas.*" [28]

[26] Significant parts of which, in Ward 39, are particularly steep and might be suitable for grazing.
[27] This term seems to be applicable to only some of this "border" area. Whilst there are two significant natural areas of land east of the strong ridge which lies to the southwest of the Sevfontein property, and where environmental management is vital, a much larger area to its south and southwest is given over to commercial timber plantations within which environmental management, albeit important on those steep planted slopes and in management of the stream edges/ reserves, would seem, in the broader sense, to be minimal.
[28] Richmond SDF (2017-2022); P8

Within this area adjacent to Ward 39, the Richmond SDF recognizes two "long-term future" nodes, one at Mazangazanga (which lies approx. 3m along a particularly tortuous road/ track from the D63/ P121 intersection), and one at Sevfontein which is situated 2km from the Ward 39 boundary and 7km, along D1124, from Songozini Clinic. It is instructive to learn what the SDF says about these two nodes:

> "*Sevfontein is a very small settlement area that is located within close proximity to the Msunduzi administrative boundaries. There is very limited prospect for this area to grow and be a notable node, however a very small long-term nodal development can be encouraged with small shops, farmstalls and Mobile facilities (health, pension payout points etc). The area is also surrounded by farms which could be an opportunity for the area in terms of agrarian development initiatives. The other important aspect is the environmental protection given the fact that there is a conservation area*." [29]

> "*Mazangazanga is a very small settlement area that is located within close proximity to the Msunduzi and Dr Nkosazana Dlamini Zuma Municipality administrative boundaries. There is very limited prospect for this area to grow and be a notable node, however a very small long-term nodal development can be encouraged with small shops, farmstalls and Mobile facilities (health, pension payout points etc). The area is also surrounded by farms which could be an opportunity for the area in terms of agrarian development initiatives.*" [30]

An examination of the particular circumstances of these two possible nodes, especially given that they are seen only as *possible* nodes at some distant date, suggest that one need not weigh them as having any particular import for Ward 39.

However the SDF goes on to refer to the Byrne Village node and which, as was seen in Section 2, is 19km southwest (by road) from Elandskop station and 27.5km from Ncwadi Village. In spite of these distances, because of what the Richmond SDF considers for Byrne, rich in settler history and with a tourism flavour, it is worth reporting on it.

> "*Byrne is identified as a Rural Service Node. It is a very small settlement that is surrounded by commercial farms and associated homesteads. The intention is to promote Byrne to be a central area for local convenient shops and manufacturing activities. The local shops would be providing the basics for the surrounding farm dwellers while the manufacturing can include the agricultural manufacturing include packaging and processing of agricultural output. These land use activities are proposed along the main road.*" [31]

Although Byrne, itself not on a main route, would seem to hold some prospect for employment, were the intentions of this SDF to be realised, it is probably too distant from Ward 39 to be important in the

[29] Richmond SDF (2017-2022), P117
[30] Richmond SDF (2017-2022), P118
[31] Richmond SDF (2017-2022), P116

scale of the Ward 39 LAP, not least because of the nature of the terrain to be traversed, and that the R58 might not be on a regular taxi route.

Another feature of the Richmond SDF map is its depiction of that portion of D63 (along the ridge, east of Furth) between D58 and P121 to be "Corridor". It certainly is a road but there is surely negligible prospect of it becoming a "corridor" and thus for that road status to have any implication for Ward 39 LAP.

Over and above the geographically-specific matters discussed above, the Richmond SDF highlights the matter of Urban Edges and the need to geographically define them in the context of setting limits/ boundaries, in certain areas, so as to arrest/ limit residential consumption of productive agricultural land. These lines drawn on maps will have to be enlightened and technically defensible against the background of areas intended be densified and the active provision of services in those areas to attract, and provide for, the intended growth/ numbers of residents. To "hold" such lines against predation will take informed policies and steadfast political will. To not do so will be to condemn W39 to the continuation of agricultural land loss and inefficient land allocation practices. The Richmond SDF quotes the following:

> *There is no 'scientific' way of defining these containment edges: they require strong administrative actions to defend them. A number of factors contribute to the delineation which are characteristics of the natural environment (natural barriers such as water courses, steep slopes, vegetation of significance and so on), central purpose of these edges is to compact urban development in order to achieve greater urban efficiencies (an effective edge should be as close to the existing built-up area as possible), should not follow existing cadastral boundaries (strong straight geometric edge not wavy lines) and should be reinforced through the creation of fire-breaks and more intensive forms of agriculture which should be encouraged to occur hard against the edge. Suburban and leap-frog' sprawl should be discouraged. As far as is possible, new development should be contiguous with the existing built edge.* [32]

As will be seen later, another adjoining municipal has a concordant approach to this issue. The Ward 39 LAP needs to follow this cue.

Altogether, the above strongly suggest that there is little in the Richmond SDF which will have any direct import for Ward 39 and this is partly a matter of geography: the strong spine which runs generally from Elandskop Station southwards to the uMkhomazi River constitutes a watershed feature dividing these municipal areas, the land falling much more steeply towards Richmond, towards the south.

- Even so, there is value in engaging with Richmond on environmental matters along this boundary for there might well be matters of worth beyond what can be depicted within the SDF. Indeed,

[32] Provincial Spatial Planning Guideline 5: Defining Limits on Settlement Expansion: The issue of the Urban Edge (Department of Co-operative Government and Traditional Affairs: 2009, p8-10).

as will be seen presently in discussion of the Nkosazana Dlamini Zuma municipal SDF, there is one particular area which is likely to be joint interest.

Additionally, the nature and timing of the industrial development conceived of within Byrne Village would be worth exploration so as to confirm, or otherwise, its relevancy to Ward 39.

4.2.3. Dr Nkosazana Dlamini Zuma Municipality SDF (2017)

This municipal area lies to the south of Ward 39, sharing, in a west-to-east direction, a border comprising 5km of river, 7km of railway line and 4.3km of cadastral.

The Dr Nkosazana Dlamini Zuma Municipal SDF describes the municipal geographic interface with the Msunduzi municipal area in the following terms:

> "*Msunduzi Local Municipality is situated within uMgungundlovu District Municipality. It is the second largest local municipality in KwaZulu Natal and is the capital of the Province. It shares the north-eastern border with Dr Nkosazana Dlamini Zuma LM. The main strategic spatial planning issue between the two municipalities includes the expansion of rural settlements in the Ncwadi area (the north-eastern part of Ingwe) to the south-western parts of Vulindlela- KwaMafuze Traditional Authority Areas.*" [33]

This is a rather confusing statement because it does not make clear exactly how these expanding rural settlements in Ncwadi, to the north of Dr Nkosazana Dlamini Zuma municipal area, and expanding away from it towards Vulindlela, are an issue. One has to, instead look elsewhere for that clarification and that would seem to be found on P34 where it is clear that, although this SDF has been largely purged of references to its ex-area which included Ncwadi, some still remain. The municipal concern quoted above was in the context of it being responsible for the Ncwadi area. As a result, one may pay no heed to it.

Highlighted, at P12, is the need to engage with adjoining municipalities in respect of cross-border agricultural land management, and which strikes a concordant chord with one of Msunduzi's SDF intentions.

It is probably first worth examining the interface with this municipality by examining two different areas: that where the Mkomazi River is the boundary (i.e. the western portion) and that where it is not (i.e. the eastern portion) because the river lies within its area of jurisdiction.

- The partly cultivated and eroded area south of the Mkomazi River is stated, in terms of agricultural terms, to be "threatened". However the SDF proposes no particular development initiatives within 5km save that it identified certain roads [34] to the south of the river to have "corridor" status. The SDF deals with corridors to some degree at its Pp 83-87, but interestingly, notwithstanding the map having depicted the stated roads to be corridors, these are not listed as even tertiary corridors. As a result they are but roads. The SDF also makes no mention of the nearly completed

[33] Dr Nkosazana Dlamini-Zuma municipal SDF: P10
[34] A1935; L1319; L1320; L1217; and L1208

bridge across the Mkomazi River [35]; and which surely has the potential to have a significant impact between the areas either side of it; and

- That island of this municipality's territory which is trapped between Ward 39 to its north, the crossing-less Mkomazi River to its south, and a short extremely steep portion of the Richmond interface to its east. This "island" may be reached in two ways by vehicle:
- *via* Deepdale station [36], plus a track of uncertain status from the boundary to decommissioned Ndutshini Station (0.9km) plus a further distance (1.3km) to an ex-homestead; and
- *via* Ncwadi plus travel on a track [37] of uncertain status within Ward 39 to the boundary plus a further distance [38] to a *cul-de-sac* presumably linking to a no longer visible ex-homestead.

In terms of environmental sensitivity, this island has categories of "CBA (optimal)" and "ESA" of more or less equal area [39], plus a lesser area agriculturally "Threatened". Clearly these, given this municipality's declared intention [40] to work with adjoining municipalities on agricultural conservation and development matters, provides an important administrative and project link, with the Kzn Dept of Agriculture and Rural Development as a partner, on one or more joint projects. In the northeastern corner of this island, just on the Msunduzi/ Richmond/ Nkosazana Dlamini Zuma interface, is an area (approx. 1.5km by 0.5km) identified [41] as environmentally "Threatened". This constitutes another area of co-operation and synergy amongst these municipalities.

Bulwer is a "primary" node within its municipality and, albeit 56.1km from Elandskop Station and 37.9km from Ncwadi, is used by Ward 39 residents for some purposes. Let us examine what this SDF has to say about this node.

> "*Bulwer is strategically located as it is traversed by the R617. This route provides opportunity for Bulwer to capitalise on the through traffic going to areas such as Pietermaritzburg, Kokstad etc. Bulwer lacks the requisite magnitude of commercial development to support surrounding populations. It is serviced with, inter alia, 2 schools, a police station, library and small scale commercial and retail shops.*
>
> *It encompasses a low-cost housing development and still needs more infrastructure upgrading projects to propel the town forward. Activities such as commercial development, location of government offices and residential development should be encouraged: Importantly, the growth of Bulwer should take cognisance of the environmentally sensitive nature of the surrounding environment. Bulwer is a strong commercial, service and educational node, with several schools, police station, a wide variety of shops and new community facilities. The local municipality aims to promote development opportunities accordingly within the primary node. Bulwer was deemed the appropriate node to develop more affordable housing, which will serve to attract more government employees and private sector employees to stay permanent*

[35] 1.1km northeast of its decommissioned Butu railway station
[36] A total journey of approx 23km^2
[37] Approx. 4.5km
[38] Approx. 5.6km
[39] Environmental Sensitivity map on P60
[40] and Msunduzi's
[41] Biodiversity Conservation Map on P 56

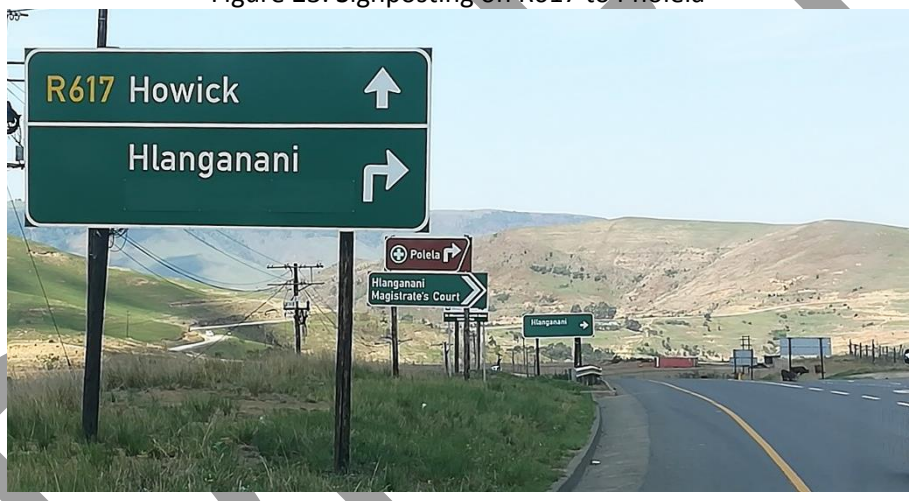
within Dr Nkosazana Dlamini Zuma. Subsequently, Bulwer was extended to include an affordable housing development and additional up market development around the Mountain Park Hotel. Additional land to the east and south of the town has been" [42]

The key thing here is that Bulwer's shopping and other services are used. With the growth and development of nodes within Vulindlela, at least some of these ties/ link might weaken over time.

A closer node of some relevance in terms of services used by Ward 39 residents [43], is that at Pholela/ Hlanganani, 40km and 25.3km from Elandskop Station and Ncwadi respectively. The SDF provides [44]:

"*Pholela node exhibits clear nodal characteristics. The node has land use diversity, and consists of core land uses that serve as significant attractors of population from various parts of the municipality. Pholela can be seen as an administrative node as it has a number of public facilities and offices of government departments. These include a Community Health Centre [45]; a magistrate's court, a traditional council administrative centre, a school,* [and] *Department of Agriculture and Rural Development, SASSA and Department of Social Development offices. Other uses within his node include commercial activities and places of worship*."

Figure 23: Signposting on R617 to Pholela



In a discussion with municipal planning staff [46], it was learned that the municipality knew of no intended, or likely, cross-border initiatives and knew of no sites of cultural or historical significance within Ward 39.

However, that meeting brought forth news of housing projects intended for the Ncwadi area, namely within its ex-Ward 7 as set out below.

[42] Yes, the statement in the SDF does end just there.
[43] Meeting with municipal staff held on 31st October 2017
[44] At P 116
[45] Importantly, much larger in terms of size and range of services than that at Ncwadi
[46] Meeting held with Dr Nkosazana Dlamini Zuma municipal employees on 31st October 2017

- The Ingwe 2015 IDP review includes a copy of the SDF map on which the intended housing projects are depicted and referenced [47]. Part of that map is depicted below and shows different human settlement intentions in the Qadi TA.

Figure 24: Extract from Ingwe 2015 SDF Housing Map 23 on P 159

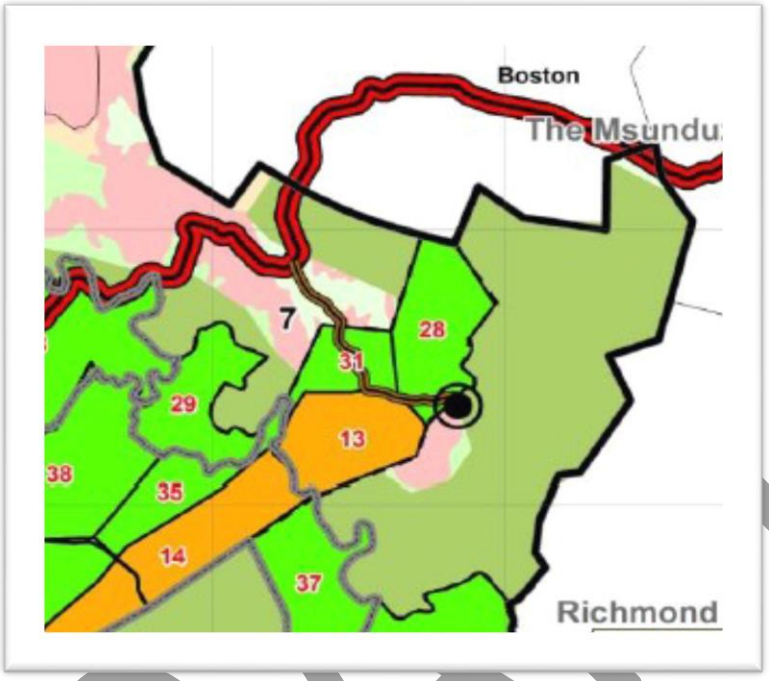


Table 8: Ingwe 2015 SDF: Housing Project Information.

Map Ref	Project No	Name		Trad Council	Units
Priority Housing Projects					
13	IHP 13	Mdutshini		AmaQadi	1000
Future – Rural Housing Projects					
28	IHP 28	Greater Ncwadi			600
31	IHP 31	Greater Deepdale (farms)			300
				Total	1900

The origins of these intended housing projects are to be found in ex-Ingwe's 2013 "Human Settlements Sector Plan". From the information available, these projects require budgeting in the present. But before any budgeting for or planning of these is undertaken, it is important that the measure of this "need" be examined by Msunduzi, and if so affirmed, that the appropriate planning for the location

[47] The Msunduzi Ward 39 Community Based Planning document stated there to be a need for housing within the ward, but it gives no measure thereof. On its unnumbered page 7 it records its "Submissions to the IDP" and, in respect of housing, it suggests a Rural Housing project at Ncwadi to benefit 13000 Community Elders in the 2018-2020 time frame. These proposals, not in the Msunduzi IDP of 2017, have their origin in proposals of the then Ingwe municipality.

of such be done as part of this project, not least because this is a very rural area with some valuable agricultural and natural resources which should not be compromised.

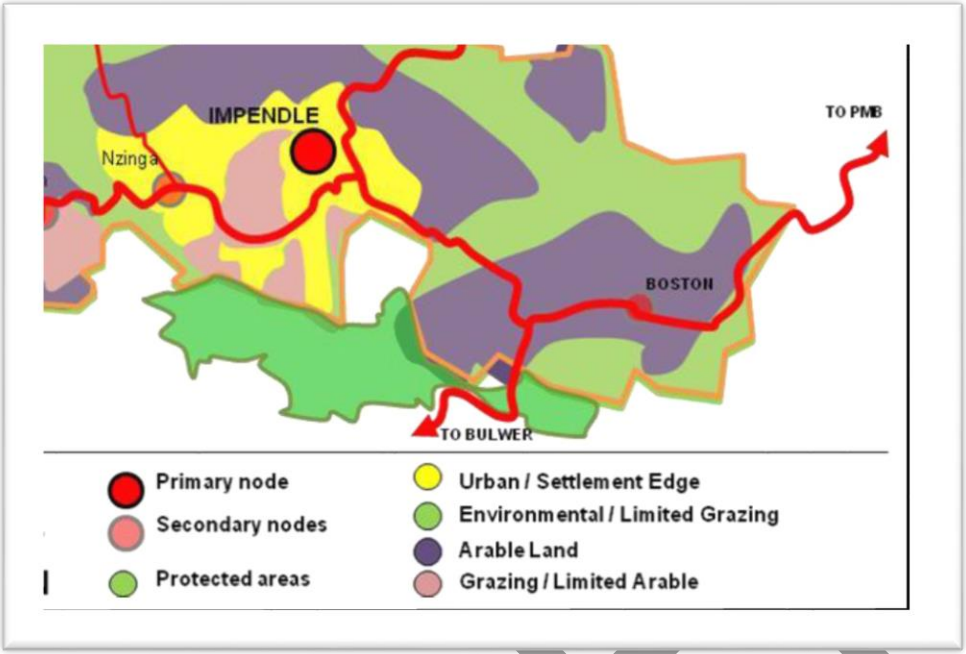
In summary, the above has the following import for Msunduzi municipality:

- There is a need to work with Dr Nkosazana Dlamini Zuma municipality on a joint project (and by inference perhaps with other municipalities) on the retention/ securance of land for conservation purposes, and for the promotion and adoption of Stewardship sites to comprise part of those considerations, together towards the development of/ expansion of open space networks, part of which should provide for the movement of indigenous fauna;
- There is a need to work with Dr Nkosazana Dlamini Zuma municipality on a joint project (and by inference perhaps with other municipalities) on the protection (particularly from consumption by urban/ settlement uses) of, and development, of agricultural land so as to enhance agricultural output;
- Msunduzi municipality should examine, in concert with the Provincial Dept of Human Settlements, the bases for the ex-Ingwe intended housing projects in the Qadi area and, if confirmed as to need and location, to work with that department towards their design and, importantly, density;
- Consider the location for, and possible establishment of, a "Thusong" centre within its jurisdiction and which will enable the Ward 39 residents, and persons in proximate areas to benefit from the range of services there provided;
- Examine, with Dr Nkosazana Dlamini Zuma municipality, the implications which the new road bridge over the Mkomazi River will have on movement routes and opportunities for development in each municipal area.

4.2.4. Impendle Municipality Spatial Development Management Framework (2017)

The first thing to note in respect of this SDMF is that it is of some, but also uncertain, vintage. The document, called a *draft*, is dated 2010 and yet it includes up to date information on capital projects for the period 2017-2022. Also, the SDF map depicted therein (at P52) has a stylized presentation as shown below.

Figure 25: Portion of Impendle *draft* SDF



However, what it does show is very interesting. It shows not just environmental land abutting Ward 39, but that grazing is permitted upon it and that that grazing is limited, presumably by the imposition of at least number restrictions, presumably *per* large (and perhaps also small) animal unit. It shows large swathes of arable land, again affirming the agricultural function and assets of this area generally and which accord well with the history set out at Section 2, affirming the potential for co-operative ventures/ synergies in this general area. It shows also a substantial west-east swathe of protected area [48], a small portion to the east of the R617 at Lundy's Hill and a much larger section to its west. That this abuts Ward 39's portion [49] of what is called the Impendle Reserve, now incorporated within the Impendle municipal area, represents a significant opportunity for synergy of action. The SDMF [50], highlights the value of this reserve, and its tourism potential and that, in order to wisely protect it, no grazing of animals, and no cropping, shall be permitted upon it. The portion of that reserve within Ward 39 should, correctly, enjoy the same protection and the municipality should undertake such an investigation and implement appropriate measures to achieve such.

Impendle town is the primary node which is described as follows:

> "*Impendle Town has been identified as the principal development node of the municipality. The node is well located within the Municipality to serve the needs of the majority of the residents of the area. As a rural service node it is also well-developed with an appropriate level of urban infrastructure, offering a range of commercial retail and government services* [51] *to*

[48] Approx. 16km long on a WNW-WSW axis
[49] Approx 280ha
[50] at P31
[51] Including large police station and magistrate's court

residents. It has, however, been noted that, despite substantial commercial activity in Impendle Town, people still travel to Pietermaritzburg for the bulk of their household needs.".

Whilst a range of initiatives and studies [52] are proposed, and have associated costing estimates, the SDF includes none in its budget allocations.

Boston is described as a secondary node performing the function of agricultural service centre, with Petrol Filling Station, Agricultural Co-op, Moth Hall but with the intention of developing it, in the context of being a gateway to the Drakensberg, as tourism information centre with tourism-related stop-over facilities, [53] and for which specific investigations etc are mooted [54].

What does not come through in the SDF is the particularly comprehensive and modern Thusong centre [55] in town, and also the maize mill erected within the industrial area.

Figure 26: Impendle Thusong Centre

[52] listed at P153 *et seq.*
[53] P119
[54] P156
[55] mentioned at Pp74 and 160

Figure 27: Impendle Thusong Centre 2

Figure 28: Thusong Centre signage on R617 at 127-1 intersection to Impendle

From the distance table in Section 2, it will be noted that:

- Elandskop is closest to Boston, followed by Taylor's Halt, Byrne and then Impendle (25.1km) followed by yet more distant places; and
- Ncwadi is closest to Boston, followed by Pholela, by Byrne, and then Impendle (33.5km) followed by yet more distant places.

Figure 29: Impendle Maize Mill

Also not mentioned in this SDF is the 2015-completed maize mill to which maize producers may sell their dried crop so that beneficiation occurs locally and improves the local circulation of money. Nor does the SDF mention the recently-constructed piggery and abattoir in Boston and which is source to sell animals and where local beneficiation may occur. These two enterprises, transport permitting, would serve to support agricultural production in the area of which Ward 39 is part.

The above deal with specific developments/ areas depicted on the map, but there is one important subject, dealt with in this SDMF, which has given rise to some of those depicted areas. This is the matter of the "Urban Edge", mentioned earlier in this document with respect to the Richmond Municipal SDF. But before delving deeper into this subject, remember that

- in Section 2 of this report, it was suggested that the majority of this ward has a particular character; and
- nothing less than the provincial SDF itself identified large swathes of Ward 39 to have an asset denoted as "Landscape Character".

The Impendle SDMF correctly deals with the Urban Edge in some depth and it is instructive to quote *verbatim* from that SDF's Pp14 and 15:

> *"Dewar and Louw [56] identify three distinct landscapes: urban, rural and wilderness. The balance between these three elements essentially provides that "sense of place" that people experience and identify with.*
>
> *The issue that dominates most areas in KZN, and is certainly applicable to Impendle, is that settlement formation and growth is destroying this balance. "The urban is seen as the*

[56] Dewar, D. and Louw, Defining Limits on Settlement Expansion: The Issue of the Urban Edge, Provincial Spatial Planning Guideline 5, July 2009, KZN Department of Local Government & Traditional Affairs, p.3

dynamic element and it spreads out like a cancer, devouring all rural and wilderness landscapes in its path" [57]

Dewar and Louw say that the challenge is to change the perception and see rural and wilderness landscapes as positive and that they should inform the pattern of urban or settlement growth.

The form and function of these landscape types needs to be recognised and defined more clearly [58]*. Instead, there is the growth of settlements spreading out tentacles into what were rural landscapes, but are now neither urban nor rural. People living there cannot make a living out of rural, agricultural pursuits – the land holdings are too small and under too much pressure from humans and in some places, their livestock. They are also not living in an urban environment with all the amenities that that should provide. For one thing, the scattered nature of the settlement means thresholds are too low and it is too expensive to provide the level of amenities typical of an urban lifestyle. This sprawl of settlement is difficult to manage and often creates serious and sometimes irreversible negative effects on the natural environmental systems that are necessary to sustain life.*

The concept of landscape therefore, while seeming to be a slightly intangible, psychological feeling or sense of place, can be directly linked to the underlying health of the natural systems we rely on – land, water and air. Once that sense of place is lost, whether it is an urban, rural or a wilderness landscape, it is an almost certain indicator that there are some serious problems which, if not addressed, will affect the long-term sustainability of all who live there or depend on that environment.

The incorporation of landscape into spatial planning at sub-regional level is gaining importance as the emphasis on sustainable development has increased internationally (Eco Assessments 2007 [59]*). Allied to landscape are visual and sense of place assessments which are linked with projects and plans where landscape character and the associated visual quality is in question. The importance of landscape and visual impact is linked to the sensitivity of the affected landscape. It is noted by Eco Assessments (2007, pg 10) that "…by combining magnitude and sensitivity in a systematic approach, consistent conclusions on impact significance can be drawn". In order to assess impact it is necessary to define landscape character. In this context it may broadly be defined as a distinct and recognizable pattern of elements that occur consistently in a particular type of landscape. Characterisation involves identifying areas of distinctive character and classifying and mapping them in terms of both character types and location."*

[57] *ibid*

[58] This introduces the concept of an "urban edge" which is necessary to define and so preserve the distinct landscape types (also referred to as "settlement edge" given the rural nature of Impendle as a whole.

[59] Eco Assessments, 2007, Eskom Master Plan Central Region – Draft SEA, vol 3, appendices

In consequence, these considerations and concepts bear to be applied in full measure to Ward 39's planning.

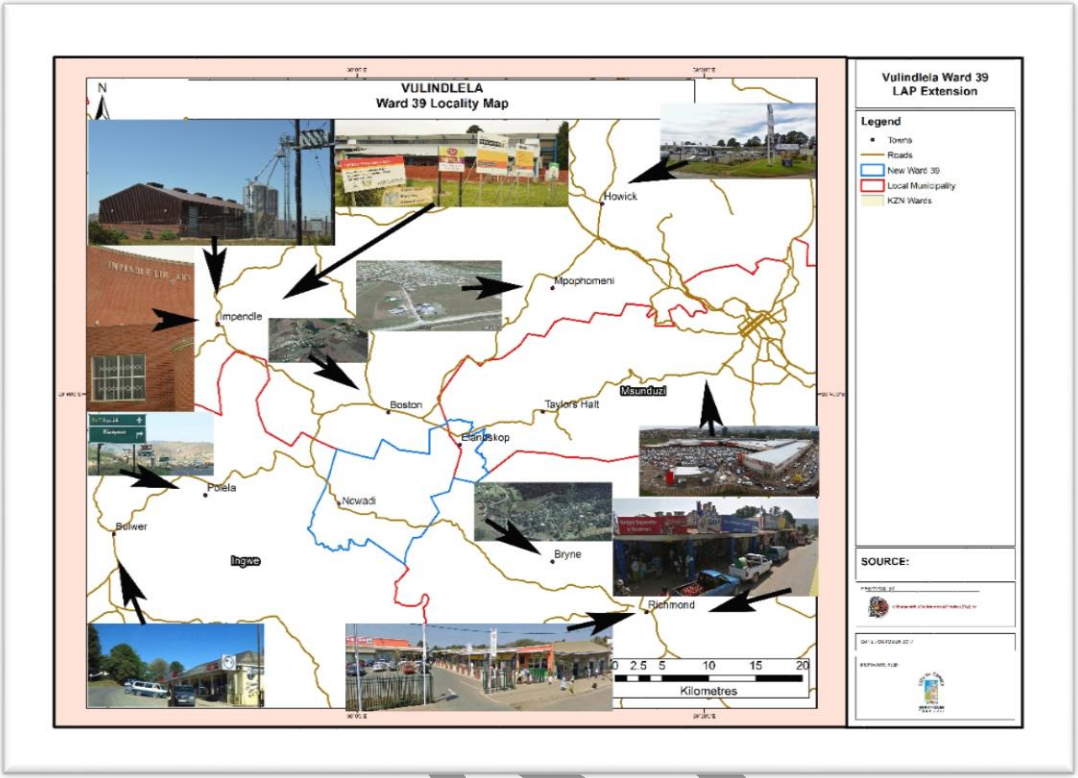
In summary, the more important implications of/ opportunities derived from this SDF and brought to the fore by it are:

- the concert of action in the protection of environmental assets, in their own right and for enjoyment in recreation with respect to landscape and viewsheds;
- the concert of action in the conservation of, and securance, of agricultural assets, including the setting of specific stocking limits on large and small animals for specific areas;
- the joint action, with a number of organisations, to: (a) ensure that the portion of the Impendle Nature Reserve which lies within Ward 39, is secure from grazing of animals and cropping; and (b) investigate the possibilities of tourism initiatives within this portion of the Impendle Nature Reserve;
- the concert of action in the conservation of, and securance, of agricultural assets, including the setting of specific stocking limits on large and small animals for specific areas;
- the active investigation of synergies between the Boston Farmers' Association and farmers within Ward 39; and
- the embrace of, and application of, Urban Edge principles and design criteria in the planning of Ward 39 so as to define Urban Edge boundaries and to adopt policies and technical tools to ensure their defence.

4.3. Conclusions

Figure 30 pictorially depicts some of attractions/ influences which nodes in the vicinity of Ward 39 have upon, and for, it.

Figure 30. Attractions / Influence of nodes in the vicinity of Ward 39



Collectively, the import of these various documents is that the Ward 39 Local Area Plan should:

- acknowledge the value of the landscape corridors and viewsheds within Ward 39, as depicted in the Provincial SDF;
- acknowledge the value of the agricultural assets within Ward 39 and recommend that Council, in concert with other actors, set in place:
- Council-adopted policies, consistent with the principles under-pinning the Subdivision of Agricultural Land Act (act 70 of 1970) and any concordant elements of the Regulation of Agricultural Land Holdings Bill [60], so as to secure the agricultural assets within the ward, and further develop them [61];
- Council-endorsed policies as to stocking rates for large and/ or small animal units on specific land types so as to combat erosion (see also Section 5.5 later); and
- Controls to ensure that conservation-status lands are not grazed or ploughed;
    - Acknowledge the value of the Conservation assets – including the riverine corridors and wetlands - which the ward possesses, and set in place policies and controls on the one hand, to secure these from grazing, ploughing, poaching and over-exploitation of whatever natural medicine plants might grow there and, on the other, develop conservation-supportive approaches to open access to tourism-related activities;

[60] proposed by the National Dept of Rural Development and Land Reform
[61] it being noted that an amount of R1 million was recommended, at P172 of the SDF, for such investigation;

- Initiate joint projects, with adjacent municipalities, to develop mutually-reinforcing policies and approaches to the management of "border" natural areas of different conservation *stati*;
- Promote the creation of "Stewardship" sites";
- Acknowledge the risk which urban sprawl poses to the sustainability of, and proper development of, Ward 39 [62];
- Examine the Edendale Station-Deepdale Station rail link with a view to its use for passenger transportation as an element integral to the IRPTN, it being noted that such possible use of this existing infrastructure runs counter the intention expressed in the Msunduzi 2015 SDF;
- Urgently address the problem of urban sprawl through the identification and definition of Urban Edges (perhaps inviting adjoining municipalities together with planning staff from the Kzn Dept of Co-operative Governance and Traditional Affairs (KznCogta) [63] to participate in elements thereof);
- Examine the possible establishment of, and best location for, a Tsusong centre in proximity to Ward 39 and closer than that at Impendle;
- Propose interventions particularly, or only, within the ex-ward 7 and 8 portions of this ward so as to achieve significantly higher residential densities;
- Engage with Richmond municipality to determine its anticipated development of the industrial area proposed for the Byrne node;
- Engage with the Kzn Dept of Human Settlements to determine the measure of, and location of, accommodation need (generally east of the P140 or P137/ in the Ncwadi area [*per isigodi*]/ elsewhere); and
- Describe the ways in which the outcomes of the above-stated initiatives/ projects are likely to ameliorate the state of social need highlighted in the Provincial SDF.

5. NATURAL ENVIRONMENT

5.1. Geology and Soils

5.1.1. Groups and Forms

Ward 39 forms part of the geology of KwaZulu-Natal coastal belt and hinterland. The area is underlain by rocks dating back to the Precambrian to Quaternary periods. The following layers occur in Ward 39:

- Doleritic sills and dykes (intrusive).
- Karoo Sequence with the following groups and forms:
  - Beaufort Group – Estcourt, Adelaide, Tarkastad and Molteno Forms.
  - Ecca Group – Pietermaritzburg, Vryheid and Volksrust Forms.

[62] although this could be argued to already have been covered by the Council-adopted Vulindlela Local Area Plan at P39 *et seq*

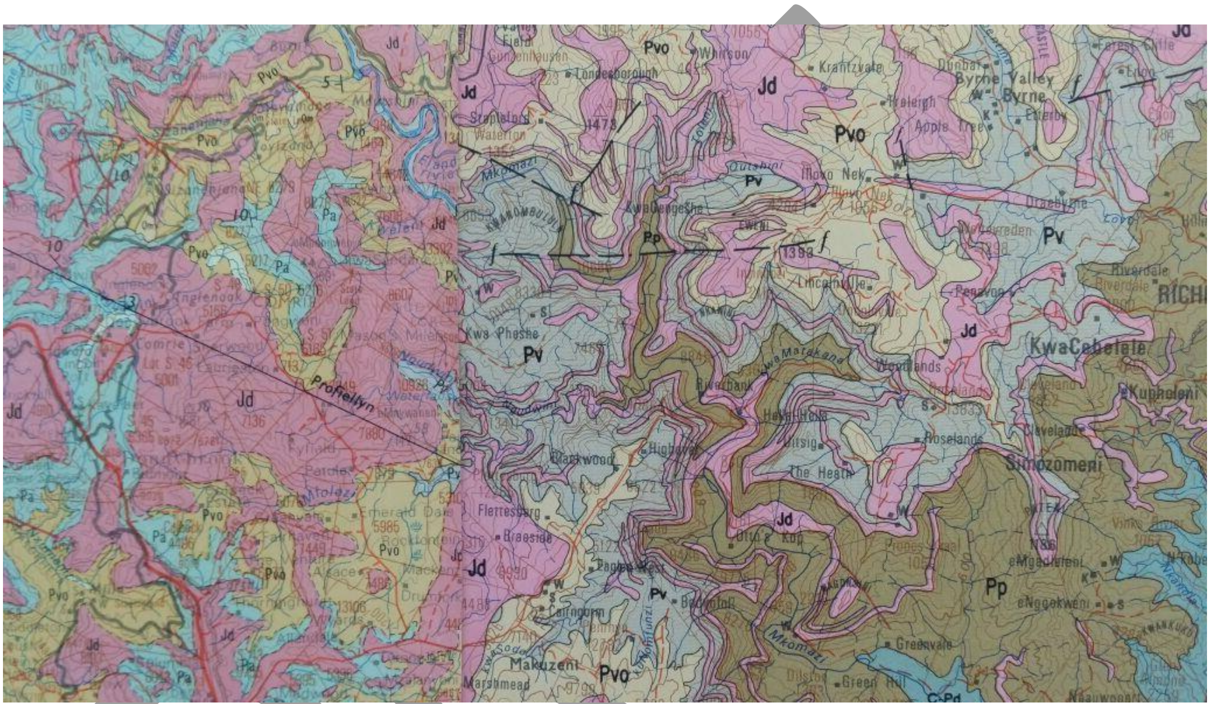
[63] the advocate of this planning guideline

- Dwyka Group.

The Tugela, Matigulu and Mapumulo Groups which are underlain by granitic rock are located to the north and east of the province. In contrast the project area forms part of the higher scarp located in the west of the province which is derived from basaltic and sedimentary rock formations.

The specific forms located in the project area include Volksrust, Pietermaritzburg and Adelaide and their location may be seen in Figure 31 below. The area is also characterised by extensive doleritic sills and dykes which have intruded into the sedimentary layers (Linstrom, 1987).

Figure 31. Detailed geology map of the area



5.1.2. Description

The basal Dwyka has a depth of up to 120 meters. This is overlain by forms in the Karoo Sequence outlined above which have depths ranging from 200-300 meters. In the Ecca Group, the Vryheid formation is of deltaic origin comprises medium grained sandstone and minor shale inlays. In contrast the Volksrus formation comprises 200m of grey/black shale. The Beaufort Group is inclusive of the Estcourt Formation which in turn comprises dark shale and sandstone layers. Red mudstone characterizes the top of this formation. The Adelaide Formation comprises blue, green and grey mudstone alternating with sandstone of a similar colour range. The Tarkastad Formation comprises fine sandstone alternating with blue green mudstone. The Molteno formation comprises coarse sandstone alternating with blue-green mudstone and grey shale. The Elliot Formation consists of maroon and grey mudstone alternating with sandstone. The Clarens Formation includes fine grained sandstone massives which appear to have been the result of Aeolian deposits.

As noted by Linstrom (1981), the Karoo episode in the geology of this era ended with the outpouring of thick basaltic lava as the basis of the Drakensberg mountain range. Intrusions of Karoo dolerite sills and dykes occur throughout this area. The dykes have a north –west to south-east direction.

A review of the geological groups occurring in the area would seem to indicate the following:

- No major fault lines or any form of underlying instability in the area.
- Opportunities for any form of mining limited to quarrying and sand winning.

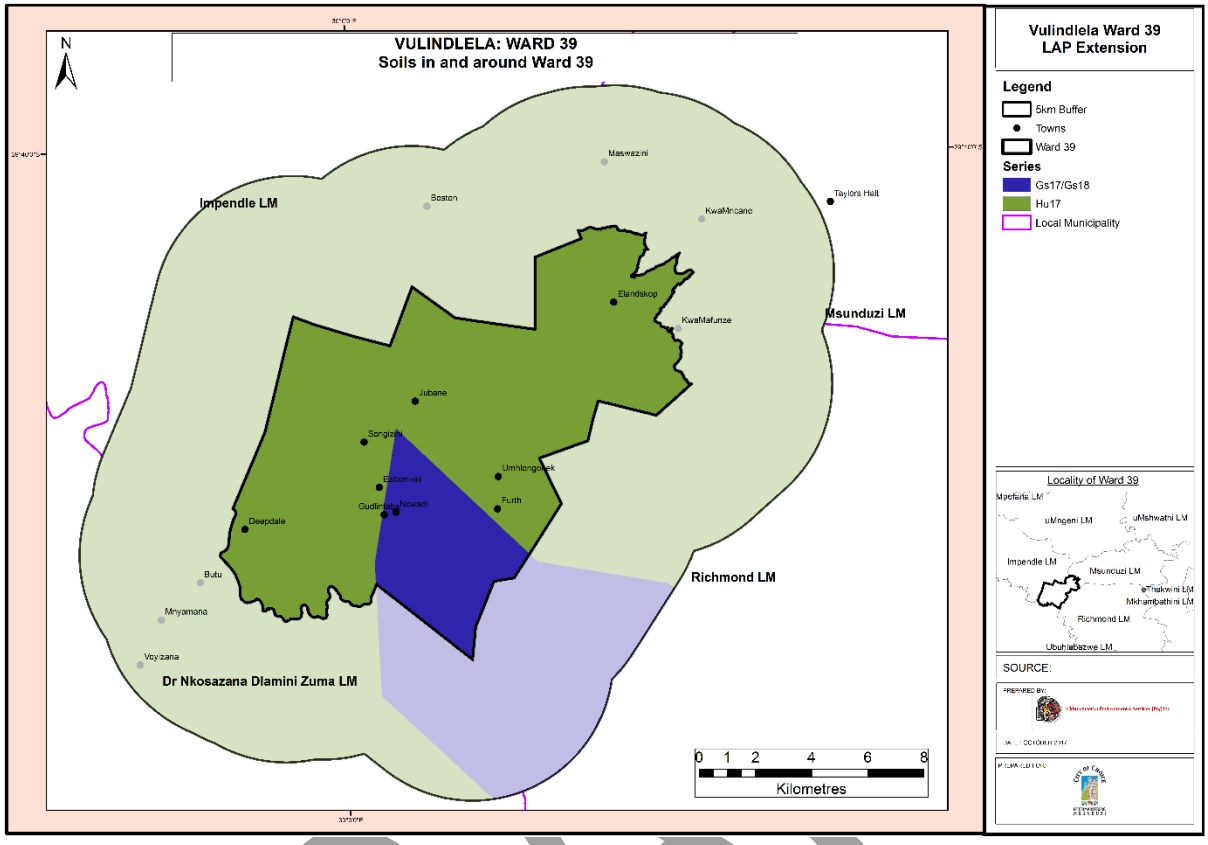
Evidence of small deposits of phosphate, coal, torbanite, molybdenum and bauxite occur but not at scale sufficient for commercial mining to occur (Linstrom, 1987).

5.1.3. Soils

There are two descriptors of soils which need to be considered in planning for Ward 39. These include what is termed "agricultural soils" and "geotech soils". The agricultural soils are dealt with under the agriculture section of this report and hence will not be repeated here. Information on the geotechnical description of soils is not readily available and would require a suitably qualified specialist to prepare this information. The importance of geotechnical data is that it has direct reference to where infrastructure, housing, factories etc. would best be constructed. This type and level of information is essential at detailed planning and project levels.

In the absence of more detailed geotechnical data, a brief description of likely soils is outlined below. Figure 32 shows the derivative soils relating to the parent materials. Thus weathered dolerite is generally related to deep red clays which, in cases, have "heaving" potential which potentially has negative implications for buildings unless constructed on well reinforced foundations. As may be noted in Figure 32 these are widespread in the south western areas of Ward 39. The remainder of the south western area is characterized by what is termed "Mudrock". Based on the findings in the geological series map (Figure 31), it is probable that this is referring to the Beaufort Group and related Adelaide and Estcourt Forms which, as noted previously, have inherent sandstone and mudstone properties. The soils likely to derive from these formations are likely to be sandy and well-drained with clay/mud horizons derivative from the mudstone. The northern and eastern areas of the Ward, in contrast, include Karoo Series rock which is predominantly sandstone and shales and will most likely produce stable soils for construction purposes.

Figure 32. Soils (Pitman and Bailey, 2016)



As noted above, further detailed analysis at local level is required by a qualified soil scientist to establish actual soils and their geotechnical properties prior to embarking on any local development involving infrastructure, residential, social service facilities and business structures

5.1.3.1. Groundwater Seepage

No material could be located on groundwater status in Ward 39. It is however probable in terms of the geology of the area that where dolerite dykes intersect with dolerite sills or alternatively metamorphosed sandstone layers (hard and impervious) this produces potential for underground storage of water draining off the highlands and high rainfall areas. These reserves once fully charged will in turn generate seepage where the groundwater level intersects with ground surface most commonly where rock strata are exposed.

Further detailed work is required by hydrogeologists to establish possible localities of these reserves and the type of yield that they could sustain. Similarly the preconditions for recharge will have to be properly modelled to establish optimum land use in the Ward and surrounding areas to ensure that the reserves are not depleted, particularly in dry months.

In the Vulindlela Rural Housing Settlement Plan the following was noted in relation to groundwater seepage: ”raised hilltop and ridge areas, negligible groundwater seepage is anticipated...Below the dolerite ridge line and hillside topographical areas near the valley lines, shallow seasonal perennial groundwater seepage activity is expected.” (Msunduzi, 2011).

5.1.4. Assessment: Geology and Soils

Based on a review of available material from the Council for Geoscience (Dept. Mineral and Energy Affairs, 1988) for the project area it would appear that there are no geological hazards in the area e.g. unstable fault lines, sinkholes etc. The greatest limitation on construction, apart from topography, may be the clayey and often unstable soils deriving from dolerite dykes and sills. Soils deriving from the sand and mudstone or alluvium is unlikely to pose any major threats to development in this area. Mineral and/or metal mining potential is virtually non-existent in this area.

Due to limited data specialist studies are required by soils scientists and hydrogeologist.

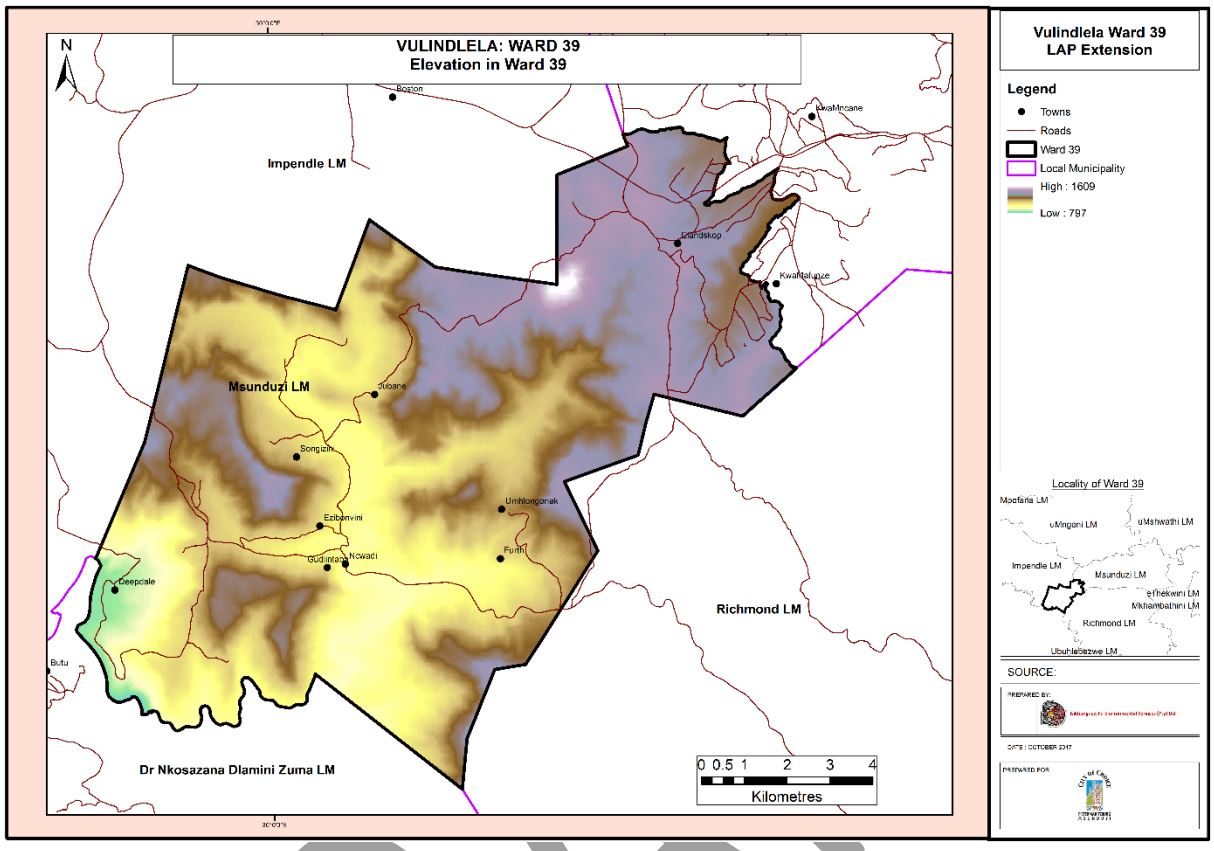
As noted, agricultural soils are dealt with under the agricultural section of this report.

5.2. Topography and Slope

5.2.1. Topography

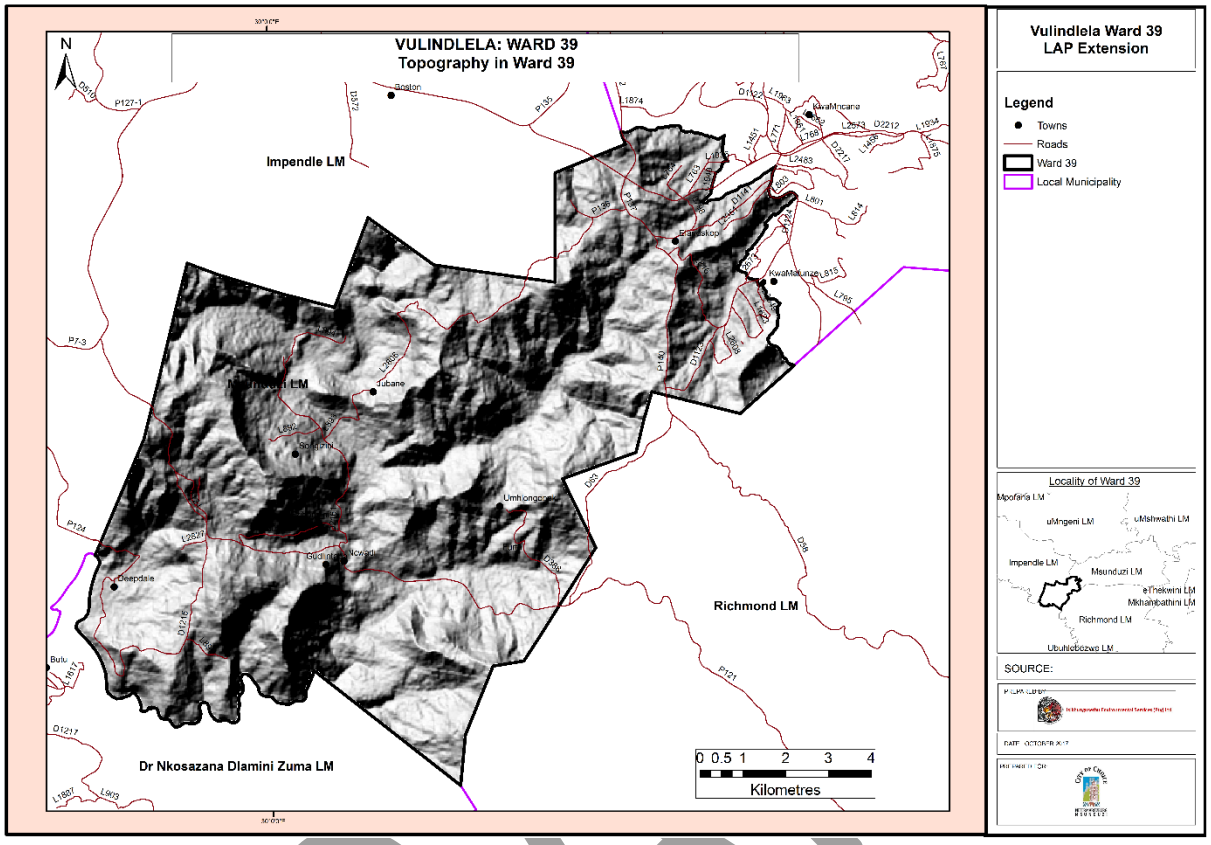
Ward 39 comprises land which is located at high, medium and low altitudinal ranges as indicated in Figure 33. Highlands are predominantly located in the north east of the project area and are characterized by undulating sandstone ridges intersected by dolerite dykes. In the south and west the tops of ridges tend to be narrow with steep slopes into the valleys. In contrast the northern and eastern highlands have more rounded and undulating ridgelines with areas suited to large-scale agriculture and settlement. The deeply incised river systems drain into the Mkhomazi system. There are limited areas of low lying land in Ward 39. These are mainly located to the west of the area along the Mkhomazi River valley.

Figure 33. Elevation (EKZNW, 2015)



The rugged nature of the topography of this area is highlighted in Figure 34. This topography needs to be taken into consideration in the planning of future settlement development and the implementation of infrastructure, particularly roads, bridges, water supply, sanitation etc. This is particularly important for the land which is located between the Qadi TC in the west and the major settled areas in the east. This is currently State owned land (DRDLR) and due to its being less rugged than that in Qadi TC and less heavily settled that the eastern areas. It may need to be considered for future managed agriculture and properly demarcated settlement. In this part of Ward 39 there is the potential for this type of development to be located on provincial transport routes to enhance accessibility.

Figure 34. Hillshading (EKZNW, 2015)

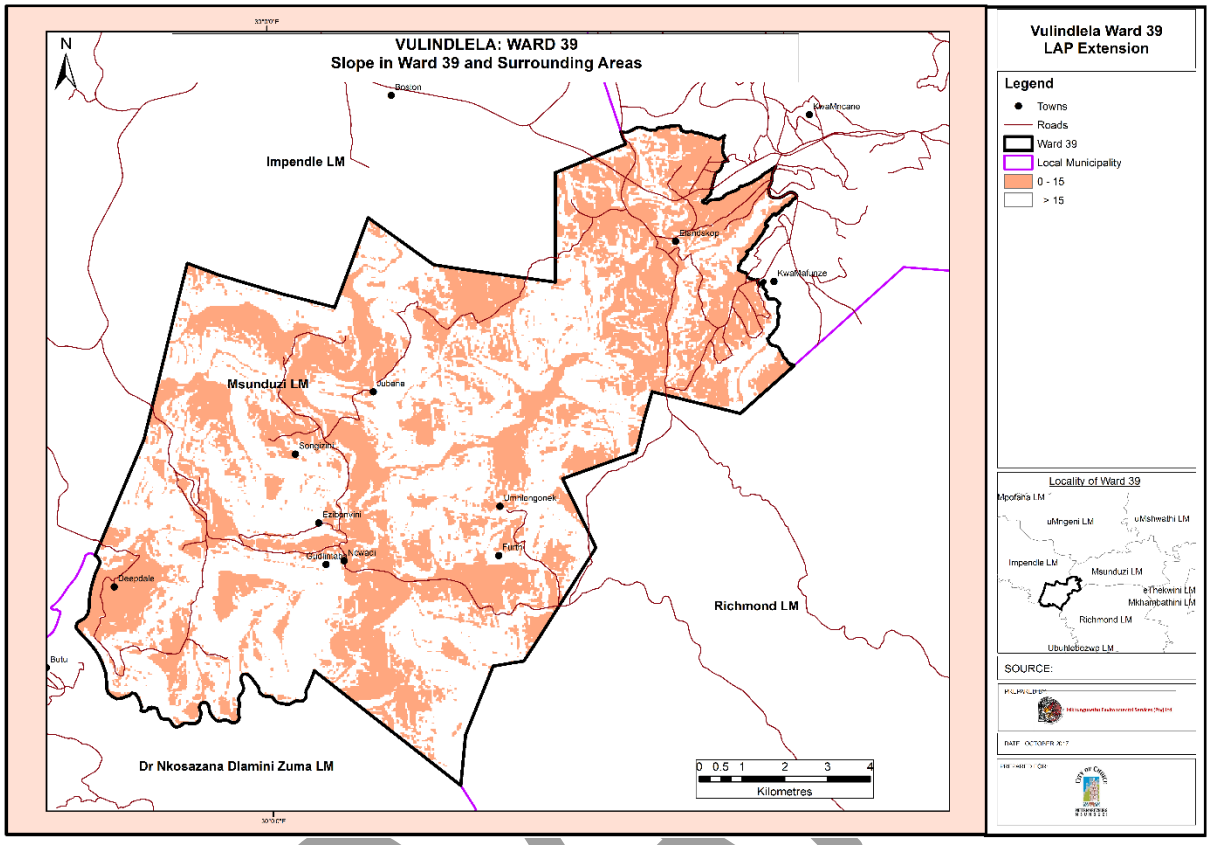


5.2.2. Slope

A break of 15% has been used in Figure 35 to provide an indication of the areas that fall below and above this slope in Ward 39. The indications are that the area to the north east has the largest areas of flatter land whilst that located in the centre and the west tends to be confined to ridgelines and to some of the broader valleys and shallower slopes running through the area. Based on a review of Figure 35 the areas best suited to future development, in terms of slope, are located on the land below 15% in the north east and those flatter areas located in the centre and in the north and east of the project area. One of the issues that will need to be resolved in this steep terrain is the potential conflict between differing land uses. Thus for example there could be a clash between future settlement and extensive agriculture, both favoring slopes less than 15%. Similarly bulk infrastructure and agriculture favor flatter slopes as does industry. Depending upon the outcome of this plan, great care will have to be taken in protecting high value agricultural lands in the less that 15% areas whilst locating future settlement and infrastructure development on the marginal lands within this or steeper slope breaks.

Further more detailed slope analysis will be undertaken in the planning stages of this project to establish appropriate land use, at a more localized scale. This will form the basis of a broad land use framework for the Ward 39 LAP.

Figure 35.Slope (EKZNW, 2015)



5.2.3. Assessment: Topography and Slope

As noted in the assessment of geology and soils previously, there are no evident geological threats to undermine future development in Ward 35. Rather, detailed geotechnical soils analysis should be undertaken prior to investment in any form of development taking place.

Topography and slope would appear to have a greater effect on future development than geology. Furthermore there is no major mineral wealth in the area other than for quarrying and sandwinning.

As may be noted in the agricultural section, the higher lying northern and eastern areas are the most favourable for agriculture on a large scale. These are also the areas most favoured for settlement due to their accessibility. In future planning it is the highlands that need to be carefully planned and managed to optimize agricultural and water production and minimize urban sprawl. If this can be achieved then there are opportunities in agriculture and ecotourism for employment, local income generation and possibly carbon sequestration.

The lower lying and more rugged southern and western areas are mainly located within the Qadi TC area where settlement has taken place along major transport routes. There is limited opportunity in these areas for large scale expansion due to slope, access roads through rough terrain and a lack of water for domestic and agricultural purposes. Future development of these areas needs to be informed by sustainability: this is a critical planning principle used in the Vulindlela LAP (Isik, 2016) and derived from national planning frameworks. The costs of maintaining settlement in remote inaccessible areas where economies of scale are limited, is unsustainable by municipalities. This may

be linked with local geological, topographical and climatic conditions which cannot easily be overcome without substantial investment.

5.2.4. Alignment with VLAP SQ

The review of geology and topography would seem to indicate that the Groups and Formations in Ward 39 are a continuation of those which occur in the main part of Vulindlela. The main difference in topography is that the western area of Ward 39 is lower lying and more rugged than that in Vulindlela. This in turn has implications for the land uses which can be sustained in this relatively remote traditional area of Msunduzi.

Investigations revealed no specialist geological data available from Msunduzi for Ward 39 whereas the VLAP SQ was informed by geological data from the Vulindlela Rural Housing Project, Davies, Lynn and Partners.

5.3. Hydrological Review

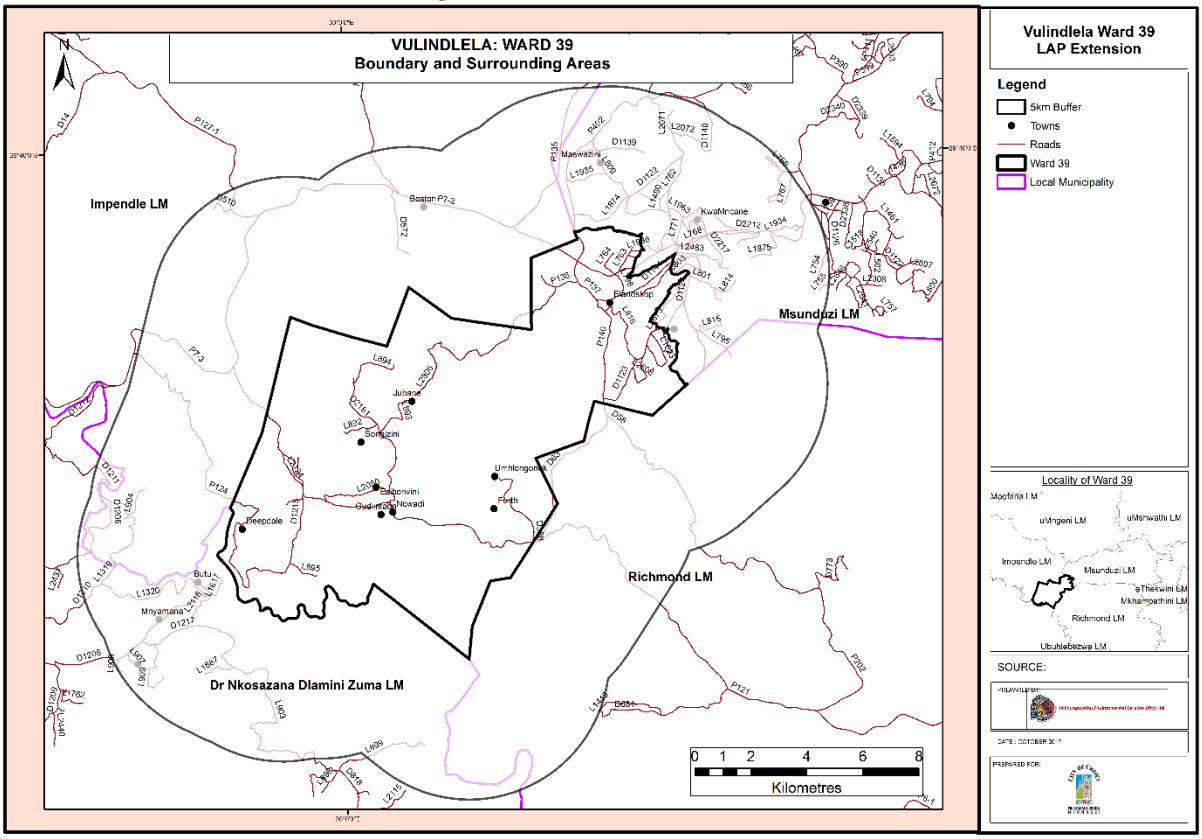
5.3.1. Purpose of the Report

The main focus of this report is firstly to describe the hydrology, and secondly the possible effects of future projected climatic changes in this area.

Hydrologically this system is complex, with land use comprising of rural urban areas interspersed with subsistence agriculture and commercial forestry. This, in combination with the considerable quantity of precipitation per year that is received in this area, often results in significant surface water and sediment contributions to the streams and rivers that flow through this area (Figures 39 - 40). Furthermore, within this region are a considerable number of wetland systems, most of which do not appear to be managed and many of which could be in danger of significant degradation as a result of the anthropogenic activities occurring in this area (Isikhungusethu Environmental Services, 2012; Msunduzi, 2010; Dr Nkosazana Dlamini Zuma Local Municipality, 2017).

If future projected climate change is over-laid in this area it is apparent that a number of impacts could occur which could be detrimental the agricultural activities in this area. Despite the constraints that are associated with the possible impacts of climate change are the possible opportunities that are presented, such as the diversification of activities within this area, which would be possible if some form of investment were to occur in this area (Schulze, 2011a).

Figure 36. Location of ward 39



5.3.2. Catchment Hydrology

The Ward 39 area is located to the South West of Pietermaritzburg in Primary catchment U. Owing this area being topographically relatively complex there are a number of small watersheds that have resulted in the delineation of 4 quaternary catchments (Figure 37), which are intersected by the Ward 39 boundary. The total area of the Quaternary catchments that are intersected by the Ward 39 boundary is approximately 1 400km^2. Each of the 4 Quaternary catchments comprises of 3 Quinary catchments that have been delineated based on altitudinal parameters (Figure 37). Mean Annual Precipitation (MAP) in this area ranges from approximately 800mm to more than 1100mm. The soils in this area are sandy where underlain with sedimentary rock, and dominated by red clays where underlain by dolerite. In most instances they are well drained soils with a limited risk of erosion occurring. Furthermore, with this area a reasonably dense streamflow network exists (Figure 40) (Linstrom, 1987; Schulze *et al*., 2011b).

The majority of these smaller streams are episodic\ephemeral\seasonal, i.e. they only flow during the wet summer period of the year as the catchments feeding into these streams are small and incapable of supplying water during the dry period of the year. There is a watershed along the old Msunduzi and Ingwe boundary, and those watercourses on the Ingwe side drain into the Mkomazi River, while those on the Msunduzi side of the boundary drain into the Msunduzi River. As the majority of the new Ward 39 is located in the old Ingwe district municipality, most of the surface water flows into the Mkomazi River. The catchments supplying the perennial systems are larger and hence a greater quantity of water is retained in the catchment to be released as baseflow during the seasonal drought period (winter). Table 9 provides the mean annual runoff (MAR) from each of the Quinary catchments

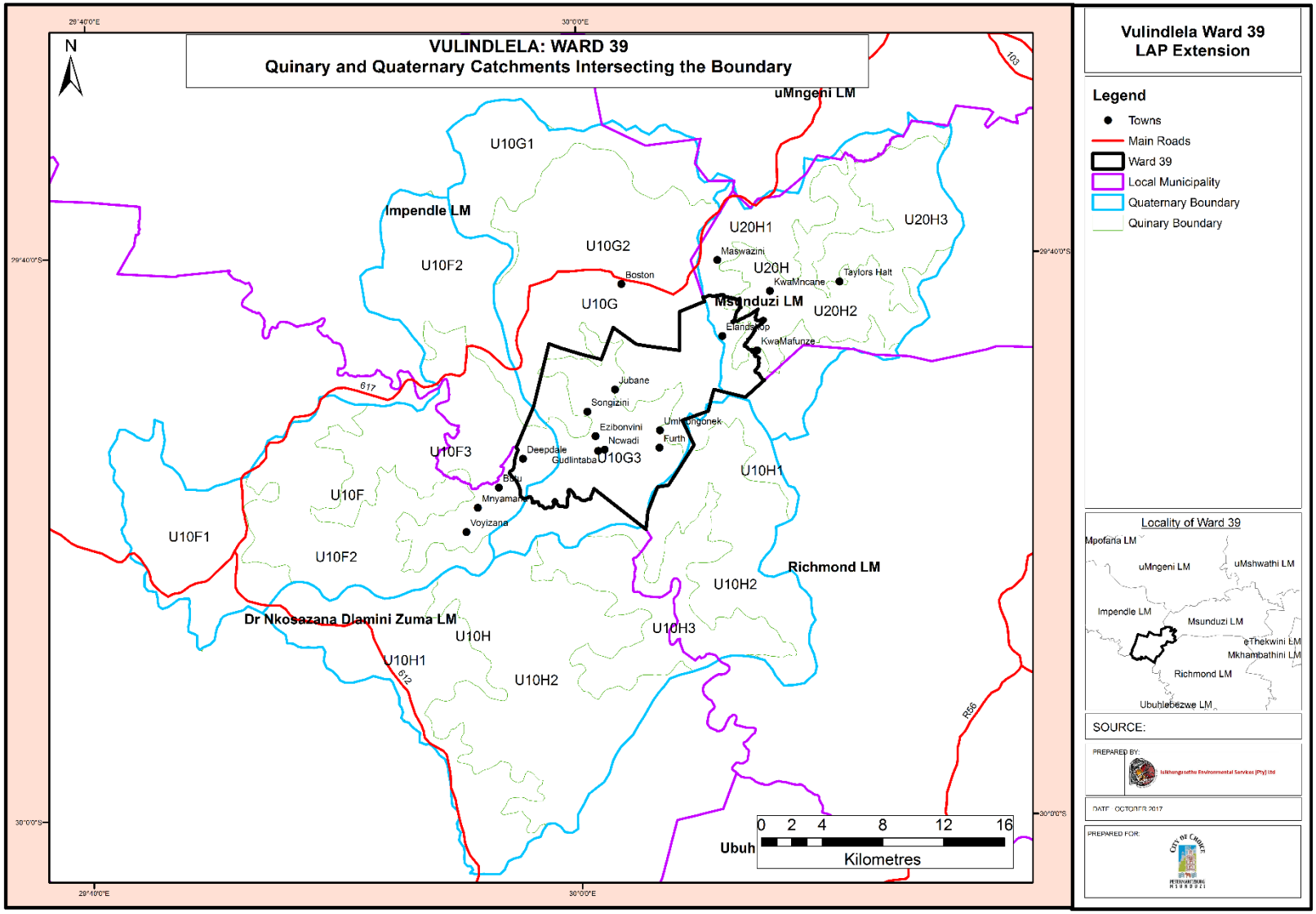
for the historical period from 1951 – 1999 for each of the as simulated under baseline/natural land use. In order to estimate the MAR from this area under actual land use another simulation would have to be undertaken. MAR from natural to actual land use is heavily dependent on the changes in land use that has occurred in this area, and an extensive survey would have to be undertaken in order to achieve a simulation to a reasonable level of accuracy (Schulze and Kunz, 2011a;).

Table 9. MAR values for each quinary catchment excluding upstream contributions simulated using historical (1951 – 1999) climate records (Lynch, 2004; Schulze and Kunz 2011a, b).

QUINARY	MAP (mm)	MAR (mm)	MA GW Recharge (mm)
U10F1	963	198.75	92.5
U10F2	914	184.29	78.5
U10F3	908	250.63	87.6
U10G1	928	209.85	131.8
U10G2	912	189.75	111.5
U10G3	881	241.27	97.6
U10H1	839	106.74	39
U10H2	848	115.14	43.7
U10H3	973	222.72	76.4
U20H1	921	196.7	115.2
U20H2	914	189.77	93.6
U20H3	909	184.44	72.4

The above table shows the mean annual precipitation, mean annual runoff and mean annual ground water recharge in this area per Quinary catchment. Runoff varies from approximately 106mm to 198mm, while groundwater recharge ranges from approximately 39mm to 132mm. Both runoff and groundwater recharge are directly influenced by land cover, in that higher density land cover will result in lower runoff and higher ground water recharge and vice versa. If crops have a dense surface cover then it is highly probable that water would flow in a similar manner to that of natural vegetation, however if crop distribution is sparse, then runoff will be high and ground water recharge will be low. The combination of the mentioned factors will influence the hydrological regime as described in the following sections (Schulze and Kunz, 2011a and b).

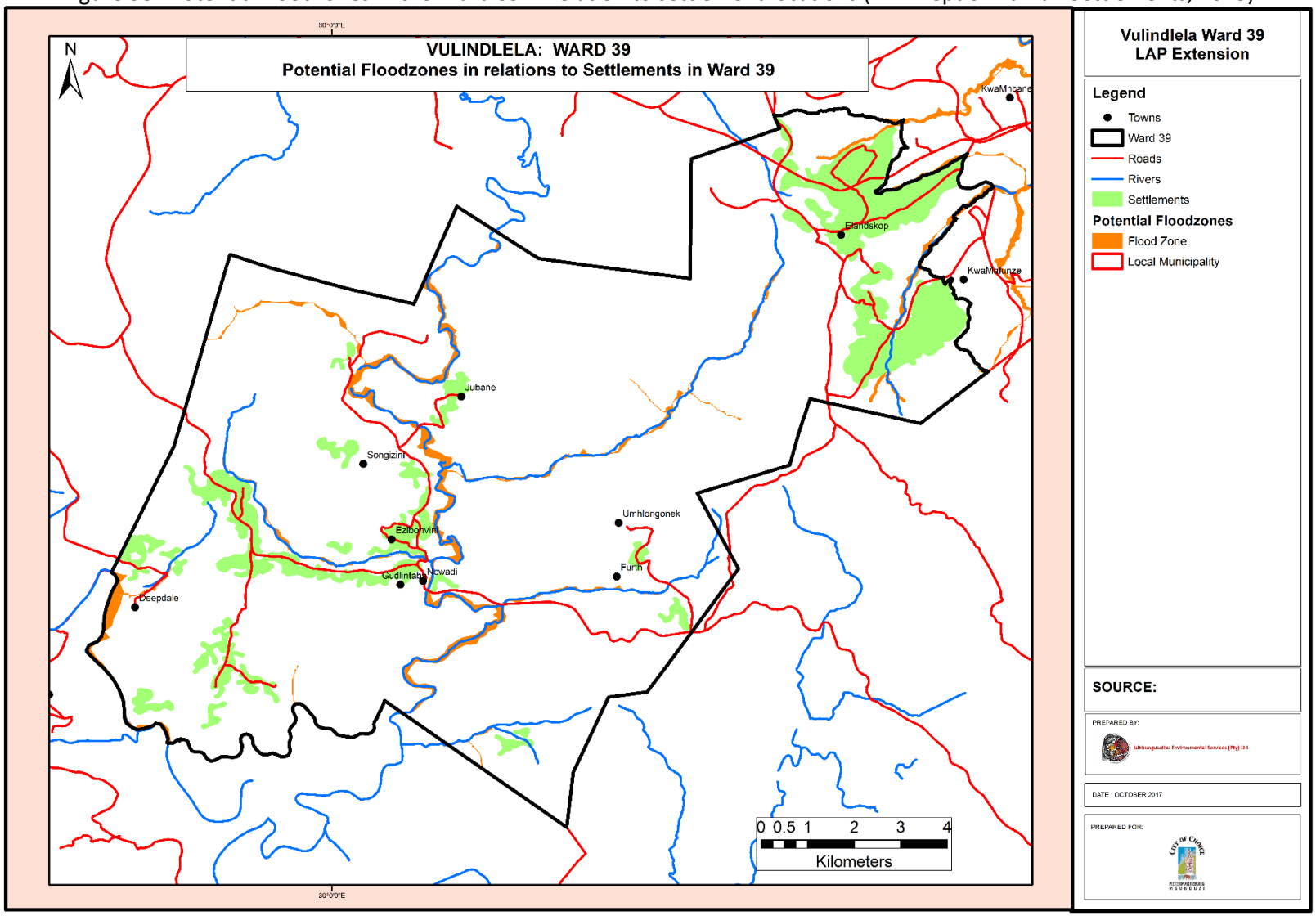
Figure 37. Quaternary and Quinary catchment boundaries intersected by the Ward 39 boundary line (Schulze and Horan, 2010)



5.3.3. Flood Risk Assessment

From the IDP and EMF undertaken for the portion of Ward 39 that is located in what was Ingwe municipality, a full flood risk assessment has not yet been undertaken. However, the department of Human Settlement during 2013 undertook an assessment of potential flood zones in this area. The result of this study has subsequently been refined by Msunduzi Municipality. From this map the areas that are at risk of flooding are highlighted, which shows that the settlements in the eastern areas have been constructed within these potential flood zones, while those in the western areas are in close proximity to these areas. Therefore, until a full flood risk assessment has been undertaken in this area the following recommendations are made with regards to stream and wetland buffers to reduce the risk of injury or loss of life during flood events. For areas such as Ward 39 where there is very limited floodline data it is recommended in the IDP that a 40m buffer be used. In this zone there should be no development in terms of residences or commercial activity such as shops or offices. A buffer width as recommended will ensure that the magnitude of the flood event is reduced, through a reduction in the overland flows, as well as increasing the infiltration of water into the soil (Msunduzi Municipality, 2015; Msunduzi Municipality, 2010; KZN Dept of Human Settlements, 2013).

Figure 38. Potential floodzones in the Ward 39 in relation to settlement locations (KZN Dept of Human Settlements, 2013)



Owing to the limited time frame for this study it was not possible to undertake a full flood assessment, hence, the following text will describe what will be required to undertake this study.

In order to complete a flood risk assessment the following biophysical data needs to be obtained:

- Aerial photography,
- Geology and soils information,
- Rainfall/Contours,
- Land use,
- Cadastral,
- Streets,
- Environmental servitudes, and
- Historical floodlines.

Subsequent to assembling the above data a catchment model using this information to provide baselines regarding land use, historical floodlines etc could be created. From the above information inputs into a peak discharge model would be developed which would allow for the simulation to determine of 1:100 year accumulative peak discharge at selected points along the river. Flow information output by the model will be converted into a volume per area measurement to highlight the impact that the variation in climate, soils, vegetation and anthropogenic interference can have on storm flow events. (Sim, M. J, 2009).

Furthermore, the effects of climate change on peak flows need to be accounted for in this area as the flood zone could be expanded as the occurrence and magnitude of storm events may increase into the future. Hence, it is highly probable that the occurrence and magnitude of flood events into the future will increase, thus further increasing the risk of development in the identified flood zone areas. In order to ensure that the risk within this area is minimized it is highly recommended that an updated full flood assessment be undertaken in this area as this will provide definitive boundaries beyond which development should not place. This is due to the high risk of flooding which may in some instances prove fatal to those living within these high risk zones (Sim, M. J, 2009).

5.3.4. Surface Water

5.3.4.1. Rivers

The purpose of this portion of the study is to identify the major rivers in this area, as well as the smaller non-perennial systems, as shown in Figure 40.

Owing to the highly variable topography of this area, in combination with the high rainfall, geology, and to some extent land cover there is a relatively dense network of rivers that drains the western portion of Ward 39 into the Mkomazi River. There is also a small portion in the eastern side that drains into the Msunduzi River. Owing to the highly seasonal rainfall occurring in this ward and the surrounding areas, a large number of these systems non-perennial systems systems. However, due to the land cover, which comprises of grasses, and shrublands with a few forested areas, the infiltration of water into the soil will be high, thereby resulting in high groundwater recharge. This will promote higher baseflow levels during the drier periods, thereby facilitating flows in the larger

systems throughout the year. In the event that the area of denudation is increased, the flood peaks will increase and overall ground water recharge will decrease. This will reduce flows during the dry season and could result in some systems becoming non-perennial, which would further put stress of the people living in this area, especially those that rely on the water in these streams and river for agricultural and domestic usage (Bailey and Pitman, 2016; Isikhungusethu Environmental Services, 2012; Ingwe Local Municipality, 2014; Ingwe Local Municipality, 2015; Dr Nkosazana Dlamini Zuma Local Municipality, 2017).

Figure 39. Major Rivers within the catchments intersected by the Ward 39 boundary line (DWAF, 2005a)

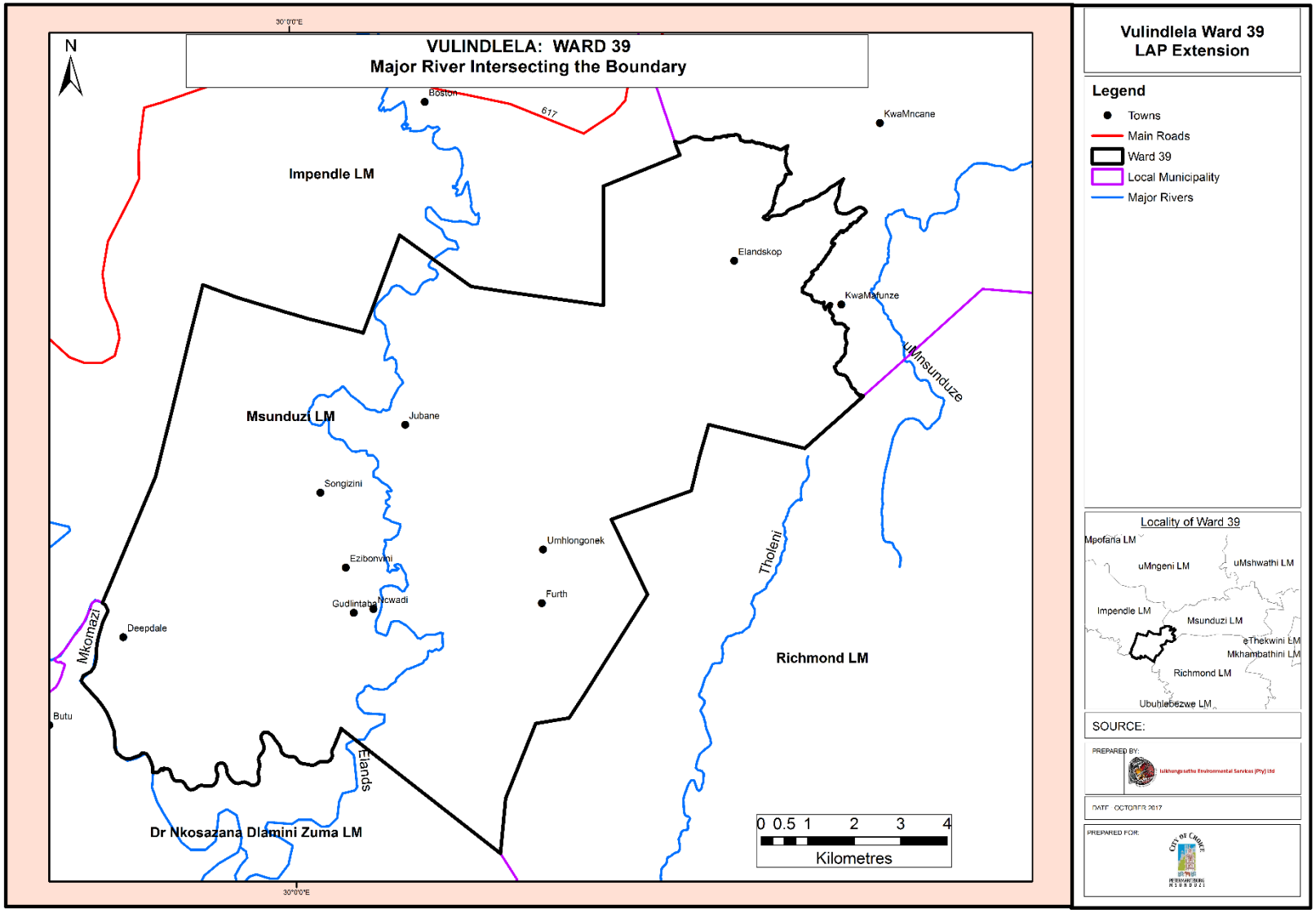
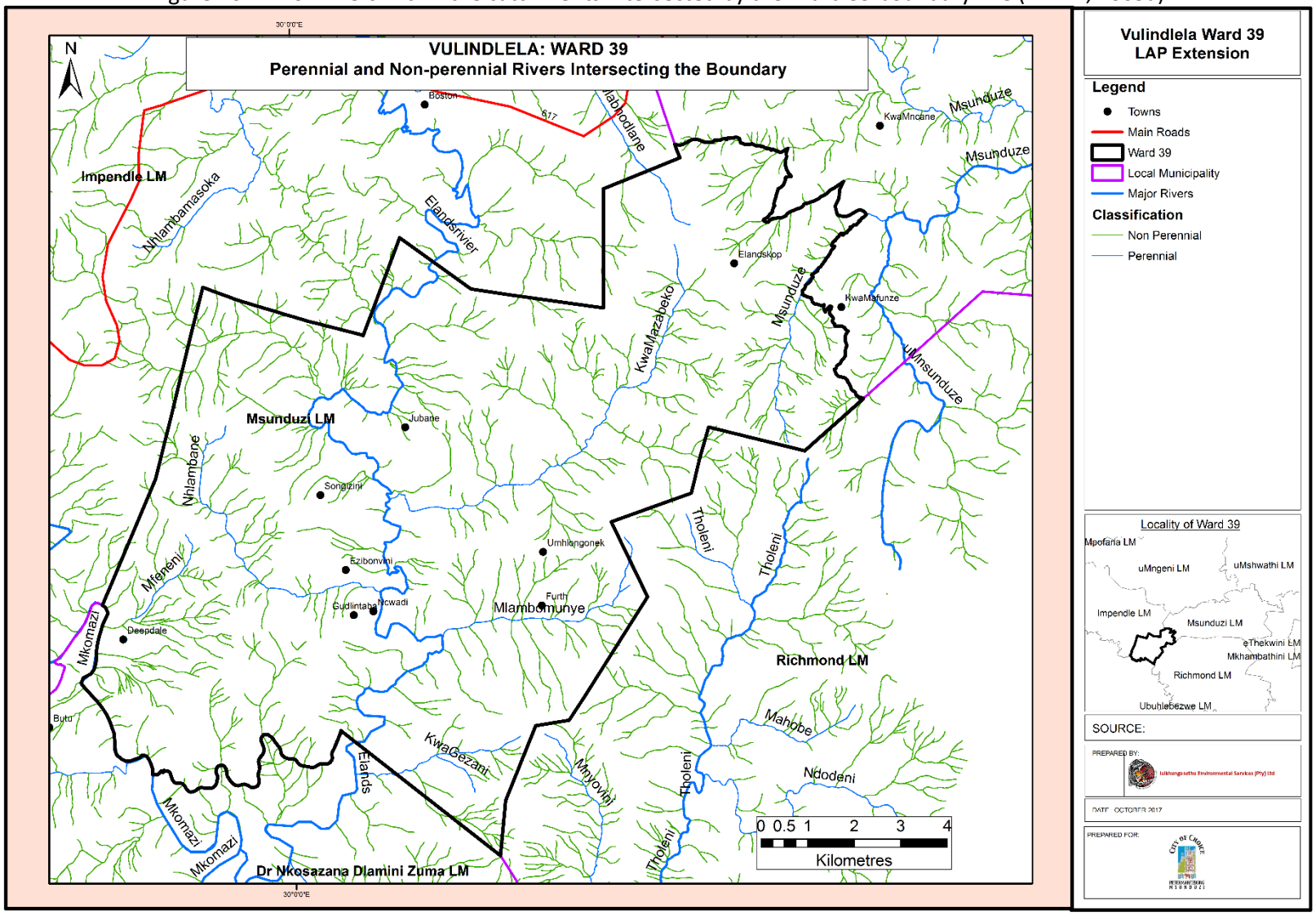


Figure 40. Minor Rivers within the catchments intersected by the Ward 39 boundary line (DWAF, 2005a)



5.3.4.2. Water Quality

To provide an accurate assessment of water quality in this area, drivers such as land cover, anthropogenic activities and climate have to be taken into account using the following assessments:

- Present Ecological Status (PES)
- Instream Health Integrity (IHI)
- Ecological Importance and Sensitivity (EIS)

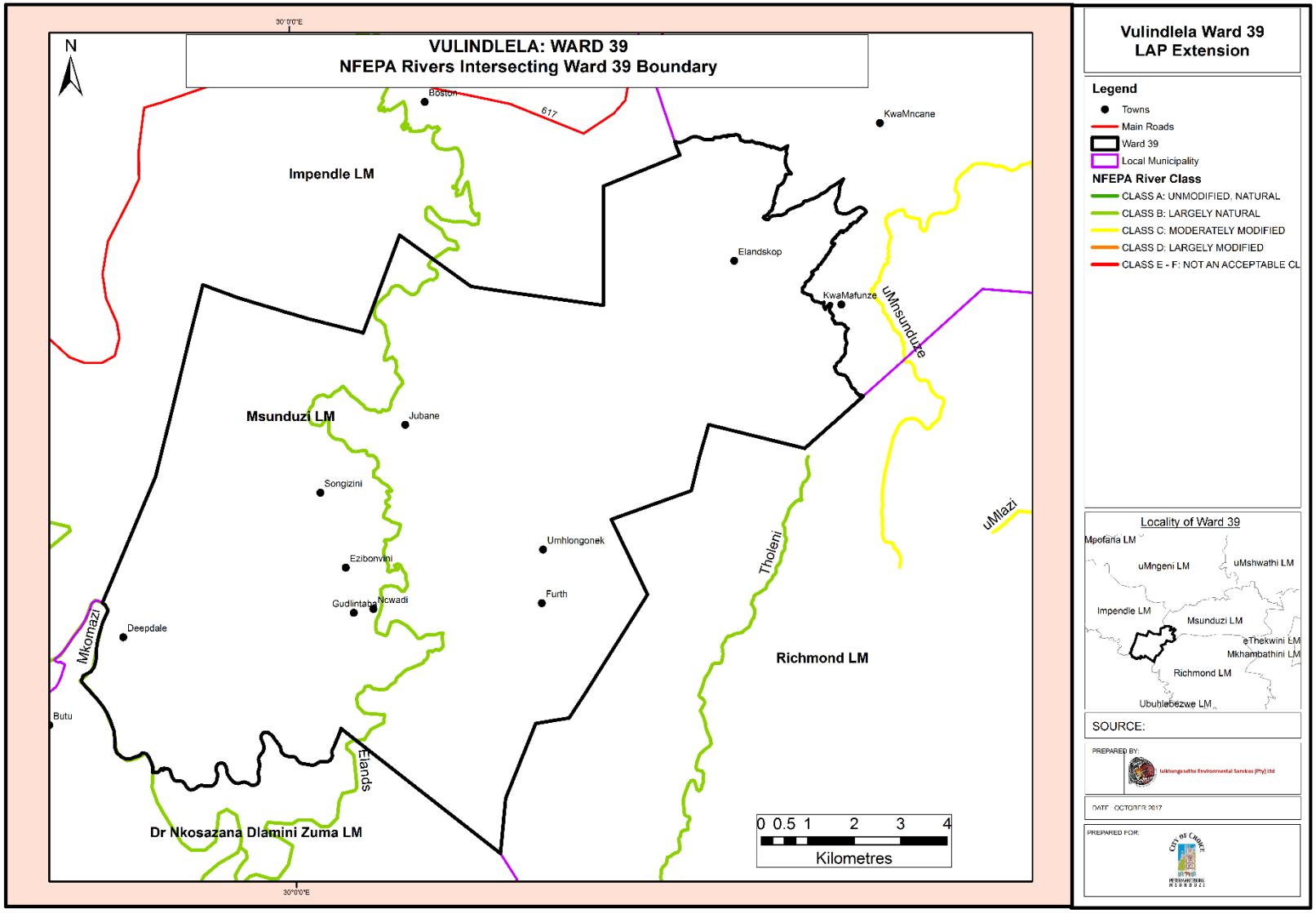
PES, IHI and EIS provide a quantitative indication as to the impacts that changes occurring within the rivers / wetlands as consequence of anthropogenic interference and changes in land cover that may be occurring in these sub-catchments and affecting the overall health. Related to this is the assessment of the quality of water in the river and the immediate surroundings which would be undertaken using the SASS5 biological assessment tool in addition to chemical assessment of water samples taken at various points along the river reach (Groundtruth, 2008). Table 10, below shows the results of a study undertaken by Groundtruth in 2008 in the Msunduzi area, the upper reaches of which are now located in the far eastern areas of the new Ward 39.

Table 10. Results from water quality study undertaken by Groundtruth in Msunduzi,(2008).

No.	Description	EIS	State	WQ summary
1	Msunduzi catchment above Henley Dam	Moderate	Good	Fair biological health; low pollutant levels. Instances of moderately high faecal contamination; Dissolved O_2 show well aerated system. Low conductivity. Nutrient concs low.

From the above table it is clear that the upper reaches of the catchment that are more rural tend to be in better condition. This is due to the lower levels of development occurring in these areas, in addition to the lower population densities, which mean that in most instances there are lower levels of inorganic pollutants and organic pollutants respectively. In the adjacent Mkomazi catchment a, assessment of water quality has not yet been undertaken, however, from the NFEPA Rivers identified in the area, the Elands River is classified as class B, or largely natural according to the DWAF 1999 study undertaken in this area. Owing to the close link between water quality and catchment condition, it can be inferred that the portion of the Elands River catchment located in Ward 39 may not yet be significantly impacted upon by anthropogenic activities. This is largely due to the rural nature of activities occurring in this area, where overgrazing is not yet too problematic, although this must be closely monitored. Furthermore, there is a lack of pollutants, beyond litter, in this area, which will also contribute to the largely natural state of the system. However, it must be acknowledged that the NFEPA classification of this system is based on an assessment that was undertaken 18 years ago, and could be significantly change, due to the trend of increasing development throughout RSA. Due to the reliance of people on the to supply water for agricultural and domestic needs it is imperative that it be monitored to ensure that quality does not deteriorate as this could become a serious health risk in future (Groundtruth, 2008; Ingwe Local Municiaplity, 2014; Ingwe Local Municipality, 2015).

Figure 41: NFEPA Rivers in and around Ward 39 (CSIR, 2011)



5.3.5. Wetlands

To determine the developmental constraints as regards wetland systems within this area a high level desktop study must be undertaken using the latest high resolution aerial imagery, in addition to the latest contour maps that are available. This will allow for the determination of wetland areas, which are not suitable for development purposes. Further desktop analysis of potential wetlands in the area could be undertaken using terrain unit and vegetation maps, both of which can used to identify wetlands, which are typically found in valley bottoms or floods zones with a specific type of vegetation. Using these coverages systems were would have been identified and then subsequent field maps would have to be produced to assist in the ground truthing of these systems and could be used to adjust boundaries where necessary (INR, 2007).

A number of wetlands are located in Ward 39 area as well as intersected by the boundary of this area (Figure 42). These wetlands are of varying types from hillslope seeps to channeled valley bottom systems. All of them result in a reduction in flow rate through these system and an increase in infiltration which results in a ground water recharge and groundwater movement from the upper reaches of the wetland to the lower reaches where it is often released as baseflow during the drier periods of the year, i.e. winter (INR, 2007;).

These wetland systems are in varying conditions, with a significant number classified as moderately modified to seriously modified in the eastern areas of Ward 39. This is as a result anthropogenic interference such as over-grazing, pollution or change in land cover from natural, agricultural or even peri-urban uses, as development in this area is often uncontrolled and can result in the destruction of some of these systems. The significant modification of these systems will affect their functioning as wetlands, in that water retention and filtration capacity will be considerably reduced, thus resulting in reduced baseflow releases into the river system below these wetlands. This could result in some river systems becoming non-perennial. In addition to this if water retention is decrease it is probable that the filtration capacity of these systems will be decreased thereby reducing the water quality moving down the system, which could have detrimental consequence to downstream systems (INR, 2007; Ingwe Local Municipality, 2014; Dr Nkosazana Dlamini Zuma Local Municipality, 2017; DWAF, 2005b).

To try and prevent the occurrence of development within these areas buffers, of varying widths depending on how they were identified and verified, have been placed around these systems. For those systems identified during a desktop study a 30m buffer has been placed around while those that have been verified through a cursory field visit have been allocated a 20m buffer. It is hoped that this will curb some of the degradation of the wetland systems located throughout this area. This will preserve these systems and the services that they provide such as provision of baseflows, retardation of floods and filtration of water in this area (INR, 2007; DWAF, 2005b).

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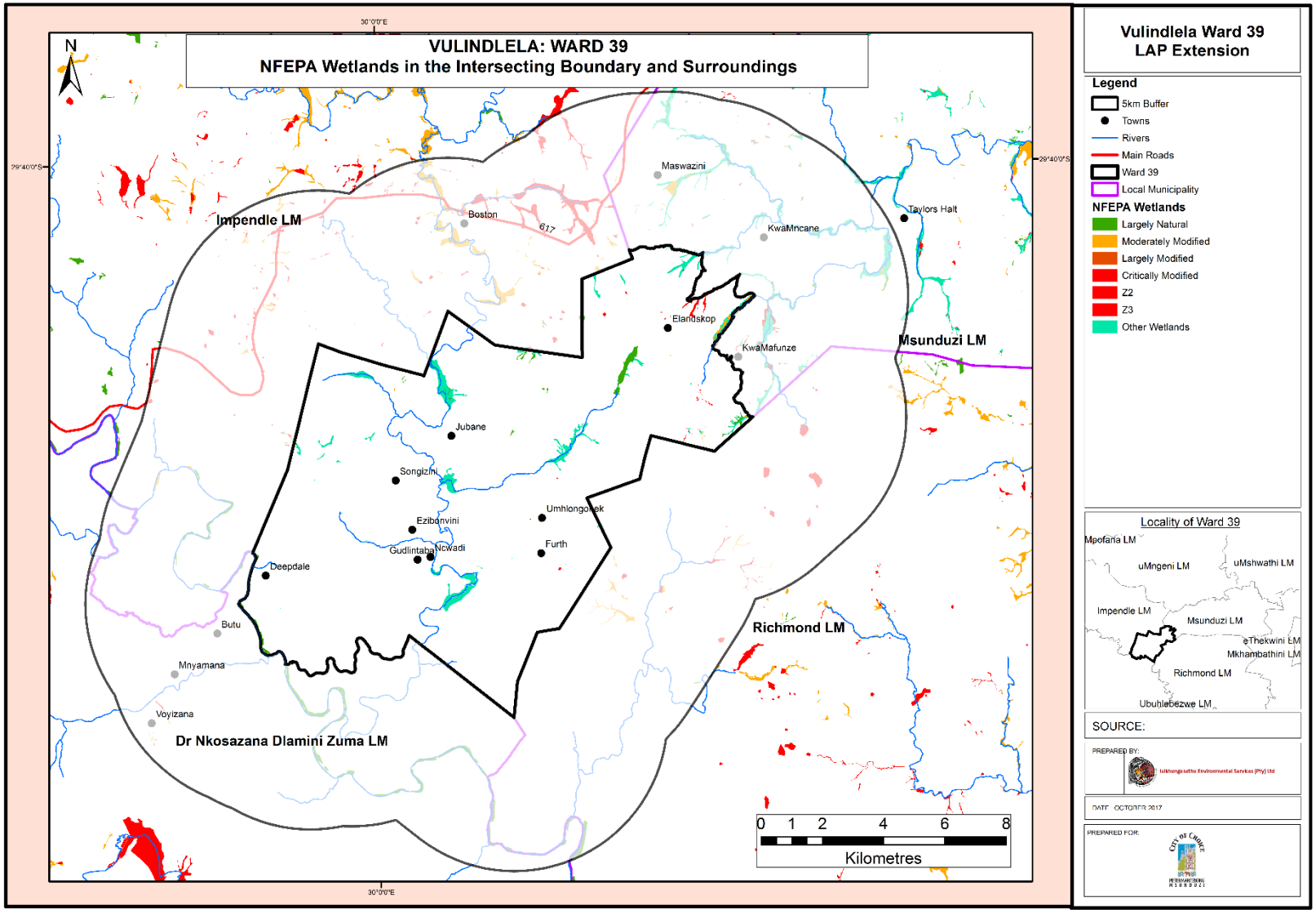
Figure 42. Wetlands contained within – and intersected by the Ward 39 boundary line (CSIR, 2011)



5.3.6. Impoundments

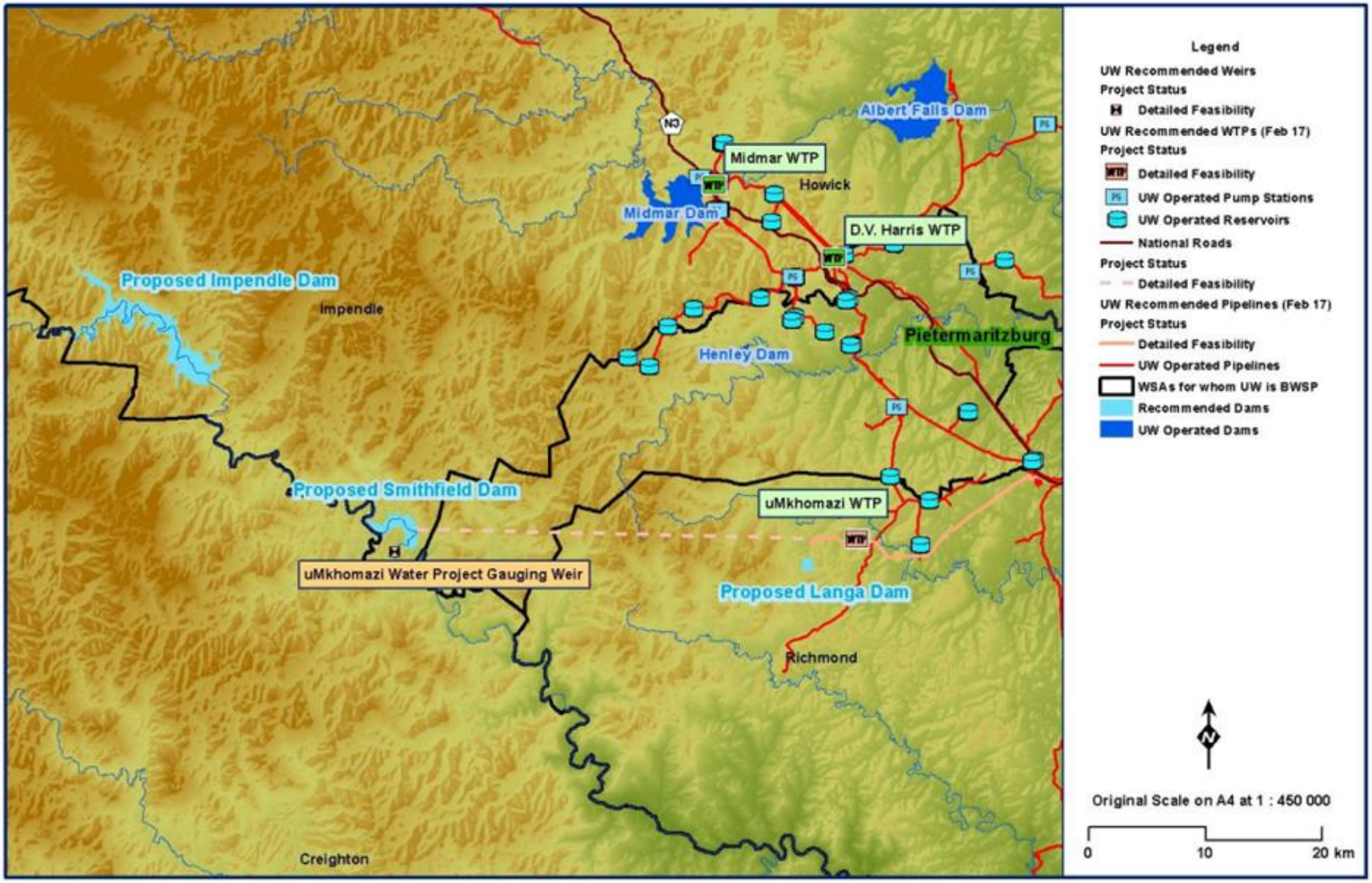
Figure 43 shows that there are no impoundments of any significance located within Ward 39. The majority of the potable water is supplied to this area via boreholes, of which one is currently operational (Engeolab, 2017).

Owing to the significant pressure on water resources in the Umgeni catchment, particularly from eThekwini, there is a plan to construct a dam on the Mkomazi River, to augment the supply from the Umgeni system. This dam will be named the Smithfield dam and will be located in the central reaches of the Mkomoazi system, mid-way between the Lundy's Hill bridge and Deepdale. Table 11 summarizes the key information with regards to the proposed augmentation scheme. At this period there is no indication as to whether this dam could be used to meet some of the water demands in Ward 39 (Umgeni Water, 2017).

Table 11. Specification of the proposed Smithfield Dam on the Mkomazi River (Umgeni Water, 2017)

Project Components	**Water Resource Components (to be developed by DWS):** ▪ Smithfield Dam – having a storage capacity 251 million m^3 (31% of MAR), earth core rockfill dam. ▪ A Transfer Tunnel – 3.5 m bored diameter (3.0 m lined diameter), concrete-lined (where necessary), overall length of 32 km. ▪ Balancing Dam – located at the outlet portal of the tunnel in the vicinity of Baynesfield Estate. ▪ 3km of 3 000 mm Raw Water Pipeline. **Potable Water Supply Components (to be developed by Umgeni Water):** ▪ Water Treatment Plant (WTP) – to be located near Baynesfield Estate with an initial capacity of 500 Mℓ/day and allowance for further module to increase capacity to 625 Mℓ/day. ▪ 156.25 Mℓ potable water storage reservoir at WTP. ▪ Bulk Potable Water Pipelines –2 820mm diameter (15.1 km) and 2 540 mm diameter (4.6 km) gravity mains from the WTP to '57 pipeline.
Capacity	625 Mℓ/day

Figure 43. Impoundments located within the Ward 39 boundary line (Umgeni water, 2017).



5.3.7. Ground Water

From the information available regarding this area without undertaking an extensive Geological survey it would appear that the groundwater resources in this area are limited. There is currently a proposed project in order to verify, update and establish new sustainable boreholes in this area. From a previous study undertaken it was established that there are 21 boreholes within Ward 39 as well as in the immediate surroundings (Figure 44) (Pers Comm, 2011). Owing to the topography of this area and manner in which groundwater moves through the soil it is improbable that boreholes would not be located on ridge lines. Rather these sources of water will be located on slopes or valley bottoms as a consequence of the downslope movement of groundwater (Figure 45).

Hence, it is probable that the greatest availability of ground water valley bottoms as this has the greatest contributing area. Although this may be the most productive area, the rate at which the extraction of water can occur is dependent on the soil types, while the quantity of recharge occurring is heavily dependent on land cover type and topography. Water will move very slowly through soils with very high clay content and more rapidly through soils with a low clay content. However, although high extraction rates are desirable it should be noted that if significant quantities of water are extracted from sandy soils a cone of drawdown could result which could take years to recover. In soils that have a higher clay content slower rates of soil water movement the extraction rates of water are limited, which if could limit the impacts of boreholes and reduce the possibility of affecting the ground water table in the long term. However, as with all resources careful monitoring and management is required in order to ensure that the maximum sustainability of these systems is ensured. It should be noted that the management of ground water resources includes the management and conservation of wetland systems and riparian areas, as well as proper land cover management (Engeolab, 2017; Schulze *et al*., 2011d).

Land cover, in addition to topography and soil type will determine the quantity and rate of groundwater recharge. Land cover plays a major role in ground water recharge as denser land cover will result in greater infiltration of water into the soil, thereby improving ground water recharge and baseflows. Less dense land cover will result in runoff and decrease infiltration into the soil and therefore lower ground water recharge and baseflows. In order to quantify the effects of future development scenarios in this area on ground water, simulations factoring in the changes would have to be undertaken to provide accurate projections as to future borehole yields and potential extraction rates (Schulze *et al.,* 2011d)

Figure 44. Boreholes located within and in the immediate vicinity of the Ward 39 boundary line (Pers Comm, 2011).

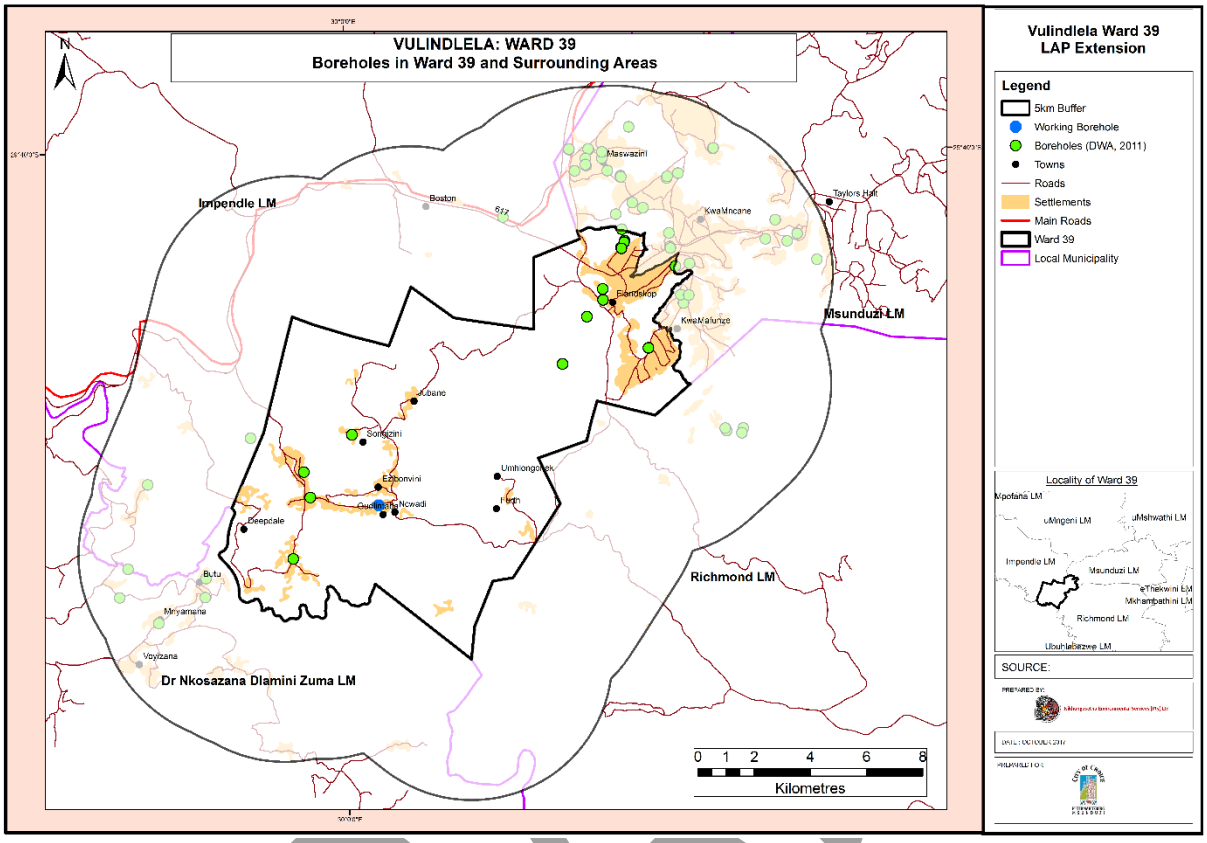
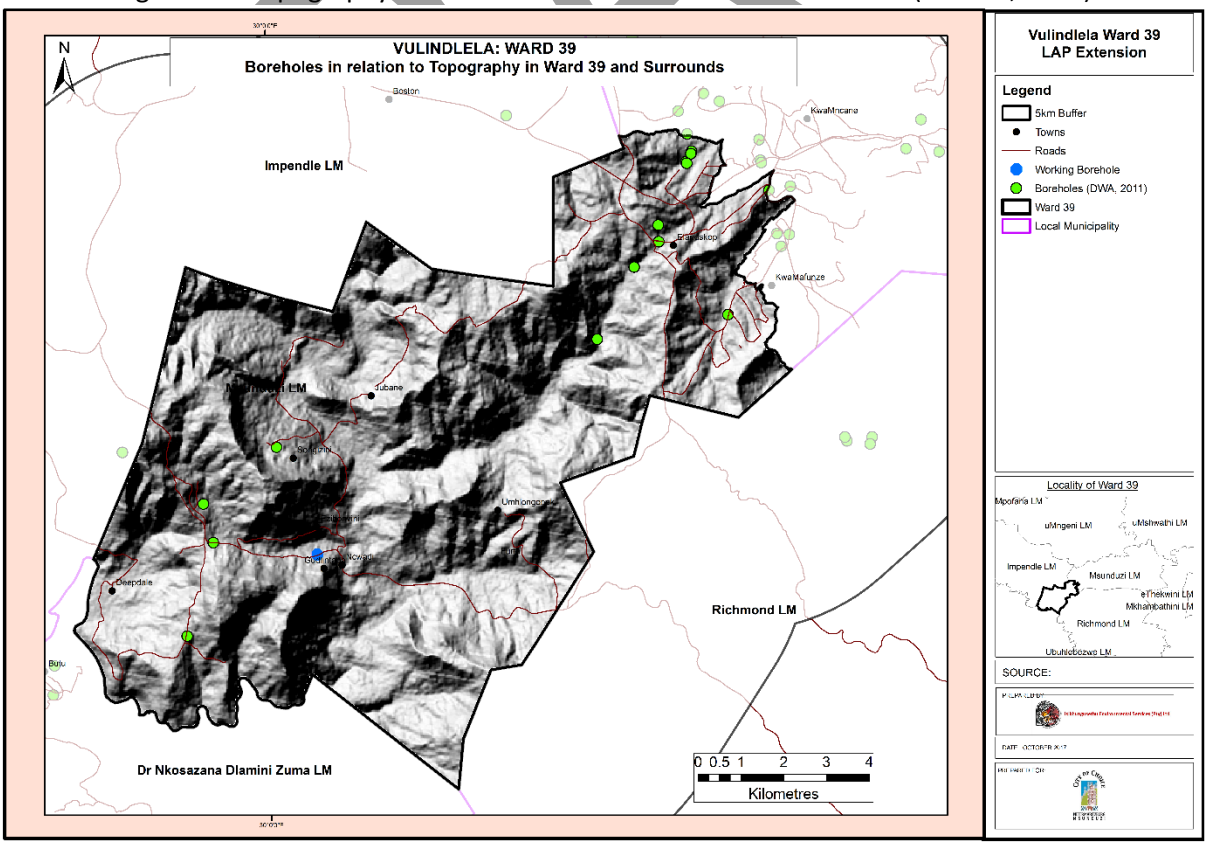


Figure 45. Topography in relation to Borehole location in Ward 39 (EKZNW, 2015)



5.3.8. Climate – Current and Future

Climate changes is a global phenomenon and is differentiated from weather as it is a change in long term overall averages in rainfall and temperature, which will be the main focus of this section. Prior this, a brief description with regards to the method used to arrive at the rainfall and temperature values in the maps below.

The most recent GCMs that have been applied in research in South Africa are those that were applied in developing the Special Report on Emissions Scenarios (SRES) and the, different models applied developing the Representative Concentration Pathways (RCPs) for the Intergovernmental Panel on Climate Change (IPCC).

Please note that in the case of this study the AR4 (SRES) GCMs were used in the creation of temperature maps as the outputs from the AR5 (RCP) GCMs are as yet not available. Furthermore, it should be noted that the RCP GCMs have not yet been analysed to same extent as the SRES GCMs and there may be errors that have not yet been identified, as occurred with the GISS-ER GCM of the SRES ensemble. The problem with this GCM was only identified some years after the data was released (Pers Comm, 2017; Schulze *et al*., 2011e; Schulze, 2011f).

Owing to the global coverage of GCMs, the spatial resolution is relatively coarse (200 – 400km). Therefore, the outputs from these models were downscaled through the development of various statistical relationships between the local and global environment. This can be achieved using either dynamic or statistical downscaling methods. In RSA, the Climate Systems Analysis Group (CSAG) undertook to statistically downscale the AR4 scenarios from a global scale to a point scale. This was done as point outputs of daily rainfall, max and min temperatures can be utilised in various climate and hydrological modelling studies. Scenarios of daily rainfall were produced at 2642 stations, while max and min temperature were produced for 440 and 427 stations respectively. These were then linked to the Quaternary and thus Quinary catchments throughout South Africa, resulting the creating of a database (Schulze *et* al, 2011b; Schulze *et al*., 2011e; Schulze, 2011f).

For both rainfall and temperature values a baseline record was developed from 1950 – 1999, from which a substantial database, the Quinary Catchment Database, has developed and contains a wide variety of quantitative information for each quinary catchment (Schulze, *et al*., 2011b).

Added to this database is projected rainfall and temperature data for each quinary catchments for the AR4 and recently the rainfall projections of the AR5 scenarios.

It is expected that climate change will impact on a number of sectors such as:

- Biodiversity,
- Water resources,
- agriculture,
- Health,
- Infrastructure,
- Waste management,
- Energy use,

- Transportation.

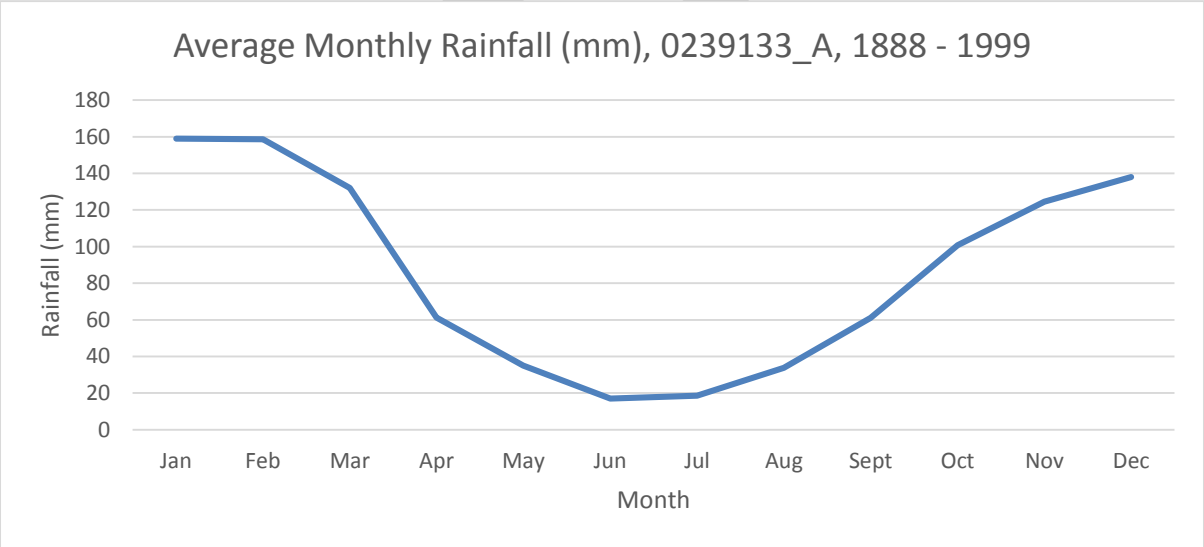
Mitigation/adaptation measures will have to be put in place in order to ensure that the projected changes in rainfall and temperature are accounted for (Schulze, 2011a).

5.3.9.Rainfall

5.3.9.1. Current period

In this area the current mean annual precipitation is between 700 mm – 1000 mm with most rainfall occurring during the summer period of the year (Figure 46). A negligible quantity of precipitation in the form of drizzle will occur during the winter months as cold fronts pass over this area. Most of the precipitation received in this area during summer is convectional rainfall, i.e. is as a result of hot humid air rising, cooling, condensing and then falling as a result of thunderstorms of considerable magnitude. This type of rainfall is of very high intensity and often does not last for more than a few hours. However, during the summer season the frequency of these events is very high, sometimes occurring on a daily basis, and can as a result of the intensity of rainfall cause considerable damage to property and crops (Schulze and Kunz, 2011a; Schulze and Kunz, 2011c; Schulze, 2011g).

Figure 46. Mean Monthly Precipitation from station 0239133_A from 1888 to 1999 (Kunz, 2004)



5.3.9.2. Future period

Into the Immediate future period 2016 -2045 it is projected that the mean annual precipitation over the eastern areas of South Africa will decrease slightly, according to the RCP GCMs (Figure 48). The quantity of this decrease is uncertain, however, numerous empirical and dynamic GCMs have calculated that the decrease may be between 0 - 2 % by 2045. Despite the high variability of these projections it has been indicated that the period during which this rainfall occur is becoming shorter, thus resulting in a higher concentration and so higher intensity of precipitation events. This could be a precursor to an increase in the frequency of supercells in this area, which could cause increase the damage to homes and threaten the livelihoods of residents (Schulze and Kunz, 2011a; Schulze and Kunz, 2011c; Schulze, 2011g; Schulze, 2011a; Msunduzi Municipality, 2016).

In the Ward 39 area agriculture contributes to a significant portion of the local livelihoods within the area, hence if storm events are projected to become more intense over a shorter period of time it is possible that the following impacts may occur:

- Crop damage
- Threat to livelihoods
- Local food security
- Increase in flood peaks
- Threat to infrastructure and services.

It is also projected that a temporal shift may occur, resulting in the occurrence of precipitation later rather than earlier, which could:

- Force a shift in the cultivation patterns within this area.
- Result in the failure of crops if the number of degree days does not coincide with the occurrence of rainfall to meet the requirements for certain crops.
- Considerable damage could be done to areas of sensitive biodiversity as a result increase flood peaks etc (Schulze, 2011a; Msunduzi Municipality, 2016).

The increase in the occurrence and magnitude of extreme storm events could in some instances overwhelm the capacity of wetlands systems in the area, resulting in irreversible damage and possibly destruction of these systems. This would be extremely detrimental downstream areas resulting in significant deterioration of water quality and potential increase in the spread of water borne diseases, which in this area could result in epidemics, which may be exacerbated by waste management systems that could be overwhelmed by an increase in storm flows.

Figure 47. Present Mean Annual Precipitation per Quinary catchment intersected by the Ward 39 boundary line (Schulze and Horan, 2010).

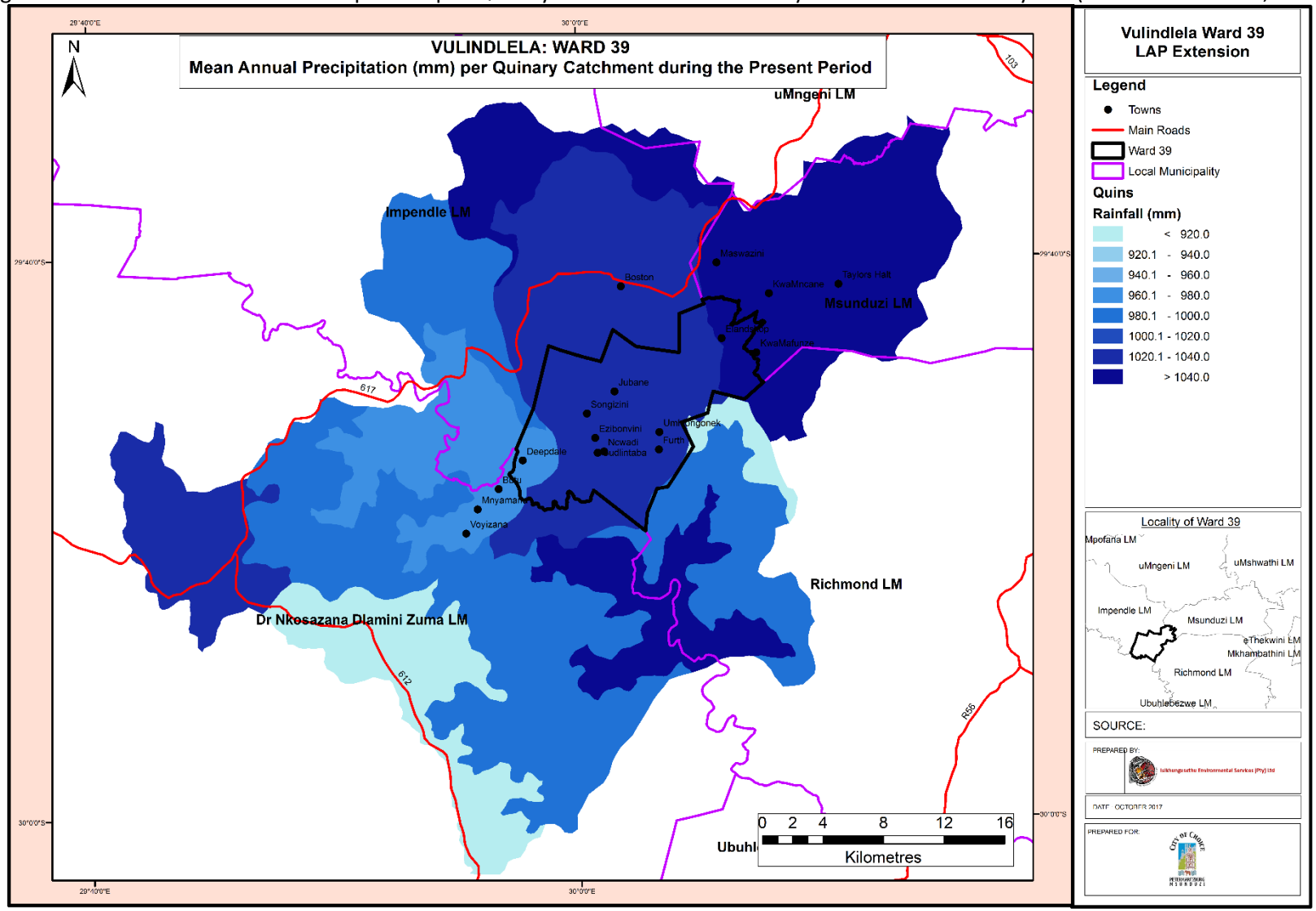
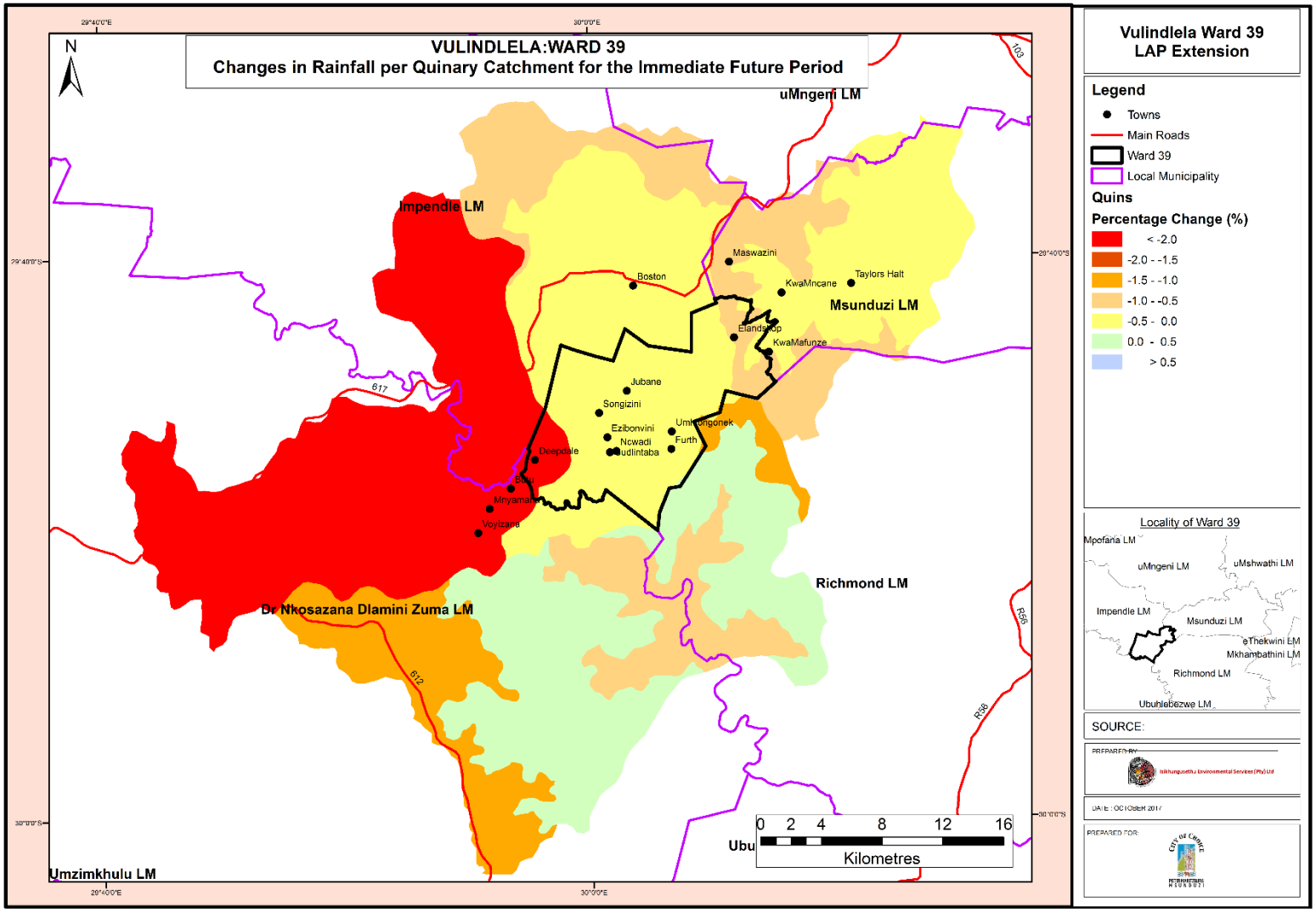


Figure 48. Projected Mean Annual Precipitation per Quinary catchment intersected by the Ward 39 boundary line (Schulze and Horan, 2010; CORDEX, 2016).



5.3.10. **Temperature**

5.3.10.1. Current Temperature

The mean annual temperature of this area ranges from 14 to 17 degree C. During the summer period the humidity as well as the higher temperatures result in the convection rainfall that supplies water to this area. Furthermore, as a result of the high humidity the evaporation during this period could be lower due to the high percentage humidity of this area. During winter although temperatures are lower the humidity is close to 0 resulting in a water vapor deficit which promotes greater evaporation during the dry period (Schulze and Kunz, 2011c; Schulze and Kunz, 2011d).

5.3.10.2. Future temperature

Into the future it is projected that temperatures are likely to increase (Figure 50) by approximately 2 degrees C. The implications of this are an increase in evaporation, especially as minimum temperatures increase, which could impact severely on both agriculture and water resources in this area. This in turn could detrimentally affect the subsistence farmers that rely on small reservoirs for the survival of their crops, especially as water availability decreases. Furthermore, the crops could be directly impacted upon as a number of chill units are required for the germination and fruition of man crops, which will not occur if temperatures increase significantly. Hence directly impacting on the livelihoods of many farmers and further impacting on those residents that purchase from these subsistence farmers (Schulze and Kunz, 2011d; Msunduzi Municipality, 2016; Schulze and Bulcock, 2011).

Temperature increases could significantly impact on sensitive ecosystems such as wetlands within this area as a result of increased evaporation that is projected to occur during future periods. During the dry winter period of the year when there is low humidity and higher projected temperatures the water deficit between the soil and atmosphere is expected to increase, thus resulting in increase evaporation. Owing to projected shorter but more intense wet seasons in addition to the increase evaporation, soil crusting may occur which will impede infiltration when rainfall does occur, thus potentially setting in motion a detrimental cycle within this area (Schulze and Kunz, 2011d; Msunduzi Municipality, 2016; Schulze and Bulcock, 2011).

Figure 49. Present Mean Annual Temperature per Quinary catchment intersected by the Ward 39 boundary line (Schulze and Horan, 2010).

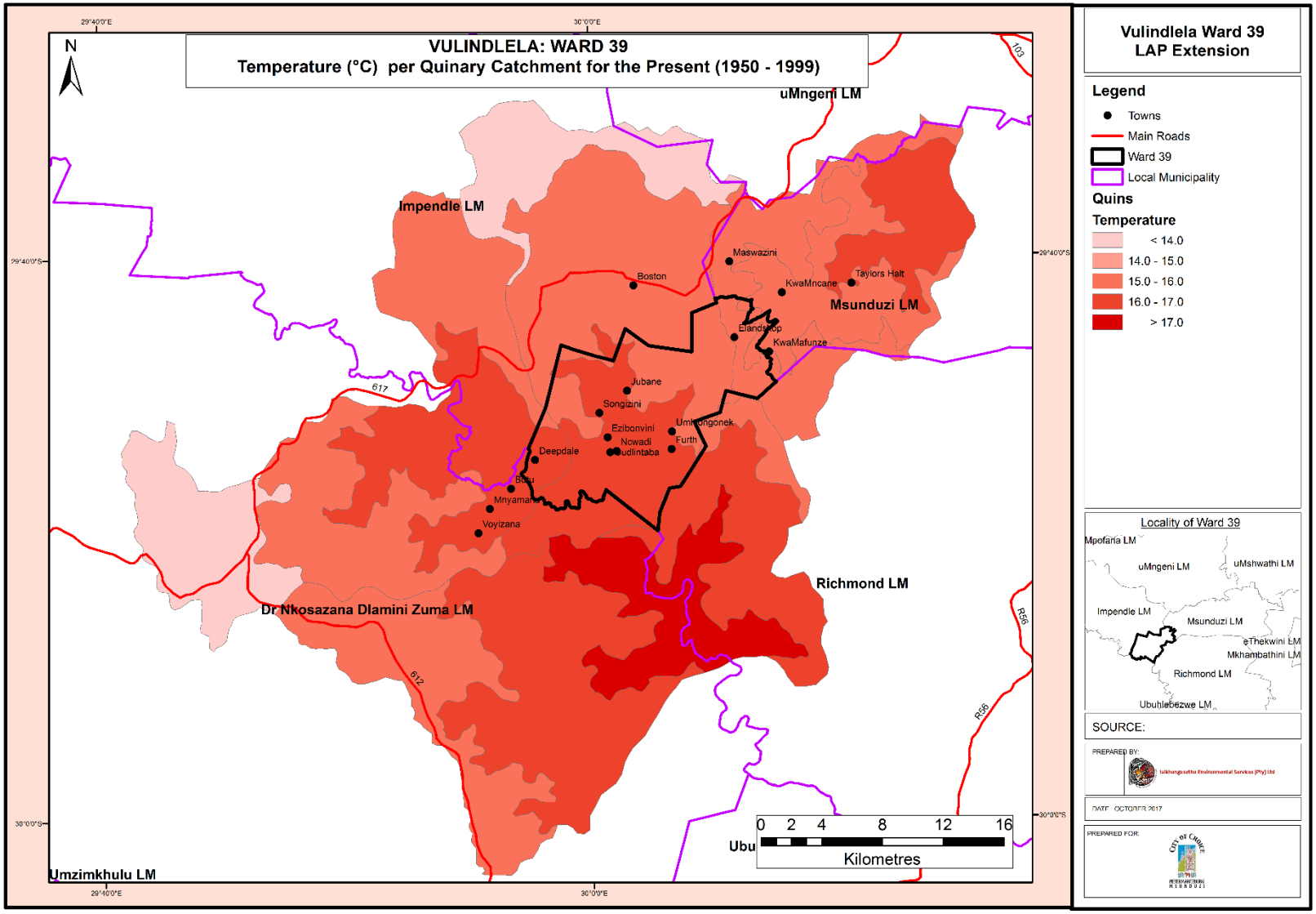
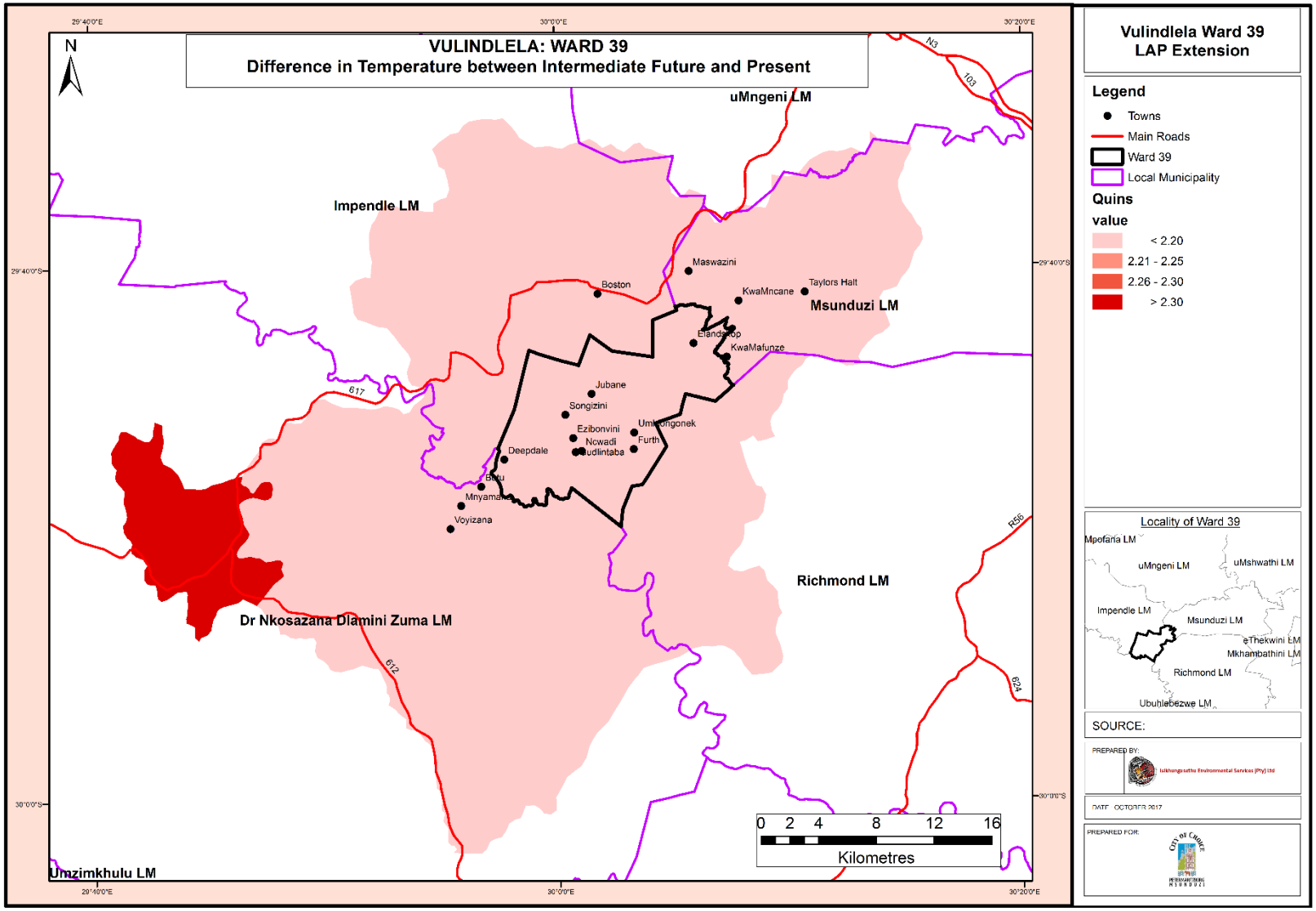


Figure 50. Projected Future Mean Annual Temperature per Quinary catchment (Schulze and Horan, 2010; Pers Comm, 2017b)



5.3.11. Opportunities and Constraints posed by Hydrology and Climate Change

5.3.11.1. Constraints

As indicated in Figure 48 it is projected that mean annual precipitation (MAP) during the immediate future period will remain similar to current period, with some small decreases occurring throughout Ward 39. The decrease in the quantity of rainfall would in most instances be considered a detrimental aspect of Climate change. The first issue or constraint is the water availability in this area which may decrease into the future, which may impact negatively on dryland agriculture with regards to crop water requirements. Furthermore, variability of rainfall in this area, which is expected to increase, thus resulting in greater unpredictability which could be detrimental to agriculture as crops require stable, consistent rainfall, especially in those areas dominated by dryland agriculture. The intensity of rainfall is a constraint as it could result in the exceedance of the soils infiltration rate, at which point runoff from this area will increase significantly. This could result in increased erosion occurring in this area, as well as a decrease in groundwater recharge. Further impacts of climate are those of temperature.

An increase in temperature will cause an increase in evaporation and potentially an increase in evapo-transpiration resulting in an overall increase in water loss from this from area. Additionally, the increase in temperature could exceed the thresholds of some crops planted in this area. This would require the farmer to plant crops that are capable of surviving the increase in temperature that is projected into future periods. Furthermore, it would require that the crops that are planted be more water efficient than the previous variety as water availability is projected to decrease as a consequence of the increase in temperatures.

Another major constraint of adapting to climate change is capital. Many small holder or subsistence farmers are breaking even and cannot absorb the sometimes exorbitant cost of adapting to climate change. This can result in an increase in poverty and social inequality as people struggle with the costs of climate change, resulting in a society where the wealthy are able to adapt to the costs of living, while the poor are not able to adapt.

Further constraints may be the potential damage that could be caused to infrastructure within this area as a result of more intense rainfall events. This could stunt economic growth in this area especially in the event that transport routes to and from this area are damage, impeding the movement of goods in and out of the region.

5.3.11.2. Opportunities

The potential opportunities of climate change can often be obscured by the constraints however, in many instances the constraints can be turned to opportunities. One of the first major opportunities is the increase in concentration of rainfall which, if proper storage can be provided, would enable the irrigation of crops through the seasonal drought which is projected to become more severe. The increased intensity and concentration of rainfall that is projected to occur in this region could result the more rapid filling of storage tanks which would be beneficial, especially as rainfall is projected to become more variable, as tanks would be full thus allowing small scale farmers to cope with greater

variability. However, this could only work if the collection systems and storage tanks were extremely efficient without any leaks and permitting a negligible quantity of evaporation.

Additionally, the increase in heat units in this area could permit the cultivation of crops that could not be grown in this area previously. This could open a new market that could be exploited under past climatic conditions, thus possibly providing a new revenue stream to some smallholders and subsistence farmers within the community.

A further opportunity that could be available would be an increase in the generation of household power using solar panels. The generation of power using this method could potentially become more viable as the increase in the length of the seasonal drought could potentially mean an increase in the number of sunshine days, and thus power generation days.

5.4. Biodiversity

Biodiversity is defined by the National Environmental Management: Biodiversity Act (Act No 10 of 2004) as "the variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the other ecological complexes of which they are part and also includes diversity within species, between species and of ecosystems". By this definition, biodiversity effectively includes all organisms, from the smallest to the largest. Furthermore, this term encompasses all the biophysical processes, regulatory systems, relationships and networks that upon which life (including humans) depends (NEMBA, 2004; Groundtruth, 2017).

It must be recognised that biodiversity provides the basis for all development in that the biophysical processes essential for human well-being such as, agriculture, fishing, tourism as well as industrial materials to name a few. Therefore, it is in the interests of all people to ensure that loss of biodiversity is limited, as further losses will increase the adversity already experience by many people. In the focal area of the study, ward 39, a large portion of the biodiversity is still intact, however, this may change into the future as development continues, which, as mentioned, could result in the deterioration of living standards as people are stripped of their livelihoods (Groundtruth, 2017; Isikhungusethu Environmental Services, 2012; Ingwe Local Municipality, 2014) .

This section will describe the biodiversity found in Ward 39, the current transformation and the possible impacts, as well as recommendations to limit future losses.

5.4.1. Biophysical Overview of Ward 39

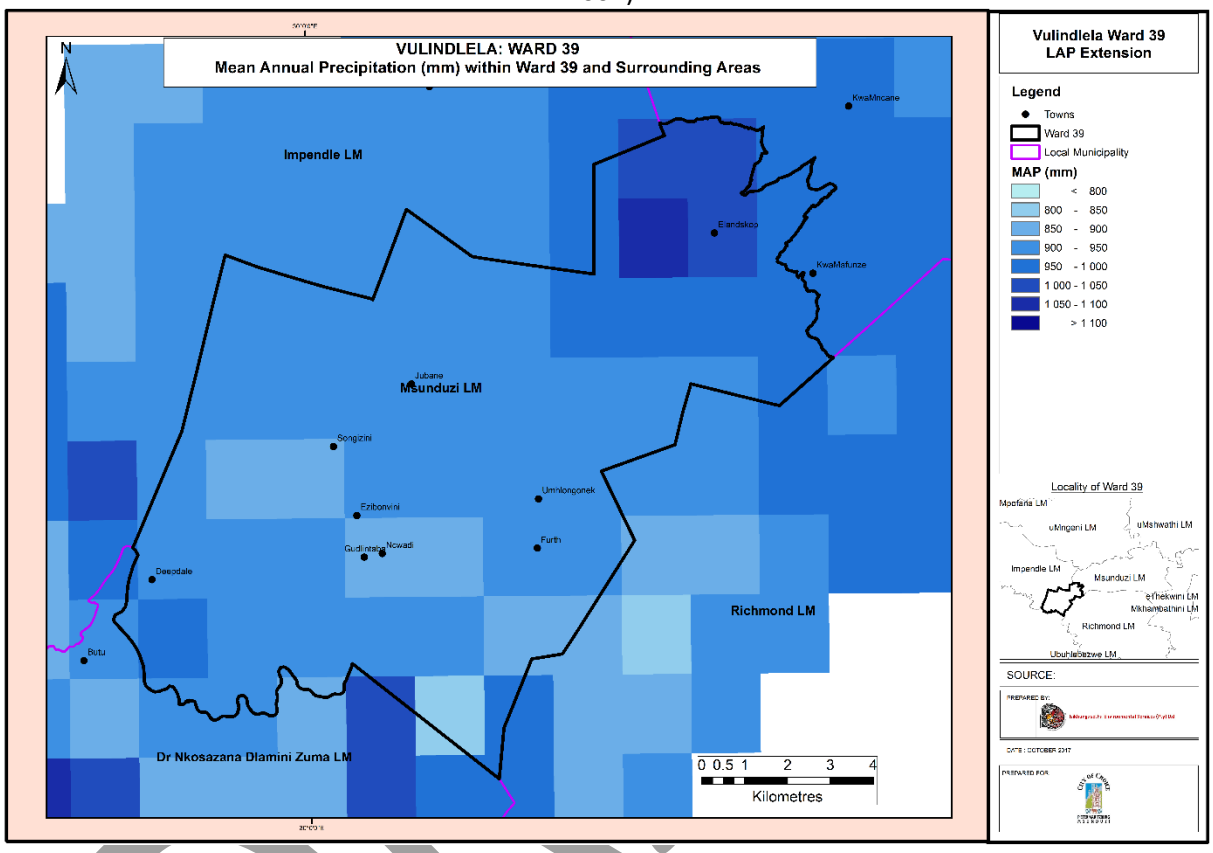
Ward 39 extends from the western edge of Msunduzi Local Municipality, into what used to be Ward 7 of Ingwe Local Municipality, with the western border formed by the Mkomazi River. A portion of the old wards 7 and 8 in the Msunduzi Municipality also form part of the New Ward 39. Ward 39 makes up approximately 18% of the area of Msunduzi Municipality, and comprises of a highly variable biophysical environment as shown in the figures below.

5.4.1.1. Precipitation

Mean annual precipitation ranges from approximately 800 mm in the lower areas to more than 1100 mm in the higher regions, especially along the eastern areas, along the water shed between the

Umgeni and Mkomazi catchments. Most of the rainfall occurs during the summer months, October to April. This rainfall occurs in the form of convective thunderstorms, which are often brief high intensity events. During the winter months rainfall can occur in the form cold fronts, although, this quantity of precipitation is minimal (Lynch, 2004; Schulze *et al*., 2011a).

Figure 51. Mean annual precipitation at a spatial resolution of 1 arc minute or a 1.7km grid (Lynch, 2004).



5.4.1.2. Topography

Topographically this area is highly variable as shown by the two Figures below. Elevation ranges from 797 masl to 1609 masl, and the variability in the landscape and elevation give rise to a number of micro-climates that support a wide range of biodiversity. Furthermore, this variable topography gives rise to many small valleys and hills, which in a high rainfall area often result in the occurrence of many small wetlands / streams, which form micro-habitats. An example is the grasslands found on the north facing slopes, while the cooler wetter south facing slopes often provide habitats that are ideal for indigenous forests (Msunduzi Municpality, 2015; Groundtruth, 2017; ingwe Local Municipality, 2015).

Figure 52. Topographical map illustrating the highly variable landscape within Ward 39 (EKZNW, 2015).

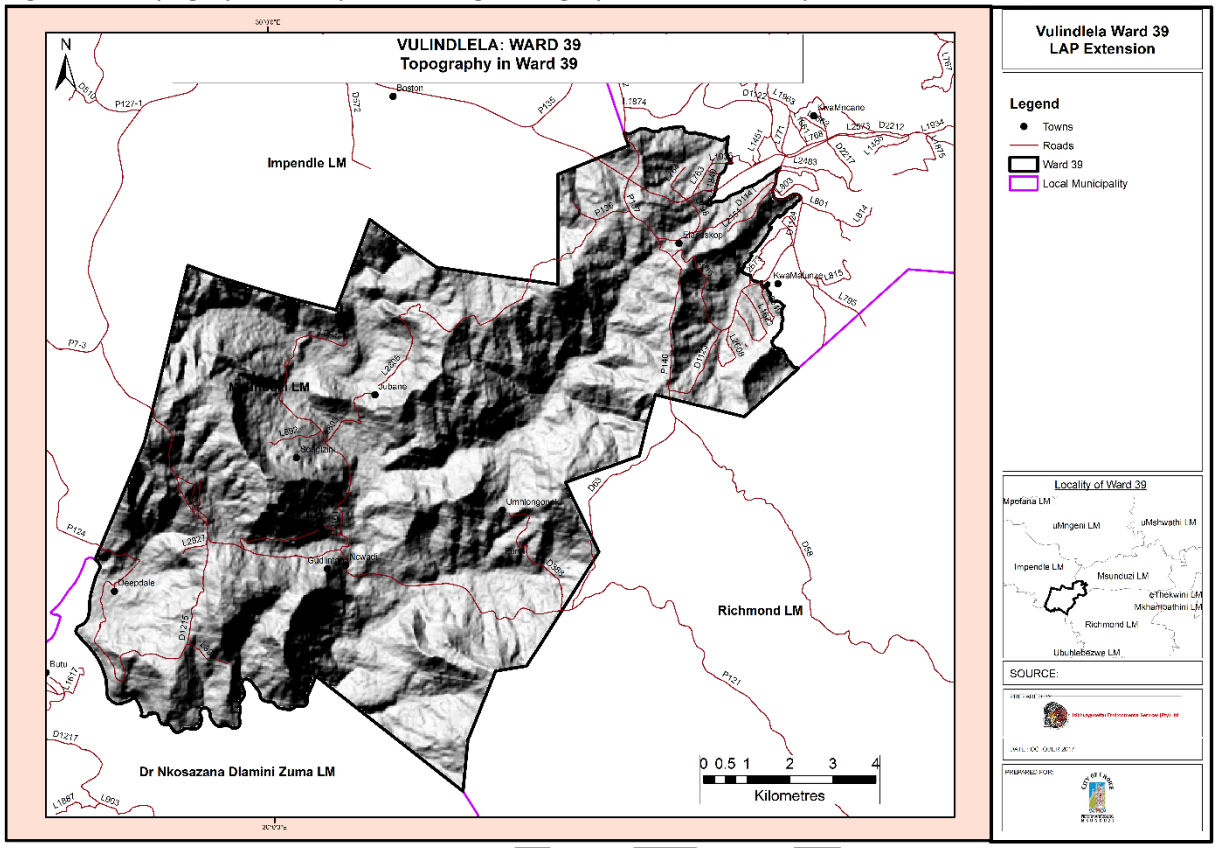
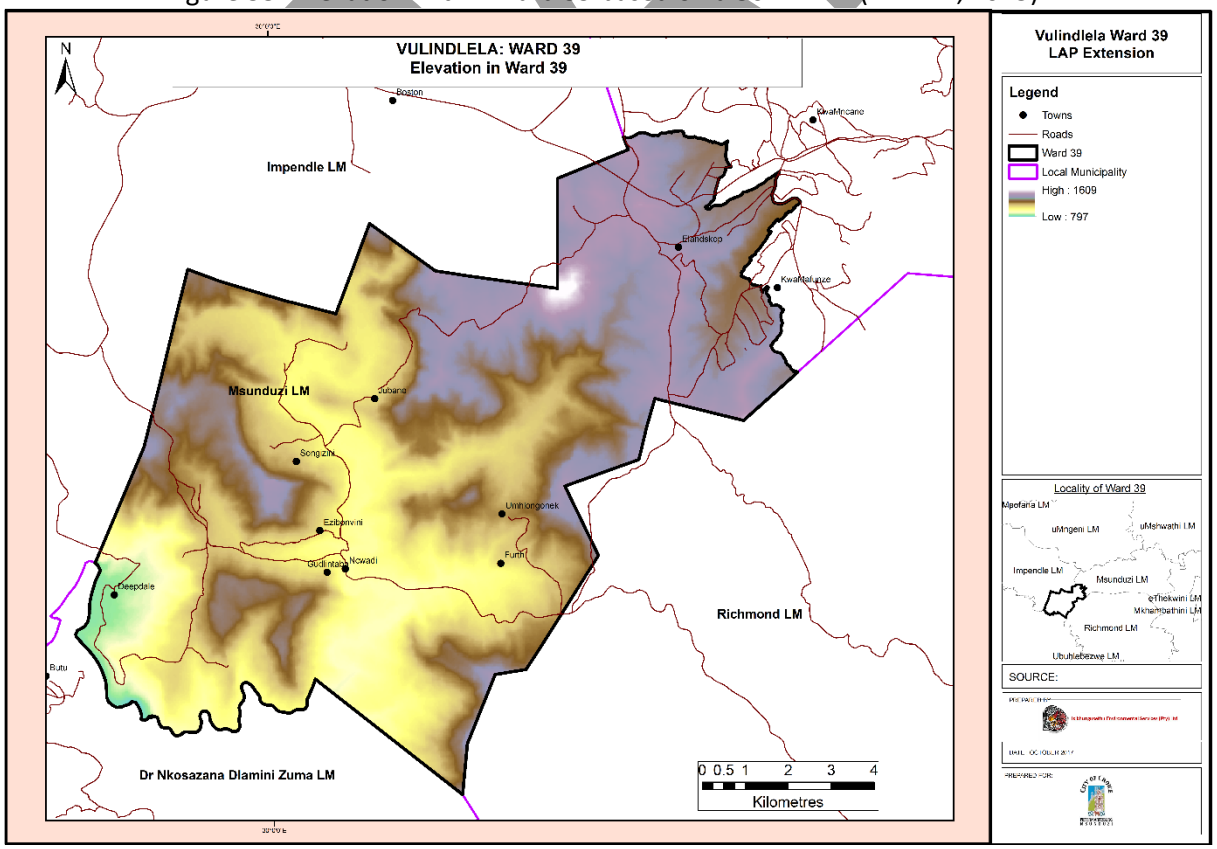


Figure 53. Elevation within ward 39 based on a 30m DEM (EKZNW, 2015).

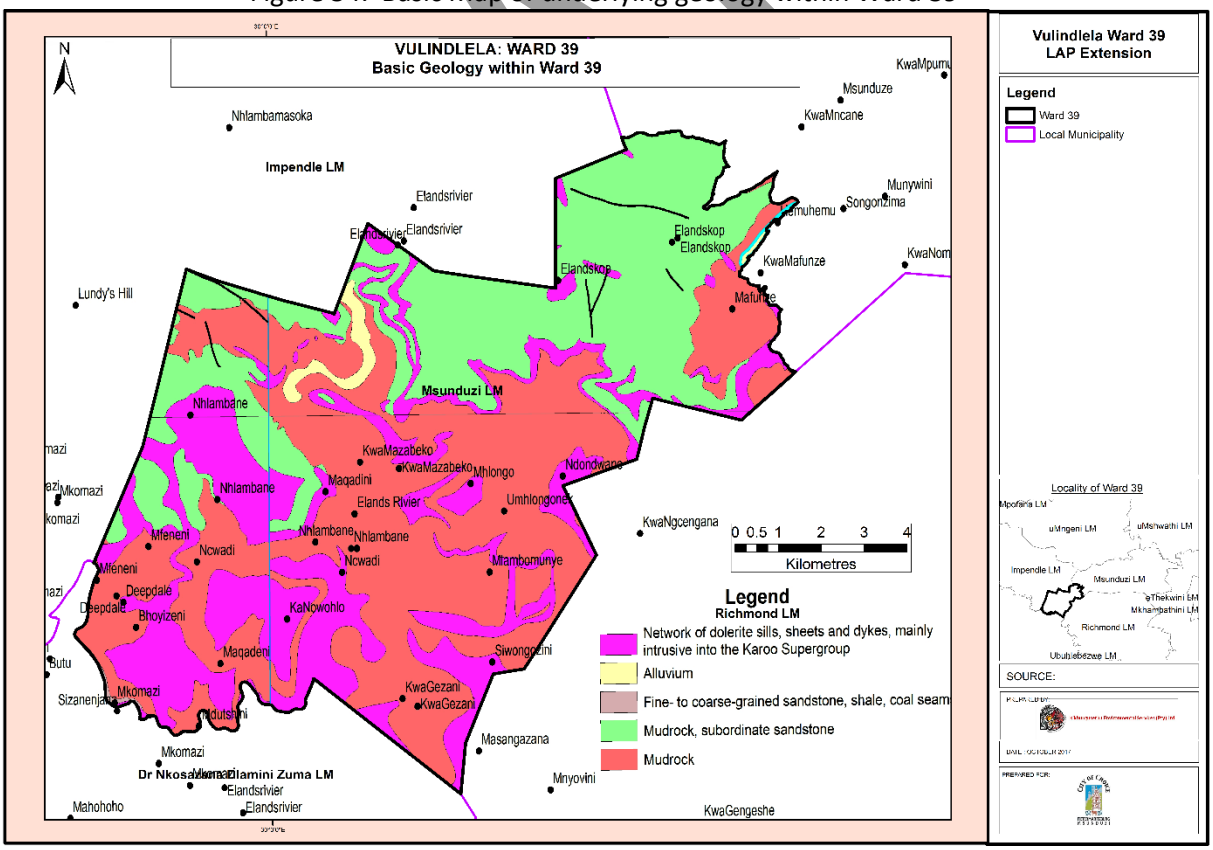


5.4.1.3. Geology

A large portion of the underlying rock found in Ward 39 comprises of mudrock, which are a class of fine grained siliclastic sedimentary rocks, including sandstone and shale. As a consequence of the sedimentary nature of mudrocks soils that are derived from these rocks are likely to be sandy / well drained with possibly clay or mud horizons that are derivative from the mudstone. As regards impact of Dolerite, soils overlying these areas are generally related to deep red clays, which can affect foundations negatively due to movement. As a consequence of the sandy nature of soils that occupy approximately 70% of this area, erosion will become a problem in the absence of land cover (Linstrom W., 1987).

In areas such as Ward 39 sandy soils can be problematic, due to the highly variable topography, overgrazing and poor farming practices which often result in exposed areas. When exposed to the element, and high intensity rainfall events that are often experienced in KwaZulu-Natal, erosion may result, and over prolonged periods can result in gullies and eventually total loss of topsoil. Furthermore, erosion will impact negatively on water quality, as turbidity levels will increase, any fertilisers that may be used in this area could enter the hydrological system, thereby causing eutrophication, if high enough concentrations of nitrogen and phosphorus are present (Linstrom W., 1987).

Figure 54. Basic Map of underlying geology within Ward 39



5.4.1.4. Water Resources

Water in Ward 39 during the summer months are relatively abundant, due to the summer rainfall regime, which increases water availability in the form of rivers and streams. Owing to the relatively dense surface cover, the soils and the variable topography in ward 39 there are a significant number of wetlands and water courses to be found in this area, especially in valleys, both small and large (Figures 55 and 56). This indicates high levels of water retention in this area, and during the drier winter months it is probable that baseflows entering the larger streams and rivers are enough to ensure continuous surface flows throughout the drier months. This assists in ensuring the availability of water in this area for agricultural purposes as well as domestic purposes, in those areas without piped water supply. However, for those people that do not live near one of larger watercourses / wetlands it can mean a long walk to obtain water for domestic and agricultural purposes (Msunduzi Municipality, 2015; Isikhungusethu Environmental Services, 2012; Msunduzi, 2010; Ingwe Muncipality, 2014; Nkosazana Dlamini Zuma Local Municipality, 2017; Ingwe Local Municipality, 2015; Schulze *et al, 2011b*).

Figure 55. Perennial and non-perennial streams in ward 39 and surrounding area (EKZNW, 2008; DWAF, 2005).

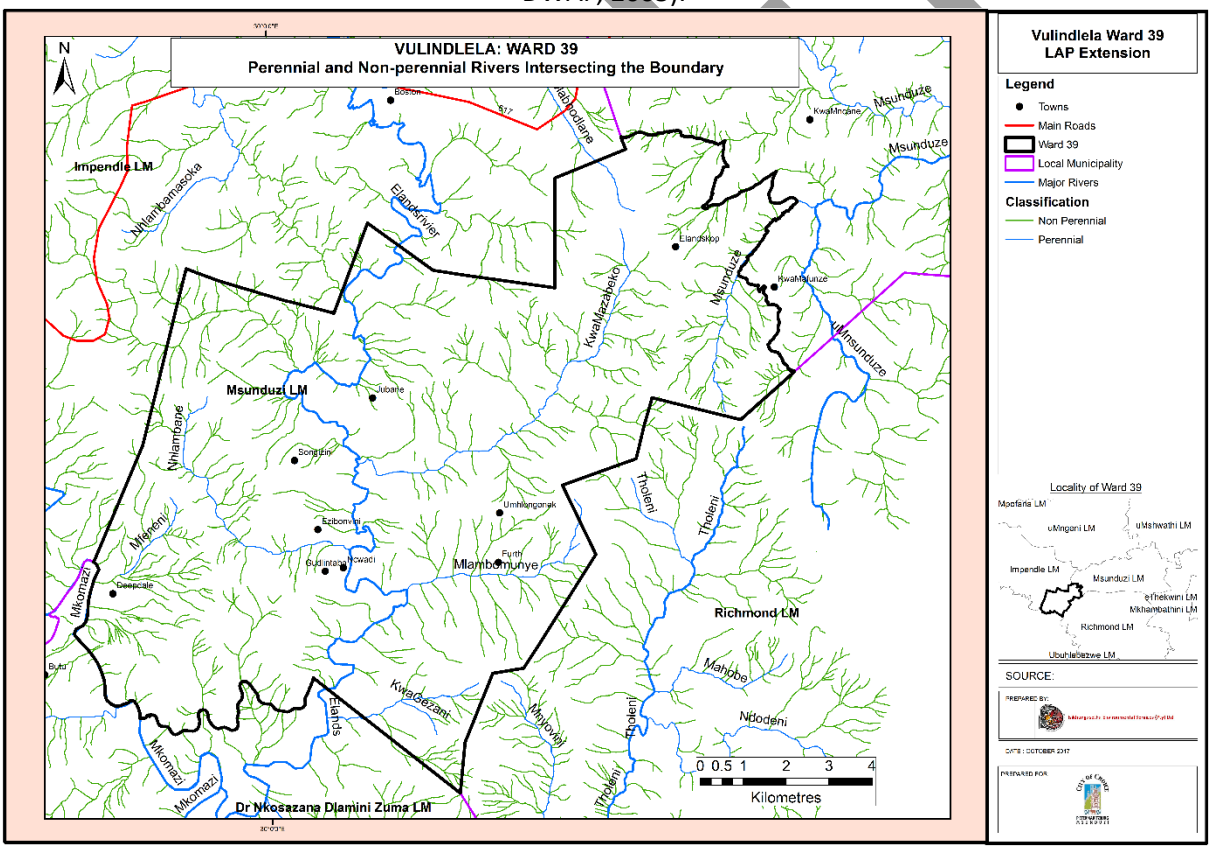
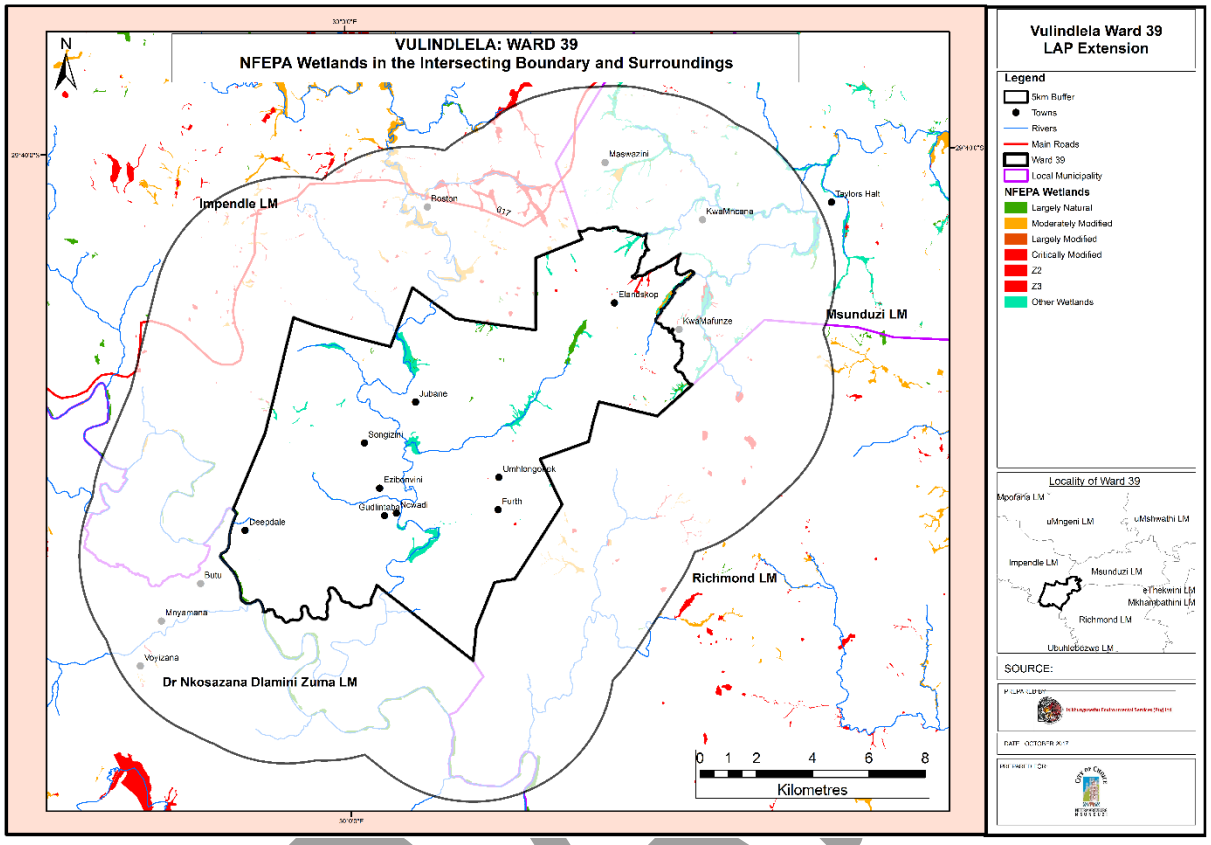


Figure 56. NFEPA and other wetland systems located in and around Ward 39 (CSIR, 2011; Pers comm, 2017a).



5.4.2. Land Cover

5.4.2.1. Natural Vegetation

There are four vegetation types within Ward 39 that can be grouped into two vegetation biomes, namely forest and grassland (Figure 57). Both classifications provide the basic template to determine the distribution of species that can be found throughout this area (Groundtruth, 2017). The following vegetation types dominate ward 39:

- Eastern mistbelt forest (0.9%),
- KwaZulu Natal Hinterland Thornveld (2%),
- Midlands Mistbelt Grassland (48%), and
- Southern KwaZulu-Natal Moist Grassland (48.2%).

Ward 39 is dominated by vegetation types that are associated with the grassland biome (98.9%) followed by the forest biome (1.09%) and the savanna biome (0.01%).

Figure 57. Broad vegetation types in ward 39 (Pers Comm, 2017a).

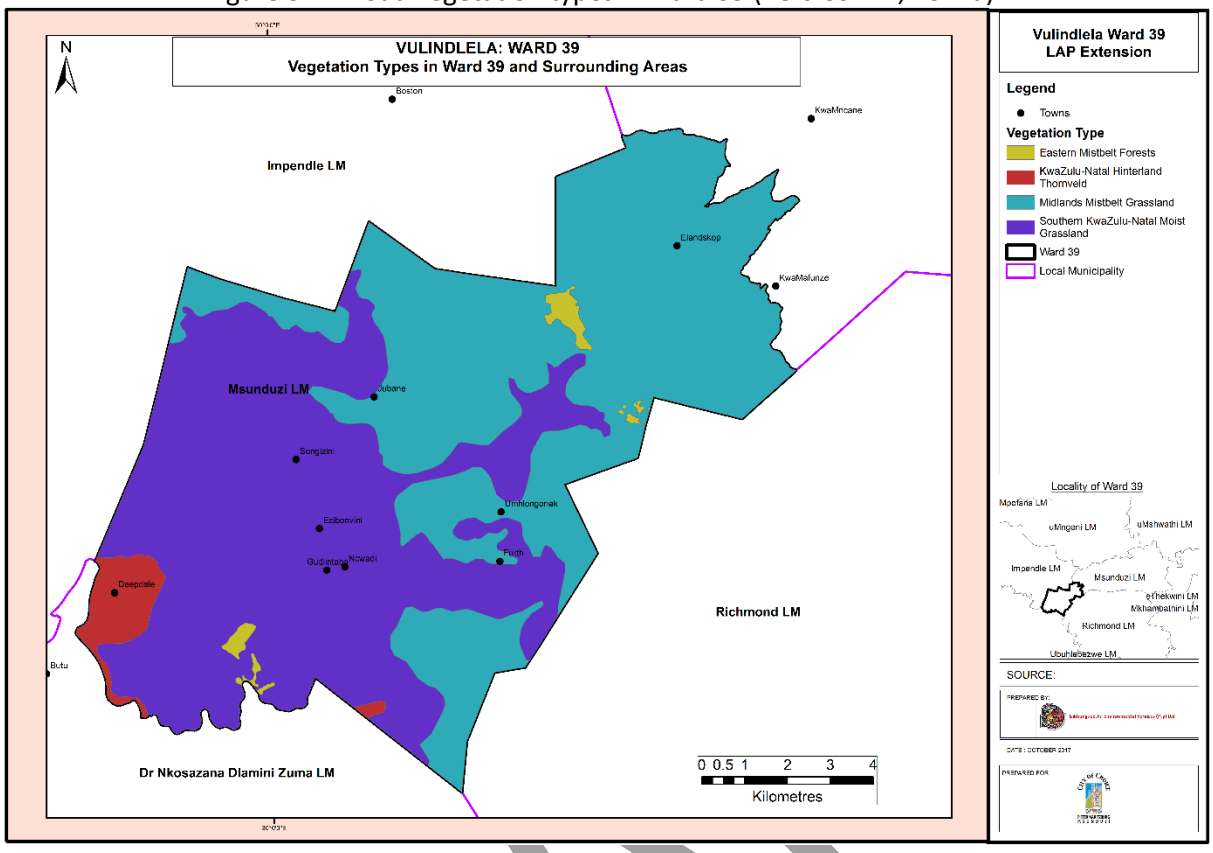
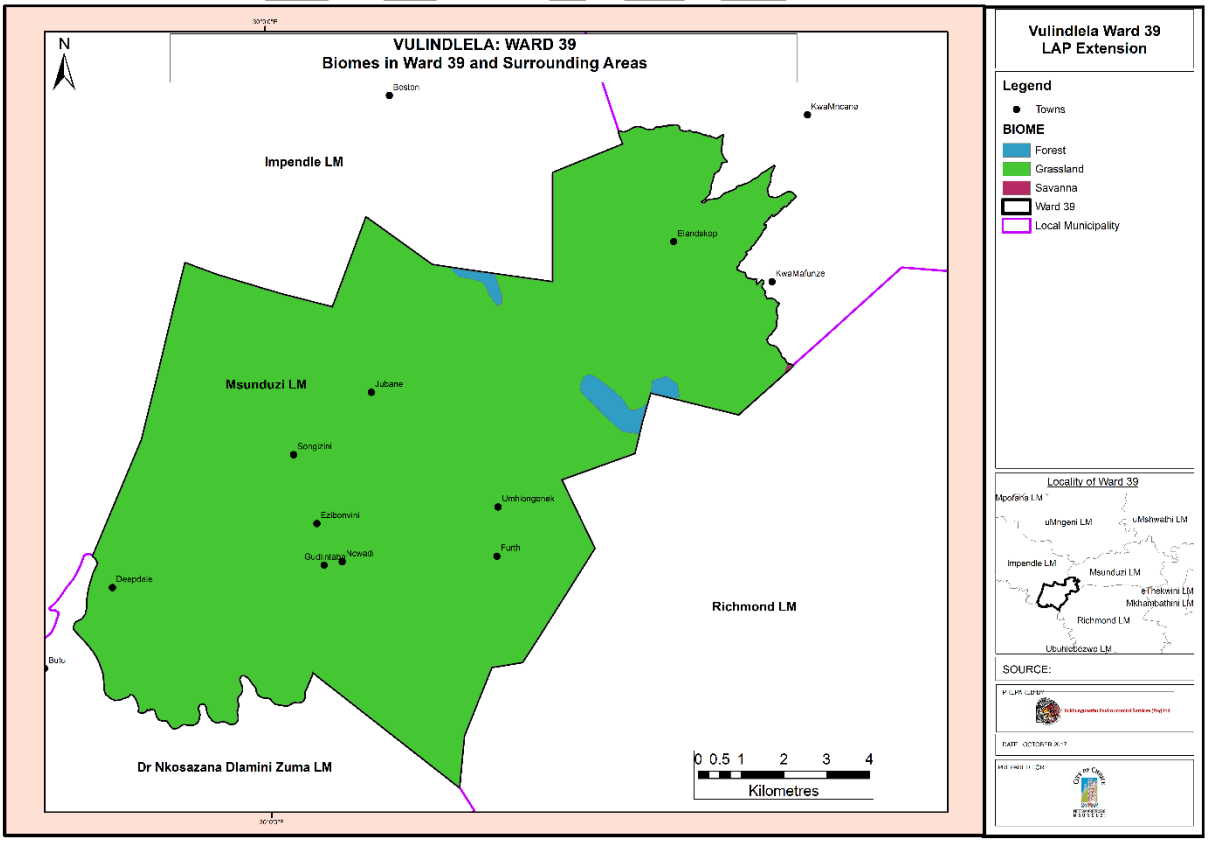


Figure 58. Biomes found within ward 39



The present distribution of land cover is markedly different as a result of agriculture, urbanisation and forestry, as described in the following sub-section.

5.4.2.2. Transformed and Formally Protected Areas

In comparison with the rest of the Mgungundlovu district municipality 45 % of which is transformed, approximately 11% has been rural urban areas (Figure 59). Most of the transformed areas are grasslands, as the forested areas tend on the slopes, many of which are too steep for most agricultural activities and are not suitable for development nodes. At present the fragmentation between habitats is manageable, however, if into the future development in Ward 39 continues and cognisance is not take of the biodiversity areas, then it is possible that this fragmentation will become more significant. This will prevent the free movement of biota within this area, thereby preventing proper disbursement of populations and could in extreme circumstances result in populations being cut off. Furthermore, those grasslands that have not been transformed for agricultural purposes, are being put under pressure through the poor land use management practices such as over-grazing or fire burning. Unfortunately, only a small portion of ward 39 (5%) forming a conservation area protected by EKZNW as well as a stewardship area (Figure 60). This land is protected and cannot be utilised for agricultural, residential, commercial or industrial purposes (Groundtruth, 2017; SANBI, 2017; Pers Comm, 2017a).

Figure 59. Present land use based on the work undertaken by the Msunduzi Municipality (Pers Comm, 2017a).

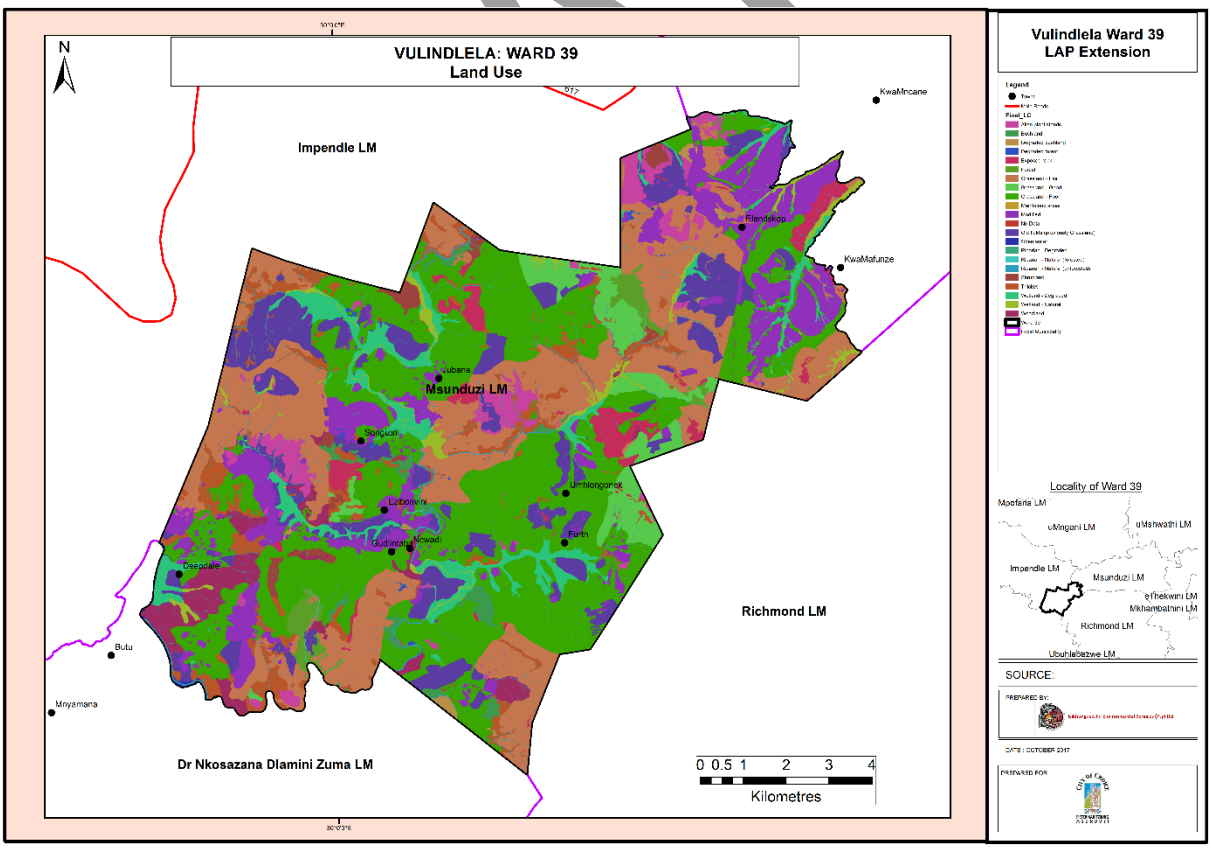
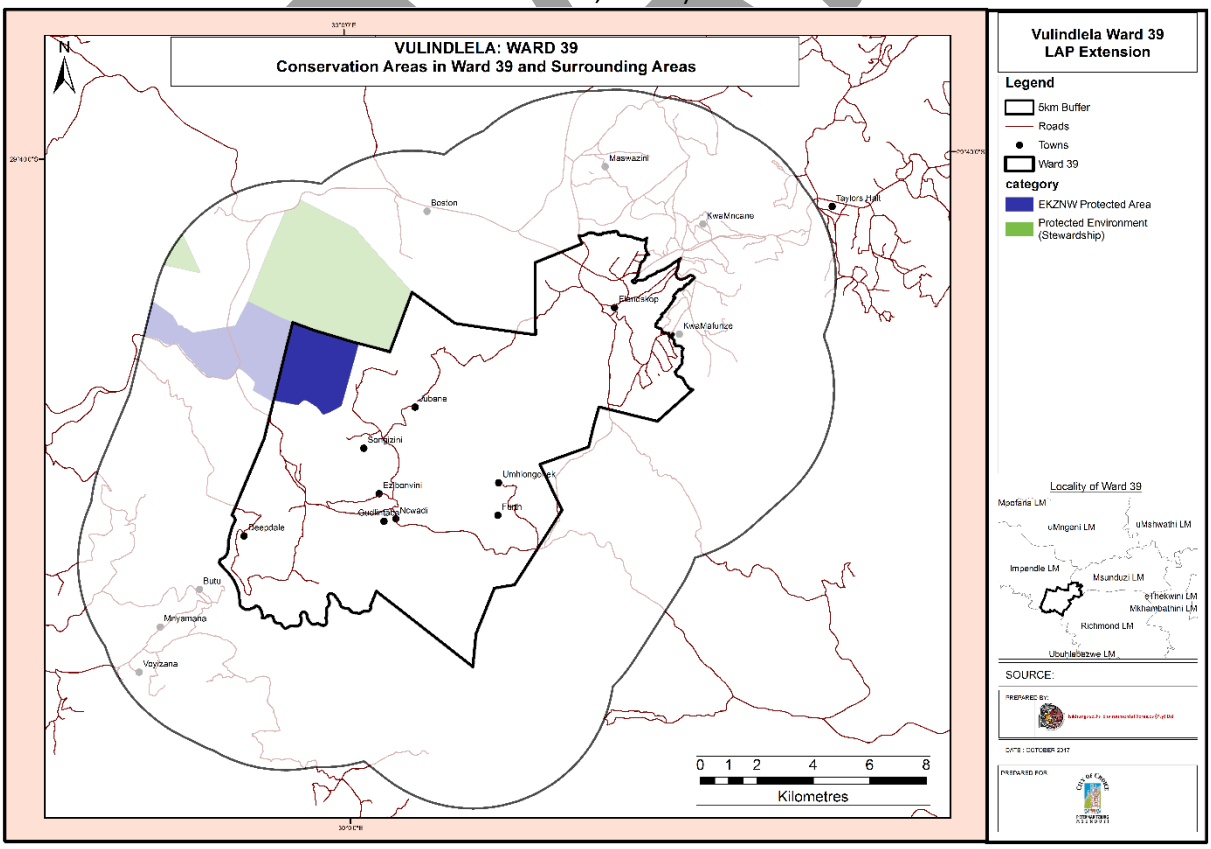


Table 12. Land use areas within Ward 39, based on the Msunduzi Land use (Pers Comm, 2017a).

Description	Area (ha)	Area (%)
Alien plant stands	397.19	2.95
Bushland	159.28	1.18
Degraded bushland	31.46	0.23
Degraded forest	12.25	0.09
Exposed rock	332.66	2.47
Forest	164.29	1.22
Grassland - Fair	2751.85	20.41
Grassland - Good	499.26	3.70
Grassland - Poor	4138.35	30.69
Maintained areas	1.55	0.01
Modified	1452.91	10.77
No Data	0.00	0.00
Old fields (previously Grassland)	1331.05	9.87
Open water	6.60	0.05
Riparian - Degraded	82.11	0.61
Riparian - Natural (forested)	4.18	0.03
Riparian - Natural (unforested)	120.39	0.89
Shrubland	124.12	0.92
Thicket	640.13	4.75
Wetland - Degraded	652.03	4.84
Wetland - Natural	203.86	1.51
Woodland	379.44	2.81
TOTAL	**13484.98**	**100.00**

Figure 60. Areas currently under conservation in Ward 39 and the immediate surroundings (Pers Comm, 2017a)



5.4.2.3. Conservation Planning

To ensure that the ecological processes in this area continue to function, there are areas within Ward 39 that should not be disturbed into the future. If they have been disturbed then they should be rehabilitated to the condition that they were in prior to the disturbance, i.e. natural state. In order to determine which areas are important for the continuation of the functioning of ecological processes, a methodology has been developed to inform the spatial delineation of critical biodiversity areas (CBA) and ecological support areas (ESA). CBA and ESAs are the two primary categories that are the most important for biodiversity management.

CBAs and ESA serves to ensure that within Ward 39 there are fewer instances of fragmentation, which often results in the isolation of species populations. Furthermore, preservation of these areas will ensure that the ecological processes are able to continue, albeit in an interrupted state. Continuation of these processes will allow for further socio-economic development which, as highlighted in sub-section 1, is almost entirely dependent on a functioning ecosystem. To ensure further deterioration in the socio-economic situation doesn't occur, as well as to ensure the maintenance of critical ecological infrastructure (CEI), CBAs and ESAs areas must be observed. CEI may be defined as areas that are most important ecologically or have the highest level of dependence by people. The definition and purpose of CBAs and ESAs is provided in Table 13, along with the management objective (SANBI, 2017).

The total area that is classified as being irreplaceable with regards to CBAs is 14%, while optimal CBAs occupy 30%. The two CBAs do not overlap, hence in an ideal situation the total area in ward 39 that would be protected to conserve ecosystem functionality would be 44%. ESAs occupy 37% of the area in Ward 39, however there is significant overlap with the ESAs and CBAs (Figures 61 and 62). In order to ensure the continued function of the biodiversity in this area the areas that are indicated as critical areas should remain undisturbed, and the ESAs should be preserved to at least fair ecological state (SANBI, 2017).

In Ward 39, according to the ESKOM 2013 household data, there is minimal overlap between the households and the CBAs (Figure 63), however, there is some overlap between the households and the ESAs. This is not too substantial, and should not prove to be detrimental to the biodiversity of the area, if the land use within these areas in properly managed to prevent further degradation.

Table 13. Definition and purposes of CBAs and ESAs within Ward 39 (SANBI, 2017)

	Definition	Purpose	Management Objective
Critical Biodiversity Area	A CBA is an area that must remain in good ecological condition in order to meet biodiversity targets for ecosystem types, species or ecological processes. With protected areas CBAs identified in a biodiversity plan must meet biodiversity targets for representation for ecosystems / species of concern. Often CBAs are classified as irreplaceable or optimal. Irreplaceable CBAs are those areas that cannot be found anywhere else. Optimal areas are those areas that in an ideal world would remain completely undisturbed.	Together with protected areas ensures a viable representative sample of all ecosystem types and species can exist.	To ensure that these areas stay in as natural condition as possible.
Ecological Support Area	An ESA is an area that must retain its ecological processes to: • Meet biodiversity targets for processes that have not been met in CBAs or protected areas • Meet biodiversity targets for representation of ecosystem types / species of concern when it is not possible to meet them in CBAS. • Support the ecological functioning of a protected area or CBA.	Ensures the long term functioning of the landscape as a whole.	These areas must at least retain the ecological processes, which often requires at least semi natural ecological conditions.

Figure 61. Irreplaceable and optimal CBAs in and around ward 39 (SANBI, 2017)

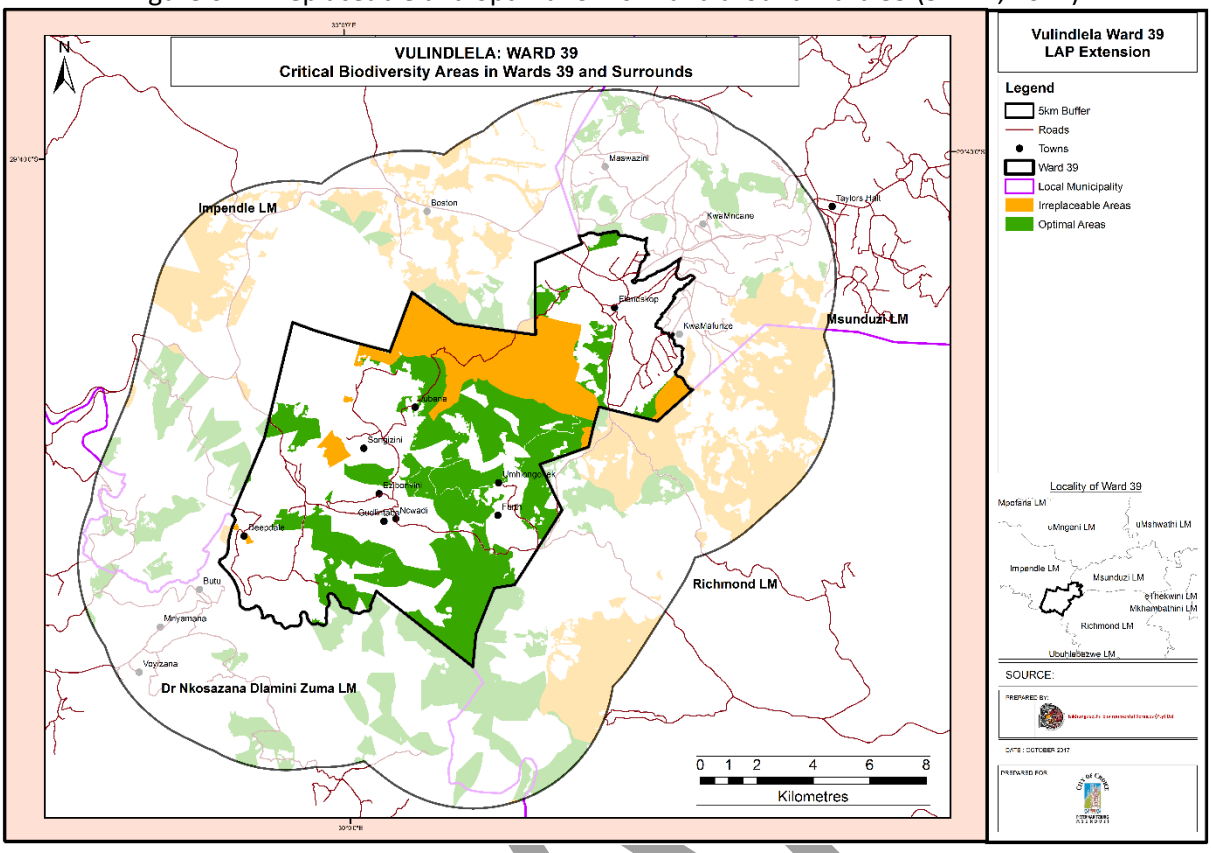


Figure 62. ESAs in and around ward 39 (SANBI, 2017)

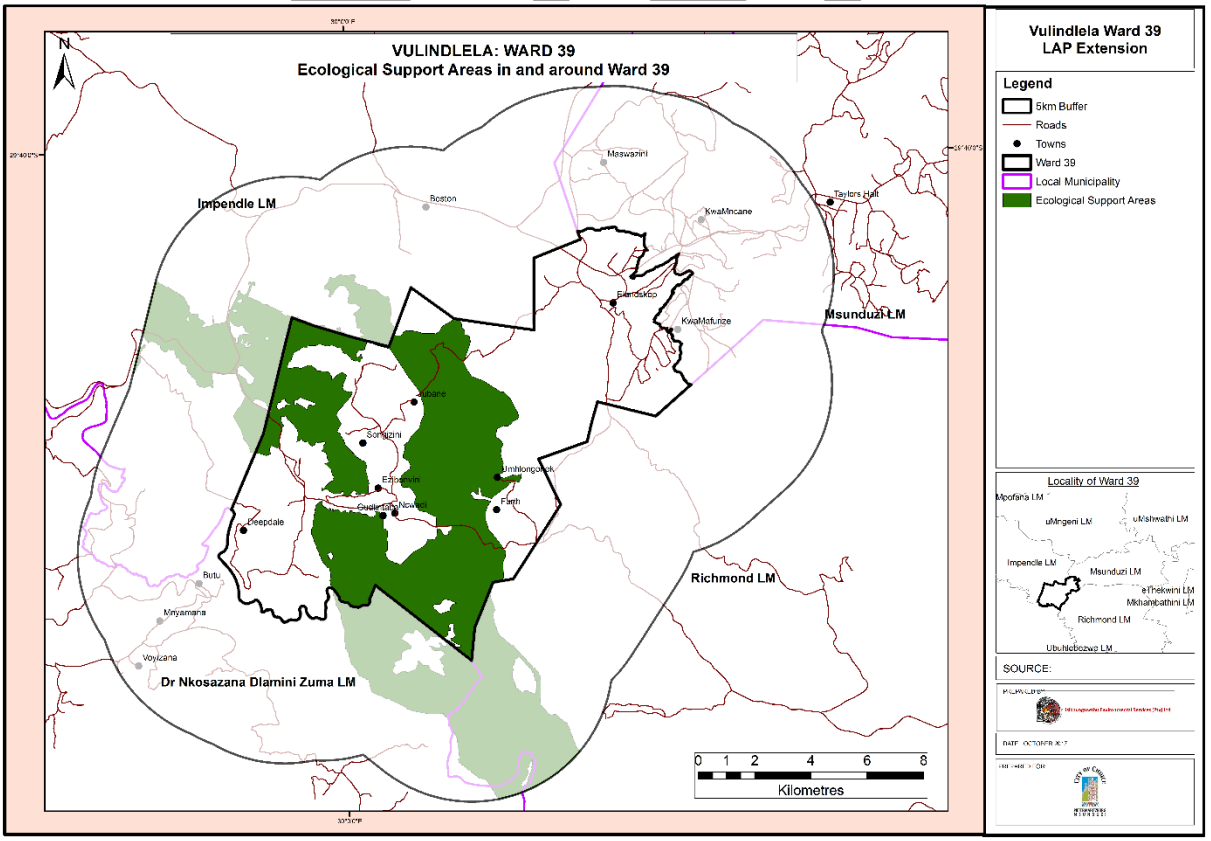
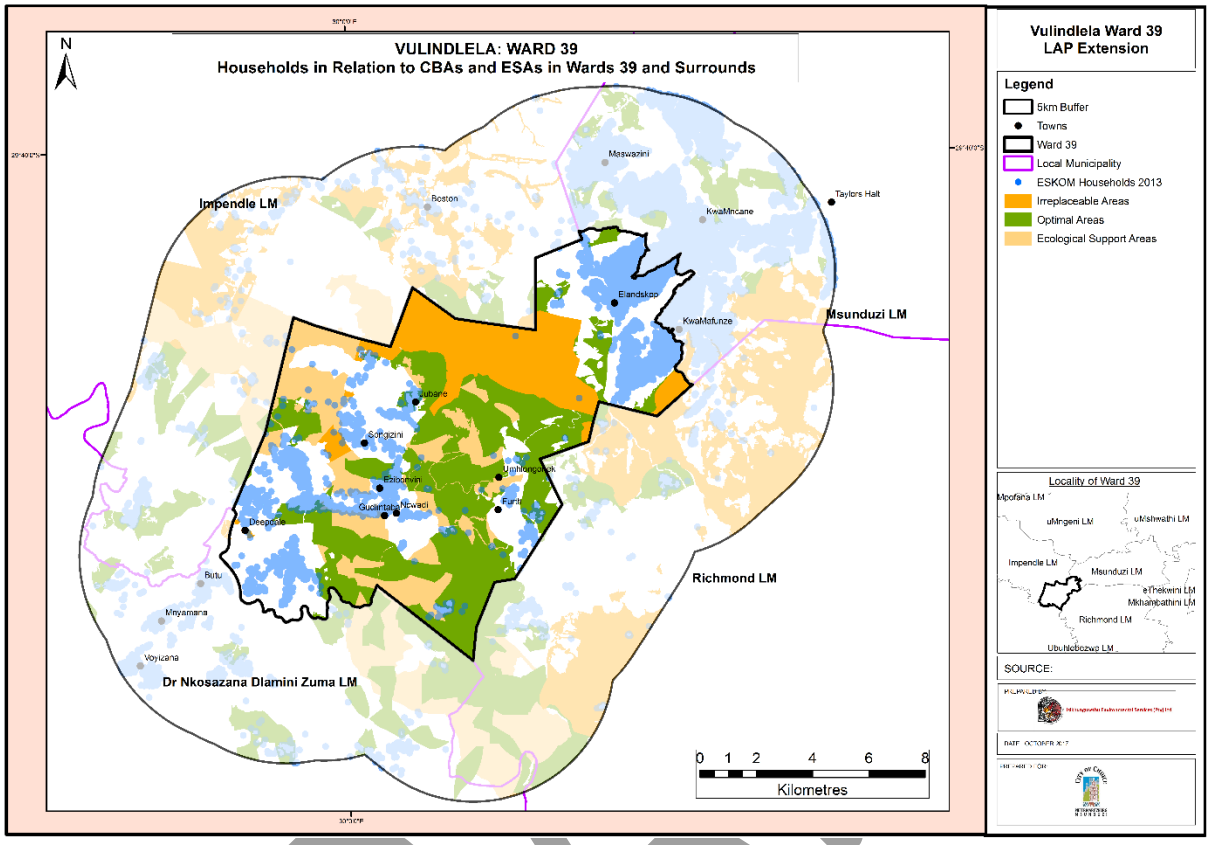


Figure 63. Location of households / settlements in relation to CBAs and ESAs (SANBI, 2017; Pers Comm, 2017b)



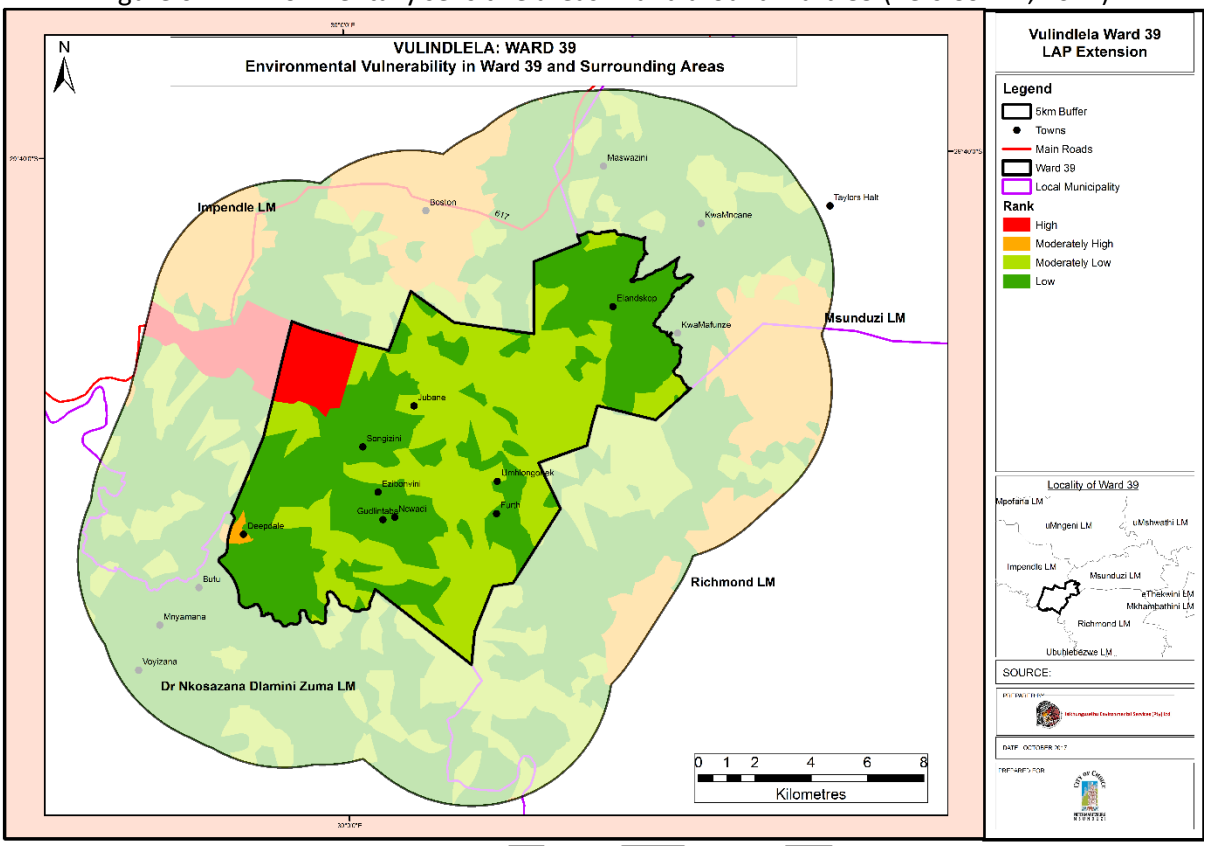
5.4.2.4. Environmental Vulnerability

There is a small area (4.9%) of environmentally sensitive or vulnerable (Red) land located on the outer Ward 39 boundary. This areas is intersected by the Ward 39 boundary and forms part of the conservation area (Figure 64). There is a small area (0.4%) that is ranked as Moderately High, indicating that it is still sensitive to changes that may occur, however, it is not as critical as those areas with High sensitivity. Those areas that are ranked as Moderately Low (45.7%) and Low sensitivity (49%), Light and Dark green respectively, are those areas that are more resilient to changes that may occur. In the instance of Ward 39 the settlements that are located in this area do not intrude on the highly sensitive ecological areas and as such any intrusion in these areas must be avoided. Despite most of Ward 39 being classified and low environmental vulnerability, a proper management strategy must be put in place, implemented and adhered to. This will ensure that ecological function within this ward 39 retained and potentially restored to those areas that require this.

Conservation and protection of these areas is important for maintaining ecosystem health and localized endemic flora species (Msunduzi Environmental Department Meeting, 2015).

The majority of land within the Ward 39 boundary falls under the less and not environmentally sensitive categories, as mentioned above, therefore development is more feasible in these areas moving into the future. However, developments will have to be monitored so that they don't encroach on sensitive areas (Msunduzi Environmental Department Meeting, 2015).

Figure 64. Environmentally sensitive areas in and around ward 39 (Pers Comm, 2011)



5.4.3. Opportunities and Constraints

5.4.3.1. Opportunities

- Compact land development patterns use land efficiently.
- Conservation areas - Green tourism accreditation.
- Topology of the landscape offers good views and recreation opportunities therefore attracting investment interests – sense of place.
- Protection of Ecosystem assets.
- Local community based ecosystem restoration initiatives.
- Environmental education posts identified.

5.4.3.2. Constraints

- Poor land use management could mean a loss in high potential agricultural land.
- Visual and aesthetics impacts.
- Limited information on the environment.
- Loss of fauna and flora species.
- Lack of transparent, clear and decisive decision making which undermines the possibility of a healthy environment.
- Limited / non-existent waste water treatment facilities.
- Loss of ecosystem goods and services.
- Service delivery backlogs for sanitation and potable water.
- Water quality may deteriorate into the future due to poor management and sanitation.
- Installation of water treatment plant is required.

- Need for more communication between municipalities, ward committee, ward councillors as well as the communities.
- Limited quantities of potable / piped water available.
- During drier months surface water quantities are limited.
- Lack of environmental awareness and benefits of ecosystem.
- Poor land use management has led to degradation of soil.
- Environmental issues are not considered to be a priority.
- Lack of integration of natural capital and ecosystem goods and services into economic and development decision making.

5.5. Air Quality

Air is a resource required by all life, and as such it is important to have an indication as to the possible impacts of natural as well anthropogenic processes. Within Pietermaritzburg there are a number of industrial, transport, and manufacturing as well as other activities occurring, many of which produce pollutants in the form gases and particulate matter. In high concentrations these pollutants can prove detrimental to ecological health as well as human health, and in the long term can contributes to the degradation of the atmosphere. Furthermore, these pollutants will contribute to accelerating the rate at which climate change is occurring, which could be detrimental to many areas, while benefitting others, depending on location and the changes that are projected to occur (State of Air Report, 2005; Superczynski, S. D *et al*., 2011; Simpson, A, 2009).

This section will briefly describe the status quo of the air quality within Ward 39, which relates to the topography, land cover, population and economic activities occurring within this area.

5.5.1. Topographical Influence

Topographically Ward 39 is highly variable, comprising of broad valleys, mountainous areas. This will influence air movement in that at night air will move into the valleys and an inversion layer will form, that may result in trapping some air and pollutants in these valleys overnight. However, this area is separated from Pietermaritzburg by the Umgeni / Mkomazi Watershed boundary, the altitude of which is approximately 1500m, and prevents the movement a significant portion of pollution from Pietermaritzburg into this area (Figures 65 and 66). The result of this is that the air quality in this area is relatively good ((State of Air Report, 2005; Superczynski, S. D *et al*., 2011; Simpson, A, 2009).

Figure 65. Elevation of Ward 39 (EKZNW, 2015)

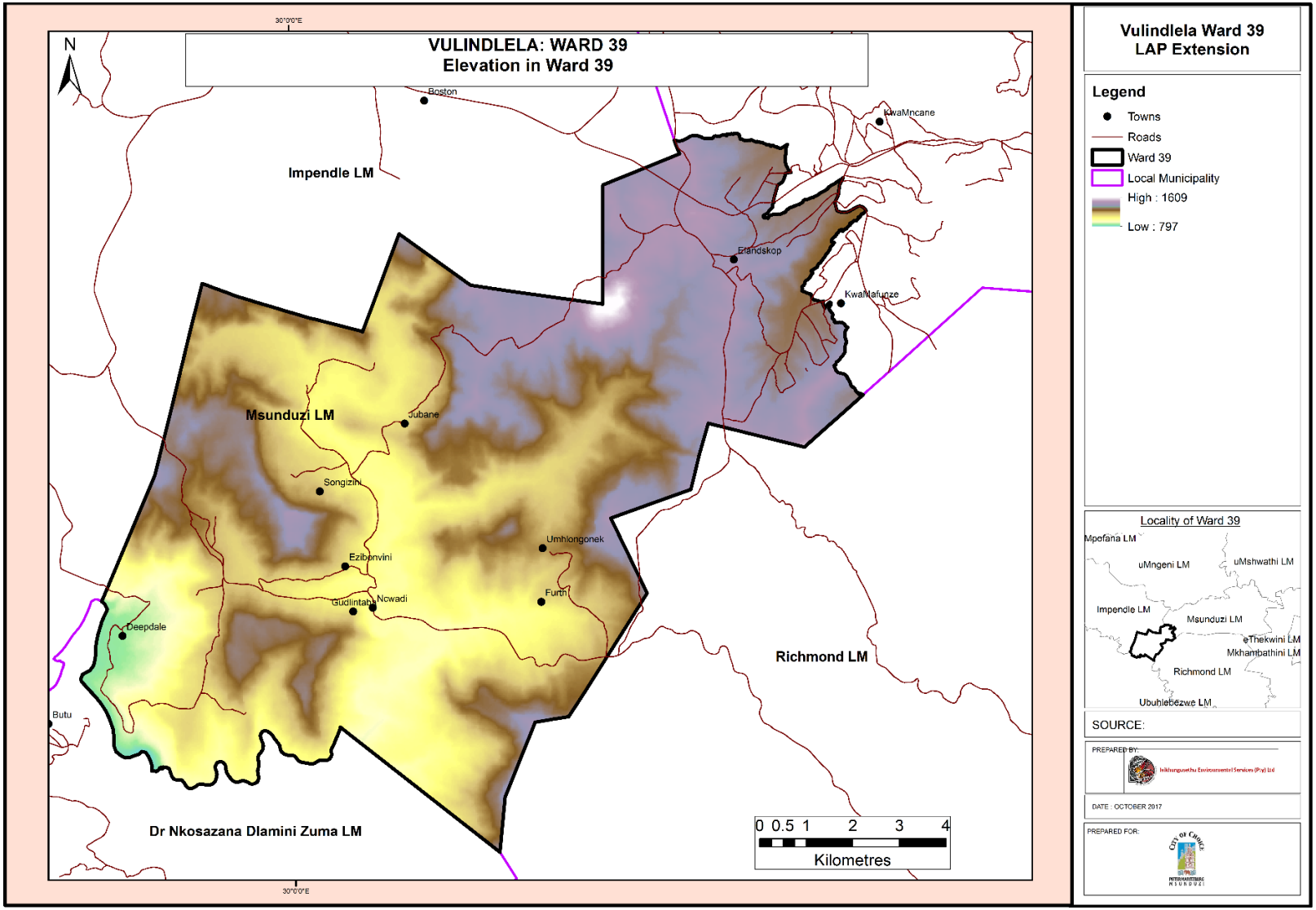
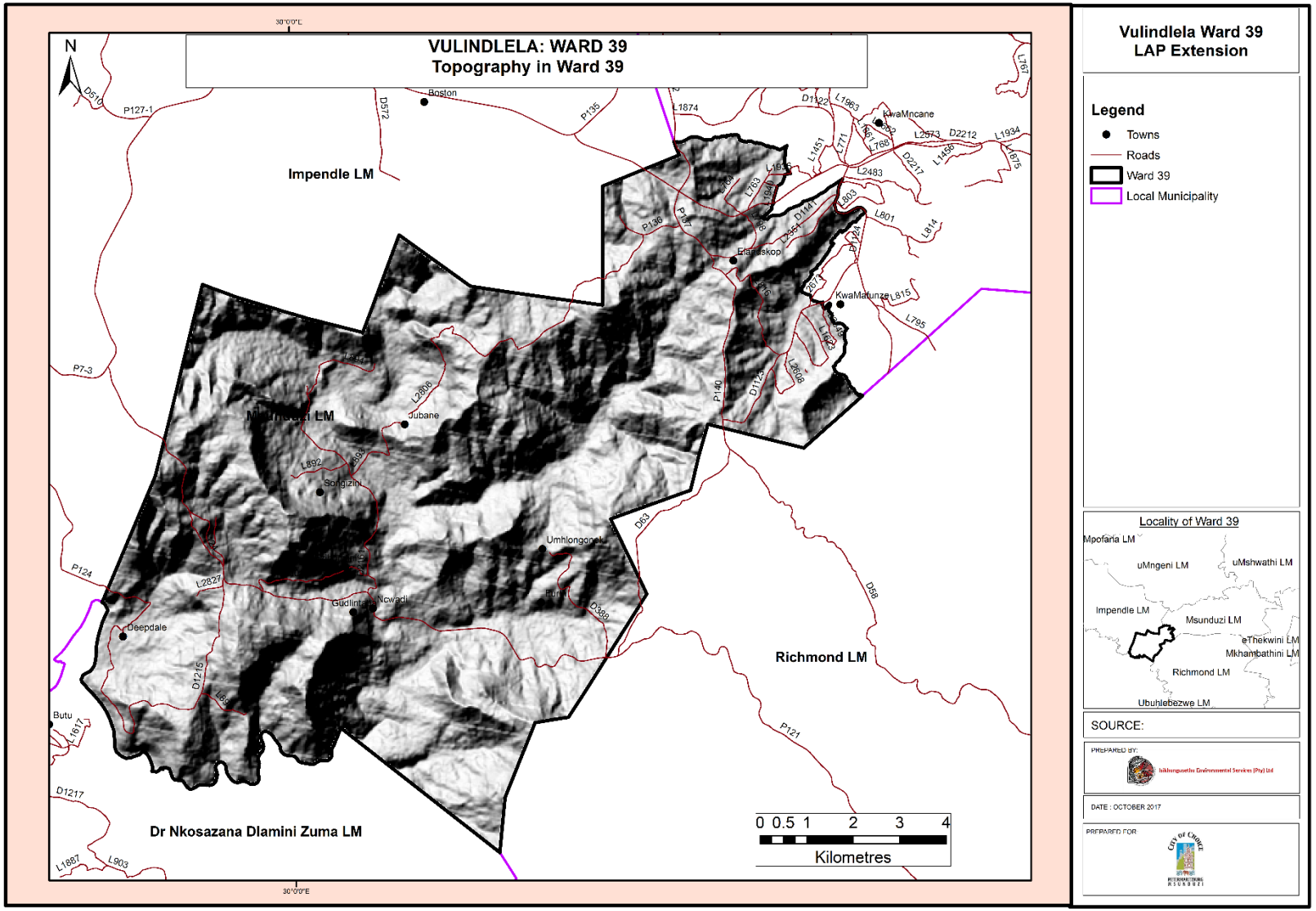


Figure 66. Topography of Ward 39 (EKZNW, 2015)



5.5.2. Influence of Land Cover

Land cover, in most instances, does not directly influence air quality. Rather it is an indirect influence, occurring as a result of the other processes. An example of this is a lack of soil surface cover will result in low soil structure and high erodability. If this occurs in large tracts of land this could result in dispersal of soil particles into the atmosphere during the occurrence of high windspeeds. However, in this area the only major contributor of soil particulate matter would be dust from roads during the passing of vehicles.

Another contributor of particulate matter into the atmosphere would be the burning of biomass, as often occurs in agricultural practices. Soot and ash will enter the atmosphere and over time pollutant will build up and gradually decrease the air quality, and may eventually impact negatively on human and ecological health (State of Air Report, 2005; Superczynski, S. D *et al*., 2011; Simpson, A, 2009).

5.5.3. Socio-economic Influence on Air Quality

The main economic activities occurring in this area are agricultural activities which could result in the burning of grass to stimulate new growth for livestock, or to try and re-integrate nutrients from the surplus of the previous years' crop back into the soil. The result of this practice has been mentioned in the previous sub-section. The industry occurring in the area is negligible with the possible exception of a small sawmill that is functioning in the area and the associated locomotive transport of timber. Other activities include small shops and businesses. Apart from this there very little other business activity occurring in this area, as a result there is no real threat to the air quality in this area (State of Air Report, 2005; Simpson, A, 2009; Isikhungusethu, 2012; Dr Nkosazana Dlamini Zuma Local Municipality, 2017).

In this area one of the major polluters will be the burning of firewood for cooking and a source of heat, especially during winter, when temperatures are low. Anthropogenically, it is possible that this source of pollution could lead to a deterioration in health faster than other pollutants in this area. This is due to cooking often being undertaken indoors, with poor ventilation, thereby resulting in high concentrations of pollutants. This in addition to the proximity of people to the source of pollution could contribute to the deterioration of people health (State of Air Report, 2005).

5.5.4. Potential Impacts of a Degradation in Air Quality

The following tables are a summary of the possible ecological and anthropogenic impacts that a deterioration in air quality may cause. In this area the most probable causes of air pollution will be particulate matter, due to the burning of biomass, wood and fossil fuels for domestic and agricultural purposes. Other chemical pollutants indicated in the table below will be released through the combustion of biomass, fossil fuels and other combustible materials, all of which will contribute to deterioration in air quality (State of Air Report, 2005, Ingwe, 2014).

Table 14. Pollutants, their sources and potential impacts (State of Air Report, 2005)

Pollutants	Main contributing sources	Impacts
Particulate matter (PM) Less than 10 microns in size (PM_{10}) Dust, sand, ash, soot, smoke, pollen, exhaust emissions	· Household fuel combustion – primarily coal-burning on the Highveld and wood-burning in coastal areas · Industrial, commercial, and institutional fuel-burning appliances · Industrial process and fugitive emissions · Vehicle tail pipe emissions (primarily diesel vehicle emissions) · Mining and quarrying, including fugitive dust and smouldering coal dumps · Biomass burning, including wild-fires and crop-burning practices · Vehicle entrainment from paved and unpaved roads · Agriculture – fugitive dust emissions during ploughing · Windblown dust · Coal-fired base-load electricity generation · Diesel-powered locomotives and shipping · Other sources including: informal waste combustion, tyre-burning, waste incineration.	*Health* Exposure to PM has been associated with hospitalization for respiratory or cardiovascular diseases and exacerbation of respiratory diseases, such as asthma. The health effects depend on particle size and chemical composition. *Ecological* Wet and dry PM deposition can cause damage to plants, metal surfaces, fabrics, and buildings. Depending on chemical composition, PM can contaminate soil and water. Other impacts include reduced visibility and the production of haze.
Sulphur dioxide (SO_2)	· Industrial, commercial, and institutional fuel-burning appliances – specifically coal and heavy fuel oil (HFO) combustion · Coal-fired base-load electricity generation – specifically on the Mpumalanga Highveld · Gas-turbine peak-load electricity generation · Refineries · Industrial processes, including pulp and paper manufacture and metallurgical operations · Coal mining, including smouldering coal dumps (especially abandoned and defunct collieries), most of which are on the Mpumalanga Highveld · Household coal and wood combustion · Vehicle engine emissions (primarily diesel-powered vehicles) · Emissions from diesel-powered locomotives and shipping emissions (in harbour cities) · Biomass burning, including wild-fires and crop-burning.	*Health* Sulphur dioxide causes upper respiratory irritation and can aggravate existing respiratory diseases, especially asthma. *Ecological* Sulphur dioxide contributes to acid deposition, which causes acidification of dams and rivers, and damages trees and crops as well as buildings and statues. Leachates and percolates can contaminate subterranean aquifers.
Nitrogen oxides (NO_x, NO, NO_2)	· Vehicle tail pipe emissions – all areas · Industrial and other fuel-burning processes, specifically gas-burning appliances · Base-load electricity generation, specifically on the Mpumalanga Highveld · Gas-turbine peak-load electricity generation · Household fuel combustion – primarily coal-burning on the Highveld and wood-burning in coastal areas · Diesel-powered locomotive engines and shipping emissions (in harbour cities) · Airports – aircraft and passenger vehicle emissions at international airports (such as those in Cape Town, Johannesburg, and eThekwini), are significant sources · Biomass burning, including wild-fires and crop-burning practices · Tyre-burning is one of several minor sources.	*Health* Exposure to nitrogen dioxide (NO_2) increases the risk of respiratory infections. *Ecological* Nitrogen oxides play an important role in the atmospheric reactions that create ozone and contribute to acid deposition. Ozone can cause acidification of dams and rivers, damage trees and crops as well as buildings and statues, and also reduce visibility.

Carbon monoxide (CO)	Carbon monoxide is produced by incomplete combustion of carbon fuels (including petrol, diesel, wood, coal, and liquid petroleum gas) in the transportation, industrial, and household sectors.	*Health* When CO enters the bloodstream, it reduces the delivery of oxygen to the body's tissues and cells, because the haemoglobin in the red blood cells has a higher affinity for CO than for oxygen.
Carbon dioxide (CO_2)	Carbon dioxide is found naturally in the atmosphere. It is also a product of complete combustion of fossil fuels.	*Health* Carbon dioxide constitutes a health risk only at concentrations high enough to displace oxygen and cause asphyxiation. *Climate change* Carbon dioxide is a greenhouse gas.
Volatile organic compounds (VOCs) including hydrocarbons	· Commonly occurring VOCs including benzene, ethylbenzene, toluene, and xylene · Transport (petrol vehicles are a key contributor, as well as diesel vehicles and airport activities) · Industrial processes, particularly chemical manufacturing facilities and refineries – including stack emissions and diffuse sources such as evaporative emissions from chemical storage · Dry cleaners, paint spray booths, and residential use of solvents and paints · Household fuel-combustion · Waste disposal sites – trace releases of toxic and odoriferous VOCs · Biomass burning, including wild fires and crop burning	*Health* Some VOCs are respiratory irritants, others cause malodour (for example, limonene, amines, butyric acid), and some are carcinogens (such as benzene and methylene chloride). *Ecological* VOCs participate in the complex chemical reactions whereby O_3 is formed at ground level.
Methane (CH_4)	Landfill sites and livestock farming are important sources of methane.	*Health* Methane constitutes a health risk only at concentrations high enough to displace oxygen and cause asphyxiation. It is a serious hazard at explosive or combustible concentrations. *Climate change* Methane is a greenhouse gas, with a global warming potential (GWP) of 23[1].

5.5.5. Air Quality Monitoring and Management

5.5.5.1. Status quo of air quality monitoring

Figure 67. Air quality monitoring network throughout RSA, in relation to population distribution (State of Air Report, 2005)

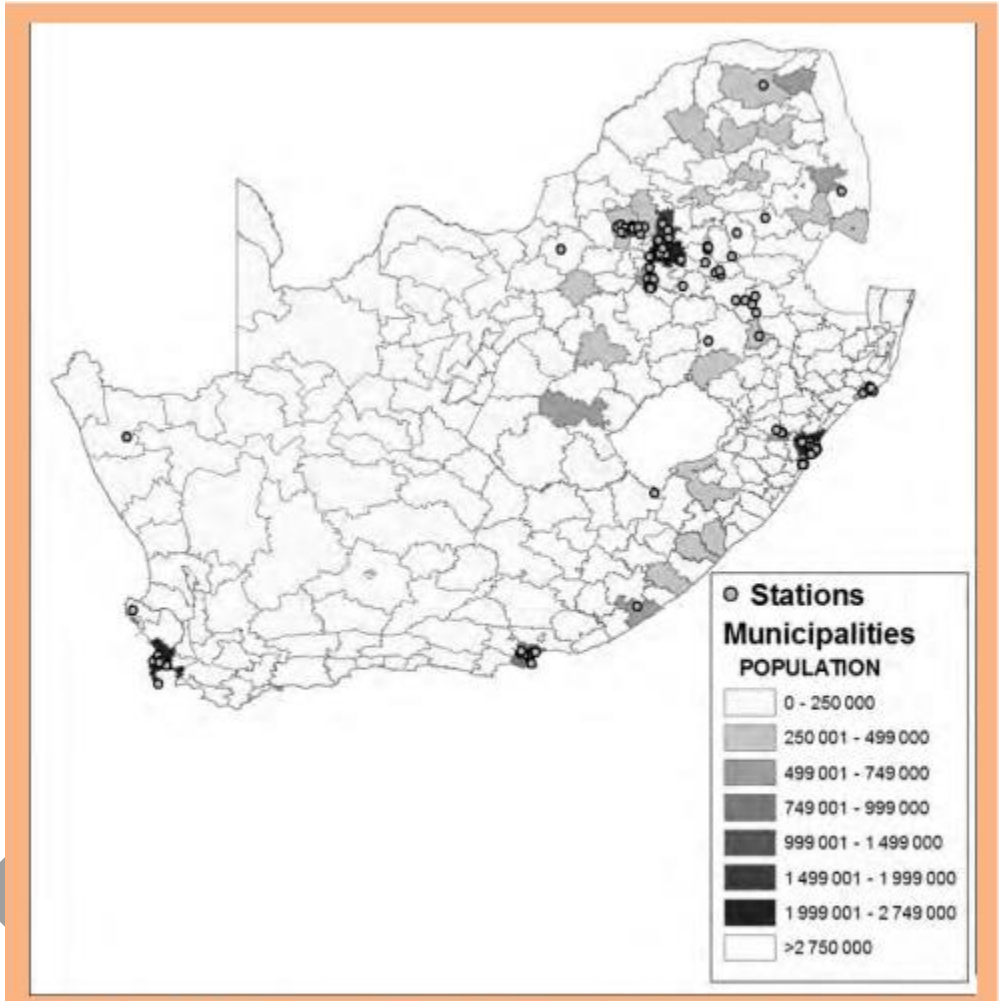


Figure B: South African population distribution by municipality, and the relative location of monitoring stations for ambient air quality. The municipal boundaries are demarcated, and the population bins used are those defined by SANS 1929:2005

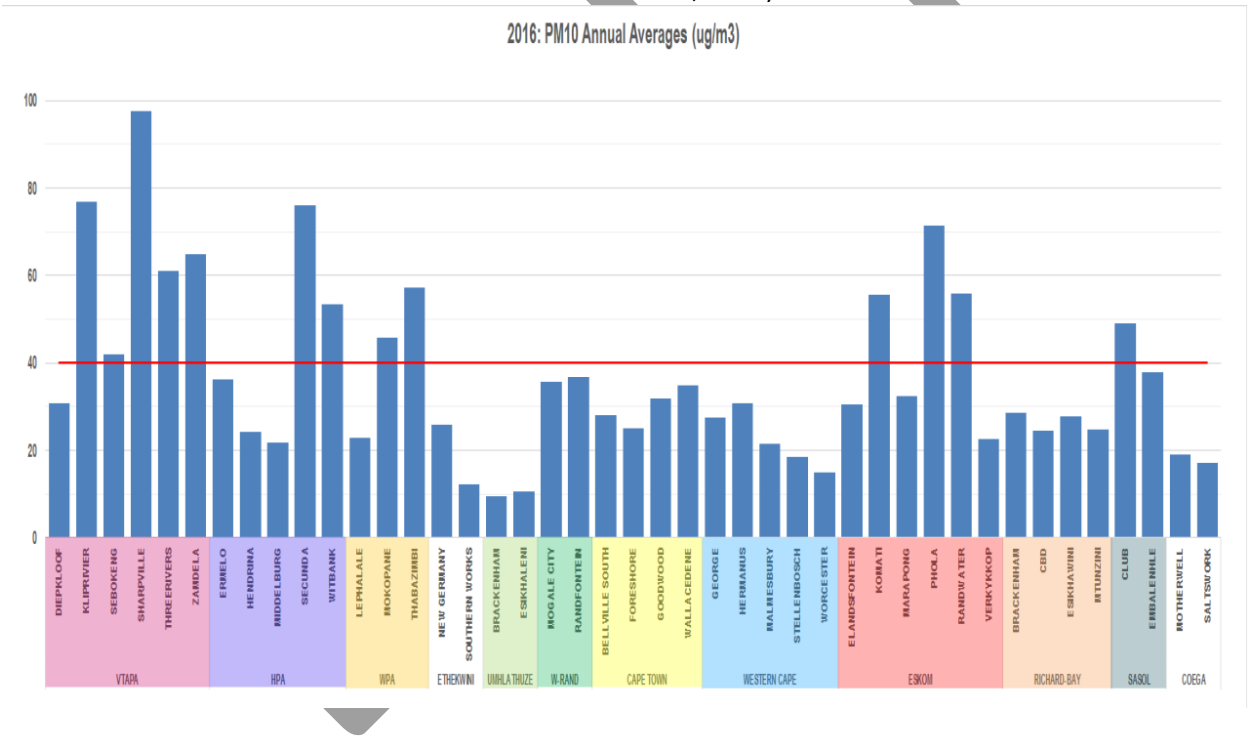
In South Africa the majority of air quality monitoring occurs in major centres with a significant presence of industrial areas, highly populated areas (Figure 67). It was found that in highly populated / industrial areas the monitoring networks were sufficient, however in those areas with a lower population figures the monitoring network was inadequate or the area was not monitored at all, as is the case in Ward 39. As a result the level of atmospheric pollutants in many areas of RSA could not be determined. This prevents an analysis on the potential impacts of these pollutants on human health as well as environmental health in those areas that do not have monitoring networks present (States of Air Quality Report, 2005; Isikhungusethu Environmental Services, 2012; Dept of Environmental Affairs, 2014; Dept of Environmental Affairs, 2017).

The absence of adequate networks in KZN, apart from those located in eThekwini, means that the ability to analyse the air quality in the province in substantially reduced. Therefore, the results cited in this document will be a summary of the overall analysis undertaken in South Africa, obtained from the 2017 State of Air Report.

5.5.6. Status Quo of Air Quality

Nationally particulate matter of 10 micons or smaller (PM_{10}) and 2.5 microns or smaller ($PM_{2.5}$) in addition to sulphur dioxide (SO_2) are monitored. From the emissions studies undertaken to inform the report, particulate matter, resulting from power stations, vehicle emissions etc, is still the greatest threat to air quality in South Africa. As the figure below shows, the main industrial areas of South Africa, the Vaal, the Highveld and the Western Cape areas are those areas in which the highest concentrations of particulate material are present (State of Air Report, 2005, Dept of Environmental Affairs, 2017).

Figure 68. Concentration of particulate matter of 10 micons or less in the atmosphere (Dept of Environmental Affairs, 2017)



5.5.6.1. Air Quality Management Strategies

In order to reduce the concentrations of pollutants, thereby improving air quality, there are a number of instruments that have been and are currently being developed. These tools include environmental legislation, emission inventories, dispersion modelling and concentration inventories. Table 15 briefly outlines some of the tools that are being utilised to control and monitor air quality in South Africa. Despite the rural nature of Ward 39 these tools must be utilised to maintain the air quality in this area, the integrity of which may be threatened due to increased urbanisation and commercial investment (State of Air Report, 2005).

Table 15. Framework for the monitoring and management of air quality in South Africa (State of Air Report, 2005)

Instrument/Tool/Strategy	Brief Description
Promulgation of the National Environmental Management: Air Quality Act (NEM: AQA)	Provides a clear institutional and planning framework for air quality management.
Development of South African Air Quality Information System (SAAQIS).	Ensures that credible data is readily available, to facilitate appropriate measures to improve air quality.
Development and maintenance of an effective air quality management framework.	Ensures that current and future potential impacts of air emissions in RSA are avoided, minimised or mitigated against.
Declaration of priority areas	In line with NEM:AQA, these areas are those in which air quality is being threaten through high levels of industry. If an areas is declared a high priority area an Air Quality Management Plan (AQMP) must be put in place and regular reviews undertaken to ensure that air quality has not deteriorated further.
Development of national, provincial, municipal and priority area AQMPs	In line with the NEM:AQA, this provides a management framework to manage those areas with poor air quality.
Strategy for addressing air pollution in dense low income settlements	Attempt to improve indoor and ambient air quality in dense, low income urban settlement through monitoring and *Basa njengo Magogo*, which is effectively creating more efficient burning indoor fires. Eventually the goal is for these areas to be in line with the National Ambient Air Quality Standards (NAAQS).
Atmospheric Emission Licence (AEL)	NEM:AQA ensures that anyone that undertakes a listed activity must hold an AEL, thereby control emissions.
Control of vehicle emissions	The adoption of the Euro-vehicle emissions for petrol driven vehicles, the reduction in Sulphur in Diesel and benzene in petrol and National Vehicle Emissions Strategy are reducing the pollutants emitted from vehicles.
Integrated energy plan	Owing to the reliance on coal for the production of energy, and Integrated energy plan, developed by the Dept of Energy, aims to reduce the demand for electricity.
Education and Awareness	Educate and improve the awareness with regards to the implications of poor air quality and how they could assist in reducing emissions.
Addressing Climate Change	Development of a National Climate Change Response Strategy and Implementation Plan as well as National Greenhouse Emissions Inventory.
National Air Quality Indicator (NAQI) for South Africa	The purposes of NAQI are: • Monitor the implementation of NEM:AWA, and the compliance to air quality standards • Assess and reflect national Air Quality trends • Inform the objectives of NAQI • Measure indicators • Act as a support tool for policy makers

	• Raise public awareness and support • Assist in determination and implementation of interventions • Development and implementation of human health standards for South Africa.

5.5.7. Conclusion

Owing to the rural nature of a large portion of Ward 39 and the surrounding areas, the air quality is relatively good. This is re-enforced by the fact that this area is not considered a high priority area with regards to air quality, which indicates that pollutants are not exceeding National standards. However, also as a result of the rural / agricultural nature of this area there will be periods when burning occurs, resulting in significant emissions.

Owing to the lack of monitoring networks in and around Pietermaritzburg, assumptions have been made based on the data obtained from various other networks around the country. Hence, in some areas there may be inaccuracies. A recommendation is to install and automatic monitoring station, to provide data for this area, that can be utilised in future monitoring and planning projects.

6. BUILT ENVIRONMENT AND HUMAN DEVELOPMENT

6.1. Socio-Economic Profile

6.1.1. Population Dynamics

6.1.1.1. Population Distribution

Based on Stats SA data obtained from Census 2011, with boundary adjustments for 2016, the population in Ward 39 was estimated at 13 586 people or 2545 households. This constitutes 9% of the total number of households in all wards of Vulindlela. After Wards 4 and 8, this is the least populated ward in Vulindlela. (Stats SA, 2011)

It is noted that the Eskom (2013) building count (referred to as dwellings henceforth) showed 2571 dwellings in Ward 39.[64]

i. Distribution

The area predominantly comprises rural traditional settlements. The houses in these settlements are mainly located within the traditional authority areas of Mpumuza, Funze and Qadi Traditional Councils. Table 16 provides the dwellings in each traditional council showing Funze TC is potentially the most populated whilst Mpumuza TC is the least populated. It is noted that over 14% of the population is located outside of traditional authority areas mostly on state land.

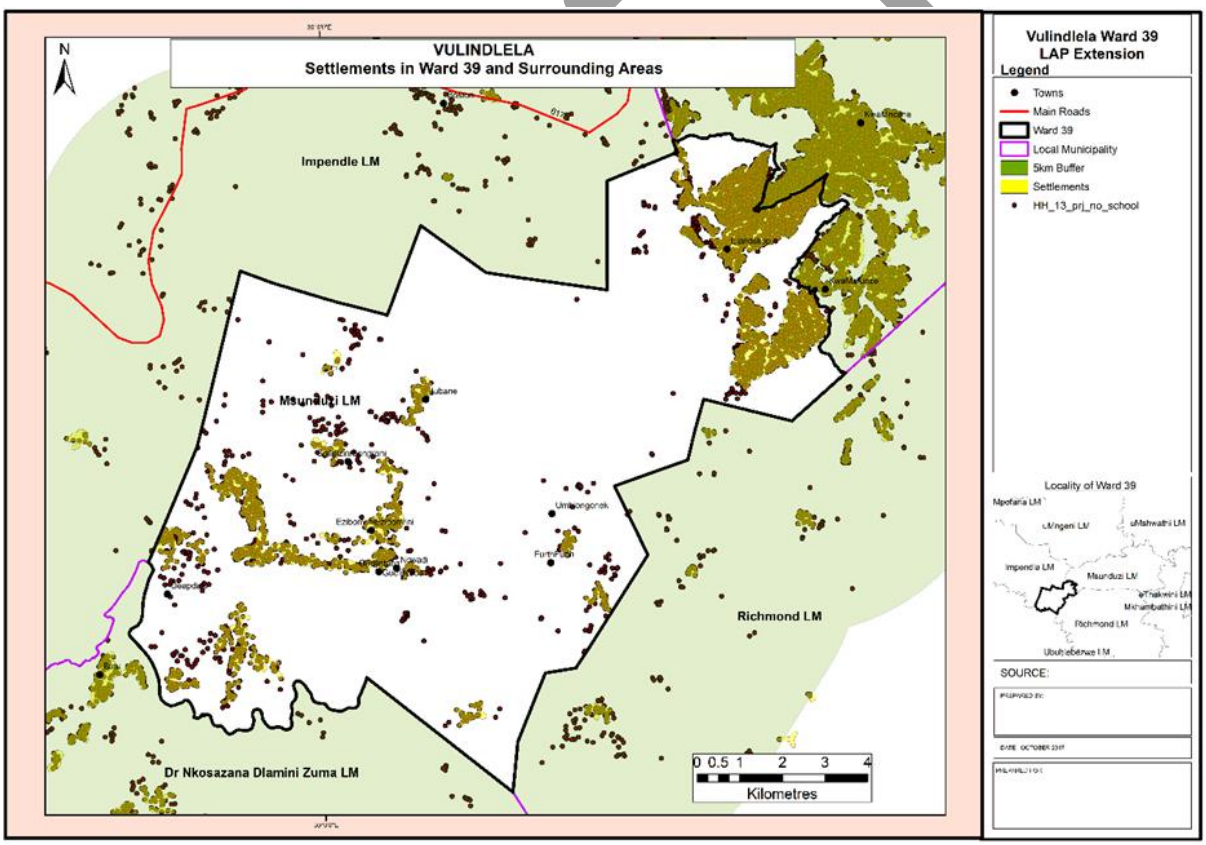
[64]Eskom (2013) data has been utilized in this report where information from Stats SA (2011) is not available. This is not to replace the household data, but rather to provide an indication of numbers from a dataset most closely related to household data. In the case of Ward 39 there is a difference of 26 between the number of dwellings from Eskom data (2013) and the number of households from Stats SA (2011) data.

Table 16. Number of Dwellings in Traditional Council Areas in Ward 39

Traditional Council	Dwellings	Percentage of Total Dwellings
Mpumuza TC	314	12%
Funze TC	1,083	42%
Qadi TC	813	32%
Outside TC Areas	361	14%
Total	2,571	100%

Sources: Isikhungusethu, 2017; Eskom, 2013

Figure 69. Settlement Distribution



ii. Household Size

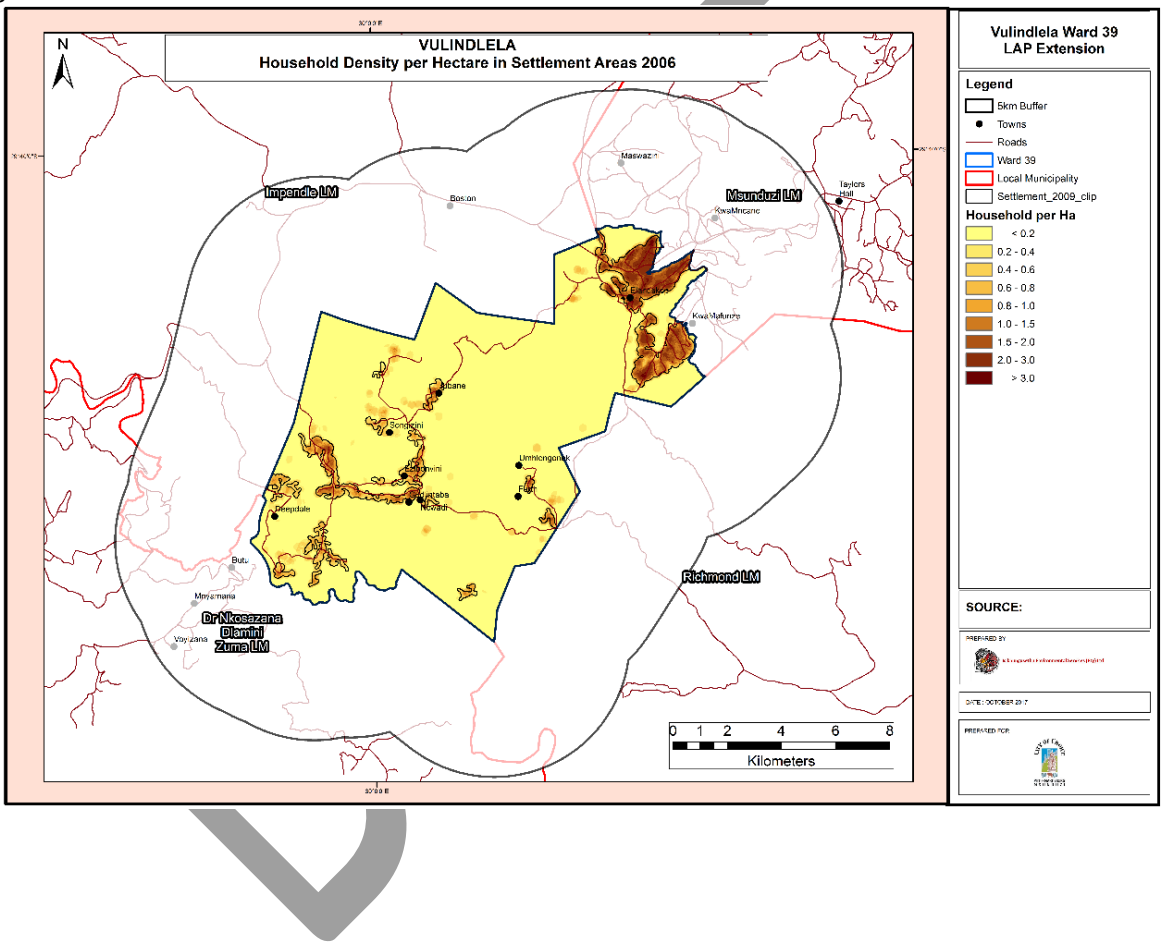
In Ward 39 the average household size is 4.86 persons. This differs from the remainder of Vulindlela where the average household size is 5.07 persons. The majority (397) of households indicated only one person in a household, whilst the second highest number (323 households) indicated four persons. (Stats SA, 2011)

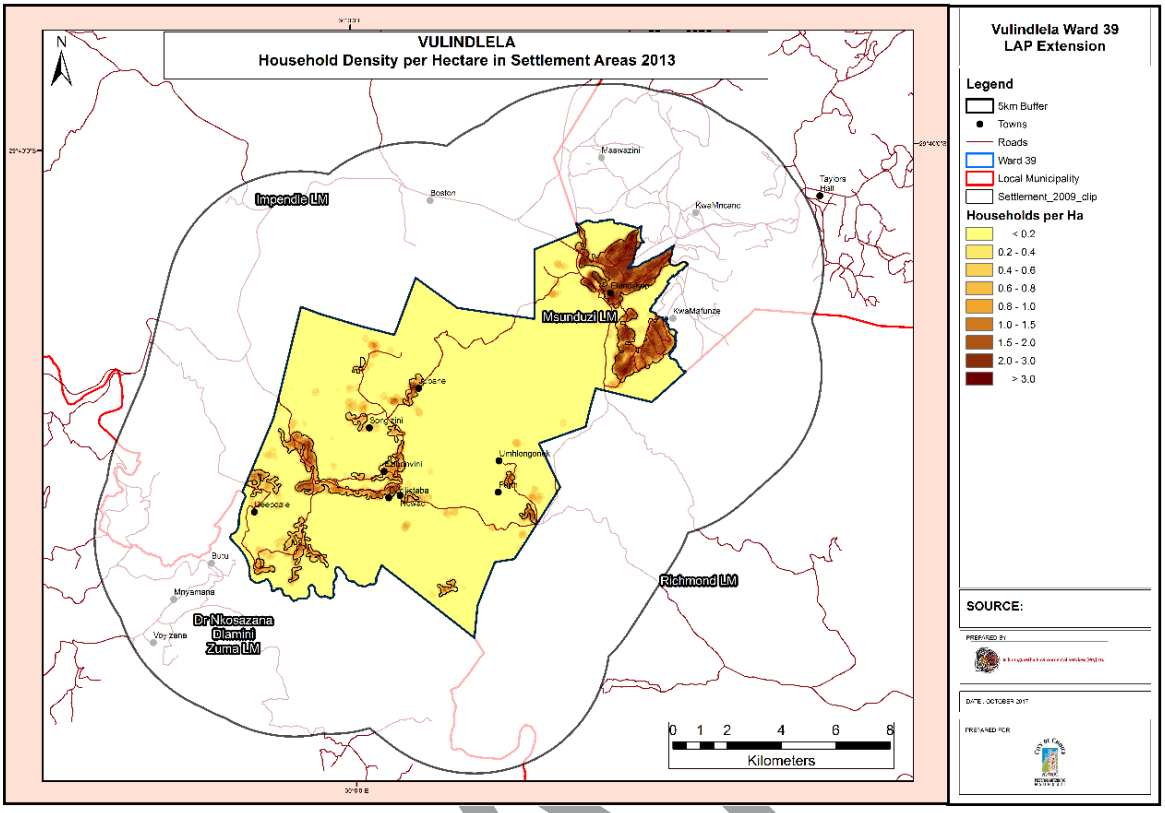
iii. Settlement Densities

Figure 70 shows comparative settlement densities in 2006 and 2013 where density in a settlement ranges from 0.72 to 2.9 dwellings per hectare. There was an average of 1.3 dwellings per hectare in 2013 with an increase in average density since 2006 of 0.13 dwellings per hectare across all settlements.

It can be seen in Figure 70 that the highest densities in ward 39 occur in the north eastern area. The lowest density settlements, in contrast, are located in the central, western and southern parts of the ward.

Figure 70. Settlement Densities 2006 and 2013





6.1.1.2. Population Growth

i. Historical Growth Trend

In the absence of any other growth factor for Ward 39, and consequently making use of the factor used in the VLAP (2% per annum) it appears that the population has grown from 13586 in 2011 to over 14700 people in 2015 and 15300 people in 2017.

As can be seen from Table 17 and Figure 71 there has been an increase of 12.5% in dwellings in Ward 39 from 2006 to 2013. The average growth rate per annum for this period is 1.78%. It must be noted, however, that the growth rate has increased significantly from 1.16% per annum in the three year period (2006-2009) to 2.61% per annum in the four year period (2009-2013).

Table 17. Settlement Growth

Years	Number of Dwellings	Percentage Increase of Dwellings	Annual Growth Rate	Annual Average Growth Rate
2006	2,250	14.3%		1.9%
2009	2,328		1.16%	
2013	2,571		2.61%	

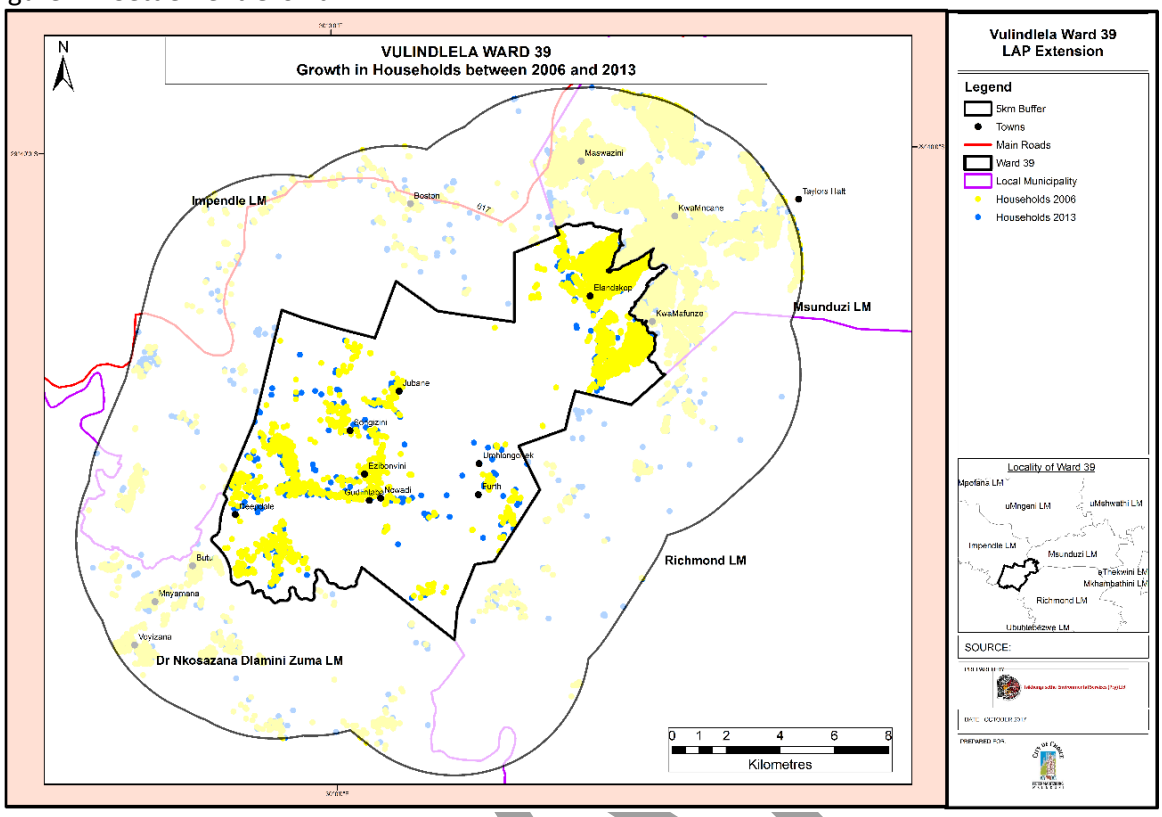
Source: Eskom, 2006, 2009, 2013

A sample count of increase in numbers of structures was undertaken for this project using Google Earth images. Growth rates of number of structures were calculated on these samples. It must be noted that these cannot be compared with the Eskom or Stats SA datasets due to the difference in definitions of structures, dwellings and households. Findings from the sample review indicate an increase in buildings of between 1.8% and 6.6% over the different periods shown in Table 18.

Table 18. Sample Review of Changes in Number of Structures

Sample Area	Year	Number of Structures	Difference in Number of Structure	Annual Average Growth Rate
Sample area 1	2006	154	30	1.8%
	2017	184		
Sample area 2	2006	37	27	6.6%
	2017	64		
Sample area 3	2008	67	14	2.6%
	2016	81		
Sample area 4	2008	43	15	4.4%
	2016	58		

Figure 71. Settlement Growth



It is likely based on VLAP growth data, that there has been an increase in dwelling structures in the north eastern area of Ward 39 in the more densely settled areas. This growth could be linked to the roll out of rural housing by Msunduzi Municipality and an influx of people into settlements in this part of Ward 39. In contrast, significant growth in the more rural settlements located in the central and western areas is unlikely to have taken place.

It is noted that there is no information on birth and death rates available at a local level and thus this cannot be included in this report.

ii. Future Growth

Following the medium growth scenario identified for Msunduzi in the LED Plan (2014) and used in the VLAP (2016) the indications are that there will be a population growth rate of 2% per annum. In terms of this growth rate, the population of Ward 39 could grow by 26% (19792 people) in 15 years (from 2015 to 2030) and by 50% in 35 years where there could be 29410 people by 2050. The growth pattern is likely to be uneven across Ward 39, and is likely also to be influenced by the implementation of capital investment in the area.

By utilising the same growth factor on housing/dwellings the following can be determined for growth trends in the three Traditional Council authorities (Table 19).

Table 19. Growth Trends in Traditional Councils

Traditional Council	Dwellings			
	2013	2015	2030	2050
Mpumuza TC	314	327	440	653
Funze TC	1,083	1127	1516	2253
Qadi TC	813	846	1138	1692
Outside TC Areas	361	376	505	751
Total	2,571	2675	3600	5349

Sources: Isikhungusethu, 2017; Eskom, 2013

6.1.1.3. Migration Patterns

Based on Census data (2011) the majority of inhabitants of Ward 39 were born in KwaZulu-Natal (97%). 96% of them had not moved from the Ward between 2001 and 2011 (Stats SA, 2011) whilst the remaining 4% (equating to just under 480 people) indicated that they had moved into the area in this time. The majority of incoming residents indicated that they came from an area within KwaZulu-Natal (43%) whilst smaller numbers came from Eastern Cape (2.5%), outside of South Africa (1.7%) and Gauteng (1.4%). A large number of those who had moved (241 people) into the area did not provide the area of previous residence.

It is noted that there is no information on outward migration at a local level and thus this cannot be included in this report.

6.1.1.4. Population Groups and Language

The black african population group dominates the area (99.7%) with the majority speaking *isiZulu* as their first language. Table 20 shows there are a number of other first languages in the community, however these are in the minority.

Table 20. First Languages of Persons in Ward 39

Language	Number of People
Afrikaans	19.2
English	220
IsiNdebele	151
IsiXhosa	22

Language	Number of People
IsiZulu	12,959
Sepedi	38
Sesotho	11
Setswana	76
Sign language	86
Tshivenda	1
Other	4

Source: Stats SA, 2011

6.1.2. Socio-Economic Characteristics

6.1.2.1. Age-gender Profile

53% of the population are female and 47% male. Table 21 that follows provides the age-gender profile of Ward 39 where it can be seen that the Ward has a very youthful population with 47% between the ages of 0 and 20 years of age. Of this age group there are marginally more males (52%) than females (48%), however in the other age groups females are more numerous than males, particularly above the age of 41 where 63% are female and only 37% male. This would seem to indicate a high level of absenteeism amongst work age males presumably involved in migrant labour.

Table 21. Age and Gender Profile

Age	Male	Female	Total	Percentage
0-20	3,316	3,069	6,384	47%
	52%	48%		
21-40	1,968	2,221	4,188	31%
	47%	53%		
41-60	794	1,211	2,005	15%
	40%	60%		
61+	368	640	1,008	7%
	37%	63%		
Total	6,445	7,141	13,586	100%

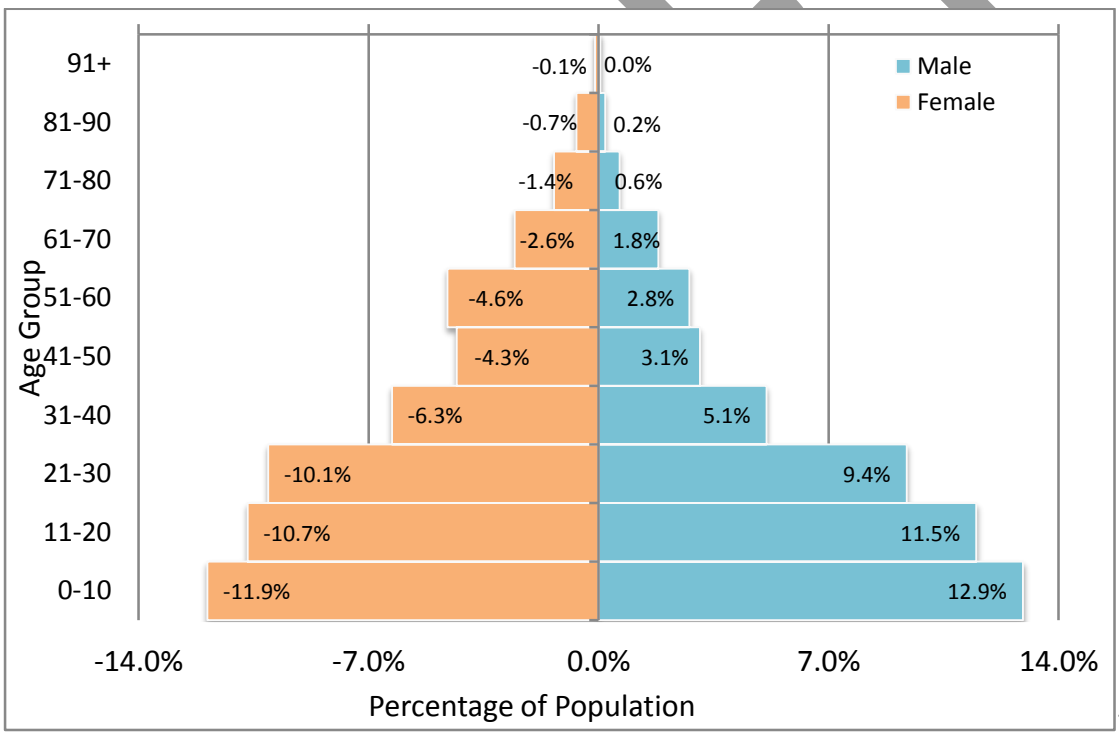
Age	Male	Female	Total	Percentage
	47%	53%	100%	

Source: Stats SA, 2011

Whilst the Census results in 2011 showed slightly more than 1000 people over the age of 60, it is interesting to note that members of the community estimate a significantly higher elderly population (4000 people) in 2017, however, the term "elderly" was not defined by them (Ward 39 Area Based Planning Community Meeting Notes, 3-9 March 2017).

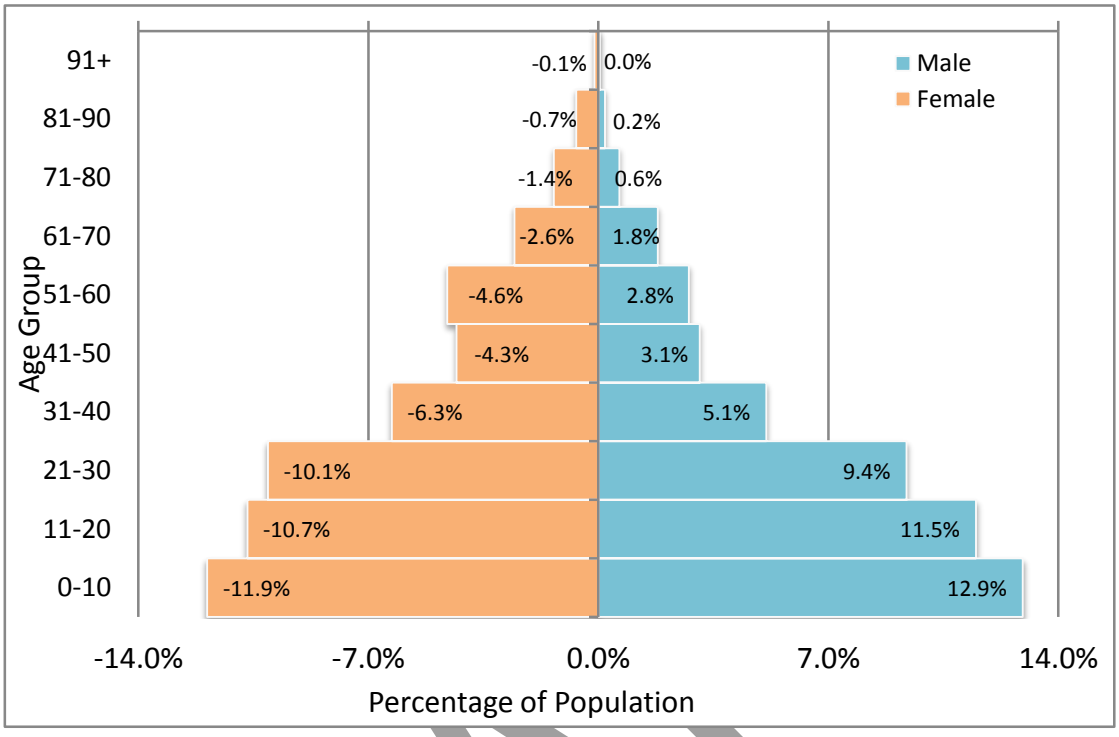
Further data sourced from Stats SA (2011) indicates that in Ward 39 the most number of people are aged 5, 17 and 2 where there are over 350 people in each of these age categories. The next highest age comprising more than 320 people each, are 3, 4, 14 and 15. The adult population (over 18 years of age) comprises 59% whilst 41% are younger. (Stats SA, 2011)

Further age groups are provided in Figure **72. Population Pyramid**



72 in the population pyramid prepared for Ward 39.

Figure 72. Population Pyramid



Source: Stats SA, 2011

In terms of household head data, Stats SA (2011) indicates that 55% of households are headed by females and 45% male. The majority (44%) of household heads fall in the 41-60 year age bracket. However, there are a significant number of households headed by the elderly (32%) and a small percentage (2%) that are child-headed. (Stats SA, 2011)

6.1.2.2. Educational Levels

At the time of the 2011 census, 5433 people were attending an educational institution. This is 45% of the applicable population (i.e. people above 5 years of age) whilst 49% were not being educated. The remaining 6% did not specify. (Stats SA, 2011)

Table 22 indicates that 12% of the applicable population had received no school education whilst 37% had received only some sort of primary level education. In total, 49% (5911 people) of the applicable population had less than grade 8 level of education. 18%, equating to 2098 people, had a matric whilst few (2.3%) had received some higher education. (Stats SA, 2011)

Table 22. Education Levels

Highest Education Level	Applicable Population (above 5 years)		Adult Population (above 18 years)	
	Number of People	Percentage	Number of People	Percentage
No school education	1,438	12.0%	1,348	16.7%
Junior Primary (Grades 0-2)	1,507	12.6%	278	3.5%
Primary (Grades 3-7)	2,966	24.8%	1,417	17.6%
Senior (Grade 8)	843	7.1%	473	5.9%
Senior (Grades 9-11)	2,828	23.7%	2,197	27.3%
Matric (Grade 12)	2,098	17.5%	2,072	25.7%
NTC	22	0.2%	22	0.3%
Other Higher Education	255	2.1%	253	3.1%
Total	11,957	100%	8,060	100%

Source: Stats SA, 2011

An analysis of the education levels of the adult population (i.e. excludes those of school-going age at the time of the census) shows that 17% had not attended school and a further 21% had some form of primary education. Thus, 38% of the adult population received less than grade 8 level of education. It is noted that 71% of the adult population equating to over 5700 people had less than a matric level of education. (Stats SA, 2011).

6.1.2.3. Employment Levels

Table 23 shows that 86% of the workforce (i.e. persons from 15 to 65 years of age) are unemployed whilst only 14% are employed. This low level of employment equates to 1150 people i.e. 8% of the entire population of Ward 39. As can also be seen in the table, 49% of the workforce are not economically active i.e. persons (such as full-time scholars and students, full-time homemakers, those retired and those who are unable or unwilling to work) not looking for work. (Stats SA, 2011)

Table 23. Employment Levels

Employment Status	Number of People	Percentage of Applicable Workforce	Percentage of Population
Employed	1,150	14%	8%

Employment Status	Number of People	Percentage of Applicable Workforce	Percentage of Population
Unemployed	1,906	23%	14%
Discouraged work-seeker	1,217	15%	9%
Other not economically active	4,077	49%	30%
Applicable work force	8,350	100%	61%
Not applicable	5,235		39%
	13,585		100%

Source: Stats SA, 2011

Of those employed, 67% are in the formal sector i.e. government, parastatals, registered non-governmental organisations and private registered businesses. A further 4% are employed in private households whilst 10% did not know in what sector they were employed. The remaining 19% were employed in the informal sector. (Stats SA, 2011)

6.1.2.4. Income Levels

As shown in Table 24 more than half of the population does not have an income, whilst 49% of the population earns an income. The majority fall into the income bracket of earning less than R4800 per annum. Less than 2% earn more than R76801 per annum. (Stats SA, 2011). It cannot be ascertained how many of those who receive an income derive that from government grants.

Table 24. Income Profile

Income Category	Number of People	Percentage of Population
No income	6,980	51%
R 1 - R 4800	2,635	19%
R 4801 - R 9600	550	4%
R 9601 - R 19200	1,717	13%
R 19201 - R 38400	418	3%
R 38401 - R 76800	225	2%
R 76801 - R 153600	148	1%
R 153601 - R 307200	62	0.5%

Income Category	Number of People	Percentage of Population
R 307201 - R 614400	17	0.1%
R 614401- R 1228800	2	0.0%
R 1228801 - R 2457600	1	0.0%
R2457601 or more	4	0.0%
Unspecified	826	6%
Total	13,586	100%

Source: Stats SA, 2011

It is noted that there is no information available on sources of income at a local level and thus this cannot be included in this report. The following short-term employment opportunities have been noted in the past:

- Government has financial support programmes:
  - EPWP and CWP projects employ youth from destitute households to cut grass, maintain school gardens, change street light bulbs and undertake maintenance in the ward.

The Department of Health employs people from low income households in the ward as Community Care Givers.

6.1.3. Summary of Socio-Economic Status Quo

A summary of the socio-economic situation in Ward 39 is noted below. These constitute the informants and constraints to developing the local area plan:

- Majority of households live within Traditional Councils areas
- Majority of the population resides in the north eastern area, in particular, in Funze TC.
- Relatively low densities in settled areas.
- Youthful population.
- Low levels of education.
- High unemployment levels.
- Past population growth trends are low.
- Appears to be an increase in population.

6.2. Settlement Patterns

6.2.1. Settlement Typologies

The need to establish different categories or types of settlement, to enable planned development interventions, has been the subject of debate in the developing world since the 1950's. Jacobs (2014) notes that in South Africa there are 18 million rural people or 4,6 million rural households resident in scattered and fragmented settlements. He further points out the reduction in rural population (32%) accompanied by a decline in the rural household size from 4,7 persons per unit in the 1990s to 3,8 per unit by 2011/12. Jacobs (2014) goes on to note that fragmented government intervention in rural development persists. This he argues further exacerbates the fragmented spatial fabric of rural areas inherited from colonial and apartheid eras. He argues the need for coordinated intervention by government agencies, not just in policy terms but through a common approach based on a more standardized inter-departmental settlement categorization system. This needs to be based on a set of common criteria namely: size of settlement, growth dynamics, density of dwellings, type and level of infrastructure, dominant economic sector(s) and location relative to major centres.

Schmidt and du Plessis (undated) note that in South Africa, government departments have identified 9 different typologies each structured differently to influence interventions in the urbanization process depending upon department mandates. They go on to note that there is no universal approach in place to define settlement typologies although there are a number of common defining criteria which include: size of population, density of dwelling units, growth trends of settlement (population and dwelling units), and type and level of economic activity. In their assessment of the 9 governmental settlement typologies Schmidt and du Plessis note the lack of synergy and inconsistency in these typologies resulting in often conflicting and contradictory interventions in settlement development. One of their key observations is the need in government for standardized and coordinated classification of settlement. They argue that this needs to be inclusive of a more nuanced classification system that has the capacity to accommodate the impact that apartheid policies have had on urban form in South Africa. They go on to note that urban and rural places should be viewed as integral parts of a continuous local, regional, national and international system which are inter-related through a complex web of social, economic, political, and environmental linkages.

Kahn (2015) supports the notion that colonial and subsequent apartheid policies led to segregation and dislocation of large populations from economic, services and retail opportunities. He argues that post-apartheid spatial planning has tended to entrench this distorted and unsustainable condition for rural populations. Based on a review of development trends in KwaZulu-Natal, Kahn (2015) notes that the notion of distortion in terms of settlement patterns is further complicated by economic growth trends, different types of land ownership and topography. These factors serve to impact on accessibility for those attempting to gain access to economic activities, information and services opportunities. Thus the massive upsurge in formal and informal housing development in traditional areas, particularly those adjoining metropolitan areas. Kahn notes that these high density - high growth settlements in traditional areas are located in areas with ease of access to transportation and a variety of services and economic opportunities for residents. The growth in population in these

areas derives from continuing in-migration from rural areas, from small towns and natural form increase (Isik 2009). Kahn describes these high density informal settlement areas as 'peri-urban transitional' located between high density formal development and low density scattered rural settlement. One of the features of the fragmented landscape created by apartheid and subsequent spatial planning is the notion of 'dislocation'. Thus, there may be pockets of isolated high density settlement located in relatively isolated areas which appear un-related to the urbanisation pressures described by Kahn. Similarly there may be tracts of land close to urban areas which are un-occupied and yet nearby there is high density informal development on small parcels of land. As noted, this phenomenon of 'dislocation' relates to planning policies (past and current), land ownership and economic drivers.

In the face of this complex set of dynamics, associated with rural development in post apartheid South Africa, the 2006 National Development Plan advocated investment on localities of economic growth and economic potential aimed at gearing up private sector investment. This was aimed at redressing past and current inequalities emanating from the apartheid era. The focus on investment in growth points was accompanied, in the 2006 NDP, by provision of basic services in rural areas where economic potential is low with the emphasis in these areas being on investment in human capital: enhance the potential for both economic and spatial mobility to growth centres with higher order services and opportunities.

By 2012 revisions to the NDP call for a more inclusive rural economy with a focus in investment in the transformation of rural settlement. There is recognition in the 2012 NDP that rural settlement, whilst on the decline, is nonetheless a persistent reality, particularly in the face of economic recession and declining metropolitan economies. The emphasis in the 2012 policy document is on promoting agriculture and the improved provision of infrastructure aimed at promoting rural economic growth and development albeit at small and micro scale.

It is in the light of the above observations that Kahn (2014) goes on to argue along with Jabobs (2014) and Schmidt et al (undated) that planned interventions in peri-urban and rural areas need to take place in the context of the full urban to rural settlement continuum, they need to be coordinated and standardized and they need to be nuanced and sensitive to a variety of factors including: population size, settlement density, mix of public and private places, socio-economic character of resident and surrounding (catchment) populations and locality in relation to other centres at local and regional scales.

Kahn goes on to identify the following broad settlement types as an enhancement to the typology developed for DRDLR in the 2009 Urban Edges – Rural Settlements project (Isik 2009). This typology includes:

Table 25: Settlement Typology

Type of Settlement	Description
Settlements	Low density residential structures agricultural orientation housing lower income groups.
Service Points	Concentration of services, but not necessarily houses.

Hamlets	Settlements comprising less than 100 people with a basic level of services. Insufficient population threshold to support higher order functions.
Villages	Settlements comprising 5000 people with limited higher order services. Increased threshold for improved services.
Towns	Wide range of social and commercial services with an established economic base, a defined CBD and a defined catchment.
Cities/Metro areas	The sphere of a city extends into district level and is inclusive of multiple residential, employment and services nodes.

Kahn argues for the establishment of a matrix comprising the above types of settlement juxtaposed to the following broad forms of settlement including: urban, peri-urban, rural transformation, rural, recreation, resources based (eg mining) and specialised.

In the 2015 VLAP (Isik 2015), it was noted that settlement in Vulindlela was characterized by varied location and nature and this was attributed to accessibility to: land, economic opportunities, and social and commercial services. Thus it was noted that: location, infrastructure, population size, social and economic profiles, density and growth of settlement in Vulindlela were effective tools in determining type and level of settlement development in the area. This was used to identify high, medium and low potential developments. On the continuum of urban to rural, described by Kahn (2015) Vulindlela was inclusive of the following components of his proposed matrix:

Table 26: Applied Matrix

Settlement Types	Urban	Peri-urban	Rural Transformation	Rural
Settlements		Yes	Yes	Yes
Service Points				
Hamlets				
Villages	*Yes*			
Towns				
Cities/Metros	Yes			

Thus it may be noted that owing to dislocation there are settlements in Vulindlela which are rural, peri-urban and transformative in nature, but which do not qualify for village or town status. The focus of the VLAP was to identify interventions that could be used by the municipality to redress this situation and over time introduce a differentiated nodal function into selected the peri-urban and rural transformation settlements such that the space economy of Vulindlela could be more fully integrated into that of Msunduzi. This in turn gave rise to the definition of 3 levels of centres/nodes in the VLAP depending upon a variety of factors. The most westerly of these nodes was identified at KwaMncane and included the high density – high growth settlements located at Mafunze, Songozini and Mkeshekeni. These were settlements located in the old Vuluindlela wards 7 and 8 prior to their inclusion of Ward 39.

The introduction of the central and western areas of Ward 39 into Vulindlela has served to introduce a new dynamic into the settlement typology for what now comprises this expanded management area

of Msunduzi. The absence of major settlement on state land immediately adjoining the densely settled areas at Mafuze, Songizini and Mkeshekene demonstrates the dislocation principle outlined above. This is compounded by the inclusion of the relatively inaccessible and isolated (topographically) Qadi traditional area located to the extreme west of Ward 39 (in the order of 120kms distant from Pietermaritzburg). This area is characterized by low density un-serviced (water, sanitation, electricity) settlement (relative to that in Vulindlela) which is located along major ridge lines which gain access to the regional transport route on the R 61 from Underberg to Msunduzi via Taylors Halt or Howick-Mphopomeni. As a consequence of the inclusion of Qadi in Ward 39 a 'village' has now been included in the typology matrix (red italics in the table) which is located at Ncwadi. This is the only village in Vulindlela due to the fact that it has colonial historical origins as a self-standing services centre albeit small with limited catchment and low socio-economic profile residents.

In terms of the current settlement pattern in what comprises the new Vulindlela it would appear that a new dynamic has been added in terms of a large area of largely undeveloped state land and a group of dislocated rural traditional settlements inclusive of a small largely non-functional village located on land with limited productive agricultural potential.

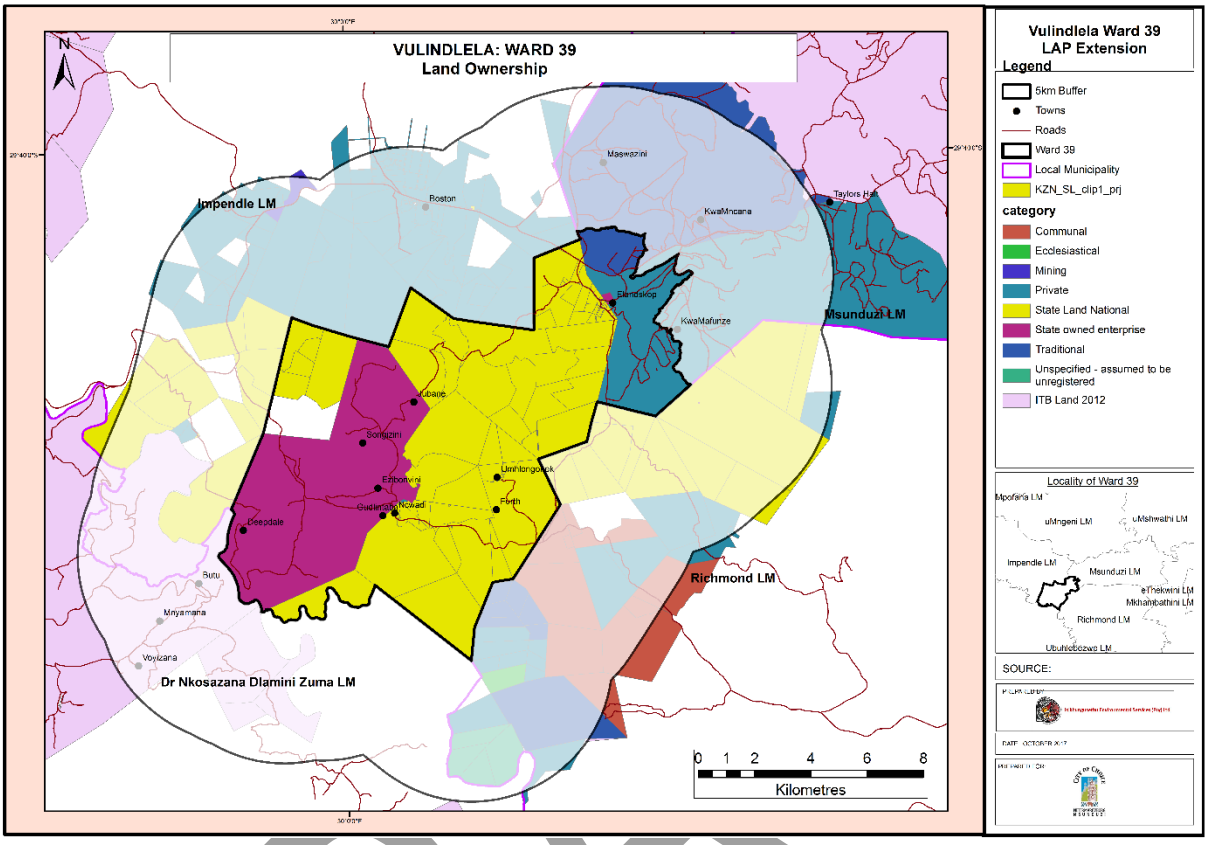
Hence the continuum from rural to urban in Vulindlela would now, in terms of this literature review, be inclusive of the components listed in the matrix above and provide a basis from which to investigate planning options in the assessment phase of this project.

6.2.2. Land Ownership

6.2.2.1. Ownership

Land within Ward 39 is owned by the State (DRDLR), State Owned Enterprises, Ingonyama Trust Board and South African Transport Services (see Figure 73). There are three Traditional Councils which have are represented in Ward 39 by the: Qadi, Funze and Mpumuza Traditional Councils. Based on 2015 landownership data, sourced from DRDLR (Surveyor General), Qadi is located on State Owned Enterprise land. Those portions of Funze and Mpumuza land which are located in Ward 39 are located on Ingonyama Trust Board land (Figure 74).

Figure 73. Land Ownership



Owing to the fact that there are different line function departments which own land in Ward 39, there are likely to be differing management, administrative and service delivery functions in each area. This diversity of responsibility is potentially complicated by the fact that the municipality has authority for land use planning and management over all land in its area of jurisdiction. However, Traditional Councils which occupy the land are competent to administer land allocation, but not land use planning and management which, as noted, is a municipal function. However, following tradition, these Councils continue to both allocate and administer land use in traditional areas in the absence of a formal agreement and local capacity to administer on behalf of the municipality.

In order to co-ordinate the complexities associated with ownership, land use management and administration, project delivery and operation and maintenance of asset some form of co-ordinatory mechanism is essential. This aspect of the Ward 39 Local Area plan is further considered under the institutional section 8 of this report.

Figure 74.Traditional Authority Areas (DRDLR, 2015)

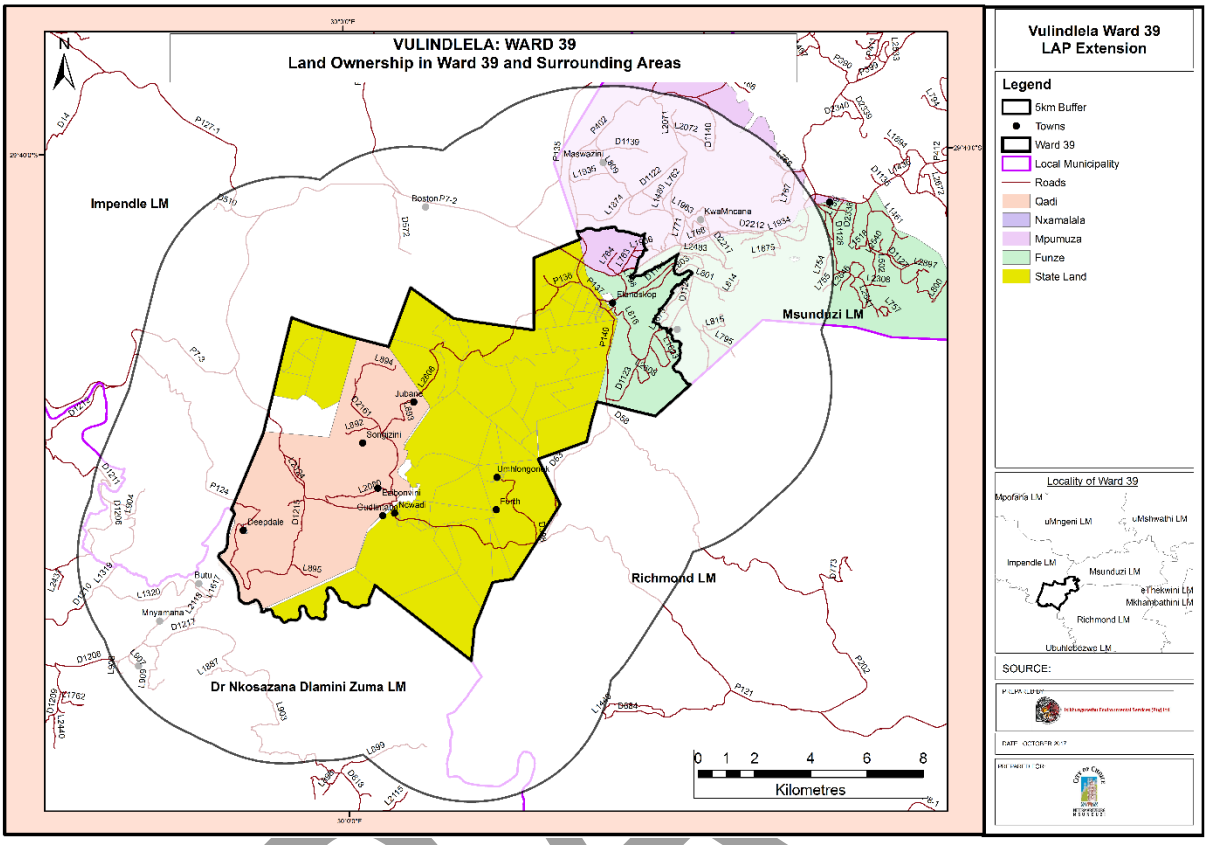


Table 27. Land Ownership (DRDLR, 2015)

Traditional Council	Area (Ha)	Dwellings	Percentage of Total Dwellings
Mpumuza TC	308	314	12%
Funze TC	1,221	1,083	42%
Qadi TC	3,671	813	32%
State land	7902	313	12%
Unknown	383	48	2%
Total	13,485	2,571	100%

6.2.2.2. Land Reform

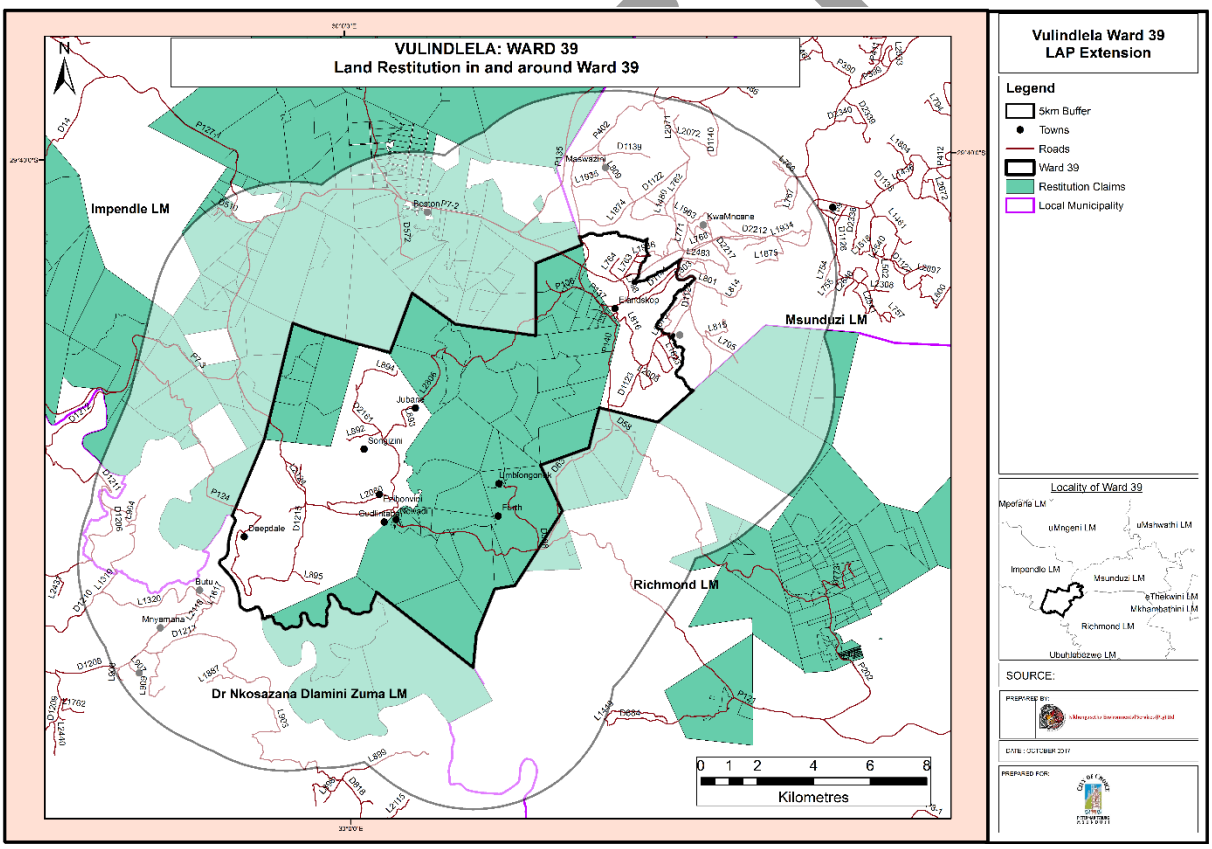
The land reform data supplied by DRDLR and shown in Figure 75 below indicates that there are a substantial number of restitution claims under consideration in Ward 39. There are als a limited

number of restitution cases on the ward 39 border in respect of both Dr Nkosazana Dlamini Zuma and Impendle Municipalities. In respect of the Nkosazana Dlamini Zuma Municpality, the 2016 SDF review indicated that the majority of the land around Ncwadi is currently subject to land restitution and claims.

Further, it indicated that Ncwadi as a potential node should be used to play a central role in provision of services to surrounding land reform projects in this area. (Nkosazana Dlamini Zuma SDF, 2016).

Enquiries with Department of Rural Development and Land Reform (DRDLR) in respect of land reform projects under way has not revealed any current projects. There appears to be a mismatch in respect of the mapping of land restitution applications and projects being undertaken by the department. This matter is currently under review.

Figure 75. Land Reform (DRDLR, 2015)



The DRDLR information indicates that there are a limited number of land reform projects to the north and south of Ward 39. If the mapping provided is infact correct this will hold significant consequences and implications for Ward 39 and its surrounds, as the restitution of claims could see a large influx of new residents and homesteads in an unplanned manner.

6.2.3. Human Settlement

The data that is readily available on human settlement in this area dates back to 2006. This involved Eskom in the delineation of settlement on the basis of criteria which included household densities. The criteria were designed to meet the requirements of Eskom in terms of determining energy provision to rural households.

Subsequent work on settlement was conducted by DRDLR (2009) where the focus was on density based on distance between dwelling structures (25 meters) and minimum number of units (i.e. 10 structures). This produced settlements which differed in terms of boundary lines from those of Eskom and were intended for spatial planning purposes.

During its phase (1995-2003) of Community Water Services Provision the then Department of Water Affairs produced a further set of definitions of what constituted a settlement and in turn used differing criteria with yet further delineations of settlement boundaries.

The notion of settlement is useful in terms of planning services provision and the ranking of areas in terms of size, density and making projections in terms of future land requirements. However, settlement boundaries have, since the advent of GIS, been computed mathematically and hence do not always equate or accommodate conditions at ground level. For example lower density scattered houses may be excluded from a settlement although in reality they form part of it. Similarly topography is often not taken into account although in some of the more recent modelling this can be accommodated in the algorithms.

Thus it may be, in status quo investigations into the location of households, that settlement boundaries, as indicated above, have limited application outside of capital investment planning and provision. Hence in the VLAP and subsequently Ward 39 planning, emphasis has been placed on the location of households in the status quo in preparation for the planning phase of the local area plan. This in no way affects the notion of 'settlement' as identified in Section 1 (Settlement Typology) of this report. In other words it is argued that settlements in rural and peri urban areas exist irrespective of the differing boundaries that are drawn around them for capital investment purposes.

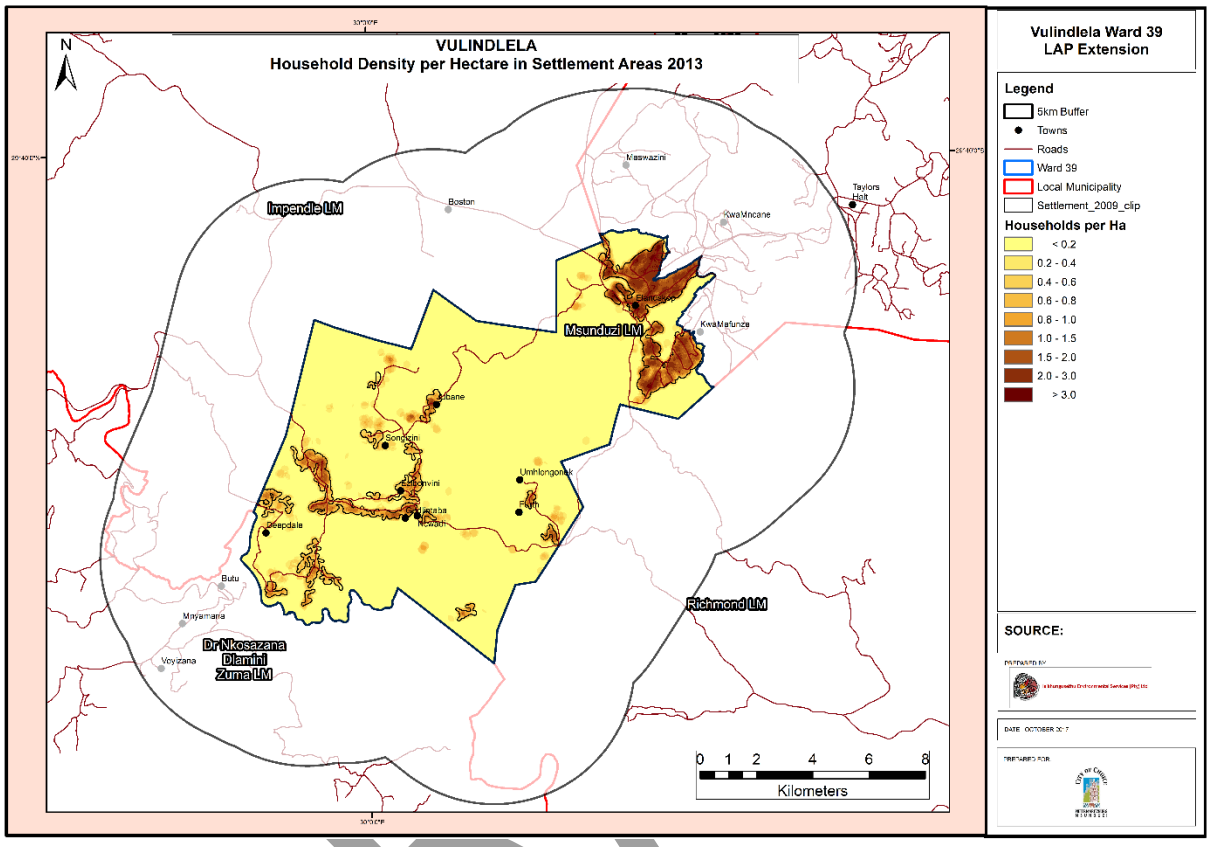
Once again there are a number of different interpretations on how a household is defined, particularly in traditional rural areas. Owing to the fact that Eskom has undertaken regular updates of households throughout South Africa since 2006 using Spot 5 Imagery, these data sets have been used (up to 2013 data) in this project to locate households and determine density and growth. Reference has been made to both the Eskom and DRDLR settlement data for determination of a broad hierarchy, but excluded for determination of the location of households.

6.2.4. Distribution of Households

The distribution of households in the Ward mainly relates to the following factors: topography, historical planning, land ownership, location of social and utility services and land allocation by representatives of traditional structures and government departments (Isik 2010). Thus it may be

noted in Figure 76 that there are relatively high concentrations of settlement on the eastern side of the Ward in what was previously part of Wards 7 and 8 of Vulindlela.

Figure 76. Household Distribution (Pers Comm, 2017)



This settlement historically bordered on commercial farms prior to acquisition by the State and hence the defined edge along property boundaries. The households located on this land fall under the Funze and Mpumumza Traditional Councils in settlement areas known as Mafunze and Songozima with a centre or node planned at KwaMncane in the VLAP.

In contrast settlement on land to the west of Ward 39 is mainly located on land owned by the State and administered by the Qadi Traditional Council. Households here tend to be located in linear developments along the road and services infrastructure in the Ward. There are concentrations of households in defined areas in the west which are included in Figure 76 above and extend from Jubane in the north though Songizini, Ezibomvini to Ncwadi and Deepdale in the south.

In both the Qadi TC and state land areas in ward 39 there is scattered settlement which falls below the density ranges used to define settlements by DRDLR and Eskom. The more scattered households are also located along transport and services routes albeit at a lower level than their more urban counterparts.

The distribution of households on state owned land in the central part of Ward 39 tend to be scattered at low densities over what appears to have been commercial farms prior to acquisition by the state.

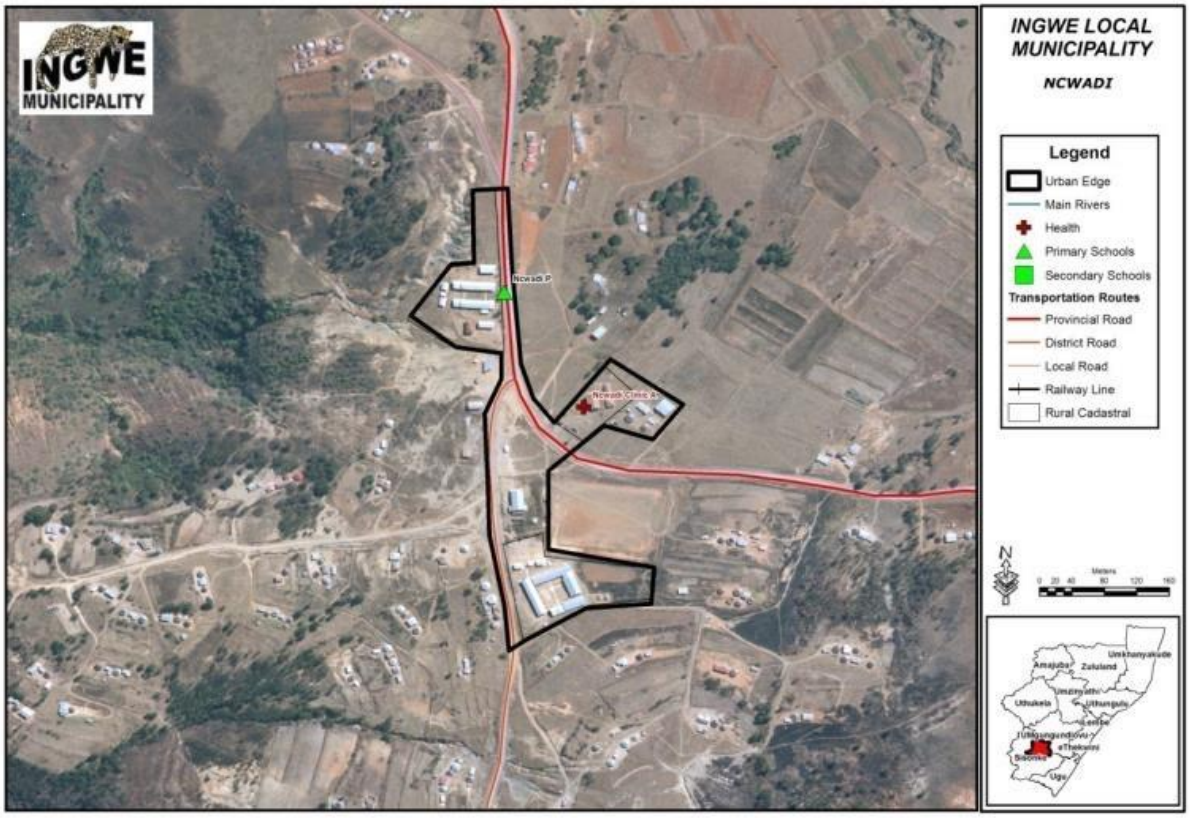
There are a few low density settlement concentrations on state owned land at Furth and to the east of Jubane and Gudlintaba. The lack of settlement on state owned land needs to be further investigated with the relevant directorate of DRDLR to establish what is planned for these areas in future.

Statistical information on household distribution is contained in the population distribution part of the Socio-Economic section of this report (see Section 6.1) and hence will not be repeated in this section.

6.2.5. Settlement Hierarchy

A hierarchy of nodes or centres was identified in the Msunduzi SDF (2016) and supported in the VLAP with further detail being provided on the proposed structure and function of each of the centres. This included the settlements located in the Funze and Mpumuza traditional areas located to the east of Ward 39. The remainder of Ward 39 was previously located in the NDZ LM where in the 2016 SDF it was established that Ncwadi, situated along the P124, was defined as a secondary node and that no other nodes were identified for this area. It was noted in the SDF that Ncwadi has great potential to be a thriving rural service centre for the surrounding community. (NDZ LM SDF, 2016). Currently Ncwadi settlement is serviced with a clinic and a primary school.

Figure 77. Ncwadi Node (NDZ, 2016)



The future role of Ncwadi in the Vulindlela hierarchy of centres will be determined based on a review of population, accessibility, functionality and its linkages with neighbouring centres in Ingwe such as Bulwer, Impendle and Hlanganani. The future role and function of Ncwadi in the hierarchy of centres in Vulundlela and greater Msunduzi will form part of the analysis of the status quo data in the next phase of this project.

6.3. Assessment

The findings of this component of the status quo would seem to indicate that the inclusion of Ward 39 into Vulindlela has added yet further elements on to the continuum of settlement identified in the VLAP. This involves inclusion of the following:

- Low density and largely un-serviced rural traditional settlement in both Qadi and on state land.
- A largely non-functional village in the form of Ncwadi in the Qadi traditional area.
- Limited economic capacity of the resident population to support or 'grow' a local resilient economy under current conditions – i.e. dependency on state grants and subsistence production.
- A relatively large area of un-developed and un-settled state owned land forming a buffer between the old wards 7 and 8 of Vulindlela and the Qadi traditional area.
- Un-coordinated administrative responsibility for the different components of this area relating mainly to land ownership and land administration.

These additional areas are topographically and infrastructurally (excluding rail) divided from what comprised the old Vulindlela. Thus for example extension of the Msunduzi bulk water system into the central and western areas of Ward 39 poses a challenge due to volumes and distance. Similarly topography limits the potential for improved road accessibility to Edendale and Pietermaritzburg. The historical rail link would be an ideal link if upgraded, as argued in the VLAP, but does not form part of the capital investment priority of the government agencies involved.

As noted in Section 1 of this report, these settlements and the 'village' largely fall outside of the settlement typology identified for Vulindlela and are subject to differing influences and dynamics being located so far away from the centre. As a consequence creative alternatives will need to be formulated in the Ward 39 plan which serve to harnass the agricultural potential inherent in the state land (see agricultural report) and the human potential resident in rural settlements. As noted in the NDP (2012) this may be an area where the emphasis in investment needs to be on human capital as opposed to place in order to give them opportunities in skills and mobility.

6.4. Alignment with VLAP

Alignment of Ward 39 through inclusion and integration in the VLAP will involve clear definition of the future role of Ward 39 in Msunduzi, re-definition of the settlement typology to include the un-

developed state land, scattered largely un-serviced rural settlement and poorly developed village. The revision of the typology will also need to include clearly defined functions for the Ward 39 area, the type and level of service that can be sustained, the return on investment that can realistically be achieved for Msunduzi and forward and backward linkages which can be utilised to promote the social and economic development of this area.

6.5. Services and Infrastructure

6.5.1. Transport and Utility Services

The 2015 Msunduzi Municipal SDF Review (2014) observes that Vulindlela is considerably less developed and less economically active than the other ABM regions in the Msunduzi Municipality. Similarly, the 2017 draft Municipal SDF review (p 111) identifies the current development restrictions in respect of the Ingwe portion of the newly created Ward 39, citing the road, electricity and housing needs in respect of this area, also reflected in the 2016/17 Ingwe SDF Review (160 -163). This area has largely been neglected in the provision of services and infrastructure. In addition, services have not been proportionately distributed across the new Ward 39. The more formal or urban areas in the east are better serviced and more connected than the peri-urban or rural areas in the south-west of the ward.

Utility services and access to transport are critical to creating decent living conditions and economic opportunities for citizens. The Msunduzi Municipality's IDP indicates that great improvements are needed to meet its goals and visions (Msunduzi Municipal SDF Review, 2014). Vulindlela has become somewhat a forgotten space in terms of development, both from public and private investment perspectives (Msunduzi Municipal SDF Review, 2014).

A step-by-step plan has been established to focus on integrating Vulindlela into the higher levels of service provided to other ABM zones in the Msunduzi Municipality (Msunduzi Municipal SDF Review, 2014: 6). It is intended to achieve this objective through better transport corridors, sustainable urban centres in key centres as well as a general improvement in service provision (Msunduzi Municipal SDF Review, 2014: 6). It is recommended that the same approach is followed in respect of the integration of Ward 39 into Vulindlela.

6.5.1.1. Transport

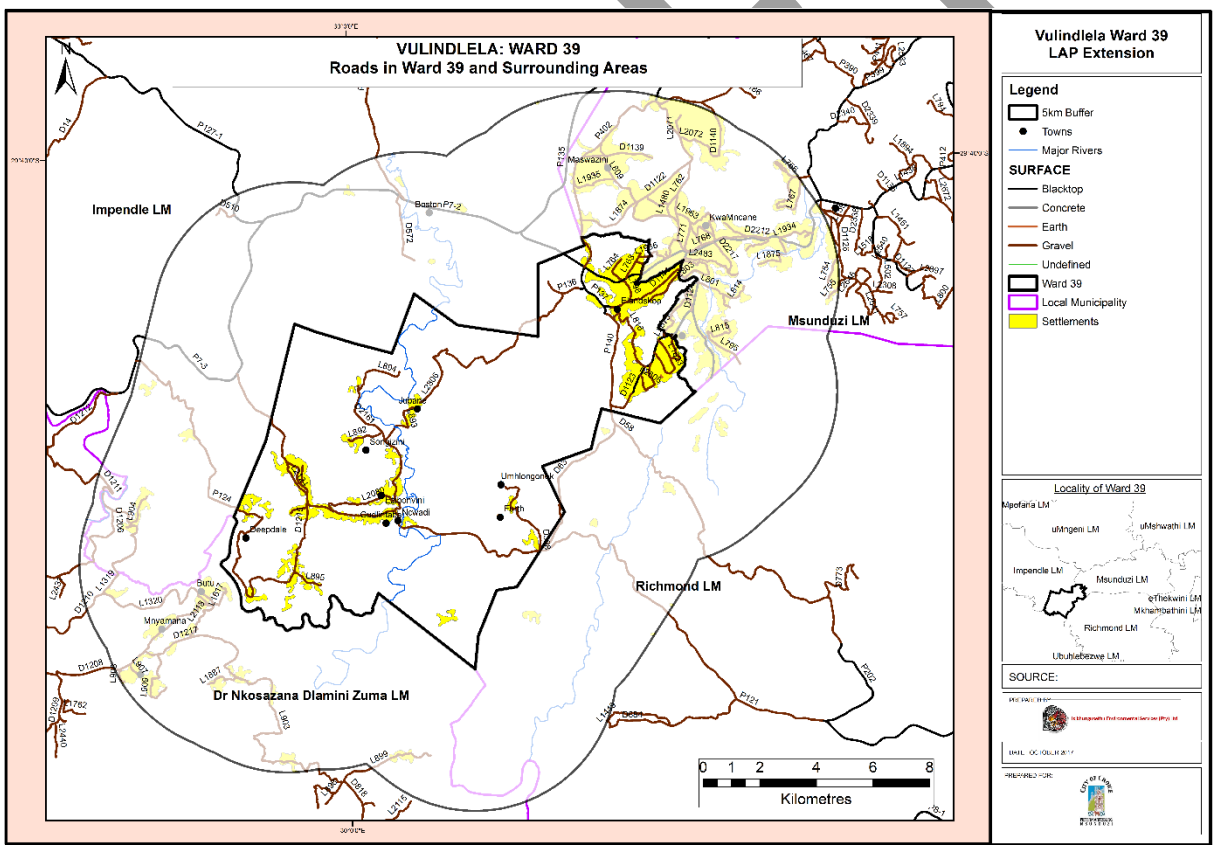
The inequality in respect of services, mentioned in the introduction above, is also evident in respect of the road network. The developed portions of Ward 7 and 8 (Vulindlela) in the north-eastern section of the newly-created Ward 39, are serviced by provincial road M70 and tarred local integrator roads, whilst the rest of the ward is serviced by gravel roads of varying quality. The road infrastructure is lacking both in terms of a well distributed transport network and neglected road maintenance. The lack of quality transportation infrastructure is a hindrance in the movement of people (Msunduzi Municipal SDF Review, 2014: 7). The limited choice of movement options is aggravated by the steeply undulating topography, located in the west of the Municipal area (Msunduzi Municipal SDF Review, 2014). The consequences of poor road maintenance include economic and social impacts such as

vehicle damage, property damage from storm water, difficulties in accessing properties and increased journey times. A major concern from the Ward 39 community is the dust emanating from the gravel roads leading to health concerns at the Ncwadi Clinic as well as reducing the lifespan of electronic equipment at schools.

There are two main routes traversing Ward 39. The M70 is the main provincial route connecting Pietermaritzburg town centre and Ward 39 as shown in Figure 78 below. The main route connecting the ex-Ingwe portion with Vulindlela, Bulwer, Boston and Richmond is the P 121, a relatively good gravel road. The P121 meanders in a south-southwest direction following the ridge line to the hamlet of Furth, whereafter it descends to the Mkomazi valley in a westerly direction and then proceed in a west-northwest direction to the Ncwadi node. From there if follows a steep climb in a northweasterly direction to the Boston – Bulwer Provincial Road R617.

The settlements of Furth, Umhlongonek, Gudlintaba, Ezibonvini, Songizini, Jubane, Ncwade and Deepdale are connected to the P121 *via* lower order local gravel roads.

Figure 78: Ward 39 road network (DoT, 2013)



The 2014 Msunduzi Municipal SDF Review provides the following insights:

- To perform at an optimal rate, maximum choice and accessibility must be provided to the people. This choice could refer to both the movement of pedestrians as well as vehicles. For sustainable

development to occur there needs to be less reliance and use of private modes of transportation and a movement towards more public orientated forms of transport.

- Sustainable transport also looks at ways of providing fuel efficient and environmentally safe alternatives, such a bus, train, cycling or even pedestrian orientated movements. "Sustainable transport systems would make a positive contribution to the environmental, social and economic sustainability of the communities they serve" (Msunduzi Municipal SDF Review, 2014).

Due to the topography of Ward 39, and its drainage to the Mkomazi river, its tributaries have necessitated the construction of a number of bridges (see Figure 79 below) to ensure access to the surrounding area, particularly to the south and southwest. Bridge construction substantially increases road infrastructure costs.

Figure 79: Recently (2017) partly re-constructed bridge of P121 over the Ncwadi River

The Msunduzi Integrated Transport Plan (ITP) considers the construction of a right of way lane from Northdale to Georgetown. To connect with this new public movement corridor, it will be important to consider options to provide access from Ncwadi to Taylors Halt and from there to Georgetown.

One of the considerations to create access from Ncwadi to Taylors Halt is the use of the 54.5 km of operational railroad from Deepdale station to Taylor's Halt station. Figure 80 shows that the railway line, and trains are operational, although at this stage not being used for passenger transport. A meeting with a community focus group on 13 December 2017 confirmed that the train is operated by by Transnet, but has been used for goods, essentially timber.

Figure 80: Functioning train and train-line

6.5.1.2. Bulk Water

The National Water Act provides for protection of the environment as well as addressing the basic needs of citizens (Bulk Water and Sewerage Services – Msunduzi Central Area and CBD Extension Node Local Area Plan, 2013). Minimum standards for potable water supply are described in the legislation and it is noted that these are not being met in the Vulindlela area (Bulk Water and Sewerage Services – Msunduzi Central Area and CBD Extension Node Local Area Plan, 2013).

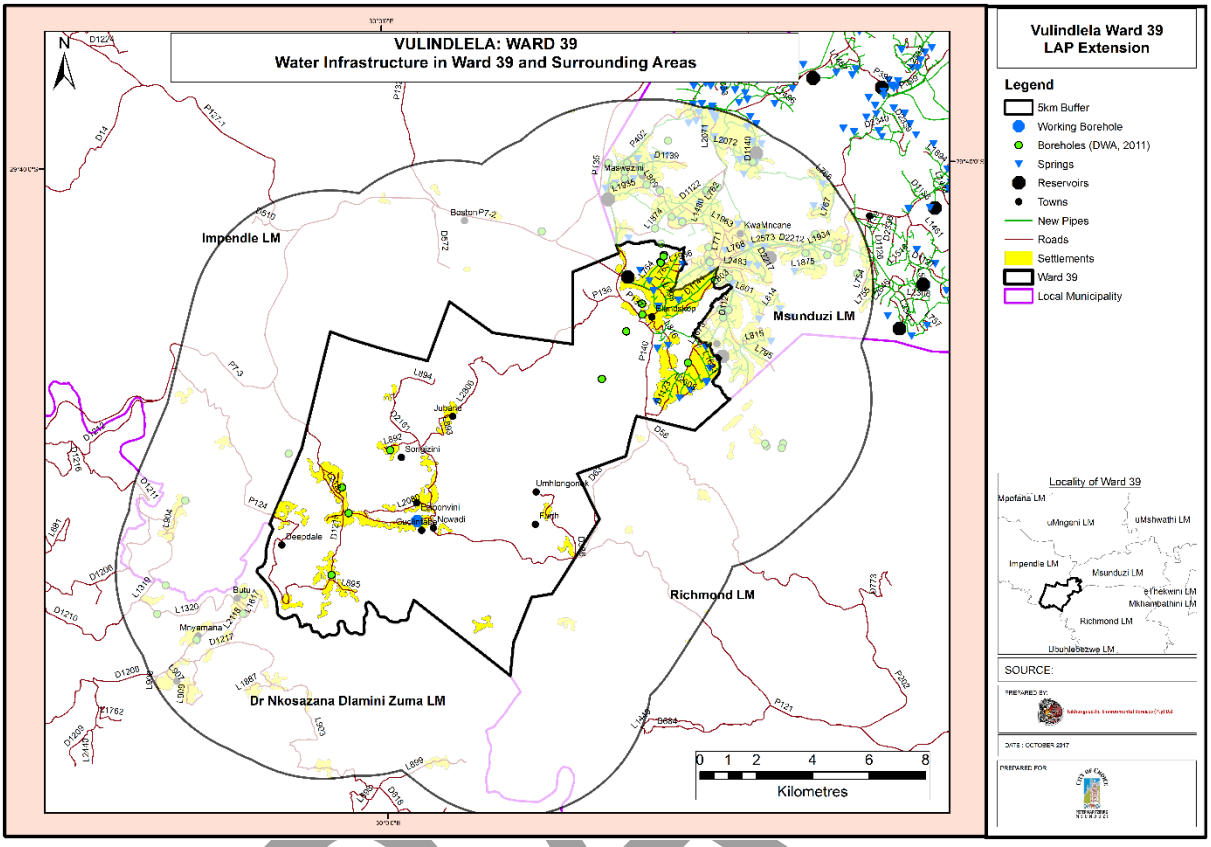
Ward 39 Bulk Water Provisions

The bulk water supply in respect of Ward 39 consists of two distinctly separate systems.

As pointed out in the introduction of the study, Ward 39 is constituted of 3 components, namely portion Ward 7 Vulindlela, portion of Ward 8 Vulindlela and Portion of Ward 7 Inge Municipality (now Dr Nkosazana Dlamini Zuma Municipality).

The Vulindlela portions of Ward 39 have had the benefit of a better reticulation network, with appropriately sized reservoirs and generally sufficient bulk supply to provide the required water demand, as depicted in Figure 81 below.

Figure 81: Current Water reticulation, Ward 39



Whilst the Vulindlela portion has reticulated water, the current measured bulk supply to Vulindlela shows that demand for water greatly exceeds the supply. One of the primary reasons for is likely to be the influx of people from outside the area and the unplanned erection of houses (uMgungundlovu District Municipality SEA & SEMP, 2013). There has been a rapidly increasing demand for water services in Vulindlela due to the uncontrolled and high settlement growth on traditional land (Msunduzi Work Session Notes, 2015). A second primary reason is likely to be due to the large number of unauthorized and unmetered connections as noted above. In 2009, 23 000 water meters were installed at yard standpipe connections, with the tally sitting at 25 000 water meters currently in Vulindlela. This equates to 38% of the total number of water meters in Msunduzi Municipality. Municipal officials are unable to determine the number of illegal connections in the area but it is estimated at approximately 22 000 (Msunduzi Work Session Notes, 2015).

Furthermore, it is known also that water losses (unaccounted for water) are high.

In contrast, the Portion of Ward 7 Ingwe has been dependant on borehole systems.

(i). Water demand, ex Ward 7, Ingwe

Engeolab (2017, p 6), appointed by Msunduzi Municipality to determine the borehole capacity, following their assessment of the geohydrological capacity of the project area (portion of Ward 7, Ingwe) confirms that the, "… water demand has steadily increased from 2002 to 2017 and currently

exceeds the available volume from the single borehole (Borehole A) or the backup borehole (Borehole C)."

Their assessment identified seven existing water sources with a 3km radius if the project site, as detailed Table 28 below.

Table 28: Existing borehole sources (Engeolab, 2017)

Source Number	Latitude WGS84	Longitude	Source Type	Depth (m)	Static Water Level (mbgl)	Yield (l/s)	Existing Equipment	Condition / Status	Photo
Existing Borehole 1	S29 46 49.2	E30 01 17.3	Borehole	?	?	?	Handpump	Not Working	Photo 1
Existing Borehole 2	S29 46 08.9	E29 58 58.5	Borehole	?	?	?	Handpump	Working	Photo 2
Monitoring borehole	S29 46 36.2	E29 59 31.5	Borehole	120	?	1.3	Casing & Lid for Monitoring	Working	
Borehole A	S29 46 44.6	E30 00 19.1	Borehole	36	4.85	14	Electrical Submersible	Working	
Borehole B	S29 46 48.0	E30 00 32.3	Borehole	106	4.9	14	Monitoring casing	Working	
Borehole C	S29 46 44.6	E30 00 21.0	Borehole	37	4.93	14	Electrical Submersible	Not Working	
Borehole D	S29 46 45.5	E30 00 21.1	Borehole	90	6.5	4.4	Monitoring casing	Working	

Photo 1: Existing Borehole 1

Photo 2: Existing Borehole 2

In respect of the above boreholes, there are two boreholes along the P121 road adjacent to the Ncwadi river after the Old Ncwadi hotel. Only the one borehole is operational at present. This water is pumped to a 400kl reservoir 860m NNW from the Ncwadi Clinic, depicted in Figure 82 below.

Figure 82: Reservoir above the Ncwadi clinic

This is, in turn linked to a 200 kl reservoir built closer to the Ncwadi/ Boston road intersection (1.85km further NNW with height gain of 208m) the filling of which is dependent on the water level in the main (lower) reservoir. Without that level being achieved, the pump will not activate to lift water to the higher level. The pump to the higher elevated reservoir is linked to a float which in turn is dependent on the water level. Of recent the water levels in the main reservoir has not reached the critical level, which means no water can be pumped to the higher reservoir. These two reservoirs are able to meet a 60 litre *per* person *per* day Ncwadi area demand when adequate water supply enables the pump to be operational.

A dual system approach has been initiated to address the water demand issues in respect of the Ward 39. The first phase will deal with the optimal use of the current infrastructure. The second Phase will look at augmenting the current capacity with additional water from Vulindlela Ward 8 reservoir (Reservoir number 10).

There is a further long-term plan to construct a small treatment works near or at the new Mkomazi offtake for supply to Ward 39 and the surrounding rural communities within the Harry Gwala municipal area which require reticulated water. The Mkomazi dam is a major construction currently funded by the Department of Water Affairs. There is major pressure for completion of this scheme as it is predicted that the Durban Metro will experience serious water shortages by 2020 (i.e. domestic supplies cut to 30%).

In respect of phase 1, the borehole system needs to be reived and improved. This will allow for a temporary solution to the current water provisions for the Ncwadi region.

In parallel with the above process, business plans have been prepared to utilise the number 10 reservoir in Ward 7, to pump water to the Ncwadi clinic area. This business plan has been submitted for consideration. The “blue line” from reservoir 10 to the Ncwadi Clinic represents the intended

route and water to provide a constant and sufficient supply of water to the Ncwadi community, as detailed below. This will also include the construction of a new 5KL reservoir above the clinic to ease the water demand requirements.

Figure 83: Proposed pipeline from reservoir 10 (Ward 7 Vulindlela) to reservoir above the Ncwadi Clinic

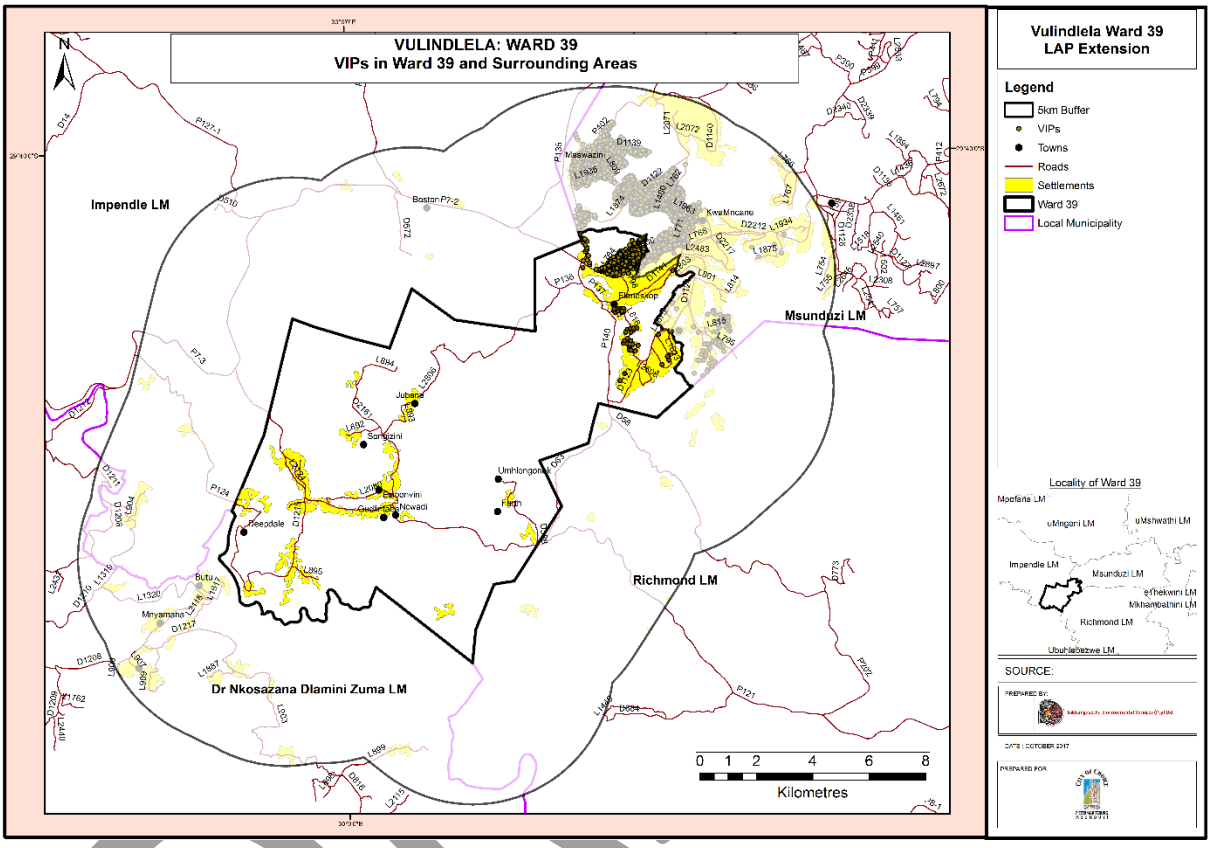
The timeline to achieve the two water related projects will require 3 to 5 years.

Wards 7 and 8 Vulindlela generally have a stable water supply.

6.5.1.3. Sanitation

Figure 84 depicts the erected Pit latrines (VIPs) from 2010 to 2016, in Vulindlela.

Figure 84: Pit latrines erected in Vulindlela between 2010 and 2016 (Qwabe[07.12.2017], Msunduzi Municipality: Water and Sanitation)



Ward 39 has no reticulated sewerage system. Sanitation planning for the area is to construct a Ventilated Improved Pit (VIP) latrines for each household: this programme, presently being implemented, seeks to eradicate sanitation backlogs in the area. Substantial progress has been made in respect of those ex-Ward 7 and 8 portions now part of Ward 39. Over the period 2010 to 2014, 8300 VIPs were installed in Vulindlela.

Ex-ward 7 Ingwe is however not as well serviced in respect of VIPs.

Discussions with Qwabe (07.12.2017, Msunduzi Municipality: Water and Sanitation) revealed that there is a need for VIP toilet facilities in Ward 39. Funding for 140 VIPs for the 2017/18 year has been secured and all the funding will be used for ex-Ward 7 Ingwe portion of Ward 39. A Municipal Infrastructure Grant application has already been submitted. It is the intention to have these VIPs erected before the end of July 2018. The exact positioning is not known at this stage and will be subject to needs identified by the Traditional Authority structures.

While VIPs may be the most appropriate form of sanitation in low density rural areas, their use can pose a health risk in high density settlements, particularly where use is made of surface and ground water to supplement domestic water supply. The residential density in ex-Wards 7 and 8 Vulindlela does not exceed 15 units per hectare. These housing densities raise questions regarding the health and safety of the current sanitation system being implemented in Ward 39 unless this remains at close to present low density levels and which might accord well with its rural-and-primarily-agricultural base, it being noted that the geology north and northeast of Elandskop is very different from that lower within the Mkomazi catchment.

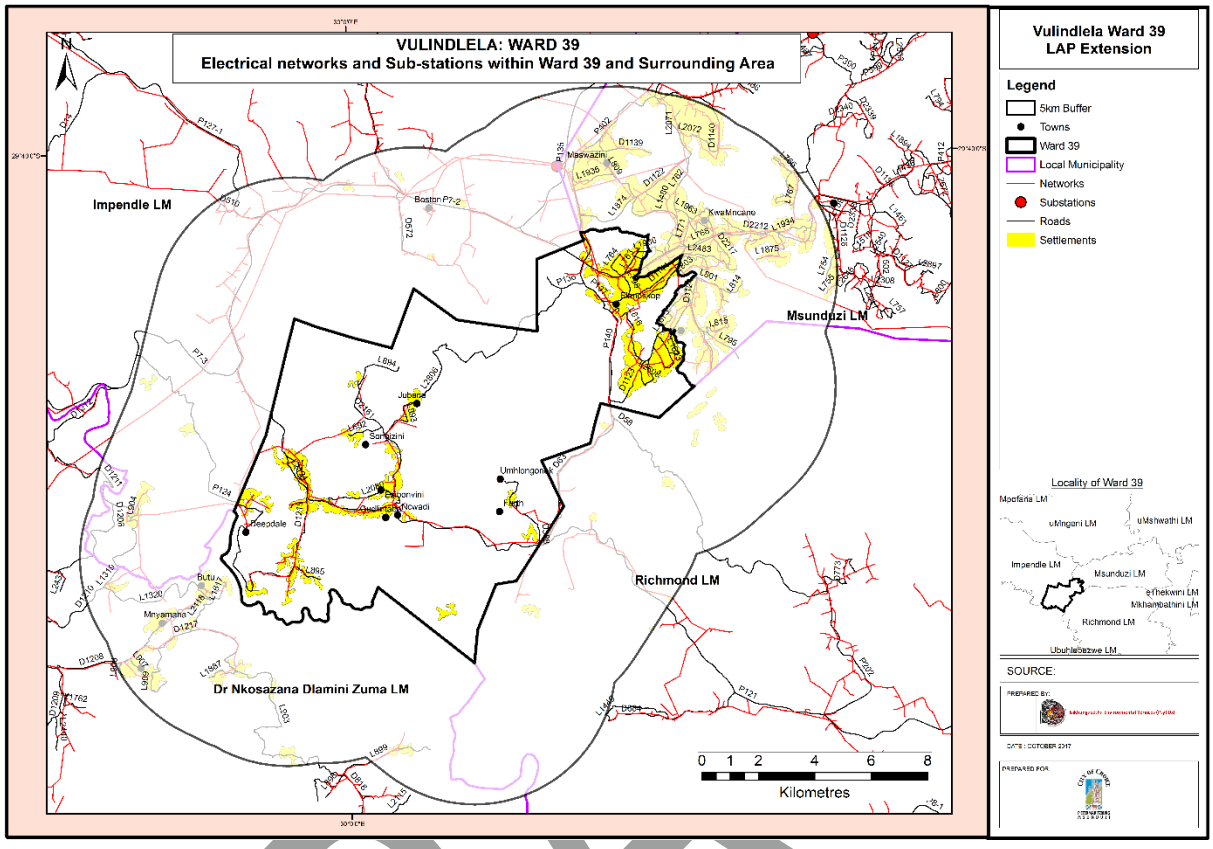
The provision of waterborne sanitation to any of the areas in Ward 39 in the foreseeable future is very unlikely primarily due to its unaffordability and the lack of sufficient water. There is also the question regarding the treatment of the effluent at Darvill Sewage Works in terms of its capacity to process additional volumes of sewage, as raised with Qwabe (07.12.2017, Msunduzi Municipality: Water and Sanitation). It is recommended that further investigation be undertaken.

The management of the VIPs requires attention, and preferably a strategic policy by Msunduzi. Ideally, the policy should identify fast-growing, high density areas which should be considered for phased conversion to waterborne sewage disposal. The policy should also deal with the systematic upgrade of the Msunduzi Waste Water Treatment Works, to accommodate the additional pressure on the existing system. At the same time, attention should be given to the improved management of VIPs. At this stage, a new French drain is prepared when VIP reaches its capacity. It would be more beneficial for the environment and groundwater resources if VIPs could be cleared and treated at a Waste Water Treatment plant.

6.5.1.4. Energy

Figure 85 shows electricity distribution in respect of Ward 39. From the information provided it is evident that Ward 39, with the exception of a hamlet in the South, is adequately services in respect of power. Future extension of power networks should consider and encourage solar and other renewable sources seeking to become more sustainable. During the preparation of the Vulindlela Local Area Plan in 2015, Eskom had indicated that electrical lines in Vulindlela have nearly reached capacity, with 2 lines over capacity, 2 lines nearing full capacity and one other which is still within its capacity range. The need to consider other sources of energy is no longer an option, but a necessity.

Figure 85: Electricity supply to Ward 39 (Pers Comm, 2017)



Electricity is predominantly used for heating and lighting purposes while wood is used predominately for cooking purposes (Msunduzi Local Municipality (Vulindlela – Ward 4) Community Based Plan Report, 2011).

6.5.1.5. Solid Waste

Solid waste collection and disposal for Ward 39 cannot be considered in isolation of dealing with solid waste in the Msunduzi municipal area as a whole have been addressed and resolved. Waste disposal is a very real, and growing, issue in Ward 39. Waste disposal is a complex issue that requires strong political and management application and is unlikely to be resolved in the short term.

Few if any households in Vulindlela have access to this service (Msunduzi Local Municipality (Vulindlela – Ward 4) Community Based Plan Report, 2011). Waste is predominantly buried or burned in household yards or deposited randomly in public open spaces (Msunduzi Local Municipality (Vulindlela – Ward 4) Community Based Plan Report, 2011). This method, based on logistical challenges and costs may be the least-cost short-term solution, but holds in risks both in terms of fire and health hazard as well as air pollution, and will result in longer-term clean-up and safety costs. This requires policy directives and could also provide commercial opportunities through recycling.

6.5.1.6. Telecommunications

The majority of the people in Ward rely solely on their cell phones (Msunduzi Local Municipality (Vulindlela – Ward 4) Community Based Plan Report, 2011 and Qadi Traditional Authority meeting 10.11.2017).

However there are an adequate number of Telkom masts present in the majority of the Vulindlela area, therefore, it is assumed that landlines and internet connections are available to a limited extent. However, there are still some areas within Vulindlela that don't have coverage.

6.5.1.7. Information Technology

There is a technology and innovation hub in its initial phases, being planned for the Pietermaritzburg Airport. This is being supported by the National Department of Science and Technology.

6.5.1.8. Cemeteries

The 2016/17 Ingwe SDF Review (p 42), merely draws attention to the requirement that "*cemeteries should be accessible to the public, well fenced and be located away from water courses and that there should be a provision for parking for both public and private transportation*". The draft 2017 Msunduzi SDF review does not address cemeteries.

A community focus group discussion on 13 December 2017 revealed that burials for local communities take place on the family homesteads. Non-local resident burials take place in cemeteries. There use to be a cemetery associated with a local church, but that has long since reached capacity and is no longer in use.

Monitoring of the cemeteries is undertaken, only of the formal cemeteries. There is no monitoring or analysis of informal cemeteries or homestead burials, therefore the impacts that these may pose are unknown and not quantified.

6.5.1.9. Firestations

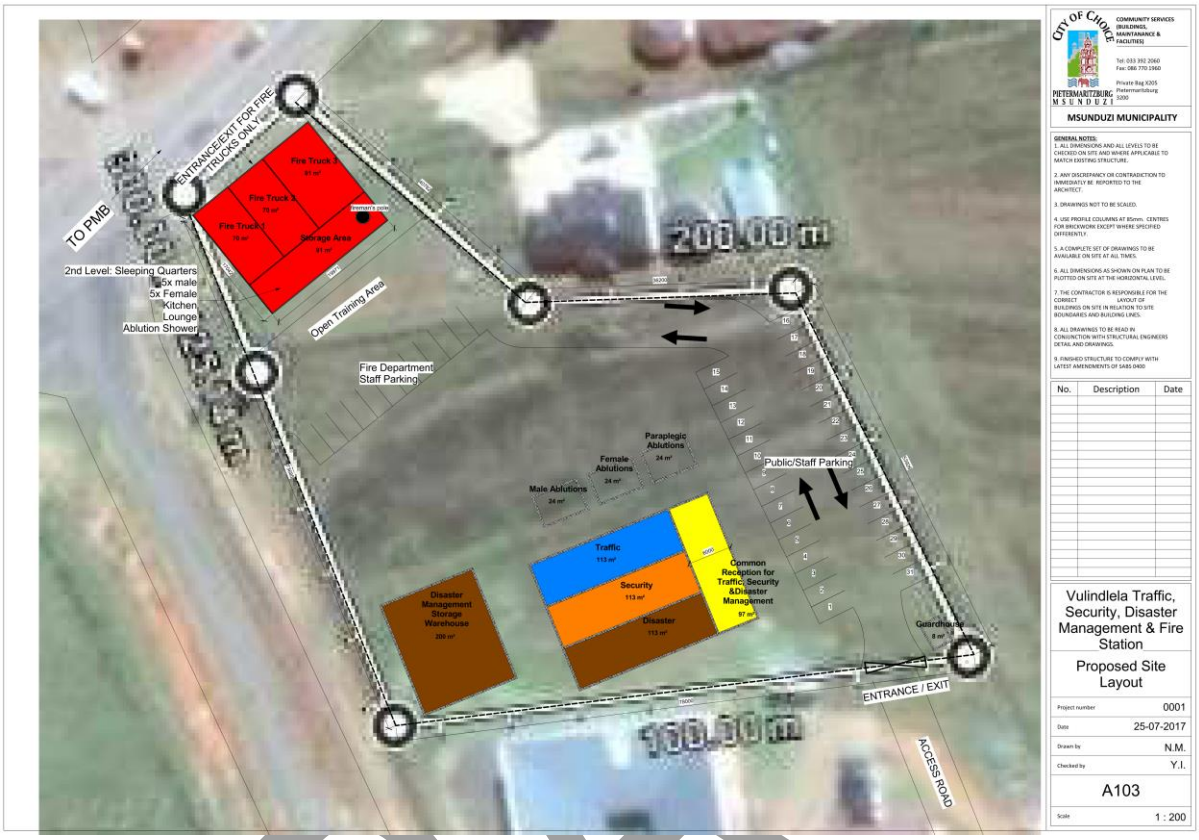
The meeting with the Vulindlela Amakhosi on 13 November 2017 revealed the need for the Local Area Plan to also consider Fire Stations. With Ncwadi being 63 km from Msunduzi centre, fires become a real risk.

It was encouraging to learn that there is a Satellite fire station at Plessislaer and that that there are current plans for a Disaster Management Centre at Taylor's Halt, just adjacent to the current Area Based Management Office (Padayachee, J. I9.12.2017, Msunduzi Fire Department).

The Disaster Management Centre, as planned, is to house the following:

- Traffic
- Security
- Fire management
- Disaster Management

Figure 86: Proposed Taylor's Halt Disaster Management Centre



Source: Msunduzi Municipality

The current estimated costs for the centre is in the region of R35 million, excluding equipment and staff (Padayachee, J. I9.12.2017, Msunduzi Fire Department).

There is also a proposal on the table to have a sub-satellite fire station at Ncwadi to deal with small emergencies. This recommended that this station is manned with a LDV with fire fighting equipment which can deal with minor issues, and act as a stop-gap whilst the large-scale fire-fighting equipment is deployed.

A timeframe for the implementation of the Taylor's Halt Depot is not available as yet as funding is still to be sourced.

6.5.2. Social Services and Facilities

6.5.2.1. Housing

As noted in Section 6.1 of this report, at the time of the census there were 2545 households recorded in Ward 39. (Stats SA, 2011). More recent, GIS data indicates 2571 dwellings are located in Ward 39 (Eskom, 2013). The issue of numbers of dwelling units and households is dealt with in the section dealing with population dynamics in the status quo.

i. Types of Housing

As can be seen in Table 29 the majority (59%) of the dwellings in Ward 39 are traditional houses built out of traditional materials defined by Stats SA as "clay, mud, reeds or other locally available natural materials". The emphasis in traditional housing in rural areas is on clusters of units comprising households which include: rondavels under thatch or corrugated iron and square or rectangular units under corrugated iron Figure 87 below).

A further 33% of dwelling units are built with brick or concrete blocks. These are mainly, but not exclusively, located in the higher density settlements. According to the Stats SA data there is a small proportion of flats, apartments and cluster houses and very few informal dwellings (only 21 recorded). (Stats SA, 2011).

Table 29. Types of Dwellings (Stats SA, 2011)

Types of Main Dwelling	Number of Dwellings	% of Total Dwellings
House or brick/concrete block structure on a separate stand or yard	830	33%
Traditional dwelling/hut/structure made of traditional materials	1,495	59%
Flat or apartment in a block of flats	107	4%
Cluster house in complex	53	2%
Town house (semi-detached house in complex)	4	0.2%
House/flat/room in back yard	6	0.2%
Informal dwelling/shack	8	0.3%
Room/flatlet on a property or a larger dwelling/servants'quarters/granny flat	7	0.3%
Semi-detached House, Caravan or tent	0	0.0%
Other	6	0.2%
Unspecified	23	0.9%
Not applicable	6	0.2%
	2,545	100%

Based Table 29 above, the housing backlogs in Ward 39 were estimated to be over 1500 houses in 2011.

Figure 87 provides photographs taken during a field trip for this project and provides examples of the different types of houses found in Ward 39.

Figure 87. Examples of Types of Houses in Ward 39 (Sanders, 2017)

New Developments and RDP Housing

There is no information from Department of Human Settlements on past or current RDP housing projects in the area. A scan of Google Earth and fieldwork in the area indicates that in-situ housing upgrades have been constructed in settlements at Mafume, Mbumbane and Songozima in the east (i.e. old Vulindlela Wards 7 and 8). Presumably these houses were constructed as part of the Msunduzi rural housing upgrade programme in Vulindlela. This is not the case for housing in the central and western areas of Ward 39 which were historically under the Ingwe municipality.

A number of housing projects have been identified in relevant municipal sector plans dating back to 2014 and include:

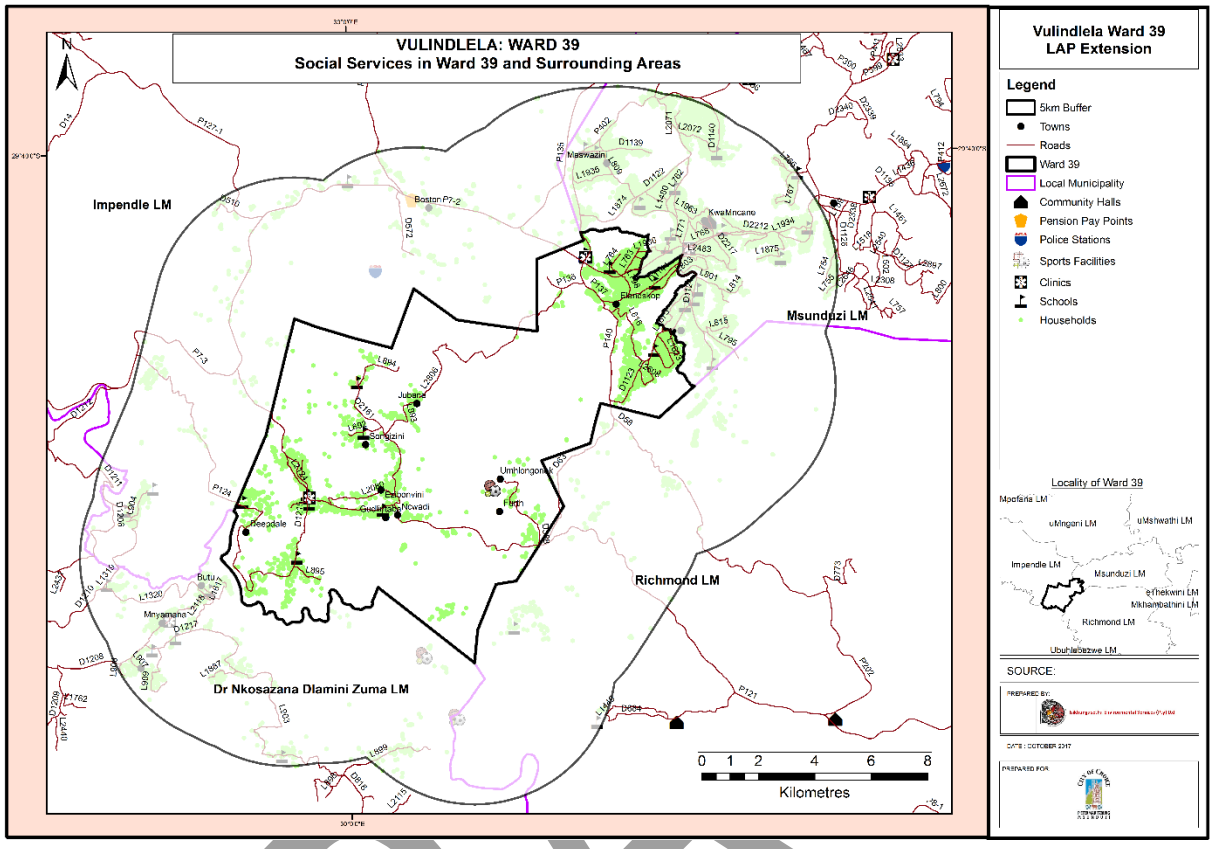
- In 2014 Ingwe Local Municipality and Department of Human Settlements agreed to a housing construction project of 1000 units (Ward 39 Traditional Leader Meeting, 2017). The Ingwe 2016/17 SDF included this housing project for Ward 39.
- The Ingwe Municipality Housing Sector Plan, 2007 identified Deepdale for a Housing project.
- Lack of adequate RDP housing in Songonzima and Ncwadi was identified in the Msunduzi IDP as a community issue from the municipal wards needs analysis (Msunduzi IDP 2017/22 p. 252-253).
- It was noted at the community IDP meeting held in March 2017 that community representatives submitted an RDP housing project for Ncwadi area which would benefit 13000. This project was allocated for the 2018-2020 timeframe.
- The Nkosazana Dlamini Zuma SDF indicated that the Mdutshini Housing project for 1000 units was in the planning stage and awaiting funding.
- The SDF (Nkosazana Dlamini Zuma SDF, 2016/17)) also noted the roll out of three Sukuma Sakhe Projects in Ward 39 which were intended to assist in addressing backlogs in the area.

The status of these projects could not be ascertained from officials and community members at meetings. It needs to be identified if any of these project are in the old Ingwe Ward 7 now portion of Ward 39. Based on the outcome of community meetings convened for IDP planning purposes in March 2017 there is a great need for housing and related services e.g. water and sanitation provision and waste removal. (Ward 39 Area Based Planning Community Meeting Notes, 3-9 March 2017) required in Ward 39, particularly the western areas

6.5.2.2. Social Services

Figure 88 provides an indication of the location of social service facilities in Ward 39. The facilities that are in place are mainly located in the eastern area of Ward 39. Each of the services available will be considered in more detail below.

Figure 88. Social Services (DRDLR, 2015)



6.5.2.3. Education

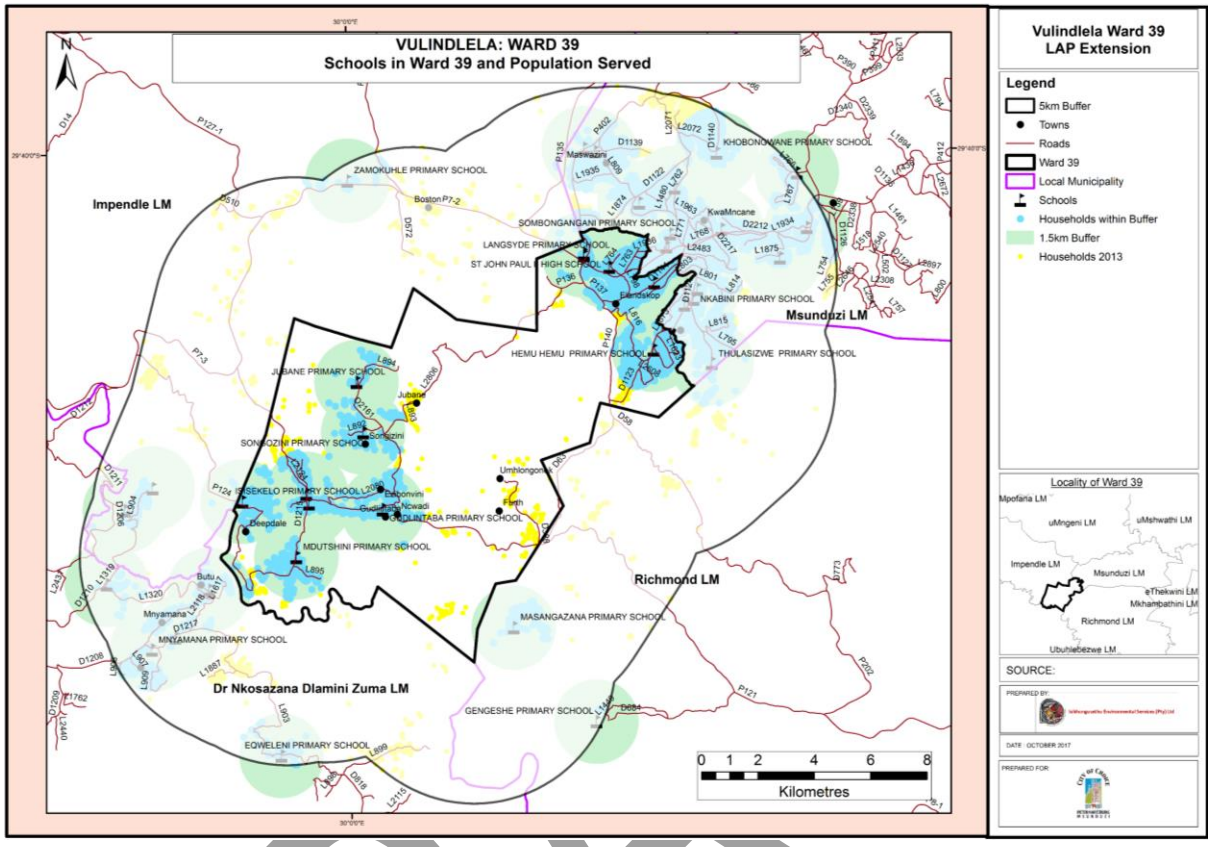
i. Crèche Facilities

Fieldwork in Ward 39 has revealed that there are a number of both registered and unregistered creches in the area. These facilities accommodate pre-school aged children. The distribution and number of facilities would seem to indicate that there is a need amongst mothers, particularly in the eastern areas for child care. This would seem to indicate some level of informal employment or and economic activity taking place among this age and gender group possibly not identified in the Census data. The crèche facilities need to be georeferenced in order to be mapped.

ii. Schools

There are twelve schools located in Ward 39 as can be seen in Figure 89.

Figure 89. Primary and Secondary Schools (DRDLR, 2015)



a. Primary School Education

The dataset provided by Department of Education indicates ten facilities inclusive of numbers of pupils and classrooms as shown in Table 30.

Table 30. Primary Schools in Ward 39 (Dept of Education, 2017)

Name of School	Number of Pupils	Number of Classrooms	Pupils per Classroom
Gudlintaba Primary	134	5	26.8
Hemu Hemu Primary	362	14	25.8
Isisekelo Primary	64	6	10.6
Jubane Primary	24	5	4.8
Mdutshini Primary	142	9	15.7
Ncwadi Primary	380	8	47.5
Songozima Primary	405	11	36.8
Ekhokhwane	419	21	19.9
Langsyde (out of area)	142	9	15.7
Songozini	72	4	18

The location of schools provided by the Department of Education is included in Figure 89 and demonstrates that primary schools are evenly distributed throughout the settled areas providing accessibility to primary school learners. The number of pupils per class room ranges from 4,8 to 47,5

with an average of 22. The smaller schools located in rural areas appear to have fewer pupils and the lowest pupils per class ratio. No information was provided by the Department of pupil teacher ratios and on the quality of education provided in these primary schools in terms of teaching, access to facilities and access to books and materials.

It is possible that there are additional facilities located in areas adjoining Ward 39 that serve the pupils in the Ward – this will be reviewed during the next phase of the Ward 39 Local Area Plan where accessibility of services will be analysed.

b. Secondary School Education

The Department of Education has indicated two secondary schools located in Ward 39. The data provided indicates an average of 43, 4 pupils per classroom in the senior schools which is substantially higher than that in the primary facilities.

Table 31. Secondary Schools Located in Ward 39 (Department of Education, 2017)

Name of School	Number of Pupils	Number of Classrooms	Pupils per Classroom
John Paul II	591	15	39.4
Ntabende's	380	8	47.5

The community indicated that there was one secondary education facility in Ward 39 and that it was too far from many households and thus could not service the entire Ward (Ward 39 Area Based Planning Community Meeting Notes, 3-9 March 2017). However, if one examines Figure 89, locating secondary schools in and around Ward 39, then it will be noted that there are other secondary facilities that pupils in Ward 39 are likely to be attending, particularly adjoining the eastern and western settled areas.

Accessibility to schools based purely on those located in Ward 39 indicates challenges for learners located at some distance from these facilities, particularly in the more rural western areas. However, if neighbouring schools are included, then accessiblity may improve for many of the learners. Further work on accessibility will be undertaken in the analytical stage of the project to determine if additional facilities are required and where these should be located.

ii. Tertiary Education

There are no tertiary education facilities close to residents in Ward 39. The majority of tertiary education facilities are located in and immediately around the central business district in Msunduzi and include: universities, technical colleges, educational training centres etc. Consequently residents of Ward 39 who need tertiary education have to travel over 100kms to gain access to these facilities. Facilities are available, but they are not easily accessible to the people of Ward 39. This has negative implications for the developmental potential of this Ward in terms of human resources capacity.

iii. Quality of Education

There is no information available on the quality of education provided in Ward 39.

The Ward should benefit from the outcome of the Minister of Higher Education and Trainings' task team investigation into the feasibility and possible models for the establishment of an integrated education precinct within the Imbali-Edendale-Vulindlela peri-urban context of the Msunduzi Municipality (Msunduzi LED Division, 2014, GEVDI, 2015).

6.5.2.4. Health

It was noted at a community planning meeting held by COGTA and ABM that 40% of the population reported that they know people who have passed away through HIV/AIDs. It was indicated that there is a need for HIV/AIDs awareness campaigns and more CCG's. (Ward 39 Area Based Planning Community Meeting Notes, 3-9 March 2017)

i. Clinics

Two fixed clinics were identified in the area located at Songozima and Ncwadi. A roving medical doctor visits these clinics on a weekly basis.

The following health care staff are located at each clinic:

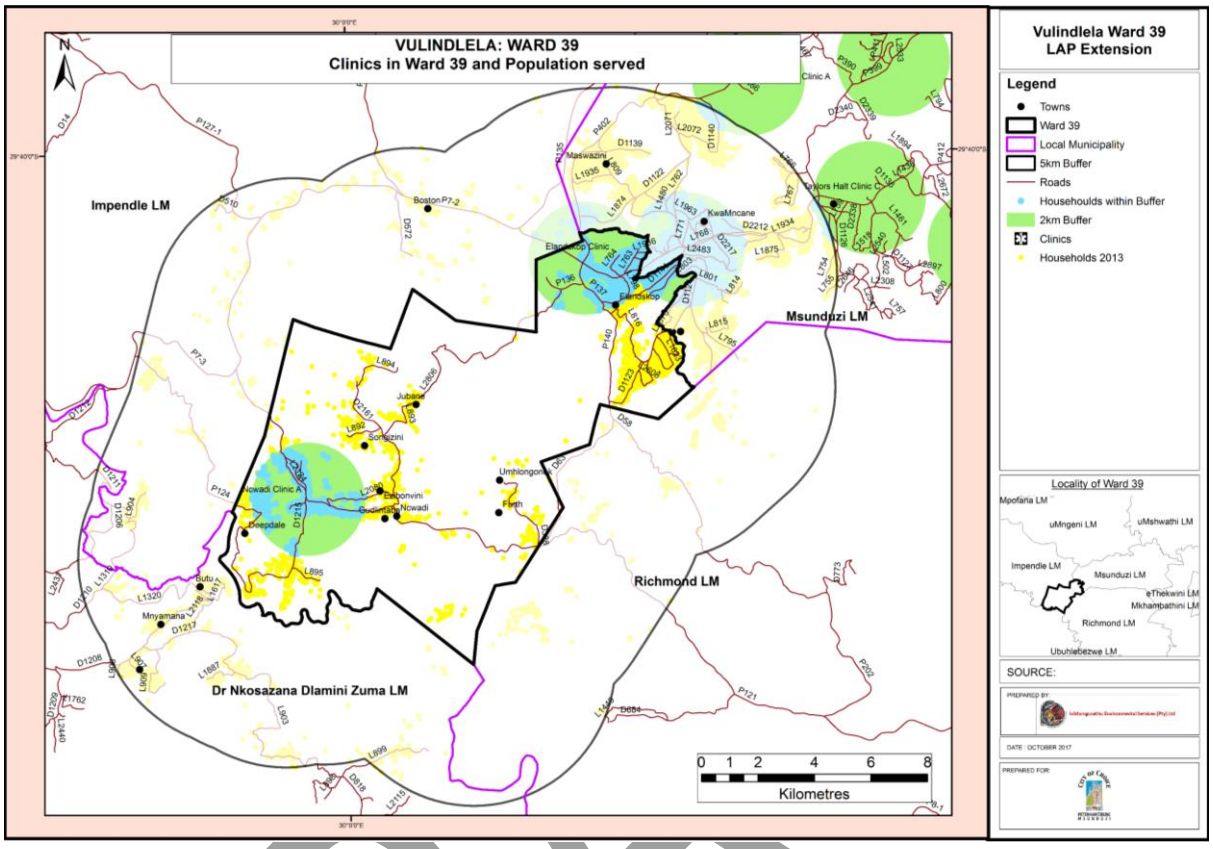
- 2 professional nurses to administer primary health care.
- 1 staff nurse.
- 1 lay counsellor for HIV Aids patients.
- 1 nutritional advisor.

The Department of Health indicated that there are five mobile clinics operational in Ward 39. These facilities include the same health care staff complement as in the fixed clinics. These mobile clinics operate at the following locations and are visited by the average number of patients indicated:

- Magininda – average monthly patients - 50.
- Deepdale Station – average monthly patients - 61.
- Jubane – average monthly patients - 30.
- Ndlothsheni – average monthly patients - 54.
- Mamyenyeza – average monthly patients - 12.

The location of clinics is provided in Figure 90 below.

Figure 90. Clinic Facilities



ii. Health Centres and Hospitals

There are no Community Health Centres (CHCs) located in Ward 39. Patients requiring a higher level of service than can be provided at clinics are referred to CHCs located at Pholela or Impendle. The referrals from clinics and the CHCs are also to the government hospitals located in Pietermaritzburg. Referral patients are transported to the hospitals by departmental combis and are collected at Elandskop and Ncwadi.

that are available to people in Ward 39 including one tertiary hospital (Greys Hospital), one regional hospital (Edendale Hospital), one district hospital (Northdale Hospital), and two specialist hospitals mainly relating to mental health (Townhill hospital, and Fort Napier hospital). These hospitals are all located in Pietermaritzburg. There is a specialist TB hospital based at Richmond which is also accessible to the people of Ward 39, but probably less so than those in Msunduzi due to transport routes followed by public transport services.

Accessibility to hospitals by Ward 39 residents will be reviewed in the analysis phase of the Ward 39 Local Area Plan.

6.5.2.5. Safety and Security

It is claimed by community representatives that there is a high incidence of drug and alcohol abuse in Ward 39, particularly in areas of Khokhwane, Songonzima and Mbumbane. This has also led to increase in crime such as house-breakings and theft and the need for increased policing. (Ward 39 Area Based Planning Community Meeting Notes, 3-9 March 2017).

i. Police Stations

There are no police facilities located in Ward 39. The Ward is serviced by the police station in Boston and Taylors Halt.

The Taylors Halt facility is not a fully established police station with a full complement of police officers and is regarded as a satellite police station. It was established as an emergency station some years ago and does not have the capacity to extend beyond the original Vulindlela boundaries (Isik, 2016). The station is mainly utilised by the Vulindlela community for criminal cases, affidavits and certification of documents and is insufficient dealing with all police matters resulting in people having to travel long distances for the full range of police services.

The Boston station is an established facility, but located at some distance from the central and western areas of Ward 39. Consequently it is likely that there is limited policing service taking place in Ward 39 at present. In the VLAP (Isik, 2016) it was established that the majority of the Vulindlela inhabitants utilise the Plessislaer Police Station. This will have to be established for the western areas of Ward 39 in planned community meetings.

As identified in the VLAP a fully functional police station is required in Vulindlela to deal with all civil issues in the area.

6.5.2.6. Community Facilities

i. Traditional Courts

Traditional Courts have been established in Traditional Council areas by COGTA throughout KwaZulu-Natal. Consequently there will be courts located in the three traditional areas that are included in Ward 39, however they may not be located within the boundary of Ward 39. These courts are responsible for administration of the traditional area and resolving civil matters at localized level. The location of these courts needs to be identified.

ii. Community Halls

It was identified at the community meeting held in March 2017 that there are five community halls in Ward 39 located in Songonzima, Songozini, Ntabende, Deepdale, Vulingqondo (Ward 39 Area Based Planning Community Meeting Notes, 3-9 March 2017). These halls have been built and maintained by municipalities for use by local municipal structures.

Data provided by DRDLR, (2015) did not indicate any community halls in Ward 39 and these halls will need to be georeferenced in order to be included in the mapping dataset for the planning phase of Ward 39 Local Area Plan.

iii. Pension Pay Points

There is no information on pension pay points which are, in recent times, more commonly located at municipal halls or supermarkets e.g. Shoprite Checkers. One pension payout point was provided in the dataset obtained from DRDLR, (2015) and this was located in Boston.

iv. Local Markets

There is no indication of formal or informal markets in Ward 39. Further investigation is required to establish possible occasional markets at taxi ranks and pension pay points.

v. Libraries

There are no libraries found in Ward 39.

vi. Sports Facilities

There are three sports grounds situated in Ntabende, Songonzini and Mdutshini. Little information is available from Ingwe or Msunduzi Municipalities on the type and level of facility available in Ward 39. Based on a scan of the satellite images it appears that these are mainly local community facilities which could benefit from an upgrade to encourage youth involvement in sporting activities.

vii. Religious Structures and Activities

Data on religious facilities is not available and needs to be ascertained.

There are faith-based programmes by Shri Mt. Edgecombe temple, Churches and Mosques (Ward 39 Area Based Planning Community Meeting Notes, 3-9 March 2017) however it is uncertain as to what comprises these activities.

6.5.3. Summary of the Status Quo of Facilities and Social Services

A summary of the social services situation in Ward 39 is noted below. These constitute the informants and constraints to developing the local area plan:

- Limited data available at ward level on social services.
- Over 1500 housing backlog estimated in 2011.
- Difficult access to hospital facilities.
- Limited clinic facilities.
- Primary schools service the whole Ward but there is a need for secondary and tertiary facilities.
- Police facilities outside of the Ward and are inadequate.

6.6. Economic Structure and Productivity

The reader will have noted from the information set out in Sections 6.1.2.3 and 6.1.2.4 that the majority of the residents in Ward 39 have low levels of employment within the working age groups, and that the amount of money earned by those employed persons is low. The reader will also have noted from the Provincial SDF maps appearing in Section 4 that this is an area in which social facility/ service provision falls below the level of existing population need/ requirement. It will come as no surprise then that the afore-mentioned StatsSA information is corroborated by other information.

6.6.1. Local Economic

As there is no publicly-available statistic of income or employment at a local level, this cannot be reported on here. However it was learned [65] that a small number of people are employed in agriculture in the managing of cattle on SADT land east and north-east of Ncwadi, as temporary labour both within the Ncwadi area and also on the nearby farms beyond Ward 39, and as temporary labour when there are occasional infrastructure-related projects in the vicinity. As will be appreciated from the information presently to be presented on the shops within the ward, these do not constitute employment opportunities of any significance.

The National Development Plan (NDP) and the Provincial Growth and Development Strategy (PGDS) refer to a hierarchy of nodes and service centres and so it is opportune to make at least brief mention of them. Within this region, Pietermaritzburg is clearly the main commercial and manufacturing economic engine. Also within the area administered by the Msunduzi municipality, there are other nodes of significance, and that to the west of the CBD is Edendale which has enjoyed much attention in the last few years, in particular the planning for, and design and development of, its CBD. Integral to the functioning of that CBD is the construction of the Integrated Rapid Transport Passenger Network (IRTPN), a terminal for which is to be developed on the M70 between Edendale Hospital and Mall on the south, and new commercial and office development to its north, on either side of the KwaPata stream. The IRTPN is planned to link to the west, through Vulindlela and, by increments, even to Taylor's Halt. Taylor's Halt is intended, by the Msunduzi SDF (2015) [66], to be developed as an "Urban Hub" and which level of urban place is one level below that of a CBD. Interestingly, although the SDF *text* makes reference to that place to be of that level, its *map* shows an "Urban Hub" level place to intended at the intersection of the M70/ P7-2 and D1124 just adjacent to where the Songonzima Clinic is. That SDF's Sustainable Map on P80 shows the intention to have an IRTPN stop at this "Urban Hub" plus a further two within the ward, the western-most being at the M70/ P137 turnoff to Elandskop.

It has elsewhere been mentioned that the Vulindlela Local Area Plan was developed in 2015. That made certain proposals, one of those related to Taylor's Halt. It recognized the growth occurring at the intersection of M70 and D1127, and recommended its formalization by designing for its further

[65] Workshop (held on 11th December 2017) with municipality-invited representatives.

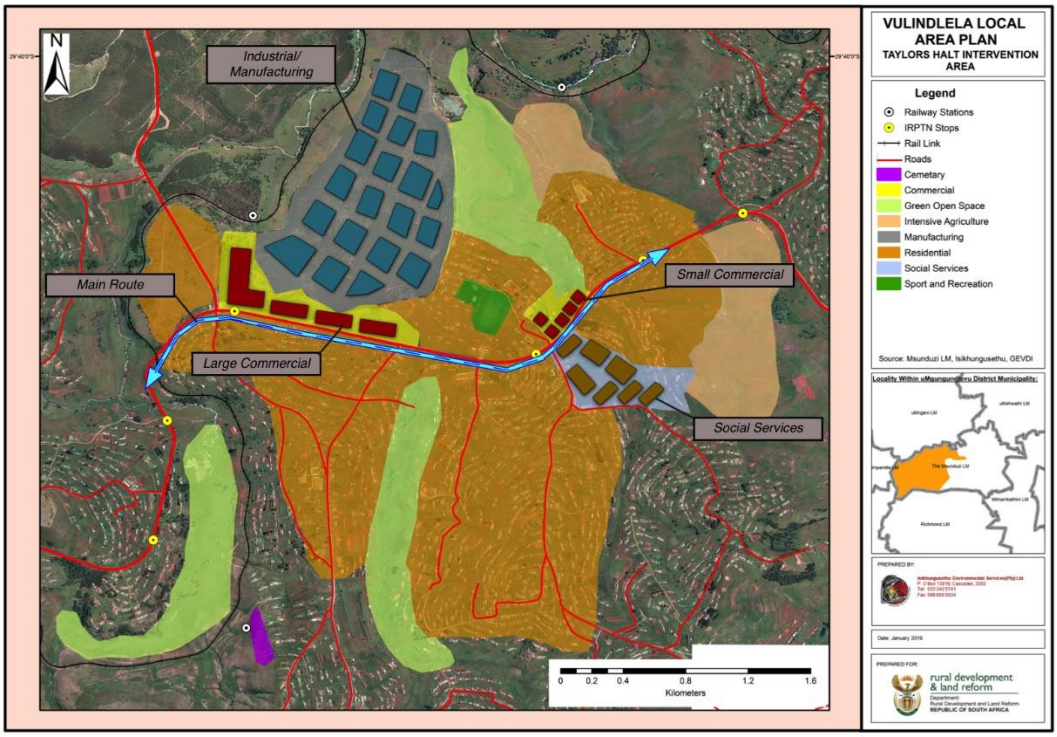
[66] P88, in its reference to a poly-centric city, mentions it being one of the five "Urban Hubs", along with Ambleton, Mkhondeni, Nadi and KwaMncane

development between D1126 and D1127. Figure 91 shows some of the development at the latter intersection (and in its northern environs) while Figure 92 shows the Vulindlela LAP's intentions for it, which was influenced by a precinct plan developed by the Ingonyama Trust Board.

Figure 91: Development on three of the four quadrants [67] of the M70/ D1127 intersection near Taylor's Halt

[67] Development in the fourth quadrant comprises a municipal building: the Area Based Management office

Figure 92: Taylor's Halt Development Design (Isikhungusethu Environmental Services, 2015)



The Taylor's Halt node lies approx. 9km ENE of Elandskop Station and the establishment of a Tsusong centre or its equivalent at the first-mentioned so as to provide for a range of community- and social-services to meet local needs in that area and its surrounds and which might then be of service also to Ward 39 residents. The establishment of one such centre within Ward 39 would probably not be justified. This matter should be investigated.

Having set that "scene", let us turn to more specific information in respect of retail commercial activity within Ward 39.

6.6.2. Economic Activities

A land use survey, focussing on non-residential uses within the ward, was undertaken. This section reports on the only the commercial-related information flowing therefrom, recorded in Table 32, followed by discussion thereon.

Table 32: Commercial/ Retail Uses and Floor Areas (*per* Traditional Area *per isigodi*)

Area		Land Use	Description (m*m)	Floor Area (m^2)		Co-ordinates					
	Ref			Paced	Estim	South			East		
						D	M	S	D	M	S
MPUMUZA											
	?? (*isigodi* north of M70)										
	19	Site 1	Bldg1: shop (4x6)	24		29	42	20.36	30	6	5.1
			Bldg2: tavern (5x16)	80							
			Area3: Undercover carwash (7x14)								
		Site 2	Tuckshop (7x10)	70		29	42	21.6	30	6	3
			Butcher	16							
	23		Shop		108						
	3	Builders' Yard plus shop	Open storage of product (20x40=800)			29	42	10	30	5	19
			Buildings used for commercial (5x16)		80						
FUNZE											
	Songonzima										
	8	Ex-motor garage (10x20)	*vacant*		*200*	29	42	51.5	30	5	39
	10	Bldg1: Shop (photo)(6x9)		72		29	42	54	30	5	43
		Bldg1: (3x6)	*vacant*		*18*						
		Bldg2: (14x27)	*vacant*		*378*						
		Bldg3: (phot) (10x21)	*vacant*		*210*						
		Bldg4: (9x15)	*vacant*		*135*						
	13	Butchery (7x11)		77		29	42	26	30	5	55
	26	ex-bottle store (6x15)	*vacant*	*90*		29	42	23	30	6	4.3
	29	Shop (photo) (6x6)	Part of largely residential building	36		29	42	35.28	30	6	21.26
	30	Shop (6x7) In RDP house bldg			42	19	42	36.2	30	6	44.7
	31	Shop (Eliyas) (photo) (5x8)		40		29	42	23	30	6	18.2
	32	Shop (phot) (3x6)		18		29	42	16.46	30	7	14.55
	33	Shop (phot) (7x10)		70		29	42	27.9	30	6	56
	37	Shop (6x7)			42	29	42	51	30	6	5
	Mkheshekweni										

Area	Ref	Land Use	Description (m*m)	Floor Area (m^2)		Co-ordinates					
				Paced	Estim	South			East		
						D	M	S	D	M	S
	39	ex-shop (phot) (9x20)	*vacant*	*180*		29	43	21.4	30	6	22
	Mbumbane 2										
	44	Shop (photo)(7x9)		63		29	44	2.8	30	6	26.1
	45	Tavern (8x12)			96	29	44	25	30	6	17
	Mbumbane 1										
	49	Building (phot) (15x15=225)	Mbumbane Store	113		29	44	6.5	30	6	36.5
			(*vacant* : to be tavern)	*112*							
	51	Tavern (7x15)			105						
	54	ex-shop (7x10)	*vacant*	*70*		29	43	28.6	30	6	49.1
QADI											
	Mthuthu/Bho										
	1	Shop (15x15=225m^2)	Shop half		112	29	45	36.4	29	59	10.4
			vacant half (113)		*113*						
	1	Shop (9x12)			108	29	46	33.3	29	59	8
	1	Tavern (8x12)			96	29	46	38.5	29	59	16.8
	Nhlambane/Gudlindaba										
	12	Shop (7x10)			70	29	46	39	29	59	23.5
	Mthuthu/Deepdale										
	16	Ex-butchery(4x6=24)	*vacant*		*24*	29	47	7.8	29	57	41.5
	Mdutshini										
	21	Shop? (7x23=161)				29	47	45	29	58	47.5
	Songozini										
		Shop (6x10=60)			60	29	45	25.6	30	0	4.3
		Ex-shop (7x10=70)	Now agricultural shed			29	45	22.2	30	0	11.2
SADT			East of Ncwadi Stn								
		ex-GeneralDealer&Hotel	16x23=368 (partly roofless) *vacant*	*368*		29	47	4	30	1	9.5

Area		Land Use	Description (m*m)	Floor Area (m^2)		Co-ordinates					
	Ref			Paced	Estim	South			East		
						D	M	S	D	M	S
		ex-Butchery (4.5x6=27)	*vacant*	*27*							
		ex-Storeroom/Shed (6x14=84)	*vacant*	*84*							
			Total 3607	1610	1997						
			Less vacant *2009*	*931*	*1078*						
			Net used = 1528	609	919						

Commercial activity/intensity within in an area can, in some respects, be taken as a barometer for its general "health ", at least in urban or urbanizing areas. Let us examine Ward 39 from this perspective.

Ward 39 is served by fewer than 30 retail outlets, largely shops, but with some taverns and bottle stores too, and also a builder's yard (at the intersection of M70 and P137/P402). The total floor area of the functional establishments is approx. 1700m^2, [68], this to serve a population of approx. 15000 in 2017. Typically the shops are very poorly stocked and then largely with non-perishable items and these in small numbers over a narrow range. Elsewhere this report has noted that this is generally an area of social need and it is thus not surprising for this to be reflected in the low buying power of the dispersed residents.

Figure 93: Typical shop (in Mbumbane 2) (Floor Area: 63m^2), this one built on a wetland/ spring

In addition to this rather small commercial floor area (approx. 1700m^2), attention must be drawn to the extensive vacant floor area (approx. 2000m^2), which has not been taken up or, more correctly, was used for retail purposes in times past, 56% of the available floor area is vacant. However, this level of vacancy is perhaps artificially high because some of those buildings are old and dilapidated and relics of a time when Ncwadi station area had an economic vibrancy. This is no longer the case. If one deducts the Ncwadi station area vacant floor area from both vacant floor area and total floor area in the table, one still has a vacancy of a still very high 48%.

[68] The reader will note the difference in total used floor area (*1528m^2*), in the table, and the less finite "*approx. 1700m^2*"reference. This statement has had to be couched in this way because the aforementioned survey was not able, in the time available, to cover all of Ward 39. The areas of Ndlutsheni, Maqodeni and Jubane have yet to be surveyed and whatever further commercial floor area is found, incorporated into this table.

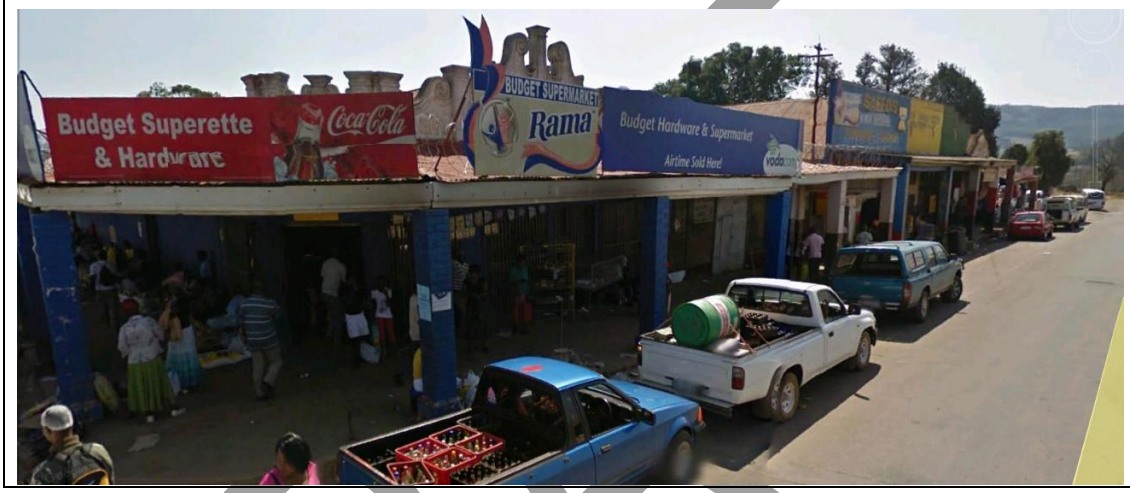
Figure 94: Goods on sale in above-depicted shop

Within the buildings which are used, the use of space is sub-optimal as indicated by the low stock levels. Some are partially used buildings, the unused areas being locked and/or boarded up. The general condition of all commercial buildings is low, perhaps indicating a revenue too low to permit maintenance. The average shop floor area is 66m^2, whilst that of taverns is 94m^2.

Light was cast on the low level of commercial activity at the meeting with community representatives [69]: the vast majority of shopping occurs in Pietermaritzburg CBD (approx. 80%), with an un-estimated very low volume of purchases occurring in Richmond. Taxi fares (single) to Pietermaritzburg, from Ncwadi (63km) and ex-wards 7 and 8 (40km) are, respectively, R32-R35 and R20, whereas a single taxi fare (in a bakkie) to Richmond (33km and 37km distant, respectively) is R25.

[69] At the 11th December 2017 information-sharing workshop

Figure 95: Richmond shopping range



Source: Google Earth Street View

A bus service operates (a number of times *per* day) along the M70, a bus fare (single) to the Pietermaritzburg CBD costing R23. Edendale CBD was not a preferred destination for taxi passengers because the majority of passengers head to Pietermaritzburg CBD and so those drivers tend not to stop at the Edendale Mall. By the same token, notwithstanding that Boston, with limited shopping opportunities, and Impendle with its Thusong centre are reasonably closed, they are not where most taxis travel and if such a journey is undertaken, it is very costly.

Figure 96: Edendale Mall

Source: Edendale Mall website

6.6.3. Commercial Services

No commercial service within the ward was identified during the survey.

6.6.4. Manufacturing and Beneficiation

No manufacturing within the ward was identified during the survey.

6.6.5. Agriculture

Mentioned a few times in other sections of this report is the significance of agriculture, both historically and presently. This activity occupies by far the largest area within the ward, whether that be commercial agriculture, or subsistence agriculture. Also mentioned is the investment in agriculture in this area. Historically that investment was, in the SADT land, in many forms:

- the contouring of grazing lands for the purpose of moisture retention and soil retention [70];
- the construction of at least 7 dams:
- the construction of at least 6 silos;
- the excavation of silage puts/ furrows;
- the construction of milking and other sheds;
- the construction of dip tanks;
- the fencing of fields;
- the construction of cattle kraals; and
- the construction of farm roads.

[70] severe soil erosion is noted in some areas

Figure 97: Contoured grazing lands 1.1km SW of Elandskop Station

Source: Google Earth

Figure 98: Soil erosion (4.3km NE of Ncwadi Clinic) within Magelekedla *isigodi*

Community representatives [71] advised that the vast majority of the SADT land is given over to grazing herds of cattle owned by persons residing at Ncwadi but largely managed on the land by immigrants from other countries. It was not possible, in that meeting, to learn how many persons were so employed, but it was stated to be very low. It was reported, in an earlier section, that prior to the mid-1970s, the farmers in this area were members of the Boston Farmers' Association (established in 1890) and that this area benefitted from that membership. Those representatives advised that there was no Ward 39 farmers' association, additionally that those owners typically owned between 20 and 60 head of cattle. The prime output in those 1970s was cattle for slaughter and that these animals were sold at the sale yards at Elandskop.

[71] *ibid*

Figure 99: Cattle grazing on contoured lands. Road P121 in the background

Subsequently, it was reported, cattle came to be sold at other venues. Although these community representatives [72] advised that cattle are now sold at sales at Nottingham Road, Lions River, Boston and Underberg, they were unable to provide information on output, i.e. how many were sold at such sales *per* sale event, or *per* year. In addition, small animals in the form of goats and sheep are kept, the former vastly outnumbering the latter, but both kept for domestic consumption, not trade.

6.6.6. Forestry

Another activity mentioned in that meeting was that there is some felling of the timber which grows on the SADT, and the sale thereof. It was not able to be determined if that timber was the wattle which has infested some of these areas, or whether it was indigenous timber. Related to this is that during the site inspection a substantial amount of timber was found stacked in the loading area adjacent to the defunct Umhlongonek station (Figure 100). Enquiry of a group of people in close proximity thereto revealed that this timber was not destined for transport from that station *via* goods train but that that it would be collected by lorries. Enquiry at the said workshop provided much the same answer.

[72] *ibid*

Figure 100: Timber, stacked ready for transport, at decommissioned Umhlongonek station loading area

6.6.7. Tourism

In spite of no tourism being known to occur within Ward 39, this area has, as indicated from the maps and observations made early in Section 4 with regard to Landscape Corridors, potential were these assets to be capitalized upon. The open areas lend themselves to mountain biking using existing game or cattle tracks, possibly with some additional single-track construction in parts. The wetlands and scenic areas would be suitable for guided hiking trails which might link well with the conservation efforts in the Impendle Nature Reserve of which a lesser, but still significant, portion lies within this ward. The many wetlands and sizable blocks of indigenous forest suggest a healthy birdlife. These assets, in concert, would support a healthy fauna [73] and flora population, part of the former compromised to an unknown extent by hunting [74] undertaken by locals on these lands and the forested parts where hunted game would seek refuge. Custodianship status to the vast majority of the SADT land would go a long way to raising the profile of this area and affirming its worthiness to visit. Given the rugged terrain in parts, zip-line opportunities could be investigated.

Tourists typically would visit an area if there are a few related recreation opportunities and experiences on offer and so a multifaceted approach should be considered. The intended

[73] Tortoise are represented in this ward.
[74] Reported by community representatives at the 11th December 2017 workshop.

construction of a major dam on the Mkomazi has the opportunity to be a major drawcard, not just for boating and yachting pursuits, but also for fishing, for bass in particular, especially given that this dam would have some deep areas and some shallow areas, much like Albert Falls Dam has. Hang-gliding is commenced from Bulwer Mountain, 500m above that town to its east. Prevailing winds permitting, this activity might be able to be undertaken from a launch height approx. 400m above dam water level might represent an opportunity worth exploring.

6.6.8.Summary

Sector	Brief description (Current)	Future possible opportunities to be investigated
Agriculture	Cattle, goats, maize, plus, largely for domestic consumption, sheep, poultry, vegetables	-Develop association with Boston Farmers' Association; -Establish cattle sale yard; -Extend maize cultivation: for sale to maize mill at Impendle; -Pig farming; slaughter at new abattoir at Boston; -Feedlot; -Contouring of grazing lands especially in Qadi; -Undertake soil erosion prevention methods; -Determine stocking rates for different areas
Forestry	Tree felling occurs and logs are sold but it is not known if, and to what degree, these are planted for harvesting.	-Examine forestry potential in selected areas within uMkhomzi catchment; -Examine beneficiation
Small commercial	-Small shops with small range of goods -High level of building vacancy	-Examine alternative uses for vacant buildings in appropriate areas
Tourism	Nil	-Identify specific view corridors by determining their specific characteristics/ qualities and recommend specific actions to secure and enhance these; -Achieve some level of conservation status for extensive area linking with Impendle Nature Reserve; -Determine what levels of fauna and flora exist (especially given hunting of the former and wetland modification) and how these levels can be enhanced; -Examine whether continued hunting in this area is compatible with its best use of this area given the potential benefits which might flow from this pursuit ceasing; -Mountain biking; -Hiking;

		- Zip-line; -Hang-gliding; -Determine what land will be expropriated for the dam on the Mkomazi River and whether opportunity exists for land within the ward to be used for accommodation and recreation pursuits (especially boating/ fishing/ sailing/ wind-surfing etc) related to the dam. -Engage with the municipalities of Impendle and Dr Nkosazana Dlamini Zuma in the examination of mutually-supportive actions/ initiatives
Cultural Heritage	Very little known	-Undertake research project to record this information (archaeological and built environment); -Erect plaques/ structures to mark significant places and events; -Learn histories of surviving elements of built environment and determine if these ought to be renovated and re-purposed rather than being left for material plundering; -Integrate this information into appropriate brochures/ wedbsites to market the area.

This ward has a real opportunity to make better use of the undeniable quality and extent of its natural assets, both in the area of agricultural development/ enhancement and conservation/ recreation planning to provide tangible positive outcomes for, and uplift, its residents. The proximate dam planned to impound the waters of the Mkomazi River represents a catalytic project, a gift. A fairly rare opportunity lies in the hands of the municipal officials who will implement the LAP's designed outcomes.

It is, however, not without its difficulties in land management, be that stocking rates, erosion or arresting agricultural consumption by municipality unsanctioned land use change/ settlement. Depending on the strength of the policy approaches, the incentives and controls which will be recommended to be applied, a good measure of Council resolve is likely to be needed for this plan's goals to be realised.

6.7. Agricultural

6.7.1. Current Agricultural Activities

a) **Land use**

A review of land use on 2017 Google Earth Images and National Land Cover (2000) would seem to indicate that owing to the mountainous and in cases rugged nature of the area, land use in Ward 39 follows a similar pattern to that in the more rural areas of Vulindlela. This involves settlement mainly being confined to ridges (Ncwadi, Furth) and the less productive agricultural sides of valleys (Songizini,

Gudlintaba). There is evidence of the major valleys having been used for extensive cultivation in the past. Similarly the more productive arable lands on the hillsides were historically cultivated as evidenced by extensive contour banks around settlement such as Furth, Gudlintaba and Nkabini.

Based on land use trends in Vulindlela it is possible that the land in traditional areas of Ward 39 was also subjected to Betterment Planning (BP) in the 1970s accompanying land acquisition and re-settlement, by the state at that time, for the establishment of the then KwaZulu homeland. BP originated in the 1950s as an outcome of the findings of the Tomlinson Commission (1954). This policy report was prepared to investigate the economic viability of the, then reserves. Many recommendations were made by the commission, but few accepted for implementation. One of the recommendations with the most lasting impact on many rural areas of both KwaZulu-Natal and the Eastern Cape included BP. This involved investment by the government in the structured planning of settlement in traditional rural areas aimed at the protection of agricultural resources for productive use by rural communities. The system envisaged by BP was that people would live in households in small structured villages located on the least productive agricultural lands such as ridges and the steep sides of valleys. Villages were based on a rudimentary layout where households would have access to 1 to 2 hectares of land around their homesteads and road access to services in a hierarchy of centres. Land around homesteads was to be used for household food production. Provision for larger land allocations were made in areas adjoining the villages on what was then deemed to be high potential land for arable and livestock production. These larger holdings varied from 5 to 10 hectares per household and in some cases were larger. Provision in BP was also made for the establishment of woodlots close to villages for the provision of wood for domestic energy requirements and for homestead construction. There is evidence of organised rural settlement and woodlots in Ward 39 adjacent to BP settlements. Owing to the pressures on land for settlement subsequent to the implementation of BP, settlement has tended to extend outside of the original designated villages and along access roads onto, often good, agricultural lands (e.g. Ncwadi, Maqadeni, Songozini).

The evidence of contour banks on lands close to settlement most probably pre-dates BP and relocation of communities to live in this area. These lands, prior to the 1970s, were probably used for large scale commercial farming and hence evidence of that type of agricultural practice. This observation would seem to be supported by the historical record of early settlers in this area from 1860s onwards.

Land use in the eastern part of Ward 39 is dominated by settlement which is dense relative to that in other parts of the ward. These settlements are interspersed with land set aside for livestock and timber production. As a consequence of this being state owned land, the central part of Ward 39 is sparsely settled and it appears that land has not been used for cultivation for extended periods of time. It is probable that this land is used for traditional livestock production. The western and southern areas located on Qadi Traditional Authority land has defined pockets of settlement interspersed with large expanses of un-developed land which is rugged terrain and mainly used for livestock and limited arable. These observations on land use, above, are borne out by the findings in Table 33 where up to 67% of the area is under indigenous land cover with 40% grassland, 26% bushland and 1% indigenous forest. A limited area is under forestry plantation and cultivation (20% which is mainly subsistence). Interestingly, urban areas make up the remainder of the area (6%) which

is classified as predominantly residential and limited rural. Please note that the total area in the table below does not equal that of Ward3 9 as this also includes the land cover in the buffer around ward 39.

Table 33. Land Cover

Land Cover	Area (Ha)	Percentage of Total Area %	Grouped	Percentage of Total Area %
Forest (indigenous)	166	0.6	17883	67.4
Thicket, Bushland, Bush Clumps, High Fynbos	6785	25.6		
Unimproved (natural) Grassland	10932	41.2		
Improved Grassland	103	0.4		0.4
Forest Plantations (Eucalyptus spp)	804	3.0	2119	8.0
Forest Plantations (Pine spp)	367	1.4		
Forest Plantations (Acacia spp)	799	3.0		
Forest Plantations (clearfelled)	149	0.6		
Waterbodies	114	0.4		0.4
Wetlands	65	0.2		0.2
Bare Rock and Soil (erosion : sheet)	45	0.0	1689	6.0
Degraded Unimproved (natural) Grassland	1644	6.0		
Cultivated, temporary, commercial, irrigated	574	2.2	3084	11.6
Cultivated, temporary, subsistence, dryland	2510	9.5		
Urban / Built-up (rural cluster)	126	0.5	1495	5.6
Urban / Built-up (residential, formal township)	1368	5.2		
Total Area Ward 39	**26551**	**100**	**26270**	**100**

Source: National Land Cover, 2000

b) Arable

Based on the satellite images (Google Earth, 2015) and land cover (Table 33 above and**Figure 101** Figure 101 below), limited areas of land in the traditional areas of Ward 39 were under cultivation in this and in previous growing seasons. It appears that cultivation is mainly limited to small areas around or adjacent to households. There are exceptions at Songizini, for example, where lands below settlement in the fertile alluvial soils have been cultivated for production purposes, although these areas are limited. Based on the historical use of land in Ward 39, evidenced in contour banks, levelled areas and pastures, the full arable potential of the area does not appear to be utilised. The reasons for under-utilisation of agricultural lands in KwaZulu-Natal are complex and are summarised later in this report in agricultural opportunities and constraints (**Error! Reference source not found.**).

During a telephonic interview with the agricultural extension officer for the area, Mr Magwaza indicated that a major limiting factor on extensive arable production is lack of traction and that the Department of Agriculture's mechanisation programme for this area still has to be implemented. It appears that there was a rotational mechanisation system operated by the Department of Agriculture, but this has since been closed down. Thus local farmers are relying on local tractor owners to assist with land preparation, transport and harvest. (Mr Magwaza, 2017. pers.comm., 29 November).

There is an example of an area where realisation of full agricultural potential has been achieved with access to equipment, inputs and expertise, albeit on the boundary of Ward 39. This is the site of the Severfontein Correctional Centre located below Nkabini on the southwestern boundary of Vulindlela Photo 1). Extensive areas are under cultivation presumably to make provision for fresh food supplies to the inmates and staff of this institution. The potential of this area is enhanced through irrigation from the two dam sites located in the prison ground. This provides some indication of what could be achieved under different management conditions in the traditional areas in Ward 39.

Photo 1: Land Use Sevfontein Correctional Facility (Google Earth, 2017)

Source: Google Earth, 2017

Domestic Food Production

The Extension Officer for the area, responsible for arable production, indicated in a discussion on agricultural activities that a relatively small proportion of households in the area were involved in home food production on a small scale i.e. food security (Mr Magwaza, 2017. pers.comm., 29 November). This observation is supported by a review of the satellite coverage (Google Earth, 2017), field trips through the area and the Census data which indicated that 21% of households (535) were involved in vegetable production (Stats SA, 2011). The Department of Agriculture assists these households with inputs such as seed, fertiliser and extension services.

The crops that are typically produced at household level include cabbage, spinach, potatoes, dry beans, peas and tomatoes (Mr Magwaza, 2017. pers.comm., 29 November). The range of vegetables produced is limited by seasonal temperature fluctuations (particularly the cold in winter) and length of growing season.

Clearly vegetable production forms an important part of the local food security network, mostly being grown for personal household consumption. Any surpluses are traded locally amongst households as part of the local food supply network.

Smallholder Farming

As noted by the Extension Officer, there are a number of smallholder farmers located in Ward 39. He acknowledged that there are large areas with high arable potential that are not being fully utilised. Smallholders are cultivating up to two hectares of land and are unable to expand their holdings due to a lack of traction services in the area. It is anticipated that until the Department of Agriculture extends its mechanisation programme into this area production areas will continue to be limited. A further limiting factor in crop production is lack of access to irrigation, particularly in the growing season where there are limitations on rainfall. (Mr Magwaza, 2017. pers.comm., 29 November).

The crops produced by smallholders include:

- Maize for domestic consumption (green and dry).
- Dry beans.
- Potatoes.
- Limited orchard production.

It was not clear as to whether any other vegetables (such as those being produced for domestic food production) were being produced by smallholders for commercial purposes. This will be established at the time of the agricultural census planned for next year by municipal officials.

There is no evidence of timber production for commercial purposes among smallholders in Ward 39, although there are areas which favour this form of agriculture. However, it should be noted that in planning for future agricultural production in this area, there is an inherent conflict between livestock - plantations and livestock - arable areas due to their favouring the same locations i.e. highlands, high rainfall, well drained soils etc.

The majority of smallholders obtain their agricultural inputs (seed, fertilizer etc.) from commercial outlets in Howick and Pietermaritzburg. The Department of Agriculture provides limited inputs particularly maize and potato seed and extension support. (Mr Magwaza, 2017. pers.comm., 29 November).

Outputs from smallholders are sold on local markets (i.e. within Ward 39) with very limited amounts being traded externally. Further information is required on the economic contribution that agriculture has to the Ward 39 residents.

Large-scale Commercial Farming

It appears that there is limited land under commercial production in Ward 39. Based on a review of Google earth (2017) the areas are located in the north west where land is being used for extensive cultivation on established contour banks. A further portion of land set aside for commercial timber production is located in the north east adjoining the R62. All the road infrastructure accompanying commercial forestry has been implemented on this property, but it is not being actively farmed. There are fragmented areas of timber located throughout Ward 39 which presumably are used for fuel and house construction – this cannot be regarded as commercial timber. This presumably would account for the 8% of the land cover of Ward 39 comprising 2119 hectares is under non-indigenous forestry (Table 33).

c) Livestock

The indications from Stats SA, 2011 are that 35% of households (882) are involved in livestock production including cattle, goats, sheep, pigs and poultry. Each of the listed forms of livestock are considered below based on information gathered from census data and from local extension officers.

No information could be obtained on a variety of issues related to livestock production in Ward 39 due to the fact that Msunduzi extension staff have just recently taken responsibility for the area and do not yet have reliable information. A set of questions have been prepared for the extension staff and once completed can then be included in revisions to this report. The questions are attached as Annexure 1 and 2 to this report. In addition, valuable information will be gathered at a census of livestock to be undertaken at the six dipping tanks in the area in February 2018 (Ms. P. Ditibane, 2017. pers.comm., 29 November).

The Livestock Extension Officer, Ms P. Ditibane, indicated in a discussion on livestock production in Ward 39, that livestock producers form part of the Msunduzi Livestock Association. The main function of this body is to identify and resolve issues associated with agricultural production and marketing in Msunduzi. (Ms. P. Ditibane, 2017. pers.comm., 29 November).

Cattle

It was noted that the communal system (traditional) of livestock production is utilised in Ward 39 by cattle keepers (Ms. P. Ditibane, 2017. pers.comm., 29 November). It is noted from studies of other communal areas in KwaZulu-Natal (Department of Economic Affairs, 1986. Isik, 2010) and confirmed by the Ms Ditibane that stocking rates, under traditional forms of livestock production, are affected

by the condition of the grasslands which in turn are affected by climate, burning and over or under stocking. (Ms. P. Ditibane, 2017. pers.comm., 29 November).

In comparison with commercial herd management, traditional herds are generally not managed to optimise yield for market purposes. Rather, for these livestock owners, cattle are regarded as a 'store' of wealth and offtake related to a variety of cultural, social and economic factors including: marriage, celebrations, meat offtake, stockvels etc. Under these conditions livestock are treated for disease. This includes dipping at six dip tanks every 14 days with Msunduzi providing chemicals at the dips. However, these traditional herds are not managed in terms of commercial principles involving: optimising quality (managed breeding programmes and artificial insemination), limiting size of herds, disease control, supplementary feed and managing veld condition. Hence large areas of land are set aside by Traditional Councils for livestock production where households have access to the available resources on a communal basis. Owing to grasslands being under communal management there is no single veld management policy i.e. grazing camp delineation, rotational grazing or burning. One of the consequences is that, over time, the diversity of grass species in the grassland sword tends to decline and hence the grazing potential decreases which in turn negatively impacts on the carrying capacity and the number of units that can be supported.

The broad location of the livestock grazing potential areas are contained in Figure 103 below. The indications from this map are that the areas with the highest concentrations of livestock are likely to be located in the eastern and central highlands of Ward 39 where stocking rates are at 2.2 hectares per large stock unit. In contrast the number of hectares in the lowlands doubles indicating a halving of the stocking rate in these areas. In the absence of actual data on cattle it is probable that the higher value grasslands are burnt every year and maybe even twice yearly to achieve a 'green flush' late winter to carry cattle through to the rainy season. Based on an average stocking rate and hectares of land available it is possible to estimate number of livestock (3774 large stock units) that could be carried in this area Table 34 below. It should be noted that that figure does not necessarily equate to the actual number of stock in the Ward.

It was established form the Livestock Extension Officer that sales take place amongst community members in Ward 39 as well in sales yards outside of Ward 39. Sales yards used include Bulwer, Impendle, Underberg and Ndaleni. (Ms. P. Ditibane, 2017. pers.comm., 29 November). The need for a sales yard facility in Ward 39 was identified as an important need by the Extension Officer (Mr Magwaza, 2017. pers.comm., 29 November).

As can be seen in Table 34 the majority of households (20%) that produce cattle own less than 10 units with only 4% owning up to 100 units. A further important finding from the census data is that at the time of survey 76% (inclusive of the 1% of households with 0 cattle) of households were not involved in cattle production. (Stats SA, 2011)

Table 34. Cattle Ownership

Number of Cattle	Dwellings	Percentage of Total Dwellings
0	26	1%
0-10	507	20%
11-100	98	4%
100	3	0%
Not applicable	1911	75%
Total	2545	100%

Source: Stats SA, 2011.

Sheep

Sheep are primarily used for meat production and not for wool as in other parts of the KwaZulu-Natal Province. In the same way as cattle, sheep graze on commonage pastures where there is no camping or rotational grazing system. Sheep are treated by owners for ailments and advice is provided by the Extension staff. (Ms. P. Ditibane, 2017. pers.comm., 29 November).

The Census data indicates that in the order of 3% of households own sheep (Table 35). The remainder are not involved in this type of livestock production. Unfortunately there are no records available as yet on number of sheep in Ward 39. That information will be made available by the Extension staff once the census has been completed early next year.

In the absence of actual data and based on a review of the grazing potential map in Section 3 of this report, it is probable sheep are mainly located in the colder wetter highlands (high rainfall grasslands) of the study area which is primarily in the central and eastern parts.

Table 35. Sheep Ownership (Stats SA, 2011)

Number of Sheep	Dwellings	Percentage of Total Dwellings
0	69	3%
0-10	41	2%
11-100	18	1%
100	1	0%
Not applicable	2416	95%
Total	2545	100%

Goats

The indications from the Census data are that 20% of households have access to goats with the remainder not involved in this form of livestock production (Table 36). Goats are less selective that cattle and sheep in terms of their grazing requirements and hence tend to be more widespread throughout the area although it is probable that they will mainly be located in areas where cattle and sheep are not viable i.e. hotter, drier valleys including the Mkhomazi.

Table 36. Goat Ownership (Stats SA, 2011)

Number of Goats	Dwellings	Percentage of Total Dwellings
0	23	1%
0-10	407	16%
11-100	94	4%
100	2	0%
Not applicable	2019	79%
Total	2545	100%

Pigs

The indications from Census data (Table 37) and from the Extension staff is that pig ownership is very limited in Ward 39. Those households which own pigs use them for domestic meat requirements and they are located around households where they mainly depend upon household scraps and limited natural foraging for food supplies.

Table 37. Pig Ownership (Stats SA, 2011)

Number of Pigs	Dwellings	Percentage of Total Dwellings
0	72	3%
0-10	3	0%
11-100	1	0%
100	0	0%
Not applicable	2469	97%
Total	2545	100%

Horses and Donkeys

There is evidence of a limited number of horses and donkeys in Ward 39. These are generally regarded as traction animals by communities in surrounding areas e.g. Impendle, Richmond, Ndaleni. Further information on this type of livestock will be necessary in order to provide a clear understanding on their role in the local agricultural economy of this area. The Census data has a category termed "Other" for livestock. It is not clear what is included in this category, but almost certainly traction animals form part of this group.

Poultry

Census data indicates that 767 households in Ward 39 are involved in poultry production such as chickens, ducks, geese, guinea fowl, ostrich etc. (Stats SA, 2011). The Livestock Extension Officer indicated that as far as she could determine there were no commercial poultry producers in Ward 39. The majority of producers are local households who have chickens at home for egg and meat

production for domestic use. Surplus birds are sold or traded for other locally produced food stuff. (Ms. P. Ditibane, 2017. pers.comm., 29 November).

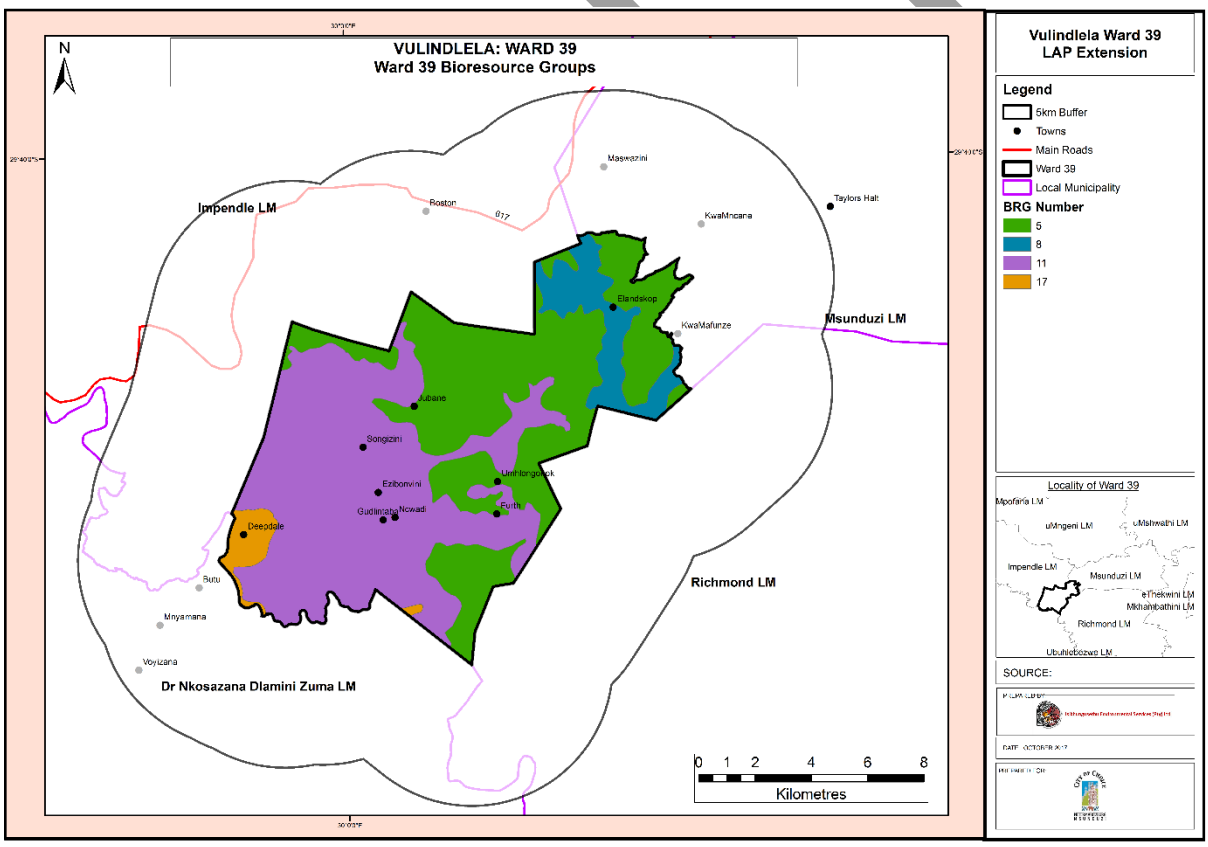
6.7.2. Agricultural

a) **Overview of Potential**

A detailed review of agricultural potential for Ward 39 is contained in Annexure 3 of this report. A brief summary follows to provide an overview of potential in the area.

As shown in Figure 101, Ward 39 is characterised by four Bioresource Groups i.e. BRGs 5, 8, 11 and 17. Within these BRGs there are six Bioresource Units i.e. BRUs VWb1, Wc27a, Xc14, Yc13, Yc14a and b, Yd18 (see Figure 101). BRGs provide a macro view of agricultural potential in any given area at a broader regional scale. The BRUs are located within each of the BRGs and provide a micro view of agricultural potential at a localised scale.

Figure 101. Bioresource Groups



b) Resume of BRGs

BRG 5: Moist Midlands.

BRG 5 is characterised by high potential soils and favourable climate for maize, potato, cabbage, timber (wattle, pine and eucalypt), beef and dairy production. The natural veld in this area is not ideal

for commercial livestock or dairy production. Animals in these areas generally require supplementary feed, particularly in the dry season owing to the loss of nutrient and palatability of grasses later in the growing season. The area is well suited to seasonal or permanent pasture production.

This BRG is also important for water production due to its relatively high rainfall and to the natural grasses and forest which occur in this area. As a consequence, one of the options for future land use in this area is to seriously consider game production and conservation of natural vegetation. The aim here would be to enhance water production and increase tourism potential whilst at the same time investigating the possibility of carbon sequestration and trading options.

Different species of timber are well suited to this BRG and could include commercial timber operations (outsourced or community owned) where extensive areas of land are available for this form of agriculture. However, as noted above, there is a potential conflict of interest between timber, arable and livestock production in this BRG: if land is converted to timber then the available areas for arable and livestock grazing are reduced proportionally with a concomitant reduction in the diversification of agriculture and the number of livestock units that can be carried in this area. Limiting agriculture to mono-cropping in timber could have a negative impact on the local economy of the area, particularly if ownership of commercial forests is not local. Diversified local agricultural tends to support a wide variety of up and downstream services and hence enhances local economic diversification.

BRG 8: Moist Highlands Sourveld

This BRG is located along the Drakensberg highlands in the province above the other BRGs. It is inclusive of BRG Subgroup 8.2, known as Impendle, which is mountainous in nature lying on the crests of the ridge lines extending from Impendle mountain to Boston, Elandskop and Byrne outside of the town of Richmond.

BRG 8 is located in the summer rainfall region with a high rainfall well in excess of 800mm. It has short growing seasons and cold, dry winters. Soils tend to have limited potential for arable production due to their being relatively shallow. However, the BRG is characterised by pockets of high potential land which is suited to intensive production. Grazing of livestock is recommended at two hectares per large animal unit with access to supplements and pastures in winter. In order to maintain and enhance the productive potential of the natural grasslands a rotational grazing system and managed burning programme is advocated in this BRG.

Despite its limitations, land in this BRG is suited to intensive farming systems including beef, dairy, maize and potatoes. The grazing capacity and climate in this area lends itself to combined grazing of cattle and sheep. This BRG also is suitable for the conservation of grasslands and forests and the production of a variety of species of game.

BRG 11: Southern Moist Upland Grassland

In Ward 39 BRG 11 is inclusive of two subgroups (11a and b Hlanganani). It is regarded as a transitional zone located immediately below the Moist Highlands Sourveld. This BRG follows the watersheds along

the major river valleys in this area (Mkhomazi and Polela) extending to Creighton, Donnybrook and Lufafa Road. The terrain on the watersheds tends to be undulating while the upper edges of the valleys are often very steep and do not lend themselves to many forms of agriculture.

The climate in this BRG favours a variety of agricultural activities with rainfall ranging from 797-1117mm per annum. Owing to its adjoining BRG 5, its location on the watershed of major catchments and to its relatively high rainfall, this includes areas that are important for water production. Hence management of the resources is critical for sustained downstream water production.

The habitat in this BRG is vulnerable (Mr K Camp, 2017. pers.comm.) due to major transformation in the form of timber and sugar production, the cultivation of maize and the grazing of livestock and dairy. The BRG sub-groups include large areas of natural forests (e.g. that located on Lundy's Hill – known as 7 Mile Bush), grasslands and bushed grasslands.

The land use potential of this BRG lends itself to large scale agricultural production. The main types of agriculture practised on a large scale in the commercial farming areas in this BRG include: maize, soya bean, dairy, beef and timber (mainly pine). As noted under the status quo component of this report, this potential is not being realised in Ward 39. As regards livestock production, the stocking rates are in the order of 2.2 hectares per large stock unit and a more flexible form of grazing system is feasible than advocated in the BRGs 5 and 8 due to, amongst other factors, slope and climate. Supplementary grazing in the form of pastures (Smuts finger grass and Kikuyu) during the dry season is appropriate particularly for dairy.

BRG 17: Coastal Hinterland Thornveld

This BRG is inclusive of a sub-group known as Deepdale (17.8) which is centred in a small area in the west of the project area on the Mkhomazi River. The remainder of the BRG occurs in the major river valleys along the central and southern KwaZulu-Natal coastal areas. It is known as a secondary veld and is dominated by Acacia species of trees and grasslands dominated by Dry Ngongoni veld. This is noted as being a vulnerable habitat due to high levels of transformation taking place in this BRG through urbanisation and subsistence agriculture.

This BRG is characterised by a drier, hotter climate than the BRGs described above. Rainfall ranges from 646-825mm. Summers tend to be hot and winters mild and hence restrictions on production potential relate more to rainfall and slope that they do to temperature with the exception of valleys in winter which are subject to temperature inversion and frost.

Owing to its location the area forming this BRG tends to have a poor supply of water other than for the major river systems which run through to the sea from the highlands. The lack of water is compounded by the rugged nature of the terrain in the area and poor soils for agricultural production. Where pockets of high quality soils intersect areas with reasonable slope (up to 12%) and water that can be used for irrigation purposes, then it is possible to produce maize, dry bean, sugar cane, and vegetables and limited areas of timber (wattle). There is the possibility of frost in valleys in winter which could impact on the types of crops produced in this BRG. Livestock production is feasible in these areas (Figure 103), but veld condition is poor and stocking rates are at around 3.5 hectares per

large animal unit. Thus the number of stock that can be carried on these grasslands is substantially lower than in the BRGs located in the highlands. These grasslands require careful management to maintain their productive condition. Over utilisation generally results in bush and scrub encroachment and loss of grazing. Thus rotational grazing and resting of camps for long periods is required. A managed burning programme is also necessary to maintain the grasslands.

Figure 102. Bioresource Units

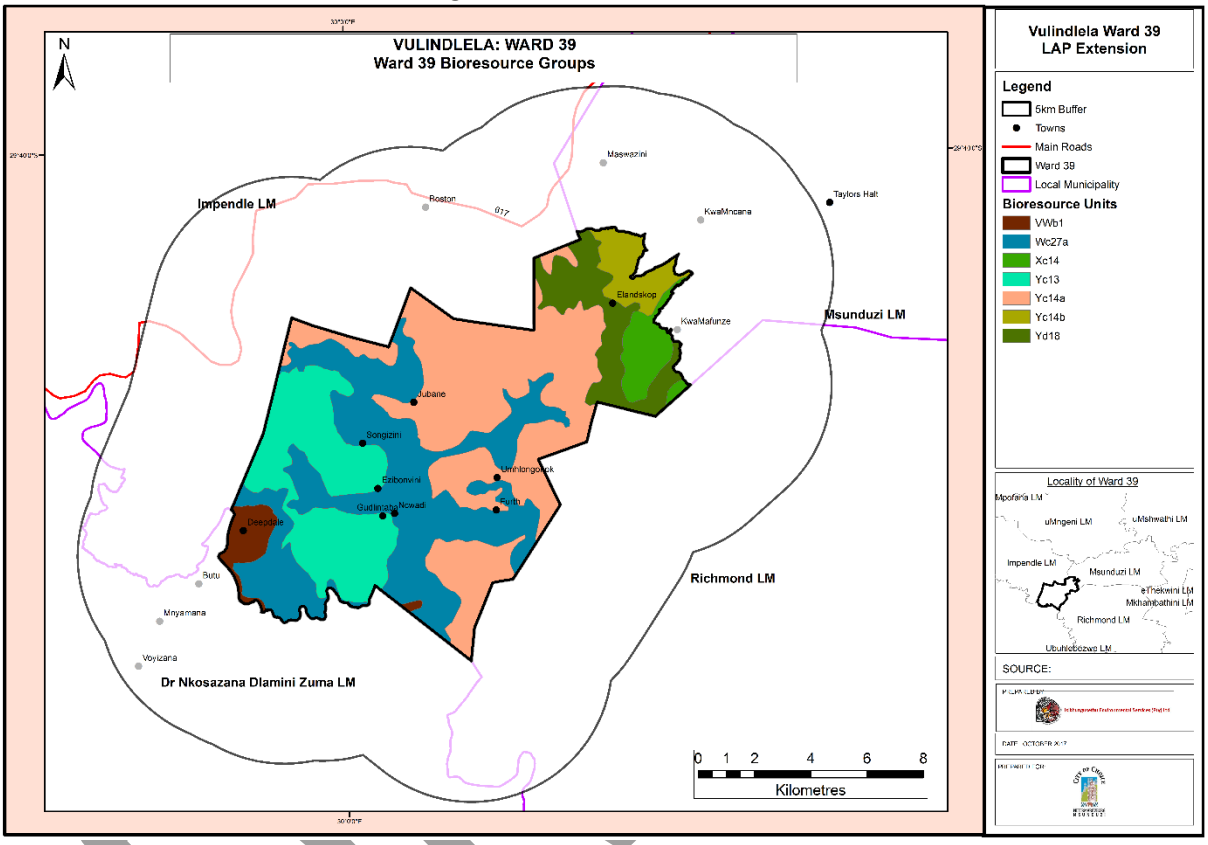
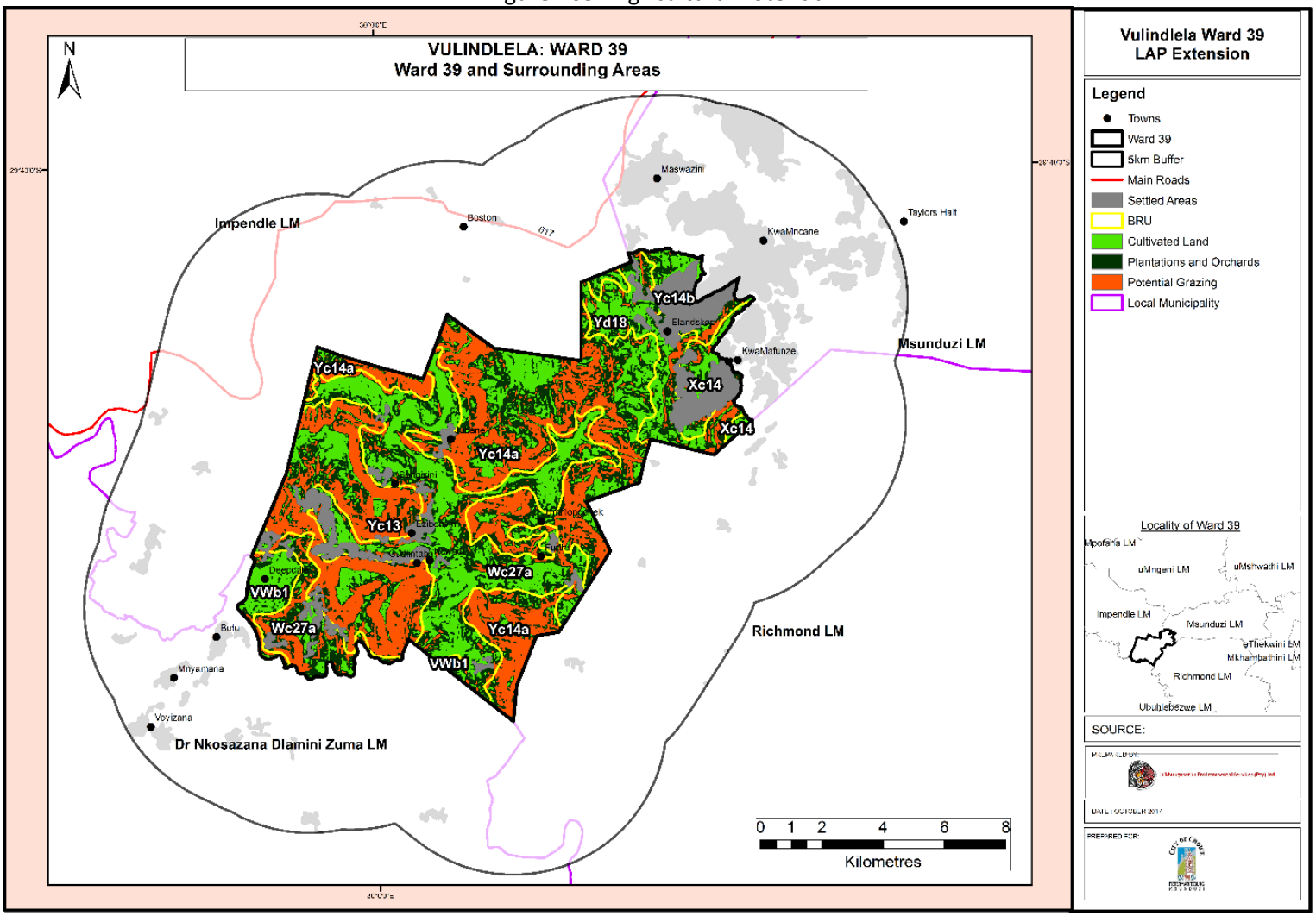


Figure 103. Agricultural Potential



The areas potentially available in Ward 39 for different types of agriculture are included in Table 38 below. It should be noted that there is potential for 'overlap' in land suited to arable and plantations or plantations and grazing. In other words flatter areas are best suited for arable, but could equally be used for plantations and livestock. However, arable cannot be located on steeper lands at scale and hence location of plantations or grazing on flatter areas results in loss of production potential for all forms of cultivation. Thus the below 12% slope areas need to be set aside for cultivation and the above 12% identified for plantations, orchards and grazing. Restrictions should be placed on any form of plantation in the areas above 25% due to erodibility and loss of water production potential. These steep areas should be set aside for conservation and managed stocking.

In the absence of actual cattle numbers it is possible to establish potential stock numbers on areas set aside for grazing and plantations assuming that this land is not used for any other form of development. At an average stocking rate across all BRUs of 2,5 hectares per large stock unit, the potential stock that could be carried in this area could be in the order of 3774 units. If any of this land is turned over to plantations or settlement or orchards, then the number of stock declines proportional to land areas removed for other types of land use.

Table 38. Potential Areas for Agriculture (Isikhungusethu Slope Analysis 2017)

Percentage Slope	Type of Potential	Hectares	Percentage of Total Hectares	Large Stock Units
<12%	Arable	4651.56	33%	
12-24%	Orchards and plantations	5012.82	36%	2004
>25%	Grazing	4424.94	31%	1770
	Total	14089.32	100%	3774

c) Summary of Agricultural Potential

Table 39 is used to provide a summary of the agricultural potential of each of the BRGs and associated BRUs in Ward 39. The columns in the table are used to identify each BRG and BRU and includes:

- A description of land potential:
  - L1-L3 high to moderate potential,
  - L4-L5 moderate to restricted potential,
  - L6-L8 very restricted to very low potential.
- Climate capability in terms of rainfall, temperature and wind:
  - C1-C2 slight limitations to production,
  - C3-C5 moderate limitations to production,
  - C6-8 severe limitations to production.
- Terrain slope.
- Percentage of area available for cropping.
- Suggested crops and their alternatives.
- Percentage of area available for orchards and timber.
- Stocking rates on lands identified for livestock.

- A broad description of each of the BRUs.

Thus it may be concluded from information contained in Table 39 that BRUs located in BRG 8 provide the greatest range of agricultural opportunities in Ward 39 owing to its locality, climate, slope and current level of underdevelopment. In contrast BRG 5 is more limited in extent, steeper slopes, higher, colder and is accompanied by limited growing season. BRG 17 has limited potential owing to it including rugged landscape, lower rainfall and harsh growing conditions, which could be overcome in limited areas with irrigation.

Table 39. Summary of Agricultural Potential (BRU, 2017)

BRU code (Rainfall mm)	BRG code (Veg type)	Land Potential (L)	Climate Capability Limiting Rating	Terrain and Slope	Annual Arable Cropping <12%	Crops	Alternative Crops	Orchards and Timber	Hectare/ Animal Unit (Grazing Capacity)	Potential Land Use
VWb1	17	3	C3	Steep (broken, Valley, Broken)	19,3	Cabbage, Cowpeas, Dry Bean, Groundnut, Maize, Potatoes, Sorghum, Sunflower		51,3	3,8	VWb1 is situated in the Coast Hinterland Thornveld on steep broken terrain. The rainfall ranges from 750 - 850mm and 56 % of the soils are well drained with 35% being Glenrosa form. Arability is restricted to 19% of the BRU and the climate rating of moderate and a land potential of moderate.
Wc27	11	5	C3	Steep (broken), Moderate	15,9	Cabbage (Jan-Sept), Carrot (Sept- Mar), Dry Bean (Nov-Mid Jan), Maize (Nov), Groundnut, Maize, Potatoes (Oct-Feb), Tomatoes Oct), Wattle, Eucalyptus, Pinus ssp	Apple Pink Lady, Blueberry, Grapes (Wine & Table), Kiwi Fruit), Lettuce (Jan-Feb: Sept-Oct), Peach, Nectarine, Rapberry, Swiss Chard (Feb;, Aug-Nov)	45,4	2,3	Wc27 is in the Moist Transitional Tall Grassveld on broken terrain and steep/moderate slopes. It has a rainfall of 800 mm to 850 mm and a slightly restricted growing season due to low temperatures and frost. The soils are mainly well-drained (53%) and Glenrosa (24%) form, mottled, poorly-drained (10%) and duplex soils are also found. The erosion hazard is high. Arability is restricted to 15% of the BRU and the grazing capacity is 2.3 ha per animal unit on good veld. This BRU has a restricted potential for cropping, moderate potential for grazing and a moderate potential for timber.
Xc14	5	4	C3	Steep (broken), Moderate (rolling)	26,2	Cabbage (Aug-Mar), Carrots (Sept-Mar), Dry Bean (Nov-Mid Jan), Maize (Nov), Potatoes, Tomatoes (Oct), Wattle, Eucalypte, Pinus spp	Apple Granny Smith, Blueberry, Grape (Wine & Table), Lettuce, Peach, Nectarine, Sweet Potato (Nov), Swiss Chard (Feb: Aug-Nov)	72,7	2,6	Xc14 is in Moist Midlands Mistbelt on broken rolling terrain and steep/moderate, slopes. The rainfall is from 850 mm to 900 mm and the climate is slightly restricted due to low temperatures and frost during the growing season. The soils are mainly well-drained (74%) with a lesser extent of Glenrosa (19%) forms. Arability is 26% of the BRU which has a grazing capacity on good veld of 2.6 ha per animal unit on reasonable veld, the potential for grazing is restricted due to poor quality veld. The BRU has a moderate potential for cropping and a good potential for timber.
Xc13	11	4	C3	Steep (broken), Moderate (rolling)	21,5	Cabbage (Jan-Sept), Carrot (Sept- Mar), Dry Bean (Nov-Mid Jan), Maize (Nov), Groundnut, Maize,	Apple Pink Lady, Blueberry, Grapes (Wine & Table), Kiwi Fruit), Lettuce	52,4	2,3	Xc13 is in Moist Transitional Tall Grassveld and on steep, broken and moderate, rolling terrain. The rainfall ranges from 850 mm to 900 mm and the effect of climate is a slightly restricted growing season due to low temperatures and frost.. The soils

						Potatoes (Oct-Feb), Tomatoes Oct), Wattle, Eucalyptus, Pinus ssp	(Jan-Feb: Sept-Oct), Peach, Nectarine, Raspberry, Swiss Chard (Feb;, Aug-Nov)			are mainly well-drained forms with Glenrosa form common. The arability is 22% of the BRU and grazing capacity 2.6 ha per animal unit on good veld. The potential of this BRU is determined as moderate.
Yc14	5	4	C3	Steep, Moderate (rolling)	28,1	Cabbage (Aug-Mar), Carrots (Sept-Mar), Dry Bean (Nov-Mid Jan), Maize (Nov), Potatoes, Tomatoes (Oct), Wattle, Eucalypte, Pinus spp	Apple Granny Smith, Blueberry, Grape (Wine & Table), Lettuce, Peach, Nectarine, Sweet Potato (Nov), Swiss Chard (Feb: Aug-Nov)	64,2	2,6	Yc14 is in Moist Midlands Mistbelt on rolling terrain and steep/moderate slopes. The climate has a slightly restricted growing season due to low temperatures and frost. The rainfall ranges from 900 mm to 1 100 mm. The soils are dominated by well-drained (72%) forms with Glenrosa (23%) form common. Arability is 28% of the BRU. The grazing capacity on veld in good condition is 2.6 ha per animal unit. This BRU has a moderate potential for cropping and high potential for timber with a restricted potential for grazing due to steeps and poor quality veld.
Yd18	8	6	C4	Steep (broken, Mountainous), Moderate	19,4	Cabbage (Sept-Jan), Carrots (Oct-Feb), Dry Beans (Nov- Mid Jan), Maize (Nov), Potatoes (Oct- Feb), Tomatoes (Oct-Dec)	Apple Granny Smith, Blueberry, Hazel Nuts, Lettuce (Sept-Oct), Peach, Nectarine, Persimmon, Proteas, Swiss Chard	51,8	2,3	Yd18 is in Moist Highland Sourveld and on steep, mountainous, broken with secondary areas of moderate slopes. The climate, with low temperatures and severe frosts restrict the planting dates and growing season for adapted crops. The soils are well-drained and Glenrosa forms and the arability of 19.4% of the BRU. The grazing capacity of good veld is 2.3 ha per animal unit and the BRU has a potential very restricted.

6.7.3. Agricultural Informants and Constraints

a) Overarching

As noted, certain parts of Ward 39, particularly those located in the higher rainfall areas on undulating land have high agricultural potential. With the correct farmer training, expertise, management practises and the implementation of appropriate road and bulk water infrastructure this potential could be translated into viable extensive farming operations. This is evidenced in the farming operation taking place at the nearby Severfontein Correctional Service Facility. The review of agricultural potential and the historical record of land use in this and surrounding areas would seem to support this finding.

However, the evidence in current land use practises in Ward 39 would seem to indicate very limited organised agriculture taking place in the Ward at present. This relates to the communal tenure system which characterises communal areas, lack of access to capital and the necessary infrastructure and equipment, lack of expertise and training in establishing and operating commercial farming operations.

In contrast to the identified potential in this area, the emphasis in current land use in Ward 39 is on household food security and traditional livestock production amongst around a third of the population. The remaining households do not appear to be actively involved in agriculture. This would seem to indicate conformity with trends identified in Vulindlela in what may be termed the phenomenon of accommodating 'displaced urbanisation' on prime agricultural land.

The history of rural development in this province and more particularly Vulindlela, would seem to indicate that the demand for land for housing allied to the provision of social and utility services and housing tends not to take cognisance of agricultural resources which leads to the loss of productive agricultural land. In order to both conserve and realise the economic benefits if this agricultural potential there needs to be a substantial change in mind set among government, politicians and residents of these areas: this change of approach and thinking about agricultural resources is clearly 'spelled out' in national and provincial planning principles and in the VLAP. In essence this involves making provision to accommodate 'displaced urbanisation' in clearly demarcated fully serviced centres each with a sound economic base. The aim is to 'free up agricultural land' and ensure that it is not settled such that it can be used for productive agriculture in current and future generations by competent and committed farmers including small, medium and large scale producers.

b) Informants

Smallholders:

- Ward 39 would appear to have under-utilised agricultural potential in the areas where settlement has not yet taken place (Map 3).
- The potential for extensive development lies in the following sub-sectors of agriculture:
    - Expanding areas under extensive arable, particularly: maize, soya bean, dry bean, potatoes.
    - Expanding areas under Intensive cultivation of vegetables.

    - Introduction of timber production including: Eucalypt, Pine, Wattle.
    - Enhancing and upgrading local cattle for beef production.
    - Introduction of dairy.
    - Commercialisation of poultry.
- The different opportunities in agriculture are closely linked to the location of BRGs and BRUs in Ward 39. Thus different types of agriculture will need to be located in those areas of Ward 39 best suited to each type of enterprise.
- Opportunities at localised level require in-field investigation and verification.

Food Security:

- There appears to be un-realised potential for expanding food security production around households and in communal gardens in areas where there is settlement, particularly low density levels.
- The sub-sectors with potential for expansion include: limited grains (maize, sorghum), a variety of vegetables suited to each BRU, poultry and possibly deciduous fruit in the highlands (BRGs 8 and 5) and citrus in the lowlands (BRG 17).

c) Constraints

Smallholders:

- Limited access to traction services in Ward 39 by smallholder farmers.
- Distances, costs and logistics associated with accessing main centres in the region to secure inputs into production.
- Lack of access to irrigation for smallholder production, particularly in relation to high value crops such as vegetables, maize and pastures.
- Challenges associated with production in volumes sufficient to generate surpluses which can be invested in expansion of each enterprise.
- Difficulties associated with accessing external markets for the sale of produce for smallholder farmers due to: relatively inaccessible location relative to regional centres and markets, limitations on road access into the area and the complete lack of market presence.
- Costs and haulage distances for inputs and outputs for smallholder farmers.
- Limitations for smallholder farmers on expertise and training in commercial farming i.e. establishing and operating medium to large scale farming operations and associated enterprises.
- Access to agricultural land with secure rights which could be used to secure seasonal production loans by farmers.
- The need for individual farmers to co-ordinate and co-operate with one another in securing inputs and sharing costs in relation to: land preparation, irrigation, securing costs effective inputs (seed, fertilizer, herbicides etc.), harvesting of crops, local processing and packaging, transportation and joint marketing.
- Obtaining specialised extension services relating to specific commercial crops, livestock, plantations and orchard establishment and operation.

Food Security:

- There is potential for expansion in food security production in this area, but this will require the establishment of a support programme by Msunduzi and the Department of Agriculture. This will ensure that these producers benefit from the programmes aimed at enhancing food security for rural communities.

6.8. Cultural Heritage

Section 2 of this report recorded certain historical events which occurred at places within this ward. Amongst those, at the risk of repetition, was the attempted burning down of the wooden bridge over the Mkomazi River, just at the bottom of Lundy's Hill, and the erection of two buildings, paid for by John Langalibalele Dube, at the Ncwadi Primary School. The referred-to workshop elicited reference to the buildings [75], revered, but no knowledge of the former [76]. It also brought forth reference to the Ntabende Hill to which people go to pray, and to two revered trees, one a Tambuti tree which may not be marked or harmed in any way [77], a particular tree type (Mlahlankosi/ Mphafa) which occurs locally, the branches of which are used in burial ceremonies.

Attempts to acquire more information yielded direction only to get same from the Richmond and Byrne Museum in Richmond. Telephonic attempts failed but other leads will need to be examined.

7. CURRENT AND PLANNED PROJECTS AND INITIATIVES

7.1. Projects and Initiatives

There are a number of developments planned for the area, varying in size, implementation period and implications. These projects cover a wide range of aspects including:

- Infrastructure,
- Housing,
- Agriculture and
- Management of the project area and implementation of the eventual Local Area Plan.

The description of the current and future projects will therefore follow the above template.

[75] but said to be 2 classrooms and a church

[76] Worthy of further study and the possible erection of some proximate edifice to mark the event and with would, conceivably be of the nature of the original marking of the Mandela capture. This would have to be only *proximate* because that point will be some metres below the new dam's water level at this point. Another historical record at about this position was the erection of a small hydro-electricity plant at about the time of the erection of the D1212 bridge across this river and which turbines powered machinery.

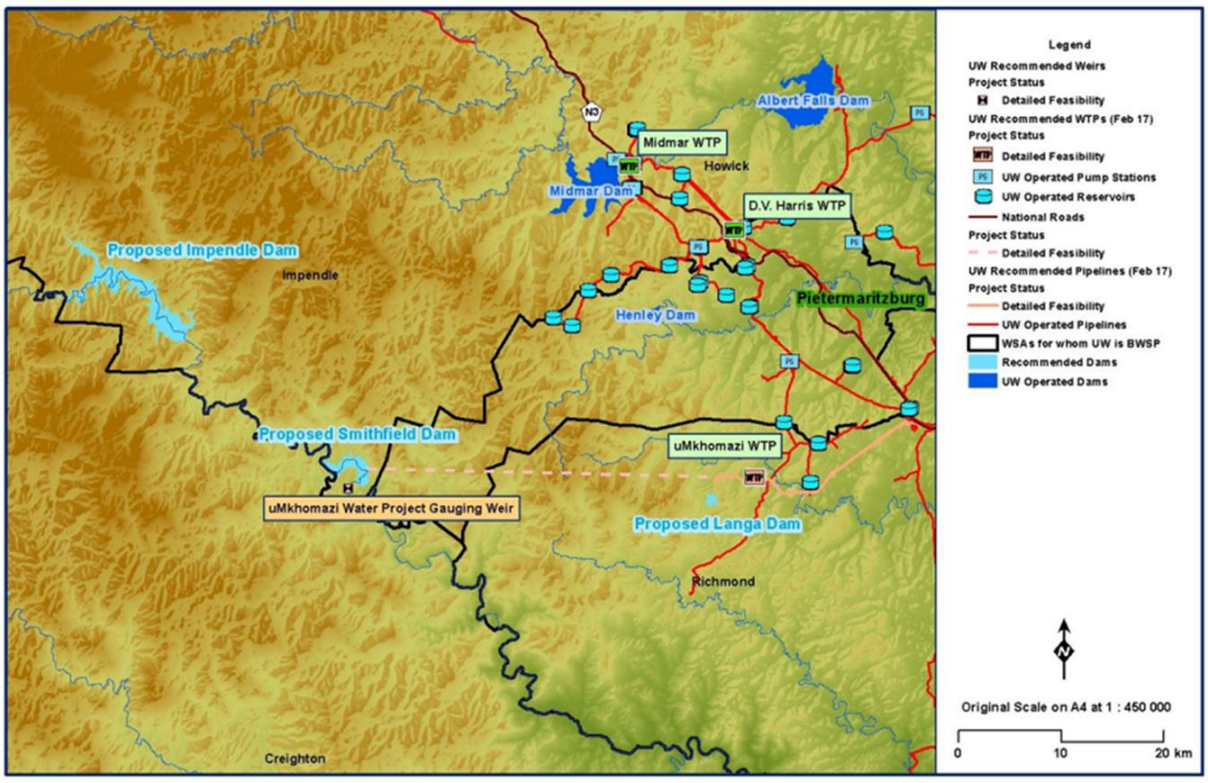
[77] although no particular history attached to it could be adducted at that workshop

7.2. Infrastructure Projects

7.2.1. Major Dam on the Mkomazi

This dam is proposed to be constructed very close to Ncwadi. The wall will be 4.4km due west of the Ncwadi Community Hall. The dam will flood back approx. 12km upstream to beyond the present road bridge [78] across this river. Apart from the water potentially to be drawn to serve this area, and other downstream areas deep into the South Coast itself, it has the potential to constitute a significant recreation attraction. There are complications associated with such because the National Department of Water Affairs, Forestry and Fisheries (DAFF) is apparently empowered to expropriate only land which is necessary for the purpose of water impoundment or its allied infrastructure. If recreation does, in good time, indeed come to the shores of this dam, recreation accommodation and other recreation-related services/ sports have the potential to be significant boosts to this local economy. Amongst these related activities are birding, hiking, trial-running, mountain-biking remembering that Section 2 highlighted that Ward 39 is endowed with many natural assets in the form of indigenous grasslands and bush, and wetlands and, presumably, the fauna which would, ordinarily, live in these habitats. These activities would marry well with any conservancies which could, potentially, be agreed/ declared over the area.

Figure 104: Map of Dam on the Mkomazi River (Umgeni, 2016)



[78] Which will need a replacement.

As consequence of the construction, it seems that the water level would flood a significant part of road P124 which is presently used to travel west from Deepdale Station to the R617. It is not yet known whether it is intended to construct an approx 2.7m portion of the road so affected. Such construction, it is opined, is unlikely because such replacement road would most likely fall within the area of land expropriated or, alternatively, would need, in order to avoid such expropriated land, to be fairly high up, and therefore cut into, the steep ridge to the east as to make construction relatively costly. More information as to the fate of P124 is still needed. Because there is some infrastructure within Ncwadi to provide certain services to workers engaged in constructing the dam wall, there might be positive spin-offs for local businesses during this phase, although the "A I Kajee" store, immediately west of the Ward 39 boundary, is probably best placed to sell product during that time.

7.2.2. Major New Road Bridge across the Mkomazi River

This R12 million, 100m bridge (at a point 3.6km SW of the Ncwadi community hall) has just been completed and will connect Deepdale Station with Buto Station just 1km to the SW of that bridge. Thanks to this construction, the opposing areas of Dr Nkosazana Dlamini Zuma and Msunduzi's Ward 39 will be able to develop a relationship. Co-operation surely lies in prospect.

Figure 105: New bridge across Mkomazi River

These twin projects in close proximity to, and thus related to, each other imply an almost urgent need to work with Dr Nkosazana Dlamini Zuma municipality to examine the likely implications/ impacts of the new bridge over the Mkomazi River a short distance downstream of Deepdale Station and, in concert with other bodies, what opportunities exist for co-operative planning of these now conjoined areas of the two municipalities.

7.2.3. Road Maintenance

The Pietermaritzburg Regional Office are currently doing blading and general maintenance of gravel roads in the area.

Figure 106: Grader working in Ward 39 on-site inspection day: 27 November 2017. Elandskop Station sidings on-route to the Umhlongonek Station crossing.

The Department recently completed a bridge over Mkomazi River (referred to above) which provides a link between NDZ Municipality and Msunduzi municipality. Part of this project was to extend D1208 up to D1215 on the other side of Mkhomazi River.

7.2.4. Water Reticulation

In contrast, the Portion of Ward 7 Ingwe has been dependant on borehole systems. There are two boreholes along the P121 road adjacent to the Ncwadi river after the Old Ncwadi hotel. Only the one borehole is operational at present. This water is pumped to a 400kl reservoir 860m NNW from the Ncwadi Clinic. This is, in turn, linked to a 200 kl reservoir built closer to the Ncwadi/ Boston road intersection (1.85km further NNW with height gain of 208m) the filling of which is dependent on the water level in the main (lower) reservoir. Without that level being achieved, the pump will not activate to lift water to the higher level. The pump to the higher elevated reservoir is linked to a float which in turn is dependent on the water level. Of recent the water level in the main reservoir has not reached the critical level, which means no water can be pumped to the higher reservoir. These two reservoirs are able to meet a 60 litre *per* person *per* day Ncwadi area demand when adequate water supply enables the pump to be operational.

A dual system approach has been initiated to address the water demand issues in respect of the Ward 39. The first phase will deal with the optimal use of the current infrastructure. The second Phase will look at augmenting the current capacity with additional water from Vulindlela Ward 8 reservoir (Reservoir number 10).

There is a further long-term plan to construct a small treatment works near or at the new offtake for the Mkomazi supply to Ward 39 and the surrounding rural communities within the Harry Gwala municipal area which require reticulated water. The Mkomazi dam is a major construction currently funded by the Department of Water Affairs. There is major pressure for completion of this scheme

as it is predicted that the Durban Metro will experience serious water shortages by 2020 (i.e. domestic supplies cut to 30%).

In respect of phase 1, the borehole system needs to be reived and improved. This will allow for a temporary solution to the current water provisions for the Ncwadi region.

In parallel with the above process, business plans have been prepared to utilise the number 10 reservoir in Ward 7, to pump water to the Ncwadi clinic area. This business plan has been submitted for consideration. The "blue line" from reservoir 10 to the Ncwadi Clinic represents the intended route and water to provide a constant and sufficient supply of water to the Ncwadi community, as detailed below. This will also include the construction of a new 5KL reservoir above the clinic to ease the water demand requirements.

7.2.5. Sanitation

Ward 39 has no reticulated sewerage system. Sanitation planning for the area is to construct a Ventilated Improved Pit (VIP) latrine for each household: this programme, presently being implemented, seeks to eradicate sanitation backlogs in the area. Substantial progress has been made in respect of those ex-Ward 7 and 8 portions part of Ward 39. Over the period 2010 to 2014, 8300 VIPs were installed in Vulindlela.

Discussions with Qwabe (07.12.2017, Msunduzi Municipality: Water and Sanitation) revealed that there is a need for VIP toilet facilities in Ward 39. Funding for 140 VIPs for the 2017/18 year has been secured and all the funding will be used for ex-Ward 7 Ingwe portion of Ward 39. A Municipal Infrastructure Grant application has already been submitted. It is the intention to have these VIPs erected before the end of July 2018. The exact positioning is not known at this stage and will be subject to needs identified by the Traditional Authority structures.

The provision of waterborne sanitation to any of the areas in Ward 39 in the foreseeable future is very unlikely primarily due to its unaffordability and the lack of sufficient water.

7.3. Housing

The 2015 Ingwe IDP review identifies three housing projects in respect of the Ncwadi portion of Ward 39. The aforementioned IDP review includes a copy of the SDF map on which the intended housing projects are depicted. An extract of that map is depicted below and shows different human settlement intentions in the Qadi TA.

Figure 107: Extract from Ingwe 2015 SDF Housing (Ingwe Municipality, 2015)

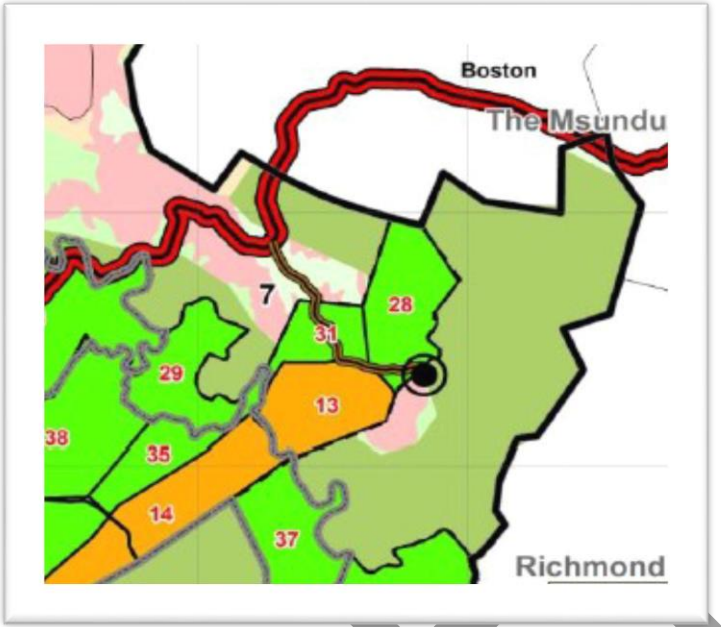


Table 40:Ingwe 2015 SDF: Housing Project Information.

Map Ref	Project No	Name	Trad Council	Units
Priority Housing Projects				
13	IHP 13	Mdutshini	AmaQadi	1000
Future – Rural Housing Projects				
28	IHP 28	Greater Ncwadi		600
31	IHP 31	Greater Deepdale (farms)		300
			Total	1900

The origins of these intended housing projects are to be found in ex-Ingwe's 2013 "Human Settlements Sector Plan". From the information available, these projects require budgeting in the present. But before any budgeting for or planning of these is undertaken, it is important that the measure of this "need" be examined by Msunduzi, and if so affirmed, that the appropriate planning for the location of such be done as part of this project, not least because this is a very rural area with some valuable agricultural and natural resources which should not be compromised.

7.4. Agriculture

The Department of Agriculture, Forestry and Fisheries (DAFF), like many other Government entities, is still in the process of coming to understand the dynamics and needs of the newly created Ward. For example, at a community focus group meeting, held on 13 December 2017, reference was made to the Department of Education which is the process of relocating the Ward 39 District Management from Kokstad and Ixopo to Msunduzi, allowing improved accessibility.

At a meeting held with Mr Magwaza of DAFF on 16 November 2017, it was established that DAFF is involved in the three programmes listed below.

a) Food Security

Mr Magwaza (Personal comm. 16.11.2017) of DAFF explained that their Department is supporting 270 families with 6 varieties of seeds in respect of the Food security program. These seeds include cabbage, spinach, carrots, butternuts, beetroot and onions. These seeds are grown in seedbeds until they are mature enough to be transplanted.

It was established that the families to be supported are identified at War-room level. Those community members who have the greatest need, and who will farm the seedlings, are identified for support.

b) District Tractor Programme

The Department had, prior to 2015, provided support to small- and medium-scale farmers, by providing tractors, managed at district level, and used on a rotational basis. This programme was altered by those tractors being allocated to Traditional Leaders in areas where large scale farming was being undertaken.

This has resulted in small-scale farmers becoming disappointed at the loss of their mechanisation support.

There have been attempts to return to the previous system of tractor-and-implements allocation and sharing, but the Traditional Leaders and the communities who presently hold those resources do not wish to relinquish them.

The Mechanisation Section of DAFF is now in the process of securing the services of a Service Provider to re-instate the District Tractor support system.

c) Fencing and Irrigation

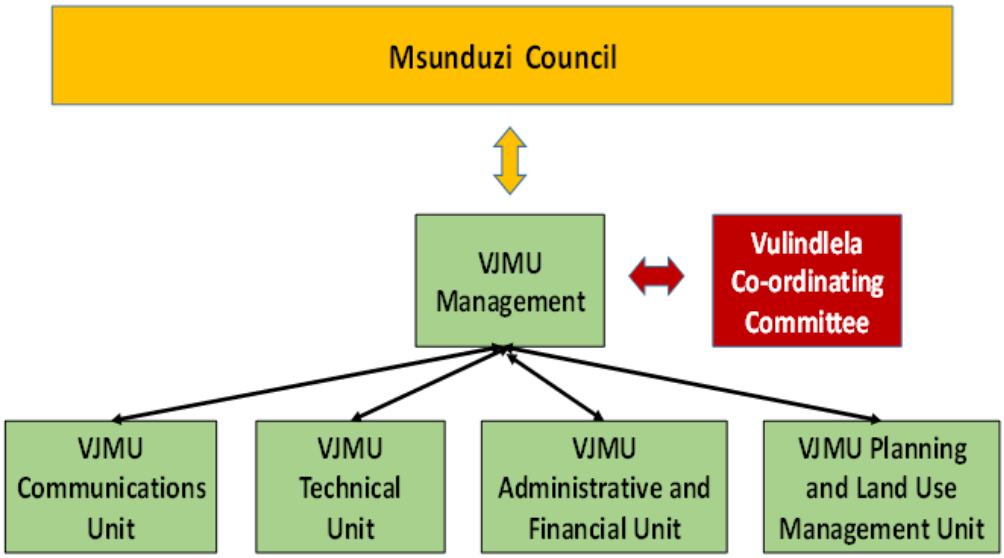
DAFF confirmed that it does provide assistance in respect of irrigation and fencing, however this is subject to successful business plan application to, and approval by, that Department.

7.5. LAP Implementation Management: Joint Management Committee

One of the cornerstones of the Vulindlela LAP, and consequently also in respect of this LAP, is the effective implementation of the Joint Management Committee to jointly manage land use change consideration and land use management in respect of Traditional administered areas as well as jointly taking responsibility for the implementation of the municipality's adopted local area plan recommendations and programmes. Whilst this may be considered a "softer" issue, the implementation of the Joint Management Committee, consisting of municipal officials, the Traditional Council and the Ingonyama Trust Board and potentially DRDLR as the administrator of the South African Development Trust Land, this institutional structure is fundamental to the successful

implementation of the local area plan. Indeed, without such structure in place, and functional, the objects of this very plan cannot be achieved.

Figure 108: Suggested structure and reporting lines for the Vulindlela Joint Management Unit



7.6. Projects and Initiatives Summary

In an attempt to consolidate the above information, the following table is presented:

Table 41: Ward 39 Current and Planned Projects

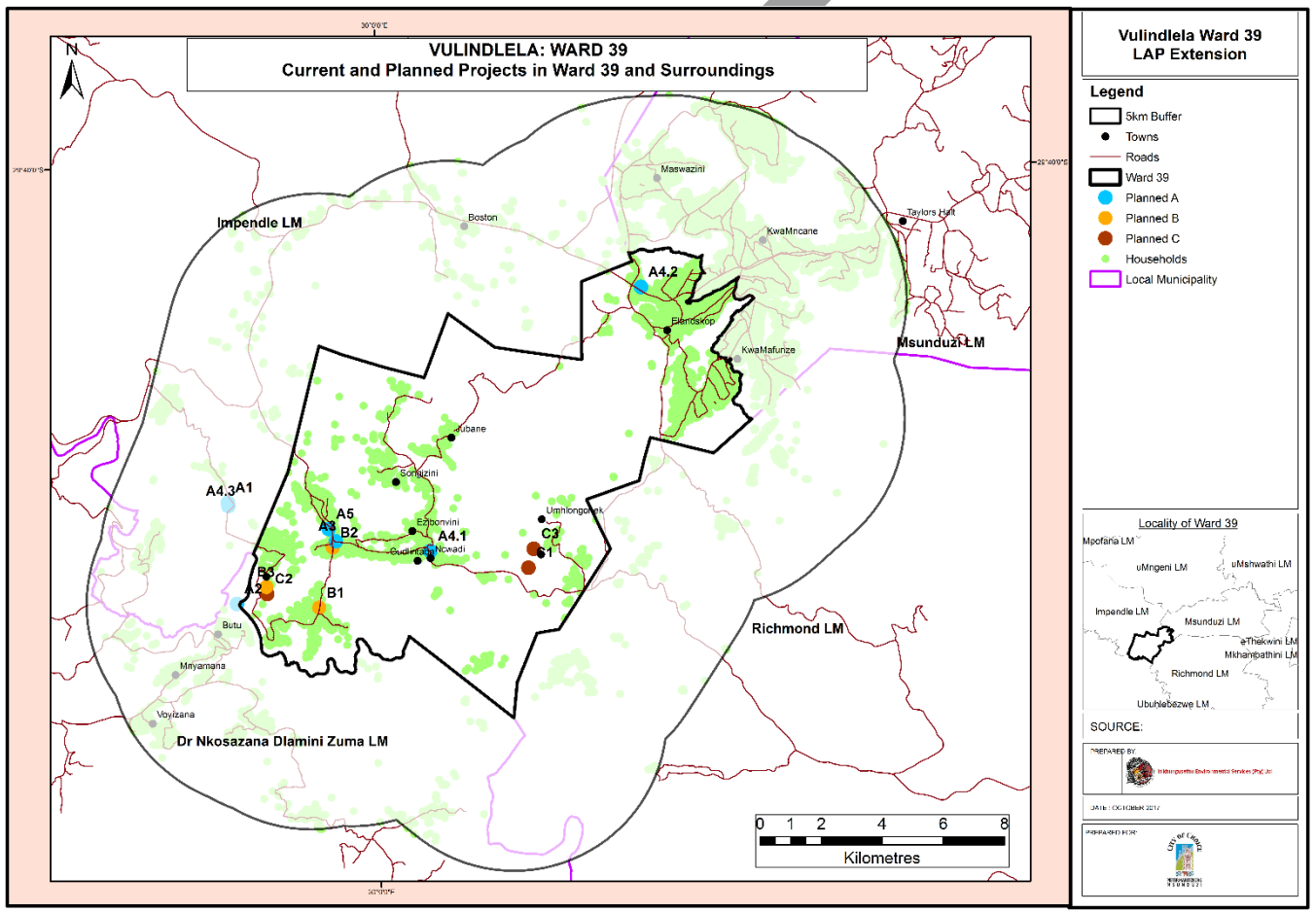
Sector	Project name	Project	Possible funder, if available	Map Reference	Project status	
					Current	Planned/ under consideration
Infrastructure	Major dam on the Mkomazi River	This dam is proposed to be constructed very close to Ncwadi. The wall will be 4.4km due west of the Ncwadi Community Hall. The dam will flood back approx. 12km upstream to beyond the present R617 road bridge across this river.	Department of Water Affairs	A1		Planned
	New bridge across the Mkomazi River	A bridge has recently been completed at a point 3.6km SW of the Ncwadi Community Hall. This bridge connects Deepdale Station with Buto Station just 1km to the SW of that bridge. Thanks to this construction, the opposing areas of Dr Nkosazana Dlamini Zuma and Msunduzi's Ward 39 will be able to develop a relationship. This bridge was built at the request of residents in the Dr Nkosasaza Dlamini Zuma municipality wishing to have a shorter travel time to Richmond.	Department of Transport	A2	Bridge alongthe D1208 road connecting Ncwadi and Richmond completed in July 2017	
	New roads/ maintenance of existing roads	The Pietermaritzburg Regional Office are currently doing blading and general maintenance of gravel roads in the area. The Department recently completed a bridge over Mkomazi River (referred to above) which provides a link between NDZ Municipality and Msunduzi municipality. Part of this project was to extend D1208 up to D1215 on the other side of Mkhomazi River.	Department of Transport	A3	Maintenance of existing roads being undertaken	
	Water reticulation	Phase 1 of the water reticulation plan deals with the optimal use of the current borehole infrastructure. Work has commenced to improve the current borehole feed to the main Ncwadi Reservoir.	Msunduzi Municipality	A4.1	Currently being attended to	
		Phase 2 will augment the current capacity with additional water from Vulindlela Ward 8 reservoir (Reservoir number 10).	Msunduzi Municipality	A4.2		A business plan has been submitted.
		There is a further long-term plan to construct a small treatment works near or at the new Mkomazi dam offtake for supply to Ward 39 and the surrounding rural communities within the Harry Gwala	Department of Water Affairs	A4.3		Future planned

		municipal area. The Mkomazi dam is a major construction currently funded by the Department of Water Affairs.				
	VIP Pit latrines	Ward 39 has no reticulated sewerage system. Sanitation planning for the area is to construct a Ventilated Improved Pit (VIP) latrine for each household: Substantial progress has been made in respect of those ex-Ward 7 and 8 portions part of Ward 39. Over the period 2010 to 2014, 8300 VIPs were installed in Vulindlela. 140 VIP pit latrines are about to be built in Ward 39.	Msunduzi Municipality	A5		Business plan under consideration
Housing	Mdutshini	1000 House development	Department of Human Settlement and Vulindlela Housing Agency	B1		Proposed, subject to budget
	Greater Ncwadi	600 house development	Department of Human Settlement and Vulindlela Housing Agency	B2		Proposed, subject to budget
	Greater Deepdale (farms)	300 house development	Department of Human Settlement and Vulindlela Housing Agency	B3		Proposed, subject to budget
Agriculture	Food security	Department of Agriculture, Forestry and Fisheries is supporting 270 families with 6 varieties of seeds in respect of the Food security programme. It is intended that this programme be extended.	Department of Agriculture, Forestry and Fisheries	C1	Current support to 270 families	Project to be extended
	District Tractor programme	The Department of Agriculture, Forestry and Fisheries, up to 2015 had provided support to small and medium scale farmers, through tractors which were managed at district level and could be used on a rotational basis. This programme was altered with the tractors being allocated to Traditional Leaders in areas where large scale farming was being undertaken. The Mechanisation Section of the Department of Agriculture, Forestry and Fisheries is in the process of securing the services of a Service Provider to re-instate the District Tractor support system.	Department of Agriculture, Forestry and Fisheries	C2		Project to replace Tractors underway

	Fencing and irrigation	The Department of Agriculture, Forestry and Fisheries confirmed that they do provide assistance in respect of irrigation and fencing, subject to a successful business plan application to the Department.	Department of Agriculture, Forestry and Fisheries	C3	On-going	
Administrative management	Joint Management Committee	The intension of the Joint Management Committee is to jointly manage land use management in respect of Traditional administered areas as well as jointly taking responsibility for the implementation of the local area plan recommendation and programmes. This institutional structure is fundamental to the successful implementation of the local area plan.	Msunduzi Municipality	D1	Initiated in respect of Vulindlela and needs to be extended	

7.6.1.Project Map Reference

Figure 109. Current and Planned Projects in and Around Ward 39



7.7. Project Implications in Respect of Infrastructure and the Environment

Table 42 below contains a summary of the various projects previously identified and their implications in respect of Infrastructure and the environment.

Table 42: summary of the various projects previously identified and their implications in respect of Infrastructure and the environment

Sector	Project name	Project	Infrastructure implications	Potential Environmental Implications
Infrastructure	Major dam on the Mkomazi River	This dam is proposed to be constructed very close to Ncwadi. The wall will be 4.4km due west of the Ncwadi Community Hall. The dam will flood back approx. 12km upstream to beyond the present road bridge across this river.	[1]. The provision of a dam will provide much needed water for the Region, including Ward 39. [2]. Access roads will need to be built. [3]. Water pipelines and pump stations will need to be erected	[1]. EIA and associated impact assessments will need to be undertaken. [2]. The proposed dam site is situate outside the environmental protected area.
	New bridge across the Mkomazi River	A bridge has recently been completed at a point 3.6km SW of the Ncwadi Community Hall. This bridge connects Deepdale Station with Buto Station just 1km to the SW of that bridge. Thanks to this construction, the opposing areas of Dr Nkosazana Dlamini Zuma and Msunduzi's Ward 39 will be able to develop a relationship.	[1]. Road access from Ncwadi to the bridge along road D1208 and from the bridge, via D1215 to Richmond.	[1]. Environmental impact assessment were undertaken.
	New roads / maintenance of existing roads	The Pietermaritzburg Regional Office are currently doing blading and general maintenance of gravel roads in the area. The Department recently completed a bridge over Mkomazi River (referred to above) which provides a link between NDZ Municipality and Msunduzi municipality. Part of this project was to extend D1208 up to D1215 on the other side of Mkhomazi River.	[1]. The maintenance relates to existing roads. [2]. The new road extensions relate to D1208 up to the D1215.	[1]. An environmental impact assessment was done in respect of the road extensions.
	Water reticulation	Phase 1 of the water reticulation plan deals with the optimal use of the current borehole infrastructure. Work has commenced to improve the current borehole feed to the main Ncwadi Reservoir.	This project relates to existing infrastructure.	This project relates to existing infrastructure. No new impacts

		Phase 2 will look at augmenting the current capacity with additional water from Vulindlela Ward 8 reservoir (Reservoir number 10).	[1]. A new pipeline is to be constructed from Reservoir 10 in Ward 7 Vulindlela to current reservoir in Ncwadi above the Ncwadi Clinic. [2]. A further, larger reservoir of 5 Kl is to be constructed. [3]. Additional water allow for further reticulation.	[1]. All the new infrastructure will be subject to Environmental authorisation. [2]. The new infrastructure will either be within existing disturbed areas and within or near road reserves.
		There is a further long-term plan to construct a small treatment works near or at the new Mkomazi dam offtake for supply to Ward 39 and the surrounding rural communities of within the Harry Gwala municipal area. The Mkomazi dam is a major construction currently funded by the Department of Water Affairs.	[1]. Further infrastructure will need to be constructed to allow the transportation of water from the dam to Ncwadi and the reticulation from there.	[1]. All the new infrastructure will be subject to Environmental authorisation. [2]. The new infrastructure will either be within existing disturbed areas and within or near road reserves.
	VIP Pit latrines	Ward 39 has no reticulated sewerage system. Sanitation planning for the area is to construct a Ventilated Improved Pit (VIP) latrines for each household: Substantial progress has been made in respect of those ex-Ward 7 and 8 portions part of Ward 39. Over the period 2010 to 2014, 8300 VIPs were installed in Vulindlela.140 VIP pit latrines are being made in respect of Ward 39.	[1]. 140 new VIPs are to be constructed in the ex Ward 7 Ingwe area.	[1]. All the new infrastructure will be subject to Environmental authorisation. [2]. The new infrastructure will either be within existing disturbed areas and within or near road reserves. .
Housing	Mdutshini	1000 House development	[1]. These new structures are to be constructed, but will generally be within existing *iMizi* footprints. [2]. The LAP must determine settlement edges to contain development and reduce impacts. [3]. Some roads may need to be adjusted to	[1]. EIAs are to be undertaken for the housing and infrastructure to be developed. [2]. The construction of the housing must be restricted to the current *iMizi* footprint and settlement edge.
	Greater Ncwadi	600 house development	[1]. These new structures are to be constructed, but will generally be within existing *iMizi* footprints. [2]. The LAP must determine settlement edges to contain development and reduce impacts.	[1]. EIAs are to be undertaken for the housing and infrastructure to be developed. [2]. The construction of the housing must be restricted to the current *iMizi* footprint and settlement edge.

			[3]. Some roads may need to be adjusted to	
	Greater Deepdale (farms)	300 house development	[1]. These new structures are to be constructed, but will generally be within existing *iMizi* footprints. [2]. The LAP must determine settlement edges to contain development and reduce impacts. [3]. Some roads may need to be adjusted to	[1]. EIAs are to be undertaken for the housing and infrastructure to be developed. [2]. The construction of the housing must be restricted to the current *iMizi* footprint and settlement edge.
Agriculture	Food security	Department of Agriculture, Forestry and Fisheries is supporting 270 families with 6 varieties of seeds in respect of the Food security program. It is intended that this programme be extended.	[1]. The initial food security programme relates to households who have been practicing agriculture.	[1]. The initial environmental impacts will be negligible as the majority of land has been planted in the past. [2]. With the extension of the programme, environmental impact assessments will need to be undertaken.
	District Tractor programme	The Department of Agriculture, Forestry and Fisheries, up to 2015 had provided support to small and medium scale farmers, through tractors which were managed at district level and could be used on a rotational basis. This programme was altered with the tractors being allocated to Traditional Leaders in areas where large scale farming was being undertaken. The Mechanisation Section of the Department of Agriculture, Forestry and Fisheries is in the process of securing the services of a Service Provider to re-instate the District Tractor support system.	No impact on infrastructure	[1] The use of tractors will be.linked to existing disturbed areas in the form of existing cultivated fields, fields. The use of mechanical equipment will increase dust pollution and potentially fuel pollution through oil and diesel leaks from the mechanical equipment.
	Fencing and irrigation	The Department of Agriculture, Forestry and Fisheries confirmed that they do provide assistance in respect of irrigation and fencing, subject to a successful business plan application to the Department.	No impact on infrastructure	[1]. Fencing of community and household gardens will have limited impact on the movement of fauna and insects. {2]. Irrigation, if done in conjunction with the application of pesticides could lead to leaching and must be done with care
Administrative management	Joint Management Committee	The intension of the Joint Management Committee is to jointly manage land use management in respect of Traditional administered areas as well as jointly taking responsibility for the implementation of the local area	No structural implications	[1].The association will support the implementation of the LAP and Land Use Management

		plan recommendation and programmes. This institutional structure is fundamental to the successful implementation of the local area plan.		

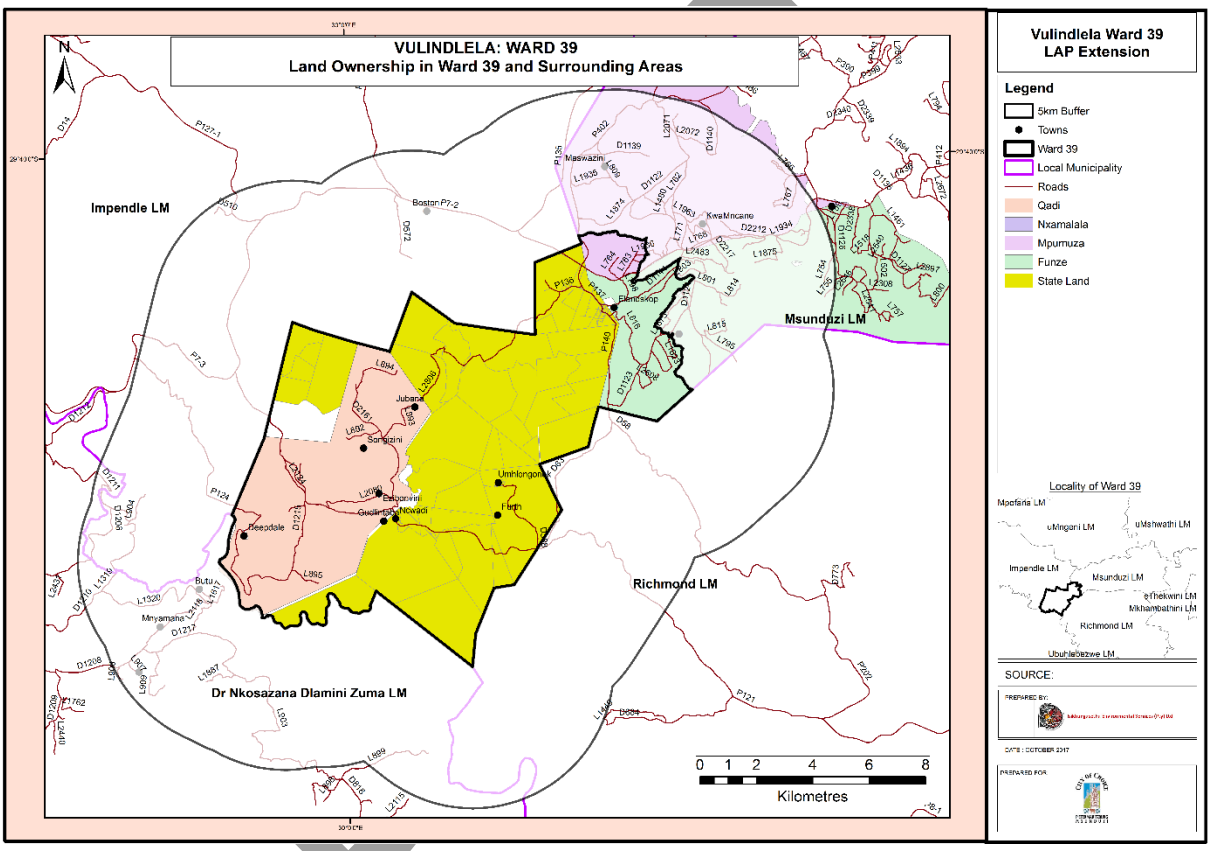
8. INSTITUTIONAL ARRANGEMENTS IN RESPECT OF LAND USE MANAGEMENT

8.1. Background: Msunduzi Institutional Structures in Respect of Land Use Management

8.1.1. Overview of Land Ownership

Ward 39 has three portions of land under the administration of the Ingonyama Trust, namely Portion of Ward 7 (Funze T.A), Portion of Ward 8 (Mpumuza T.A.), both of Vulinldela), and the Qadi Traditional Authority area as per Figure 110 below:-

Figure 110: Ward 39 Ownership map (DRDLR, 2015)



8.1.2. Land Management

In the Vulindlela Local Area Plan, in respect of the institutional arrangements associated with Land Use Management, it was established that the Municipal Council is the ultimate decision-making body at Local Government Level in this area. This power is further entrenched through the provisions of the Spatial Planning and Land Use Management Act, 2016 (Act No. 16 of 2013) (SPLUMA), which requires the municipal planning authority to take decisions on land use planning and management.

Land use management, as pointed out above, ultimately rests with local government, however, there is an additional layer of Traditional Authority institutions, under the auspices of the Ingonyama Trust,

which have certain land allocation functions on the lands which they occupy in Ward 39. In addition, there is, between the Qadi and Vulindlela ex-Ward 7 and 8 areas, another land owner: the South African Development Trust.

In terms of the functions and mandates of these institutions, the municipality is responsible for strategic planning through the development of Integrated Development Plans, Spatial Development Frameworks, Local Area Plans and Precinct plans. These plans consider ~~both~~ spatial planning, land use planning and strategic planning in respect of infrastructure development and implementation.

Traditional authorities, in terms of their areas of jurisdiction are responsible for the allocation of land. Where a person wants to change the land use, the Traditional Authority must motivate the proposed change to the municipality for its authorizing approval through its relevant structures. In traditional areas, and among traditional structures this fundamental distinction [79] is sometimes not known. This has led to land uses and land use changes which have taken place without reference to approved land use plans or municipal authority. This, in turn, has compromised agricultural land and resulted in urban sprawl throughout Vulindlela.

8.2. Need for Co-ordinated Decision Making

From the above, it should be clear that there is a need for the establishment of a structure to facilitate aligned land use management decision-making.

It is vital that the municipality and traditional structures reach a common understanding on the legal situation as pertains to these matters including the uniform application of municipal bylaws throughout the municipal area. One of the primary municipal concerns, associated with poorly defined land use management responsibilities, is urban sprawl. This results in the need to extend a type and level of service into rural traditional authority areas which cannot be sustained by the municipality.

Ward 39 has three Traditional Council area including, the whole of Qwadi and parts of Funze and Mpumuza Traditional Areas. Traditional Councils each have their own areas of jurisdiction which are defined by traditional boundaries recorded by COGTA. One of the important functions of Traditional Councils is the allocation, by local Indunas who are responsible for allocation at *iziGodi* level, of land to persons.

[79] motivated proposal by the traditional authority, consideration by municipality, followed by its approval/ refusal.

8.3. Local Area Plan Implementation Requirements

In considering the extent of co-ordination required between traditional structures and the municipality over land administration, it is important to recognise that the implementation requirements of a Local Area Plan tend to be broader than mere land use management. A Local Area Plan is inclusive of various development initiatives which are intended to take place in synchronisation with the spatial planning of specific areas. These include water provision, road construction, corridor development, housing provision and associated development initiatives. The responsibility of these infrastructure development projects often rests with provincial and other state institutions.

The implementation of a Local Area Plan therefore goes beyond the spatial and land use management requirements. It would therefore be appropriate that the Municipality, the Ingonyama Trust, ~~and~~ the Traditional Authority and the SA Development Trust seek to co-ordinate all aspects of a Local Area Plan, particularly at project planning and implementation stages. There is thus a need for the co-ordination of a variety of different actions and actors to guide the type of institutional arrangements necessary to achieve effective land use allocation and administration.

8.4. Vulindlela Joint Management Unit

One of the directives of the National Development Pan requires that municipalities and traditional structures establish entities that can be used to effectively plan and develop areas under traditional administration.

> *A layer of complexity comes from the role assigned to traditional leadership. Traditional leadership plays an important role in facilitating communication with South Africa's citizens to improve the effectiveness of developmental local government. However, confusion emerges when traditional forms of authority are legislated, as traditional leadership structures may then displace or duplicate the role of the state. This has potential to create disjuncture between the traditional authorities' land-usage rights and the responsibilities of municipalities to deliver services to that land*. (National Development Plan, p 233).

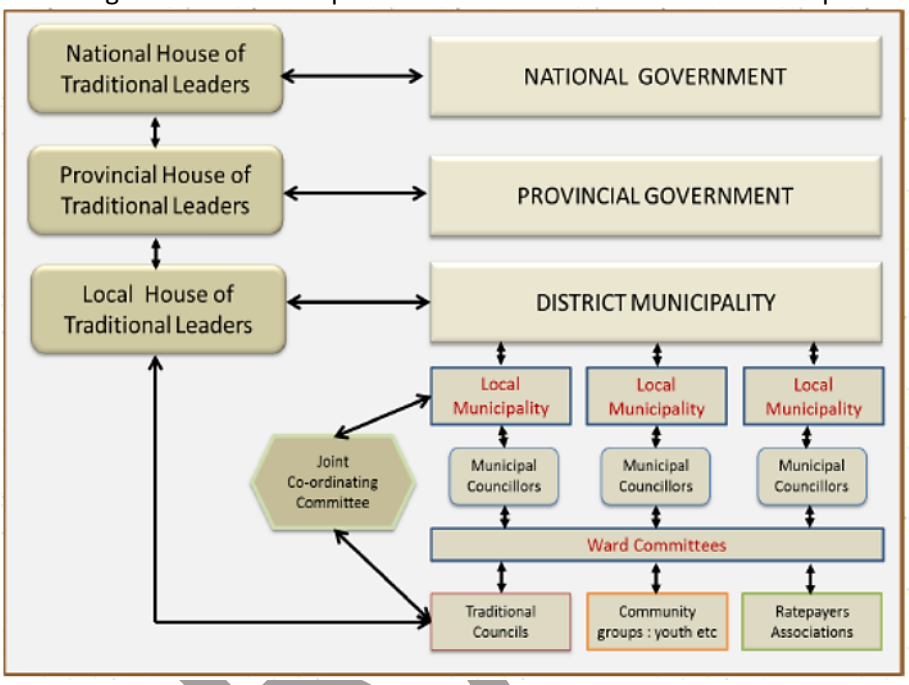
In Ward 39, land administration and development is complicated by the fact that there are different land owners involved in governance of the land. As may be noted from Figure 110 (Land Ownership), land owners include: the State (as in DRDLR), State Owned Enterprises, Ingonyama Trust Board and SA Transport Services. These government institutions all have their own legal mandates relating to planning, development and services delivery. As noted above, the municipality is responsible for planning and land use management throughout the area whilst land allocation is a function of traditional structures, but only on traditional land. The allocation (and its processes) which takes place on state land is unclear without further investigation into this matter.

It is against this complexity of differing line function mandates and local municipal and traditional land management practices, that the need for a co-ordinating mechanism was identified in the VLAP and is equally necessary in Ward 39. To avoid duplication of effort, and at the same time achieve effective

implementation of this plan, it is necessary for government to invest in a joint management structure responsible for co-ordinating government agencies and implementing the Local Area Plan.

The Vulindlela Local Area Plan, based on the above requirements and the comments by key role-players found that there is a need for a locally based Joint Management Unit (JMU) to assume responsibility for both implementation of the plan, provision of services (utility) and land management in Vulindlela and of which Ward 39 is now part.

Figure 111. Diagram of relationship between traditional leaders and municipal structures



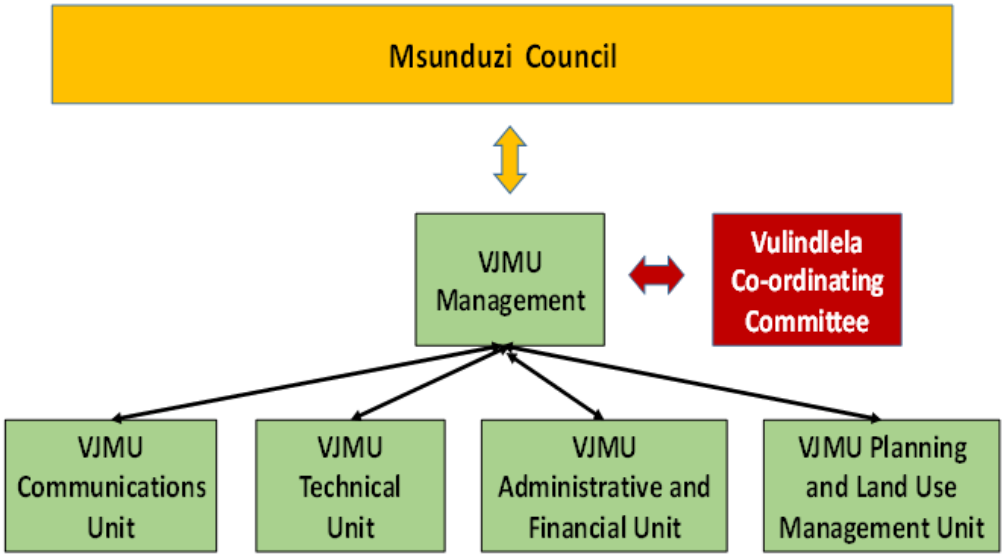
8.4.1 Components of JMU

The Vulindlela LAP report recommended that the following structure be implemented:

- Overall manager with delegated authority to direct the JMU staff.
- Communications section dealing with awareness creation among the people of Vulindlela.
- Technical section dealing with detailed design, raising of project funding (government and donor grants) and 'hard project' implementation (construction of infrastructure, township layout) and operation and maintenance.
- Land management and administration involving representation from traditional structures, the municipality and the ITB.
- Delegated authority from the municipality to receive and conduct initial processing of development applications prior to directing them to either the Authorised Officer or the Joint Municipal Planning Tribunal for final decision making.
- Revenue generation related to billings and payment for services.

An illustration of the components of the JMU is provided in Figure 112 below.

Figure 112: Suggested structure and reporting lines for the Vulindlela Joint Management Unit



8.5. Progress to Date

The establishment of the Joint Management Unit was approved by a sitting of full Council in March 2016. One of the consequences of this Council Approval was the appointment of Mr Sipho Zimu to manage and oversee the implementation and gradual assumption of responsibilities, as *per* the recommended structure.

Whilst progress has been made, there is a need for the signing of agreements with the ITB, the Traditional Authority and Msunduzi to formally implement this JMU. In the case of Ward 39, this must necessarily include SADT/ DRDLR.

8.6. Integration of Ward 39

It is critical that Ward 39 be integrated into the structure to ensure effective integration and support of the proposed development in that ward so that its future may be planned, not just happen.

To initiate this process, the Vulindlela Local Area Plan was presented to Amakhosi of the 14th of November 2017. The engagement was hosted by the Mayor. Other implementation processes will follow from this event.

8.7. Memorandum of Understanding regarding Land Use Planning and Development

In recognition of the need to ensure that the relationship between the traditional and municipal structures is well understood and that each carries out their respective roles and responsibilities effectively, a generic Memorandum of Understanding (MOU) has been drawn up. This MOU arose out of the Small Towns Formalisation programme, a Department of Co-operative Governance and

Traditional Affairs initiative. However, the provisions within the MOU apply to planning and land use matters in general, and is not limited to the formalisation of small towns within Ingonyama Trust areas.

This MOU has been termed a "Planning and Development Cooperation Agreement" and is intended to be signed by three signatories:

- The Ingonyama Trust Board (ITB)
- The Traditional Council in question – dependent on where the proposed planning or development initiative is taking place
- The Local Municipality in question – dependent on where the proposed planning or development initiative is taking place.

The usefulness of the MOU is that it sets out clearly the main parameters where there are shared roles and responsibilities. It describes the duties of all three parties towards the land: the ITB as owner, the traditional council as occupier (in accordance with customary law and practice) and the municipality in terms of planning and development and issuing of approvals/ refusals. Due to the extent of the land administered by the Department of Rural Development and Land Reform, the MOU may need to be modified to include the community residing on the SADT land.

The MOU also recommends that a joint Forum amongst the signatories be set up for the purposes of consultation and communication about the terms of the agreement and the activities flowing from it.

The MOU sets out the imperatives of municipal planning and its governing legislation and how it should engage with the traditional leadership and traditional communities; it mentions municipal servicing and sets out how cooperative planning and development is to be carried out, with each signatory carrying out its respective functions and obligations, and being fully mindful of each other's roles in planning and development. It also sets out conflict resolution procedures. The roles of DRDLR and COGTA in this process are merely (and importantly) facilitative, and supportive. The role in respect of DRDLR may however need to change depending on the role it elects to fulfil in respect of the management of the SADT based community.

There have been, and might at times still be, occasional misunderstandings between municipal and traditional structures, given that there is overlap in certain land use functions. The key to resolving these is to get real and deep understanding of the importance of sound land use management in this era of increasing population pressure, financial constraints, environmental degradation and, for many, economic hardship. Through means of the various municipal planning frameworks, it should be possible to obtain support from all parties, so that the implementation of the plans is reinforced by both municipal and traditional decision-making in respect of land use.

9. STATUS QUO KEY FINDINGS, CONSTRAINTS AND DIRECTIVES

The status quo assessment undertaken has identified a number of key considerations. These findings are based on the field work and data assimilation, discussions with the Amakhosi as well as the Traditional Leader and iZinduna in respect of Qadi Traditional Council.

9.1. Introduction

Based on the consultation with the above key stakeholders, the 2015 SDF review and the research findings, the following themes have been identified. (Annexure 4).

- Accessibility - in terms of sub-regional location, transportation networks, access to land, economic opportunities, infrastructure and social services
- Land allocation and land use - challenges in terms of informal system of land allocation and land use
- Demographics (population profiles) and social issues - high proportion of the population being in the low income and state welfare dependent categories, high levels of unemployment and limited prospects to turn this around linked to limited access to skills training, employment opportunities and lack of market information.
- Ecological services - transformation of biodiversity in Ward 39 and the associated loss of ecological services production due to the expansion of settlement and different forms of agriculture (subsistence, small scale, commercial and livestock).
- Agricultural practices – A large sector of the Ward 39 Community is dependent on agriculture for survival and needs careful attention (It is for this reason that practice has its own heading, separate from agricultural economic activities).
- Economy - the economy of Ward 39, under current conditions is largely based on government interventions with limited private sector income and investment. Identifying opportunities for the diversification of the local economy in the Ward 39.
- Agricultural practices – A large sector of the Ward 39 Community is dependent on agriculture for survival and needs careful attention (It is for this reason that practice has its own heading, separate from agricultural economic activities).
- Management of the area – administrative management of the area, spatial planning and associated project implementation

9.2. Status quo key findings

The key status quo findings, per theme are summarised in the tables below.

Table 43: Accessibility and services

Key finding:	Difficulties with accessibility and services delivery
Transport network	A poorly defined transportation network in place with limited all-weather surfacing. Mountainous terrain hampers the creation of a lattice networks of roads for the bulk of the area
Basic utility services	Basic utility services are more prominent in the Eastern portion of Ward 39. This includes water reticulation, and sewage disposal means of ventilated pit latrines (VIPs). The Qadi Traditional Authority in the South West has an erratic water supply from a single functioning bore-hole. Msunduzi is planning to install 140 VIPs by the end of June 2018. Households in Ward 39 appear to be well supplied in respect of electricity.
Social services	Social service facilities are scattered and of a lower order.
Servicing costs	A lack of up to date spatial planning coupled with uncontrolled, informal settlement results in lengthy service lines and, in the process results in increased services provision costs and engineering challenges.
Topography	Topographical constraints for infrastructure development.
Economic development constraints and opportunities	Economic development opportunities are limited by poor access influenced by steep topography, limited areas of serviced land available, infrastructure not suited to large scale development and a local workforce of low training and technical skill. There are however agricultural opportunities particularly with large tracts of unused state land with good agricultural potential which could be used for livestock, timber, crop cultivation. The climate well suited to different forms of agriculture. This economic opportunity is subject to appropriate levels of management and expertise, infrastructure provision etc.

Table 44: Land allocation and land use

Key finding:	Poor land allocation and land use practices
Informal housing	Traditional land allocation system favours informal housing where land is available for informal residential allocation but inaccessible for the more formalised large scale economic development.
Loss of good agricultural land	Progressive loss of good agricultural land and biodiversity due to the lack of a standardised zoning and land use management system across all traditional areas in Ward 39, more prominent in the more densely-settled eastern area.
Scatter of settlement - sprawl	Mix of high, medium and low density settlement scattered throughout Ward 39 – inefficiency in use of space and provision of services - no evidence of the notion of densification and urban or settlement edge definition. The construction of scattered new housing units in areas where services are not available entrenches inefficiencies. Significant residential densification initiatives in the Edendale and eastern areas of Vulindlela, in closer proximity to work opportunities, must be undertaken.
Location in high risk areas	Danger of certain housing being located in high risk areas (flood and unstable slopes).
Land allocation processes	Land use management by the municipality and continued land allocation by traditional leaders has the potential to lead to inherent problems. Msunduzi

	Municipality administers land use and service provision, whereas traditional leaders consider land allocation. Allocation cannot be separated from land use and hence this relationship requires further attention.

Table 45: Demographics: population growth

Key finding:	Population growth
Population growth	Based on the 2006-2013 Eskom household data, the average population growth rate per annum is 1.9%. It must be noted, however, that the growth rate has increased significantly from 1.16% per annum in the three year period (2006-2009) to 2.61% per annum in the four year period (2009-2013). Based on current projections this will increase the current number of households from 2 571 to 4 682 by 2050 (2 111 additional structures or 82% increase).
Implications for service delivery	The rapid increase in population in certain parts of Ward 39 implies increased demands for service delivery, social services, open space facilities and burial sites, all which influence the environment.
Entry point to the city	It is anticipated that certain parts of Ward 39 are being used as an 'entry point' for migrants who are wanting to gain access to the formal services economy in Pietermaritzburg.
National urbanisation patterns	Following national and provincial trends, significant growth through natural increase and in-migration into South African cities is being experienced in Ward 39.

The need for planning intervention in Ward 39 becomes evident when viewed in the light of the following:

- Population pressures.
- Loss of biodiversity and productive agricultural resources.
- A high need for housing, social services, infrastructure provision and employment generating opportunities.

Table 46: Demographics: social issues

Key finding:	Extensive social issues
Majority low income	A high proportion of the population is in the low income and state welfare dependent categories.
Unemployment	High levels of unemployment and limited prospects to turn this around are linked to limited access to skills training, employment opportunities and lack of market information.
Poorest sector of Msunduzi	The poorest people in the Msunduzi Municipality (i.e. Ward 39) having to travel the furthest and to pay the most to gain access to employment and services.
Low education levels	Low levels of education - linked in some way to large numbers and scattered location of schools in Ward 39 and possible impacts on standards of education provided.
High cost of access to services	Limited access to higher order services for the residents of Ward 39 owing to distance and cost. These are services are mainly located in the inner-city and CBD of Msunduzi Municipality. Of the surrounding towns, transport is generally only provided to Richmond, which is therefore a secondary centre.

High proportion of youth	Youthful age profile with limited facilities to engage this age group such as sports facilities, internet facilities, entertainment outlets and post school training.
Crime risk	Security and crime risk linked to unemployment, limited SAPS presence in the area and a wide range of social issues.

Table 47: Biodiversity

Key finding:	Loss of biodiversity
Significant transformation	Large tracts of the area included in Ward 39 has been subject to transformation due to the expansion of settlement and different forms of agriculture (subsistence, small scale, commercial and livestock).
Potential for rehabilitation and protection of biodiversity	Despite the level of transformation there are nonetheless areas where biodiversity is still intact and where, with rehabilitation, these areas could be expanded to produce sustainable ecosystem goods and services to local communities. This includes a Ezemvhelo KZN protected area in the North-west.
Protect against further transformation	The emphasis in future development of Ward 39 needs to be to safeguard against further transformation, particularly of the more sensitive areas.
Climate change influences	Improved management of biodiversity could have beneficial effects in the mitigation of certain of the impacts of climate change, in particular increased intensity of flooding events.
Historical protection of agricultural land	The area was subject to 'betterment planning' in the 1950s, 60s and 70s and hence settlement has in the past been located on land not suited to agriculture. That is, the best agricultural areas have been protected. However, over the past 15-20 years agricultural resources have come under pressure from settlement, particularly in the high density and high growth areas in the North-East.

Table 48: Agriculture

Key finding:	Value of/ to agriculture
Agricultural opportunities	-The maize mill recently constructed in Impendle's industrial area represents an opportunity for local maize growers to sell their dried product -The abattoir recently built at Boston is intended primarily for pig slaughter: this represents an opportunity for local farmers -The area has at least 7 dams: the construction of additional dams to harness the good rainfall which this area receives, should be examined
Agricultural challenges	-The level and extent of erosion in a number of areas needs to be addressed as a matter of urgency -DAFF's reinstatement of its tractor-plus-implements support system for emerging farmers is urgent

Table 49: Economy

Key finding:	Current economic difficulties; significant future potential
Government sector dominated economy	The economy of Ward 39, under current conditions, is largely based on government interventions with limited private sector income and investment.
Agricultural potential	Ward 39 comprises land with high agricultural potential in the form of arable, plantations and livestock production. These high value agricultural resources, if consolidated and properly managed, could feed into local and district markets with the view to replacing costly imports thereby enhancing self-sustainability and the reduction of the carbon footprint.
Assets under threat	The economic development potential (assets) of the area appears to be under threat and possibly being eroded by inappropriate land use management practices.
Possibilities for turn-around	Based on a review of those assets in Ward 39 with economic development potential it would appear that, under different management regimes and changed local attitudes, it may be possible to turn around the local economy as one of the key challenges to the future development of this area.
Potential for growth	Ample human potential in youth and working age population profiles. Incidence of local small scale entrepreneurs operating in the agricultural, production processing, retail and commercial sectors which with appropriate strategic support could be expanded and grown into local business ventures serving local and external consumers located in proposed development centres in Ward 39.
Tourism potential	Potential to develop a number of local features as a tourist destinations including water sports, hiking trails, landscape and cultural experiences.
Green economy	Opportunities for green job creation through rehabilitation programmes by promoting the green economy.

Table 50: Management

Key finding:	Management
Implementation of the Joint Management Committee	The implementation of the Joint Management Committee in Vulindlela has already commenced. It is critical that this be extended to the new Ward 39 to ensure that the momentum continues, and that the management area is subject to the same controls. The Amakhosi in respect of Vulindlela gave their in principle support for the implementation and extension of the Joint Management Committee at the meeting on 13 November 2017. Not insuring the implementation of the Joint Management Committee will lead to uncoordinated and unmanaged settlement of people and provision of resources in the area.
Signing of agreement pertaining to the Joint Management Committee	To ensure that the Joint Management Committee proceeds and that a terms of reference, determining apportioned responsibility is operationalised, it is recommended that a Memorandum of agreement, addressing these matters be prepared and signed by the parties concerned to facilitate implementation.

The status quo assessment of Ward 39 findings will be used to inform the interventions to be implemented to overcome the central challenges identified in this part of Msunduzi.

Table 51 summarises the status quo findings and the main areas where future intervention is required in Ward 39. These interventions coincide and are aligned with the seven pillars identified in the 2015 Msunduzi SDF review

Table 51: Status quo findings and directives for implementation

Issues	Key findings	Directive	Interventions
Accessibility and services	▪ Challenges in respect of services. ▪ Cost of servicing due to topography and settlement pattern. ▪ Lack of connectivity to Msunduzi (126km return trip)	▪ Access available resources and implementation methodology. ▪ Improve road and ITC connectivity. ▪ Cellular phone connectivity required. ▪ Improved water and sanitation.	▪ Improve cost effectiveness through higher density of development including, or primarily, residential.
Land allocation and land use	▪ Different roles and authorities of traditional leaders and councillors in respect of land use management. ▪ Lack of a settlement planning.	▪ Establish a joint structure to align and manage land use decisions. ▪ Determine settlement edges to contain growth and urban form.	▪ Establish a joint decision-making authority. ▪ Prepare a land use scheme(s) as the basis for land administration. ▪ Establish settlement edges for authorities to co-manage.
Population increase	▪ There has been an increase in the population including in-migration. ▪ The number of households is projected to grow by more than 80%, to 4682 by the year 2050	▪ Identification of urban vs rural residential areas. ▪ Development of a densification strategy for the urban nodes. ▪ Development of settlement edges.	▪ Development of density controls in both urban areas (encourage) and rural areas (discourage), linked to services.
Demographics and social issues	▪ Limited access to higher order services. ▪ Poor and youthful population with lack of economic opportunities.	▪ Identify intervention areas to create environment to establish services. ▪ Consider land uses to support local job opportunities, including youth.	▪ Establish intervention areas at nodal points. ▪ Land use configuration to support economic opportunity.
Protection of biodiversity and agriculture	▪ Need to contain settlement expansion to protect agriculture. ▪ The need for a plan to protect and enhance ecological infrastructure.	▪ Develop strategies to protect agricultural practices. ▪ Develop strategies and plans to protect ecological infrastructure	▪ Development of a rural development strategy. ▪ Develop open space system linking with Msunduzi system.

Agriculture	▪ Loss of, and threat to, productive agricultural land by peri-urban sprawl	▪ Halt the loss of productive agricultural land	▪ Institute land use change controls and land use change and application and consideration processes, and apply these in Ward 39 ▪ Substantially densify residential development in the north-eastern section of Ward 39 ▪ Substantially densify residential development in the Edendale and eastern Vulindlela areas ▪ Design an internal road network within the SDF- and Vulindlela LAP-identified Taylor's Halt node for the creation of land parcels which can give effect to the nodal plan's land use categories.
Economy	▪ Lack of economic development opportunities in Ward 39. ▪ Missed tourism and agricultural opportunities.	▪ Land use configurations to support economic opportunity development. ▪ Assess opportunities for tourism and agricultural growth.	▪ Land use plan recognising economic development needs. ▪ Make provision for manufacturing and agri-processing as the basis for sustainable local economic development. ▪ Establish tourism opportunities and corridors.

Area Management and project implementation	▪ Ward 39 is well managed by Msunduzi ABM. ▪ There is a need to roll-out the Joint Management Committee Insitution, developed as part of the Vulindlela Local Area Plan, in respect of Ward 39. ▪ There is support to roll-out the Joint Management Committee structure and programme, as determined at the meeting with the Vulindlela Amakhosi on 13 November 2017.	▪ That the Joint Management Committee be formalised through the signing of an agreement between the Msunduzi Municipality, the Ingonyama Trust Board and the Traditional Councils. This agreement must include the Committee terms of reference and the apportioned responsibility when operationalised.	▪ The Vulindlela and Ward 39 LAP must form the basis for development and land allocation in the Traditionally managed areas.

10.ALIGNMENT WITH THE VLAP

It is the intention of the Ward 39 Local Area Plan, as required in the project terms of reference that the Ward 39 Local Area Plan must dovetail with the Vulindlela Local Area plan. This is to ensure a common approach in respect of management, servicing, level of services, land use management and infrastructure provision. Ward 39 is essentially an extension of the Vulindlela area, and thus the need to align the Ward 39 Local Area Plan with the earlier Vulindlela Local Area Plan is a logical and responsible consequence.

Whilst the real alignment will take place during the preparation of the Local Area Plan, it is important that the base for alignment be set during the status quo assessment. This alignment will require analysis of all the information which will need to be weighed up, where-after one would be able to determine where there is alignment and where there are clashes to be resolved.

In this regard some conduits have emerged through the Status Quo assessment. This includes the following:

- **Linkages iro infrastructure**:
    - Roads and
    - water pipelines to be built from Vulindlela Ward 7 (Reservoir 10)

- **Linkage in respect of Management**:
    - The extension of the Vulindlela Joint Management Committee
    - The extension of the Area Based Management
    - Agricultural practices

- **Integration in terms of**:
    - Vulindlela Housing Agency (being extended over the whole area)
    - Integration into Vulindlela Hierarchy of nodes – relationship with Kwamcane, Taylor's Halt and Ncwadi
    - Economic development opportunities
    - The Msunduzi Ecological Infrastructure System (Open Space System) with the Ward 39 Ecological Infrastructure system

The linkages listed above are being interwoven into the fabric of the Vision and synthesises phase as well as the preparation of the actual Ward 39 Local Area Plan.

Some of the observations already made in respect of alignment include the following:

10.1. Social facilities

Social services facilities in Ward 39 indicates that the residents of the eastern areas have access to a wider range of services than those in the west. In order to achieve an alignment of the number and

quality of social services provided Ward 39 and those in Vulindlela, it will be necessary to conduct further analysis in respect of services gaps.

The question of location, numbers and upgrading of facilities will depend on the overall development objectives for Ward 39 in the context of Vulindlela and Msunduzi. It may need to include the rationalization of facilities, such as primary schools (there are schools with few pupils). Rationalisation, in some instances may improve quality for the larger population and limit unnecessary costs.

10.2. Densification of nodes and agriculture

In the Vulindlela Local Area Plan, provision was made for the inclusion of urban densification in defined nodes in the management area. Establishment of these nodes was accompanied by provision for intensive small-scale agriculture adjoining centres aimed local market gardening geared to local markets.

The notion was for large scale production to be located in the rural areas surrounding these centres.

Subject to the outcome of the status quo findings, it is likely that similar provisions could be applied in Ward 39 as a continuum of the VLAP.

10.3. Socio-economic findings

A summary of the socio-economic situation in Ward 39 revealed that:

- The majority of households live within Traditional Council areas
- The majority of the population resides in the north eastern area, in particular in the Funze Traditional Council
- Densities in settled areas, with the exception of Funze area, are relatively low
- The population is a relatively youthful population
- There are low levels of education
- High unemployment levels
- Past population growth trends are relatively low.
- There appears to be an increase in the population growth over the past four years.

A comparison with the Vulindlela report findings, the comparison is positive, i.e., -

- Ward 39 has a youth population of 47% in comparison with 45% in Vulindlela (2% difference).
- The age groups above the age of 41 are the same.
- The gender profile has a difference of 1%.
- Education levels in respect of Ward 39 is 7% as opposed to the 12% in respect of Vulidlela. This would be expected due to the rural character of the ex-Ward 7 Inge portion of Ward 39.
- Both Vulindlela and Ward 30 have low levels of employment.
- The income levels in Ward 39 are lower than Vulindlela. This was anticipated as Ward 39 represents a more rural community and the lack of economic opportunities, particularly being 63 km away from the Msunduzi Town Centre, would contribute to the lower economic profile.

10.4. Joint Management Committee

The Vulindlela report, as previously reported, forms one of the pillars of the implementation plan as well as land use management. The extension of this institution, to include the newly formed Ward 39, was raised at the workshop with the Mayor, the Chairperson of the Economic Development Portfolio Committee, the Vulindlela and Ward 39 Amakhosi, and there was agreement in principle that the Joint Management Committee forum should be extended to include Ward 39.

10.5 Integration

The above represented the initial areas of integration, which will be fleshed out during the Vision and synthesis phase as well as the subsequent preparation of the Local Area Plan in respect of Ward 39, which will include specific strategic mapping to stitch the planning proposal together to match the landscape fabric.

11.STATUS QUO CONCLUSION AND WAY FORWARD

This ward (13,485ha, the ownership of 383ha are unknown) may be conceived of as comprising three areas of different character and even different histories.

- The north-eastern component (1529ha: 12%) comprises, in the context of these areas, fairly high density residential development (less than 15 units per gross hectare) interspersed with patches of vacant land and land on which subsistence agriculture and limited animal grazing is undertaken. This serviced land is under ITB ownership, land allocation being undertaken within three isigodi.
- The body (7902ha: 60%) of this ward is blessed with many natural assets which are fundamental to the existing level of agricultural productivity, and also to its further development. Even at the level of the Provincial SDF, these hills and valleys, and their characters and viewsheds and tour natural places, stand bold. This land, owned by the SA Development Trust, is largely used for cattle grazing and particularly sparsely settled, homesteads, seemingly agriculture related, being in clusters.
- The southwestern component (3671ha: 28%) is generally sparsely developed, some areas used for grazing, but with an intensification of residential density at the Ncwadi node and in its environs.

Agriculture is the predominant pursuit by area and, it seems, probably even by GGP. This activity has some potential to grow, unlike the many small shops dotted about and whose low level of maintenance, small size, narrow stock range coupled with low stock levels are an accurate reflection of the incomes earned, or more correctly, not earned, in this area. Another measure is the amount of once used-but-now vacant shop floor area is high (approx. 2000m2) relative to the presently used area (approx. 1700m2). Commercial would not seem to be an area for early or quick employment gains.

The inequality in respect of utility services, infrastructure and housing provision, service level disparity and lack of social facilities, as well as transport and corridor movement patterns are a challenge. Much of the Vision and synthesis will need to focus on the integration of Ward 39 into Vulindlela and into

Msunduzi, with specific focus on achieving equity. This however will be subject to the availability of resources and current priorities within Msunduzi as a whole. It may be necessary, based on the principles of the Suku Ma Sakhe programme to determine the priorities within Ward 39, starting with the poorest of the poor.

The large amount of information gathered in the compilation of this report will be further synthesized so as to develop an appropriate vision for the ward.

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Ward 39 Traditional Leader Meeting 10.11.2017

13.ANNEXURES

13.1. Annexure 1: Survey

INTRODUCTION TO SURVEY
Date of interview:
Name of Interviewer:
Name of extension Officer:
Location of interview: (place name ref to map)
Type of interview:
Individual
Group

PROGRAMMES:					
Describe the different programmes being administered in Ward 39 by Dept Agric:	What is the taget beneficiary group per programme	Who is the contact officer per programme	What type of support is provided to producers		
1					
2					
3					
4					
5					
6					
7					
8					
9					
The 3 programmes which are important to this planning project include:					

FOOD SECURITY:	Number	Proportion
How many or what proporton of households in Ward 39 are involved in food security production i.e. gardening around homestead or/and community gardens		
	Y	N
What is produced by households in gardens:		
Veges		
Maize		
Fruit		
Chickens and eggs		
Goats		
Pigs		
Sheep		
Dairy cow for milk		
Does gardening supplement household food requirements		
Or		
Does gardening feed a household all year round		

LIVESTOCK:				
What types, numbers and value of livestock are produced in Ward 39:	Y	N	Numbers	Sale value per unit
Cattle				
Dairy cows				
Goats				
Sheep (wool and mutton)				
Pigs				
Poultry				
Horses				
Donkeys				
Other				
Which parts of ward 39 are used for cattle production - locate on map areas demarcated by each Traditional Council				
Provide an estimate of hectares available for grazing in Ward 39				
What is the general condition and stocking rate of grazing lands in ward 39:	LAU/Ha	LAU=Large Animal Unit		
Good				
Fair				
Poor				
Confirm the following:				
Grazing of livestock takes place on communal pasture lands				
Livestock not permitted in lands used for crop production in growing season				
Sales of livestock:				
How are livestock sold in Ward 39:	Y	N		
Private sales				
Auctions				
Where are livestock auctioned for sale in Ward 39				
What type of livestock is sold in Ward 39:	Numbers of livestock sold annually in Ward 39	Rand value of annual sales		
Cattle				
Goats				
Sheep				
Other				
Number of animals used for transportation sold annually in Ward 39	Numbers of animal units sold annually in Ward 39	Rand value of annual sales		
Horses				
Donkeys				
Poultry:	Y	N		
Are there any commercial poultry producers in Ward 39				
How many birds are produced annually				
Where are the birds sold - names of places				
Estimated value of annual sales				
Dairy:	Y	N		
Are there any commercial dairy producers in Ward 39				
If no where do households obtain milk supplies				
If yes how many litres of milk are produced annually				
Where is the milk sold - names of places				
Estimated value of annual sales				

CROP PRODUCTION (Farmers)	Small	Medium	Large scale			
How many small, medium and large scale farmers operate in Ward 39						
	Maize	Sorghum	Potatoes	Beans	Peanuts	Veggies
What types and volumes of crops do farmers in ward 39 produce (annual):						
Estimated value of volumes sold per annum for Ward 39						
	Deciduous	Citrus	Berries			
Fruit - specify types and volumes in bakkie loads						
Estimated value of volumes sold per annum for Ward 39						
Inputs:						
Where (place names) do farmers obtain inputs into food production:						
Seed						
Fertilizer						
Chemicals for pests						
Medicines for livestock - de-worming, tick dip, etc						
	Y	N				
Does Dept Agric provide any inputs						
Non-Governmental Organisations						
If yes specify what is provided to farmers?						
Traction and Transport:						
How do farmers plough/plant land and transport produce:	Y	N				
Own tractor and equipment						
Local traction contractor						
Ploughing services provided by Dept. Agriculture						
Own transport						
Hire transport						
Dept Agric assist with transport						
Sales:	Y	N				
Who do farmers sell produce to:						
Local people						
Sell at local markets						
Buyers for local markets						
Buyers for external markets						
Where do you sell your produce:	Y	N				
Your village						
Local Markets (eg pension pay days)						
Livestock auctions						
Local centres						
Regional centres						

13.2. Annexure 2: SCHEDULE OF FINDINGS – COMMUNITY MEETING 13.12.2017

INTRODUCTION TO SURVEY:						Percentage					
Purpose of survey:	Focus Group Survey 13 Dec 2017										
Date of interview:	13-Dec-17										
Name of Interviewer:	Nelson Ntshangase								Ward 39 (Old Ward 7 Ingwe)	Ward 39 (Old Wards 7 and 8 Vulindlela)	
Name of interviewee:	See attendance register										
Age of interviewee	n/a										
Residential location of interviewee (place name ref to map)	n/a										
Location of interview: (place name ref to map)	ABM Office, Taylor's Halt										
Type of interview:	**Y**	**N**									
Individual											
Group	Group										
Are you a pensioner - if so what type of pension do you have?	Y	N	State	Pvte	None				Most households dependant on pensions and or grants Child support/ dissability and foster care 75% to 80%	Is is more prevelant in old Vulindlela Wards as apposed to Ncwadi. More people in Vulindlela have access to job opportunties 50%	
Pensioner response											
Are you employed - if so in what sector? What proportion of the household is employed	Y	N	Agric	Trade	Manuf	Services			Only a few people employed - mostly governement employees Teachers, Police, Education, security Permanent (Age 20 to 35) - 15% to 20% Permanent (Age 35 to 60) - 15% to 20% The younger generation generally stay where they work and only come back to Ncwadi over weekends and holidays	Only a few people employed - mostly governement employees Teachers, Police, Education, security Permanent (Age 20 to 35) - 15% to 20% Permanent (Age 35 to 60) - 15% to 20% The younger generation generally stay where they work and only come back to Ncwadi over weekends and holidays	
New category: Seasonal work											
									Opportunities: Impendle game reseve, farm labour, Forestry Specific projects	Opportunities: Impendle game reseve, farm labour, Forestry Specific projects	
Employed response											
If unemployed do you have access to some form of grant? How many people are employed?	Y	N	UIF	Welfare grant	Other						
Unemployed response											
If unemployed do you have seasonal or part time work? If unemployed, where do people get money from ? (Child grant/ Unemployment Fund/ Pension/ Seisonal work.	Y	N	Agric	Trade	Manuf	Services			There are a large proportion of the community which are unemployed. This particularly in respect of the youth Youth Employed: 70% to 80% 35 to 60: 55%	 Youth Employed: 30% 35 to 60:25%	
How many people are self employed? (Spaza Shop/ Tavern)			Agric	Trade	Manuf	Services	Seasonal Jobs		Usually Youth given the temporary jobs - Normally Youth and Woman		
Self employed response									Yes there are self employed people - cutting of logs and selling outside the area - sell even to companies, such a Bison Board (Wattle in the Ncwadi area - Just north of Ncwadi Village) - Yes there are Spaza Shops (10 to 12 Spaza shops) - There also is a Co op exiting of woman baking cakes etc Just one tavern, which is legal in the Ncwadi area. There are some illgel operations as well - about 8 in Ncwadi area)	Shops, 2 butcheries - but linked to Shisha Njama, Funeral Palour, Carwash - not sure of legal status	
Are you a member of a household in ward 39?	Y	N									
Response											
If not a member of household in ward 39 what is your role here? (Foreigners (Migrant)/ housing of these people)			Job seeker	Worker	Vistor	Other			Yes there are Foreigners in Ncwadi - Look after lifestock - mostly in Lesotho Cattle belong to people from Ncwadi, but Yes there are people from Pakistan - but generally in respect of shops There are people from Malawi, Mosambique and Zimbabwe , generally involved as Domestic workers About 10% of population	Yes there a a number of Foreigners - Pakastani people involed in commerce. There foriegners involved in artwork and welding etc Estimated 10% of the population	
Individual response											
If member of household, what is your role in that household: How many house holds are stable (Mother & father)/ How many are child managed). Howoften do they come home?	Y	N	Grandparent	Parent	Offspring	Relative	Tenant		Vistor	Single mom with children Men with children (5%) No parents, only children (15 to 20%)	Single mom with children Men with children (5%) No parents, only children (15 to 20%)
Household member response											

FOOD PRODUCTION	Y	N	1. Not much activity in respect of food production. Generally buy their food								
Are you involved in food production for home use			2. There are individual house holds where food production takes place. This generally includes mielies, beans, potatoes and vegatables (Mainly for own consumption). Additional production planted for animal feed.								
If no:			3. Animal sale yards at Boston, Lions River, Underberg and Nottingham roads (Mainly beef sold there)								
Are you involved in commercial food and livestock production			4. Goats not really for trade - rather for family and own consumption								
Complete farmer survey for commercial producers			5. Other lifestock - Sheep, horses (Horses used to herd animals), donkeys used to transport of produce), chickens for meat and eggs								
			Many dogs for security and hunting in the area								
			No pigs _Larry asked this question as there is a market developing for Pork _ No historical market, but as the market is now developing the interest may change								
			Larry asked whether they use the mill at Impendle to Mill their maize. No, there is a Mill in Ncwadi - need to be show us where it is (Mr Ngcobo)								
COMMERCIAL SERVICES:											
Where do you buy the following goods:	Local informal trade	Local store									
			Ncwadi	Ward 7 and 8	Comments						
Fresh food			Mostly Richmond or Msundzi		Mostly use people with Bakkies when you go to Richmond (5%) - Once a month				Once a month		
Fresh food (include meat)			Pmb/ Richmond	Pmb	Bulwer, Boston, Howick and Impendle - limited transport so not often visited						
Processed food (Tinned/ maize meal/ cooldrink)			Pmb/ Richmond	Pmb	Transport to PMB - Town rather than Edendale Mall _ Mostly downtown shopping -Retief Street etc						
Clothing			Pmb/ Richmond	Pmb							
Medicines			Pmb/ Richmond	Pmb							
School books			Pmb	Pmb							
Building materials			Pmb/ Richmond	Pmb	No block-making in their area						
Fuel for household use			Pmb/ Richmond	Pmb	Use of local building material places generally used by people with their own transport						
SOCIAL SERVICES:											
Where do you access the following social services: name & location of facility:											
Hospital treatment			Edendale	Edenedale							
Clinic treatment			Ncwadi	Pmb							
Primary school		5Km and more	Ncwadi	Pmb							
Secondary school		5Km and more	Ncwadi	Pmb							
Post-school training			N/A	Pmb							
Library services			Nil in Ncwadi	Pmb	Or Msunduzi Main library				Kwamncame / Kwamfunzi _ Not very useful		
Police services			Nil in Ncwadi	Pmb	Rely on Boston (20km)						
Home Affairs			Pmb	Pmb							
Creche		10 Creche site	Ncwadi	Pmb							
Worship			Ncwadi churches	Pmb	Homegroups in Homes						
Hall			4 Halls		Weddings/funerals/Conferences/ They are being used on a regular basis - hire social use						
Other											
TRANSPORT SERVICES:											
What type of transport do you use to travel to the following destinations:	Walk	Cycle	Taxi	Lift club	Own Car	Bus	Rail		Area 7 & 8 Vulindlela	Ncwadi	
Travel to local facilities (schools, clinics, standpipes etc) - within 10kms		Rare	Yes	No liftclubs	5% (Ncwadi) 70% (7&8)				Bus travels daily (Regular service) 7+8 R20 per trip (Single trip) 7+8 R23 Bus Richmond bakkie (R50 return)	Not reliable	Poor/ unreliable
Travel to local centres - within 20kms											There are roads where taxi's will not go.
Travel to regional centres within 80kms											
Which centres do you travel to for the following services:	Shopping	Medical	Education	welfare Grants	Banking	Employment	Repairs to household goods			7&8	
Boston									Seldom	Rare	
Bulwer									No direct transport	Rare	
Impendle									No direct transport	Sometimes	
Taylor's Halt									Only for family thing	Yes	
Edendale									Yes	Treatment	
Howick									No direct transport		
Pmb									Yes		
Other											
Train									Used for Goods/Logs generally/ Traing did move paseengers many years ago		

UTILITY SERVICES:					Ward 39	Area 7 & 8 Vulindlela
What type of water source do you have at your place of residence?	Unprotected water source (spring, river)				Spings / One borehole under constructution. A number being bullt/ 3 planned- all under constrctuction	
	Protected water source (standpipes-part of scheme)				Have heard of other waterworks under construction	
	Reticulated-house connection					
	Emergency services (tanker)				Not much rain water harvesting	
						Piped watre from Reservoir
					Six Water tanks (Jo-Jo) Tanks were provided by Msunduzi, but too little support	
					Ward 39	Area 7 & 8 Vulindlela
What type of sanitation service do you have at your place of residence?	No facilities				Nil	Nil
	Pit latrine - own construction				Portable system	Long drop -each household - has standpipe
	VIP provided by govt				Often not well build and collapse? Often built by themselves	
	Buckets				No	
	Septic Tank				Very few	
	Reticulated				Nil	
					No water source polution	
What are your sources of energy for cooking, ligthing and heating?	Wood/ coal				Do use for fires	Obtain from the forest
	Gas/ paraffin				Seldomly	
	Local off grid (Solar)				Nil	
	Eskom pre-paid				Mainly electricity	
					Ward 39	7 & 8
Do you have cell phone signal	None		Y	N	General problem	
	At home					
	At social service facilities (schools, clinics etc)					
	At centres					
					No facilities to make copies/ approach schools	Better in wards 7 and 8
Do you have access to the internet	None		Y	N	No signal	
	At home					
	At social service facilities (schools, clinics etc)					
	At centres					
How do you dispose of your solid waste?	Own facility: pit/burn/ compost				Pit and burn	Pit and burn
	Take to municipal site: where?					
	Municipal collection					
					Ward 39	7 & 8
How and where do you bury your deceased?	At home site				All	There is a need for one, but for non-locals - not functioning yet
	Nearby group site: where?				There was a church cemetry - near Ncwadi school	
	Municipal Cemetery: where?					
Cultural heritage	Ncawdi school	Built by Dube - church and two class rooms (1957)				
		No sacred sites				
		Mountain called Ntabende - used for prayers				

14.Annexure 3: Agricultural Potential Assessment

14.1. Introduction

This report provides a detailed assessment of the Bioresource Groups (BRGs) and associated Bioresource Units (BRUs) located in each of the BRGs in the project area. BRGs are a macro indicator of climate, soils, vegetation and crop production potential. In contrast BRUs located within each of the BRGs provide a micro level indication of climate, soils, slope and the types of agriculture best suited to each of these areas. This review of BRGs and BRUs provides a detailed understanding of the agricultural potential of the land located in Ward 39.

14.2. Process for Allocation Land Potential

14.2.1. Background

This assessment of agricultural potential was based on updated Bioresource Groups (BRGs) and Bioresource Units (BRUs) produced jointly by the Natural Resources Unit at Cedara (DAEA) and Isikhungusethu (Pty) Ltd for the Umzimkhulu Municipality.

The information used in the process of determining land potential is extracted mainly from the Bioresource Unit (BRU) Inventory Programme (Bru Report Writer, version 9.042: Piers Whitwell), and from the revised Bioresource Group Programme. This includes climate and soil information, while further interpretations based on the BRU inventories, is extracted from "A Land Potential Classification for KwaZulu-Natal" (Guy and Smith 1998). This includes the broad land, climate and soil class potential for each BRU.

14.2.2. Broad Land Potential of BRUs

Because the variation in soils and microclimate within a BRU can be significant, only a broad land potential can be given for a BRU. Once the soil of a specific area has been determined, the soil class, slope and climate class of the area can be used to provide a good indication of the land potential of that particular area (or ecotope).

14.2.3. Climate Class

Climate classes were determined by Guy and Smith (1998) for each BRU and these classes have been used in the process of determining land potential. Because of wide variations of climate class of BRUs within the BRGs, it was decided to standardize the climate classes according to BRGs but allow variations of one class, up or down from the standard class.

14.2.4. Soil Groups

Broad soil groups have been determined for each BRU and given as a percentage of the area of the BRU. For example, if well-drained soils of the BRU make up 38%, this figure is obtainable in the BRU inventory but does not indicate the percentage slope or effective rooting depth. The figure, together with the figures for the other soil groups represented in the inventory, therefore gives a broad

indication of the potential of the BRU. This does need to be considered with reference to the climate class.

14.2.5. Arable Land

The term “arable land” or more commonly referred to as ‘arability’, refers to an area of soil that can be cultivated in a sustainable manner. Appropriate conservation measures are necessary for sustainability. Arable land falls into certain groups of soils, has a slope that can be safely cultivated and has an acceptable effective rooting depth. The following listing provides the soil groups and their symbols used in the determination of arable potential.

Potential arable soil groups and their symbols

Soil Groups/Capability Classes:

A: Humic topsoil

Includes all humic topsoil with an effective rooting depth of 450 mm or more.

B: Well-drained

Includes orthic topsoils with subsoils that are red (apedal and/or structured), yellow-brown, red over yellow-brown, sand, E over yellow-brown, E over red, red over mottled, and a 50:50 topsoil mix with weathering rock.

C: Alluvial deposits

This includes all alluvial soils.

D: Mottled and moderately drained

Includes subsoils that are yellow-brown over mottled, yellow-brown over gley, yellow-brown over hard plinthic, and E over weathering rock.

F: Black topsoil

Includes black clays with blocky structure, stratified alluvium, weathering rock subsoil, and mottled subsoils.

H: Weathering rock (Glenrosa form)

Topsoil intermingling with weathering rock.

Effective rooting depth

Over 500 mm

Clay percentage

Over 15%

14.2.6. Land Potential Assessment Procedure

This assessment procedure is based on the agricultural potential of arable land. It does not take the grazing value of the rangeland, which is based on the condition of the veld, into account. Veld condition is based largely on past management, and can differ widely within a BRU and indeed from camp to camp, and even within a camp on a single farm. This can only be determined by a specialist in the procedure of veld condition assessment. It is possible to give a broad grazing capacity for a BRU based on that figure assigned to a Bioresource Group. This figure must, however, be used with caution

and accompanied by an explanation that a correct grazing capacity for a specified area can only be applied after a veld condition assessment has been done.

The quality of grasslands for livestock production has been determined in accordance with Bioresource Groups in this strategic assessment. This has been undertaken in order to establish likely grazing capacities in different areas of the municipality and therefore the areas best suited to livestock production.

14.2.7. Initial Process

In the process of classifying an initial broad land potential for a BRU, climate class and arability (based on soil capability classes) were used in this project. This is a weighted average of land potential of the BRU owing to the fact that it has to take all variations of slope and soil types into account together with the climate class of the BRUs. In the case of annual cropping a maximum slope of 12% is allowed and taken into account when assessing general land potential. In the case of perennial crops a greater slope is allowed and so the land potential for these crops will differ from that of annual cropping. The perennial crops include sugar cane, timber and orchards. The maximum slopes for these crops are:

Crop		maximum slope per clay percentage
Sugar cane	clay:	0% to 15% = 12%; >15% = 20%
Timber & orchards	clay:	0% to 15% = 20%; >15% = 40%

Because steeper slopes are permitted for these crops the area that can be cultivated is greater that the area for annual cropping and so the potential will be higher.

For the purposes of this project it was decided that climate class would be measured against the amount of arable land in each of the BRUs identified in the municipality. Table 52 provides an assessment of land potential based on climate capability classes and the percentage of arable land in the BRUs. These are given in different classes of arability from over 80% arable down to under 10% arable land within a BRU. The higher the percentage of arable land within a climate class, the higher the land potential. Table 53 provides a description of the climate classes and Table 52 a description of the Land Potential classes.

Table 52: Land Potential Classes: Climate Capability Classes and Percentage Arability

Arability	**Climate capability**							
	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**
>80%	1	1	2	2	3	3	4	4

65 – 79%	1	2	2	3	3	4	4	5
50 – 64%	2	2	3	3	4	4	5	6
40 – 49%	2	3	3	4	4	5	5	6
30 – 39%	3	3	3	4	4	5	6	7
20 – 29%	4	4	4	4	4	6	6	7
11 – 19%	5	5	5	6	7	7	7	8
<10%	5	6	6	8	8	8	8	8

As may be noted in Table 52, eight land potential classes have been identified for the project area. These have been spatially located on the basis of the following colour coding:

1	Very high potential	Dark green
2	High potential	Dark green
3	Good potential	Light green
4	Moderate potential	Orange
5	Restricted potential	Yellow
6	Very restricted potential	Light red
7	Low potential	Dark red
8	Very low potential	Dark red

The following table provides a description of the climate capability classes applied in Table 52 above.

Table 53: Climate Capability Classes

Climate Capability class	**Limitation rating**	**Description**
C1	None to slight	Local climate is favourable for good yields for a wide range of adapted crops throughout the year

C2	Slight	Local climate is favourable for a wide range of adapted crops and a year round growing season. Moisture stress and lower temperatures increase risk and decrease yields relative to C1
C3	Slight to Moderate	Slightly restricted growing season due to the occurrence of low temperatures and frost. Good yield potential for a moderate range of adapted crops.
C4	Moderate	Moderately restricted growing season due to low temperatures and severe frost. Good yield potential for a moderate range of adapted crops but planting date options are more limited than C3.
C5	Moderate to Severe	Moderately restricted growing season due to low temperatures, frost and/or moisture stress.
C6	Severe	Moderately restricted growing season due to low temperatures, frost and/or moisture stress.
C7	Severe to Very severe	Severely restricted choice of crops due to heat, cold and/or moisture stress.
C8	Very severe	Very severely restricted choice of crops due to heat or cold and moisture stress. Suitable crops at high risk of yield loss.

14.2.8. Standardised Climate Capability Classes

The Climate Classes codes have been standardized for each BRG (and the BRUs within the BRGs) and this is given in Table 54. Should the climate class given for a BRU in its inventory vary by one class, up or down, from the standard class, the BRU inventory class will be applied to the BRU. If, however, the class varies by two classes, the class will be adjusted up or down to within one class of the standard class. For example, if a BRU which lies within BRG 5 (standard Climate Class C3) be given as C4, it will be accepted. If it is given in the BRU inventory as C5, it will be adjusted to C4 (within one class of the standard class).

Table 54: Standard Climate Classes for Bioresource Groups

Bioresource Group	Standard Climate Code
1	C1
2	C3
3	C2
4	C4
5	C3
6	C4
7	C3
8	C4
9	C5
10	C7
11	C4
12	C5
13	C6
14	C6
15	C3
16	C5
17	C4
18	C5
19	C4
20	C5
21	C7
22	C8
23	C8

Table 55 provides a description of the land potential classes.

Table 55: Description of Land Potential Classes

Land Potential Class	Description of Land Potential Class **Permission must be granted before virgin land is cultivated in terms of the Soil Conservation Act**
L1	**Very high potential**: no limitations. Approved and appropriate contour protection must be implemented.
L2	**High potential**: very infrequent and/or minor limitations due to slope, soils, temperature or rainfall. Approved and appropriate contour protection must be implemented.
L3	**Good potential**: infrequent and/or moderate limitations due to soil, slope, temperature or rainfall. Approved and appropriate contour protection must be implemented.
L4	**Moderate potential**: moderately regular and/or severe to moderate limitations due to soil, slope, temperature or rainfall. Approved and appropriate contour protection must be implemented.
L5	**Restricted potential**: Regular and/or moderate to severe limitations due to soil, slope, temperature or rainfall. Approved and appropriate contour protection must be implemented.
L6	**Very restricted potential**: Regular and/or severe limitations due to soil, slope, temperature or rainfall. Non arable.
L7	**Low potential**: Severe limitations due to soil, slope, temperature or rainfall. Non arable.
L8	**Very low potential**: Very severe limitations due to soil, slope, temperature or rainfall. Non arable.

14.2.9. Land Potential of the Identified Polygons (arable areas)

As stated above all areas that have been cultivated in the past, that have slopes under 12% and do not have erosion problems or residential areas located on them, were marked as potential annual cropping lands or project area. Areas suitable for perennial crops would require a separate investigation. At the scale of the full municipality, it is not feasible to identify the soils of these areas at a field level. This will have to form part of a detailed field investigation for each of the sites prioritised in this project. The soils identified, and the climate of the area, will determine whether the area can be developed.

The initial land potential of these arable areas will have the same as that identified for the BRU in which they are situated. An adjustment will have to be made if the soils are found to be unsuitable for cultivation, or can be adjusted according to the soils identified in the field inspection. An adjustment can also be made if it is possible to irrigate the lands. This applies to all areas which have Class l, 2 or 3 soils according to Table 56: Increase for irrigation according to soil classes.
Here we have a contradiction in that we pushed everything to ‘high’.

Table 56: Increase in Land Potential (LP) if under irrigation according to soil class.

Soil class	Increase to LP
I	I
II	I
III	II
IV to VIII	No increase

Note: A final decision on the potential of the land can only be made after a soil survey has been carried out in the field.

Table 57: Land capability class of the BRUs in Ward 39

BRU	Soil capability	Climate capability	Arability %	Land potential
Xc14	3	3	18%	5 – Restricted
Yc14	2	3	27%	4 – Moderate
Yd18	4	4	16%	6 - Very restricted
Wc27	3	3	16%	5 – Restricted
Yc13	4	4	7%	8 – Very low
VWb1	4	3	14%	5 – Restricted

Refer to Figure 102 for the Land potential of the Bioresource Units in Ward 39.

14.3. Bioresource Groups and Bioresource Units

14.3.1. Bioresource Groups and Units

The Bioresource Groups (BRGs) and the Bioresource Units have been used to make assessments of the agricultural potential of the area. A Bioresource Group is a specific vegetation type controlled by an interplay of biotic factors such as geological parent material and soil, climate (mainly rainfall and temperature), vegetation and altitude. In particular the vegetation 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

A Bioresource Unit is an area within which the environmental factors such as climate, soil type, vegetation and terrain type have a degree of homogeneity such that land use practices, farming enterprises, production and production techniques, can be clearly defined and will 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.
The BRGs and BRUs of Ward 39 are presented in Figures 113 and 114.

Figure 113. Productivity of the BRUs

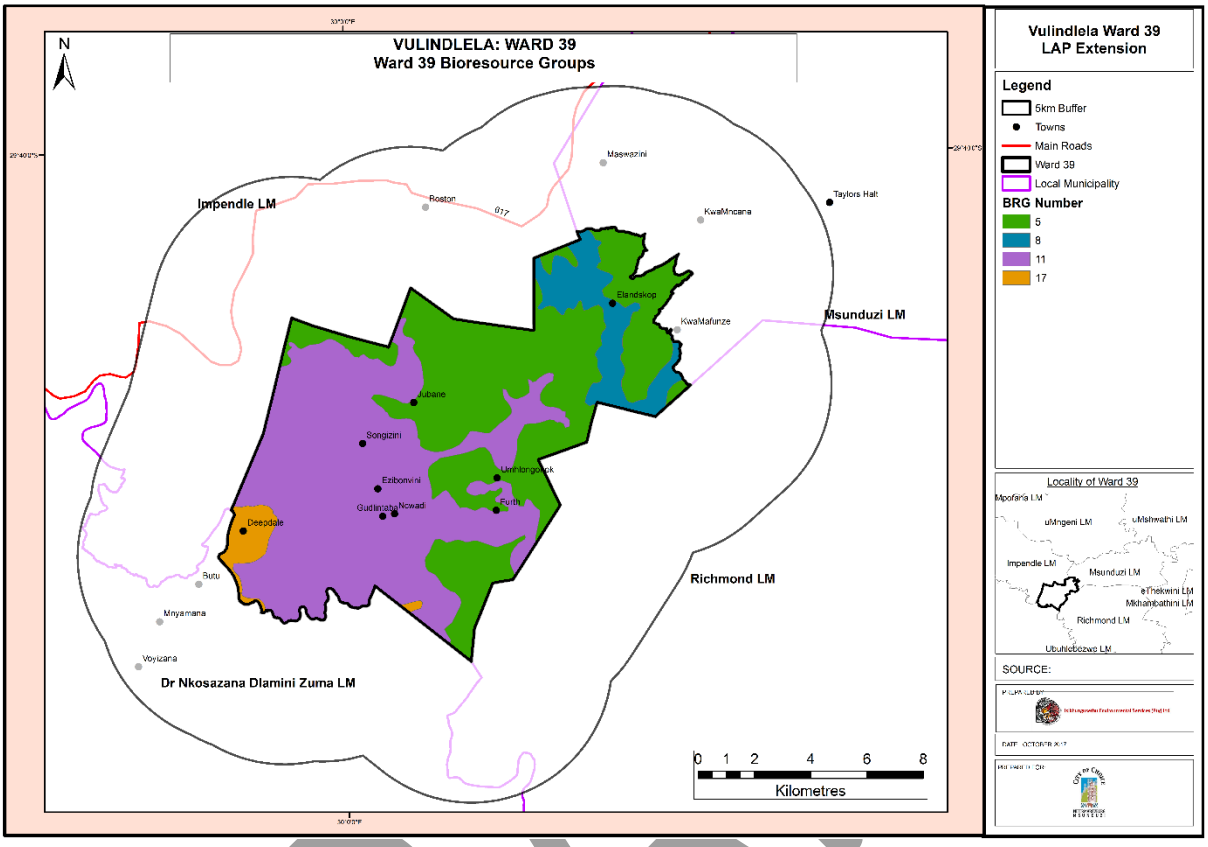
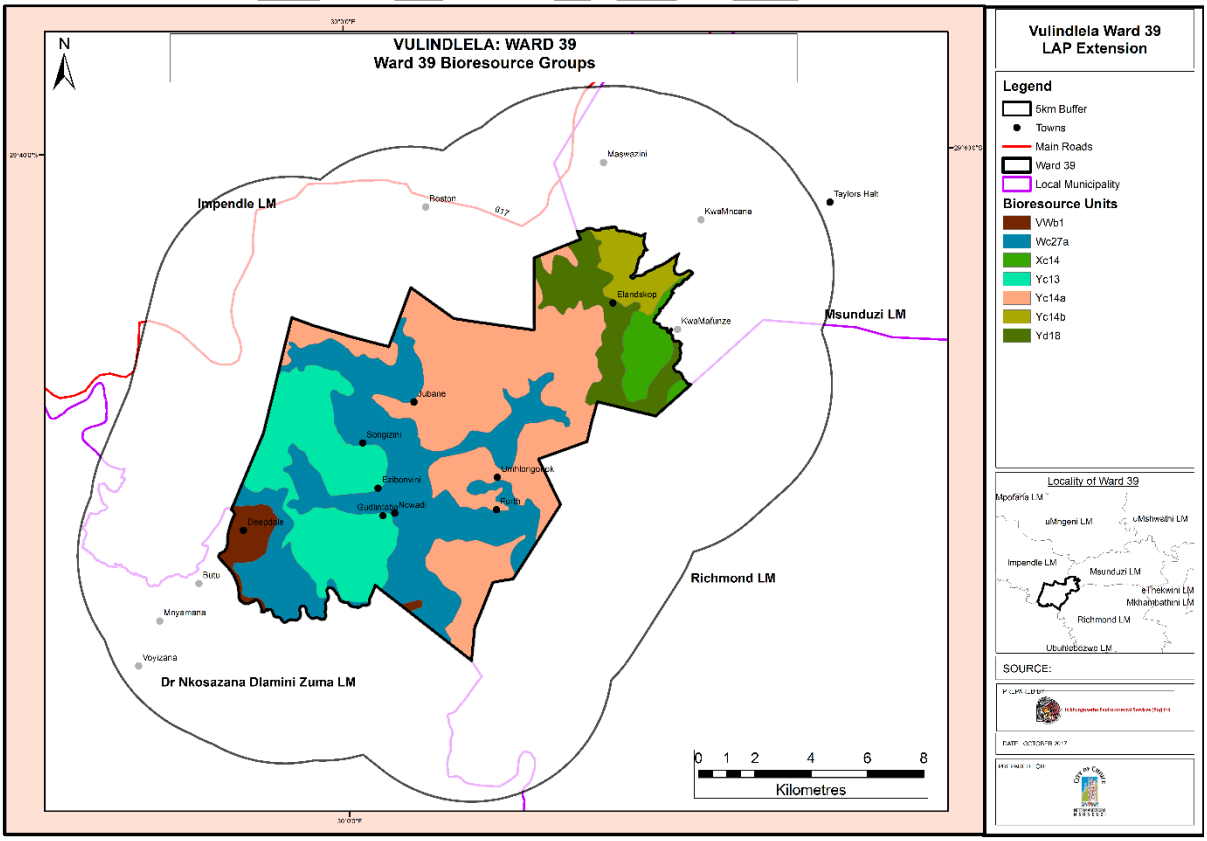


Figure 114. BRGs in Ward 39



The BRGs of Ward 39, and the BRUs contained within them, are described below.

14.3.2. **BRG 5: Moist Midlands Mistbelt**

14.3.2.1. General Locality and description

The Moist Midlands Mistbelt is the fifth largest BRG in the province and has a total area of 626 293 ha. It is considered to be second only to BRG 1 in terms of production potential. Lying in an approximate altitude range of 900 m to 1 400 m above sea level, the terrain is rolling and slopes moderate to steep. Arable land in this BRG covers 26% of the BRG, or 165 443 ha. The mean annual rainfall range is from 801 mm to 1 141 mm and mean annual temperature from 14.4°C to 18.5°C. Soils and a favourable climate mean that this BRG is generally suitable for cultivation of a wide variety of crops. It is considered to be a highly threatened vegetation type having deteriorated in condition due to poor management in the past of early burning (winter) and selective overgrazing of the palatable species. These have either become low in vigour or have died out.

14.3.2.2. Climate

This BRG has a temperate climate, with an annual rainfall ranging from 801 mm to 1 141mm. Heavy mists are a common and important feature, providing additional moisture, particularly to forests which are able to effectively intercept the moisture-laden air. Cedara has recorded an average of 46 days with mist per year. Much of the rain comes in the form of cold frontal activity, mainly in the spring and early summer. Thunderstorms are common in summer and autumn and at Cedara an average of 60 days with thunderstorms is recorded per year.

The mean annual temperature range for the Group is 14.4°C to 18.5°C. Climate hazards include occasional droughts, usually of short duration, occasional hail, frost, which varies from slight to severe, and excessive cloudiness during the summer growing season. Hot, north-westerly ("berg") winds, which blow from the north-west, mainly in August and September, are of particular importance. They occasionally reach gale force and become warmer as they lose altitude, having a desiccating effect on the vegetation. This is accompanied by a drop in humidity and an increase in the fire hazard during this often dry period of the year. The major effect of the Berg winds is on the north and north-east facing slopes. Winds from the south-east frequently follow Berg winds and carry the misty and rainy conditions of cold fronts.

Table 58 indicates the remarkable change from Berg wind to cold front conditions over a short period of time. On a particular day at Cedara, which lies in this BRG, a sudden change of wind from the north-west to the south-east occurred at approximately 14h00 with no significant change in wind speed, and induced a temperature drop from 32.4°C at 14h00, to 21.9°C measured at 15h00, and an increase in humidity from 19% at 14h00 to 80% at 15h00 (Siddons & Clemence, 1985).

Table 58: Rapid change in weather conditions at Cedara

Time	Wind direction	Temperature °C	Humidity %
14h00	North-west	32.4	19
15h00	South-east	21.9	80

An understanding of the pattern of predominant daily wind directions and peaks is of particular importance during the burning season of July to October. It can vary as indicated in the study carried out by Siddons & Clemence (1985) at Cedara. North-westerly winds which are defined as the warmer, drier group, are predominant in the early part of the day, decreasing as the proportion of moister winds from the south and south-east increase. Table 59 reflects the varying proportion of each wind on a monthly basis.

Table 59: Predominant daily wind directions at Cedara 1983/1984.

	July	August	September	October
Wind direction				
North/North-west wind				
Peak hour*	11h30	10h45	07h45	09h30
% occurrence**	40%	36%	55%	55%
Duration (time)***	09h30 - 14.h30	09h30 - 12h30	06h30 - 17h00	06h30 - 11h45
South/South-east wind				
Peak hour*	18h00	19h30	18h45	18h15
% occurrence**	68%	85%	78%	88%
Duration (time)***	10h30 - 19h45	09h33 - 19h30	10h45 - 19h45	06h30 - 19h15

* "Peak hour" refers to the average time of the day when the particular wind blows at its peak velocity.
** "Percentage occurrence" refers to the average percentage of occurrence of the wind direction.
*** "Duration" indicates the average duration in time that the wind blows per day.
These figures give a good indication of the month and time of day to burn.

The mean annual evaporation range is from 1 479 mm to 1 778 mm.

14.3.2.3. Vegetation

Few relic areas of the former *Themeda triandra* grassland veld remain. In these patches, together with the dominant *Themeda triandra,* species such as *Tristachya leucothrix, Trachypogon spicatus, Eragrostis capensis, E. racemosa* and *Monocymbium ceresiiforme* are common. Other species include *Alloteropsis semialata, Andropogon appendiculatus, Brachiaria serrata, Cymbopogon excavatus, C. validus, Digitaria tricholaenoides, Elionurus muticus, Eragrostis curvula, Harpochloa falx, Heteropogon contortus, Panicum ecklonii, Setaria nigrirostris* and *Setaria sphacelata.*

The high potential of the arable areas of this BRG has meant that little value has been placed on the veld and veld management has always been poor. The poor management practices include excessive burning, particularly during the season of active grass growth, followed by continuous selective over-grazing. These practices have largely destroyed the palatable grass species and resulted in grasslands of low pastoral value. The palatable grass species have been replaced by hardy pioneer species such as *Aristida junciformis, Eragrostis plana, Sporobolus africanus* and *Hyparrhenia hirta. Aristida junciformis,* or Ngongoni grass, is a densely tufted and strongly rooted grass with a wiry leaf and is particularly dominant, leading to the common name for this BRG of Ngongoni veld. This grass is grazed only in the very early stages of growth following fire, when the grazing animal is able to pull the entire leaf from the plant. In the late summer the ripening inflorescence is eaten. In many cases where veld appears to be completely dominated by Ngongoni, many palatable species are present, albeit in a state of low vigour. A season's rest could improve the grazing value of the veld considerably, although generally it requires several seasons to build up the vigour required to be of some grazing value. Resting of veld is an essential strategy to apply in order to maintain the quality of veld, but is virtually never practised.

To indicate what resting can achieve in restoring the grassland, mention can be made of an agreement between the Department of Agriculture and the landowners of the Karkloof to Howick area. These landowners, mainly timber and dairy farmers placed little value on their veld and claimed that in August and September the winds in the valley were very unpredictable. They requested that they be permitted to burn in early July on the condition that the grassland is never grazed. The result was seem many years later when the farm of Mr William Hyslop, St John's Farm, just north of Howick, was inspected as part of an environmental assessment procedure. It was found that *Themeda triandra* was dominant in the grassland together with a wide range of herbaceous flowers.

Mixed *Podocarpus* forests (Southern Mistbelt Forests) are a feature of this BRG, usually situated in the transitional area with the adjacent, higher-lying Moist Highland Sourveld. These relic forests include the Nkandhla, Qudeni, Karkloof, Weza and forests near Richmond and Dargle. They are found mainly on the cooler, south-facing aspects where they receive more moisture and protection from fire. Cold, dry winters, followed by hot north-westerly winds, are a hazard in the area and particularly so for these forest remnants. A feature of these forests is the abrupt margins where fire has destroyed the ecotone, or forest margin of rank grasses, shrubs and young trees. These margins are of great importance in the biodiversity of forests. The contribution of forests to the conservation of water resources needs greater recognition. Most forests have been extensively exploited and *Podocarpus* species, in particular, were felled for building timber in the past. The main danger now exists in the form of uncontrolled fires and encroachment by commercial timber plantations. Taylor (1963) estimated that there had been a reduction in forest patches of between 25% and 75% since 1900.

Poisonous plants of the BRG include *Moraea* species on bottomland sites, *Senecio retrorsus* and *Lantana camara. Pteridium aquilinum* bracken is an indigenous plant that has become a problem in some areas in that it forms thickets which eliminates grass cover. Alien weeds include *Chromolaena odorata, Ageratina adenophora, Datura stramonium, Cirsium vulgare, Solanum mauritianum, Melia azedarach, Acacia mearnsii, A. dealbata, A. melanoxylon, A. longifolia, Ricinus communis, Morus alba,*

Montanoa hibiscifolia, Robinia pseudoacacia, Pyracantha angustifolia, Sesbania punicea, Cinnamomum camphora, Cestrum laevigatum, Tithonia diversifolia, T. rotundifolia, Rubus cuneifolius, Pinus patula, P. elliottii, Ipomoea alba, Hedychium coccineum, H. garderianum, H. coronarium, Catharanthus roseus, Pennisetum purpureum, P. clandestinum, Senna didymobotrya, Populus X canescens, Eucalyptus grandis, Eucalyptus spp., *Caesalpinia decapetala. Araujia sericifera, Passiflora subpeltata, Pereskia aculeata, Psidium guajava, Lilium formosum, Thelechitonia trilobata, Macfadyena ungius-cati, Cardiospermum grandiflorum, Canna indica, Arundo donax, Jacaranda mimosifolia, Pereskia aculeata, Psidium guajava* and *Lantana camara.* A new arrival is *Campuloclinium macrocephalum* pompon weed which has spread through Gauteng and has been found near Lions River on the old main road. The invasion of alien weeds into the MMM area of Pietermaritzburg townlands, has earned it the title of "Weed capital of South Africa" owing to the large variety and the density of weeds.

Benchmark for BRG 5 - Moist Midlands Mistbelt

Groups and species	**Relative abundance (%)**
Increaser I	
Alloteropsis semialata	2
Digitaria tricholaenoides	1
Eulalia villosa	1
Setaria nigrirostris	1
Trachypogon spicatus	2
Tristachya leucothrix	18
Total	**25**
Decreaser	
Brachiaria serrata	1
Diheteropogon amplectens	2
Monocymbium ceresiiforme	2
Themeda triandra	45
Total	**50**
Increaser IIa	
Eragrostis capensis	2
Harpochloa falx	2
Heteropogon contortus	3
Total	**7**
Increaser IIb	
Eragrostis curvula	1
Eragrostis plana	1
Eragrostis racemosa	1
Hyparrhenia hirta	1
Sporobolus africanus	1
Total	**5**
Increaser IIc	
Microchloa caffra	1
Paspalum scrobiculatum	1
Forbs	5
Sedges	2
Total	**9**
Increaser III	
Aristida junciformis	2
Diheteropogon filifolius	1
Elionurus muticus	1
Rendlia altera	-

Total	**4**
Grand total	**100**

14.3.2.4. Water Resources

This BRG is generally well-watered, with streams rising in the south-facing hills where BRG 5 meets the Moist Highland Sourveld. These streams are a most important source of water for the lower lying areas that they feed and it is essential that regional planning takes this into account.

14.3.2.5. Soils

The potential of the soils of this BRG is high, in spite of the fact that the inherent nutrient status is low. The area of arable soils is approximately 26% of the BRG and high potential soils make up about 15% of the area. Particular problems are P-fixation and Al-toxicity. Soils are highly leached and this has an important bearing on the economy of the BRG, which is most suited to intensive systems of farming. Refer to the relevant Subgroup for detailed information.

14.3.2.6. Land use Potential

This BRG has a particularly high potential, mainly because of its favourable climate. Approximately 26% of the area is arable and more than half has been transformed for plantations, cultivated land and urban sprawl (Mucina & Rutherford, 2006). It is generally intensively farmed to annual crops such as maize, and dairy is an important enterprise. The veld is of a very poor quality and cultivated pastures, for which BRG 5 is ideally suited, form the basis for any livestock enterprise. The climate and soils promote timber production which is the most widespread land use form, largely because trees are planted on slopes which normally exceed 12%, the slope considered to be safe to cultivate from a soil conservation point of view. Eucalypts (gum), pine and wattle are grown, while poplar was once grown extensively on alluvial soils in the valleys. Sugar cane is grown on sites where the drainage of cold air is good, ensuring that no frost, or only light frost, occurs. Both timber and sugar cane are considered to be semi-perennial crops and the cover reduces the erosion threat. Special care has to be taken when harvesting timber and re-planting cane. Other crops include avocado on deep, well-drained soils.

Supplementary irrigation plays an important role in crop production, particularly with vegetables. The Moist Midland Mistbelt, and especially the indigenous forests, has very good potential for tourism and recreation. The veld is generally of poor quality and requires very good management for animals to perform satisfactorily. Most stock farming is supported by cultivated pastures. The grazing capacity varies considerably according to the condition of the grassland, but is about 2.5 ha per AU on reasonable veld with approximately 250 days when the veld can support animals without supplementary feeding. The winter requirement for cattle is a dry matter supplement of 1.5 tons/AU to maintain animals in productive and reproductive condition. Based on a four camp rotational grazing system, the recommended period of stay in each camp is 10 days, with 20 days period of absence with a grazing cycle of 30 days. Resting the veld is vital to maintain the vigour of the palatable species and

it should receive a full season's rest every fourth year, or more often if the grassland is in poor condition, that is, low in vigour with a poor quality grazing value. Additional rests may be necessary to build up the vigour of the desirable plants and this could include autumn rests.

While specifications have been given for a four camp rotational grazing system, it is preferable to apply a flexible management system such as advocated in the Venter-Drewes flexible management system. In this system a priority camp is grazed whenever there is sufficient material and the herd returns to it repeatedly throughout the season. In the second year this camp becomes second in priority and is only grazed when there is insufficient grazing material in the priority camp. In the third year it becomes a third priority camp and finally, in the fourth year, it is rested for the full season to re-establish vigour. Following the rest, the camp is burned in the spring and again becomes a priority camp.

Burning is necessary when moribund material accumulates so that palatable species do not become smothered. The recommended period for burning is from the 1st of August to the 30th of September. Burning should take place as soon as possible during this period, before the grass commences active growth and preferably following rain.

The pattern of predominantly daily wind directions and peaks during the burning season of July to October varies as indicated in a study of wind behaviour at Cedara by Siddons & Clemence (1985). North and north-westerly winds, defined as the warmer, drier group, are predominant in the early part of the day, decreasing as the proportion of moister winds from the south and south-east increase. The proportion of each wind group varies monthly as indicated in the introduction.

Game animals suited to the area are zebra, bushpig (reintroduced themselves when cane was planted), grey duiker, oribi, bushbuck, reedbuck and mountain reedbuck.

14.3.2.7. Conservation

Mucina & Rutherford (2006) state that BRG 5 is endangered and one of the most threatened vegetation types of KZN. The target is 23%. A small area, about 0.5% is statutorily conserved in reserves such as Ngeli, Impendle, Blinkwater, Qudeni, Doreen Clark, Karkloof and Queen Elizabeth Park. Over 50% has been transformed by agricultural cultivation, timber and cane planting and urban spread. The remaining grasslands are poorly managed and most of them are seriously degraded with a dominance of *Aristida junciformis* and few forbs. This is the result of injudicious burning and grazing, both selective and overgrazing. The invasion of alien weeds (refer to list in the introduction to the MMM) into cultivated land, including timber plantations, grasslands, forests and even urban areas has reached proportions that landowners find economically challenging to control. A lack of control in the initial stages of invasion when it would be economically feasible and an easy task to remove the invaders is unfortunate and leads to the situation being experienced today.

This area lies in Subgroup 5.4 CEDARA and includes only two BRUs of the entire Subgroup. Extracts from the BRUs falling within the Subgroup are as follows:

14.3.3. Bioresources Units within Subgroup 5.4 Cedara of the Moist Midlands Mistbelts

14.3.3.1. Overview

BRUs included in area

Xc14 Taylor's Halt: total area = 10 833 ha
Area in Ward 39 = 476.2 ha or 4.4% of Xc14
Yc14 Byrne: total area = 69 503 ha
Area of Yc14 a & b in Ward 39 = 5 045.9 ha or 7.3% of Yc14

Total area of BRG 5.4 in Ward 39 5 522 ha

Altitude range 669 m to 1 621 m

Terrain Rolling/ broken

Slope Steep, Moderate

BRU potential classes

BRUs	Climate	Soil	Land
Xc14	3	3	3
Yc14	3	2	2

14.3.3.2. Climate

Mean annual rainfall range	885 mm to 979 mm
Mean annual temperature range	16.2°C
Mean January maximum temperature range	20.0°C to 36.0°C
Mean July minimum temperature range	- 3.0°C - 4.0°C to
Incidence of frost	Moderate to severe frost in pockets or low-lying areas. On an average 5 to 9 days of heavy frost may occur within a period of 46 to 70 days – between the second half of May and the first half of August. This occurs in 88% to 96% of years.
Heat units base 4.4°C (May to Sept.) range	1 318 to 1 593
Heat units base 5°C (Full year) range	4 004 to 4 478
Heat units base 10°C (October to March) range	1 514 to 1 742
Mean annual Apan evaporation range	1 604 mm to 1 655 mm

14.3.3.3. Vegetation

General description

The general pattern is grassland of low grazing value with *Aristida junciformis,* or Ngongoni grass, being the dominant species. Isolated pockets of *Podocarpus* forest remain as remnants of what were once extensive forests. The forests found on the hill above Pietermaritzburg and the others north of Byrne and below the mountain escarpment of Cunningham's Castle, are the largest pockets remaining. Like most forests in the Moist Midland Mistbelt, they are threatened by uncontrolled fire, commercial timber plantings and weed invasion. Common species include *Aristida junciformis* and *Buddleja salviifolia, Greyia sutherlandia* and *Leucosidea sericea* at the upper altitudinal limits. *Pteridium aqualinum* (bracken) grows mainly on moist south-facing aspects and becomes a major problem as it will exclude grass cover. A major problem in the area is the invasion of alien weed species into plantations and to a lesser extent lands and veld. These weeds are *Rubus cuneifolia* (American bramble), *Solanum mauritianum* (bugweed) and *Acacia mearnsii* (black wattle).

14.3.3.4. Water Resources

Many streams rise in the Subgroup, or immediately above it, making it an important source of water supply. It is important therefore, to consider water conservation measures when planning land use. The Msunduze River and its upper tributaries have their source in the Subgroup, as do the Lovu River and the Mkobeni River. These rivers provide water for irrigation lower down in their valleys.

14.3.3.5. Soil Resources

Soil		**Area (ha)**	**% of Subgroup**
Arable area		1 447	26%
High potential soil		699	13%
Shallow soils		1 426	26%
Moderate to poorly-drained	1 275		23%
Moderate slopes, rocky non-arable	1 232		22%
Too steep for cultivation		1 180	21%
Soil Group			
A (humic topsoil)		20	0.4%
B (well-drained subsoil)		4 187	76%
C (alluvial soil)		12	0.2%
D (moderately-drained, mottled)		30	0.5%
H (subsoil weathering rock)		1 106	20%
I (poorly-drained soil)		168	3.0%

Fb erodibility rating Xc14 = 5.2 (limited risk)
Yc14 = 5.0 (high risk)

Soil forms and series found within the soil groups

A Ia10, Ia11, Kp10, Kp11

B Bv16, Bv27, Cv16, Cv17, Cv18, Cv27, Cv37, Gf11, Gf12, Gf13, Gf21, Gf22, Gf23, Gf31, Gf32, Hu17, Hu18, Hu27, Hu28, Hu36, Hu37, Hu38, Oa16, Oa17, Oa36, Oa37, Pn16, Pn17, Sd11, Sd21, Sd22

C	Du10
D	Av16, Av17
E	Cf12, Cf13, Cf22, Lo12, Lo13, Wa12, We12, We13
H	Gs16, Gs17, Gs18, Gs19, Ms10, Ms11
I	Ka10, Ka20, Kd14, Kd16, Kd19,

Dominant soil ecotopes

Ecotope	Area (ha)	Percentage of Subgroup
B.1.1	337	6.1
B.2.1	287	5.2
B.2.2	138	2.5

14.3.3.6. Land use Potential

This is an area of broken and rolling terrain with steep and moderately steep slopes. In the Hilton and Cedara area timber, dairy and maize are important. North of Hilton, on crest land and in a north-facing valley, sugar cane is produced. The Boston district produces timber and maize, and beef and dairy are important. Taylors Halt is a communally farmed area, producing mainly maize, and the Byrne area produces timber, maize and citrus and has one of the few areas suitable for tea production.

Cedara is an important centre in the Subgroup, being the headquarters for agricultural research of the Department of Agriculture and an important source of information for the high rainfall BRGs of the Province. Cedara Agricultural College is also situated in this BRG. The recommended crops and their potential production are listed in the crop production table below.

14.3.3.7. Crop Production potential

Comparison of yields per BRU for various crops in tons per ha per annum.
Only BRUs that have 20% or more arable land, or irrigation areas, will be included in the table
Management is taken as 70% of best management which is standard for commercial production.

BRU	Maize (dryland)				Maize (irrigated)			
	Av. Yield	Max yield	Min yield	% of BRU	Av. yield	Max yield	Min yield	% of BRU
Xc14	5.8	6.2	3.9	24%	6.9	6.9	6.9	24%
Yc14	5.8	6.3	4.6	26%	6.6	6.6	6.6	26%
	Dry bean				Potatoes (Sept irrigated)			
Xc14	1.5	1.5	1.0	24%	34.8	39.1	33.3	24%
Yc14	1.5	1.6	1.1	26%	36.0	40.0	32.0	26%
	Soyabeans (dryland)				Soya beans (irrigated)			
Xc14	2.9	3.1	2.0	24%	3.7	3.8	3.5	24%
Yc14	3.0	3.2	2.4	26%	3.6	3.8	3.1	26%
	Cabbage (March)				Tomato (October)			
Xc14	Oct 78.7	84.2	75.8	24%	61.6	67.8	57.6	24%
Yc14	Oct 78.1	83.0	70.5	26%	60.3	65.8	52.7	26%
	Kikuyu				Italian ryegrass (March)			

Xc14	9.2	10.6	6.4	69%	9.7	9.7	9.7	24%
Yc14	9.5	10.9	6.6	64%	9.7	9.7	9.7	26%
Tall fescue (dryland)					Tall Fescue (irrigated)			
Xc14	6.4	7.9	4.8	24%	8.7	10.9	5.4	24%
Yc14	7.1	8.6	6.4	26%	8.7	10.5	5.3	26%
	Pinus Elliotti							
Xc14	13.6	14.5	11.6	69%				
Yc14	13.6	14.8	8.9	63%				
	Pinus taeda				*Pinus patula*			
Yc14	16.5	17.5	14.0	51%	17.0	18.5	12.9	60%

14.3.4. BRG 8; Moist Highland Sourveld

14.3.4.1. Locality and description

The Moist Highland Sourveld (MHS) lies along the foothills of the Drakensberg and stretches from the south-western to the north-western areas of KwaZulu-Natal. It is 931 800 ha in extent, and lies within an approximate altitude range of 1 400 m to 1 800 metres above sea level. The mean annual rainfall generally exceeds 800 mm and well-drained apedal soil forms, largely dystrophic in nature, are common. This relates to the 'sourveld' characteristic of the grassland. Young soils of the Glenrosa form are dominant in most areas. While the main bodies of the MHS lie close to the Drakensberg range, there are several high points or isolated Subgroups of the MHS found away from the Drakensberg and situated on the crests of the terrain at altitudes exceeding 1 400 m above sea level. These are classified as MHS and will be treated as Subgroups of the MHS Bioresource Groups.

Phillips (1969) recognised the importance of defining different sub-regions within the Highland Sourveld. Bioclimatic sub-regions 4a to 4e, are similar to BRG 8, and are characterised by highly leached soils, whereas his Bioclimatic sub-regions 4f and 4g have partially leached soils, many of a plinthic nature. The areas, comprising BRG 9 Dry Highland Sourveld, have been separated from the areas of the Moist Highland Sourveld for the same reason.

The Bioresource Groups or vegetation types lying adjacent and below the MHS are either BRG 11 Southern Moist Upland Grassveld or BRG 5 Moist Midlands Mistbelt, while BRG 10, the Drakensberg Grasslands, lie adjacent, and at a higher altitude along the Drakensberg. The topography of the MHS is gently to moderately rolling over large areas, but mountainous terrain occurs frequently, rendering it suitable for extensive farming or for conservation only. The largest areas of the MHS occur in the East Griqualand/Umzimkulu district, the Kamberg and Underberg district in the midlands of the Province, and in the Groenvlei area in the north of the Province.

14.3.4.2. Climate

The mean annual rainfall ranges from 800 mm to 1 265 mm per year and approximately 80% of the rain falls in the summer months of October to March. Mist is a frequent occurrence, particularly at the higher altitudes, and snow occurs every two to four years (Moll, 1965). The frequency of snowfalls is greater on the highest ranges of the mountains and close to the Drakensberg. Considerable damage

can be done to timber plantations during heavy snow storms.

The mean annual temperature is 14.1°C, within a range of 11.3°C to 18.9°C. Summers are moderately warm, with a January mean maximum of 21.0°C to 28.9°C. The winter months are cold with the severity increasing from north to south of the BRG. The mean minimum July temperature range in the west and south of the Province is -3.7°C to 6.3°C, while those in the north and east are warmer, ranging from -0.5°C to 4.1°C. Severe frosts can occur over a six month period, particularly in bottomland areas. Light frosts may occur during the early and late summer months.

Wind has an effect on evaporation, as can be seen from the figures from Impendhle and Tabamhlope. These two stations have similar mean annual rainfall and temperature figures, but there is a big difference in the windrun figures. At Impendhle, the mean windrun is 91 km per day, and the mean annual evaporation is 1 384 mm per year. At Tabamhlope, the mean annual windrun is 147 km per day and the evaporation is 1 543 mm per year. The mean annual evaporation ranges from 1 346 mm to 1 807 mm.

14.3.4.3. Vegetation

The vegetation is a fire-maintained grassland, dominated by short bunch grasses up to 0.5 m in height. In the absence or reduction of fire, a development towards *Podocarpus* forest occurs, with grasses such as *Cymbopogon* spp. and tall *Hyparrhenia* spp., and the trees *Leucosidea sericea* and *Buddleja salviifolia* being the forest precursors.

Abundant grass species are *Alloteropsis semialata, Andropogon appendiculatus, Brachiaria serrata, Cymbopogon excavatus, Cymbopogon validus, Digitaria tricholaenoides, Diheteropogon amplectens, D. filifolius, Eulalia villosa, Harpochloa falx, Elionurus muticus, Eragrostis capensis, E. curvula, E. plana, E. racemosa, Heteropogon contortus, Microchloa caffra, Monocymbium ceresiiforme, Setaria nigrirostris, Sporobolus africanus, Themeda triandra, Trachypogon spicatus* and *Tristachya leucothrix*.

Soils derived from dolerite are structurally better suited to plant growth than soils derived from sedimentary rocks. Veld based on doleritic soils generally has a good basal cover and can withstand grazing pressure reasonably well and is usually dominated by *Themeda triandra, Tristachya leucothrix* and *Heteropogon contortus*. On soils derived from sedimentary parent material, the cover is usually poorer than on doleritic soils and is relatively susceptible to disturbance, resulting in a dominance of *Eragrostis* species and *Sporobolus africanus*.

Veld in good condition is dominated by *Themeda triandra* and *Tristachya leucothrix*, while veld disturbed by overgrazing is dominated by *Eragrostis curvula, E. plana*, and *Sporobolus africanus*. Veld that is selectively overgrazed (understocked for long grazing periods, or grazed with sheep only, that is no cattle, so that the palatable species are selectively utilised), frequently favours an increase in the wiregrass species *Elionurus muticus, Aristida junciformis* and *Diheteropogon filifolius*. On shallow soils the common species are *Microchloa caffra, Eragrostis racemosa* and *Heteropogon contortus*.

Aspect has a marked effect on both the species composition, palatability and the productivity of the

grassland. On south-facing aspects, the soil is generally deeper and grass productivity is relatively higher than on north-facing aspects. The grass on these south-facing aspects, including *Festuca costata* and *Cymbopogon* species is, however, less palatable than grass on north-facing aspects, and this can be observed in the utilisation of *Themeda triandra* which will be grazed shorter on the north-facing slopes compared to the south-facing slopes within close proximity to one another. As a result, where stock have uncontrolled access to veld, the north-facing aspects tend to be overgrazed, and deteriorate in condition, while the south-facing aspects are under-utilised. At the highest altitudes, and on south-facing slopes, *Festuca costata* is a common and little-used species.

Forbs play an important role in the species composition and forbs such as some *Senecio* species, *Helichrysum aureonitens* and sedges, increase in relative abundance when veld is over-utilised, while *Pteridium aquilinum* Bracken, increases with under-utilisation. The shrub *Felicia filifolia* aster dominates in veld, particularly on north-facing aspects, where severe overgrazing with the resultant denudation has occurred. By resting such areas and building up a fuel load, this shrub can be controlled by a hot, or high intensity fire, but such a treatment must be followed by resting of the area to build up the vigour of the grass plants. *Phymaspermum acerosa* Curry's Post weed, invades veld that is overgrazed and the invasion of this species can also be controlled by the use of fires of high intensity.

Two groups of forbs occur. The spring aspect forbs flower in spring, growth commencing as soil temperatures rise following the cold of winter. They are partly associated with disturbance and are found in areas that are regularly burned. Autumn aspect forbs are not common and are regarded as early indicators of under-utilisation. Annual burning, particularly in autumn and winter, is regarded as a reason for the paucity of these forbs in the veld. *Pteridium aquilinum* Bracken, is the most widespread forb.

Isolated forest patches occur, mainly on the cooler and moister south-facing slopes, and particularly where they have been protected from fire. Where fire has been excluded from the veld, woody species make an appearance, in particular the forest precursors such as *Searsia* spp. *Leucosidea sericea* and *Buddleja salviifolia*. Trees common to these forests include the yellowwoods *Podocarpus latifolius* and *P. falcatus*. Other trees include *Halleria lucida, Olinia emarginata, Calodendrum capense, Celtis africana, Rapanea melanophloeos, Kiggelaria africana* and *Ilex mitis*.

This grassland of this vegetation type is possibly the least disturbed and most resilient in the Province. *Podocarpus* forest occurs in areas where natural fire barriers are found. These forests are reasonably resilient, but have been seriously damaged through exploitation for timber, and through fire, which burns into the forest margins, each fire diminishing the size of the forest. The destruction of forest margins has a seriously diminishing effect on the biotic diversity of this form of vegetation. The Highland Sourveld has the lowest ratio of forest to grassland of any of the moist regions in the Province.

Formerly wetlands of considerable size occurred in the Moist Highland Sourveld and these were important for maintaining the low flow of streams in dry periods. Many of them have been drained

for cultivation and much of the winter pasturage for beef and dairy animals is now grown on drained wetland sites. Many wetlands have been dammed to provide water for stock and irrigation. From a water conservation point of view, this may be preferable to the drainage of wetlands, but destroys the biotic diversity of a natural habitat. The conservation of threatened species, and the wattled crane in particular, depends on the maintenance of wetlands of appreciable proportions. In this case it is the owners of private land that will determine the preservation of these birds.

Poisonous plants include *Senecio* species and *Pteridium aquilinum* Bracken. *Moraea* sp.Tulip, is a poisonous plant in bottomlands, but more particularly so once these areas have been developed under cultivated pastures. Common weeds of the veld are *Rubus cuneifolius* American bramble, and the Australian wattle species *Acacia dealbata* silver wattle, *A. mearnsii* black wattle and *A. decurrens* green wattle. Wattle trees, particularly along water courses, pose a serious problem. Water flow in streams is affected, and grass cover is destroyed by the trees, causing a loss in grass production and a soil erosion hazard along the stream banks. Unfortunately the invasion of weeds, and particularly of bramble and wattle, both black and silver, progresses year by year with little action being taken to control the problem. What starts as a single wattle tree, when it could easily have been controlled in the initial stages of invasion, will, in time, become a 'wattle jungle'.

A serious pest in this veld type is the ghost moth larva, *Dalaca rufescens,* which spins a dense web about 6 cm in circumference between grass tufts and just above, and horizontal to, the ground. These webs are not obvious because they become coated by soil and plant debris. The larvae eat the base of the grass tufts and can do considerable damage. It appears to be a selective grazer, preferring *Themeda triandra* to the tougher fibred species of grass. The moth, which has a weak flight, is able to fly over and into short-grazed grass and the problem is therefore common in overgrazed veld.
The benchmark for BRG 12 to 15 is given below.

Benchmark for Moist Highland Sourveld

Groups and species	**Relative abundance (%)**	
Increaser I		
Alloteropsis semialata	2	
Eulalia villosa		1
Trachypogon spicatus	2	
Tristachya leucothrix	20	
Total		**25**
Decreaser		
Brachiaria serrata		1
Diheteropogon amplectens		1
Monocymbium ceresiiforme		2
Themeda triandra		45
Total		**49**
Increaser IIa		
Eragrostis capensis		1
Harpochloa falx		3
Heteropogon contortus		4
Total		**8**
Increaser IIb		
Eragrostis curvula		1
Eragrostis plana		1

Eragrostis racemosa	1	
Hyparrhenia hirta		1
Total		**4**
Increaser IIc		
Microchloa caffra		1
Forbs		5
Sedges		1
Total		**7**
Increaser III		
Diheteropogon filifolius		2
Elionurus muticus		5
Total		**7**
Grand total		**100**

14.3.4.4. WaterResources

This Broad Bioresource Group is generally rich in water resources. While the mean annual rainfall is in excess of 800 mm, there are numerous streams which rise in the area. Being to a large extent immediately below the Drakensberg mountain range or its foothills, streams and rivers rising in the mountains flow through this grassland. Suitable sites for farm dams are common and the subsoil building material on site is generally suitable. Sites for the planting of timber require particular attention because this area is a very important water source for the Province.

14.3.4.5. Soils

Soils are relatively deep, highly leached and strongly acid. On most slopes Glenrosa form is common. This form, with its topsoil overlying and intermingling with the under-lying weathering rock, usually has a shallow effective rooting depth. Fertility is low, but physical properties are favourable.

14.3.4.6. Land use, management and potential

Arability is reasonably high and 19.5% of the greater MHS is arable, while 9.9% of the area consists of high agricultural potential soils. The prevailing climatic conditions make the MHS difficult to farm. The dry, cold and frosty winters result in a short growing season and consequently winter feed has to be provided for domestic stock to cater for the deterioration in the quality of the veld in the winter. Hailstorms are a frequent occurrence in summer, jeopardising crop production. In addition to this, the soils are leached, requiring an expensive input of fertilizer. Despite these problems, this BRG is suited to intensive farming systems including beef, dairy, sheep, potatoes and maize. Certain areas, such as Kamberg, are intensively farmed, including crops and livestock, while in others, notably Underberg, dairy farming is important. Potatoes are grown in the Underberg and Kamberg areas. Timber plantations are increasing in the Underberg area. High quality pastures are important and an understanding of raising and maintaining soil fertility is essential. The veld, relative to other vegetation types, has always been considered to be in reasonable to good condition, but recent assessments of the grasslands have put this perception in doubt. The grazing season is curtailed by the long winter period, when winter feed in the form of pastures, hay or silage, is necessary. The supplementary feed requirements amount to 1 ton of dry matter per Animal Unit (AU) for the winter period. Beef ranching

is an important enterprise and an annual mass gain of 120 kg per AU is possible. Sheep farming is less important, with sheep numbers declining. For good veld management and animal performance, sheep should be grazed in conjunction with cattle and at a ratio of 1:1, that is, approximately one cattle unit to six sheep. The grazing capacity for veld in good to reasonable condition is 2.0 ha per AU and the length of the grazing season, which depends largely on the management of the veld, is approximately 250 days. Veld should be rested at least once every four years, but this depends on the management system applied and on the condition of the grassland which might indicate the need for more frequent rest. Should burning be followed by close and continuous grazing, particularly by sheep, it has been proved that the vigour of palatable species can be reduced by as much as 40% to 60% in a season. In this case, the veld should be rested in the following year to restore vigour.

Burning is necessary to remove moribund material which may accumulate. Most of the veld is burnt every year and this can be indicative of inefficient management of the veld. The recommended burning period is from the 1st of August to the 30th of September, but veld should be burnt as early as possible in this period and preferably soon after rain. Burning should be avoided once the palatable species have commenced growth as this has a deleterious effect on their vigour. It is important to recognise that grassland burnt every two years supports the greatest number and widest variety of wildlife. Grasslands that are totally protected from fire for three years or more are poorer in both numbers and diversity of wildlife.

If the intention is to burn to remove moribund material a low intensity fire should be applied. To achieve a low intensity fire the veld should be burnt when the air temperature is below 20^{o}C and the relative humidity is over 50%, and by burning with the wind (head fire). By burning early or late in the day these criteria may be met. If the burn is to be used to clear weeds such as aster *Felicia filifolia* or Currie's post weed *Phymaspermum acerosa*, it is necessary to apply a fire of greater intensity. The grassland should receive a season's rest to build up the fuel load and the conditions required for such a fire are an air temperature of over 25^{o}C and a relative humidity of less than 30%. The fire should be burnt with the wind. Avoid burning when the wind speed is 20 km/h or more (Winston Trollope, 2010).

The effects of burning and the patterns created on the abundance and locality of wildlife was shown in a study of francolin in the Drakensberg by Mentis & Bigalke (1979) and Mentis & Rowe-Rowe (1979). The birds avoided freshly burnt grassland where obviously cover is absent, but were most numerous on grasslands in the second and third year after burning. Their numbers then began to decline and in grass that had not been burnt for several years they were absent. This was partly because foraging for the underground part of plants in thick grassland was too difficult. Small mammals react in a similar manner. According to Little & Crowe (2000) redwing francolin are very sensitive to burning and where burning occurs more frequently than every two years, population collapses have been recorded. In many areas of this BRG the absence of redwing francolin is very apparent and their evocative calls are seldom heard. A high percentage of the grasslands of the Moist Highland Sourveld are burnt repeatedly year after year.

It is recommended that a flexible management system as advocated in the Venter-Drewes

management system is recommended, or the grassland management system (Camp & Wood, 2005) which meets the requirements of both domestic stock and wildlife. In the Venter-Drewes System a priority camp is grazed whenever there is sufficient material and the herd returns to it repeatedly throughout the season. In the second year this camp becomes second in priority and is only grazed when there is insufficient grazing material in the priority camp. In the third year it becomes a third priority camp and finally, in the fourth year, it is rested for the full season to re-establish vigour. Following the rest, the camp is burned in the spring and again becomes a priority camp. This system ensures that the animals, both domestic and wild ungulates, receive palatable and nutritious grazing throughout the season.

In the grazing management system described by Camp & Wood (2005), only the primary camps are fenced but three management areas within the primary camps are demarcated. The stocking rate applied must be at 70% of the estimated grazing capacity. Management Area 1 within a Primary Camp is burnt in year 1 and then non-selectively grazed for the season. In year 2 it is not burnt and becomes a secondary grazing area, in fact being selectively grazed as non-palatable species will generally be left ungrazed. In year 3 it is not grazed and in effect receives a whole grazing season's rest. This process is ideal for providing quality grazing and meets the requirements of most wild life species, particularly small mammals and game birds as well as oribi, in that the first season after burning provides a good grazing and foraging area while the third year, when the grassland rests, shelter and nesting sites are provided. An additional advantage is the very much reduced cost of fencing as well as reduced management requirements.

The wild herbivores that are found in the MHS are eland, common reedbuck, grey duiker, bushbuck, oribi, steenbok, blesbok, black wildebeest, grey rhebuck and mountain reedbuck. To encourage the presence of these animals it is necessary to plan for the habitats that meet their living requirements. "The wild ungulates of Natal", D T Rowe-Rowe (1994), provides all the information necessary on distribution and status, living requirements, social organisation and, population dynamics of the animals found in KwaZulu-Natal. These are summarised for the animals of this vegetation type.

Common reedbuck favour grassland areas where short, high quality grazing is found, but also need tall grass or reeds for cover to rest up, seek shelter from predators and for their young for the first few months after birth.

Grey duikers require a certain amount of woody vegetation for both cover and food. It has a wide range of fodder plants and survives almost anywhere. Bushbucks require forest, forest verges, or large patches of bush where they can shelter and, as browsers, find their food. The MHS consists mainly of open grassland and so the antelope will be found mainly in the thickets along river courses, or in the margins of forests on the south-facing slopes. The MHS is particularly suitable for oribi, particularly the flat to gentle slopes. Here they will feed on the short grass, particularly after a burn, and seek shelter in the longer grass areas.

Steenbok are very rarely encountered in the MHS, preferring drier areas, but have been seen west of Mooi River. They favour open grassland or lightly wooded grassland where it feeds very selectively

on grasses, forbs and shrubs. Blesbok, which it is believed were only originally found in East Griqualand and the northern areas of KZN, have been introduced into Kamberg Nature Reserve and many farms. They favour open grassland on flat to undulating terrain. They prefer short grass as followers of bulk grazers or after a burn.

It is believed that black wildebeest were found in the Mooi River district in early times and have been introduced to Kamberg Nature Reserve. They prefer the open woodland or grassland in the drier areas of South Africa. Grey rhebuck occur in mountainous terrain and are more likely to be found in the upper altitudinal limits of the MHS. Their preferred habitat is the grasslands of mountainous areas and they feed on the regrowth following a burn and need long grass for lying up. Mountain reedbuck habitat is the grassland of steep hill slopes. They are highly selective grazers, feeding on certain grass species, preferring the regrowth of burnt areas.

The area of this BRG group that has been statutorily protected is insufficient to conserve the biodiversity of such a large and important vegetation type. It is, therefore, imperative that private landowners participate in conservation programmes.

14.3.4.7. Conservation

BRG 8 is considered to be reasonably resilient to degradation. The soils are mainly well-drained red apedal soils which, because of the rainfall and deep drainage, are depleted of nutrients. Liming in conjunction with the necessary fertilizer application is necessary for good crops. Soils cultivated on steep slopes are vulnerable to erosion and effective erosion control measures are essential for sustainable farming. The grasslands are reasonably resilient but with overgrazing the palatable grass species give way to tough, pioneer species, generally referred to as mtshiki (*Eragrostis curvula, E. plana* and *Sporobolus africanus*) while selective overgrazing results in an increase in the tough wire grass species (*Elionurus muticus, Diheteropogon filifolius* and *Rendlia altera*).

14.3.5. **BRG Subgroup 8.2 Impendle**

14.3.5.1. Locality and description

This BRG includes the Impendhle highlands with Impendhle village situated in the central south-west. An extension, which crosses the Howick-Kokstad road to the north-east of Boston, includes Elandskop and ends at Cunningham's Castle near Byrne. It is a mountainous area lying mainly on the crests of the terrain.

BRUs included Yd18 Impendhle (portion)
Total area 46 409 ha
1 021 ha falls in Ward 39
Altitude range 1 206 m to 2 029 m
Terrain Broken, mountainous
Slope Steep/moderate
BRU potential classes

BRU	Climate	Soil	Land
Yd18	4	4	4

14.3.5.2. Climate

Mean annual rainfall range		995 mm	
Mean annual temperature		14.2°C	
Mean January maximum temperature		23.3°C	
Mean July minimum temperature range		2.3°C	
Frost Severity: Days of heavy frost			
Days	Days within	Period	% expectation
13	77	2nd half May to 1st half August	92%
Heat units base 4.4°C range (May to Sept)		1 027	
Heat units base 5°C range (Full year)		3 353	
Heat units base 10°C range (Oct to March)		1 222	
Mean annual Apan evaporation range		1 611 mm	

14.3.5.3. Vegetation

The dominant vegetation pattern of this BRG Subgroup is a grassland with smaller areas of bushed grassland. Throughout the Subgroup wattle scrub is a problem, particularly along watercourses, with *Acacia dealbata* the dominant species. The bushed grassland has *Leucosidea sericea* and *Buddleja salviifolia* forming this pattern. *Rubus cuneifolia* is an alien weed which grows along road verges and in thickets in the veld, and which poses a serious invader problem. On overgrazed sites near Impendle, *Phymaspermum acerosum*, or Curry's post weed, has formed fairly dense thickets. *Solanum mauritianum* is a problem alien weed particularly where timber has been planted.

14.3.5.4. Water Resources

Many minor rivers in this Subgroup assist to make this a well-watered area.

14.3.5.5. Soil Resources

Soils		**Area (ha)**	**% of Subgroup**
Arable area		162	15.9%
High potential soils		290	7.9%
Shallow soils		419	41%
Mottled, poorly-drained		347	34%
Moderate slopes, too rocky to cultivate		368	36%
Soil Groups			
A (humic topsoil)	27		2.7%
B (well-drained soils)		520	51%
E (Plinthic, poorly-drained)		7	0.7%
H (Young weathering subsoils)		253	25%
I (poorly-drained soils)		2	2.0%
K (organic soils)	51		0.5%
Sands <15% clay	8		0.08%
Fb erodibility rating		5.5 (limited)	
Soil forms and series found within the soil groups			

A Ia10, Kp10, Ma10, No10

B Bv16, Bv17, Cv16, Cv17, Cv18, Cv27, Gf11, Gf12, Gf13, Hu16, Hu17, Hu18, Oa16, Oa17, Oa37, Pn16, Pn17, Sd11, Sd12

C -

D -

E -

F -

G -

H Gs16, Gs19, Ms10

I Ka10

J -

K -

Dominant soil ecotopes

Ecotopes	Area (ha)	Percentage of Subgroup
B.2.1	97	9.5
B.2.2	49	4.8

14.3.5.6. Land use and potential

With the exception of portions in the Impendle and Elandskop districts, this Subgroup is farmed commercially. Beef production utilises most of the area, with dairy also playing an important role. In the east, near Boston and Byrne, timber production is increasing in extent.

The recommended crops and their potential production are listed in the crop production table below.

14.3.5.7. Crop production potential

Comparison of yields for this BRU for various crops in tons per ha per annum.
Management is taken as 70% of best management for commercial farms.

BRU	Maize (dryland)				Maize (irrigated)			
	Av. Yield	Max yield	Min yield	% of BRU	Av. yield	Max yield	Min yield	% of BRU
BRU Yd18	5.1	6.3	4.2	21%	6.1	6.1	6.1	21%
	Dry bean				Carrot			
	1.3	1.6	1.1	21%	44.5	49.3	34.5	20%
	Potatoes dryland				Potatoes irrigated			
	33.6	39.5	30.5	21%	37.7	44.8	32.6	21%
	Soyabeans (dryland)				Soya beans (irrigated)			
	2.8	3.4	2.3	21%	3.5	4.0	3.0	21%
	Cabbage (March)				Tomato (October)			
	Oct 78.3	89.7	69.4	20%	Oct 58.0	68.3	49.7	20%
	Kikuyu				Italian ryegrass (March)			
	9.4	11.5	6.2	50%	9.5	9.5	9.5	20%
	Tall fescue (dryland)				Tall Fescue (irrigated)			
	6.9	7.7	5.7	21%	8.3	9.3	6.5	20%
	Pinus taeda				*Pinus patula*			
	15.6	17.0	11.9	30%	15.8	18.0	10.8	46%

14.3.6. **BRG 11: Southern Moist Upland Grassland**

14.3.6.1. Locality and Description

BRG 11 Southern Moist Upland Grassland is a transitional zone which generally lies below BRG 8 Moist Highland Sourveld and BRG 5 Moist Midlands Mistbelt except where the boundary lies on the escarpment and then the adjacent BRGs are BRG 17 Eastern Valley Bushveld and BRG 12 Southern Tall Grassveld. BRG 11 is 172 025 ha in extent and the altitude range is approximately 608 m to 1 813 m above sea level. Geographically the Southern Moist Grassland extends from the upper reaches of the Mkhomazi and Pholela rivers lying adjacent to the Moist Highland Sourveld and BRG 10 Southern Drakensberg Grasslands respectively, down the Mkhomazi River Valley to Deepdale. From this point it extends along the watershed between the Mkhomazi River and Mzimkhulu River valleys as far south as Lufafa Road. From Donnybrook there is an extension that runs north of the Creighton basin (BRG 12 Southern Tall Grassveld) and then up the Mzimkhulu River and Pholela River valleys. New Subgroups have been mapped in the Umzimkulu district. The terrain varies from undulating to very steep valleys leading down to the Mkhomazi and Mzimkhulu rivers.

14.3.6.2. Climate

The average mean annual rainfall ranges from 797 mm to 1 117 mm. In the southern area near Donnybrook there is an average of 126 raindays per year recorded, with 4 raindays in June and July. Mists occur frequently in the spring and early summer and along the watershed from Lufafa Road to Donnybrook, dense mists are a common feature. The mean annual temperature range is from 14.6°C to 17.1°C, while the mean maximum January temperature ranges from 24.8°C to 26.8°C. The July mean minimum temperature ranges from -0.1°C to 4.7°C and frosts are moderate, with the occasional severe frost. The mean annual evaporation range is from 1 457 mm to 1 692 mm.

14.3.6.3. Vegetation

The most extensive plant association in the Southern Moist Upland Grassland is a *Themeda-Hyparrhenia* grassland with *Hyparrhenia hirta* dominating much of the veld, particularly disturbed veld. Where selective overgrazing has occurred, and particularly by sheep in the past, *Elionurus muticus* has increased in relative abundance and in the southern borders *Aristida junciformis* has invaded from the adjacent BRG 5 Moist Midlands Mistbelt. On leached soils, particularly on south facing aspects, taller, sour grasses *(Dobho)* which includes *Cymbopogon excavatus,* are found and the palatability of these areas is low. In the latter areas and disturbed areas there is a richness in forbs. This is also found on areas that have not been grazed such as the railway line reserves where an abundance of forbs (wild flowers) are found. Forests occur on some moist southerly westerly slopes. These include the forest on Lundy's Hill, the Nxumeni Forest near Donnybrook and the Hlabeni and Ngongoni forests northwest of Creighton. Several forests are found in the Umzimkhulu district including the Tuduma Forest.

Benchmark table for the grasslands of the Southern Moist Grassland.

Group and species	**Relative abundance (%)**
Increaser I	
Cymbopogon excavatus	1

Cymbopogon validus	-	
Digitaria tricholaenoides		1
Eulalia villosa		-
Setaria nigrirostris		2
Trachypogon spicatus	2	
Tristachya leucothrix	19	
Total		**25**
Decreaser		
Andropogon appendiculatus		-
Brachiaria serrata		1
Diheteropogon amplectens		2
Melinis nerviglumis		1
Monocymbium ceresiiforme		-
Themeda triandra		48
Total		**52**
Increaser IIa		
Eragrostis capensis		2
Harpochloa falx		-
Heteropogon contortus		4
Total		**6**
Increaser IIb		
Eragrostis curvula		1
Eragrostis plana		1
Eragrostis racemosa	2	
Hyparrhenia hirta		1
Setaria sphacelata var. torta		2
Sporobolus africanus	-	
Total		**7**
Increaser IIc		
Cynodon dactylon		-
Microchloa caffra		1
Paspalum scrobiculatum		-
Forbs		5
Sedges		2
Total		**8**
Increaser III		
Elionurus muticus		1
Diheteropogon filifolius		1
Rendlia altera		-
Total		**2**
Grand total		**100**

14.3.6.4. Water Resources

This is a well-watered area with streams rising in, or flowing through it. Being close to the headquarters of catchments, streams have limited supply and dams need to be constructed to hold sufficient water for irrigation purposes. It is a very important source of water and the conservation of this resource requires the highest priority.

14.3.6.5. Land use potential

This agricultural potential varies according to the terrain. It is particularly high on moderate to gentle slopes, but difficult to manage, particularly from a soil conservation point of view on steep slopes. Despite this it has a climate that favours a wide range of agricultural crops and enterprises and has a

reasonably high percentage of arable land at 18% of the BRG. High potential soils cover 9.5% of the BRG. It is an important maize and timber production area, while dairy and beef are important farming enterprises.

The current grazing capacity is 2.2 ha per AU and a grazing season of 250 days during which the veld can support domestic animals. The length of the grazing season can vary according to the management applied. A minimum seasonal rest should be given to veld every fourth year and burning is necessary to prevent the veld becoming moribund. The recommended burning season is from the 1st of August to the 30th of September. Burning should preferably be carried out before growth commences, that is, as early as possible during this period and preferably as soon after rain has fallen as possible.

Siddons & Clemence (1985) studied the pattern of predominantly daily wind directions and peaks at Cedara during the burning season of July to October. They found that the wind behaviour pattern varied according to wind direction. North and north-westerly winds, defined as the warmer, drier group, are predominant in the early part of the day, decreasing as the proportion of moister winds from the south and south-east increase. This pattern is similar throughout the midlands of KwaZulu-Natal. The proportion of each wind group varies monthly as indicated in Figure 115.

Figure 115: Predominant daily wind directions at Cedara 1983/1984

	July	**August**	**September**	**October**
Wind direction				
North/North-west				
Peak hour*	11h30	10h45	07h45	09h30
Percentage occurrence**	40%	36%	55%	55%
Duration (time)***	09h30-14h30	09h30-12h30	06h30-17h00	06h30-11h45
South/South-east				
Peak hour*	18h00	19h30	18h45	18h15
Percentage occurrence**	68%	85%	78%	88%
Duration (time)***	10h30-19h45	09h33-19h30	10h45-19h45	06h30-19h15

* "Peak hour" refers to the average time of the day when the particular wind blows at its peak velocity.

** "Percentage occurrence" refers to the average percentage of occurrence of the wind direction.

*** "Duration" indicates the average duration in time that the wind blows per day.

These figures give a good indication of the month and time of day to burn.

A flexible grazing management system is preferable as advocated in the Venter-Drewes system. In this system a priority camp is grazed whenever there is sufficient material and the herd returns to it repeatedly throughout the season. In the second year this camp becomes second in priority and is only grazed when there is insufficient grazing material in the priority camp. In the third year it becomes a third priority camp and finally, in the fourth year, it is rested for the full season to re-establish vigour. Following the rest, the camp is burned in the spring and again becomes a priority camp. This system works well in a veld type which loses palatability early in the season. The repeated grazing of new grass maintains palatability and the nutritious value of the grass for a longer period. This system meets the habitat and feeding requirements of many species of wildlife, with fresh grazing, mixed cover and rest areas providing shelter.

Game species suited to the area are zebra, bushpig, hartebeest, Grey duiker, oribi, bushbuck, reedbuck and mountain reedbuck.

14.3.6.6. Conservation

The vegetation type is rated by Mucina & Rutherford (2006) as vulnerable and with a conservation target of 23%. The area has been extensively transformed by conversion from grassland to timber plantations and by the cultivation of land for pasture and crop production.

14.3.7. **BRG Subgroup 11.1a &b Hlanganani**

14.3.7.1. Locality and Description

This large Subgroup extends from the upper reaches of the Mkhomazi and Pholela rivers where it lies adjacent to the Moist Highland Sourveld and Drakensberg Grasslands respectively, and then down the Mkhomazi River valley to Deepdale. From this area it extends along the watershed between the Mkhomazi River and the Mzimkhulu River as far south as Lufafa Road. From Donnybrook there is a westward extension that runs north of the Creighton basin and then up the Mzimkhulu River and Pholela River valleys. Two Subgroups are found, one south of the Creighton basin and overlooking the Mzimkhulu River valley, and the other in the east overlooking the Mkhomazi River valley. This existing BRG outline was generally retained by Mucina & Rutherford (2006) but renamed.

BRUs included **Subgroup 11.1a**
Wc27a Nkumba (15 347 ha)
4 243 ha falls in Ward 39
Yc13 Lundy's Hill (17 995 ha)
2 335 ha falls in Ward 39

Total area 6 578 ha
Altitude range 608 m to 1 663 m
Terrain Mainly rolling with areas of broken terrain
Slope Mainly steep and moderate

BRU potential classes

BRUs	Climate	Soil	Land
Wc27a	3	3	3
Yc13	4	4	4

14.3.7.2. Climate

In the area near Donnybrook, there is an average of 126 raindays per year recorded, with 4 raindays in June and July.

Mean annual rainfall range	805 mm to 1 117 mm
Mean annual temperature range	14.8°C to 16.7°C
Mean January maximum temperature range	24.8°C to 26.8°C
Mean July minimum temperature range	0.7°C to 4.7°C

Frost Severity: Days of heavy frost	Occasional severe frost, particularly in valleys. Days of heavy frost vary widely within the Subgroup from as few as 4 days in BRU Wc27 to as many as 38 days in Yc12. Most start occurring from the 1st half of May to the 1st half of June, and finish from the 2nd half of July to the 1st half of August.
Heat units base 4.4°C (May to Sept) range	1 040 to 1 525
Heat units base 5°C (Full year) range	3 558 to 4 485
Heat units base 10°C (Oct to March) range	1 404 to 1 787
Apan annual evaporation	1 557 mm to 1 692 mm

14.3.7.3. Vegetation

The dominant veld pattern is a *Themeda-Hyparrhenia* grassland. Forests occur on some moist southerly westerly slopes. These include the forest on Lundy's Hill, the Nxumeni Forest near Donnybrook and the Hlabeni and iNgongoni forests northwest of Creighton. Areas of bushed grassland are common, formed by *Searsia* spp., *Leucosidea sericea* and *Buddleja salviifolia* grow on moist aspects where they receive some protection from fire, with *Pteridium aquilinum* (bracken) common on the verges of bush clumps. Problem alien plants are *Acacia dealbata* and *A. mearnsii*, mainly along watercourses, and *Solanum mauritianum* and *Rubus cuneifolia* on disturbed areas, around lands, along roads and in timber plantations.

14.3.7.4. Water Resources

This Subgroup has an abundant supply of water. Many strong streams and rivers rise in the area, or are supplied by strong sources near the head of the river. These include the Lotheni, Mkhomazi, Pholela, Mzimkhulu and Ngwangwane rivers. Being an important catchment area water conservation requires particular attention in land use planning.

14.3.7.5. Soil Resources

Soils		**Area (ha)**	**% of Subgroup**
Arable area		1 125	17.1%
High potential soils		585	8.9%
Shallow soils		2 829	43%
Mottled, poorly-drained		3 092	47%
Moderate slopes, too rocky to cultivate		1 908	29%
Soil Groups			
A (humic topsoil)	13		0.2%
B (well-drained soils)		3 286	50%
C (Alluvial soils)		53	0.8%
D (Plinthic, moderately-drained)		46	0.07%
E (Plinthic, poorly-drained)		329	5.0%

F (Black clays)	59	0.9%
H (Young weathering subsoils)	1 645	25%
I (poorly-drained soils)	210	3.2%
J (duplex soils)	263	4.0%

Fb erodibility rating	Generally 5.1 to 6.1 (limited risk) with smaller areas of 4.3 to 4.8 (high risk)

Soil forms and series found within the soil groups

A	Ia11, Kp11, Ma11
B	Cv16, Cv17, Cv18, Cv26, Cv27, Cv18, Cv27, Cv28, Cv37, Cv38, Gf11, Gf12, Gf13, Gf22, Hu16, Hu17, Hu18, Hu26, Hu27, Hu28, Oa16, Oa17, Oa36, Oa37, Pn26, Sd10, Sd11, Sd12, Sd20, Sd21
C	Du10
D	Av16, Av17, Pn16, Pn17,
E	Cf11, Cf12, Cf13, Cf22, Lo12, Lo13, Lo22, Wa12, Wa13, Wa22, We12, We13, We22, We32
F	Ar30, Bo10, Bo11, Mw11, My11
G	-
H	Gs13, Gs16, Gs17, Gs19, Ms10, Ms11
I	Ka10, Kd10, Kd13, Kd14, Kd16, Kd17, Kd19
J	Es13, Es16, Es17, Es36, Ss26, Ss27, Sw11, Sw12, Sw22, Sw30, Sw31, Sw32, Sw41, Sw42, Va12, Va30, Va31, Va32, Va41, Va42
K	-

Dominant soil ecotopes

Ecotope	Area (ha)	Percentage of Subgroup
B.1.1	592	9.0
B.1.2	210	3.2
B.2.1	704	10.7
B.2.2	322	4.9

14.3.7.6. Land Use Potential

This Subgroup is farmed both commercially (58.6%) and communally (35.5%). Most of the Subgroup (67%) has a C4 climate class which means that it has a moderately restricted growing season due to low temperatures and frost. The remaining 33% has a C3 climate class meaning that it has a slightly restricted growing season because of low temperatures and frost which shortens the growing season. Good yields can be expected for a moderate range of adapted crops. In the arable areas which make up 17% of the total area of the Subgroup crop production of maize, for example, can be high.

The most important lines of land use are beef, dairy, maize and timber production. The area under timber increased considerably during the 1970s.

14.3.7.7. Crop Production Potential

The table below presents a comparison of yields per BRU for various crops in tons per ha per annum for BRUs in the Subgroup. These yields are estimated at a management level of 70% of the potential management level.

BRU	Maize (dryland)				Maize (irrigated)			
	Av. Yield	Max yield	Min yield	% of BRU	Av. yield	Max yield	Min yield	% of BRU
Wc27	5.5	6.3	4.0	19%	8.0	8.0	8.0	18%
Yc13	6.0	7.5	4.4	10%	7.7	7.7	7.7	10%
	Dry beans				Potatoes (September - irrigated)			
Wc27	1.4	1.6	1.0	19%	37.7	40.2	32.2	17%
Yc13	1.5	1.9	1.1	10%	26.9	31.4	22.9	10%
	Soya beans (dryland)				Italian ryegrass (March)			
Wc27	2.5	2.8	1.8	18%	9.2	9.2	9.2	18%
Yc13	2.8	3.5	2.1	10%	9.0	9.0	9.0	10%
	Cabbage (April)				Tomato (October)			
Wc27	69.0	71.4	60.7	17%	82.5	87.6	70.0	17%
Yc13	59.3	67.6	52.2	10%	73.5	86.1	62.6	10%
	Smuts Finger grass				Kikuyu			
Wc27	9.4	10.2	6.1	24%	10.5	12.7	6.9	45%
Yc13	10.0	12.2	6.6	16%	10.5	12.7	6.9	44%
	Pinus patula				*Pinus taeda*			
Yc13	16.5	19.1	11.4	37%	16.5	18.1	12.7	22%

14.3.8. BRG 17: COAST HINTERLAND THORNVELD

14.3.8.1. Locality and description

The Coast Hinterland Thornveld occurs in all the major river valleys between the Thukela River and the Mzimkhulu River and is 113 378 ha in extent. It is similar to the Mixed Thornveld in that it is found at the upper margins of river valleys mainly in the lowland areas. It is a secondary veld, dominated by *Acacia* species, which have expanded from the valley vegetation into the grassland areas. In the case of the grasslands of the Coast Hinterland Thornveld, it is very similar to that of Dry Ngongoni Veld, particularly at its upper margins.

14.3.8.2. Conservation Status

This vegetation type is rated as vulnerable with a target of 25% and there is no statutorily conserved area according to Mucina & Rutherford (2006), although Bisley Nature Reserve near Pietermaritzburg does lie in the CHT. Approximately 22% has been transformed by cultivation and urban spread.

14.3.8.3. Climate

The mean annual rainfall ranges from 646 mm to 825 mm. Two stations, Double Diamond in Tala Valley, and Ukulinga, the University Research Farm, average 680 mm from 106 raindays. Winter rainfall amounts to 23% of the total annual rainfall, with four raindays in June and July, the mid-winter months. The mean annual temperature range for BRG 29 is from 16.8°C to 19.0°C. Summers are warm

to hot and winters mild. Moderate frosts are experienced occasionally with severe frost rare. The range in the mean annual evaporation for this BRG is from 1 606 mm to 1 725 mm.

14.3.8.4. Vegetation

The Coast Hinterland Thornveld is a secondary veld which, before major disturbance occurred, is likely to have varied from an *Acacia* wooded grassland to woodland. Aerial photos taken in 1946 show open grassland where today *Acacia* woodlands and thickets occur. The dominant vegetation patterns now are wooded grassland, woodland, bushed grassland and bushland thicket. The original woodland was dominated by *Acacia sieberiana,* but much of it has been encroached by species such as *Acacia karroo, A. nilotica, Ziziphus mucronata, Maytenus heterophylla, Brachylaena elliptica, Erythrina latissima, Cussonia spicata, Aloe ferox, Euphorbia ingens, Searsia pentheri, Grewia occidentalis* and *Ehretia rigida*. The Coast Hinterland Thornveld can be distinguished from the Thukela Thornveld by its floristic richness, which includes many coast species, and by its scrub and bush clump character. The major cause of this difference is due to climate; rainfall in the Coast Hinterland Thornveld has a wider distribution through the year and frosts are lighter, moderate to severe frost being rare and localised. The Coast Hinterland Thornveld and the Thukela Thornveld meet in the area of The Kop, near Kranskop, which lies above the Thukela River.

Shrubs up to 1.5 m form dense thickets in some areas and these include *Coddia rudis, Asparagus* spp., *Lantana rugosa* and at lower altitudes *Diospyros dichrophylla.* Problem plants, which form dense stands, include *Lippia javanica, Dichrostachys cinerea* and the alien weeds *Lantana camara and Solanum mauritianum. Lantana camara,* in particular, is a major problem, forming thickets which are difficult to eradicate. In addition, it is a poisonous plant and causes stock losses.

Faurea saligna woodlands occur in isolated areas on Natal Group Sandstones (Table Mountain Sandstone) and usually on south-facing slopes, where summer conditions are cooler and conditions moister. Trees associated with this woodland, and usually found on the margins, are *Acacia caffra, Combretum molle, Dombeya rotundifolia* and *Cussonia spicata.* Initially the grassland would have been dominated by *Themeda triandra,* but this species is now low in relative abundance and the dominant grass is the unpalatable *Aristida junciformis.* The drastic deterioration in the quality of the veld has resulted from the common practice of burning throughout the year to promote a flush of fresh growth, followed by selective overgrazing. This thornveld is, however, less invasive into the grasslands than Thukela Thornveld. This may be because of the intensity of grass and scrub competition and because the dominant *Aristida junciformis,* being less palatable, is seldom grazed short and supplies a better fuel load for winter fires. In veld in reasonable condition, common species are *Themeda triandra, Heteropogon contortus* and *Tristachya leucothrix.* On heavy soils and black clays *Bothriochloa insculpta* and *Setaria incrassata* occur, while on shallow soil and on heavily grazed areas, *Eragrostis capensis, E. chloromelas, E. curvula, E. superba, E. racemosa, Sporobolus pyramidalis* and *S. fimbriatus* occur. With prolonged overgrazing, these species give way to *Aristida junciformis. Perotis patens* and *Trichoneura grandiglumis* grow on sandy soils. On shallow stony soil, *Aristida barbicollis, Melinis repens, M. nerviglumis* and *Tragus berteronianus* provide a poor cover. With severe overgrazing and trampling, *Eragrostis plana* and *Cynodon dactylon* increase in relative abundance. In

shaded areas *Panicum maximum* is an important grass, providing grazing value to areas which are frequently poorly covered. *Chloris gayana* and *Digitaria eriantha* become dominant on disturbed areas which are subsequently little utilised.

Benchmark for BRG 17 Coast Hinterland Thornveld

Categories and species	**Relative abundance (%)**
Increaser I	
Bothriochloa bladhii	1
Cymbopogon excavatus	1
Cymbopogon plurinodis	-
Hyparrhenia filipendula	1
Tristachya leucothrix	8
Total	**11**
Decreaser	
Brachiaria serrata	2
Digitaria eriantha	3
Melinis nerviglumis	1
Themeda triandra	44
Total	**50**
Increaser IIa	
Eragrostis capensis	3
Heteropogon contortus	4
Total	**7**
Increaser IIb	
Bothriochloa insculpta	2
Eragrostis chloromelas	2
Eragrostis curvula	1
Eragrostis plana	-
Eragrostis racemosa	3
Eragrostis superba	1
Hyparrhenia hirta	6
Sporobolus africanus	1
Sporobolus fimbriatus	2
Sporobolus pyramidalis	1
Total	**19**
Increaser IIc	
Aristida barbicollis	1
Aristida congesta	-
Cynodon dactylon	-
Melinis repens	-
Perotis patens	1
Tragus berteronianus	-
Forbs	5
Sedges	4
Total	**11**
Increaser III	
Aristida junciformis	2
Total	**2**
Grand total	**100**

14.3.8.5. Water Resources

This BRG has a poor supply of water. Some localised areas are situated close to streams or rivers, which supply adequate water for domestic and stock watering purposes, but little suitable soil exists close to water for irrigation farming purposes.

14.3.8.6. Land Use Potential

The area is generally of a rugged nature, and only 13.5% of the total area is arable. High potential soils make up 5% of the BRG. Where both soil and water are suitable, the potential exists for the production of sugar cane, maize and vegetables, while in the lower valleys subtropical fruit is grown. Many areas are close to markets which raises the potential. Valley bottoms experience frost and care must be taken in these areas to select suitable crops which are frost resistant. The quality of the veld is poor and the grazing capacity is, at best, 3.5 ha per AU. The bush encroachment problem reduces grass production, but does offer the alternative of farming goats. Management of these animals must be efficient to ensure success and to prevent a further deterioration of the veld. Theft has been a major deterrent to prospective goat farmers. Game animals found in isolated areas of this BRG include kudu, grey duiker, bushbuck, zebra, nyala, bushpig, warthog, impala and eland.

The grazing capacity on grassland in reasonable condition is 3.5 ha per AU with 28.0 grazing days per ha per cycle and 123 grazing days per season, which extends over 275 days. The recommended veld management system, based on a four camp rotational grazing system, is a period of stay of 21 days per camp and a period of absence of 42 days, in a grazing cycle of 63 days. This veld requires a full season's rest at least every four years if the veld is being correctly stocked and managed, and more frequently with poor management, or if the veld is in poor condition. To retain or improve the quality of grazing, it is essential to improve or maintain the vigour of the palatable species. Fire plays an important role, mainly in assisting with the control of invading woody species. The recommended burning period is from the 15th of July to the 30th of September. Burning should take place as soon as possible during this period, and should be done as soon as possible after rain. The grazing of regrowth after burning should only occur once the leaves have reached a height of 100 mm.

If the intention is to burn to remove moribund material a low intensity fire should be applied. To achieve this the veld should be burnt when the air temperature is below 20^{o}C and the relative humidity is over 50%, and by burning with the wind (head fire). By burning early or late in the day these criteria may be met. If the burn is to be used to clear weeds or to control encroaching *Acacia* species, it is necessary to apply a fire of greater intensity. The grassland should receive a season's rest to build up the fuel load and the conditions required for such a fire are an air temperature of over 25^{o}C and a relative humidity of less than 30%. The fire should be burnt with the wind. Avoid burning when the wind speed is 20 km/h or more (Winston Trollope, 2010).

14.3.9. **BRG Subgroup 17.8 Deepdale**

14.3.9.1. Locality and Description

Deepdale lies in the Mkhomazi River valley south of the Howick-Underberg road. Deepdale railway siding, on the line from Pietermaritzburg to Underberg, is situated in the Subgroup. This is a high altitude Subgroup of BRG 29 which is surrounded by Moist Upland Grassland and graduates into Eastern Valley Bushveld at its lowest point in the valley.

BRUs included	VWb1 Deepdale (1 781 ha)
Total area in Ward 39	364 ha
Altitude range	720 m to 1 008 m
Terrain	Valley, broken
Slope	Steep/-/moderate

BRU potential classes

BRU	Climate	Soil	Land
VWb1	3	4	3

14.3.9.2. Climate

Mean annual rainfall	825 mm
Mean annual temperature	17.3°C
Mean January maximum temperature	27.0°C
Mean July minimum temperature	4.5°C
Incidence of frost	Occasional severe frost
Frost Severity: Days of heavy frost	6 days within 47 days, 90% expectation
Heat units base 4.4°C (May to Sept)	1 457
Heat units base 5.0°C (all year)	4 487
Heat units base 10°C (Oct to Mar)	1 829
Mean annual Apan evaporation	1 721 mm

14.3.9.3. Vegetation

This is an area of bushed grassland, with small areas of bushland. The main indicator species are *Hyparrhenia hirta* and *Acacia natalitia.*

14.3.9.4. Water Resources

The Subgroup is centred on the Mkhomazi River and the Elands River joins the Mkhomazi River in the Subgroup. Water supplies are good.

14.3.9.5. Soil Resources

Soils	**Area (ha)**	**% of Subgroup**

	Arable area	66	18%
	High potential soils	44	12%
	Soil Groups		
	B (well-drained soils)	193	53%
	C (Alluvial soils)	2	0.6%
	E (Plinthic, poorly-drained)	4	1.1%
	H (Young weathering subsoils)	124	34%
	I (poorly-drained soils)	14	3.9%
	J (duplex soils)	9	2.5%

Fb erodibility rating 5.0 (limited risk)

Soil forms and series found within the soil groups

B	CV16, Cv28, Gf11, Hu16, Hu26, Hu27, Hu28, Oa16, Oa36, Sd12
E	Cf12, Lo12, Wa12, We12
H	Gs19, Ms10
I	Ka10, Kd16
J	Es16, Es36, Sw30, Va30, Va31

Dominant soil ecotopes

Ecotope	Area (ha)	Percentage of Subgroup
B.1.1	15	4.0
B.2.1	63	17.2
B.2.2	31	8.6

14.3.9.6. Land use and potential

A potential for irrigation exists in the upper reaches of the Subgroup where moderately sloped lands are situated next to the Mkhomazi River in this communally farmed area. The lower portions of the Subgroup are mainly steep and rugged, suited only for cattle and goat production.

BRU VWb1	Maize (dryland)				Maize (irrigated)			
	Av. Yield	Max yield	Min yield	% of BRU	Av. yield	Max yield	Min yield	% of BRU
	5.0	5.5	3.5	18%	8.3	8.3	8.3	18%
	Cabbage (May)				Dry bean			
	67.9	70.3	59.8	18%	1.2	1.4	0.9	18%
	Potato (Sept -irrig)				Soyabean (irrigated)			
	37.0	39.6	31.7	18%	4.0	4.1	3.4	18%
	Wattle (timber)				Wattle (bark)			
	9.6	10.0	8.6	49%	2.1	2.2	1.9	49%
	Tomato (Oct. Irrigated)				Italian Ryegrass (March - irrigated)			
	81.8	86.4	69.1	18%	9.2	9.2	9.2	18%
	Carrot (Sept)				Lucerne (irrigated)			
	49.9	53.6	37.5	18%	10.3	10.3	10.3	13%
	Oats (dryland)				Oats (irrigated)			
	4.3	4.4	3.8	18%	7.0	7.2	6.1	18%

14.3.9.7. Crop production potential

Yields for BRU VWb1 for various crops are given in tons per ha per annum.
A management level of 70% of the optimum management level was used to determine production.

The recommended crops and their potential production are listed in the crop production table below.

14.4. Summary of Natural Resources

14.4.1. Summary of Climate Ranges and Total Areas

Total area	13 485 ha	
Arable area	2 800 ha	21%
High potential	1 618 ha	12%
Mean annual rainfall	825 mm – 1 117 mm	
Mean annual temperature	14.2°C – 17.3°C	
Apan evaporation	1 557 mm – 1 721 mm	

14.4.2. Potential

	Climate	Soil	Land
Xc14	3	3	3
Yc14	3	2	2
Yd18	4	4	4
Wc27	3	3	3
Yc13	4	4	4
VWb1	3	4	3

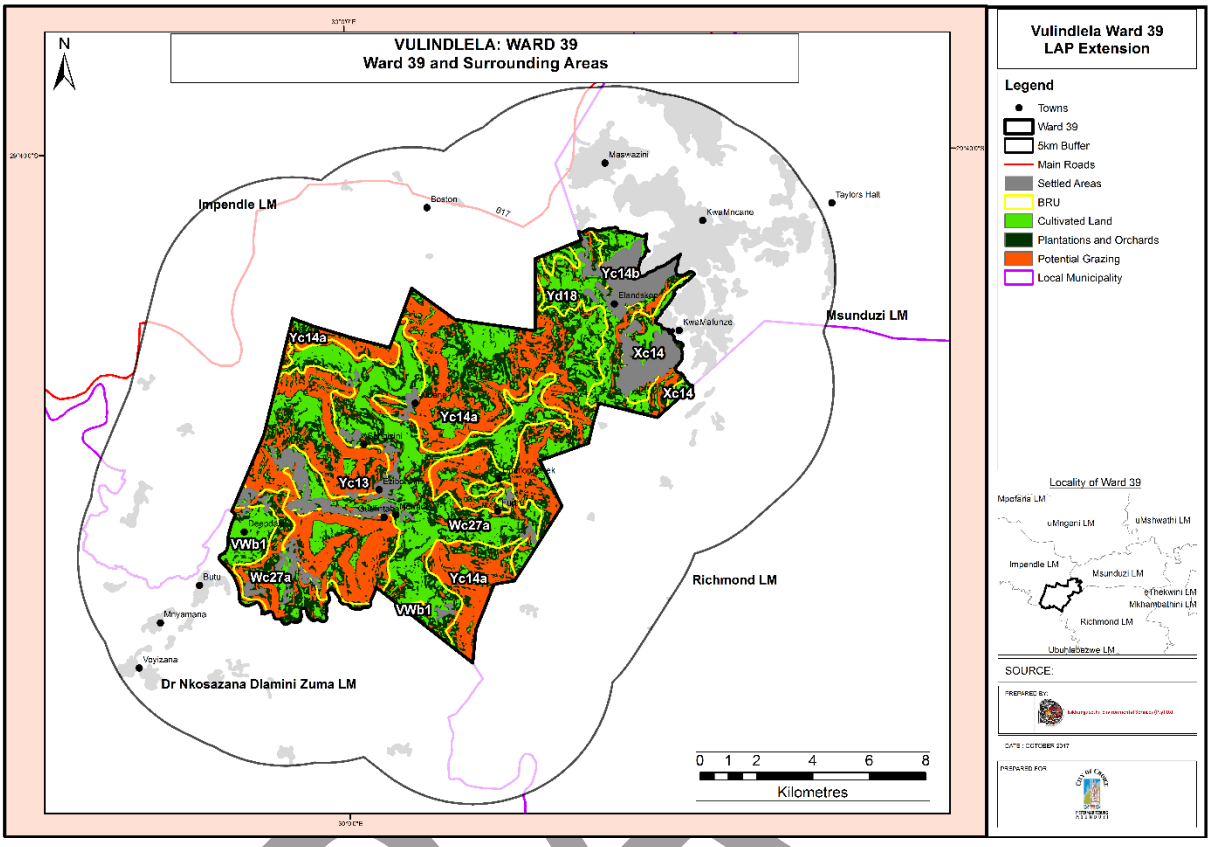
14.4.3. Crop Production Potential

BRU	**Maize** (dryland)				**Maize** (irrigated)			
	Av. Yield	Max yield	Min yield	% of BRU	Av. yield	Max yield	Min yield	% of BRU
Xc14	5.8	6.2	3.9	24%	6.9	6.9	6.9	24%
Yc14	5.8	6.3	4.6	26%	6.6	6.6	6.6	26%
Yd18	5.1	6.3	4.2	21%	6.1	6.1	6.1	21%
Wc27	5.5	6.3	4.0	19%	8.0	8.0	8.0	18%
Yc13	6.0	7.5	4.4	10%	7.7	7.7	7.7	10%
VWb1	5.0	5.5	3.5	18%	8.3	8.3	8.3	18%
	Dry beans							
Xc14	1.5	1.5	1.0	24%				
Yc14	1.5	1.6	1.1	26%				
Yd18	1.3	1.6	1.1	21%				
Wc27	1.4	1.6	1.0	19%	37.7	40.2	32.2	17%
Yc13	1.5	1.9	1.1	10%	26.9	31.4	22.9	10%
VWb1	1.2	1.4	0.9	18%				
	Potatoes (Dryland)				**Potatoes** (irrigated)			

Xc14					34.8	39.1	33.3	24%
Yc14					36.0	40.0	32.0	26%
Yd18	33.6	39.5	30.5	21%				
Wc27					37.7	40.2	32.2	17%
Yc13					26.9	31.4	22.9	10%
VWb1					37.0	39.6	31.7	18%
	Soya beans (dryland)							
Xc14	2.9	3.1	2.0	24%	3.7	3.8	3.5	24%
Yc14	3.0	3.2	2.4	26%	3.6	3.8	3.1	26%
Yd18	2.8	3.4	2.3	21%	3.5	4.0	3.0	21%
Wc27	2.5	2.8	1.8	18%	9.2	9.2	9.2	18%
Yc13	2.8	3.5	2.1	10%	9.0	9.0	9.0	10%
	Cabbage (April)				**Tomato** (October)			
Xc14	Oct 78.7	84.2	75.8	24%	61.6	67.8	57.6	24%
Yc14	Oct 78.1	83.0	70.5	26%	60.3	65.8	52.7	26%
Yd18	Oct 78.3	89.7	69.4	20%	Oct 58.0	68.3	49.7	20%
Wc27	69.0	71.4	60.7	17%	82.5	87.6	70.0	17%
Yc13	59.3	67.6	52.2	10%	73.5	86.1	62.6	10%
VWb1	67.9	70.3	59.8	18%	81.8	86.4	69.1	18%
	Smuts Finger grass				**Kikuyu**			
Xc14	9.4	10.2	6.1	24%	10.5	12.7	6.9	45%
Yc14	10.0	12.2	6.6	16%	10.5	12.7	6.9	44%
Yd18					9.4	11.5	6.2	50%
Wc27	9.4	10.2	6.1	24%	10.5	12.7	6.9	45%
Yc13	10.0	12.2	6.6	16%	10.5	12.7	6.9	44%
	Pinus patula				***Pinus taeda***			
Yc14	17.0	18.5	12.9	60%	16.5	17.5	14.0	51%
Yd18	15.8	18.0	10.8	46%	15.6	17.0	11.9	30%
Wc27								
Yc13	16.5	19.1	11.4	37%	16.5	18.1	12.7	22%
	Pinus elliotti							
Xc14	13.6	14.5	11.6	69%				
Yc14	13.6	14.8	8.9	63%				

It should be noted that owing to topography, soils and local climatic variation, areas suited to different forms of agriculture vary at a local level. Hence, in order to identify local areas suited for cultivation of specific crops a local area investigation is required. In order to narrow down areas which could be used for different forms of agricultural production, a slope analysis has been undertaken for Ward 39. This includes areas under 12% slope suited for cultivation of crops listed in the cropping tables in the various BRUs. Slope breaks 13-24% are best suited for plantation crops and slope in excess of 25% are best suited for grazing. Figure 116 illustrates areas that have been identified using slope analysis as having cultivation potential. Field investigations of soils are needed to establish the suitability for crops and management requirements.

Figure 116. Agricultural Potential Analysis according to slope categories



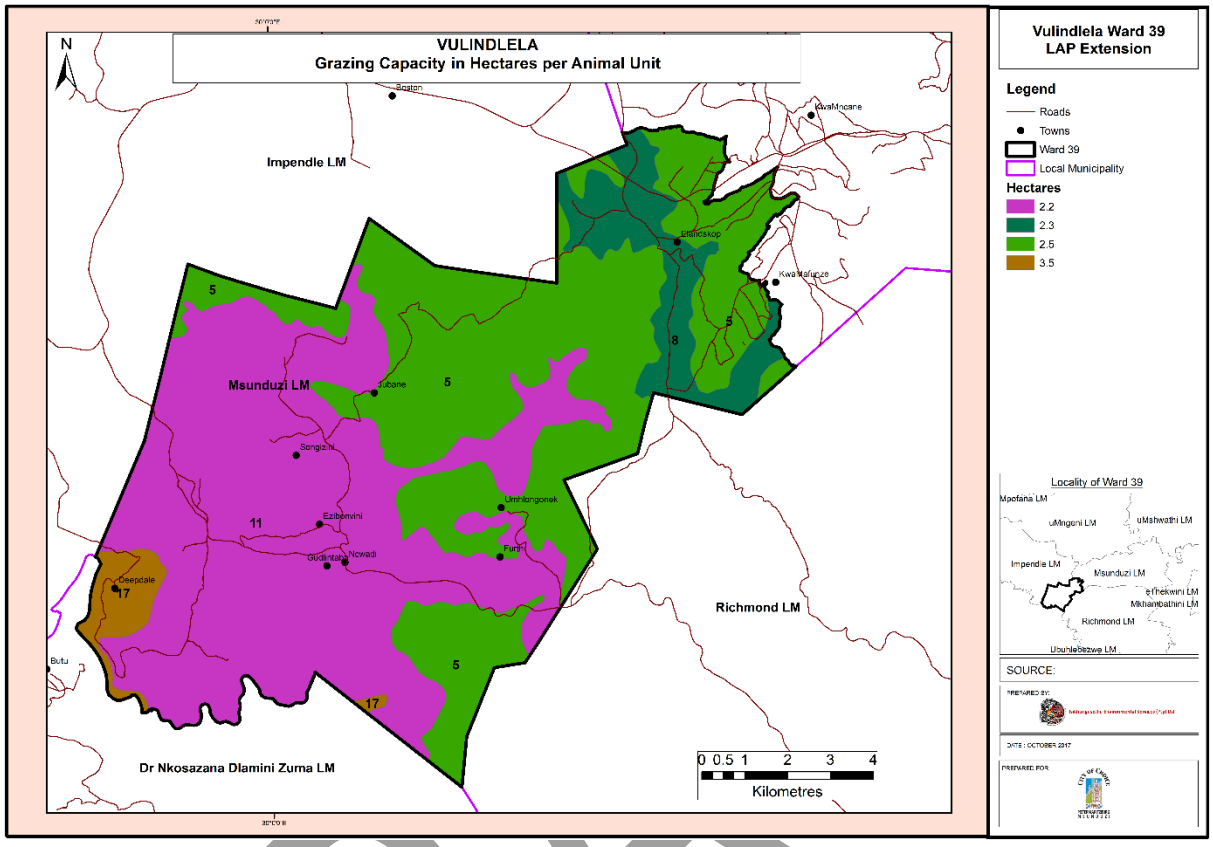
14.4.4. Analysis of Agricultural Potential

The agricultural potential of different areas in Ward 39 is included. Slopes under 12% are reserved for crop cultivation, with slopes between 13% and 24% are best suited for plantations and orchards while slopes above 25% are recommended for livestock production.

Figure 116 illustrates different areas and their suitability for agricultural use. Approximately 4 652 hectares are on slopes suitable for arable production, 5 013 hectares are on slopes suitable for plantations, and 4 425 hectares are on slopes suitable for grazing. Ground truthing is recommended before undertaking any agricultural activity. It must be pointed out that annual cultivation is restricted to slopes of less than 12% while plantations, orchards and grazing can utilise any slope.

Livestock Production As illustrated in Figure 117, Ward 39 has a varying grazing potential based on the BRGs of the area. Within a BRG the grazing capacity can very greatly according to local veld condition. However a broad figure per BRG has been supplied. A more reliable grazing capacity for any local area can only be obtained by an infield study.

Figure 117. The Grazing Capacities according to Bioresource Group



It should be recognised that the land user should regard the grasslands as a crop and that any animal products are the secondary product of the management system. The quality and vigour of the grassland will determine the productivity of the animals. A measure (veld condition assessment) of the grassland will indicate the productivity of the area the thus the number of animals that can be run on the veld (animal units per hectare) and maintained in a production. It is preferable to apply a flexible grazing management system as advocated in the Venter-Drewes (1969) flexible system.

In this system a priority camp is grazed whenever there is sufficient material (assessed as a height of leaves 10 cm) and the herd returns to it repeatedly throughout the season whenever it is ready for grazing. In the second year this camp becomes second in priority. It will then be selectively grazed and the animals removed once the palatable species have been grazed. They will then return to the priority camp if it is ready to be grazed or move on to the third camp. In the third year it becomes a third priority camp and finally, in the fourth year, it is rested for the full season to re-establish vigour. Following the rest, the camp is burned in the spring and again becomes a priority camp.

Burning is necessary when moribund material accumulates so that palatable species do not becomesmothered. The recommended period for burning varies according to the BRG but should be done before the grass commences growth in the spring. The grazing potential can only be established

once investigations on the condition of the veld have been assessed. Veld condition is determined by the species and vigour of grass species for grazing purposes.

Principles for veld management rehabilitation include:
• Establish the grazing value and condition of the veld,
• Determining grazing capacity in hectares per Animal Unit,
• Plan a rotational rest and grazing system, and
• Planned a burning programme.

14.5. Conclusion

14.5.1. Agriculture

Soils within the Ward vary considerably with the topography, geology and rainfall patterns. Large portions of highly productive agricultural land have, however, been developed for other uses, mainly settlement. The remaining areas of highly productive agricultural land have been identified in Figure 116.

As far as can be established from the literature and from interaction with ward Councillors, the agricultural sector in Ward 39 comprises of: maize production (small holder), commercial timber, subsistence livestock (cattle, goats, and pigs), small scale poultry and veggie production. Agriculture contributed 4% of the GDP per Sector for the Msunduzi Municipality, there is no information of the value of the contribution of Ward 39.

No evidence of agri-processing units (other than for sawmills) could be identified in Ward 39.

Constraints

The major limitations to agricultural growth are believed to be as outlined below:

• Loss of land with agricultural potential to settlement and poor land use management practises particularly in relation to grasslands.
• A lack of access to additional land, inputs, finance, transportation.
• Provision/distribution of adequate water supplies during the dry season for irrigation purposes.
• Security of crops due to theft.
• Spread of urban development into areas with agricultural potential.
• Limited areas of remaining land that could be used for agricultural development.
• Lack of agricultural infrastructure owing to the fact that there is limited organised agriculture in
• Limited access among farmers to training for commercial production.
• Based on a study which was conducted by DRD&LR: SPI on agriculture in traditional areas (Isik 2013), cultivation has declined due to younger generations being interested in working in other sectors of the economy, lack of equipment and capital, poor access to markets, limited market intelligence and production skill, and the inability for small scale producers to compete with commercial operations.

Opportunities

• Small scale commercial producers have been identified in Ward 39 and will be contacted in Phase 3 to establish challenges, opportunities and markets.
• Consolidating agricultural land holdings by densifying settlement and recovering high value lands for production purposes.
• Protecting agricultural resources which have been identified in this investigation as being of value for future production purposes subject to filed verification.
• Release of high value land from traditional/ITB control to enable privatisation for expansion of holdings and commercialisation of the sector in Ward 39.
• Job creation through natural capital restoration work, such as eradication of alien invasive plants, reclamation of wetlands and rehabilitation of eroded areas.
• Recovery of areas that are currently under non-permitted plantations.
• Decreasing production costs through the implementation of sustainable farming practices.
• Generation of energy from waste-biogas.
• Seek to densify further residential and industrial development within urban edges around major urban and rural settlements in order to constrain further expansion into natural areas through the implementation of urban edges.
• Integrate green open space and small scale agriculture into urban areas to mitigate negative impacts associated with urbanisation.

14.6. Annexure 5: Alignment of Key Stakeholder Inputs

Alignment of key stakeholder inputs and theme development based on common issues raised.

Theme	Mayor, Ward 39 Amakhosi & Councillors (13/11/2017)	Qadi Nkosi and iZinduna (10/11/2017)	Status Quo finding
Accessibility - in terms of sub-regional location, transportation networks, access to land, economic opportunities, infrastructure and social services	- Poor road infrastructure and the need for tarred roads - Water provision in Qadi area a serious concern - Need for Fire stations closer to Ward 39 - Lack of police Stations	- Roads in a poor condition and dust is particular a problem around the clinic and schools - Need for housing support desperately required	- The road network is not well defined in the Qadi TC area. - Department of Transport does maintenance work of the gravel roads and these were found, during visits in August, September and November 2017 to be in medium to good repair. - New bridge linking Ncwadi with NDZ Municipality completed in July 2017

			- Water and sanitation provision is a problem, and various options to augment the current supply are being considered - Lack of SAPS presence in, and distance from, the area is a concern -Ward 39 is, as per the KZN PGDP is an area which is socio-economically deprived. - Only 8% of the total Ward 39 population is employed.
Land allocation and land use - challenges in terms of informal system of land allocation and land use	- Amakhosi must undertake land allocation based on Local Area Plan recommendation. - Land allocation should follow service installation	N/a	- Traditional leaders and Msunduzi Municipality must co-ordinate land use and land allocation, as per the Ward 39 Joint Management Committee.
Demographics (population profiles) and social issues - high proportion of the population being in the low income and state welfare dependent categories, high levels of unemployment and limited prospects to turn this around linked to limited access to skills training, employment opportunities and lack of market information.	- Need to consider employment opportunities, particularly in Forestry.	N/a	- The KZN PGDP 2017 recognises this area as an area which is socio-economically poor and needing support. - The population growth iro Ward 39 will need to be strategically managed to avoid sprawl, and the erosion of high quality agricultural land.

Ecological services - transformation of biodiversity in Ward 39 and the associated loss of ecological services production due to the expansion of settlement and different forms of agriculture (subsistence, small scale, commercial and livestock).	N/a	N/a	-Agriculture is an essential land use activity providing economic opportunities in an otherwise economically deprived area.
Agricultural practices – A large sector of the Ward 39 Community is dependent on agriculture for survival and needs careful attention (It is for this reason that practice has its own heading, separate from agricultural economic activities).	-The importance of agriculture and Forestry in respect of economic activity observed	-The need for agricultural support is of a high priority for the Qadi Traditional Council.	-The agricultural section of the Status Quo report provides a detailed analysis of agriculture and recognises the value of agriculture in respect of this area. -Soil erosion, possibly linked to overstocking rates or other practices, needs to be addressed. - DAFF is prioritizing resumption of tractor-and-implements support to this area
Economy - the economy of Ward 39, under current conditions is largely based on government interventions with limited private sector income and investment. Identifying opportunities for the diversification of the	N/a	N/a	-The Local Economic Review of Ward 39 revealed a limited range of economic activities accompanied by 92% unemployment and a generally grant dependant community. -There are some opportunities, however, being 63km from the

local economy in the Ward 39.			Pietermaritzburg Hub negatively impacts on the any strengthening of economic linkages.
Management of the area – administrative management of the area, spatial planning and associated project implementation	-The Joint Management Committee was supported	N/a	-This is a critical part of the general land use management and the implementation of the eventual Land Use Management