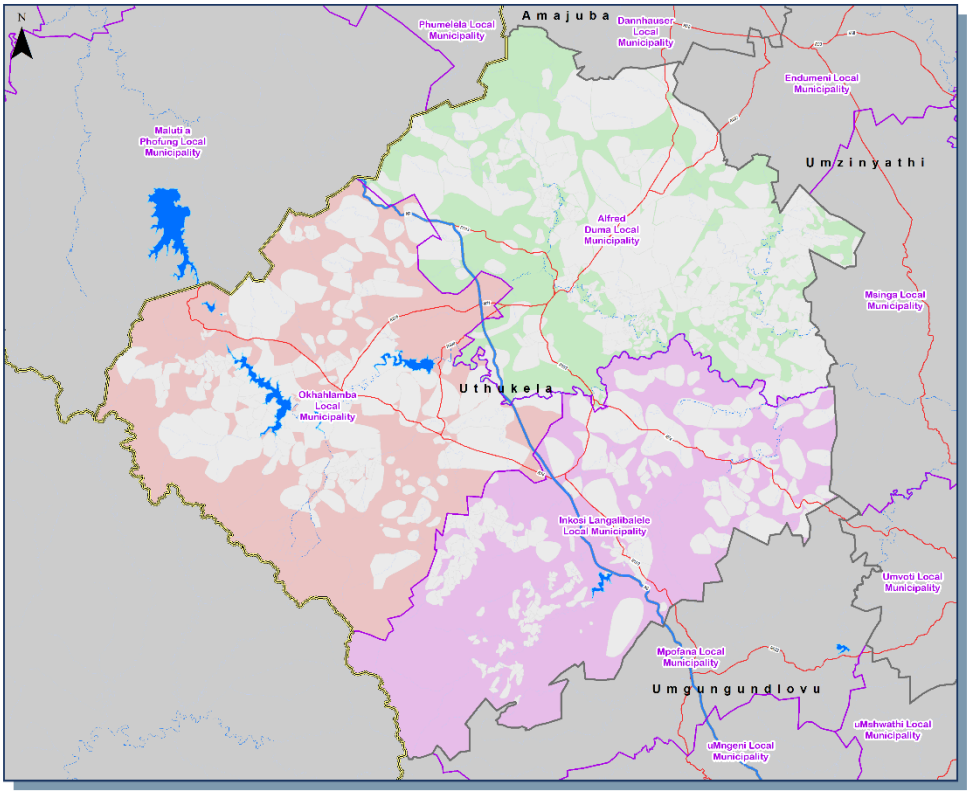
UNIVERSAL ACCESS PLAN PHASE III – PROGRESSIVE DEVELOPMENT OF A REGIONAL CONCEPT SECONDARY BULK WATER MASTER PLAN FOR THE UTHUKELA DISTRICT MUNICIPALITY

CONTRACT NO. 2018/164



Reconnaissance Report

January 2021

Prepared for:

UMGENI WATER•AMANZI

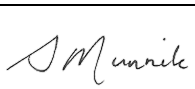
Name : Umgeni Water
Phone : 033-341 1232 / 082 852 9308
Email : vernon.perumal@umgeni.co.za
Contact Person: Vernon Perumal
Address: 310 Burger Street
Pietermaritzburg
3201

Prepared by:

MARISWE JTN CONSULTING

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

REPORT / DOCUMENT CONTROL FORM

PROJECT NAME: UNIVERSAL ACCESS PLAN PHASE III – PROGRESSIVE DEVELOPMENT OF A REGIONAL CONCEPT SECONDARY BULK WATER MASTER PLAN FOR THE KWAZULU-NATAL PROVINCE				**PROJECT NUMBER:** 27814
REPORT / DOCUMENT TITLE:	UNIVERSAL ACCESS PLAN PHASE III – PROGRESSIVE DEVELOPMENT OF A REGIONAL CONCEPT SECONDARY BULK WATER MASTER PLAN FOR THE UTHUKELA DISTRICT MUNICIPALITY			
Document Status:	**Draft / Interim / Final:** Final **Rev. No.:** 003		**Issue Date:** 29 January 2021	
Prepared for:	**Client's Name:** Umgeni Water		**Contact Person:** Vernon Perumal **Tel No.:** 033-341 1232 **Email Address:** vernon.perumal@umgeni.co.za	
Prepared at / by:	**Office:**		**Division:**	
Verification Process:	**Name:**	**Capacity:**	**Signature:**	**Date:**
Verification by Author:	M Esterhuizen	Planner		2021/01/29
Checked by:	S Munnik	Project Leader		2021/01/29
Authorised by:	S Munnik	Project Leader		2021/01/29

Quality Verification:

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.

B. Demographics

uThukela DM has three district municipalities bordering it within the Province of KwaZulu-Natal, namely Amajuba to the north, uMzinyathi to the east and uMgungundlovu to the south-east. In the south-west, it shares its border with the country of Lesotho and in the north-west, it shares its border with the Maluti-a-Phofung DM in the Free State Province.

uThukela DM consists of three local municipalities namely:

- Alfred Duma (KZN238);
- Inkosi Langalibalele (KZN237); and
- Okhahlamba (KZN235).

The size of uThukela district municipality is approximately 11 500km². uThukela DM is 75 % rural and most of the areas comprise of traditional areas.

According to the Community survey 2016, the total population in the UTDM is estimated to be 706 589 people spread unevenly among the seventy-four (74) wards.

Table B-1: Population Figures 2011 and 2016

LM Name	Population 2011	Population 2016	Population Growth	Growth Rate pa
Alfred Duma	339 777	356 274	16 497	1.08
Inkosi Langalibalele	196 227	215 182	18 955	2.09
Okhahlamba	132 068	135 132	3 064	0.52
Total (Growth Rate Average)	**668 072**	**706 588**	**38 516**	**1.27**

Source: StatsSA, 2016 Community Survey

The most significant growth in numbers were experienced in the Alfred Duma and Inkosi Langalibalele LMs. The Inkosi Langalibalele LM, home to the main towns of Estcourt and Weenen, experienced the highest growth rate in terms of percentage as well as of persons.

Population growth was determined until 2050 that resulted in the projected number of people residing within UTDM will be approximately 790 000 people. The projected population per Municipality is tabled within Table B-2 below.

Table B-2: Project Population per Local Municipality until 2050

Local Municipality	2020	2025	2030	2035	20405	2045	2050
Alfred Duma	363,066	366,899	368,684	376,705	384,900	393,274	401,830
Inkosi Langalibalele	209,671	211,885	212,915	217,547	222,280	227,116	232,057
Okhahlamba	141,131	142,621	143,315	146,432	149,618	152,873	156,199
Total	**713,867**	**721,405**	**724,914**	**740,685**	**756,799**	**773,263**	**790,086**

Source: Water Demand Model, UAP Phase III, 2020

C. Service Levels

C.1 Water

According to the UTDM Backlog Study on Water and Sanitation, approximately 17% of the households do not have access to safe drinking water.

Table C-1: WSA Backlog Study, Water Supply, 2016/2017

	Access to safe drinking water		No access to safe drinking water		Total households
LM Name	**No. of Households**	**Percentage (%)**	**No. of Households**	**Percentage (%)**	
Alfred Duma	20 401	59%	14 164	41%	34 565
Inkosi Langalibalele	38 985	87%	5 702	13%	44 687
Okhahlamba	75 356	90%	8 361	10%	83 717
Total	**134 742**	**83%**	**28 227**	**17%**	**162 969**

Source: WSA Backlog Study, Water Supply, 2016/2017

C.2 Sanitation

According to the UTDM Backlog Study on Water and Sanitation, approximately 19% of the households do not have access to adequate sanitation.

Table C-2: Sanitation Backlogs within UTDM

	Access to adequate sanitation		No access to adequate sanitation		Total households
LM Name	**No. of Households**	**Percentage (%)**	**No. of Households**	**Percentage (%)**	
Alfred Duma	20 576	59.50%	13 989	40.50%	34 565
Inkosi Langalibalele	35 835	80.20%	8 852	19.80%	44 687
Okhahlamba	75 679	90.40%	8 038	9.60%	83 717
Total	**132 090**	**81.10%**	**30 879**	**18.90%**	**162 969**

Source: WSA Backlog Study, Water Supply, 2016/2017

D. Water Resources

Provision was made for the following water resources studies, allocated to applicable water scheme areas (refer to the costing details per scheme for more information):

- A study on the Sunday's River water resources availability and reconciliation with water requirements (R4mil);
- Investigative studies on the utilisation of groundwater to augment surface water supplies (R2.5mil);
- Feasibility study on the Bushmans River catchment for domestic utilisation in the Inkosi Langalibalele LM (R10mil);
- Study for water resources options to supply the Indaka WSS (R2mil); and
- Tugela River catchment study under the Vaal Integrated System Reconciliation and Maintenance (R24mil).

D-1: Tugela River and Tributaries

The Tugela River is utilised (in the UTDM) for abstraction of water to supply the Colenso, Langkloof, Ezakheni and Tugela Estates Water Supply Schemes. Furthermore, the Driel Barrage on the Tugela River supplies the Bergville WSS and the Spioenkop Dam on the Tugela River supplies the Ladysmith WSS and Ezakheni WSS. Ladysmith WSS is further supplied from the Klip River, a tributary of the Tugela River.

The Zwelisha Moyeni WSS obtains water from the Khombe River, a tributary of the Tugela River, near the Woodstock Dam. The Loskop-Bhekuzulu WSS obtains its water from the Little Tugela River, another tributary of the Tugela River. Furthermore, the Indaka WSS obtains its water from the Sundays River, a tributary of the Tugela River, downstream of the Klip River.

During the last Strategy Steering Committee meeting of the Integrated Vaal Reconciliation Study, held in October 2019, it was identified that the hydrology for the Tugela-Vaal System needs to be updated and recalibrated (DWS, 2019).

D-2: Tugela-Vaal Transfer Scheme

The main surface water resources in the UTDM form part of a larger system of water resources of strategic importance. The Tugela and Klip Rivers are the primary rivers in this catchment. The Upper Tugela Mean Annual Runoff (MAR), is 1 256 million m³/a. The gross available surface water resource in the Upper Tugela based on development levels in 2004 was estimated to be between 553 and 570 million m³/a depending on where water in this catchment was supplied to. The following water sources are part of the Tugela-Vaal Transfer Scheme:

- Woodstock Dam;
- Khombe River;
- Driel Dam and Driel Barrage;
- Spioenkop Dam;
- Little Tugela River;
- Klip River;
- Oliphantskop Dam;
- Bushmans River;
- Wagendrift Dam; and
- Sundays River.

D-3: Bushmans River and Wagendrift Dam

The Bushmans River and the Wagendrift Dam on the Bushmans River, supplies the areas of Estcourt WSS, Estcourt Rudimentary WSS and Weenen/Kwanobamba WSS.

D-3: Groundwater Sources

There are a number of households (37 462, or 25% of the total number of households in the UTDM) in the non-urban areas that are supplied from groundwater sources. Groundwater is also utilised for agriculture, irrigation and industrial activities.

Groundwater quality is often affected by the coal mining activities in the region, especially in the north and eastern parts of the UTDM. It is further affected by rural sanitation installations not according to minimum safe and hygienic standards and wastewater treatment plant not functioning properly and not operated according to license conditions.

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

- At outlet of Key Area: 5million m³/a; and
- At Spioenkop Dam: 5million m³/a.

Groundwater availability in the Little Thukela River Key Area (year 2005), at 1:50 assurance level: 1million m³/a, then in the Bushmans River Key Area (year 2005), at 1:50 assurance level: 2million m³/a.

The following areas are supported or rely fully on groundwater as source:

- ✓ South of the existing Zwelisha Moyeni WSS – borehole supply and springs;
- ✓ South of the existing Bergville WSS – borehole supply;
- ✓ Ngedlengedleni WSS – sand aquifer next to the Tugela River, borehole supply;
- ✓ Cornfields WSS – borehole supply;
- ✓ Frere WSS – borehole supply;
- ✓ Driefontein WSS – borehole supply;
- ✓ Estcourt Rudimentary WSS – borehole supply; and
- ✓ Ekuvukeni Lime Hill WSS – borehole supply to augment surface water supplies to the Fitty Park area.

E. Existing Water Supply Schemes and Water Requirements

There are currently 13 municipal water supply schemes within the UTDM.

The water requirements for UTDM are presented per Local Municipality within Table E-1. These water requirements were calculated for consumers having formal water supply schemes and for consumers not yet supplied from a formal water supply scheme. By 2050, it is estimated that the UTDM would require 186.41Mℓ/day.

The Alfred Duma LM, being the most populous and urbanised, has the highest water requirements, representing 58% of the total water demands of 2020 and 55% of the total water demands of 2050. The Alfred Duma LM also has the highest growth in water demands by volume, representing an increase of 17.66 Mℓ/d from 2020 to 2050. The Inkosi Langalibalele LM has an increase in demands of 11.60Mℓ/d from 2020 to 2050 and the Okhahlamba an increase in demands of 10.74 Mℓ/d from 2020 to 2050.

Table E-1: Water Demand Projects per LM, Mℓ/day

	Population				Water Demands (Mℓ/d)			
LM Name	**2020**	**2030**	**2040**	**2050**	**2020**	**2030**	**2040**	**2050**
Alfred Duma	379,552	394,244	414,147	435,054	85.05	90.61	96.41	102.71
Inkosi Langalibalele	219,369	227,861	239,364	251,447	40.19	45.42	48.46	51.78
Okhahlamba	147,658	153,374	161,117	169,251	21.17	28.23	29.97	31.92
Total	**746,579**	**775,480**	**814,628**	**855,752**	**146.41**	**164.27**	**174.84**	**186.41**

Source: Water Demand Model, UAP Phase III, 2020

F. Existing Sanitation Schemes

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

Table F-1: Summary of WWTPs

LM Name	Plant Name	Design Capacity (Mℓ/d)	Annual Average Production (Operational) (Mℓ/d)*	Class of Plant
Alfred Duma	Colenso	3.20	1.00	C
	Ekuvukeni	2.40	1.27	D
	Ezakheni	34.00	14.00	B
	Ladysmith	23.00	15.00	C
Inkosi Langalibalele	Estcourt	12.00	10.00	C
	Weenen ponds	0.11	0.11	E
	Wembezi	12.00	8.00	C
Okhahlamba	Bergville	1.00	0.60	D
	Winterton	3.20	0.40	D
Total		**90.91**	**50.38**	

Source: UTDM (2020)

* Currently, treatment capacities are affected by non-operational status of pump stations at Colenso, Ezakheni, Estcourt, Wembezi and Winterton. A business plan is in place to correct this issue (UTDM, 2020).

G. 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.

UTDM receives funding from RBIG, MIG & WSIG as published in the Division of Revenue Bill (B5-2019). The total allocation for 2019/2020 to 2021/2022, for the two RBIG projects, amounts to R1.099 billion and for the WSIG component, amounts to R321.9 million, whereas for the MIG component, amounts to R5.889 million.

H. Bulk Water Supply Interventions Considered

This study aims to ensure that the UTDM 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 H-1, the water resource requirements illustrated in Table H-2 and the costs illustrated in Table H-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.

Table H-1: WSIAs, Population and Water Requirements

Water Supply Scheme / WSIA		Population 2020	Water Requirements (Mℓ/d)						
			2020	2025	2030	2035	2040	2045	2050
UTK001	Bergville WSS	28 483	5.13	5.45	5.81	5.99	6.18	6.38	6.59
UTK0775	Bergville Future TBC	20 332	1.44	2.45	3.50	3.60	3.70	3.81	3.92
UTK002, UTK077	Colenso WSS and Colenso Future WSS	10 894	1.86	2.12	2.40	2.47	2.55	2.63	2.71
UTK004	Driefontein WSS	73 365	12.62	13.20	13.84	14.28	14.75	15.24	15.75
UTK012, UTK006, UTK0797, UTK0796	Loskop-Bhekuzulu WSS & Emoyeni-Epangweni WSS, Empangweni Future WSS & Etatane Future	64 272	10.77	11.13	11.53	11.98	12.44	12.93	13.44
UTK007	Estcourt WSS	70 847	17.09	17.74	18.48	19.03	19.60	20.20	20.82
UTK007b	Estcourt Rudimentary WSS	44 167	7.77	7.96	8.18	8.45	8.73	9.02	9.33
UTK008	Ezakheni WSS	81 096	22.64	23.17	23.80	24.55	25.32	26.12	26.96
UTK005	Indaka WSS	101 137	17.61	18.02	18.50	19.08	19.68	20.32	21.00
UTK010	Ladysmith WSS	92 969	26.81	27.46	28.21	29.09	30.00	30.94	31.92
UTK014	Tugela Estates WSS	11 148	1.99	2.03	2.09	2.15	2.22	2.30	2.37
UTK015	Weenen/Kwanobamba WSS	15 271	1.77	2.24	2.73	2.82	2.92	3.02	3.13
UTK017	Zwelisha Moyeni WSS	50 325	8.78	9.11	9.48	9.79	10.11	10.45	10.80
UTK0783	Zwelisha Moyeni Future TBC	19 966	1.39	2.35	3.37	3.46	3.56	3.67	3.78
UTK901	Alfred Duma Rural	5 831	0.89	0.97	1.05	1.09	1.12	1.16	1.20
UTK902	Inkosi Langalibalele Rural	15 003	1.67	2.14	2.64	2.72	2.80	2.89	2.98
UTK903	Okhahlamba Rural	13 463	2.22	2.54	2.89	2.97	3.07	3.16	3.26
TOTAL		**718 568**	**142.46**	**150.08**	**158.51**	**163.52**	**168.76**	**174.23**	**179.95**

Source: Water Demand Model, UAP Phase III, 2020

The Ladysmith WSS and Ezakheni WSS have the highest water demands for 2020 and till 2050, totalling 49.45 Mℓ/d in 2020 and 58.87 Mℓ/d in 2050, representing 38% of the total for these bulk schemes for both planning horizon years. The Ladysmith WSS and Ezakheni WSS also have the highest growth in demands from 2020 to 2050, totalling 9.42 Mℓ/d.

Table H-2 Water Resources Required vs proposed WSI

WSIA	WSIA Name	Population (2050)	2050 Demand (Mℓ/day)	2050 Demand (Mm^3/a)	[A] Existing Resources (Mm^3/a)*	[B] Proposed Additional Demand under UAP Phase III (Mm^3/a)	[A+B] Total Demand (Mm^3/a)	Balance (Mm^3/a)
UTK001	Bergville WSS	32 648	2.40	1.87		0.53	0.53	
UTK0775	Bergville Future TBC	23 305	1.43	0.53		0.91	0.91	
UTK002, UTK077	Colenso WSS and Colenso Future WSS	12 487	0.99	0.68		0.31		
UTK004	Driefontein WSS	84 093	5.75	4.61		1.14		
UTK012, UTK006, UTK0797, UTK0796	Loskop-Bhekuzulu WSS & Emoyeni-Epangweni WSS, Empangweni Future WSS, Etatane Future WSS	73 670	4.85	3.88		0.96		
UTK007	Estcourt WSS	81 207	7.60	6.24	40	1.36	0.12	
UTK007b	Estcourt Rudimentary WSS	50 625	3.40	2.84	40	0.57	0.19	
UTK008	Ezakheni WSS	92 955	9.84	8.26		1.58	0.31	
UTK005	Indaka WSS	115 926	7.66	6.43		1.24		
UTK010	Ladysmith WSS	106 564	11.65	9.79	15	1.86	1.14	
UTK014	Tugela Estates WSS	12 778	0.87	0.73		0.14		
UTK015	Weenen/Kwanobamba WSS	17 504	1.14	0.65		0.50	0.48	
UTK017	Zwelisha Moyeni WSS	57 684	3.94	3.21		0.74	0.39	
UTK0783	Zwelisha Moyeni Future TBC	22 886	1.38	0.51		0.87	0.10	
TOTAL		784 333	62.91	50.21		12.70	0.96	

* Most of the areas are supplied or proposed to be supplied from the Tugela River, else from its tributaries. The hydrology of the Tugela River catchment needs to be reviewed and updated. The available yield from the tributaries is not known in most instances, however for the Sundays River, one of the sources for Ladysmith WSS, there water balance is already in a deficit. The yield from groundwater used by the scheme areas is not known.

Table H-3: Total Cost Requirement

WSIA	WSIA Name	Total Cost Requirement				
		Primary	**Secondary**	**Tertiary**	**10% Contingencies**	**Total Cost (Excl VAT)**
UTK001	Bergville WSS	R45 160 800	R43 062 000	R61 772 000	R14 999 480	R164 994 280
UTK0775	Bergville Future TBC	R54 280 800	R45 637 000	R74 502 000	R17 441 980	R191 861 780
UTK002, UTK077	Colenso WSS and Colenso Future WSS	R16 142 260	R27 949 000	R1 535 000	R4 562 626	R50 188 886
UTK004	Driefontein WSS	R0	R101 060 000	R212 671 000	R31 373 100	R345 104 100
UTK012, UTK006, UTK0797 , UTK0796	Loskop-Bhekuzulu WSS & Emoyeni-Epangweni WSS, Empangweni Future WSS & Etatane 2 Future WSS	R96 323 000	R93 690 000	R181 805 000	R37 181 800	R408 999 800
UTK007	Estcourt WSS	R208 766 000	R40 070 000	R80 251 000	R32 908 700	R361 995 700
UTK007b	Estcourt Rudimentary WSS	R74 775 000	R6 819 000	R132 350 000	R21 394 400	R235 338 400
UTK008	Ezakheni WSS	R76 284 000	R140 017 000	R176 245 000	R39 254 600	R431 800 600
UTK005	Indaka WSS	R102 487 000	R124 874 000	R264 031 000	R49 139 200	R540 531 200
UTK010	Ladysmith WSS	R202 789 000	R345 749 000	R118 343 000	R66 688 100	R733 569 100
UTK014	Tugela Estates WSS	R44 941 850	R5 947 000	R18 165 000	R6 905 385	R75 959 235
UTK015	Weenen/Kwanobamba WSS	R28 207 000	R17 907 000	R28 487 000	R7 460 100	R82 061 100
UTK017	Zwelisha Moyeni WSS	R113 560 500	R59 735 000	R76 395 000	R24 969 050	R274 659 550
UTK0783	Zwelisha Moyeni Future TBC	R41 899 900	R10 924 000	R42 144 000	R9 496 790	R104 464 690
UTK901	Alfred Duma Rural					R68 653 749
UTK902	Inkosi Langalibalele Rural					R163 778 716
UTK903	Okhahlamba Rural					R146 971 197
Total		**R1 105 617 110**	**R1 063 440 000**	**R1 468 696 000**	**R363 775 311**	**R4 380 932 083**

A total estimate of approximately R4.38 billion is required to address the total bulk water supply requirement by 2050.

I. Conclusions and Recommendations

The UTDM 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. 17% of the consumers within UTDM does not have access to reliable water supply across the whole of the UTDM's geographic extent. 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 UTDM 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 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 UTDM could consider is renewed loan funding through the Development Bank of Southern Africa (DBSA).

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 for areas that do not yet have access to basic and safe water supply, such as Bergville Future, Driefontein and Zwelisha Moyeni Future WSS, would be an implementation priority for the UTDM. Furthermore, areas that are developed and having a high population density, but unreliable water supply, such as Indaka WSS.

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 in areas such as Ladysmith and Ezakheni.

For the UTDM DM as WSA, the applicable WSIAs for UAP Phase III are:

- UTK001 Bergville WSS
- UTK0775 Bergville Future TBC WSS;
- UTK002 Colenso WSS and UTK0776 Colenso Future WSS;
- UTK004 Driefontein WSS;
- UTK012 Loskop-Bhekuzulu WSS, including UTK006 Emoyeni-Epangweni WSS and UTK0797 Empangweni Future WSS;
- UTK007 Estcourt WSS;
- UTK007b Estcourt Rudimentary WSS;
- UTK008 Ezakheni WSS;
- UTK005 Indaka WSS;
- UTK010 Ladysmith WSS;
- UTK014 Tugela Estates WSS;
- UTK015 Weenen/Kwanobamba WSS;

- UTK017 Zwelisha Moyeni WSS;
- UTK0783 Zwelisha Moyeni Future TBC;
- UTK0901 Alfred Duma Rural;
- UTK0902 Inkosi Langalibalele Rural; and
- UTK0903 Okhahlamba Rural.

Although all area interventions would be an implementation priority for the WSA, it is proposed to consider the following eight (8) priorities detailed within Table I-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 I-1 Proposed Implementation Order

Proposed Priorities (Phased Approach)	WSIA No and Name		Proposed Project Name	Estimated Project Value (Excl VAT)
1	UTK004	Driefontein WSS	Driefontein WSS	R345 104 100
2	UTK012, UTK006, UTK0797, UTK0796	Loskop-Bhekuzulu WSS & Emoyeni-Epangweni WSS & Empangweni Future WSS & Etatane 2 Future WSS	Loskop extended WSS	R408 999 800
3	UTK007	Estcourt WSS	Estcourt WSS	R361 995 700
4	UTK007b	Estcourt Rudimentary WSS	Estcourt Rudimentary WSS	R235 338 400
5	UTK008	Ezakheni WSS	Ezakheni WSS	R431 800 600
6	UTK005	Indaka WSS	Indaka WSS	R540 531 200
7	UTK010	Ladysmith WSS	Ladysmith WSS	R733 569 100
8	UTK017	Zwelisha Moyeni WSS	Zwelisha Moyeni WSS	R274 659 550

Table of Contents

List of Tables

List of Figures

LIST OF ABBREVIATIONS

ADM	Amajuba District Municipality
CoGTA	Department of Cooperative Governance and Traditional Affairs
CoU	City of uMhlathuze
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^3	Cubic meter
MIG	Municipal Infrastructure Grant
Mℓ/day	Mega liter per day
Mm^3	Million Cubic meter
Mm^3	Million Cubic Meters
Mm^3/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 uThukela District Municipality (UTDM) – in this instance also the Water Services Authority (WSA).

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 considered for UAP Phase III:

- Development and Implementation of Water Conservation / Water Demand Management in uThukela District Municipality: Bulk Water Meter Audit Report, 2016;
- StatsSA Community Survey, 2016;
- uThukela District Municipality Non-Revenue Water Master Plan Strategy for 2015;
- Submission of monthly water balance reports to the DWS;
- KZN Water Conservation and Water Demand Management Handbook. uThukela District Municipality, 2018;
- uThukela District Integrated Development Plan, 2019/2020;
- uThukela District Integrated Development Plan, 2018/2019;
- uThukela District Integrated Development Plan, 2017/2018;
- uThukela District Growth and Development Plan, 2018;
- uThukela District Municipality Local Economic Development Strategy, 2013;

- uThukela DM Backlog Study for Water & Sanitation Services, 2017;
- Ezakheni / Emnambithi Bulk Internal Water Services Master Plan and Water Conservation & Demand Management Strategy, 2011;
- uThukela DM corporate GIS;
- Umgeni Water Infrastructure Master Plans, 2017, 2018, 2019 and 2020;
- Eskom Satellite Building Count (SBC), 2015;
- 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 UTDM (2019), there were a few changes of officials with new appointments as well as persons appointed in acting positions.

Umgeni Water is providing operational support in the UTDM 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

				Indirect demands as a ratio of direct demands			
Classification	**Type of Centre**	**Description**	**Typical CSIR / SACN Settlement Typology**	**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	Regional Centre 2	0.15	0.08	0.08	0.08

		the whole conurbation.					
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^3/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.

2.1 CONTEXT

The uThukela District Municipality (DC23) is one of the ten (10) District Municipalities and one (1) Metropolitan Municipality that constitute the KwaZulu-Natal Province. uThukela DM has three (3) district municipalities bordering it within the Province of KwaZulu-Natal, namely Amajuba to the north, uMzinyathi to the east and uMgungundlovu to the south-east. In the south-west, it shares its border with the country of Lesotho and in the north-west, it shares its border with the Maluti-a-Phofung DM in the Free State Province (UTDM IDP, 2019/2020). A map of the study area is provided in Figure 2-1.

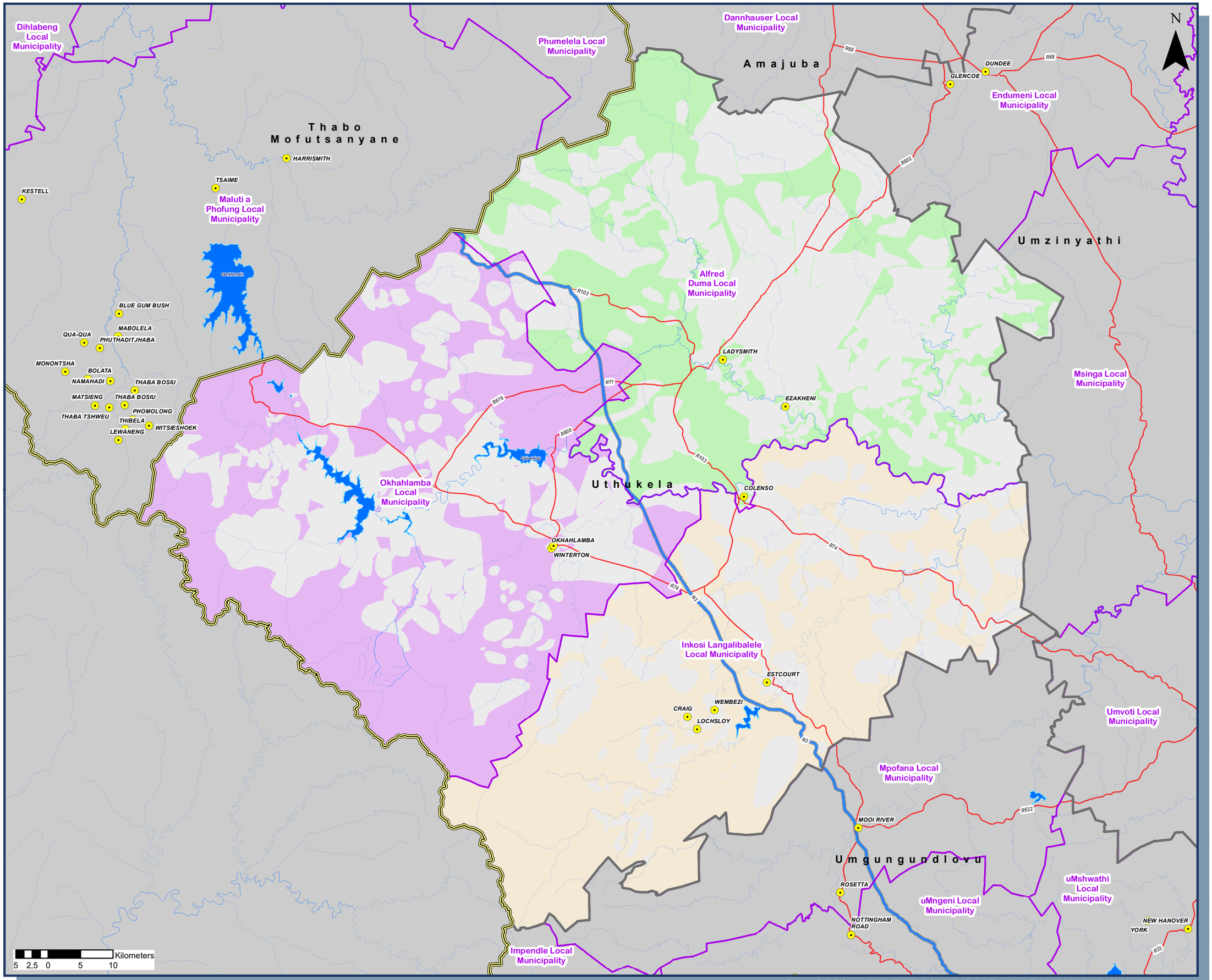
uThukela DM consists of three local municipalities namely:

- Alfred Duma (KZN238);
- Inkosi Langalibalele (KZN237); and
- Okhahlamba (KZN235).

The size of uThukela district municipality is approximately 11 500km². uThukela DM is 75 % rural and most of the areas comprising of traditional areas (UTDM IDP, 2019/2020).

According to the Community survey 2016, the total population in the UTDM is estimated to be 706 589 people spread unevenly among the seventy-four (74) wards. The 2% growth in population is noticeable from 2001 to 2011 as per the 2011 Statistics SA. The dependency ratio in UTDM declined from 76.4 to 70.9 between 2001 and 2011 (UTDM IDP, 2019/2020).

The main tourism hub is the Cathkin Park, which falls within the Cathkin Park node, and another node located near the Royal Natal National Park, called Babangibone Development Node. The Ladysmith town is a significant historical tourism destination and offers a number museums and historical sites while Bergville and Winterton towns are located within the vicinity of the Drakensberg and derive some benefits from the tourism industry. uThukela district municipality has a good climate and abundance of natural resources like Drakensberg mountains. The intrinsic beauty of the area enhances the tourism opportunities in the district. Below are the maps of uThukela district municipality, wards and tribal authorities (UTDM IDP, 2019/2020).

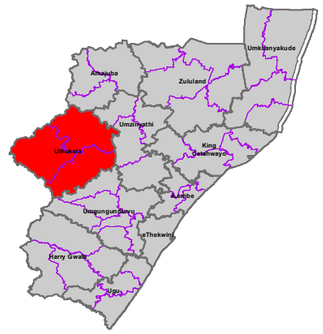


Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMaps\uThukelaDM\27814_200612_UTDM_LocalityMap.mxd

Legend

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

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT 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

uThukela District Municipality

DATE COMPLETED:

22 June 2020

MAP NO.:

DC23: 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 study area.

2.2.1 Alfred Duma Local Municipality (ADLM)

The municipality is a category B municipality and is in the north-western part of KwaZulu-Natal with the most prominent towns being Ladysmith and Ezakheni. The Municipality is strategically located along the N3 corridor which links Durban and Gauteng as well as the N11 which links it with Mpumalanga and Free State Provinces. As such its long-term vision is to be the first metro municipality in the northern region (ADLM IDP, 2019/2020).

It has the highest population numbers (339 777) compared to other municipalities and it is the most developed. It serves as the regional economic hub in the district as most government regional offices and Industrial areas are located within the municipality. The ADLM comprises 36 wards with 29 of those being rural wards and some of them administered by the traditional authorities (ADLM IDP, 2019/2020).

Alfred Duma Municipality spans over an area of 3 020km² of which 70% is rural land with limited basic services and infrastructure. The Provincial Growth and Development Strategy for KwaZulu-Natal classifies Ladysmith as a tertiary node with regional significance. This means that the area is earmarked for the location of infrastructure that serves the whole of UTDM and beyond and connects the region with major urban centres such as Durban and Johannesburg. The ADLM is also well located in relation to at least two (2) of the major tourism destinations in KwaZulu-Natal, namely the Battlefields to the north and Ukhahlamba-Drakensburg Park to the south (ADLM IDP, 2019/2020).

The Klip River and Sunday's River and their tributaries traverse the municipality and drain into the Tugela River (also known as uThukela), which is the largest river system in KwaZulu-Natal. There is substantial runoff from the Tugela catchment because of high rainfall. This presents the municipality with great opportunity in relation to agriculture (ADLM IDP, 2019/2020).

The issue of contributing towards the green environment is also a priority in the municipality hence the recently constructed waste recycling plant which will be fully function by end of 2019 and at the same time will contribute towards creating jobs in the area especially for rural people. Another project that the municipality will embark on this financial year is planting of trees in and around the town to address the issue of emissions of greenhouse gasses in the atmosphere around Ladysmith (ADLM IDP, 2019/2020).

2.2.2 Inkosi Langalibalele Local Municipality (ILLM)

The municipality is a category B municipality and is in the western part of KwaZulu Natal with the most prominent towns being Estcourt, Wembezi, Colenso and Weenen. The ILLM consists of 23 wards and a fair number of people reside in one of the nine (9) traditional authorities. The majority of the ILLM's population is concentrated in urban farming areas but there are few patches of high-density settlements within the informal areas. The municipality boasts well-established industrial, commercial and residential areas as well as rich agricultural farmlands. The municipality has the second biggest population in the

district with based on the 2016 community survey which concluded that the total population of the municipality is 223 898. (ILLM IDP, 2019/2020).

Agriculture is the dominant land use in the municipality in the form of commercial farming followed by conservation both public and private conservation entities then land for residential purposes. The commercial farmlands are privately owned. A large extent of this land is under land restitution. This is the major economic activity in the municipality followed by manufacturing and tourism. The agricultural sector is well established and stable in terms of employment. However, the sector is confronted with two (2) major challenges, i.e. high dependency on traditional crop and products with little innovation (ILLM IDP, 2019/2020).

The N3 national road traverses north-south through the ILLM and runs adjacent to Colenso and Estcourt. Two (2) main access and mobility routes have been identified as primary development (regional) corridors, namely:

- Giant Castle to Weenen Nature Reserve Corridor (north–south axis);
- Regional road from Colenso in the west through Weenen to Greytown and beyond (east-west axis); and
- R103 which runs parallel to and north of the N3. For the purposes of the Spatial Development Framework, R103 is seen as part of the broader N3 corridor (ILLM IDP, 2019/2020).

The most prominent rivers flowing through the ILLM are the Bushmans (Boesmans), Bloukrans and Little Tugela which in turn are also tributaries to the Tugela River. The quality and quantity of water emerging from the municipality largely depends on land use and land management practices in the municipality (ILLM IDP, 2019/2020).

2.2.3 Okhahlamba Local Municipality (OLM)

The municipality is a category B municipality and is in the western part of KwaZulu Natal with the most prominent towns being Bergville, Winterton and Zwelisha Moyeni. The municipality covers an area of approximately 3 544km² and consists of 15 wards. The municipality is mostly rural in character and includes traditional authority areas (OLM IDP, 2018/2019).

The OLM has a population of 135 132 in 2016, growing from 132 068 in 2011. This accounted for a 1.2% growth rate and could be attributed by the major infrastructure development within Okhahlamba and job opportunities as well as better health care facilities. The R74 traverses the municipality in a south-east-north-westerly direction, dissecting the municipality in two. It provides important linkages to the Drakensberg area in the west and access to the N3 in the east (OLM IDP, 2018/2019).

The OLM is characterised by its major spatial feature, the Drakensberg Mountains which have been declared as a World Heritage Site. The Tugela River originates in the OLM in the Drakensberg mountains and there are also strategic water resource infrastructure components, namely the Spioenkop Dam and

Woodstock Dam, Driel Dam and Kilburn Dam that form part of the Tugela-Vaal Transfer Scheme (OLM IDP, 2018/2019).

The main economic sectors in Okhahlamba are agriculture, manufacturing, trade, commerce, and tourism. Commercial agriculture comprises 14% of the land area. Subsistence agriculture and forestry also form part of the agricultural activities in the region (OLM IDP, 2018/2019).

2.3 Climate and Climate Change

The UTDM climatic conditions are varied between summer and winter months ranging between very cold temperatures during the winter and high summer temperatures. The average temperature for the UTDM is about 17°C. The minimum temperature for UTDM is below 0°C during winter months and often higher than 30°C in the summer months (UTDM SDF, 2018/2019).

The average Annual rainfall for UTDM is consistent throughout the district with no major difference between the local municipalities. The average rainfall for UTDM is between 650mm and 1 000mm per year. Annual precipitation ranges from 620 to 1265mm per annum. Rainfall is highest in the eastern escarpment areas of the Drakensberg and generally decreases towards the east. Annual temperatures are higher in the east and temperature decreases towards the higher lying escarpment areas of the Drakensberg (UTDM SDF, 2018/2019).

The UTDM faces a number of threats due to climate change. These include impacts on the agricultural and forestry sector which is vulnerable to changes in climate. Climate change causes altered weather conditions which in turn, alter crop yield patterns. Sometimes this is in the form of drought, sometimes unseasonal heavy rains causing flash floods. Some areas which have been ideal for growing certain crops may experience climate change and they will no longer be suitable. This change in patterns is expected to put pressure on agriculture and result in food shortages (UTDM SDF, 2018/2019).

The UTDM has prepared a Climate change response Plan (mitigation & adaptation options) that was approved by Council (UTDM IDP, 2019/2020). The Climate change response Plan is part of the Local Government Climate Change Support Program (LGCCSP), an initiative of the Department of Environmental Affairs and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

The Draft CCRP addresses various potential threats and impacts of climate change on the WSA. The CCRP used various models to provide information on predicted changes in precipitation and temperature. The report states the following: “It is therefore projected across most of the models that Amajuba District Municipality could experience an increase in rainfall in the months of January, February, March, May, July, August September, October, November and December, and a decrease in rainfall during April and June (Climate System Analysis Group 2017a).”

Other potential threats in this area, related to water include:

- Deterioration of water quality, especially impoundments, due to increased salt concentrations due to evaporation;
- Increased floods – also deteriorating water quality and increasing pollutants in water sources;
- Increased droughts – reducing the diluting ability of water resources; reducing water availability; and
- Poorer water quality and less water availability impact on aquatic ecosystems;

Responses to these threats include improved water resource management and management of water services infrastructure and other supporting infrastructure such as stormwater systems.

The drought during the 2015-2017 summer seasons had an impact on the water security in terms of water availability in this area. The consumers, whether residential, commercial, industrial or agricultural are therefore vulnerable to climate change and extreme weather events.

It is critical that the WSA improves the water security by means of improved water services operation and management, to ensure sustainable services.

Consumer education and awareness will also be critical to ensure information dissemination and improved understanding of the importance to conserve water, improve water stewardship and enhancing the resilience of the WSA and consumers to deal with uncertainties regarding climate change or unforeseen events.

The Department of Environment's Climate Change Adaptation Strategy (2017) denotes that there has been an overall increase in temperature throughout South Africa, but most predominantly in the drier western and north-eastern parts of the country, extending to the east coast of KwaZulu-Natal.

Studying the trends in rainfall since 1921-2015, it appears that there is a positive trend in the central southern interior, but no significant trend in other parts of the country. It is still expected that variability will increase.

2.4 Topography, Geology and Soils

The information in this section was sourced from the UTDM SDF, 2018/2019.

The UTDM is located in the foothills of the Drakensberg Mountains, which form the escarpment. The dominant topographical features of the DM are valley slopes and undulating hills, but the topography is highly diverse and also includes broad valleys, moderate to steep slopes, rolling hills, flat plains, dolerite koppies and steep ridges. Topography is relatively flat within the central part of the district especially around the built-up urban areas.

The western edge of the District comprises of Ukhahlamba Drakensberg Park which is a stretch of steep mountainous area that meanders and becomes the boarder of the UTDM with Lesotho and the Free State Province. The Drakensberg Mountain Range stretches from the Eastern Cape to the Mpumalanga Province.

There are few steep and mountainous areas within some parts of the district including within the southern part of Ekuvukeni and the north of Driefontein Complex. It should be noted that development within some areas with sharp inclines or declines are restricted areas that there are restrictions on development of areas that slope sharply.

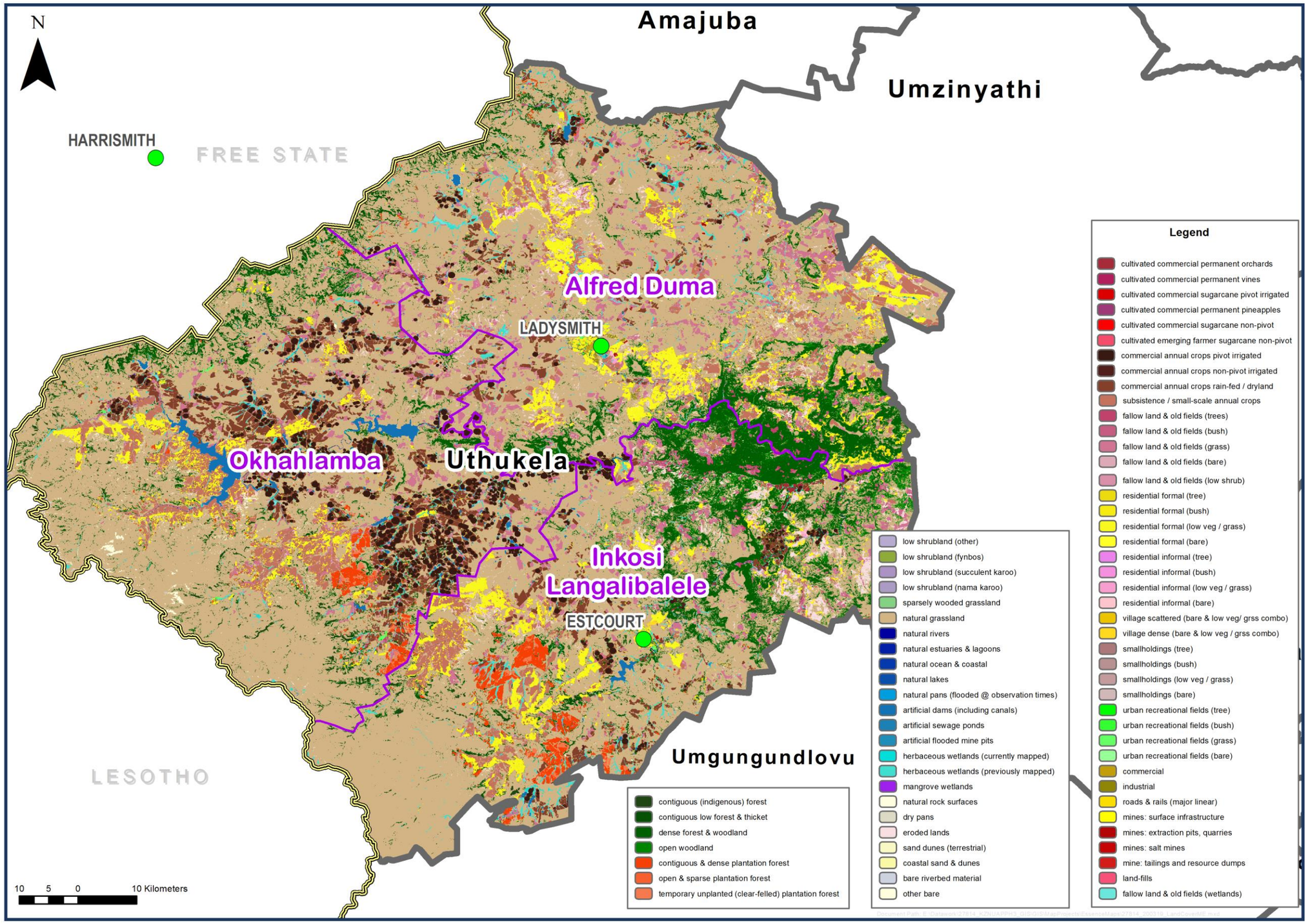
According to the Provincial Spatial Planning Guideline 2, the UTDM is characterized by a number of geotechnical risks which may limit development prospects within some parts of the municipal area. Fortunately, the main growth centres (towns) and surrounding have a limited risk at a desktop geotechnical point of view. The expected geotechnical hazards are due to areas with basalt and high proportion of dolerite, as well as the major structural geology feature of the Tugela Fault and its immediate surrounds which causes the geotechnical risks to be high.

The areas such as Weenen and Wembezi have a medium risk since these are areas with moderate proportion of dolerite. Although most identified geotechnical hazards can be overcome through engineering solutions, the issue often becomes one of cost. The findings are based on a desktop study of the available information for the development and use of a 'checklist' that can be easily accessed by the relevant decision makers to determine zones of risk.

2.5 ENVIRONMENT

The information in this section was sourced from the UTDM SDF, 2018/2019. Water resources are described separately in the Section 5.1 of this document. The land cover was sourced from the Department of Environment (2018 dataset) and is illustrated in Figure 2-2.

Figure 2-2 Land Cover



The UTDM is rich in biodiversity and particularly high in species diversity and habitats. The majority of the UTDM area is classified as the grassland biome, but savannah is present in the areas near the south and south-eastern boundaries, extending westwards as far as Ladysmith. The flora can be further subdivided into vegetation types, which can be defined in terms of dominant, common and rare species that may be associated with landscape and physical features such as topography, geology, soils and climate.

The dominant vegetation types are Northern KwaZulu-Natal Moist Grassland, KwaZulu-Natal Highland Thornveld, Thukela Thornveld and Low Escarpment Moist Grassland, and of these vegetation types, only the Northern KwaZulu-Natal Moist Grassland is considered a threatened ecosystem (listed as Vulnerable).

Other vegetation types found within the municipality include Northern KwaZulu-Natal Shrubland, Eastern Free State Sandy Grassland (Endangered), Income Sandy Grassland (Vulnerable), Basotho Montane Shrubland (Vulnerable), Northern Afro temperate Forest, Thukela Valley Bushveld and Eastern Temperate Freshwater Wetland. The UTDM is considered a hotspot for amphibian and bird diversity[1] (although this is primarily in the Drakensberg).

2.6 Institutional Arrangements for Water Supply

The UTDM is the Water Services Authority (WSA) for its area of jurisdiction and is also performing the bulk and reticulated water services as Water Services Provider.

Umgeni Water is currently assisting with operations in some of the areas, namely the operation & maintenance of the following water treatment works (WTP): Ezakheni, Ekuvukeni / Oliphantskop, and Tugela Estate.

2.7 Economic Development Opportunities

The existing UTDM Local Economic Development (LED) Strategy is dated 2013 and has to be reviewed urgently. The information below are excerpts from the existing strategy to provide indicative opportunities and priorities of economic development and growth identified at the time. Reference is still made to the local municipalities prior to the recent amalgamation, Emnambithi/Ladysmith LM and Indaka LM (now Alfred Duma LM); and Imbabazane LM and Umtshezi LM (now Inkosi Langalibalele LM).

Ladysmith is the dominant urban centre in the district in terms of commercial, administrative, manufacturing and higher order public facilities. Historically, key types of manufacturing activities in the area included footwear, food, beverages, transport and logistics. Other smaller towns of significance within the district include Estcourt, Bergville and Colenso while Pietermaritzburg, Harrismith and Newcastle, located outside the district are also of importance. The spatial location of towns, rural settlements and industrial areas in uThukela reflect the Apartheid legacy of separate development.

[1] See the Biodiversity Sector Plan - uThukela District Municipality, 2015, prepared by Ezemvelo KZN Wildlife.

uThukela has significant areas of agricultural potential. Extensive commercial farming can be found in Emnambithi/Ladysmith LM, Okhahlamba and uMtshezi, whilst subsistence farming is widespread in Indaka and Imbabazane. Commercial farming within the district includes crops, livestock, forests and game. Imbabazane and Indaka municipalities have no significant economic base, whilst Okhahlamba is largely rural in nature, but with a significant tourism base.

Some of the opportunities in the UTDM include the location – easily accessible from the N3 highway; its natural resources for agricultural and tourism activities as well as cultural value; a strong labour pool and business and commercial development opportunities.

From the UTDM IDP (2019/2020), the following catalytic projects were listed for which the status is unfortunately unknown with specific reference to the proposed bulk water supply infrastructure (Qedusizi Dam and the Ingula Pumped Water Scheme)

- uThukela Electronics Hub. At the existing IThala Industrial Park outside Ladysmith.
- Aerodrome in Ladysmith.
- The N11 road upgrade.
- Internal road link from Ezakheni to Ladysmith.
- Bergville Hospitality School.
- Cableway development. At the Northern Berg Escarpment.
- Besters Agricultural Project.
- Qedusizi Dam.
- uThukela Tourism Route.
- District AgriPark in Bergville.
- Ingula Pumped Water Scheme.
- Logistics Hub Ladysmith.
- Commercial Development on Helpmekaar Road. Next to Ithala Industrial Park.
- Indoor sports complex at Bergville.
- Maluti-Drakensberg Transfrontier Park. Linking Okhahlamba Drakensberg Park World Heritage Site and Sehlabathebe National Park in Lesotho.
- Denrose Coal Powered Energy. A coal electricity generation project at Colenso.
- One Source Multi Smelter Park. Establishment of a smelter at Colenso.

3. DEMOGRAPHICS

Since the completion of the UAP Phase II studies in 2016, there have been demarcation changes in the uThukela District Municipality with the amalgamation of the five local municipalities into three local municipalities that are as follows:

- The Emnambithi/Ladysmith Local Municipality and Indaka Local Municipality becoming the Alfred Duma Local Municipality;
- The Umtshezi Local Municipality and Imbabazane Local Municipality becoming the Inkosi Langalibalele Local Municipality; and
- There were no changes to the Okhahlamba Local Municipality demarcation or name.

A map of population distribution is provided in Figure 3-1.

Note that the next national census will be conducted in 2021[2].

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:

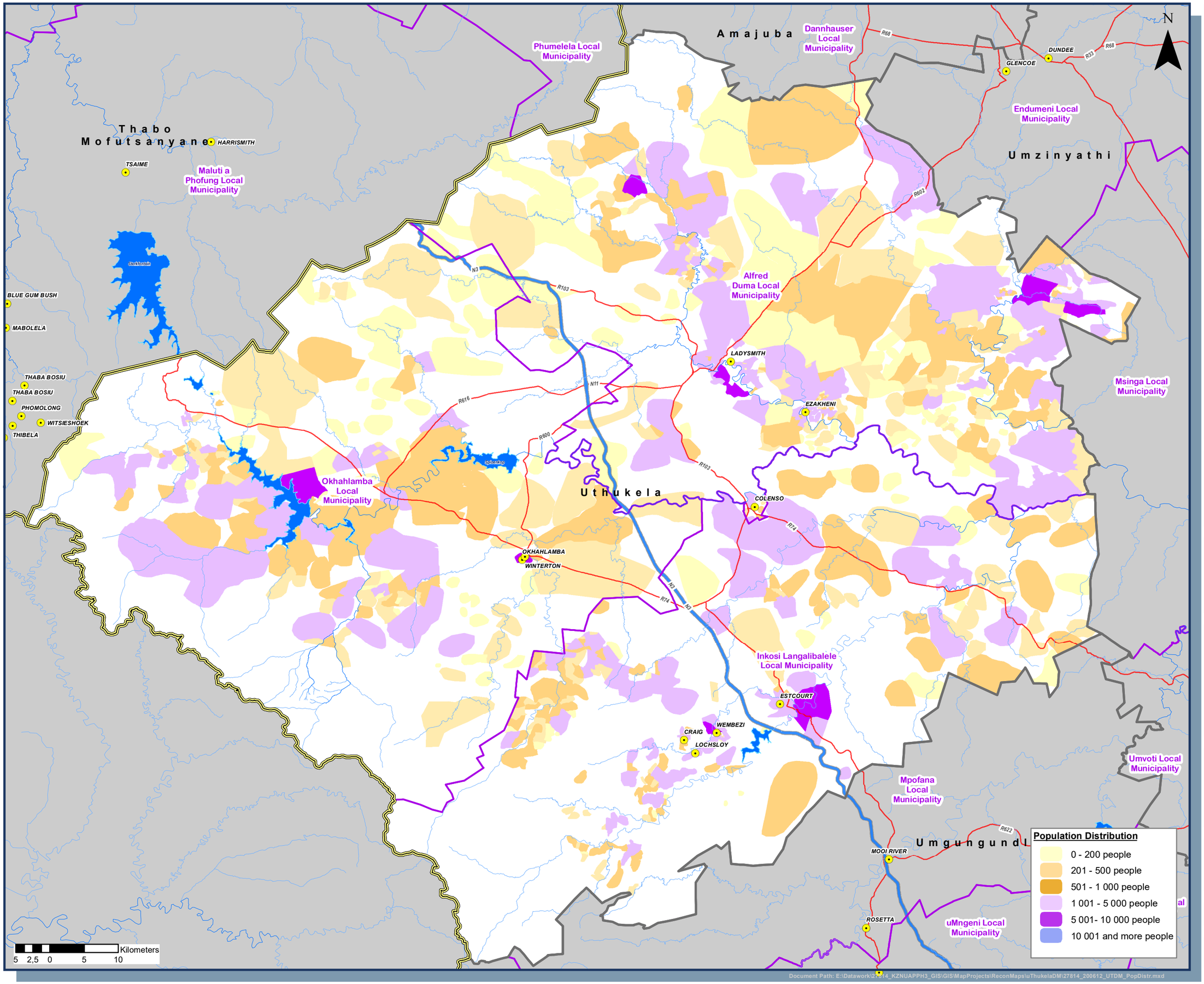
Table 3-1: Population: 2011 and 2016

LM Name	Population 2011	Population 2016	Population Growth	Growth Rate pa
Alfred Duma	339 777	356 274	16 497	1.08
Inkosi Langalibalele	196 227	215 182	18 955	2.09
Okhahlamba	132 068	135 132	3 064	0.52
Total (Growth Rate Average)	**668 072**	**706 588**	**38 516**	**1.27**

Source: StatsSA, 2016 Community Survey

The most significant growth in numbers were experienced in the Alfred Duma and Inkosi Langalibalele LMs. The Inkosi Langalibalele LM, home to the main towns of Estcourt and Weenen, experienced the highest growth rate in terms of percentage as well as of persons.

[2] The timing and undertaking the 2021 or next national census may be affected by the COVID19 pandemic.

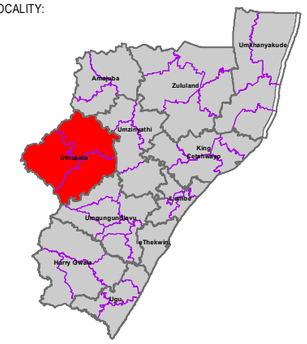


Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMaps\uThukelaDM\27814_200612_UTDM_PopDistr.mxd

Legend

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

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT 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
uThukela District Municipality

DATE COMPLETED:

22 June 2020

MAP NO.:

DC23: Figure 3.1

3.2 SOCIAL AND ECONOMIC INDICATORS

The information for this section was sourced from the uThukela District Growth and Development Plan, 2018.

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 indicators available that can be used to establish who benefits from economic development and by how much are the beneficiaries benefiting.

Furthermore, data on household income can be used to inform poverty analysis. In uThukela the R1- R4 800 and R4 801-R9 600 household income categories have increased considerably throughout the years. This can be an indication of improvement in the socio-economic status of the households in the district. The number of households in the upper end income categories (i.e.R1 228 801-R 457 600) have decreased throughout the years.

Table 3-2: Household income of the UTDM and the KZN province in 2011

Income Category	KZN Households	UTDM Households
No Income	387,240	22,150
R 1- 4 800	125,843	8,876
R 4 801- R 9 600	217,220	17,024
R 9 601- R 19 600	494,870	32,817
R 19 602- R38 200	500,449	31,121
R 38 201- R 76 400	300,450	15,365
R 76 401- R 153 800	210,595	9,339
R 153 801- R 307 600	158,363	6,174
R 307 601- R 614 400	98,245	3,271
R 614 401- R 1 228 800	30,829	638
R1 228 801- R 2457 600	9,201	253
R2 457 601 or more	6,017	254
Unspecified	107	3
Grand Total	**2,539,429**	**147,286**

Source: Statistics South Africa 2011

The UTDM identified seven (7) goals in implementing its Growth and Development Strategy including the domains of Inclusive Economic Growth; Human Resource Development; Human and Community Development; Strategic Infrastructure; Environmental Sustainability; Governance and Policy; and Spatial Equity. Table 3-3 summarises the indicators and target per domain:

Table 3-3: UTDM Growth and Development Goals, Indicators

Domain	Indicator	Target
Goal 1: Inclusive Economic Growth **Targets 2017 - 2035**		

Domain	Indicator	Target
Contribution to District GDP by each sector:	Agriculture	0.072
	Manufacturing	0.216
	Business, Real Estate, Insurance & Finance Services	0.165
	Tourism	0.05
	Unemployment rate	0.182
6.2 Goal 2: Human Resource Development **Targets 2017- 2035**	Percentage of Grade 1 learners who attended a Grade R class.	0.35
	Gross enrolment rate at primary school	0.96
	Gross enrolment rate at secondary school	0.89
	FET NC(V) graduation rate	0.7
	Numbers participating in AET.	TBD
Goal 3: Human and Community Development **Targets 2015-2020**	Longevity, life expectancy	M: 58.4 and F: 62.7
	Decrease in absolute poverty: % below food poverty line	10.79
	(Baseline: NIDS, 2008, PL = half R418 proposed by NPC)	
	Decrease in social inequality: share of income earned by poorest	22.1
	60% (source data: NIDS)	
	Total number of crimes measured as the number of crimes	2500
	reported per 100 000 /population)	
Goal 4: Strategic Infrastructure **Targets 2017 - 2035**	Spatial accessibility index as per methodology set out in the KZN PGDP goal area for spatial equity.	TBD
	% of households with access to minimum water standard.	0.58
	% of households with yard water connections	0.55
	% of households with sanitation to MIG standards	0.26
Goal 5: Environmental Sustainability **Targets 2015 - 2020**	Number of NPAES areas	TBD
	Megawatts produced by means of renewable energy sources	TBD
	No of disaster events responded to	TBD
Goal 6: Governance and Policy **Targets 2015 - 2020**	Clean audits achieved in District and Local Municipalities	90% Clean Audits
	Creation of a single window of co-ordination between the Provincial Government, Municipalities and Non-Governmental forums	New Intervention
	Functionality of IGR forums	TBD
Goal 7: Spatial Equity **Targets 2015-2020**		
Percentage Housing Backlog	Baseline Alfred Duma LM: 69.0%	TBD
	Baseline Inkosi Langalibalele LM: 66.5%	TBD
	Baseline Okhahlamba LM: 64.0%	TBD

Source: UTDM Growth and Development Strategy, 2018

For each of the domains, the UTDM Growth and Development Strategy further identified primary detailed indicators and target implementation timeframes in five-year increments.

3.3 Population Growth Scenarios

Umgeni Water, in collaboration with Statistics South Africa, developed a population growth scenario for 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 II projected the population for the UTDM from 2015 to 2035, as illustrated in Table 3-4.

Table 3-4: UTDM Demographic Projections – Population, UAP Phase II

Local Municipality	2015	2020	2025	2030	2035
Emnambithi/Ladysmith	248 655	267 278	283 273	301 683	314 898
Imbabazane	118 686	127 051	134 112	142 071	147 543
Indaka	108 626	116 052	122 234	128 990	133 346
Okhahlamba	138 751	148 728	157 149	166 792	173 609
Umtshezi	87 215	93 519	99 092	105 460	109 843
TOTAL	**701 933**	**752 628**	**795 860**	**844 996**	**879 239**

Source: UAP Phase II, 2016

Most people resided in the Emnambithi / Ladysmith LM which during the 2011 Census, had an estimated 53% of the population living in urban areas. The Umtshezi LM had most people living in urban areas, estimated at 61%. The growth rate per annum varied between 1.14% (Indaka LM) and 1.33% (Emnambithi / Ladysmith LM.

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

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

Local Municipality	2020	2025	2030	2035	2040	2045	2050
Alfred Duma	363,066	366,899	368,684	376,705	384,900	393,274	401,830
Inkosi Langalibalele	209,671	211,885	212,915	217,547	222,280	227,116	232,057
Okhahlamba	141,131	142,621	143,315	146,432	149,618	152,873	156,199
Total	**713,867**	**721,405**	**724,914**	**740,685**	**756,799**	**773,263**	**790,086**

Source: UAP Phase III, 2020

The average annual population growth rate for the municipalities between 2020 and 2025 is estimated to be 0.21% and from 2030 to 2050, it increases to 0.43%.

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

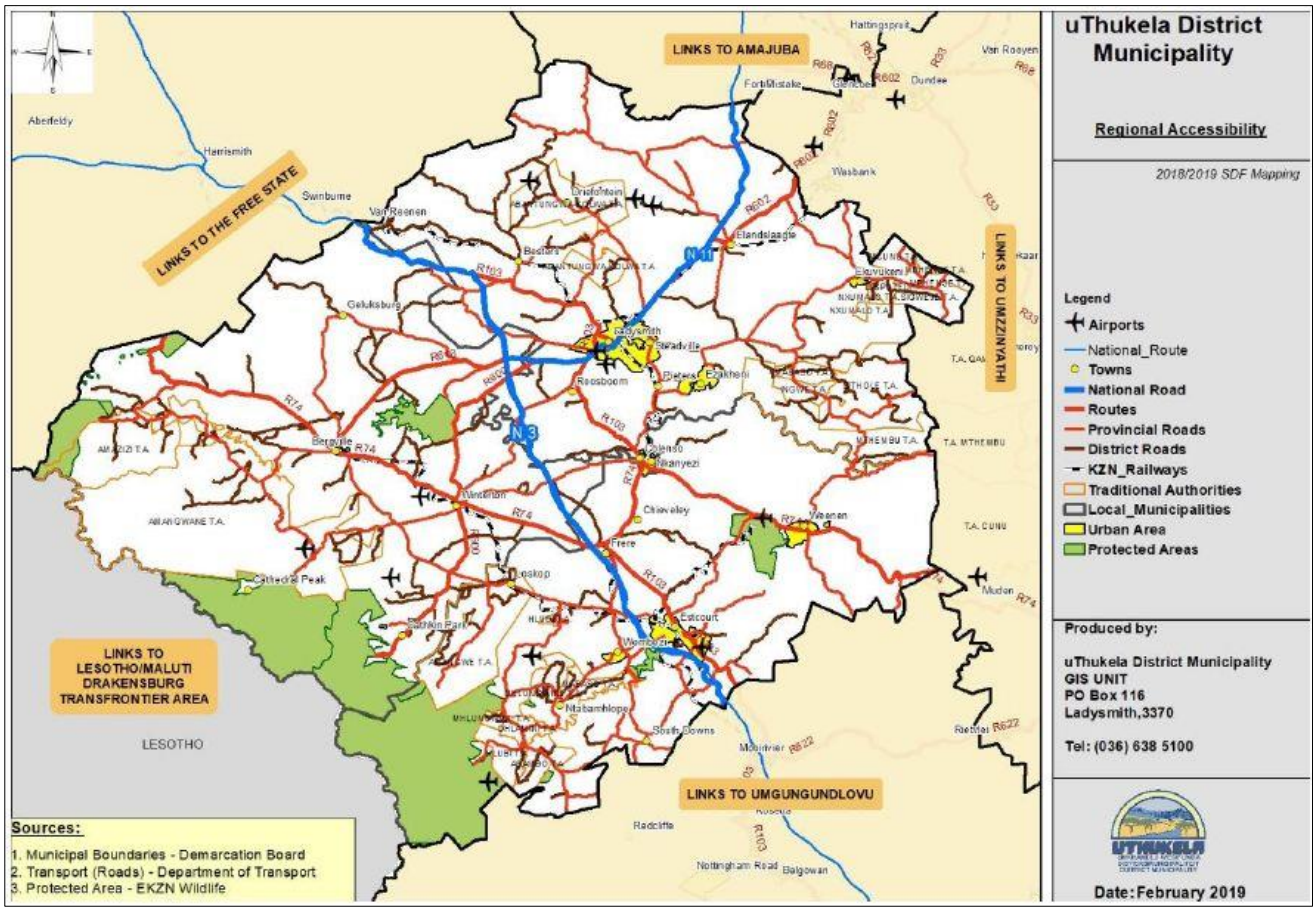
From the UTDM SDF (2018/2019), that aligns to the KZN Provincial Spatial and Economic Development Strategy (PSEDS), the areas of Ladysmith and Estcourt were identified as Level 3 nodes and Bergville as a Level 4 node. These nodes have existing basic and critical infrastructure and strong economic activities that can be further developed. Ekuvukeni is a secondary node providing an important linkage between urban and rural areas.

Furthermore, a tourism route was proposed along the Ukhahlamba Drakensberg, encompassing Harry Gwala (previously Sisonke), Umgungundlovu and uThukela District Municipalities, then another along Umtshezi, Msinga and Nkandla Local Municipalities.

The following roads also form important corridor linkages within the UTDM and neighbouring areas: the N3 and N11 national highways, the R74, R103, R600 and R616.

Figure 3-2 from the SDF provides an overview of the corridors, road network and nodes.

Figure 3-2 UTDM Spatial Development Corridors and Nodes



Source: UTDM Spatial Development Framework

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:

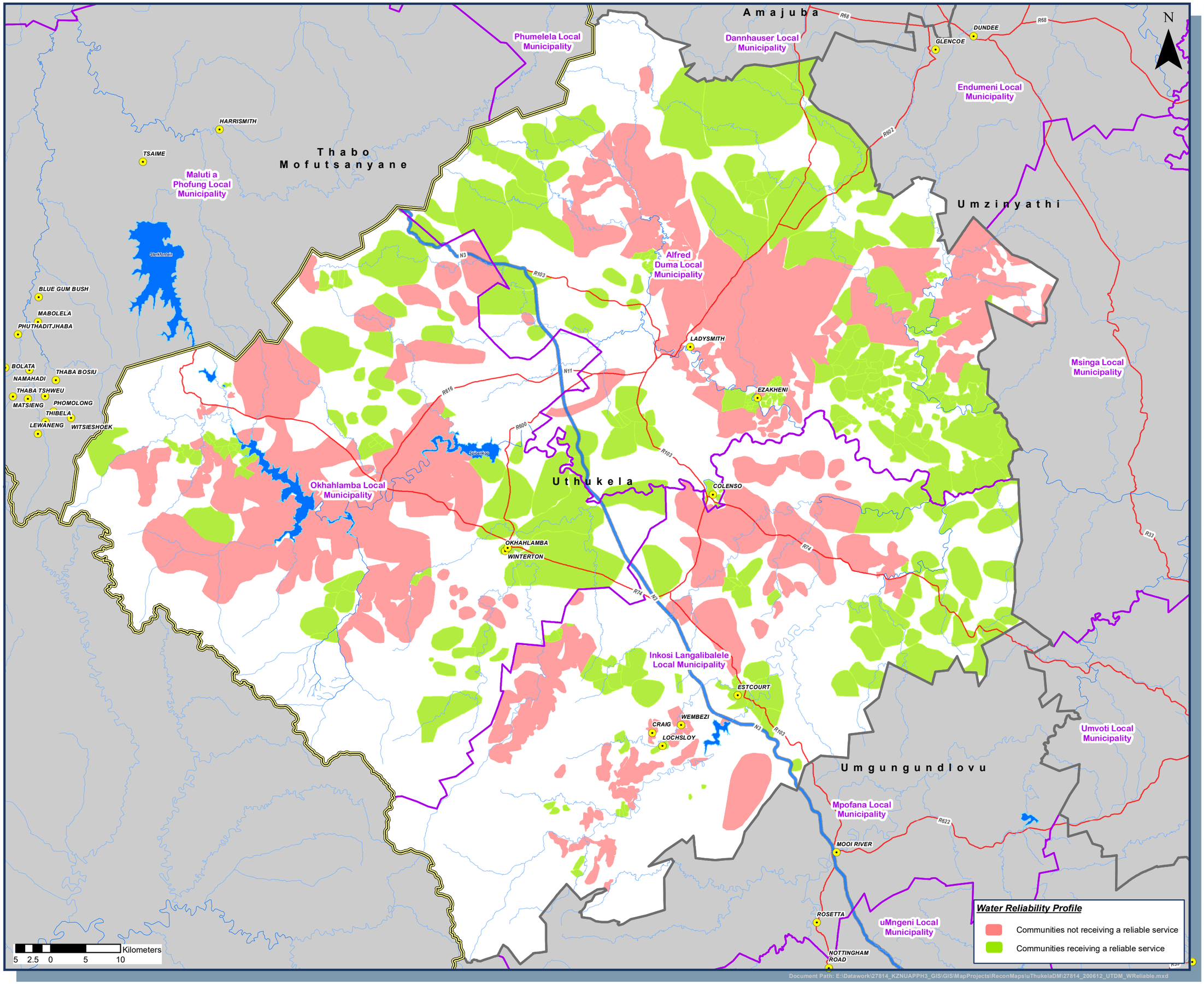
Table 4-1: Water Supply Levels, Community Survey 2016

	Access to safe drinking water		No access to safe drinking water		Total households
LM Name	**No. of Households**	**Percentage (%)**	**No. of Households**	**Percentage (%)**	
Alfred Duma	66 480	78.3	18 473	21.7	84 953
Inkosi Langalibalele	36 856	81.1	8 613	18.9	45 469
Okhahlamba	19 676	67.8	9 341	32.2	29 017
Total	**123 011**	**77.2**	**36 428**	**22.8**	**159 439**

Source: StatsSA, 2016 Community Survey

The municipality with the highest level of service, by number of households having access to safe drinking water, is the Alfred Duma LM, representing 42% of the WSA total number of households.

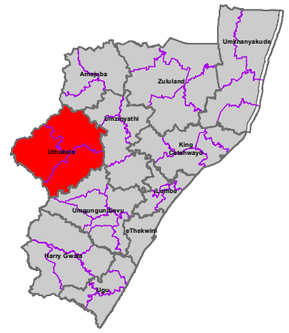
The Alfred Duma LM also has the highest number of households not having access to save drinking water, representing 12% of the WSA total number of households.



Legend

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

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT 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

uThukela District Municipality

DATE COMPLETED:

2020/11/26

MAP NO.:

DC23: Figure 4.1

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMaps\uThukelaDM\27814_200612_UTDM_WReliable.mxd

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
Alfred Duma	74 442	54 782	74%	19 660	26%
Inkosi Langalibalele	45 925	19 907	43%	26 018	57%
Okhahlamba	26 516	12 052	45%	14 464	55%
Total	**146 883**	**86 741**	**59%**	**60 142**	**41%**

Source: DWS RF geodatabase, 2016

The information is corresponding in part to the 2016 Community Survey for the Alfred Duma and Okhahlamba LMs but differs to quite an extent for the Inkosi Langalibalele LM with the DWS data reporting a significantly higher number of households not having reliable water supply.

4.1.3 Water Services Master Plan, 2017

The UTDM Water Services Master Plan reports on water service levels from the 2011 Census and the UTDM Backlog Study (2016/2017).

4.1.4 WSA Backlog Study 2016/2017

The UTDM Backlog Study on Water and Sanitation Services included an assessment of service levels and backlogs. The table below illustrates the information from the backlog study report for water supply.

Table 4-3: WSA Backlog Study, Water Supply, 2016/2017

	Access to safe drinking water		No access to safe drinking water		Total households
LM Name	**No. of Households**	**Percentage (%)**	**No. of Households**	**Percentage (%)**	
Alfred Duma	20 401	59%	14 164	41%	34 565
Inkosi Langalibalele	38 985	87%	5 702	13%	44 687
Okhahlamba	75 356	90%	8 361	10%	83 717
Total	**134 742**	**83%**	**28 227**	**17%**	**162 969**

Source: WSA Backlog Study, 2016/2017

The study report examined the results from the backlog study, versus the 2011 Census and the 2016 Community Survey. The differences were noted and the UTDM, in agreement with the DWS and COGTA, preferred to use the information from the backlog study.

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

<table>
<tr><td rowspan="8">System Input Volume (corrected for known errors)</td><td rowspan="4">Authorised consumption</td><td rowspan="2">Billed Authorised Consumption</td><td>Billed Metered Consumption (including water exported)</td><td rowspan="2">Revenue Water</td></tr>
<tr><td>Billed Unmetered Consumption</td></tr>
<tr><td rowspan="2">Unbilled Authorised Consumption</td><td>Unbilled Metered Consumption</td><td rowspan="6">Non-Revenue Water (NRW)</td></tr>
<tr><td>Unbilled Unmetered Consumption</td></tr>
<tr><td rowspan="4">Water losses</td><td rowspan="2">Apparent Losses</td><td>Unauthorised Consumption</td></tr>
<tr><td>Customer Metering Inaccuracies</td></tr>
<tr><td rowspan="3">Real Losses</td><td>Leakage on Transmission and/or Distribution Mains</td></tr>
<tr><td>Leakage and Overflows at Utility's Storage Tanks</td></tr>
<tr><td>Leakage on Service Connections up to point of Customer metering</td></tr>
</table>

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 or R6/kl is reflected in the last column.

Table 4-4: 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 uMhlathuze	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 4-5: 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%
eThekwini	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%
KZN Total	**221**	**38 220**	**1 409 481**	**55**	**10 527 711**	**2 616 248**	**78.3%**

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 has a WC/WDM Strategy dated 2015, but it states that it should be reviewed annually to update progress and objectives. The following objectives were listed in the 2015 Strategy:

- To inculcate a culture of water conservation to the consumers;
- To reduce non-revenue water losses to below 40% during 2016/2017 financial year;
- To reduce non-revenue water to below 30% during 2019/2020 financial year;
- To increase revenue water;
- To identify and register indigent consumers and provide them with free basic water supply;
- To identify business consumers that do not pay for water and make them pay for water supplied;

- To identify households that can afford to pay for water but do not pay for water and make them pay water supplied to them;
- To measure water balance in order to quantify water supply input volume, revenue water and separate non – revenue water into real water losses and apparent water losses; and
- To ultimately reduce real water loss to below 20% over five years.

To achieve the listed objectives, the WSA identified various activities, grouped under technical, social, economic and regulatory interventions.

The DWS prepared for all WSAs in KZN: KZN Water Conservation and Water Demand Management Handbook. Guideline Manual in Support of DWS Regulatory Requirements for Water Service Authorities, July 2018, uThukela DM.

The Handbook provides theoretical information on WC/WDM and may be able to assist WSAs in addressing water conservation and water demand management activities.

4.2.3 Water Services Master Plan, 2017

The information reported in the Water Services Master Plan, 2017, was obtained from a Non-Revenue Master Plan prepared in 2015. The infrastructure leakage index (ILI) was given as 15.7, “which in effect implies that the level of physical leakage is almost 16 times higher than it should be. The average ILI value for South African municipalities is estimated at 6.8”.

The latest No Drop Guideline (2018) classifies an ILI of more than eight (>8), as “Extremely high physical water loss” and is the worst-performing category of evaluation of the ILI.

4.2.4 WSA Water Balance

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 39 850 700kl/a (109.18Mℓ/d);
- Authorised consumption of 29 569 044kl/a (81.01 Mℓ/d);
- Water losses totalling 10 281 656kl/a (28.17 Mℓ/d), comprising of Apparent losses of 2 130 513kℓ/a (5.84 Mℓ/d) of and Real losses of 8 151 143kℓ/a (22.33 Mℓ/d).

The 2019/2020 IDP states a target revenue collection of 50.1% as the current (January 2019) collection rate is only 42%.

4.3 WATER DEMAND MODEL

The Water Demand Model as described within Section 1.5 was applied to the uThukela District 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 UTDM, per local municipality in megalitres per day (Mℓ/d).

Table 4-6: Water Demand Projections per LM, Mℓ/d

	Population				Water Demands (Mℓ/d)			
LM Name	**2020**	**2030**	**2040**	**2050**	**2020**	**2030**	**2040**	**2050**
Alfred Duma	379,552	394,244	414,147	435,054	85.05	90.61	96.41	102.71
Inkosi Langalibalele	219,369	227,861	239,364	251,447	40.19	45.42	48.46	51.78
Okhahlamba	147,658	153,374	161,117	169,251	21.17	28.23	29.97	31.92
Total	**746,579**	**775,480**	**814,628**	**855,752**	**146.41**	**164.27**	**174.84**	**186.41**

Source: Water Demand Model, UAP Phase III, 2020

The Alfred Duma LM, being the most urbanised and developed, has the highest water requirements, representing 58% of the total water demands of 2020 and 55% of the total water demands of 2050. The Alfred Duma LM also has the highest growth in water demands, representing an increase of 17.66 Mℓ/d from 2020 to 2050. The Inkosi Langalibalele LM has an increase in requirements of 11.60Mℓ/d from 2020 to 2050 and the Okhahlamba an increase in requirements 10.74 Mℓ/d.

4.3.2 Demand per Regional Water Scheme

This sub-section presents the projected population and water demands from 2020 to 2050 for the UTDM, 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 4-7: Water Demand Projections per WSS, Mℓ/d

		Population				Water Demands (Mℓ/d)			
WSS Number	**WSS Name**	**2020**	**2030**	**2040**	**2050**	**2020**	**2030**	**2040**	**2050**
UTK001	Bergville WSS	28,483	29,585	31,079	32,648	5.13	5.81	6.18	6.59
UTK002	Colenso WSS	7,138	7,414	7,789	8,182	1.69	1.77	1.89	2.01
UTK004	Driefontein WSS	73,365	76,205	80,052	84,093	12.62	13.84	14.75	15.75
UTK007b	Estcourt Rudimentary WSS	44,167	45,876	48,192	50,625	7.77	8.18	8.73	9.33
UTK007	Estcourt WSS	70,847	73,590	77,305	81,207	17.09	18.48	19.60	20.82
UTK008	Ezakheni WSS	81,096	84,235	88,488	92,955	22.64	23.80	25.32	26.96
UTK005	Indaka WSS	101,137	105,052	110,355	115,926	17.61	18.50	19.68	21.00
UTK010	Ladysmith WSS	92,969	96,568	101,443	106,564	26.81	28.21	30.00	31.92
UTK012	Loskop-Bhekuzulu WSS	31,680	32,906	34,567	36,312	5.47	5.83	6.28	6.78
UTK013	Ngedlengedleni WSS	4,182	4,344	4,563	4,793	0.74	0.78	0.83	0.89
UTK014	Tugela Estates WSS	11,148	11,579	12,164	12,778	1.99	2.09	2.22	2.37
UTK016	Winterton WSS	6,743	7,004	7,358	7,729	1.50	1.58	1.69	1.80
UTK017	Zwelisha Moyeni WSS	50,325	52,273	54,912	57,684	8.78	9.48	10.11	10.80
Total		**603,279**	**626,633**	**658,267**	**691,498**	**129.85**	**138.36**	**147.28**	**157.00**

Source: Water Demand Model, UAP Phase III, 2020

The Ladysmith WSS and Ezakheni WSS have the highest water demands for 2020 and till 2050, totalling 49.45 Mℓ/d in 2020 and 58.87 Mℓ/d in 2050, representing 38% of the total for these bulk schemes for both planning horizon years. The Ladysmith WSS and Ezakheni WSS also have the highest growth in demands from 2020 to 2050, totalling 9.42 Mℓ/d.

5. EXISTING WATER SUPPLY INFRASTRUCTURE

This chapter provides an overview of the more important water resources in the WSA. Note that water resources that forms part of water supply systems into the WSA, but that are located outside the WSA will also be reported on. This may include water resource transfer schemes or water supply schemes traversing the WSA and catchment boundaries. Some of the water sources are also shared for the purpose of industrial and irrigation / agricultural use.

5.1 WATER RESOURCE AVAILABILITY

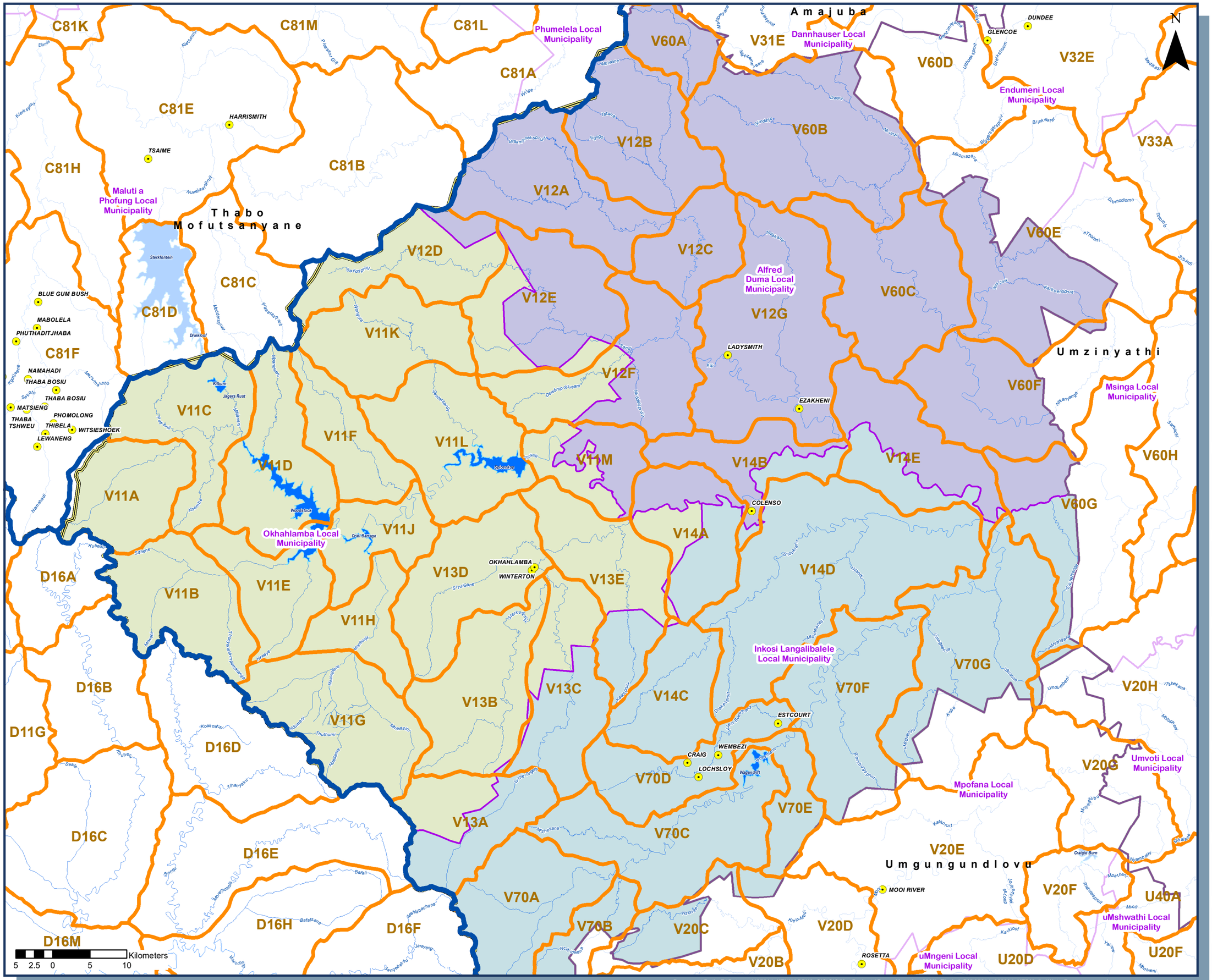
5.1.1 Overview

The UTDM falls within the Pongola Mtamvuna Water Management Area (WMA), which drains towards the east coast of South Africa. The WMA border coincides with the northern and western border of the District. The north-western border is formed by the Free State Province and the south-western border by the neighbouring country of Lesotho.

The most prominent surface water resources in the UTDM are the Tugela (also known as Thukela) River, including major tributaries such as Klip, Little Tugela, Bushmans and Sundays Rivers, then also the Woodstock Dam, Spioenkop Dam, Wagendrift Dam and the Driel Dam (Barrage).

There are a number of groundwater sources such as boreholes and springs, which are utilised in the rural areas of each municipality as well as to augment surface water schemes' supply.

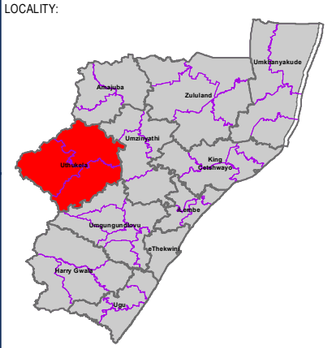
See Figure 5-1 for an overview of water resources.



Legend

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names
- Rivers
- Water Management Area
- Quaternary Boundaries & Numbers (W22F)

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT 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

uThukela District Municipality

DATE COMPLETED: 22 October 2020

MAP NO.: **DC23: Figure 5.1**

5.1.2 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 5-1: Water Use Licensing, 2019. uThukela District Municipality.

Water User Sector	Resource Type	Registered Volume (m^3)	Time Interval	Registered Volume in Mℓ/d
Domestic	BOREHOLE	193 347.00	PER YEAR	0.53
Domestic	DAM	10 460.00	PER YEAR	0.03
Domestic	RIVER/STREAM	88 762.00	PER YEAR	0.24
Domestic	SCHEME	5 901.00	PER YEAR	0.02
Other user sector	BOREHOLE			
Other user sector	BOREHOLE	491 697.00	PER YEAR	1.35
Other user sector	DAM	43 429 309.00	PER YEAR	118.98
Other user sector	RIVER/STREAM			
Other user sector	RIVER/STREAM	74 206 514.00	PER YEAR	203.31
Other user sector	SCHEME	24 782 193.00	PER YEAR	67.90

Source: DWS KZN Regional Office, 2019

The information provided includes all allocations for the District Municipality. Only very small water volumes are registered for domestic use, from boreholes, surface waters and schemes, which are less than actual use. For the other user sectors, most include water allocations for irrigation, of which the larger volumes are from the Tugela River, Little Tugela River, Sterkspruit and Lindeque Spruit.

The water use license information on the WARMS, from local surface water sources as abstracted by the WSA for all WTPs, need to be confirmed if recorded by the DWS.

Information on Full Supply Capacity (FSC) and Historic Firm Yield (HFY) is provided in Table 5-2.

Table 5-2: Water Resources: FSC, HFY

Water Resource	FSC	HFY
	Mm³	Mm³/a
Woodstock Dam	373.26	280.00
Spioenkop Dam	272.27	73.00
Driel Barrage[3]	10.36	
Wagendrift Dam	55.90	107.00
Kilburn Dam	36.70	
Oliphantskop Dam – original capacity	1.45	3.34
Oliphantskop Dam – 85% siltation (current status)		1.10
Oliphantskop Dam – with EWR		0.00
Slangdraai Dam	10.30	6.14
Bushmans River	Available water in the Bushmans River catchment up to the confluence with the Tugela River is 80 million m³/a, while the water requirements for the catchment was 40 million m³/a.	
Tugela River	The DWS indicated (2019) that the hydrology of the Tugela River catchment needs to be updated as a matter of priority.	

Source: DWS UAP Phase II (2016); Umgeni Water (2020)

An overview of the 2005 water balance and reconciliation of main surface water sources in the Thukela Water Management Area (in million m³/a) is provided in Table 5-3.

Table 5-3: Reconciliation of water requirements and available resources for the Thukela WMA

Key Area	Available water			Water requirements/allocations			Balance
	Local yield	Transfers In	Total	Local requirements	Transfers out	Total	
Upper Thukela	506	0	506	114	377+11[1]	502	**4**
Little Thukela	8	0	8	38	0	38	**(30)**
Bushmans	80	0	80	40	29[1]	69	**11**
Sundays	8	0	8	32	0	32	**(24)**
Mooi	64	0	64	52	22	74	**(10)**
Buffalo	174	0	174	96	55	151	**23**
Lower Thukela	105	40[2]	145	58	87	145	**0**
Total	**945**	**0**	**945**	430	541	971	**(26)**
Allocable							**38[3]**

Notes:

1. Releases to support the Lower Thukela Key Area.
2. Supplied from Spioenkop and Wagendrift dams.
3. Since it is not feasible to supply the shortages in the Little Thukela, Sundays or Mooi Key Areas from the surpluses in the Upper Thukela, Buffalo or Bushmans Key Areas, there is at least 38 million m³/a available for allocation in the Thukela WMA.

Source: Uthukela Water Management Area ISP (DWAF, 2004).

[3] Driel Barrage is called Driel Dam on maps. A "barrage" is a type of dam and therefore "Driel Barrage" and "Driel Dam" are used Interchangeably (Umgeni Water, 2020)

5.1.3 Surface Water Resources

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

5.1.3.1 Tugela River

The Internal Strategic Perspective report for the Thukela Water Management Area (2004), describes the Tugela River water source's geographic location as follows:

"*The Thukela River originates in the Drakensberg Mountain Range along the border between Lesotho and the KwaZulu-Natal Province of South Africa. The river meanders through central KwaZulu-Natal and discharges into the Indian Ocean. The Little Thukela, Klip, Bloukrans, Bushmans, Sundays, Mooi and Buffalo rivers are the major tributaries of the Thukela, which together make up the 'V' Hydrological Drainage with its 88 quaternary catchments. The total area of the Thukela River catchment is approximately 30 000 km² in extent*."

The total MAR of the Tugela River catchment is high 3 799 million m³/a but can be highly variable. The ISP listed the following Key Areas for the WMA:

- Upper Thukela (tertiary catchments V11, V12, V14 and quaternaries, V60G, H and J);
- Little Thukela (tertiary catchment V13);
- Bushmans (tertiary catchment V70);
- Sundays (quaternary catchments V60A, B, C, D, E and F);
- Mooi (tertiary catchment V20);
- Buffalo (tertiary catchments V31, V32 and quaternaries, V33A and B); and
- Lower Thukela (tertiary catchments V40, V50 and quaternaries, V33C, D and V60K);

The UTDM comprises all or part of the following tertiary catchments: V11, V12, V13, V14, V60 and V70.

The Tugela River is utilised (in the UTDM) for abstraction of water to supply the Colenso, Langkloof, Ezakheni and Tugela Estates Water Supply Schemes. Furthermore, the Driel Barrage on the Tugela River supplies the Bergville WSS and the Spioenkop Dam on the Tugela River supplies the Ladysmith WSS and Ezakheni WSS. The Tugela River is also known as the Thukela River.

The Thukela WMA ISP, made mention of the proposed Jana Dam to be located on the Tugela River (DWAF, 2004). This Dam would assist in the water supply and economic development in the region and may still be an option for development.

The following Wastewater Treatment Plants (WWTP) discharge in or nearby in a tributary of the Tugela River:

- Ladysmith WWTP: 2014 Green Drop score of 86.4%, putting it in a high risk category;
- Ezakheni WWTP: 2014 Green Drop score of 86.4%, putting it in a high risk category;
- Bergville WWTP: 2014 Green Drop score of 76.5%, putting it in a high risk category; and
- Colenso WWTP: 2014 Green Drop score of 70.6%, putting it in a medium-high risk category.

During the last Strategy Steering Committee meeting of the Integrated Vaal Reconciliation Study, held in October 2019, it was identified that the hydrology for the Tugela-Vaal System needs to be updated and recalibrated (DWS, 2019).

5.1.3.2 Tugela-Vaal Transfer Scheme and Ingula Pumped Storage Scheme

The main surface water resources in the UTDM form part of a larger system of water resources of strategic importance. The Tugela and Klip Rivers are the primary rivers in this catchment. The Tugela Catchment Area is divided into the Upper Tugela (tertiary catchments V11, V12, V14 and quaternaries, V60G, V60H and V60J) and Lower Tugela (tertiary catchments V40, V50 and quaternaries, V33C, V33D and V60K) at the confluence of the Bushmans River, north-east of Weenen.

The Upper Tugela Mean Annual Runoff (MAR), is 1 256 million m³/a. The gross available surface water resource in the Upper Tugela based on development levels in 2004 was estimated to be between 553 and 570 million m³/a depending on where water in this catchment was supplied to. This already included provision for the Environmental Water Reserve estimated at 71 million m³/a. Water use within the Upper Tugela was estimated to be 114million m³/a (312.33Mℓ/d), with irrigation the biggest user at 87 million m³/a (238.36Mℓ/d). Urban use (Ladysmith, Colenso and Bergville) was estimated at 17 million m³/a (46.58Mℓ/d), according to the Thukela Water Management Area ISP (DWAF, 2004).

The following is an extract from the Thukela Water Management Area ISP (DWAF, 2004) and provides an overview of the Thukela-Vaal Transfer Scheme infrastructure:

- Woodstock Dam, located on the upper reaches of the Thukela River, is the main source of water for the scheme. The net storage capacity of the dam is 373 million m³;
- Driel Barrage situated on the Thukela River 7km downstream of the Woodstock Dam. Water is released from Woodstock Dam to Driel Barrage, from where it is pumped to a transfer canal that feeds the Jagersrust Balancing Dam. The net storage capacity of Driel Barrage is 8.7 million m³;·
- A transfer canal, which allows transferred water to gravitate to the Jagersrust Balancing Dam before it is pumped to Kilburn and over the catchment divide to Sterkfontein Dam. The canal has a maximum capacity of some 20 m³/s;
- Diversion weirs in the Upper Thukela River which divert run-of-river flows upstream of Woodstock Dam into the above-mentioned transfer canal. The estimated capacity of these diversions is some 4 m³/s, which is additional to the total canal capacity of 20 m³/s mentioned above;
- Jagersrust Balancing Dam, provides balancing storage at the end of the transfer canal from where water is pumped to Kilburn Dam;
- Kilburn Dam, the lower reservoir in the Eskom pump storage scheme, with an active storage capacity of 27 million m³. Kilburn Dam provides both the storage for the transferred water and is a sump for the water discharged after electricity generation;·
- Sterkfontein Dam, located in the headwaters of the Wilge River, a main tributary of the Vaal River, provides storage for water transferred over the escarpment. This dam, with a capacity of 2 617 million m³. Water is released from Sterkfontein Dam to Vaal Dam when required;·

- Driekloof Dam is the upper reservoir of the Eskom pump storage scheme and is situated in the upper reaches of the Sterkfontein Dam catchment. Water can only be transferred from Driekloof Dam to Sterkfontein Dam when Driekloof Dam is spilling;·
- Spioenkop Dam was constructed to regulate flow downstream of the Driel Barrage to mitigate the effect of the transfer scheme. This dam has a capacity of 280 million m³. The dam also supplies water to Ladysmith and supports water requirements for the farmers between the dam and the confluence of the Little Thukela River. Releases are also occasionally called for to dilute the effluent discharged by Sappi into the lower Thukela near the river mouth. It should be noted, however, that SAPPI does not have a formal allocation from the dam. The Tugela-Mhlathuze Water Transfer Scheme at Middeldrift can also be supported from Spioenkop Dam if necessary; and
- The proposed Jana Dam, which forms part of the Thukela Water Project, will also be located in this area on the Thukela River should this project proceed. It is important that the optimal long-term benefits be derived from the development of the Thukela River, and that both the national and local interests should be considered.

The uThukela-Vaal Transfer Scheme transfers 377 million m3/annum (DWA 2004: 26) from this area of the uThukela Catchment to the Vaal System. In addition, the recently constructed Ingula Pumped Storage Scheme (commissioned between 2016 and 2017) is a hydroelectric peaking power scheme developed to generate electricity on the Braamhoek River (*in* Umgeni Water Infrastructure Master Plan, 2020). The Ingula Pumped Storage Scheme which includes the Braamhoek Dam (lower dam of the Scheme) on the Braamhoek River, is located in the north-west reaches of the Alfred Duma LM, about 14km from Driefontein.

5.1.3.3 Woodstock Dam

The Woodstock Dam (quaternary catchments V11D and V11E) is the main source of water for the Thukela-Vaal Transfer Scheme. It is currently not used directly as water source for domestic supply. It does however play a strategic role in the management of the local resources further down the Tugela River and the Thukela-Vaal Transfer Scheme.

The Zwelisha Moyeni WSS is located next to the Woodstock Dam, but obtains its water from the Khombe River canals linked to the Tugela River.

5.1.3.4 Khombe River

A weir in the Khombe River (quaternary catchment V11C) canals, a tributary of the Tugela River and located just upstream from the Woodstock Dam, supplies the Zwelisha Moyeni WSS.

According to the water balance assessment for the Thukela Internal Strategic Perspective (ISP) from the Department of Water Affairs and Forestry (2004), the available water in the upper Tugela River was 506 million m³/a and the water requirements including the transfer of 377 million m³/a to the Vaal River System and 11 million m³/a to support the lower Tugela River system, leaves a surplus of 4 million m³/a (10.96Mℓ/d). This water is available in the Spioenkop Dam, which is downstream of the Zwelisha Moyeni Water Supply

Area. The current and future water requirements for the Zwelisha Moyeni WSS can be met from the available water supplies in the upper Tugela River (All Towns Strategy for the Zwelisha Moyeni WSS, 2011).

5.1.3.5 Driel Dam and Driel Barrage

The Bergville WSS obtains its water from the Tugela River (quaternary catchment V11J), where it is abstracted about six (6) kilometres downstream of the Driel Dam and Driel Barrage. The Driel Dam, together with the Woodstock and Spioenkop Dams, are part of the Upper Tugela River regulatory system for water resources.

The 2011 All Towns Strategy for the Bergville WSS indicated that although the water requirements can currently be met from the Tugela River, the Operating Rules of the Upper Tugela need to be reviewed in order to ensure future water requirements from this source area are met.

The 2004 Thukela Water Management Area ISP (DWAF) advised on the construction of farm dams, which are generally discouraged upstream of the Driel Barrage. There is potentially between 15 million m³/a and 30 million m³/a available downstream of the Driel Barrage.

5.1.3.6 Spioenkop Dam

The Spioenkop Dam (quaternary catchment V11L), is located about 25km downstream of the Driel Barrage. The Dam forms an integral part of water regulation in the Tugela River. It is currently used by the Ladysmith WSS for domestic supply at a rate of 18Mℓ/d (6.57 million m³/a) and it provides water for irrigation.

Depending on where water in the system is abstracted, there could be 15 million m³/a available at the Spioenkop Dam, if abstracted directly from the Dam. If abstracted at the proposed Jana Dam site, there could be 30 million m³/a available.

There is still uncertainty (2019) on the available yield from the Spioenkop Dam, for allocation to the domestic water supply sector. The DWS should be able to advise. However, during the last Strategy Steering Committee meeting of the Integrated Vaal Reconciliation Study, held in October 2019, it was identified that the hydrology for the Tugela-Vaal System needs to be updated and recalibrated. The potential additional water requirements to serve the ADLM's current and future needs were mentioned.

5.1.3.7 Little Tugela River

The Little Tugela River (quaternary catchments V13A and V13C) is utilised for abstraction of water to supply the Loskop WSS and Winterton WSS.

According to the Thukela WMA ISP (DWAF, 2004), the river is mainly utilised for irrigation and water requirements already exceeded the sustainable yield. Furthermore, if the Ecological Water Reserve (EWR) is implemented, there will be no further opportunity for increased water use from this system. The Thukela WMA ISP further reported that after allowance for the EWR and return flows, the yield from the Little Tugela River catchment was estimated as 8 million m³/a (at a 1:50 assurance level). The water balance was a deficit of

30 million m³/a, after allocations were made for irrigation, domestic (urban and rural), industrial and afforestation.

There are plans to increase the treatment capacity of the Loskop WTP and to construct a new abstraction works along the Little Tugela River. The 2010 Business Plan for this (and the other scheme components) indicated that a hydrological assessment still needed to be conducted to establish whether the yield from the river would be sufficient to augment supply to the Loskop WTP and its extension to Bhekuzulu and Empangweni. The hydrological study was completed in October 2015 and confirmed that enough water is available to meet the requirements for water supply to domestic consumers (IWR Water Resources, 2015).

5.1.3.8 Klip River

The Klip River (quaternary catchment V12G), supplies water to the Ladysmith WTP for use in Ladysmith, Steadville and Roosboom (augmented with supply from the Spioenkop Dam).

The Klip River originates north-west of Ladysmith, at the border with the Free State Province, in quaternary catchment V12A. It flows east then south, passing through the Driefontein WSS area before joining the Sand River about 3km before the Ladysmith WTP. Water quality in the Klip River is affected by high organic loads from uncontrolled sewerage along its flow path as well as from agricultural and livestock activities.

The Windsor Dam (+-6km north of the Ladysmith WTP) is the only dam in the Klip River and was initially built as a flood control measure for Ladysmith. It has been superseded by the Qedusizi Dam (Mt Pleasant Dam) in fulfilling this purpose. These dams are not inundated at present (2019).

The Klip River is not reliable during winter months or during periods of drought, putting the reliability of supply to the towns of Ladysmith and Roosboom at risk if water conservation measures are not implemented as well.

No further information is available on the available yield from the Klip River.

5.1.3.9 Oliphantskop Dam

The Oliphantskop Dam (quaternary catchment V60C), is located in the Sundays River, approximately 8km west of Ekuvukeni and is used as water source for the Ekuvukeni Lime Hill WSS. The estimated full storage capacity of the Dam is 1.45 million m³ (DWA, 2012). The **DWA report emphasised the need to identify an alternative water source for domestic consumers reliant on this Dam** as the siltation problem will only continue due to upstream soil erosion. The abstraction point is located beneath the silt level and this has a direct, adverse effect on the operation of the WTP and quality of water produced.

Umgeni Water undertook a hydrographic survey (2020) of the Oliphantskop Dam and it indicated a current dam capacity of 0.379 million m³ (Umgeni Water, 2020).

The dam was empty during December 2015 as a result of drought conditions (experienced in most of the country), but the level has increased slightly after some rains during January 2016 – see Figure 5-2. The current level of the dam is about 90% (June 2019), however the level of siltation affects abstraction and water supply from the Oliphantskop WTP and cannot fulfil the water requirements of the consumers in the Ekuvukeni Lime Hill WSS.

If the Environmental Water Reserve is taken into account, the Oliphantskop Dam cannot be utilised for any other water consumption activities.

Figure 5-2. Oliphantskop Dam – after rains that followed the drought conditions, January 2016

The UTDM appointed a contractor (2018/2019) for the desilting of the Oliphantskop Dam. The impact from the desilting process on water availability is still to be evaluated, but it appears not to have had a positive outcome to improve available yield from the dam.

5.1.3.10 Bushmans River

The Bushmans River (quaternary catchment V70G), is one of the two (2) water sources, the other being the Wagendrift Dam on the Bushmans River, supplying the Estcourt WSS. Abstraction takes place at the Bushmans River weir, to supply the Archie Rodel WTP, whereas the Wagendrift Dam supplies the George Cross WTP. The Bushmans River is also utilised as indirect source to supply the Weenen WSS by means of a balancing dam, supplied via an irrigation canal. The River is intensively used for irrigation (31 million m³/a) whereas the domestic use represents only a fraction (4 million m³/a).

The Bushmans River originates near the borders with Lesotho and neighbouring uMgungundlovu District Municipality, in the southern part of the UTDM (quaternary catchment V70A). Along with the Tugela River, it is one of the longest rivers in the UTDM. It traverses in a north-easterly direction, past Estcourt, where it joins the Tugela River, near Tugela Estates in the east of the UTDM. The Wagendrift Dam just south of Estcourt is located on the Bushmans River.

The Thukela WMA ISP (2004) reported that after allowance for the EWR and return flows, the yield from the Bushmans River catchment was estimated as 80 million m³/a (at a 1:50 assurance level). The water balance was a surplus of 40 million m³/a, after allocations were made for irrigation, domestic (urban and rural),

industrial and afforestation. This water – mainly available through the Wagendrift Dam – could be utilised in this catchment area, or the Lower Tugela catchment area.

The proposed Mielietuin Dam site (part of the Thukela Water Project) is located near Estcourt in the southern reaches of the Bushmans River, south of the Wagendrift Dam. If constructed, it could further improve water security in this area. However, correspondence with DWS (30 November 2015) confirmed that the Lesotho Highlands Water Project Phase 2 would take preference over the Thukela Water Project.

The DWS noted that the hydrology information for the Tugela River Catchment needs to be updated to inform planning and decision-making in on the Vaal-Transfer scheme as well as overall on the Integrated Vaal System (DWS, October 2019).

The quality of water in the Bushmans River below Estcourt is affected by diffuse pollution from agricultural activities. The Estcourt WWTP discharges into the Bushmans River, just south of the Wagendrift Dam. The 2014 Green Drop score of the WWTP was 86.4%, putting it in a high-risk category. The Weenen anaerobic ponds are located just south of the town of Weenen and north of the Bushmans River. Its 2014 Green Drop score was 47.1%, representing a low risk.

5.1.3.11 Wagendrift Dam

The Wagendrift Dam (quaternary catchment V70C), is the second of the two water sources supplying the Estcourt WSS, where abstraction takes place at the Dam to supply the George Cross WTP.

The Wagendrift Dam, just south of Estcourt, is located on the Bushmans River and was built in 1963 with its main purpose being supporting irrigation requirements. The Dam has a capacity of 55.9 million m³. The water balance in the Bushmans River catchment is 40 million m³/a and could be utilised through this Dam. New allocations have to take cognisance however of the Fairbreeze mine development (near the lower Tugela catchment) and ecological reserve requirements of the lower Tugela.

The DWS operates the Wagendrift Dam and the Bushmans Supply System. The yield of the dam far exceeds the existing demand and as a result there are no specific operating rules for this water resource. DWS have confirmed that they will be developing operating rules for this system in the near future (Umgeni Water, 2020).

5.1.3.12 Sundays River

The Sundays River (quaternary catchment V60B), originates in the north of the UTDM, at the border with the Free State Province and traverses south through the Ekuvukeni Lime Hill WSS, before it meets the Tugela River, near the confluence with the Bushmans River. The Oliphantskop Dam, located on the Sundays River, is the water source for the Ekuvukeni Lime Hill WSS.

The Slangdraai Dam (Waterfall, quaternary catchment V60B) in the upper reaches of the river is the main storage reservoir in this river, with a capacity of 10.3 million m³. The main use in this catchment area is for irrigation, followed by domestic consumption. The registered water use however reflects only a small percentage of the actual water use and needs to be verified.

The Thukela WMA ISP (2004) reported that after allowance for the EWR and return flows, the yield from the Sundays River catchment was estimated as 8 million m³/a (at a 1:50 assurance level). The water balance was a deficit of 24 million m³/a, after allocations were made for irrigation, domestic (urban and rural), industrial and afforestation.

The Sundays River is further impacted by diffuse pollution from rural domestic consumers having no improved access to sanitation, fertilizers and runoff from agricultural activities and disused coal mines

5.1.4 Proposed Potential Surface Water Sources

The following are proposed potential dams within the WSA from the ISP (DWAF, 2004):

- Jana Dam on the Tugela River, just below the confluence of the Tugela and Klip Rivers and about 20km south-east of Ladysmith;
- Mielietuin Dam on the Bushmans River, approximately 20km downstream of the Wagendrift Dam and about 16km north-east of Estcourt and before Weenen.

The development of new surface water resources will depend on detailed evaluations on the water requirements, economic and environmental costs and social benefits amongst other considerations. The DWS has recognised the need to review and update the Tugela Transfer Scheme's water resources hydrology model (Integrated Vaal Reconciliation SSC Meeting, October 2019). This will affect the potential planning and phasing of water resource infrastructure developments.

5.1.5 Groundwater Sources

There are a number of households (37 462, or 25% of the total number of households in the UTDM) in the non-urban areas that are supplied from groundwater sources (Census, 2011). Groundwater is also utilised for agriculture, irrigation and industrial activities. The water use registered on the WARMS database needs to be confirmed.

Groundwater quality is often affected by the coal mining activities (present and past) in the region, especially in the north and eastern parts of the UTDM. It is further affected by rural sanitation installations not according to minimum safe and hygienic standards and wastewater treatment plant not functioning properly and not operated according to license conditions.

According to the Thukela WMA ISP (DWAF, 2004), 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 m³/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 Upper Thukela River Key Area (year 2005), at 1:50 assurance level:

- At outlet of Key Area: 5million m³/a; and
- At Spioenkop Dam: 5million m³/a.

Groundwater availability in the Little Thukela River Key Area (year 2005), at 1:50 assurance level: 1 million m³/a.

Groundwater availability in the Bushmans River Key Area (year 2005), at 1:50 assurance level: 2million m³/a.

Groundwater use plays an in important role in providing access to water to rural areas where larger, formalised water supplies from treated surface water sources are costly to construct and maintain. The following areas are supported or rely fully on groundwater as source:

- South of the existing Zwelisha Moyeni WSS – borehole supply and springs;
- South of the existing Bergville WSS – borehole supply;
- Ngedlengedleni WSS – sand aquifer next to the Tugela River, borehole supply;
- Cornfields WSS – borehole supply for Cornfields town;
- Frere WSS – borehole supply for Frere town;
- Driefontein WSS – borehole supply;
- Howe Wittekop WSS – likely borehole supply. To be confirmed; and
- Ekuvukeni Lime Hill WSS – borehole supply to augment surface water supplies to the Fitty Park area.

Water quality of the boreholes in the uThukela catchment can be very poor (mining, VIP toilets etc) so many boreholes of very good yield are left capped in the uThukela catchment due to poor water quality (manganese, iron, fluoride, turbidity, E.coli etc.). Following the serious drought in KZN in 2015-2017, many boreholes were drilled by private users and organisations during that time that is affecting the recharge. Groundwater potential of KZN is particularly high compared with rest of South Africa and should be considered as an option in areas not close to surface water.

There are no large-scale hydrogeological studies available for the UTDM to quantify the groundwater available for use in domestic supply. There are however small-scale maps for South Africa which may provide a general indication of groundwater availability, yield, quality and borehole depth. Groundwater recharge ability was affected by an increase in drilling of boreholes during the 2015/2016 drought.

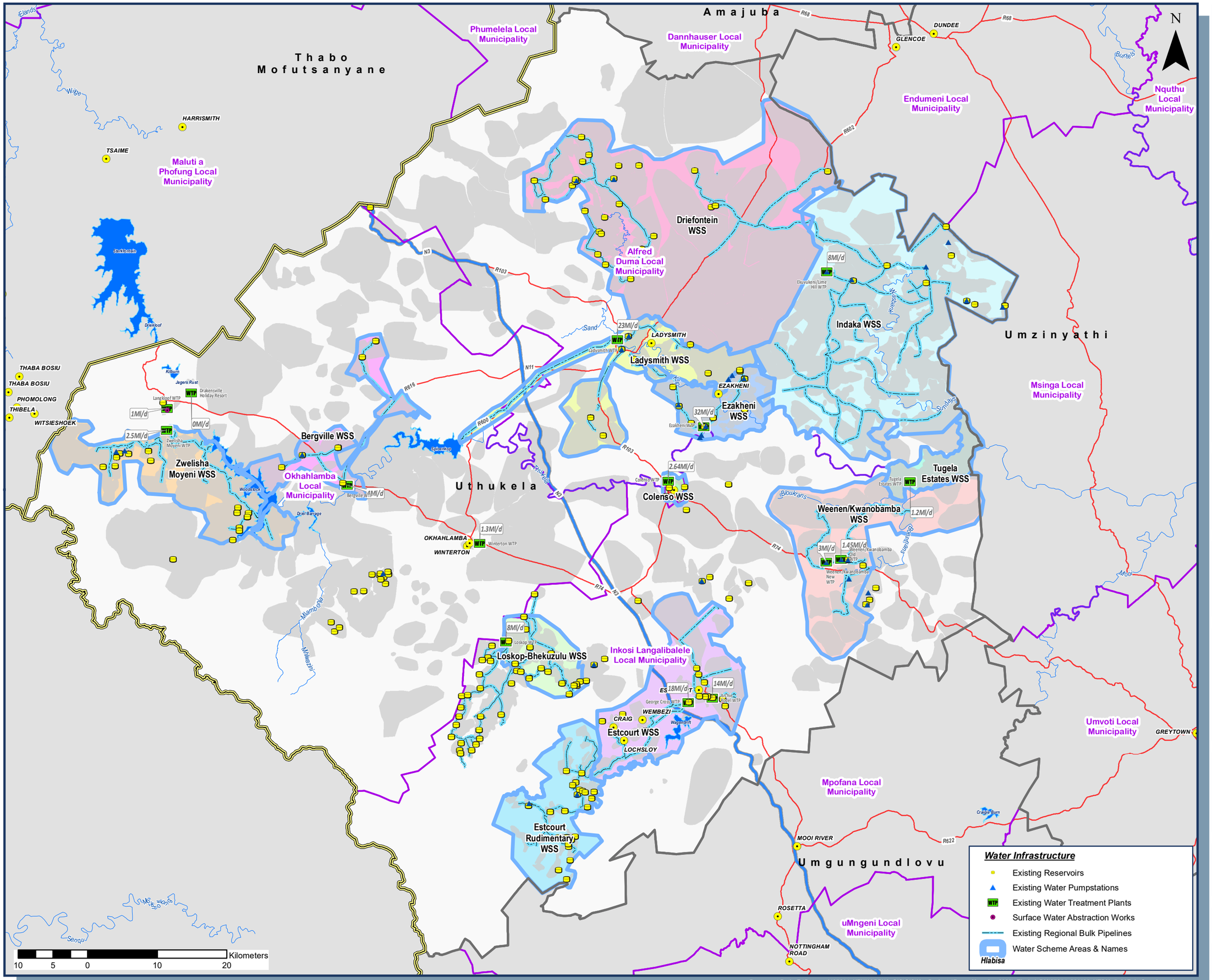
The Department of Education and Department of Public Works initiated a groundwater feasibility study – Schools Drought Relief Project, investigating the existing and potential groundwater use at education facilities, for the KZN Province in 2017. This information may be useful for guiding groundwater 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 WSA has 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 5-3). Brief discussions were held with the UTDM technical and PMU officials during May and June 2019. The UTDM 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.

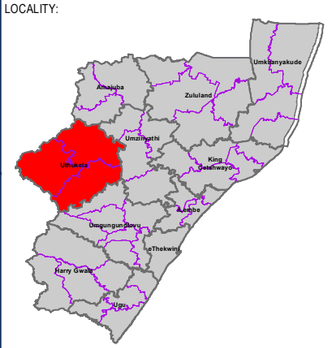
The UTDM has developed an Operational and Maintenance(O&M) Plan that was adopted by Council on the 18 May 2017 and the plan is under implementation (IDP, 2019/2020).



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- National Roads
- Main Roads
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns (Eshowe)

LOCALITY:



CLIENT: UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT 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

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components
uThukela District Municipality

DATE COMPLETED: 2020/11/26

MAP NO.: **DC23: Figure 5.3**

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 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.

A summary of the Water Treatment Works is provided in Table 5-4.

Table 5-4: Summary of WTPs

LM Name	Plant Name	Design Capacity (Mℓ/d)	Annual Average Production (Operational) (Mℓ/d)	Class of Plant
Alfred Duma	Colenso	2.64	2.8	C
	Ezakheni	32	30	B
	Ladysmith	23	27.5	C
	Oliphantskop	10	3.5	C
	Tugela Estate	1.2	0.45	C
Inkosi Langalibalele	Archie Rodel	12	10	C
	George Cross	21	22	C
	Loskop	1.2	1.20	C
	Moyeni	2.5	2.50	C
	Weenen (old)	1.44	1.5	
	Weenen (new)	2.5	1.7	
Okhahlamba	Bergville	4 (including a package plant, which is stand-alone but share the source and the final water reservoir, next to the main WTP, technical details of which have been excluded in this table, as the plant has been offline for 6 years*, and details of components are not available) (2.4Mℓ/day without the package plant)	3.2	C
	Langkloof	1.1	0.01	C
	Winterton	1.30	1.30	C
	Zwelisha Moyeni	5 (Actually 2.4Mℓ/day, as the new package plant was never used – not commissioned)	3.0	
Total Capacity		**120.88**	**110.66**	

Source: uThukela DM correspondence received and from interviews (June 2019); Umgeni Water (2020)

5.3.1 Bergville WSS

Most information for this scheme, depicted in Figure 5-4, is obtained from the UAP Phase II and updated from discussions with UTDM officials during 2019/2020. Supplemented with information from Umgeni Water, 2020.

The Bergville WSS is located in the central area of Okhahlamba LM, north of the Driel Barrage and between the Woodstock Dam in the west and Spioenkop Dam in the east. The Bergville WSS serves the areas of Bergville, Bethany, iNdanyana, Rookdale, Woodford, Hambrook, Action Homes, Malottas Kraal and Green Point, totalling 5 547 households (2011). There is another settlement north of Malottas Kraal, namely Greenpoint (2011 Census reported 54 households in this area), which is currently served via water tanker.

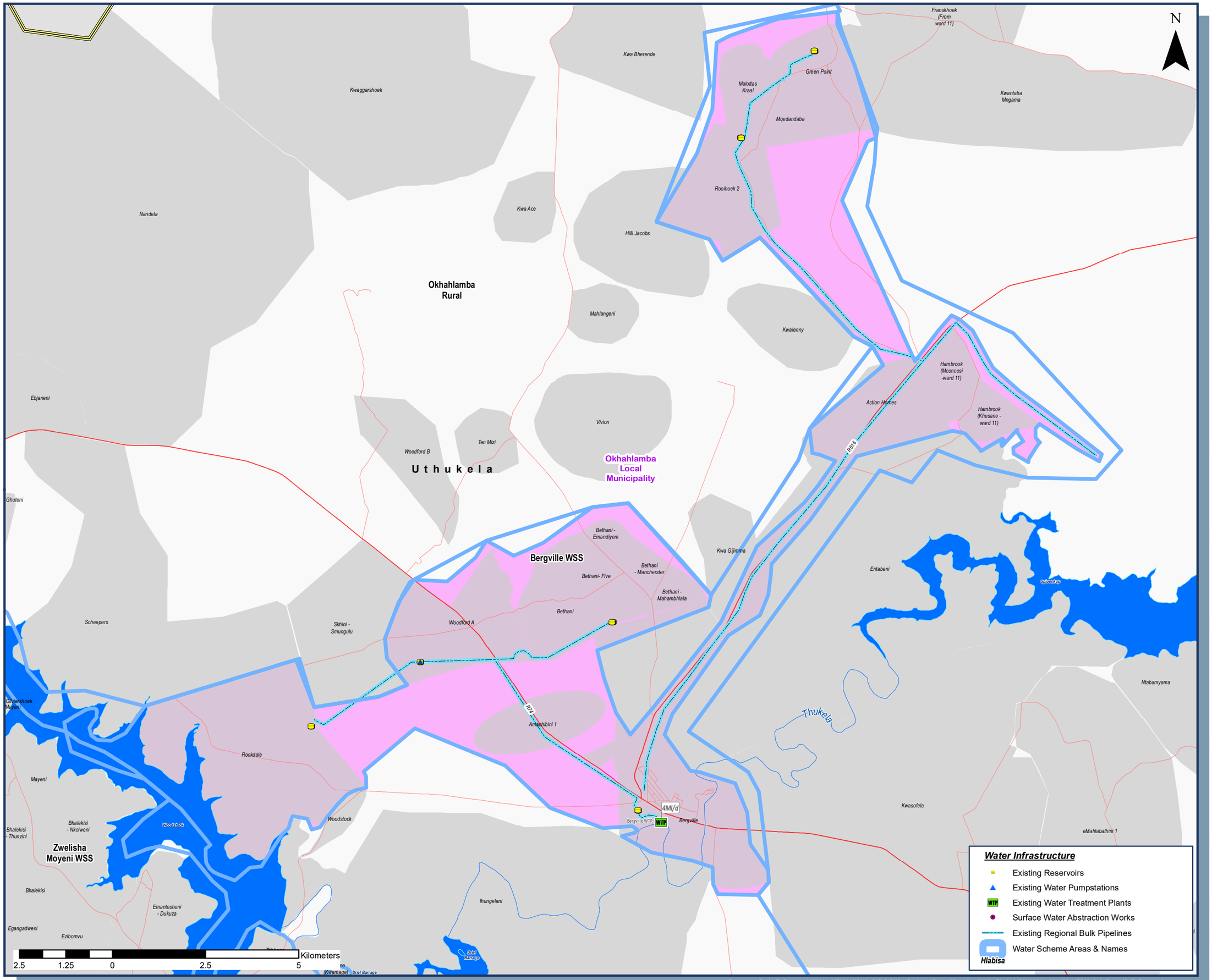
Water is abstracted from the Tugela River, about 10km downstream of the Driel Dam, where it is treated at the Bergville WTP. The 2014 Blue Drop Report (DWS) listed the design capacity of the Bergville WTP as 4.0Mℓ/d and operating at 3.72 Mℓ/d (93%) of its capacity. There were a number of refurbishment and improvement needs planned and implemented during 2015/2016 for this WTP to ensure optimal performance.

The settlements of Hambrook, Green Point and Malottas Kraal are also supplied from boreholes if there is water available, but are affected by drought conditions such as experienced during 2015/2016. Most of the bulk pipelines are originally asbestos-cement, but replacements are made using uPVC pipes.

The urban areas supplied by the Bergville WTP, abstracting from the Tugela River and have house connections or yard connections for water supply. In the rural areas consumers have community standpipes, but many households informally connected to increase their service levels to yard connections. In rural areas consumers also make use of boreholes fitted with hand pumps.

It is not known whether there are working bulk meters at the abstraction works or WTP. Water volume supplied is therefore estimated. This estimation is also used for the water balance reporting (UTDM, 2019).

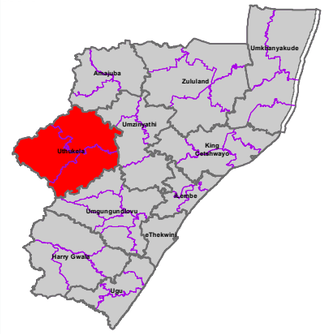
The larger consumers in this area include the offices of the Okhahlamba Local Municipality, the Disaster Management offices, then others such as educational or health services' facilities and Public Works facilities.



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- National Roads (N1)
- Main Roads
- Local Roads
- Dams & Dam Names (Driel Dam)
- Rivers
- Settlements
- Major Towns (Eshowe)

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT 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

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Bergville WSS
uThukela District Municipality

DATE COMPLETED: 2020/11/26

MAP NO.: **DC23: Figure 5.4**

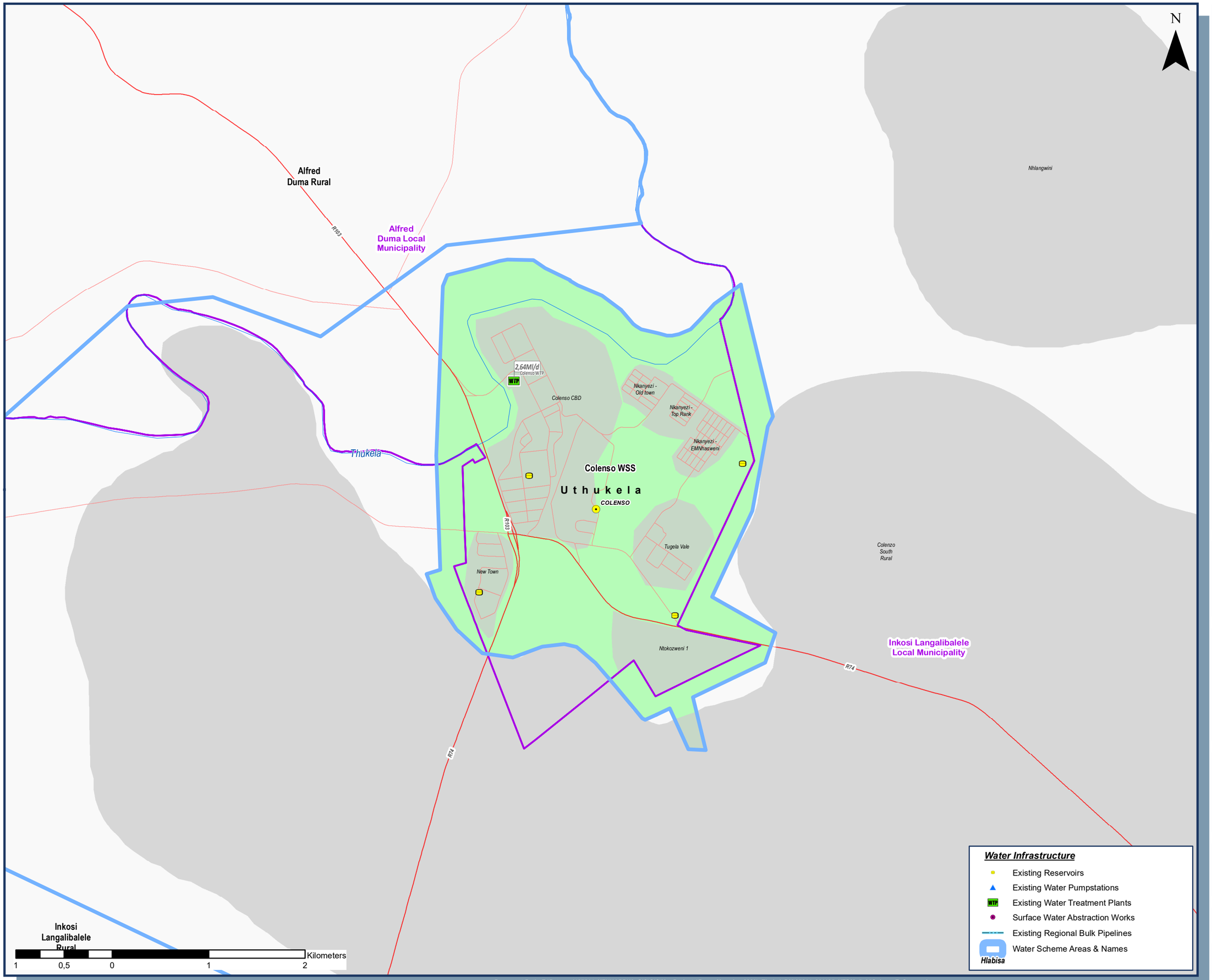
5.3.2 Colenso WSS

Most information for this scheme, depicted in Figure 5-5, is obtained from the UAP Phase II and updated from discussions with UTDM officials during 2019/2020. Supplemented with information from Umgeni Water, 2020.

The Colenso WSS is located in the southern portion of the Emnambithi / Ladysmith LM (now Alfred Duma LM) and currently serves the town of Colenso, Inkanyesi and the new Magazini development, totalling 1 642 households (2011). There is a mine development towards the east of Colenso and Inkanyesi, which may assist in improving infrastructure in this area.

Water is abstracted from the Tugela River, where it is treated at the Colenso WTP. The water abstracted has however a high turbidity (up to 4 000 NTU), which poses challenges in treating the water. The 2014 Blue Drop Report (DWS) listed the design capacity of the Colenso WTP as 2.6Mℓ/d operating at 1.378Mℓ/d (53%) of its design capacity.

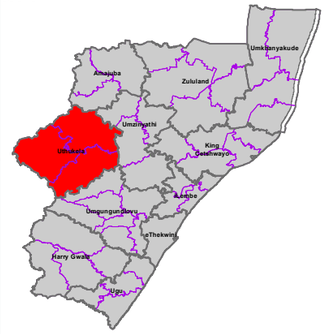
Currently Colenso obtains water primarily from the Tugela River, supplemented by groundwater (although the consumers service by the production borehole need to be confirmed). The WTP is operating at full capacity (design given as 2.64Mℓ/d, 2019) and needs to be upgraded to keep up with increased water requirements as it is operated above its design capacity (estimated operational volume of 2.8Mℓ/d). Most consumers are metered and billed.



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- National Roads
- Main Roads
- Local Roads
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT 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

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Colenso WSS
uThukela District Municipality

DATE COMPLETED: 2020/11/25

MAP NO.: **DC23: 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)

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_201125_UTDM_5_05ColensoExSup.mxd

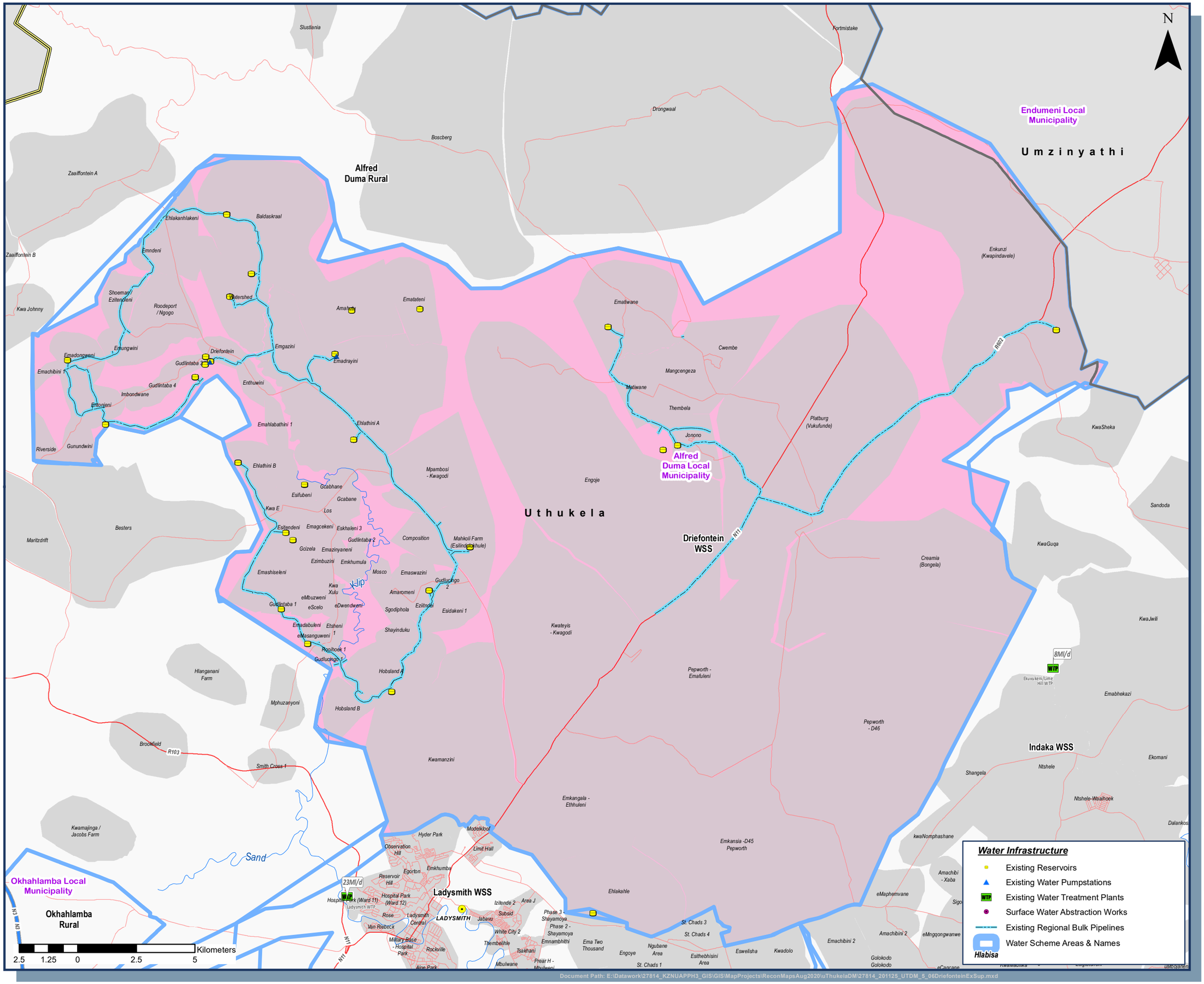
5.3.3 *Driefontein WSS*

Most information for this scheme, depicted in Figure 5-6, is obtained from the UAP Phase II and updated from discussions with UTDM officials during 2019/2020. Supplemented with information from Umgeni Water, 2020.

The Driefontein WSS is located in the central and eastern portion of the Emnambithi / Ladysmith LM (now Alfred Duma LM). It covers an area of approximately 850km² and serves around 13 settlements including Watersmeed and Matiwane, totalling 12 542 households (2011).

Consumers are supplied from groundwater (no WTP) and reticulation was being installed with plans to serve consumers by 2019 from water supplied from the Spioenkop Dam. However, the area of Driefontein, including Matiwane, is still served from production boreholes and hand pumps as no bulk infrastructure exists to supply this area from the Spioenkop Dam as initially envisaged. There are formal community standpipes, but many consumers connected informally to increase the water supply level to yard connections.

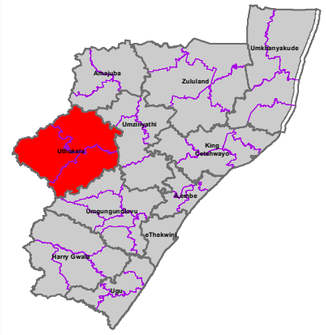
There are working bulk meters at the reservoirs but not read monthly or at other regular intervals. Since consumers connected informally, there are no consumer meters installed. Larger consumers would include Public Works facilities and education facilities.



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- National Roads
- Main Roads
- Local Roads
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns (Eshowe)

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

MARISWE
IMPROVING LIVES ENGINEERING 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 TITLE

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

Water Infrastructure

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Driefontein WSS
uThukela District Municipality

DATE COMPLETED: 2020/11/26

MAP NO.: **DC23: Figure 5.6**

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_201125_UTDM_5_06DriefonteinExSup.mxd

5.3.4 *Ekuvukeni Lime Hill WSS (Indaka WSS)*

Most information for this scheme, depicted in Figure 5-7, is obtained from the UAP Phase II and updated from discussions with UTDM officials during 2019/2020. Supplemented with information from Umgeni Water, 2020.

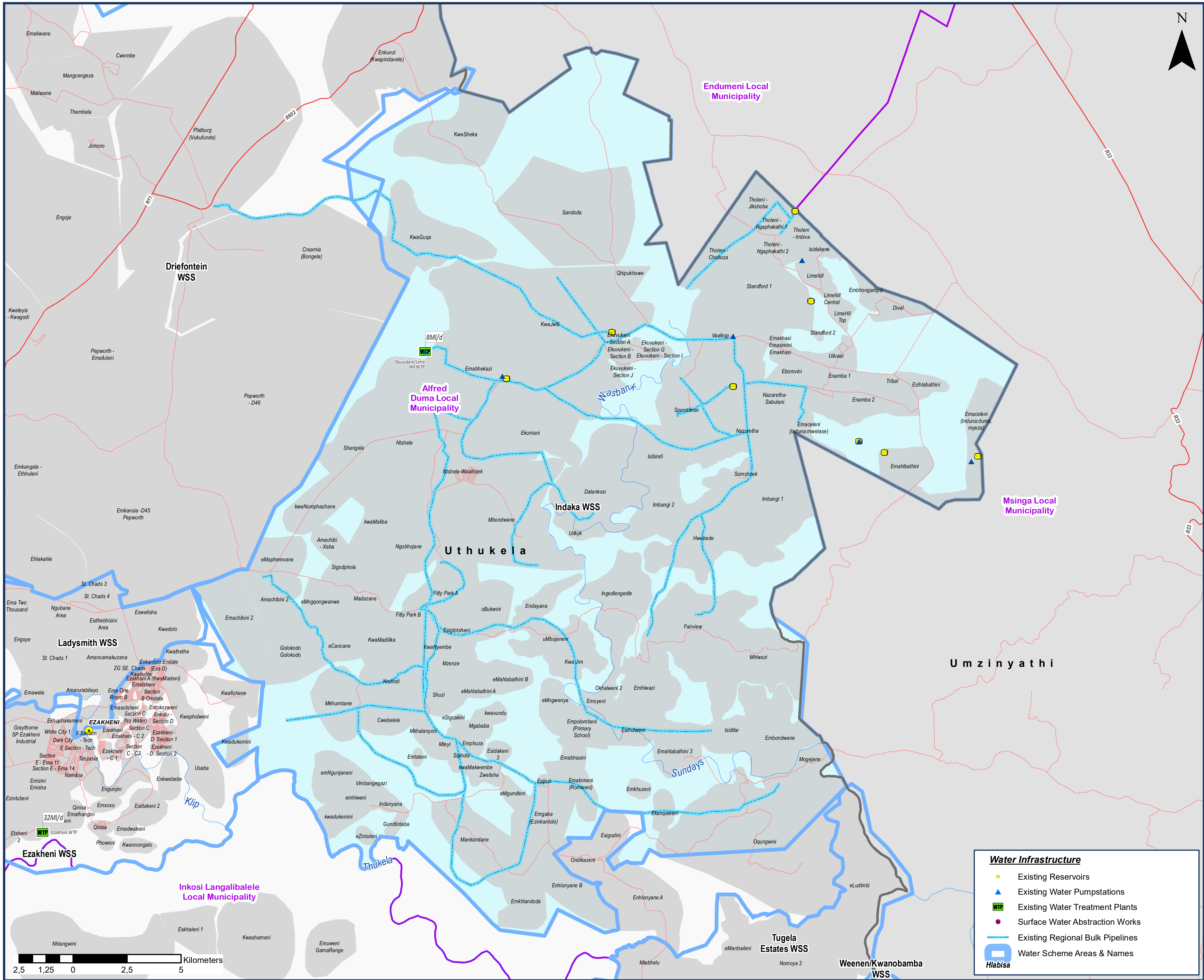
The Ekuvukeni Lime Hill WSS constitutes the majority of eastern portion of the now-called Alfred Duma LM and includes the areas of Ekuvukeni, Amakasi, Entabeni and Limehill along with another 54 settlement areas, totalling 17 566 households (2011). The WSS area footprint extends south up to Mziyanke, Zamokuhle, Mjinti and Ndaka, which is just south of the Sundays River. The area of Fitty Park however (north of Zamokuhle) receives water from the Ngedlengedleni-Umhlumayo WSS (November 2015).

Water is abstracted from the Oliphantskop Dam located on the Sundays River, where it is treated at the Oliphantskop WTP. The 2014 Blue Drop Report (DWS) listed the design capacity of the Ekuvukeni WTP as 10Mℓ/d and operating at 7.5Mℓ/d (75%) of its capacity. Some areas are also supplied from boreholes.

The Oliphantskop Dam was sludged up and dried up during December 2015 as a result of the prevailing drought conditions. The Internal Strategic Perspective (ISP) for the Uthukela Water Management Area indicated that the Sundays River catchment area is already in a deficit in water balance (DWAF, 2004). The Water Use License registered under the UTDM for use from the Oliphantskop Dam is only 1.323 million m^3/a (3.626Mℓ/d).

Water supply to outlying areas poses a challenge as water demand is high even though there is sufficient reservoir storage capacity. This area is already in a deficit of water supplied and it is exacerbated further due to the lack of sufficient water sources and ineffective WTP operations due to refurbishment operations being conducted by the UTDM.

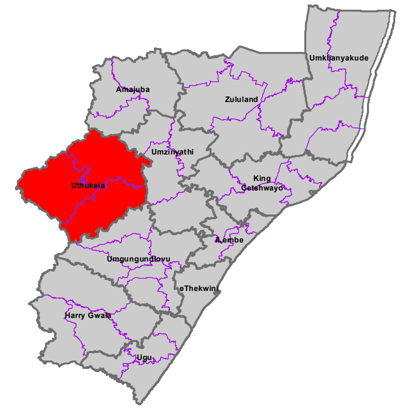
Most consumers in this scheme are not metered (except in Ekuvukeni proper) and not billed for water supplied. There are no bulk meters to measure water supplied.



Legend

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

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

MARISWE

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

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Indaka WSS uThukela District Municipality

DATE COMPLETED: 2020/11/25

MAP NO.: DC23: Figure 5.7

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_201125_UTDM_5_07IndakaExSup.mxd

The WSA indicated the design capacity of the Ekuvukeni WTP as 8Mℓ/d and it is operating at 4Mℓ/d, however the bulk meters at the plant are not working and the lower volume is due to refurbishment works being conducted at the plant by UTDM (UTDM, 2019/2020). The main storage reservoir has a capacity of 5Mℓ/d, but there are also other reservoirs of which the capacities need to be confirmed by the UTDM.

The AC rising main (450mm ø) is in a fair condition, however there are many leaks in the reticulation network. There are bulk sales meters at the Ekuvukeni main reservoir, Waaihoek and Mabhekazi (Umgeni Water owned), which are read on a monthly interval (Umgeni Water, 2020).

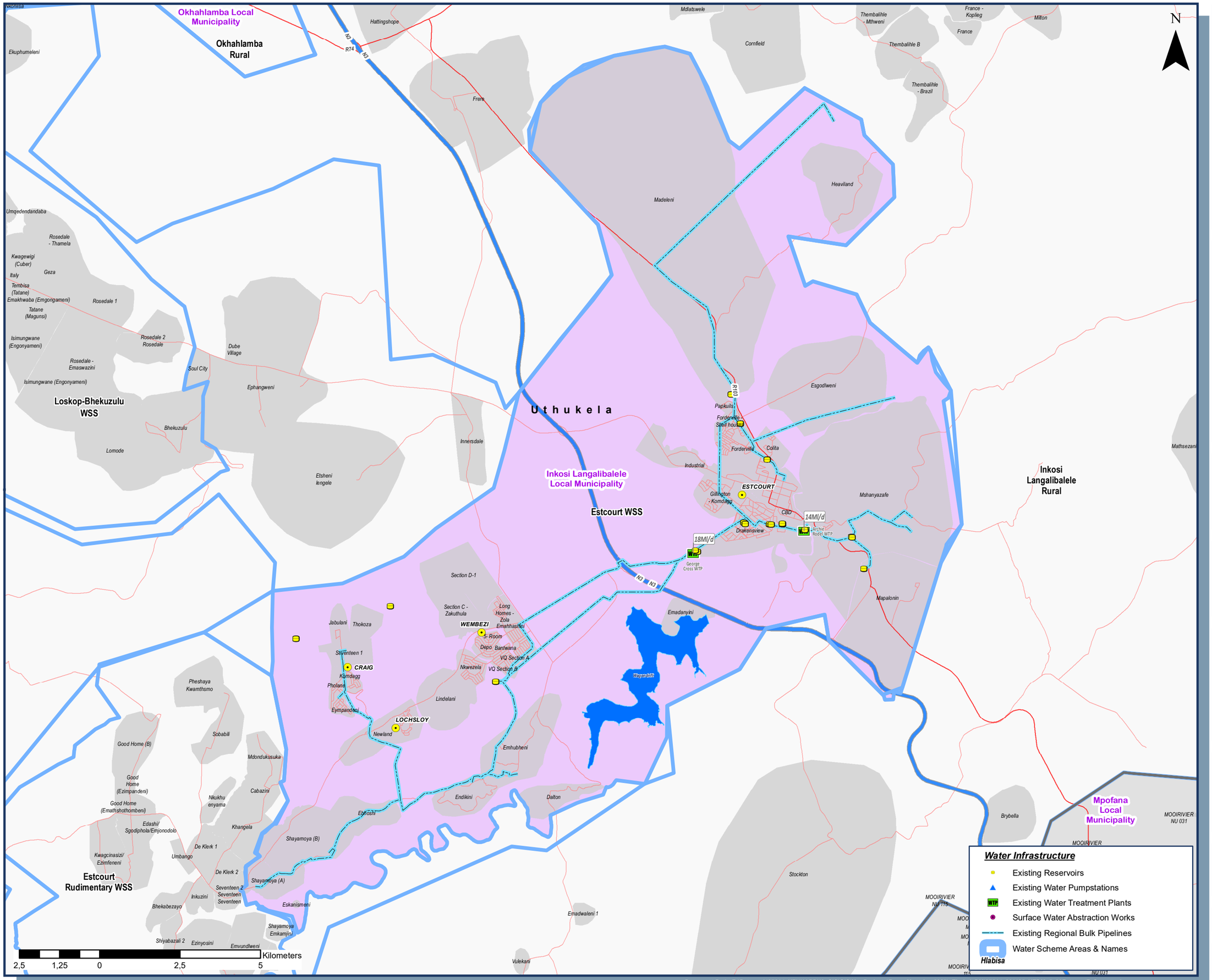
The area is being supplied with intermittent water, which may affect the integrity of the system and is not conducive for sustainable water supplied. The Indaka WSS is further augmented by groundwater in the form of five production boreholes that supply distribution reservoirs in the areas of Limehill, Rockcliff, Kwajwili, Qhinkhowe and Ekuvukeni central, however the water quality is poor due to high levels of sulphate (Umgeni Water, 2020).

5.3.5 Estcourt WSS

Most information for this scheme, depicted in Figure 5-8, is obtained from the UAP Phase II and updated from discussions with UTDM officials during 2019/2020. Supplemented with information from Umgeni Water, 2020.

The Estcourt WSS is located in the west-central portion of the Umtshezi LM (now Inkosi Langalibalele LM) but extends further south-west into the Imbabazane LM. The main urban areas are Estcourt, Wembezi, Zwelisha and Boschi and immediate surrounds. This is one of the major urban and industrial nodes in the UTDM. The scheme serves a total of 15 948 households (2011).

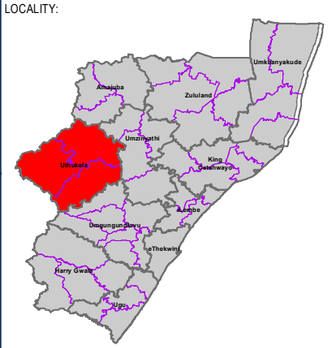
There are two water treatment works serving consumers in this scheme. The Archie Rodel WTP, located south-east of Estcourt next to the golf course, is supplied from the Bushmans River Weir. The 2014 Blue Drop report listed the design capacity of the Archie Rodel WTP as 12Mℓ/d and operating at 9Mℓ/d (75%) of its design capacity. The George Cross WTP, located to the south-west of Estcourt, is supplied from the Wagendrift Dam, where water is abstracted and pumped to the WTP. The 2014 Blue Drop report listed the design capacity of the George Cross WTP as 21Mℓ/d and operating at 18.06Mℓ/d (86%) of its design capacity.



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- National Roads
- Main Roads
- Local Roads
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA
UMKHANDLU WESIFUNDA DISTRIKSMUNISIPALITEIT DISTRICT MUNICIPALITY

UTHUKELA DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

MARISWE
IMPROVING LIVES ENGINEERING 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 TITLE

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Estcourt WSS
uThukela District Municipality

DATE COMPLETED:

2020/11/25

MAP NO.:

DC23: Figure 5.8

Water is supplied Wembezi and to a number of informal areas (not yet formalised), which increases the water required from each of the WTP. Most of the bulk meters in the water supply scheme are not operational and water actually supplied and consumed cannot be reported on accurately.

The majority of areas served by the Archie Rodel WTP have house connections and waterborne sanitation, with the remainder having VIP installations for sanitation services. The areas served by the George Cross WTP have a mixture of house connections, and waterborne sanitation, community standpipes, informal yard connections and VIP installations.

At present there is still spare capacity at the Archie Rodel WTP, but not at the George Cross WTP. There are plans to develop the Umtshezi East Regional Water Supply Scheme to extend supply from the George Cross WTP towards Weenen.

According to Umgeni Water, the Archie Rodel WTP is producing 10 Mℓ/d and the George Cross WTP is producing 22 Mℓ/d (2020). There are bulk meters installed and read at the WTP and at the WWTP.

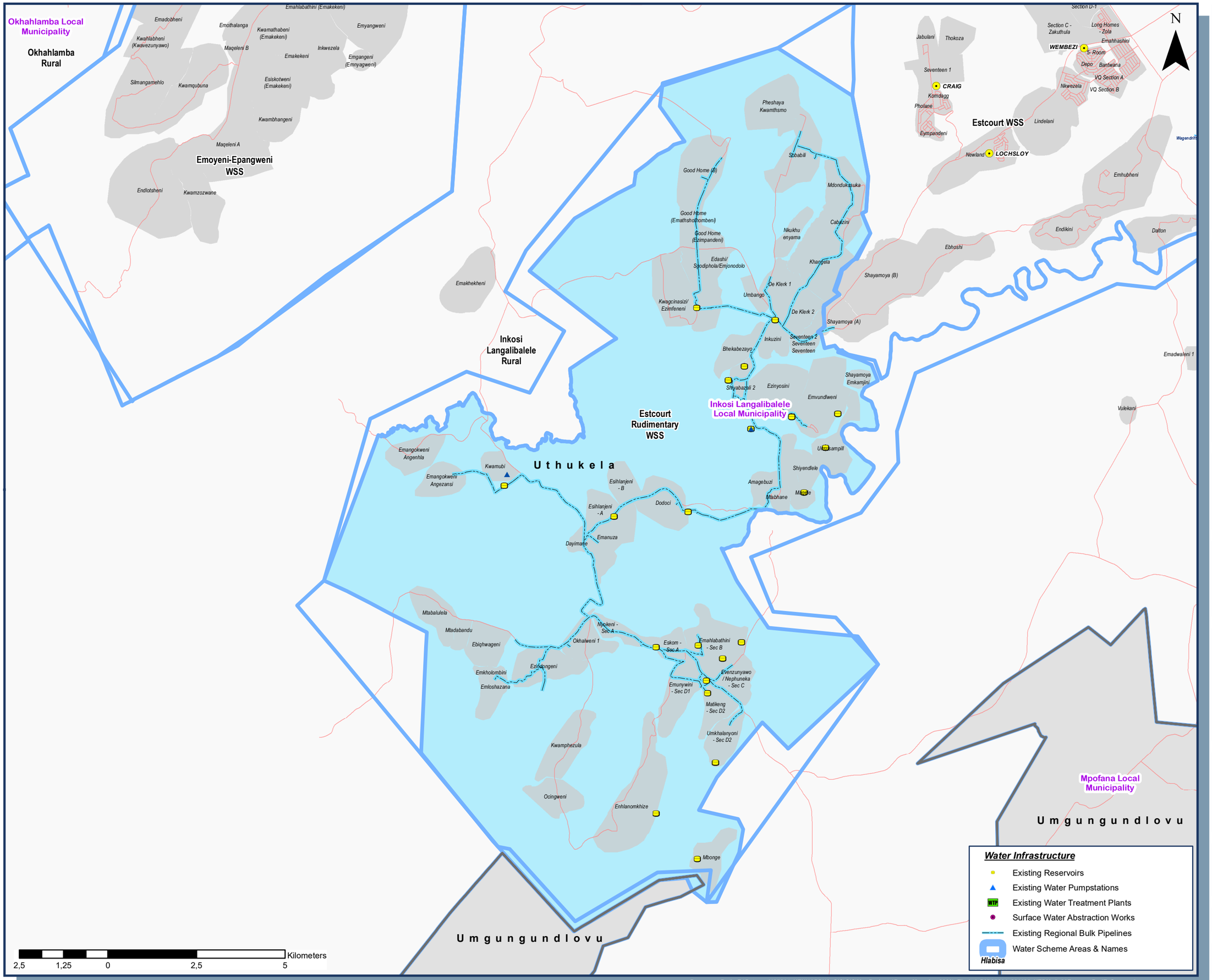
The area of Estcourt includes large industrial and manufacturing water consumers as well as other large consumers such as education and health facilities. Consumers served by the Archie Rodel WTP are metered and billed, but not all consumers served from the George Cross WTP are metered and billed. It is estimated that the real water loss of water supplied to the Wembezi area amounts to 10Mℓ/d.

More information was provided by the project consultant (2020) that is working in this area, indicating that to mitigate the water losses in Wembezi, bulk water is shut down at night and resumed again the next day. The area is also plagued by ageing infrastructure and has a high level of on-property leakages. The reticulation in Wembezi and Ntabamhlophe is still being upgraded.

5.3.6 Estcourt Rudimentary WSS

Most information for this scheme is obtained from the UAP Phase II and updated from discussions with UTDM officials during 2019/2020. Supplemented with information from Umgeni Water, 2020.

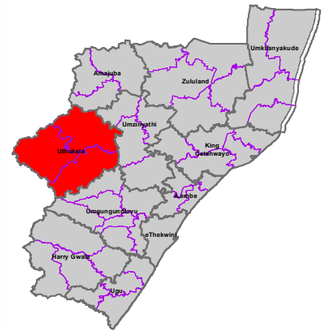
The area south of Shayamoya, and from KwaSobabili, Good Home and Edashi onwards (south), receive water from production boreholes and a weir in a tributary of the Bushmans River, constituting the Estcourt Rudimentary WSS, depicted in Figure 5-9. The service area includes an estimated 7 772 households (2011). Water from the river is treated with chlorine tablets before being supplied to consumers. Most consumers obtain water from community standpipes and sanitation is provided mostly in the form of pit and VIP latrines.



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- National Roads
- Main Roads
- Local Roads
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns (Eshowe)

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA
UMKHANDLU WESIFUNDA DISTRIK.MUNISIPALITEIT
DISTRICT MUNICIPALITY

UTHUKELA DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

MARISWE
IMPROVING LIVES ENGINEERING 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 TITLE

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Estcourt Rudimentary WSS uThukela District Municipality

DATE COMPLETED:

2020/11/25

MAP NO.:

DC23: Figure 5.9

Water Infrastructure

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

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_201125_UTDM_5_09EstcourtRudExSup.mxd

The UTDM could not provide more information on the phasing and design parameters of the extension of the Estcourt WSS into the Estcourt Rudimentary WSS in time for inclusion in this report.

According to the UTDM (2019/2020), water is still obtained from production boreholes. Consumers are not metered and the sanitation services remain in the form of pit and VIP latrines. There is a connection from the George Cross WTP that is supplied from the Wagendrift Dam on the Bushmans River. However due to the extent of leakages and informal connections in the Wembezi area and surrounds, water cannot reach the Estcourt Rudimentary WSS as intended. The UTDM PMU manager indicated that projects are under way to address water losses in Wembezi and strengthen the water supply network in the Estcourt Rudimentary WSS.

5.3.7 Ezakheni WSS

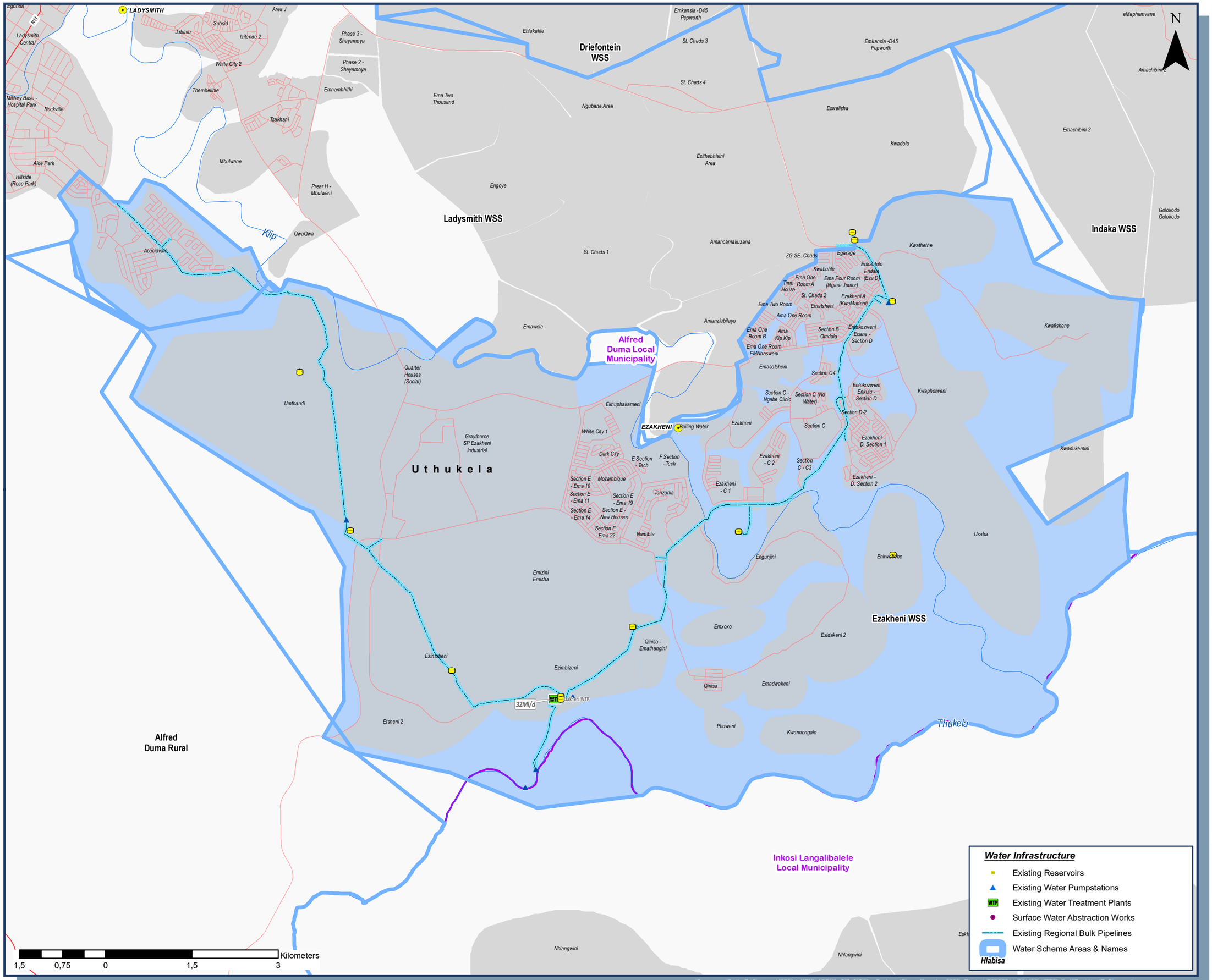
Most information for this scheme, depicted in Figure 5-10, is obtained from the UAP Phase II and updated from discussions with UTDM officials during 2019/2020. Supplemented with information from Umgeni Water, 2020.

The Ezakheni WSS is located adjacent to and east of the Ladysmith WSS, in the Emnambithi / Ladysmith LM (now Alfred Duma LM). It serves the areas of Ezakheni A to Ezakheni E, Acaciavale, Umbulwana, Graythorne and Brakfontein. Although the Doornkloof area (615 households, 2011) is not currently supplied from the scheme, it is accounted for in the household count and water requirements. The service area includes a total of 18 953 households representing 72 764 persons (2011).

Water is abstracted from the Tugela River Weir, where it is treated at the Ezakheni WTP (design capacity of 32Mℓ/d – also given as such in the 2014 Blue Drop Report). This WTP received a 2014 Blue Drop score of 31%, digressing from its previous score (was 45.93 in 2012).

Furthermore, the Ezakheni WSS augments supply to the neighbouring Ladysmith WSS at an estimated rate of 6.12Mℓ/d. Water use by different consumer types (domestic, industrial and business) should be quantified if possible. The consumers in the Ezakheni WSS area have mostly yard connections and waterborne sanitation. The Ezakheni WTP is operating at 30Mℓ/d, which is near its design capacity of 32Mℓ/d. However, there are still many challenges with real losses in the scheme.

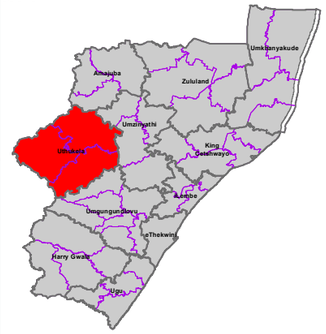
There are various large water consumers in this area such as industries, businesses and education and health facilities. The Ezakheni WSS includes asbestos cement pipes and pressure affects the operation of the pipes and therefore the reliability and operational sustainability of the system if not managed correctly (UTDM, 2019/2020).



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- National Roads (N1)
- Main Roads
- Local Roads
- Dams & Dam Names
- Rivers
- Settlements
- Eshowe — Major Towns

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

MARISWE
IMPROVING LIVES ENGINEERING 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 TITLE

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Ezakheni WSS
uThukela District Municipality

DATE COMPLETED: 2020/11/25

MAP NO.: **DC23: Figure 5.10**

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_201125_UTDM_5_10EzakheniExSup.mxd

5.3.8 Ladysmith WSS

Most information for this scheme, depicted in Figure 5-11, is obtained from the UAP Phase II and updated from discussions with UTDM officials during 2019/2020. Supplemented with information from Umgeni Water, 2020.

The Ladysmith WSS is located in the central to southern portion of the Emnambithi / Ladysmith LM (now Alfred Duma LM) and includes the Ladysmith urban area, Steadville, Ezakheni Proper as well as Roosboom and Meadows (the latter two areas being located 8km to the south-west of Ladysmith). This is one of the major urban and industrial nodes in the UTDM. The service area includes 23 118 households representing 84 795 persons (2011).

The Ladysmith WTP is supplied from water abstracted from the Klip River as well as water abstracted from the Spioenkop Dam. The raw water from the Spioenkop Dam is provided under gravity via a 32km, 510mm diameter pipeline at a current rate of 18Mℓ/d to the WTP. An estimated 12Mℓ/d is provided from the Klip River to the WTP. The abstraction from the Klip River is unreliable during periods of drought or during late winter months before the summer rain season.

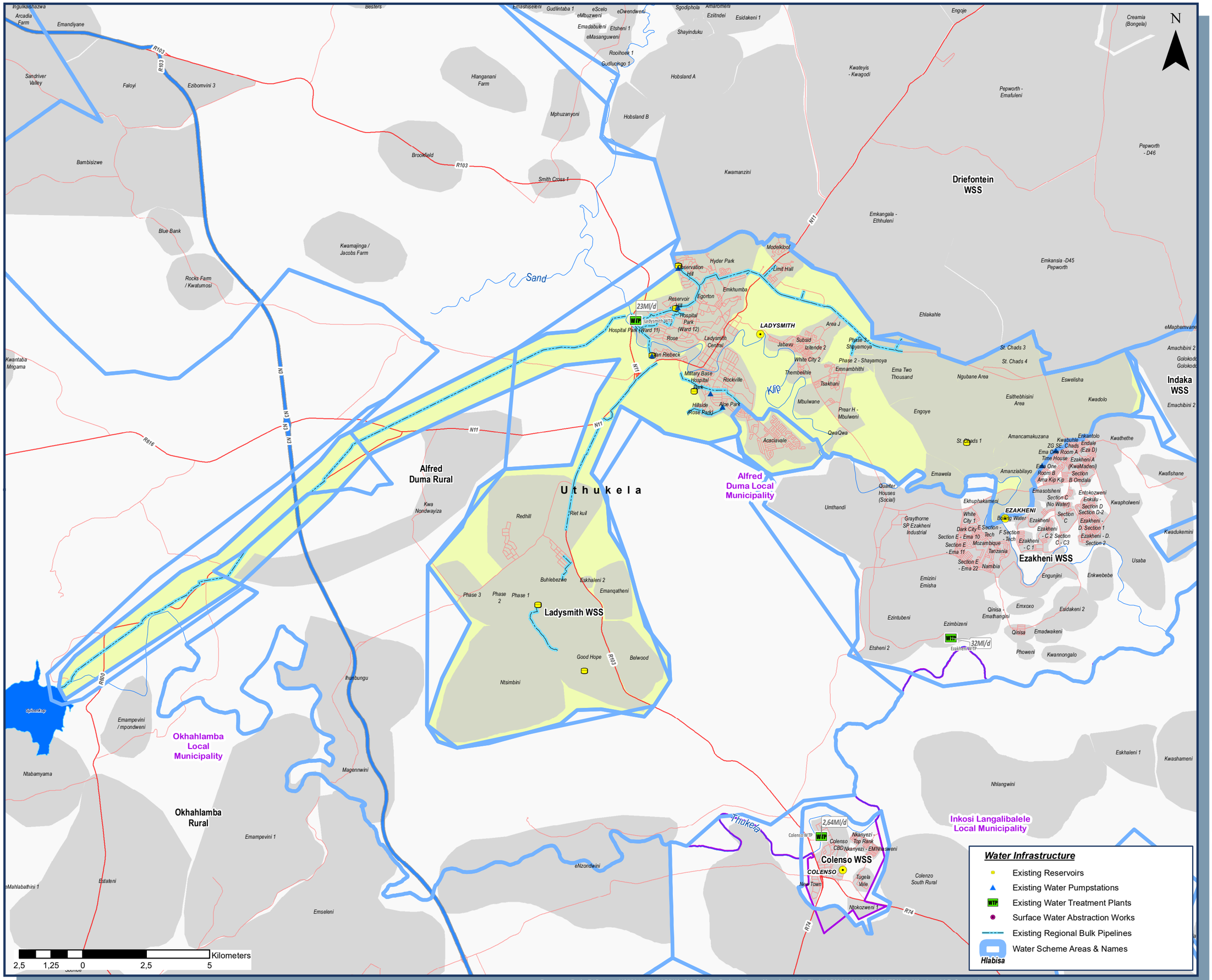
Roosboom and Meadows are supplied at a rate of 32kl/h (0.384Mℓ/d if running a cycle of 12 hours) from the Ladysmith WTP. There are boreholes also in use in Roosboom, which augments supply in the case of drought.

The Ladysmith WSS is also augmented with water supplied from the neighbouring Ezakheni WSS at a rate of 510m³/hour. If supplied for 12 hours, it equates to approximately 6.12Mℓ/d. The 2014 Blue Drop Report (DWS) listed the design capacity of the Ladysmith WTP as 23Mℓ/d and operating at 20.93Mℓ/d (91%) of its design capacity.

The urban areas of Ladysmith have high levels of service, with household connections and waterborne sanitation. Roosboom and surrounds have community standpipes, but many consumers perform informal connections to yard level. Sanitation services in Roosboom and surrounds are by means of VIP installations.

The Ladysmith WTP, operating at 27.5Mℓ/d, which is above its design capacity of 23Mℓ/d (Umgeni Water, 2020), is still supplied from the Klip River (about 40% of the water requirements) and the Spioenkop Dam (about 60% of the water requirements). The supply to Ladysmith from the Spioenkop Dam is limited by the pipe size therefore supply cannot be increased if the Klip River is affected by drought or the drier winter season.

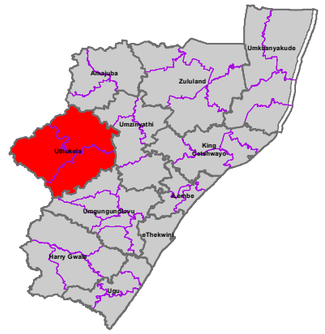
There are various large water consumers in this area such as industries, businesses and education and health facilities. Most consumers in the Ladysmith WSS are metered and billed. The Ladysmith WSS includes asbestos cement pipes and pressure affects the operation of the pipes and therefore the system if not managed correctly. A need for additional Pressure Reducing Valves (PRVs) has been identified (UTDM, 2019/2020).



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- National Roads
- Main Roads
- Local Roads
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT 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

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Ladysmith WSS
uThukela District Municipality

DATE COMPLETED: 2020/11/25

MAP NO.: **DC23: Figure 5.11**

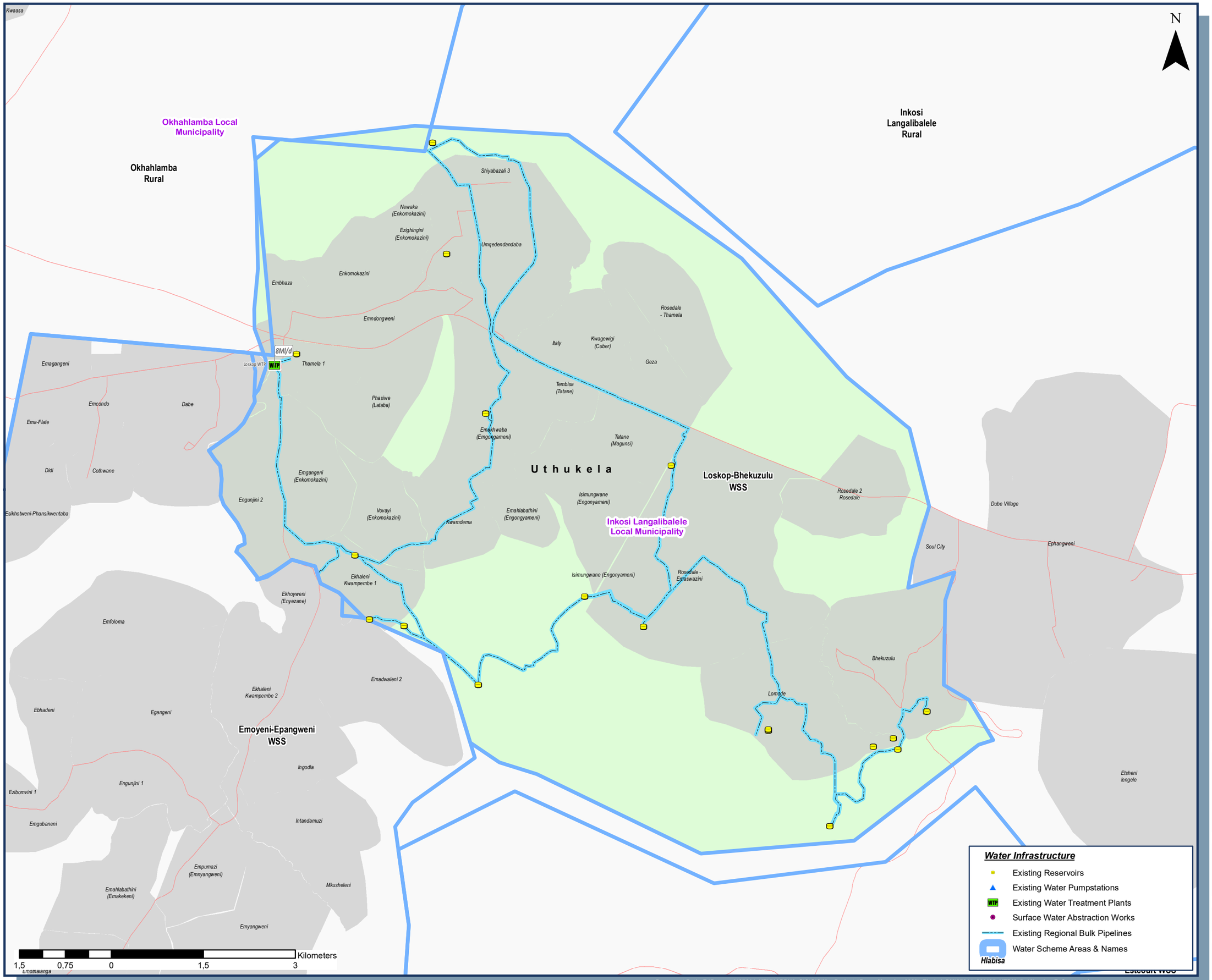
5.3.9 Loskop WSS

Most information for this scheme, depicted in Figure 5-12, is obtained from the UAP Phase II and updated from discussions with UTDM officials during 2019/2020. Supplemented with information from Umgeni Water, 2020.

The Loskop WSS is located in the northern part of the Imbabazane LM (now Inkosi Langalibalele LM) and includes the settlements of Bhekuzulu, Engonyameni and Etatane amongst others. There is a total of eight settlement areas, having an estimated 6 098 households (2011).

Water is abstracted from the Little Tugela River (also known as the Injisuthi River), where it is treated at the Loskop WTP with a design capacity of 1.2Mℓ/d and operating 100% of its capacity. The 2014 Blue Drop Report (DWS) provided the design capacity of the Loskop WTP as 1.2Mℓ/d and operating at 1.2Mℓ/d (100%) of its design capacity.

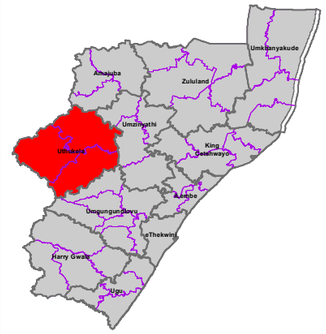
Most consumers are provided with standpipes, but there are many informal connections to homes (therefore yard or house connections).



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- National Roads (N1)
- Main Roads
- Local Roads
- Dams & Dam Names (Driel Dam)
- Rivers
- Settlements
- Major Towns (Eshowe)

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA
UMKHANDLU WESIFUNDA
DISTRIKSMUNISIPALITEIT
DISTRICT MUNICIPALITY

UTHUKELA DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

MARISWE
IMPROVING LIVES ENGINEERING 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 TITLE

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Loskop-Bhekuzulu WSS uThukela District Municipality

DATE COMPLETED:

30 June 2020

MAP NO.:

DC23: Figure 5.12

The Internal Strategic Perspective (ISP) for the Uthukela Water Management Area indicated that the Little Tugela River is already stressed in terms of water allocations – predominantly for irrigation (DWAF, 2004). The development of farm dams may improve water availability to consumers. The implementation of the Ecological Reserve however may further reduce the water availability for human needs (any user sector).

The WARMS database lists one registered water use by a WSP for this area for a volume of 1.872 million m³/a (5.129Mℓ/d). The Loskop WSS was augmented via MIG projects to improve and increase water supply to existing consumers as well as extending the scheme to the areas of Bhekuzulu, Empangweni and Emoyeni-Amangwe WSS.

The consumers in the Loskop WSS are connected via yard connections and have sanitation services in the form of VIPs. There are no plans currently to increase the sanitation service level. The Emoyeni-Epangweni area has the same water and sanitation service levels.

The Emoyeni-Empangweni scheme area is located in the south of the Loskop WSS. It is also referred to as the Emoyeni-Amangwe scheme area. It serves the settlements of Emoyeni, Emandabeni, Emakhekheni, Emnyangweni, Emadolobwe and Engodini, totalling 3 791 households (2011).

The Little Tugela River's flow reduces during drought and the drier winter season, therefore affecting water security during these times. There is minimal use of groundwater, but some individual consumers do make use of boreholes (production boreholes and hand pump installations). There are also springs in the area, but these also dry up during the winter season.

The UTDM has installed more than 50 storage reservoirs and tanks, but other water source and storage options (such as rainwater harvest tanks) may still need to be investigated.

There is a bulk meter at the Loskop WTP (already running at full operating capacity) which is read monthly. There are a few larger consumers such as manufacturing and educational facilities.

From correspondence with the project consultant (2019/2020), there are 11 phases to provide improved water to this area, of which phases 1-4 and 6-8 are complete which covers wards 1-6 and ward 18. There is a new Loskop WTP with a design capacity of 8Mℓ/d, but under phase 10 and 11, the abstraction works, rising mains and two dams – one in the Loskop area and one in the Amangwe area, are still to be constructed. Phase 5 is in progress and phase 9 (serving ward 1 and the Amangwe area) is still to go to tender.

5.3.10 Tugela Estates WSS and Ngedlengedleni WSS

Most information for this scheme, depicted in Figure 5-13, is obtained from the UAP Phase II and updated from discussions with UTDM officials during 2019/2020. Supplemented with information from Umgeni Water, 2020.

The Tugela Estates WSS is located just south of the Ngedlengedleni WSS which in turn is south of the Ekuvukeni WSS. The Tugela Estates WSS forms the southern border of the now-called Alfred Duma LM It

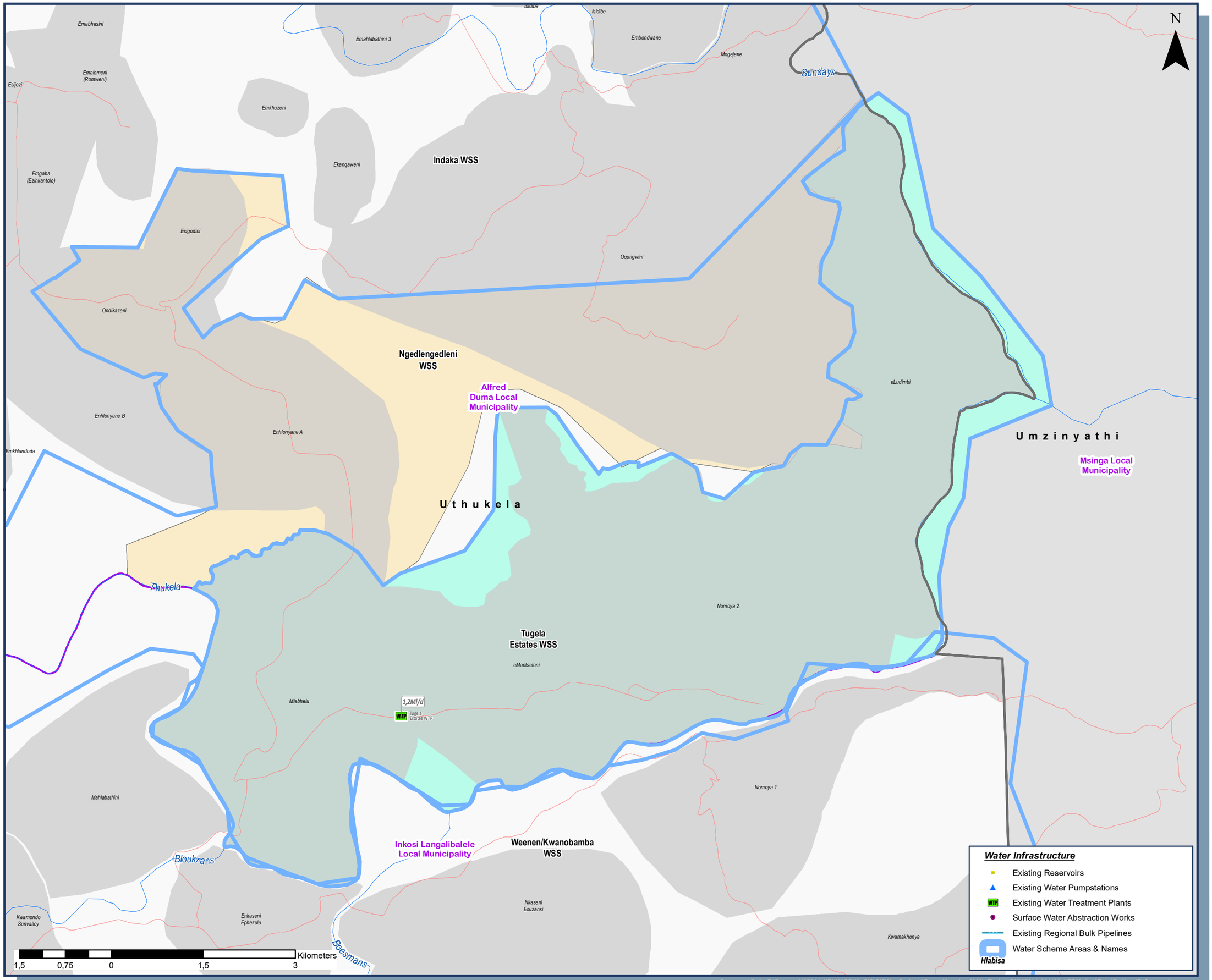
includes the areas of Kokwane, Langa, Mbango, The Ravine, Tugela Estates and Zamazema, totalling 1 758 households (2011). The Ngedlengedleni WSS is a borehole system and supplies the areas of Buli, Gcinglishane B, Mthembu, Oqungweni SP (sub-place), Umhlumayo SP and Vreemdeburg SP.

Water is abstracted from the Thukela River and then treated at the Tugela Estates WTP to serve the consumers in ward 10 via standpipes. The 2014 Blue Drop Report (DWS) listed the design capacity of the Tugela Estates WTP as 1.2Mℓ/d and operating at 0.9Mℓ/d (75%) of its design capacity. There are however a number of informal connections to bring water to yard level connections. Consumers in the east, in Langa are served via community standpipes.

The Ngedlengedleni WSS is served from a pumped borehole scheme with the pump station adjacent to the Tugela Estates WTP.

The Umgeni Water Infrastructure Master Plan (2019) refers to the Ngedlengedleni WSS as the uMhlumayo Borehole System and states its capacity as 1.4Mℓ/d. The uMhlumayo Borehole System abstract water from a borehole next to the Tugela River from where it is conveyed to the pump station. The water is dosed with sodium hypochlorite and then enters the storage and distribution system.

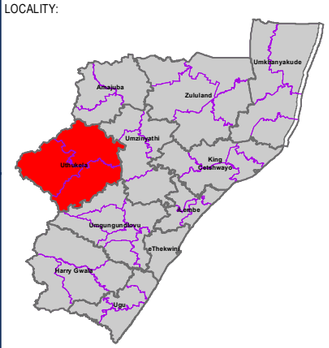
The Tugela Estates WTP is operating at 0.45Mℓ/d, but is hampered by ageing infrastructure, poor system operating conditions as well as pressure from illegal connections. Both the Tugela Estates and Ngedlengedleni WSS (operating above its design capacity) cannot meet the current water requirements (Umgeni Water, 2020).



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- National Roads (N1)
- Main Roads
- Local Roads
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns (Eshowe)

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA
UMKHANDLU WESIFUNDA DISTRIK/MUNISIPALITEIT
DISTRICT MUNICIPALITY

UTHUKELA DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

MARISWE
IMPROVING LIVES ENGINEERING 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 TITLE

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Tugela Estates WSS, Ngedlengedleni WSS

uThukela District Municipality

DATE COMPLETED: 2020/11/25

MAP NO.: **DC23: Figure 5.13**

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_201125_UTDM_5_13TugelEstNgedExSup.mxd

5.3.11 Weenen / Kwanobamba WSS and Umtshezi East Regional WSS

Most information for this scheme, depicted in Figure 5-14, is obtained from the UAP Phase II and updated from discussions with UTDM officials during 2019/2020. Supplemented with information from Umgeni Water, 2020.

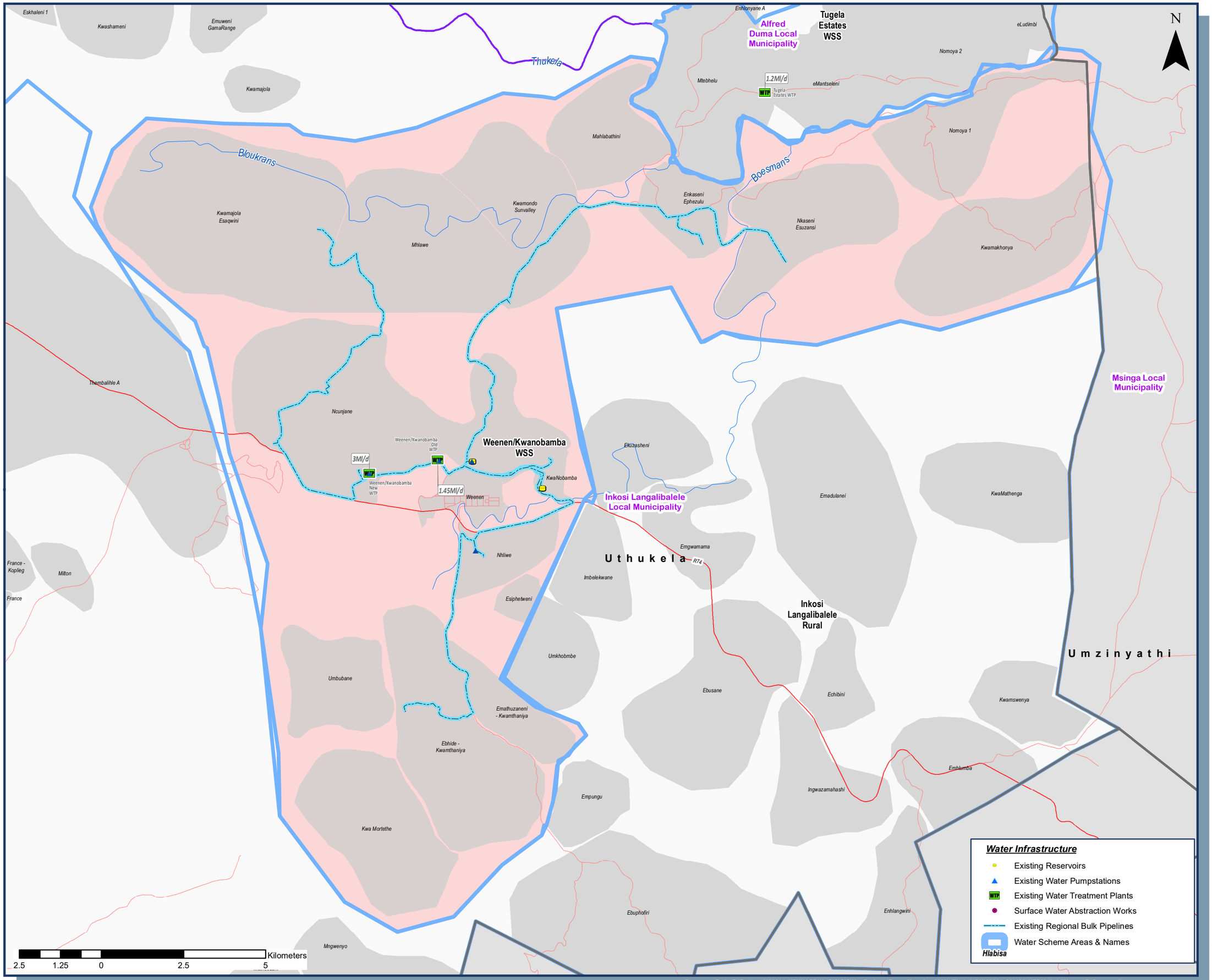
The Weenen WSS is located in the central-eastern part of the now-called Inkosi Langalibalele LM and is also one of the developed urban nodes in the UTDM. It serves the areas of Weenen, Ezitendeni/KwaNobamba and Impembeni, totalling 1 570 households (2011).

Water is abstracted from a balancing dam that is supplied from an irrigation canal that in turn is supplied from the Bushmans River. The water is then treated at the old Weenen WTP located just south of Weenen, next to the Bushmans River. The area engineer and engineering consultant (ECA Consulting Engineers) indicated that the old Weenen WTP capacity is 1.45Mℓ/d (operating at 100% of its design capacity). The 2014 Blue Drop Report (DWS) listed the design capacity of the Weenen WTP as 1.4Mℓ/d and operating at 1.41Mℓ/d (101%) of its design capacity. The second (new) WTP at Weenen has been commissioned and was designed for 3Mℓ/d (Kantech Services, 2020) and is operational, producing 1.7Mℓ/d (Umgeni Water, 2020).

The irrigation canal is shared with farmers, which put the water supply assurance for domestic use at risk during high water use for irrigation purposes. For this reason, the UTDM area engineer indicated that future options may need to consider withdrawing water from the Bushmans River directly to supply the new Weenen WTP.

Weenen has full waterborne sanitation or septic tanks and house connections for water whereas in Ezitendeni and Impembeni, consumers are provided with water from standpipes. There are however informal connections, therefore actually providing water to yard or house connections. Consumers in Ezitendeni and Impembeni have VIPs for sanitation services.

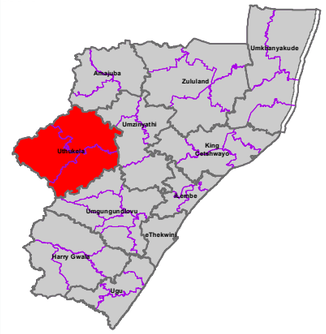
There are plans to extend water supply from the new Weenen WTP and further augment the supply via the George Cross WTP to serve consumers to the north and east of Weenen. This is also known as the Umtshezi East Regional Water Supply Scheme.



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- National Roads (N1)
- Main Roads
- Local Roads
- Dams & Dam Names
- Rivers
- Settlements
- Eshowe — Major Towns

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT 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

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Weenen/Kwanobamba WSS
uThukela District Municipality

DATE COMPLETED:

2020/11/26

MAP NO.:

DC23: Figure 5.14

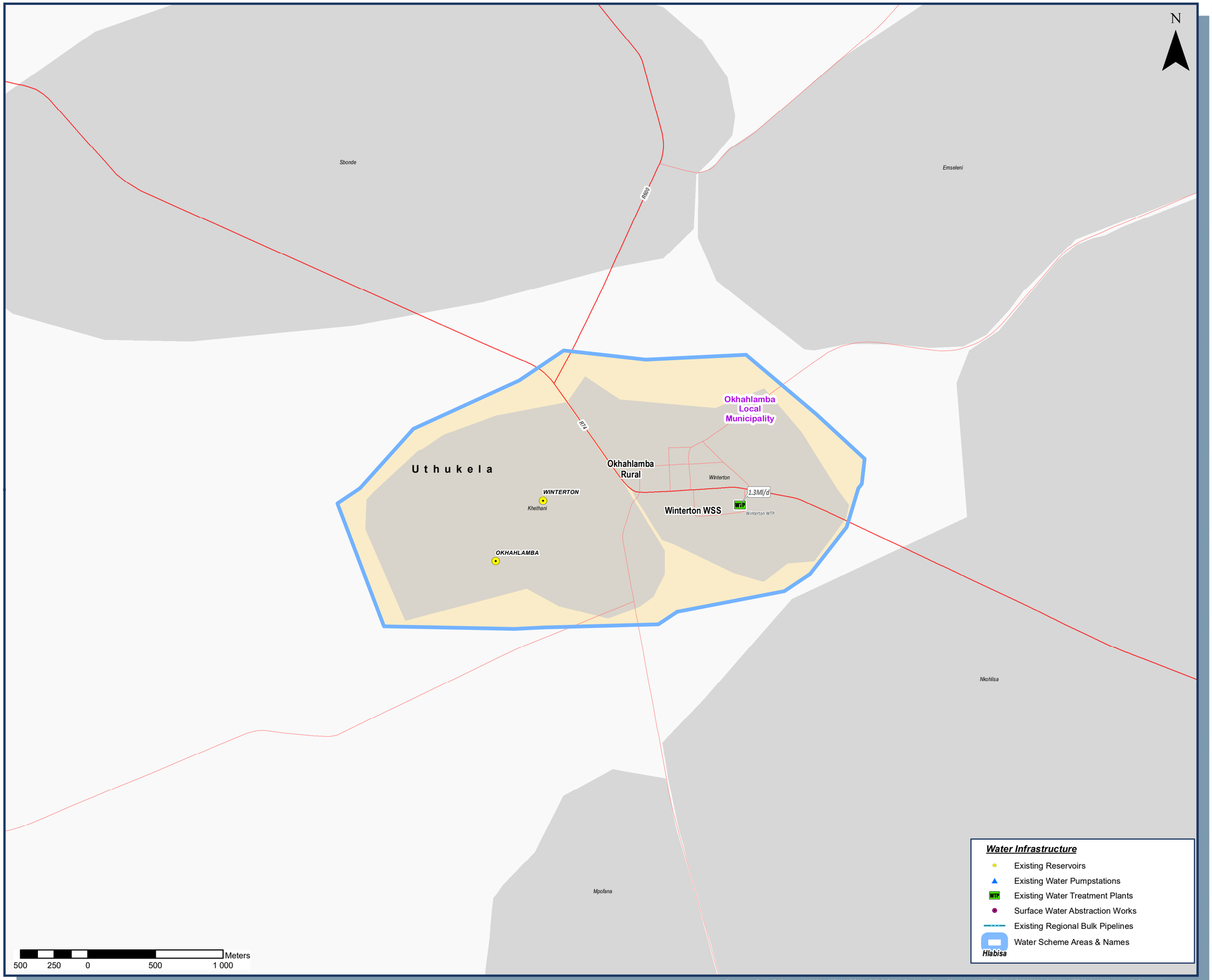
5.3.12 Winterton WSS

Most information for this scheme, depicted in Figure 5-15, is obtained from the UAP Phase II and updated from discussions with UTDM officials during 2019/2020. Supplemented with information from Umgeni Water, 2020.

The Winterton WSS is located in the eastern section of the Okhahlamba LM and includes the areas of Winterton and Khethwani, totalling 1 807 households (2011).

Water is abstracted from a weir in the Little Tugela River (also known as the Injisuthi River), where it is treated at the Winterton WTP, having a design capacity of 1.3Mℓ/d, operating at full capacity. The 2014 Blue Drop Report (DWS) listed the design capacity of the Winterton WTP as 1.3Mℓ/d and operating at 0.806Mℓ/d (62%) of its design capacity.

Water supply pipes are mostly from asbestos-cement material but are replaced as necessary when breakages or leaks occur, with uPVC pipes. The condition of the infrastructure is generally acceptable but consumers experience interruptions in supply from time to time due to low pressure in the system. Most consumers in Winterton have waterborne sanitation and house connections, whereas Khethwani has septic tanks. Consumers in Winterton pay for water services, but none of the consumers in Khethwani are billed and therefore don't pay for water services. There are no really large water consumers in this WSS.



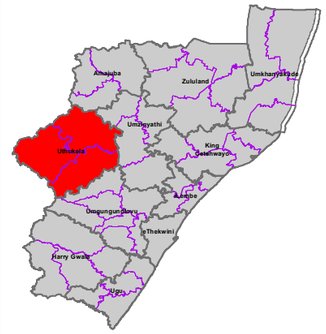
Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- National Roads (N1)
- Main Roads
- Local Roads
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns (Eshowe)

Water Infrastructure

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

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT 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

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Winterton WSS
uThukela District Municipality

DATE COMPLETED: 2020/11/26

MAP NO.: **DC23: Figure 5.15**

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_201125_UTDM_5_15WintertonExSup.mxd

5.3.13 Zwelisha Moyeni WSS

Most information for this scheme, depicted in Figure 5-16, is obtained from the UAP Phase II and updated from discussions with UTDM officials during 2019/2020. Supplemented with information from Umgeni Water, 2020.

The Zwelisha Moyeni WSS is located in the central area of the Okhahlamba LM, continuing towards the western border with the Free State Province and the Kingdom of Lesotho. It includes about 29 settlement areas, amongst other Mkukwini, Nyusana, Zwelisha, Amazizi, Bhalekisi, Mazizini (including Newstende) and Moyeni, totalling 9 887 households (2011).

Water is abstracted from a canal and weir system in the Khombe River, a tributary of the Tugela River, where it is treated at the Zwelisha Moyeni WTP. The Woodstock Dam and Driel Barrage are located along the eastern boundary of the WSS, but these are strategic resources and form part of the Tugela Transfer Scheme. The 2014 Blue Drop Report (DWS) listed the design capacity of the Zwelisha Moyeni WTP as 5.0Mℓ/d and operating at 2.4Mℓ/d (48%) of its capacity. The UTDM listed the design capacity of the Zwelisha Moyeni WTP as 2.5Mℓ/d (UTDM, 2019/2020).

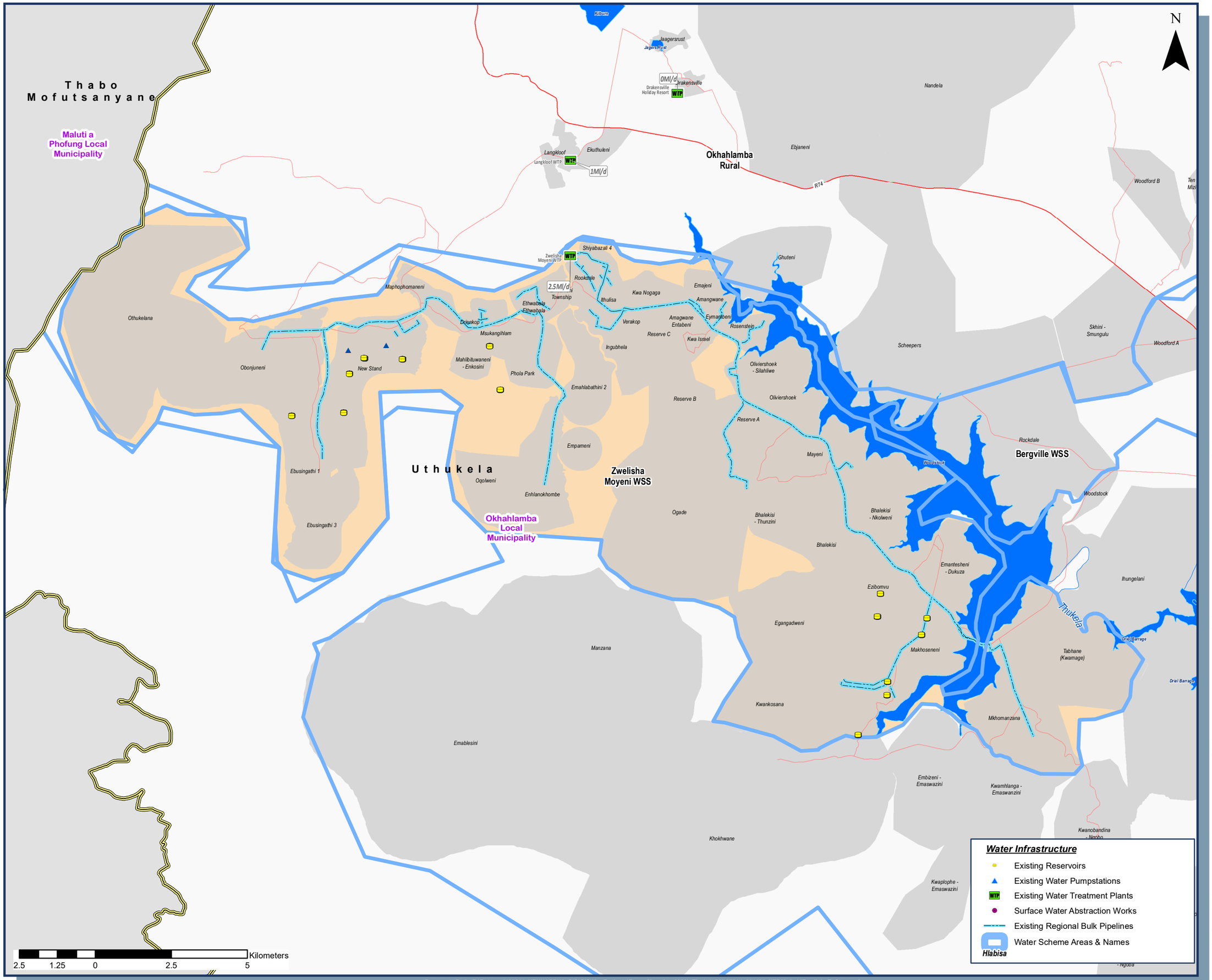
A MIG project (MIG/KZN0595/W/07/09) was being implemented to improve reticulation and water supply (Dukuza / Hoffenthal, Esibomvu, Emakhosaneni, Gosheni, Nkomanzana, KwaNkosana, Gangadweni) – pipelines have been constructed, but are not yet linked to the existing scheme. According to Umgeni Water (2020), along with the existing Zwelisha Moyeni WTP, there is also a package plant that can bring the total supply to 5Mℓ/d, however, this has not been operational.

The bulk water supply pipelines (asbestos-cement) are in a fair condition. Pipelines replaced as a result of breakages or leaks are from the uPvc material type.

Wards 4, 6, 7, 8 and 9 are connected and receive formal water supply from this scheme. Most of the remaining households have established informal connections from the standpipes to yard connections. Sanitation is still in the form of VIP and pit latrines. The UTDM will replace the pit latrines with VIP latrines in due course. Water from the Khombe River is also utilised by irrigators along the canal. There are no individual meters to measure water consumption and no consumer pays for water supplied

Apart from supply via the Tugela River canals that provide water to the Zwelisha Moyeni WTP, there are consumers that make use of production boreholes and hand pumps. The Zwelisha Moyeni WTP needs maintenance as it currently cannot operate at full capacity due to siltation at the weir (UTDM, 2019/2020). The canals also need maintenance to ensure improvement of reliability of the water source. There is a Water Services Infrastructure Grant (WSIG) project for the upgrading of the WTP and abstraction works as well as to improve storage capacity in the scheme.

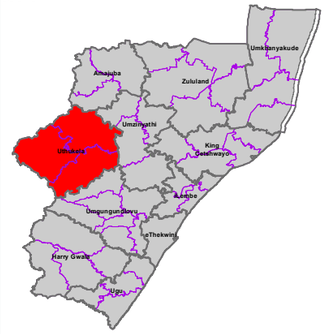
There are no bulk meters at the WTP therefore water supplied is estimated. The only larger water consumers are education facilities, but generally consumers are not metered.



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- National Roads (N1)
- Main Roads
- Local Roads
- Dams & Dam Names (Driel Dam)
- Rivers
- Settlements
- Major Towns (Eshowe)

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA
UMKHANDLU WESIFUNDA DISTRIK/MUNISIPALITEIT
DISTRICT MUNICIPALITY

UTHUKELA DISTRICT MUNICIPALITY

CONSULTANTS:

Project No.: 27814

MARISWE
IMPROVING LIVES ENGINEERING 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 TITLE

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Zwelisha Moyeni WSS uThukela District Municipality

DATE COMPLETED:

2020/11/26

MAP NO.:

DC23: Figure 5.16

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_201125_UTDM_5_16ZwelishaExSup.mxd

5.4 Other Water Supply Schemes

The following sections give a brief overview of the other water supply schemes (WSS), supply areas or self-supply areas in the WSA.

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[4]) 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.

5.4.1 Alfred Duma Local Municipality

The Bester WSS area is located in the central area of ADLM, 8km north-west of the Windsor Dam and about 5km west of Kirkintulloch and Watersmeet. It includes the settlement of Bester that has 64 households (2011). Water is obtained from boreholes, springs as well as tankered water. There were an estimated 37 households (56%) with water supply below RDP standards. Under the UAP Phase III water requirements modelling, the 2020 water requirements for this area was projected as 0.03Mℓ/d.

The settlements of Blue Bank and Glasgow are located in the western area of the ADLM. The Sand River forms the eastern boundary of the settlements. Even though the 2011 Census indicates the water source being a borehole, the level of service is reported as no access to any type of water supply. All 153 households are below RDP standards in terms of water supply – the borehole is not operational. Under the UAP Phase III water requirements modelling, the 2020 water requirements for this area was projected as 0.02Mℓ/d.

Lusitania is a small settlement located in the north of the Emnambithi / Ladysmith LM, about 12km north of Watershed and Doornhoek. It is currently not connected to the Driefontein WSS supply area. There are an estimated 145 households in the settlement (2011). According to the 2011 Census, all households are supplied via water tanker. There are no boreholes in use in this area. Potential for groundwater exploitation is reduced due to the coal deposits, affecting water quality. Under the UAP Phase III water requirements modelling, the 2020 water requirements for this area was projected as 0.09Mℓ/d.

The Ngedlengedleni-Umhlumayo WSS is located just south of the Ekuvukeni Lime Hill WSS, within the Indaka LM. It includes the settlements of Oqungweni, Bhaza and Ghobo amongst others in ward 9, having 948 households (2011). It may be that consumers in the neighbouring Msinga Local Municipality, residing in

[4] SDG 6: Ensure availability and sustainable management of water and sanitation for all

Majozi, Bhaza and Ghobo are also supplied from this scheme, but this has to be confirmed. Under the UAP Phase III water requirements modelling, the 2020 water requirements for this area was projected as 0.74Mℓ/d.

5.4.2 Inkosi Langalibalele Local Municipality

The Colenso rural area is located in the northern part of the ILLM and east of the existing formal Colenso WSS and north of the Bloukrans River. The potential future supply includes new developments as well as rural areas with an estimated 502 households (2011). This area forms part of the rural sub-place area of the 2011 Census (uMtshezi NU – referring to the whole of the area of the Umtshezi LM, not including the built-up urban or developed areas) and detailed information on the current water sources in use is not available. It is presumed that most residents obtain water from boreholes, springs and other local sources. Under the UAP Phase III water requirements modelling, the 2020 water requirements for this area was projected as 0.18Mℓ/d.

The Cornfields WSS are consists of Cornfields township then the Mbondwana and Thembalihle townships in the east, less than four kilometres from Cornfields. Cornfields (693 households) is supplied with water from two boreholes (one is currently not operational) as well as water tankers, but there are still 245 households below RDP. In Mbondwana and Thembalihle, water is obtained from production boreholes, springs and other local sources. Under the UAP Phase III water requirements modelling, the 2020 water requirements for this area was projected as 1.10Mℓ/d.

The Bloukrans River, a major tributary of the Tugela River, forms the north-western boundary of Cornfields whilst the Mtontwanes River divides the Mbondwana and Thembalihle townships. Quality in the Bloukrans River seems to be affected by poor sanitation infrastructure in Cornfields, Mbondwana and Thembalihle areas (DWAF, 2004).

The Frere WSS area is supplied from groundwater in the form of a production borehole and is located in the north-western area of the Umtshezi LM, 6km west of Colenso and about 15km of Loskop. It includes the settlement of Frere that has 235 households (2011). The borehole dried up in January 2016 due to the prevailing drought conditions. Currently (2019) the borehole does provide water, but consumers have to use a hand pump for the abstraction. Under the UAP Phase III water requirements modelling, the 2020 water requirements for this area was projected as 0.25Mℓ/d.

The Bloukrans River runs through the Frere settlement and there is an existing weir which may serve as an option for water supply in this area. Water supply services are in the form of community standpipes, but most consumers do not have adequate access (within 200m walking distance) therefore there are an estimated 80% of households below RDP standard.

The area south and east of Weenen and Impembezi, lies south of the Bushmans River and includes the surrounding area of the Umngwenya River in the west and the iBusone River in the east. It is currently not provided for by the existing Weenen WSS (Umtshezi LM). There are an estimated 1 256 households in this area, of which there are 1 227 households (98%) below RDP standards (2011). Under the UAP Phase III water requirements modelling, the 2020 water requirements for this area was projected as 0.21Mℓ/d.

5.4.3 Okhahlamba Local Municipality

Along with the potential rural scheme areas below, there are a few tourist resorts and developments in the OLM that are self-supplied.

The Amangwane area lies in the southern part of the Okhahlamba LM, and just north of the Bell Park Dam located on the Mtoti River. It is approximately 15km south-west of Winterton and similar in distance, east of the Loskop WTP (as the crow flies). The 2011 Census Sub-place layer refers to this area by the name of Amangwane and recorded a total of 329 households, of which 234 were below RDP levels of water supply. The area consists of AmaSwazi and Meadowsweet. The area superintendent and area operators indicated that AmaSwazi receives water from a spring – supplying community standpipes and Meadowsweet receives tankered water. Under the UAP Phase III water requirements modelling, the 2020 water requirements for this area was projected as 0.13Mℓ/d.

The Bergville rural area is located in the central area of Okhahlamba LM, south of the Tugela River and south-west of the Spioenkop Dam in the east. The area includes Malefetheni, Situlwane, Bukweni and Kwanokopela amongst others, totalling 3 319 households (2011). This is mostly a rural area with dispersed settlements and households. The Bergville WTP and existing water supply area is located towards the north of this area. The majority of households (2 307) obtain water from private boreholes and springs. There were an estimated 2 241 households (68%) with water supply below RDP standards. The Driel Barrage is located in the upper west corner and the area is further bounded in the west by the Mlambonja River. Under the UAP Phase III water requirements modelling, the 2020 water requirements for this area was projected as 1.44Mℓ/d.

The Howe Wittekop area is in the north of the Okhahlamba LM. The UTDM does not currently provide any formal water supply services in this area. Of the 336 households in the supply area (neighbouring settlements of Howe, Wittekop and Nqula), 307 are below basic RDP service levels. Under the UAP Phase III water requirements modelling, the 2020 water requirements for this area was projected as 0.06Mℓ/d.

The Langkloof settlement is supplied from the Tugela River where water is treated at the 1Mℓ/d WTP – operating at full capacity. The 2011 Census reported that of the 362 households, 260 households don't have access to formal water supply and that in total, 332 households are below RDP. The households not having access to the scheme's supply (mostly through community standpipes and informal connections), utilise springs as water source. There are only dry sanitation installations in this settlement. Under the UAP Phase III water requirements modelling, the 2020 water requirements for this area was projected as 0.06Mℓ/d.

The Zwelisha Moyeni rural area is located in the southern central area of the Okhahlamba LM, south of the existing Zwelisha Moyeni WSS. It includes an estimated 18 rural settlements – based on the 2011 Census Sub-Places, totalling 3 176 households. Of these, there are an estimated 2 619 households (82%) below RDP levels of service. Consumers currently obtain water mainly from boreholes and springs. The Woodstock Dam, fed from the Mnweni River is situated just north of the settlements and the Nxwaye, Thonyelana-mpumalanga and Mlambonja Rivers traverse through the potential scheme area. Under the UAP Phase III water requirements modelling, the 2020 water requirements for this area was projected as 1.39Mℓ/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).

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
Alfred Duma	35 760	674	10 905	24 256	10 002	247	1 516	1 966
Inkosi Langalibalele	8 819	388	9 968	15 060	8 607	1 425	80	2 606
Okhahlamba	2 309	756	6 219	7 888	5 668	27	1 237	5 406
Total	**46 888**	**1 819**	**27 092**	**47 204**	**24 277**	**1 699**	**2 833**	**9 977**

Source: StatsSA, 2016 Community Survey

The municipalities with the highest level of service, by number of households having access to flush or VIP sanitation services, are Alfred Duma (71 595HH) and Inkosi Langalibalele (34 235HH) LMs, representing 44% and 21% of the WSA total number of households respectively. There is a total of 123 003 households (76% of the WSA) having a sanitation services level of VIP or better.

There is a total of 38 786 households (24% of the WSA) not having access to flush or VIP sanitation services, with about a third each of the total in each LM.

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

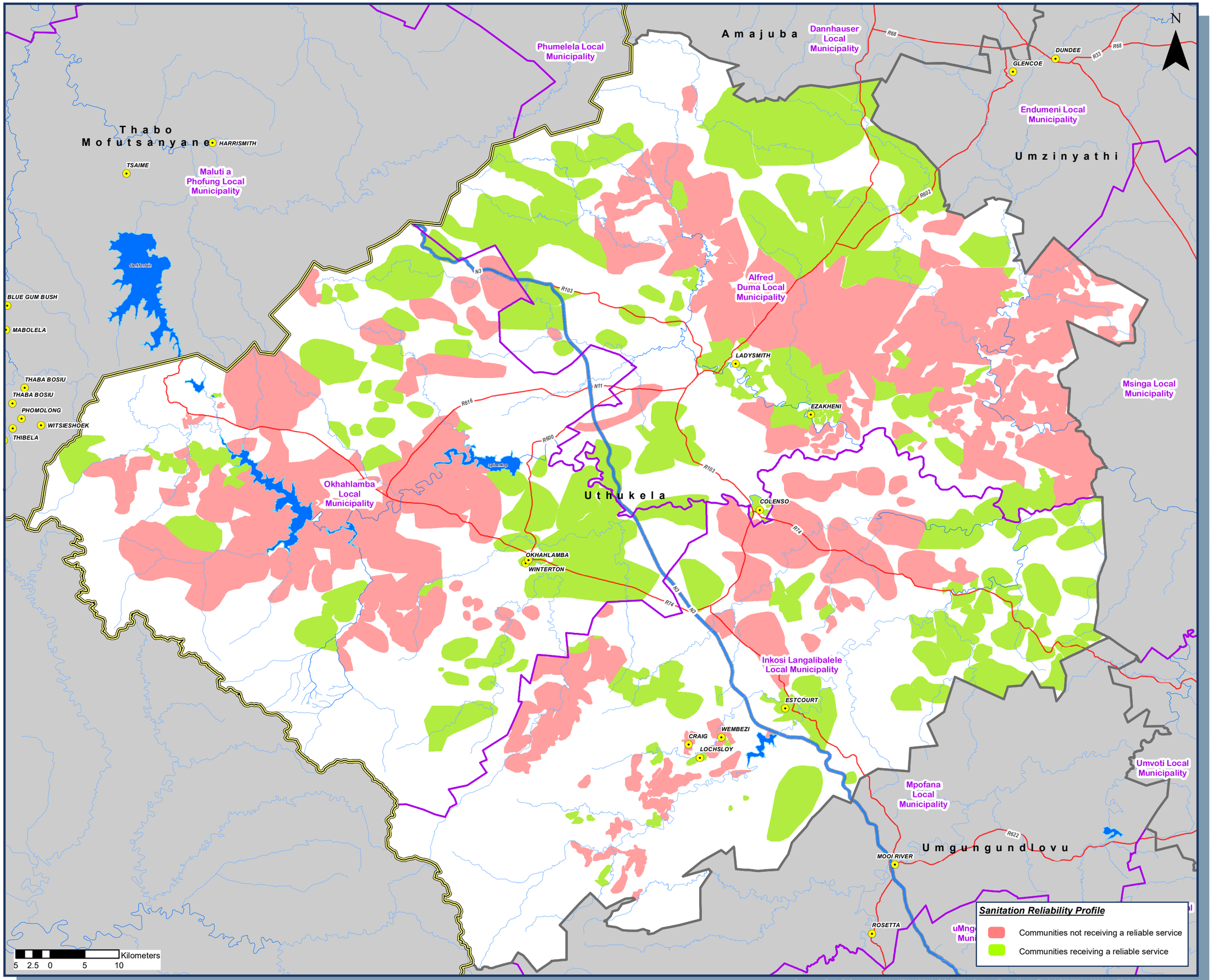
LM Name	No of Households	Households with RDP or above LoS	Percentage	Households not within RDP or above LoS	Percentage
Alfred Duma	74 442	68 235	92%	6 207	8%
Inkosi Langalibalele	45 925	39 430	86%	6 495	14%
Okhahlamba	26 516	19 852	75%	6 664	25%
Total	**146 883**	**127 517**	**87%**	**19 366**	**13%**

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 (87%) and only 13% not having access to at or above RDP standards.

6.1.3 The Water Services Master Plan, 2017

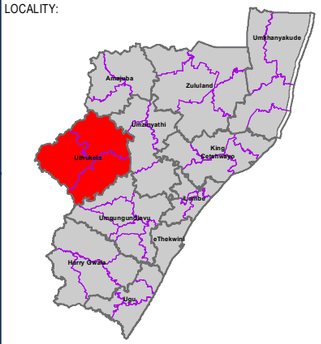
The UTDM Water Services Master Plan reports on sanitation service levels from the 2011 Census and the UTDM Backlog Study (2016/2017).



Legend

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

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT 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
uThukela District Municipality

DATE COMPLETED:

22 October 2020

MAP NO.:

DC23: Figure 6.1

6.1.4 WSA Backlog Study 2016/2017

The UTDM Backlog Study on Water and Sanitation Services included an assessment of service levels and backlogs. The table below illustrates the information from the backlog study report for sanitation supply.

Table 6-3: WSA Backlog Study, Sanitation Supply, 2016/2017

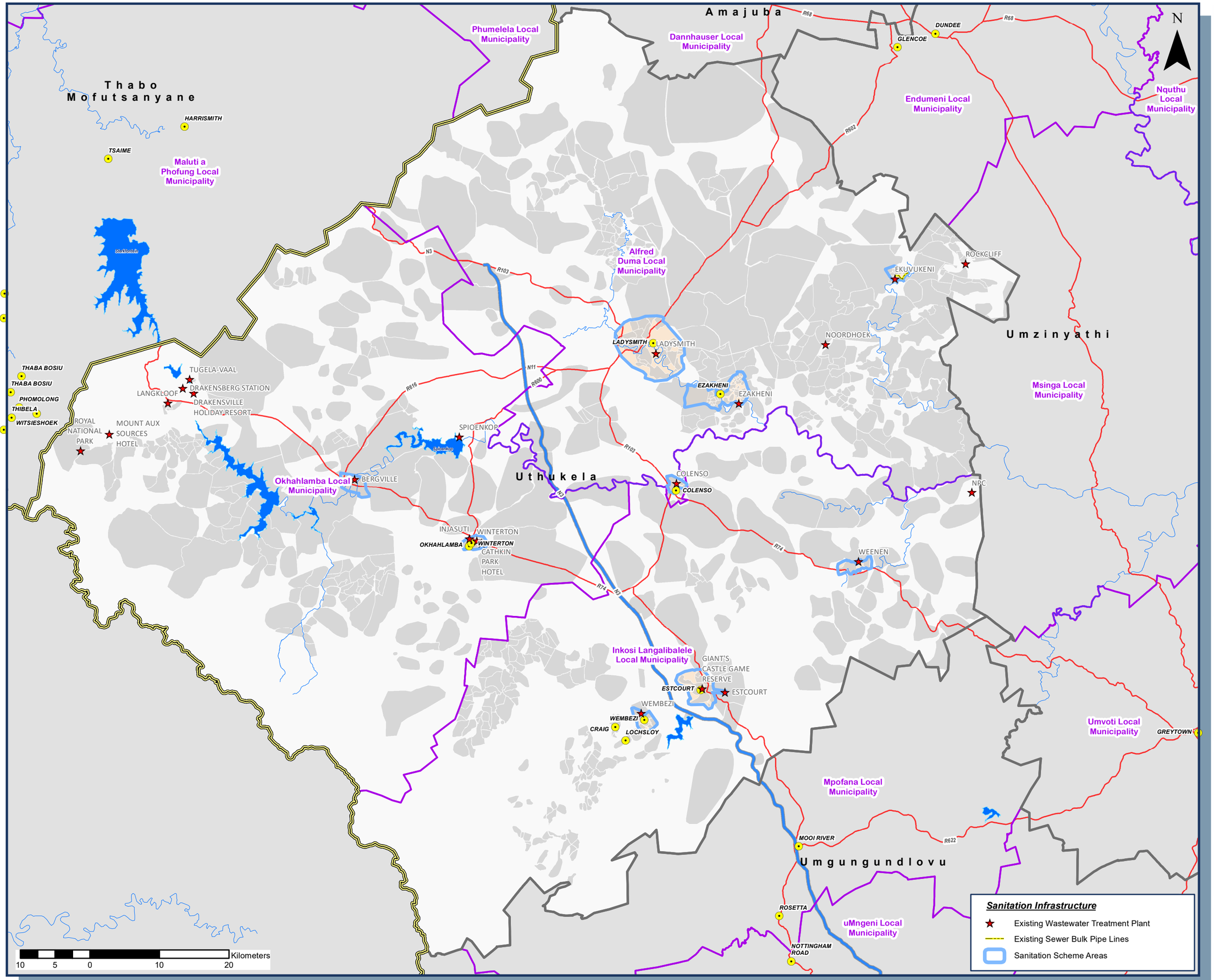
	Access to adequate sanitation		No access to adequate sanitation		Total households
LM Name	**No. of Households**	**Percentage (%)**	**No. of Households**	**Percentage (%)**	
Alfred Duma	20 576	59.50%	13 989	40.50%	34 565
Inkosi Langalibalele	35 835	80.20%	8 852	19.80%	44 687
Okhahlamba	75 679	90.40%	8 038	9.60%	83 717
Total	**132 090**	**81.10%**	**30 879**	**18.90%**	**162 969**

Source: WSA Backlog Study, 2016/2017

The study report examined the results from the backlog study, versus the 2011 Census and the 2016 Community Survey. The differences were noted and the UTDM, in agreement with the DWS and COGTA, preferred to use the information from the backlog study.

6.2 URBAN AND BULK SANITATION SUPPLY SCHEMES

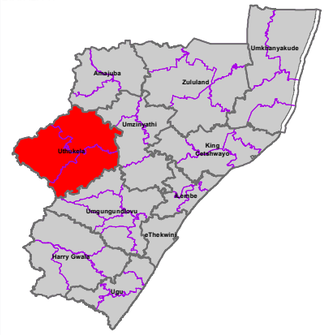
Bulk sanitation supply schemes, depicted in Figure 6-2, can be identified as schemes with a large geographic footprint, or with a wastewater treatment plant (WWTP) of a design capacity of 2Mℓ/d or more.



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- National Roads
- Main Roads
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns (Eshowe)

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA
UMKHANDLU WESIFUNDA DISTRIKSMUNISIPALITEIT DISTRICT MUNICIPALITY
UTHUKELA DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

MARISWE
IMPROVING LIVES ENGINEERING SOLUTIONS

Mariswe
PO Box 25549, Monument Park
Pretoria, 0105

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

JTN CONSULTING

PROJECT TITLE

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

MAP TITLE:

Existing Sanitation Infrastructure

uThukela District Municipality

DATE COMPLETED:

30 June 2020

MAP NO.:

DC23: Figure 6.2

Sanitation Infrastructure

- Existing Wastewater Treatment Plant
- Existing Sewer Bulk Pipe Lines
- Sanitation Scheme Areas

A summary of the Wastewater treatment plants is provided in Table 6-4.

Table 6-4: Summary of WWTPs

LM Name	Plant Name	Design Capacity (Mℓ/d)	Annual Average Volume Treated (Operational) (Mℓ/d)*	Class of Plant
Alfred Duma	Colenso	3.20	1.00	C
	Ekuvukeni	2.40	1.27	D
	Ezakheni	34.00	14.00	B
	Ladysmith	23.00	15.00	C
Inkosi Langalibalele	Estcourt	12.00	10.00	C
	Weenen ponds	0.11	0.11	E
	Wembezi	12.00	8.00	C
Okhahlamba	Bergville	1.00	0.60	D
	Winterton	3.20	0.40	D
Total		**90.91**	**50.38**	

Source: UTDM (2020)

* Currently, treatment capacities are affected by non-operational status of pump stations. A business plan is in place to correct this issue (UTDM, 2020). The affected WWTPs are denoted by being underlined.

Should WWTPs not be fully operational, they pose significant risks to the receiving water resources and the communities and ecosystems in the vicinity of plants operating above their design capacities.

Information on beneficiation from these plants such as the production of biogas or electricity, or the production of fertiliser should still be obtained

6.2.1 Bergville SS

Most information for this scheme is obtained from discussions with UTDM officials and information shared during 2019/2020.

The Bergville SS is located in the central area of Okhahlamba LM, and serves the formal town of Bergville, which had 283 households in 2011. The Bergville WWTP discharges to the Sandspruit River, a tributary of the Tugela River. The old Bergville WWTP had a design capacity of 0.4Mℓ/d, but a new WWTP constructed during 2017/2018 is now in use and has a design capacity of 1Mℓ/d (ECA Consulting, 2019).

The urban areas have waterborne sanitation or conservancy tanks and the rural areas are served by VIPs. The future service level types for sanitation in rural areas will likely remain as is. However, for the urban areas, there is currently a project under way to provide reticulated sewer to the new Bergville WWTP.

6.2.2 Colenso SS

Most information for this scheme is obtained from discussions with UTDM officials and information shared during 2019/2020.

The Colenso SS is located in the southern portion of the now-called Alfred Duma LM and serves the urban town area of Colenso totalling 1 645 households (2011). The 2011 Census includes the township areas of Inkanyesi and Nkankezi, which are also connected to the sewer system.

The Colenso WWTP has a design capacity of 3.2Mℓ/d and operating at 1Mℓ/d. The Colenso WWTP discharges into a small tributary of the Tugela River. According to the UTDM (2019/2020), the Colenso WWTP is operating at full capacity (when all sewer pump stations are functional) and would need to be upgraded to meet increasing water and sewer requirements.

6.2.3 Ekuvukeni SS

Most information for this scheme is obtained from discussions with UTDM officials and information shared during 2019/2020.

The Ekuvukeni SS serves the urban area of Ekuvukeni proper only, constituting 11 018 persons in 2 607 households (2011). The 2014 Green Drop report indicated that the plant has a design capacity of 2.34Mℓ/d and a critical risk rating of 94.1% for this WWTP (activated sludge and lagoons).

The UTDM indicated the Ekuvukeni WWTP having a design capacity of 2.4Mℓ/d and discharges into the Wasbank River, a tributary of the Sundays River. The WWTP is operating at 1.27Mℓ/d, however, treatment capacity is affected by pump stations that are not fully functional. A business plan was prepared to correct the situation (UTDM, 2019/2020).

According to Umgeni Water (2020), the Ekuvukeni WWTP has been recently refurbished after it was damaged due to vandalism. The Ekuvukeni WWTP still only serves Ekuvukeni proper.

6.2.4 Estcourt SS

Most information for this scheme is obtained from discussions with UTDM officials and information shared during 2019/2020.

The Estcourt SS is located in the west-central portion of the now-called Inkosi Langalibalele LM and serves the main urban area of Estcourt. There was a total of 22 070 persons and 6 280 households in 2011.

The UTDM indicated the Estcourt WWTP having a design capacity of 12Mld and operating at 10Mℓ/d, however, treatment capacity is affected by pump stations not fully functional. A business plan was prepared to correct the situation. The Estcourt WWTP discharges into the Bushmans River, one of the primary tributaries of the Tugela River.

There are bulk meters installed and read at the WTP and at the WWTP in Estcourt.

6.2.5 Ezakheni SS

Most information for this scheme is obtained from discussions with UTDM officials and information shared during 2019/2020.

The Ezakheni SS is located adjacent to and east of Ladysmith, in the now-called Alfred Duma LM.

The UTDM provided the design capacity of the Ezakheni WTP as 34Mℓ/d and operating at 14Mℓ/d, however, treatment capacity is affected by pump stations not fully functional. A business plan was prepared to correct the situation. The Ezakheni WWTP discharges to the Klip River, a tributary of the Tugela River. The Ezakheni WWTP needs to be upgraded and operation & maintenance improved, including the installation of flow meters.

6.2.6 Ladysmith SS

Most information for this scheme is obtained from discussions with UTDM officials and information shared during 2019/2020.

The Ladysmith SS is located in the central to southern portion of the now-called Alfred Duma LM and includes the urban area of Ladysmith and suburbs. The service area includes 64 849 persons and 19 939 households (2011).

The Ladysmith WWTP is located east of Leonardsville and Nambiti and discharges into the Klip River, a tributary of the Tugela River. The 2014 Green Drop Report indicated a risk rating of 90.9%, putting it in a critical risk category. The UTDM however has initiated a project to rehabilitate the WWTP.

The UTDM reported the design capacity of the Ladysmith WWTP as 23Mℓ/d and operating at 15Mℓ/d. The urban areas of Ladysmith have high levels of service, with household connections and waterborne sanitation. Roosboom is served by means of VIP installations.

The Ladysmith WWTP is in need of maintenance as its operational functions are sub-optimal and may potentially need to be upgraded. Treatment capacity is affected by pump stations not fully functional. A business plan was prepared to correct the situation.

There are various large water consumers in this area such as industries, businesses and education and health facilities. It is not known if there are privately-owned WWTPs and if industrial discharges meet the UTDM's influent requirements or effluent discharge quality requirements where applicable.

6.2.7 Weenen SS

Most information for this scheme is obtained from discussions with UTDM officials and information shared during 2019/2020.

The Weenen SS is located in the central-eastern part of the now-called Inkosi Langalibalele LM and is also one of the developed urban nodes in the UTDM. It serves the urban town of Weenen, totalling 3 127 persons and 722 households (2011).

Weenen has full waterborne sanitation or septic tanks and house connections for water whereas in Ezitendeni and Impembeni, consumers have VIPs and are provided with water from standpipes. There are however informal connections, therefore actually providing water to yard or house connections.

Weenen has a very small wastewater treatment system (maturation ponds) of 0.1Mℓ/d and it is operating at full capacity. The existing Weenen WWTP is located between Weenen and KwaNobamba, adjacent to a small tributary of the Bushmans River. A new 1.5Mℓ/d WWTP was planned for starting construction in 2015 and to be completed by 2017. However, this did not materialise. According to the UTDM PMU Office (2019/2020), the new WWTP is in the tender phase. The location of the new Weenen WTP is just east of the bridge over the Bushmans River, south of KwaNombamba.

6.2.8 Wembezi SS

Most information for this scheme is obtained from discussions with UTDM officials and information shared during 2019/2020.

The Wembezi SS is located in the west-central portion of the now-called Inkosi Langalibalele LM and serves the areas of Wembezi A, Wembezi B and Wembezi C. There was a total of 20 814 persons and 5 256 households in 2011.

There are oxidation ponds for the sewer from the Wembezi area, with a design capacity of 12Mℓ/d and it is utilised up to 8Mℓ/d currently (2020). Treatment capacity is affected by pump stations not fully functional. A business plan was prepared to correct the situation. The ponds are located adjacent to the Klein Bushmans River, tributary of the Bushmans River.

The first three ponds become sludged fairly quickly and this is an ongoing issue. There are no fencing and no lighting, posing a health and safety risk. The chlorination system was vandalised and the meter is not calibrated (UTDM, 2016; Umgeni Water, 2019/2020).

6.2.9 Winterton SS

Most information for this scheme is obtained from discussions with UTDM officials and information shared during 2019/2020.

The Winterton SS is located in the eastern section of the Okhahlamba LM and includes the areas of Winterton and possibly part of Khethwani, totalling 5 754 persons and 1 704 households (2011). Most areas in Winterton have waterborne sanitation whereas in Khethwani there are septic tank installations.

Winterton has a WWTP with a design capacity of 3.2Mℓ/d and it is operating at 0.4Mℓ/d, however, treatment capacity is affected by pump stations not fully functional. A business plan was prepared to correct the situation. The 2014 Green Drop Report listed the design capacity as 2Mℓ/d.

The consumers in Winterton are supplied via house connections and waterborne sanitation, but there are some areas supplied with sanitation via VIP installations.

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[5] or sub-regional [6]scale (over vast distances[7]), 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. Funding is allocated to the WSA for implementation.

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)
RBIG 5b	Alfred Duma Local Municipality	Spioenkop to Ladysmith BWS	-	R100 000	R400 000
RBIG 5b	Alfred Duma Local Municipality	Driefontein Indaka Bulk Water Supply	R10 000	R39 399	-
Total			**R10 000**	**R139 399**	**R400 000**

Source: Division of Revenue Bill (B5-2019)

[5] "Macro" is defined as infrastructure serving extensive areas across multi-municipal boundaries

[6] "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

[7] Over "vast distances" is considered as any distances greater than 5km

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

Local 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)
uThukela DM Allocation	R183 937	R194 737	R210 274	R108 000	R113 940	R100 000

Source: Division of Revenue Bill (B5-2019)

Since the UTDM is the WSA, the following information is presented from the latest IDP (2019/2020). The capital projects are presented in Table 7-3.

Table 7-3: Capital Projects, UTDM, 2019/2020

MIG Funding

Projects Name	Project Phase	Local Municipality	Budget		Total Budget
			Direct Cost	Indirect cost	183 937
Ntabamhlophe CWSS	Phase 13	Inkosilangalibalele	R 3 600 000.00	R 400 000.00	R 4 000 000.00
	Ntabamhlophe Emergency Repairs		R 18 000 000.00	R 1 200 000.00	R 19 200 000.00
Kwanobamaba-Ezitendeni water supply	New abstruction and Bulk pipeline	Inkosilangalibalele	R 15 000 000.00	R 2 100 000.00	R 17 100 000.00
	Weenen and Ezitendeni reticulation		R 5 000 000.00	R 700 000.00	R 5 700 000.00
Bergville Sanitation Project	Phase 2	Okhahlamba	R 20 000 000.00	R 2 800 000.00	R 22 800 000.00
Umsthezi East Bulk Water Supply	Planning	Inkosilangalibalele		R 3 000 000.00	R 3 000 000.00
Ekuvukeni Regional Bulk Water Supply	Upgrading Oliphantskoop WTW	Alfred Duma	R 18 000 000.00	R 2 520 000.00	R 20 520 000.00
	Bulk rising main and booster pump station at Zandbuild		R 18 000 000.00	R 2 520 000.00	R 20 520 000.00
Bhekuzulu-Ephangwini Cummunity Water Supply	Phase 5 Bulk Supply		R 7 500 000.00	R 1 000 000.00	R 8 500 000.00
Fitty Park Sunday River Water Supply	Phase 2 Reticulation	Alfred Duma	R 9 000 000.00	R 1 000 000.00	R 10 000 000.00
District Wide Sanitation	VIP	District wide sanitation	R 5 000 000.00	R -	R 5 000 000.00
District Wide Underground Water Project		District Wide	R 5 000 000.00	R -	R 5 000 000.00

MIG Funding continued:

Refurbishment and Upgrade of Water and Sanitation Infrastructure			R 5 000 000.00	R -	
MIG Topslice (PMU)		District	R -	R -	R 5 000 000.00
TOTAL MIG					**R 183 960 000.00**

WSIG Funding

Projects Name	**Project Phase**	**Local Municipality**	**Budget**		**Total Budget**
			Direct Cost	**Indirect cost**	**108 000 000**
Moyeni/Zwelisha Bulk & Reticulation Upgrade		Okhahlamba	R -	R 3 000 000.00	R 3 000 000.00
Escourt Industrial Pipeline Bulk Upgrade		Inkosilangalibalele	R 15 000 000.00	R 1 600 000.00	R 16 600 000.00
Wembezi Bulk & Reticulation Upgrade (WCDM)		Inkosilangalibalele	R 35 000 000.00	R 4 900 000.00	R 39 900 000.00
Reticulation to ennersdale,Ephangwini phase	Phase 3	Inkosilangalibalele	R 18 800 000.00	R 1 200 000.00	R 20 000 000.00
Reticulation to ennersdale,Ephangwini phase	Phase 4	Inkosilangalibalele	R 12 000 000.00	R 1 500 000.00	R 13 500 000.00
Spring Protection District Wide		Districtwide	R 15 000 000.00	R -	R 15 000 000.00
TOTAL WSIG					**R 108 000 000.00**

EPWP Funding

Projects Name	Project Phase	Local Municipality	Budget		Total Budget
			Direct Cost	Indirect cost	7 054 000
General Water/Sewer Maintenance & Reticulation		District Wide			R 4 206 000.00
Water Service Delivery Intervention		District Wide			R 1 848 000.00
Uthukela Environmental Impact		District Wide			R 1 000 000.00
TOTAL EPWP					**R 7 054 000.00**

RBIG Funding

Projects Name	Project Phase	Local Municipality	Budget		Total Budget
			Direct Cost	Indirect cost	45 000 000
Emnambithi Bulk Water	Stage 1	Alfred Duma	R20 000 000.00	R 2 800 000.00	R 22 800 000.00
	Stage 2		15 000 000.00	R 2 100 000.00	R 17 100 000.00
	Stage 3		4 540 000.00	R 560 000.00	R 5 100 000.00
					R 45 000 000.00

Source: UTDM IDP 2019/2020

8. SYNOPSIS OF EXISTING AND COMMITTED SCHEMES

A gap analysis has been undertaken for the water schemes in the UTDM. The gap analysis considered current planning interventions by the WSA.

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 Bergville WSS

The Bergville WSS includes the town of Bergville, Bethany, Acton Homes and Greenpoint which are served with treated water from the Bergville WTP.

There are no plans for bulk water upgrades or new infrastructure for this scheme area. There is an area to the south of this WSS (Bergville Future WSS) with no formal water supply, having an estimated water requirement of 3.9Mℓ/d by 2050.

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 6.59Mℓ/d.

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

Table 8-1: Bergville WSS Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	4		4	6.8	2.8
Storage (Mℓ)				17.6	17.6
Bulk conveyance - Raw Water (Mℓ/d)					
Bulk conveyance - Clear Water (Mℓ/d)	38.9		38.9	54.24	15.34

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 of the existing WTP, the bulk pipelines and reservoirs would need to be increased to meet the demand of 2050.

8.1.2 Colenso WSS

The Colenso WSS includes the town of Colenso, which are served with treated water from the Colenso WTP.

There are no plans for bulk water upgrades or new infrastructure for this scheme area. There is an area to the south and east of Colenso (Colenso Future WSS) not having formal water supply, with an estimated water requirement of 0.7Mℓ/d by 2050.

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 2.01Mℓ/d.

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

Table 8-2: Colenso WSS Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	2.64		2.64	2.7	0.06
Storage (Mℓ)	1.25		1.25	2.95	1.70
Bulk conveyance - Raw Water (Mℓ/d)					
Bulk conveyance - Clear Water (Mℓ/d)	11.90		11.90	14.28	2.38

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 Driefontein WSS

The Driefontein WSS includes the extended small town areas of Watersmeed, Peace Town, Burford and Driefontein which are served through production boreholes.

There is one RBIG project for this area, to upgrade water supply infrastructure, including the area of Ekuvukeni (Indaka WSS). Progress has been made to improve the water supply network. No details however could be obtained during UAP Phase III on the details of the scheme's implementation, including when it may be linked to the existing Ladysmith WSS.

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 15.75Mℓ/d.

The existing and planned infrastructure capacity is compared with the projected 2050 demand. This comparison is provided in Table 8-3.

Table 8-3: Driefontein WSS Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	no WTP				none

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Storage (Mℓ)	15.00		15.00	33.72	18.72
Bulk conveyance - Raw Water (Mℓ/d)					
Bulk conveyance - Clear Water (Mℓ/d)	68.2		68.2	83.16	14.96

8.1.4 Ekuvukeni Lime Hill WSS (Oliphantskop-Indaka WSS)

The area of Indaka WSS, includes the urban area of Ekuvukeni and surrounding extended developments. Only the urban area of Ekuvukeni is supplied from the Oliphantskop Dam.

There is one RBIG project for this area, to upgrade water supply infrastructure, including the area of Watersmeed, Peace Town, Burford and Driefontein (Driefontein WSS). No details however could be obtained during UAP Phase III on the details of the scheme's implementation, including when it may be linked to the existing Ladysmith WSS.

There are two MIG projects for this area, one to upgrade the Oliphantskop WTP (budgeted R20.5million, 2019/2020) and one for a bulk rising main and booster pump station (budgeted R20.5million, 2019/2020).

The planning conducted under the UAP Phase III study made provision for meeting the water requirements up to 2050. The projected water requirements for this area are 21.00Mℓ/d.

The existing and planned infrastructure capacity is compared with the projected 2050 demand. This comparison is provided in Table 8-4.

Table 8-4: Ekuvukeni Lime Hill WSS (Oliphantskop-Indaka WSS) Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	8		8	19	11
Storage (Mℓ)	5		5	31.19	26.19
Bulk conveyance - Raw Water (Mℓ/d)					
Bulk conveyance - Clear Water (Mℓ/d)	174.20		174.20	211.92	37.72

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.

8.1.5 Estcourt WSS

The urban area of Estcourt is supplied from the Archie Rodel and the George Cross WTPs.

There is funding allocated for the planning component of the Umtshezi East Regional Water Supply Scheme during the 2019/2020 financial year, under the MIG programme. Furthermore, there is a project to upgrade water supply to the Wembezi area (budgeted R29.9million, 2019/2020).

The planning conducted under the UAP Phase III study made provision for meeting the water requirements up to 2050. The projected water requirements for this area are 20.82Mℓ/d.

The existing and planned infrastructure capacity is compared with the projected 2050 demand. This comparison is provided in Table 8-5.

Table 8-5: Estcourt WSS Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d) – George Cross WTP	18		18		none
Water Treatment (Mℓ/d) – Archie Rodel WTP	14		14		none
Storage (Mℓ)				32.62	32.62
Bulk conveyance - Raw Water (Mℓ/d)					
Bulk conveyance - Clear Water (Mℓ/d)	102.00		102.00	127.16	25.16

8.1.6 Estcourt Rudimentary WSS

The Estcourt Rudimentary WSS is located south and adjacent to the existing Estcourt WSS and supplies the areas of KwaSobili, Goodhome, Edashi, Emdwebu, eZinyosini, KwaDlamini and Emhlabathini. There is a connection to the George Cross WTP in Estcourt WSS.

There are no listed plans for bulk water upgrades or new infrastructure for this scheme area, however, according to the PMU Manager, there are now (2020) urgent measures to address the water leakages in the Wembezi area which causes intermittent supply further south of the network, which includes the Estcourt Rudimentary WSS.

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 9.33Mℓ/d.

The existing and planned infrastructure capacity is compared with the projected 2050 demand. This comparison is provided in Table 8-6.

Table 8-6: Estcourt Rudimentary WSS Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	none				
Storage (Mℓ)				18.47	18.47
Bulk conveyance - Raw Water (Mℓ/d)					
Bulk conveyance - Clear Water (Mℓ/d)	45.80		45.80	55.04	9.24

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 bulk pipelines and reservoirs would need to be increased to meet the demand of 2050.

8.1.7 Ezakheni WSS

The Ezakheni WSS supplies the urban area of Ezakheni east of Ladysmith and augmenting supply to the area of Ladysmith. This area has high water losses and Non-Revenue Water (NRW) is estimated to be more than 60%.

There are no plans for bulk water upgrades or new infrastructure for this scheme area.

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 26.96Mℓ/d.

The existing and planned infrastructure capacity is compared with the projected 2050 demand. This comparison is provided in Table 8-7.

Table 8-7: Ezakheni WSS Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	32		32	32	
Storage (Mℓ)				44.4	44.4
Bulk conveyance - Raw Water (Mℓ/d)					
Bulk conveyance - Clear Water (Mℓ/d)	166.97		166.97	212.87	45.90

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 bulk pipelines and reservoirs would need to be increased to meet the demand of 2050.

8.1.8 Ladysmith WSS

The Ladysmith WSS supplies the urban and industrial area of Ladysmith west of Ezakheni. There are two water resources used for this area, namely the Spioenkop Dam on the Tugela River and the Klip River, a tributary of the Tugela River. The Klip River is however unreliable especially during winter months or drought conditions.

There is one RBIG project for the Ladysmith area, Spioenkop to Ladysmith BWS, with estimated funding allocations of R100million and R400million for the 2020/2021 and 2021/2022 financial years respectively (DORA, 2019). The UTDM IDP lists the project as the Emnambithi Bulk Water, with funding allocations in three stages with a total budget of R45million, but no programming timelines are indicated.

There is uncertainty as to the available water yield from the Spioenkop Dam, considering its role in the Tugela Transfer Scheme, or whether the dam wall can be raised without affecting the transfers or downstream water users. The Department of Water and Sanitation still need to update the hydrological study for the transfer scheme, which forms part of the Integrated Vaal River System.

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 31.92Mℓ/d.

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

Table 8-8: Ladysmith WSS Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	23		23		
Storage (Mℓ)				37	37
Bulk conveyance - Raw Water (Mℓ/d)					
Bulk conveyance - Clear Water (Mℓ/d)	69.69		69.69	89.04	19.34

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 of the bulk pipelines and reservoirs would need to be increased to meet the demand of 2050.

8.1.9 Loskop WSS

The Loskop WSS supplies the areas of Loskop, Amangwe and surrounds. There is currently a project under way, conducted in phases, to improve water supply in this area. The Loskop WTP has already been upgraded as part of this project, to 8Mℓ/d. According to Umgeni Water (2020), the plant produces about 2Mℓ/d as the reticulated infrastructure still has to be completed.

It is further envisaged that the Empangweni WSS Future area will be supplied from the Loskop WTP. The Emoyeni-Epangweni WSS is already supplied from the Loskop WTP.

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 existing Loskop WSS are 6.78Mℓ/d. Furthermore, the projected water requirements for the existing Emoyeni-Epangweni WSS are 5.14Mℓ/d and for the Empangweni WSS Future area, they are 1.37Mℓ/d, thus totalling 13.29Mℓ/d.

The existing and planned infrastructure capacity is compared with the projected 2050 demand. This comparison is provided in Table 8-9.

Table 8-9: Loskop WSS Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	8		8	15	7

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Storage (Mℓ)				15	15
Bulk conveyance - Raw Water (Mℓ/d)					
Bulk conveyance - Clear Water (Mℓ/d)	82.55		82.55	100.42	17.87

8.1.10 Tugela Estates WSS and Ngedlengedleni WSS

The Tugela Estates WSS obtains water from the Tugela River and supplies consumers from the Tugela Estates WTP. The Ngedlengedleni WSS is a borehole scheme, also referred to as the uMhlumayo Borehole System, which has its pump station next to the Tugela Estates WTP.

There are no plans for bulk water upgrades or new infrastructure for these scheme areas. According to Umgeni Water (2020), production boreholes are being implemented in these areas in order to boost inflow. A geohydrological study is being undertaken.

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 Tugela Estates WSS area are 2.37Mℓ/d and for the Ngedlengedleni WSS are 0.89Mℓ/d.

The existing and planned infrastructure capacity is compared with the projected 2050 demand. This comparison is provided in Table 8-10 for Tugela Estates WSS and in Table 8-11 for Ngedlengedleni WSS.

Table 8-10: Tugela Estates WSS Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	1.2		1.2	2.1	1.1
Storage (Mℓ)				3.44	3.44
Bulk conveyance - Raw Water (Mℓ/d)					
Bulk conveyance - Clear Water (Mℓ/d)	9.40		9.40	13.12	3.72

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.

Table 8-11: Ngedlengedleni WSS Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	1.4		1.4		
Storage (Mℓ)				2.2	2.2
Bulk conveyance - Raw Water (Mℓ/d)					
Bulk conveyance - Clear Water (Mℓ/d)	2.80		2.80	4.48	1.68

8.1.11 Weenen/Kwanobamba WSS and Umtshezi East Regional WSS

The UTDM is busy implementing the Umtshezi East Regional WSS and built a new WTP at Weenen to serve the surrounding areas to the north and south. Details on the phasing and status of implementation could not be obtained from the UTDM during UAP Phase III. The George Cross WTP in the Estcourt WSS may also be utilised (needs to be upgraded) to provide water to the north of Estcourt, between Weenen and Estcourt.

There is funding allocated for the planning component of the Umtshezi East Regional Water Supply Scheme during the 2019/2020 financial year, under the MIG programme. Furthermore, there is a project to upgrade water supply to the Wembezi area (budgeted R29.9million, 2019/2020).

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 Weenen/Kwanobamba WSS area are 3.13Mℓ/d. For the area to the south of the Weenen/Kwanobamba WSS, the water requirements are 1.12Mℓ/d.

The existing and planned infrastructure capacity is compared with the projected 2050 demand. This comparison is provided in Table 8-12.

Table 8-12: Weenen/Kwanobamba WSS Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d) - old	1.4		1.4		
Water Treatment (Mℓ/d) - new	3.0		3.0		
Storage (Mℓ)				7.88	7.88
Bulk conveyance - Raw Water (Mℓ/d)					

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Bulk conveyance - Clear Water (Mℓ/d)	11.40		11.40	15.76	4.36

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 bulk pipelines and reservoirs would need to be increased to meet the demand of 2050.

8.1.12 Winterton WSS

The Winterton WSS supplies Winterton and Khethwani from the Winterton WTP. There are no plans for bulk water upgrades or new infrastructure for this scheme area.

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 1.8Mℓ/d. The existing and planned infrastructure capacity is compared with the projected 2050 demand. This comparison is provided in Table 8-13.

Table 8-13: Winterton WSS Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	1.3		1.3	2.4	1.1
Storage (Mℓ)					
Bulk conveyance - Raw Water (Mℓ/d)					
Bulk conveyance - Clear Water (Mℓ/d)					

8.1.13 Zwelisha Moyeni WSS

The Zwelisha Moyeni WSS supplies the areas of Zwelitsha, Grootgeluk, Mazizini, Dukuza and surrounds, to the west of the Woodstock Dam.

There are no RBIG projects planned with only one WSIG project for the upgrade of bulk and reticulation infrastructure in this area, with a budget allocation of R3 million in 2019/2020.

The planning conducted under the UAP Phase III study made provision for meeting the water requirements up to 2050. The projected water requirements for this area are 10.8Mℓ/d.

The existing and planned infrastructure capacity is compared with the projected 2050 demand. This comparison is provided in Table 8-14.

Table 8-14: Zwelisha Moyeni WSS Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	5		5	11	6
Storage (Mℓ)	2.4		2.4	21.55	19.15
Bulk conveyance - Raw Water (Mℓ/d)					
Bulk conveyance - Clear Water (Mℓ/d)	55.30		55.30	71.96	16.66

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

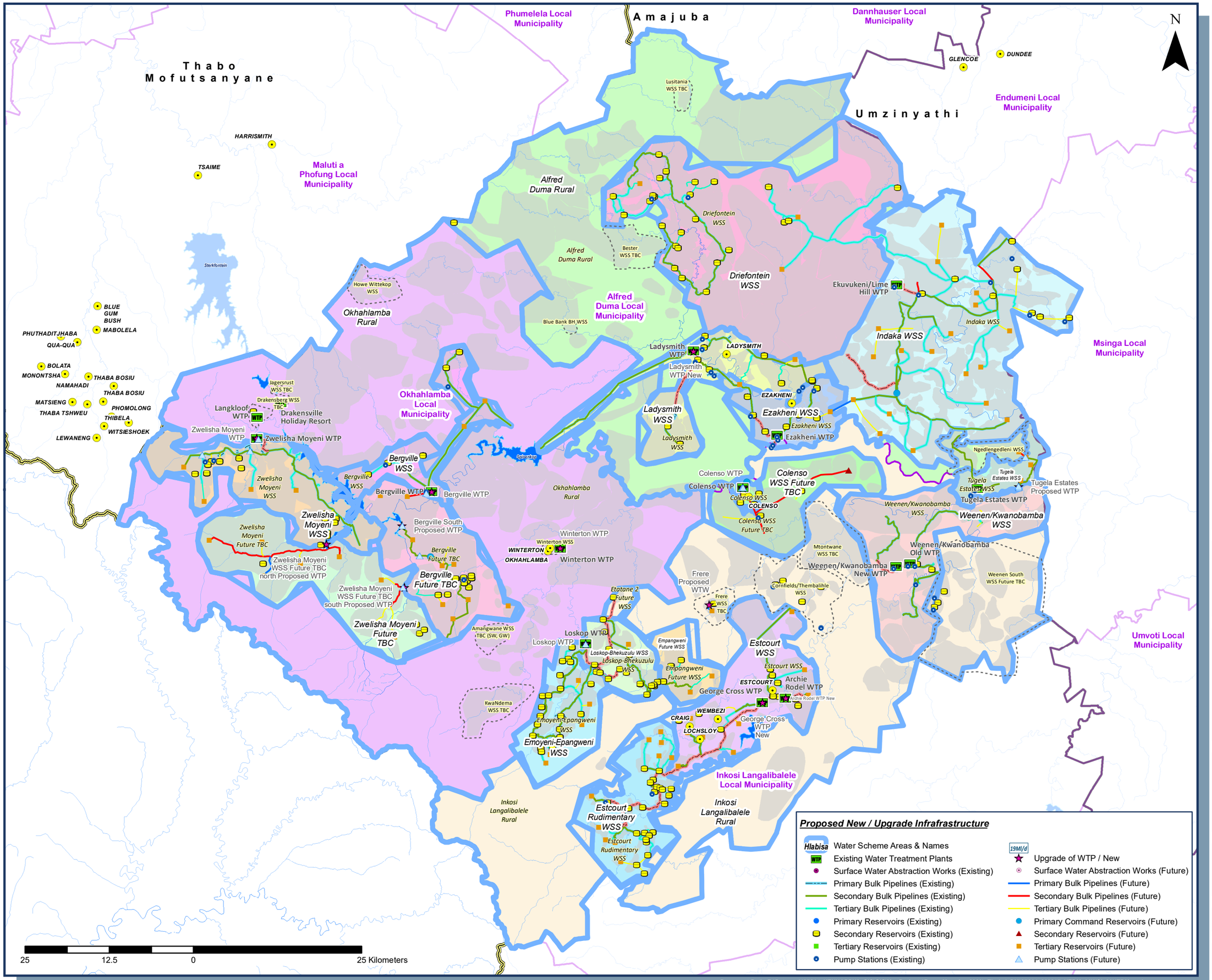
This section details the water supply reconciliation options for bulk water services within the uThukela DM – considering existing use and future supplies and water sources, per scheme area. It must be noted that the Water Supply Intervention Areas (WSIAs) were demarcated based on all the existing planning 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.

The details of the each WSIA split between existing upgrade and future additional requirements are provided per WSIA within the paragraphs hereafter and illustrated for the entire WSA in Figure 9-1.

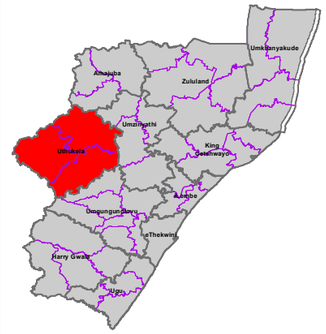
For the UTDM DM as WSA, the applicable larger and urban WSIAs for UAP Phase III are:

- UTK001 Bergville WSS
- UTK0775 Bergville Future TBC WSS;
- UTK002 Colenso WSS and UTK0776 Colenso Future WSS;
- UTK004 Driefontein WSS;
- UTK012 Loskop-Bhekuzulu WSS, including UTK006 Emoyeni-Epangweni WSS and UTK0797 Empangweni Future WSS;
- UTK007 Estcourt WSS;
- UTK007b Estcourt Rudimentary WSS;
- UTK008 Ezakheni WSS;
- UTK005 Indaka WSS;
- UTK010 Ladysmith WSS;
- UTK014 Tugela Estates WSS;
- UTK015 Weenen/Kwanobamba WSS;
- UTK017 Zwelisha Moyeni WSS; and
- UTK0783 Zwelisha Moyeni Future TBC.

Each of the 2020 WSIAs' proposed interventions are briefly discussed in the following sub-sections.



LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT 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

uThukela District Municipality

DATE COMPLETED:

2020/11/25

MAP NO.:

DC23: Figure 9.1

9.2 UTK001 BERGVILLE WSS

9.2.1 Water Demand

The water demand for the Bergville WSS was determined for 2020 and 2050 and included within Table 9-1. The Bergville WSS serves the areas of Bergville, Bethany, iNdanyana, Rookdale, Woodford, Hambrook, Action Homes, Malottas Kraal and Green Point.

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

Population	**Population 2020**	**Population 2050**
	28 483	32 648
Water Demand	**Demand 2020**	**Demand 2050**
	5.13	6.59

9.2.2 Water Resource Consideration

The Bergville area is supplied from water abstracted from the Tugela River, about 10km downstream of the Driel Dam, where it is treated at the Bergville WTP.

The increase in water requirements for this WSS, from 2020, to 2050 is small at 1.46Mℓ/d and unlikely to affect the availability from the source. However, consideration to be given to all domestic requirements by 2050 from the same water source.

The DWS indicated (2019) that the hydrology of the Tugela River catchment needs to be updated as a matter of priority especially as it plays an important role in the Integrated Vaal River System by means of the Tugela-Vaal transfer scheme. It also influences the planning, prioritisation and sequencing of water resources development in the Tugela River catchment (upper) and the Lesotho Highlands Water Project.

9.2.3 Water Supply Infrastructure

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

- The existing capacity at the Bergville WTP is proposed to be upgraded to 6.8Mℓ/d to meet the area's water requirements for 2050.
- The bulk distribution infrastructure would be extended to include eight secondary bulk pipes of diameter ranging between 50-355mm, totalling 39.11km in length and three tertiary pipes of diameter ranging from 200-250mm and totalling 9.01km in length.
- The existing storage should be increased by one primary reservoir, having a total storage capacity of 4 000kl and nine tertiary reservoirs, having a total storage capacity of 13 600kl.

- There are four pump stations proposed, one from the WTP to pump station P2, requiring 73.18kW, one from pump station P2, to reservoir Res1, requiring 29.45kW, one in the northern part near Rooihoek to pump to reservoir Res7, requiring 16.66kW and one near the WTP to pump to reservoir Res10, requiring 1.47kW.

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

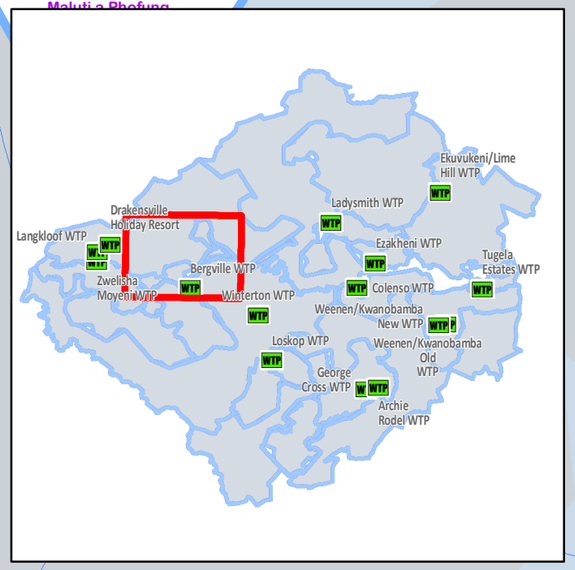
9.2.4 Financial Requirements

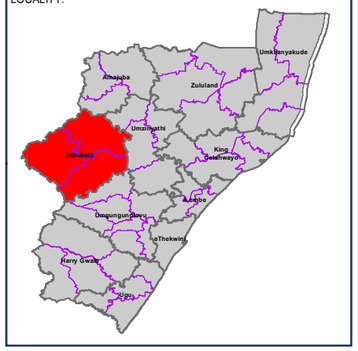
The bulk cost requirement for the Bergville WSS is provided within Table 9-2 below.

Table 9-2: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	R54 280 800	R5 428 080	R59 708 880
Secondary	R45 637 000	R4 563 700	R50 200 700
Tertiary	R74 502 000	R7 450 200	R81 952 200
Total	**R174 419 800**	**R17 441 980**	**R191 861 780**

The total bulk cost requirement is R191.86 million (excl VAT). The scheme development cost per household is approximately R24 495.





Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Farm Land & Conservation Areas
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns (Eshowe)

LOCALITY:

CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT 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 - Bergville WSS uThukela District Municipality

DATE COMPLETED: 2020/11/26

MAP NO.: **DC23: Figure 9.2**

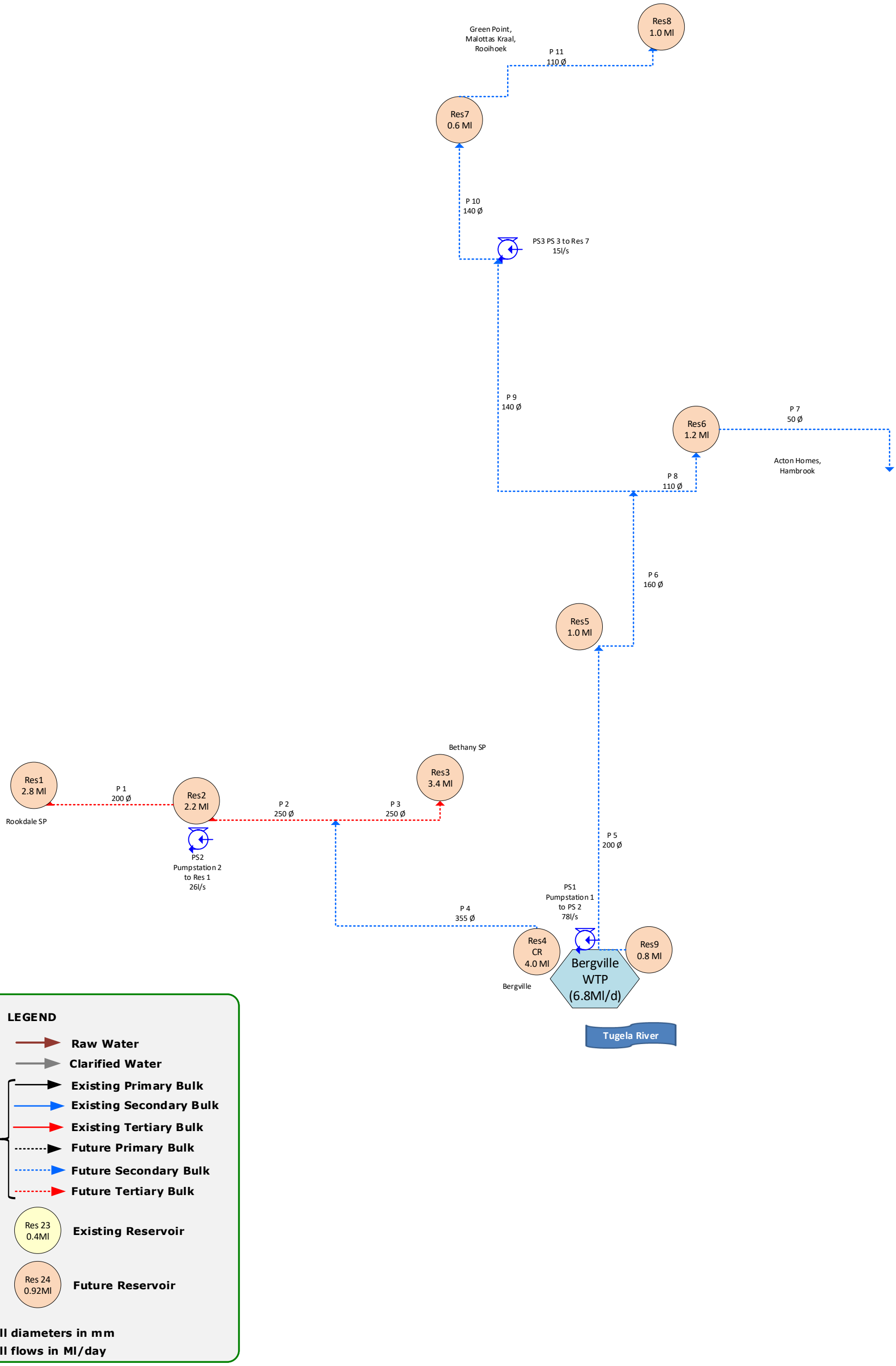
Proposed New / Upgrade Infrafrastructure

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

5 2.5 0 5 Kilometers

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_200831_UTDM_09WSI_02Bergville.mxd

Figure 9-3
WSIA: UTK001 Bergville WSS



9.3 UTK0775 BERGVILLE FUTURE TBC WSS

9.3.1 Water Demand

The water demand for the Bergville Future TBC WSS was determined for 2020 and 2050 and included within Table 9-3.

The Bergville Future TBC WSS lies south of the main town of Bergville and existing Bergville WSS. The Bergville Future TBS WSS includes the areas of Malefetheni, Situlwane, Bukweni and Kwanokopela amongst others, totalling 3 319 households (2011). This is mostly a rural area with dispersed settlements and households.

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

Population	**Population 2020**	**Population 2050**
	20 332	23 305
Water Demand	**Demand 2020**	**Demand 2050**
	1.44	3.92

9.3.2 Water Resource Consideration

The majority of households obtain water from private boreholes and springs. The WSA also provides water via water tanker. There are minimal existing infrastructure components in the form of internal water supply.

It is proposed to utilise the Driel Dam on the Tugela River as source for this WSS.

The water requirements for this WSS are relatively small and unlikely to affect the availability from the source. However, consideration to be given to all domestic requirements by 2050 from the same water source.

The DWS indicated (2019) that the hydrology of the Tugela River catchment needs to be updated as a matter of priority especially as it plays an important role in the Integrated Vaal River System by means of the Tugela-Vaal transfer scheme. It also influences the planning, prioritisation and sequencing of water resources development in the Tugela River catchment (upper) and the Lesotho Highlands Water Project.

9.3.3 Water Supply Infrastructure

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

- It is proposed to construct the Bergville South WTP with a design capacity of 3.8Mℓ/d to meet the area's water requirements for 2050. Abstraction would be from the Driel Dam.
- The bulk distribution infrastructure would be extended to include 10 secondary bulk pipes of diameter ranging between 50-315mm, totalling 31.15km in length, as well as six tertiary bulk pipes of diameter ranging between 63-160mm, totalling 16.25km in length.

- The existing storage should be increased by one primary command reservoir with a capacity of 2 320kl and 12 tertiary reservoirs, having a total storage capacity of 8 200kl.
- There are two pump stations proposed, one from the Bergville South WTP to pump station P6, requiring 107.70kW and one from pump station P6, to primary command reservoir Res13 CR, requiring 147.80kW.

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

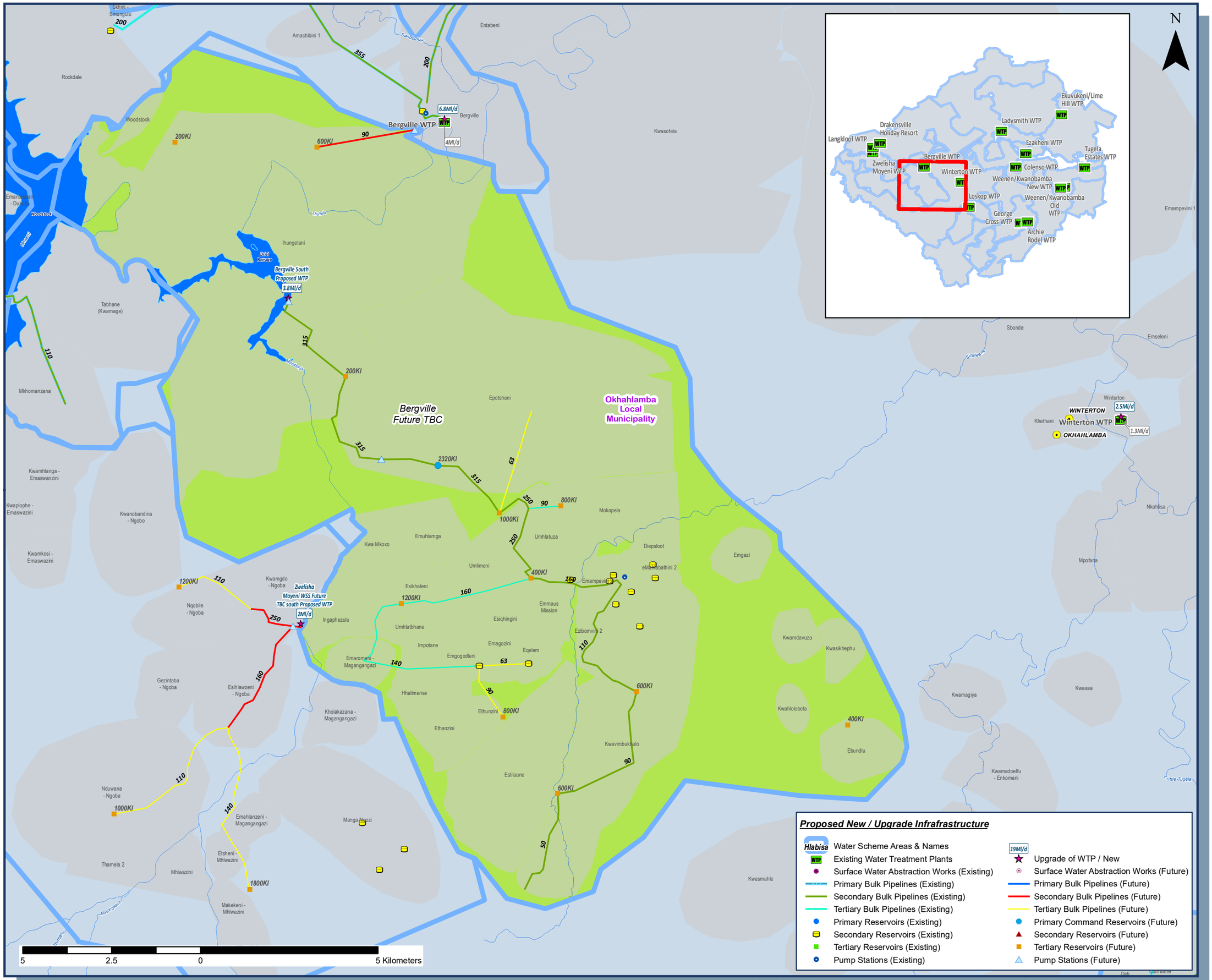
9.3.4 Financial Requirements

The bulk cost requirement for the Bergville Future TBC WSS is provided within Table 9-4 below.

Table 9-4: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	R45 160 800	R4 516 080	R49 676 880
Secondary	R43 062 000	R4 306 200	R47 368 200
Tertiary	R61 772 000	R6 177 200	R67 949 200
Total	**R149 994 800**	**R14 999 480**	**R164 994 280**

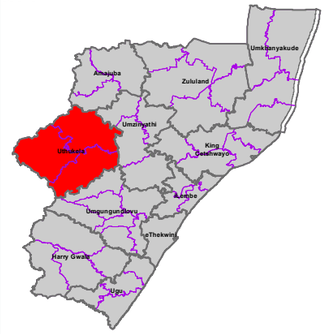
The total bulk cost requirement is R164.99 million (excl VAT). The scheme development cost per household is approximately R29 509.



Legend

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

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA
UMKHANDLU WESIFUNDA
DISTRIKSMUNISIPALITEIT
DISTRICT MUNICIPALITY

UTHUKELA DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

MARISWE
IMPROVING LIVES ENGINEERING 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 TITLE

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

MAP TITLE:

Total Bulk Water Supply Interventions - Bergville Future TBC uThukela District Municipality

DATE COMPLETED: 2020/11/26

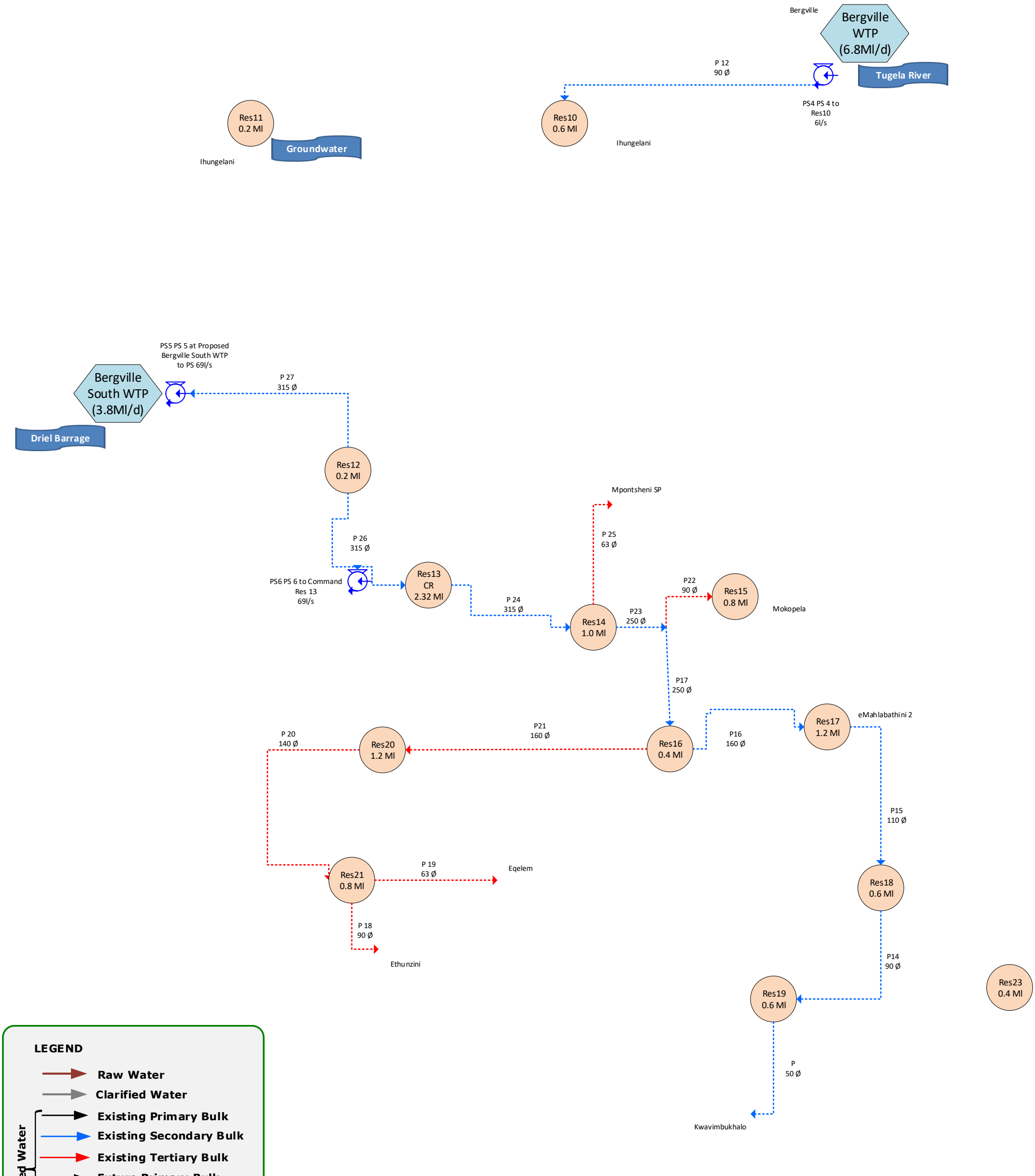
MAP NO.: **DC23: Figure 9.4**

Proposed New / Upgrade Infrafrastructure

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

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_200831_UTDM_09WSI_04BergvilleFuture.mxd

Figure 9-5
WSIA: UTK0775 Bergville Future TBC WSS



9.4 UTK002 Colenso WSS and UTK0776 Colenso Future WSS

9.4.1 Water Demand

The water demand for the Colenso WSS and Colenso Future WSS was determined for 2020 and 2050 and included within Table 9-5.

Table 9-5: Population and Water demand (Mℓ/day) 2020 and 2050

	Population 2020	Population 2050
Colenso WSS	7 138	8 182
Colenso Future WSS	3 756	4 305
Total	10 894	12 487
	Demand 2020	**Demand 2050**
Colenso WSS	1.69	2.01
Colenso Future WSS	0.18	0.7
Total	1.87	2.71

9.4.2 Water Resource Consideration

Water is abstracted from the Tugela River, where it is treated at the Colenso WTP. It is assumed that there are sufficient resources to meet the requirements for these areas.

The increase in water requirements for this WSS, from 2020, to 2050 is small at 0.84Mℓ/d and unlikely to affect the availability from the source. Even if considering a baseline demand using only the 2020 Colenso WSS water requirements, versus the total for Colenso WSS and Colenso Future WSS for 2050, it becomes 1.02Mℓ/d. However, consideration to be given to all domestic requirements by 2050 from the same water source.

The DWS indicated (2019) that the hydrology of the Tugela River catchment needs to be updated as a matter of priority especially as it plays an important role in the Integrated Vaal River System by means of the Tugela-Vaal transfer scheme. It also influences the planning, prioritisation and sequencing of water resources development in the Tugela River catchment (upper) and the Lesotho Highlands Water Project.

9.4.3 Water Supply Infrastructure

The following infrastructure upgrades and augmentation will be required in order to adequately supply the Colenso WSS and Colenso Future WSS and are illustrated within Figure 9-6 overleaf followed by the schematic layout of the WSIA within Figure 9-7.

It is planned to provide the areas included in the Colenso Future WSS, by extending the existing Colenso WSS.

- It is proposed to upgrade the existing Colenso WTP from 2.64Mℓ/d, to 2.7Mℓ/d to meet the demands of 2050.
- One primary bulk line of 1.05km will connect the Colenso WTP to Reservoir 1. A secondary bulk pipe of 125mm diameter with a length of 1.18km will connect the future Colenso supply area to the existing supply area. There will be an additional 11 secondary bulk pipes ranging in diameter of 63-250mm and totalling 22.49km as well as nine tertiary bulk pipes ranging in diameter of 50-125mm and totalling 13.03km in length to provide water to all areas.
- The existing storage should be increased by one primary reservoirs, having a total storage capacity of 200kl and seven secondary reservoirs with a total storage capacity of 3 350kl.

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

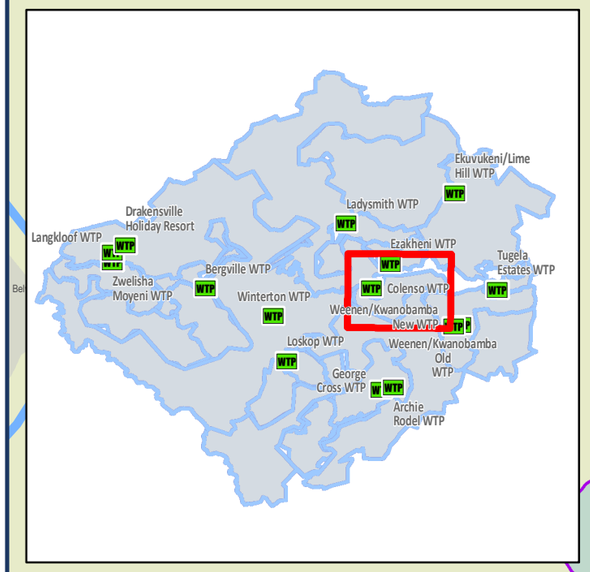
9.4.4 Financial Requirements

The bulk cost requirement for the Colenso WSS and Colenso Future WSS is provided within Table 9-6 below.

Table 9-6: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	R16 142 260	R1 614 226	R17 756 486
Secondary	R27 949 000	R2 794 900	R30 743 900
Tertiary	R1 535 000	R153 500	R1 688 500
Total	**R45 626 260**	**R4 562 626**	**R50 188 886**

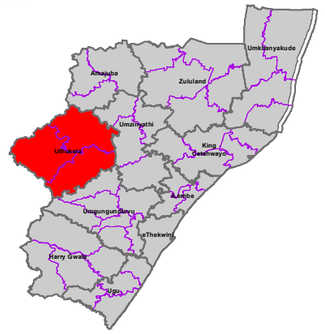
The total bulk cost requirement is R50.189 million (excl VAT). The scheme development cost per household is approximately R14 871.



Legend

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

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA
UMKHANDLU WESIFUNDA
DISTRIK SMUNISIPALITEIT
DISTRICT MUNICIPALITY

UTHUKELA DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

MARISWE
IMPROVING LIVES ENGINEERING 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 TITLE

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

MAP TITLE:

Total Bulk Water Supply Interventions - Colenso WSS and Colenso Future WSS
uThukela District Municipality

DATE COMPLETED: 2020/11/26

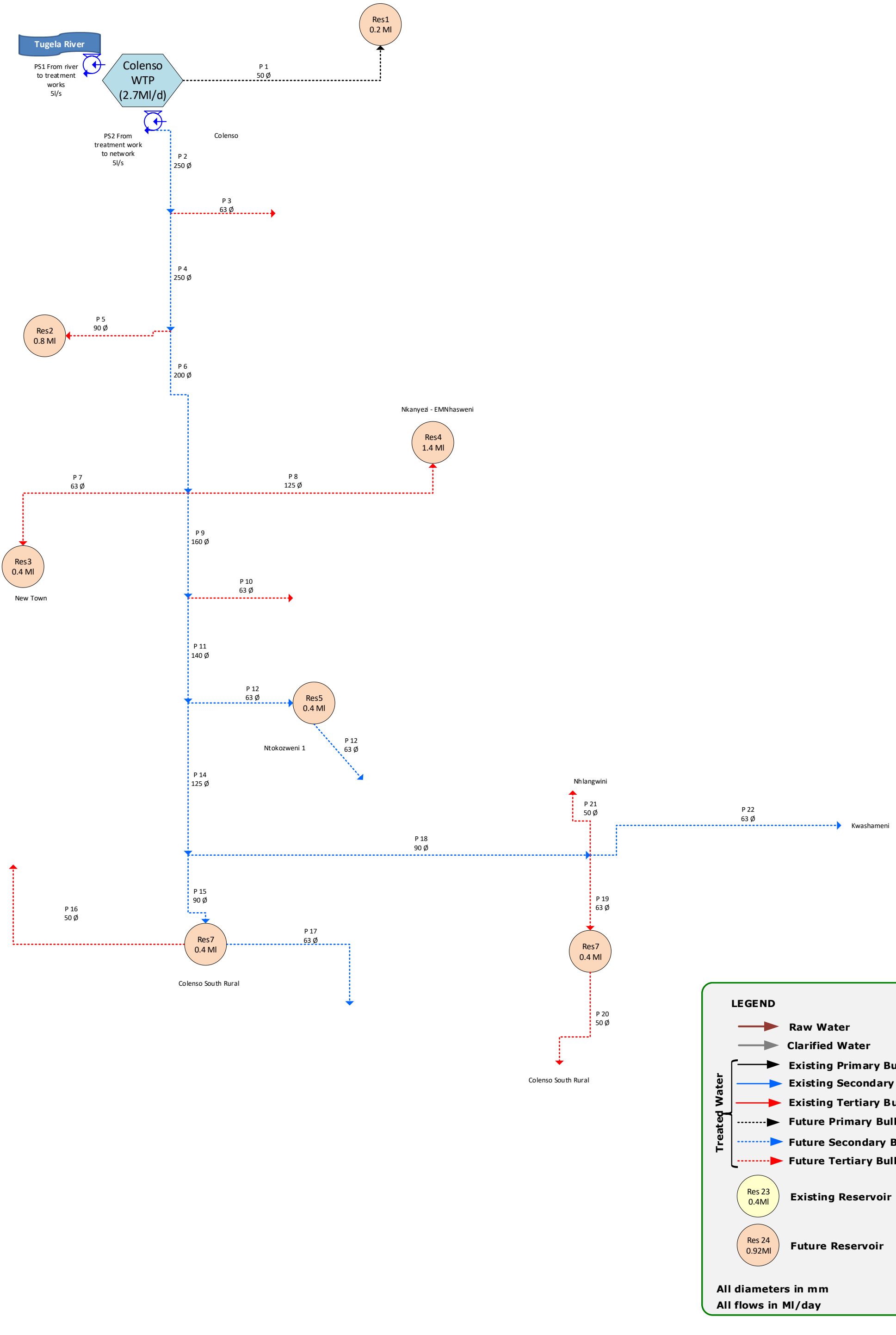
MAP NO.: **DC23: Figure 9.6**

Proposed New / Upgrade Infrafrastructure

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

Figure 9-7

WSIA: UTK002 Colenso WSS and UTK0776 Colenso Future WSS



9.5 UTK004 Driefontein WSS

9.5.1 Water Demand

The water demand for the Driefontein WSS was determined for 2020 and 2050 and included within Table 9-7. The area includes 13 settlements, the most prominent being Watersmeed and Matiwane.

Table 9-7: Population and Water demand (Mℓ/day) 2020 and 2050

Population	**Population 2020**	**Population 2050**
	73 365	84 093
Water Demand	**Demand 2020**	**Demand 2050**
	12.62	15.75

9.5.2 Water Resource Consideration

In the west, the Driefontein WSS is supplied from groundwater, by means of production boreholes and hand pumps. There are plans to provide this area with water should the larger Spioenkop to Ladysmith Bulk Water Supply (Emnambithi Bulk Water) project be implemented.

The current groundwater yield is unknown. It is advised to investigate other options for water supply, including from surface water.

In the east, it is proposed to connect the Driefontein WSS to the Indaka WSS, which is supplied from the Oliphantskop Dam. It is further proposed to augment supply to the Indaka WSS from the Ezakheni WSS which is supplied from a weir in the Tugela River.

9.5.3 Water Supply Infrastructure

The following infrastructure upgrades and augmentation will be required in order to adequately supply the Driefontein WSS and are illustrated within Figure 9-8 overleaf followed by the schematic layout of the WSIA within Figure 9-9.

- It is proposed to further develop the western area of the Driefontein WSS to provide universal access to water.
- It is further proposed to connect the eastern area of the Driefontein WSS to the existing Indaka WSS through a 315mm diameter secondary bulk pipe of 8.1km. The Indaka WSS is proposed to be augmented from the Ezakheni WSS.
- There will be an estimated 51.1km of secondary bulk pipes ranging in diameter of 75-355mm to supply the Driefontein WSS, with an 8.12km, 315mm diameter tertiary bulk to the Indaka WSS. A further 28 tertiary bulk pipes ranging in diameter of 63-250mm, totalling 77.57km in length to supply the Driefontein WSS.
- Storage for the Driefontein WSS comprises 29 tertiary reservoirs with a total capacity of 31 400kl.

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

9.5.4 *Financial Requirements*

The bulk cost requirement for the Driefontein WSS is provided within Table 9-8.

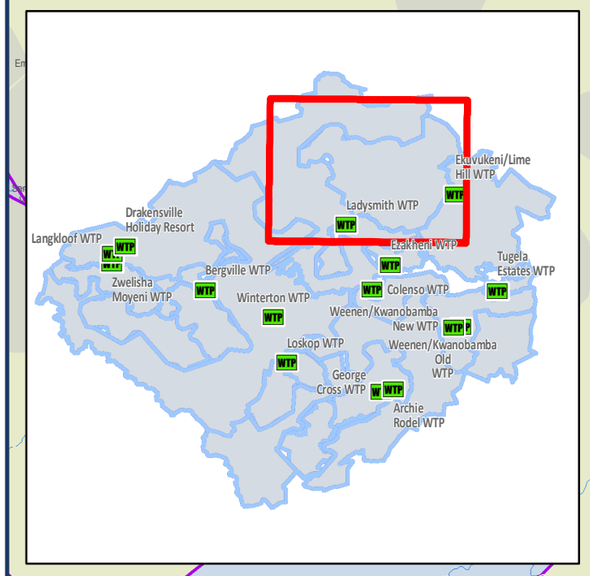
Table 9-8: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	R0	R0	R0
Secondary	R101 060 000	R10 106 000	R111 166 000
Tertiary	R212 671 000	R21 267 100	R233 938 100
Total	**R313 731 000**	**R31 373 100**	**R345 104 100**

The total bulk cost requirement is R345.1 million (excl VAT). The scheme development cost per household is approximately R17 105.

Proposed New / Upgrade Infrastructure

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



Okhahlamba Local Municipality

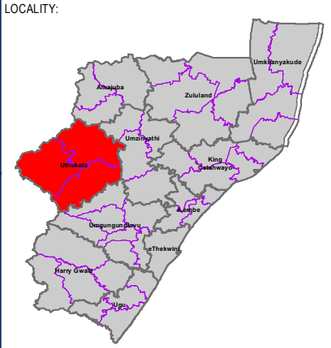
8.5 4.25 0 8.5 Kilometers

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_200831_UTDM_09WSI_08Driefontein.mxd

Legend

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

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT 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

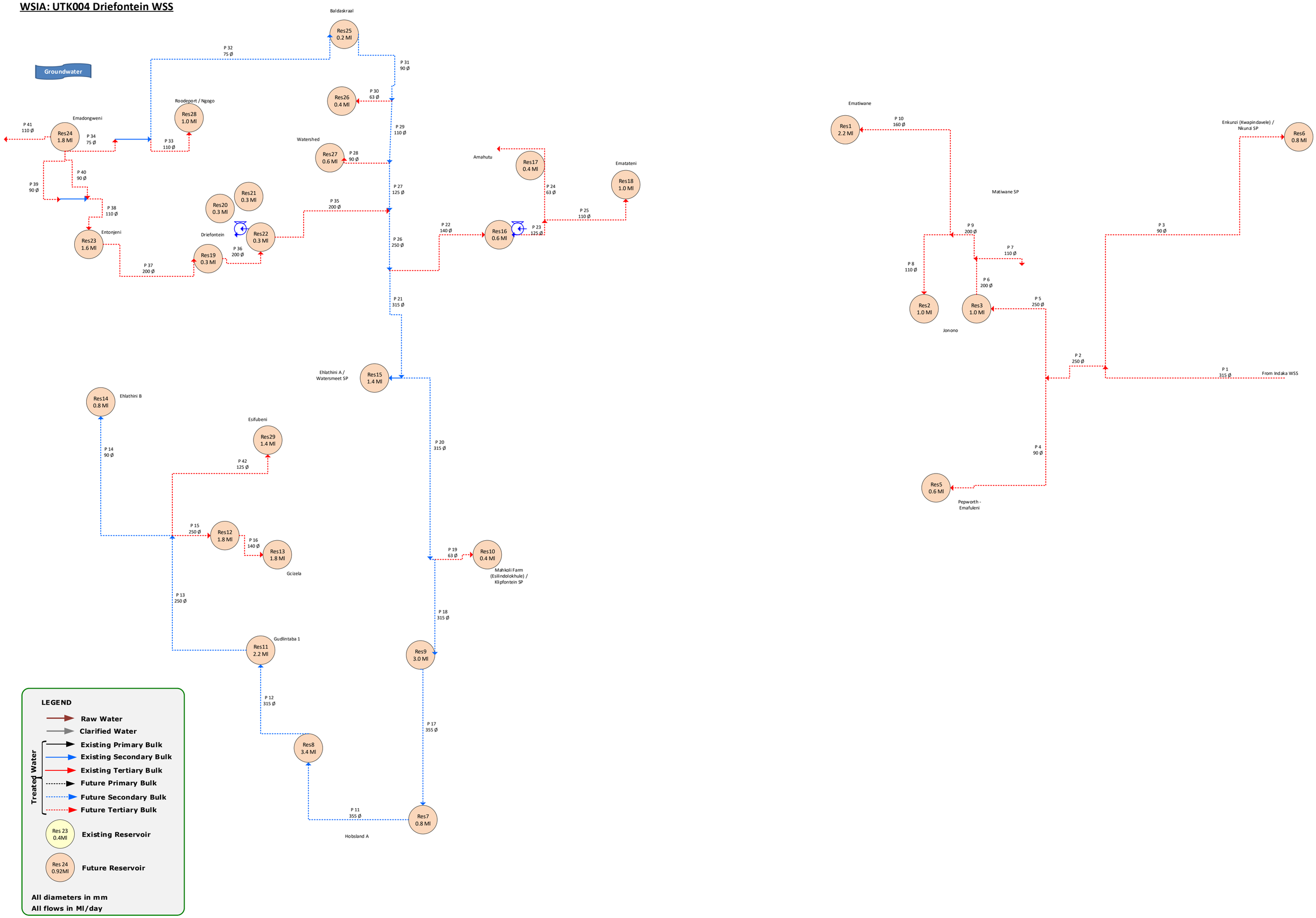
MAP TITLE:

Total Bulk Water Supply Interventions - Driefontein WSS uThukela District Municipality

DATE COMPLETED: 2020/11/26

MAP NO.: **DC23: Figure 9.8**

Figure 9-9
WSIA: UTK004 Driefontein WSS



9.6 UTK012 Loskop-Bhekuzulu WSS, including UTK006 Emoyeni-Epangweni WSS and UTK0797 Empangweni Future WSS

The UTK012 Loskop-Bhekuzulu WSS, including UTK006 Emoyeni-Epangweni WSS, UTK0797 Empangweni Future WSS and UTK0796 Etatane 2 Future WSS can be considered as one supply area as all areas are, or will in future, be supplied from the Loskop WTP.

9.6.1 Water Demand

The water demand for the Loskop-Bhekuzulu WSS, Emoyeni-Epangweni WSS, Empangweni Future WSS and Etatane 2 Future WSS was determined for 2020 and 2050 and included within Table 9-9 and are listed separately as these are currently separate areas.

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

	Population 2020	Population 2050
Loskop-Bhekuzulu WSS	31 680	36 312
Emoyeni-Epangweni WSS	25 705	29 464
Empangweni Future WSS	6 064	6 950
Etatane 2 Future WSS	823	943
Total	**64 272**	**73 669**
	Demand 2020	**Demand 2050**
Loskop-Bhekuzulu WSS	5.47	6.78
Emoyeni-Epangweni WSS	4.08	5.14
Empangweni Future WSS	1.09	1.37
Etatane 2 Future WSS	0.13	0.16
Total	**10.77**	**13.45**

9.6.2 Water Resource Consideration

Water is abstracted from the Little Tugela River (also known as the Injisuthi River), where it is treated at the Loskop WTP.

The Internal Strategic Perspective (ISP) for the Uthukela Water Management Area indicated that the Little Tugela River is already stressed in terms of water allocations – predominantly for irrigation (DWAF, 2004). The development of farm dams may improve water availability to consumers. The implementation of the Ecological Reserve however may further reduce the water availability for human needs (any user sector).

The WARMS database lists one registered water use by a WSP for this area for a volume of 1.872 million m^3/a (5.129Mℓ/d).

The Little Tugela River's flow reduces during drought and the drier winter season, therefore affecting water security during these times. There is minimal use of groundwater, but some individual consumers do make use of boreholes (production boreholes and hand pump installations). There are also springs in the area, but these also dry up during the winter season.

The UTDM has installed more than 50 storage reservoirs and tanks, but other water source options and storage options (such as rainwater harvest tanks) may still need to be investigated.

9.6.3 Water Supply Infrastructure

The following infrastructure upgrades and augmentation will be required in order to adequately supply the Loskop-Bhekuzulu WSS, Emoyeni-Epangweni WSS and Empangweni Future WSS and are illustrated within Figure 9-10 overleaf followed by the schematic layout of the WSIA within Figure 9-11.

- For the three WSS areas, it is anticipated that water will continue to be supplied from the Loskop WTP and that the Loskop WTP be upgraded to 15Mℓ/d to meet the 2050 water requirements.
- The scheme area development consists of 26.13km of primary bulk pipes ranging in diameter from 110-450mm. Furthermore, the network is proposed to be extended by 30 secondary bulk pipes ranging in diameter from 63-400mm and totalling 73.38km as well as 22 tertiary bulk pipes ranging in diameter from 63-200mm and totalling 40.38km in length.
- The existing storage should be increased by 34 tertiary reservoirs, having a total storage capacity of 29 440kl.
- A pump station is proposed to provide water from the Loskop WTP, to the command reservoir serving the Empangweni Future WSS.

It is recommended to perform further detail hydrological studies to determine the yield from existing surface and groundwater sources.

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

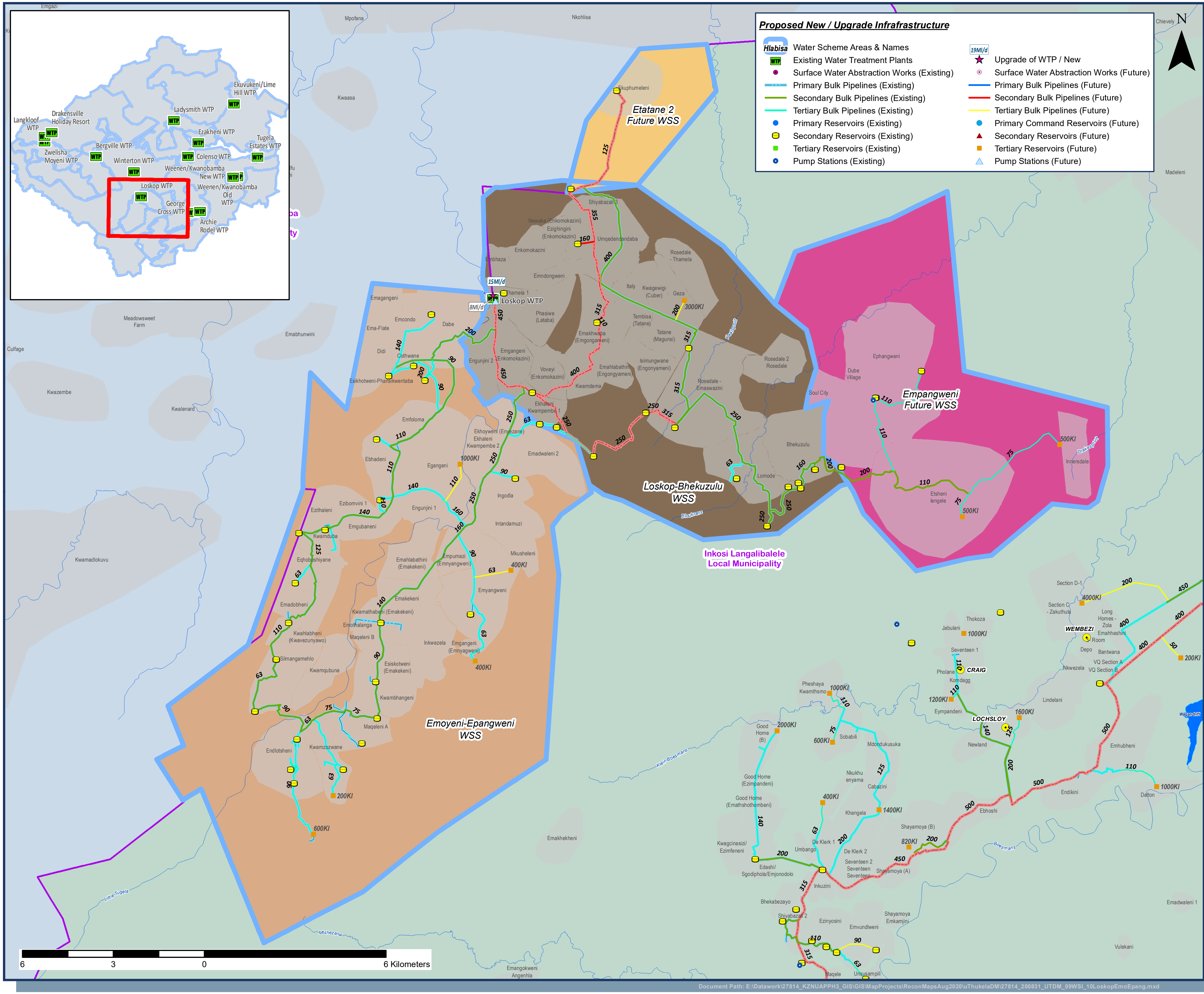
9.6.4 Financial Requirements

The bulk cost requirement for the Loskop-Bhekuzulu WSS, Emoyeni-Epangweni WSS and Empangweni Future WSS is provided within Table 9-10 below.

Table 9-10: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	96 323 000	R9 632 300	R105 955 300
Secondary	93 690 000	R9 369 000	R103 059 000
Tertiary	181 805 000	R18 180 500	R199 985 500
Total	**R371 818 000**	**R37 181 800**	**R408 999 800**

The total bulk cost requirement is R408.999 million (excl VAT). The scheme development cost per household is approximately R25 575.



Legend

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

LOCALITY:

CLIENT: UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY: UTHUKELA DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

MARISWE

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

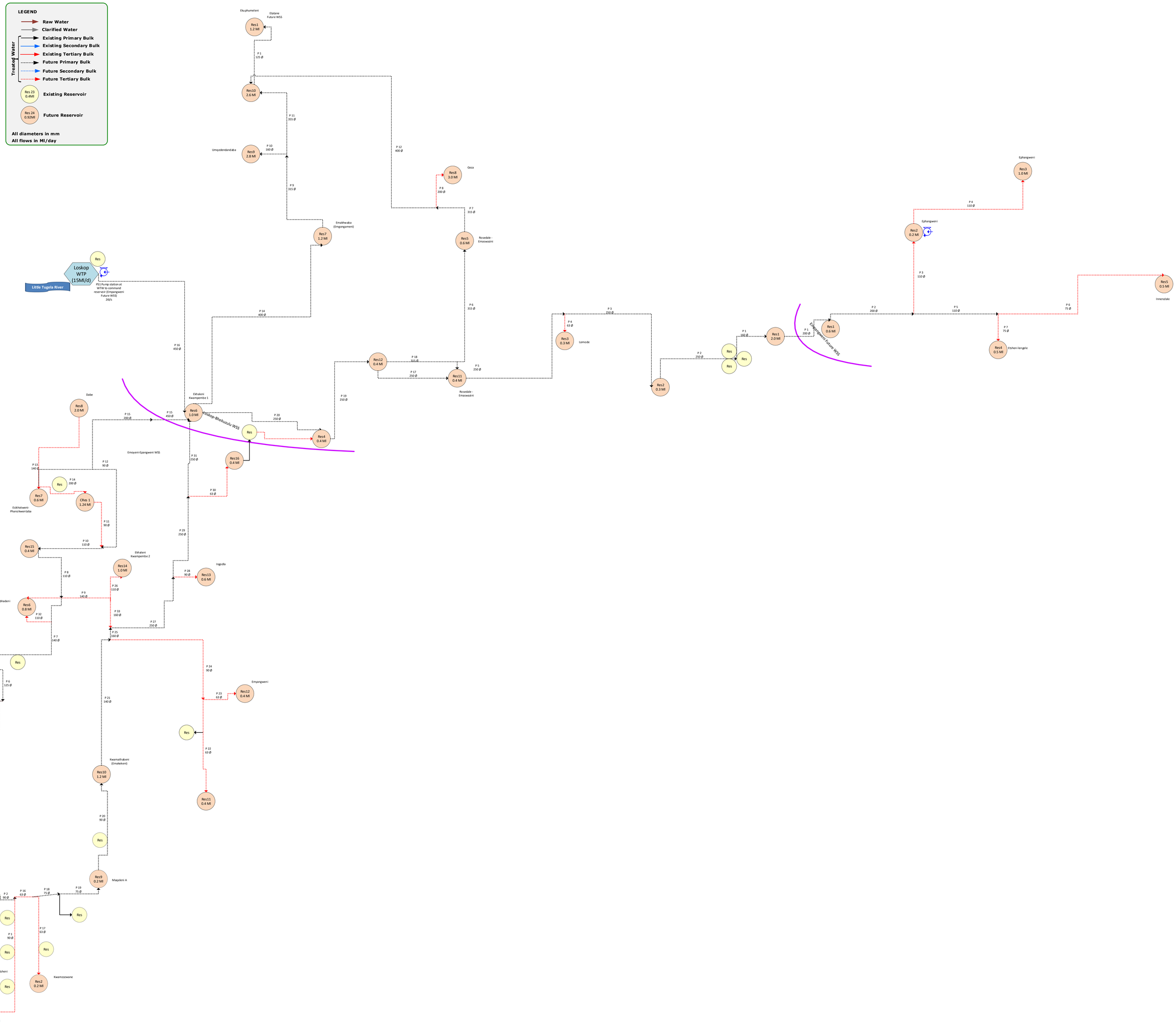
Universal Access Plan Phase III - Progressive Development of a Regional Concept Secondary Bulk Water Master Plan

MAP TITLE: Total Bulk Water Supply Interventions - Loskop-Bhekuzulu WSS, Emoyeni-Epangweni WSS and Empangweni Future WSS uThukela District Municipality

DATE COMPLETED: 2020/11/26

MAP NO.: DC23: Figure 9.10

Figure 9-11
WSIA: UTK012 Loskop-Bhekuzulu WSS, including
UTK006 Emoyeni-Epangweni WSS, UTK0797 Empangweni Future WSS
And UTK0796 Etatane 2 Future WSS



9.7 UTK007 ESTCOURT WSS

9.7.1 Water Demand

The water demand for the UTK007 Estcourt WSS was determined for 2020 and 2050 and included within Table 9-11.

Table 9-11: Population and Water demand (Mℓ/day) 2020 and 2050

Population	**Population 2020**	**Population 2050**
	70 847	81 207
Water Demand	**Demand 2020**	**Demand 2050**
	17.09	20.82

9.7.2 Water Resource Consideration

The Estcourt WSS obtains its water from a weir in the Bushmans River, which supplies the Archie Rodel WTP, and the Wagendrift Dam on the Bushmans River, which supplies the George Cross WTP.

The Bushmans River is also utilised as indirect source to supply the Weenen WSS by means of a balancing dam, supplied via an irrigation canal. The River is intensively used for irrigation (31 million m³/a) whereas the domestic use represents only a fraction (4 million m³/a).

The Thukela WMA ISP (2004) reported that after allowance for the EWR and return flows, the yield from the Bushmans River catchment was estimated as 80 million m³/a (at a 1:50 assurance level). The water balance was a surplus of 40 million m³/a, after allocations were made for irrigation, domestic (urban and rural), industrial and afforestation. This water – mainly available through the Wagendrift Dam – could be utilised in this catchment area, or the Lower Tugela catchment area.

The available yield for domestic use from the Bushmans River needs to be determined. This is particularly important prior to implementing the planned Umtshezi East Regional WSS.

The DWS indicated (2019) that the hydrology of the Tugela River catchment needs to be updated as a matter of priority especially as it plays an important role in the Integrated Vaal River System by means of the Tugela-Vaal transfer scheme. It also influences the planning, prioritisation and sequencing of water resources development in the Tugela River catchment (upper) and the Lesotho Highlands Water Project.

The quality of water in the Bushmans River below Estcourt is affected by diffuse pollution from agricultural activities.

9.7.3 Water Supply Infrastructure

The following infrastructure upgrades and augmentation will be required in order to adequately supply the Estcourt WSS and are illustrated within Figure 9-12 overleaf followed by the schematic layout of the WSIA within Figure 9-13.

- The existing capacity at the George Cross and Archie Rodel WTPs is considered sufficient to meet the Estcourt WSS's water requirements for 2050, however,
    - The George Cross and Archie Rodel WTPs were constructed in 1973 and 1952, therefore provision was made for new WTPs in the costing of this scheme, with the same capacity as the existing WTPs.
    - It is advised to review the capacity of the George Cross WTP, when considering its role in local supply and potential supply extension as part of the Umtshezi East Regional Water Supply Scheme and supply to the south of Estcourt.
- The bulk distribution infrastructure would be extended to include 12 primary bulk pipes of diameter ranging between 63-500mm, totalling 27.40km in length, as well as secondary bulk pipes ranging in diameter of between 63-450mm, totalling 30.43km in length and a further 10 tertiary bulk pipes ranging in diameter of between 50-200mm, totalling 21.31km in length.
- The existing storage should be increased by 20 tertiary reservoirs, having a total storage capacity of 32 620kl.
- No new or additional pump stations are proposed.

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

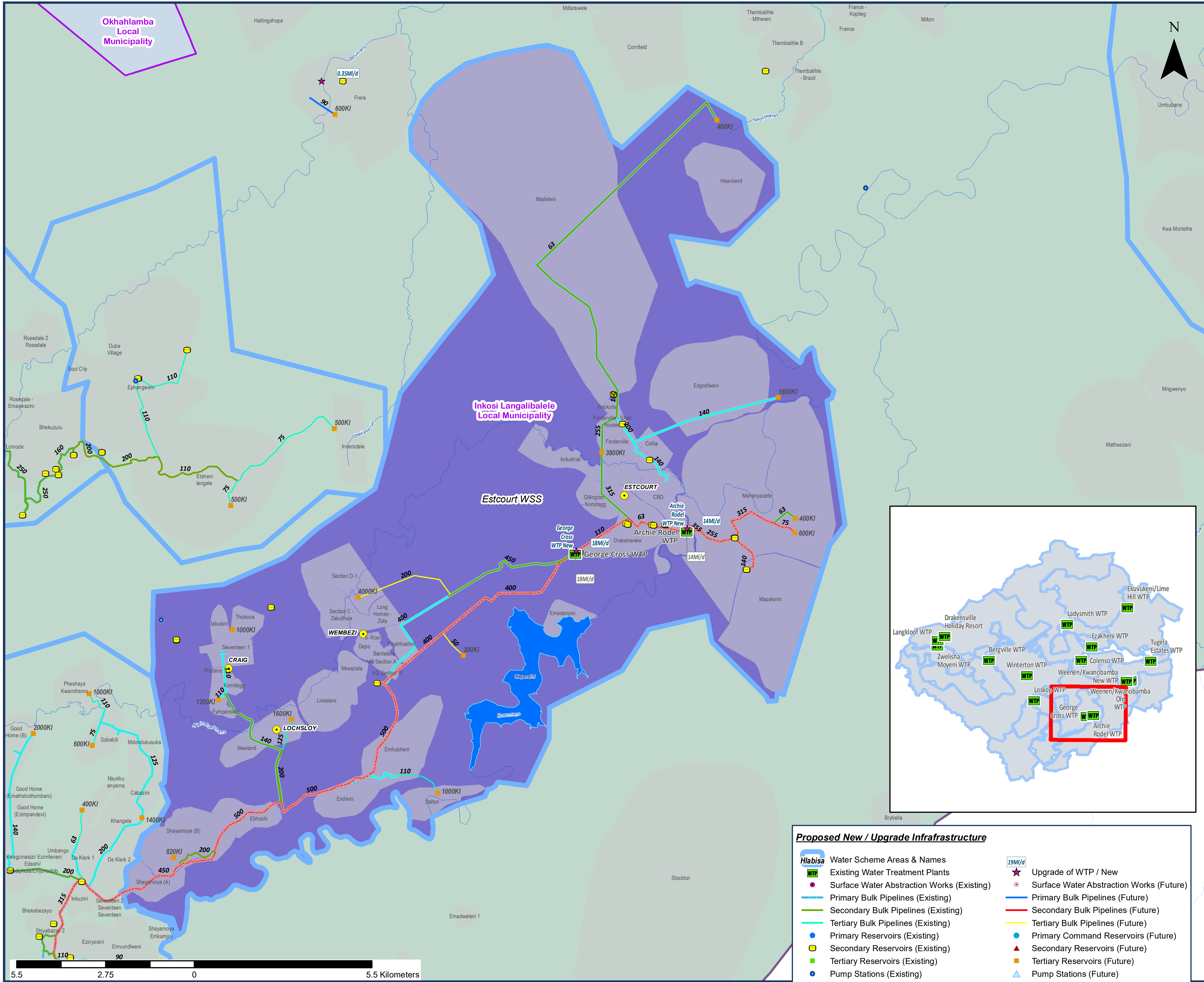
9.7.4 Financial Requirements

The bulk cost requirement for the Estcourt WSS is provided within Table 9-12 below.

Table 9-12: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	R208 766 000	R20 876 600	R229 642 600
Secondary	R40 070 000	R4 007 000	R44 077 000
Tertiary	R80 251 000	R8 025 100	R88 276 100
Total	**R329 087 000**	**R32 908 700**	**R361 995 700**

The total bulk cost requirement is R361.996 million (excl VAT). The scheme development cost per household is approximately R18 580.



Legend

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

LOCALITY:

CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT 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:

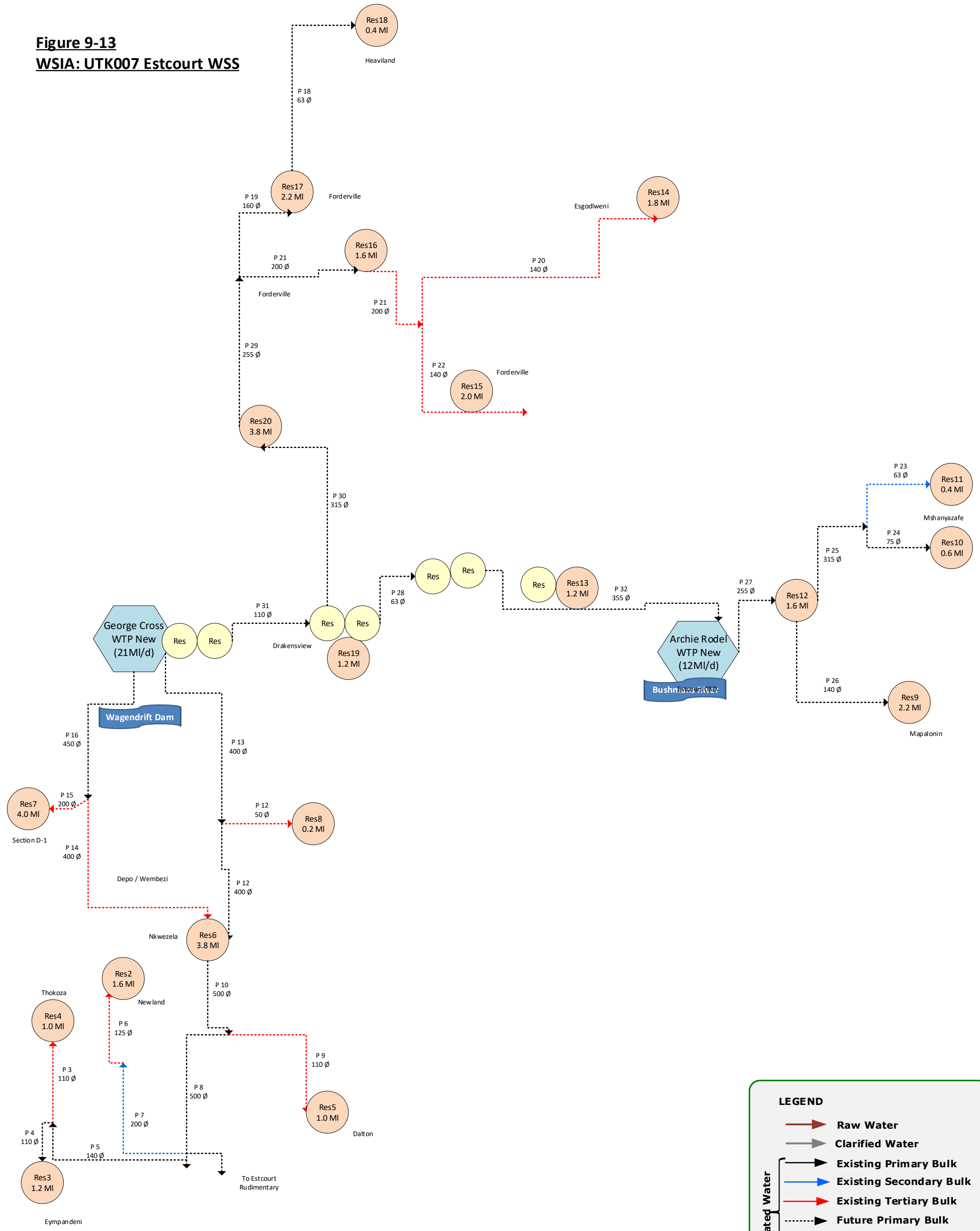
Total Bulk Water Supply Interventions - Estcourt WSS
uThukela District Municipality

DATE COMPLETED: 2020/11/26

MAP NO.: DC23: Figure 9.12

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_200831_UTDM_09WSI_12Estcourt.mxd

Figure 9-13
WSIA: UTK007 Estcourt WSS



9.8 UTK007B ESTCOURT RUDIMENTARY WSS

9.8.1 Water Demand

The water demand for the UTK007b Estcourt Rudimentary WSS was determined for 2020 and 2050 and included within Table 9-13.

Table 9-13: Population and Water demand (Mℓ/day) 2020 and 2050

Population	**Population 2020**	**Population 2050**
	44 167	50 625
Water Demand	**Demand 2020**	**Demand 2050**
	7.77	9.33

9.8.2 Water Resource Consideration

The area south of Shayamoya, and from KwaSobabili, Good Home and Edashi onwards (south), receive water from production boreholes and a weir in a tributary of the Bushmans River as well as from the George Cross WTP that is supplied from the Wagendrift Dam on the Bushmans River. However due to the extent of leakages and informal connections in the Wembezi area and surrounds, water cannot reach the Estcourt Rudimentary WSS as intended.

No further information is available on the existing and available yield from groundwater or from the Bushmans River weir and upstream of the weir for utilisation in this area.

The available yield for domestic use from the Bushmans River needs to be determined. This is particularly important prior to implementing the planned Umtshezi East Regional WSS.

9.8.3 Water Supply Infrastructure

The following infrastructure upgrades and augmentation will be required in order to adequately supply the Estcourt Rudimentary WSS and is illustrated within Figure 9-14 overleaf followed by the schematic layout of the WSIA within Figure 9-15.

- The existing capacity at the George Cross and Archie Rodel WTPs is considered sufficient to meet the Estcourt Rudimentary WSS's water requirements for 2050, however
    - The dosing operations of water from the Bushmans River weir, may need to be replaced with a treatment plant.
    - It is advised to review the capacity of the George Cross WTP, when considering its role in local supply and potential supply extension as part of the Umtshezi East Regional Water Supply Scheme and supply to the south of Estcourt.
- The bulk distribution infrastructure would be extended to include seven primary bulk pipes of diameter ranging between 250-450mm, totalling 28.12km in length, secondary bulk pipes ranging in diameter of between 50-200mm, totalling 14.03km in length and 19 tertiary bulk pipes ranging in diameter of between 50-200mm, totalling 42.38km in length.

- The existing storage should be increased by 25 tertiary reservoirs, having a total storage capacity of 18 470kl.
- No new or additional pump stations are proposed.

Bulk infrastructure is currently being constructed to connect the Estcourt Rudimentary WSS area to the Estcourt WSS. The priority though is to address the extensive leakages in the Wembezi area as it causes water not to reach further down the network including in this area, from the George Cross WTP. More information on the phasing and design parameters of this extension still to be provided by the PMU Manager (2020), including plans to build a package plant to serve these areas.

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

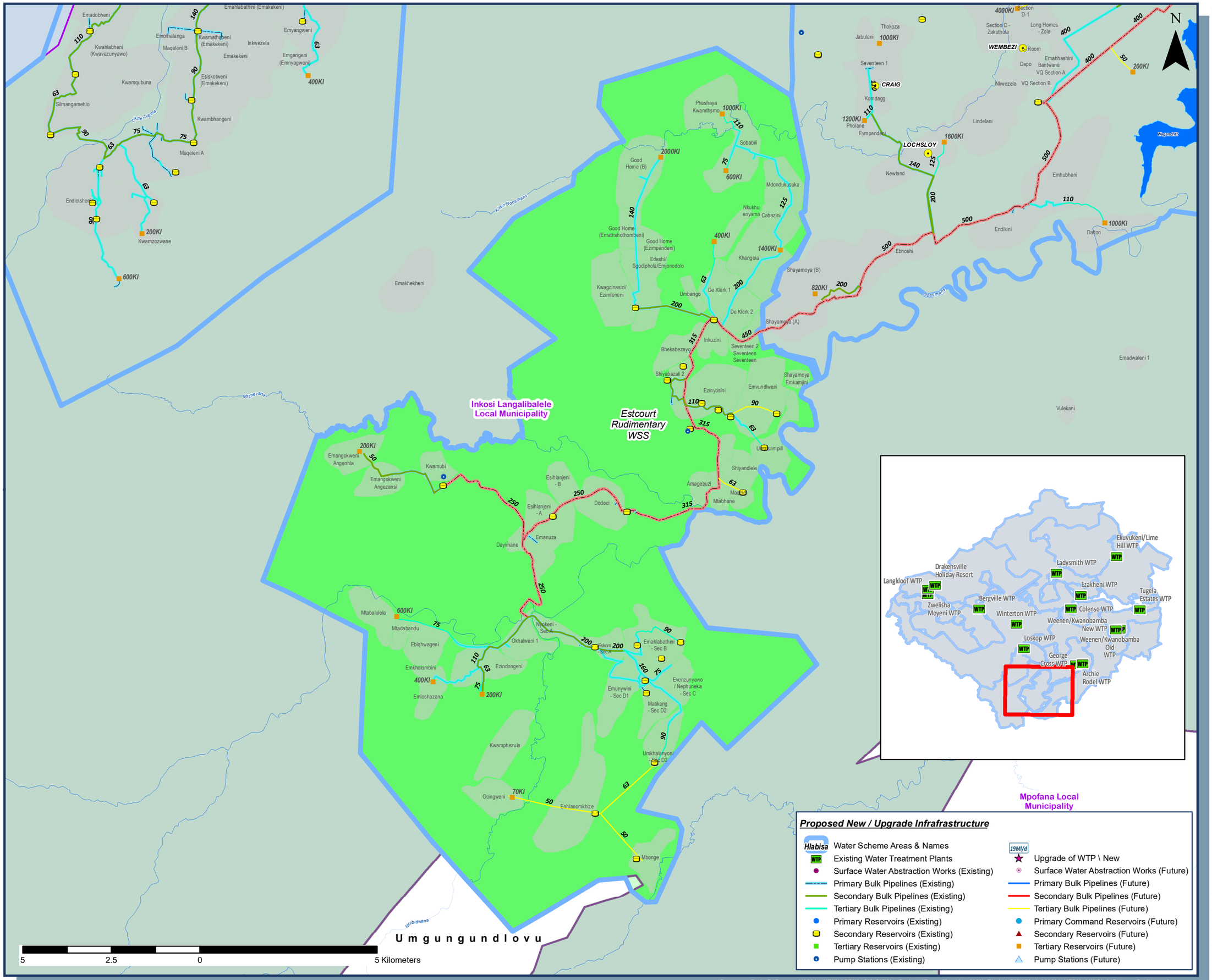
9.8.4 Financial Requirements

The bulk cost requirement for the Estcourt Rudimentary WSS is provided within Table 9-14 below.

Table 9-14: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	R74 775 000	R7 477 500	R82 252 500
Secondary	R6 819 000	R681 900	R7 500 900
Tertiary	R132 350 000	R13 235 000	R145 585 000
Total	**R213 944 000**	**R21 394 400**	**R235 338 400**

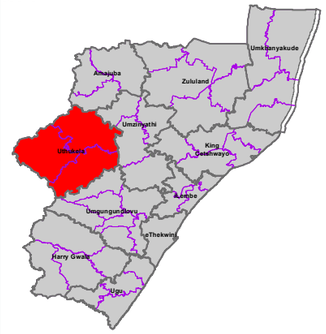
The total bulk cost requirement is R235.34 million (excl VAT). The scheme development cost per household is approximately R19 376.



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Farm Land & Conservation Areas
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns (Eshowe)

LOCALITY:



CLIENT: UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY: UTHUKELA DISTRICT 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 - Estcourt Rudimentary WSS uThukela District Municipality

DATE COMPLETED: 2020/11/26

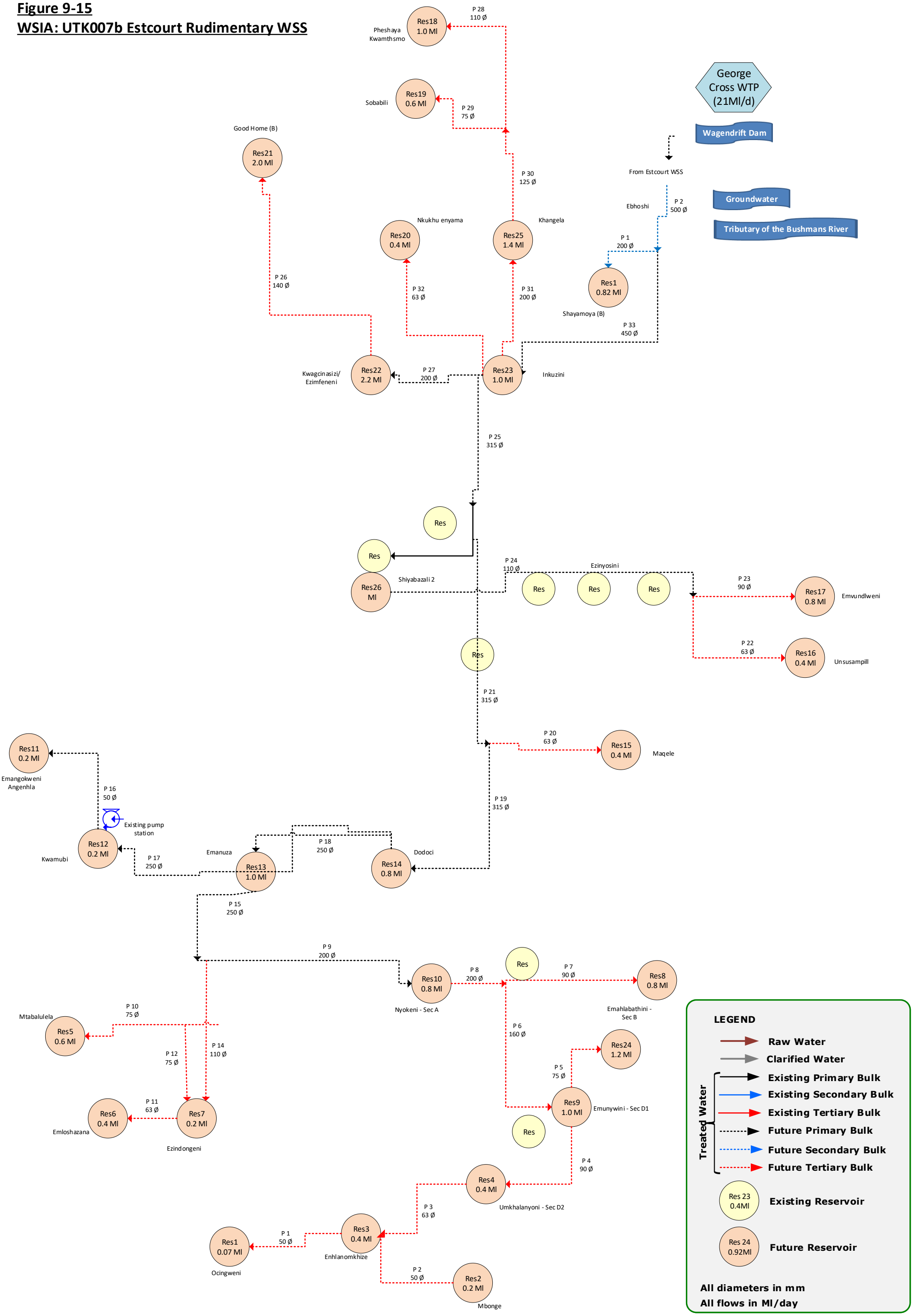
MAP NO.: **DC23: Figure 9.14**

Proposed New / Upgrade Infrafrastructure

- Hlabisa — Water Scheme Areas & Names
- Existing Water Treatment Plants
- Surface Water Abstraction Works (Existing)
- Primary Bulk Pipelines (Existing)
- Secondary Bulk Pipelines (Existing)
- Tertiary Bulk Pipelines (Existing)
- Primary Reservoirs (Existing)
- Secondary Reservoirs (Existing)
- Tertiary Reservoirs (Existing)
- Pump Stations (Existing)
- 19Ml/d — Upgrade of WTP \ New
- Surface Water Abstraction Works (Future)
- Primary Bulk Pipelines (Future)
- Secondary Bulk Pipelines (Future)
- Tertiary Bulk Pipelines (Future)
- Primary Command Reservoirs (Future)
- Secondary Reservoirs (Future)
- Tertiary Reservoirs (Future)
- Pump Stations (Future)

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_200831_UTDM_09WSI_14EstcourtRudim.mxd

Figure 9-15
WSIA: UTK007b Estcourt Rudimentary WSS



9.9 UTK008 EZAKHENI WSS

9.9.1 Water Demand

The water demand for the Ezakheni WSS was determined for 2020 and 2050 and included within Table 9-15.

Table 9-15: Population and Water demand (Mℓ/day) 2020 and 2050

Population	**Population 2020**	**Population 2050**
	81 096	92 955
Water Demand	**Demand 2020**	**Demand 2050**
	22.64	26.96

9.9.2 Water Resource Consideration

The Ezakheni area is supplied from the Ezakheni WTP which is supplied from the Tugela River weir. The available yield from the Tugela River is not known.

The DWS indicated (2019) that the hydrology of the Tugela River catchment needs to be updated as a matter of priority especially as it plays an important role in the Integrated Vaal River System by means of the Tugela-Vaal transfer scheme. It also influences the planning, prioritisation and sequencing of water resources development in the Tugela River catchment (upper) and the Lesotho Highlands Water Project.

9.9.3 Water Supply Infrastructure

The following infrastructure upgrades and augmentation will be required in order to adequately supply the Ezakheni WSS and are illustrated within Figure 9-16 overleaf followed by the schematic layout of the WSIA within Figure 9-17.

- The existing capacity at the Ezakheni WTP is considered sufficient to meet the area's water requirements for 2050.
- The bulk distribution infrastructure would be extended to include three primary bulk pipes of diameter ranging between 140-813mm, totalling 6.95km in length, seven secondary bulk pipes ranging in diameter of between 110-762mm, totalling 20.53km in length and four tertiary bulk pipes ranging in diameter of between 90-560mm, totalling 5.91km in length.
- The existing storage should be increased by two primary reservoirs, having a total storage capacity of 1 000kl and 11 tertiary reservoirs, having a total storage capacity of 43 400kl.
- There are two pump stations proposed, one to serve the primary command reservoir R3, requiring 21.49kW and one to serve the primary command reservoir R4, requiring 734.60kW.

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

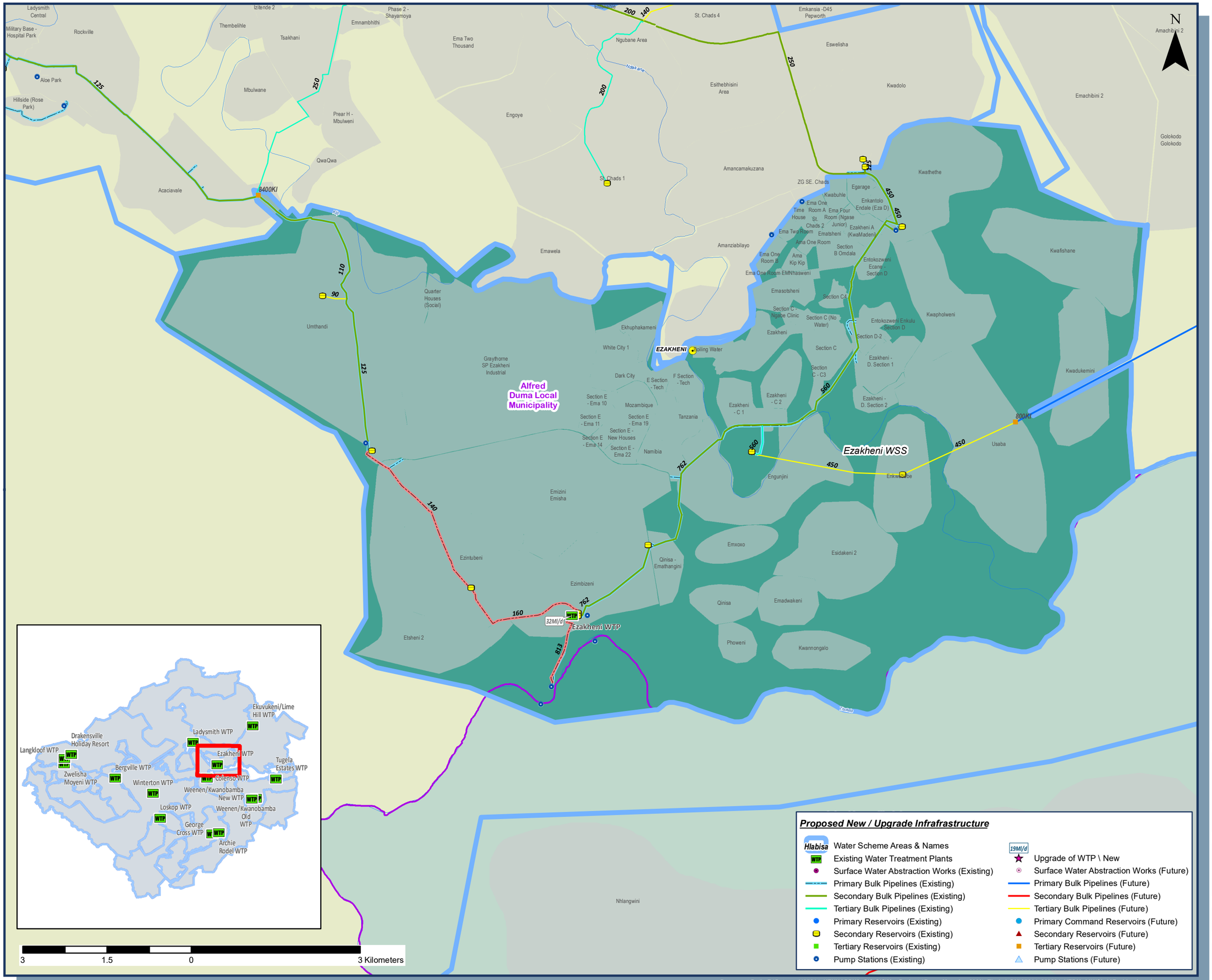
9.9.4 Financial Requirements

The bulk cost requirement for the Ezakheni WSS is provided within Table 9-16 below.

Table 9-16: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	R76 284 000	R7 628 400	R83 912 400
Secondary	R140 017 000	R14 001 700	R154 018 700
Tertiary	R176 245 000	R17 624 500	R193 869 500
Total	**R392 546 000**	**R39 254 600**	**R431 800 600**

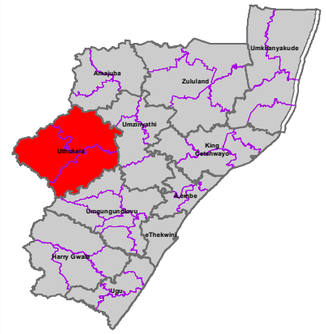
The total bulk cost requirement is R431.8 million (excl VAT). The scheme development cost per household is approximately R19 362.



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Farm Land & Conservation Areas
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns (Eshowe)

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA
UMKHANDLU WESIFUNDA DISTRIKSMUNISIPALITEIT DISTRICT MUNICIPALITY

UTHUKELA DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

MARISWE
IMPROVING LIVES ENGINEERING 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 TITLE

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

MAP TITLE:

Total Bulk Water Supply Interventions - Ezakheni WSS
uThukela District Municipality

DATE COMPLETED: 2020/11/26

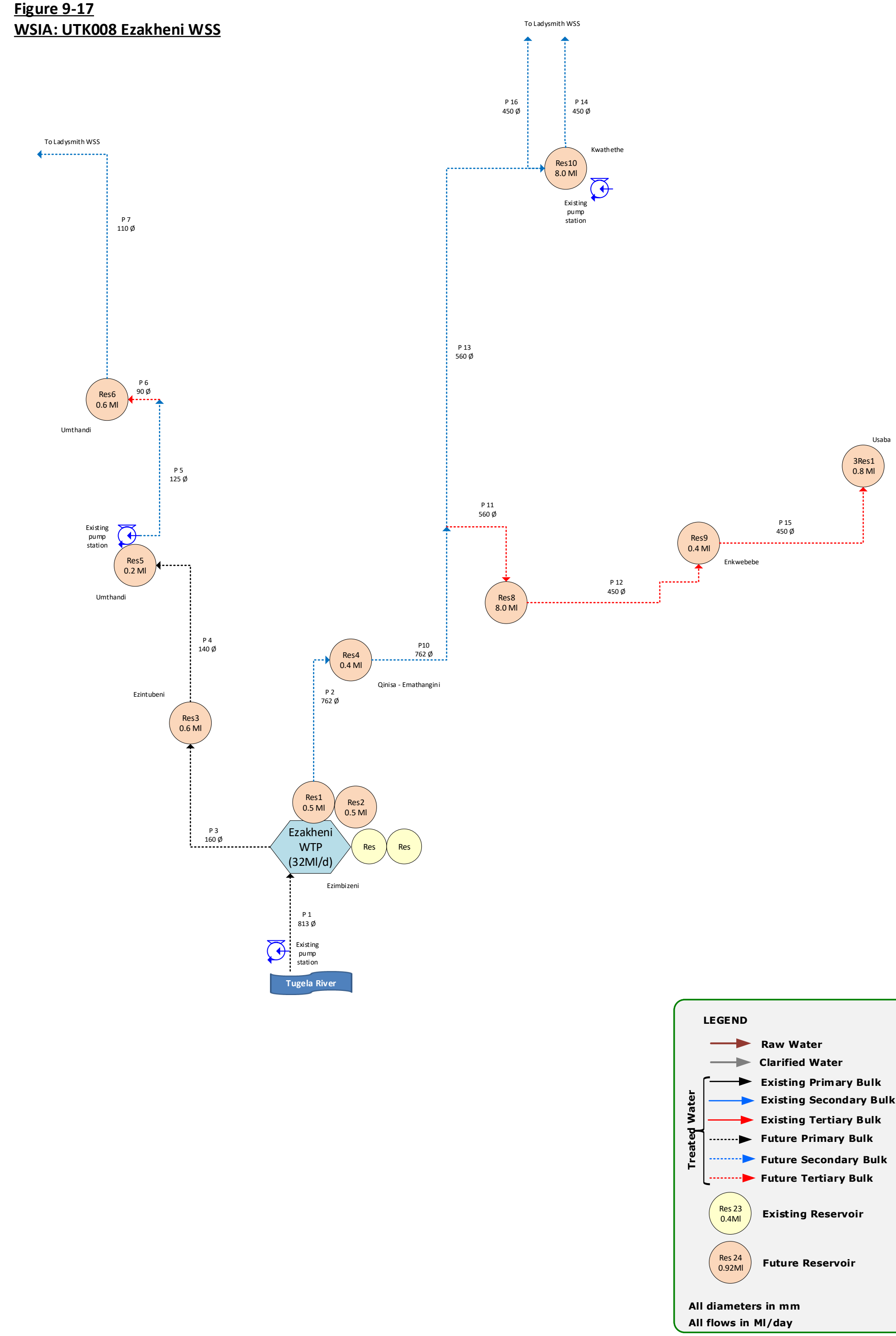
MAP NO.: **DC23: Figure 9.16**

Proposed New / Upgrade Infrafrastructure

- Hlabisa — Water Scheme Areas & Names
- Existing Water Treatment Plants
- Surface Water Abstraction Works (Existing)
- Primary Bulk Pipelines (Existing)
- Secondary Bulk Pipelines (Existing)
- Tertiary Bulk Pipelines (Existing)
- Primary Reservoirs (Existing)
- Secondary Reservoirs (Existing)
- Tertiary Reservoirs (Existing)
- Pump Stations (Existing)
- 19Ml/d — Upgrade of WTP \ New
- Surface Water Abstraction Works (Future)
- Primary Bulk Pipelines (Future)
- Secondary Bulk Pipelines (Future)
- Tertiary Bulk Pipelines (Future)
- Primary Command Reservoirs (Future)
- Secondary Reservoirs (Future)
- Tertiary Reservoirs (Future)
- Pump Stations (Future)

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_200831_UTDM_09WSI_16Ezakheni.mxd

Figure 9-17
WSIA: UTK008 Ezakheni WSS



9.10 UTK005 INDAKA WSS

9.10.1 Water Demand

The water demand for the Indaka WSS was determined for 2020 and 2050 and included within Table 9-17.

Table 9-17: Population and Water demand (Mℓ/day) 2020 and 2050

Population	**Population 2020**	**Population 2050**
	101 137	115 926
Water Demand	**Demand 2020**	**Demand 2050**
	17.61	21.00

9.10.2 Water Resource Consideration

The Indaka area is supplied from the Oliphantskop WTP which is supplied from the Oliphantskop Dam located on the Sundays River. Siltation of the dam has been a problem for many years and it affects the operational efficiency and capacity of the WTP. Recent efforts to desilt the dam were not successful.

The Indaka WSS is further augmented by groundwater in the form of five production boreholes that supply distribution reservoirs in the areas of Limehill, Rockcliff, Kwajwili, Qhinkhowe and Ekuvukeni central, however the water quality is poor due to high levels of sulphate.

9.10.3 Water Supply Infrastructure

The following infrastructure upgrades and augmentation will be required in order to adequately supply the Indaka WSS and are illustrated within Figure 9-18 overleaf followed by the schematic layout of the WSIA within Figure 9-19.

- The existing capacity at the Oliphantskop WTP is considered insufficient to meet the area's water requirements for 2050, however, it is limited by the water source yield. It is proposed to augment supply with 11Mℓ/d from the neighbouring Ezakheni WTP.
- The bulk distribution infrastructure would be extended to include three primary bulk pipes of diameter ranging between 250-660mm, totalling 19.46km in length, 19 secondary bulk pipes ranging in diameter of between 90-500mm, totalling 84.51km in length and 35 tertiary bulk pipes ranging in diameter of between 50-400mm, totalling 144.14km.
- The existing storage should be increased by two primary reservoirs, having a total storage capacity of 1 780kl and 26 tertiary reservoirs, having a total storage capacity of 29 410kl.
- There are is one pump station proposed at the Oliphantskop WTP to supply the primary command reservoir R1, requiring 69.61kW.

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

9.10.4 Financial Requirements

The bulk cost requirement for the Indaka WSS is provided within Table 9-18 below.

Table 9-18: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	R102 487 000	R10 248 700	R112 735 700
Secondary	R124 874 000	R12 487 400	R137 361 400
Tertiary	R264 031 000	R26 403 100	R290 434 100
Total	**R491 392 000**	**R49 139 200**	**R540 531 200**

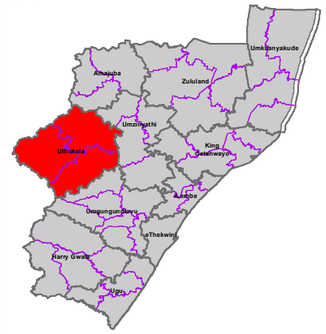
The total bulk cost requirement is R540.53 million (excl VAT). The scheme development cost per household is approximately R19 435.

N

Legend

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

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA
UMKHANDLU WESIFUNDA
DISTRIKSMUNISIPALITEIT
DISTRICT MUNICIPALITY

UTHUKELA DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

MARISWE
IMPROVING LIVES ENGINEERING 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 TITLE

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

MAP TITLE:

Total Bulk Water Supply Interventions - Indaka WSS uThukela District Municipality

DATE COMPLETED:

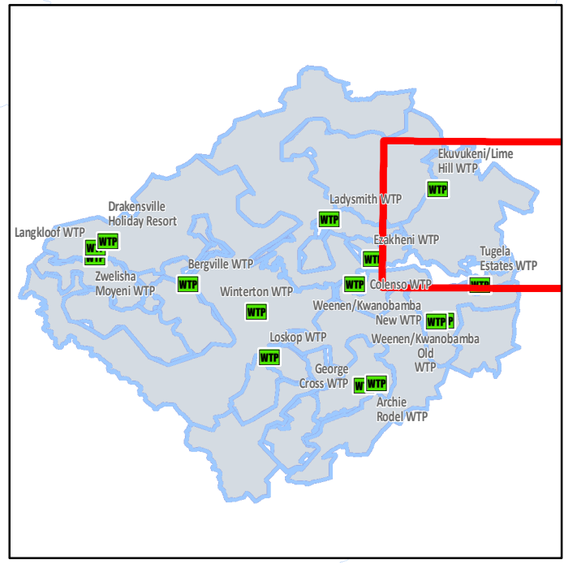
2020/11/26

MAP NO.:

DC23: Figure 9.18

Proposed New / Upgrade Infrafrastructure

- Hlabisa — Water Scheme Areas & Names
- WTP — Existing Water Treatment Plants
- Surface Water Abstraction Works (Existing)
- Primary Bulk Pipelines (Existing)
- Secondary Bulk Pipelines (Existing)
- Tertiary Bulk Pipelines (Existing)
- Primary Reservoirs (Existing)
- Secondary Reservoirs (Existing)
- Tertiary Reservoirs (Existing)
- Pump Stations (Existing)
- 19Ml/d — Upgrade of WTP \ New
- Surface Water Abstraction Works (Future)
- Primary Bulk Pipelines (Future)
- Secondary Bulk Pipelines (Future)
- Tertiary Bulk Pipelines (Future)
- Primary Command Reservoirs (Future)
- Secondary Reservoirs (Future)
- Tertiary Reservoirs (Future)
- Pump Stations (Future)



Endumeni Local Municipality

Alfred Duma Local Municipality

Inkosi Langalibalele Local Municipality

Umzinyathi

Indaka WSS

Ekuvukeni/Lime Hill WTP

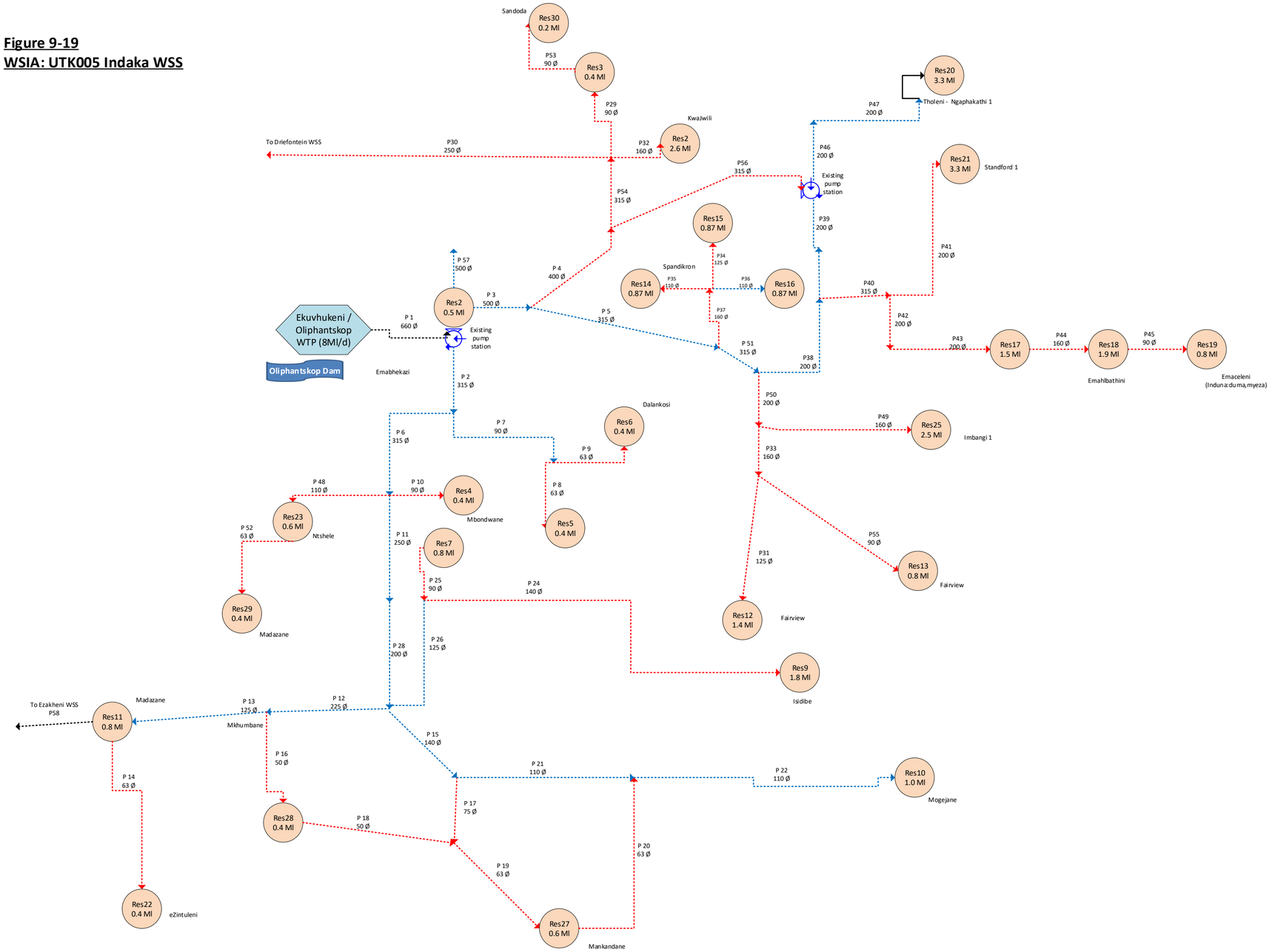
Tugela Estates Proposed WTP 1.1Ml/d

Tugela Estates WTP

8.5 4.25 0 8.5 Kilometers

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_200831_UTDM_09WSI_18Indaka.mxd

Figure 9-19
WSIA: UTK005 Indaka WSS



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
- Res 23 0.4Ml — Existing Reservoir
- Res 24 0.92Ml — Future Reservoir

All diameters in mm
All flows in Ml/day

9.11 UTK010 LADYSMITH WSS

9.11.1 Water Demand

The water demand for the Ladysmith WSS was determined for 2020 and 2050 and included within Table 9-19.

Table 9-19: Population and Water demand (Mℓ/day) 2020 and 2050

Population	**Population 2020**	**Population 2050**
	92 969	106 564
Water Demand	**Demand 2020**	**Demand 2050**
	26.81	31.92

9.11.2 Water Resource Consideration

The Ladysmith area is supplied from water abstracted from the Klip River as well as water abstracted from the Spioenkop Dam. The abstraction from the Klip River is unreliable during periods of drought or during late winter months before the summer rain season.

Roosboom and Meadows are supplied from the Ladysmith WTP and further augmented from groundwater in the form of boreholes in case of drought.

The Ladysmith WSS is further augmented with water supplied from the neighbouring Ezakheni WSS's Ezakheni WTP which is supplied from the Tugela River weir. The available yield from the Tugela River is not known.

The DWS indicated (2019) that the hydrology of the Tugela River catchment needs to be updated as a matter of priority especially as it plays an important role in the Integrated Vaal River System by means of the Tugela-Vaal transfer scheme. It also influences the planning, prioritisation and sequencing of water resources development in the Tugela River catchment (upper) and the Lesotho Highlands Water Project.

9.11.3 Water Supply Infrastructure

The following infrastructure upgrades and augmentation will be required in order to adequately supply the Ladysmith WSS and are illustrated within Figure 9-20 overleaf followed by the schematic layout of the WSIA within Figure 9-21.

- The existing capacity at the Ladysmith WTP is considered sufficient to meet the area's current water requirements along with the supply allocation from the neighbouring Ezakheni WTP, however,
    - The WTP was constructed in 1978 and provision was made for a new WTP in the costing of this scheme, with the same capacity as the existing WTP.
- The bulk distribution infrastructure would be extended to include primary bulk pipes of diameter ranging between 250-560mm, totalling 11.84km in length, 10 secondary bulk pipes ranging in diameter of between

110-630mm, totalling 59.62km in length and five tertiary bulk pipes ranging in diameter of between 140-250mm, totalling 13.1km in length.

- The existing storage should be increased by two primary reservoirs, having a total storage capacity of 9 800kl and seven tertiary reservoirs, having a total storage capacity of 27 200kl.
- There are two pump stations proposed, one at the Ladysmith WTP to primary command reservoir R1, requiring 137.75kW and one to serve primary command reservoir R7, requiring 85.49kW.

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

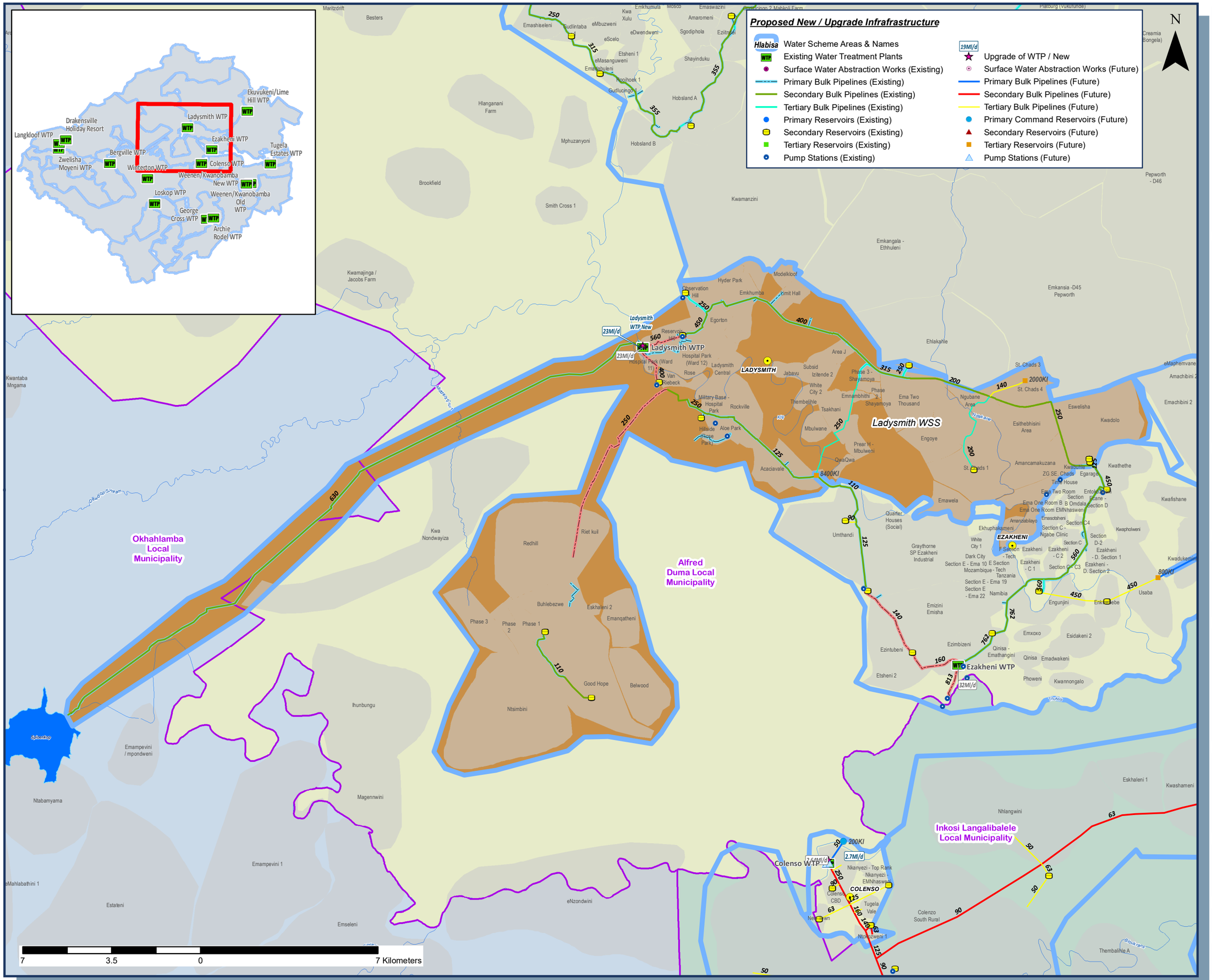
9.11.4 Financial Requirements

The bulk cost requirement for the Ladysmith WSS is provided within Table 9-20 below.

Table 9-20: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	R202 789 000	R20 278 900	R223 067 900
Secondary	R345 749 000	R34 574 900	R380 323 900
Tertiary	R118 343 000	R11 834 300	R130 177 300
Total	**R666 881 000**	**R66 688 100**	**R733 569 100**

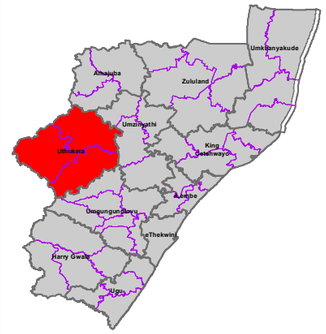
The total bulk cost requirement is R733.569 million (excl VAT). The scheme development cost per household is approximately R28 693.



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Farm Land & Conservation Areas
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns (Eshowe)

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT 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 - Ladysmith WSS uThukela District Municipality

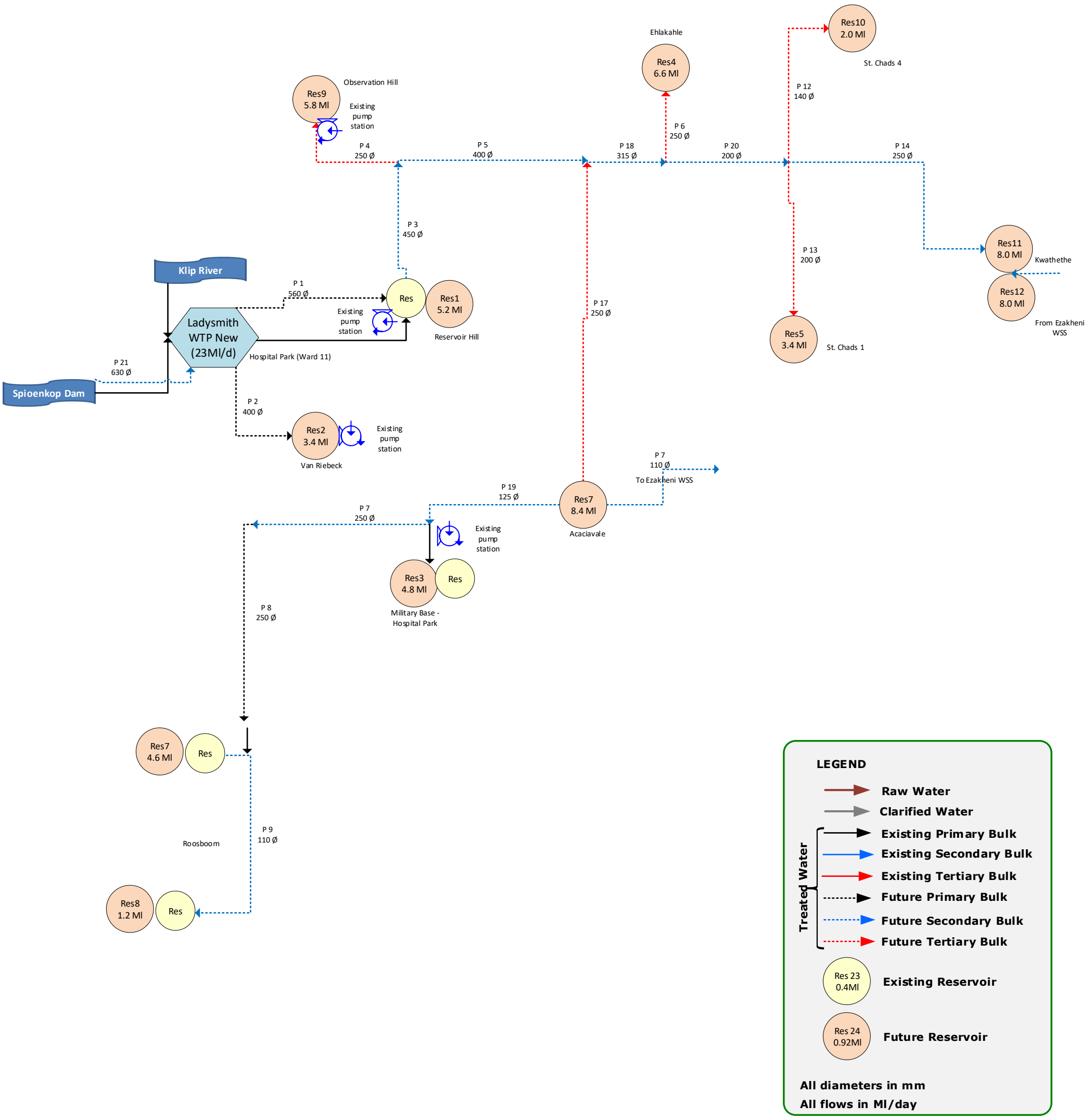
DATE COMPLETED:

2020/11/26

MAP NO.:

DC23: Figure 9.20

Figure 9-21
WSIA: UTK010 Ladysmith WSS



9.12 UTK014 TUGELA ESTATES WSS

9.12.1 Water Demand

The water demand for the Tugela Estates WSS was determined for 2020 and 2050 and included within Table 9-21.

Table 9-21: Population and Water demand (Mℓ/day) 2020 and 2050

Population	**Population 2020**	**Population 2050**
	11 148	12 778
Water Demand	**Demand 2020**	**Demand 2050**
	1.99	2.37

9.12.2 Water Resource Consideration

The Tugela Estates area is supplied from the Tugela River. The available yield from the Tugela River is not known.

The DWS indicated (2019) that the hydrology of the Tugela River catchment needs to be updated as a matter of priority especially as it plays an important role in the Integrated Vaal River System by means of the Tugela-Vaal transfer scheme. It also influences the planning, prioritisation and sequencing of water resources development in the Tugela River catchment (upper) and the Lesotho Highlands Water Project.

9.12.3 Water Supply Infrastructure

The following infrastructure upgrades and augmentation will be required in order to adequately supply the Tugela Estates WSS and are illustrated within Figure 9-22 overleaf followed by the schematic layout of the WSIA within Figure 9-23.

- The existing capacity at the Tugela Estates WTP is considered insufficient to meet the area's water requirements for 2050. It is proposed to construct a new WTP with a capacity of 1.1Mℓ/d.
- The bulk distribution infrastructure would be extended to include one primary bulk pipe with a diameter of 160mm and length of 1.37km from the abstraction works, to the pump station supplying the existing WTP.
- The proposed new WTP will be supplied also from the Tugela River and primary bulk pipe with a diameter of 200mm and length of 0.32km.
- The network is further extended by nine secondary bulk pipes ranging in diameter of between 63-200mm, totalling 13.93km in length.
- The existing storage should be increased by six tertiary reservoirs, having a total storage capacity of 3 440kl.
- The three existing pump stations will be extended to a capacity of 111.85kW and two new pump stations required with a capacity of 87.65kW.

Of interest, the smaller Ngedlengedleni WSS is supplied from groundwater in the form of boreholes. Its abstraction and treatment plant are located on the same site, adjacent to the Tugela Estates WTP. The 2050 projected water demands for the Ngedlengedleni WSS is 0.89Mℓ/d.

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

9.12.4 Financial Requirements

The bulk cost requirement for the Tugela Estates WSS is provided within Table 9-22 below.

Table 9-22: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	R44 941 850	R4 494 185	R49 436 035
Secondary	R5 947 000	R594 700	R6 541 700
Tertiary	R18 165 000	R1 816 500	R19 981 500
Total	**R69 053 850**	**R6 905 385**	**R75 959 235**

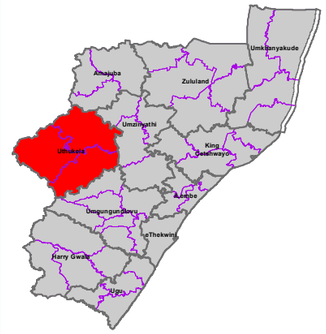
The total bulk cost requirement is R75.595 million (excl VAT). The scheme development cost per household is approximately R24 777.

N

Legend

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

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA
UMKHANDLU WESIFUNDA
DISTRIKSMUNISIPALITEIT
DISTRICT MUNICIPALITY

UTHUKELA DISTRICT MUNICIPALITY

CONSULTANTS:

Project No.: 27814

MARISWE
IMPROVING LIVES ENGINEERING 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 TITLE

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

MAP TITLE:

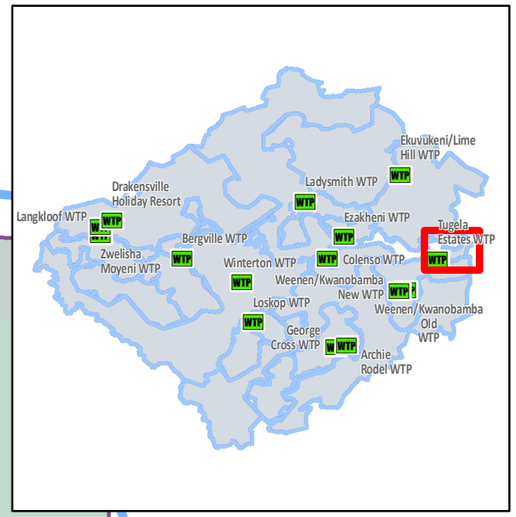
Total Bulk Water Supply Interventions - Tugela Estates WSS uThukela District Municipality

DATE COMPLETED:

2020/11/26

MAP NO.:

DC23: Figure 9.22



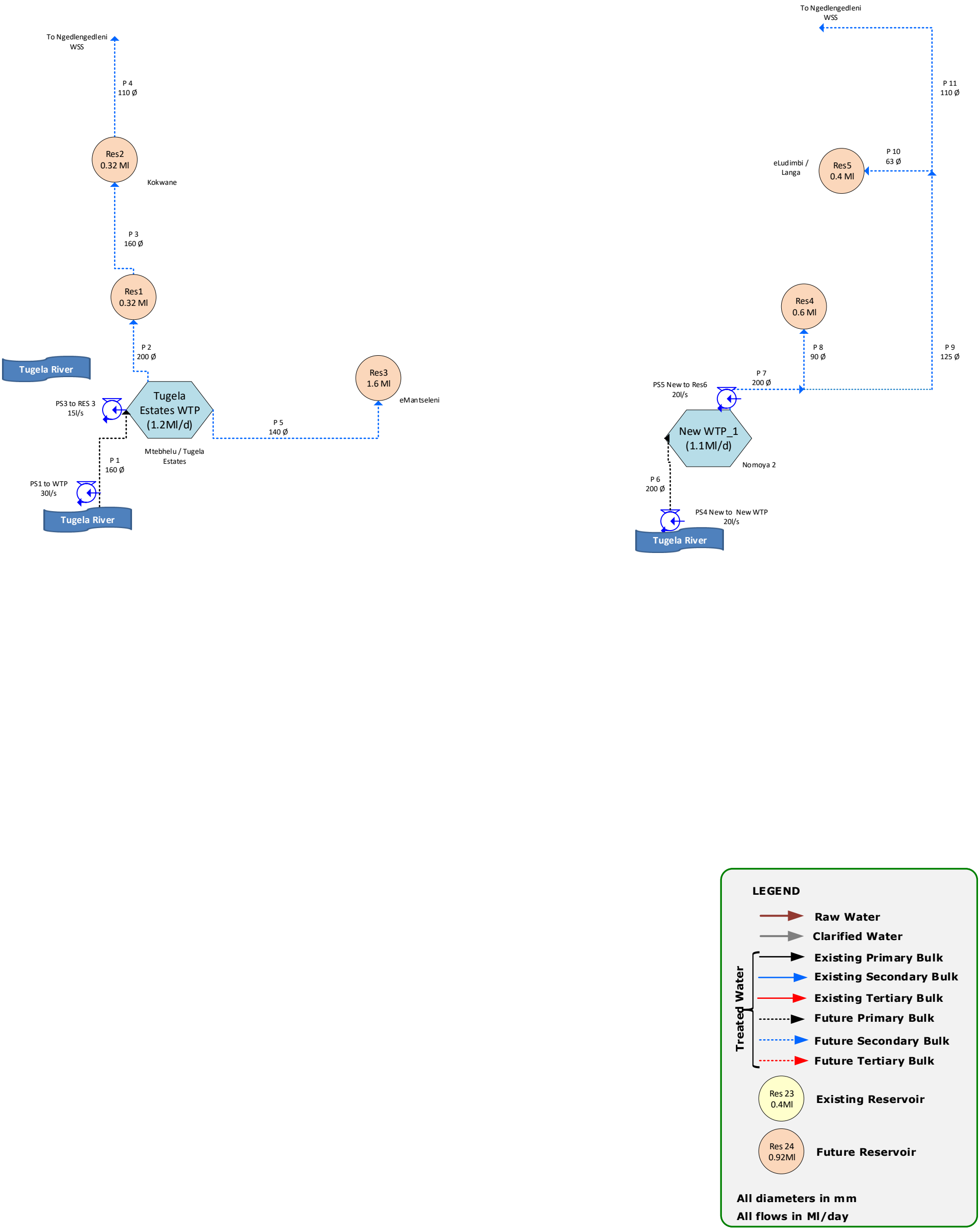
Emahlabathini 3
Emboniwane
Mogejane
1000Kl
Emkhuzeni
Indaka WSS
Emalomeni (Romweni)
Ekanqaweni
110
Esigodini
Oqungwini
Ondikazeni
Enhlonyane A
Enhlonyane B
125
160
200
140
63
90
Mtebhelu
Mahlabathini
Nkaseni Esuzansi
Enkaseni Ephezulu
Bloukrans
Boesmans
eMantseleni
Nomoya 2
Nomoya 1
eLudimbi
Thukela
Sundays
Umzinyathi
Msinga Local Municipality
Alfred Duma Local Municipality
Inkosi Langalibalele Local Municipality
Tugela Estates WSS
Weenen/Kwanobamba WSS
1000Kl
200Kl
400Kl
600Kl
Tugela Estates Proposed WTP 1.1Ml/d
Tugela Estates WTP 1.2Ml/d
2.5 1.25 0 2.5 Kilometers

Proposed New / Upgrade Infrafrastructure

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

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_200831_UTDM_09WSI_22TugelaEstates.mxd

Figure 9-23
WSIA: UTK014 Tugela Estates WSS



9.13 UTK015 WEENEN/KWANOBAMBA WSS

9.13.1 Water Demand

The water demand for the Weenen/Kwanobamba WSS was determined for 2020 and 2050 and included within Table 9-23

Table 9-23: Population and Water demand (Mℓ/day) 2020 and 2050

Population	**Population 2020**	**Population 2050**
	15 271	17 504
Water Demand	**Demand 2020**	**Demand 2050**
	1.77	3.13

9.13.2 Water Resource Consideration

The Weenen/Kwanobamba area is supplied from the old Weenen WTP, which obtains its water from a canal off the Bushmans River. In addition, the new Weenen WTP, located about two kilometres west of the old WTP, is abstracting from a farm dam from the canal, also supplied from the Bushmans River.

The available yield for domestic use from the Bushmans River needs to be determined. This is particularly important prior to implementing the planned Umtshezi East Regional WSS.

9.13.3 Water Supply Infrastructure

The following infrastructure upgrades and augmentation will be required in order to adequately supply the Weenen/Kwanobamba WSS and are illustrated within Figure 9-24 overleaf followed by the schematic layout of the WSIA within Figure 9-25.

- The existing capacity at the old Weenen WTP as well as the new Weenen WTP is considered sufficient to meet the area's water requirements for 2050, even should the old WTP be decommissioned.
- The bulk distribution infrastructure would be extended to include one primary bulk pipe from the new Weenen WTP of 160mm in diameter (4.33km) serving the areas to the west of this WTP. Then one primary bulk pipe from the old Weenen WTP of 200mm in diameter (3.73km) serving the areas to the east of this WTP. In addition, there are 12 secondary bulk pipelines ranging in diameter of between 50 and 200mm and having a total length of 51.15km and six tertiary bulk pipelines ranging in diameter of between 50 and 110mm and having a total length of 6.04km.
- The existing storage should be increased by three primary reservoirs, having a total storage capacity of 2 080kl and 14 tertiary reservoirs, having a total storage capacity of 5 800kl.
- There are two pump stations proposed, one to serve the primary command reservoir Res1, requiring 0.42kW and one serving primary command reservoir Res17, requiring 35.40kW.

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

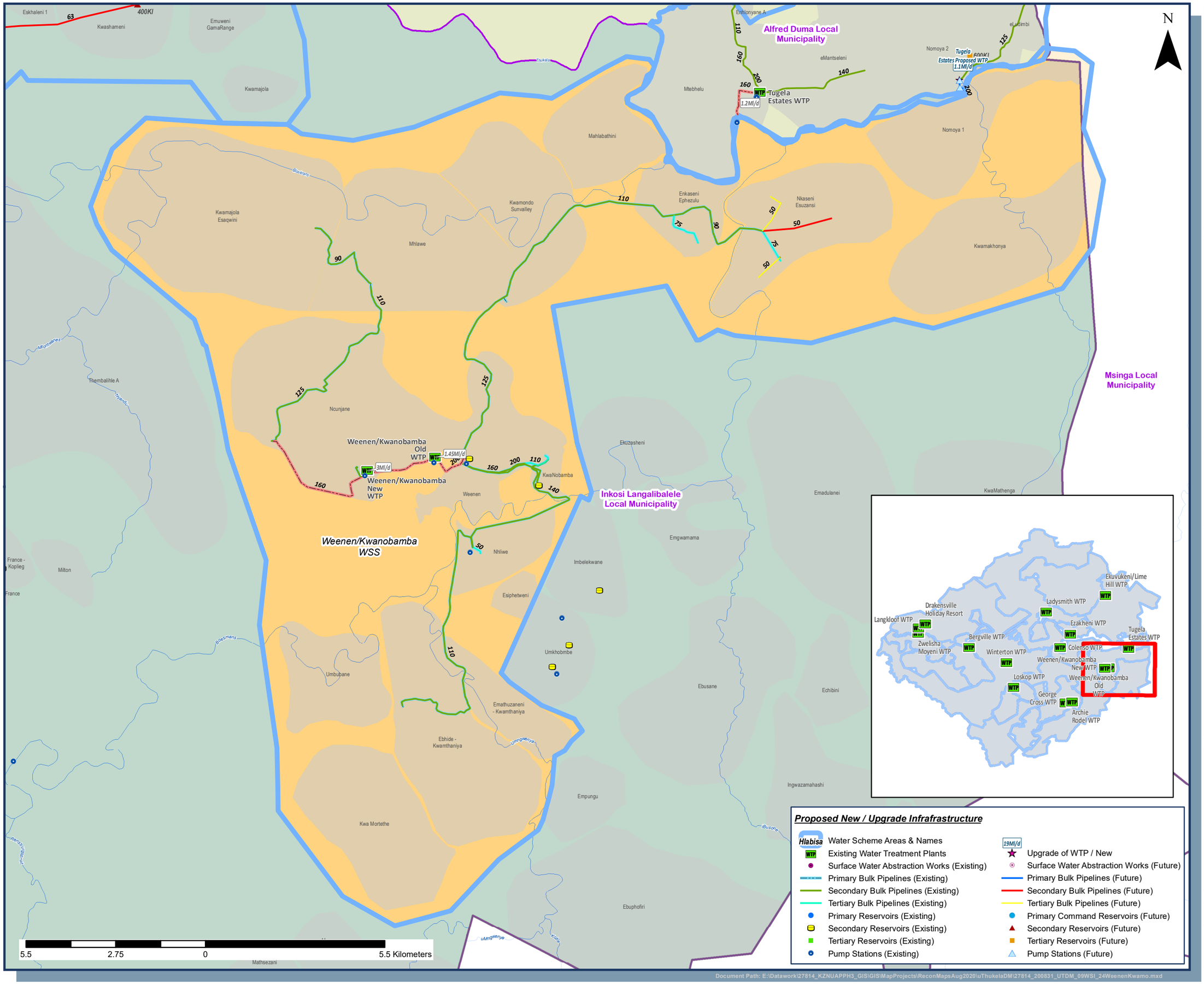
9.13.4 Financial Requirements

The bulk cost requirement for the Weenen/Kwanobamba WSS is provided within Table 9-24 below.

Table 9-24: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	R28 207 000	R2 820 700	R31 027 700
Secondary	R17 907 000	R1 790 700	R19 697 700
Tertiary	R28 487 000	R2 848 700	R31 335 700
Total	**R74 601 000**	**R7 460 100**	**R82 061 100**

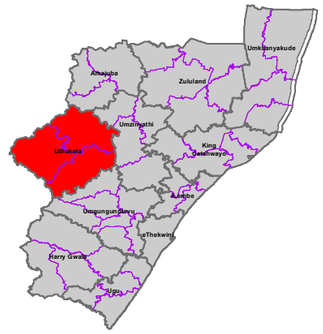
The total bulk cost requirement is R82.06 million (excl VAT). The scheme development cost per household is approximately R19 541.



Legend

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

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT 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 - Weenen/Kwanobamba WSS uThukela District Municipality

DATE COMPLETED: 2020/11/26

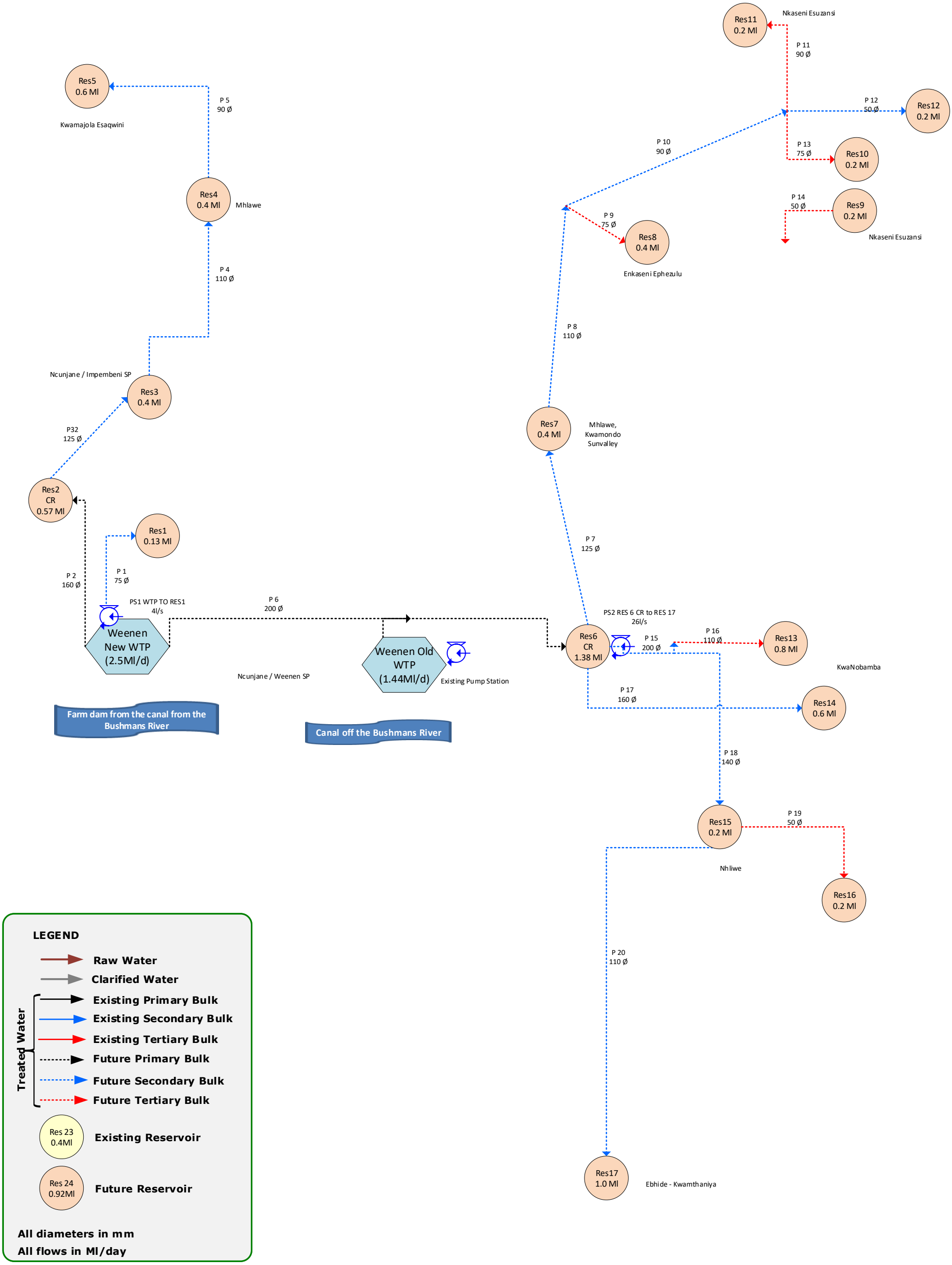
MAP NO.: **DC23: Figure 9.24**

Proposed New / Upgrade Infrafrastructure

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

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_200831_UTDM_09WSI_24WeenenKwamo.mxd

Figure 9-25
WSIA: UTK015 Weenen/Kwanobamba WSS



9.14 UTK017 Zwelisha Moyeni WSS

9.14.1 Water Demand

The water demand for the Zwelisha Moyeni WSS was determined for 2020 and 2050 and included within Table 9-25.

Table 9-25: Population and Water demand (Mℓ/day) 2020 and 2050

Population	**Population 2020**	**Population 2050**
	50 325	57 684
Water Demand	**Demand 2020**	**Demand 2050**
	8.78	10.80

9.14.2 Water Resource Consideration

The Zwelisha Moyeni area is supplied from water which is abstracted from a canal and weir system in the Khombe River, a tributary of the Tugela River, where it is treated at the Zwelisha Moyeni WTP. The Woodstock Dam and Driel Barrage are located along the eastern boundary of the WSS, but these are strategic resources and form part of the Tugela Transfer Scheme.

Water from the Khombe River is also utilised by irrigators along the canal. Apart from supply via the Tugela River canals, there are consumers that make use of production boreholes and hand pumps. The Zwelisha Moyeni WTP's operation and efficiencies are affected by siltation at the weir. The canals also need maintenance to ensure improvement of reliability of the water source.

The available yield from the Khombe River is not known and should be established, should this remain the water source option for this WSS.

The DWS indicated (2019) that the hydrology of the Tugela River catchment needs to be updated as a matter of priority especially as it plays an important role in the Integrated Vaal River System by means of the Tugela-Vaal transfer scheme. It also influences the planning, prioritisation and sequencing of water resources development in the Tugela River catchment (upper) and the Lesotho Highlands Water Project.

9.14.3 Water Supply Infrastructure

The following infrastructure upgrades and augmentation will be required in order to adequately supply the Zwelisha Moyeni WSS and are illustrated within Figure 9-26 overleaf followed by the schematic layout of the WSIA within Figure 9-27.

- The existing capacity at the Zwelisha Moyeni WTP is proposed to be upgraded from 2.5Mℓ/d to 11Mℓ/d to meet the area's water requirements for 2050.
- The bulk distribution infrastructure would be extended to include a primary bulk pipe of 500mm in diameter and 3.47km in length from the WTP to the first network junction, together with 14 secondary bulk pipes ranging in diameter of between 110-315mm and totalling 38.47km in length and 14 tertiary bulk pipes

ranging in diameter of between 50-200mm and totalling 29.66km in length would complete the main water network.

- The existing storage should be increased by one primary reservoir, having a total storage capacity of 6 750kl and 13 tertiary reservoirs, having a total storage capacity of 14 800kl.
- There are three pump stations proposed, one from the WTP to primary command reservoir Res1CR, requiring 516.32kW, one to serve the tertiary reservoir Res8, requiring 17.00kW and one to serve the tertiary reservoir Res13, requiring 59.60kW.

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

However, Umgeni Water indicated that they are constructing a 20Mℓ/d plant at Zwelisha Moyeni (November, 2020).

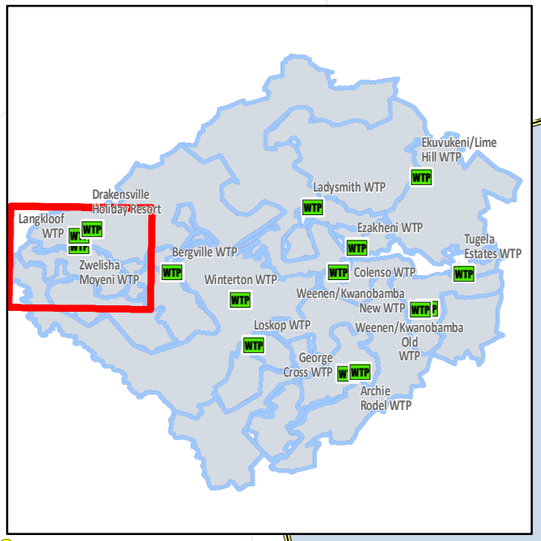
9.14.4 Financial Requirements

The bulk cost requirement for the Zwelisha Moyeni WSS is provided within Table 9-26 below.

Table 9-26: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	R113 560 500	R11 356 050	R124 916 550
Secondary	R59 735 000	R5 973 500	R65 708 500
Tertiary	R76 395 000	R7 639 500	R84 034 500
Total	**R249 690 500**	**R24 969 050**	**R274 659 550**

The total bulk cost requirement is R274.659 million (excl VAT). The scheme development cost per household is approximately R19 846.



Proposed New / Upgrade Infrafrastructure

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

N

Drakensville Holiday Resort WTP 0Ml/d

Langkloof WTP 1Ml/d

Zwelisha Moyeni WTP 11Ml/d, 2.5Ml/d

Okhahlamba Local Municipality

Zwelisha Moyeni WSS

Zwelisha Moyeni WSS Future TBC north — Proposed WTP 1.9Ml/d

1000Kl, 2400Kl, 200Kl, 400Kl, 440Kl, 320Kl

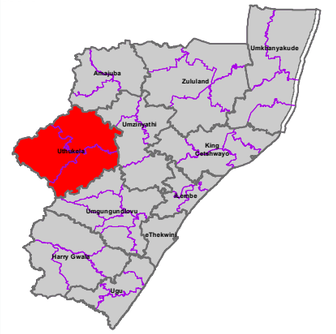
6 3 0 6 Kilometers

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_200831_UTDM_09WSI_26ZwelishaM.mxd

Legend

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

LOCALITY:



CLIENT: UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY: UTHUKELA DISTRICT 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

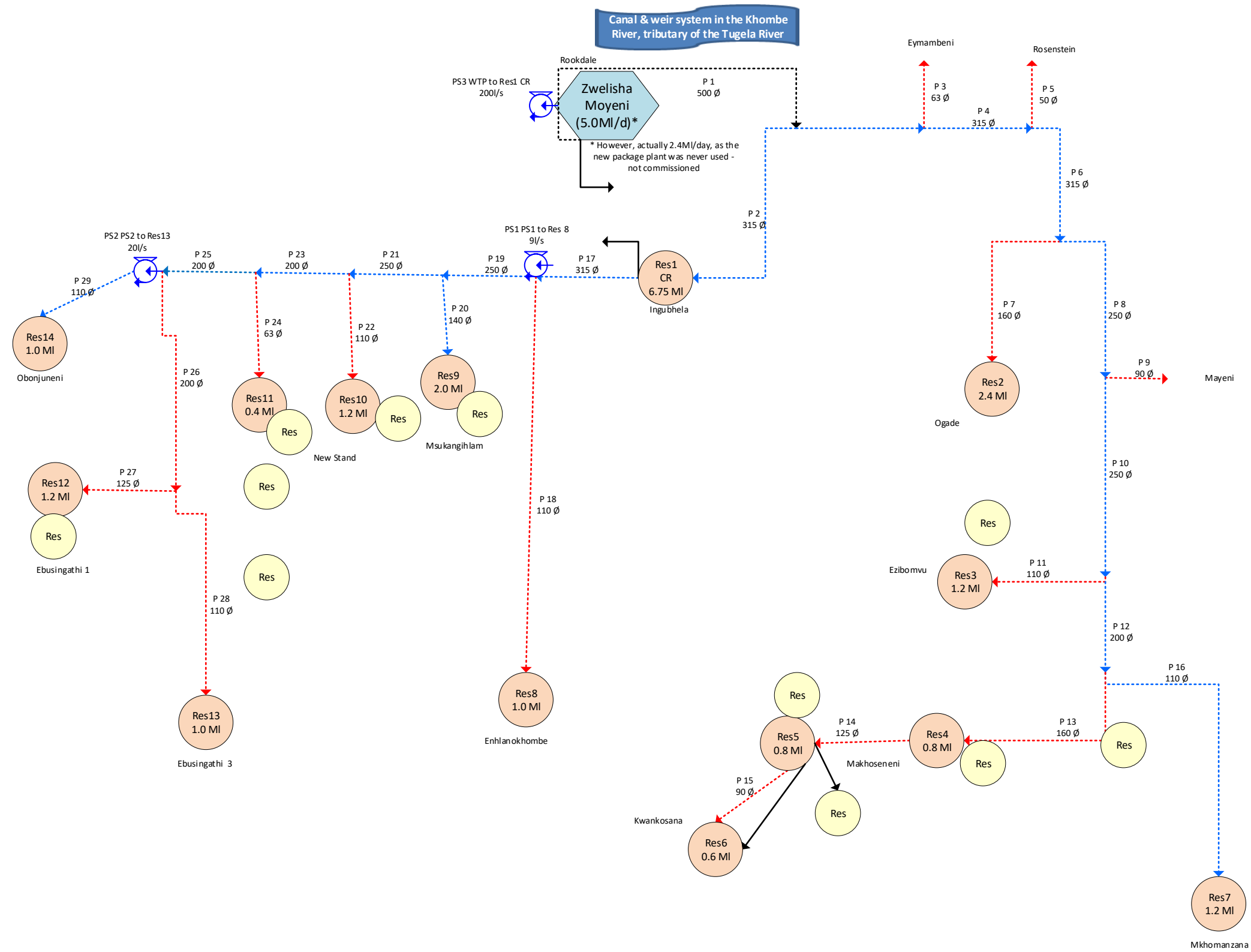
MAP TITLE:

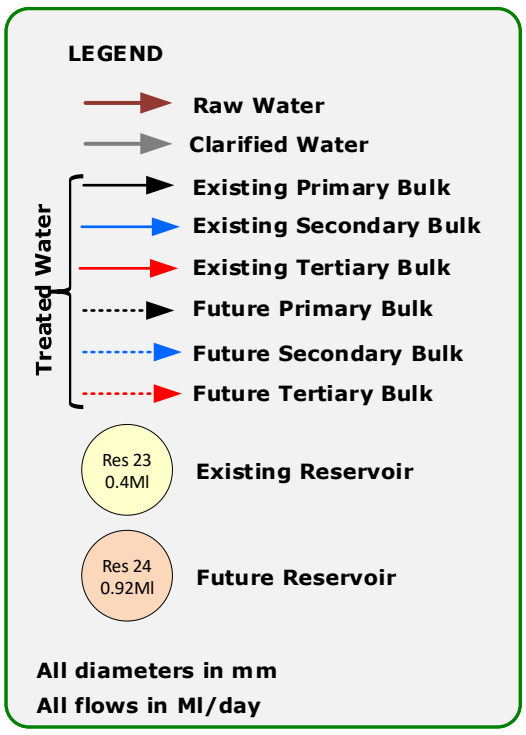
Total Bulk Water Supply Interventions - Zwelisha Moyeni WSS uThukela District Municipality

DATE COMPLETED: 2020/11/26

MAP NO.: **DC23: Figure 9.26**

Figure 9-27
WSIA: UTK017 Zwelisha Moyeni WSS





9.15 UTK0783 Zwelisha Moyeni Future TBC

9.15.1 Water Demand

The water demand for the Zwelisha Moyeni Future TBC WSS was determined for 2020 and 2050 and included within Table 9-27.

Table 9-27: Population and Water demand (Mℓ/day) 2020 and 2050

Population	**Population 2020**	**Population 2050**
	19 966	22 886
Water Demand	**Demand 2020**	**Demand 2050**
	1.39	3.78

9.15.2 Water Resource Consideration

The Zwelisha Moyeni Future TBC WSS area is located in the southern central area of the Okhahlamba LM, south of the existing Zwelisha Moyeni WSS. It includes an estimated 18 rural settlements and most do not have access to universal basic water and sanitation services.

Consumers currently obtain water mainly from boreholes and springs. The most prominent rivers in this area are the Mhlwazini River, a tributary of the Mlambonja, that along with the Tugela River, feed the Driel Dam. There are also the Mnweni and Nxwaye Rivers, flowing into the Woodstock Dam.

It is proposed to utilise the Woodstock Dam and Mlambonja River for the future water sources of the proposed Zwelisha Moyeni Future TBC WSS.

The DWS indicated (2019) that the hydrology of the Tugela River catchment needs to be updated as a matter of priority especially as it plays an important role in the Integrated Vaal River System by means of the Tugela-Vaal transfer scheme. It also influences the planning, prioritisation and sequencing of water resources development in the Tugela River catchment (upper) and the Lesotho Highlands Water Project.

9.15.3 Water Supply Infrastructure

The following infrastructure upgrades and augmentation will be required in order to adequately supply the Zwelisha Moyeni Future TBC WSS and are illustrated within Figure 9-28 overleaf followed by the schematic layout of the WSIA within Figure 9-29.

The geographic extent of this area is quite large ~ 270km² and providing infrastructure to the rural, dispersed households will be challenging. Should this be a formalised local scheme development (with sub-scheme areas), it could be divided into the Zwelisha Moyeni WSS Future North and Zwelisha Moyeni WSS Future South.

- It is proposed to construct a 1.9Mℓ/d WTP in the north of this scheme, at the confluence of the Mnweni River with the Woodstock Dam, to meet this sub-area's water requirements for 2050. It is further proposed

to construct a 2.0Mℓ/d WTP in the south of this scheme, at the Mlambonja River, to meet this sub-area's water requirements for 2050.

- The bulk distribution infrastructure would consist of one primary bulk line from the WTP in the north, of 250mm in diameter (0.76km in length), to serve the main water supply network, along with a primary bulk line of 90mm diameter (3.47km in length) to reach the community furthest south of this norther portion of the sub-area and reservoir Res3. There are seven secondary bulk pipelines, ranging in diameter of between 90-250mm, totalling 27.87km in length and five tertiary bulk pipelines ranging in diameter of between 63-140mm, totalling 16.26km in length.
- The existing storage should be increased by nine tertiary reservoirs, having a total storage capacity of 7 960kl.
- There are two pump stations proposed, one to serve the tertiary reservoir Res5 in the north, requiring 205.89kW and one serving tertiary reservoir Res8, requiring 159.36kW in the south.

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

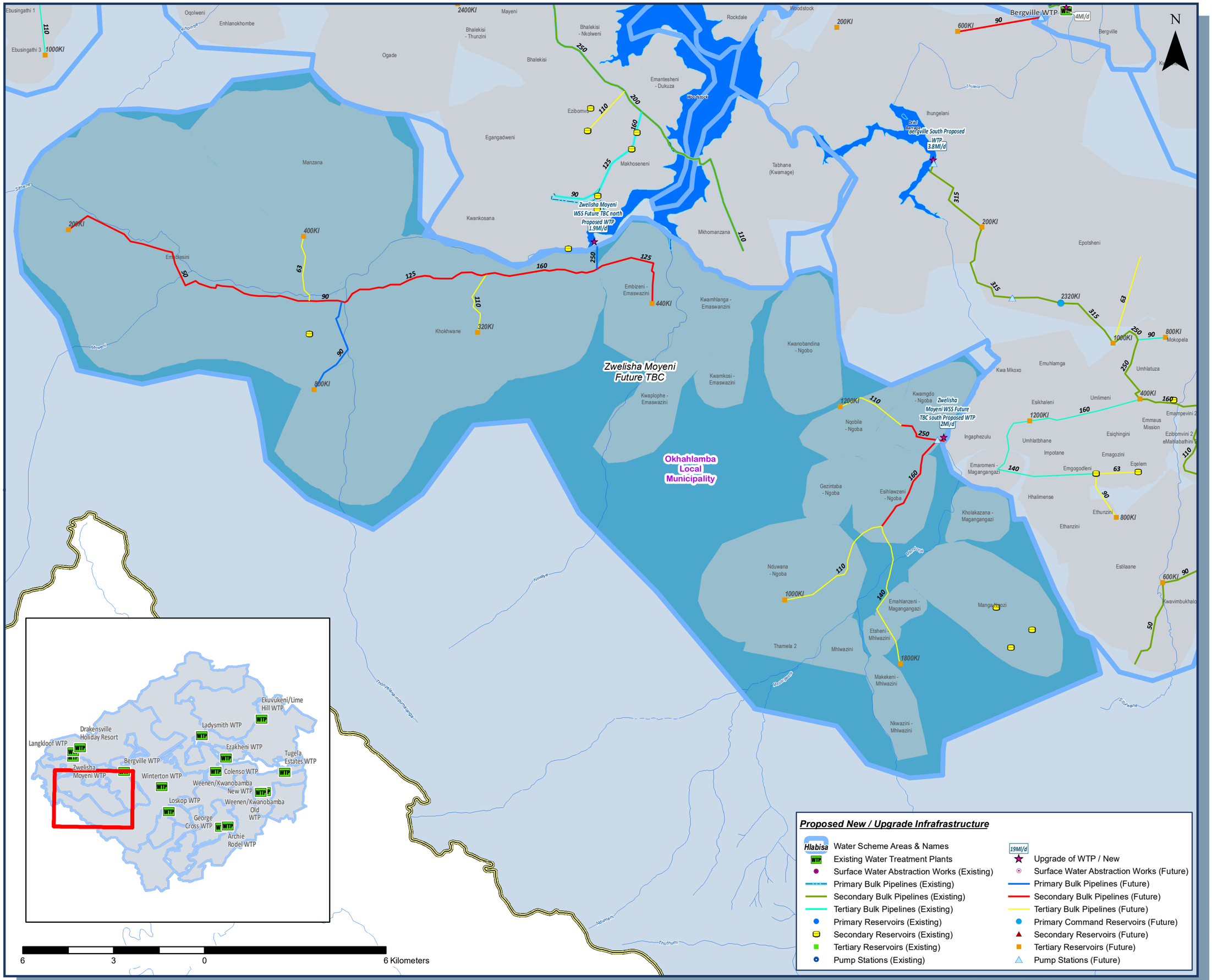
9.15.4 Financial Requirements

The bulk cost requirement for the Zwelisha Moyeni Future TBC WSS is provided within Table 9-28 below.

Table 9-28: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	R41 899 900	R4 189 990	R46 089 890
Secondary	R10 924 000	R1 092 400	R12 016 400
Tertiary	R42 144 000	R4 214 400	R46 358 400
Total	**R94 967 900**	**R9 496 790**	**R104 464 690**

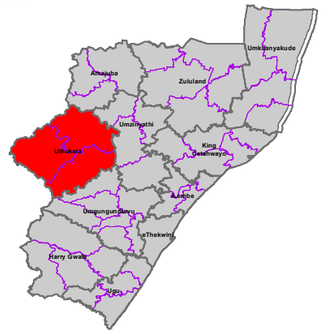
The total bulk cost requirement is R104.46 million (excl VAT). The scheme development cost per household is approximately R19 026.



Legend

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

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA DISTRICT 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 - Zwelisha Moyeni Future WSS uThukela District Municipality

DATE COMPLETED: 2020/11/26

MAP NO.: **DC23: Figure 9.28**

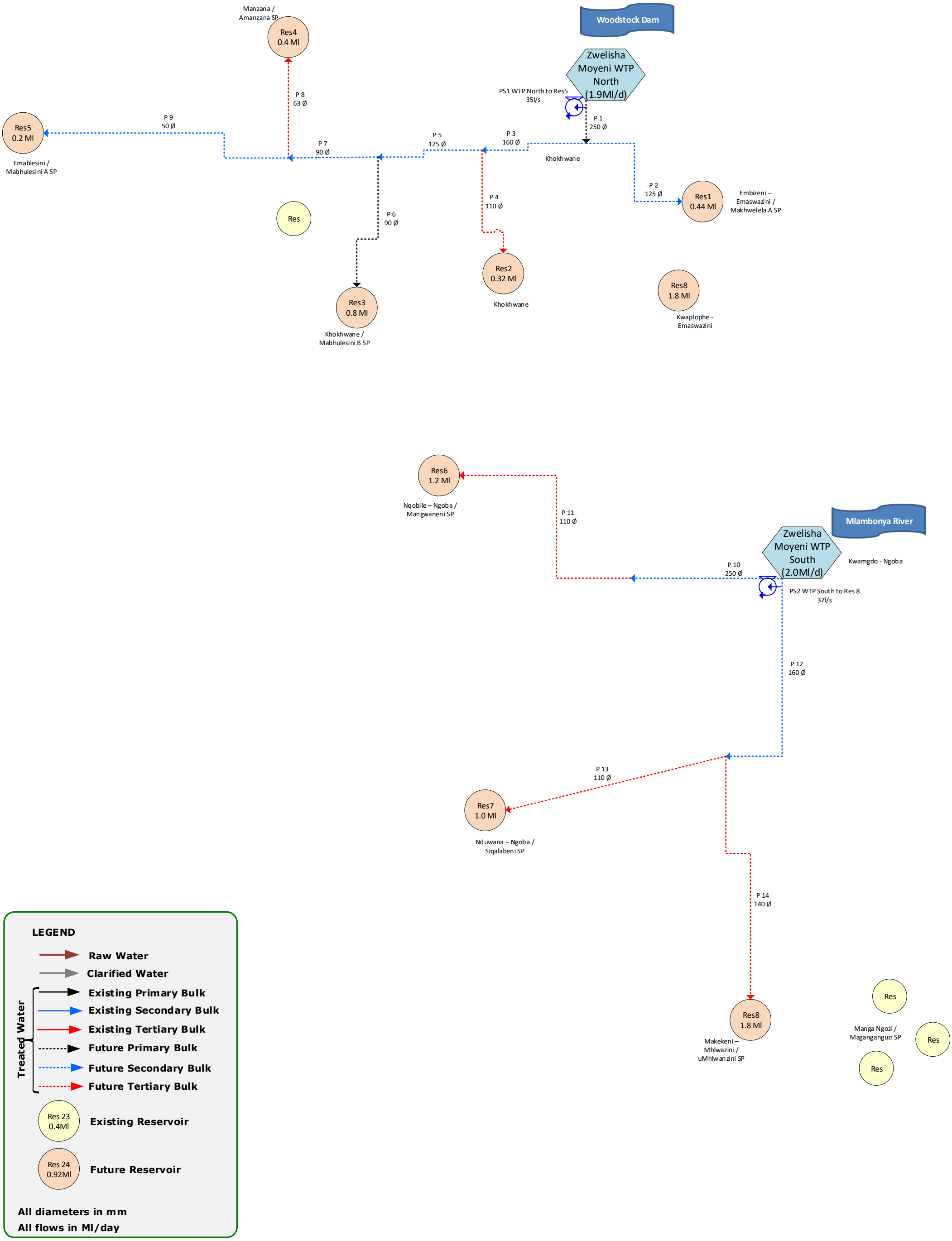
Proposed New / Upgrade Infrafrastructure

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

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_200831_UTDM_09WSI_28ZwelishaMFuture.mxd

Figure 9-29

WSIA: UTK0783 Zwelisha Moyeni Future TBC WSS



9.16 uThukela Rural Areas

This section provides the proposed water supply interventions for the rural areas of the UTDM.

It is proposed perform a groundwater hydrology study to verify the water resource availability to meet the water requirements for these rural areas for the 2050 planning horison. A cost allocation of R5million (excluding VAT) is provided for this study and allocated under the Alfred Duma LM.

9.16.1 UTK901 Rural Areas: Alfred Duma LM

The rural areas of the ADLM are illustrated in Figure 9-30. Most of these areas make use of local surface and groundwater sources such as boreholes and springs. The rudimentary schemes falling under the ADMLM are Bester WSS TBC, Blue Bank BH WSS, Lusitania WSS TBC and the Ngedlengedleni WSS. The remainder of areas include farmsteads, protected areas and sparsely dispersed households.

Under the UAP Phase III study, the estimated water requirements for this area (1 458km²), under the 2050 planning horison is 1.20Mℓ/d and the projected population 6 684.

To consider supplying all households with groundwater-sourced supply, would require an estimated R68 653 749 (ex VAT).

9.16.2 UTK902 Rural Areas: Inkosi Langalibalele LM

The rural areas of the ILLM are illustrated in Figure 9-31. Most of these areas make use of local surface and groundwater sources such as boreholes and springs. The rudimentary schemes falling under the ILLM are Cornfields/Thembalihle WSS, Frere WSS TBC, Mtontwane WSS TBC and Weenen South WSS Future TBC. The remainder of areas include farmsteads, protected areas and sparsely dispersed households.

Under the UAP Phase III study, the estimated water requirements for this area (1 820km²), under the 2050 planning horison is 2.98Mℓ/d and the projected population 17 179.

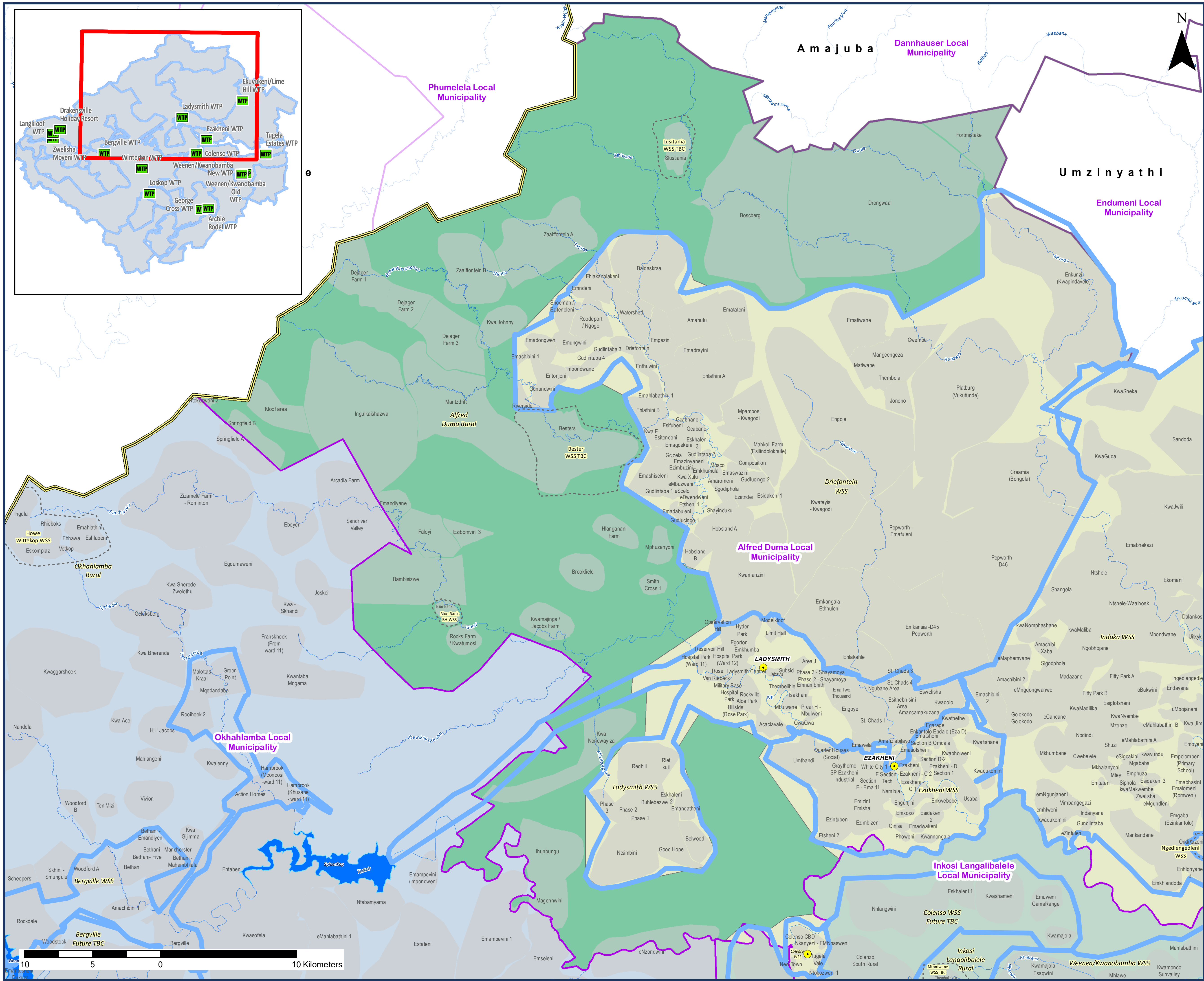
To consider supplying all households with groundwater-sourced supply, would require an estimated R163 778 716 (ex VAT).

9.16.3 UTK903 Rural Areas: Okhahlamba LM

The rural areas of the OLM are illustrated in Figure 9-32. Most of these areas make use of local surface and groundwater sources such as boreholes and springs. The rudimentary schemes falling under the OLM are Amangwane WSS TBC (SW, GW), Drakensberg WSS TBC (private land scheme), Howe Wittekop WSS, Jagersrust WSS TBC (private land scheme), KwaNdema WSS TBC, Langkloof WSS and Winterton WSS. The remainder of areas include farmsteads, protected areas and sparsely dispersed households.

Under the UAP Phase III study, the estimated water requirements for this area (2 818km²), under the 2050 planning horison is 3.26Mℓ/d and the projected population 15 432.

To consider supplying all households with groundwater-sourced supply, would require an estimated R146 971 197 (ex VAT).



Legend

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

LOCALITY:

CLIENT: UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY: UTHUKELA DISTRICT 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 - Alfred Duma LM Rural uThukela District Municipality

DATE COMPLETED: 2020/11/26

MAP NO.: DC23: Figure 9.30

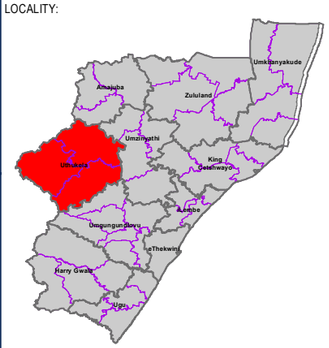
Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_200831_UTDM_09WSI_30ADumaRural.mxd

N

Legend

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

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

UTHUKELA
UMKHANDLU WESIFUNDA DISTRICT MUNICIPALITY

UTHUKELA DISTRICT MUNICIPALITY

CONSULTANTS:

Project No.: 27814

MARISWE
IMPROVING LIVES ENGINEERING 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 TITLE

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

MAP TITLE:

Total Bulk Water Supply Interventions - Inkosi Langalibalele LM Rural uThukela District Municipality

DATE COMPLETED:

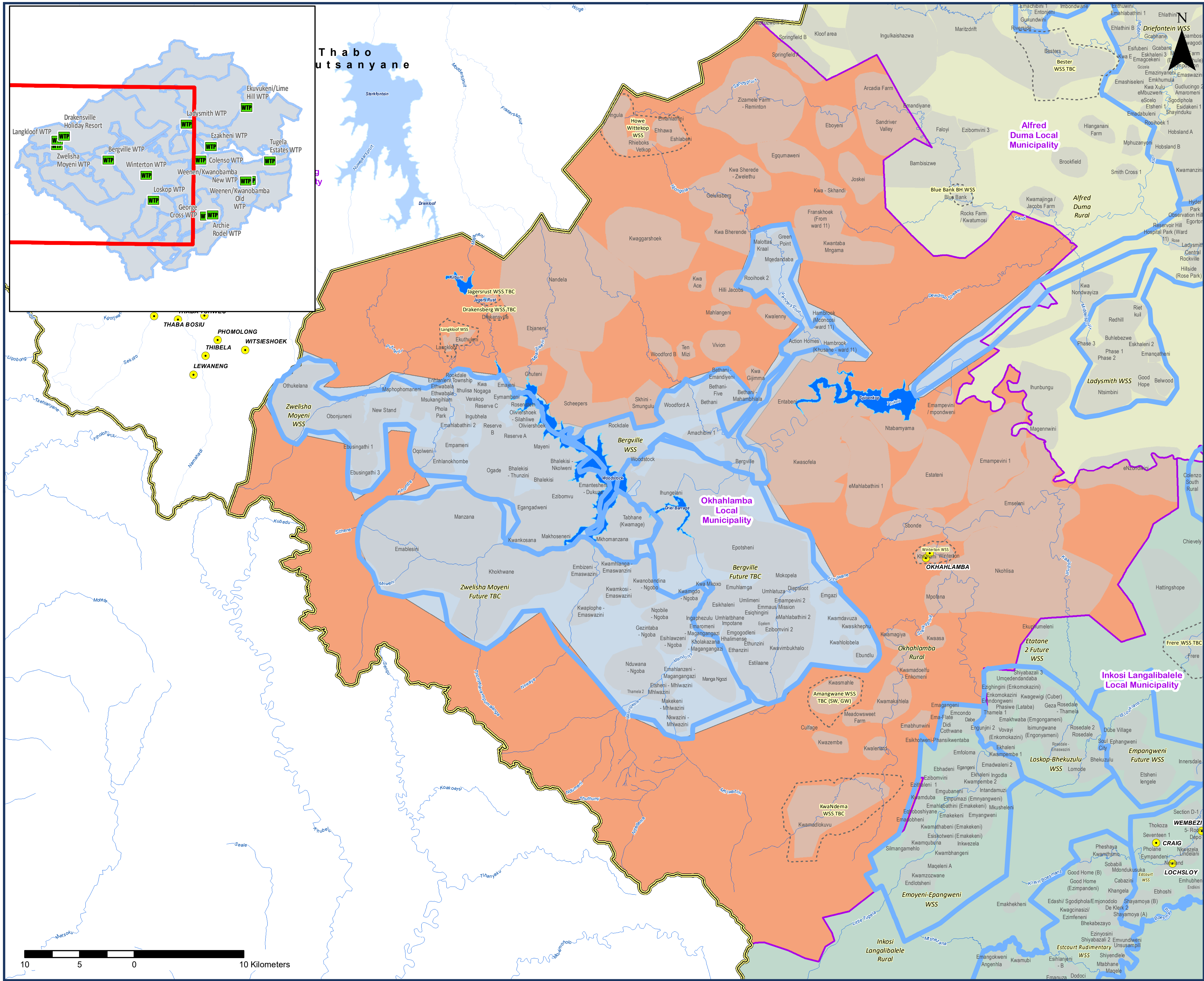
2020/11/26

MAP NO.:

DC23: Figure 9.31

10 5 0 10 Kilometers

Document Path: E:\Datawork\27814_KZNUAPPH3_GIS\GIS\MapProjects\ReconMapsAug2020\uThukelaDM\27814_200831_UTDM_09WSI_31InkosiLLMRural.mxd



Legend

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

LOCALITY:

CLIENT: UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY: UTHUKELA DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

MARISWE

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 - Okhahlamba LM Rural
uThukela District Municipality

DATE COMPLETED: 2020/11/26

MAP NO.: DC23: Figure 9.32

10. CONCLUSIONS

10.1 Total Water Demand per Supply Area

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

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
UTK001	Bergville WSS	28 483	5.13	5.45	5.81	5.99	6.18	6.38	6.59
UTK0775	Bergville Future TBC	20 332	1.44	2.45	3.50	3.60	3.70	3.81	3.92
UTK002, UTK077	Colenso WSS and Colenso Future WSS	10 894	1.86	2.12	2.40	2.47	2.55	2.63	2.71
UTK004	Driefontein WSS	73 365	12.62	13.20	13.84	14.28	14.75	15.24	15.75
UTK012, UTK006, UTK0797, UTK0796	Loskop-Bhekuzulu WSS & Emoyeni-Epangweni WSS, Empangweni Future WSS & Etatane Future	64 272	10.77	11.13	11.53	11.98	12.44	12.93	13.44
UTK007	Estcourt WSS	70 847	17.09	17.74	18.48	19.03	19.60	20.20	20.82
UTK007b	Estcourt Rudimentary WSS	44 167	7.77	7.96	8.18	8.45	8.73	9.02	9.33
UTK008	Ezakheni WSS	81 096	22.64	23.17	23.80	24.55	25.32	26.12	26.96
UTK005	Indaka WSS	101 137	17.61	18.02	18.50	19.08	19.68	20.32	21.00
UTK010	Ladysmith WSS	92 969	26.81	27.46	28.21	29.09	30.00	30.94	31.92
UTK014	Tugela Estates WSS	11 148	1.99	2.03	2.09	2.15	2.22	2.30	2.37
UTK015	Weenen/Kwanobamba WSS	15 271	1.77	2.24	2.73	2.82	2.92	3.02	3.13
UTK017	Zwelisha Moyeni WSS	50 325	8.78	9.11	9.48	9.79	10.11	10.45	10.80
UTK0783	Zwelisha Moyeni Future TBC	19 966	1.39	2.35	3.37	3.46	3.56	3.67	3.78
UTK901	Alfred Duma Rural	5 831	0.89	0.97	1.05	1.09	1.12	1.16	1.20
UTK902	Inkosi Langalibalele Rural	15 003	1.67	2.14	2.64	2.72	2.80	2.89	2.98
UTK903	Okhahlamba Rural	13 463	2.22	2.54	2.89	2.97	3.07	3.16	3.26
TOTAL		**718 568**	**142.46**	**150.08**	**158.51**	**163.52**	**168.76**	**174.23**	**179.95**

Source: Water Demand Model, UAP Phase III, 2020

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^3/a)	[A] Existing Resources (Mm^3/a)*	[B] Proposed Additional Demand under UAP Phase III (Mm^3/a)	[A+B] Total Demand (Mm^3/a)	Balance (Mm^3/a)
UTK001	Bergville WSS	32 648	2.40	1.87		0.53	0.53	
UTK0775	Bergville Future TBC	23 305	1.43	0.53		0.91	0.91	
UTK002, UTK077	Colenso WSS and Colenso Future WSS	12 487	0.99	0.68		0.31		
UTK004	Driefontein WSS	84 093	5.75	4.61		1.14		
UTK012, UTK006, UTK0797, UTK0796	Loskop-Bhekuzulu WSS & Emoyeni-Epangweni WSS & Empangweni Future WSS & Etatane Future WSS	73 670	4.85	3.88		0.96		
UTK007	Estcourt WSS	81 207	7.60	6.24	40	1.36	0.12	
UTK007b	Estcourt Rudimentary WSS	50 625	3.40	2.84	40	0.57	0.19	
UTK008	Ezakheni WSS	92 955	9.84	8.26		1.58	0.31	
UTK005	Indaka WSS	115 926	7.66	6.43		1.24		
UTK010	Ladysmith WSS	106 564	11.65	9.79	15	1.86	1.14	
UTK014	Tugela Estates WSS	12 778	0.87	0.73		0.14		
UTK015	Weenen/Kwanobamba WSS	17 504	1.14	0.65		0.50	0.48	
UTK017	Zwelisha Moyeni WSS	57 684	3.94	3.21		0.74	0.39	
UTK0783	Zwelisha Moyeni Future TBC	22 886	1.38	0.51		0.87	0.10	
TOTAL		784 333	62.91	50.21		12.70	0.96	

* Most of the areas are supplied or proposed to be supplied from the Tugela River, else from its tributaries. The hydrology of the Tugela River catchment needs to be reviewed and updated. The available yield from the tributaries is not known in most instances, however for the Sundays River, one of the sources for Indaka WSS, there water balance is already in a deficit. The yield from groundwater used by the scheme areas is not known.

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 UTK001 Bergville WSS

Table 10-3: WSIA Summary for UTK001 Bergville WSS

Bergville WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Bergville WSS	**UTK001**	**28 483**	**32 648**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Bergville WSS	**UTK001**	**5.13**	**6.59**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resource**	**Dam**				
		River	Tugela River		The DWS indicated (2019) that the hydrology of the Tugela River catchment needs to be updated as a matter of priority.	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	Bergville WTP	Primary Bulk		4
			Bergville WTP upgrade	Primary Bulk		6.8
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	0	0
				Secondary Bulk	50-355 ømm	39.11
				Tertiary Bulk	200-250 ømm	9.01
		Reservoirs	Command Reservoir	Primary Bulk	1	4000
			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	6	10800
		Pump stations		Primary Bulk	3	119.28
4.2	**Future**	Bulk Pipelines		Primary Bulk	0	0
				Secondary Bulk	0	0
				Tertiary Bulk	0	0
		WTP		Primary Bulk		
				Secondary Bulk		
		Reservoirs	Command Reservoir	Primary Bulk		

			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	3	2800
		Pump stations		Primary Bulk	1	1.466
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R54 280 800**	**R5 428 080**	**R59 708 880**	
		Secondary	R45 637 000	R4 563 700	**R50 200 700**	
		Tertiary	R74 502 000	R7 450 200	**R81 952 200**	
		Total	**R174 419 800**	**R17 441 980**	**R191 861 780**	

10.3.2 UTK0775 Bergville Future TBC

Table 10-4: WSIA Summary for UTK0775 Bergville Future TBC

Bergville Future TBC						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Bergville Future TBC	**UTK0775**	**20 332**	**23 305**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Bergville Future TBC	**UTK0775**	**1.44**	**3.92**	
					Comments	
3	**Water Resource**	**Dam**	Driel Dam		FSC: 10.36Mm³	
		River				
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	none	Primary Bulk		0
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	0	0
				Secondary Bulk	50-315 ømm	28.35
				Tertiary Bulk	90-160 ømm	10.2
		Reservoirs	Command Reservoir	Primary Bulk		
			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	2	2000
		Pump stations		Primary Bulk		
4.2	**Future**	Bulk Pipelines		Primary Bulk	0	0
				Secondary Bulk	90 ømm	2.8
				Tertiary Bulk	63 - 90 ømm	6.05
		WTP	Bergville South WTP	Primary Bulk		3.8
				Secondary Bulk		
		Reservoirs	Command Reservoir	Primary Bulk	1	2320
			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	10	6200
		Pump stations		Primary Bulk	2	255.5
5			**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	

	Cost Requirement	Primary	**R45 160 800**	**R4 516 080**	**R49 676 880**	
		Secondary	R43 062 000	R4 306 200	**R47 368 200**	
		Tertiary	R61 772 000	R6 177 200	**R67 949 200**	
		Total	**R149 994 800**	**R14 999 480**	**R164 994 280**	

10.3.3 UTK002 Colenso WSS and UTK077 Colenso Future WSS

Table 10-5: WSIA Summary for UTK002 Colenso WSS and UTK077 Colenso Future WSS

Colenso WSS & Colenso WSS Future TBC						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Colenso WSS & Colenso WSS Future TBC	**UTK002 & UTK0776**	**10 894**	**12 487**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Colenso WSS & Colenso WSS Future TBC	**UTK002 & UTK0776**	**1.87**	**2.71**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resource**	**Dam**				
		River	Tugela River		The DWS indicated (2019) that the hydrology of the Tugela River catchment needs to be updated as a matter of priority.	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	Colenso WTP	Primary Bulk		2.64
			Colenso WTP upgrade	Primary Bulk		2.7
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	0	0
				Secondary Bulk	0	0
				Tertiary Bulk	0	0
		Reservoirs	Command Reservoir	Primary Bulk		
			Command Reservoir	Secondary Bulk	6	3600
			Supply Reservoirs	Tertiary Bulk		
		Pump stations		Primary Bulk		
4.2	**Future**	Bulk Pipelines		Primary Bulk	50 ømm	1.05
				Secondary Bulk	50 - 250 ømm	23.67
				Tertiary Bulk	50 - 125 ømm	13.03
		WTP		Primary Bulk		

				Secondary Bulk		
		Reservoirs	Command Reservoir	Primary Bulk	1	200
			Command Reservoir	Secondary Bulk	1	400
			Supply Reservoirs	Tertiary Bulk		
		Pump stations		Primary Bulk	2	1.963
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R16 142 260**	**R1 614 226**	**R17 756 486**	
		Secondary	R27 949 000	R2 794 900	**R30 743 900**	
		Tertiary	R1 535 000	R153 500	**R1 688 500**	
		Total	**R45 626 260**	**R4 562 626**	**R50 188 886**	

10.3.4 UTK004 Driefontein WSS

Table 10-6: WSIA Summary for UTK004 Driefontein WSS

Driefontein WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Driefontein WSS	**UTK004**	**73 365**	**84 093**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Driefontein WSS	**UTK004**	**12.62**	**15.75**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resource**	**Dam**	0			
		River				
		Groundwater	Boreholes		Other water source options to be investigated.	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	none	Primary Bulk		0
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	0	0
				Secondary Bulk	75-355 ømm	51.1
				Tertiary Bulk	63-315 ømm	84.53
		Reservoirs	Command Reservoir	Primary Bulk		
			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	26	28 800
		Pump stations		Primary Bulk		
4.2	**Future**	Bulk Pipelines		Primary Bulk	0	0
				Secondary Bulk	0	0
				Tertiary Bulk	110 ømm	1.16
		WTP		Primary Bulk		
				Secondary Bulk		
		Reservoirs	Command Reservoir	Primary Bulk		

			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	3	2 600
		Pump stations		Primary Bulk		
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R0**	**R0**	**R0**	
		Secondary	R101 060 000	R10 106 000	**R111 166 000**	
		Tertiary	R212 671 000	R21 267 100	**R233 938 100**	
		Total	**R313 731 000**	**R31 373 100**	**R345 104 100**	

10.3.5 UTK012 Loskop-Bhekuzulu WSS, UTK006 Emoyeni-Epangweni WSS and UTK0797 Empangweni Future WSS

Table 10-7: WSIA Summary for UTK012 Loskop-Bhekuzulu WSS, UTK006 Emoyeni-Epangweni WSS and UTK0797 Empangweni Future WSS

Emoyeni-Epangweni WSS & Loskop-Bhekuzulu WSS & Etatane 2 Future WSS & Empangweni Future WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Emoyeni-Epangweni WSS & Loskop-Bhekuzulu WSS & Etatane 2 Future WSS & Empangweni Future WSS	**UTK006 & UTK012 & UTK0796 & UTK0797**	**64 272**	**73 669**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Emoyeni-Epangweni WSS & Loskop-Bhekuzulu WSS & Etatane 2 Future WSS & Empangweni Future WSS	**UTK006 & UTK012 & UTK0796 & UTK0797**	**10.77**	**13.45**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resource**	**Dam**	0			
		River	Little Tugela River		Yield unknown	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	Loskop WTP	Primary Bulk		8
			Loskop WTP Upgrade	Primary Bulk		15
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	110 - 450 ømm	26.13
				Secondary Bulk	63 - 400 ømm	72.82
				Tertiary Bulk	63 - 200 ømm	37.06
		Reservoirs	Command Reservoir	Primary Bulk		
			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	27	24040
		Pump stations		Primary Bulk		
4.2	**Future**	Bulk Pipelines		Primary Bulk	0	0.00
				Secondary Bulk	160 ømm	0.56

				Tertiary Bulk	63 - 200 ømm	3.32
		WTP		Primary Bulk		
				Secondary Bulk		
		Reservoirs	Command Reservoir	Primary Bulk		
			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	8	6600
		Pump stations		Primary Bulk		
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R96 323 000**	**R9 632 300**	**R105 955 300**	
		Secondary	R93 690 000	R9 369 000	**R103 059 000**	
		Tertiary	R181 805 000	R18 180 500	**R199 985 500**	
		Total	**R371 818 000**	**R37 181 800**	**R408 999 800**	

10.3.6 UTK007 Estcourt WSS

Table 10-8: WSIA Summary for UTK007 Estcourt WSS

Estcourt WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Estcourt WSS	**UTK007**	**70 847**	**81 207**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Estcourt WSS	**UTK007**	**17.09**	**20.82**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resource**	**Dam**	Wagendrift Dam		FSC: 55.9Mm³; HFY: 107Mm³/a	
		River	Bushmans River		Water balance (2004): 11Mm³/a	
		Water Resource Development			Feasibility study on Bushmans River catchment for Inkosi Langalibalele LM. R10mil allocation to Ladysmith WTP.	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	George Cross WTP	Primary Bulk		18
			Archie Rodel WTP	Primary Bulk		14
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	63-500 ømm	27.4
				Secondary Bulk	63-450 ømm	30.43
				Tertiary Bulk	110-400 ømm	17.07
		Reservoirs	Command Reservoir	Primary Bulk		
			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	8	15800
		Pump stations		Primary Bulk		
4.2	**Future**	Bulk Pipelines		Primary Bulk	50 - 200 ømm	4.24
				Secondary Bulk	0	0
				Tertiary Bulk	0	0
		WTP	George Cross WTP New	Primary Bulk		18
			Archie Rodel New	Primary Bulk		14
		Reservoirs	Command Reservoir	Primary Bulk		

			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	12	16820
		Pump stations		Primary Bulk		
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R208 766 000**	**R20 876 600**	**R229 642 600**	
		Secondary	R40 070 000	R4 007 000	**R44 077 000**	
		Tertiary	R80 251 000	R8 025 100	**R88 276 100**	
		Total	**R329 087 000**	**R32 908 700**	**R361 995 700**	

10.3.7 UTK007b Estcourt Rudimentary WSS

Table 10-9: WSIA Summary for Estcourt Rudimentary WSS

Estcourt Rudimentary WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Estcourt Rudimentary WSS	**UTK007b**	**44 167**	**50 625**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Estcourt Rudimentary WSS	**UTK007b**	**7.77**	**9.33**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resource**	**Dam**	Wagendrift Dam		FSC: 55.9Mm³; HFY: 107Mm³/a	
		River				
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	George Cross WTP	Primary Bulk		18
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	250 - 450 ømm	28.12
				Secondary Bulk	50 - 200 ømm	14.03
				Tertiary Bulk	63 - 200 ømm	33.59
		Reservoirs	Command Reservoir	Primary Bulk		
			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	15	11600
		Pump stations		Primary Bulk		
4.2	**Future**	Bulk Pipelines		Primary Bulk	0	0
				Secondary Bulk	0	0
				Tertiary Bulk	50 - 90 ømm	8.79
		WTP		Primary Bulk		
				Secondary Bulk		
		Reservoirs	Command Reservoir	Primary Bulk		
			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	10	6870
		Pump stations		Primary Bulk		

5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R74 775 000**	**R7 477 500**	**R82 252 500**	
		Secondary	R6 819 000	R681 900	**R7 500 900**	
		Tertiary	R132 350 000	R13 235 000	**R145 585 000**	
		Total	**R213 944 000**	**R21 394 400**	**R235 338 400**	

10.3.8 UTK008 Ezakheni WSS

Table 10-10: WSIA Summary for UTK008 Ezakheni WSS

Ezakheni WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Ezakheni WSS	**UTK008**	**81 096**	**92 955**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Ezakheni WSS	**UTK008**	**22.64**	**26.96**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resource**	**Dam**	0			
		River	Tugela River Weir		The DWS indicated (2019) that the hydrology of the Tugela River catchment needs to be updated as a matter of priority.	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	Ezakheni WTP	Primary Bulk		32
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	140 - 813 ømm	6.96
				Secondary Bulk	110 - 762 ømm	20.53
				Tertiary Bulk	560 ømm	0.62
		Reservoirs	Command Reservoir	Primary Bulk	2	1000
			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	9	34200
		Pump stations		Primary Bulk	2	756.092
4.2	**Future**	Bulk Pipelines		Primary Bulk	0	0
				Secondary Bulk	90 - 450 ømm	5.29
				Tertiary Bulk	0	0
		WTP		Primary Bulk		6.8
				Secondary Bulk		
		Reservoirs	Command Reservoir	Primary Bulk		

			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	2	9200
		Pump stations		Primary Bulk		
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R76 284 000**	**R7 628 400**	**R83 912 400**	
		Secondary	R140 017 000	R14 001 700	**R154 018 700**	
		Tertiary	R176 245 000	R17 624 500	**R193 869 500**	
		Total	**R392 546 000**	**R39 254 600**	**R431 800 600**	

10.3.9 UTK005 Indaka WSS

Table 10-11: WSIA Summary for UTK005 Indaka WSS

Indaka WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Indaka WSS	**UTK005**	**101 137**	**115 926**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Indaka WSS	**UTK005**	**17.61**	**21.00**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resource**	**Dam**	Oliphantskop Dam		Siltation of the dam remains a problem.	
		Water Resource Development			Study for augmentation from another source or WSS to serve Indaka WSS. R2million. Study of the Sundays River catchment and water resource options, reconciliation with water requirements. R4million. Costs to Ladysmith WTP.	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	Oliphantskop WTP	Primary Bulk		8
				Primary Bulk		
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	250-660 ømm	15.6
				Secondary Bulk	90-500 ømm	79.51
				Tertiary Bulk	50-500 ømm	108.09
		Reservoirs	Command Reservoir	Primary Bulk	1	380
			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	8	15070
		Pump stations		Primary Bulk	0.337 m^3/s	69.61
4.2	**Future**	Bulk Pipelines		Primary Bulk	450 ømm	3.86
				Secondary Bulk	200 - 500 ømm	5.00
				Tertiary Bulk	50 - 200 ømm	36.05
		WTP		Primary Bulk		

				Secondary Bulk		
		Reservoirs	Command Reservoir	Primary Bulk	1	1400
			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	18	14340
		Pump stations		Primary Bulk		
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R102 487 000**	**R10 248 700**	**R112 735 700**	
		Secondary	R124 874 000	R12 487 400	**R137 361 400**	
		Tertiary	R264 031 000	R26 403 100	**R290 434 100**	
		Total	**R491 392 000**	**R49 139 200**	**R540 531 200**	

10.3.10 UTK010 Ladysmith WSS

Table 10-12: WSIA Summary for UTK010 Ladysmith WSS

Ladysmith WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Ladysmith WSS	**UTK010**	**92 969**	**106 564**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Ladysmith WSS	**UTK010**	**26.81**	**31.92**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resource**	**Dam**	Spioenkop Dam		The DWS indicated (2019) that the hydrology of the Tugela River catchment needs to be updated as a matter of priority.	
		River	Klip River		Yield unknown	
		Water Resource Development			Review the groundwater utilisation, R1million. Consider the commissioning of higher intensity investigations, groundwater potential, R1.5million. Thukela WMA study under Vaal Integrated System Reconciliation and Maintenance incl. updated hydrology, R24million. Another R16m for other studies to serve Indaka & Estcourt WSS.	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	Ladysmith WTP	Primary Bulk		23
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	250 - 560 ømm	11.85
				Secondary Bulk	110 - 630 ømm	59.62
				Tertiary Bulk	110 - 630 ømm	11.52
		Reservoirs	Command Reservoir	Primary Bulk	2	9800
			Command Reservoir	Secondary Bulk		

			Supply Reservoirs	Tertiary Bulk	6	25200
		Pump stations		Primary Bulk	2	223.249
4.2	**Future**	Bulk Pipelines		Primary Bulk	0	0
				Secondary Bulk	140 ømm	1.58
				Tertiary Bulk	0	0
		WTP	Ladysmith WTP New	Primary Bulk		23
				Secondary Bulk		
		Reservoirs	Command Reservoir	Primary Bulk		
			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	1	2000
		Pump stations		Primary Bulk		
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R202 789 000**	**R20 278 900**	**R223 067 900**	
		Secondary	R345 749 000	R34 574 900	**R380 323 900**	
		Tertiary	R118 343 000	R11 834 300	**R130 177 300**	
		Total	**R666 881 000**	**R66 688 100**	**R733 569 100**	

10.3.11 UTK014 Tugela Estates WSS

Table 10-13: WSIA Summary for UTK014 Tugela Estates WSS

Tugela Estates WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Tugela Estates WSS	**UTK014**	**11 148**	**12 778**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Tugela Estates WSS	**UTK014**	**1.99**	**2.37**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resource**	**Dam**	0			
		River	Tugela River		The DWS indicated (2019) that the hydrology of the Tugela River catchment needs to be updated as a matter of priority.	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	Tugela Estates WTP	Primary Bulk		1.2
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	160 ømm	1.37
				Secondary Bulk	63 - 200 ømm	13.93
				Tertiary Bulk	0	0
		Reservoirs	Command Reservoir	Primary Bulk		
			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	3	2240
		Pump stations		Primary Bulk	3	111.847
4.2	**Future**	Bulk Pipelines		Primary Bulk	200 ømm	0.32
				Secondary Bulk	0	0
				Tertiary Bulk	0	0
		WTP	New WTP_1	Primary Bulk		1.1
				Secondary Bulk		
		Reservoirs	Command Reservoir	Primary Bulk		

			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	3	1200
		Pump stations		Primary Bulk	2	87.646
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R44 941 850**	**R4 494 185**	**R49 436 035**	
		Secondary	R5 947 000	R594 700	**R6 541 700**	
		Tertiary	R18 165 000	R1 816 500	**R19 981 500**	
		Total	**R69 053 850**	**R6 905 385**	**R75 959 235**	

10.3.12 UTK015 Weenen/Kwanobamba WSS

Table 10-14: WSIA Summary for UTK015 Weenen/Kwanobamba WSS

Weenen/Kwanobamba WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Weenen/Kwanobamba WSS	**UTK015**	**15 271**	**17 504**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Weenen/Kwanobamba WSS	**UTK015**	**1.77**	**3.13**	
					Comments	
3	**Water Resource**	**Dam**				
		River	Bushmans River		Water balance (2004): 11Mm³/a	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	Weenen (old) WTP	Primary Bulk		1.45
			Weenen new WTP	Primary Bulk		3
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	160-200 ømm	8.06
				Secondary Bulk	90-200 ømm	48.97
				Tertiary Bulk	50-110 ømm	3.70
		Reservoirs	Command Reservoir	Primary Bulk	3	2080
			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	14	5800
		Pump stations		Primary Bulk		
4.2	**Future**	Bulk Pipelines		Primary Bulk	0	0
				Secondary Bulk	50 ømm	2.18
				Tertiary Bulk	50 ømm	2.34
		WTP	Weenen New WTP	Primary Bulk		3
				Secondary Bulk		
		Reservoirs	Command Reservoir	Primary Bulk		
			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk		

		Pump stations		Primary Bulk		
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R28 207 000**	**R2 820 700**	**R31 027 700**	
		Secondary	R17 907 000	R1 790 700	**R19 697 700**	
		Tertiary	R28 487 000	R2 848 700	**R31 335 700**	
		Total	**R74 601 000**	**R7 460 100**	**R82 061 100**	

10.3.13 UTK017 Zwelisha Moyeni WSS

Table 10-15: WSIA Summary for UTK017 Zwelisha Moyeni WSS

Zwelisha Moyeni WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Zwelisha Moyeni WSS	UTK017	50 325	57 684	
		Total		**50 325**	**57 684**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Zwelisha Moyeni WSS	UTK017	8.78	10.8	
		Total		**8.78**	**10.8**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resources**	**Dam**				
		River	Khombe River, a tributary of the Tugela River		Yield unknown	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	Zwelisha Moyeni WTP	Primary Bulk		2.5
			Zwelisha Moyeni WTP upgrade	Primary Bulk		11
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	500 ømm	3.47
				Secondary Bulk	110 - 315 ømm	37.82
				Tertiary Bulk	50 - 200 ømm	24.66
		Reservoirs	Res1 CR	Primary Bulk		6750
			Res10	Tertiary Bulk		1200
			Res11	Tertiary Bulk		400
			Res12	Tertiary Bulk		1200
			Res3	Tertiary Bulk		1200
			Res4	Tertiary Bulk		800
			Res5	Tertiary Bulk		800
			Res6	Tertiary Bulk		600
			Res7	Tertiary Bulk		1200
			Res9	Tertiary Bulk		2000

		Pump stations		Primary Bulk		
4.2	**Future**	Bulk Pipelines		Primary Bulk		
				Secondary Bulk	63 ømm	0.65
				Tertiary Bulk	63 - 125 ømm	5.0
		WTP			-	
					-	-
		Reservoirs	Res13	Tertiary Bulk		1000
			Res14	Tertiary Bulk		1000
			Res2	Tertiary Bulk		2400
			Res8	Tertiary Bulk		1000
		Pump stations	PS1 PS1 to Res 8	Primary Bulk	0.009 m³/s	16.998
			PS2 PS2 to Res13	Primary Bulk	0.020 m³/s	59.599
			PS3 WTP to Res1 CR	Primary Bulk	0.200 m³/s	516.316
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R113 560 500**	**R11 356 050**	**R124 916 550**	
		Secondary	R59 735 000	R5 973 500	R65 708 500	
		Tertiary	R76 395 000	R7 639 500	R84 034 500	
		Total	**R249 690 500**	**R24 969 050**	**R274 659 550**	

10.3.14 UTK0783 Zwelisha Moyeni Future TBC

Table 10-16: WSIA Summary for UTK0783 Zwelisha Moyeni Future TBC

Zwelisha Moyeni Future TBC						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Zwelisha Moyeni Future TBC	**UTK0783**	**19 966**	**22 886**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Zwelisha Moyeni Future TBC	**UTK0783**	**1.39**	**3.78**	
					Comments	
3	**Water Resource**	**Dam**	Future proposed source for WTP North: Woodstock Dam		FSC: 373.26Mm³; HFY: 280Mm³/a	
		River	Future proposed source for WTP South: Mlambonja River		Yield unknown	
		Groundwater	Boreholes and springs			
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	none	Primary Bulk		0
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	0	0
				Secondary Bulk	0	0
				Tertiary Bulk	0	0
		Reservoirs	Command Reservoir	Primary Bulk		
			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk		
		Pump stations		Primary Bulk	1	205.889
4.2	**Future**	Bulk Pipelines		Primary Bulk	90 - 250 ømm	4.23
				Secondary Bulk	50 - 250 ømm	27.87
				Tertiary Bulk	63 - 140 ømm	16.26
		WTP	Zwelisha Moyeni WTP North	Primary Bulk		1.9
			Zwelisha Moyeni WTP South	Primary Bulk		2
		Reservoirs	Command Reservoir	Primary Bulk		
			Command Reservoir	Secondary Bulk		
			Supply Reservoirs	Tertiary Bulk	9	7960

		Pump stations		Primary Bulk	1	159.357
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R41 899 900**	**R4 189 990**	**R46 089 890**	
		Secondary	R10 924 000	R1 092 400	**R12 016 400**	
		Tertiary	R42 144 000	R4 214 400	**R46 358 400**	
		Total	**R94 967 900**	**R9 496 790**	**R104 464 690**	

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 10-17: Financial Requirements based on Demand Model Interventions

WSIA	WSIA Name	Total Cost Requirement				
		Primary	**Secondary**	**Tertiary**	**10% Contingencies**	**Total Cost (Excl VAT)**
UTK001	Bergville WSS	R45 160 800	R43 062 000	R61 772 000	R14 999 480	R164 994 280
UTK0775	Bergville Future TBC	R54 280 800	R45 637 000	R74 502 000	R17 441 980	R191 861 780
UTK002, UTK077	Colenso WSS and Colenso Future WSS	R16 142 260	R27 949 000	R1 535 000	R4 562 626	R50 188 886
UTK004	Driefontein WSS	R0	R101 060 000	R212 671 000	R31 373 100	R345 104 100
UTK012, UTK006, UTK0797, UTK0796	Loskop-Bhekuzulu WSS & Emoyeni-Epangweni WSS, Empangweni Future WSS & Etatane 2 Future WSS	R96 323 000	R93 690 000	R181 805 000	R37 181 800	R408 999 800
UTK007	Estcourt WSS	R208 766 000	R40 070 000	R80 251 000	R32 908 700	R361 995 700
UTK007b	Estcourt Rudimentary WSS	R74 775 000	R6 819 000	R132 350 000	R21 394 400	R235 338 400
UTK008	Ezakheni WSS	R76 284 000	R140 017 000	R176 245 000	R39 254 600	R431 800 600
UTK005	Indaka WSS	R102 487 000	R124 874 000	R264 031 000	R49 139 200	R540 531 200
UTK010	Ladysmith WSS	R202 789 000	R345 749 000	R118 343 000	R66 688 100	R733 569 100
UTK014	Tugela Estates WSS	R44 941 850	R5 947 000	R18 165 000	R6 905 385	R75 959 235
UTK015	Weenen/Kwanobamba WSS	R28 207 000	R17 907 000	R28 487 000	R7 460 100	R82 061 100
UTK017	Zwelisha Moyeni WSS	R113 560 500	R59 735 000	R76 395 000	R24 969 050	R274 659 550
UTK0783	Zwelisha Moyeni Future TBC	R41 899 900	R10 924 000	R42 144 000	R9 496 790	R104 464 690
UTK901	Alfred Duma Rural					R68 653 749
UTK902	Inkosi Langalibalele Rural					R163 778 716
UTK903	Okhahlamba Rural					R146 971 197
Total		**R1 105 617 110**	**R1 063 440 000**	**R1 468 696 000**	**R363 775 311**	**R4 380 932 083**

Source: Water Demand Model, UAP Phase III, 2020

A total estimate of approximately R4.38 billion is required to address the total bulk water supply requirement by 2050.

10.5 Funding Options

The UTDM 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 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 UTDM could consider is renewed loan funding through the Development Bank of Southern Africa (DBSA). The UTDM IDP 2019/2020 confirmed that the UTDM serviced its loan with the DBSA and does not have any new borrowings. Its main sources of revenue are from grants and municipal services for water & sanitation.

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 for areas that do not yet have access to basic and safe water supply, such as Bergville Future, Driefontein and Zwelisha Moyeni Future WSS, would be an implementation priority for the UTDM. Furthermore, areas that are developed and having a high population density, but unreliable water supply, such as Indaka WSS.

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 in areas such as Ladysmith and Ezakheni.

11. RECOMMENDATIONS

11.1 Responsibilities

The provision of water services remains the responsibility of the UTDM as the WSA. The UTDM 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 UTDM to take this process further.

11.2 Selection of Solutions

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

- UTK001 Bergville WSS
- UTK0775 Bergville Future TBC WSS;
- UTK002 Colenso WSS and UTK0776 Colenso Future WSS;
- UTK004 Driefontein WSS;
- UTK012 Loskop-Bhekuzulu WSS, including UTK006 Emoyeni-Epangweni WSS and UTK0797 Empangweni Future WSS;
- UTK007 Estcourt WSS;
- UTK007b Estcourt Rudimentary WSS;
- UTK008 Ezakheni WSS;
- UTK005 Indaka WSS;
- UTK010 Ladysmith WSS;
- UTK014 Tugela Estates WSS;
- UTK015 Weenen/Kwanobamba WSS;
- UTK017 Zwelisha Moyeni WSS;
- UTK0783 Zwelisha Moyeni Future TBC;
- UTK0901 Alfred Duma Rural;
- UTK0902 Inkosi Langalibalele Rural; and
- UTK0903 Okhahlamba Rural.

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

DWAF	Thukela WMA: Internal Strategic Perspective. DWAF Report No : P WMA 07/000/00/0304. 2004
DWS	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.
DWS	Reference Framework Geo database, March 2018.
IDP	uThukela District Municipality IDP Review, 2019/2020.
IWR Water Resources	Off-channel Dams in the Injasuthi River Catchment Surface Water Assessment, 2015.
Planning and Feasibility Studies	No recent studies or infrastructure master plans available.
Statistics SA	Census 2011; Community Survey 2016.
Umgeni Water	UAP Phase II: Towards the Development of a Regional Bulk Water Requirements for the uThukela Cetshwayo District Municipality, June 2015. Umgeni Water Infrastructure Master Plan, 2019. Umgeni Water Infrastructure Master Plan, 2020.

ANNEXURE B – DETAILED PROPOSED WSI INFRASTRUCTURE COMPONENT COSTS

UTK001 Bergville WSS

The total bulk cost requirement is R191.86 million (excl VAT). The scheme development cost per household is approximately R24 495.

Bergville WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Bergville WSS	UTK001	28 483	32 648	
		Total		**28 483**	**32 648**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Bergville WSS	UTK001	5.13	6.59	
		Total		**5.13**	**6.59**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resources**	**Dam**				
		River	Tugela River		The DWS indicated (2019) that the hydrology of the Tugela River catchment needs to be updated as a matter of priority.	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	Bergville WTP	Primary Bulk		4
			Bergville WTP upgrade	Primary Bulk		6.8
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk		
				Secondary Bulk	50-355 ømm	39.11
				Tertiary Bulk	200-250 ømm	9.01
		Reservoirs	Res4 CR	Primary Bulk		4000
			Res1	Tertiary Bulk		2800
			Res2	Tertiary Bulk		2200
			Res3	Tertiary Bulk		3400
			Res7	Tertiary Bulk		600
			Res8	Tertiary Bulk		1000
			Res9	Tertiary Bulk		800

		Pump stations	PS1 Pumpstation 1 to PS 2	Primary Bulk	0.0778 m^3/s	73.18
			PS2 Pumpstation 2 to Res 1	Primary Bulk	0.0259 m^3/s	29.45
			PS3 PS 3 to res 7	Primary Bulk	0.0148 m^3/s	16.66
4.2	**Future**	Bulk Pipelines		Primary Bulk		
				Secondary Bulk		
				Tertiary Bulk		
		WTP				
					-	-
		Reservoirs	Res10	Tertiary Bulk		600
			Res5	Tertiary Bulk		1000
			Res6	Tertiary Bulk		1200
		Pump stations	PS4 PS 4 to res10	Primary Bulk	0.0055 m^3/s	1.466
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R54 280 800**	**R5 428 080**	**R59 708 880**	
		Secondary	R45 637 000	R4 563 700	R50 200 700	
		Tertiary	R74 502 000	R7 450 200	R81 952 200	
		Total	**R174 419 800**	**R17 441 980**	**R191 861 780**	

UTK0775 Bergville Future TBC

The total bulk cost requirement is R164.99 million (excl VAT). The scheme development cost per household is approximately R29 509.

Bergville Future TBC						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Bergville Future TBC	UTK0775	20 332	23 305	
		Total		**20 332**	**23 305**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Bergville Future TBC	UTK0775	1.44	3.92	
		Total		**1.44**	**3.92**	
					Comments	
3	**Water Resources**	**Dam**	Driel Dam		**FSC: 10.36Mm³**	
		River				
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	none	Primary Bulk		
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk		
				Secondary Bulk	50-315 ømm	28.35
				Tertiary Bulk	90-160 ømm	10.2
		Reservoirs	Res17	Tertiary Bulk		1200
			Res21	Tertiary Bulk		800
		Pump stations	none	Primary Bulk		
4.2	**Future**	Bulk Pipelines		Primary Bulk		
				Secondary Bulk	90 ømm	2.8
				Tertiary Bulk	63 - 90 ømm	6.05
		WTP	Bergville South WTP		-	3.8
					-	-
		Reservoirs	Res13 CR	Primary Bulk		2320
			Res11	Tertiary Bulk		200
			Res12	Tertiary Bulk		200
			Res14	Tertiary Bulk		1000

			Res15	Tertiary Bulk		800
			Res16	Tertiary Bulk		400
			Res18	Tertiary Bulk		600
			Res19	Tertiary Bulk		600
			Res20	Tertiary Bulk		1200
			Res22	Tertiary Bulk		800
			Res23	Tertiary Bulk		400
		Pump stations	PS5 PS 5 at Proposed Bergville South WTP to PS 6	Primary Bulk	0.0685 m^3/s	107.700
			PS6 PS 6 to Command Res 13	Primary Bulk	0.0685 m^3/s	147.800
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R45 160 800**	**R4 516 080**	**R49 676 880**	
		Secondary	R43 062 000	R4 306 200	R47 368 200	
		Tertiary	R61 772 000	R6 177 200	R67 949 200	
		Total	**R149 994 800**	**R14 999 480**	**R164 994 280**	

UTK002 Colenso WSS and UTK077 Colenso Future WSS

The total bulk cost requirement is R50.189 million (excl VAT). The scheme development cost per household is approximately R14 871.

Colenso WSS & Colenso WSS Future TBC						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Colenso WSS & Colenso WSS Future TBC	UTK002 & UTK0776	10 894	12 487	
		Total		**10 894**	**12 487**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Colenso WSS & Colenso WSS Future TBC	UTK002 & UTK0776	1.87	2.71	
		Total		**1.87**	**2.71**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resources**	**Dam**				
		River	Tugela River		The DWS indicated (2019) that the hydrology of the Tugela River catchment needs to be updated as a matter of priority.	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	Colenso WTP	Primary Bulk		2.64
			Colenso WTP upgrade	Primary Bulk		2.7
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk		
				Secondary Bulk		
				Tertiary Bulk		
		Reservoirs	Res2	Secondary Bulk		800
			Res3	Secondary Bulk		400
			Res4	Secondary Bulk		1400
			Res5	Secondary Bulk		400
			Res6	Secondary Bulk		200
			Res7	Secondary Bulk		400

		Pump stations	none	Primary Bulk		
4.2	**Future**	Bulk Pipelines		Primary Bulk	50 ømm	1.05
				Secondary Bulk	50 - 250 ømm	23.67
				Tertiary Bulk	50 - 125 ømm	13.03
		WTP		Primary Bulk	-	
					-	-
		Reservoirs	Res1	Primary Bulk		200
			Res8	Secondary Bulk		400
		Pump stations	PS1 From river to treatment works	Primary Bulk	0.0052 m^3/s	0.476
			PS2 From treatment work to network	Primary Bulk	0.0052 m^3/s	1.487
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R16 142 260**	**R1 614 226**	**R17 756 486**	
		Secondary	R27 949 000	R2 794 900	R30 743 900	
		Tertiary	R1 535 000	R153 500	R1 688 500	
		Total	**R45 626 260**	**R4 562 626**	**R50 188 886**	

UTK004 Driefontein WSS

The total bulk cost requirement is R345.1 million (excl VAT). The scheme development cost per household is approximately R17 105.

Driefontein WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Driefontein WSS	UTK004	73 365	84 093	
		Total		**73 365**	**84 093**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Driefontein WSS	UTK004	12.62	15.75	
		Total		**12.62**	**15.75**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resources**	**Dam**				
		River				
		Groundwater	Boreholes		**Other water source options to be investigated.**	
4	**Infrastructure**			**Class**	**Size / No**	
4.1	**Existing**	WTP	none	Primary Bulk		**Capacity (Ml/d or kl or km or kW)**
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk		
				Secondary Bulk	75-355 ømm	51.1
				Tertiary Bulk	63-315 ømm	84.53
		Reservoirs	R1	Tertiary Bulk		2200
			R10	Tertiary Bulk		400
			R11	Tertiary Bulk		2200
			R12	Tertiary Bulk		1800
			R13	Tertiary Bulk		1800
			R14	Tertiary Bulk		800
			R15	Tertiary Bulk		1400
			R16	Tertiary Bulk		600
			R17	Tertiary Bulk		400
			R18	Tertiary Bulk		1000
			R19	Tertiary Bulk		300
			R2	Tertiary Bulk		1000

			R20	Tertiary Bulk		300
			R21	Tertiary Bulk		300
			R22	Tertiary Bulk		300
			R23	Tertiary Bulk		1600
			R24	Tertiary Bulk		800
			R25	Tertiary Bulk		200
			R26	Tertiary Bulk		400
			R27	Tertiary Bulk		600
			R29	Tertiary Bulk		1400
			R3	Tertiary Bulk		1000
			R6	Tertiary Bulk		800
			R7	Tertiary Bulk		800
			R8	Tertiary Bulk		3400
			R9	Tertiary Bulk		3000
		Pump stations	none	Primary Bulk		
4.2	**Future**	Bulk Pipelines		Primary Bulk		
				Secondary Bulk		
				Tertiary Bulk	110 ømm	1.16
		WTP	none		-	
					-	3.8
		Reservoirs	R28	Tertiary Bulk		1000
			R4	Tertiary Bulk		1000
			R5	Tertiary Bulk		600
		Pump stations	none	Primary Bulk		
				Primary Bulk		
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	147.800
		Primary	**R0**	**R0**	**R0**	
		Secondary	R101 060 000	R10 106 000	R111 166 000	
		Tertiary	R212 671 000	R21 267 100	R233 938 100	
		Total	**R313 731 000**	**R31 373 100**	**R345 104 100**	

UTK012 Loskop-Bhekuzulu WSS, UTK006 Emoyeni-Epangweni WSS and UTK0797 Empangweni Future WSS

The total bulk cost requirement is R408.999 million (excl VAT). The scheme development cost per household is approximately R25 575.

Emoyeni-Epangweni WSS & Loskop-Bhekuzulu WSS & Etatane 2 Future WSS & Empangweni Future WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Emoyeni-Epangweni WSS & Loskop-Bhekuzulu WSS & Etatane 2 Future WSS & Empangweni Future WSS	UTK006 & UTK012 & UTK0796 & UTK0797	64 272	73 669	
		Total		**64 272**	**73 669**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Emoyeni-Epangweni WSS & Loskop-Bhekuzulu WSS & Etatane 2 Future WSS & Empangweni Future WSS	UTK006 & UTK012 & UTK0796 & UTK0797	10.77	13.45	
		Total		**10.77**	**13.45**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resources**	**Dam**				
		River	Little Tugela River		Yield unknown	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	Loskop WTP	Primary Bulk		8
			Loskop WTP Upgrade	Primary Bulk		15
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	110 - 450 ømm	26.13
				Secondary Bulk	63 - 400 ømm	72.82
				Tertiary Bulk	63 - 200 ømm	37.06
		Reservoirs - Loskop	Res1	Tertiary Bulk		2000
			Res10	Tertiary Bulk		2600

			Res11	Tertiary Bulk		400
			Res12	Tertiary Bulk		400
			Res2	Tertiary Bulk		300
			Res3	Tertiary Bulk		300
			Res4	Tertiary Bulk		400
			Res5	Tertiary Bulk		600
			Res6	Tertiary Bulk		1000
			Res7	Tertiary Bulk		1200
			Res9	Tertiary Bulk		2800
		Reservoirs - Emoyeni-Epangweni	CRes1	Tertiary Bulk		1240
			Res10	Tertiary Bulk		1200
			Res13	Tertiary Bulk		600
			Res15	Tertiary Bulk		400
			Res16	Tertiary Bulk		400
			Res3	Tertiary Bulk		800
			Res4	Tertiary Bulk		400
			Res5	Tertiary Bulk		400
			Res6	Tertiary Bulk		800
			Res7	Tertiary Bulk		600
			Res8	Tertiary Bulk		2000
			Res9	Tertiary Bulk		200
		Reservoirs - Empangweni Future	Res1	Tertiary Bulk		600
			Res2	Tertiary Bulk		200
			Res3	Tertiary Bulk		1000
		Etatane 2 Future WSS	Res1	Tertiary Bulk		1200
		Pump stations		Primary Bulk		
4.2	**Future**	Bulk Pipelines		Primary Bulk		0.00
				Secondary Bulk	160 ømm	0.56
				Tertiary Bulk	63 - 200 ømm	3.32
		WTP			-	
					-	-

		Reservoirs - Loskop	Res8	Tertiary Bulk		3000
		Reservoirs - Emoyeni-Epangweni	Res1	Tertiary Bulk		600
			Res11	Tertiary Bulk		400
			Res12	Tertiary Bulk		400
			Res14	Tertiary Bulk		1000
			Res2	Tertiary Bulk		200
		Reservoirs - Empangweni Future	Res4	Tertiary Bulk		500
			Res5	Tertiary Bulk		500
		Pump stations	PS1 Pumpstation at WTP to command reservoir	Primary Bulk		
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**96 323 000**	**R9 632 300**	**R105 955 300**	
		Secondary	93 690 000	R9 369 000	R103 059 000	
		Tertiary	181 805 000	R18 180 500	R199 985 500	
		Total	**R371 818 000**	**R37 181 800**	**R408 999 800**	

UTK007 Estcourt WSS

The total bulk cost requirement is R361.996 million (excl VAT). The scheme development cost per household is approximately R18 580.

Estcourt WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Estcourt WSS	UTK007	70 847	81 207	
		Total		**70 847**	**81 207**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Estcourt WSS	UTK007	17.09	20.82	
		Total		**17.09**	**20.82**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resources**	**Dam**	Wagendrift Dam		**FSC: 55.9Mm³; HFY: 107Mm³/a**	
		River	Bushmans River		Water balance (2004): 11Mm³/a	
		Water Resource Development			Feasibility study on Bushmans River catchment for Inkosi Langalibalele LM. R10mil allocation to Ladysmith WTP.	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**					
		WTP	George Cross WTP	Primary Bulk		18
			Archie Rodel WTP	Primary Bulk		14
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	63-500 ømm	27.40
				Secondary Bulk	63-450 ømm	30.43
				Tertiary Bulk	110-400 ømm	17.07
		Reservoirs	Res12	Tertiary Bulk		1600
			Res13	Tertiary Bulk		1200
			Res15	Tertiary Bulk		2000
			Res16	Tertiary Bulk		1600
			Res17	Tertiary Bulk		2200
			Res19	Tertiary Bulk		1200
			Res6	Tertiary Bulk		3800

			Res9	Tertiary Bulk		2200
		Pump stations	none	Primary Bulk		
4.2	**Future**	Bulk Pipelines		Primary Bulk	50 - 200 ømm	4.24
				Secondary Bulk		
				Tertiary Bulk		
		WTP	George Cross WTP New	Primary Bulk	-	18
			Archie Rodel New	Primary Bulk	-	14
		Reservoirs	Res1	Tertiary Bulk		820
			Res10	Tertiary Bulk		600
			Res11	Tertiary Bulk		400
			Res14	Tertiary Bulk		1800
			Res18	Tertiary Bulk		400
			Res2	Tertiary Bulk		1600
			Res20	Tertiary Bulk		3800
			Res3	Tertiary Bulk		1200
			Res4	Tertiary Bulk		1000
			Res5	Tertiary Bulk		1000
			Res7	Tertiary Bulk		4000
			Res8	Tertiary Bulk		200
		Pump stations	none	Primary Bulk		
				Primary Bulk		
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	147.800
		Primary	**R208 766 000**	**R20 876 600**	**R229 642 600**	
		Secondary	R40 070 000	R4 007 000	R44 077 000	
		Tertiary	R80 251 000	R8 025 100	R88 276 100	
		Total	**R329 087 000**	**R32 908 700**	**R361 995 700**	

UTK007b Estcourt Rudimentary WSS

The total bulk cost requirement is R235.34 million (excl VAT). The scheme development cost per household is approximately R19 367.

Estcourt Rudimentary WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Estcourt Rudimentary WSS	UTK007b	44 167	50 625	
		Total		**44 167**	**50 625**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Estcourt Rudimentary WSS	UTK007b	7.77	9.33	
		Total		**7.77**	**9.33**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resources**	**Dam**	**Wagendrift Dam**		**FSC: 55.9Mm³; HFY: 107Mm³/a**	
		River				
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	George Cross WTP	Primary Bulk		18
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	250 - 450 ømm	28.12
				Secondary Bulk	50 - 200 ømm	14.03
				Tertiary Bulk	63 - 200 ømm	33.59
		Reservoirs	Res10	Tertiary Bulk		800
			Res12	Tertiary Bulk		200
			Res13	Tertiary Bulk		1000
			Res14	Tertiary Bulk		800
			Res15	Tertiary Bulk		400
			Res16	Tertiary Bulk		400
			Res17	Tertiary Bulk		800
			Res2	Tertiary Bulk		200
			Res22	Tertiary Bulk		2200
			Res23	Tertiary Bulk		1000
			Res24	Tertiary Bulk		1200

			Res3	Tertiary Bulk		400
			Res4	Tertiary Bulk		400
			Res8	Tertiary Bulk		800
			Res9	Tertiary Bulk		1000
		Pump stations		Primary Bulk		
				Primary Bulk		
4.2	**Future**	Bulk Pipelines		Primary Bulk		
				Secondary Bulk		
				Tertiary Bulk	50 - 90 ømm	8.79
		WTP			-	
					-	-
		Reservoirs	Res1	Tertiary Bulk		70
			Res11	Tertiary Bulk		200
			Res18	Tertiary Bulk		1000
			Res19	Tertiary Bulk		600
			Res20	Tertiary Bulk		400
			Res21	Tertiary Bulk		2000
			Res25	Tertiary Bulk		1400
			Res5	Tertiary Bulk		600
			Res6	Tertiary Bulk		400
			Res7	Tertiary Bulk		200
		Pump stations		Primary Bulk		
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R74 775 000**	**R7 477 500**	**R82 252 500**	
		Secondary	R6 819 000	R681 900	R7 500 900	
		Tertiary	R132 350 000	R13 235 000	R145 585 000	
		Total	**R213 944 000**	**R21 394 400**	**R235 338 400**	

UTK008 Ezakheni WSS

The total bulk cost requirement is R431.8 million (excl VAT). The scheme development cost per household is approximately R19 362.

Ezakheni WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Ezakheni WSS	UTK008	81 096	92 955	
		Total		**81 096**	**92 955**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Ezakheni WSS	UTK008	22.64	26.96	
		Total		**22.64**	**26.96**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resources**	**Dam**				
		River	Tugela River Weir		The DWS indicated (2019) that the hydrology of the Tugela River catchment needs to be updated as a matter of priority.	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	Ezakheni WTP	Primary Bulk		32
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	140 - 813 ømm	6.96
				Secondary Bulk	110 - 762 ømm	20.53
				Tertiary Bulk	560 ømm	0.62
		Reservoirs	R3	Primary Bulk		600
			R4	Primary Bulk		400
			R1	Tertiary Bulk		500
			R10	Tertiary Bulk		8000
			R11	Tertiary Bulk		8000
			R12	Tertiary Bulk		8000
			R2	Tertiary Bulk		500

			R5	Tertiary Bulk		200
			R6	Tertiary Bulk		600
			R8	Tertiary Bulk		8000
			R9	Tertiary Bulk		400
		Pump stations	PS1 Pumpstation at Ezakheni WTP to Command Reservoir (R3)	Primary Bulk	0.017 m³/s	21.489
			PS2 Pumpstation at Ezakheni WTP to Command Reservoir (R4)	Primary Bulk	0.410 m³/s	734.60
4.2	**Future**	Bulk Pipelines		Primary Bulk		
				Secondary Bulk	90 - 450 ømm	5.29
				Tertiary Bulk		
		WTP			-	
					-	-
		Reservoirs	R13	Tertiary Bulk		800
			R7	Tertiary Bulk		8400
		Pump stations	none	Primary Bulk		
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R76 284 000**	**R7 628 400**	**R83 912 400**	
		Secondary	R140 017 000	R14 001 700	R154 018 700	
		Tertiary	R176 245 000	R17 624 500	R193 869 500	
		Total	**R392 546 000**	**R39 254 600**	**R431 800 600**	

UTK005 Indaka WSS

The total bulk cost requirement is R540.53 million (excl VAT). The scheme development cost per household is approximately R19 435.

Indaka WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Indaka WSS	UTK005	101 137	115 926	
		Total		**101 137**	**115 926**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Indaka WSS	UTK005	17.61	21.00	
		Total		**17.61**	**21.00**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resources**	**Dam**	Oliphantskop Dam		**Siltation of the dam remains a problem.**	
		Water Resource Development			Study for augmentation from another source or WSS to serve Indaka WSS. R2million. Study of the Sundays River catchment and water resource options, reconciliation with water requirements. R4million. Costs to Ladysmith WTP.	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	Oliphantskop WTP	Primary Bulk		8
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	250-660 ømm	15.6
				Secondary Bulk	90-500 ømm	79.51
				Tertiary Bulk	50-500 ømm	108.09
		Reservoirs	R1	Primary Bulk		380
			R16	Tertiary Bulk		870
			R17	Tertiary Bulk		1500
			R18	Tertiary Bulk		1900
			R19	Tertiary Bulk		800
			R2	Tertiary Bulk		2600
			R20	Tertiary Bulk		3300
			R21	Tertiary Bulk		3300

			R4	Tertiary Bulk		800
		Pump stations	PS1	Primary Bulk	0.337 m³/s	69.61
4.2	**Future**	Bulk Pipelines		Primary Bulk	450 ømm	3.86
				Secondary Bulk	200 - 500 ømm	5.00
				Tertiary Bulk	50 - 200 ømm	36.05
		WTP				
					-	-
		Reservoirs	R8	Primary Bulk		1400
			R10	Tertiary Bulk		1000
			R11	Tertiary Bulk		800
			R12	Tertiary Bulk		1400
			R13	Tertiary Bulk		800
			R14	Tertiary Bulk		870
			R15	Tertiary Bulk		870
			R22	Tertiary Bulk		400
			R23	Tertiary Bulk		600
			R25	Tertiary Bulk		2200
			R27	Tertiary Bulk		600
			R28	Tertiary Bulk		400
			R29	Tertiary Bulk		400
			R3	Tertiary Bulk		400
			R30	Tertiary Bulk		200
			R5	Tertiary Bulk		400
			R6	Tertiary Bulk		400
			R7	Tertiary Bulk		800
			R9	Tertiary Bulk		1800
		Pump stations	none	Primary Bulk		
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R102 487 000**	**R10 248 700**	**R112 735 700**	
		Secondary	R124 874 000	R12 487 400	R137 361 400	
		Tertiary	R264 031 000	R26 403 100	R290 434 100	
		Total	**R491 392 000**	**R49 139 200**	**R540 531 200**	

UTK010 Ladysmith WSS

The total bulk cost requirement is R733.569 million (excl VAT). The scheme development cost per household is approximately R28 693.

Ladysmith WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Ladysmith WSS	UTK010	92 969	106 564	
		Total		**92 969**	**106 564**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Ladysmith WSS	UTK010	26.81	31.92	
		Total		**26.81**	**31.92**	
					Comments	
3	**Water Resources**	**Dam**	Spioenkop Dam	**FSC: 272.27Mm³ HFY: 70Mm³/a**	**The DWS indicated (2019) that the hydrology of the Tugela River catchment needs to be updated as a matter of priority.**	
		River	Klip River		Yield unknown	
		Water Resource Development			Review the groundwater utilisation, R1million. Consider the commissioning of higher intensity investigations, groundwater potential, R1.5million. Thukela WMA study under Vaal Integrated System Reconciliation and Maintenance incl. updated hydrology, R24million. Another R16m for other studies to serve Indaka & Estcourt WSS.	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	Ladysmith WTP	Primary Bulk		23
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	250 - 560 ømm	11.85

				Secondary Bulk	110 - 630 ømm	59.62
				Tertiary Bulk	110 - 630 ømm	11.52
		Reservoirs	R1	Primary Bulk		5200
			R7	Primary Bulk		4600
			R2	Tertiary Bulk		3400
			R3	Tertiary Bulk		4800
			R4	Tertiary Bulk		6600
			R5	Tertiary Bulk		3400
			R8	Tertiary Bulk		1200
			R9	Tertiary Bulk		5800
		Pump stations	PS1 Pumpstation at Ladysmith WTP to Command Reservoir (R1)	Primary Bulk	0.25 m^3/s	137.754
			PS2 Pumpstation at Ladysmith to Command Reservoir (R7)	Primary Bulk	0.040 m^3/s	85.50
4.2	**Future**	Bulk Pipelines		Primary Bulk		
				Secondary Bulk	140 ømm	1.58
				Tertiary Bulk		
		WTP	Ladysmith WTP New	Primary Bulk	-	23
					-	-
		Reservoirs	R10	Tertiary Bulk		2000
		Pump stations	none	Primary Bulk		
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R202 789 000**	**R20 278 900**	**R223 067 900**	
		Secondary	R345 749 000	R34 574 900	R380 323 900	
		Tertiary	R118 343 000	R11 834 300	R130 177 300	
		Total	**R666 881 000**	**R66 688 100**	**R733 569 100**	

UTK014 Tugela Estates WSS

The total bulk cost requirement is R75.595 million (excl VAT). The scheme development cost per household is approximately R24 777.

Tugela Estates WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Tugela Estates WSS	UTK014	11 148	12 778	
		Total		**11 148**	**12 778**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Tugela Estates WSS	UTK014	1.99	2.37	
		Total		**1.99**	**2.37**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resources**	**Dam**				
		River	Tugela River		The DWS indicated (2019) that the hydrology of the Tugela River catchment needs to be updated as a matter of priority.	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	Tugela Estates WTP	Primary Bulk		1.2
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	160 ømm	1.37
				Secondary Bulk	63 - 200 ømm	13.93
				Tertiary Bulk		
		Reservoirs	Res1	Tertiary Bulk		320
			Res2	Tertiary Bulk		320
			Res3	Tertiary Bulk		1600
		Pump stations	PS1 to WTP	Primary Bulk	0.030 m^3/s	9.519
			PS2 to Ngedlengedleni	Primary Bulk	0.030 m^3/s	97.229
			PS3 to RES 3	Primary Bulk	0.015 m^3/s	5.099
4.2	**Future**	Bulk Pipelines		Primary Bulk	200 ømm	0.32
				Secondary Bulk		

				Tertiary Bulk		
		WTP	New WTP_1	Primary Bulk		1.1
					-	-
		Reservoirs	Res4	Tertiary Bulk		600
			Res5	Tertiary Bulk		400
			Res6	Tertiary Bulk		200
		Pump stations	PS4 New to New WTP	Primary Bulk	0.020 m^3/s	2.337
			PS5 New to Res6	Primary Bulk	0.020 m^3/s	85.309
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R44 941 850**	**R4 494 185**	**R49 436 035**	
		Secondary	R5 947 000	R594 700	R6 541 700	
		Tertiary	R18 165 000	R1 816 500	R19 981 500	
		Total	**R69 053 850**	**R6 905 385**	**R75 959 235**	

UTK015 Weenen/Kwanobamba WSS

The total bulk cost requirement is R82.06 million (excl VAT). The scheme development cost per household is approximately R19 541.

Weenen/Kwanobamba WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Weenen/Kwanobamba WSS	UTK015	15 271	17 504	
		Total		**15 271**	**17 504**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Weenen/Kwanobamba WSS	UTK015	1.77	3.13	
		Total		**1.77**	**3.13**	
					Comments	
3	**Water Resources**	**Dam**				
		River	Bushmans River		Water balance (2004): 11Mm³/a	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	Weenen (old) WTP	Primary Bulk		1.45
			Weenen new WTP	Primary Bulk		3
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	160-200 ømm	8.06
				Secondary Bulk	90-200 ømm	48.97
				Tertiary Bulk	50-110 ømm	3.70
		Reservoirs	Res1	Primary Bulk		130
			Res2 CR	Primary Bulk		570
			Res6 CR	Primary Bulk		1380
			Res10	Tertiary Bulk		200
			Res11	Tertiary Bulk		200
			Res12	Tertiary Bulk		200
			Res13	Tertiary Bulk		800
			Res14	Tertiary Bulk		600
			Res15	Tertiary Bulk		200
			Res16	Tertiary Bulk		200

			Res17	Tertiary Bulk		1000
			Res3	Tertiary Bulk		400
			Res4	Tertiary Bulk		400
			Res5	Tertiary Bulk		600
			Res7	Tertiary Bulk		400
			Res8	Tertiary Bulk		400
			Res9	Tertiary Bulk		200
		Pump stations	PS1 WTP TO RES1	Primary Bulk	0.0037 m^3/s	0.42
			PS2 RES 6 CR to RES 17	Primary Bulk	0.0259 m^3/s	35.40
4.2	**Future**	Bulk Pipelines		Primary Bulk		
				Secondary Bulk	50 ømm	2.18
				Tertiary Bulk	50 ømm	2.34
		WTP				
					-	-
		Reservoirs		Primary Bulk		
				Tertiary Bulk		
		Pump stations		Primary Bulk		
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R28 207 000**	**R2 820 700**	**R31 027 700**	
		Secondary	R17 907 000	R1 790 700	R19 697 700	
		Tertiary	R28 487 000	R2 848 700	R31 335 700	
		Total	**R74 601 000**	**R7 460 100**	**R82 061 100**	

UTK017 Zwelisha Moyeni WSS

The total bulk cost requirement is R274.659 million (excl VAT). The scheme development cost per household is approximately R19 846.

Zwelisha Moyeni WSS						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Zwelisha Moyeni WSS	UTK017	50 325	57 684	
		Total		**50 325**	**57 684**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Zwelisha Moyeni WSS	UTK017	8.78	10.8	
		Total		**8.78**	**10.8**	
			HFY (Mm3/a)	**HFY (Ml/d)**	**Comments**	
3	**Water Resources**	**Dam**				
		River	Khombe River, a tributary of the Tugela River		Yield unknown	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	Zwelisha Moyeni WTP	Primary Bulk		2.5
			Zwelisha Moyeni WTP upgrade	Primary Bulk		11
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	500 ømm	3.47
				Secondary Bulk	110 - 315 ømm	37.82
				Tertiary Bulk	50 - 200 ømm	24.66
		Reservoirs	Res1 CR	Primary Bulk		6750
			Res10	Tertiary Bulk		1200
			Res11	Tertiary Bulk		400
			Res12	Tertiary Bulk		1200
			Res3	Tertiary Bulk		1200
			Res4	Tertiary Bulk		800
			Res5	Tertiary Bulk		800
			Res6	Tertiary Bulk		600
			Res7	Tertiary Bulk		1200

			Res9	Tertiary Bulk		2000
		Pump stations		Primary Bulk		
4.2	**Future**	Bulk Pipelines		Primary Bulk		
				Secondary Bulk	63 ømm	0.65
				Tertiary Bulk	63 - 125 ømm	5.0
		WTP			-	
					-	-
		Reservoirs	Res13	Tertiary Bulk		1000
			Res14	Tertiary Bulk		1000
			Res2	Tertiary Bulk		2400
			Res8	Tertiary Bulk		1000
		Pump stations	PS1 PS1 to Res 8	Primary Bulk	0.009 m³/s	16.998
			PS2 PS2 to Res13	Primary Bulk	0.020 m³/s	59.599
			PS3 WTP to Res1 CR	Primary Bulk	0.200 m³/s	516.316
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R113 560 500**	**R11 356 050**	**R124 916 550**	
		Secondary	R59 735 000	R5 973 500	R65 708 500	
		Tertiary	R76 395 000	R7 639 500	R84 034 500	
		Total	**R249 690 500**	**R24 969 050**	**R274 659 550**	

UTK0783 Zwelisha Moyeni Future TBC

The total bulk cost requirement is R104.46 million (excl VAT). The scheme development cost per household is approximately R19 026.

Zwelisha Moyeni Future TBC						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Zwelisha Moyeni Future TBC	UTK0783	19 966	22 886	
		Total		**19 966**	**22 886**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Zwelisha Moyeni Future TBC	UTK0783	1.39	3.78	
		Total		**1.39**	**3.78**	
					Comments	
3	**Water Resources**	**Dam**	Future proposed source for WTP North: Woodstock Dam		**FSC: 373.26Mm³; HFY: 280Mm³/a**	
		River	Future proposed source for WTP South: Mlambonja River		**Yield unknown**	
		Groundwater	Boreholes and springs			
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or kl or km or kW)**
4.1	**Existing**	WTP	none	Primary Bulk		
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk		
				Secondary Bulk		
				Tertiary Bulk		
		Reservoirs		Tertiary Bulk		
		Pump stations	PS1 WTP North to Res5	Primary Bulk	0.035 m³/s	205.889
4.2	**Future**	Bulk Pipelines		Primary Bulk	90 - 250 ømm	4.23
				Secondary Bulk	50 - 250 ømm	27.87

				Tertiary Bulk	63 - 140 ømm	16.26
		WTP	Zwelisha Moyeni WTP North	Primary Bulk	-	1.9
			Zwelisha Moyeni WTP South	Primary Bulk	-	2
		Reservoirs	Res1	Tertiary Bulk		440
			Res2	Tertiary Bulk		320
			Res3	Tertiary Bulk		800
			Res4	Tertiary Bulk		400
			Res5	Tertiary Bulk		200
			Res6	Tertiary Bulk		1200
			Res7	Tertiary Bulk		1000
			Res8	Tertiary Bulk		1800
			Res8	Tertiary Bulk		1800
		Pump stations	PS2 WTP South to Res 8	Primary Bulk	0.037 m^3/s	159.357
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	**R41 899 900**	**R4 189 990**	**R46 089 890**	
		Secondary	R10 924 000	R1 092 400	R12 016 400	
		Tertiary	R42 144 000	R4 214 400	R46 358 400	
		Total	**R94 967 900**	**R9 496 790**	**R104 464 690**	