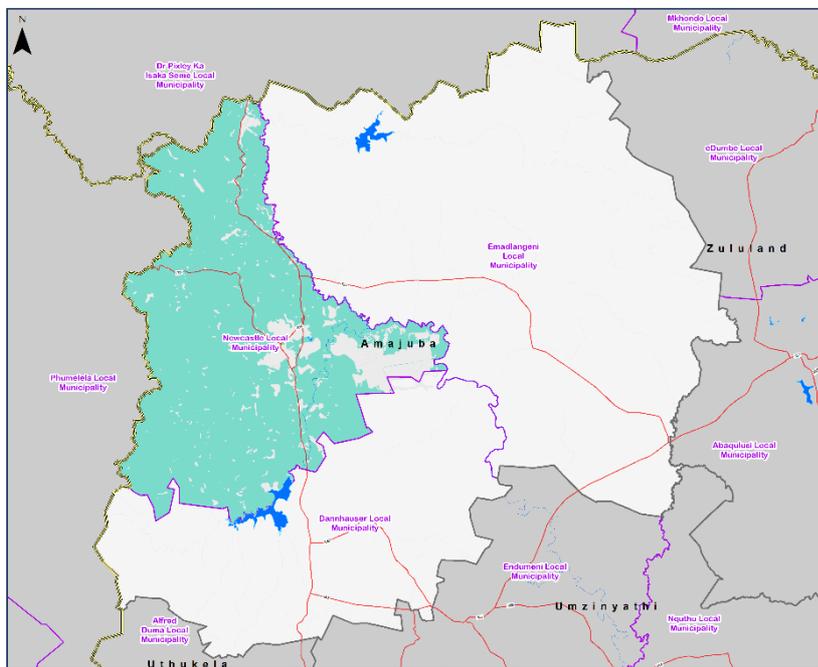


# UNIVERSAL ACCESS PLAN PHASE III – PROGRESSIVE DEVELOPMENT OF A REGIONAL CONCEPT SECONDARY BULK WATER MASTER PLAN FOR THE NEWCASTLE LOCAL MUNICIPALITY

(AS WATER SERVICES AUTHORITY)

CONTRACT NO. 2018/164



## Reconnaissance Report

January 2021

Prepared for:



Name : Umgeni Water  
Phone : 033-341 1232 / 082 852 9308  
Email : [vernon.perumal@umgeni.co.za](mailto:vernon.perumal@umgeni.co.za)  
Contact Person: Vernon Perumal  
Address: 310 Burger Street  
Pietermaritzburg  
3201

Prepared by:



Name : Mariswe (Pty) Ltd  
Phone : +27 (0)12-424-9707  
Email : [sandram@mariswe.com](mailto:sandram@mariswe.com)  
Contact Person: Sandra Munnik  
Address: P O Box 25549  
Monument Park  
0181

**REPORT / DOCUMENT CONTROL FORM**

<b>PROJECT NAME:</b> UNIVERSAL ACCESS PLAN PHASE III – PROGRESSIVE DEVELOPMENT OF A REGIONAL CONCEPT SECONDARY BULK WATER MASTER PLAN FOR THE KWAZULU-NATAL PROVINCE		<b>PROJECT NUMBER:</b> 27814		
<b>REPORT / DOCUMENT TITLE:</b>	UNIVERSAL ACCESS PLAN PHASE III – PROGRESSIVE DEVELOPMENT OF A REGIONAL CONCEPT SECONDARY BULK WATER MASTER PLAN FOR THE NEWCASTLE LOCAL MUNICIPALITY			
<b>Document Status:</b>	<b>Draft / Interim / Final:</b> Final <b>Rev. No.:</b> 003	<b>Issue Date:</b> 29 January 2021		
<b>Prepared for:</b>	<b>Client's Name:</b> Umgeni Water	<b>Contact Person:</b> Vernon Perumal <b>Tel No.:</b> 033-341 1232 <b>Email Address:</b> vernon.perumal@umgeni.co.za		
<b>Prepared at / by:</b>	<b>Office:</b>	<b>Division:</b>		
<b>Verification Process:</b>	<b>Name:</b>	<b>Capacity:</b>	<b>Signature:</b>	<b>Date:</b>
<b>Verification by Author:</b>	M Esterhuizen	Planner		2021/01/29
<b>Checked by:</b>	S Munnik	Project Leader		2021/01/29
<b>Authorised by:</b>	S Munnik	Project Leader		2021/01/29
<b>Quality Verification:</b>				
This report / document has been prepared under the quality controls established by Mariswe's Quality Management System, which meets the requirements of the ISO 9001:2015 standard which has been certified by DEKRA Certification under Certificate Number 20907782/5.				
				

Document Issue Record		
Rev. No.	Description:	Issue Date:
001	Draft Reconciliation Report	March 2020
002	Incorporate comments received from Umgeni Water	August 2020
003	Final Reconciliation Report	January 2021

## EXECUTIVE SUMMARY

### A. Introduction

Phase III follows on the Phase II study for the Development of a Universal Access Plan (UAP) for Water Supply in the KwaZulu-Natal Province which was completed in June 2016 by various Professional Service Providers (PSP's) that were appointed by Umgeni Water.

The deliverables for UAP Phase II were divided in two phases where Phase 1 included the information review and development of a High Level Status Quo Assessment and Phase 2 included the development of a demand model and needs development plan, culminating in a Reconnaissance Study report for each Water Services Authority (WSA) on bulk water supply. Water Supply Intervention Areas (WSIAs) were identified during UAP Phase II and were based on areas that could be served either by existing schemes or through planned scheme developments (planned projects).

However, the level of detail within the outcome of UAP Phase II varied between the various PSP's and the magnitude of the cost requirement resulted in Umgeni Water to revisit the process and the need for UAP Phase III was initiated. The main objective of Phase III will be to further develop the conceptual bulk water master plan that would clearly distinguish between primary and secondary bulk.

This document applies to the Newcastle Local Municipality as Water Services Authority and its area of responsibility as WSA.

### B. Demographics

The Newcastle Local Municipality (NLM, KZN252) is one of three local municipalities in the Amajuba District Municipality (ADM, DC25), the other two being Dannhauser bordering NLM in the south and Emadlangeni bordering the NLM in the east.

The NLM is located in the north-western region of the KwaZulu-Natal Province and is bordered in the north by the Mpumalanga Province and in the west by the Free State Province. The NLM has a spatial extent of about 1 854km<sup>2</sup>.

The majority of the people (80%) within the NLM resides within the Newcastle east area, which is predominantly urban and peri-urban areas characterised by a general lack of adequate local infrastructure.

The NLM had a population of 389 117 in 2016, growing from 363 236 in 2011 and accounting for 73% of the total Amajuba District Municipal population and is reflected in Table B-1.

**Table B-1: Population Figures 2011 and 2016**

LM Name	Population 2011	Population 2016	Population Growth	Growth Rate pa
Newcastle	363 236	389 117	25 881	1.56

Source: StatsSA, 2016 Community Survey

The growth in the Newcastle LM is likely due to natural growth and migratory growth due to the urban developments in and around the areas of Newcastle, Madadeni and Osizweni.

Population growth was determined until 2050 that resulted in the projected number of people residing within the WSA to be approximately 551 499 people. The projected population per Municipality is tabled within Table B-2 below.

**Table B-2: Projected Population until 2050**

Local Municipality	2020	2025	2030	2035	2040	2045	2050
Newcastle	410 824	427 211	445 180	469 664	495 496	522 748	551 499

Source: Water Demand Model, UAP Phase III, 2020

The average annual population growth rate for the municipalities in the ADM between 2020 and 2025 is estimated to be 0.79% and from 2030 to 2050, it increases to 1.08%.

## C. Service Levels

### C.1 Water

According to the Community Survey 2016, approximately 9.6% of the total number of households in the WSA do not have access to safe drinking water.

**Table C-1: Community Survey, 2016 Water Supply Levels within NLM**

LM Name	Access to safe drinking water		No access to safe drinking water		Total households
	No. of Households	Percentage (%)	No. of Households	Percentage (%)	
Newcastle	81 504	90.4	8 637	9.6	90 142

Source: StatsSA, 2016 Community Survey

## C.2 Sanitation

According to the Community Survey 2016, approximately 22% (19 758 households) of the total number of households in the WSA do not have access to basic sanitation.

**Table C-2: Community Survey 2016 Sanitation Supply Levels within NLM**

LM Name	Flush toilet connected to a public sewage system	Flush toilet connected to a septic tank or conservancy tank	Chemical toilet	Pit latrine/toilet with ventilation pipe	Pit latrine/toilet without ventilation pipe	Ecological toilet (e.g. urine diversion; enviroloo, etc.)	Bucket toilet (collected by municipality or emptied by HH)	Other or None
Newcastle	56 657	2 411	4 695	6 825	14 754	335	1 034	3 635

Source: StatsSA, 2016 Community Survey

## D. Water Resources, Existing Water Supply Schemes and Water Requirements

The WSA falls in the Buffalo River catchment and in the larger Pongola Mtamvuna Water Management Area (WMA), one of nine WMAs that divides the large catchment areas of South Africa. The Pongola Mtamvuna WMA covers the whole of the KZN province, except a small part in the south, that falls within the Mzimvubu Tsitsikamma WMA.

The most prominent rivers in the WSA are the Ngagane, Ncandu and Horn Rivers with the Buffalo River being the north-eastern boundary of the WSA. Other rivers include the Ngogo and Harte Rivers. The most prominent dam is the Ntshingwayo Dam (previously Chelmsford Dam).

### D-1: Buffalo River

The Buffalo River is the main northern tributary of the Thukela River and flows in a south-easterly direction from the eastern escarpment (Newcastle area) to its confluence with the Thukela River near Nkandla. Irrigation forms the larger part of water requirements (55million m<sup>3</sup>/a), but combined, the domestic water requirements and water transfers account for an estimated 50million m<sup>3</sup>/a.

The Buffalo River is used as one of the water sources for the Biggarsberg WSS to Dundee, Glencoe and Hattingspruit, where water is abstracted at the Tayside Weir located in the neighbouring Endumeni LM. The water released (more or less annually) from the Ntshingwayo Dam ensures continued supply at the Tayside weir. The Biggarsberg WSS is reliant on the operating rules of the Ntshingwayo Dam and return flows into the Buffalo River. The Buffalo River is also used as one of the water sources to the Newcastle, Madadeni and Osizweni WSS. However, the supply is unreliable during the winter months or if there are drought conditions.

### D-2: Ngagane and Ncandu Rivers

The Ngagane River rises at 1993m MSL near Die Ark on the Normandien Pass on the opposite side of the watershed of the Ncandu River. The Ntshingwayo Dam captures the flow of the river south of Newcastle.

The Ncandu River, a tributary of the Ngagane River, joins the Ngagane River north-west of Madadeni from where the Ngagane River flows in an easterly direction towards the confluence with the Buffalo River just north of Madadeni.

The Ngagane River and Ntshingwayo Dam are used as water sources to the Newcastle, Madadeni and Osizweni WSS.

### **D-3: Slang River**

The Slang River in the neighbouring Emadlangeni LM, is the first major tributary of the Buffalo River, joining the Buffalo River 4km south-east of Volksrust. The Slang River flows westerly to the Zaaihoek Dam.

### **D-4: Zaaihoek Dam**

The Zaaihoek Dam, a strategic water source for energy generation and part of the Tugela-Vaal Transfer Scheme, is located on the Slang River. Only water for ecological purposes and for irrigators at an agreed pattern is generally released from this Dam on a continuous basis. In emergency situations, depending on the urgency of supply to the Vaal system, water may be released into the Buffalo river system.

In emergency situations, depending on the urgency of supply to the Vaal system, water may be released into the Buffalo river system.

The report – Development of Water Supply and Drought Operating Rules for Stand-alone Schemes and Dams Typical of Rural/Small Municipal Water Supply Schemes. Eastern Cluster. Buffalo River Catchment (Newcastle, Glencoe, Dundee and Others Decision Support System (2013) – listed the water requirements transfer from the Zaaihoek Dam for the Majuba Power Station as 26Mm<sup>3</sup>/a during 2015/2016. The Full Supply Capacity (FSC) of the Zaaihoek Dam is 184.87Mm<sup>3</sup>/a. The reported HFY was 59Mm<sup>3</sup>/a without the environmental reserve.

### **D-5: Ntshingwayo Dam**

The Ntshingwayo Dam (previously the Chelmsford Dam) is located on the Ngagane River about 18km south-west of Newcastle. The majority of the dam area is in the Dannhauser LM and the remainder in the Newcastle LM. The capacity of the dam is 194million m<sup>3</sup> with an available reserve yield of 21million m<sup>3</sup>/annum. The reserve yield should be preserved for the expected domestic and industrial growth of the supply area of between 11million m<sup>3</sup> and 39million m<sup>3</sup> over the next 20 years (2034) if other dams are not constructed in the demand area not taking account of the associated increase in return flows.

### **D-6: Proposed Surface Water Sources**

The following may be potential dams within the WSA, but need further detailed investigations:

- ✓ Ncandu Dam on the Ncandu River, near the town of Newcastle;
- ✓ Horn River Dam on the Horn River flowing south-west from Newcastle.

Both dam sites have yet to be fully investigated and both rivers are tributaries of the Ngagane River. A proposal exists for Ncandu Dam to be constructed upstream of the confluence of the Ngagane River and Ncandu River. The yield of the proposed dam is indicated as 16.87Mm<sup>3</sup>/annum with a capacity to sustain another 46Mℓ/day of water supply. This proposal is still subject to evaluation against other potential resources such as the proposed Ngogo and Womeni Dams (uThukela Water Master plan) and further exploitation of Buffalo River.

Costing for the planning and construction of the Ncandu Dam is included under the Ngagane WTP serving the Newcastle LM, but for reference, provision is made for R1.007billion.

### **D-7 Groundwater Sources**

There are a number of households in the non-urban areas that are supplied from groundwater sources. Groundwater is also utilised for agriculture, irrigation and industrial activities, but little information is registered on the WARMS database. Groundwater quality is often affected by the coal mining activities in the region. Groundwater quality is generally good, specifically in the higher rainfall areas.

There are 988 boreholes in the Buffalo Flats area of the Dannhauser LM which will remain as backup supply once this area is supplied from the Ngagane WTP in the NLM (Amajuba District Municipality Master Plan for Water Supply, 2011). The functionality of the existing boreholes is unknown.

### **D-8 Water Supply Infrastructure**

The urban water supply schemes in the WSA are the following:

- ✓ Charlestown WSS; and
- ✓ Newcastle, Madadeni and Osizweni WSS.

The urban water supply schemes in the Amajuba DM that also source water from the Ntshingwayo Dam are dealt with in the Amajuba DM UAP Phase III report, but for reference, are the following:

- ✓ Skombaren WSS;
- ✓ Durnacol and Dannhauser WSS;
- ✓ Dannhauser 3 WSS Hilltop;
- ✓ Ngagane/Dannhauser 1 WSS Buffalo Flats; and
- ✓ Utrecht WSS (in times when the local resources are insufficient due to drought conditions).

### **D- 9 Urban and Bulk Water Supply Schemes**

Bulk water supply schemes can be identified as schemes with a large geographic footprint, or with a water treatment works (WTP) of a design capacity of 2Mℓ/day or more.

A summary of the Water Treatment Works is provided in Table D-1 below.

**Table D 1 Summary of WTPs**

Plant Name	Design Capacity (Mℓ/d)	Annual Average Production (Operational) (Mℓ/d)
Charlestown (package plant)	2	below 2*
Ngagane	130	110
<b>Total Capacity</b>	<b>132</b>	<b>110</b>

Source: Newcastle LM correspondence received and from interviews with ADM and Uthukela Water (June, 2019)

\* The NLM could not provide information on the actual water abstracted nor used from the Charlestown package plant, however, according to Umgeni Water, the plant is operating at about 0.5Mℓ/day (2020).

The projected population and water requirements for the WSA are presented in Table D-2.

**Table D-2 Water Demand Projections, Mℓ/day**

LM Name	Population				Water Demands (Mℓ/day)			
	2020	2030	2040	2050	2020	2030	2040	2050
<b>Newcastle</b>	434,174	479,288	537,484	602,747	116.74	131.61	149.98	170.98

Source: Water Demand Model, UAP Phase III, 2020

The Newcastle LM, being the most urbanised and developed, has the highest water requirements in the Amajuba DM, representing 80% of the total water demands for 2020 and 78% of the total water demands for 2050. Newcastle LM also has the highest growth in water demands, representing an increase of 54.24Mℓ/d from 2020 to 2050.

## E. Existing Sanitation Schemes

A summary of the Wastewater treatment plants is provided in Table E-1 below.

**Table E-1: Summary of WWTPs**

Plant Name	Owner and Operator	Design Capacity (Mℓ/day)	Annual Average Production (Operational) (Mℓ/day)	Class of Plant
CHARLESTOWN PONDS	NLM	0.75	0.50	E
MADADENI	NLM	12	9	B
MADADENI PONDS	NLM	TBC	TBC	E
NEWCASTLE	NLM	25	20	B
OSIZWENI	NLM	15	14	B
	Total Capacity based on known information	52.75	43.50	

Source: Newcastle LM correspondence received and from interviews with ADM and Uthukela Water (June, 2019)

In addition, there are privately-owned WWTPs, mainly serving the mining settlements or correctional services facilities, such as Ballengeigh, Ekuseni Juvenile CS, Kilbarchan, Natal Cambrian and Arcelor Mittal.

## **F. Planned and Implementation Projects**

The existing regional bulk projects were considered and evaluated to identify potential gaps within the existing project footprints. This was done in the context to improve access to basic services but at the same time support economic growth and development and ensure sustainable services.

NLM receives funding only from MIG & WSIG. Currently there is no funding from RBIG. The funding streams available for infrastructure development over the next three years (till 2021/2022) within NLM amounts to R495 million. Of this, the WSIG funding till 2021/2022 amounts to R135 million.

## **G. Bulk Water Supply Interventions Considered**

This study aims to ensure that the NLM can make provision for and plan to supply all consumers within its area of jurisdiction with at least basic water supply services. Not all consumers are currently supplied with formal schemes and part of the objectives of this study were to determine where these consumers are, what their water requirements are and the options that could be considered to ensure universal access to water supply up to 2050.

Water Supply Intervention Areas (WSIAs) were identified during this process based on areas that can be served either by linkage to existing schemes or through planned scheme developments (planned projects). These WSIAs, population and their water requirements are illustrated within Table G-1, the water resource requirements illustrated in Table G-2 and the costs illustrated in Table G-3.

For completeness, tables however include rural areas currently obtaining water from groundwater sources such as boreholes and springs or water tanker. The consumers are residing on rural farmsteads or small settlements such as Amajuba Forest, Ingogo and Normandien.

**Table G-1: Conceptual Scheme Areas, Population and Water Requirements**

Water Supply Scheme / WSIA		Population 2020	Water Requirements (Mℓ/d)						
			2020	2025	2030	2035	2040	2045	2050
<b>AMA011b</b>	Charlestown Supply Area	5 249	0.92	0.93	1.05	1.06	1.21	1.22	1.39
<b>AMA012</b>	Newcastle Madadeni Osizweni WSS	419 408	114.01	114.04	128.39	129.12	146.28	147.14	166.73
<b>AMA013</b>	Newcastle Rural Supply Area	7 898	1.35	1.50	1.66	1.77	1.89	2.03	2.17
<b>AMA001</b>	Amajuba Forest	1 620	0.28	0.28	0.32	0.32	0.37	0.37	0.43
<b>Newcastle LM</b>		<b>434 175</b>	<b>116.56</b>	<b>116.75</b>	<b>131.42</b>	<b>132.27</b>	<b>149.75</b>	<b>150.76</b>	<b>170.72</b>

Source: Water Demand Model, UAP Phase III, 2020

The Newcastle Madadeni Osizweni WSS/WSIA has the highest water demands for 2020 and until 2050, totalling 114 Mℓ/day in 2020 and 167Mℓ/day in 2050.

**Table G-3: Water Resources Required vs proposed WSI**

WSIA	WSIA Name	Population (2050)	2050 Demand (Mℓ/day)	2050 Demand (Mm <sup>3</sup> /a)	[A] Existing Resources (Mm <sup>3</sup> /a)*	[B] Proposed Additional Demand under UAP Phase III (Mm <sup>3</sup> /a)	[A+B] Total Demand (Mm <sup>3</sup> /a)	Balance (Mm <sup>3</sup> /a)
AMA011b	Charlestown Supply Area	7 287	1.65	0.60				
AMA012	Newcastle Madadeni Osizweni WSS	582 248	166.73	60.86	170	19.24	189.24	
<b>Newcastle LM</b>		589 534	168.38	61.46	170			
AMA003	Skombaren Ngagane WTP WSS	6 082	1.39	0.51	170	0.17	170.17	
AMA004 and AMA008	Dannhauser WSS	9 009	3.03	1.10		0.33		
	Durnacol WSS	5 367	1.96	0.72		0.21		
<b>Total: AMA004 and AMA008</b>		14 376	4.99	1.82	170	0.54	170.54	
AMA005 and AMA014	Dannhauser 3 WSS Hilltop	13 860	2.42	0.88		0.31		
	Ngagane/Dannhauser 1 WSS Buffalo Flats	125 856	24.23	8.84		3.07		
<b>Total: AMA005 and AMA014</b>		139 715	26.65	9.73	170	3.37	173.37	
AMA016	Utrecht/Ngagane WSS	11 750	3.38	1.23	1.1**	0.38	1.48	
<b>TOTAL</b>		171 923	36.40	13.29		4.47		

\* The licensed allocation to the Ngagane WTP from its three water sources totals 170Mℓ/day (62.05Mm<sup>3</sup>/a).

\*\* The full supply capacity of the Dorps dam is 1.1Mm<sup>3</sup>, but the historic firm yield for both the Dorps and Nywerheids dams is not known.

The groundwater availability in the Buffalo Flats area and Charlestown Supply Area is unknown

Capital costs for serving the 2050 water requirements are only provided for the Newcastle Madadeni Osizweni WSS/WSIA and the Charlestown WSS/WSIA. A water resources study to establish the available groundwater sources for the remainder of the NLM, is provided under AMA013 Newcastle Rural Supply Area.

Refer to the UAP Phase III report for the Amajuba DM for costing details for schemes that fall within the ADM's area of jurisdiction as WSA.

**Table G-2: Total Cost Requirement**

WSIA	WSIA Name	Total Cost Requirement				
		Primary	Secondary	Tertiary	10% Contingencies	Total Cost (Excl VAT)
AMA011b	Charlestown Supply Area	R29 217 000	R3 535 000	R0	R3 275 200	R36 027 200
AMA012	Newcastle Madadeni Osizweni WSS	R1 122 340 000	R2 413 088 948	R79 506 000	R361 493 495	R3 976 428 442
AMA013	Newcastle Rural Supply Area					R80 214 596
<b>Total</b>		<b>R1 151 557 000</b>	<b>R2 416 623 948</b>	<b>R79 506 000</b>	<b>R364 768 695</b>	<b>R4 092 670 238</b>

Source: Water Demand Model, UAP Phase III, 2020

A total estimate of approximately R4.09 billion is required to address the bulk water supply requirement by 2050.

## H. Conclusions and Recommendations

The NLM still faces some backlog in water supply – not only in providing all consumers within its area of jurisdiction with access to water supply according to its WSA duties, but also in ensuring sustainable water services of existing supply. In the WSA, 9.6% of the consumers does not have access to reliable water supply. Furthermore, there are areas where the existing water supply infrastructure as well as water source, are insufficient to meet current and projected future water requirements. New developments and urbanisation put further strain on existing supplies and resources.

The WSA relies mainly on grant funding programmes to fund their bulk water supply projects. These funding programmes are mainly RBIG, MIG and WSIG. Based on all the current funding streams available to the WSA over the MTEF period, it may take more than fifty years for the WSA to address its water supply requirements. However, it is noted that the WSA applied for RBIG funding, which will greatly assist in speeding up the process of infrastructure development.

Another funding option that the WSA could consider is loan funding through the Development Bank of Southern Africa (DBSA). However, in the 2019/2020 IDP it states that the WSA is not considering taking loans in the next three financial years.

The implementation programme will depend on the availability of funds from National Treasury as well as the capacity of the Municipality to implement projects. Furthermore, implementing appropriate WC/WDM programmes would assist to delay capital investment requirements.

The proposed water supply intervention area (WSIAs) as appropriate solutions for bulk water supply development within the WSA:

- ✓ AMA012 Newcastle Madadeni Osizweni WSS;
- ✓ AMA011b Charlestown Supply Area; and
- ✓ AMA013 Newcastle Rural Supply Area.

The supply to the Ngagane/Dannhauser 1 WSS Buffalo Flats from the Ngagane WTP, is subject to the planning from the Amajuba DM as WSA.

The proposed priority WSIA is further detailed within Table H-1. It is also proposed to follow a phased approach for implementation, pending water resource availability and human settlement development. However, the order would most likely be determined by the availability of funds or intervention programmes and should be confirmed with the WSA.

**Table H-1 Proposed Implementation Order**

Proposed Priorities (Phased Approach)	WSIA No and Name		Proposed Project Name	Estimated Project Value (Excl VAT)
1	AMA012	Newcastle Madadeni Osizweni WSS	Newcastle Madadeni Osizweni WSS	R3 976 428 442

## Table of Contents

<b>1. OBJECTIVES AND METHODOLOGY .....</b>	<b>1</b>
1.1 Background and Introduction .....	1
1.2 Purpose of the Report.....	2
1.3 Information Sources.....	2
1.4 Stakeholder Engagement .....	3
1.5 Water Requirements Model Methodology.....	3
1.5.1 Total Water Demand Calculations .....	3
1.6 Base Data .....	3
1.6.1 Assumptions.....	5
1.6.2 Output of the Water Demand Model.....	7
1.7 DWS Reference Framework Geodatabase .....	7
1.8 Reconnaissance Report.....	8
<b>2. STUDY AREA.....</b>	<b>9</b>
2.1 Context.....	9
2.2 Physical Characteristics of the Study Area .....	11
2.2.1 Newcastle Local Municipality (NLM).....	11
2.3 Climate and Climate Change .....	11
2.4 Topography, Geology and Soils.....	12
2.5 Environment.....	12
2.6 Institutional Arrangements for Water Supply.....	17
2.7 Economic Development Opportunities.....	17
<b>3. DEMOGRAPHICS .....</b>	<b>19</b>
3.1 Existing Population Distribution.....	19
3.1.1 Community Survey 2016 .....	19
3.2 Social and Economic Indicators.....	21
3.3 Population Growth Scenarios .....	23
3.4 Main Development Nodes .....	23
<b>4. WATER REQUIREMENTS.....</b>	<b>25</b>

4.1	Water Supply Service Level .....	25
4.1.1	<i>Community Survey 2016 Water Supply Levels</i> .....	25
4.1.2	<i>DWS Reference Framework Water Supply Levels</i> .....	27
4.1.3	<i>Water and Sanitation Master Plan</i> .....	27
4.1.4	<i>WSA Municipal Infrastructure Forum Reporting</i> .....	27
4.2	Water Losses and Demand Management .....	27
4.2.1	<i>Water Balance, KZN Summary</i> .....	29
4.2.2	<i>WSA WC/WDM Strategy</i> .....	30
4.2.3	<i>WSA Water Balance</i> .....	31
4.3	Water Demand Model .....	32
4.3.1	<i>Water Demand</i> .....	32
4.3.2	<i>Demand per Regional Water Scheme</i> .....	32
<b>5.</b>	<b>EXISTING WATER SUPPLY INFRASTRUCTURE .....</b>	<b>34</b>
5.1	Water Resource Availability .....	34
5.1.1	<i>Overview</i> .....	34
5.1.2	<i>All Towns Strategy (2015)</i> .....	36
5.1.3	<i>Water Use Licensing</i> .....	37
5.1.4	<i>Surface Water Resources</i> .....	38
5.1.5	<i>Proposed Potential Surface Water Sources</i> .....	40
5.1.6	<i>Groundwater Sources</i> .....	40
5.2	Existing Water Supply Schemes .....	42
5.3	Urban and Bulk Water Supply Schemes .....	44
5.3.1	<i>AMA011: Charlestown WSS</i> .....	45
5.3.2	<i>AMA012: Newcastle, Madadeni and Osizweni WSS</i> .....	47
5.3.3	<i>AMA014: Dannhauser Buffalo Flats WSS</i> .....	50
5.3.4	<i>AMA013: Newcastle Rural Supply Area</i> .....	53
<b>6.</b>	<b>EXISTING SANITATION BULK INFRASTRUCTURE .....</b>	<b>54</b>
6.1	Sanitation Service Levels .....	55
6.1.1	<i>Community Survey 2016 Sanitation Supply Levels</i> .....	55
6.1.2	<i>DWS Reference Framework Water Supply Levels</i> .....	56
6.1.3	<i>Water and Sanitation Master Plan</i> .....	56
6.1.4	<i>WSA Municipal Infrastructure Forum Reporting</i> .....	56
6.2	Urban and Bulk Sanitation Supply Schemes .....	58

6.2.1	<i>Charlestown SS</i> .....	60
6.2.2	<i>Madadeni SS</i> .....	60
6.2.3	<i>Newcastle SS</i> .....	60
6.2.4	<i>Osizweni SS</i> .....	61
<b>7.</b>	<b>BULK WATER SUPPLY PROJECTS CURRENTLY IN PLANNING</b> .....	<b>62</b>
7.1	Regional Bulk Water Projects in Planning.....	62
7.2	Newcastle LM and Amajuba DM.....	63
<b>8.</b>	<b>SYNOPSIS OF EXISTING AND COMMITTED SCHEMES</b> .....	<b>65</b>
8.1.1	<i>Charlestown WSS</i> .....	65
8.1.2	<i>Newcastle, Madadeni and Osizweni WSS</i> .....	66
8.1.3	<i>Dannhauser Buffalo Flats WSS and Hilltop</i> .....	66
<b>9.</b>	<b>PROPOSED BULK WATER SUPPLY INTERVENTIONS</b> .....	<b>69</b>
9.1	UAP Phase III Water Supply Interventions.....	69
9.2	AMA012 Newcastle Madadeni Osizweni WSS.....	71
9.2.1	<i>Water Demand</i> .....	71
9.2.2	<i>Water Resource Consideration</i> .....	71
9.2.3	<i>Water Supply Infrastructure</i> .....	71
9.2.4	<i>Financial Requirements</i> .....	72
9.3	AMA011b Charlestown Supply Area.....	75
9.3.1	<i>Water Demand</i> .....	75
9.3.2	<i>Water Resource Consideration</i> .....	75
9.3.3	<i>Water Supply Infrastructure</i> .....	75
9.3.4	<i>Financial Requirements</i> .....	76
9.4	AMA013 Newcastle Rural Supply Areas.....	79
<b>10.</b>	<b>CONCLUSIONS</b> .....	<b>81</b>
10.1	Total Water Demand per Supply Area.....	81
10.2	Total Water Resources Required vs Proposed Water Supply Interventions (WSI).....	83
10.3	Summary of Total Bulk Water Infrastructure Requirements per WSIA.....	84
10.3.1	<i>AMA011b Charlestown Supply Area</i> .....	85
10.3.2	<i>AMA012 Newcastle Madadeni Osizweni WSS</i> .....	87
10.4	Financial Requirements.....	89
10.5	Funding Options.....	89

---

10.6	Implementation Programme.....	89
<b>11.</b>	<b>RECOMMENDATIONS.....</b>	<b>90</b>
11.1	Responsibilities .....	90
11.2	Selection of Solutions.....	90
11.3	Pertinent Legislation .....	90
11.3.1	<i>Municipal Structures Act</i> .....	91
11.3.2	<i>Municipal Systems Act</i> .....	91
11.3.3	<i>Water Services Act</i> .....	91
	<b>ANNEXURE A – REFERENCES .....</b>	<b>93</b>
	<b>ANNEXURE B – DETAILED PROPOSED WSI INFRASTRUCTURE COMPONENT COSTS .....</b>	<b>95</b>

## List of Tables

Table 1-1 Assumed average AADD per person per combined income and LoS category .....	6
Table 1-2 Indirect demands, as a ratio of direct demands per Centre classification .....	6
Table 1-3 Level of Service Upgrade .....	7
Table 2-1 Mean Annual Precipitation.....	11
Table 3-1: Population: 2011 and 2016 .....	19
Table 3-2: People Living in Poverty .....	21
Table 3-3 Household income of ADM per Local Municipality .....	22
Table 3-4 Amajuba DM Deprivation Index per Local Municipality.....	22
Table 3-5: ADM Demographic Projections – Population, UAP Phase III.....	23
Table 4-1: Water Supply Levels, Community Survey 2016.....	25
Table 4-2: DWS RF Water Reliability, 2016 .....	27
Table 4-3: Water Balance, KZN Provincial Summary, 2017/2018 .....	29
Table 4-4: KZN WSA WSS Characteristics .....	30
Table 4-5: Water Demand Projections per LM, Mℓ/d.....	32
Table 4-6: Water Demand Projections per WSS*, Mℓ/d.....	33
Table 5-1: Water Resources: FSC and HFY .....	36
Table 5-2: Water Use Licensing, 2019. Amajuba District Municipality. ....	37
Table 5-3: Summary of WTPs .....	45
Table 6-1: Sanitation Supply Levels, Community Survey 2016.....	55
Table 6-2: DWS RF Sanitation Level of Service (LoS), 2016 .....	56
Table 6-3: Summary of WWTPs.....	58
Table 7-1: RBIG Funding in terms of DORA .....	62
Table 7-2: MIG and WSIG Funding in terms of DORA.....	63
Table 8-1: Charlestown Gap Analysis .....	65
Table 8-2: Newcastle, Madadeni and Osizweni WSS Gap Analysis .....	66
Table 8-3: Dannhauser Buffalo Flats WSS and Hilltop Gap Analysis .....	67
Table 9-1: Population and Water demand (Mℓ/day) 2020 and 2050 .....	71
Table 9-2: Cost Requirement.....	72
Table 9-3: Population and Water demand (Mℓ/day) 2020 and 2050 .....	75
Table 9-4: Cost Requirement.....	76
Table 10-1: Total Water Demand (Mℓ/d) 2050 per WSIA .....	81
Table 10-2: Water Resources Required vs proposed WSI .....	83
Table 10-3: WSIA Summary for AMA011b Charlestown Supply Area .....	85

---

Table 10-4: WSIA Summary for AMA012 Newcastle Madadeni Osizweni WSS .....	87
Table 10-5: Financial Requirements based on Demand Model Interventions .....	89

## List of Figures

Figure 2-1 Study Area .....	10
Figure 2-2 Land Cover .....	13
Figure 2-3 Sensitive areas and Areas of Concern .....	15
Figure 2-4 Biodiversity Priority Areas .....	16
Figure 3-1 Population Distribution .....	20
Figure 3-2 Human Development Index, NLM .....	21
Figure 4-1 Water Supply Reliability Profile .....	26
Figure 4-2 IWA Best Practice Standard Water Balance .....	28
Figure 5-1 Water Resources .....	35
Figure 5-2 Existing Water Supply Schemes .....	43
Figure 5-3 Charlestown WSS .....	46
Figure 5-4 Newcastle, Madadeni and Osizweni WSS .....	48
Figure 5-5 Dannhauser – Buffalo Flats WSS .....	52
Figure 6-1 Sanitation Service Level Profile .....	57
Figure 6-2 Existing Sanitation Schemes .....	59
Figure 9-1 Overall WSA Proposed Bulk WSIs .....	70
Figure 9-2: AMA012 Newcastle Madadeni Osizweni WSS .....	73
Figure 9-3: Schematic layout of AMA012 Newcastle Madadeni Osizweni WSS .....	74
Figure 9-4: AMA011b Charlestown Supply Area .....	77
Figure 9-5: Schematic layout of AMA011b Charlestown Supply Area .....	78
Figure 9-6 AMA013 Newcastle Rural Supply Area .....	80

## LIST OF ABBREVIATIONS

ADM	Amajuba District Municipality
CoGTA	Department of Cooperative Governance and Traditional Affairs
CoU	City of uMhlatuze
CR	Command Reservoir
DM	District Municipality
DWS	Department of Water and Sanitation
EMF	Environmental Management Framework
GIS	Geographical Information System
IDM	iLembe District Municipality
IDP	Integrated Development Plan
IRDP	Integrated Residential Development Programme
KZN	KwaZulu-Natal
ℓ/c/d	Liters per capita per day
LED	Local Economic Development Programme
LM	Local Municipality
LoS	Level of Service
LTBWSS	Lower Thukela Bulk Water Supply Scheme
m <sup>3</sup>	Cubic meter
MIG	Municipal Infrastructure Grant
Mℓ/day	Mega liter per day
Mm <sup>3</sup>	Million Cubic meter
Mm <sup>3</sup>	Million Cubic Meters
Mm <sup>3</sup> /a	Million Cubic Meters per annum
NLM	Newcastle Local Municipality
NRW	Non-Revenue Water
PSP	Professional Service Provider
R '000	Rand Thousands
RBIG	Regional Bulk Infrastructure Grant
RDP	Reconstruction and Development Plan
Res	Reservoir
RF	Reference Framework
RWSS	Regional Water Supply Scheme

---

SDF	Spatial Development Programme
SIV	System Input Volume
UAP	Universal Access Plan
UKDM	Umkhanyakude District Municipality
UTDM	uThukela District Municipality
VAT	Value Added Tax
WMA	Water Management Area
WSA	Water Services Authority
WSDP	Water Services Development Plan
WSI	Water Supply Intervention
WSIA	Water Supply Intervention Area
WSIG	Water Services Infrastructure Grant
WSP	Water Service Provider
WSS	Water Supply Scheme
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

## 1. OBJECTIVES AND METHODOLOGY

This report is the Bulk Water Master Plan for the study titled “Universal Access Plan Phase III – Progressive Development of a Regional Concept Secondary Bulk Water Master Plan for the Newcastle Local Municipality (NLM) – in this instance also the Water Services Authority (WSA) for its area of jurisdiction. The NLM falls within the Amajuba District Municipality (ADM), which is also a Water Services Authority, but only for the other two municipalities in its jurisdiction, namely Dannhauser and Emadlangeni Local Municipalities.

This section provides the background of the study, an introduction and description of the study objectives.

### 1.1 BACKGROUND AND INTRODUCTION

This study follows on the Phase II study for the Development of a Universal Access Plan (UAP) for Water Supply in the KwaZulu-Natal Province which was completed in June 2016 by various Professional Service Providers (PSP's) appointed by Umgeni Water.

However, the level of detail within the final outcome of UAP Phase II varied between the various PSP's and the magnitude of the cost requirement resulted in Umgeni Water to revisit the process and the need for UAP Phase III was initiated. The main objective of Phase III will be to further develop the conceptual bulk water master plan that would clearly distinguish between primary and secondary bulk.

Umgeni Water appointed Mariswe (Pty) Limited (previously UWP Consulting (Pty) Ltd), in association with JTN Consulting in November 2018 to review the UAP Phase II process by developing of UAP Phase III for the whole of the KwaZulu-Natal province. The areas are as follows:

- ✓ Amajuba District Municipality (ADM);
- ✓ City of uMhlathuze Local Municipality (CouM);
- ✓ Harry Gwala District Municipality (HGDM);
- ✓ iLembe District Municipality (IDM);
- ✓ King Cetshwayo District Municipality (KCDM);
- ✓ Newcastle Local Municipality (NLM);
- ✓ The Msunduzi Local Municipality (TMLM);
- ✓ Ugu District Municipality (Ugu);
- ✓ Umgungundlovu District Municipality (UMDM)
- ✓ Umkhanyakude District Municipality (UKDM);
- ✓ uMzinyathi District Municipality (UZDM);
- ✓ uThukela District Municipality (UTDM); and
- ✓ Zululand District Municipality (ZDM).

The abovementioned municipalities were allocated WSA status for their respective areas of jurisdiction. Amajuba, King Cetshwayo and uMgungundlovu's responsibilities as WSA excludes the areas covered by the Newcastle, City of uMhlathuze, and The Msunduzi Local Municipalities which themselves are WSA's. UAP Phase III reports are developed per WSA, i.e. 13 reports are prepared.

## 1.2 PURPOSE OF THE REPORT

This report is the second deliverable of the study, namely the Reconnaissance Study that outlines the conceptual master plan of primary and bulk regional schemes per WSA.

The UAP Phase III aims to review and update the UAP Phase II study reports in order to clearly distinguish between primary and secondary bulk water requirements. The implementation of the UAP Phase III study will be executed in two phases and are as follows:

Phase	Description	Deliverables
Phase 1	Due diligence of the conceptual Regional Bulk Scheme Reports from UAP Phase II	High Level Water Services Intervention Areas (WSIA) due diligence report outlining the viability and sustainability of the already proposed regional schemes
Phase 2	Reconnaissance into the Proposed Regional Primary and Secondary Bulk Schemes per Water Services Authority	Reconnaissance Study that outlines the conceptual master plan of primary and bulk regional schemes

Phase 1 includes the information review and conducting a due diligence of the conceptual regional bulk schemes proposed during UAP Phase II.

Phase 2 includes the development of a demand model up to 2050 and needs development plan, culminating in a Reconnaissance Study report on primary and secondary bulk water supply.

The Report would also provide status quo information on sanitation level of service per WSA inclusive of sanitation bulk scheme components. The sanitation status quo information was collected, verified and validated during the Municipal visits and incorporated within the geo database.

The UAP Phase III study information would be used to update the DWS Reference Framework (RF) geodatabase where possible.

## 1.3 INFORMATION SOURCES

Since the completion of the UAP Phase II study report for the WSA, the following studies and activities have been initiated and / or completed, that will be taken into account for UAP Phase III:

- ✓ Amajuba District Municipality Water and Sanitation Master Plan, 2016;
- ✓ Newcastle Local Municipality Water and Sanitation Master Plan – still in development (requires funding for its release),
- ✓ Development and Implementation of Water Conservation/Water Demand Management in Amajuba District Municipality: Bulk Water Meter Audit Report, 2016;
- ✓ StatsSA Community Survey, 2016;
- ✓ Submission of monthly water balance reports to the DWS;
- ✓ KZN Water Conservation and Water Demand Management Handbook. Amajuba District Municipality, 2018;
- ✓ KZN Water Conservation and Water Demand Management Handbook. Newcastle Local Municipality, 2018;
- ✓ Amajuba District Municipality Spatial Development Framework, 2018/2019;

- 
- ✓ Amajuba District Municipality Integrated Development Plan, 2019/2020;
  - ✓ Dannhauser Local Municipality Integrated Development Plan, 2018/2019;
  - ✓ Emadlangeni Local Municipality Integrated Development Plan, 2019/2020;
  - ✓ Newcastle Local Municipality Integrated Development Plan, 2019/2020;
  - ✓ Newcastle Local Municipality Spatial Development Framework, 2017/2018;
  - ✓ Umgeni Water Infrastructure Master Plans, 2017, 2018, 2019 and 2020;
  - ✓ Uthukela Water Infrastructure Master Plan 2015;
  - ✓ Eskom Satellite Building Count (SBC), 2015;
  - ✓ Newcastle Local Municipality Community Base Plans April 8, 2019 – still to be obtained;
  - ✓ All Towns Reconciliation Strategies Studies (Department of Water and Sanitation, 2012 or 2016), where possible.

More information will be provided in this report, in the relevant sections. It is possible that more studies and activities have been initiated or completed and will be included in the UAP Phase III study as and when required, such as updated Water Services Development Plans or DWS water resource studies.

#### 1.4 STAKEHOLDER ENGAGEMENT

---

During the UAP Phase III study, the stakeholders identified and engaged from the previous UAP Phase II study, were reviewed and the stakeholder list updated. In the ADM and NLM (2019), there were a few changes of officials with new appointments as well as persons appointed in acting positions.

Uthukela Water provides bulk water services in the Newcastle LM and the relevant officials are included in the stakeholder list.

Stakeholder engagements include site visits during the Inception process; follow-up engagements (site visits, email, telephonic) to elicit comments and information relevant to this study; and the presentation of the Due Diligence Reports.

#### 1.5 WATER REQUIREMENTS MODEL METHODOLOGY

---

A report outlining the methodology, design criteria and assumptions to be used to develop the water demand model for this study, UAP Phase III was approved by the Client. The approved water demand model was then applied to determine the demands for all areas included in the study, at least at a town level. The water demands are required to inform the concept design for a design horizon period up to 2050, with the minimum level of service a yard connection at 100 l/capita per day.

##### 1.5.1 Total Water Demand Calculations

---

This section provides information on the base data used for the modelling, assumptions made and outputs of the water demand model, based on a pilot Water Services Authority area.

#### 1.6 BASE DATA

---

The base data used for this study includes the following:

- ✓ 2011 Census: Spatial data for the Main Places, Sub-Places and Small Areas Layer. Main Places are similar to the level of towns, Sub-Places are similar to the level of suburbs and the Small Areas Layer are of a smaller level of detail than Sub-Places, encompassing a number of enumerated census areas;
- ✓ 2011 Census: alpha-numeric data, linking to the spatial data, for household income categories, combined with water Level of Service (LoS). The derived household income and LoS information was combined into categories as follows:
  - Category 1 (Very High Income): Households with a house connection and an income more than R 1 228 000 per year;
  - Category 2 (Upper Middle Income): Households with a house connection and an income between R 153 601 and R 1 228 000 per year;
  - Category 3 (Average Middle Income): Households with a house connection and an income of between R 38 401 and R 153 600 per year;
  - Category 4 (Low Middle Income): Households with a house connection and an income of between R 9 601 and R 38 400 per year;
  - Category 5 (Low Income): Households with a house connection and an income between R1 and R 9 600 per year;
  - Category 6 (Yard Connections): all Households with a Yard Connection;
  - Category 7 Households with access to interim services and
  - Category 8 Households with access to below interim services.
- ✓ 2011 Census: categorisation of Main Places – similar to town level data, based on best-known characteristics of the Main Place. The types of Towns/Centre categories include:
  - Category 1: Long Established Metropolitan Centres (M): Large conurbation of a number of largely independent local authorities generally functioning as an entity;
  - Category 2: City (c): Substantial authority functioning as a single entity isolated or part of a regional conurbation;
  - Category 3: Town: Industrial (Ti): A town serving as a centre for predominantly industrial activities;
  - Category 4: Town: Isolated (Tis): A town functioning generally as a regional centre of essentially minor regional activities;
  - Category 5: Town: Special (Ts): A town having significant regular variations of population consequent on special functions. (Universities, holiday resorts, etc.);
  - Category 6: Town: Country (Tc): A small town serving essentially as a local centre supporting only limited local activities.
  - Category 7: Contiguous (Nc): A separate statutory authority or a number of authorities adjacent to, or close to, a metropolis or city and functioning as a component part of the whole conurbation;
  - Category 8: Isolated (Nis): A substantial authority or group of contiguous authorities not adjacent to an established metropolis or authority;
  - Category 9: Minor (Nm): Smaller centres with identifiable new or older established centres not constituting centres of significant commercial or industrial activity;
  - Category 10: Rural (Nr): All other areas not having significant centres.
- ✓ Population Growth: Population numbers per Small Areas Layer as provided by Umgeni Water that developed with Statistics South Africa the population growth for the following years:
  - 2016; 2020; 2025; 2030; 2035; 2040; 2045 and 2050.

- 
- ✓ 2019 Updated Levels of Service as provided by Water Services Authorities. The 2019 LoS may be recorded in different formats and at different spatial levels (settlement / town, ward, other). The following categories were applicable the pilot WSA, based on wards and spatially allocated to the Small Areas Layer:
    - AtBelow: Assumed for the purposes of this study to include all areas below the standpipe level of service in 2019;
    - At: All areas at standpipe level of service in 2019 and
    - Above: All areas above the standpipe level of service in 2019.

### 1.6.1 Assumptions

---

The following assumptions were made in order to calculate the demands per Small Area:

- ✓ That the ratio of population within each income category in the House Connection LoS category has not changed since 2011. The assumption is that the individuals in each category may be earning more since 2011, but that the categories themselves should have also then moved upwards by the same average quantum. The ratio of population in each category may then be assumed to have stayed more or less the same, even though the actual income values may have changed. This will not influence the demand allocated to each category.
- ✓ That the categorisation of Centres has not changed since the 2011 Census. The categorisation of Main Places may be reviewed if necessary
- ✓ The projected population growth numbers as provided by Umgeni Water was used without any further analyses.
- ✓ The 2019 updated Level of Service as provided for the pilot WSA was used, which also indicated potential future levels of service. However, it was found that some areas are marked as below standpipe level when the 2011 Census recorded these areas as above RDP level. We assumed that these areas may have been marked as below standpipe level subsequent to the Census due to factors such as water availability / reliability or other factors. It was decided, in these cases, that the infrastructure probably still exists in these areas as recorded during the Census and that it would be prudent, for water demand modelling purposes, to assume the Census RDP levels still apply. In cases where the WSA indicated areas to be in higher categories than recorded in the Census, the WSA for Level of Service was used, since it is assumed that these areas have since been upgraded to a higher level of service. No area was therefore downgraded from the Census data, but some areas were upgraded to a higher LoS with the new 2019 data.
- ✓ Average of the Annual Average Daily Demand (AADD) values (Direct Demands) were assumed, as shown in. Table 1-1 Assumed average AADD per person per combined income and LoS category. These were informed by the previous UAP Phase II study.
- ✓ Indirect demands, as a ratio of AADD, were assumed, as summarised in Table 1-2 Indirect demands, as a ratio of direct demands per Centre classification per Centre category.

**Table 1-1 Assumed average AADD per person per combined income and LoS category**

Category	Description of consumer category	Household Annual Income range	Average AADD (l/c/d)
1	House Connections: Very High Income	>R1 228 000	410
2	House Connections: Upper middle income	R 153 601 – R 1 228 000	295
3	House Connections: Average Middle Income	R 38 401 – R 153 600	228
4	House Connections: Low middle Income	R 9 601– R 38 400	170
5	House Connections: Low income	R 1 – R 9600	100
6	Yard Connections		100
7	Households with access to interim services		70
8	Households with access to below interim services		12

**Table 1-2 Indirect demands, as a ratio of direct demands per Centre classification**

Classification	Type of Centre	Description	Typical CSIR / SACN Settlement Typology	Indirect demands as a ratio of direct demands			
				Commercial	Industrial	Institutional	Municipal
1	Long established Metropolitan centres (M)	Large conurbation of a number of largely independent local authorities generally functioning as an entity.	City Region	0.2	0.3	0.15	0.08
2	City (c)	Substantial authority functioning as a single entity isolated or part of a regional conurbation.	City / Regional Centre 1 / Regional Centre 2				
3	Town: Industrial (Ti)	A town serving as a centre for predominantly industrial activities.	Regional Centre 1 / Regional Centre 2				
4	Town: Isolated (Tis)	A town functioning generally as a regional centre of essentially minor regional activities	Service Town				
5	Town: Special (Ts)	A town having significant regular variations of population consequent on special functions. (Universities, holiday resorts, etc.)	Service Town / Local or Niche Town	0.3	0.15	0.08	0.03
6	Town: Country (Tc)	A small town serving essentially as a local centre supporting only limited local activities	Local or Niche Town	0.1	0.15	0.03	0.1
7	Contiguous (Nc)	A separate statutory authority or a number of authorities adjacent to, or close to, a metropolis or city and functioning as a component part of the whole conurbation.	Regional Centre 2	0.15	0.08	0.08	0.08
8	Isolated (Nis)	A substantial authority or group of contiguous authorities not adjacent to an established metropolis or authority.	High Density Rural				
9	Minor (Nm)	Smaller centres with identifiable new or older established centres not constituting centres of significant commercial or industrial activity.	Local or Niche Town				

10	Rural (Nr)	All other areas not having significant centres.	Rest of South Africa				
----	------------	---	----------------------	--	--	--	--

- ✓ The phased upgrading of Level of Service up to 2050 was assumed as summarised in Table 1-3 Level of Service Upgrade.

**Table 1-3 Level of Service Upgrade**

Dwelling Type	LOS Upgrade
House Connections: Very High Income	Grows with Population growth
House Connections: Upper middle income	Grows with Population growth
House Connections: Average Middle Income	Grows with population growth + additional 2.5% increase from Low Middle Income by between 2019 and 2030 + additional 5% increase from Low Middle Income between 2031 and 2050
House Connections: Low middle Income	Grows with population growth + additional 5% increase from Low Income by between 2019 and 2030 + additional 10% increase from Low Income between 2031 and 2050
House Connections: Low income	Grows with population growth + additional 7.5% increase from Yard Connections by between 2019 and 2030 + additional 15% increase from Yard Connections between 2031 and 2050
Yard Connections	Grows with Population growth + minimum LOS by 2030
Households with access to interim services	Reduce to 0 by 2030
Households with access to below interim services	Reduce to 0 by 2030

- ✓ Finally, an additional 10 % and 15% were added to the total water demand (Sum of Direct and Indirect Demands) for water treatment losses and distribution losses respectively.

### 1.6.2 Output of the Water Demand Model

The output of the water demand model is a total water demand (including direct demands, indirect demands and acceptable losses) for 2019; 2020; 2025; 2030; 2035; 2040; 2045 and 2050 per Small Area, in Million Cubic Meters per annum (Mm<sup>3</sup>/a). This water demand will be compared to available supply demands if possible and an opinion on potential discrepancies will be given.

As the output is based on the Census Small Areas Layer and coded accordingly, it can be used in a GIS environment for further analysis.

## 1.7 DWS REFERENCE FRAMEWORK GEODATABASE

The DWS Directorate: Water Services – Planning and Information – maintains a national database for water services planning. It is a spatial database, in a GIS format, that includes layers for settlements, water supply infrastructure, sanitation supply infrastructure and projects.

This study aims to update the service levels for settlements based on feedback from each WSA. Furthermore, where possible, the bulk and reticulation infrastructure components in the geodatabase are also updated to include not only the latest existing, but also planned water supply infrastructure.

---

## 1.8 RECONNAISSANCE REPORT

---

The final deliverable of this study is a Reconnaissance Report – this report – to reconcile the water requirements, with available water sources, for all areas in a WSA. This includes the evaluation of existing capacities of infrastructure, potential extensions to new areas, or scheme development options for areas where linkage to existing schemes are not feasible.

The potential costs for scheme development and timeframes were investigated and are presented in this report. Umgeni Water provided unit reference costs for infrastructure components that have been applied where possible.

Information on available water sources were mainly obtained from existing DWS Reconciliation Strategies (larger systems and from the All Towns Studies). Where available, project-specific studies or technical reports were consulted to verify information on available water sources. Information on groundwater availability and quality is however not readily available to a sufficient level of detail.

## 2. STUDY AREA

This section provides an overview of the study area, setting the scene and discusses the institutional arrangements for water supply. It also provides a brief overview of the demographics in the area and the economic development opportunities. A map of the study area is provided in Figure 2-1.

### 2.1 CONTEXT

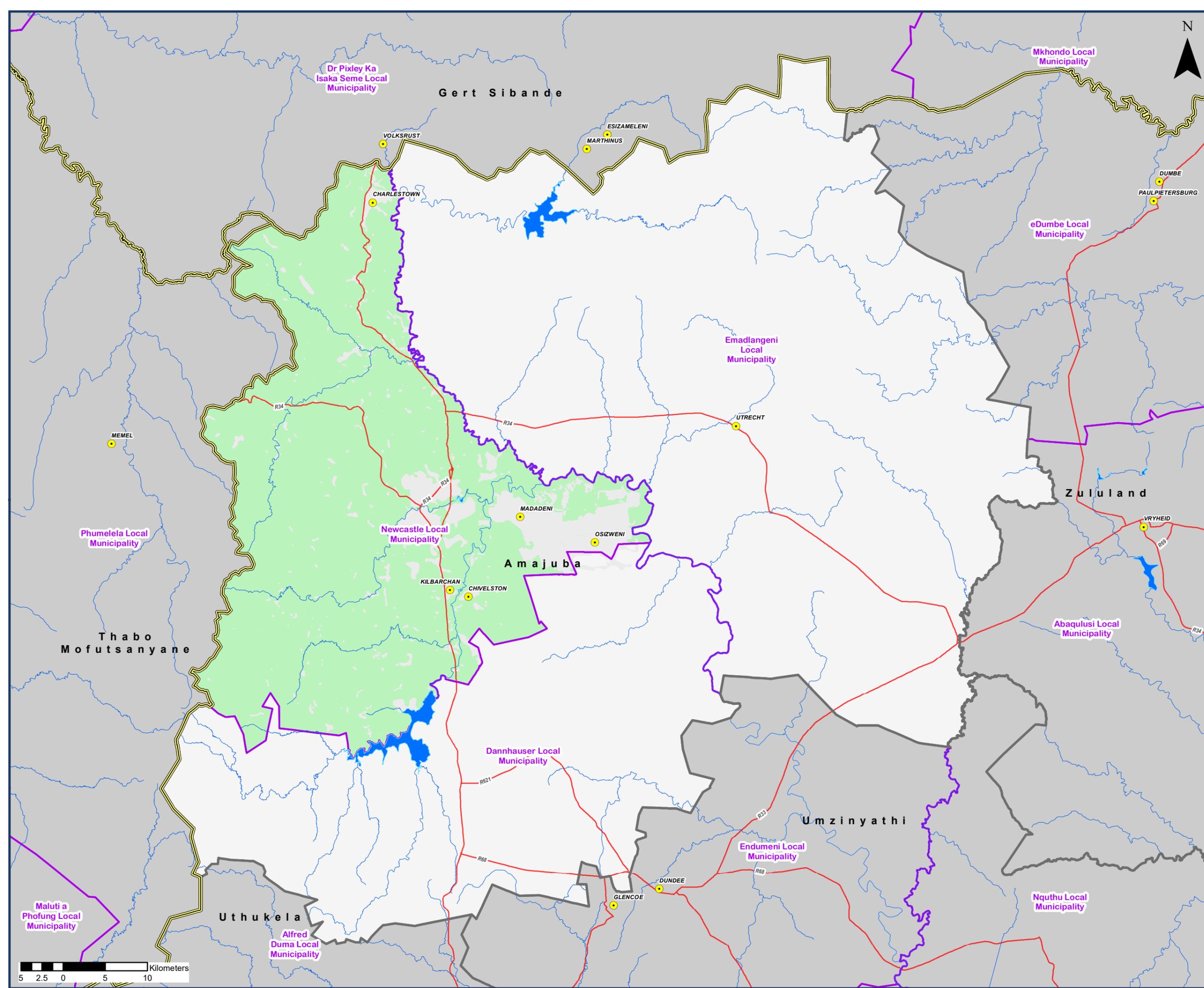
The Newcastle Local Municipality (NLM, KZN252) is one of three local municipalities in the Amajuba District Municipality (ADM, DC25), the other two being Dannhauser bordering NLM in the south (DLM, KZN254) and Emadlangeni bordering the NLM in the east (ELM, KZN253 Local Municipalities. The NLM is the Water Services Authority for its area of jurisdiction. The NLM provides water services in its area of jurisdiction as well as to some of the areas in the neighbouring Dannhauser and Emadlangeni LMs.

The NLM is located in the north-western region of the KwaZulu-Natal Province and is bordered in the north by the Mpumalanga Province and in the west by the Free State Province. The NLM has a spatial extent of about 1 854km<sup>2</sup> and is one of 43 local municipalities in the KwaZulu-Natal Province (NLM IDP, 2019/2020).

The main transportation route linking the NLM to its surroundings, is the N11 traversing north-south. This is also an alternative route between Johannesburg and Durban along with a railway line linkage. The R34 just north of Newcastle town bisects the ADM in an east-west direction and provides a linkage from the port city of Richards Bay to the interior (ADM IDP, 2019/2020).

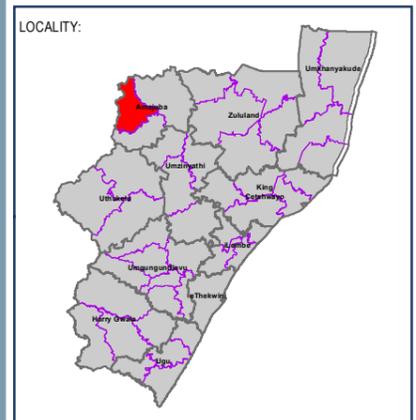
According to the Community survey 2016, the total population in the NLM is estimated to be 389 117 people within 90 347 households, demarcated into 34 wards. Newcastle LM has the highest population within the ADM and between 2011 and 2016 experienced an average growth of 1.42% per annum. The NLM further has the second-highest number of persons for a local municipality in KZN, the first being Msunduzi LM (NLM IDP, 2019/2020).

A high majority of the people (80%) within the NLM resides within the Newcastle east area, which is predominantly township and semi-rural areas characterised by a general lack of adequate infrastructure services. However, the NLM is well-placed to benefit from regional economic growth given its strategic location at the nexus of major tourism, logistics, farming and industrial routes; mining and manufacturing activities (NLM IDP, 2019/2020).



**Legend**

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Farm Land & Conservation Areas
- National Roads
- Main Roads
- Local Roads
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns



CLIENT:

DISTRICT MUNICIPALITY:

NEWCASTLE LOCAL MUNICIPALITY

CONSULTANTS:

Project No.: 27814

Mariswe  
PO Box 25549, Monument Park  
Pretoria, 0105

Tel: + 27 (0) 12 424 9700  
Fax: + 27 (0) 12 460 4071  
Email: pretoria@mariswe.com

PROJECT TITLE

**Universal Access Plan Phase III -  
Progressive Development of a  
Regional Concept Secondary  
Bulk Water Master Plan**

MAP TITLE:

**Study Area  
Newcastle Local Municipality**

DATE COMPLETED:

18 June 2020

MAP NO.:

KZN252: Figure 2.1



## 2.2 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

The following sections provide a brief description of the physical characteristics of the local municipalities in the ADM to provide context to the NLM.

### 2.2.1 Newcastle Local Municipality (NLM)

The municipality is a category B municipality and is in the northern part of KwaZulu-Natal with the most prominent urban areas being Newcastle, Madadeni and Osizweni. The municipality covers an area of approximately 1 854km<sup>2</sup> and consists of 34 wards and two Tribal Authorities. The municipality is mostly urban in character with more than 50% of its population residing in urban areas (NLM IDP, 2019/2020).

The NLM had a population of 398 117 in 2016, growing from 363 236 in 2011 and accounting for 73% of the total Amajuba District Municipal population. The N11 national highway traverses north-south through the NLM and along with the P483, R34 and rail links, form an important transport and product movement corridor between Gauteng and the coastal metropolitan municipality of eThekweni (NLM IDP, 2019/2020).

Although agriculture and mining are the primary economic sectors, they contribute only 3.8% of employment in the NLM, with most people employed in the community services, trade and manufacturing sectors. The peri-urban areas are experiencing a high level of human settlement growth and development in improving housing structures and infrastructure which will lead to increased demands on the NLM to provide full municipal services (NLM IDP, 2019/2020).

## 2.3 CLIMATE AND CLIMATE CHANGE

The WSA climatic conditions are varied between summer and winter months ranging between very cold temperatures during the winter, with temperatures that can go below zero degrees Celsius and high summer temperatures that can exceed 30°C. The average temperature for the ADM is about 17°C. The mean annual precipitation figures per LM are illustrated in Table 2-1 (ADM SDF, 2019/2020).

**Table 2-1 Mean Annual Precipitation**

	Newcastle
<b>Annual minimum rainfall</b>	504
<b>Annual maximum</b>	1 149

The majority of rainfall within the NLM falls during summer within the October and March period. Peak rainfall falls within the November and January period with the western part of the NLM experiencing the highest rainfall and due to its elevation, also the coldest temperatures. The winters are very cold and dry and they fall within the April and September period (NLM IDP 2019/2020).

It is anticipated that climate change will have the following impacts in the NLM: increasing temperatures, indicating more hot days and fewer cold days; that the intensity of precipitation will increase and leading to more frequent floods; higher potential for droughts in summer; however generally wetter conditions; higher

wind speeds; loss of ecosystem biodiversity and ecosystem services; and damage to infrastructure. The NLM has identified various climate change mitigation and adaptation options (NLM IDP 2019/2020).

---

## 2.4 TOPOGRAPHY, GEOLOGY AND SOILS

---

The NLM SDF (2017/2018) stipulates that the northern and western region of the municipality are characterised by mountain ranges whereas in the central region, there are scattered small hills and a rolling landscape, changing to a mostly flat landscape in the east. Elevations above sea level range from 1 160m above sea level in the flat terrain in the east to 2 228m above sea level in the mountainous terrain in the west that forms part of the Drakensberg escarpment (NLM IDP, 2019/2020).

The Newcastle LM Environmental Management Framework (EMF, 2015) give guidance as to the forms of development that are best suited to each subsurface consideration. Much of the developed Newcastle east and west are underlain by Carboniferous sandstone. Whereas, the rest of Newcastle is underlain by Dolerite which is suitable for landfill and cemetery sites when water and other resources are ruled out. Permian mudstone, sandstone and shale are located along the western margin of the municipality, an area that is characterised as the water production zone for the municipality that needs to be protected (NLM SDF, 2017/2018).

The NLM is known for its deposits of coal, turbinite, iron oxide, bauxite, dimension stone, sand, brick clay and aggregate. The occurrence of mineral deposits is of economic interest and informs the potential economic status of the area. Minerals are vital for construction and attracting industries that are related to manufacturing and energy production (NLM SDF, 2017/2018).

The NLM IDP (2019/2020) makes mention of acid mine drainage in the Ballengeigh area that is of concern and needs urgent intervention as it affects surface and groundwater quality.

---

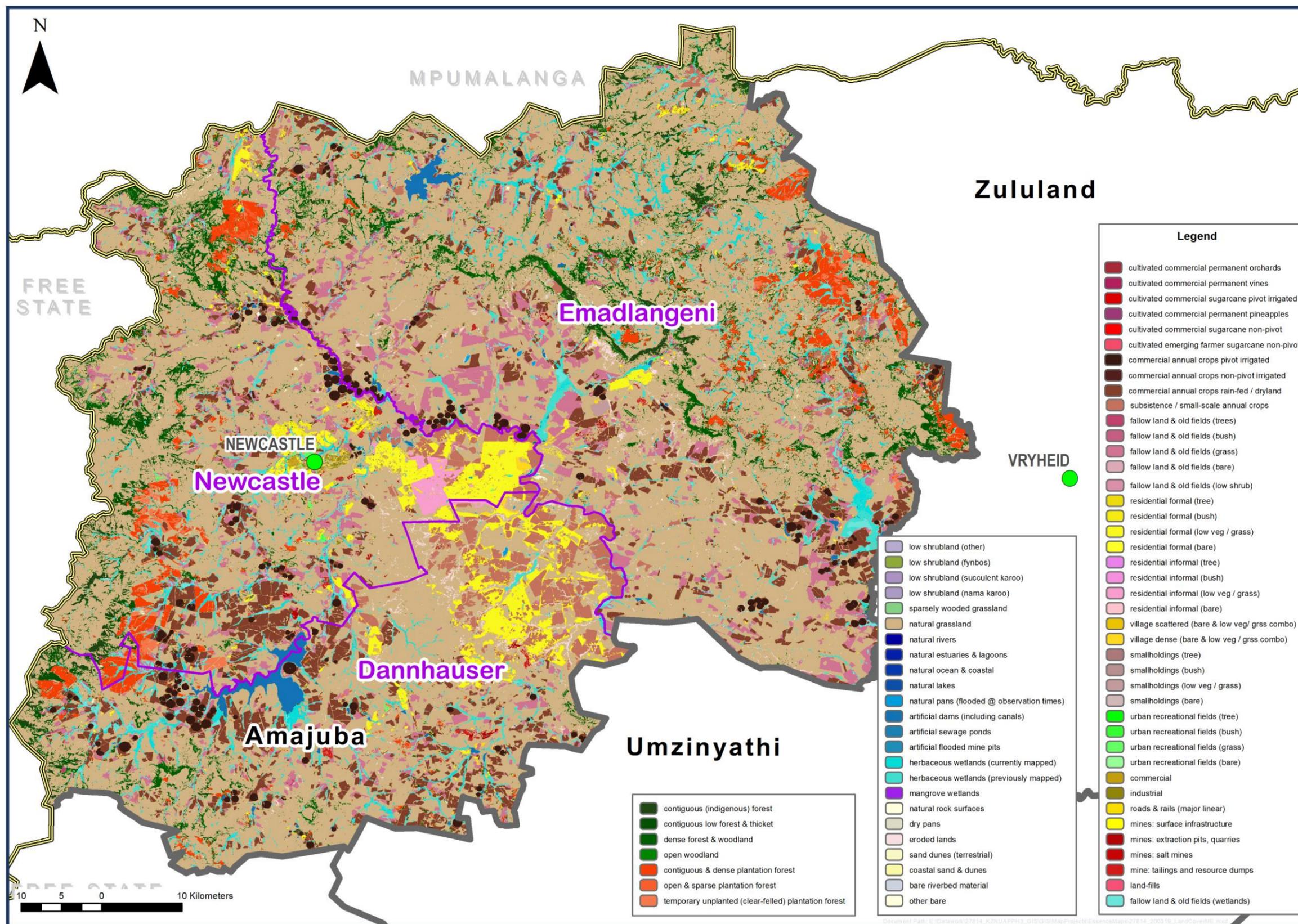
## 2.5 ENVIRONMENT

---

For the purpose of this report, water resources are described separately in the Water Resources section of this document. The land cover was sourced from the Department of Environment (2018 dataset) and is illustrated in Figure 2-2.

The NLM EMF stipulates that the highest concentration of urban development is in the eastern region of the municipality. Extensive agriculture is practised in the south-western region of the NLM having high potential agricultural land and higher rainfall. Else, the majority of the NLM consists of grassland. The NLM SDF (2017/2018) however states that there is a lack of detailed environmental GIS data. Engagements were made with various role-players such as KZN Wildlife, but it has to be an ongoing process to ensure alignment between the environmental components and information in the SDF.

Figure 2-2 Land Cover



---

The NLM SDF (2017/2018), reporting from the NLM EMF (2015) has identified the wetland areas, environmental areas of concern and biodiversity priority areas which need to be conserved and protected to ensure they remain in a natural state.

The wetland areas are often at the confluence of small river tributaries that join larger rivers and are found along the longitudinal central region of the NLM as well as around the outskirts of the Newcastle, Osizweni and Madadeni urban areas. The sensitive areas of concern are illustrated in Figure 2-3 and the biodiversity priority areas in Figure 2-4.

Figure 2-3 Sensitive areas and Areas of Concern

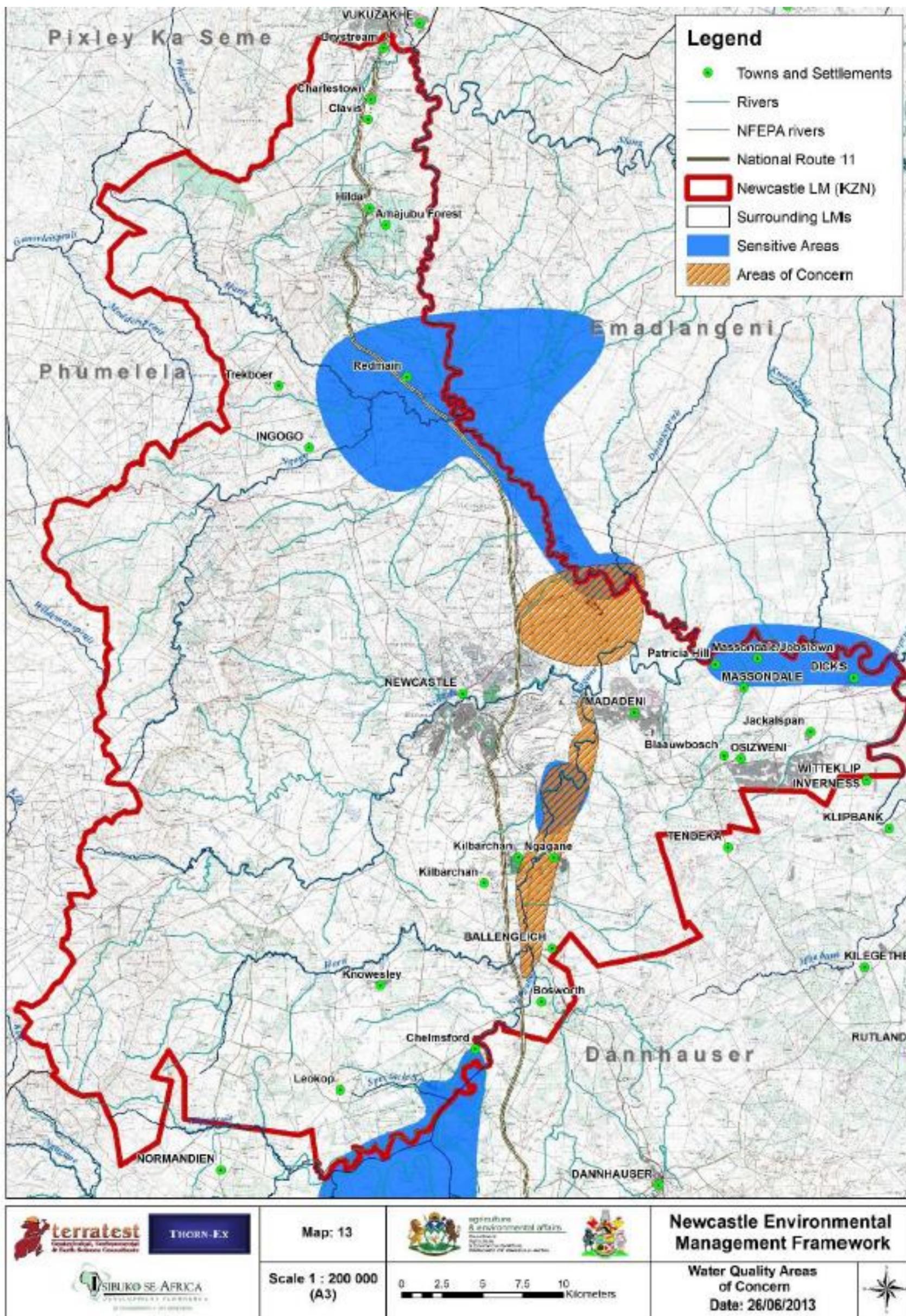
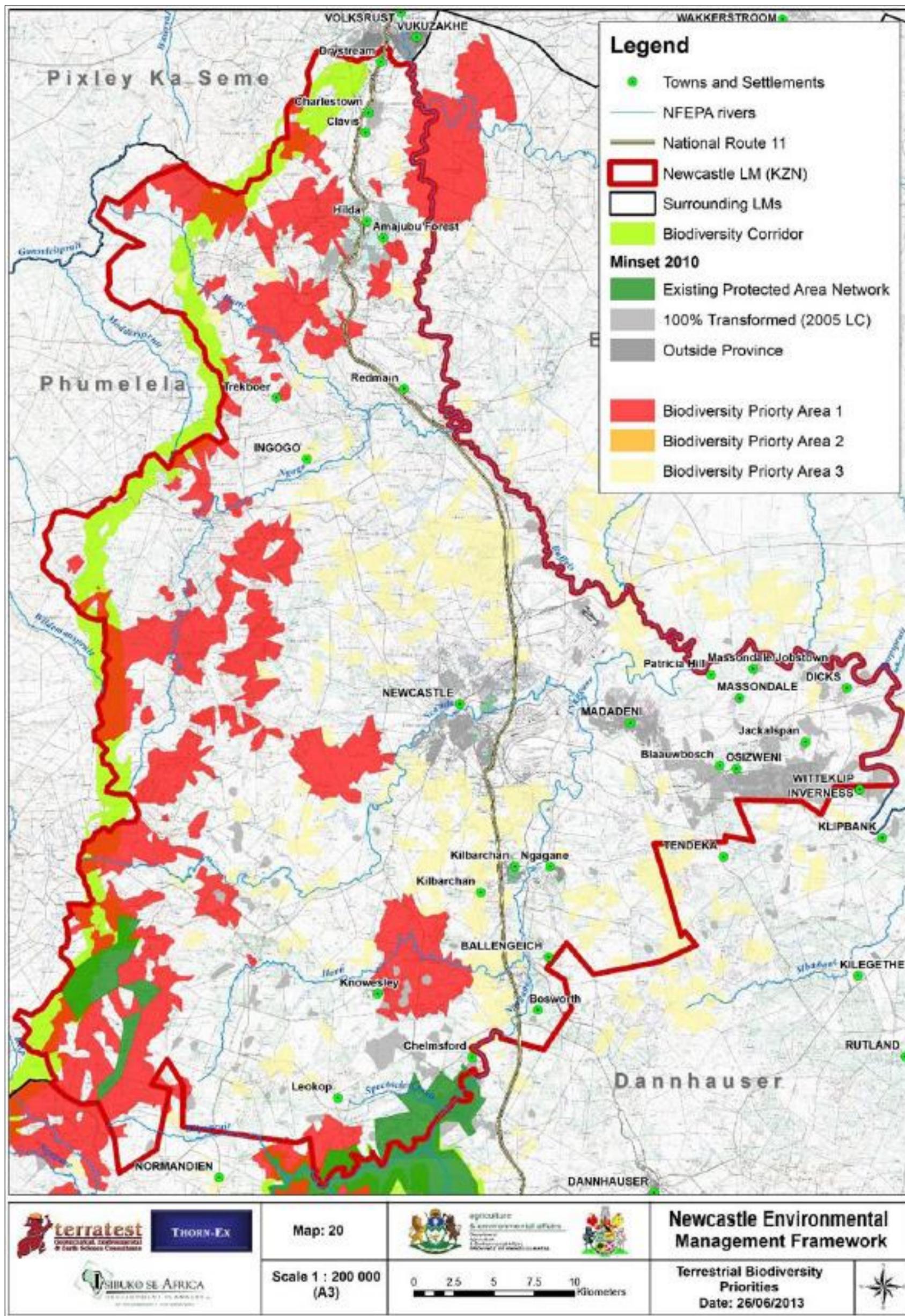


Figure 2-4 Biodiversity Priority Areas



---

## 2.6 INSTITUTIONAL ARRANGEMENTS FOR WATER SUPPLY

---

The NLM is the Water Services Authority (WSA) for its area of jurisdiction, whereas the Amajuba District Municipality is the water services authority for the remaining two local municipalities, namely Dannhauser Local Municipality and Emadlangeni Local Municipality. The NLM is performing secondary bulk and retail water and sanitation services as Water Services Provider in its area of jurisdiction.

Uthukela Water, a municipal-owned entity with its shareholding distributed among the Amajuba District Municipality, uMzinyathi District Municipality and Newcastle Local Municipality. It provides bulk water services to some parts of the listed municipalities, namely the operation and maintenance of the abstraction works for the Biggarsberg and Ngagane WTPs and primary bulk water supply infrastructure.

---

## 2.7 ECONOMIC DEVELOPMENT OPPORTUNITIES

---

The NLM's urban centres are multi-functional nodes, with strong transportation hubs incorporating a variety of land use activities such as commercial, retail, cultural and residential. The Newcastle central business district (CBD) provides employment for a large percentage of the population and links suburban and township populations through a transportation network. The CBD is also an important source of regional economic growth and makes significant contributions to the GDP of the Amajuba District family of municipalities (NLM IDP, 2019/2020).

According to the KwaZulu-Natal Provincial Spatial Economic Development Strategy (KZN PSEDS), Newcastle has been identified as Node No.2, with the majority of the area being identified as having potential to be an Agricultural Service Area, but also as secondary node of industrial development. There are also areas within the NLM which were identified as Protected Areas and also Landscape Corridors mainly significant for tourism development. The manufacturing sector contributes 27% to the NLM's Gross Value Added, followed by the government sector (24%); finance and business (15%) and wholesale and retail (12%) (NLM IDP, 2019/2020).

The agricultural sector plays a key role in economic development and sustainable employment opportunities in the NLM although it does not contribute as much as other sectors to the Gross Domestic Product. Agrarian Reform, coupled with effective Land Reform, are both identified as key instruments towards achieving agricultural development. The agricultural potential may further be boosted through unleashing the potential of the Ingonyama Trust Land through improved communication and alignment of local government initiatives with those of the Tribal Authority (NLM IDP, 2019/2020).

The fastest and consistent growing sectors are however finance and business, with finance and insurance services growing at an average rate of almost 9% per annum since 2000, and business services growing at 6.2% over the same period. Manufacturing is the largest contributing sector within the district economy, contributing approximately 25.2% to total GVA and experienced modest growth in the past decade (2000 – 2010), with an average real annual GVA growth rate of 0.6%, in comparison with the provincial average growth of 2.2% (NLM IDP, 2019/2020).

---

The national Department of Human Settlements identified total of 101 catalytic projects, of which eight<sup>1</sup> are in the KZN Province and Newcastle JBC Mega Housing project is one of them, located in the NLM. The Johnstown, Blaauwbosch and Cavan (JBC) mega housing project is situated within the eastern part of Newcastle LM, between the townships of Madadeni and Osizweni. Two major housing projects (JBC Phase 1 and JBC Phase 2&3) with a total yield of about 9 511 mixed housing opportunities have been initiated by the municipality and province. Eventually 14 011 housing opportunities will be available (NLM IDP, 2019/2020).

From the inauguration of the KZN Premier in May 2019, it was reported<sup>2</sup> that: “JBC Newcastle Integrated Rural Development Programme (IRDP). Planning is 100% complete, and 2 011 units are being processed for phase 1 to start construction by January 2020”<sup>3</sup>.

The NLM IDP (2019/2020) noted that there are several agricultural catalytic project identified, but they are not listed. Another catalytic project mentioned in the IDP is the completed Techno-hub, that will assist in the promotion and development of science and technology skills in the NLM.

---

<sup>1</sup> The eight projects are: Umlazi Urban Regeneration ,Cornubia Housing Project (eThekweni Metro), JBC Mega Housing Development (Newcastle LM), Hyde Park Country Estate (KwaDukuza LM), Greater Amaoti Housing Project, Empangeni Mega IRDP, eThekweni Inner City and Kwamashu Urban Hub (Department of Human Settlements, First Quarter Performance Report 2018/2019, August 2018).

<sup>2</sup> <https://www.gov.za/speeches/inauguration-speech-premier-sihle-zikalala-27-may-2019-0000>

<sup>3</sup> IRDP refers to the Integrated Residential Development Programme.

### 3. DEMOGRAPHICS

This section presents the current and projected demographics for the Newcastle LM as WSA. , however information is also reported on the Amajuba DM, itself a WSA for the remaining two local municipalities, to provide more context to the ADM and its characteristics. It is of interest as the WSAs share water resources and water supply infrastructure and growth in one area, affects available water resources and infrastructure in another area. A map of population distribution is provided in Figure 3-1.

Note that the next national census will be conducted in 2021<sup>4</sup>.

#### 3.1 EXISTING POPULATION DISTRIBUTION

##### 3.1.1 Community Survey 2016

The 2016 Community Survey, issued by StatsSA, reported the estimated population and household figures as well as socio-demographic information such as health, infrastructure services, etc. for the whole of South Africa.

The following population figures are presented from the 2016 Community Survey for the WSA as well as the other two local municipalities in the ADM, to provide context.

**Table 3-1: Population: 2011 and 2016**

LM Name	Population 2011	Population 2016	Population Growth	Growth Rate pa
Newcastle	363 236	389 117	25 881	1.56
Other Local Municipalities in the Amajuba DM				
Dannhauser	102 937	105 341	2 404	0.52
Emadlangeni	34 442	36 869	2 427	1.55
<b>Total (Growth Rate Average)</b>	<b>500 615</b>	<b>531 327</b>	<b>30 712</b>	<b>1.35</b>

Source: StatsSA, 2016 Community Survey

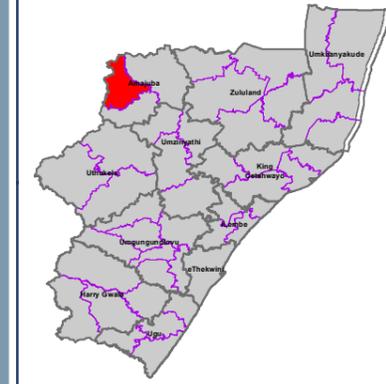
The most significant growth in numbers were experienced in the Newcastle LM with the municipalities of Dannhauser and Emadlangeni having a very small population growth in comparison. The growth in the Newcastle LM is very likely due to the urban development in and around the urban areas of Newcastle, Madadeni and Osizweni.

<sup>4</sup> The timing and undertaking of the 2021 or next national census may be affected by the COVID19 pandemic.

**Legend**

-  Provincial Boundaries
-  District Municipality Boundaries
-  Local Municipality Boundaries
-  Farm Land & Conservation Areas
-  National Roads
-  Main Roads
-  Local Roads
-  Dams & Dam Names
-  Rivers
-  Settlements
-  Major Towns

LOCALITY:



CLIENT:



DISTRICT MUNICIPALITY:



NEWCASTLE LOCAL MUNICIPALITY

CONSULTANTS:

Project No.: 27814



Mariswe  
PO Box 25549, Monument Park  
Pretoria, 0105



Tel: + 27 (0) 12 424 9700  
Fax: + 27 (0) 12 460 4071  
Email: pretoria@mariswe.com

PROJECT TITLE

**Universal Access Plan Phase III -  
Progressive Development of a  
Regional Concept Secondary  
Bulk Water Master Plan**

MAP TITLE:

**Population Distribution  
Newcastle Local Municipality**

DATE COMPLETED:

18 June 2020

MAP NO.:

KZN252: Figure 3.1

**Population Distribution**

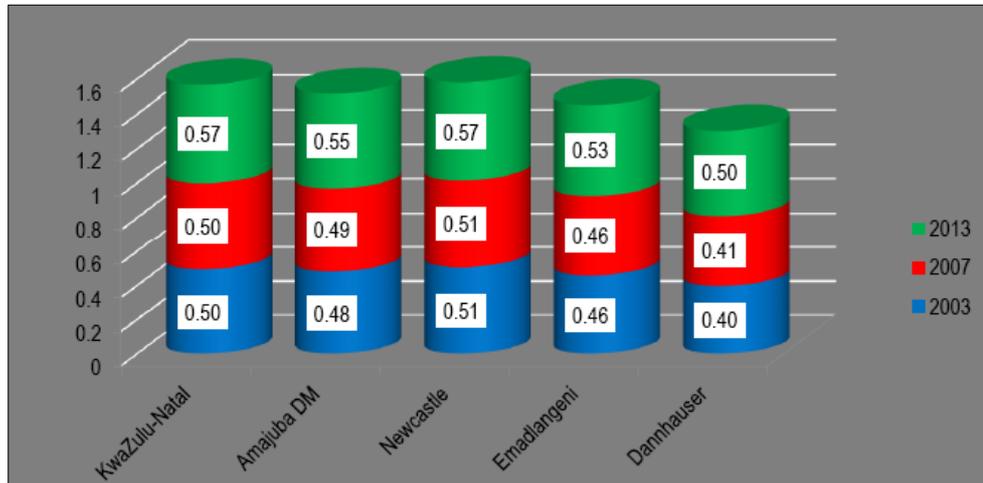
-  0 - 200 people
-  201 - 500 people
-  501 - 1 000 people
-  1 001 - 5 000 people
-  5 001 - 10 000 people
-  10 001 and more people



### 3.2 SOCIAL AND ECONOMIC INDICATORS

The Human Development Index<sup>5</sup> (HDI) for Newcastle has improved significantly since 1996, as illustrated in Figure 3-2, with the Newcastle LM having the same index as the KZN Province of 0.57, for the year 2013 (NLM IDP 2019/2020).

**Figure 3-2 Human Development Index, NLM**



The number of people living in abject poverty within Newcastle LM, compared with that of the KwaZulu-Natal Province, the Amajuba DM and the other local municipalities within the district is illustrated in Table 3-2. Of the three local municipalities in the ADM, the Newcastle LM has the lowest level of poverty at 44.4%.

**Table 3-2: People Living in Poverty**

	2002		2006		2012	
	People living in poverty	Percentage of people living in poverty	People living in poverty	Percentage of people living in poverty	People living in poverty	Percentage of people living in poverty
KwaZulu-Natal	5 586 644	58.10%	5 224 176	52.80%	4 729 241	45.70%
Amajuba	301 878	64.40%	287 427	59.40%	256 987	50.90%
Newcastle	170 620	56.00%	162 113	51.00%	148 150	44.40%
Emadlangeni	43 787	69.10%	43 273	64.60%	34 941	51.30%
Dannhauser	87 471	86.80%	82 041	82.60%	73 896	72.10%

Source: Global Insight in NLM IDP (2019/2020)

Household income can be used as a proxy for economic well-being of household and individuals, as it determines their consumption and savings potentials. Changes in the income by households is one of the direct indicator available that can be used to establish who benefits from economic development and by

<sup>5</sup> The Human Development Index (HDI) is a statistic composite index of life expectancy, education, and per capita income indicators, which are used to rank countries into four tiers of human development. [https://en.wikipedia.org/wiki/Human\\_Development\\_Index](https://en.wikipedia.org/wiki/Human_Development_Index). A value closer to one indicates a higher level of development.

how much are the beneficiaries benefiting (ADM District Growth and Development Plan (DGDP), 'Vision 2030', 2019/2020).

Furthermore, data on household income can be used to inform poverty analysis. Table 3-3 illustrates low annual household income figures for the ADM in 2011, with about 70% of the population earning below R38 200 per annum (approximately R3 200 per month). Of those about 74% are households in the Newcastle LM.

**Table 3-3 Household income of ADM per Local Municipality**

Income Category	Dannhauser LM	Emadlangeni LM	Newcastle LM	ADM Households
No Income	17,0%	11,6%	18,0%	17,3%
R 1- 4 800	5,3%	3,6%	5,1%	5,0%
R 4 801- R 9 600	10,3%	10,1%	8,7%	9,1%
R 9 601- R 19 600	23,9%	20,8%	19%	20,0%
R 19 602- R38 200	23,4%	25,0%	18,6%	19,9%
R 38 201- R 76 400	11,7%	14%	11,1%	11,4%
R 76 401- R 153 800	4,9%	7,6%	8,5%	7,7%
R 153 801- R 307 600	2,2%	4,1%	6,5%	5,4%
R 307 601- R 614 400	1,1%	2,5%	3,3%	2,8%
R 614 401- R 1 228 800	0,1%	0,3%	0,8%	0,8%
R1 228 801- R 2457 600	0,1%	0,3%	0,2%	0,4%
R2 457 601 or more	0,1%	0,1%	0,2%	0,4%

Source: Statistics South Africa 2011

The ADM DGDS (2019/2020) further reports on the KZN Multiple Deprivation Index in 2011, developed by KZN Provincial Treasury. The index is based on income levels, employment levels, health, education, access to services, and crime rates. Each local municipality is allocated a score for each of the indicators, which are then totalled in order to derive the deprivation index for each locality. Fifty-one local municipalities in KZN were analysed, and then ranked in ascending order - from 1 (highest level of deprivation) to 51 (lowest level of deprivation). The Deprivation Index for the ADM is presented in Table 3-4.

**Table 3-4 Amajuba DM Deprivation Index per Local Municipality**

LM	Income	Employment	Health	Education	Living Environment	Crime	Final Ranking
Dannhauser	3	8	44	21	16	28	11/51
Emadlangeni	20	19	5	36	36	29	21/51
Newcastle	45	50	11	45	45	30	49/51

Source: KZN Provincial Treasury, 2011

The Dannhauser LM has the highest levels of deprivation within the ADM, ranked 11 out of the 51 municipalities in the province. The Newcastle LM has the lowest levels of deprivation and ranks more favourably within the district and provincial context (49/51).

### 3.3 POPULATION GROWTH SCENARIOS

Umgeni Water, in collaboration with Statistics South Africa, developed a population growth scenario for areas the KwaZulu-Natal Province. The information was provided to Mariswe on a Census Small Areas Layer level, that can be used in the water requirements model and it links to the existing 2011 Census theme databases and GIS.

The UAP Phase III projected population for the ADM, from 2016 to 2050 is illustrated in Table 3-5.

**Table 3-5: ADM Demographic Projections – Population, UAP Phase III**

Local Municipality	2020	2025	2030	2035	2040	2045	2050
Dannhauser	116,370	120,987	126,045	132,949	140,233	147,916	156,022
Emadlangeni	38,954	40,508	42,212	44,533	46,983	49,567	52,293
Newcastle	410,824	427,211	445,180	469,664	495,496	522,748	551,499
<b>Total</b>	<b>566,148</b>	<b>588,707</b>	<b>613,437</b>	<b>647,147</b>	<b>682,711</b>	<b>720,231</b>	<b>759,813</b>

Source: UAP Phase III

The average annual population growth rate for the municipalities between 2020 and 2025 is estimated to be 0.79% and from 2030 to 2050, it increases to 1.08%.

The next national census will take place in 2021 which is in less than one year from now. This census will provide greater certainty of at least current population figures and can also give a better understanding of migration patterns.

### 3.4 MAIN DEVELOPMENT NODES

The Newcastle LM applied a Development Concept in its Spatial Development Framework, that firstly, proposes urban corridors aligned along public transportation routes, thus promoting higher densities along these transportation routes. Secondly, it proposes a hierarchy of Service Delivery Centres (or SDCs) along these corridors, thus creating opportunities for mixed land use around transportation bus stops and taxi ranks. This will ensure urban development along the transportation routes, managing urban sprawl and therefore provide a means to conserve ecosystems and agricultural land (NLM SDF, 2017/2018).

The Newcastle CBD SDC was given the status of first order, because of the town's population size and because it holds the municipal area's only significant number of retail, office, industrial and commercial uses. Due to its dominance in terms of social and economic activities, the Newcastle CBD provides services and employment opportunities, not only for its local residents, but for the entire municipal area. It should therefore be located on the intersection of the municipal area's Class 2 and 3 roads and contain a large bus and taxi rank (NLM SDF, 2017/2018).

Due to the spatial distribution of settlements and population, it is furthermore proposed that another first order SDC is pro-actively established within the JBC area between Madadeni and Osizweni to service the growing population in this area. The Madadeni and Osizweni CBDs were given second order SDC status due to the large settlements they serve and support (NLM SDF, 2017/2018).

---

Third-order SDC status was given to two settlements, mainly due to the population size and the location. The third order SDC's namely Fairleigh (Siyahlalala) and Kilbarchan are situated to the west and south of the Newcastle CBD respectively (NLM SDF, 2017/2018).

The following areas have been identified as Industrial Nodes: Newcastle industrial area, Mittal, Karbochem and Madadeni Industrial Estate. Large-scale mixed used nodes run along the P483 corridor between Newcastle, Madadeni and Osizweni. The area along Vlam Crescent (Vlam suburb in Newcastle) has been identified as focused multi-use nodes to serve industrial, warehousing and retail needs. The SDF (2017/2018) also lists neighbourhood multi-use nodes, tertiary nodes and smaller nodes of importance.

## 4. WATER REQUIREMENTS

This section provides an overview of existing water service levels and projected water requirements as calculated using the demand model developed for the purpose of this study.

### 4.1 WATER SUPPLY SERVICE LEVEL

The water services levels based on current available information is provided from various sources. Detailed verification of service levels will be performed during this study for UAP Phase III. The service level verification may also be used to update the DWS RF geodatabase. Refer to Figure 4-1 for the water reliability profile map.

Reliability of services are affected by aging infrastructure, operation and maintenance, reliability of electricity supply, water resource availability, vandalism and theft, or extreme weather events. All these then affect water security to consumers and to the environment.

#### 4.1.1 Community Survey 2016 Water Supply Levels

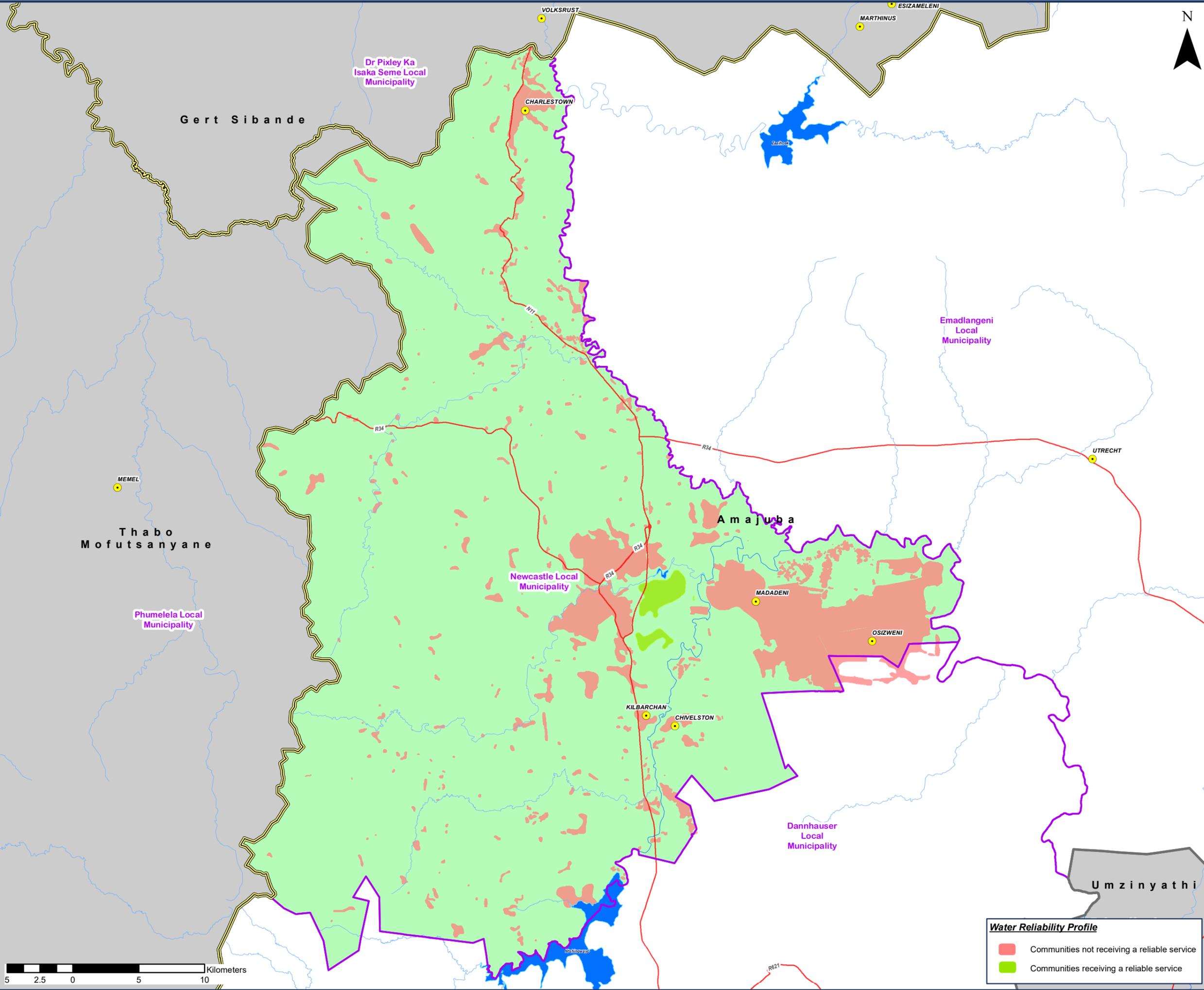
The following service levels are presented from the 2016 Community Survey for the WSA.

**Table 4-1: Water Supply Levels, Community Survey 2016**

LM Name	Access to safe drinking water		No access to safe drinking water		Total households
	No. of Households	Percentage (%)	No. of Households	Percentage (%)	
Newcastle	81 504	90.4	8 637	9.6	90 142

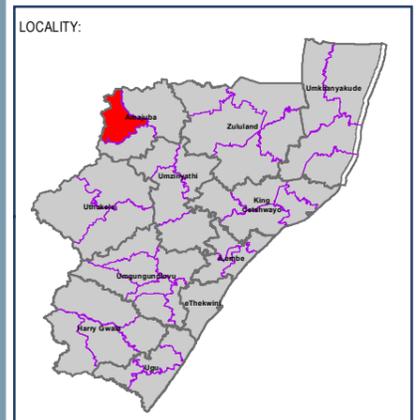
Source: StatsSA, 2016 Community Survey

Only 9.6% of the households within the Newcastle LM do not have access to safe drinking water compared to compared to the ADM with approximately 24% of the households not having access to safe drinking water. NLM has the highest level of service, by number of households having access to safe drinking water in the Amajuba DM.



**Legend**

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Farm Land & Conservation Areas
- National Roads
- Main Roads
- Local Roads
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns



CLIENT:

DISTRICT MUNICIPALITY:

NEWCASTLE LOCAL MUNICIPALITY

CONSULTANTS:

Project No.: 27814

Mariswe  
PO Box 25549, Monument Park  
Pretoria, 0105

Tel: + 27 (0) 12 424 9700  
Fax: + 27 (0) 12 460 4071  
Email: pretoria@mariswe.com

PROJECT TITLE

**Universal Access Plan Phase III -  
Progressive Development of a  
Regional Concept Secondary  
Bulk Water Master Plan**

MAP TITLE:

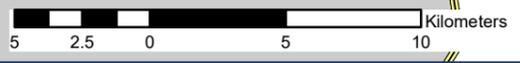
**Water Supply Reliability Profile  
Newcastle Local Municipality**

DATE COMPLETED:

18 June 2020

MAP NO.:

KZN252: Figure 4.1



**Water Reliability Profile**

- Communities not receiving a reliable service
- Communities receiving a reliable service

#### 4.1.2 DWS Reference Framework Water Supply Levels

The settlement's service levels presented were last updated during 2016.

**Table 4-2: DWS RF Water Reliability, 2016**

LM Name	No of Households	Households with reliable water supply	Percentage	Households with no reliable water supply	Percentage
Newcastle	92 485	83 794	91%	8 691	9%

Source: DWS RF geodatabase, 2016

The information is corresponding to the 2016 Community Survey for the whole of the WSA and the municipalities of Dannhauser and Newcastle. There is a slight difference in the Emadlangeni LM, with the 2016 Community Survey reporting more households with access to safe water supply.

#### 4.1.3 Water and Sanitation Master Plan

The Water and Sanitation Master Plan was updated for the WSA, however due to non-payment of the service provider, the NLM has not yet received delivery of the Plan.

#### 4.1.4 WSA Municipal Infrastructure Forum Reporting

No information could be sourced from the IGR reporting by the WSA.

### 4.2 WATER LOSSES AND DEMAND MANAGEMENT

Each WSA should prepare a Water Conservation and Water Demand Management (WC/WDM) Strategy in order to address water inefficiencies and ensure protection and conservation of water resources. It goes along with the financial sustainability of providing water services.

Part of such a WC/WDM Strategy is reporting on the water balance in the format developed by the International Water Association (IWA). The water balance provides an overview of water supplied, as System Input Volume (SIV) and the potential water accounted for and billed or water not billed, or water lost.

The WSAs in KZN each report monthly to the DWS Regional Office to provide information on its water balance components. The information is then submitted to the DWS Head Office in Pretoria.

The water balance information is an indicator of the water supply systems' efficiencies to supply water and conserve water resources. The main components reported on are system input volume (SIV), billed and unbilled consumption, metered and unmetered consumption, physical losses and unauthorised losses. The International Water Association (IWA) developed a standard methodology for reporting which then illustrates the resulting component of Revenue Water and Non-Revenue Water (NRW), see Figure 4-2.

**Figure 4-2 IWA Best Practice Standard Water Balance**

System Input Volume (corrected for known errors)	Authorised consumption	Billed Authorised Consumption	Billed Metered Consumption (including water exported)	Revenue Water	
			Billed Unmetered Consumption		
		Unbilled Authorised Consumption	Unbilled Metered Consumption	Unbilled Unmetered Consumption	Non-Revenue Water (NRW)
	Real Losses	Customer Metering Inaccuracies			
		Leakage on Transmission and/or Distribution Mains			
			Leakage and Overflows at Utility's Storage Tanks		
	Leakage on Service Connections up to point of Customer metering				

Source: Lambert, A. 2003. *Assessing non-revenue water and its components: a practical approach*. Prepared by the IWA Water Losses Task Force.

#### 4.2.1 Water Balance, KZN Summary

The following is a summary for the province, for the 2017/2018 financial year, as obtained from the DWS Head Office, Directorate: Water Use Efficiency. The Real Losses percentage of 30% or more, are highlighted in red, as are the WSAs having real losses (RL) of more than 10Mℓ/d. The equivalent Rand value per day as a reflection of the real losses per day, if assuming a bulk water price of R6/kl is reflected in the last column.

**Table 4-3: Water Balance, KZN Provincial Summary, 2017/2018**

WSA	Total System Input Volume (SIV) Kℓ/a	Real Losses Kℓ/a	Real Losses %	NRW Kℓ/a	Non-Revenue Water %	SIV Mℓ/d	Real Losses Mℓ/d	RL ZAR/d at R6/kl
eThekwini	321 333 002	87 650 063	27.3%	105 210 821	32.7%	880.36	240.14	R 1 440 823
Msunduzi	68 467 170	16 568 296	24.2%	32 383 145	47.3%	187.58	45.39	R 272 356
Newcastle	29 232 135	12 214 736	41.8%	14 149 362	48.4%	80.09	33.47	R 200 790
King Cetshwayo	24 266 572	11 063 392	45.6%	13 829 241	57.0%	66.48	30.31	R 181 864
Ilembe	20 610 221	11 063 392	53.7%	13 829 241	67.1%	56.47	30.31	R 181 864
Umgungundlovu	20 541 931	6 327 783	30.8%	10 825 905	52.7%	56.28	17.34	R 104 018
Uthukela	39 850 700	6 272 776	15.7%	24 265 606	60.9%	109.18	17.19	R 103 114
Ugu	45 595 559	6 195 703	13.6%	16 009 621	35.1%	124.92	16.97	R 101 847
Umzinyathi	12 480 726	4 597 998	36.8%	7 583 491	60.8%	34.19	12.60	R 75 584
City of uMhlatuze	27 407 660	3 920 426	14.3%	7 015 424	25.6%	75.09	10.74	R 64 445
uMkhanyakude	14 493 279	2 896 322	20.0%	6 813 861	47.0%	39.71	7.94	R 47 611
Amajuba	5 039 952	1 338 623	26.6%	2 537 314	50.3%	13.81	3.67	R 22 005
Harry Gwala	3 841 338	1 188 582	30.9%	1 460 174	38.0%	10.52	3.26	R 19 538
Zululand	19 846 359	- 246 948	-1.2%	13 181 260	66.4%	54.37	- 0.68	-R 4 059

Source: Department of Water and Sanitation, 2019

The global average for NRW is 36.6%, and that for South Africa is 37%. Each water supply scheme and area should be viewed in context such as its operational, ecological, economic and social aspects.

The water balance component's units are usually reported as percentages but should be read in conjunction with the actual volumes.

The paper prepared for WISA: Supporting the implementation, monitoring and evaluation of water conservation and water demand management in KwaZulu-Natal (Singh et al., 2018), provided the overall characteristics of water systems per WSA in the KZN Province, as illustrated in the table below. The base year of information was 2016/2017.

**Table 4-4: KZN WSA WSS Characteristics**

WSA	Number of Water Supply Systems	System Characteristics					
		Length of mains (km)	Estimated Total Number of Connections	Average Supply Pressure (m)	Estimated Population	Estimated Households	% Time Pressurised
uMkhanyakude	25	2 239	75 932	50	689 130	151 245	81.4%
uThukela	15	2 062	86 966	45	318 858	79 410	73.5%
uMgungundlovu	15	2 381	28 436	50	412 092	111 376	86.0%
Amajuba	5	887	14 660	65	80 666	16 629	85.0%
King Cetshwayo	15	3 760	35 003	67	684 499	113 606	64.0%
City of uMhlathuze	4	2 021	77 363	58	278 507	77 363	99.0%
Harry Gwala	17	863	25 397	65	502 265	122 437	80.0%
Newcastle	2	1 094	84 220	45	363 236	84 269	78.7%
eThekweni	4	12 364	562 417	54	3 729 043	1 062 873	77.0%
Ugu	18	3 930	44 606	51	707 817	117 970	80.8%
Msunduzi	1	2 037	183 472	65	660 499	183 472	97.4%
uMzinyathi	15	1 350	38 990	40	551 177	125 736	67.0%
Zululand	40	870	115 071	50	892 310	178 516	86.2%
iLembe	45	2 362	36 948	62	657 612	191 346	64.0%
<b>KZN Total</b>	<b>221</b>	<b>38 220</b>	<b>1 409 481</b>	<b>55</b>	<b>10 527 711</b>	<b>2 616 248</b>	<b>78.3%</b>

The system characteristics per WSA provides valuable insight into the context per WSA and the potential extent of networks, consumers and challenges.

#### 4.2.2 WSA WC/WDM Strategy

The WSA prepared a 5-Year Strategic Management Plan for the Reduction of Non-Revenue Water in the Newcastle Local Municipality, dated August 2015. The No Drop initiative from the Department of Water Affairs was incorporated in the Blue Drop programme at the time. The NLM does not have an updated strategy (as per meeting on 14 May 2019).

The 2015 Strategic Management Plan (SMP) focused on water losses, and had the following objectives:

- ✓ Determine the baseline situation in terms of water balances for each supply system in accordance with international and national best practice;

- 
- ✓ Identify areas of possible NRW reduction, by water balance component and per supply system, prioritise these in order of impact and prepare a consolidated NRW Reduction Intervention programme;
  - ✓ Establish targets in terms of NRW by volume, supported by Key Performance Indicators and budget/funding requirements;
  - ✓ Address the internal requirements necessary for the successful implementation of a WC/WDM Programme in terms of resources, systems and critical success factors;
  - ✓ Identify short-term problems that are being experienced with the Municipality's billing database and determine any necessary corrective actions;
  - ✓ Develop a software model that allowed NLM the flexibility to determine intervention impact, targets and budget requirements to suit changing needs and focus areas.

The SMP is a strategic plan and based on a desktop assessment of available information such as the Water Safety Plan (2010), Water Services Development Plan and available infrastructure and study reports. No field visits were conducted to verify information. The town of Newcastle was analysed as one supply zone and the areas of Madadeni & Osizweni as the second zone. Information for other supply areas was not sufficient to include them in the SMP's analysis.

For the purpose of this UAP report, the water balance information from the SMP can be summarised as follows (based on 2013/2014 data):

- ✓ System input volume of 35 477Mℓ/a (97.2Mℓ/d);
- ✓ Authorised consumption of 20 191Mℓ/a (55.3Mℓ/d);
- ✓ Water losses totalling 15 286Mℓ/a (41.9Mℓ/d), comprising of Apparent losses of 3 008Mℓ/a (8.2Mℓ/d) of and Real losses of 12 278Mℓ/a (33.6Mℓ/d).

The SMP used a bulk tariff of R5.5/kl and estimated the total NRW, in financial terms as R109.55 million for the 2013/2014 financial year.

#### **4.2.3 WSA Water Balance**

---

The WSA prepares monthly water balances, in the IWA format, on a local municipality level, for submission to the DWS.

For the purpose of this UAP report, the water balance information from the DWS can be summarised as follows (based on 2018 data):

- ✓ System input volume of 29 920 324kl/a (81.97Mℓ/d);
- ✓ Authorised consumption of 17 292 712kl/a (47.38Mℓ/d); and
- ✓ Water losses totalling 12 627 612kl/a (34.60Mℓ/d), comprising of Apparent losses of 3 156 903kl/a (8.65Mℓ/d) of and Real losses of 9 470 709kl/a (25.95Mℓ/d).

From the 2018/2019 Newcastle IDP it was reported on revenue collection as follows: “As per our statistics we are only collecting 80% of the monthly revenue billed therefore creating a shortfall in excess of R20 million rand per month, 89% of this shortfall lies within the individuals’ category.”

#### 4.3 WATER DEMAND MODEL

The Water Demand Model as described within Section 1.5 was applied to the Newcastle Local Municipality and the population growth estimates utilising Census’ Community Survey 2016 as base were used to determine the project population until 2050 of which the detailed are provided within the paragraphs hereafter.

##### 4.3.1 Water Demand

This sub-section presents the projected population and water demands from 2020 to 2050 for the Newcastle LM in megalitres per day (Mℓ/d). All three local municipalities in the ADM have areas that are served from the Ngagane WTP in the Newcastle LM, see Table 4-6 for more details.

**Table 4-5: Water Demand Projections per LM, Mℓ/d**

LM Name	Population				Water Demands (Mℓ/d)			
	2020	2030	2040	2050	2020	2030	2040	2050
Newcastle	434,174	479,288	537,484	602,747	116.74	131.61	149.98	170.98

Source: Water Demand Model, UAP Phase III, 2020

The Newcastle LM, being the most urbanised and developed, has the highest water requirements, representing 80% of the total water demands of 2020 and 78% of the total water demands of 2050 in the ADM. Newcastle LM also has the highest growth in water demands, representing an increase of 54.24Mℓ/d from 2020 to 2050.

##### 4.3.2 Demand per Regional Water Scheme

This sub-section presents the projected population and water demands from 2020 to 2050 for the Newcastle LM and ADM, per bulk water supply scheme in megalitres per day (Mℓ/d).

Some schemes however have water requirements of less than 2Mℓ/d but are listed as they may serve as urbanisation and development or special nodes.

**Table 4-6: Water Demand Projections per WSS\*, Mℓ/d**

WSS Number	WSS Name	Population				Water Demands (Mℓ/d)			
		2020	2030	2040	2050	2020	2030	2040	2050
<b>Newcastle LM as WSA</b>									
AMA012	Newcastle Madadeni Osizweni WSS	419 408	462 987	519 205	582 248	114.01	128.39	146.28	166.73
AMA011b	Charlestown Supply Area	5 249	5 794	6 498	7 287	1.09	1.24	1.43	1.65
<b>Total, NLM</b>		<b>424 657</b>	<b>468 781</b>	<b>525 703</b>	<b>589 535</b>	<b>115.10</b>	<b>129.63</b>	<b>147.71</b>	<b>168.38</b>
<b>Amajuba DM as WSA, served from the Ngagane WTP**</b>									
AMA014	Ngagane/Dannhauser 1 WSS Buffalo Flats	90 657	100 077	112 229	125 856	15.83	18.24	21.01	24.23
AMA003	Skombaren Ngagane WTP WSS	4 381	4 836	5 423	6 082	0.92	1.05	1.21	1.39
AMA016	Utrecht/Ngagane WSS	8 464	9 344	10 478	11 750	2.33	2.61	2.97	3.38
AMA015	Waterval Ngagane WTP WSS	1 671	1 845	2 069	2 320	0.61	0.67	0.75	0.85
<b>Total, ADM</b>		<b>105 173</b>	<b>116 102</b>	<b>130 199</b>	<b>146 008</b>	<b>19.69</b>	<b>22.57</b>	<b>25.94</b>	<b>29.85</b>

Source: Water Demand Model, UAP Phase III, 2020

\* Note however that the scheme, AMA002 called Arcelor Mittal WSS (Newcastle LM), is not in the list because there is no census small area layer feature in this industrial area. The area is served by a private water treatment works, abstracting water from the Ngagane River. The water requirements for this industrial area would need to be obtained from the private operator.

\*\* It is only the Waterval Ngagane WTP WSS, serving the Waterval prison, and Skombaren Ngagane WTP WSS that are completely supplied by the Ngagane WTP. The Ngagane WTP augments supply in the Ngagane/Dannhauser 1 WSS Buffalo Flats area and serves as backup supply to the Utrecht WSS should this scheme's local sources fail.

For 2020, the demands for areas in the Newcastle LM, supplied from the Ngagane WTP are 114.01Mℓ/d, projected to increase to 166.73Mℓ/d by 2050.

The ADM has plans to construct a new 20Mℓ/day WTP at the Ntshingwayo Dam, to supply the Hilltop and Buffalo Flats area to become the Dannhauser Regional Water Supply Scheme. The DWS still to approve some of the phases of this planned scheme development.

---

## 5. EXISTING WATER SUPPLY INFRASTRUCTURE

This chapter provides an overview of the more important water resources in the WSAs (NLM, ADM). Note that water resources that forms part of water supply systems into the NLM, but that are located outside the NLM will also be reported on. This may include water resource transfer schemes or water supply schemes that traverse NLM and catchment boundaries.

### 5.1 WATER RESOURCE AVAILABILITY

---

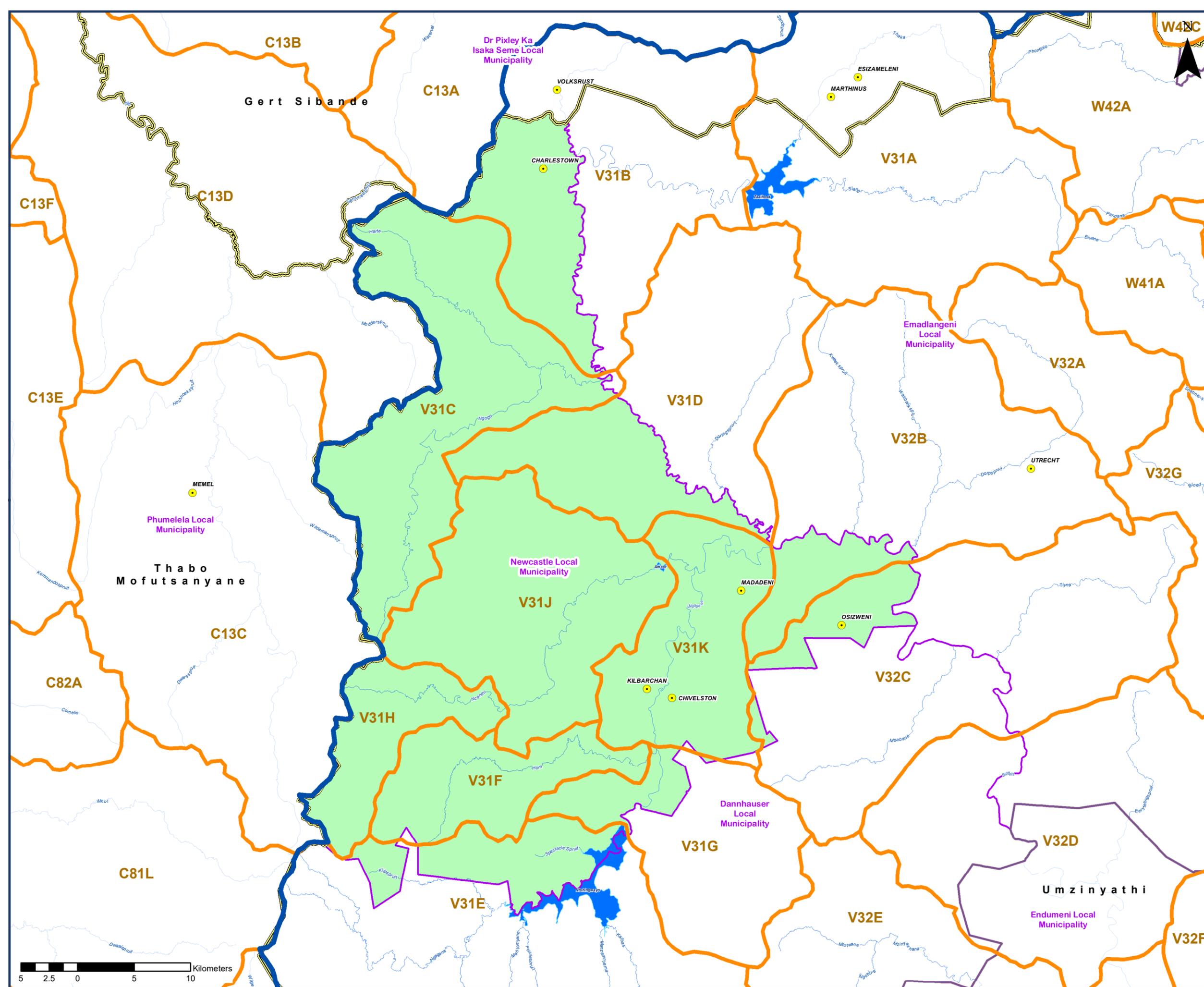
#### 5.1.1 Overview

---

The WSAs fall in the Pongola Mtamvuna Water Management Area (WMA), one of nine WMAs that divides the large catchment areas of South Africa. The Pongola Mtamvuna WMA covers the whole of the KZN province, except a small part in the south, that falls within the Mzimvubu Tsitsikamma WMA.

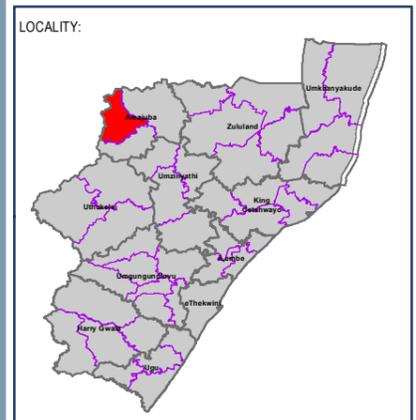
The most prominent rivers in the WSAs are the Buffalo and Ngagane Rivers. Others include the Slang, Ngogo, Harte and Ncandu Rivers. The most prominent dams are the Zaaihoek and Ntshingwayo Dams. The Zaaihoek Dam is a DWS dam built in 1988 to supply the Majuba power station near Volksrust. Currently there are no domestic abstractions from this dam. In the south, there are smaller dams, that are part of the water sources supplying the Biggarsberg WSS (Amajuba DM and uMzinyathi DM).

See Figure 5-1 for an overview of water resources.



**Legend**

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names
- Rivers
- Water Management Area
- Quaternary Boundaries & Numbers



CLIENT:

DISTRICT MUNICIPALITY:

NEWCASTLE LOCAL MUNICIPALITY

CONSULTANTS:

Project No.: 27814

Mariswe  
PO Box 25549, Monument Park  
Pretoria, 0105

Tel: + 27 (0) 12 424 9700  
Fax: + 27 (0) 12 460 4071  
Email: pretoria@mariswe.com

PROJECT TITLE

**Universal Access Plan Phase III -  
Progressive Development of a  
Regional Concept Secondary  
Bulk Water Master Plan**

MAP TITLE:

**Water Resources  
Newcastle Local Municipality**

DATE COMPLETED:

22 October 2020

MAP NO.:

KZN252: Figure 5.1

The existing water resources' full supply capacity (FSC) and historic firm yield of relevance are displayed in Table 5-1. There are other smaller dams in the WSAs used for small-scale irrigation, or other uses.

**Table 5-1: Water Resources: FSC and HFY**

Water Resource	Tertiary or Quaternary Catchment	FSC	HFY	Note
		Mm <sup>3</sup>	Mm <sup>3</sup> /a	
Buffalo River	V31, V32, V33		Not available	
Buffalo River at Tayside Weir	V32D	Not available	2.92	
Ngagane River	V31E, V31G, V31K		Not available	
Ntshingwayo Dam	V31E	211.258	100% - 75 80% - 68 60% - 60 40% - 52 20% - 38	Available reserve yield of 21Mm <sup>3</sup> /a <sup>6</sup> . DWS 2013: Short-term stochastic yields at various dam level %'s
Tom Worthington Dam	V32E	1.89	1.9	
Verdruk Dam	V32E	1.29		
Zaaihoek Dam	V31A	184.87	47	Currently used for Eskom

Source: DWS, 2015, 2019, Umgeni Water (2020)

### 5.1.2 All Towns Strategy (2015)

This section provides pertinent information from the All Towns Strategy (2015) prepared for the Ntshingwayo Dam Supply Area, which includes the areas in Newcastle, Emadlangeni and Dannhauser Local Municipalities.

The Strategy reports the available yield of the supply area and downstream demands, having taken into account irrigation water requirements and water transfers to Majuba power station, which includes an allocation for Volksrust, as 72.31million m<sup>3</sup>/a (198.11Mℓ/d). This includes an allocation of 2.9 million m<sup>3</sup>/a for the Biggarsberg WSS supply area from the Tayside weir on the Buffalo River.

The allocation to the Newcastle, Madadeni and Osizweni WSS was 56 million m<sup>3</sup>/a, and recently an additional allocation of 5 million m<sup>3</sup>/a was made, totalling ~61 million m<sup>3</sup>/a (167.12Mℓ/d) for this WSS.

The Strategy further emphasises that although local water resources are currently sufficient, there are high water losses, but also high growth expected in this area. The following recommendations were made:

- ✓ Implement water conservation and demand management measures;
- ✓ Increase the allocation from Ntshingwayo Dam for domestic use to support growth in demand, but it has to be coordinated between the supplies to the Newcastle, Madadeni and Osizweni WSS, the Dannhauser Buffalo Flats WSS, Dannhauser WSS and the Biggarsberg WSS;

<sup>6</sup> Draft District Rural Development Plan. Amajuba District Municipality. 2016. Department of Rural Development and Land Reform.

- ✓ Development of storage system from the Buffalo River (potentially in the upper Buffalo); and
- ✓ Development of a dam in one of the tributaries of Buffalo River (potentially in the upper Buffalo River catchment);

Note: The DWS to confirm the licensed water allocations for this area's water resources.

### 5.1.3 Water Use Licensing

This section provides a summary of water use licensing as recorded at the DWS and received in September 2019, titled DW 760 report. The purpose of reflecting this information, from the Water use Authorization & Registration Management System (WARMS), is to evaluate the water use licensed at the DWS, versus the water currently in use especially for domestic water supply, by the WSA.

There are records in the source data with no District Municipality allocation. These records are not included in the summary.

The water user sectors have been grouped to distinguish only two categories: for domestic use and for other user sectors.

**Table 5-2: Water Use Licensing, 2019. Amajuba District Municipality.**

Water User Sector	Resource Type	Registered Volume (m <sup>3</sup> )	Time Interval	Registered Volume in Mℓ/d
Domestic	BOREHOLE	94 535.00	PER YEAR	0.26
Other user sector	BOREHOLE			
Other user sector	BOREHOLE	1 450 242.00	PER YEAR	3.97
Other user sector	DAM	15 462 516.00	PER YEAR	42.36
Other user sector	RIVER/STREAM	30 266 994.00	PER YEAR	82.92
Other user sector	SCHEME			
Other user sector	SCHEME	12 076 007.00	PER YEAR	33.08
Other user sector	SPRING/EYE	251 535.00	PER YEAR	0.69

Source: DWS KZN Regional Office, 2019

The information provided should include all allocations for the District Municipality, irrespective of Water Services Authority status, therefore Newcastle Local Municipality's allocations should be included. However, it seems that the only domestic water use registered, is for supply from boreholes, to the volume of 0.26Mℓ/d.

The water use license information on the WARMS, from the Ntshingwayo Dam, Buffalo River and Ngagane River, for domestic water supply, should be verified by the DWS.

---

#### 5.1.4 Surface Water Resources

---

The next sections provide an overview of the most prominent surface water resources.

##### 5.1.4.1 Buffalo River

The Internal Strategic Perspective report for the Thukela Water Management Area (2004), describes the Buffalo River Key area as follows:

*“The Buffalo River is the main northern tributary of the Thukela River and flows in a south-easterly direction from the eastern escarpment (Newcastle area) to its confluence with the Thukela River near Nkandla.”*

The ISP listed the following Key Area for the WMA:

- ✓ Buffalo (tertiary catchments V31, V32 and quaternaries, V33A and B);

The ADM comprises all or part of the following tertiary catchments: V31 and V32 and small parts in the north-east of the ADM: W41 and W42. The latter tertiary catchments form part of the previously-demarcated Usutu to Mhlatuze WMA.

The ISP report further states that irrigation forms the larger part of water requirements (55million m<sup>3</sup>/a), but combined, the domestic water requirements and water transfers account for an estimated 50million m<sup>3</sup>/a.

The Buffalo River is the primary water source of the Biggarsberg WSS to Dundee, Glencoe and Hattingspruit, where water is abstracted at the Tayside Weir located in the neighbouring Endumeni LM. The water released (more or less annually) from the Ntshingwayo Dam ensures continued supply at the Tayside weir. Furthermore, treated effluent water from the Newcastle, Osizweni and Madadeni Wastewater treatment plants are also released into the Buffalo River, making it available for abstraction and use in this WSS.

The Biggarsberg WSS is reliant on the operating rules of the Ntshingwayo Dam and return flows into the Buffalo River. The Drought Operating Rules for Stand-alone Schemes and Dams Typical of Rural/Small Municipal Water Supply Schemes (DWS, 2013) indicated that the Buffalo River abstraction should be used as first priority, followed by use from the municipal dams for this WSS. According to these rules, the WTP's recommended abstraction from the Buffalo River Tayside Weir is limited to the size of abstraction infrastructure, i.e. 14Ml/day.

The Buffalo River is also used as one of the water sources to the Newcastle, Madadeni and Osizweni WSS. However, the supply is unreliable, especially during the winter months.

##### 5.1.4.2 Ngagane and Ncandu Rivers

The Ngagane River rises at 1993m MSL near Die Ark on the Normandien Pass (quaternary V31E) on the opposite side of the watershed of the Ncandu River (quaternary V31H and V31J). The Ntshingwayo Dam captures the flow of the river south of Newcastle.

The Ncandu River, a tributary of the Ngagane River, joins the Ngagane River north-west of Madadeni from where the Ngagane River flows in an easterly direction towards the confluence with the Buffalo River just north of Madadeni.

The Ngagane River and Ntshingwayo Dam are used as water sources to the Newcastle, Madadeni and Osizweni WSS.

#### **5.1.4.3 Slang River**

The Slang River (quaternaries V31A and V31B) is the first major tributary of the Buffalo River, joining the Buffalo River 4km south-east of Volksrust. Rising at 2 275msl south of Wakkerstroom on the high Balelesberg-Skurweberg Plateau, the Slang River flows westerly – a unique feature in Natal – to the Zaaihoek Dam, from where water is pumped to the Majuba coal-fired power station at a rate of 55 Mm<sup>3</sup>/annum.

#### **5.1.4.4 Zaaihoek Dam**

The Zaaihoek Dam is located on the border between the V31A and V31B catchments, on the Slang River. The yield of the Zaaihoek Dam according to White Paper WPE 86 is 47Mm<sup>3</sup>/annum. The excess water is allocated to the Vaal system. Only water for ecological purposes and for irrigators at an agreed pattern is generally released from this Dam on a continuous basis. In emergency situations, depending on the urgency of supply to the Vaal system, water may be released into the Buffalo river system.

The report – Development of Water Supply and Drought Operating Rules for Stand-alone Schemes and Dams Typical of Rural/Small Municipal Water Supply Schemes. Eastern Cluster. Buffalo River Catchment (Newcastle, Glencoe, Dundee and Others Decision Support System (2013) – listed the water requirements transfer from the Zaaihoek Dam for the Majuba Power Station as 26Mm<sup>3</sup>/a during 2015/2016. The Full Supply Capacity (FSC) of the Zaaihoek Dam is 184.87Mm<sup>3</sup>/a. The reported HFY was 59Mm<sup>3</sup>/a without the environmental reserve.

#### **5.1.4.5 Ntshingwayo Dam**

The Ntshingwayo Dam (previously the Chelmsford Dam) is located (quaternary V31D) on the Ngagane River about 18km south-west of Newcastle. The majority of the dam area is in the Dannhauser LM and the remainder in the Newcastle LM. The capacity of the dam is 194million m<sup>3</sup> with an available reserve yield of 21million m<sup>3</sup>/annum. The reserve yield should be preserved for the expected domestic and industrial growth of the supply area of between 11million m<sup>3</sup> and 39million m<sup>3</sup> over the next 20 years (2034) if other dams are not constructed in the demand area not taking account of the associated increase in return flows.

The Newcastle LM 2019/2020 IDP stated that the dam wall was raised during 1982 and cannot be augmented further to increase the yield.

The Amajuba DM, Umzinyathi DM & Newcastle LM Regional Bulk Water Supply Scheme Prefeasibility Study Revised, June 2017, performed a yield analysis on the Ntshingwayo Dam. This report stated the yield of the Dam, without the Ecological Water Reserve (EWR) as 61.8million m<sup>3</sup>/a, and with the EWR, the yield was reduced to 39.6million m<sup>3</sup>/a (equates to a yield of 108.49Mℓ/d with the EWR).

The report – Development of Water Supply and Drought Operating Rules for Stand-alone Schemes and Dams Typical of Rural/Small Municipal Water Supply Schemes. Eastern Cluster. Buffalo River Catchment (Newcastle, Glencoe, Dundee and Others Decision Support System (2013) – confirmed the order of water resources supply to the Newcastle, Madadeni & Osizweni WSS as the Ntshingwayo Dam then the Ngagane River, and lastly the Buffalo River.

#### **5.1.5 Proposed Potential Surface Water Sources**

---

The following are proposed potential dams within the WSA:

- ✓ Ncandu Dam on the Ncandu River, near the town of Newcastle; and
- ✓ Horn River Dam on the Horn River flowing south-west from Newcastle.

Both dam sites have yet to be fully investigated and both rivers are tributaries of the Ngagane River. A proposal exists for Ncandu Dam to be constructed upstream of the confluence of the Ngagane River and Ncandu River. The yield of the proposed dam is indicated as 16.87Mm<sup>3</sup>/annum with a capacity to sustain another 46Mℓ/day of water supply. This proposal is still subject to evaluation against other potential resources such as the proposed Ngogo and Womeni Dams (uThukela Water Master plan) and further exploitation of Buffalo River.

Costing for the planning and construction of the Ncandu Dam is included under the Ngagane WTP serving the Newcastle LM, but for reference, provision is made for R1.007billion.

The Amajuba DM, Umzinyathi DM & Newcastle LM Regional Bulk Water Supply Scheme. Prefeasibility Study Revised, June 2017, performed a yield analysis on the proposed Ncandu Dam. This report stated the yield of the Dam, without the Ecological Water Reserve (EWR) as 7.68million m<sup>3</sup>/a, and with the EWR, the yield was reduced to 5.04million m<sup>3</sup>/a (equates to a yield of 13.8Mℓ/d with the EWR).

The Horn River Dam option along with the Ncandu Dam option were discussed in the report by RAWS Consulting Engineers: AMAJUBA / GIJIMA WATER / AGRICULTURAL SYNERGIES. REPORT ON IRRIGATION PROPOSALS (2007). Further information to be sourced from the ADM; the DWS is not aware of this potential dam (2019).

The development of new surface water resources will depend detailed evaluations on the water requirements, economic and environmental costs and social benefits amongst other considerations.

#### **5.1.6 Groundwater Sources**

---

There are a number of households in the non-urban areas that are supplied from groundwater sources. Groundwater is also utilised for agriculture, irrigation and industrial activities, but little information is registered on the WARMS database.

Groundwater quality is often affected by the coal mining activities in the region.

According to the 2004 Thukela WMA ISP (DWAF), the median depth of the water table in this WMA is 20m. Groundwater quality is generally good, specifically in the higher rainfall areas. The area consists of hard-rock aquifer formations and generally results in low-yielding groundwater supplies (0.1 – 0.6l/s), but higher yields can be obtained in suitable areas. The groundwater exploitation in the WMA is still low (2.75million m<sup>3</sup>/a, which is only 0.4% of the mean annual recharge over the area) and significant opportunity exists for further development.

Groundwater availability in the Buffalo River Key Area (year 2005), at 1:50 assurance level:

- ✓ At outlet of Key Area: 6million m<sup>3</sup>/a;
- ✓ At Ntshingwayo Dam: 6million m<sup>3</sup>/a.

There are 988 boreholes in the Buffalo Flats area of the Dannhauser LM which will remain as backup supply once this area is supplied from the Ngagane WTP (Amajuba District Municipality Master Plan for Water Supply, 2011). The functionality of the existing boreholes is unknown.

The Ntshingwayo Dam Supply Area All Towns Strategy for 2014 contains very little information on groundwater sources in this area. It stipulated that there is limited potential for significant groundwater development.

Groundwater is one of the main sources other than rivers or streams, for rural areas of the Emadlangeni LM. Groundwater in the northern portion of the Emadlangeni LM is of general good quality, but deteriorates towards the south. SRK Consulting (appointed by DWS) undertook an extensive borehole rehabilitation and drilling program within the Emadlangeni Local Municipality recently. This report is available upon request from SRK. Findings of this report was incorporated and applied in the report: First Order Water Services Master Plan for the Rural areas of the Emadlangeni Local Municipality, (2014).

The Master Plan developed the first full proposed scheme footprint for water supply to almost all consumers in the Emadlangeni LM.

The Amajuba DM, Umzinyathi DM & Newcastle LM Regional Bulk Water Supply Scheme. Prefeasibility Study Revised, June 2017, performed a desktop evaluation of groundwater exploitation potential for the study area. The groundwater exploitation potential was estimated to be 66Mm<sup>3</sup>/a for the whole of the study area and only 6-7Mm<sup>3</sup>/a was utilised. The Newcastle LM (part of Amajuba DM) and Endumeni LM (part of Umzinyathi DM) were found to have higher yielding boreholes (25% yielding >2l/s) than in the other parts of the study area (18% yielding >2l/s).

---

The Department of Education and Department of Public Works initiated a groundwater feasibility study – Schools Drought Relief Project, investigating the existing and potential groundwater use at education facilities, for the KZN Province in 2017. This information may be useful for guiding groundwater options in especially rural areas not served from existing schemes.

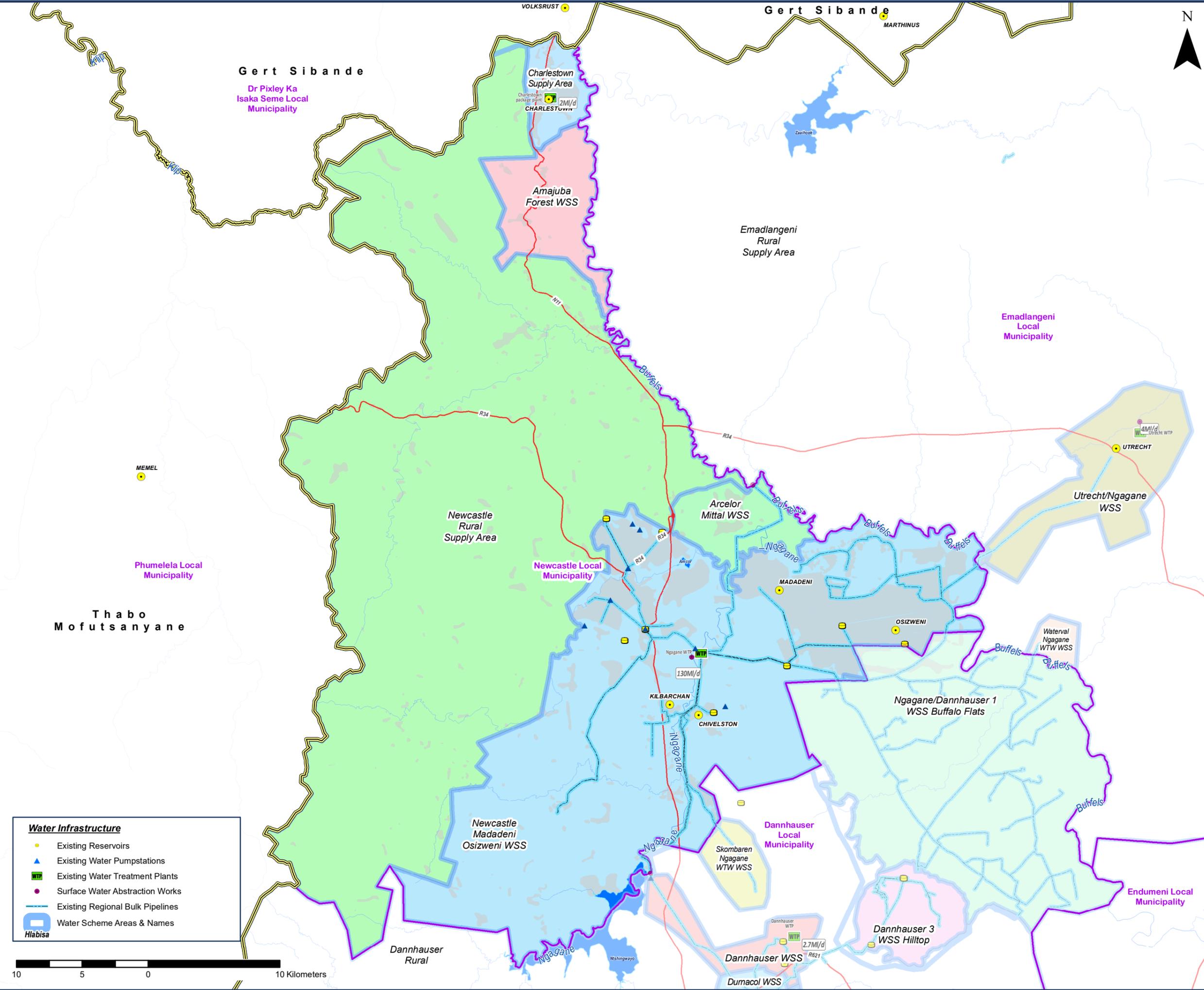
## 5.2 EXISTING WATER SUPPLY SCHEMES

---

Since the completion of the UAP Phase II studies, the WSAs have commenced and completed projects for water supply and sanitation development.

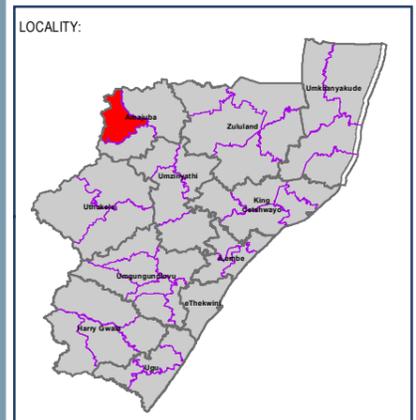
This section provides a brief overview of the existing bulk and local water supply schemes (see Figure 5-2). Discussions were held with the municipal technical and PMU officials during May and June 2019. The NLM does not have up-to-date information systems or planning documents that are readily available and accessible to all officials, which make uptake of information and sharing of knowledge more difficult.

The NLM has not yet received their updated Water and Sanitation Infrastructure Master Plan, as it is being withheld by the consultant until payment received from the NLM (2020).



**Legend**

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Farm Land & Conservation Areas
- National Roads
- Main Roads
- Local Roads
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns



CLIENT:

DISTRICT MUNICIPALITY:

NEWCASTLE LOCAL MUNICIPALITY

CONSULTANTS:

Project No.: 27814

Mariswe  
PO Box 25549, Monument Park  
Pretoria, 0105

Tel: + 27 (0) 12 424 9700  
Fax: + 27 (0) 12 460 4071  
Email: pretoria@mariswe.com

PROJECT TITLE

**Universal Access Plan Phase III -  
Progressive Development of a  
Regional Concept Secondary  
Bulk Water Master Plan**

MAP TITLE:

**Existing Scheme Areas &  
Infrastructure Components  
Newcastle Local Municipality**

DATE COMPLETED:

2020/11/26

MAP NO.:

KZN252: Figure 5.2

**Water Infrastructure**

- Existing Reservoirs
- Existing Water Pumpstations
- Existing Water Treatment Plants
- Surface Water Abstraction Works
- Existing Regional Bulk Pipelines
- Water Scheme Areas & Names

Hlabisa



---

Areas that are extensively rural, with dispersed households and that are not near existing formal or regional schemes, should be assisted by the WSA to ensure universal access to basic water and sanitation, by 2030, to meet the Sustainable Development Goal (SDG<sup>7</sup>) of “Leaving no one behind”.

This can be achieved in the form of individual household supply and on-site treatment, local community-managed schemes, or other water service models that take into account local conditions and community preferences for sustainable water and sanitation services. There are many organisations such as the International Water Management Institute (IWMI), Global Water Partnership (GWP), IRC and donor organisations (USAID, UNICEF, SIDA, WaterAid, etc.) that can assist a WSA to implement WASH (Water, Sanitation and Hygiene) systems.

The urban water supply schemes in the Amajuba DM that abstracts from the Ntshingwayo Dam, is dealt with in the Amajuba DM UAP Phase III report, but for reference, are the following:

- ✓ Durnacol & Dannhauser WSS (own WTP); and
- ✓ Skombaren WSS (Ngagane WTP).

The Utrecht WSS (Emadlangeni LM in the ADM) is sometimes supplied from the Ntshingwayo Dam with water treated at the Ngagane WTP. The Utrecht WSS has its own local resources, water treatment and supply infrastructure, but when there are drought conditions or other local water resource challenges, it cannot meet the water requirements and utilises the existing bulk pipeline from the Ngagane WTP.

Furthermore, the Buffalo Flats area in the north-east of the Dannhauser LM in the ADM is supplied from the Ngagane WTP and is included in this report as it has a fairly large water requirement. More information can also be sourced from the Amajuba DM UAP Phase III report.

### 5.3 URBAN AND BULK WATER SUPPLY SCHEMES

---

The following sections give a brief overview of the urban and bulk water supply schemes (WSS). Bulk water supply schemes can be identified as schemes with a large geographic footprint, or with a water treatment works (WTP) of a design capacity of 2Mℓ/d or more.

---

<sup>7</sup> SDG 6: Ensure availability and sustainable management of water and sanitation for all

A summary of the Water Treatment Works is provided in Table 5-3.

**Table 5-3: Summary of WTPs**

Plant Name	Design Capacity (Mℓ/d)	Annual Average Production (Operational) (Mℓ/d)
Charlestown (package plant)	2	0.5
Ngagane	130	110
<b>Total Capacity</b>	<b>132</b>	<b>110</b>

Source: Newcastle LM correspondence received and from interviews with ADM and Uthukela Water (June, 2019); supplemented with information from Umgeni Water (2020).

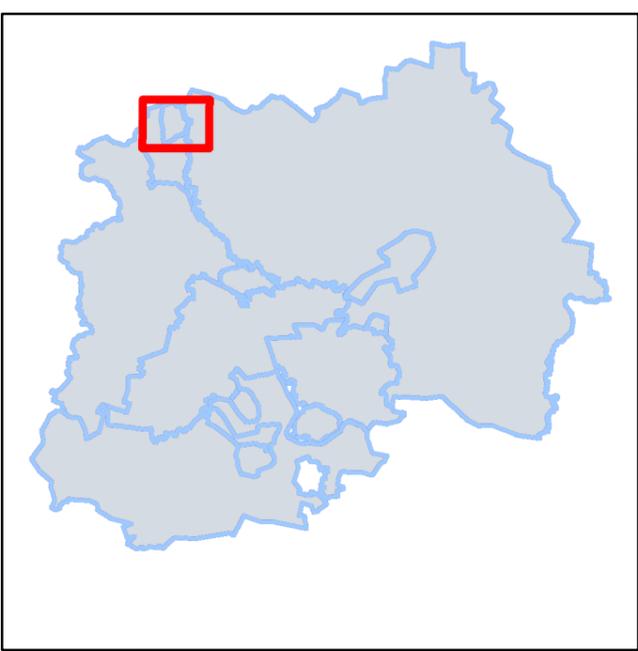
### 5.3.1 AMA011: Charlestown WSS

The Charlestown area, depicted in Figure 5-3, used to be supplied from the Greater Volksrust WSS, that included the towns of Volksrust and Vukuzakhe (Mpumalanga Province), and Charlestown. This is not the case anymore as there is a new package plant for Charlestown which treats water from four production boreholes. However, the operations are reliant on the availability of electricity to provide water (NLM, 2019).

The package plant has a design capacity of 2Mℓ/d and operating at 0.5Mℓ/day.

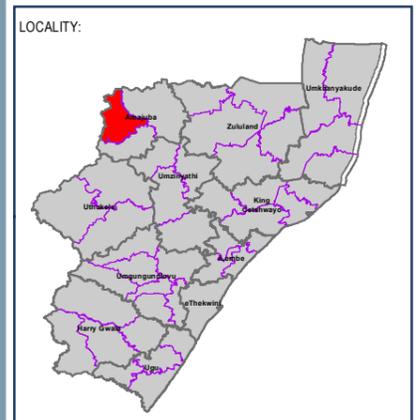
There are two potable water storage tanks (2x260kℓ) at the package plant, providing water the command reservoir site consisting of two elevated steel tanks (40kℓ and 380kℓ), and one steel tank at ground level (500kℓ). These reservoirs are in good condition and feed the various pressure zones of Charlestown (Umgeni Water, 2020).

Most of the residents in Charlestown are supplied with house connections. Sanitation services are through septic tanks that are emptied to sewage treatment ponds. There is still capacity at the ponds for additional sewage waste.



**Legend**

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Farm Land & Conservation Areas
- National Roads
- Main Roads
- Local Roads
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns



CLIENT:

DISTRICT MUNICIPALITY:

NEWCASTLE LOCAL MUNICIPALITY

CONSULTANTS:

Project No.: 27814

Mariswe  
PO Box 25549, Monument Park  
Pretoria, 0105

Tel: + 27 (0) 12 424 9700  
Fax: + 27 (0) 12 460 4071  
Email: pretoria@mariswe.com

PROJECT TITLE

**Universal Access Plan Phase III -  
Progressive Development of a  
Regional Concept Secondary  
Bulk Water Master Plan**

MAP TITLE:

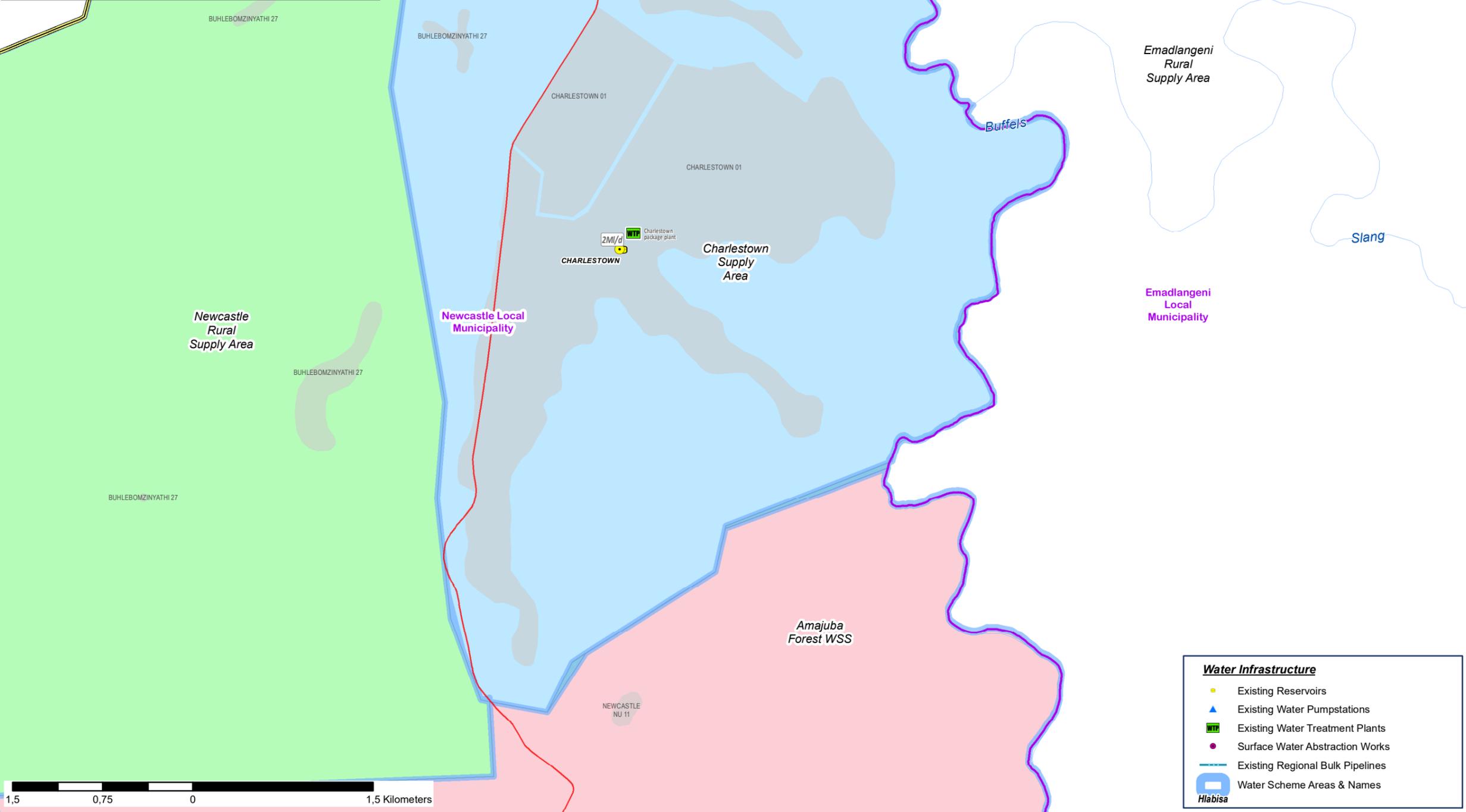
**Existing Scheme Areas &  
Infrastructure Components -  
Charlestown Supply Area  
Newcastle Local Municipality**

DATE COMPLETED:

2020/11/26

MAP NO.:

KZN252: Figure 5.3



**Water Infrastructure**

- Existing Reservoirs
- Existing Water Pump Stations
- Existing Water Treatment Plants
- Surface Water Abstraction Works
- Existing Regional Bulk Pipelines
- Water Scheme Areas & Names

**Hlabisa**



---

### 5.3.2 AMA012: Newcastle, Madadeni and Osizweni WSS

---

Information in this section is from the reports:

- ✓ Ngagane BP revision 4-Emergency Upgrade Ngagane WPP – Amended 14 Nov 2013;
- ✓ Water Development Plans Status Report Feb 2015 v1.0; and
- ✓ Ngagane Bulk Water Upgrade Regional Bulk Infrastructure Project Business Plan, August (Uthukela Water, 2019). Herein after referred to as the Ngagane BP (2019).

Where necessary, the information is updated from discussions with the NLM and Uthukela Water, held on 14 May 2019.

The Newcastle, Madadeni and Osizweni WSS, depicted in Figure 5-4, includes the towns of Newcastle, Alcockspruit, Skombaren, Madadeni, Osizweni, Blaauwbosch Laagte, Cavan, Jakkalspan, Johnstown and further east up to Inverness (Newcastle LM), Mndozo and Dicks Halt. The scheme also supplies the following areas in the neighbouring Emadlangeni LM: Waterval Prison, then in case of local water shortage or drought, the areas of Utrecht, Berouw and Amangthungwa.

Most consumers receiving water from this scheme, that are in the NLM, are served with household connections and waterborne sewer. There are however many unauthorised water connections.

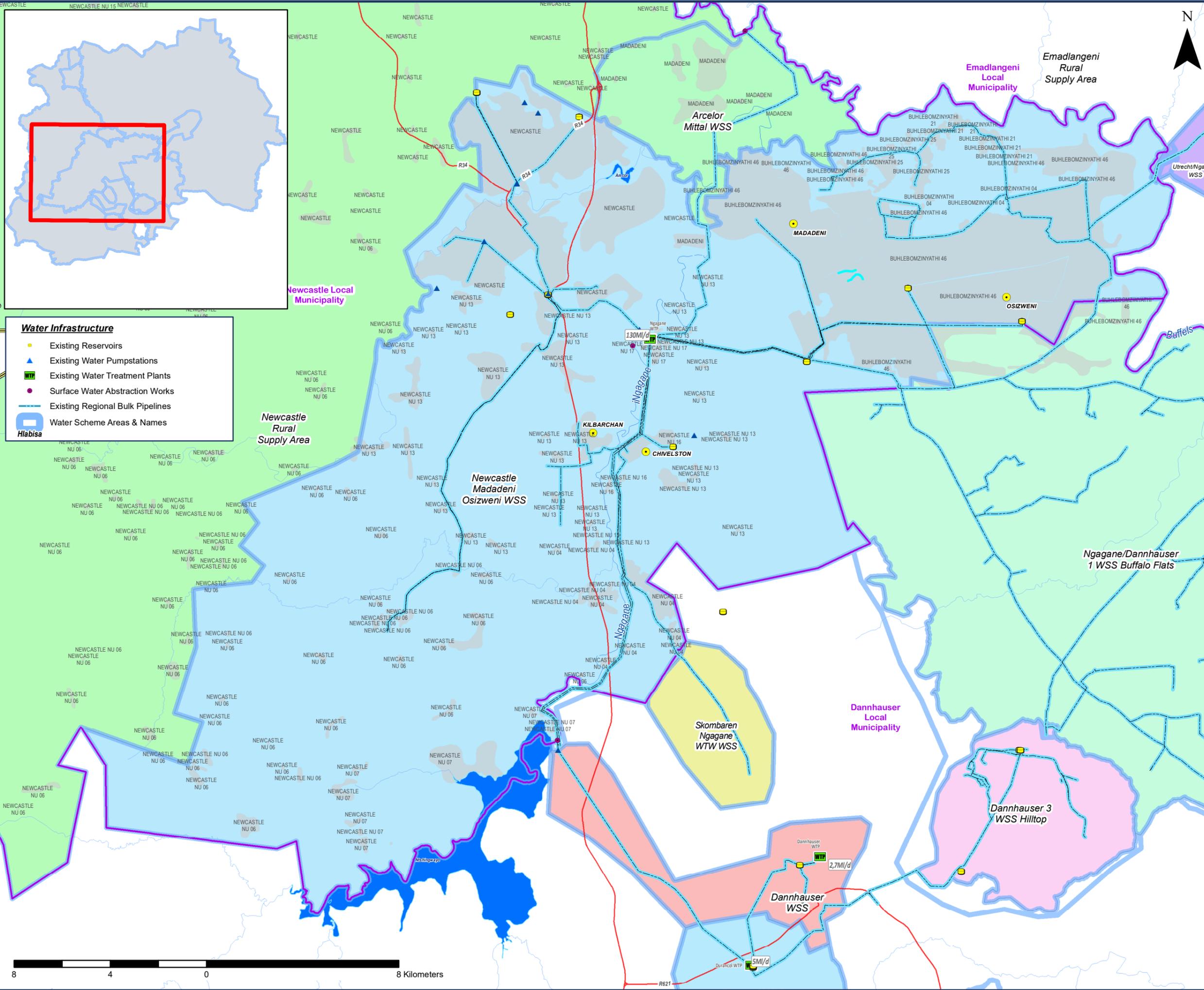
#### **Abstraction, Ngagane WTP**

Water is supplied from the Ntshingwayo Dam (92Mℓ/d supplied, 110Mℓ/d licensed allocation), Ngagane River (18Mℓ/d supplied, 30Mℓ/d allocation) and Buffalo River (unreliable supply during winter months: allocation of 30Mℓ/d with system capacity of up to 25Mℓ/d, dependent on the level of the river), then treated at the Ngagane WTP (130Mℓ/d design capacity). The Ngagane WTP is about 7km south-east of the town of Newcastle's CBD and about 17km north-east of the Ntshingwayo Dam.

The All Towns Strategy for the Buffalo River Catchment (DWS, 2016), indicated the available yield (after deductions for domestic, industrial and agricultural use and transfers) from the Ntshingwayo Dam (quaternary catchment V31K) as 9.66 million m<sup>3</sup>/a, before the ecological reserve (WRSM 2005<sup>8</sup>).

---

<sup>8</sup> WRSM/Pitman is a mathematical model to simulate the movement of water through an interlinked system of catchments, river reaches, reservoirs, irrigation areas and mines.



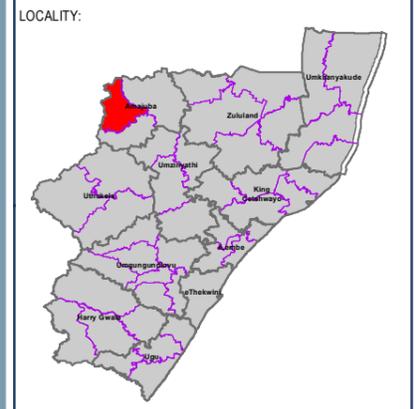
**Water Infrastructure**

- Existing Reservoirs
- Existing Water Pumpstations
- Existing Water Treatment Plants
- Surface Water Abstraction Works
- Existing Regional Bulk Pipelines
- Water Scheme Areas & Names

**Hlabisa**

**Legend**

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Farm Land & Conservation Areas
- National Roads
- Main Roads
- Local Roads
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns



CLIENT:

DISTRICT MUNICIPALITY:

NEWCASTLE LOCAL MUNICIPALITY

CONSULTANTS:

Project No.: 27814

Mariswe  
PO Box 25549, Monument Park  
Pretoria, 0105

Tel: + 27 (0) 12 424 9700  
Fax: + 27 (0) 12 460 4071  
Email: pretoria@mariswe.com

PROJECT TITLE

**Universal Access Plan Phase III - Progressive Development of a Regional Concept Secondary Bulk Water Master Plan**

MAP TITLE:

**Existing Scheme Areas & Infrastructure Components - Newcastle Madadeni Osizweni WSS Newcastle Local Municipality**

DATE COMPLETED:

2020/11/26

MAP NO.:

KZN252: Figure 5.4

When the Buffalo River flow level is very low (winter season) Uthukela Water has to draw from the Ngagane River full-time (Uthukela Water, 2019).

The Ngagane WTP also supplies consumers in the Dannhauser LM's Buffalo Flats WSS.

The Ngagane BP (2019) indicated that the only upgrade of the Ngagane WTP since 2000 was by another 10Mℓ/d to have a total hydraulic design capacity of 130Mℓ/d. The plant is operating at 110Mℓ/d. It is proposed to add a fourth module of 30Mℓ/d, bringing the total capacity to 150Mℓ/d, which will suffice until 2030, after which though new water resources need to be developed to meet future water requirements. The Ngagane BP makes provision for the following project components, to be implemented in the next four-and-a-half years, in phases:

- ✓ 1. Raw water 800mm dia steel bulk pipeline, 19.9km -Pawacons Engineering consultants;
- ✓ 2. Extension of water treatment works (by 30Mℓ/d) -module 4-Royal Haskoning/DHV;
- ✓ 3. Braakfontein 800mm dia steel rising main, 6.6km, and pump station-Abaziyo Consulting; and
- ✓ 4. Hilldrop rising 700mm dia PVC-O bulk pipeline, 5.9km, -Ilifa Consulting Engineers.

In the costing summary, the Ngagane BP (2019) also lists another item, five (5). Ngagane clear water reservoir, 19Mℓ.

Water quality in the Ngagane River is affected by coal mine dust, iron and manganese from mining operations. This issue was raised during 2015 and still remains an issue in 2019/2020. This also affects the efficiency of the treatment plant. Drought conditions affect the available supply from the Buffalo River.

During the 2015/2016 drought conditions flow was affected in the Buffalo River and DWS released water from the Zaaihoek Dam. The Zaaihoek Dam is however a strategic water resource, its main use is to support the electricity operations of Eskom.

The Ntshingwayo Dam has also been affected by drought, pollution and siltation during 2015/2016. The dam level in June 2016 was reported as 51%. The dam level as on 10 August 2020 was 70.3% (DWS, Kwazulu-Natal Province State of Dams).

### **Bulk Water Pipelines and Pumping Infrastructure**

A total of four bulk pipelines supply raw water to the Ngagane WTP as follows:

- ✓ Two gravity pipelines (one 690mm internal diameter concrete pipe and a 590mm internal diameter steel pipe with a section of AC pipe) supply the Ngagane WTP from Ntshingwayo Dam, These account for about 72-92Mℓ/day
- ✓ A 600mm diameter mild steel lined pumping main supplies the Ngagane WTP directly from the Ngagane River, accounting for 20-30Mℓ/day
- ✓ Another gravity pipeline supplies raw water from the Buffalo River to the Ngagane WTP. This pipeline is an 800mm diameter mild steel pipeline (estimated length 20km) and abstracts water from a weir

---

higher up on the Buffalo River. This pipeline is reported to be old and in need of refurbishment / replacement.

### **Storage**

The All Towns Strategy (2014) for Ntshingwayo Dam Supply Area confirmed command reservoirs at Braakfontein and Newcastle town with storage capacities of 78.8Mℓ and 46Mℓ respectively. There is also a 4Mℓ reservoir at Ekuseni supplying the low pressure sections of the town. And two 10Mℓ reservoirs at Signal Hill and Northdown respectively. Total storage, including bulk distribution reservoirs, is 148.8Mℓ. This storage is sufficient to meet 35h storage but not sufficient to meet the 48h storage requirement of the system (The All Towns Strategy, 2014).

Uthukela Water did not provide updated information on the bulk storage available (2020).

### **5.3.3 AMA014: Dannhauser Buffalo Flats WSS**

---

Most information for this scheme is obtained from the

- ✓ UAP Phase II report and
- ✓ Supporting information provided such as the Feasibility Report: Phase 1 Emergency Water Supply to Ramaphosa Settlement, Skombaren and 2 Megalitre reservoir at Hilltop. Phase 2 Dannhauser Regional Water Supply Scheme (2018). This report includes the Amajuba DM, Umzinyathi DM & Newcastle LM Regional Bulk Water Supply Scheme. Prefeasibility Study Revised, June 2017.

The Dannhauser – Buffalo Flats WSS, depicted in Figure 5-5, includes the towns of Inverness, Mtendeka, Mafahlawane, Naas, Surrey, Phillip, Martha, Uitkyk, Mbanane, Nellie Valley, Kilegethe, Dorset, Curragh and Cloneen in the Buffalo Flats area.

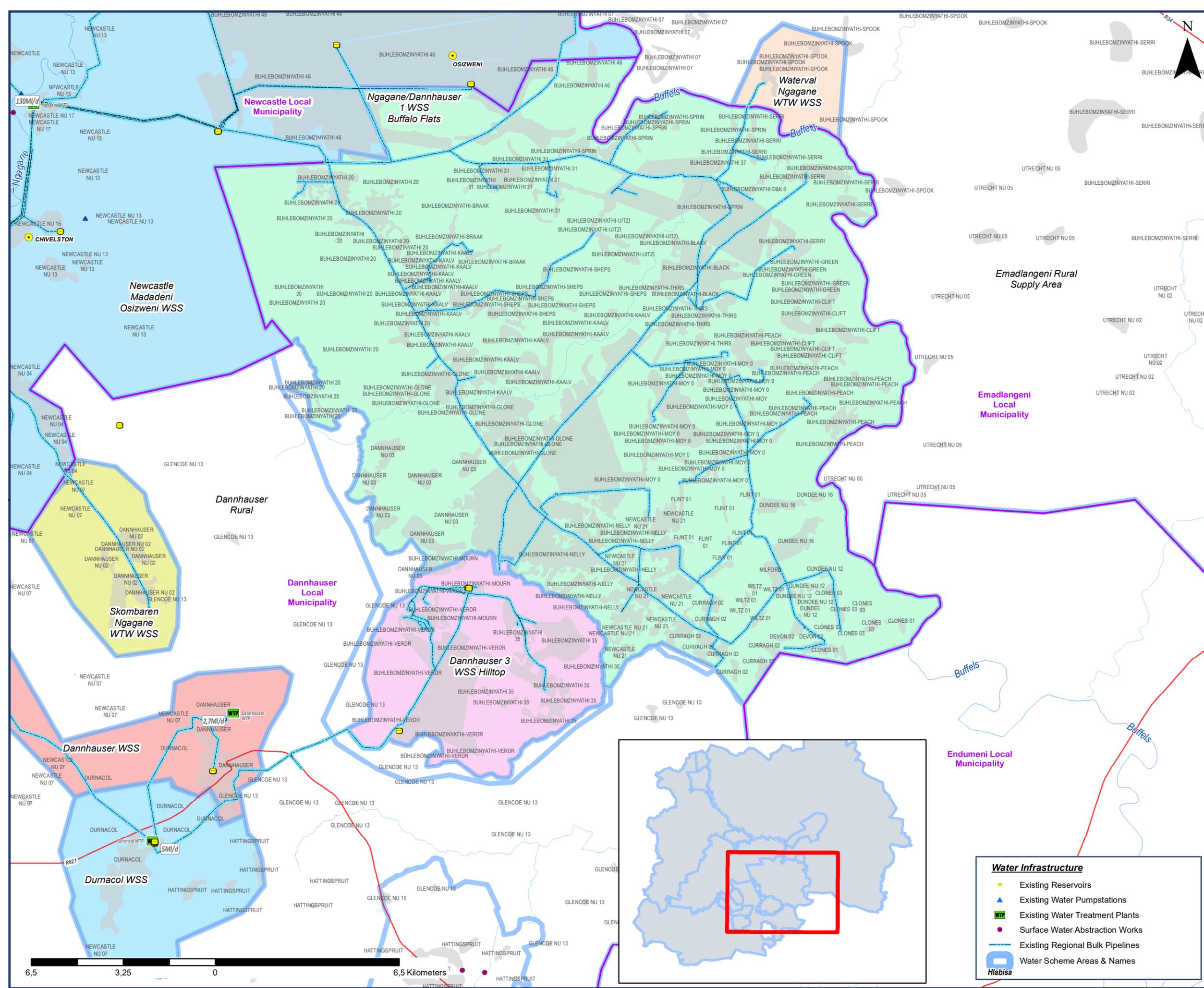
Water is supplied from the following:

Ngagane WTP via the Braakfontein Reservoirs: obtaining water from the Ntshingwayo Dam, Ngagane River and Buffalo River – see the section on the Newcastle, Madadeni and Osizweni WSS. Update from 2019: There is a 20Mℓ/d allocation to the Buffalo Flats area, but the capacity of the infrastructure only allows for 10Mℓ/d. The 2018 Feasibility report makes mention of an additional 10Mℓ/d from the planned Dannhauser Regional Scheme, once the Durnacol WTP is upgraded from 5Mℓ/d to 20Mℓ/d. However, the DWS did not approve the business plan (Umgeni Water, 2020).

There are however also areas reliant on groundwater supplies and water tankers, such as Chester, Cork, Flint, Greenock, Mullingar, Nyanyadu, Spookmill and Zondo in the north-east and Geduld, Hilltop, Kempshoek, Kliprand, Nguqunguqu, Strijbank, Twhatgwha and Verdriet in the southern part of the scheme area. The volume of groundwater supplied should be established as well as the potential for increased conjunctive use of groundwater and surface water in this area.

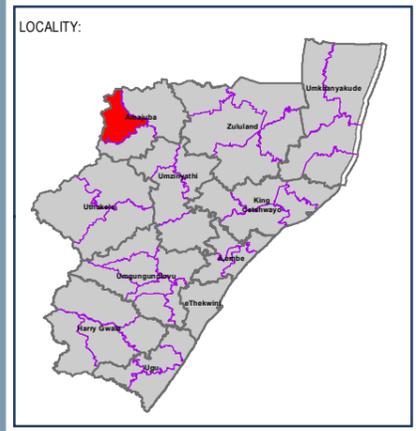
---

The 2018 Feasibility report indicated that water supply to the Buffalo Flats area from the Ngagane WTP does not meet the demand. Furthermore, that the ADM has embarked on upgrading of the water supply service levels to yard connections, which increase the water consumption. The proposed Phase 2 discussed in this report, indicate that water supply will be augmented from the proposed new 20M<sup>3</sup>/d WTP at the Ntshingwayo Dam along with the supporting infrastructure to become the Dannhauser Regional Water Supply Scheme. However, the DWS did not approve the business plan (Umgeni Water, 2020).



**Legend**

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Farm Land & Conservation Areas
- National Roads
- Main Roads
- Local Roads
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns



CLIENT:

DISTRICT MUNICIPALITY:

NEWCASTLE LOCAL MUNICIPALITY

CONSULTANTS:

**MARISWE**  
IMPROVING LIVES THROUGH SOLUTIONS

**JTN**  
CONSULTING

Mariswe  
PO Box 25549, Monument Park  
Pretoria, 0105

Tel: + 27 (0) 12 424 9700  
Fax: + 27 (0) 12 460 4071  
Email: pretoria@mariswe.com

Project No.: 27814

PROJECT TITLE

**Universal Access Plan Phase III -  
Progressive Development of a  
Regional Concept Secondary  
Bulk Water Master Plan**

MAP TITLE:

**Existing Scheme Areas & Infrastructure  
Components - Ngagane/Dannhauser  
1 WSS Buffalo Flats  
Newcastle Local Municipality**

DATE COMPLETED:

2020/11/26

MAP NO.:

KZN252: Figure 5.5

**Water Infrastructure**

- Existing Reservoirs
- Existing Water Pumpstations
- Existing Water Treatment Plants
- Surface Water Abstraction Works
- Existing Regional Bulk Pipelines
- Water Scheme Areas & Names

Hlabisa

---

#### 5.3.4 AMA013: Newcastle Rural Supply Area

---

The areas not served from the Newcastle, Madadeni and Osizweni WSS or the Charlestown WSS include the areas of Arcelor Mittal, a private scheme, the area of Amajuba Forest WSS (private land), then the remainder of Newcastle LM Rural (AMA013). These remaining rural areas consist mostly of farmsteads and small settlements such as Ingogo and Normandien. Most of these areas make use of groundwater sources such as springs and boreholes. The NLM does provide water tanker services to some areas.

The UAP Phase II planning did not include this area as part of the water requirements costing due to the sparsely populated places. The study did project the 2020 water requirements as 1.0Mℓ/d and the 2035 water requirements as 1.4Mℓ/d.

Under the UAP Phase III study, for the Newcastle Rural Supply areas (demarcated under supply area AMA013), the 2020 population is estimated at 7 898 and the water requirements at 1.354Mℓ/d.

## 6. EXISTING SANITATION BULK INFRASTRUCTURE

The following sections give a brief overview of the sanitation service levels and urban and bulk sanitation schemes (SS).

The UAP Phase II study did not include or address bulk sanitation.

## 6.1 SANITATION SERVICE LEVELS

### 6.1.1 Community Survey 2016 Sanitation Supply Levels

The following service levels are presented from the 2016 Community Survey for the WSA:

**Table 6-1: Sanitation Supply Levels, Community Survey 2016**

LM Name	Flush toilet connected to a public sewage system	Flush toilet connected to a septic tank or conservancy tank	Chemical toilet	Pit latrine/toilet with ventilation pipe	Pit latrine/toilet without ventilation pipe	Ecological toilet (e.g. urine diversion; enviroloo, etc.)	Bucket toilet (collected by municipality or emptied by HH)	Other or None
Newcastle	56 657	2 411	4 695	6 825	14 754	335	1 034	3 635

Source: StatsSA, 2016 Community Survey

The Newcastle LM has the highest level of service, by number of households having access to flush or VIP sanitation services. There is a total of 70 588 households (78%) having a sanitation services level of VIP or better.

### 6.1.2 DWS Reference Framework Water Supply Levels

The settlement's service levels presented in Table 6-2 and Figure 6-1 were last updated during 2016.

**Table 6-2: DWS RF Sanitation Level of Service (LoS), 2016**

LM Name	No of Households	Households with RDP or above LoS	Percentage	Households not within RDP or above LoS	Percentage
Newcastle	92 485	91 899	99%	586	1%

Source: DWS RF geodatabase, 2016

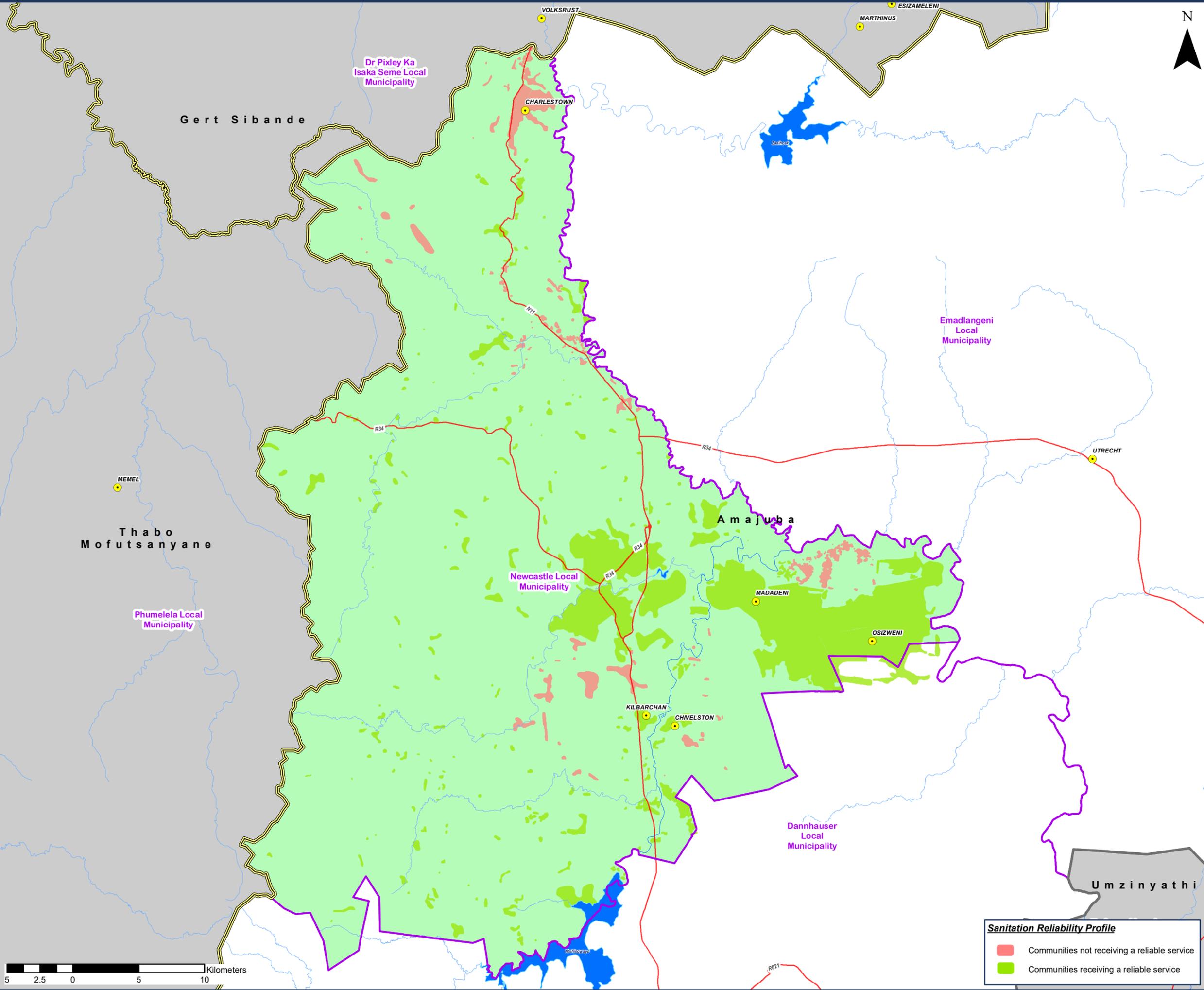
The information is not corresponding to the 2016 Community Survey, with the DWS data reflecting a higher percentage of households having access to sanitation services at or above RDP standards (99%) and only 1% not having access to at or above RDP standards.

### 6.1.3 Water and Sanitation Master Plan

The Water and Sanitation Master Plan was updated for the WSA, however due to non-payment of the service provider, the NLM has not yet received delivery of the Plan.

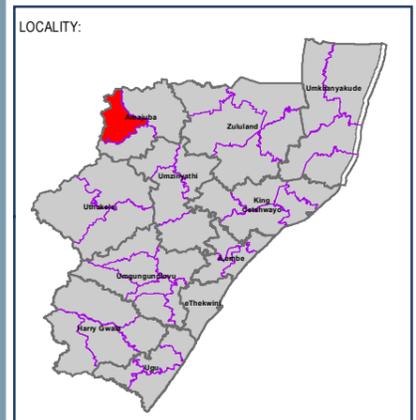
### 6.1.4 WSA Municipal Infrastructure Forum Reporting

No information could be sourced from the IGR reporting by the WSA.



**Legend**

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Farm Land & Conservation Areas
- National Roads
- Main Roads
- Local Roads
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns



CLIENT:

DISTRICT MUNICIPALITY:

NEWCASTLE LOCAL MUNICIPALITY

CONSULTANTS:

Project No.: 27814

Mariswe  
PO Box 25549, Monument Park  
Pretoria, 0105

Tel: + 27 (0) 12 424 9700  
Fax: + 27 (0) 12 460 4071  
Email: pretoria@mariswe.com

PROJECT TITLE

**Universal Access Plan Phase III -  
Progressive Development of a  
Regional Concept Secondary  
Bulk Water Master Plan**

MAP TITLE:

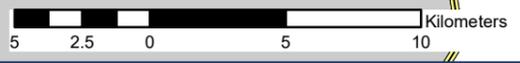
**Sanitation Reliability Profile  
Newcastle Local Municipality**

DATE COMPLETED:

18 June 2020

MAP NO.:

KZN252: Figure 6.1



**Sanitation Reliability Profile**

- Communities not receiving a reliable service
- Communities receiving a reliable service

## 6.2 URBAN AND BULK SANITATION SUPPLY SCHEMES

Bulk sanitation supply schemes, depicted in Figure 6-2, can be identified as schemes with a large geographic footprint, or with a wastewater treatment plant (WWTP) of a design capacity of 2Mℓ/d or more.

A summary of the Wastewater treatment plants is provided in Table 6-3.

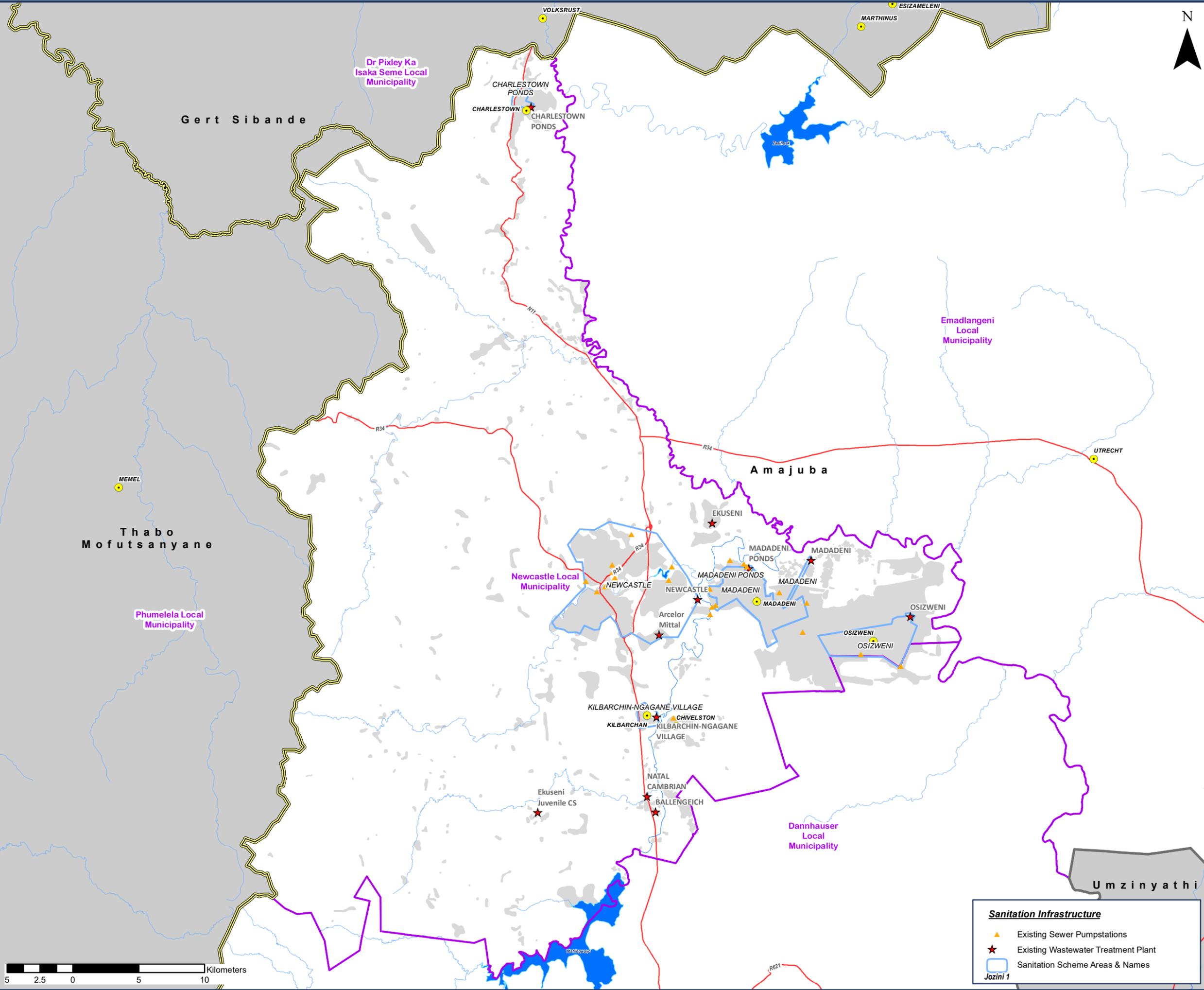
**Table 6-3: Summary of WWTPs**

Plant Name	Owner and Operator	Design Capacity (Mℓ/d)	Annual Average Volume Treated (Operational) (Mℓ/d)	Class of Plant
CHARLESTOWN PONDS	NLM	0.75	0.50	E
MADADENI	NLM	12	9	B
MADADENI Sewage Ponds	NLM	TBC	TBC	E
NEWCASTLE	NLM	25	20	B
OSIZWENI	NLM	15	14	B
	<b>Total Capacity based on known information</b>	52.75	43.50	

Source: Newcastle LM, Uthukela Water, correspondence received and from interviews with consultants (June 2019)

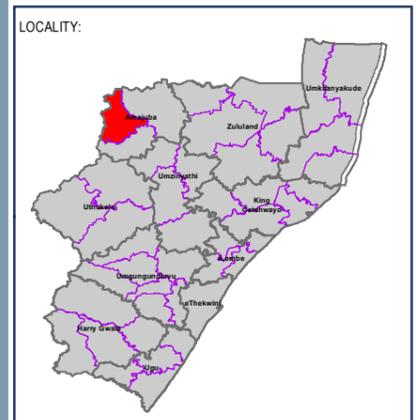
In addition, there are privately-owned WWTPs, mainly serving the mining settlements or correctional facilities.

Information on beneficiation from these plants such as the production of biogas or electricity, or the production of fertiliser should still be obtained, such as from the new Madadeni WWTP and the other larger WWTPs or even the Madadeni sewage treatment ponds (can be used for aquaponics).



**Legend**

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Farm Land & Conservation Areas
- National Roads
- Main Roads
- Local Roads
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns



CLIENT:

DISTRICT MUNICIPALITY:

NEWCASTLE LOCAL MUNICIPALITY

CONSULTANTS:

Project No.: 27814

Mariswe  
PO Box 25549, Monument Park  
Pretoria, 0105

Tel: + 27 (0) 12 424 9700  
Fax: + 27 (0) 12 460 4071  
Email: pretoria@mariswe.com

PROJECT TITLE

**Universal Access Plan Phase III -  
Progressive Development of a  
Regional Concept Secondary  
Bulk Water Master Plan**

MAP TITLE:

**Existing Sanitation Infrastructure  
Newcastle Local Municipality**

DATE COMPLETED:

18 June 2020

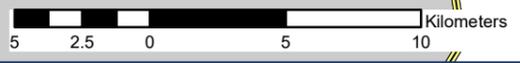
MAP NO.:

KZN252: Figure 6.2

**Sanitation Infrastructure**

- Existing Sewer Pumpstations
- Existing Wastewater Treatment Plant
- Sanitation Scheme Areas & Names

Jozini 1



---

### 6.2.1 *Charlestown SS*

---

The Charlestown SS only includes the town of Charlestown, with a population of 4 392 (947 households) as per the 2011 Census. The Census further reported that 78% of households had pit toilets for sanitation and 11% had waterborne sanitation.

Charlestown is served from a series of sewage treatment ponds of which the design capacity is unknown, but according to the NLM there is still available capacity at the ponds to accept sewage for treatment (2019). Most of the consumers are now served with septic tanks where households are upgraded in-situ, which will likely remain the future service level standard.

---

### 6.2.2 *Madadeni SS*

---

Detailed information on the new Madadeni WWTP and its catchment area should be obtained from the NLM's updated infrastructure master plan for water and sanitation when it becomes available (2019).

Selected suburbs of the Madadeni township area are served by the new Madadeni WWTP located in the north-east of Madadeni in Masondale, and the existing Madadeni sewage treatment ponds located in the north in Madadeni K. The sewer catchment, based on existing known information, includes the suburbs (2011 Census Sub-Places) of Kwamathukuza, Madadeni A, Madadeni B, Madadeni C, Madadeni D, Madadeni E, Madadeni F, Madadeni H (including the Industrial Estate), Madadeni K, Madadeni N, Madadeni P and Madadeni R. The 2011 Census reported that these areas consisted of 107 234 persons, in 24 790 households. At the time of the 2011 Census, 73% of households had waterborne sewer, 9% were served by VIPs and 8% with pit latrines.

An article in Sabinet (Civil Engineering, October 2018), gave the design capacity of the Madadeni WWTP as 25Mℓ/d, with the potential to be upgraded to 60Mℓ/d in the long-term future. However, discussions with the consultants (26 February 2020) indicated the current design capacity as 12Mℓ/d (organic loading), to be upgraded to 36Mℓ/d when funding becomes available, by 2021/2022. The intention is still to be able to meet long-term sewer requirements, with the Madadeni WWTP upgrade possible to 60Mℓ/d.

The status of development of the JBC Mega Human Settlements project should be confirmed and whether waterborne sewer is provided, that is routed to the new Madadeni WWTP.

The sewer pump station at the Madadeni sewage treatment ponds route sewer to the Madadeni WWTP at a rate of about 9Mℓ/d. There is currently no co-beneficiation at the Madadeni WWTP, however, due to the design process, energy savings have been achieved.

---

### 6.2.3 *Newcastle SS*

---

Detailed information on the Newcastle WWTP and its catchment area should be obtained from the NLM's updated infrastructure master plan for water and sanitation, when it becomes available (2019).

---

The Newcastle WWTP serves the Newcastle CBD, residential suburbs and industrial area. The 2011 Census population for this area was 51 208, residing in 15 126 households. At the time, 91% of all households were connected to a waterborne system.

The Newcastle WWTP has a design capacity of 25Mℓ/d and operates at about 20Mℓ/d. The works was recently refurbished (NLM, 2019). There is presently no co-beneficiation or water reclamation at the works. It should be confirmed whether the areas and development of Viljoen Park and Tuam Farm are now served by this WWTP.

#### **6.2.4 Osizweni SS**

---

Detailed information on the Osizweni WWTP and its catchment area should be obtained from the NLM's updated infrastructure master plan for water and sanitation when it becomes available (2019).

The Osizweni WWTP serves the suburbs of Osizweni A, Osizweni C, Osizweni D and Osizweni E. The 2011 Census population for this area was 74 100, residing in 16 212 households. At the time, 85% of all households were connected to waterborne system, 5% were served by VIPs and 4% with pit latrines.

The Osizweni WWTP has a design capacity of 15Mℓ/d and operates at about 14Mℓ/d. The NLM does not have any immediate plans for the upgrade of this works, that is already operating at capacity (2019).

## 7. BULK WATER SUPPLY PROJECTS CURRENTLY IN PLANNING

The existing funding grants for the municipal capital projects and operating subsidies for water services are mainly funded by the Municipal Infrastructure Grant (MIG) followed by the Regional Bulk Infrastructure Grant (RBIG) and the Water Services infrastructure Grant (WSIG). The main objective of MIG and WSIG is to assist WSAs by providing grant funding in removing the backlog concerning basic municipal services to poor households. RBIG focusses on the infrastructure required to connect or augment the water resource on a macro<sup>9</sup> or sub regional <sup>10</sup>scale (over vast distances<sup>11</sup>), with internal bulk systems or any bulk supply infrastructure that may have a significant impact on water resources in terms of quantity and quality. The bulk infrastructure that would have a “significant impact on water resources” includes:

- ✓ Any bulk scheme that is designed for maximum demand of 5Mℓ/day or more;
- ✓ Any wastewater treatment plant that discharges into a freshwater resource system; and
- ✓ Any water treatment plant that is designed for a maximum demand of more than 2Mℓ/day.

For the purpose of this study, the existing regional bulk projects were considered and evaluated to identify potential gaps within the existing project footprints to the extent that a total “wall-to-wall” bulk water services needs perspective is visualised and realised. This must be done in context to improve access to basic services but at the same time support economic growth and development and ensure sustainable services.

### 7.1 REGIONAL BULK WATER PROJECTS IN PLANNING

This section provides a brief overview of planned bulk water supply infrastructure.

The funding allocations from the Division of Revenue Bill (B5-2019) under the Regional Bulk Infrastructure Grant (RBIG), Municipal Infrastructure Grant (MIG) and Water Services Infrastructure Grant (WSIG) are provided in Table 7-1 and Table 7-2.

**Table 7-1: RBIG Funding in terms of DORA**

Project Code	Local Municipality	Project Name	2019/2020 (R '000)	2020/2021 (R '000)	2021/2022 (R '000)
	No allocations for NLM as WSA				

Source: Division of Revenue Bill (B5-2019)

<sup>9</sup> “Macro” is defined as infrastructure serving extensive areas across multi-municipal boundaries

<sup>10</sup> “Sub-regional” is defined as large regional bulk infrastructure serving numerous communities over a large area normally within a specific district or local municipal area

<sup>11</sup> Over “vast distances” is considered as any distances greater than 5km

**Table 7-2: MIG and WSIG Funding in terms of DORA**

Municipality	MIG 2019/2020 (R '000)	MIG 2020/2021 (R '000)	MIG 2021/2022 (R '000)	WSIG 2019/2020 (R '000)	WSIG 2020/2021 (R '000)	WSIG 2021/2022 (R '000)
Newcastle	R112 580	R119 073	R128 414	R40 000	R45 000	R50 000

Source: Division of Revenue Bill (B5-2019)

## 7.2 NEWCASTLE LM AND AMAJUBA DM

The following capital projects were reported in the Newcastle LM 2019/2020 IDP:

- ✓ Madadeni High-lying areas;
- ✓ Osizweni Pressure Management;
- ✓ Newcastle West Pressure Management;
- ✓ WC/WDM.

Then from the 2018/2019 IDP of the Amajuba DM, which may be relevant to the Newcastle LM either because of shared water resources, or shared water infrastructure (DC25 Amajuba - Supporting Table SA36 Detailed capital budget, pg. 252):

- ✓ ENG004, Dannhauser Housing Development Bulk Water and Sanitation;
- ✓ ENG005, Buffalo Flats Water Supply Scheme Phase 3B;
- ✓ ENG008, Pipeline extension and infrastructure in Skombaren and Alcockspruit;
- ✓ ENG010, Refurbishment of DNC WWTP, Tweediedale and Utrecht WTP;
- ✓ ENG011, Refurbishment and upgrade of Durnacol Water Treatment Works in Dannhauser;
- ✓ ENG012, Construction of Brakfontein reservoir;
- ✓ ENG014, Emergency water supply to Ramaphosa, Skombaren and 2 megalitre reservoir at Hilltop - Emadlangeni LM;
- ✓ ENG015, Dannhauser Borehole Refurbishment Program.

Some of the above projects relate to the Feasibility Report: Phase 1 Emergency Water Supply to Ramaphosa Settlement, Skombaren and 2 Megalitre reservoir at Hilltop. Phase 2 Dannhauser Regional Water Supply Scheme (2018).

(Table 66: Capital Infrastructure Projects 2018/19 – Newcastle Local Municipality)

- ✓ Pipe replacement and upgrade projects;
- ✓ Madadeni WWTP;
- ✓ Blaauwbosch Bulk Water Project;
- ✓ Ngagane Bulk Water Supply Project;
- ✓ Upgrade of Ngagane WWTP Phase 1;

- 
- ✓ Newcastle Non-Revenue Water Reduction;
  - ✓ Newcastle East Water Supply Extension All.

## 8. SYNOPSIS OF EXISTING AND COMMITTED SCHEMES

A gap analysis has been undertaken for the water schemes in the NLM. The gap analysis considered current planning interventions by the WSA. The gap analysis further includes the Amajuba DM as WSA and because there are water supply schemes using the Ntshingwayo Dam and Ngagane WTP, in the NLM.

Note however, that due to COVID19, municipal funds for domestic water and sanitation infrastructure, for 2019/2020 and 2020/2021 may be redirected to meet emergency water supply to all types of consumers, including health and education facilities.

### 8.1.1 Charlestown WSS

The Charlestown WSS only includes the town of Charlestown, previously supplied from the Greater Volksrust WSS, but now supplied from production boreholes and the water treated at a package plant.

There are no further projects or planning for the Charlestown area by the NLM.

The planning conducted under the UAP Phase III study made provision for meeting the water requirements up to 2050. The projected water requirements for this area are 1.65Mℓ/d.

The existing Charlestown WTP design capacity exceeds the 2050 water demand of Charlestown. However, the required raw water supply would need to be supplemented by further production boreholes. An option exists to apply to the DWS for a licence to abstract some of the required water from the nearby Buffalo River (just beyond the convergence of the Slang and the Buffalo) which borders the eastern portion of Charlestown. This would assist with assurance of supply in the Charlestown area. It is recommended that Newcastle make such an application (WULA) in this regard to DWS as soon as possible. "However, it is likely that the approval would only be granted after a full review of the historic water use licences and allocations of the Buffalo system is completed" (Umgeni Water, 2020).

There are two potable water storage tanks (2x260kℓ) at the package plant, providing water the command reservoir site consisting of two elevated steel tanks (40kℓ and 380kℓ), and one steel tank at ground level (500kℓ).

The existing and planned infrastructure capacity is compared with the projected 2050 demand. This comparison is provided in Table 8-1.

**Table 8-1: Charlestown Gap Analysis**

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	2		2	2	
Storage (Mℓ)	1.44		1.44	3.4	1.96

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Bulk conveyance - Raw Water (Mℓ/d)					
Bulk conveyance - Clear Water (Mℓ/d)	1.70		1.70	2.04	0.34

Based on the capacities of existing and planned infrastructure, there are gaps within the water supply requirements for the projected 2050 demand and the capacity the bulk pipelines and secondary and tertiary reservoirs would need to be increased to meet the demand of 2050.

### 8.1.2 Newcastle, Madadeni and Osizweni WSS

The Newcastle, Madadeni and Osizweni WSS includes the towns of Newcastle, Madadeni and Osizweni as well as an industrial area, which are served with treated water from the Ngagane WTP. Uthukela Water operates the bulk infrastructure on behalf of the NLM.

The NLM commissioned an infrastructure master plan, but due to funding constraints, has not received the deliverables from the consultant (June, 2020). There is therefore no documented planning on meeting future water requirements of consumers in the Newcastle, Madadeni and Osizweni WSS. There are currently high levels of Non-Revenue Water, which also need to be addressed.

The planning conducted under the UAP Phase III study made provision for meeting the water requirements up to 2050. The projected water requirements for this area are 166.73Mℓ/d. The water demands from industrial areas may need to be investigated further.

The existing and planned infrastructure capacity is compared with the projected 2050 demand. This comparison is provided in Table 8-2.

**Table 8-2: Newcastle, Madadeni and Osizweni WSS Gap Analysis**

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	130		130	170	40
Storage (Mℓ)	148		148	333.40	185.4
Bulk conveyance - Raw Water (Mℓ/d)	106.33		106.33	127.60	21.27
Bulk conveyance - Clear Water (Mℓ/d)	1 002.99		1 002.99	1203.59	200.6

Based on the capacities of existing and planned infrastructure, there are gaps within the water supply requirements for the projected 2050 demand and the capacity of the existing WTP, the bulk pipelines and reservoirs would need to be increased to meet the demand of 2050.

### 8.1.3 Dannhauser Buffalo Flats WSS and Hilltop

Water supply to the Buffalo Flats area is currently provided from the Ngagane WTP and groundwater in the form of production boreholes.

The area of Buffalo Flats is included in the ADM's Feasibility Report: Phase 1 Emergency Water Supply to Ramaphosa Settlement, Skombaren and 2 Megalitre reservoir at Hilltop. Phase 2 Dannhauser Regional Water Supply Scheme (2018). Phase 1's planning horizon is for 5-10 years and estimated the water requirements for Buffalo Flats and Hilltop as 11.93Mℓ/d.

The 2018 Feasibility report indicated that water supply to the Buffalo Flats area from the Ngagane WTP does not meet the demand. Furthermore, that the ADM has embarked on upgrading of the water supply service levels to yard connections, which increase the water consumption. The proposed Phase 2 from this report, will be able to augment water supply to Buffalo Flats, when the proposed new 20Mℓ/d WTP at the Ntshingwayo Dam is constructed along with the supporting infrastructure to become the Dannhauser Regional Water Supply Scheme. However, the DWS did not approve the business plan (Umgeni Water, 2020).

The planning conducted under the UAP Phase III study made provision for meeting the water requirements up to 2050. The projected water requirements for the Buffalo Flats area are 23.23Mℓ/d and for the Hilltop area as 2.42Mℓ/d.

The existing and planned infrastructure capacity is compared with the projected 2050 demand. This comparison is provided in Table 8-1.

**Table 8-3: Dannhauser Buffalo Flats WSS and Hilltop Gap Analysis**

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
<b>Water Treatment (Mℓ/d) – Ngagane WTP</b>	130		130	170	40 Note that this is mainly for the Newcastle, Madadeni and Osizweni WSS
<b>Water Treatment (Mℓ/d) – Durnacol WTP*</b>	5	15	20	20	15 (based on the ADM's planning)
<b>Storage (Mℓ)</b>					16 (Buffalo Flats) 6.3 (Hilltop)
<b>Bulk conveyance - Raw Water (Mℓ/d)</b>					
<b>Bulk conveyance - Clear Water (Mℓ/d)</b>	368.7 (Buffalo Flats) 59.30 (Hilltop)		368.7 (Buffalo Flats) 59.30 (Hilltop)	442.44 (Buffalo Flats) 73.8 (Hilltop)	73.74 (Buffalo Flats) 14.5 (Hilltop)

\* However, the DWS did not approve the business plan (Umgeni Water, 2020).

---

Based on the capacities of existing and planned infrastructure, there are gaps within the water supply requirements for the projected 2050 demand and the capacity of the existing WTP, the bulk pipelines and reservoirs would need to be increased to meet the demand of 2050.

## 9. PROPOSED BULK WATER SUPPLY INTERVENTIONS

### 9.1 UAP PHASE III WATER SUPPLY INTERVENTIONS

This section details the water supply reconciliation options for bulk water services within the uThukela DM – considering existing use and future supplies and water sources, per scheme area. It must be noted that the Water Supply Intervention Areas (WSIAs) were demarcated based on all the existing planning initiatives that are currently underway within the WSA. However, the demand model that was proposed to be used within this project will be used to determine the proposed bulk infrastructure requirements and would be sized accordingly to meet the demand of 2050. An overview of the proposed Total Bulk Water Supply Intervention Areas is illustrated in Figure 9-1.

The details of the each WSIA split between existing upgrade and future additional requirements are provided per WSIA within the paragraphs hereafter.

For the Newcastle LM as WSA, the applicable larger and urban WSIAs for UAP Phase II is:

- ✓ AMA012 Newcastle Madadeni Osizweni WSS; and
- ✓ AMA011b Charlestown Supply Area.

Also to consider:

- ✓ AMA014 Ngagane/Dannhauser 1 WSS Buffalo Flats.

The Ngagane/Dannhauser 1 WSS Buffalo Flats is fully described in the Amajuba DM UAP Phase III report. It is listed here as there is still an envisaged allocation of 20Ml/day by 2050 for this scheme, from the Ngagane WTP.

The 2020 WSIA proposed interventions for the NLM is briefly discussed in the following sub-sections.

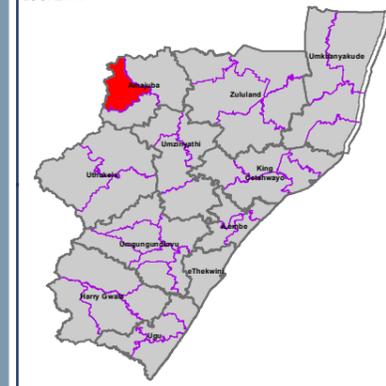
**Proposed New / Upgrade Infrastructure**

- |  |  |
|--|--|
| <b>Hlabisa</b> Water Scheme Areas & Names  | Upgrade of WTP / New                     |
| Existing Water Treatment Plants            | Surface Water Abstraction Works (Future) |
| Surface Water Abstraction Works (Existing) | Primary Bulk Pipelines (Future)          |
| Primary Bulk Pipelines (Existing)          | Secondary Bulk Pipelines (Future)        |
| Secondary Bulk Pipelines (Existing)        | Tertiary Bulk Pipelines (Future)         |
| Tertiary Bulk Pipelines (Existing)         | Primary Command Reservoirs (Future)      |
| Primary Reservoirs (Existing)              | Secondary Reservoirs (Future)            |
| Secondary Reservoirs (Existing)            | Tertiary Reservoirs (Future)             |
| Tertiary Reservoirs (Existing)             | Pump Stations (Future)                   |
| Pump Stations (Existing)                   |  |

**Legend**

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Farm Land & Conservation Areas
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns

LOCALITY:



CLIENT:



DISTRICT MUNICIPALITY:



NEWCASTLE LOCAL MUNICIPALITY

CONSULTANTS:

Project No.: 27814



Mariswe  
PO Box 25549, Monument Park  
Pretoria, 0105



Tel: + 27 (0) 12 424 9700  
Fax: + 27 (0) 12 460 4071  
Email: pretoria@mariswe.com

PROJECT TITLE

**Universal Access Plan Phase III -  
Progressive Development of a  
Regional Concept Secondary  
Bulk Water Master Plan**

MAP TITLE:

**Total Bulk Water Supply Interventions  
Newcastle Local Municipality**

DATE COMPLETED:

2020/11/26

MAP NO.:

**KZN252: Figure 9.1**



## 9.2 AMA012 NEWCASTLE MADADENI OSIZWENI WSS

### 9.2.1 Water Demand

The water demand for the Newcastle Madadeni Osizweni WSS was determined for 2020 and 2050 and included within Table 9-1. This scheme is served from the Ngagane WTP in the Newcastle LM, operated by Uthukela Water.

**Table 9-1: Population and Water demand (Mℓ/day) 2020 and 2050**

Population	Population 2020	Population 2050
		419 408
Water Demand	Demand 2020	Demand 2050
		114.01

### 9.2.2 Water Resource Consideration

The Newcastle Madadeni Osizweni WSS area is supplied from the Ngagane WTP. Water is supplied from the Ntshingwayo Dam (92Mℓ/d supplied, 110Mℓ/d licensed allocation), Ngagane River (18Mℓ/d supplied, 30Mℓ/d allocation) and Buffalo River (unreliable supply during winter months: allocation of 30Mℓ/d with system capacity of up to 25Mℓ/d, dependent on the level of the river), then treated at the Ngagane WTP (130Mℓ/d design capacity).

A detailed study needs to be conducted to confirm the available yield from the Ntshingwayo Dam, Ngagane River and Buffalo River to meet the 2050 water requirements.

A cost provision is made for the detailed feasibility study, design and construction of the proposed Ncandu Dam of R1.0075billion.

### 9.2.3 Water Supply Infrastructure

The following infrastructure upgrades and augmentation will be required in order to adequately supply the Newcastle Madadeni Osizweni WSS and are illustrated within Figure 9-2 overleaf followed by the schematic layout of the WSIA within Figure 9-3.

- ✓ It is proposed to upgrade the Ngagane WTP from 130Mℓ/day to 170Mℓ/day to meet the demands of 2050.
- ✓ The existing secondary bulk mains should be extended to include 26 bulk pipes ranging in diameter of between 110 and 1 016mm and a total length of 168.85km. Furthermore to include seven tertiary bulk pipes ranging in diameter of 250-500mm and total length of 17.16km.
- ✓ The existing storage should be increased by 22 secondary reservoirs, having a total storage capacity of 333 400kl.

It is anticipated that about 20Mℓ/day will be allocated to the Buffalo Flats area in the Amajuba DM to augment supply from the Durnacol WTP and meet this area's 2050 water requirements.

Design details of all the infrastructure components are provided within Annexure B.

#### 9.2.4 Financial Requirements

The bulk cost requirement for the Newcastle Madadeni Osizweni WSS is provided within Table 9-2 below.

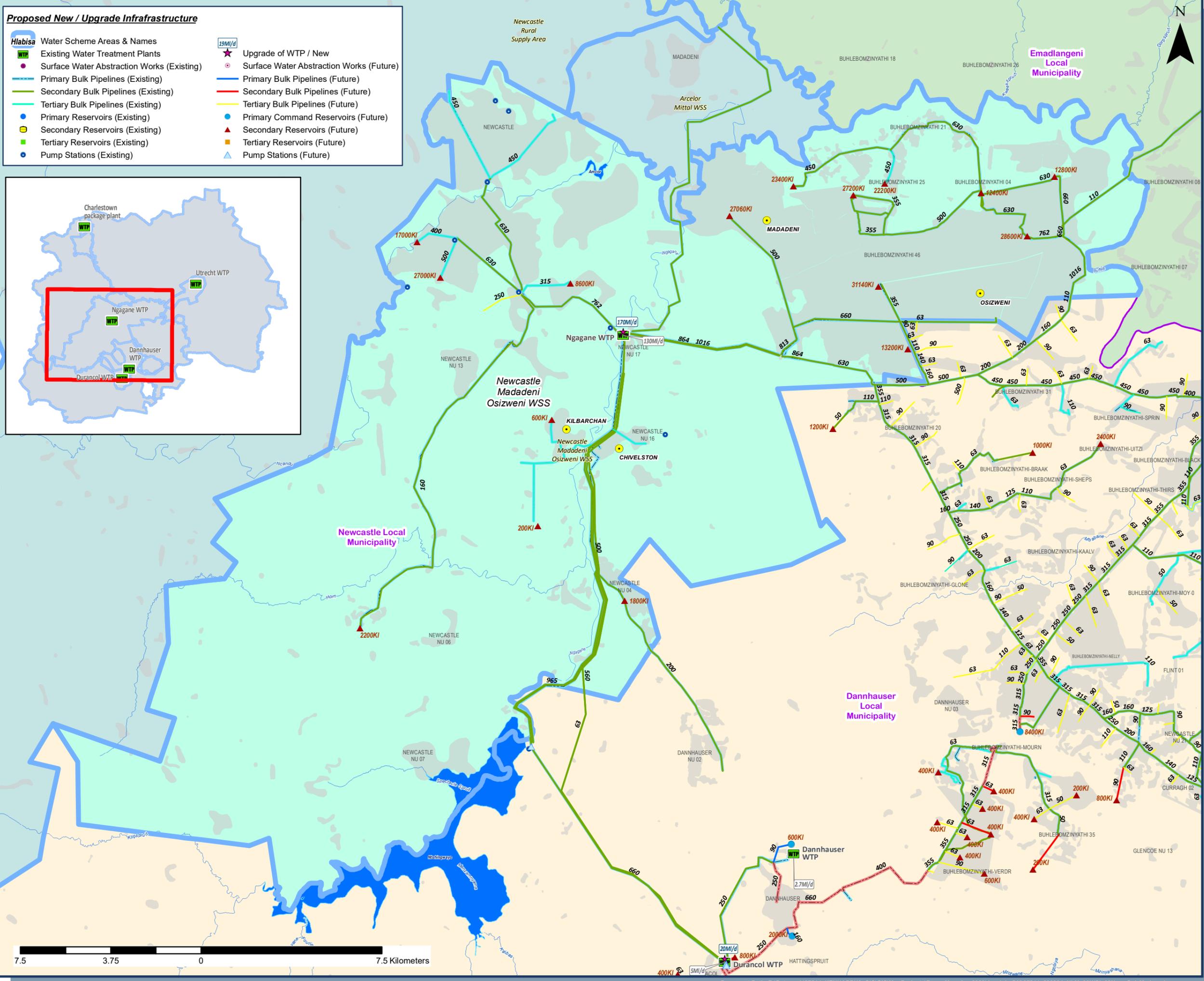
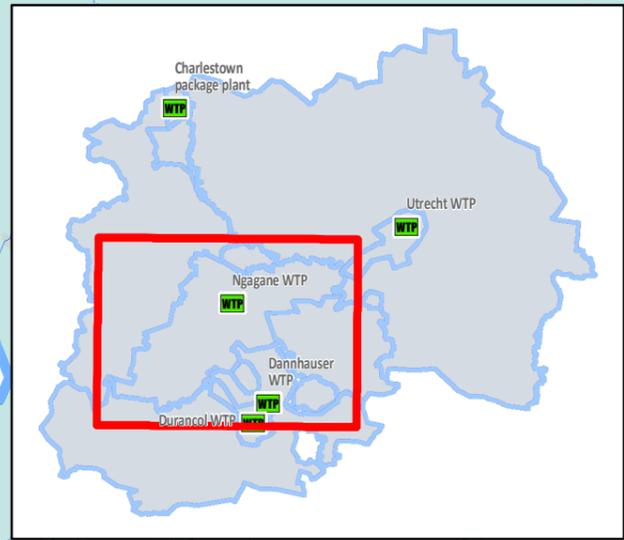
**Table 9-2: Cost Requirement**

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
<b>Primary</b>	1 122 340 000	R112 234 000	R1 234 574 000
<b>Secondary</b>	2 413 088 948	R241 308 895	R2 654 397 842
<b>Tertiary</b>	R79 506 000	R7 950 600	R87 456 600
<b>Total</b>	<b>R3 614 934 948</b>	<b>R361 493 495</b>	<b>R3 976 428 442</b>

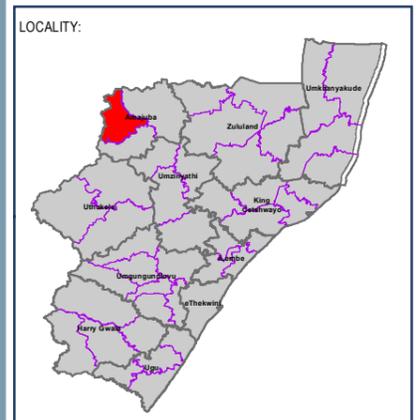
The total bulk cost requirement is R3.976 billion (excl VAT). The scheme development cost per household is approximately R34 476.

**Proposed New / Upgrade Infrastructure**

- |  |  |
|--|--|
| <b>Hlabisa</b> Water Scheme Areas & Names    | 19M/d Upgrade of WTP / New               |
| WTP Existing Water Treatment Plants          | Surface Water Abstraction Works (Future) |
| ● Surface Water Abstraction Works (Existing) | Primary Bulk Pipelines (Future)          |
| — Primary Bulk Pipelines (Existing)          | Secondary Bulk Pipelines (Future)        |
| — Secondary Bulk Pipelines (Existing)        | Tertiary Bulk Pipelines (Future)         |
| — Tertiary Bulk Pipelines (Existing)         | Primary Command Reservoirs (Future)      |
| ● Primary Reservoirs (Existing)              | Secondary Reservoirs (Future)            |
| ● Secondary Reservoirs (Existing)            | Tertiary Reservoirs (Future)             |
| ● Tertiary Reservoirs (Existing)             | ▲ Pump Stations (Future)                 |
| ● Pump Stations (Existing)                   |  |



- Legend**
- Provincial Boundaries
  - District Municipality Boundaries
  - Local Municipality Boundaries
  - Farm Land & Conservation Areas
  - Dams & Dam Names
  - Rivers
  - Settlements
  - Major Towns



CLIENT:

DISTRICT MUNICIPALITY:

NEWCASTLE LOCAL MUNICIPALITY

CONSULTANTS:

Project No.: 27814

Mariswe  
PO Box 25549, Monument Park  
Pretoria, 0105

Tel: + 27 (0) 12 424 9700  
Fax: + 27 (0) 12 460 4071  
Email: pretoria@mariswe.com

PROJECT TITLE

**Universal Access Plan Phase III -  
Progressive Development of a  
Regional Concept Secondary  
Bulk Water Master Plan**

MAP TITLE:

**Total Bulk Water Supply  
Interventions -  
Newcastle Madadeni Osizweni WSS  
Newcastle Local Municipality**

DATE COMPLETED:

2020/11/26

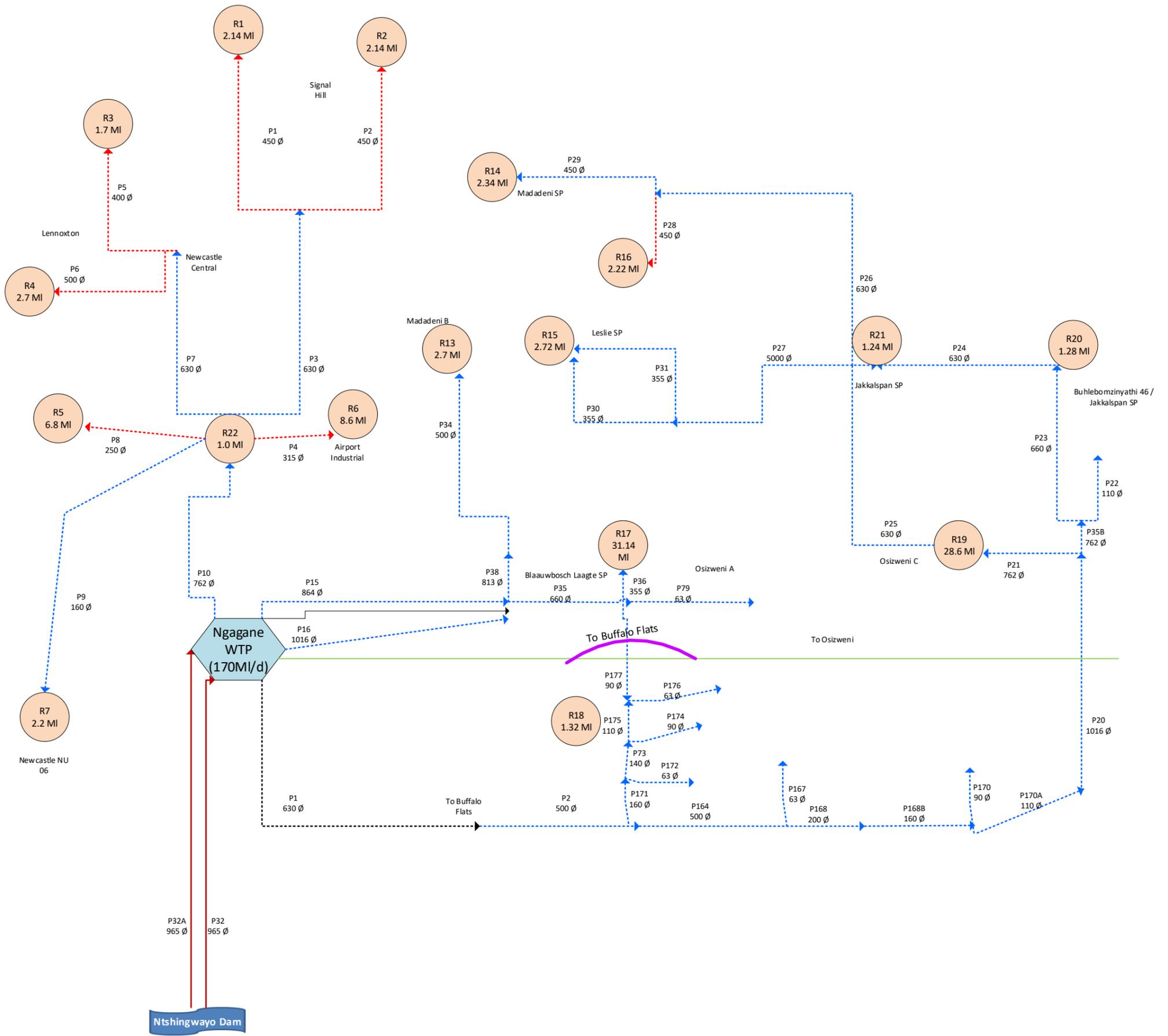
MAP NO.:

KZN252: Figure 9.2



**Figure 9-3**

**WSIA: AMA012 Newcastle Madadeni Osizweni WSS**



**LEGEND**

- Raw Water
- Clarified Water
- Existing Primary Bulk
- Existing Secondary Bulk
- Existing Tertiary Bulk
- Future Primary Bulk
- Future Secondary Bulk
- Future Tertiary Bulk

**Treated Water**

- Res 23 0.4MI Existing Reservoir
- Res 24 0.92MI Future Reservoir

**All diameters in mm**  
**All flows in MI/day**

### 9.3 AMA011B CHARLESTOWN SUPPLY AREA

#### 9.3.1 Water Demand

The water demand for the Charlestown Supply Area was determined for 2020 and 2050 and included within Table 9-3.

**Table 9-3: Population and Water demand (Mℓ/day) 2020 and 2050**

Population	Population 2020	Population 2050
		5 249
Water Demand	Demand 2020	Demand 2050
		1.09

#### 9.3.2 Water Resource Consideration

Charlestown is currently supplied from production boreholes, where the water is then treated at a package plant to potable standards. It is planned that the future source will be the Slang River, a tributary of the Buffalo River.

A detailed study needs to be conducted to confirm the available yield from the Ntshingwayo Dam, Ngagane River and Buffalo River to meet the 2050 water requirements.

#### 9.3.3 Water Supply Infrastructure

The following infrastructure upgrades and augmentation will be required in order to adequately supply the Charlestown area and are illustrated within Figure 9-4 overleaf followed by the schematic layout of the WSIA within Figure 9-5.

- ✓ There are no upgrades required of the package plant to meet the demands of 2050.
- ✓ The existing secondary bulk pipe to be extended to include one pipe of a diameter of 200mm and a total length of 3.7km.
- ✓ The existing storage should be increased by one primary reservoir, having a total storage capacity of 3 400kl.
- ✓ There is a requirement for two pump stations, totalling 53.4kW to ensure conveyance of water to all the supply areas.

Design details of all the infrastructure components are provided within Annexure B.

### 9.3.4 Financial Requirements

The bulk cost requirement for the Charlestown area is provided within Table 9-4 below.

**Table 9-4: Cost Requirement**

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
<b>Primary</b>	R29 217 000	R2 921 700	R32 138 700
<b>Secondary</b>	R3 535 000	R353 500	R3 888 500
<b>Tertiary</b>	R0	R0	R0
<b>Total</b>	<b>R32 752 000</b>	<b>R3 275 200</b>	<b>R36 027 200</b>

The total bulk cost requirement is R36.03million (excl VAT). The scheme development cost per household is approximately R24 959.

Gert Sibande

Dr Pixley Ka  
Isaka Seme Local  
Municipality

Emadlangeni  
Local  
Municipality

Newcastle Local  
Municipality

Newcastle  
Rural  
Supply Area

Charlestown  
Supply Area

Charlestown  
Supply Area

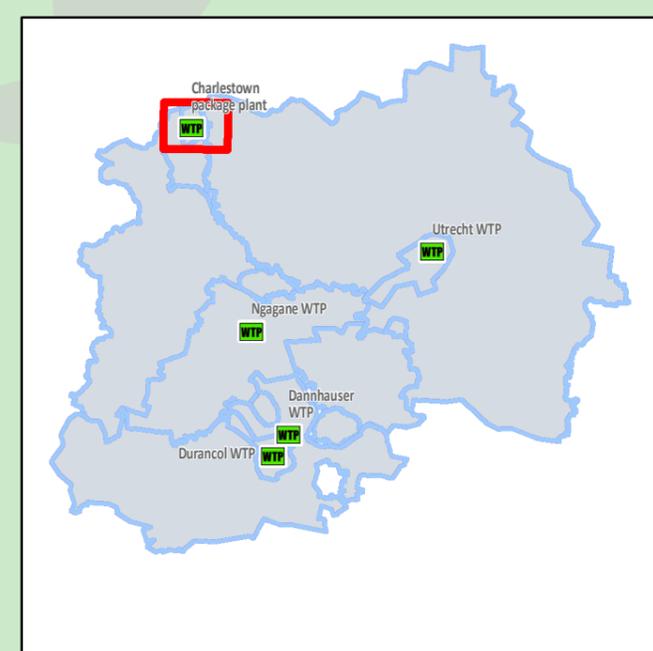
CHARLESTOWN  
3400KI

CHARLESTOWN 01

BUHLEBOMZINYATHI 27

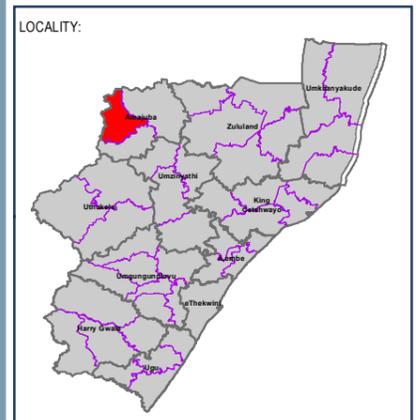
Amajuba  
Forest WSS

NEWCASTLE  
NU 11



**Legend**

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Farm Land & Conservation Areas
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns



CLIENT:

DISTRICT MUNICIPALITY:

NEWCASTLE LOCAL MUNICIPALITY

CONSULTANTS:

Project No.: 27814

Mariswe  
PO Box 25549, Monument Park  
Pretoria, 0105

Tel: + 27 (0) 12 424 9700  
Fax: + 27 (0) 12 460 4071  
Email: pretoria@mariswe.com

PROJECT TITLE

**Universal Access Plan Phase III -  
Progressive Development of a  
Regional Concept Secondary  
Bulk Water Master Plan**

MAP TITLE:

**Total Bulk Water Supply  
Interventions -  
Charlestown Supply Area  
Newcastle Local Municipality**

DATE COMPLETED:

2020/11/26

MAP NO.:

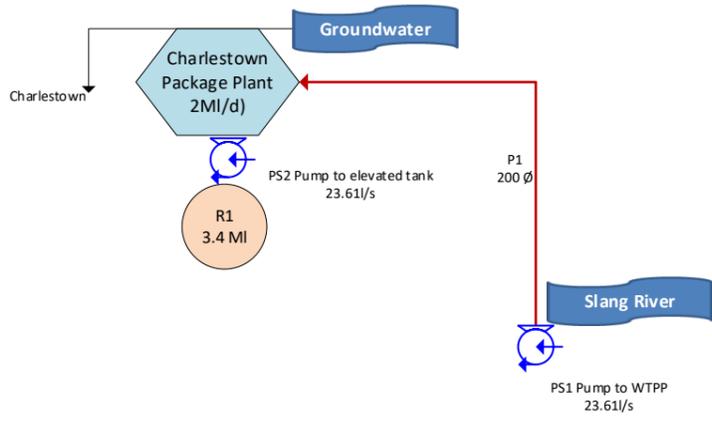
KZN252: Figure 9.4

**Proposed New / Upgrade Infrastructure**

Water Scheme Areas & Names	Existing Water Treatment Plants	Upgrade of WTP / New
Surface Water Abstraction Works (Existing)	Surface Water Abstraction Works (Future)	Primary Bulk Pipelines (Future)
Primary Bulk Pipelines (Existing)	Secondary Bulk Pipelines (Future)	Tertiary Bulk Pipelines (Future)
Secondary Bulk Pipelines (Existing)	Primary Reservoirs (Existing)	Primary Command Reservoirs (Future)
Tertiary Bulk Pipelines (Existing)	Secondary Reservoirs (Existing)	Secondary Reservoirs (Future)
Primary Reservoirs (Existing)	Tertiary Reservoirs (Existing)	Tertiary Reservoirs (Future)
Secondary Reservoirs (Existing)	Pump Stations (Existing)	Pump Stations (Future)
Tertiary Reservoirs (Existing)		
Pump Stations (Existing)		



**Figure 9-5**  
**WSIA: AMA011b Charlestown Supply Area**



**LEGEND**

- Raw Water
- Clarified Water
- Treated Water**
  - Existing Primary Bulk
  - Existing Secondary Bulk
  - Existing Tertiary Bulk
  - Future Primary Bulk
  - Future Secondary Bulk
  - Future Tertiary Bulk
- Existing Reservoir
- Future Reservoir

**All diameters in mm**  
**All flows in MI/day**

---

#### 9.4 AMA013 NEWCASTLE RURAL SUPPLY AREAS

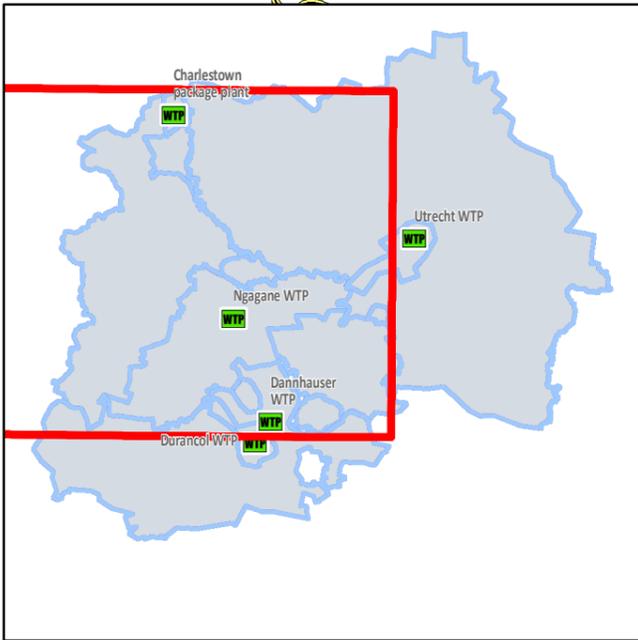
---

Most of the areas in the Newcastle Rural Supply area, illustrated in Figure 9-6, make use of groundwater sources such as springs and boreholes for supply. The NLM does provide water tankering services where needed.

Under the UAP Phase III study, the estimated water requirements for this area (1 029km<sup>2</sup>), under the 2050 planning horizon is 2.17Mℓ/d and the projected population 10 964.

To consider supplying all households with groundwater-sourced supply, would require an estimated R75 214 596 (ex VAT). It is further proposed to review and update the groundwater hydrology to verify the water resource availability to meet the water requirements for the rural areas in the Newcastle LM (1 030km<sup>2</sup>) for the 2050 planning horizon. A cost allocation of R5million (excluding VAT) is provided for this study.

A total cost of R80 214 596 excluding VAT is allocated this supply area.



Dr Pixley Ka Isaka Seme Local Municipality

Thabo Mofutsanyane

Phumelela Local Municipality

Emadlangeni Local Municipality

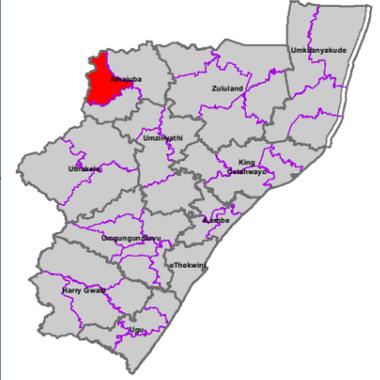
Newcastle Local Municipality

Dannhauser Local Municipality

**Legend**

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Farm Land & Conservation Areas
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns

LOCALITY:



CLIENT:



DISTRICT MUNICIPALITY:



NEWCASTLE LOCAL MUNICIPALITY

CONSULTANTS:



Project No.: 27814  
 Mariswe  
 PO Box 25549, Monument Park  
 Pretoria, 0105  
 Tel: + 27 (0) 12 424 9700  
 Fax: + 27 (0) 12 460 4071  
 Email: pretoria@mariswe.com

PROJECT TITLE

**Universal Access Plan Phase III -  
 Progressive Development of a  
 Regional Concept Secondary  
 Bulk Water Master Plan**

MAP TITLE:

**Total Bulk Water Supply  
 Interventions -  
 Newcastle Rural Supply Area  
 Newcastle Local Municipality**

DATE COMPLETED:

2020/11/26

MAP NO.:

KZN252: Figure 9.6



## 10. CONCLUSIONS

### 10.1 TOTAL WATER DEMAND PER SUPPLY AREA

The total water demand per WSIA is detailed within Table 10-1 below.

All WSIA's in the ADM is listed for reference as there are shared schemes, utilising the Ntshingwayo Dam, in the Newcastle LM. Some schemes, such as Charlestown Supply Area, is urban, but has a water demand of less than 2Mℓ/d.

**Table 10-1: Total Water Demand (Mℓ/d) 2050 per WSIA**

Water Supply Scheme / WSIA		Population 2020	Water Requirements (Mℓ/d)						
			2020	2025	2030	2035	2040	2045	2050
AMA011b	Charlestown Supply Area	5 249	0.92	0.93	1.05	1.06	1.21	1.22	1.39
AMA012	Newcastle Madadeni Osizweni WSS	419 408	114.01	114.04	128.39	129.12	146.28	147.14	166.73
AMA013	Newcastle Rural Supply Area	7 898	1.35	1.50	1.66	1.77	1.89	2.03	2.17
<b>Newcastle LM</b>		<b>432 555</b>	<b>116.28</b>	<b>116.47</b>	<b>131.10</b>	<b>131.95</b>	<b>149.38</b>	<b>150.39</b>	<b>170.29</b>
AMA003	Skombaren Ngagane WTP WSS	4 381	0.92	0.93	1.05	1.06	1.21	1.22	1.39
AMA004 and AMA008	Dannhauser WSS	6 489	2.12	2.10	2.36	2.36	2.67	2.68	3.03
	Durnacol WSS	3 866	1.38	1.37	1.54	1.54	1.74	1.74	1.96
AMA005 and AMA014	Dannhauser 3 WSS Hilltop	9 983	1.59	1.59	1.81	1.83	2.09	2.12	2.42
	Ngagane/Dannhauser 1 WSS Buffalo Flats	90 657	15.83	16.01	18.24	18.44	21.01	21.26	24.23
AMA016	Utrecht/Ngagane WSS	8 464	2.33	2.32	2.61	2.62	2.97	2.98	3.38
Amajuba DM		<b>123 841</b>	<b>24.16</b>	<b>24.34</b>	<b>27.59</b>	<b>27.85</b>	<b>31.68</b>	<b>32.00</b>	<b>36.40</b>
<b>TOTAL</b>		<b>556 396</b>	<b>140.44</b>	<b>140.81</b>	<b>158.69</b>	<b>159.80</b>	<b>181.06</b>	<b>182.39</b>	<b>206.69</b>

Source: Water Demand Model, UAP Phase III, 2020

The WSIA's in the ADM are also listed as most (except Utrecht/Ngagane WSS when its supplied from its local sources), are supplied from the Ntshingwayo Dam in the NLM.

The Newcastle Madadeni Osizweni WSS/WSIA has the highest water demands for 2020 and until 2050, totalling 114 Mℓ/day in 2020 and 167Mℓ/day in 2050.

Even though the Charlestown Supply Area has a water requirement of less than 2Mℓ/day, it is listed here as it is a developed area.

---

Costing for serving the 2050 water requirements are only provided for the Newcastle Madadeni Osizweni WSS/WSIA. Refer to the UAP Phase III report for the Amajuba DM to see further costing details for schemes that fall within the ADM's area of jurisdiction as WSA.

## 10.2 TOTAL WATER RESOURCES REQUIRED VS PROPOSED WATER SUPPLY INTERVENTIONS (WSI)

The total volume of water required for the proposed water supply interventions is tabled within Table 10-2:

**Table 10-2: Water Resources Required vs proposed WSI**

WSIA	WSIA Name	Population (2050)	2050 Demand (Mℓ/day)	2050 Demand (Mm <sup>3</sup> /a)	[A] Existing Resources (Mm <sup>3</sup> /a)*	[B] Proposed Additional Demand under UAP Phase III (Mm <sup>3</sup> /a)	[A+B] Total Demand (Mm <sup>3</sup> /a)	Balance (Mm <sup>3</sup> /a)
AMA011b	Charlestown Supply Area	7 287	1.65	0.60				
AMA012	Newcastle Madadeni Osizweni WSS	582 248	166.73	60.86	170	19.24	189.24	
<b>Newcastle LM</b>		589 534	168.38	61.46	170			
AMA003	Skombaren Ngagane WTP WSS	6 082	1.39	0.51	170	0.17	170.17	
AMA004 and AMA008	Dannhauser WSS	9 009	3.03	1.10		0.33		
	Durnacol WSS	5 367	1.96	0.72		0.21		
<b>Total: AMA004 and AMA008</b>		14 376	4.99	1.82	170	0.54	170.54	
AMA005 and AMA014	Dannhauser 3 WSS Hilltop	13 860	2.42	0.88		0.31		
	Ngagane/Dannhauser 1 WSS Buffalo Flats	125 856	24.23	8.84		3.07		
<b>Total: AMA005 and AMA014</b>		139 715	26.65	9.73	170	3.37	173.37	
AMA016	Utrecht/Ngagane WSS	11 750	3.38	1.23	1.1**	0.38	1.48	
<b>TOTAL</b>		171 923	36.40	13.29		4.47		

\* The licensed allocation to the Ngagane WTP from its three water sources totals 170Mℓ/day (62.05Mm<sup>3</sup>/a).

\*\* The full supply capacity of the Dorps dam is 1.1Mm<sup>3</sup>, but the historic firm yield for both the Dorps and Nywerheids dams is not known.

The groundwater availability in the Buffalo Flats area and Charlestown Supply Area is unknown.

---

### 10.3 SUMMARY OF TOTAL BULK WATER INFRASTRUCTURE REQUIREMENTS PER WSIA

---

A summary of the total bulk water infrastructure requirements per proposed WSIA is provided within the tables and pages hereafter.

### 10.3.1 AMA011b Charlestown Supply Area

Table 10-3: WSIA Summary for AMA011b Charlestown Supply Area

Charlestown Supply Area							
Item	Description						
1	Population	Scheme Name	Scheme No	Population 2020	Population 2050		
		Charlestown Supply Area	AMA011b	5 249	7 287		
2	Demand	Scheme Name	Scheme No	Demand 2020	Demand 2050		
		Charlestown Supply Area	AMA011b	1.09	1.65		
3	Water Resource	Dam		HFY (Mm <sup>3</sup> /a)	HFY (Mℓ/day)	Comments	
		River	Slang River			Yield unknown	
		Groundwater	Borehole				
4	Infrastructure			Class	Size / No	Capacity (Mℓ/day or kl or km or Kw)	
4.1	Existing	WTP	Charlestown WTP	Primary Bulk		2	
		Bulk Pipelines	Upvc, Steel, HDPE, AC	Primary Bulk		0	0
				Secondary Bulk		0	0
				Tertiary Bulk		0	0
		Reservoirs	Command Reservoir	Primary Bulk			
				Secondary Bulk			
Tertiary Bulk							
Pump stations		Primary Bulk					
4.2	Future	Bulk Pipelines		Primary Bulk		0	
				Secondary Bulk	200 ømm	3.73	
				Tertiary Bulk		0	
		WTP		Primary Bulk			
				Secondary Bulk			
		Reservoirs	Command Reservoir	Primary Bulk	1		3400
			Command Reservoir	Secondary Bulk			

		Supply Reservoirs	Tertiary Bulk		1000
		Pump stations	Primary Bulk	2	53.73
5	Cost Requirement	<b>Capital Cost</b>	<b>10% Contingencies</b>	<b>Total Cost (Excl VAT)</b>	
		Primary	R29 217 000	R2 921 700	R32 138 700
		Secondary	R3 535 000	R353 500	R3 888 500
		Tertiary	R0	R0	R0
		<b>Total</b>	<b>R32 752 000</b>	<b>R3 275 200</b>	<b>R36 027 200</b>

### 10.3.2 AMA012 Newcastle Madadeni Osizweni WSS

Table 10-4: WSIA Summary for AMA012 Newcastle Madadeni Osizweni WSS

Newcastle Madadeni Osizweni WSS						
Item	Description					
1	Population	Scheme Name	Scheme No	Population 2020	Population 2050	
		Newcastle Madadeni Osizweni WSS	AMA012	419 408	582 248	
2	Demand	Scheme Name	Scheme No	Demand 2020	Demand 2050	
		Newcastle Madadeni Osizweni WSS	AMA012	114.01	166.73	
					<b>Comments</b>	
3	Water Resource	Dam	Ntshingwayo Dam	FSC: 211.258Mm <sup>3</sup> . HFY: 100% - 75Mm <sup>3</sup> /a 80% - 68Mm <sup>3</sup> /a 60% - 60Mm <sup>3</sup> /a 40% - 52Mm <sup>3</sup> /a 20% - 38Mm <sup>3</sup> /a	Available reserve yield of 21Mm <sup>3</sup> /a . DWS 2013: Short-term stochastic yields (May Decision) at various dam level %'s.	
		Water Resource Development			Detailed feasibility and construction estimate of proposed Ncandu Dam, R1billion. Detailed Feasibility into proposed Dam on Ngogo River, R7.5million.	
4	Infrastructure			Class	Size / No	Capacity (Ml/d or kl or km or Kw)
4.1	Existing	WTP	Ngagane WTP	Primary Bulk		130
		Bulk Pipelines	Upvc, Steel, HDPE, AC	Primary Bulk		0
				Secondary Bulk	110 – 1016 ømm	167.11
				Tertiary Bulk	315 – 500 ømm	15.42
		Reservoirs	Command Reservoir	Primary Bulk		
Secondary Bulk				6	78 000	

			Supply Reservoirs	Tertiary Bulk		
		Pump stations		Primary Bulk		
4.2	Future	Bulk Pipelines		Primary Bulk	0	0
				Secondary Bulk	250 ømm	1.74
				Tertiary Bulk	0	0
		WTP		Primary Bulk		
				Secondary Bulk		
		Reservoirs	Command Reservoir	Primary Bulk		
			Command Reservoir	Secondary Bulk	16	255 400
			Supply Reservoirs	Tertiary Bulk		
Pump stations		Primary Bulk				
5	Cost Requirement		<b>Capital Cost</b>	<b>10% Contingencies</b>	<b>Total Cost (Excl VAT)</b>	
		Primary	R1 122 340 000	R112 234 000	R1 234 574 000	
		Secondary	R2 413 088 948	R241 308 895	R2 654 397 842	
		Tertiary	R79 506 000	R7 950 600	R87 456 600	
		<b>Total</b>	<b>R3 614 934 948</b>	<b>R361 493 495</b>	<b>R3 976 428 442</b>	

## 10.4 FINANCIAL REQUIREMENTS

The financial requirements for the provision of bulk infrastructure per WSIA based on the demand model intervention by 2050 is summarised in the table below.

**Table 10-5: Financial Requirements based on Demand Model Interventions**

WSIA	WSIA Name	Total Cost Requirement				
		Primary	Secondary	Tertiary	10% Contingencies	Total Cost (Excl VAT)
AMA011b	Charlestown Supply Area	R29 217 000	R3 535 000	R0	R3 275 200	R36 027 200
AMA012	Newcastle Madadeni Osizweni WSS	R1 122 340 000	R2 413 088 948	R79 506 000	R361 493 495	R3 976 428 442
AMA013	Newcastle Rural Supply Area					R80 214 596
<b>Total</b>		<b>R1 151 557 000</b>	<b>R2 416 623 948</b>	<b>R79 506 000</b>	<b>R364 768 695</b>	<b>R4 092 670 238</b>

Source: Water Demand Model, UAP Phase III, 2020

A total estimate of approximately R4.09 billion is required to address the bulk water supply requirement by 2050.

## 10.5 FUNDING OPTIONS

The NLM relies mainly on grant funding programmes to fund their bulk water supply projects. These funding programmes are mainly MIG and WSIG. Based on all the current funding streams available to the District Municipality over the MTEF period, it will take a minimum of 15 years for the WSA to address their water supply requirements. Another funding option that the NLM could consider is loan funding through the Development Bank of Southern Africa (DBSA). 78.9% of the NLM's capital expenditure is funded through grants and the remainder from internal funds (NLM IDP, 2019/2020). However, in the IDP it states that the NLM is not considering taking loans in the next three financial years (referring to 2017 reporting).

Special submissions to National Treasury could also be considered to create an awareness of the DM's planning and implementation readiness.

## 10.6 IMPLEMENTATION PROGRAMME

The implementation programme will depend on the availability of funds from National Treasury as well as the capacity of the Municipality to implement projects. The interventions Buffalo Flats and the Newcastle-Osizweni-Madadeni areas, would be an implementation priority for the ADM and Newcastle but the order would most likely be determined by the availability of funds or intervention programmes. Furthermore, implementing appropriate WC/WDM programmes would assist to delay capital investment requirements.

---

## 11. RECOMMENDATIONS

### 11.1 RESPONSIBILITIES

The provision of water services remains the responsibility of the NLM as the WSA. The NLM should ensure that they meet all the requirements to take these interventions to implementation readiness.

These planning studies are in various stages of readiness to lobby for grant funding and Umgeni Water could consider as a Regional Utility to assist the NLM to take this process further, in consultation with Uthukela Water and the Amajuba DM.

### 11.2 SELECTION OF SOLUTIONS

The proposed water supply intervention area (WSIAs) as appropriate solutions for bulk water supply development within the WSA:

- ✓ AMA012 Newcastle Madadeni Osizweni WSS;
- ✓ AMA011b Charlestown Supply Area; and
- ✓ AMA013 Newcastle Rural Supply Area.

The supply to the Ngagane/Dannhauser 1 WSS Buffalo Flats from the Ngagane WTP, is subject to the planning from the Amajuba DM as WSA.

### 11.3 PERTINENT LEGISLATION

Various Acts of Parliament make provision for existing or planned institutional structures for management of water resources and water and sanitation services. These are:

- ✓ Current Acts of Parliament: National Water, Water Services, Municipal Structures, Municipal Systems, Division of Revenue Acts; and
- ✓ Existing and proposed policy documents such as The White Paper on Water Services, the Local Government White Paper and the White Paper on Municipal Service Partnerships.

These Acts deal with the management of water resources and the provision of water services. Provision for the bodies listed below is made in these acts:

- ✓ The Catchment Management Agencies (CMA's) which will be established throughout South Africa over the next three years;
- ✓ Water User Associations comprising co-operative associations of individual water users at a restricted local level;
- ✓ National Government;
- ✓ Water Service Authorities comprising District Municipalities or Local Municipalities;
- ✓ Water Boards;
- ✓ Water Service Providers;
- ✓ Provincial Government; and
- ✓ Advisory Committees.

---

### **11.3.1 Municipal Structures Act**

---

The Municipal Structures Act (117 of 1997), which was subsequently amended by the Municipal Structure Amendment Act (33 of 2000), addresses the basis for establishing municipalities (Category A,B & C) and stipulates that Category A and C ( Metropolitan and District) municipalities are WSA's and the Category B (local) municipalities can only be WSA's if authorised by the Minister of DPLG.

### **11.3.2 Municipal Systems Act**

---

The Municipal Systems Act (32 of 2000) legislates internal systems and addresses the differences between the authority and the provider functions as well as alternative mechanisms for providing municipal services.

### **11.3.3 Water Services Act**

---

The Water Services Act (Act 108 of 1997) states that each WSA must for its area of jurisdiction, prepare a Water Services Development Plan (WSDP). Whilst the WSDP is a legal requirement, the real value in preparing the WSDP lies in the need to plan for Water Services (Water Supply and Sanitation Provision) whereby key targets are set over the next five years. At least six WSDP key focus areas need to be addressed during the planning process. These are:

- ✓ Basic Service: Water supply, sanitation, free basic water supply and free basic sanitation;
- ✓ Higher Levels of Service: Water supply, sanitation, associated needs and economic development;
- ✓ Water Resources: Appropriate choice, demand and water conservation management, water resource protection and integrated water resource management;
- ✓ Environmental Issues: Health, natural and social environment;
- ✓ Effective Management: planning, organisational or institutional aspects, management, financial and regulatory aspects; and
- ✓ Transfers: Infrastructure related transfers.

Water services development planning must also be done as part of the IDP process (section 12 (1) (a)) and the WSDP must be incorporated into the IDP (section 15 (5)).

Water Services Authorities must report on the implementation of its WSDP every year i.e. annual performance reporting (section 18).

Water Services Authorities must also comply with applicable regulations including Regulation No. R. 509, Government Gazette No. 22355, 8 June 2001 which requires the inclusion of a Water Services Audit as part of the annual performance report.

The Department must monitor the performance of every water services authority to ensure its compliance with every applicable water services development plan... section 62 (1) (c).

The Minister may- issue guidelines to water services institutions on performing their functions in terms of this Act section 73 (1) (h).

---

The Minister must ensure that there is a national information system on water services....to monitor the performance of water services institutions. section 68 (b) (i).

The Minister may require any ...water services institution...to furnish information to be included in the national information system. section 68 (a).

Based on the above, the preparation of a WSDP is a legal requirement.

---

## ANNEXURE A – REFERENCES

## Reference List

<b>Amajuba District Municipality</b>	Feasibility Report: Phase 1 Emergency Water Supply to Ramaphosa Settlement, Skombaren and 2 Megalitre reservoir at Hilltop. Phase 2 Dannhauser Regional Water Supply Scheme. 2018.
<b>DWAF</b>	Thukela WMA: Internal Strategic Perspective. DWAF Report No : P WMA 07/000/00/0304. 2004
<b>DWS</b>	Continuation of the Reconciliation Strategies for All Towns (CRSAT) in the Eastern Region. Water Reconciliation Strategy of the Schemes in the Buffalo River System for the Period 2015-2045. 2016.
<b>DWS</b>	Development of Water Supply and Drought Operating Rules for Stand-alone Schemes and Dams Typical of Rural/Small Municipal Water Supply Schemes. Eastern Cluster. Buffalo River Catchment (Newcastle, Glencoe, Dundee and Others Decision Support System. 2013
<b>DWS</b>	Support to the Implementation and Maintenance of Reconciliation Strategies for Towns in the Southern Region, 2016.
<b>DWS</b>	Reference Framework Geo database, March 2018.
<b>IDP</b>	Amajuba District Municipality IDP Review, 2019/2020. Newcastle Local Municipality IDP Review, 2019/2020.
<b>Statistics SA</b>	Census 2011; Community Survey 2016.
<b>Umgeni Water</b>	UAP Phase II: Towards the Development of a Regional Bulk Water Requirements for the Amajuba District Municipality and Newcastle Local Municipality, June 2015. Umgeni Water Infrastructure Master Plan, 2019. Umgeni Water Infrastructure Master Plan, 2020. Amajuba DM, Umzinyathi DM & Newcastle LM Regional Bulk Water Supply Scheme Prefeasibility Study Revised, June 2017, cited in the Umgeni Water Infrastructure Master Plan, 2020.
<b>Uthukela Water</b>	Uthukela Water Bulk Infrastructure Implementation Plans. 2015. Ngagane Bulk Water Upgrade Regional Bulk Infrastructure Project Business Plan. 2019.

---

## ANNEXURE B – DETAILED PROPOSED WSI INFRASTRUCTURE COMPONENT COSTS

## AMA011b Charlestown Supply Area

The total bulk cost requirement is R36.03million (excl VAT). The scheme development cost per household is approximately R24 959.

Charlestown Supply Area							
Item	Description						
1	Population	Scheme Name	Scheme No	Population 2020	Population 2050		
		Charlestown Supply Area	AMA011b	5 249	7 287		
		<b>Total</b>		<b>5 249</b>	<b>7 287</b>		
2	Demand	Scheme Name	Scheme No	Demand 2020	Demand 2050		
		Charlestown Supply Area	AMA011b	1.09	1.65		
		<b>Total</b>		<b>1.09</b>	<b>1.65</b>		
3	Water Resources		HFY (Mm3/a)	HFY (Mℓ/day)	Comments		
		Dam					
		River	Slang River		Yield unknown		
		Groundwater	Borehole				
4	Infrastructure			Class	Size / No	Capacity (Mℓ/day or kl or km or kW)	
		4.1	Existing	WTP	Charlestown WTP	Primary Bulk	2
				Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	
						Secondary Bulk	
						Tertiary Bulk	
				Reservoirs		Primary Bulk	
						Tertiary Bulk	
				Pump stations		Primary Bulk	
						Primary Bulk	
4.2	Future	Bulk Pipelines		Primary Bulk			
				Secondary Bulk	200 ømm	3.73	
				Tertiary Bulk			
		WTP		Primary Bulk		-	

				Primary Bulk	-	-
		Reservoirs	R1	Primary Bulk		3400
				Tertiary Bulk		
		Pump stations	PS1 Pump to WTP	Primary Bulk	0.024 m <sup>3</sup> /s	50.66
			PS2 Pump into elevated tank	Primary Bulk	0.024 m <sup>3</sup> /s	2.71
5	Cost Requirement		<b>Capital Cost</b>	<b>10% Contingencies</b>	<b>Total Cost (Excl VAT)</b>	
		Primary	R29 217 000	R2 921 700	R32 138 700	
		Secondary	R3 535 000	R353 500	R3 888 500	
		Tertiary	R0	R0	R0	
		<b>Total</b>	<b>R32 752 000</b>	<b>R3 275 200</b>	<b>R36 027 200</b>	

## AMA012 Newcastle Madadeni Osizweni WSS

The total bulk cost requirement is R3.976 billion (excl VAT). The scheme development cost per household is approximately R34 476.

Newcastle Madadeni Osizweni WSS						
Item	Description					
<b>1</b>	<b>Population</b>	<b>Scheme Name</b>	<b>Scheme No</b>	<b>Population 2020</b>	<b>Population 2050</b>	
		Newcastle Madadeni Osizweni WSS	AMA012	419 408	582 248	
		<b>Total</b>		<b>419 408</b>	<b>582 248</b>	
<b>2</b>	<b>Demand</b>	<b>Scheme Name</b>	<b>Scheme No</b>	<b>Demand 2020</b>	<b>Demand 2050</b>	
		Newcastle Madadeni Osizweni WSS	AMA012	114.01	166.73	
		<b>Total</b>		<b>114.01</b>	<b>166.73</b>	
<b>3</b>	<b>Water Resources</b>	<b>Dam</b>	Ntshingwayo Dam	FSC: 211.258Mm <sup>3</sup> . HFY: 100% - 75Mm <sup>3</sup> /a 80% - 68Mm <sup>3</sup> /a 60% - 60Mm <sup>3</sup> /a 40% - 52Mm <sup>3</sup> /a 20% - 38Mm <sup>3</sup> /a	Available reserve yield of 21Mm <sup>3</sup> /a . DWS 2013: Short-term stochastic yields (May Decision) at various dam level %'s.	
		<b>Water Resource Development</b>			Detailed feasibility and construction estimate of proposed Ncandu Dam, R1billion. Detailed Feasibility into proposed Dam on Ngogo River, R7.5million.	
<b>4</b>	<b>Infrastructure</b>			<b>Class</b>	<b>Size / No</b>	<b>Capacity (Ml/d or kl or km or kW)</b>
<b>4.1</b>	<b>Existing</b>	WTP	Ngagane WTP	Primary Bulk		130
			Ngagane WTP upgrade	Primary Bulk		170
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk		
				Secondary Bulk	110 - 1016 ømm	167.11
				Tertiary Bulk	315 - 500 ømm	15.42
		Reservoirs	1	Secondary Bulk		21400
			2	Secondary Bulk		21400
			5	Secondary Bulk		6600

			11	Secondary Bulk		1200
			12	Secondary Bulk		17400
			22	Secondary Bulk		10000
		Pump stations		Primary Bulk		
	<b>Future</b>	Bulk Pipelines		Primary Bulk		
				Secondary Bulk	250 ømm	1.74
				Tertiary Bulk		
		WTP		Primary Bulk	-	-
					-	-
		Reservoirs	3	Secondary Bulk		17000
			4	Secondary Bulk		27000
			6	Secondary Bulk		8600
			7	Secondary Bulk		2200
			8	Secondary Bulk		1800
			9	Secondary Bulk		200
<b>4.2</b>			10	Secondary Bulk		600
			13	Secondary Bulk		27060
			14	Secondary Bulk		23400
			15	Secondary Bulk		27200
			16	Secondary Bulk		22200
			17	Secondary Bulk		31140
			18	Secondary Bulk		13200
			19	Secondary Bulk		28600
			20	Secondary Bulk		12800
			21	Secondary Bulk		12400
		Pump stations				
	<b>Cost Requirement</b>		<b>Capital Cost</b>	<b>10% Contingencies</b>	<b>Total Cost (Excl VAT)</b>	
		Primary	<b>1 122 340 000</b>	<b>R112 234 000</b>	<b>R1 234 574 000</b>	
		Secondary	2 413 088 948	R241 308 895	R2 654 397 842	
		Tertiary	R79 506 000	R7 950 600	R87 456 600	
		<b>Total</b>	<b>R3 614 934 948</b>	<b>R361 493 495</b>	<b>R3 976 428 442</b>	

