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DWA REPORT NO: P WMA 12/T60/00/4111

Feasibility Study for Augmentation of the Lusikisiki Regional Water Supply Scheme (WP 10317)

DOMESTIC WATER REQUIREMENTS

OCTOBER 2013

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Author:	***Urban-Econ Development Economists: Ben van der Merwe***
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* *BKS (Pty) Ltd was acquired by AECOM Technology Corporation on 1 November 2012*

LIST OF STUDY REPORTS

This report forms part of the series of reports, prepared for the Feasibility Study for Augmentation of the Lusikisiki Regional Water Supply Scheme. All reports for the study are listed below.

Report Name	DWA Report Number
Water Resources Assessment	P WMA 12/T60/00/3711
Assessment of Augmentation from Groundwater	P WMA 12/T60/00/3811
Intermediate Reserve Determination	P WMA 12/T60/00/3911
Legal, Institutional and Financial Arrangements	P WMA 12/T60/00/4011
Domestic Water Requirements	***P WMA 12/T60/00/4111***
Irrigation Potential Assessment	P WMA 12/T60/00/4211
Water Distribution Infrastructure	P WMA 12/T60/00/4311
Materials and Geotechnical Investigations	P WMA 12/T60/00/4411
Zalu Dam Feasibility Design	P WMA 12/T60/00/4511
Regional Economics	P WMA 12/T60/00/4611
Environmental Screening	P WMA 12/T60/00/4711
Record of Implementation Decisions	P WMA 12/T60/00/4811
Main Study Report	P WMA 12/T60/00/4911

This report is to be referred to in bibliographies as:

Department of Water Affairs, 2011. FEASIBILITY STUDY FOR AUGMENTATION OF THE LUSIKISIKI REGIONAL WATER SUPPLY SCHEME: DOMESTIC WATER REQUIREMENTS P WMA 12/T60/00/4111

Prepared by:

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Executive Summary

The following four distinct geographical areas have been demarcated for the purpose of the domestic water requirement assessment:

- ***Lusikisiki Regional Water Supply Scheme (LRWSS) Planning Area** – this area will directly been influenced by the proposed Zalu Dam and will be the geographical area that will primarily be targeted by the socio-economic survey.*
- ***Primary Study Area** – this area represents the Tender Study Area and the Additional Study Area as identified during the Inception Phase. For the purpose of this report, these areas will also be referred to as the Extended Tender Study Area. The LRWSS Planning Area forms part of the Primary Study Area.*
- ***Secondary Study Area** – the Secondary Study Area includes the Primary Planning Area and comprise of the Nguza Hill and Port St Johns Local Municipalities.*
- ***Tertiary Study Area** – this area represents the O.R. Tambo District Municipal Area and provides the wider regional context within which the Zalu Dam development is planned.*

***Baseline Population:** The estimated 2010 (current) population for the LRWSS Planning Area is about 78 700 people consisting of 15 400 households. The estimated current population for the Primary Area is about 162 800 people consisting of about 32 800 households. The LRWSS Planning Area's population represents just over 48% of the Primary Area. Currently, the Secondary and Tertiary Areas estimated population sizes are 460 900 people and 1.89 million people, respectively. To determine the baseline population, an annual growth rate of 1.1% for population and 1.5% for households in the LRWSS Planning Area were used and 0.8% for population and 1.4% for households in the Primary Area (excluding the Planning Area). These growth rates are mainly based on historic growth trends.*

*Due to future developments affecting the demographic profile of an area, four population growth scenarios were used to determine domestic water demand in the LRWSS Planning Area and Primary Area. **Table 1** indicates the three population scenarios together with annual growth rates used.*

Table i: Population growth scenarios, 2010 - 2040

Area	LRWSS Planning Area				Primary Area			
Scenario	Low growth scenario	Medium growth scenario	High growth scenario	Most probable scenario	Low growth scenario	Medium growth scenario	High growth scenario	Most probable scenario
Average Annual Growth Rate	0.3%	1.1%	2.1%	1.6%	0.3%	0.9%	1.5%	1.2%
2010	78 700	78 700	78 700	78 700	162 800	162 800	162 800	162 800
2015	81 600	82 900	85 200	84 100	168 600	170 600	173 600	172 100
2020	83 600	87 800	94 000	90 900	172 000	178 900	188 400	183 650
2025	84 400	92 600	104 600	98 600	173 700	187 500	206 500	197 000
2040	85 700	107 800	147 200	127 500	179 000	211 300	258 200	234 750

Source: DWA and Urban-Econ Calculation, 2011

LOW GROWTH SCENARIO

*The **low growth scenario** takes limited economic progress and infrastructural development into account, which will result in a declining population growth rate. The annual growth rate used to determine the population for the Planning Area and primary Area is 0.3%.*

The population size for the Planning Area is expected to increase from 78 700 people in 2010 to an estimated 85 700 people in 2040. The Primary Area has a population of 162 800 in 2010, which will increase to about 168 600 people in 2015, 173 700 people in 2025 and 179 000 people in 2040.

MEDIUM GROWTH SCENARIO

*The population of the **medium growth scenario** is determined by taking only historic growth rates into account; 1.1% for the Planning Area and 0.9% for the Primary Area.*

The population size for the Planning Area is expected to increase from 78 700 people in 2010 to an estimated 107 800 people in 2040. The Primary Area has a population of 162 800 in 2010, which will increase to about 170 600 people in 2015, 187 500 people in 2025 and 211 300 people in 2040.

HIGH GROWTH SCENARIO

*The **high growth scenario** takes future economic progress and infrastructural development into account, which will result in an increase in population growth rates. Growth rates used to determine the population for the Planning Area is 2.1% and for the Primary Area 1.5%.*

The population size for the Planning Area is expected to increase from 78 700 people in 2010 to an estimated 147 200 people in 2025. The Primary Area has a population of 162 800 in 2010, which will increase to about 258 200 people in 2040.

MOST PROBABLE SCENARIO

*The **most probable scenario** is located between the medium and high growth scenarios, which present the most accurate population figures. This scenario combines historic growth rates with future economic progress and infrastructural development that will result in an increase in population growth rates. The average annual growth rate used to determine the population for the Planning Area is 1.6% and for the Primary Area 1.2%.*

The population size for the Planning Area is expected to increase from 78 700 people in 2010 to an estimated 127 500 people in 2040. The Primary Area has a population of 162 800 in 2010, which will increase to about 172 100 people in 2015, 197 000 people in 2025 and 234 750 people in 2040. The future water requirements for the study area will be based on the projections of the most probable scenario.

*Based on the population growth scenarios **Table 2** and **Table 3** indicates the future water requirements of the LRWSS Planning Area and Primary Area (Extended Tender Study Area).*

Table ii: Water demand projections for the Primary Area

	2010	2015	2020	2025	2040
LOW	18.5 Mℓ/d *6.75 million m³/a*	19.2 Mℓ/d *7.01 million m³/a*	19.5 Mℓ/d *7.12 million m³/a*	19.7 Mℓ/d *7.19 million m³/a*	20.3 Mℓ/d *7.41 million m³/a*
MEDIUM	18.5 Mℓ/d *6.75 million m³/a*	19.4 Mℓ/d *7.08 million m³/a*	20.3 Mℓ/d *7.41 million m³/a*	21.3 Mℓ/d *7.77 million m³/a*	24.3 Mℓ/d *8.87 million m³/a*
HIGH	18.5 Mℓ/d *6.75 million m³/a*	19.7 Mℓ/d *7.19 million m³/a*	21.4 Mℓ/d *7.81 million m³/a*	23.5 Mℓ/d *8.58 million m³/a*	29.8 Mℓ/d *10.88 million m³/a*
MOST PROBABLE	18.5 Mℓ/d *6.75 million m³/a*	19.7 Mℓ/d *7.14 million m³/a*	21.4 Mℓ/d *7.61 million m³/a*	23.5 Mℓ/d *8.18 million m³/a*	29.8 Mℓ/d *9.87 million m³/a*

Source: DWA and Urban-Econ Calculation, 2011

*It can be concluded from Table 1-2 that the Primary Area currently consumes approximately 18.5 Mℓ/d, which could increase to about 20.3 Mℓ/d (**low growth scenario**), 24.3 Mℓ/d (**medium growth scenario**) and about 29.8 Mℓ/d (**high growth scenario**) in 2040. It was concluded that the water requirements for the Primary Area will be approximately 29.8 Mℓ/d or 9.87 million m³/a by 2040 based on the most probable scenario.*

Table iii: Water demand projections for the LWRSS Planning Area

	2010	2015	2020	2025	2040
LOW	8.9 Mℓ/d *3.3 million m³/a*	9.3 Mℓ/d *3.4 million m³/a*	9.5 Mℓ/d *3.5 million m³/a*	9.6 Mℓ/d *3.5 million m³/a*	9.7 Mℓ/d *3.6 million m³/a*
MEDIUM	8.9 Mℓ/d *3.3 million m³/a*	9.4 Mℓ/d *3.4 million m³/a*	10 Mℓ/d *3.6 million m³/a*	10.5 Mℓ/d *3.8 million m³/a*	12.4 Mℓ/d *4.5 million m³/a*
HIGH	8.9 Mℓ/d *3.3 million m³/a*	9.7 Mℓ/d *3.5 million m³/a*	10.7 Mℓ/d *3.9 million m³/a*	12 Mℓ/d *4.3 million m³/a*	17 Mℓ/d *6.2 million m³/a*
MOST PROBABLE	8.9 Mℓ/d *3.3 million m³/a*	9.6 Mℓ/d *3.5 million m³/a*	10.3 Mℓ/d *3.8 million m³/a*	11.2 Mℓ/d *4.1 million m³/a*	14.7 Mℓ/d *5.4 million m³/a*

Source: DWA and Urban-Econ Calculation, 2011

*Currently, the domestic water demand in the Planning Area estimates at approximately 8.9 Mℓ/d, which could increase to approximately 9.7 Mℓ/d (**low growth scenario**), 12.4 Mℓ/d (**medium growth scenario**) and about 17 Mℓ/d (**high growth scenario**) in 2040. Based on the most probable scenario it can be concluded that the water requirements for the LRWSS Planning Area will be approximately 14.7 Mℓ/d or 5.4 million m³/a by 2040. The study found that the average per capita consumption of water in the Primary Area and the Planning Area is just about 114 ℓ/c/d.*

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List of Abbreviations

CPIX	Consumer Price Index
DM	District Municipality
DWA(F)	Department of Water Affairs (and Forestry)
EAP	Economically Active Population
ECSECC	Eastern Cape Socio-Economic Consultative Council
FET/ABET	Further Education and Training or Adult Basic Education and Training (colleges)
LM	Local Municipality
LRWSS	Lusikisiki Rural Water Supply Scheme
NWRS	National Water Resource Strategy
OA	Options Analysis
PEA	Potentially Economically Active Population
PSP	Professional Service Provider
Stats SA	Statistics South Africa

List of Units

a	annum
ha	hectare
hrs	hours
km	kilometre
km^2	square kilometre
ℓ	litre
ℓ/day	litre per day
ℓ/c/d	litre per capita per day
m	meter
m/s	meter per second
m^3/s	cubic meter per second
masl	meters above sea level
million m^3	million cubic meters
million m^3/a	million cubic meters per annum
Mℓ/d	mega litre per day
mm	millimetre

List of Definitions

Household	A household is a group of persons who, at least for four nights per week, live together and provide themselves jointly with food and/or other essentials for living, or a single person. The Primary Area has an average household size of 5 persons.
Employment	A contract between two parties, one being the employer and the other being the employee certifying the employee with a fixed job; forming part of the working force.
Unemployment	A person is unemployed if he or she desires employment but cannot find a job. The unemployment rate is then obtained by expressing the number of unemployed persons as a percentage of the total number of people willing and able to work (the labour force). According to the official definition, the unemployed are those people within the economically active population who: a) did not work during the seven days prior to the interview, b) want to work and are available to start work within a week of the interview, and c) have taken active steps to look for work or to start some form of self-employment in the four weeks prior to the interview.
Potential Economically Active (PEA) Population	The potential economically active (PEA) population includes the formally employed, the unemployed and those persons active in the informal/unregistered sector. The terms supply of labour and the labour force are used as synonyms for the potential economically active population. The PEA population falls within the age categories of 15-64 years.
Disposable Income	Another measure of the region's welfare. It shows the average amount of income derived during a certain period. Since disposable income includes all income receipts by households and excludes all transfers, such as taxes and social contributions, it reflects the amount of money that the population has in its disposable to be spent on consumer products and services
Growth Rate	A growth rate represents a ratio of total change in a specified time reference period to values at the beginning of the period or at a specified earlier time reference. When changes over a period of more than one calendar year are studied, the mean annual rate of change is computed.

1 INTRODUCTION

The Department of Water Affairs (DWA) appointed **BKS (Pty) Ltd** in association with four sub-consultants (**Africa Geo-Environmental Services, KARIWA Project Engineers & Associates, Scherman Colloty & Associates and Urban-Econ**) with effect from 1 September 2010 to undertake the **Feasibility Study for Augmentation of the Lusikisiki Regional Water Supply Scheme (LRWSS)**.

On 1 November 2012, BKS (Pty) Ltd was acquired by **AECOM Technology Corporation**. The new entity is a fully-fledged going concern with the same company registration number as that for BKS. As a result of the change in name and ownership of the company during the study period, all the final study reports will be published under the AECOM name.

1.1 BACKGROUND TO THE PROJECT

In the 1970s, Consultants O'Connell Manthé and Partners and Hill Kaplan Scott recommended that a regional water supply scheme based on a dam on the Xura River and a main bulk supply reservoir close to Lusikisiki (located within the then defined "administration area" of the Zalu Dam) would provide potable water supply for the entire region between Lusikisiki and the coast, extending from the Mzimvubu River in the south west to the Msikaba River in the north east. Some areas up to 15 km inland of Lusikisiki would also be supplied. A **White Paper** describing the scheme was tabled by the Transkei Government in 1979. It was envisaged that the scheme would be constructed in phases. Details of the proposed phasing of the scheme are provided in (Hill Kaplan Scott, 1986).

After the reincorporation of the Transkei Homeland *into* the Republic of South Africa (RSA) in 1994, the DWA took over responsibility for further development of the scheme. The Directorate: National Water Resource Planning commissioned the *Eastern Pondoland Basin Study* (EPBS) in 1999 to further investigate the water supply situation in the area, with a specific focus on further development in the area originally earmarked for the Lusikisiki Regional Water Supply Scheme (LRWSS). This detailed investigation was undertaken for surface and groundwater sources, which re-affirmed that the Zalu Dam was the preferred source of surface water and recommended further investigation of groundwater sources to augment water supply to the entire area or to sub-areas.

In 2007, SRK Consulting undertook the *Lusikisiki Groundwater Feasibility Study* to investigate groundwater potential and compare the new data with data produced by earlier studies. This study reported that there is a relatively strong possibility of finding high yielding boreholes, and that a combination of surface water (Zalu Dam) and groundwater would be the most feasible solution for the LRWSS.

1.2 STUDY AREA

The study area comprises the entire region between Lusikisiki (up to about 15 km inland) and the coast, extending from the Mzimvubu River in the south-west to the Msikaba River in the north-east. This area includes the Zalu Dam site (and its catchment) in the Xura River and the selected conveyance routes between the dam and the extended supply area. It also includes the boreholes to be selected for augmentation and the routes of the pipelines to augment the water supply to the users.

During the Inception Phase the study area was extended in the vicinity of the Zalu Dam and to the north of Lusikisiki, as agreed with the DWA and as indicated in **Figure 1.1**. In the south-western part of the study area the main focus will be on water supply from groundwater, due to the distance from the surface water source, Zalu Dam, as well as unfavourable topography.

1.3 OBJECTIVE, SCOPE AND ORGANISATION OF THE STUDY

The objective of this study was to complete a comprehensive engineering investigation at feasibility level for the proposed LRWSS, including the possible Zalu Dam in the Xura River, and to define the most attractive composition and size of the water supply components, taking augmentation from groundwater resources into account.

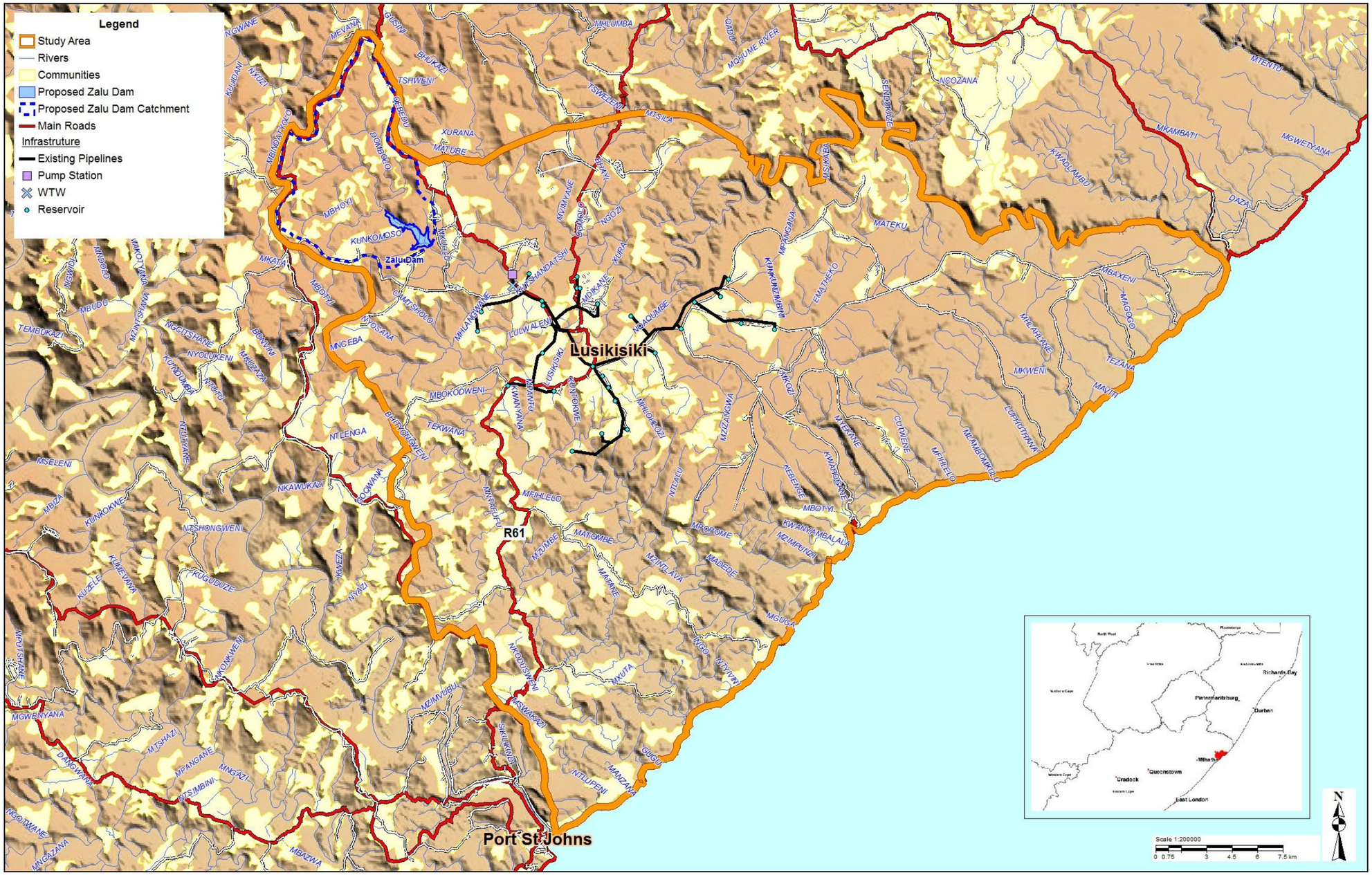


Figure 1.1: Study Area

Source: BKS, 2011

This feasibility study provided for the assessment of all aspects that impact on the viability of utilising a combination of surface water (via the Zalu Dam on the Xura River) and groundwater (via boreholes) for the expansion of the existing water supply scheme to provide all water users in the study area with an appropriate level and assurance of water supply. The study is therefore required to:

- Identify all of the technical issues likely to affect implementation, and to define and evaluate all of the actions required to address these issues;
- Provide an estimate of cost with sufficient accuracy and reliability to ensure that management decisions can be made with confidence;
- Investigate irrigation viability; and
- Provide sufficient information to enable design and implementation to proceed without further investigation.

The required activities for this project have been grouped into 14 modules, as shown in the below.

Table 1.1: Study structure

Modules	Deliverable
1. PROJECT MANAGEMENT 1.1 Study initiation and inception 1.2 Project management and administration	**Inception Report**
2. WATER RESOURCES	**Water Resources Report**
2.1 Hydrology	♦ Hydrology chapter
2.2 Yield analysis	♦ Yield Analysis chapter
2.3 Reservoir sedimentation	♦ Sedimentation chapter
3. GROUNDWATER AUGMENTATION	**Assessment of Augmentation from Groundwater Report**
4. RESERVE - ECOLOGICAL WATER REQUIREMENTS	**Intermediate Reserve Determination Report** ♦ Reserve Template **Msikaba Estuary Scoping Report**
5. WATER REQUIREMENTS	
5.1 Domestic water requirements	**Domestic Water Requirements Report**
5.2 Agriculture / Irrigation potential	**Irrigation Development Report**
6. WATER SERVICE INFRASTRUCTURE	**Water Distribution Infrastructure Report**
6.1 Distribution infrastructure	♦ Chapter in Water Distribution Infrastructure Report
6.2 Water quality	♦ Chapter in Water Distribution Infrastructure Report
7. PROPOSED ZALU DAM	
7.1 Site investigations	**Materials and Geotechnical Investigations Report**
7.2 Dam technical details	**Dam Preliminary Design Report, including design criteria, dam type selection, dam sizing**
8. COST ESTIMATE AND COMPARISON	♦ Project cost chapter included Main Study Report
9. REGIONAL ECONOMICS	**Regional Economics Report**
10. ENVIRONMENTAL SCREENING	**Environmental Screening Report** ♦ Scope of work for EIA
11. PUBLIC PARTICIPATION	♦ Included in Environmental Screening Report
12. LEGAL, INSTITUTIONAL AND FINANCIAL ARRANGEMENTS	♦ Legal, institutional and financing arrangements chapter in Main Study Report
13. RECORD OF IMPLEMENTATION OF DECISIONS (RID)	**RID**
14. MAIN REPORT AND REVIEWS	**Main Study Report**

1.4 SCOPE OF THIS REPORT

This **Domestic Water Requirements Report** is the deliverable for **Module 5.1** of the *Feasibility Study for Augmentation of the Lusikisiki Regional Water Supply Scheme*.

Urban-Econ Development Economists was appointed as a sub-consultant to assist with the ***determination of the domestic water requirements*** by reviewing the following information:

- Results of previous studies of the population living in the Study Area;
- A local investigation and socio-economic survey, to sample the current situation in order to update the current population figures and socio-economic trends as meaningful as possible; and
- To provide reliable and up to date estimates of the current and future population.

The above-mentioned information, together with an in-depth analysis of the population and household dynamics, is required to estimate the domestic water requirements in the Study Area together with future water demands.

2 STUDY ORIENTATION

2.1 PROBLEM STATEMENT

There are various sources[1] of information that provide population and household figures at a main level[2], but only Census' and DWA's[3] datasets provide population and household figures to a sub-place level. The Census data provides data for 1996 and 2001. DWA only has population figures for 2008. Upon reviewing and analysing these datasets, together with all the previous studies relevant to this study, some discrepancies came to light. The discrepancies referred to include, amongst others:

- Census's population size differ significantly from DWA's figures;
- Census's figures are 10 years old; and
- The names of the sub-places do not correlate with the names of DWA's.

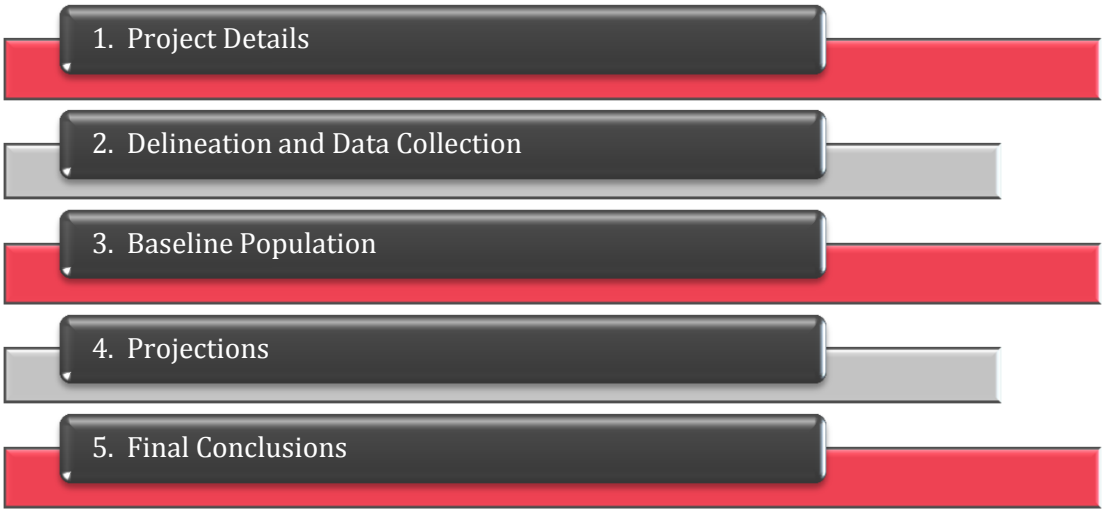
In order to develop a meaningful assessment of the current population, and anticipated future trends, the assessment was augmented by up-to-date information from a socio-economic survey conducted by Urban-Econ. It was also necessary to develop a set of scenarios or possible current population outcomes.

2.2 METHODOLOGICAL APPROACH

Diagram 2.1 illustrates the methodological approach that was followed to estimate the current population and the anticipated future domestic water demand.

[1] *Census 1996 and 2001; Community Survey 2007; Quantec (Standardised Regional) 1995 – 2010; DWA 2008; Eastern Cape Socio-Economic Consultative Council (ECSECC) 1995-2009; the Integrated Development Plans, etc.*
[2] *Main place refers to the availability of statistics on municipal level.*
[3] *DWA 2008: DWA dataset with updated population figures for 2008 on sub-place level.*

Diagram 2.1: Methodological approach



2.2.1 Step 1: Project details

The initial step consists of the project orientation process, captured in the present chapter. Project orientation entails developing:

- An understanding of the project goals and objectives; and
- A perspective of the Study Area.

2.2.2 Step 2: Delineation and data collection

In Step 2 the following important tasks need to be completed:

- The identification of the Study Area and its relationship with the area that will be subjected to the socio-economic survey, and the larger sub-region of which it forms part; and
- The gathering of primary and secondary data relating to the Study Area's socio-economic characteristics.

2.2.3 Step 3: Baseline population

The third step entails the analysis and evaluation of the data in order to obtain a realistic baseline population for the Study Area. This baseline population will form the basis of the future domestic water requirements.

2.2.4 Step 4: Future population estimates and domestic water demand

The fourth step entails the population projections from 2010 to 2025 based on historic growth trends and anticipated future changes. Given the projected population figures, the requirement for domestic water is estimated by applying given water consumption parameters to the population.

2.2.5 Step 5: Final conclusion

This step presents the key findings of the study.

2.3 Report Outline

Apart from **Section 1** that is introductory in nature, **Section 2** focuses on the broad methodology and approach that was followed. **Section 3** delineates the Study Area, whilst **Section 4** establishes a baseline population for different areas. **Section 5** provides a current socio-economic profile of the Study Area and **Section 6** estimate the 2025 population and the anticipated domestic water. **Section 7** concludes the study and **Section 8** contains a list of the references.

2.4 Delineation of the Study Area

The purpose of this section is to demarcate the area of influence of the proposed Zalu Dam in different geographical areas. These areas represent the Study Area and they have their own specific purpose in the project and will include the following:

- LRWSS Planning Study Area;
- Primary Study Area (Extended Tender Study Area);
- Secondary Study Area; and
- Tertiary Study Area.

The following paragraphs highlight these areas.

2.4.1 LRWSS planning study area

This area represents the area surrounding the proposed Zalu Dam site and comprises of, inter alia, identified sub-places located in the Tender Study Area and Additional Study Area (Primary Study Area) as identified by BKS. The Planning Study Area will be that area

that will directly be affected by the proposed Zalu Dam. The sub-places from Census 2001 and DWA 2008 datasets, in the LRWSS Planning Area, are outlined in **Table 2.1**.

Table 2.1: Sub-places included in the LRWSS Planning Area

Census 2001 Sub-places	DWA 2008 Sub-places
Luzupu	Bomveni
Zalu Heights	Zalu Heights
Mpala	Mpala
Palmarton Mission	Palmartone
Pamalitoli	Jambeni C
Nyosani	Mbila
Sibalweni	Mdikane
Lusikisiki	Kanana
Ntsimbini	Nzintlana
Tyeni	Gobozana
KwaNyati	Kwanyuswa
Gunyeni	Ntsimbini
Chithwayo	Lusikisiki
Nkunzimbini	Dubana A
Malangeni	Goso
Mdankala	Mtshayaza
Gengope	Mgezwa
Mgugwane	Mgezwa
Gemvale	Nkunzimbini
Mdovu	Malangeni
Kaleni	Upper Ntafufu - B
Kwagingqi	Ntshwabulo
Mantusini	Ntongwane
	Tafufu - B
	Mgugwana
	Thala
	Lower Ntafufu - B
	Gemvale
	Mthambalala - B

Figure 2.1 presents the sub-places from both sources. Bordered polygons indicate sub-places according to DWA 2008 and the solid colour polygons are sub-places according to Census 2001.

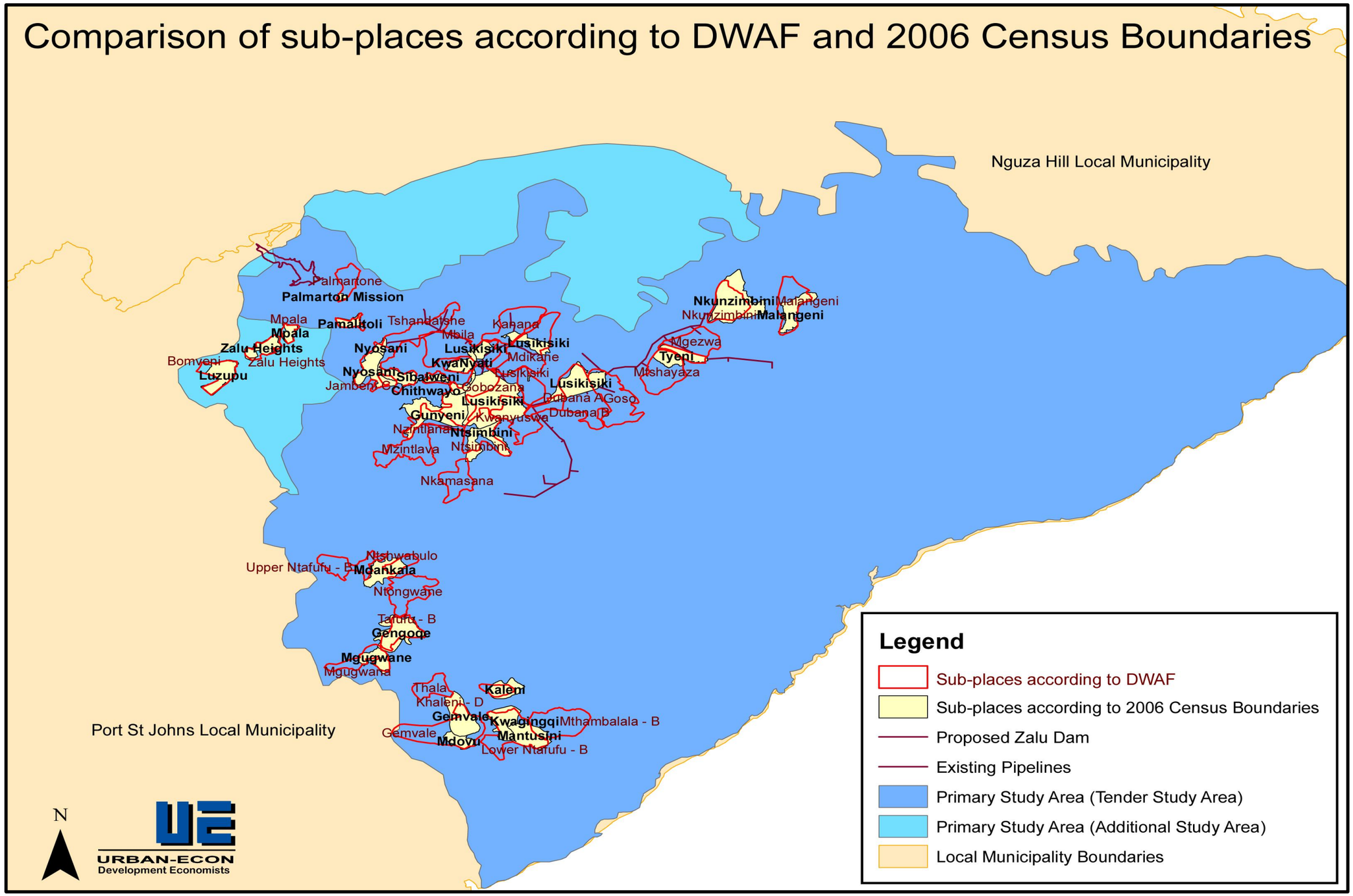


Figure 2.1: Planning Area

Source: Urban-Econ map utilising BKS, DWA and Census, 2011

2.4.2 Primary study area

The Primary Study Area is located within the jurisdiction of Nguza Hill Local Municipality (LM) and Port St Johns Local Municipality (LM) and consists of the Study Area (defined in **Section 1.2** as both the **Tender Study Area** and the Additional Study Area). This area encompasses multiple sub-places, which includes the Planning Study Area and is illustrated in **Figure 2.2.**

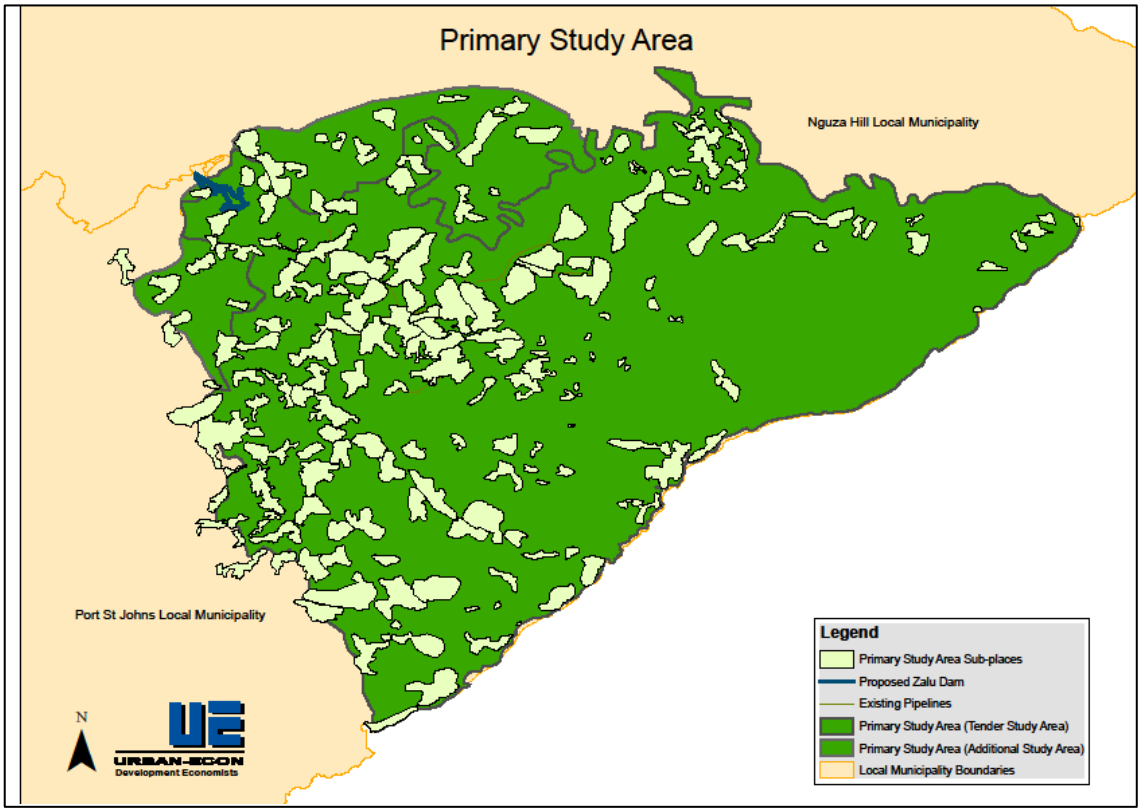


Figure 2.2: Primary Study Area

Source: DWA 2008

2.4.3 Secondary study area

This area represents the two affected local municipalities situated in the O.R. Tambo District, i.e. **Nguza Hill Local Municipality (LM)** and **Port St Johns Local Municipality (LM)**. Besides the affects that the anticipated Zalu Dam development will have on the area, the primary area is used as a base of comparison to measure the performance of the planning area in context to the larger area. **Figure 2.3** illustrates the delineated Secondary Study Area.

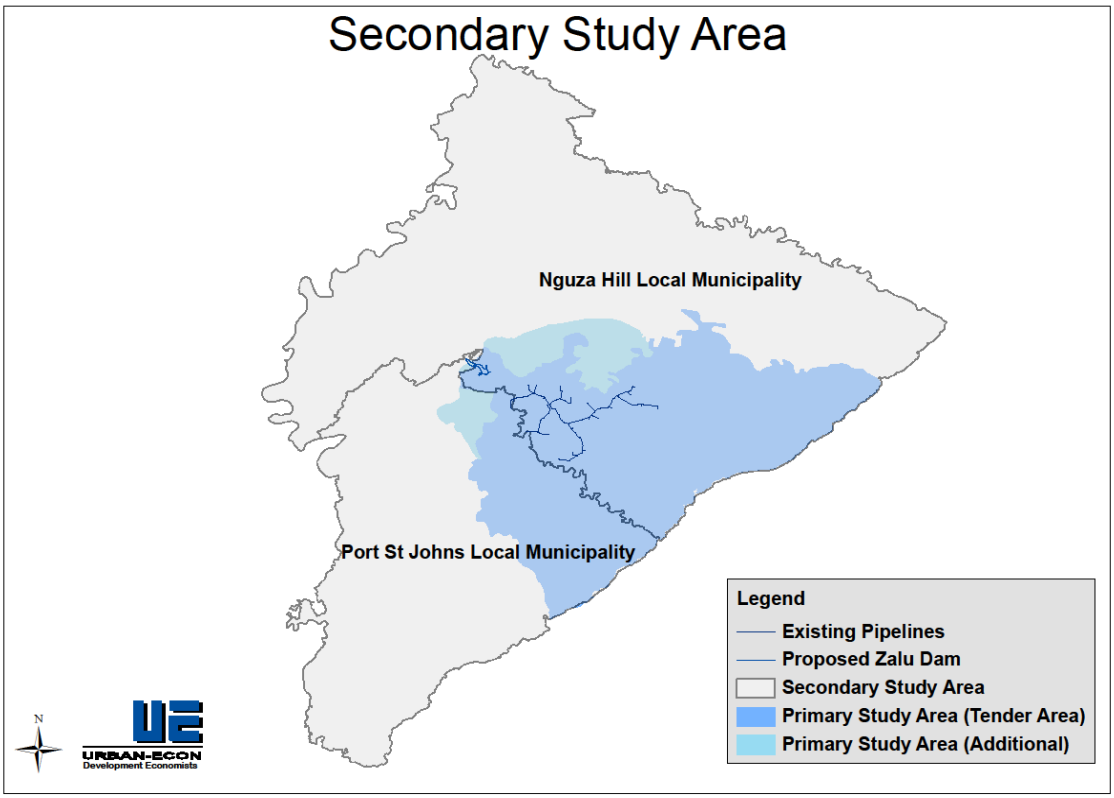


Figure 2.3: Secondary Study Area

Source: DWA 2008

2.4.4 Tertiary study area

This area represents the O.R. Tambo District Municipality located in the Eastern Cape Province. The Tertiary Study Area will mainly be affected during the construction phase of the anticipated dam development, particularly those areas where skilled, and highly skilled, workers as well as material and equipment for construction may be sourced from. **Figure 2.4** illustrates the defined Tertiary Study Area.

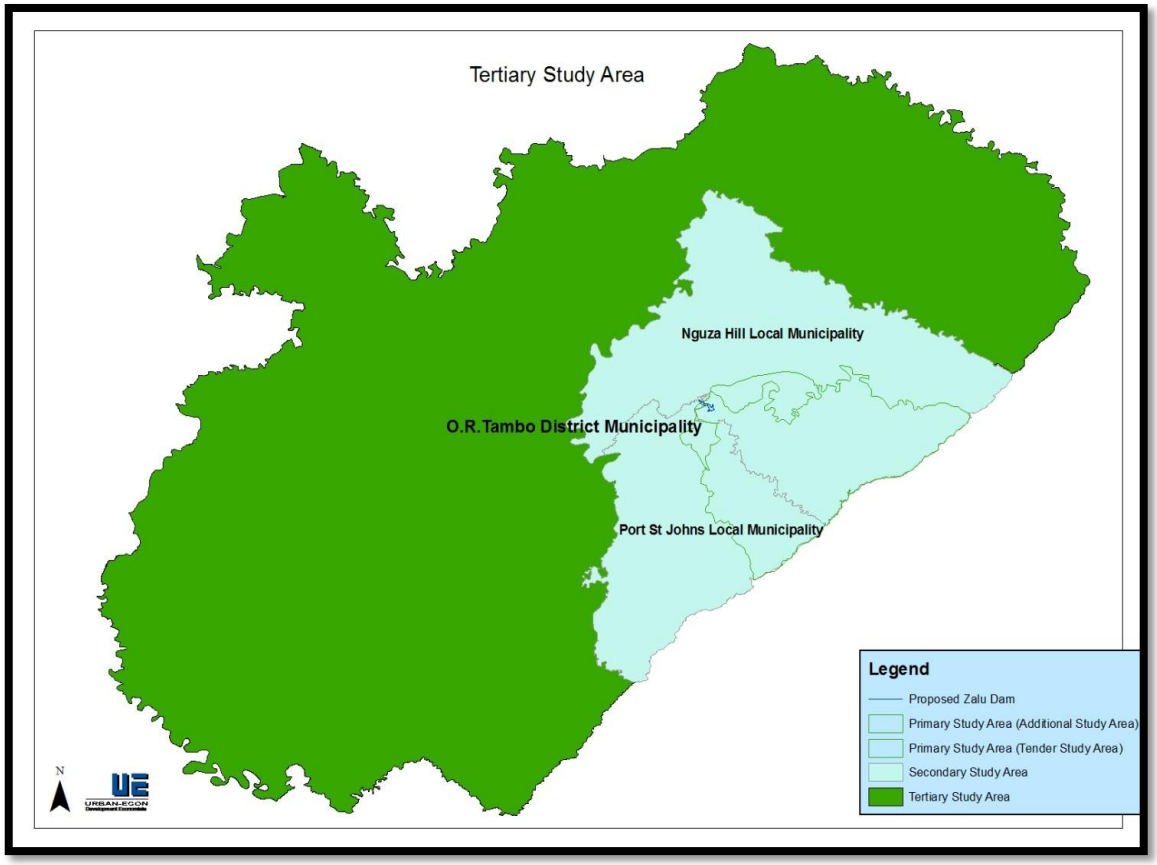


Figure 2.4: Tertiary Study Area

Source: DWA 2008

2.4.5 Conclusion

For the purpose of the water demand assessment, the following four distinct geographical areas have been demarcated:

- **LRWSS Planning Area** – this area will directly been influenced by the proposed Zalu Dam and will be the geographical area that will primarily be targeted by the socio-economic survey.
- **Primary Study Area** – this area represents the **Study Area.** The LRWSS Planning Area forms part of the Primary Study Area.
- Secondary Study Area – the Secondary Study Area includes the Primary Planning Area and comprise of the Nguza Hill Local Municipality (LM) and Port St Johns Local Municipality (LM).
- **Tertiary Study Area** – this area represents the O.R. Tambo District Municipal Area and provides the wider regional context within which the Zalu Dam development is planned.

3 CURRENT POPULATION ESTIMATES

The purpose of this section is to review results of previous studies and sources of information about the population living in the Study Area. Different data sources with different population figures were utilised for analysis in the Planning, Primary, Secondary and Tertiary Areas. These sources include:

- Census 1996 and 2001;
- Community Survey 2007;
- Quantec (Standardised Regional) 1995 - 2010;
- DWA 2008, Population Data Tables for Lusikisiki and surrounding areas on a sub place level; and
- Eastern Cape Socio-Economic Consultative Council (ECSECC) 1995-2009.

The methodology that was used to establish the most reasonable current (2010) population size is to compare the population figures from the different sources of information (together with their respective historic growth trends extrapolated to 2010) with each other. After this comparison was done the ***current population size*** for the Study Area was estimated. This was necessary since the last official census was conducted in 2001, meaning that the population in the Study Area is out-dated. The updating techniques that were used comprise the following:

- A structured socio-economic survey of a representative sample;
- A count of the physical structures according to Google Maps (2004);
- Adjustments to the number of physical structures with the growth in households according to the Community Survey of 2007; and
- Estimates of the current population household size from the socio-economic survey and adjusted number of housing units.

3.1 POPULATION ESTIMATES

3.1.1 Current population in the planning area

- **Census 1996 and 2001:** According to the 1996-2001 Census data for the LRWSS Planning Area is available on a sub place basis. Although this dataset is out-dated, it is the only available dataset at this level of detail and provides valuable demographic

structural trends, i.e. male: female ratio, age, skills, etc. Given the official trend between 1996 and 2001, the 2010 population is estimated at about 50 000 people.

- **Community Survey 2007:** The Community survey is an official database of the community survey providing demographic and socio-economic data, which was performed during February 2007. About 949 105 persons were enumerated with 246 618 households covered during enumeration in South Africa. Although the Community Survey represents the most up to date official dataset in the country, data was only published on municipal level and due to the sampling process no population figures are available for the Planning Study Area.
- **Quantec (Standardised Regional) 1995 – 2010:** Quantec is the most comprehensive collection of South African socio-economic and market indicators that provide data from 1995 up to 2010. Quantec maintain and distribute a set of data collections covering macro and regional socio-economic, industry and international trade data on local municipal level. Therefore, it was not possible to use Quantec data for the Planning Study Area either.
- **DWA 2008:** DWA provided a dataset with updated population figures for 2008 on sub-place level. According to DWA's survey conducted in 2008, the population for the Planning Area was approximately 63 000 people.
- **Eastern Cape Socio-Economic Consultative Council (ECSECC) 1995-2009:** The ECSECC provided Urban-Econ with a dataset from 1995 up to 2009, containing statistics on demographics, economics, access to services, labour market, poverty and development indicators. The data is mainly sourced from Stats SA, with some data from Government Departments, Development Agencies, and ECSECC's own data. This dataset provides population data only on municipal level and could thus not be used for the Planning Area.
- **National Water Resource Strategy (2004):** Figures could not be obtained and compared with this strategy, as the figures in the National Water Resource Strategy is not specifically representative of the Planning Area. Data obtained within this strategy is also somewhat out-dated, compared to the more recent data obtained from DWA and Quantec.

Figure 3.1 presents the sources with available population data for the Planning Area.

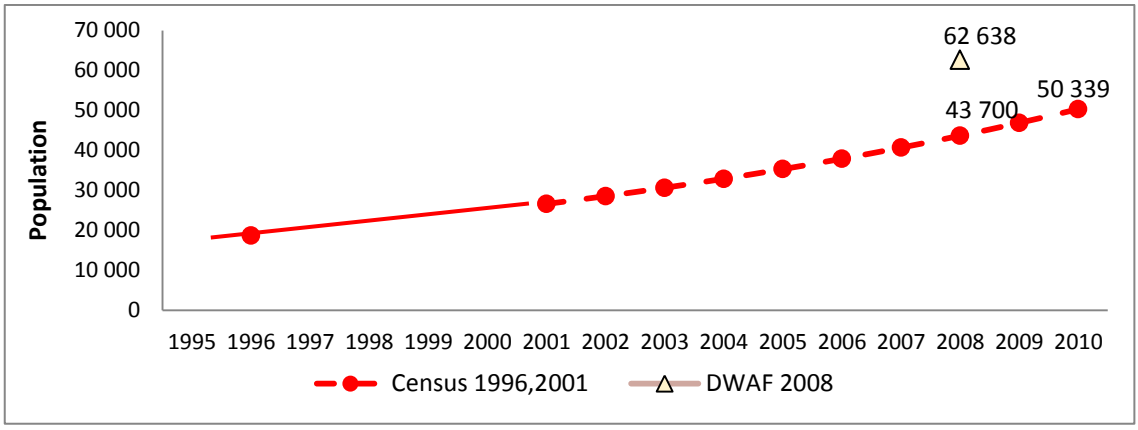


Figure 3.1: Sources with available population data of the LRWSS Planning Area

3.1.2 Current population in the primary area

- **Census 1996 and 2001:** Data for the Primary Area is available on a sub-place level and given the official trend between 1996 and 2001, the 2010 population is estimated at roughly 141 000 people.
- **Community Survey 2007:** Due to the fact that Community Survey only provides data on municipal level, no population figures are available for the Primary Area.
- **Quantec (Standardised Regional) 1995 – 2010:** No data for the Primary Area is available as Quantec only provides data on municipal level.
- **DWA 2008:** According to DWA, the population for the Primary Study Area in 2008 was approximately 160 000 people.
- **Eastern Cape Socio-Economic Consultative Council (ECSECC) 1995-2009:** The ECSECC doesn't have data available on sub-place basis therefore no data was sourced from ECSECC for the Primary Area.

Figure 3.2 illustrates the sources with available population data for the Primary Area.

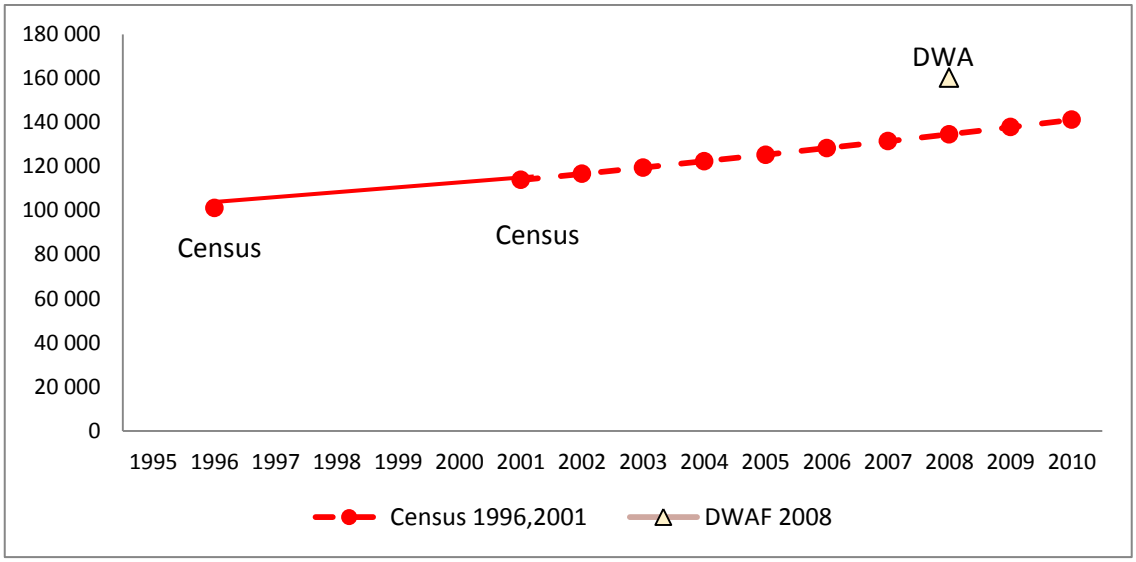


Figure 3.2: Sources with available population data of the Primary Area

3.1.3 Current population in the secondary area

- **Census 1996 and 2001:** Upon using the official trend between 1996 and 2001, the 2010 population is estimated at about 431 000 people.
- **Community Survey 2007:** According to the Community Survey, the current population in the Secondary Area should be in the order of 456 000 people.
- **Quantec (Standardised Regional) 1995 – 2010:** Given the official annual trend between 1995 and 2010, the 2010 population is estimated at about 455 000 people.
- **DWA 2008:** For the Secondary Study Area, DWA recorded in 2008 a population size of roughly 464 000 people.
- **Eastern Cape Socio-Economic Consultative Council (ECSECC) 1995-2009:** The 2010 population estimate for the Secondary Area, using the annual growth trend is about 433 000 people.

Figure 3.3 illustrates the different sources with population figures for the Secondary Study Area, indicating the year(s) in which they have data available.

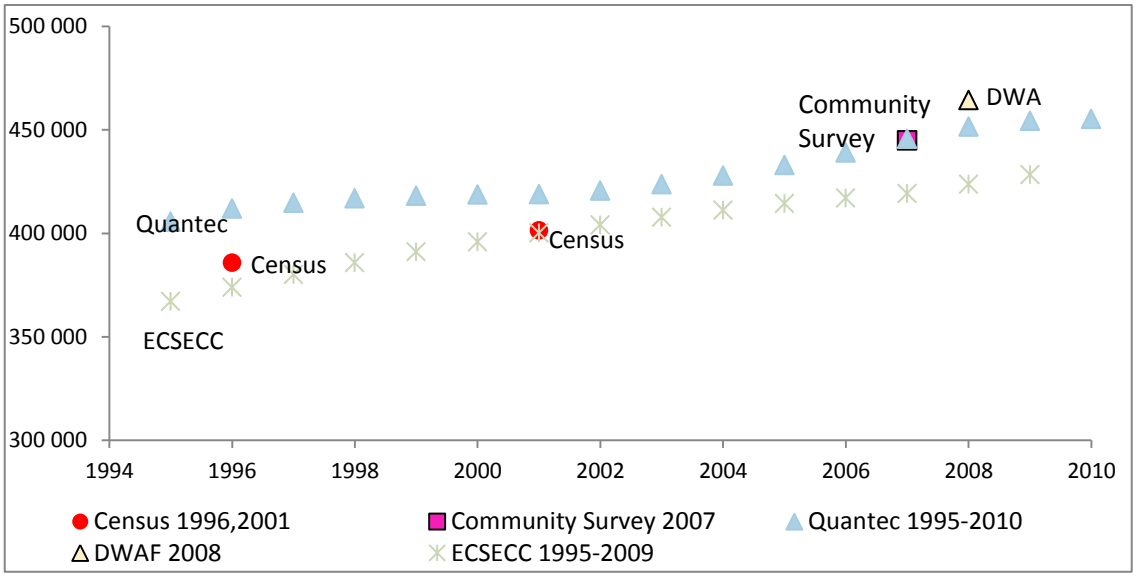


Figure 3.3: Sources with available population data of the Secondary Study Area

3.1.4 Current population in the tertiary area

- **Census 1996 and 2001:** According to the available 1996-2001 Census data for the Tertiary Area, and given the official growth trend between 1996 and 2001, the 2010 population is estimated to be about 1.87 million people.
- **Community survey 2007:** Given an average growth trend, the current population figure estimate is 1.91 million people.
- **Quantec (Standardised Regional) 1995 – 2010:** According to Quantec, an estimate of approximately 1.91 million people currently resides in the Tertiary Area.
- **DWA 2008:** According to DWA, the population for the Tertiary Area in 2008 was approximately 1.75 million people.
- **Eastern Cape Socio-Economic Consultative Council (ECSECC) 1995-2009:** Given the official trend between 1995 and 2009, the 2010 population is estimated at about 1.78 million people.

In **Figure 3.4**, the different sources present population figures for the Tertiary Area, indicating the year(s) in which they have data available.

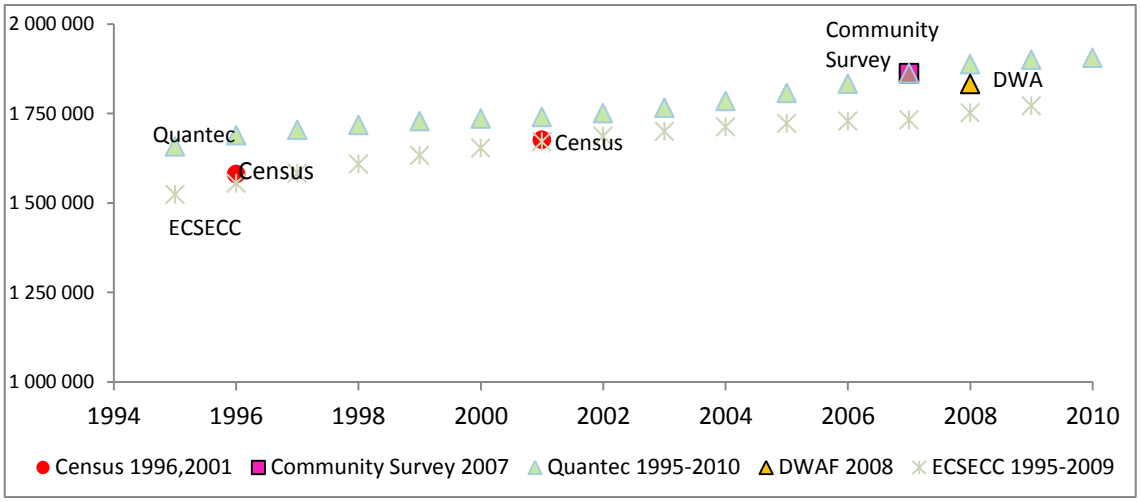


Figure 3.4: Sources with available population data of the Tertiary Area

3.1.5 Synthesis

Based on the above analysis it was found that there are different perspectives with regard to the size of the population in the various areas, comprising the Study Area. These discrepancies are evident in the following table.

Table 3.1: Minimum and maximum population figures

Study Area	Minimum population	Maximum population	DWA 2008
Planning Area (2008)	43 700	62 638	62 638
Primary Area (2008)	134 629	160 208	160 208
Secondary Area (2010)	431 447	455 200	464 351
Tertiary Area (2010)	1 784 180	1 905 311	1 831 775

Source: Census, DWA, Quantec, ECSECC and Urban-Econ 2011 calculations

Table 3.1 indicates the highest and lowest population figures collected from the various available data sources. The most recent population figures for the Planning and Primary Area is for 2008, but for the Secondary and Tertiary Area population were projected up to 2010. The highest population figure in the LRWSS Planning Area is about 19 000 people more or 43.3% more, than the lowest figure. The Primary Area's maximum population is approximately 26 000 people (19.0%) more than the lowest figure. For the Secondary Area, DWA recorded a higher population figure in 2008 than the maximum population in 2010, which is about 24 000 people more than the minimum population. The maximum population for the Tertiary Area was roughly 121 000 people more than the lowest population figure. The variance in the population numbers necessitates that the Planning Area be investigated in more detail.

3.2 PLANNING POPULATION (2010)

This sub-section focuses on the process to estimate the current population that is suitable for water demand modelling purposes. The process consists of a structured sampled survey of households in the LRWSS Planning Area (see **Appendix D**) and an attempt to determine of physical structures from Google Earth to gather primary information in order to update the population figures in **Section 4.1** to 2010.

3.2.1 LRWSS Planning area

The survey was necessary to make sense of the different available data sources and to clarify which data source, or sources, are most accurate for analysis and interpreted it into four scenarios, presented in **Appendix A**. Based on the structured sampled survey, the current population in the Planning Area is estimated[4] at 78 700 people or 15 400 households (See **Table 3.2**).

Table 3.2: LRWSS Planning Area population, 2001 - 2011

	2001			2008		2010		
Census Name	Pop	HH	DWA Name	Pop	HH	Survey	Pop	HH
Luzupu	1 574	290	Bomveni	1 814	361	Luzupu	3 078	572
Zalu Heights	1 025	192	Zalu Heights	985	196	Zalu Heights	1 034	198
Mpala	437	67	Mpala	427	85	Mpala	492	94
Palmarton Mission	55	18	Palmartone (NH)	915	182	Palmarton	1 361	268
Pamalitoli	589	122	Palmartone (PSJ)	683	136	Pamalitoli	745	142
Nyosani	242	41	Jambeni C	2 633	524	Nyosani	446	88
Nyosani	356	60				Nyosani	652	128
Sibalweni	834	156				Sibalweni	1 696	333
Lusikisiki			Mbila	3 598	716	Ngobozana	3 817	750
Lusikisiki			Mdikane	8 271	1 646	Mdikane	9 346	1 837
			Kanana	2 080	414	Kanana	2 351	462
KwaNyati	465	83				KwaNyati	501	99
Gunyeni	2 799	584	Nzintlana	1 030	205	Gunyeni	3 527	693
Chithwayo	666	108	Gobozana	4 924	980	Chithwayo	652	128
Lusikisiki SP	5 117	2 029				Gobozana	5 902	1 149
			Kwanyuswa	2 337	465	Kwanyuswa	2 808	552
						Mzintlana	1 238	243
Ntsimbini	1 000	262	Ntsimbini	1 724	343	Ntsimbini	2 366	464

[4] *The population was calculated by utilising the survey together with physical structure counted (rapid land use audit) by Urban-Econ.*

	2001			2008		2010		
Census Name	**Pop**	**HH**	**DWA Name**	**Pop**	**HH**	**Survey**	**Pop**	**HH**
			Lusikisiki	2 347	467	Lusikisiki	2 821	554
Lusikisiki	3 960	1 103	Dubana A	4 352	866	Dubana A	5 230	1 028
			Goso	3 482	693	Goso	4 186	823
Tyeni	1 932	360	Mtshayaza	3 050	607	Mtshayaza	3 534	705
			Mgezwa	724	144	Mgezwa	838	167
			Mgezwa	2 045	407	Mgezwa	2 370	472
Nkunzimbini	1 251	234	Nkunzimbini	1 171	233	Nkunzimbini	1 929	384
Malangeni	739	150	Malangeni	1 789	356	Malangeni	2 073	413
			Upper Ntafufu - B	417	83	Upper Ntafufu - B	504	98
Mdankala	138	23	Ntshwabulo	146	29	Mdankala	176	34
			Ntongwane	1 603	319	Ntongwane	1 939	375
Gengope	511	122	Tafufu - B	864	172	Gengope	1 030	199
Mgugwane	876	175	Mgugwana	1 538	306	Mgugwana	2 009	389
			Thala	1 337	266	Thala	1 617	313
Gemvale	424	84	Gemvale	1 965	391	Gemvale	746	144
Mdovu	274	40				Mdovu	243	47
Kaleni	114	23				Kaleni	140	27
Kwagingqi	352	69	Lower Ntafufu - B	1 960	390	Kwagingqi	679	131
Mantusini	907	172				Mantusini	1 692	327
			Mthambalala - B	2 427	483	Mthambalala - B	2 935	568
Total	**26 637**	**6 567**	**Total**	**62 638**	**12 465**	**Total**	**78 700**	**15 400**

Sources: Census 2001, DWA 2008, Google Earth 2004 and UE calculation, 2011

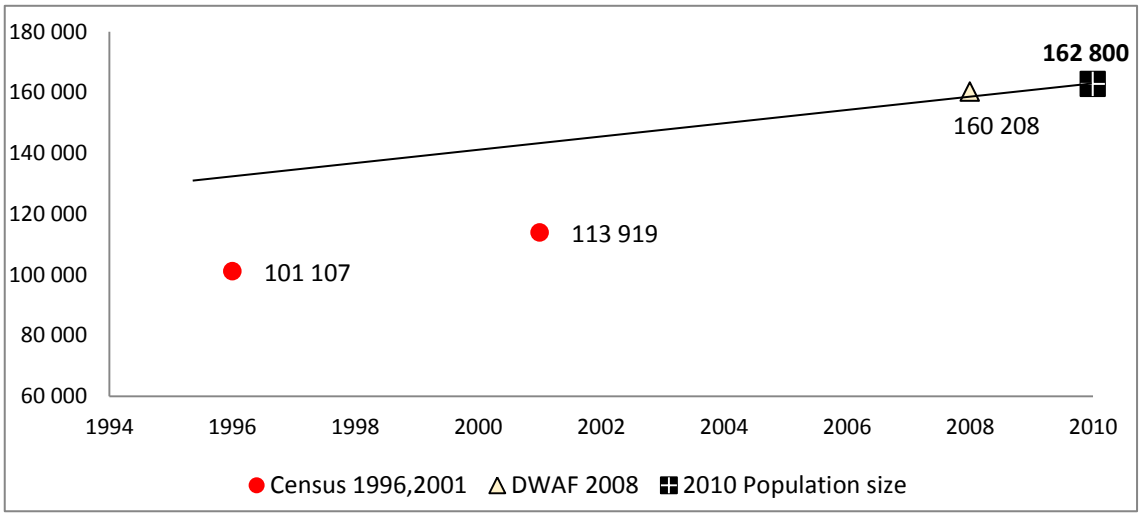
The population figures in **Table 3.3** implies that the population has increased with a growth rate of about 12.8% per annum. This is technically not correct as the 2001 Census as well as the 2008 DWA figures represent undercounts.

One of the main factors that may have a negative influence on the growth of the Study Area's population is the HIV/AIDS virus. The impact of HIV/AIDS, as well as factors such as migration; were taken into consideration by utilising historic growth rates to derive current and future population figures.

3.2.2 Primary area

Figure 3.5 illustrates the population figures of the Primary Area obtained from all the available sources available.

Figure 3.5: Population of the Primary Study Area, 1996 - 2010



Source: Census and DWA

Census and DWA are the only two sources that provide population figures for the Primary Area from 1996 to 2008. According to Census 1996, the population size was approximately 101 107 people, increasing to 113 919 people in 2001. In 2008, DWA recorded a population size of 160 208 people.

Table 3.3 indicates the 2008 and 2010 population size and number of households in the Primary Area.

Table 3.3: Population and household figures; 2008, 2011

	2008	2010	Growth rate[5]
Population	160 208	162 800	0.8%
Number of households	31 881	32 800	1.4%

Source: DWA 2008, Urban-Econ calculations 2011

According to DWA, the total population size in 2008 of the Primary Area was 160 208 people. Growing by 0.8% annually, the current population size for the Primary Area is approximately 162 800 people, which increased by about 2 600 people over the two years. At the same time, the number of households grew by 1.4% from 31 881 households to about 32 800 households. This is due to a change in household composition with households moving away from traditional extended families to display characteristic of the modern single core family unit. Currently, the average household size is 5 persons per household.

[5] *Average growth rate using annual growth from Census 1996, 2001, Quantec 1995-2010, ECSECC 1995-2009 and the IDP 2010/11 (See Appendix C)*

3.2.3 Secondary area

Figure 3.6 illustrates the population figures of the Secondary Area obtained from all the different sources available.

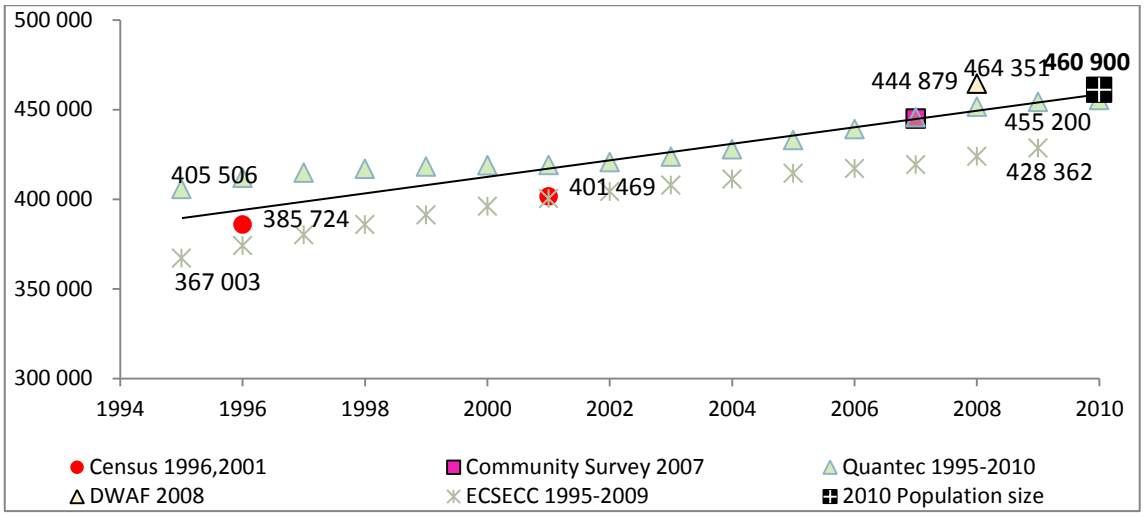


Figure 3.6: Population of the Secondary Study Area; 1995-2010

Source: Census, Community Survey, Quantec, DWA and ECSECC

Quantec and ECSECC are the only available sources providing population figures for the Secondary and Tertiary Area from 1995 to 2010. According to Census 1996, the population size for the Secondary Area was approximately 386 000 people and in 2001 about 401 000 people. According to Community Survey 2007, the population size was in the order of 445 000, which is much similar to Quantec 2008 population figure. In relation to Quantec, DWA 2008 had a slight overestimated population figure of approximately 464 000 people.

The projected population figures in 2010 from all five available sources differs somewhat ranging between 431 447 people and 471 785 people. Quantec and Community Survey indicates a similar population figure, with DWA overestimating slightly by approximately 16 000 people. Thus, an estimate of about 460 900 people for the current population in the Primary Area is reliable and most accurate to the actual population figure.

3.2.4 Tertiary area

Figure 3.7 illustrates the population figures of the Tertiary Area obtained from all the different sources available.

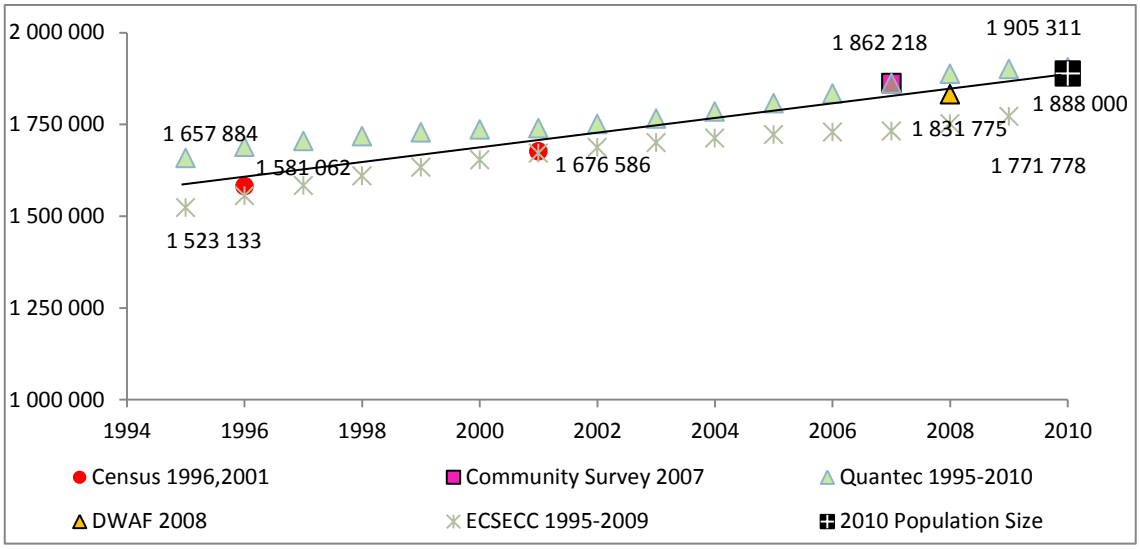


Figure 3.7: Population of the Tertiary Study Area; 1995-2010

Source: Census, Community Survey, Quantec, DWA and ECSECC

Figure 3.7 indicates that Quantec recorded in 1995 a population size of approximately 1.7 million and ECSECC roughly 1.5 million people, which is underestimated by nearly 130 000 people. According to Census 1996, the population size was approximately 1.6 million people and in 2001 roughly 1.7 million people. Community Survey 2007 had a population size of approximately 1.9 million, which is in line with Quantec 2008 population figure. In relation to Quantec, DWA underestimated the population size in 2008 by nearly 56 000 people.

Upon the examination of 2010 population figures from Quantec and ECSECC together with projected population trends for Census, Community Survey and DWA datasets, the differences in population are minor ranging between 1.78 million and 1.91 million people. DWA is very much in line with Quantec and the estimates of Community Survey and Census. Therefore, a population estimate of about 1.89 million people for the Secondary Area would be most representative to the actual population size.

3.2.5 Conclusion

Table 3.4 conclude the total 2010 population and household estimates for each Study Area.

Table 3.4: Population and households figures for 2010

	Population	Number of households
Planning Study Area	78 700	15 400
Primary Study Area	162 800	32 800
Secondary Study Area	460 900	89 500
Tertiary Study Area	1 888 000	391 400

Source: DWA 2008 and Urban-Econ Calculations 2011

The 2010 population for the LRWSS Planning Area estimates at about 78 700 people consisting of 15 400 households. The Primary Area estimates at 162 800 people with about 32 800 households. The Planning Area's population represents just over 48% of the Primary Study Area. Currently, the Secondary and Tertiary Area have population sizes of 460 900 people and 1.89 million people respectively.

4 SOCIO-ECONOMIC PROFILE

This section provides an overview of the socio-economic status of the population in the Study Area. The socio-economic aspects that will be highlighted, includes the following:

- Age and gender profile;
- Income and expenditure;
- Education;
- Employment;
- Economic profile of Lusikisiki; and
- Resource findings.

Due to the availability and accuracy of information, the 2011 market survey, Community Survey 2007 and Quantec 2010 database will form the basis of the analysis in this section.

4.1 AGE AND GENDER PROFILE

Figure 4.1 shows the age profile of the two local municipalities in the Study Area according to the 2011 market survey.

4.1.1 Age profile

The figures of Community Survey 2007 and the market survey reveal a fairly similar trend throughout the Study Area. According to the market survey, the ***largest proportion of the population is younger than 30 years***. The portion of the population that can be regarded as potentially economically active population, i.e. the population that falls in the 15 to 64 years age category comprises of 55% of the total population, which transpires to a weak labour force profile. Assumingly the majority of people older than 25 years migrate due to work opportunities and a better lifestyle elsewhere.

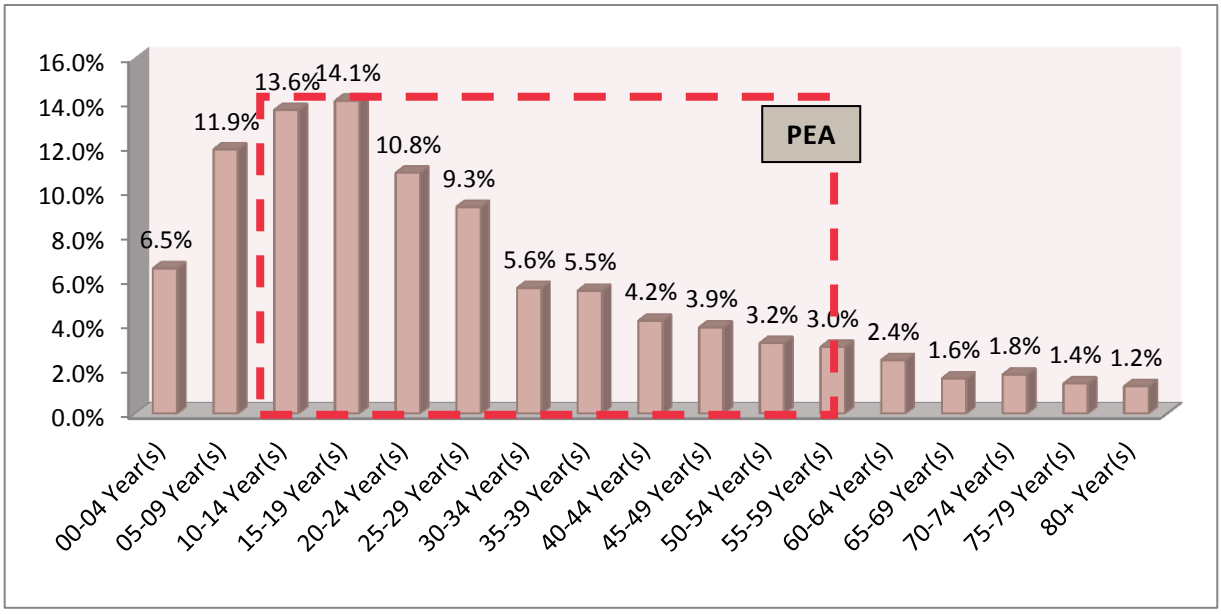


Figure 4.1: Age distribution for the Study Area, 2010

Source: Urban-Econ Market Survey, 2011

4.1.2 Gender profile

Figure 4.2 shows that there are slightly more females (51%) than males (49%) in the Study Area. Much the same trends have been recorded for the Secondary and Tertiary Areas.

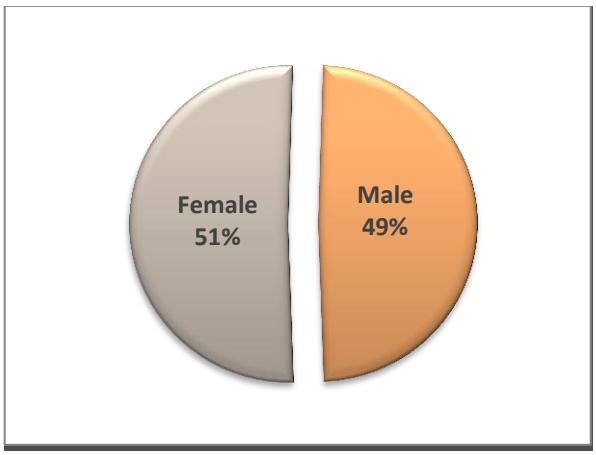


Figure 4.2: Gender Profile in the Study Area, 2010

Source: Urban-Econ Market Survey, 2011

4.2 INCOME AND EXPENDITURE

This sub-section analyses the annual income and expenditure patterns of the population in the Study Area.

4.2.1 Income

Figure 4.3 shows the average annual income of the total population in the Primary Area according to different income categories. The income categories of the Community Survey have been updated with the CPIX of Stats SA. The Market Survey conducted in the Planning Area reflects slightly higher, but much the same, trends. The income categories reflect that of the total population, and therefore include children and retired people, and it also reflects all sources of income, including social grants.

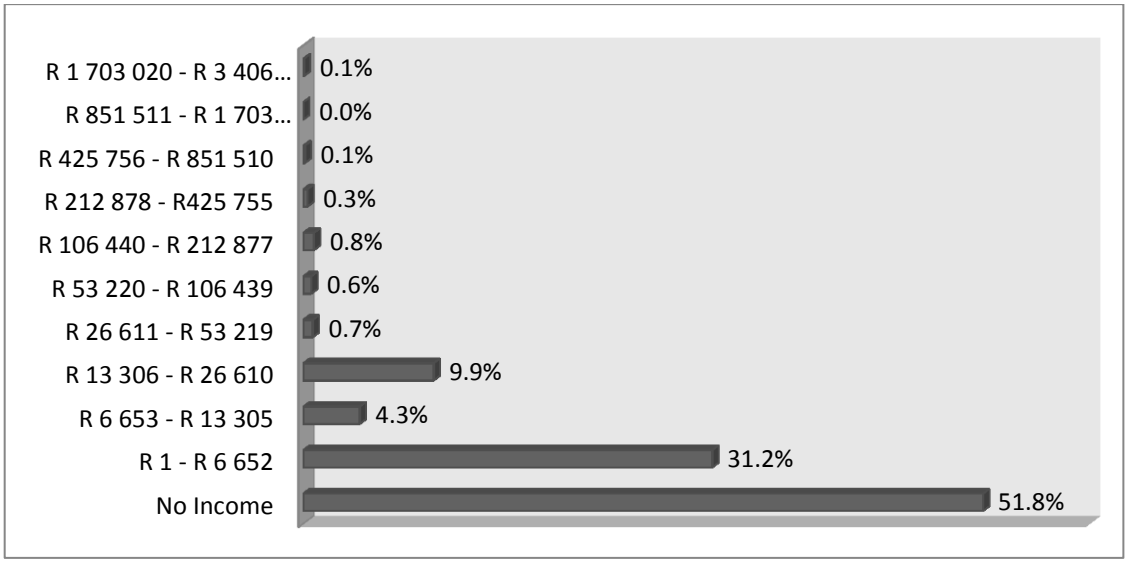


Figure 4.3: Annual Income per category in the Primary Area, 2010

Source: Community Survey 2007 and Urban-Econ Calculations 2011

Evidently, ***more than half of the population in the Primary Area earns no income***, with 31.2% earning between R 1 and R 6 652 annually. The majority of the population in the Primary Area earns less than R 26 610 per year.

Figure 4.4 indicates the main source from which households receive their monthly income. More than half of the respondents' main source of income is from social grants (57%) followed by salaries and wages (30%).

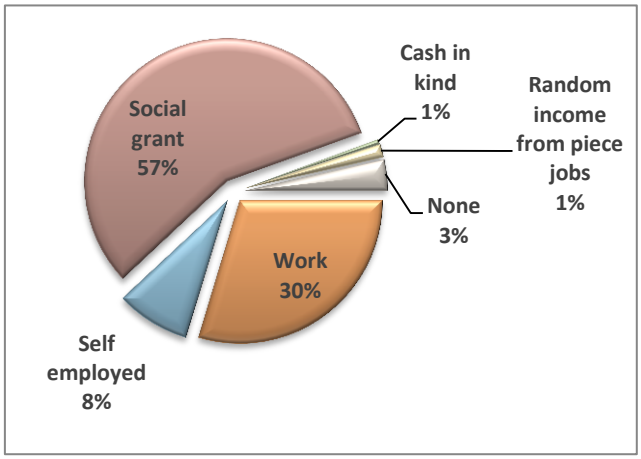


Figure 4.4: Main household income source

Source: Urban-Econ Market Survey, 2011

4.2.2 Expenditure

The main spending category of the population is on retail goods and services. Retail goods and services can be divided into four sub-categories, namely:

- **Durable goods:** Items that last for a long time. Goods including furniture, household appliances and personal transport equipment.
- **Semi-durable goods:** Items that last longer than non-durable goods but needs to be replaced periodically. Goods including clothing, footwear, kitchenware and household textiles.
- **Non-durable goods:** Items that do not last long. Goods including food, beverages, tobacco, alcohol, personal care products and pharmaceutical products.
- **Services:** Services include activities such as banking, postal, personal care, health and communications. The services category also includes expenditure on household services such as electricity and water.
- Figure 4.5 shows the distribution of household expenditure on retail goods and services per sub-category.

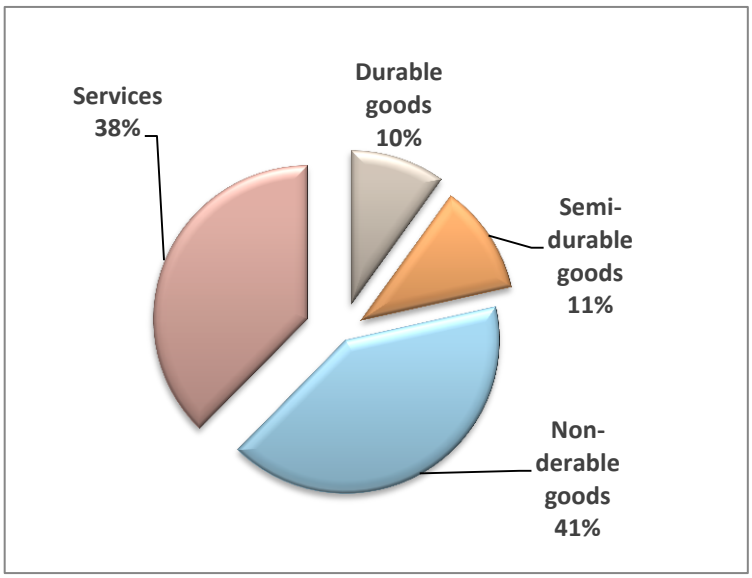


Figure 4.5: Expenditure profile for the Primary Area, 2008

Source: Quantec 2008

According to the Quantec Database, **99%** of disposable income in the Study Area is spent on retail goods and services. Non-durable goods represent the largest portion (**41%**) of the expenditure. Another expenditure category that contributes a large portion of the expenditure includes services with **38%**. Durable and semi-durable goods each contribute **10%** and **11%** respectively.

4.3 EDUCATION

Figure 4.6 illustrates the educational profile according to the 2011 Market Survey. Evidently, the majority of the population (50%) in the Primary Area has no schooling. However, ***children between 0 and 5 years of age have been included in the category and therefore result into an inflated value***. Of the people which have some kind of education, 24% has primary education and 21% has secondary education. The Market survey is much more focused and therefore differs somewhat to the District and Province. The District and Province has less people with no schooling of about 15% and 11%, respectively. About 1% of the surveyed Study Area attends a FET/ABET[6] institution/college.

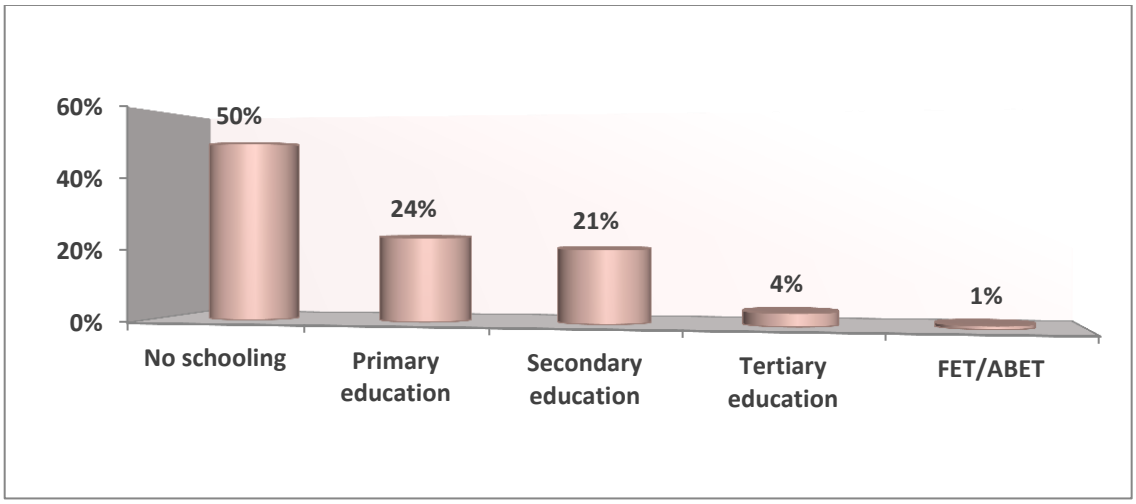


Figure 4.6: Educational profile for the Primary Area, 2010

Source: Urban-Econ Market survey 2011

4.4 EMPLOYMENT

This sub-section analyses the employment profile of the Primary Area. A clear distinction must be made between people who are employed, unemployed and those who are economically inactive (scholars, pensioners, homemakers, people with disabilities, etc.). The official definition and conditions of unemployment as stipulated by Statistics South Africa is presented below:

[6] *FET/ABET – Further Education and Training or Adult Basic Education and Training*

According to the official definition of **unemployment**, an individual must meet all the following conditions to be regarded as unemployed:

- The person did not work during the seven days prior to the survey interview, and does not have any job attachment.
- The person wants to work and is available to start work in two weeks.
- The person has taken active steps to seek work or taken initiative to start a business in the four weeks prior to the interview.

Figure 4.7 illustrates the employment profile of the population in the Primary Area. The Market Survey conducted indicates that ***72% of the population in the Primary Area is either unemployed or economically inactive***. About 15% of the population in the Primary Area is employed.

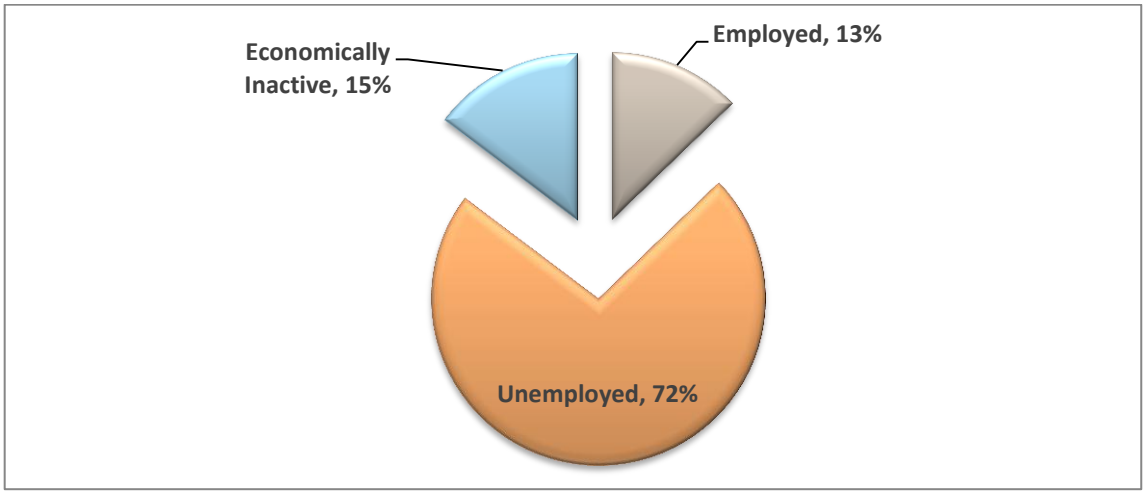


Figure 4.7: Employment profile for the Primary Area, 2010

Source: Urban-Econ Market Survey 2011

From **Figure 4.8,** the largest portion of the population in the Primary Area is employed in the *agriculture and fishing* sectors (44%), followed by both the *financial and insurance sectors* (13%) as well as the *manufacturing* sectors (13%). The *agriculture and fishing* sectors (28%) is also the largest in the Secondary Area and consist primaraly of subsistance farming, followed by *wholesale and retail trade* with 17%. The *wholesale and retail trade* sector in the Primary Area also employs a large portion of people.

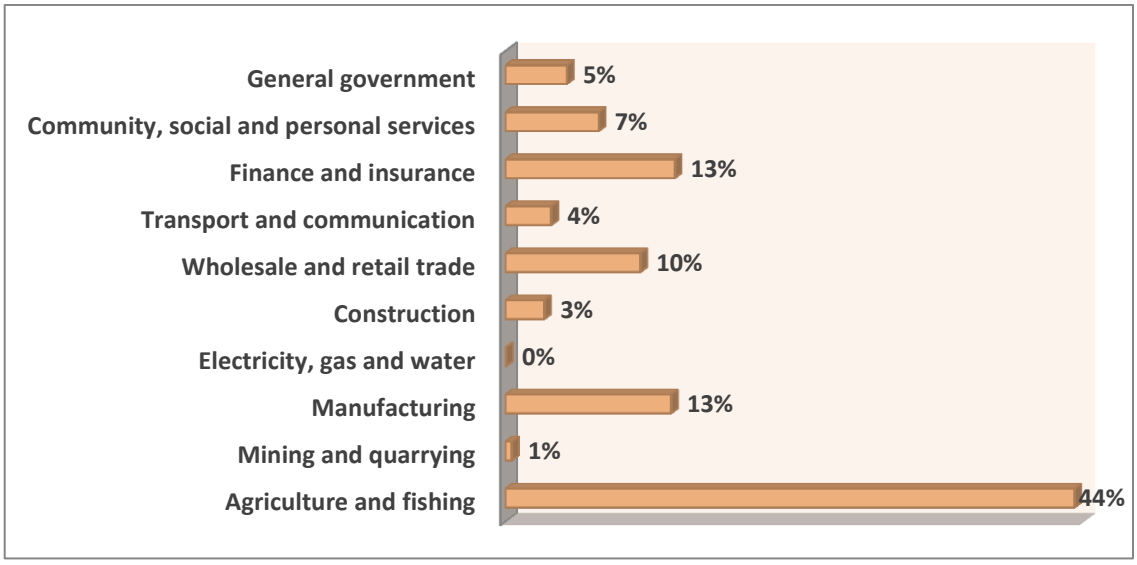


Figure 4.8: Employment per sectors in the Primary Area, 2009

Source: Quantec 2009

4.5 ECONOMIC PROFILE OF LUSIKISIKI

A business audit (**Appendix D**) that was conducted in Lusikisiki, surveyed the current status quo of businesses in the town. **Figure 4.9** indicates the finding of the business audit.

A total of 151 out of the approximate 190 formal and informal businesses were sampled in Lusikisiki, which altogether employs a total of 1180 people. It is evident that the businesses in the *food and non-alcoholic beverages* outlets, including tuck shops and food stands, are most prevalent (31%) followed by the *clothing and footwear* shops (19%).

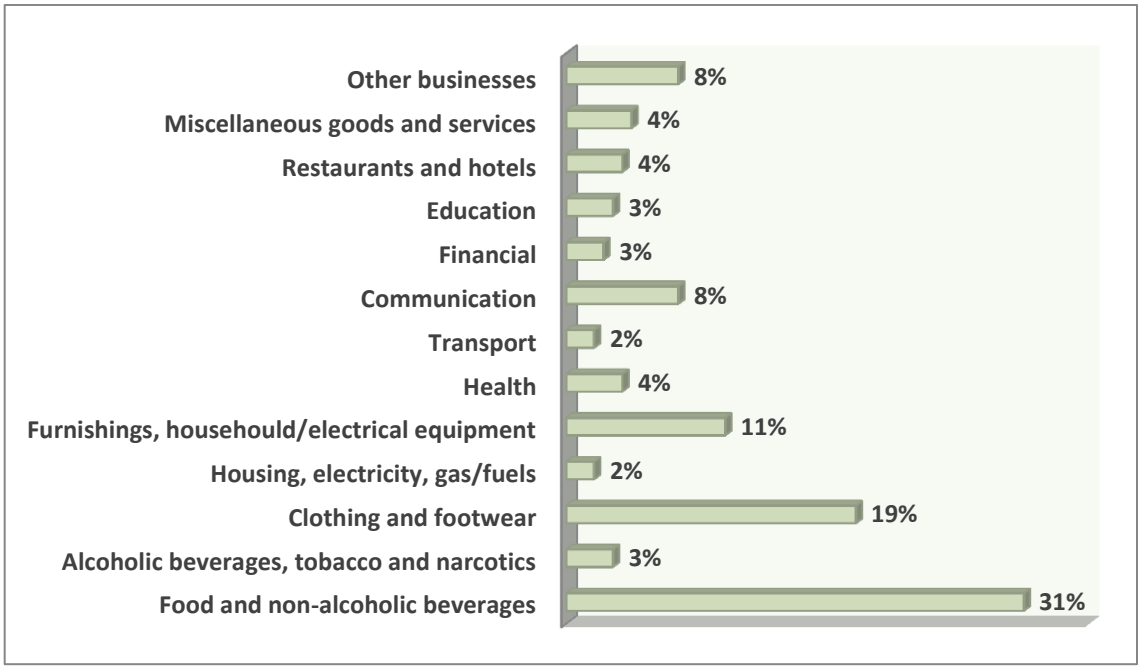


Figure 4.9: Sampled businesses in Lusikisiki, 2010

Source: Urban-Econ Business Audit 2011

Figure 4.10 illustrates the number of years the businesses have been in operation. Evidently, businesses tend to operate on average 10 years, assumingly due to regular support. The majority of 35% operate between 2 to 5 years, followed by 27% operating between 1 to 2 years. Of the sampled businesses in Lusikisiki, 5 have been in operation for longer than 20 years.

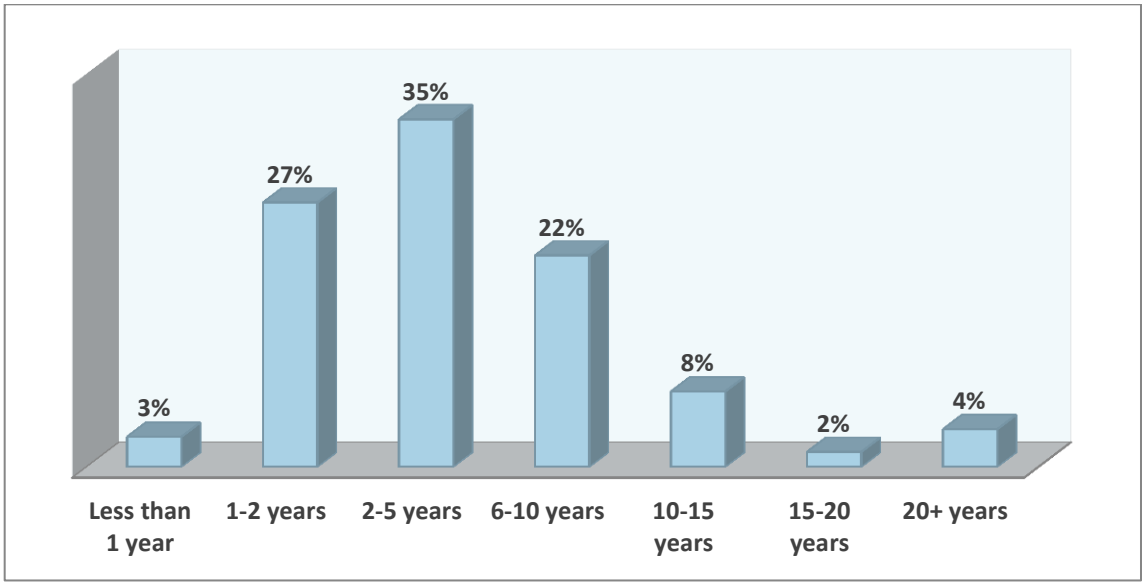


Figure 4.10: Number of years in Operation, 2010

Source: Urban-Econ Business Audit 2011

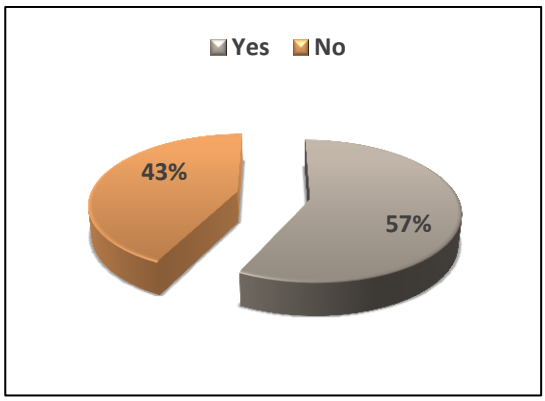


Figure 4.11: Businesses with access to piped water, 2010

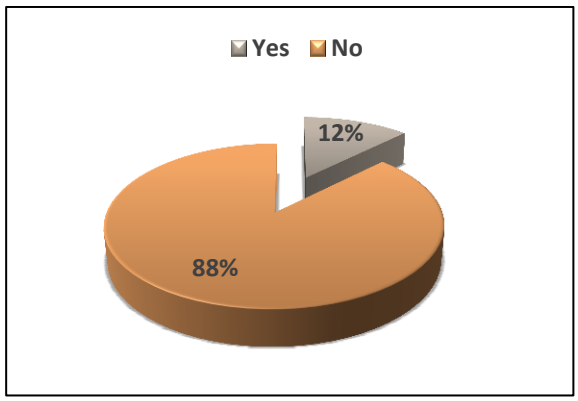


Figure 4.12: Businesses planning to relocate in the near future, 2010

Source: Urban-Econ Business Audit 2011

About 57% of the businesses indicated that they were audited have access to piped water (**Figure 4.11**). The remainder represent mainly those that operate from the sidewalks, and non-formal business stands.

Figure 4.12 illustrates that 12% of the respondents said that they are planning to relocate in the near future. The majority of those who are planning to relocate intend to relocate to Port St Johns LM.

4.6 OTHER TRENDS

This sub-section presents further outcomes of the 2011 Market Survey. **Figure 4.13** shows water resources that provide access to domestic water in the LRWSS Planning Area. According to the Market Survey, the river-stream (48%) is the main source of water followed by "piped water less than 200 metre from the dwelling" (29%). Half of the district sources their water from a river-stream.

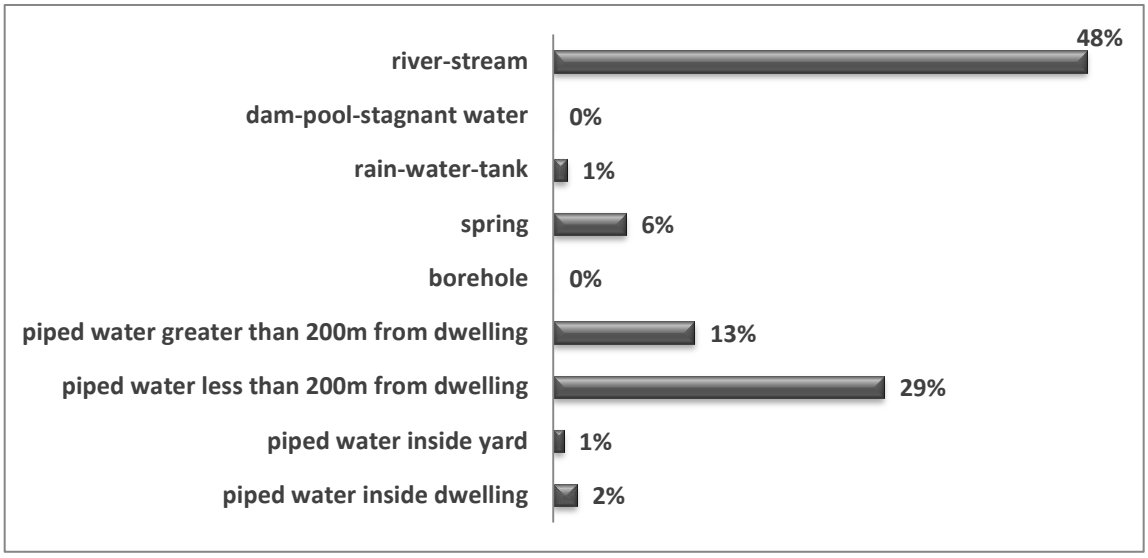


Figure 4.13: Source of domestic water, 2010

Source: Urban-Econ Market Survey 2011

Figure 4.14 shows most of the dwelling units (45%) can be categorised as traditional/hut/or dwellings made of traditional materials. This is followed by flats (40%) or second dwelling units on the same land as the main dwelling unit. This trend is much similar to the district as 70% of the households' dwelling units can also be categorised as traditional/hut/or dwellings made of traditional materials. Only 8% of the households in the Planning Area has house or brick structured housing, which is considerable lower than the district (19%).

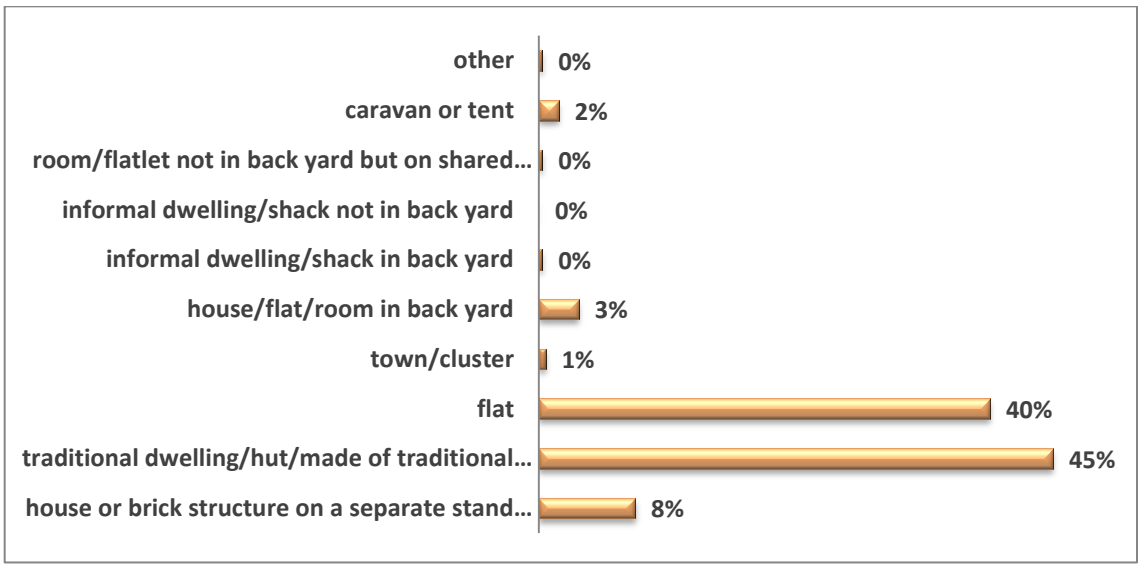


Figure 4.14: Type of dwelling, 2010

Source: Urban-Econ Market Survey 2011

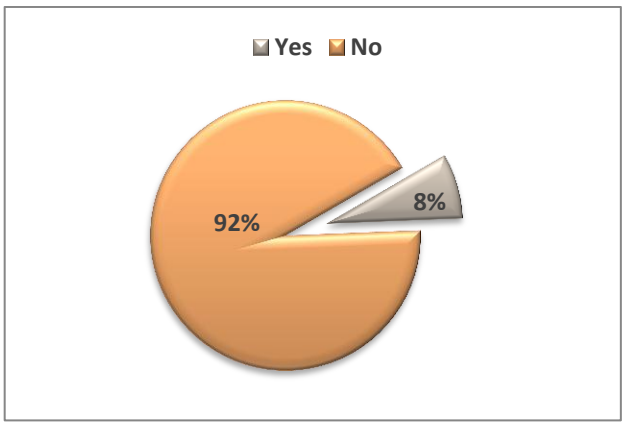


Figure 4.15: Businesses operated on premises, 2010

Source: Urban-Econ Market Survey 2011

From **Figure 4.15**, about 8% of the LRWSS Planning Area operates a business from their premises, which consists of mainly personal business, food and beverages, clothing and footwear.

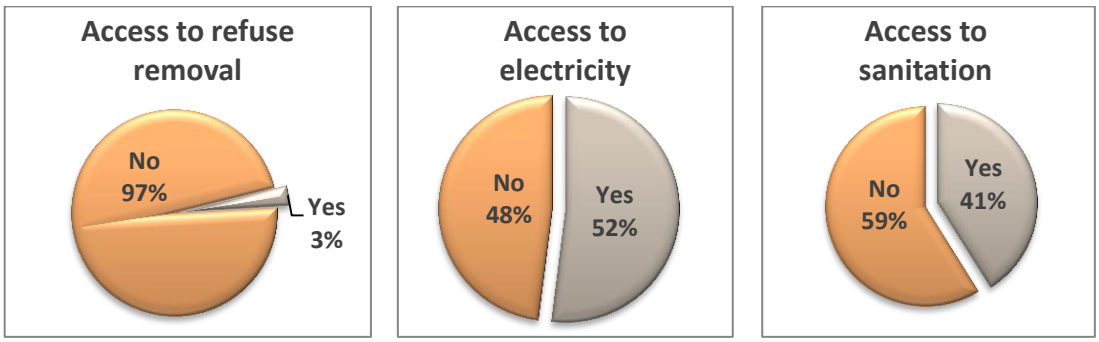


Figure 4.16: Access to basic services, 2010

Source: Urban-Econ Market Survey 2011

From **Figure 4.16**, approximately 97% of the population in the Primary Area has no access to refuse removal, which closely correlates to the O.R. Tambo District (91%). About 52% of the Primary Area has access to electricity and 41% has access to basic sanitation facilities.

Figure 4.17 illustrates the type of agricultural activities occurring on the respondent's premises. The agricultural composition of the Planning Area consists mainly of grain cultivation (59%) and vegetable farming (8%). Only 1% of the population in the Study Area cultivates orchards (fruits trees) or has livestock respectively. About 31% has no agricultural activities on their premises.

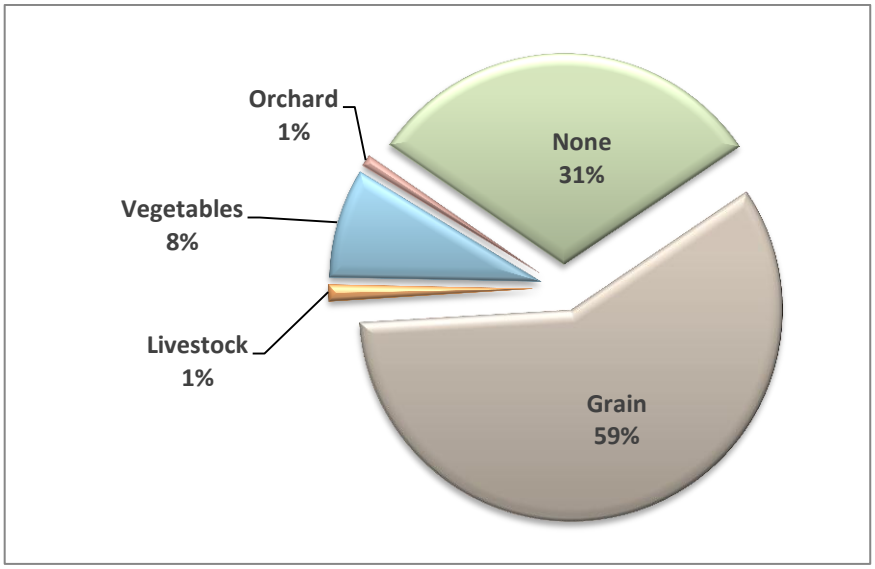


Figure 4.17: Agricultural activities occurring on premises, 2010

Source: Urban-Econ Market Survey 2011

4.7 WATER RESOURCE UTILISATION

Together with the Market Survey and the Business Audit, a more detailed survey was conducted in an area of 5 km long and between 500 m to 600 m wide, downstream of the proposed Zalu Dam site.

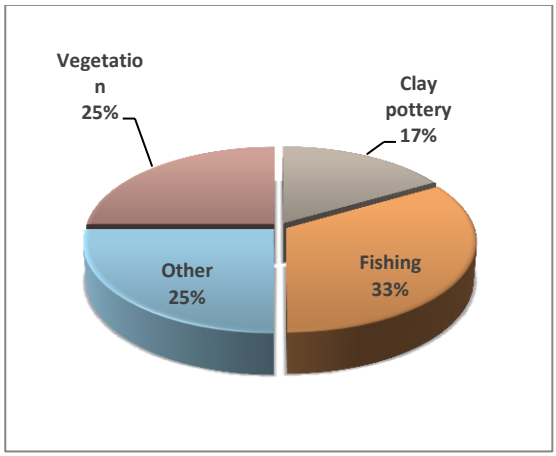


Figure 4.18: Activities along the river stream, 2010

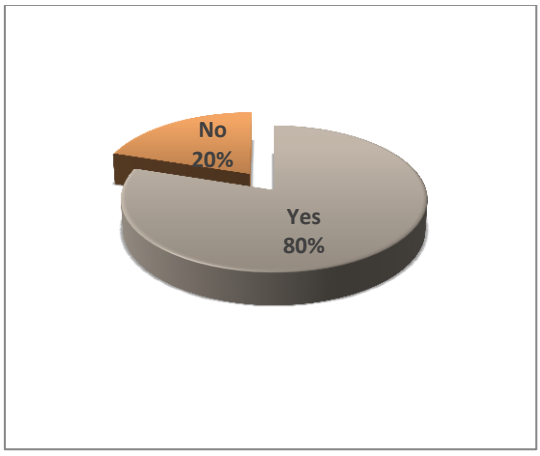


Figure 4.19: Are the river used for spiritual activities, 2010?

Source: Urban-Econ Market Survey 2011

Figure 4.18 illustrates the various activities that sprout from the river. Fishing (33%) followed by vegetation (25%) are the main resources utilised from the river. Other activities include the use of the river for medicinal uses and washing. Eels and other fish are present in the river and vegetation includes activities like thatching and wood for

fire purposes. The river is also used for recreational purposes, i.e. swimming and traditional ceremonies together with spiritual ceremonies (**Figure 4.19**).

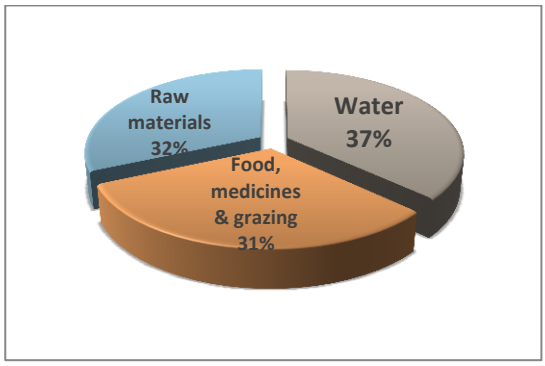


Figure 4.20: Purpose the river water is used for, 2010

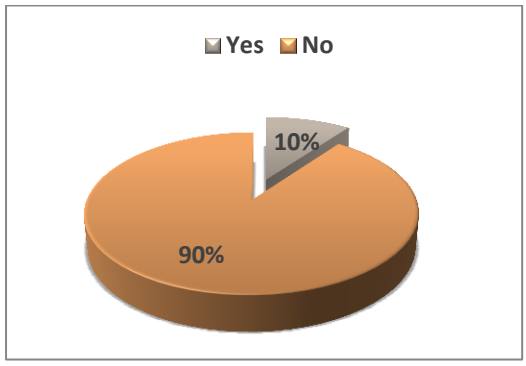


Figure 4.21: Are there deceases in the water, 2010?

Source: Urban-Econ Market Survey 2011

Figure 4.20 illustrates the purpose that the river water is used for. The respondents were asked if they use it for drinking water, food cultivation, medicines, grazing or as a raw material; the majority of respondents answered that they use it for drinking water. The response recorded is much the same for the different categories.

Referring to **Figure 4.21**, respondents were asked if they know of any deceases in the river water, of which 90% said no and the 10% that answered yes stated that it only happened once in the past 5 years.

4.8 CONCLUSION

There is a slight domination of females in the Planning Area and the largest portion of the population is younger than 30 years. Half of the population in the Primary Area has no schooling. However, children between 0 and 5 years of age have been included in the category and therefore result into an inflated value. Of the people which have some kind of education, ***24% has primary education*** and ***21% has secondary education***. About ***72% of the population in the Primary Area is unemployed*** with approximately ***15% of the population being employed*** in the formal and informal sectors. The largest portion of the population is employed in the ***agriculture and fishing sector***. Secondly, both the ***finance and insurance sector*** as well as the *manufacturing* sector also employs a significant number of people. The ***agriculture and fishing*** sector is also the largest in

the Secondary Area, followed by ***wholesale and retail trade***. The wholesale and retail trade sector in the Primary Area also employs a large portion.

Upon examining the income categories, ***more than half*** of the population in the Primary Area earns ***no income***, with ***31.2%*** earning an annual income of ***between R1 and R6 652 per annum***. More than half of the Primary Area's main source of income is from social grants followed by salaries and wages. ***Non-durable goods*** represent the largest portion of the expenditure, followed by expenditure to services.

A total of ***151*** of the about 190 formal and informal businesses were sampled in Lusikisiki (Business Audit 2011), which altogether ***employs a total of 1 180 people***. Businesses in the ***food and non-alcoholic beverages*** outlets, including tuck shops and food stands, are most prevalent followed by the ***clothing and footwear*** shops. The majority of the businesses situated in Lusikisiki have been operating for ***less than 10 years***.

According to the Market Survey, the ***river-stream is the main source of water*** followed by "piped water less than 200 metre from the dwelling" (29%).

5 PROJECTIONS

In this section the Planning and Primary Area's population size and the number of households are projected in five year intervals from 2015 to 2040. Together with the projections, the domestic water demand for the Study Area is estimated based upon standards provided by AECOM.

5.1 PROJECTED POPULATION AND HOUSEHOLDS FIGURES

Table 5.1 indicates the population size and number of households projected for 2015 until 2040 using an annual growth rate of 0.9% for population and 1.4% for households in the Primary Area (excluding the planning area) and 1.1% for population and 1.5% for households in the Planning Area **Table E.1** in **Appendix E**. These growth rates are mainly based on historic growth trends that incorporate, inter alia, the following:

- Mortality trends;
- Migration;
- HIV/AIDS effects; and
- Potential access to domestic water as a result of the proposed Zalu Dam

Table 5.1: Projections for population and households figures: 2015 - 2040

Area	Indicator	2010	2015	2020	2025	2040	*Annual GR*
LRWSS Planning Area	Population Size	78 700	82 900	87 800	92 600	107 800	*1.1%*
	Number of households	15 400	16 600	17 900	19 300	24 100	*1.5%*
Primary Area	Population Size	162 800	170 600	178 900	187 500	211 300	*0.9%*
	Number of households	32 800	35 200	37 900	40 700	50 100	*1.4%*

Source: DWA 2008 and Urban-Econ Calculations 2011

The population size for the LRWSS Planning Area is expected to increase from 78 700 people in 2010 to an estimated 82 900 people in 2015, 87 800 people in 2020 and 107 800 people in 2025. The Primary Area has a population of 162 800 in 2010, which will increase to about 170 600 people in 2015, 178 900 people in 2020 and 211 300 people in 2040. The number of households in the Planning Area indicates an increase of approximately 17 300 households from 2010 to 2040 and the Primary Area an increase of 8 700 households.

5.2 ESTIMATED DOMESTIC WATER DEMAND

This sub-section estimates the domestic demand for water (mostly rural areas) based on the following standards stated in the Feasibility Study for Augmentation of the Lusikisiki Regional Water Supply Scheme – Technical Submission (prepared by: BKS (Pty) Ltd; January, 2010):

- **Category 1:** Rural villages - basic level of service: 25 ℓ/c/d;
- **Category 2:** Rural villages - stand connections: 60 ℓ/c/d;
- **Category 3:** Rural villages with provision for schools, clinics and hospitals: 90 ℓ/c/d; and
- **Category 4:** dense rural towns with some economic development and water-borne sewerage: 150 to 250 ℓ/c/d.

To determine the water demand, the population in the Planning Area was divided into these four service level categories as indicated in **Table 5.2**.

Table 5.2: Service level categories for water consumption, 2010

	Description	Consumption	Population size
Category 1	Rural villages with basic level of service	25 ℓ/c/d	1 - 499
Category 2	Rural villages with stand connections	60 ℓ/c/d	500 - 1 499
Category 3	Rural villages with provision for schools, clinics and hospitals	90 ℓ/c/d	1 500 - 4 999
Category 4	Dense rural towns with some economic development and water-borne sewerage	200 ℓ/c/d	5 000 +

Source: BKS, 2010

Assumingly a sub-place with a population smaller than 499 people would consume 25 ℓ/c/d. Furthermore, a consumption of 60 ℓ/c/d was assumed for sub-places with a population size between 500 and 1 499 people, 90 ℓ/c/d for a population between 1 500 and 4 999 people and 200 ℓ/c/d for a population larger than 5 000 people.

Table 5.3 indicates the categorisation of the sub-places in the Planning Area into the above mentioned categories. These figures are based on the sub-place delineation discussed in **Section 2** of the report (**Figure 2.1**).

Table 5.3: LRWSS Planning area categorised by the amount of litres water consumed per day, 2010

LRWSS Planning Area	Population	ℓ/c/d	Total liters per day
Luzupu	3 078	90	276 978
Zalu Heights	1 034	60	62 028
Mpala	492	25	12 303
Palmarton	1 361	60	81 641
Pamalitoli	745	60	44 695
Nyosani	446	25	11 141
Nyosani	652	60	39 130
Sibalweni	1 696	90	152 606
Ngobozana	3 817	90	343 528
Mdikane	9 346	200	1 869 184
Kanana	2 351	90	211 561
KwaNyati	501	60	30 078
Gunyeni	3 527	90	317 446
Chithwayo	652	60	39 137
Gobozana	5 902	200	1 180 400
Kwanyuswa	2 808	90	252 761
Mzintlana	1 238	60	74 288
Ntsimbini	2 366	90	212 916
Lusikisiki	2 821	90	253 848
Dubana A	5 230	200	1 046 075
Goso	4 186	90	376 696
Mtshayaza	3 534	90	318 081
Mgezwa	838	60	50 306
Mgezwa	2 370	90	213 277
Nkunzimbini	1 929	90	173 595
Malangeni	2 073	90	186 551

LRWSS Planning Area	Population	ℓ/c/d	Total liters per day
Upper Ntafufu - B	504	60	30 266
Mdankala	176	25	4 406
Ntongwane	1 939	90	174 483
Gengope	1 030	60	61 776
Mgugwana	2 009	90	180 793
Thala	1 617	90	145 494
Gemvale	746	60	44 738
Mdovu	243	25	6 077
Kaleni	140	25	3 495
Kwagingqi	679	60	40 716
Mantusini	1 692	90	152 243
Mthambalala - B	2 935	90	264 186
	78 700		**8 938 921**

Source: Urban-Econ Market Survey 2011 and DWA

From **Table 5.3**, it can be concluded that 2% of the population of the Planning Area lives in Category **1** villages, 13% in **Category 2** villages, 59% in **Category 3** villages and 26% in **Category 4** towns. Urban-Econ assumes that the Primary Area (Extended Tender Study Area) has a similar proportional distribution as the Planning Area.

Due to future developments affecting the demographic profile of an area, four population growth scenarios were used to determine domestic water demand in the Planning and Primary Area. **Table 5.4** indicates the three population scenarios together with growth rates.

Table 5.4: Population growth scenarios, 2010 - 2040

Area	*LRWSS Planning Area*				*Primary Area*			
Scenario	*Low growth scenario*	*Medium growth scenario*	*High growth scenario*	*Most probable scenario*	*Low growth scenario*	*Medium growth scenario*	*High growth scenario*	*Most probable scenario*
Average Annual Growth Rate	0.3%	1.1%	2.1%	1.6%	0.3%	0.9%	1.5%	1.2%
2010	78 700	78 700	78 700	78 700	162 800	162 800	162 800	162 800
2015	81 600	82 900	85 200	84 100	168 600	170 600	173 600	172 100
2020	83 600	87 800	94 000	90 900	172 000	178 900	188 400	183 650
2025	84 400	92 600	104 600	98 600	173 700	187 500	206 500	197 000
2040	85 700	107 800	147 200	127 500	179 000	211 300	258 200	234 750

Source: DWA and Urban-Econ Calculation, 2011

a) Low growth scenario

The **low growth scenario** takes limited economic progress and infrastructural development into account, which will result in a declining population growth rate. The annual growth rate used to determine the population for the LRWSS Planning Area and primary Area is 0.3%.

Thus, the population size for the LRWSS Planning Area is expected to increase from 78 700 people in 2010 to an estimated 85 700 people in 2040. The Primary Area has a population of 162 800 in 2010, which will increase to about 168 600 people in 2015, 173 700 people in 2025 and 179 000 people in 2040.

b) Medium growth scenario

The population of the **medium growth scenario** is determined by taking only historic growth rates into account; 1.1% for the Planning Area and 0.9% for the Primary Area.

Thus, the population size for the LRWSS Planning Area is expected to increase from 78 700 people in 2010 to an estimated 107 800 people in 2040. The Primary Area has a population of 162 800 in 2010, which will increase to about 170 600 people in 2015, 187 500 people in 2025 and 211 300 people in 2040.

c) High growth scenario

The **high growth scenario** takes future economic progress and infrastructural development into account, which will result in an increase in population growth rates.

Growth rates used to determine the population for the Planning Area is 2.1% and for the Primary Area 1.5%.

Thus, the population size for the LRWSS Planning Area is expected to increase from 78 700 people in 2010 to an estimated 147 200 people in 2025. The Primary Area has a population of 162 800 in 2010, which will increase to about 258 200 people in 2040.

d) Most probable scenario

The **most probable scenario** is located between the medium and high growth scenarios, which present the most accurate population figures. This scenario combines historic growth rates with future economic progress and infrastructural development that will result in an increase in population growth rates. The average annual growth rate used to determine the population for the LRWSS Planning Area is 1.6% and for the Primary Area 1.2%.

Thus, the population size for the LRWSS Planning Area is expected to increase from 78 700 people in 2010 to an estimated 127 500 people in 2040. The Primary Area has a population of 162 800 in 2010, which will increase to about 172 100 people in 2015, 197 000 people in 2025 and 234 750 people in 2040.

Figure 5.1 illustrates the four growth scenarios of the Primary Area's population.

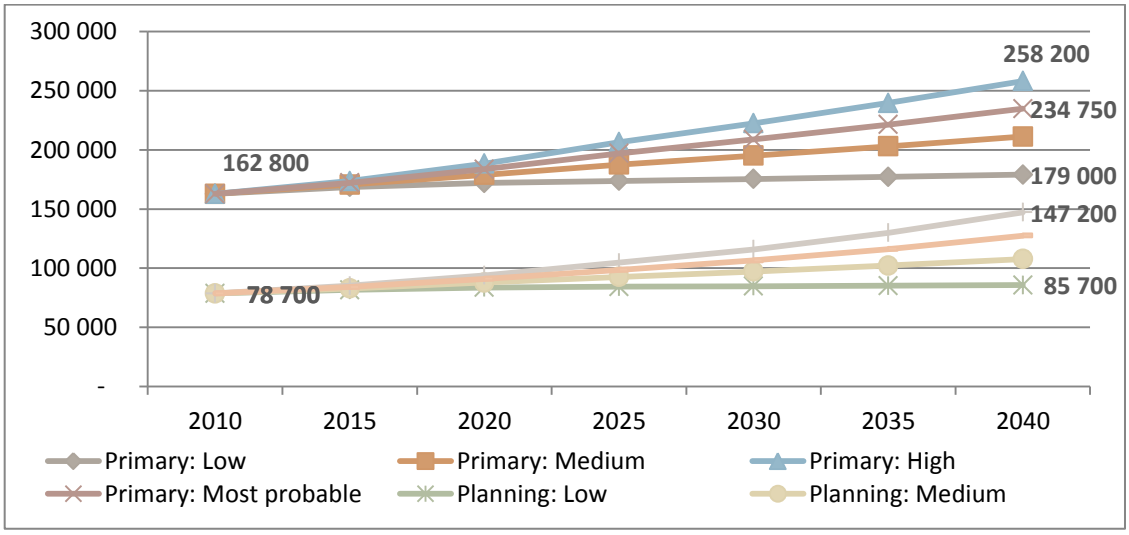


Figure 5.1: Low, medium, high and most probable growth scenario of the population in the LRWSS Primary Area and Planning Area, 2010 - 2040

Source: DWA and Urban-Econ Calculation, 2011

The 2010, 2015, 2020, 2025 and 2040 domestic water demands according to the population scenarios for the Planning and Primary Area are presented in **Table 5.5.**

Table 5.5: Domestic water demand according to growth scenarios, 2010 - 2040

Liters per day (million ℓ/day)					
LRWSS PLANNING AREA	2010	2015	2020	2025	2040
Low growth	8.93	9.29	9.48	9.58	9.71
Medium growth	8.93	9.43	9.96	10.52	12.39
High growth	8.93	9.67	10.68	11.90	16.99
Most Probable	8.93	9.55	10.32	11.21	14.69
PRIMARY AREA	**2010**	**2015**	**2020**	**2025**	**2040**
Low growth	18.50	19.20	19.50	19.70	20.30
Medium growth	18.50	19.40	20.30	21.30	24.30
High growth	18.50	19.70	21.40	23.50	29.80
Most Probable	18.50	19.55	20.85	22.40	27.05
Million cubic meters per annum (million m³/a)					
LRWSS PLANNING AREA	**2010**	**2015**	**2020**	**2025**	2040
Low growth	3.26	3.39	3.46	3.50	3.55
Medium growth	3.26	3.44	3.64	3.84	4.52
High growth	3.26	3.53	3.90	4.34	6.20
Most Probable	3.26	3.49	3.77	4.09	5.36
PRIMARY AREA	**2010**	**2015**	**2020**	**2025**	**2040**
Low growth	6.75	7.01	7.12	7.19	7.41
Medium growth	6.75	7.08	7.41	7.77	8.87
High growth	6.75	7.19	7.81	8.58	10.88
Most Probable	6.75	7.14	7.61	8.18	9.87

Source: DWA and Urban-Econ Calculations, 2011

LOW GROWTH SCENARIO: Currently the domestic water demand in the Planning Area estimates at approximately 8.9 Mℓ/d, which will increase to about 9.7 Mℓ/d in 2040. The total average water demand in the Primary Area currently estimates at approximately 18.5 Mℓ/d, which will increase to roughly 19.2 Mℓ/d in 2015, 19.5 Mℓ/d in 2020 and close to 20.3 Mℓ/day in 2040.

MIDDLE GROWTH SCENARIO: The domestic water demand for the Planning Area will increase to about 12.4 Mℓ/d in 2040. The total average water demand in the Primary Area will increase to approximately 24.3 Mℓ/d in 2040.

HIGH GROWTH SCENARIO: The domestic water demand for the Planning Area will increase to almost 17 Mℓ/d in 2040. The total average water demand in the Primary Area will increase to about 29.8 Mℓ/d in 2040.

MOST PROBABLE SCENARIO: The domestic water demand for the Planning Area will most probably increase to nearly 14.7 Mℓ/d in 2040. The total average water demand in the Primary Area will increase to around 27 Mℓ/d in 2040.

The average per capita consumption of water in the Planning Area is approximately 114 ℓ/c/d. It is important to note that the study did not allow for stock water which could in future influence the overall water demand of the study area.

COMPARISON WITH LRWSS: The LRWSS study presented the estimated water requirements for the Lusikisiki supply scheme based on the 2001 population survey and population projections. These estimates where broken down into three phases, based on the selected study areas. The following table contains the results of the LRWSS study:

Table 5.6: Summary of estimated water requirements according to LRWSS, 2001-2030

Liters per day (ℓ/day)				
PHASE 1	**2001**	**2010**	**2020**	**2030**
Low	1 549 642	2 538 008	4 046 440	6 229 576
Constant	1 764 115	2 576 780	3 794 625	5 510 000
High	2 371 010	3 926 320	6 228 505	9 882 800
PHASE 2	**2001**	**2010**	**2020**	**2030**
Low	564 197	952 448	1 544 020	2 404 344
Constant	780 785	987 940	1 283 345	1 666 925
High	936 970	1 778 230	3 079 835	5 333 760
PHASE 3	**2001**	**2010**	**2020**	**2030**
Low	234 738	396 096	643 080	1 002 240
Constant	326 025	412 600	535 900	696 000
High	391 230	742 680	1 286 160	2 227 200
TOTAL	**2001**	**2010**	**2020**	**2030**
Low	2 348 577	3 886 552	6 233 540	9 636 160
Constant	2 870 925	3 977 320	5 613 870	7 872 925
High	3 699 210	6 447 230	10 594 500	17 443 760
Million cubic meters per annum (million m³/a)				
PHASE 1	**2001**	**2010**	**2020**	**2030**
Low	0.57	0.93	1.48	2.28
Constant	0.64	0.94	1.39	2.01
High	0.87	1.43	2.27	3.61
PHASE 2	**2001**	**2010**	**2020**	**2030**
Low	0.21	0.35	0.56	0.88
Constant	0.29	0.36	0.47	0.61
High	0.34	0.65	1.12	1.95
PHASE 3	**2001**	**2010**	**2020**	**2030**
Low	0.09	0.14	0.23	0.37
Constant	0.12	0.15	0.20	0.25
High	0.14	0.27	0.47	0.81
TOTAL	**2001**	**2010**	**2020**	**2030**
Low	**0.86**	**1.42**	**2.28**	**3.52**
Constant	**1.05**	**1.45**	**2.05**	**2.88**
High	**1.35**	**2.35**	**3.87**	**6.37**

Source: LRWSS, 2011

The LRWSS study conducted in 2009, made use of 2001 Census data, and the study areas used for the analysis in the LRWSS differs from the Planning Area and Primary Area identified in this report. This study aims to determine the future water demand from

the most recent data available. The information used in this study has also been augmented with primary research, by means of conducting a socio-economic survey.

Given the above statement the results presented in **Table 5.6** cannot effectively be compared with the domestic water demand presented in **Table 5.5.** It does however appear that the water demand projected in this study, is somewhat higher than that of the LRWSS study.

5.3 BASIC LEVEL OF SERVICE

In **section 5.2** above, the water supply for a basic level of service is assumed to be 25 ℓ/c/d. This figure was set in the 1994 White paper on Water Supply and Sanitation Policy, which is based on international guidelines. However, the recently updated policy positions in the National Water Policy Review (NWPR) gazetted for public comments by DWA state that this minimum volume should be increased.

According to the NWPR, this volume of 25 ℓ/c/d is the minimum required for "direct consumption, for food preparation and for personal hygiene", and is inadequate for a "full, healthy and productive life." The policy takes the following position: "A basic water supply facility is defined as the infrastructure necessary to supply potable water to a formal connection at the boundary of a stand" (South Africa, 2013). Based on this position, the basic water supply volume would increase to 60 ℓ/c/d. Due to the fact that this policy position is under consideration and has not yet been approved, the volume of 25 ℓ/c/d has been used in this report. However, it is worth noting this possible adjustment. The tables below show the impact of this adjustment.

Table 5.7: Domestic water demand assuming basic water supply of 25 l/c/d

Liters per day (million ℓ/day)					
LRWSS PLANNING AREA	2010	2015	2020	2025	2040
Low growth	8.93	9.29	9.48	9.58	9.71
Medium growth	8.93	9.43	9.96	10.52	12.39
High growth	8.93	9.67	10.68	11.90	16.99
Most Probable	8.93	9.55	10.32	11.21	14.69
PRIMARY AREA	**2010**	**2015**	**2020**	**2025**	**2040**
Low growth	18.50	19.20	19.50	19.70	20.30
Medium growth	18.50	19.40	20.30	21.30	24.30
High growth	18.50	19.70	21.40	23.50	29.80
Most Probable	18.50	19.55	20.85	22.40	27.05
Million cubic meters per annum (million m³/a)					
LRWSS PLANNING AREA	**2010**	**2015**	**2020**	**2025**	2040
Low growth	3.26	3.39	3.46	3.50	3.55
Medium growth	3.26	3.44	3.64	3.84	4.52
High growth	3.26	3.53	3.90	4.34	6.20
Most Probable	3.26	3.49	3.77	4.09	5.36
PRIMARY AREA	**2010**	**2015**	**2020**	**2025**	**2040**
Low growth	6.75	7.01	7.12	7.19	7.41
Medium growth	6.75	7.08	7.41	7.77	8.87
High growth	6.75	7.19	7.81	8.58	10.88
Most Probable	6.75	7.14	7.61	8.18	9.87

Source: DWA and Urban-Econ Calculations, 2011

Table 5.8: Domestic water demand assuming basic water supply of 60 l/c/d as suggested in the NWPR

Liters per day (million ℓ/day)					
LRWSS PLANNING AREA	2010	2015	2020	2025	2040
Low growth	8.99	9.36	9.54	9.64	9.78
Medium growth	8.99	9.49	10.03	10.59	12.48
High growth	8.99	9.73	10.75	11.98	17.10
Most Probable	8.99	9.61	10.39	11.29	14.79
PRIMARY AREA	**2010**	**2015**	**2020**	**2025**	**2040**
Low growth	18.60	19.26	19.65	19.84	20.43
Medium growth	18.60	19.49	20.44	21.42	24.37
High growth	18.60	19.83	21.52	23.59	29.80
Most Probable	18.60	19.66	20.98	22.51	27.08
Million cubic meters per annum (million m³/a)					
LRWSS PLANNING AREA	**2010**	**2015**	**2020**	**2025**	2040
Low growth	3.28	3.42	3.48	3.52	3.57
Medium growth	3.28	3.47	3.66	3.87	4.55
High growth	3.28	3.55	3.92	4.37	6.24
Most Probable	3.28	3.51	3.79	4.12	5.40
PRIMARY AREA	**2010**	**2015**	**2020**	**2025**	**2040**
Low growth	6.79	7.03	7.17	7.24	7.46
Medium growth	6.79	7.11	7.46	7.82	8.89
High growth	6.79	7.24	7.86	8.61	10.88
Most Probable	6.79	7.18	7.66	8.22	9.89

Source: DWA and Urban-Econ Calculations, 2011

This shows that should the National Water Policy Review be approved, the overall size of the dam will increase from 5.36 million m^3/a to 5.4 million m^3/a.

6 CONCLUSION

Currently, 78 700 people resides in the planning Study Area and 162 800 people resides in the Primary Study Area. The population of the Planning Study Area represents just over 48% of the Primary Study Area. Four scenarios were identified to calculate the future water requirements of the LRWSS Planning Area and the Primary Area (Extended Tender Study Area), utilising a **low**, **medium high and most probable growth scenario**. The **low growth scenario** takes limited economic progress and infrastructural development into account, which will result in a declining population growth rate. The average growth rate used in this scenario to determine the population for the Planning Area and the Primary Area is 0.3%. The population of the **medium growth scenario** is determined by taking only historic growth rates of 0.9% for the Primary Area and 1.1% for the LRWSS Planning Area into account. The **high growth scenario** takes future economic progress and infrastructural development into account, which will result in an increase in population growth rates. Growth rates used to determine the population for the Primary Area estimates at 2.1% and 1.5% for the Planning Area.

The **most probable scenario** is located between the medium and high growth scenarios, which present the most accurate population figures. This scenario combines historic growth rates with future economic progress and infrastructural development that will result in an increase in population growth rates. The average annual growth rate used to determine the population for the Planning Area is 1.6% and for the Primary Area 1.2%. According to the most probable scenario the population size for the Planning and Primary Study Area will increase to an estimated 127 500 people and 234 750 people, respectively by 2040. The future water requirements for the study area will be based on the projections of the most probable scenario.

The largest portion of the Planning Area is younger than 30 years old. One can only assume that after secondary education the majority migrate to other cities due to a lack of job opportunities in the Planning Area. Only 15% of the population in the Study Area is employed with the largest portion (72%) being unemployed.

More than half of the population in the Study Area earns no income, with 31.2% earning an annual income of between R 1 and R 6 652 per annum. About 57% of the Study Area's main source of income is from social grants followed by salaries and wages.

A total of 151 of the about 190 formal and informal businesses were sampled in Lusikisiki (Business Audit 2011), which altogether employs a total of 1180 people. According to the Market Survey, the river-stream is the main source of water (48%) followed by "piped water less that 200 metre from the dwelling" (29%). The river water flowing through the Planning Area is partly safe and not filled with deceases and therefore the water is also significantly used for drinking, food, medicines, grazing and raw material.

The Planning Area consists of approximately 2% of the population consuming 25 ℓ/c/d; 13% consuming 60 ℓ/c/d; 59% consuming 90 ℓ/c/d; and 26% using 200 ℓ/c/d.

Table 6.1 and **Table 6.2** provide a summary of the water demand projections calculated for the Primary Area and Planning Area.

Table 6.1: Water demand projections for the Primary Area

	2010	2015	2020	2025	2040
LOW	18.5 Mℓ/d *6.75 million m³/a*	19.2 Mℓ/d *7.01 million m³/a*	19.5 Mℓ/d *7.12 million m³/a*	19.7 Mℓ/d *7.19 million m³/a*	20.3 Mℓ/d *7.41 million m³/a*
MEDIUM	18.5 Mℓ/d *6.75 million m³/a*	19.4 Mℓ/d *7.08 million m³/a*	20.3 Mℓ/d *7.41 million m³/a*	21.3 Mℓ/d *7.77 million m³/a*	24.3 Mℓ/d *8.87 million m³/a*
HIGH	18.5 Mℓ/d *6.75 million m³/a*	19.7 Mℓ/d *7.19 million m³/a*	21.4 Mℓ/d *7.81 million m³/a*	23.5 Mℓ/d *8.58 million m³/a*	29.8 Mℓ/d *10.88 million m³/a*
MOST PROBABLE	18.5 Mℓ/d *6.75 million m³/a*	19.7 Mℓ/d *7.14 million m³/a*	21.4 Mℓ/d *7.61 million m³/a*	23.5 Mℓ/d *8.18 million m³/a*	29.8 Mℓ/d *9.87 million m³/a*

Source: DWA and Urban-Econ Calculation, 2011

It can be concluded from **Table 6.1** that the Primary Area currently consumes approximately 18.5 Mℓ/d, which could increase to about 20.3 Mℓ/d (**low growth scenario**), 24.3 Mℓ/d (**medium growth scenario**) and around 29.8 Mℓ/d (**high growth scenario**) in 2040. It was concluded that the water requirements for the Primary Area will be approximately 29.8 Mℓ/d or 9.87 million m³/a by 2040 based on the most probable scenario.

Table 6.2: Water demand projections for the LRWSS Planning Area

	2010	2015	2020	2025	2040
LOW	8.9 Mℓ/d *3.3 million m³/a*	9.3 Mℓ/d *3.4 million m³/a*	9.5 Mℓ/d *3.5 million m³/a*	9.6 Mℓ/d *3.5 million m³/a*	9.7 Mℓ/d *3.6 million m³/a*
MEDIUM	8.9 Mℓ/d *3.3 million m³/a*	9.4 Mℓ/d *3.4 million m³/a*	10 Mℓ/d *3.6 million m³/a*	10.5 Mℓ/d *3.8 million m³/a*	12.4 Mℓ/d *4.5 million m³/a*
HIGH	8.9 Mℓ/d *3.3 million m³/a*	9.7 Mℓ/d *3.5 million m³/a*	10.7 Mℓ/d *3.9 million m³/a*	12 Mℓ/d *4.3 million m³/a*	17 Mℓ/d *6.2 million m³/a*
MOST PROBABLE	8.9 Mℓ/d *3.3 million m³/a*	9.6 Mℓ/d *3.5 million m³/a*	10.3 Mℓ/d *3.8 million m³/a*	11.2 Mℓ/d *4.1 million m³/a*	14.7 Mℓ/d *5.4 million m³/a*

Source: DWA and Urban-Econ Calculation, 2011

Currently, the domestic water demand in the Planning Area estimates at approximately 8.9 Mℓ/d, which could increase to just about 9.7 Mℓ/d (**low growth scenario**), 12.4 Mℓ/d (**medium growth scenario**) and about 17 Mℓ/d (**high growth scenario**) in 2040. Based on the most probable scenario it can be concluded that the water requirements for the LRWSS Planning Area will be approximately 14.7 Mℓ/d or 5.4 million m³/a by 2040. The study found that the average per capita consumption of water in the Primary Area and Planning Area are almost 114 ℓ/c/d.

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Appendix A

Population Scenarios

Appendix A discloses the four scenarios used to determine the most accurate and representative population and household figures for the Planning Area.

1. Scenario 1

Scenario 1 was calculated by utilising the results of the market survey together with a rapid land use audit conducted. Five correlating areas from the Business Audit and the Market Survey were identified, i.e. Luzupu, Palmarton, Ntsimbini, Nkunzimbini and Gemvale. The rapid land use audit was conducted on Google Maps, 2004 and then projected to 2011. Thus, Census, DWAF and Google images were utilised to calculate Scenario 1.

Table A.1: Planning Area Population, 2001 - 2011

	2001			2008		2010		
Census Name	Pop	HH	DWA Name	Pop	HH	Survey	Pop	HH
Luzupu	1 574	290	Bomveni	1 814	361	Luzupu	3 078	572
Zalu Heights	1 025	192	Zalu Heights	985	196	Zalu Heights	1 034	198
Mpala	437	67	Mpala	427	85	Mpala	492	94
Palmarton Mission	55	18	Palmartone (NH)	915	182	Palmarton	1 361	268
Pamalitoli	589	122	Palmartone (PSJ)	683	136	Pamalitoli	745	142
Nyosani	242	41	Jambeni C	2 633	524	Nyosani	446	88
Nyosani	356	60				Nyosani	652	128
Sibalweni	834	156				Sibalweni	1 696	333
Lusikisiki			Mbila	3 598	716	Ngobozana	3 817	750
Lusikisiki			Mdikane	8 271	1 646	Mdikane	9 346	1 837
			Kanana	2 080	414	Kanana	2 351	462
KwaNyati	465	83				KwaNyati	501	99
Gunyeni	2 799	584	Nzintlana	1 030	205	Gunyeni	3 527	693
Chithwayo	666	108	Gobozana	4 924	980	Chithwayo	652	128
Lusikisiki SP	5 117	2 029				Gobozana	5 902	1 149
			Kwanyuswa	2 337	465	Kwanyuswa	2 808	552
						Mzintlana	1 238	243
Ntsimbini	1 000	262	Ntsimbini	1 724	343	Ntsimbini	2 366	464
			Lusikisiki	2 347	467	Lusikisiki	2 821	554
Lusikisiki	3 960	1 103	Dubana A	4 352	866	Dubana A	5 230	1 028
			Goso	3 482	693	Goso	4 186	823
Tyeni	1 932	360	Mtshayaza	3 050	607	Mtshayaza	3 534	705
			Mgezwa	724	144	Mgezwa	838	167
			Mgezwa	2 045	407	Mgezwa	2 370	472
Nkunzimbini	1 251	234	Nkunzimbini	1 171	233	Nkunzimbini	1 929	384
Malangeni	739	150	Malangeni	1 789	356	Malangeni	2 073	413

	2001			2008		2010		
Census Name	**Pop**	**HH**	**DWA Name**	**Pop**	**HH**	**Survey**	**Pop**	**HH**
			Upper Ntafufu - B	417	83	Upper Ntafufu - B	504	98
Mdankala	138	23	Ntshwabulo	146	29	Mdankala	176	34
			Ntongwane	1 603	319	Ntongwane	1 939	375
Gengope	511	122	Tafufu - B	864	172	Gengope	1 030	199
Mgugwane	876	175	Mgugwana	1 538	306	Mgugwana	2 009	389
			Thala	1 337	266	Thala	1 617	313
Gemvale	424	84	Gemvale	1 965	391	Gemvale	746	144
Mdovu	274	40				Mdovu	243	47
Kaleni	114	23				Kaleni	140	27
Kwagingqi	352	69	Lower Ntafufu - B	1 960	390	Kwagingqi	679	131
Mantusini	907	172				Mantusini	1 692	327
			Mthambalala - B	2427	483	Mthambalala - B	2 935	568
Total	**26 637**	**6 567**	**Total**	**62 638**	**12 465**	**Total**	**78 700**	**15 400**

Sources: Census 2001, DWA 2008, Google Earth 2004 and UE calculation, 2011

2. Scenario 2

Table A.1 indicates the three other scenarios used to determine which population might be most accurate to the actual population size and number of households for 2011.

Table A.1: Scenarios presenting 2011 population and household figures

			Scenario 2		Scenario 3		Scenario 4	
		Growth Rate	**2.3%**	**3.5%**	**5.2%**	**5.5%**	**0.8%**	**1.4%**
	2008		**2011**		**2011**		**2011**	
DWA Name	**Pop**	**HH**	**Pop**	**HH**	**Pop**	**HH**	**Pop**	**HH**
Bomveni	1 814	361	1 941	400	2 114	424	1 858	376
Zalu Heights	985	196	1 054	217	1 148	230	1 009	204
Mpala	427	85	457	94	498	100	437	89
Palmartone (NH)	915	182	979	202	1 066	214	937	190
Palmartone (PSJ)	683	136	731	151	796	160	699	142
Jambeni C	2 633	524	2 818	580	3 068	616	2 696	546
Mbila	3 598	716	3 851	793	4 193	841	3 685	746
Mdikane	8 271	1 646	8 852	1 823	9 638	1 934	8 470	1 714
Kanana	2 080	414	2 226	458	2 424	486	2 130	431
Nzintlana	1 030	205	1 102	227	1 200	241	1 055	213
Gobozana	4 924	980	5 270	1 085	5 738	1 152	5 043	1 021
Kwanyuswa	2 337	465	2 501	515	2 723	546	2 393	484
Ntsimbini	1 724	343	1 845	380	2 009	403	1 766	357
Lusikisiki	2 347	467	2 512	517	2 735	549	2 404	486

			Scenario 2		Scenario 3		Scenario 4	
	Growth Rate		2.3%	3.5%	5.2%	5.5%	0.8%	1.4%
	2008		2011		2011		2011	
DWA Name	**Pop**	**HH**	**Pop**	**HH**	**Pop**	**HH**	**Pop**	**HH**
Dubana A	4 352	866	4 658	959	5 071	1 018	4 457	902
Goso	3 482	693	3 726	767	4 057	814	3 566	722
Mtshayaza	3 050	607	3 264	672	3 554	713	3 124	632
Mgezwa	724	144	775	159	844	169	741	150
Mgezwa	2 045	407	2 189	451	2 383	478	2 094	424
Nkunzimbini	1 171	233	1 253	258	1 365	274	1 199	243
Malangeni	1 789	356	1 915	394	2 085	418	1 832	371
Upper Ntafufu - B	417	83	446	92	486	98	427	86
Ntshwabulo	146	29	156	32	170	34	150	30
Ntongwane	1 603	319	1 716	353	1 868	375	1 642	332
Tafufu - B	864	172	925	190	1 007	202	885	179
Mgugwana	1 538	306	1 646	339	1 792	360	1 575	319
Thala	1 337	266	1 431	295	1 558	313	1 369	277
Gemvale	1 965	391	2 103	433	2 290	459	2 012	407
Lower Ntafufu - B	1 960	390	2 098	432	2 284	458	2 007	406
Mthambalala - B	2 427	483	2 597	535	2 828	568	2 486	503
Total	**62 638**	**12 465**	**67 036**	**13 802**	**72 989**	**14 647**	**64 148**	**12 982**

Sources: Census, Quantec, Community Survey, DWA and UE calculation, 2011

For **Scenario 2**, the Census 1996 to 2001 annual growth rate was applied to DWAF 2008 data. The population size for **Scenario 2** increased with 4 398 people from 2008 to 2011, indicating an annual growth rate of 2.3%. Between 2008 and 2011, the number of households increased from 12 465 to 13 802, which grew by 3.5%.

3. Scenario 3

The population size and number of households in **Scenario 3** was calculated using the annual growth rate average of **Scenario 1** and **2,** thus 5.2% for population size and 5.5% for number of households. Between all four scenarios, **Scenario 3** resulted in the highest population and households figures for 2011 of 72 989 people and 14 647 households, respectively.

4. Scenario 4

For **Scenario 4**, a growth rate average of Census (1996-2001), Quantec (1995-2010), ECSECC (1995-2009) and the IDP (2010/2011) were used. Thus the growth rates used to

calculate the population size in 2010 is 0.8% and number households 1.4%. From 2008 to 2011, **Scenario 4**'s population size increased from 62 638 people to 64 148 people.

Appendix B

Source Data

1. Population and households figures according to Census

Table B.1 indicates the 1996 and 2001 population and household figures for the Planning Area according to Census data. These are the only two years Census has data available for the Study Area. The total population size in 1996 and 2001 was 18 703 people and 26 637 people, respectively.

Table B.1: Population and household figures for the Planning Area (Census)

	Census Dataset			
Sub-Place Name	Population 1996	HH 1996	Population 2001	HH 2001
Tyeni	1 725	302	1 932	360
Nkunzimbini	1 006	171	1 251	234
Malangeni	792	164	739	150
Ntsimbini	847	153	1 000	262
Palmarton Mission	-	-	55	18
Pamalitoli	714	131	589	122
Mpala	272	42	437	67
Zalu heights	740	113	1 025	192
Luzupu	131	22	1 574	290
Nyosani	27	4	242	41
Nyosani	260	39	356	60
Sibalweni	700	125	834	156
Lusikisiki SP	3 661	1 035	5 117	2 029
KwaNyati	168	41	465	83
Chithwayo	401	64	666	108
Gunyeni	2 955	608	2 799	584
Mdankala	245	38	138	23
Gengoqe	816	139	511	122
Mgugwane	480	96	876	175
Kaleni	11	3	114	23
Gemvale	374	74	424	84
Mdovu	709	101	274	40
Mantusini	939	140	907	172
Kwagingqi	401	71	352	69
Lusikisiki	332	64	3960	1 103
	18 703	**3 738**	**26 637**	**6 567**

Source: Census 1996, 2001

2. Population and household figures for the Planning Area according to DWA

DWA provided Urban-Econ with population and household figures for 2008, which are presented below. **Table B.2** indicates the total population and household figures for the Planning Area. According to DWA 2008, the total population was 62 638 people consisting of 12 465 households.

Table B.2: Population and household figures for the Planning Area (DWA)

DWA Name	Population 2008	Households 2008
Bomveni	1 814	361
Zalu Heights	985	196
Mpala	427	85
Palmartone (NH)	915	182
Palmartone (PSJ)	683	136
Jambeni C	2 633	524
Mbila	3 598	716
Mdikane	8 271	1 646
Kanana	2 080	414
Nzintlana	1 030	205
Gobozana	4 924	980
Kwanyuswa	2 337	465
Ntsimbini	1 724	343
Lusikisiki	2 347	467
Dubana A	4 352	866
Goso	3 482	693
Mtshayaza	3 050	607
Mgezwa	724	144
Mgezwa	2 045	407
Nkunzimbini	1 171	233
Malangeni	1 789	356
Upper Ntafufu - B	417	83
Ntshwabulo	146	29
Ntongwane	1 603	319
Tafufu - B	864	172
Mgugwana	1 538	306
Thala	1 337	266
Gemvale	1 965	391
Lower Ntafufu - B	1 960	390
Mthambalala - B	2 427	483
	62 638	**12 465**

Source: 2008 DWA data

3. Population and household figures for the Primary Area according to DWA

Table B.3 indicates the total population and household figures for the Primary Area (Extended Tender Study Area). According to DWA 2008, the total population was 160 208 people consisting of 31 881 households.

Table B.3: Population and household figures for the Primary Area (DWA)

	Population (2008)	Households (2008)
Khonjwayo - A	90	18
Kwa - Bhala	2 301	458
Phumlo - A	1 136	226
Xhorana - A	598	119
Nzintlana	1 030	205
Mazizi Tea Plantation	25	5
Mcobotini	1 422	283
Kwanyuswa	2 337	465
Bomveni	1 814	361
Gobozana	4 924	980
Lusikisiki	2 347	467
Goso	3 482	693
Dubhana	266	53
Kwa - Bhala	432	86
Mantusini B	884	176
Mgezwa	2 045	407
Mbila	3 598	716
Hombe	543	108
Ndayeni	794	158
Thungwana	141	28
Malangeni	1 789	356
Kwa Diki	945	188
Nkunzimbini	1 171	233
Mrotshozweni	1 347	268
Lambasi	1 668	332
Mgugwana	1 538	306
Silevini	50	10
Silevini	181	36
Silevini	206	41
Nkamasana	749	149
Nkamasana	266	53
Nkamasana	106	21
Ngobozana	1 216	242
Upper Tafufu	181	36
Thakanelo - B	492	98

	Population (2008)	Households (2008)
Didi - E	834	166
Nyembezini	201	40
Phumlo - B	633	126
Qawukeni Great Place	126	25
Qawukeni - A	960	191
Malangeni - A	126	25
Kwa - Gangatha	276	55
Nyathi	95	19
Magwa Tea Factory	161	32
Dubana A	4 352	866
Dubana B	784	156
Mkhose	45	9
Mzintlava	2 603	518
Ntsimbini	1 724	343
Mcobotini	2 035	405
NEW TOWN - B	149	29
Magwa Tea Factory	111	22
Luqhoqhweni	1 769	352
Upper Tafufu	2 618	521
Thembeni	90	18
Luqhoqhweni	598	119
Mthambalala	1 201	239
Gangata	653	130
Mvimvane	1 301	259
Mrhoshozweni	794	158
Matheko	1 849	368
Bazana	1 055	210
Palmartone	915	182
Pumlo	1 759	350
Tshonya	588	117
Kwa Bhala	1 779	354
FAHLA	387	77
Mgezwa	724	144
Jambeni C	2 633	524
Mtshayaza	3 050	607
Mtanzi	3 040	605
ISIHLITO	1 457	290
Dubane	2 613	520
Magwa Tea Plantation	85	17
Gangata	1 508	300
Magwa Tea Plantation	131	26
Gangata	477	95
Gangata	663	132

	Population (2008)	Households (2008)
Gangata	497	99
Elusibeni	231	46
Lower ntafufu - A	407	81
Kanana	2 080	414
Tshandatshe	1 894	377
Mdikane	8 271	1 646
Palmartone	683	136
Mswakazi	1 136	226
Nobadula	372	74
Ntshwabulo	146	29
Khwaneni	859	171
Goqwana - B	312	62
Ntsamathe	714	142
Kwagingqi - A	965	192
Tafufu - A	809	161
Sikhukhuza	387	77
Ebuchele	1 940	386
Cabekwana - A	65	13
Mthimde - B	849	169
Mpala	427	85
Cabekwana - B	181	36
Labekani	1 055	210
Ezibeleni	266	53
Goso - B	658	131
Goso - C	1 040	207
Mbotyi - D	40	8
Zalu Heights	985	196
Kwadiki	638	127
Palmartone - D	271	54
Msikaba - A	95	19
Matheko - A	85	17
Njombela - B	422	84
Liyose	327	65
Mpisi - C	25	5
Lambasi - G	65	13
Kwandengane - B	65	13
Lusikisiki - B	30	6
Msikana - E	161	32
Msikana - F	1 920	382
Msikana - G	146	29
Matheko - B	65	13
Msikabe	60	12
Msikaba - D	156	31

	Population (2008)	Households (2008)
Msikaba - C	45	9
Cutweni	910	181
Mbotyi - G	181	36
Magwa - B	166	33
Mbotyi - I	211	42
Mbotyi - F	357	71
Mbotyi - E	65	13
Mbotyi - H	950	189
Lambasi - F	25	5
Magwa Tea Plantation- B	146	29
Port Grosvenor	10	2
KWA NDENGANE	383	75
Lambasi - E	206	41
Mzimtsha	709	141
Khonjwayo - B	30	6
Lambasi - D	1 020	203
IAMBASI	970	193
Kwandengane - C	100	20
Mbotyi - A	65	13
Lugqalweni	181	36
Nyosana	281	56
Goso - A	146	29
Kwa Jama	462	92
Jambini	1 387	276
Jambeni A	1 543	307
Ngobozana - B	216	43
Goso - D	1 141	227
Ludaka - B	75	15
Mantusini A	844	168
Xhaka	673	134
FAKINI	221	44
Matenku	920	183
Mthambalala - D	407	81
Kwandayini	588	117
Mthambalala - B	2 427	483
Lower Ntafufu - B	1 960	390
Thaleni - H	1 301	259
Ndayini - A	874	174
Thala	1 337	266
Agate Terrace	307	61
Upper Ntafufu - A	683	136
Upper Ntafufu - B	417	83
Skhulu - B	1 181	235

	Population (2008)	Households (2008)
Tafufu - B	864	172
Bulani	729	145
Dedeni	1 251	249
Engcenga	487	97
Khaleni - D	191	38
Ntongwane	1 603	319
Noqhekwane	2 105	419
Ntlanjeni	106	21
Kwa - Nyathi	352	70
Gemvale	1 965	391
Noziyongwana	45	9
Noziyongwana	95	19
Noziyongwana	106	21
Msikana - H	121	24
Machibini	106	21
Machibini	191	38
Msikana - I	45	9
Silevini	412	82
Silevini	121	24
Silevini	80	16
Silevini	246	49
	160 208	**31 881**

Source: 2008 DWA data

4. Population and household figures for the Secondary Area according to Census, Community Survey, Quantec, DWA and ECSECC

Table B.4 indicates the five available source providing population and household figures for the Secondary Area. Census provides data for 1996 and 2001, Community Survey has data for 2007, Quantec has data from 1995 till 2010, DWA has data for 2008 and ECSECC provides data for 1995 up to 2009.

Table B.4: Population and household figures for the Secondary Area (DWA)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Census 1996, 2001		385 724					401 469									
Community Survey 2007													444 879			
Quantec 1995-2010	405 506	411 923	414 737	416 792	418 118	418 761	418 902	420 601	423 697	427 798	432 974	438 916	445 651	451 534	454 231	455 200
DWA 2008														464 351		
ECSECC 1995-2009	367 003	373 945	380 074	385 814	391 102	395 897	400 242	404 073	407 720	411 139	414 378	417 021	419 115	423 738	428 362	

Source: 2008 DWA data, Census 1996, 2001, Community Survey 2007, Quantec 1995 – 2010, DWA 2008, ECSECC 1995-2009

5. Population and household figures for the Tertiary Area according to Census, Community Survey, Quantec, DWA and ECSECC

Table B.5 indicates the five different source providing population and household figures for the Tertiary Area. Census provides data for 1996 and 2001, Community Survey has data for 2007, Quantec has data from 1995 till 2010, DWA has data for 2008 and ECSECC provides data for 1995 up to 2009.

Table B.5: Population and household figures for the Tertiary Area (DWA)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Census 1996, 2001		1 581 062					1 676 586									
Community Survey 2007													1 862 218			
Quantec 1995-2010	1 657 884	1 688 647	1 704 436	1 717 888	1 728 367	1 735 482	1 739 682	1 750 457	1 765 535	1 784 433	1 807 513	1 833 430	1 862 381	1 887 834	1 900 184	1 905 311
DWA 2008														1 831 775		
ECSECC 1995-2009	1 523 133	1 554 867	1 582 970	1 608 975	1 632 524	1 653 331	1 671 461	1 686 613	1 700 188	1 711 938	1 722 005	1 728 596	1 731 862	1 751 820	1 771 778	

Source: 2008 DWA data

Appendix C

Field Report

1. Sample frame and Sample size

The selection of the sample frame and the sample size followed well-known statistical methods. Variables used to calculate the sample size include the following:

- Sample frame (population size);
- Margin of error; and
- Confidence level.

The sample frame was identified using Census 2001 and DWAF 2008 information and selecting only directly affected sub-places located in Nguza Hill Local Municipality (LM) and Port St Johns LM. Due to some discrepancies between the Census and DWAF area names and data, both data sets were taken into consideration.

In **Figure C.1**, the shape files of Census 2001 and DWAF 2008 were merged to indicate the main areas that was decided on to conduct the surveys. The bordered lines indicate the boundaries of DWAF 2008 sub-places and the shaded polygons indicate Census 2006 boundaries.

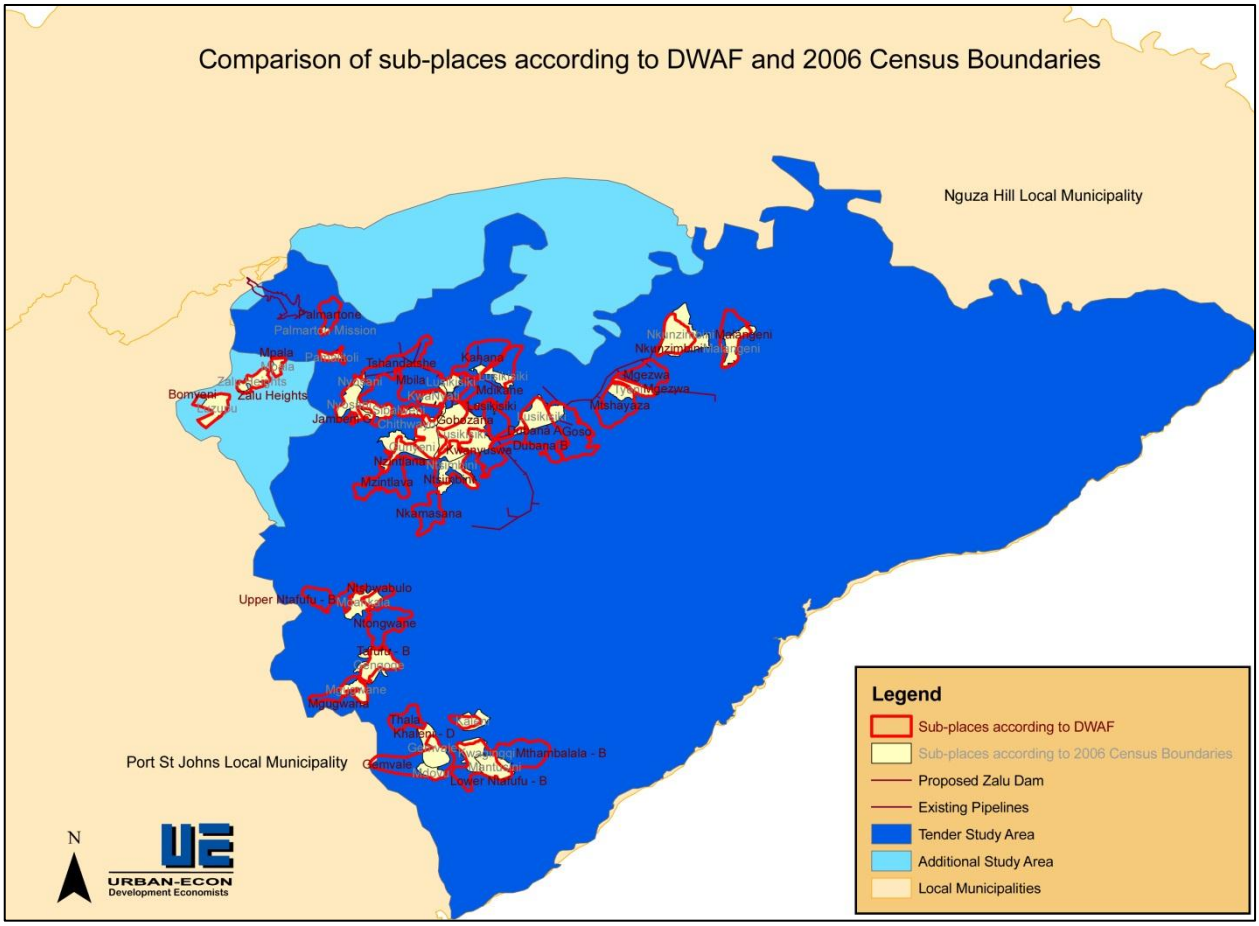


Figure C.1: Census 2001 and DWAF 2008 data merged

Source: Census 2001, DWAF 2008 and Urban-Econ Calculations, 2011

Listed in **Table C.1** are the areas within the two local municipalities that were included in the *Planning Area* for analysis. From the Census 2001 data set, 23 sub-places were identified and 29 sub-places from DWAF 2008's data set.

Table C.1: Sub-places included in the Planning Study Area

Census 2001 sub-places	DWAF 2008 sub-places
Luzupu	Bomveni
Zalu Heights	Zalu Heights
Mpala	Mpala
Palmarton Mission	Palmartone
Pamalitoli	Jambeni C
Nyosani	Mbila
Sibalweni	Mdikane
Lusikisiki	Kanana
Ntsimbini	Nzintlana
Tyeni	Gobozana
KwaNyati	Kwanyuswa

Census 2001 sub-places	DWAF 2008 sub-places
Gunyeni	Ntsimbini
Chithwayo	Lusikisiki
Nkunzimbini	Dubana A
Malangeni	Goso
Mdankala	Mtshayaza
Gengope	Mgezwa
Mgugwane	Mgezwa
Gemvale	Nkunzimbini
Mdovu	Malangeni
Kaleni	Upper Ntafufu - B
Kwagingqi	Ntshwabulo
Mantusini	Ntongwane
	Tafufu - B
	Mgugwana
	Thala
	Lower Ntafufu - B
	Gemvale
	Mthambalala - B

Table C.2: Population size and Number of households of the total Planning Study Area

	Census 2001	DWAF 2008
Population size	26 637	62 638
Number of households	6 567	12 465

A sample size for both datasets was then identified assuming a confidence level of 95% and a margin of error of 5%. Given the sample frames, the sample size then equated to about **380** households. The survey areas were chosen according to their proportional to size.

2. Surveyed areas and schedule

Six fieldworkers from the Lusikisiki area were sourced for one week, commencing on the 21st of February 2011 until the 25th of February 2011. There was a briefing session on Friday, the 19th of February 2011 to enlighten the surveyors of the project and the outcome of the surveys. The questionnaire was explained in detail for the surveyors to fully understand each question.

The surveys conducted in the stipulated P*lanning Study Area* consisted of a **Market Survey** as well as a 90/100% **Business Audit** conducted in Lusikisiki. The questionnaires for both surveys are included in **Appendix D**. Together with the market survey and the business audit, a more in-detail survey, which formed part of the Market Survey (**Section C, question 2**) was conducted 5 km downstream and 500 m/600 m in width, which reflects the resources and activities that sprout from the river, thus ecosystem goods.

Table C.3: Schedule

	Date	Type of survey	Sub-place
Day 1	**21 February**	Business audit	Lusikisiki
		Market survey	Palmartone
			Luzupu
			Zalu Heights
Day 2	**22 February**	Business audit	Lusikisiki
		Market survey	Lusikisiki
			Ntsimbini
Day 3	**23 February**	Market survey	Nkunzimbini
			Tyeni
			Malangeni
Day 4	**24 February**	Market survey	Ntafufu
			Gemvale
Day 5	**25 February**	Ecosystem goods survey	5km buffer from proposed dam wall

Table C.3 outlines the schedule that was followed during the survey exercise, indicating the date, type of survey and sub-places surveyed. Evidently, the business audit was finished by the end of day 2 and the market survey on day 4. **Figure C.2** below illustrates the schedule of the various areas that were surveyed.

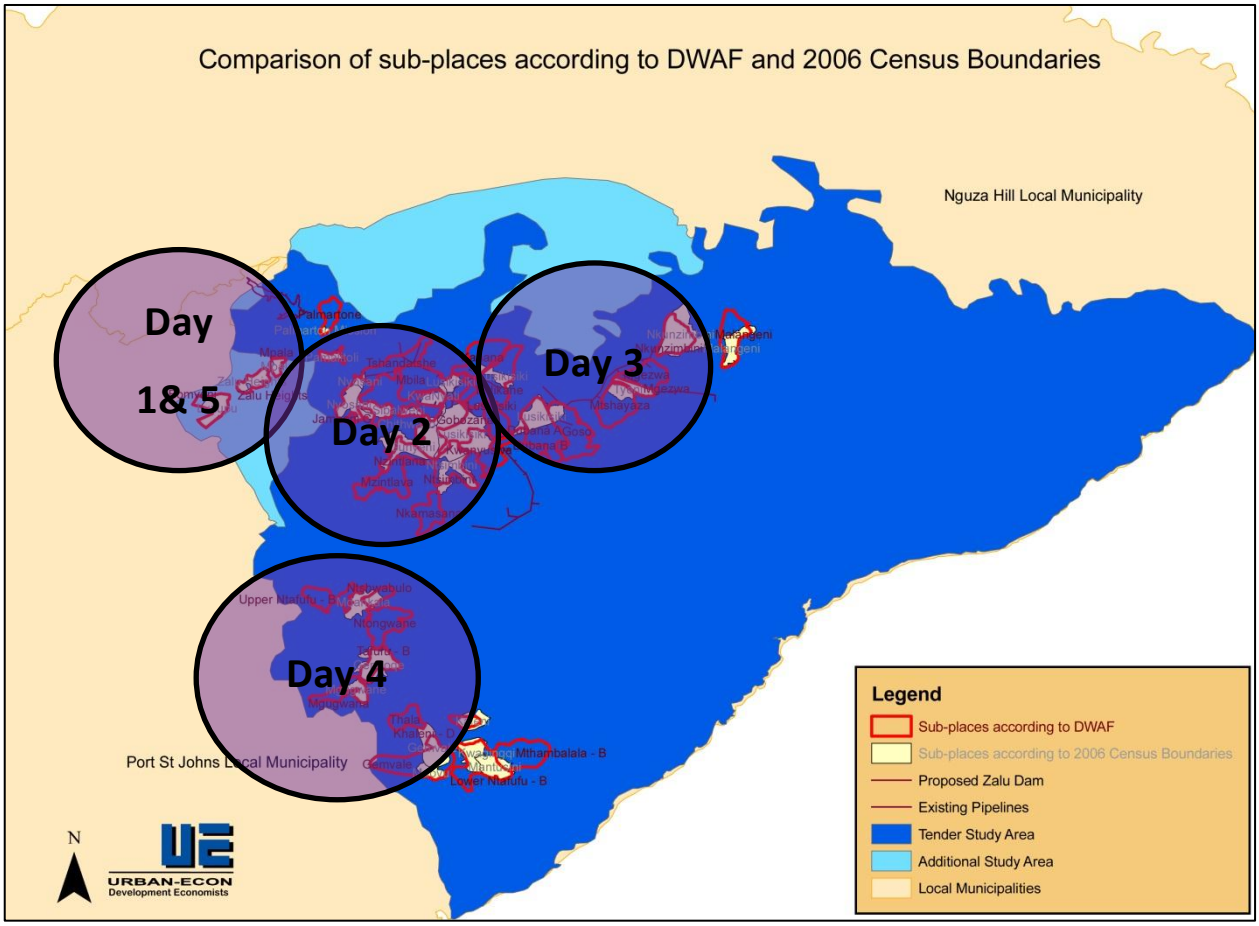


Figure C.2: Schedule of surveyed areas

All of the above scheduled survey sessions have been successfully completed. A supervisor checked each completed questionnaire for consistency of answers and reliability of information and noticed that 5% (20 questionnaires) of the market surveys were not fully completed due to unwillingness of the respondents. All 360 questionnaires were processed for data capturing.

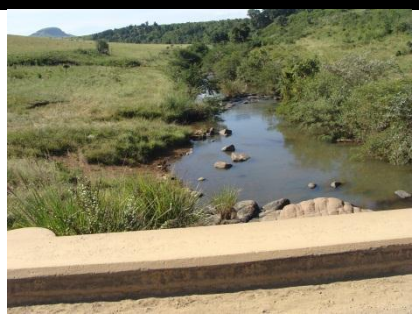
3. Photographs of the survey

Presented in **Table C.4** are some of the photos together with the GPS-coordinates from the areas surveyed.

Table C.4: Photos and GPS-coordinates from survey

Day	Sub-place	Coordinates	Photo
Day 1	Palmerton	S31°19'09.8" E29°29'21.3" Elevation: 591 m	
Day 2	Lusikisiki	S31°21'19.4" E29°32'59.3" Elevation: 620 m	
		S31°21'22.6" E29°32'44.0" Elevation: 604 m	
		S31°21'17.5" E29°34'08.2" Elevation: 582 m	
		S31°21'25.5" E29°34'04.6" Elevation: 590 m	

Day	Sub-place	Coordinates	Photo
Day 3	Nkunzimbini	S31°19'41.1" E29°40'13.4" Elevation: 571 m	
		S31°20'31.6" E29°39'40.3" Elevation: 597 m	
Day 4	Ntafufu/Gemvale	S31°33'07.6" E29°31'40.5" Elevation: 223 m	
Day 5	5km buffer downstream	S31°18'48.0" E29°28'40.5" Elevation: 624 m	 

Day	Sub-place	Coordinates	Photo
		S31°19'31.0" E29°29'10.1" Elevation: 576 m	 

4. Survey outcome

The following section outlines the key observations that were gathered by the supervisor during the fieldwork in all the sub-places. The major challenges faced by the field workers are highlighted and outlines the measures that were put to mitigate these challenges and ensure success of the market survey and the business audit.

The first challenge encountered before the survey exercise was that the stipulated name and size of the Census and DWAF places differ, which made the identification of the surveying areas as well as the sample size very difficult.

MARKET SURVEY

- Accessibility was one of the main challenges. The majority dwellings were not accessible from the road and fieldworkers had to walk most of the time. In some cases alternative sites were chosen.
- Most of the areas had a low density, thus time consuming.
- Some respondents did not understand the importance of the survey and were very reluctant to provide answers.
- A lot of the respondents weren't home during the survey. Most of them worked and left home quite early. In these cases, fieldworkers would return either later that day,

approach another member of a household would was in the position to provide meaningful answers, or chose to survey another household.

- Respondents were not always willing to discuss their remuneration.
- Boundaries of areas are not always known or easy to identify. It was not always possible to determine where a specific main place and sub place starts and finishes.
- Respondents constantly had to be reminded of the objective of the project, thus determining domestic water requirements. The respondents easily assume that water will be supplied to them.
- Unwilling to participate due to empty promises from various stakeholders in the past.

BUSINESS AUDIT

- The owner wasn't always available and the employees don't want to talk to the field workers because they feel that they don't have the authority.
- Most of the respondents are too busy and don't have time to talk to you.
- Respondents are unwilling to assist due to a lack of interest.
- Respondents assume you are from a political party and lose focus of the questionnaire.

5. Lessons learnt

As indicated, the survey conducted in Nguza Hill LM and Port St Johns LM was a success. Beside the few redundant questionnaires mentioned earlier, a sufficient number of questionnaires were completed and all of them could be successfully used for further data capturing and interpretation. Some lessons that could be learnt from this assignment, as well as success stories, that could assist in improving the efficiency of similar exercises in the future include:

- Using field workers from the local area results in the respondents being more comfortable. This helps to speed up the survey.
- It is very important that fieldworkers have the ability to communicate in the local language in order to overcome potential language barriers.
- Field workers must be briefed thoroughly in order to ensure that they understand the project and the reason behind undertaking the survey.
- Review of aerial photography of the area to be surveyed, together with a site visit are very valuable in familiarising herself or himself with the locality and identifying starting points for the survey.

- It's important to inform all relevant Ward Councillors or Ward Committees of the survey being conducted in their area, which results in willing respondents.
- Pension-pay-out dates and salary and wage weekends should be excluded from any survey's schedule when households are the measuring unit.
- The Letter of appointment should be carried with fieldworkers at all time, which ensure credibility from respondents.

Appendix D

Business Audit and Market Surveys

1. Business audit

Table D.1 illustrates the questionnaire that was used for conducting the Business Audit in Lusikisiki. A total of 151 of the about 190 formal and informal businesses were sampled in Lusikisiki.

Table D.1: The questionnaire used for the Business Audit, 2011

SURVEYORS NAME		**DATE**		
LUSIKISIKI BUSINESS AUDIT				
A1. Name of Local Municipality				
A2. Name of respondent				
A3. Business name				
A4. Owner of business				
A5. Business size (m)				
A6. Number of employees				
A7. Physical Address				
A8. Time of operation	Less than six months		5 – 10 years	
	One year		10 – 15 years	
	1 – 2 years		15 – 20 years	
	2 – 5 years		20+ years	
A9. Type of business	Financial		Computer hardware and software	
	Education		Personal	
	Health		Communications	
	Food and beverages		Legal	
	Clothing and footwear		Transport and logistics	
	Furniture		Jewelry	
	Electrical appliances		Garden and outdoor equipment	
	Consultancy		Stationary	
	Fuel and energy			
	Other (specify)			
A10. Number of employed people?				
A11. Do you have access to piped water?	Yes		No	
A12. If yes, please indicate the type of access	1 = Piped water inside dwelling 2 = Piped water inside yard 3 = Piped water on community stand: distance less than 200m from dwelling 4 = Piped water on community stand: distance greater than 200m from dwelling		5 = Borehole 6 = Spring 7 = Rain-water tank 8 = Dam/pool/stagnant water 9 = River/stream 10 = Other	

A13. Does your business require a large quantity of water?	Yes	No	
A14. If yes, please give a brief description why.			
A15. Are you planning to relocate in the near future?	Yes	No	
A16. If yes, in which Local Municipality?	Quakeni LM	Port St Johns LM	Other
A17. Other comments/ suggestions:			
	SUPERVISOR SIGNATURE		

Source: Urban-Econ 2011

2. Market survey

Table D.2 illustrates the questionnaire Urban-Econ used to conduct the Market Survey in Lusikisiki. The areas surveyed include Luzupu, Palmarton, Ntsimbini, Nkunzimbini and Gemvale.

Table D.2: The questionnaire used for the Market Survey, 2011

MARKET SURVEY			
SURVEYORS NAME		**DATE**	
INTRODUCTION			
Introduce yourself and the study in the following manner: Good day, my name is _____ on behalf of the Urban-Econ Development Economists. The objective of the feasibility study is to complete a comprehensive engineering investigation for the Lusikisiki Regional Water Supply Scheme, including the possible Zalu Dam in the Xura River, and to define the most attractive composition and size of the water supply components, taking augmentation from groundwater resources into account. You and the area in which you live have been selected randomly and all information you give will be kept confidential. Please assist us with 15 minutes of your time, which will benefit you in the future.			
SECTION A: BACKGROUND INFORMATION			
A18. Name of main respondent		**A19. Local Municipality**	
A20. Area name and extension/ward		**A21. House number and street name**	
A22. Contact details of respondent	Landline:	**A23. Contact details of respondent**	Cell:
HOUSEHOLD DEFINITION: A household is a group of persons who, at least four nights per week, live together and provide themselves ***jointly*** with food and/or other essentials for living, or a single person			
A24. Number of households at dwelling		**SUPERVISOR SIGNATURE**	

SECTION B: SOCIO-ECONOMIC PROFILE

1. HOUSEHOLD COMPOSITION

PERSON NUMBER (NOTE: Head of household = HoH)		P1 (HoH)	P2	P3	P4	P5	P6	P7	P8	P9	P10
B1. How many people are in the household?											
Note: The head of the household should always be Person 1 and the relationship written in B2 should refer to the relationship of each member of the household to the head of the household/ person 1.											
B2. What is the relationship of each person to HoH?											
B3. Is the person male or female?	**1= Male**										
	2 = Female										
B4. How old is the person? (years)											

B5. What ethnic group does the person belong to?	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**

1 = African/ Black 2 = Coloured 3 = Indian/ Asian 4 = White 5 = Other, specify

B6. If the person is currently attending an educational institution, what type of institute does he/she attend?	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**

1 = Primary 2 = Secondary 3 = Tertiary 4 = FET/ ABET 5 = No – Unable to attend 6 = No – N/A

B7. Current employed status?	**Number:**										
		1 = Employed			2 = Unemployed			3 = Economically inactive			
B8. Employment by sector	**Number:**										

1 = Agriculture/Forestry/Fishing 2 = Mining and quarrying 3 = Manufacturing	4 = Electricity/Gas/Water supply 5 = Construction 6 = Wholesale and retail trade	7 = Transport/Storage/Communication 8 = Financial/Insurance/Real estate and business services	9 = Community/Social and personal services 10 = Private Households 11 = Other or N/A

B9. Type of dwelling?	1 = House or brick structure on a separate stand or yard 2 = Traditional dwelling/hut/structure made of traditional materials 3 = Flat in block of flats 4 = Town/cluster/semi=detached house (simplex; duplex; triplex)	5 = House/flat/room in back yard 6 = Informal dwelling/shack in back yard 7 = Informal dwelling/shack NOT in back yard 8 = Room/flatlet not in back yard but on shared property 9 = Caravan or tent 10 = Other
B10. Have you relocated recently?	Yes	No
B11. If yes, please indicate which year	**Year:**	
B12. Are you planning to relocate in the near future?	Yes	No
B13. If yes, in which local municipality?	Qaukeni Local Municipality	Port St Johns Local Municipality / Other
B14. Do you operate a business on you premises?	Yes	No

B15. If yes, what type of business?			
Financial		Computer hardware and software	
Education		Personal	
Health		Communications	
Food and beverages		Legal	
Clothing and footwear		Transport and logistics	
Furniture		Jewelry	
Electrical appliances		Garden and outdoor equipment	
Consultancy		Stationary	
Fuel and energy			

	Other (specify)	
B16. Number of employed people?		

E1. INCOME COMPOSITION

B17. What is the total monthly income of the household?	None	1	R 1 - R 400	2	R 401 - R 800	3	R 801 - R 1 600	4	R 1 601 – R 3 200	5
	R 3 201 - R 6 400	6	R 6 401 – R 12 800	7	R 12 801 – R 25 600	8	R 25 601 – R 51 200	9	R 51 201 or more	10

B18. Where does the majority of the household income come from?	1 = Work	1	2 = Self-employed/ employer	2	3 = Social grant	3
	4 = Cash in kind (family or friends)	4	5 = Random income from piece jobs	5	6 = None	6

B19. How often does the household receive their income?	1 = Regularly	1	2 = Seasonally	2	3 = Irregularly	3	4 = N/A	4

2. WATER SERVICES

B20. Access to piped water ☐	1 = Piped water inside dwelling 2 = Piped water inside yard 3 = Piped water on community stand: distance less than 200m from dwelling 4 = Piped water on community stand: distance greater than 200m from dwelling	5 = Borehole 6 = Spring 7 = Rain-water tank 8 = Dam/pool/stagnant water 9 = River/stream 10 = Other

Local groundwater knowledge

B21. Have they drilled boreholes in your area in the past?	Yes	No	Don't know
B22. Is there enough groundwater in your area to serve everybody?	Yes	No	Don't know
B23. Are people drinking groundwater from boreholes in your area?	Yes	No	Don't know

B24. What does groundwater in your area taste like?	Good	Bad

Attitude towards groundwater			
B25. How does the community feel about having groundwater as a water source?	Positive	Negative	Don't know
B26. Do you think groundwater is safe to drink?	Yes	No	Don't know
B27. Can groundwater be polluted?	Yes	No	Don't know
B28. Do some of the people become sick from groundwater?	Yes	No	Don't know
B29. Is the borehole pump house or windmill a safe area for children?	Yes	No	Don't know

Source preference based on Perceptions

B30. Please rate the following table using either 1, 2 or 3.

1 = Best / Highest
2 = Medium
3 = Worst / Lowest
4 = Don't know

	Borehole water	Spring water	Dam/River water
Quantity			
Quality			
Cost to develop			
Cost to maintain			
Sustainability			
My preference			

3. OTHER SERVICES

B31. Access to electricity?	Yes	No
B32. Access to refuse removal?	Yes	No
B33. Access to sanitation facilities?	Yes	No

SECTION C: LAND USAGE

1. AGRICULTURAL ACTIVITIES

	Type 1	Size	Type 2	Size	Type 3	Size	Type 4	Size	Other	Size
C1. Types and size (ha/number) of agricultural activities that occur on premises?										

1 = Forestry 2 = Grain 3 = Livestock 4= Vegetable farming 5 = Orchard 6 = None

C2. Approximate amount of water used per day for irrigation purpose?	Type 1	Amount	Type 2	Amount	Type 3	Amount	Type 4	Amount	Other	Amount

2. RESOURCE UTILITY (RESIDING IN "PLANNING STUDY AREA" ONLY)

C1. Main activities/uses that originate from the river?	1 = Fishing		2 = Vegetation		3 = Clay pottery		4 = Other (specify)	
If 1 or 2, please specify the following: **1 = Type of fish i.e. catfish, barbell, bass, tilapia, etc.** **2 = Type of vegetation i.e. thatching, fencing, medicinal plants, sand winning, etc.**								
C2. Is the river used for spiritual uses, i.e. sacred pools?	Yes				No			
C3. If yes, please indicate	**Location:**							
	Uses:							
	Access: (everyone, sangomas, preachers)							

	Availability: (always present, dried out at times)			
	Are they in-stream:	Yes	No	
	What feeds the sacred pool:	Groundwater	River	Rainfall

C4. For what purposes do you use the river water and approximately how much?		**Purpose**	**Amount per day**
	1.	**Water**	
	2.	**Food, medicines and grazing**	
	3.	**Raw materials**	
	4.	**Other**	

C5. Do you use the river for recreational purpose?	Yes	No
C6. If yes, please indicate the type, i.e. Rafting, canoeing, swimming, recreational fishing.		
C7. Are there cultivated floodplains/wetlands	Yes	No
C8. Do you know of any diseases in the water, i.e. cholera/diarrhea?	Yes	No
C9. Were there any incidents of such diseases you know of?	Yes	No

C10. If yes, how often does it happen?	Weekly	Monthly	Every 6 months	Yearly	Once in 5 years

SECTION D: GENERAL

Other comments/ suggestions:

Source: Urban-Econ 2011

Appendix E

Growth Rates

1. Average growth rates

To calculate the population size and number of households for 2010, historic growth rates were utilised. **Table E.1** indicates the growth rates used to calculate the average growth rates, which was used to project population for the Primary, Secondary and Tertiary Study Areas. Evidently, the growth rate in households is higher than population growth. This is due to a change in household composition with households moving away from traditional extended families to display characteristic of the modern single core family unit. The annual growth rate used to project the population size was 0.9% and number of households was 1.4%.

Table E.1: Growth Rates

Source	Population	Households
Census 1996,2001	0.8%	2.7%
Quantec 1995-2010	0.8%	0.9%
ECSECC 1995-2009	1.1%	1.6%
IDP 2010/2011	0.5%	0.5%
Average growth rate	**0.9%**	**1.4%**