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

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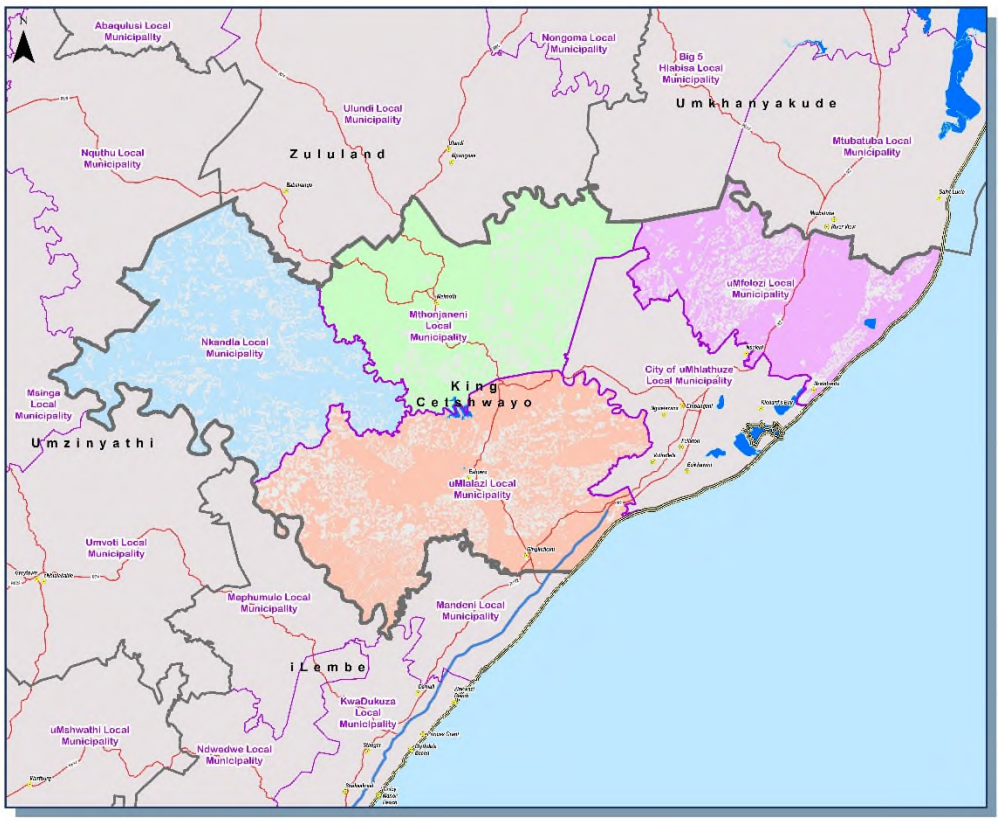

Reconnaissance Report

January 2021

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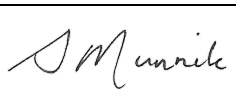
Checked by:	S Munnik	Executive Manager		January 2021
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EXECUTIVE SUMMARY

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 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.

This report is prepared for the King Cetshwayo District Municipality.

B. Demographics

The King Cetshwayo District Municipality (KCDM) is located in the north-eastern region of the KwaZulu-Natal Province on the east coast of South Africa. It covers an area of approximately 8 213 km², from the agricultural town of Gingindlovu in the south to the Mfolozi River in the north and inland to rural Nkandla.

King Cetshwayo DM consists of the following five Local Municipalities:

- ✓ uMfolozi;
- ✓ Mthonjaneni;
- ✓ Nkandla;
- ✓ uMlalazi; and
- ✓ City of uMhlathuze (WSA on its own). A separate report, the Universal Access Plan Phase III – Progressive Development of a Regional Concept Secondary Bulk Water Master Plan for the City of uMhlathuze Local Municipality, dated August 2020, has been prepared for the City of uMhlathuze.

The total population for King Cetshwayo WSA is approximately 709 761 people living within 108 896 households. The population and household figures per Local Municipality are tabled in Table B-1 below. The average number of people per household is 6.5. These figures are extracted from the Overall Master

Plan of Water Supply to King Cetshwayo District Municipality, dated March 2017. KCDM indicated that these figures should be used for the purposes of this report.

Table B-1: Population & Household Figures for KCDM

LM Name	Total Population	Total No. of Households	Avg HH Size
Mthonjaneni	112 189	17 759	6.3
Nkandla	143 316	22 484	6.4
uMfolozi	174 925	24 802	7.0
uMlalazi	279 331	43 851	6.4
Total	**709 761**	**108 896**	**6.5**

Source: Overall Master Plan of Water Supply to King Cetshwayo District Municipality: 2015 Revision, dated: March 2017)

The Mthonjaneni, uMlalazi and Mfolozi Local Municipalities have experienced a population increase between 2011 and 2016 with only Nkandla Local Municipality showing a decrease. The significant population growth for the City of uMhlathuze, Mtonjaneni and uMfolozi Local Municipalities are due to the Ntambanana Local Municipality being disestablished and its municipal area merged into the City of uMhlathuze, Mthonjaneni and uMfolozi Local Municipalities on 3 August 2016.

The population growth was determined until 2050 that resulted in the projected number of people residing within King Cetshwayo will be approximately 728 000 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	Pop 2020	Projected Population						
		2020	2025	2030	2035	2040	2045	2050
uMfolozi	174 925	149 976	153 933	157 868	162 561	167 394	172 370	177 495
uMlalazi	279 331	239 785	246 111	252 402	259 906	267 633	275 589	283 783
Mthonjaneni	112 189	95 635	98 158	100 667	103 660	106 742	109 915	113 183
Nkandla	143 316	130 002	133 432	136 842	140 911	145 100	149 413	153 855
Total	**709 761**	**615 399**	**631 633**	**647 779**	**667 037**	**686 868**	**707 288**	**728 315**

The Overall Master Plan for Water Supply to King Cetshwayo: 2015 Revision, applied a growth figure of 1.5% to project the number of households for 2015 and are used for the purposes of the UAP III study.

C. Service Levels

C.1 Water

Approximately 32% of the households do not have access to formal water supply.

Table C-1: Water Supply Backlog within King Cetshwayo District Municipality

LM Name	2015 Population	2015 Households	Households with Water Coverage	Household Backlog	Percentage Backlog
Mthonjaneni	112 189	17 759	13 432	4 327	24%
Nkandla	143 316	22 484	16 712	5 772	26%
uMfolozi	174 925	24 802	18 892	5 910	24%
uMlalazi	279 331	43 851	27 484	18 367	42%
Total	**709 761**	**108 896**	**76 520**	**34 376**	**32%**

Source: Overall Master Plan for Water Supply to King Cetshwayo 2015 Revision, dated March 2017

C.2 Sanitation

One of KCDM's Key Strategic objectives is to ensure a basic standard of living for all through the provision of basic sanitation delivery in the form of a Ventilated Improved Pit latrine (VIP). Sanitation has been covered fully in all four Local Municipalities. Currently the DM is only busy with small infill sanitation projects.

Table C-2: Sanitation Backlogs within King Cetshwayo District Municipality

LM Name	Nr of Households	Households with Sanitation	Households without Sanitation	Backlog 2019/2020
Mthonjaneni	17 759	17 759	0	0%
Nkandla	22 484	22 484	0	0%
uMfolozi	24 802	24 802	0	0%
uMlalazi	43 851	38 633	0	0%
Total	**108 896**	**103 678**	**0**	**0%**

Source: KCDM Officials during Consultation, June 2019

D. Water Resources

The King Cetshwayo District Municipality falls within the Pongola-Mtamvuna Water Management Area, one of nine WMAs that divides the large catchment areas of South Africa. The Pongola Mtamvuna WMA covers the whole of the KZN province, except a small part in the south, that falls within the Mzimvubu Tsitsikamma WMA. Water is available through two main rivers, namely the Thukela River and the Mhlathuze River and Lake Phobane (previously Goedertrouw Dam). Major rivers include the Thukela, Mfolozi, Mhlathuze, Mlalazi and Mzingwenya rivers with two significantly large lakes (Lake Cubhu and Lake Mzingazi) as well as a smaller lake, Lake Nsezi.

D-1 - Thukela River

The Thukela River is the largest river in the KZN province and has a total average annual runoff of approximately 3 799 million m³/a. A significant share of its runoff is currently being used. During dry periods there is insufficient water in the Lower Thukela River and releases from upstream dams (Ntingwe Masonry and Ntingwe dams which are being used as irrigation dams) will be needed. It is not certain if additional water is available from the Thukela River over and above the water requirements already committed.

C-2 Mhlathuze River and Lake Phobane

The Mhlathuze is fully allocated and the DWS embarked on a licensing process to review allocations and to revise allocations where an existing lawful use (ELU) was not fully utilised. A major water user in the Mhlathuze River catchment is irrigation, mainly sugarcane.

E. Existing Water Supply Schemes and Water Requirements

Table E-1 below details the water scheme supply areas with their respective sources of supply within KCDM.

Table E-1: Regional Scheme Supply Areas with their respective Water Sources

Regional Scheme Supply Area	Sub-Supply Area	Local Municipality	Surface Water Source
Greater Mthonjaneni (Goedertrouw)	Mthonjaneni	uMlalazi / Mthonjaneni	Lake Phobane (previously Goedertrouw Dam)
	Kwahlokohloko		
	Eshowe		Ruthledge and Ihlazi Dams
Middledrift	Eshowe/Nkandla	uMlalazi / Nkandla	Thukela River
Vutshini-Nkandla	Vutshini	Nkandla	Nsuze River, Vove Dam, Thukela River
Upper Nseleni	Upper Nseleni Mhlana	uMfolozi	Lake Mzingazi & Nsezi
	Mhlana-Somopho		
Mbonambi	Nzalabantu / Sokhulu	uMfolozi	Lake Mzingazi (City of uMhlathuze)

Source: King Cetshwayo District Municipality Final IDP Review, 2019/2020

The water requirements for the KCDM are presented per Local Municipality within Table E-2. These water requirements were calculated for consumers having formal water supply schemes and for consumers not yet supplied from a formal water supply scheme.

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 100ℓ capita per day. The base data used for the

modelling, assumptions made and outputs of the water demand model, are discussed in detail in Section 1.5.1.

The KCDM would require by the year 2050, 139.87Mℓ/day. uMlalazi LM's 2050 demand will be the highest with 56.01Mℓ/day followed by 32.92Mℓ/day by the uMfolozi LM.

Table E-2: Water Requirements (Mℓ/d), Per Local Municipality

Local Municipality	Population 2020	Water Requirements (Mℓ/day)						
		2020	2025	2030	2035	2040	2045	2050
uMfolozi	149 976	26.97	27.78	28.61	29.59	30.64	31.74	32.92
uMlalazi	239 785	45.71	47.13	48.59	50.30	52.10	54.00	56.01
Mthonjaneni	95 635	17.92	18.48	19.06	19.73	20.45	21.20	22.00
Nkandla	130 002	23.68	24.41	25.15	26.02	26.94	27.92	28.95
Total	**615 399**	**114.28**	**117.80**	**121.40**	**125.65**	**130.13**	**134.87**	**139.87**

F. Existing Sanitation Supply Schemes

There are 13 wastewater treatment works within the KCDM that serves the major towns but all of them need refurbishment and improved operations and maintenance. None of these works achieved Green Drop status.

Table F-1: Wastewater Treatments Works located within KCDM

Local Municipality	Wastewater Treatment Works
Mthonjaneni LM	Melmoth WWTW
Nkandla LM	Nkandla WWTW
Nkandla LM	Nkandla-KwaBadala WWTW
uMlalazi LM	Mtunzini WWTW
	Gingindlovu WWTW
	Eshowe - King Dinizulu WWTW
	Eshowe - Ocean View
	Eshowe - Fort Nonquai

Source: Rural Sanitation Report, King Cetshwayo District Municipality, 2016 Update

G. Planned and Implementation Projects

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 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.

The funding streams available for infrastructure development over the next three years within KCDM amount to R1 108 818 (see Table 7-1). However, the proposed cost requirement for bulk water supply services within KCDM is R 4,76 billion and would represent a wall to wall coverage of the total need (see

10.4 Financial Requirements). KCDM has two (2) existing bulk projects (Greater Mthonjaneni Bulk Water Supply and Middledrift Regional Bulk Water Supply projects) to the value of R87.3 million currently in planning under the Regional Bulk Infrastructure Grant earmarked until the 2021/2022 financial years.

H. Bulk Water Supply Interventions Considered

This study aims to ensure that the KCDM 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, number of applicable households, population and their water requirements are illustrated within Table H-1.

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

WSIA No	WSIA Name	Population 2020	Population 2050	Demand 2020 (Mℓ/day)	Demand 2050 (Mℓ/day)
UTG002	Eshowe	87 737	103 835	18.94	23.03
UTG006	Mbonambi	55 037	65 135	10.36	12.63
UTG007	Kwahlokohloko	83 576	98 912	14.47	17.82
UTG009	Middledrift	89 619	106 063	16.00	19.71
UTG010	Mthonjaneni	95 749	113 317	17.94	22.02
UTG014	Upper Nseleni - Mhlana	94 940	112 360	16.61	20.28
UTG016	Vutshini - Nkandla	108 741	128 694	19.96	24.38
King Cetshwayo		**615 399**	**728 315**	**114.28**	**139.87**

The Vutshini-Nkandla WSS/WSIA, Eshowe WSS/WSIA, Mthonjaneni WSS/WSIA and Middledrift WSS/WSIAs have the highest water demand of approximately 17%, 16%, 15% and 14% respectively. These WSS/WSIAs are also the biggest supply areas within KCDM and would be serving close to 62% of the KCDM population.

The total volume of water required is compared to the existing proposed water supply interventions and tabled within Table H2 overleaf:

Table H2: Water Resources Required vs proposed WSI

Water Supply Scheme / WSIA		Population (2050)	2050 Demand (Mℓ/day)	2050 Demand (Mm^3/a)	Existing Resources (Mm^3/a)	Proposed Additional under UAP Phase 3 (Mm^3/a)	Total (Mm^3/a)	Balance (Mm^3/a)
UTG002	Eshowe	103 835	23.03	8.40	1.29	3.78	5.07	-3.33
UTG006	Mbonambi	65 135	12.63	4.61	0.73	0	0.73	-3.88
UTG007	Kwahlokohloko	98 912	17.82	6.50	60.23	17.41	77.64	71.13
UTG010	Mthonjaneni	113 317	22.02	8.04				69.60
UTG009	Middledrift	106 063	19.71	7.19	40.15	3.285	43.44	36.24
UTG014	Upper Nseleni - Mhlana	112 360	20.28	7.40	4.60	0	4.60	-2.80
UTG016	Vutshini - Nkandla	128 694	24.38	8.90	1.60	7.6	9.27	0.37
King Cetshwayo		**728 315**	**139.87**	**51.05**	**108.59**	**32.1419**	**140.74**	**89.68**

From the table above, it is noted that not all the schemes will have adequate raw water resources to meet the 2050 demand requirements.

A total estimate of R 5.48 billion is required to address the total bulk water supply requirement within the KCDM. The total cost requirement per WSIA is tabled in Table H-2.

Table H-2: Total Cost requirement

WSIA	WSIA Name	Total Cost Requirement				
		Primary	Secondary	Tertiary	10% Contingencies	Total Cost (Excl VAT)
UTG002	Eshowe	R80 291 390	R216 114 000	R91 278 000	R38 768 339	R426 451 729
UTG006	Mbonambi	R20 024 000	R234 463 000	R66 897 000	R32 138 400	R353 522 400
UTG007	Kwahlokohloko	R121 990 000	R172 717 000	R134 771 000	R42 947 800	R472 425 800
UTG009	Middledrift	R57 405 000	R255 861 000	R169 243 000	R48 250 900	R530 759 900
UTG010	Mthonjaneni	R382 091 000	R527 879 000	R112 747 000	R102 271 700	R1 124 988 700
UTG014	Upper Nseleni - Mhlana	R0	R353 240 000	R232 581 000	R58 582 100	R644 403 100
UTG016	Vutshini - Nkandla	R1 057 526 000	R436 218 000	R261 179 000	R175 492 300	R1 930 415 300
King Cetshwayo		**R1 719 327 390**	**R2 196 492 000**	**R1 068 696 000**	**R498 451 539**	**R5 482 966 929**

I. Conclusions and Recommendations

The KCDM still faces a 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. 32% of the consumers within KCDM does not have access to reliable water supply across the whole of the KCDM'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 KCDM relies mainly on grant funding programmes to fund their water supply projects. These funding programmes are mainly MIG, WSIG and RBIG. Based on all the current funding streams available to the District Municipality over the MTEF period, it will take a minimum of fifteen years for the KCDM to address their bulk water supply requirements.

The provision of water services remains the responsibility of the KCDM as the WSA. The KCDM 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 be considered as a Regional Utility to assist the KCDM to take this process further.

The seven (7) proposed water supply intervention areas (WSIAs) are the appropriate solutions for bulk water supply development within KCDM and are as follows:

- ✓ UTG002 WSIA: Eshowe;
- ✓ UTG006 WSIA: Mbonambi;
- ✓ UTG007 WSIA: Kwahlokohloko;
- ✓ UTG009 WSIA: Middledrift;
- ✓ UTG010 WSIA: Mthonjaneni;
- ✓ UTG014 WSIA: Upper Nseleni-Mhlana; and
- ✓ UTG016 WSIA: Vutshini-Nkandla.

The implementation programme will depend on the availability of funds from National Treasury as well as the capacity of the Municipality to implement projects. Although all seven (7) area interventions would be an implementation priority for the DM, it is proposed to consider the following three (3) priorities detailed within Table I-1. It is also proposed to follow a phased approach for implementation for e.g. initiate only the upgrade to the WTP at first and then when funding permits, can the bulk conveyance and storage be extended, upgraded or constructed.

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 (Phased Approach)

Proposed Priorities (Phased Approach)	WSIA No and Name		Proposed Project Name	Proposed Estimated Project Value
1	UTG002	Eshowe	Upgrade the existing Goedertrouw WTP to 80Ml/day inclusive of an 800kW pump station at the WTP. This proposed project will benefit all 3 regional schemes	R185 977 000
	UTG007	Kwahlokohloko		
	UTG010	Mthonjaneni		
2	UTG016	Vutshini - Nkandla	Investigate a possible dam sighting for the Nsuze Dam (Feasibility Study)	R5 000 000
			Construction of a 21Mℓ/day WTP at the proposed dam (Nsuze Dam)	R50 242 500
			Construction of the proposed Nsuze Dam	R800 000 000
3	UTG006	Mbonambi	Initiate a feasibility study to construct a desalination plant Renegotiate service level of agreement with City of uMhlathuze to supply the additional water demand	R5 000 000

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LIST OF ABBREVIATIONS

CoGTA	Department of Cooperative Governance and Traditional Affairs
CR	Command Reservoir
CoU	City of uMhlathuze
EMF	Environmental Management Framework
DM	District Municipality
DWS	Department of Water and Sanitation
GIS	Geographical Information System
IRDP	Integrated Residential Development Programme
IDP	Integrated Development Plan
KCDM	King Cetshwayo District Municipality
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
Mm^3	Million Cubic meter
MIG	Municipal Infrastructure Grant
Mm^3	Million Cubic Meters
Mm^3/a	Million Cubic Meters per annum
Mℓ/day	Mega liter per day
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
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 King Cetshwayo District Municipality (KCDM)" – 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) that were 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), in association with JTN Consulting in November 2018 to review the UAP Phase II process by the 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 (CoU);
- ✓ 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

Information used in this study was obtained from current and existing reports and inputs from knowledgeable municipal officials. The following reports were reviewed to contribute to this report:

- ✓ The Overall Master Plan of Water Supply to King Cetshwayo District Municipality: 2015 Revision (completed March 2017);
- ✓ Individual Master Plans per Regional Scheme, 2015 Revision
- ✓ City of uMhlathuze Water Services Development Plan, April 2019;
- ✓ City of uMhlathuze Bulk Water Master Plan, June 2019;
- ✓ King Cetshwayo Final IDP Review, 2019/2020
- ✓ Monthly water balance reports as submitted by DWS (KZN) for each WSA.

Meetings were held with managers and technical staff of the KCDM to obtain their input and to ensure the latest available specifications and information is used for the purpose of this study.

Existing spatial and non-spatial data sets were used as reference such as the 2016 Community Survey, UAP Phase II Study, 2016, the Department of Water and Sanitation (DWS) Reference Framework geodatabase as well as spatial data received from the WSA itself.

1.4 Stakeholder Engagement

The PSP engaged each WSA individually during inception meetings to introduce the study, its objectives and detailed approach.

The first deliverable was a Due Diligence Report on demographics, water services levels, existing bulk water supply infrastructure, water resources, water requirements, current and planned bulk infrastructure projects and viability of water supply intervention areas. The Due Diligence also reported on a preliminary gap analysis that was conducted utilising the outcome from the proposed WSIA from UAP II and the Overall Master Plan for Water Supply for KCDM. Following the gap analysis, specific recommendations were made when determining the 2050 water demands suggested for the UAP Phase III study. Follow-up meetings were arranged with the WSAs to share the information that are presented in the Due Diligence Report and these reports were submitted to Umgeni Water.

The Due Diligence Report has now been followed by the development of a water requirements model for 2050. Further individual engagements were held with each WSA.

This resulted in the development of a Reconciliation Report, which presents the alignment of water requirements with existing and planned bulk infrastructure and available water sources for all areas within the WSA.

The Draft Reconciliation Report was presented to each WSA to obtain comments and inputs, which were considered for the final study report submitted to Umgeni Water, DWS and COGTA.

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 100ℓ 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:
    - o Category 1 (Very High Income): Households with a house connection and an income more than R 1 228 000 per year;
    - o Category 2 (Upper Middle Income): Households with a house connection and an income between R 153 601 and R 1 228 000 per year;
    - o Category 3 (Average Middle Income): Households with a house connection and an income of between R 38 401 and R 153 600 per year;
    - o Category 4 (Low Middle Income): Households with a house connection and an income of between R 9 601 and R 38 400 per year;
    - o Category 5 (Low Income): Households with a house connection and an income between R1 and R 9 600 per year;
    - o Category 6 (Yard Connections): all Households with a Yard Connection;
    - o Category 7 Households with access to interim services and
    - o 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:
    - o Category 1: Long Established Metropolitan Centres (M): Large conurbation of a number of largely independent local authorities generally functioning as an entity;
    - o Category 2: City (c): Substantial authority functioning as a single entity isolated or part of a regional conurbation;
    - o Category 3: Town: Industrial (Ti): A town serving as a centre for predominantly industrial activities;
    - o Category 4: Town: Isolated (Tis): A town functioning generally as a regional centre of essentially minor regional activities;
    - o Category 5: Town: Special (Ts): A town having significant regular variations of population consequent on special functions. (Universities, holiday resorts, etc.);
    - o Category 6: Town: Country (Tc): A small town serving essentially as a local centre supporting only limited local activities.
    - o 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;
    - o 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:

- Below: 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 and approved 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. 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 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	Regional Centre 2	0.15	0.08	0.08	0.08

				Indirect demands as a ratio of direct demands			
Classification	**Type of Centre**	**Description**	**Typical CSIR / SACN Settlement Typology**	**Commercial**	**Industrial**	**Institutional**	**Municipal**
		city and functioning as a component part of 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 .

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, water resources 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 were 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 development opportunities.

2.1 CONTEXT

The King Cetshwayo District Municipality (KCDM) is located in the north-eastern region of the KwaZulu-Natal Province on the east coast of South Africa. It covers an area of approximately 8 213 km², from the agricultural town of Gingindlovu in the south to the Mfolozi River in the north and inland to rural Nkandla.

The KCDM is surrounded by the uMkhanyakude DM to the north east and Zululand DM to the north west. The uMzinyathi and Ilembe DM's are situated to the west and south west respectively. It has the third highest population in the province (approximately 971 135 people) after the eThekwini Metro (Durban) and uMgungundlovu District (Pietermaritzburg and surrounds).

King Cetshwayo DM consists of the following five Local Municipalities:

- ✓ City of uMhlathuze (WSA on its own);
- ✓ uMfolozi;
- ✓ Mthonjaneni;
- ✓ Nkandla; and
- ✓ uMlalazi;

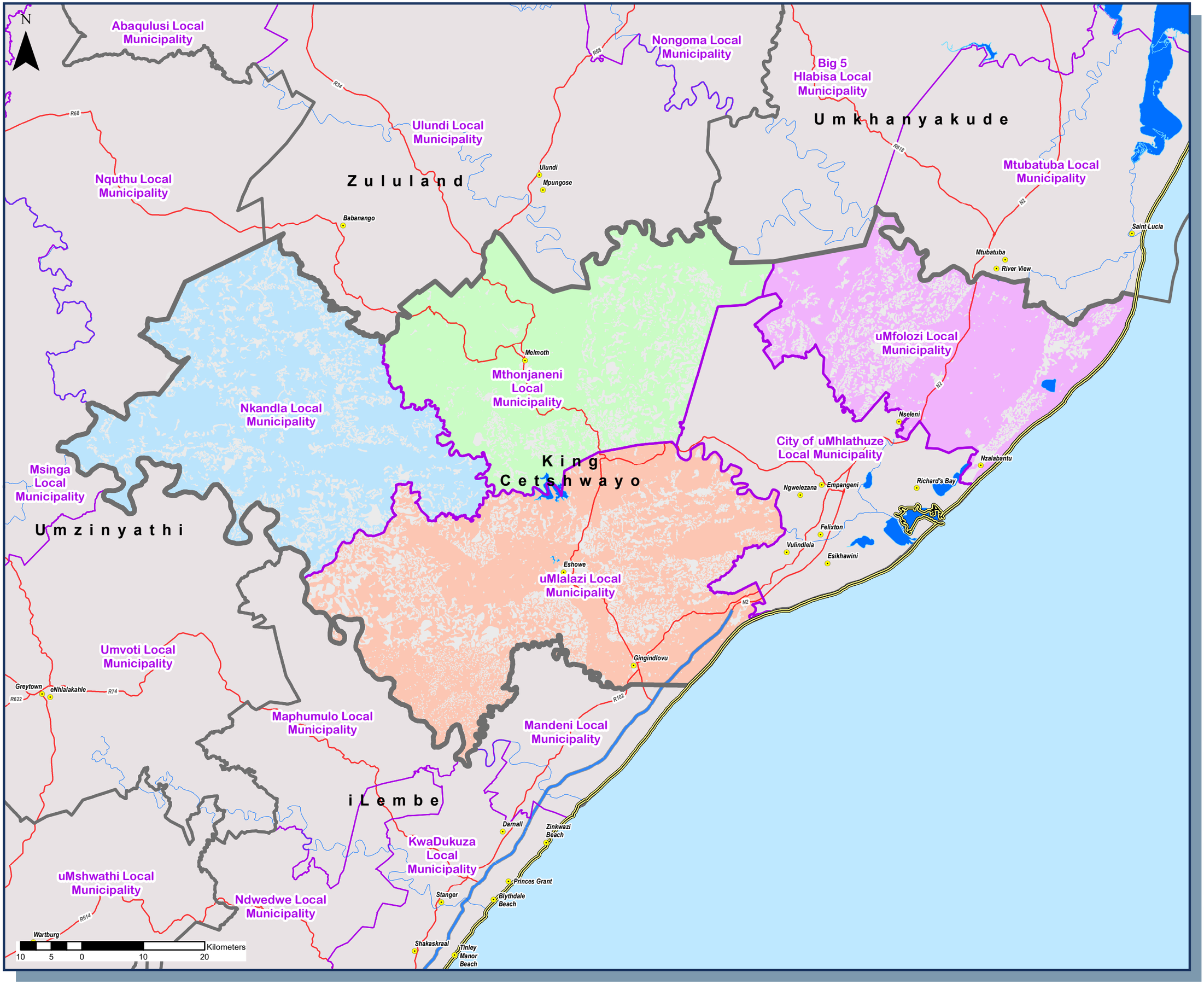
Ntambanana Local Municipality was disestablished, and its municipal area merged into the City of uMhlathuze, Mthonjaneni and uMfolozi Local Municipalities on 3 August 2016. A separate Reconciliation Report will be prepared for the City of uMhlathuze.

The N2 highway links the district to other significant economic centres, such as Durban and Johannesburg. It also offers a direct route to Maputo in Mozambique. The development of the Richards Bay Industrial Development Zone is boosting economic activity and attracting international investors. Significant economic centres are Richards Bay and Empangeni. Richards Bay, as a harbour and industrial town, attracts people from surrounding towns, rural settlements and from beyond the district. Empangeni's role as an industrial, commercial and service centre to the settlements of Esikhaleni, Eshowe, Nkandla and other rural settlements attract many people to the range of higher order services available in the town.

King Cetshwayo District's transportation infrastructure is under pressure. The road network connects the major nodes, like Richards Bay and Empangeni to the national network, however the heavy vehicles servicing the Port of Richards Bay and the adjoining industrial areas are placing considerable strain on the infrastructure. Rail is a declining transport sector, with no major commuter networks in place and limited

industrial linkages (except for the coal link from Mpumalanga to the Richards Bay Coal Terminal at the Port of Richards Bay). (IDP Draft Review, 2019/2020).

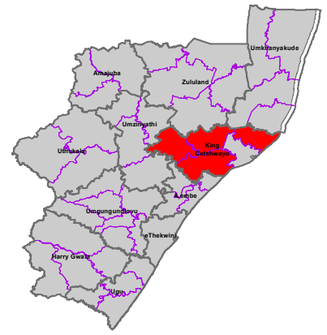
The Study Area is illustrated in Figure 2-1 overleaf.



Legend

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

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

KING CETSHWAYO DISTRICT MUNICIPALITY

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PROJECT TITLE

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

MAP TITLE:

Study Area
King Cetshwayo District Municipality

DATE COMPLETED:
30 September 2020

MAP NO.:
DC28: Figure 2.1

2.2 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

KCDM comprises the best and worst of the two economies of South Africa. It is home to several of the largest industrial giants in the world, the retail sector in the urban areas are burgeoning with economic activity, the agricultural and tourism potential is boundless, and opportunities exist for local economic development. However, in recent times, the district has also experienced a few difficulties considering the world-wide economic recession. This coupled with crippling droughts and deep rural communities living in utter poverty are also strong characteristics of King Cetshwayo district (IDP Draft Review, 2019/2020).

The district is characterised by low levels of urbanisation, approximately 80% of the people live in the rural areas characterised by scatter settlement patterns and high levels of poverty. The District has large development level inequalities between rural and urban environments. Large tracts of land within the District belong to the Ingonyama Trust and fall under the jurisdiction of Traditional Authorities.

The area is also further characterised by infrastructure backlogs, particularly in respect of water and sanitation mainly in the rural areas although great success has been achieved in eradicating the sanitation backlog in the uMfolozi, Mthonjaneni and Nkandla Local Municipalities.

2.2.1 uMfolozi Local Municipality

The uMfolozi LM has a population of approximately 174 925 people residing within 24 802 households (KCDM Overall Water Supply Master Plan for KCDM, March 2017 Review). After City of uMhlathuze and uMlalazi LM, the uMfolozi LM has the third highest population in the District as well as the highest average household size of 7 persons per household.

The uMfolozi Municipality is located close to the St Lucia Estuary, a world heritage site, and to the popular fishing spot of Mapelane as well as the world famous Hluhluwe-iMfolozi game reserves. The main town of KwaMbonambi is located close to the N2 highway, the national artery, which runs from Cape Town to Mozambique carrying investors, business, and tourist traffic. KwaMbonambi, with its abundance of land has been as identified as a primary development node. There is potential for residential and an industrial development, as well as the expansion of its timber industry.

This area is primarily rural with agriculture, mining, sugar cane and timber plantations making up the main economic activity. The Mbonambi and Sokhulu traditional areas have a high agricultural potential, but due to traditional settlement patterns, customs, and the forced relocation of some communities, the agricultural activity remains at a low intensity.

2.2.2 Mthonjaneni Local Municipality

Mthonjaneni LM is one of the smallest municipalities in South Africa, but it has the distinction of being regarded as one of the healthiest places to live in this country. Melmoth is a commercial centre for the surrounding rural areas and is one of the administrative centres of economic significance in the district. The area relies

heavily on agriculture as its primary source of revenue, with sugar cane, timber and cattle farming forming the bulk of activities. There are significant areas of large commercial farms and forestry as well as subsistence agriculture. The Mthonjaneni population is estimated at 112 189 people residing in approximately 17 759 households which is also the least number of people per local municipality in KCDM.

The three Traditional Authority areas within the LM are all owned by Ingonyama Trust.

2.2.3 uMlalazi Local Municipality

uMlalazi Local Municipality (KZN284) is situated along the north eastern coast of Kwa Zulu Natal, 125km north east of Durban. The eastern portion of uMlalazi Local Municipality lies on the N2 National and Provincial Development Corridor linking two major economic hubs of Richards Bay and Durban.

The uMlalazi Municipality is characterised by an undulating topography causing a certain number of difficulties in respect of the delivery of services.

uMlalazi LM has an estimated population of 279 331 people residing in 43 851 households. The municipality has an average household size of 6.3 persons per household. The uMlalazi LM covers one of the largest geographical areas of all municipalities in South Africa, with a total of some 2 300km². The municipal area includes a coastline on the Indian Ocean of some 18km together with a considerable hinterland.

The population distribution in the municipal area is characterized by relatively high population densities within urban nodes, and low densities in rural areas. The municipal area is dominated by tribal areas and 14 Tribal Authorities exist within the municipal area.

Eshowe, Mtunzini and Gingindlovu form the three main towns of uMlalazi Municipality. Eshowe is the sub-regional centre and has the most diversified economy. Gingindlovu is a small urban area which acts as a service centre for its surrounding area. Mtunzini is a dormitory town to the University of Zululand and to a certain extent also to Empangeni and Richards Bay.

The uMlalazi area is reliant on the agricultural sector for its financial well-being. Agricultural production is dominated by sugar cane and some timber production and also citrus farming in the Nkwaleni Valley.

2.2.4 Nkandla Local Municipality

Nkandla is situated in a remote area of mountainous beauty, which consists of mainly tribal lands and state-owned land. Nkandla town is the only urban area in Nkandla LM which offers the full array of urban development, albeit at a smaller scale. Given its under-development, the area is rich in natural resources and has great economic growth potential through agriculture. A good climate and availability of land makes it a promising centre in terms of agricultural production. Livestock, timber, tea, herbs, peaches and vegetables are some of the products of the area.

The Nkandla LM has an estimated population of 143 316 people living in approximately 22 484 households. The Municipality has an average household size of 6.3 persons per household.

2.2.5 City of uMhlathuze Local Municipality

In accordance with the Municipal Structures Act (No. 117 of 1998), the City of uMhlathuze Local Municipality (CoU) is the Water Services Authority (WSA) and the Water Services Provider (WSP) in its area of jurisdiction.

The City of uMhlathuze comprises the economic powerhouse of Richards Bay and Empangeni, and its supporting areas of Esikhawini, Ngwelezane, Nseleni, Felixton, Vulindlela and rural areas. The Municipality has the benefit of about 45km of coastline of which about 80% is in its natural state. The deep-water port located in Richards Bay (the country's largest) has been instrumental in the spatial development of the area. The port is also a provincial priority in that it is the growth engine for one of the primary provincial growth nodes.

The Municipality's population is in the range of 410 457 people residing in 110 503 households. The average household size is 3.7 persons per household.

Empangeni's role as an industrial, commercial and service centre to the settlements of Esikhaleni, Eshowe, Nkandla, Ntambanana and other rural settlements attracts many people to the range of higher order services available in the town.

2.3 CLIMATE AND CLIMATE CHANGE

The KCDM has a variable climate influenced by the Indian Ocean and elevation. The coastal and low-lying areas in the north experience hot, humid tropical temperatures and very mild winters, while inland higher-lying areas in the north-west, experience cooler temperatures. Although King Cetshwayo District has a good climate and an abundance of natural resources, the severe drought of the past 2 – 3 years has affected the District negatively in terms of agricultural productivity.

The climatic conditions of the district are very diverse due to the topography, which plays a major role in modifying rainfall and temperature. The KCDM lies within the summer rainfall areas of South Africa. Mean annual rainfall decreases from an average 1200 - 1400mm along the coastal region to an average of 650mm inland. Similarly mean annual temperatures decrease varies from 21 degrees Celsius along the coast to 16 degrees Celsius inland. The western portion of the study area lies within the Thukela catchments. The steepness and highly dissected nature of the topography result in small fast flowing watercourses, many of which are seasonal. The remainder of the study area lies within a large primary catchment with major rivers that run through it. The area also has a few wetlands, the most notable being Lake Cubhu and the Greater Mhlatuze Wetland System to the south of Richards Bay at Esikhaleni. Lake Phobane on the Mhlatuze River is the only major dam in the area.

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)[1] 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.

2.4 Topography, Geology and Soils

The topographic features of King Cetshwayo are multi-faceted. The flat coastal region comprises of the Natal Coastal Belt and Zululand Coastal Plain with altitudes ranging from sea level to 450 metres. Inland adjacent to the coastal belt, the Low veld of Zululand to the north east and the Eshowe Block to the west are characterized by hilly topography with altitudes increasing to 900 metres. The terrain becomes more extreme towards the North West. In places, the area is characterized by steeply incised valleys with altitudes between 900 and 1 400 metres. The Valley of the Tugela River bounds the district on the west. The coastal belt areas include sandstone, shale and mudstones, whose soils have a high agricultural potential. Low potential soils occur along the Tugela River as well as along portions of the Mhlatuze River (KCDM Final IDP Review, 2019/2020).

2.5 Environmental

The King Cetshwayo District generally has a good climate and is well endowed with natural resources whose comparative advantages are:

- ✓ A good climate that opens up avenues for productive agricultural and tourism development;
- ✓ Agriculture with irrigation infrastructure in place;
- ✓ A scenic environment and the coastal terrain thus creating more opportunities for tourism development; and
- ✓ The district's location within KwaZulu-Natal that is reputable for its African Experience.

[1] National Climate Change Adaptation Strategy, Republic of South Africa, October 2017

The KCDM falls within the Indian Ocean Coastal Belt, Grasslands, Forests, Savanna and Azonal Vegetation Biomes. The Grassland biome is restricted to the inland higher lying escarpment, while the Indian Ocean Belt is restricted to areas of coastal influence approximately 20-30km inland from the ocean. These biomes are further divided into 48 vegetation types. 38 out of the 48 vegetations types in KCDM are threatened and cover a large proportion of the DM (KCDM Environmental Management Framework, Draft Baseline Report, June 2018).

2.6 Institutional Arrangements for Water Supply

The KCDM is the legislated Water Services Authority for four of the Local Municipalities within its area of jurisdiction namely:

- ✓ uMfolozi Local Municipality (KZN281);
- ✓ uMlalazi Local Municipality (KZN284);
- ✓ Mthonjaneni Local Municipality (KZN285); and
- ✓ Nkandla Local Municipality (KZN286).

The City of uMhlathuze is a Water Services Authority on its own.

The King Cetshwayo WSA undertook a Section 78 capacity assessment as prescribed in the Municipal Systems Act, Act 32 of 2000. This was done to assess the capacity of all local municipalities to ascertain if they would be able to undertake the Water Services Provider (WSP) function. Since all local municipalities did not have the capacity to undertake the WSP function, King Cetshwayo entered into a service level agreement with the LMs as listed above, to provide the WSP function for their entire servicing area. This required that the WSA provide all resources and capacity to ensure that all systems were operational. To achieve this successfully, King Cetshwayo opted for the services of a Service Support Agent (SSA) for rural schemes. The town supply schemes are operated and managed by King Cetshwayo. King Cetshwayo appointed the service of a service support agent, WSSA (KCDM, MTREF, 2018/2019 – 2020/21).

In addition to the maintenance of rural schemes, the WSA is also responsible for the maintenance of rudimentary water supply facilities such as boreholes, standard development schemes and protected localised springs which do not have piped network due to low yields.

In areas where boreholes and springs have dried up and where there is no prospect of groundwater, the WSA provides water with water tankers.

3. DEMOGRAPHICS

3.1 EXISTING POPULATION DISTRIBUTION

During meetings with KCDM officials in June 2019, KCDM requested that the population and household figures as reported on in the Overall Master Plan for Water Supply to King Cetshwayo: 2015 Revision, should be used for the purposes of this study.

The total population for King Cetshwayo WSA is approximately 709 761 people living within 108 896 households. The population and household figures per Local Municipality are tabled in Table 3-1 below. The average number of people per household is 6.5.

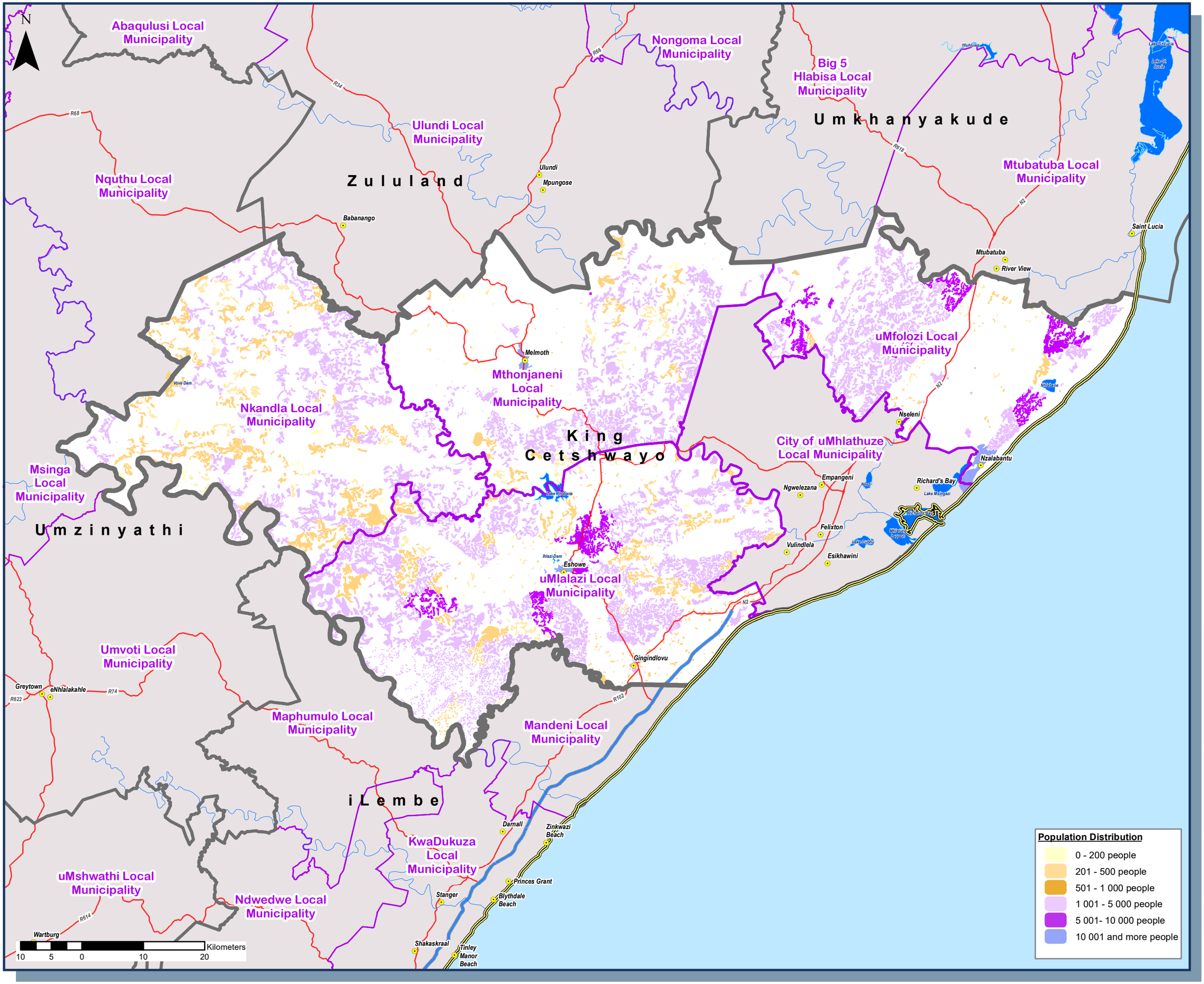
Table 3-1: Population & Household Figures for KCDM

LM Name	Total Population	Total No. of Households	Avg HH Size
Mthonjaneni	112 189	17 759	6.3
Nkandla	143 316	22 484	6.4
uMfolozi	174 925	24 802	7.0
uMlalazi	279 331	43 851	6.4
Total	**709 761**	**108 896**	**6.5**

Source: Overall Master Plan of Water Supply to King Cetshwayo District Municipality: 2015 Revision, Date: March 2017)

96% of the population in the district is rural and 4% urban, which declares the district at rural. The distribution and density of population within the study area can be classified as rural village, rural scattered and farmland.

The largest portion of the district population is concentrated in the uMlalazi Local Municipality with 279 331 people and accounts for nearly 40% of the total district population while only 16% of the population resides in Mthonjaneni Local Municipality. uMlalazi has a population density of 126 persons/km². Mthonjaneni and Nkandla Local Municipalities have the lowest population densities of 68 and 78 persons/km².



Legend

- Provinical Boundaries
- District Municipality Boundaries
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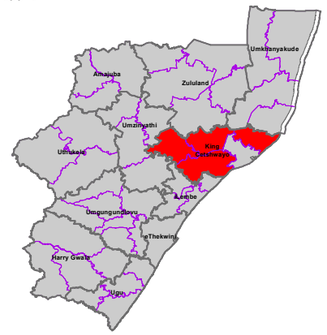

CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

KING CETSHWAYO DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

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PROJECT TITLE

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

MAP TITLE:

Population Distribution
King Cetshwayo District Municipality

DATE COMPLETED:
30 September 2020

MAP NO.:
DC28: Figure 3.1

Population Distribution

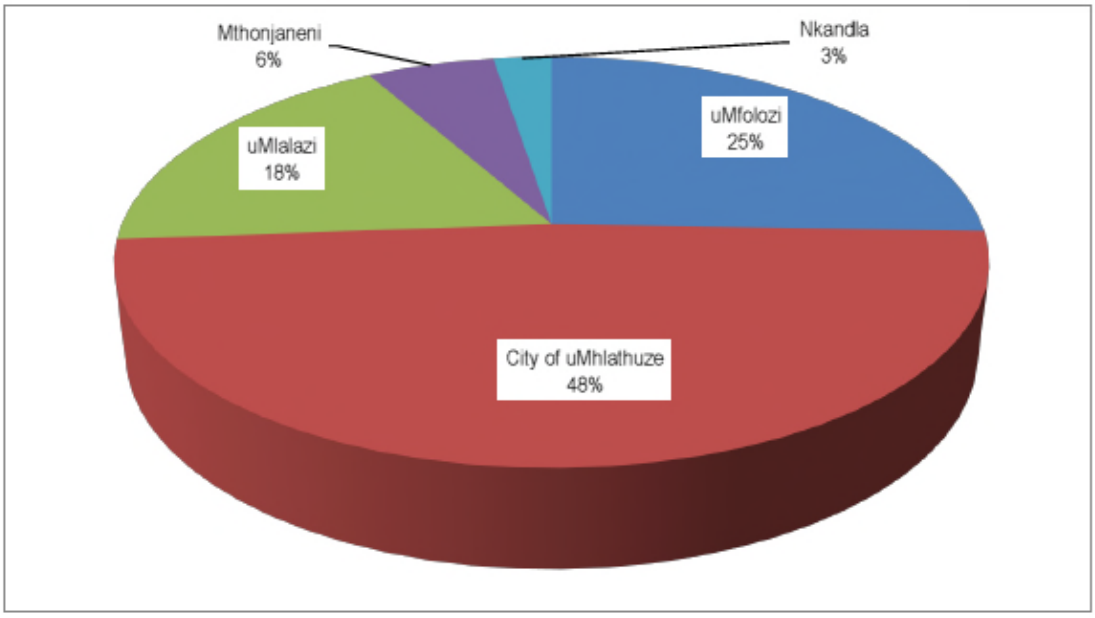
- 0 - 200 people
- 201 - 500 people
- 501 - 1 000 people
- 1 001 - 5 000 people
- 5 001- 10 000 people
- 10 001 and more people

3.2 SOCIAL AND ECONOMIC INDICATORS

According to the Global Insight 2015 Statistics, it is noted that the vast majority of economic performance (48%) in the district is vested in the City of uMhlathuze Local Municipality with its primary urban centres in Richards Bay and Empangeni. City of uMhlathuze has the most developed economy of all the municipalities in the KCDM and is the major contributor to the District Gross Domestic Product (GDP) (it is the third largest economy in KwaZulu-Natal).

Nkandla and Mthonjaneni only contribute 3% and 6% respectively to the District's GDP. Figure 3-2 below details the GDP contribution per Local Municipality.

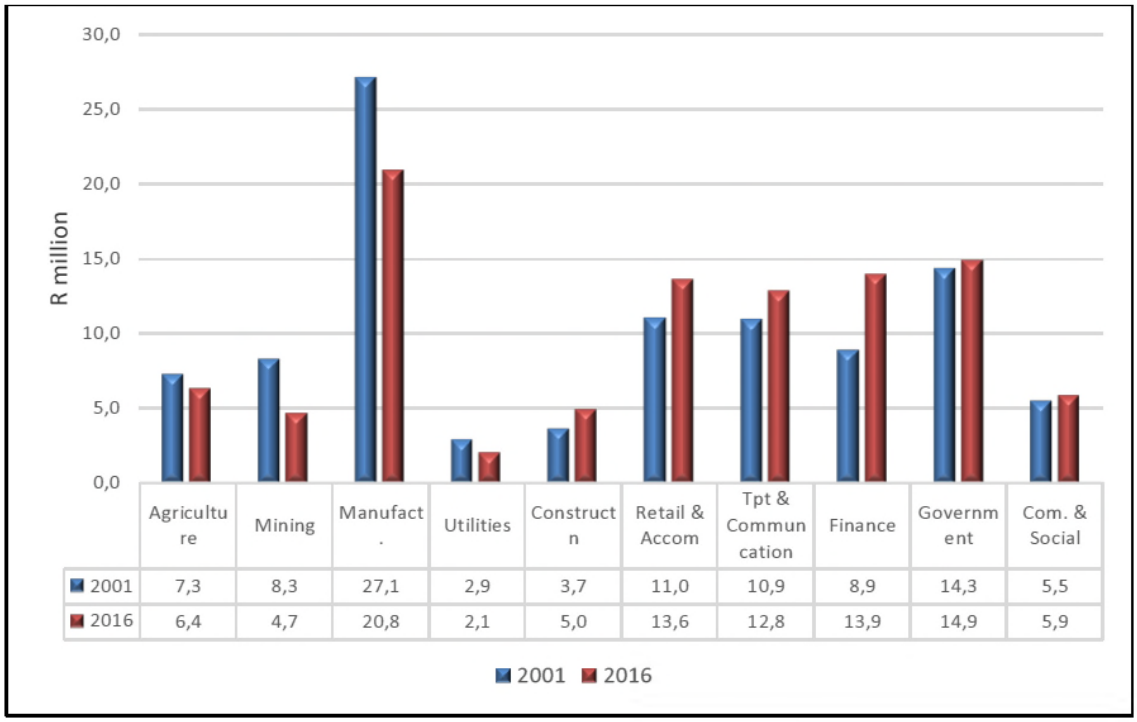
Figure 3-2: % GDP Contributions per Local Municipality



Source: Global Insights 2015

The most dominant economic sectors in KCDM is the manufacturing sector (20.8%), the government sector (14.9%) and the financial and business services sector (13.9%). The financial and business sector showed the biggest increase between 2001 and 2016. Other sectors showing significant growth includes the retail, catering and accommodation sector. Figure 3-3 displays the contributions per sector within KCDM.

Figure 3-3: Sectoral Contributions in KCDM



	Agriculture	Mining	Manufact.	Utilities	Construct n	Retail & Accom	Tpt & Commun cation	Finance	Governm ent	Com. & Social
2001	7,3	8,3	27,1	2,9	3,7	11,0	10,9	8,9	14,3	5,5
2016	6,4	4,7	20,8	2,1	5,0	13,6	12,8	13,9	14,9	5,9

Source: KCDM DGDP Draft Version 08, June 2018

The agriculture and mining sectors have decreased in their contributions to the GDP. The decrease in the agricultural sector can be attributed to the slowdown in the production of field crops and horticultural products.

High unemployment undermines the equitable distribution of income and underpins poverty. According to Global Insight, 2015, unemployment is the highest in Nkandla with 32.1%, followed by the uMfolozi and Mthonjaneni Local Municipalities with 31.3% and 26.7% respectively.

3.3 POPULATION GROWTH SCENARIOS

The largest portion of the district population is concentrated in the uMlalazi Local Municipality with 279 331 people and accounts for nearly 40% of the total district population while only 16% of the population resides in Mthonjaneni Local Municipality. uMlalazi has a population density of 126 persons/km². Mthonjaneni and Nkandla Local Municipalities have the lowest population densities of 68 and 78 persons/km².

The City of uMhlathuze, Mthonjaneni, uMlalazi and Mfolozi Local Municipalities have experienced a population increase between 2011 and 2016 with only Nkandla Local Municipality showing a decrease. The significant population growth for the City of uMhlathuze, Mtonjaneni and uMfolozi Local Municipalities are due to the Ntambanana Local Municipality being disestablished and its municipal area merged into the City of uMhlathuze, Mthonjaneni and uMfolozi Local Municipalities on 3 August 2016.

When calculating the water demand for 2050, the population growth for KCDM was also calculated which resulted in the projected number of people residing within King Cetshwayo will be approximately 728 000 people. The projected population per Municipality is tabled within Table 3-2 below.

Table 3-2: Projected Population per Local Municipality until 2050

Local Municipality	Pop 2020	Projected Population						
		2020	2025	2030	2035	2040	2045	2050
uMfolozi	112 189	149 976	153 933	157 868	162 561	167 394	172 370	177 495
uMlalazi	279 331	239 785	246 111	252 402	259 906	267 633	275 589	283 783
Mthonjaneni	174 925	95 635	98 158	100 667	103 660	106 742	109 915	113 183
Nkandla	143 316	130 002	133 432	136 842	140 911	145 100	149 413	153 855
Total	**709 761**	**615 399**	**631 633**	**647 779**	**667 037**	**686 868**	**707 288**	**728 315**

The Overall Master Plan for Water Supply to King Cetshwayo: 2015 Revision, applied a growth figure of 1.5% to project the number of households for 2015 and are used for the purposes of the UAP III study.

3.4 Main Development Nodes

The KwaZulu-Natal Spatial Development Framework (KZN SDF) reports that almost the entire Nkandla LM, the western parts of uMlalazi, and the western parts of uMfolozi LM are classified as Priority 1 intervention areas. According to the SDF, spatial intervention areas refer to specific areas where deliberate actions from either the District Municipality or any other tier of government can improve on a situation that exists in the specific area.

Richards Bay is identified as a provincial secondary node and is an urban centre with good existing economic development and the potential for growth and services to the regional economy. Nkandla, Eshowe, Melmoth and KwaMbonambi as quaternary nodes which are mainly centres that provide services to the sub-regional economy and community needs (KCDM Final IDP Review, 2019/2020).

4. WATER REQUIREMENTS

This section provides an overview of the water requirements as calculated using the demand model developed for the purpose of this study. A summary is provided firstly for the District and then for each of the Local Municipalities. The total number of households (HH) as obtained from the 2011 Census and the number of households below RDP standards are also provided. (Households below RDP standards include all households having water supply – any form – further than 200m from the household).

4.1 WATER SUPPLY SERVICE LEVEL

The water supply coverage reported on in the Overall Master Plan for Water Supply to KCDM 2015 Revision, dated March 2017, that approximately 32% of the households do not have access to formal water supply. This figure is also indicated in the KCDM IDP Final Review, 2019/2020 as the total water supply backlog in the District. The detail per Local Municipality is provided within Table 4-1 below and illustrated in Figure 4-1. KCDM indicated that these population, household and backlog figures should be used for the purposes of this report.

Table 4-1: Water Supply Backlog within King Cetshwayo District Municipality

LM Name	2015 Population	2015 Households	Households with Water Coverage	Household Backlog	Percentage Backlog
Mthonjaneni	112 189	17 759	13 432	4 327	24%
Nkandla	143 316	22 484	16 712	5 772	26%
uMfolozi	174 925	24 802	18 892	5 910	24%
uMlalazi	279 331	43 851	27 484	18 367	42%
Total	**709 761**	**108 896**	**76 520**	**34 376**	**32%**

Source: Overall Master Plan for Water Supply to King Cetshwayo 2015 Revision, dated March 2017

N

Abaqulusi Local Municipality

Nongoma Local Municipality

Big 5 Hlabisa Local Municipality

Umkhanyakude

Ulundi Local Municipality

Zululand

Nquthu Local Municipality

Mtubatuba Local Municipality

Ulundi

Mpungose

Babanango

Saint Lucia

Mtubatuba

River View

Melmoth

Mthonjaneni Local Municipality

uMfolozi Local Municipality

Nkandla Local Municipality

King Cetshwayo

City of uMhlathuze Local Municipality

Nseleni

Nhlabane

Msinga Local Municipality

Umzinyathi

Nzalabantu

Empangeni

Ngwelezana

Richard's Bay

Lake Mzingazi

Felixton

Vulindlela

Esikhawini

Eshowe

uMlalazi Local Municipality

Gingindlovu

Umvoti Local Municipality

Greytown

eNhlalakahle

Maphumulo Local Municipality

Mandeni Local Municipality

iLembe

Darnall

Zinkwazi Beach

KwaDukuza Local Municipality

Princes Grant

Blythdale Beach

Stanger

uMshwathi Local Municipality

Ndwedwe Local Municipality

Wartburg

Shakaskraal

Tinley Manor Beach

R68 R34 R66 R618 N2 R74 R622 R614 R102

10 5 0 10 20 Kilometers

Legend

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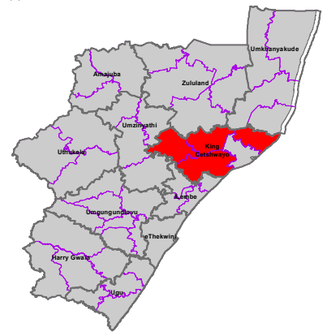

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PROJECT TITLE

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

MAP TITLE:

Water Reliability Profile

King Cetshwayo District Municipality

DATE COMPLETED:

30 September 2020

MAP NO.:

DC28: Figure 4.1

Water Reliability Profile

- Communities receiving a reliable service
- Communities not receiving a reliable service due to having no access to any water supply infrastructure
- Communities not receiving a reliable service due to a need for infrastructure requirements (upgrades)
- Communities not receiving a reliable service due to a need for water security requirements (resource problems)

4.2 WATER LOSSES AND DEMAND MANAGEMENT

The King Cetshwayo WSA has taken the issue of WC/WDM seriously. The Water Conservation and Water Demand Management Strategy has been Council approved and the implementation thereof is underway through the Water Use Efficiency (WUE) section. The priority is to determine the level of non-revenue water and set targets to reduce the non-revenue water. Other initiatives that are underway to address water losses and improve water quality and are listed below:

- ✓ Water loss management strategy;
- ✓ Water meter installation; and
- ✓ Water quality improvement interventions.

The District completed a bulk water meter audit, covering a total of 364 water meters in seven water supply areas. The location of the bulk meters was captured, and operational schematics and meter hierarchy diagrams were developed. The condition of the existing meters was assessed, and a meter replacement strategy was developed. The operational schematics and meter hierarchy diagrams will benefit the WSA in terms of water balancing.

The WSA prepares monthly water balances, in the IWA format, on a local municipality level, for submission to the DWS. The water balance for the WSA is presented in Table 4-2 for the month of December 2018.

Table 4-2: King Cetshwayo Water Balance, December 2018

Total System Input Volume 1 987 625 m3/month 66.25Mℓ/d	Authorised Consumption 857 438 m3/month Percentage of SIV = 43.1% 28.58Mℓ/d	Billed Authorised Consumption 857 438 m3/month Percentage of SIV = 43.1% 28.58Mℓ/d	Billed Metered Consumption-Domestic 58 512 m3/month Percentage of SIV = 2.9%	Revenue Water 857 438 m3/month Percentage of SIV = 43.1% 28.58Mℓ/d
			Billed Metered Consumption-Commercial 44 973 m3/month Percentage of SIV = 2.3%	
			Export Volume 1 707 m3/month Percentage of SIV = 0.1%	
			Billed Unmetered Consumption 752 246 m3/month Percentage of SIV = 37.8%	
		Unbilled Authorised Consumption - m³/month Percentage of SIV = 0.0%	Unbilled Metered Consumption - m3/month Percentage of SIV = 0.0%	Non-Revenue Water 1 130 187 m3/month Percentage of SIV = 56.9% 37.67Mℓ/d
			Unbilled Unmetered Consumption - m3/month Percentage of SIV = 0.0%	
	Water Losses 1 130 187 m³/month Percentage of SIV = 56.9% 37.67Mℓ/d	Apparent Losses 226 037 m³/month Percentage of SIV = 11.4% 7.53Mℓ/d	Unauthorised Consumption - m3/month Percentage of SIV = 0.0%	
			Metering Inaccuracies - m3/month Percentage of SIV = 0.0%	
		Real Losses 904 150 m³/month Percentage of SIV = 45% 30.13Mℓ/d	Mains and Distribution Leaks - m3/month Percentage of SIV = 0.0%	
			Reservoir Overflows - m3/month Percentage of SIV = 0.0%	
			Service Connection Leaks - m3/month Percentage of SIV = 0.0%	

Source: KZN IWA Water Balances, 2018

Not all the reduction in non-revenue water can be attributed to the abovementioned initiatives as water restrictions were also imposed as well as industries reducing their usage to alleviate the effects of the drought.

4.3 WATER DEMAND MODEL

The Water Demand Model as described within Section 1.5 was applied to the King Cetshwayo 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 for King Cetshwayo District Municipality

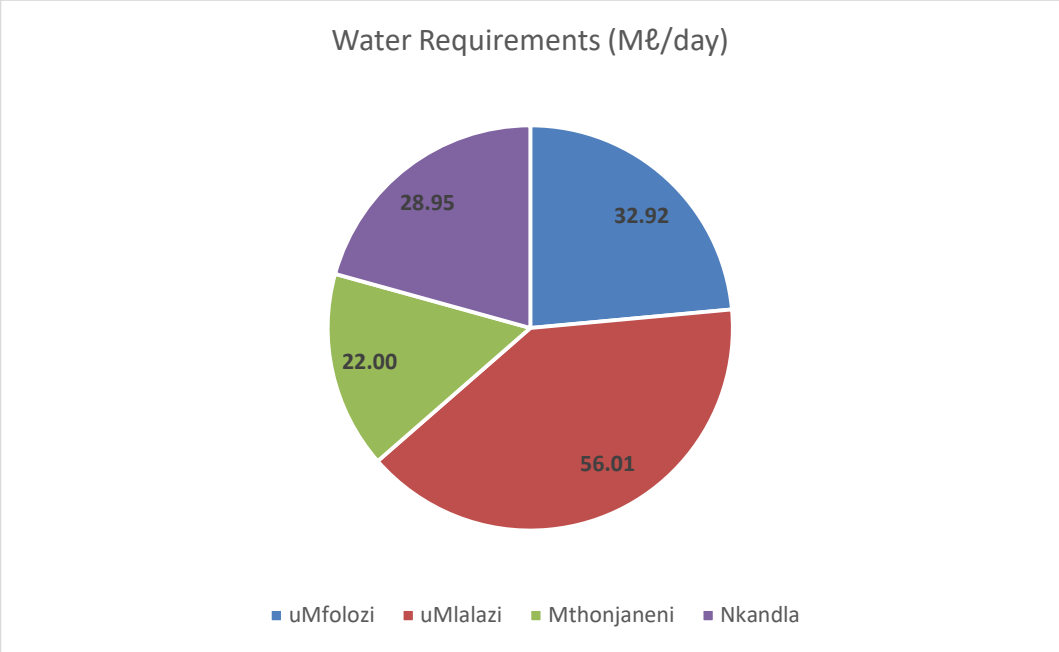
The water requirements (Mℓ/day) for the KCDM are presented per Local Municipality within Table 4-3. These water requirements were calculated for consumers having formal water supply schemes and for consumers not yet supplied from a formal water supply scheme. Section 1.5 Water Demand Methodology in this report explains the approach for the calculations to determine the theoretical water requirements and adjusted for water losses. The KCDM would require by the year 2050, 139.87Mℓ/day.

Table 4-3: Water Requirements (Mℓ/d), Per Local Municipality

Local Municipality	Population 2020	Water Requirements (Mℓ/day)						
		2020	2025	2030	2035	2040	2045	2050
uMfolozi	149 976	26.97	27.78	28.61	29.59	30.64	31.74	32.92
uMlalazi	239 785	45.71	47.13	48.59	50.30	52.10	54.00	56.01
Mthonjaneni	95 635	17.92	18.48	19.06	19.73	20.45	21.20	22.00
Nkandla	130 002	23.68	24.41	25.15	26.02	26.94	27.92	28.95
Total	**615 399**	**114.28**	**117.80**	**121.40**	**125.65**	**130.13**	**134.87**	**139.87**

The 2050 water requirements per LM are presented within Figure 4-2 in the form of a pie chart, illustrating that the uMlalazi LM will be the largest water consumer in the KCDM requiring 40% of all water followed by the uMfolozi LM with 23%.

Figure 4-2: 2050 Water Demand in Mℓ/day per LM



4.3.2 Demand per Regional Water Scheme

The water requirements for KCDM are presented in this section per existing Water Supply Scheme (WSS) area and potential future Water Supply Intervention Area (WSIA) area for the entire DM, thus covering all consumers in the municipality. Table 4-4 represent the water requirements in Mℓ/day.

The Vutshini-Nkandla WSS/WSIA, Eshowe WSS/WSIA, Mthonjaneni WSS/WSIA and Upper Nseleni-Mhlana Middledrift WSS/WSIAs have the highest water demand of approximately 17%, 16%, 15%and 14% respectively. Some of these WSS/WSIAs are also the biggest supply areas within KCDM and would be serving close to 62% of the KCDM population. Middledrift WSS/WSIA constitutes a big supply area but the water demand expected for 2050 is less than the other areas mentioned above.

Table 4-4: Water Demand per WSS/WSIA in Mℓ per day

Water Supply Scheme / WSIA		Population 2020	Water Requirements (Mℓ/day)						
			2020	2025	2030	2035	2040	2045	2050
UTG002	Eshowe	87 737	18.94	19.50	20.08	20.76	21.48	22.23	23.03
UTG006	Mbonambi	55 037	10.36	10.67	10.99	11.36	11.76	12.18	12.63
UTG007	Kwahlokohloko	83 576	14.47	14.93	15.41	15.96	16.54	17.16	17.82
UTG009	Middledrift	89 619	16.00	16.51	17.04	17.65	18.30	18.98	19.71
UTG010	Mthonjaneni	95 749	17.94	18.50	19.08	19.76	20.47	21.23	22.02
UTG014	Upper Nseleni - Mhlana	94 940	16.61	17.11	17.63	18.23	18.88	19.56	20.28
UTG016	Vutshini - Nkandla	108 741	19.96	20.57	21.19	21.92	22.70	23.52	24.38
Total		**615 399**	**114.28**	**117.80**	**121.40**	**125.65**	**130.13**	**134.87**	**139.87**

5. EXISTING WATER SUPPLY INFRASTRUCTURE

This section provides an overview of the available water resources as well as the current surface water supplied schemes and the larger groundwater schemes (not for individual consumption).

KCDM Officials indicated during discussions that the District Municipality agrees with their Overall Master Plan for KCDM (2015 Revision) in terms of their regional schemes and that these existing supply schemes should be used for future planning.

5.1 WATER RESOURCE AVAILABILITY

5.1.1 Surface Water

The King Cetshwayo District Municipality falls within the Pongola-Mtamvuna Water Management Area, one of nine WMAs that divides the large catchment areas of South Africa. The Pongola Mtamvuna WMA covers the whole of the KZN province, except a small part in the south, that falls within the Mzimvubu Tsitsikamma WMA. Water is available through two main rivers, namely the Thukela River and the Mhlathuze River and Lake Phobane (previously Goedertrouw Dam).

The King Cetshwayo District falls within the summer rainfall region of South Africa and has numerous surface water resources which are currently threatened due to the drought the past 3 years. Major rivers include the Thukela, Mfolozi, Mhlathuze, Mlalazi and Mzingwenya rivers with two significantly large lakes (Lake Cubhu and Lake Mzingazi) as well as a smaller lake, Lake Nsezi.

5.1.1.1 Thukela River

The Thukela River is the largest river in the KZN province and has a total average annual runoff of approximately 3 799 million m³/a. A significant share of its runoff is currently being used.

During dry periods there is insufficient water in the Lower Thukela River and releases from upstream dams where there is a limited surplus, will be needed. It is not certain if additional water is available from the Thukela River over and above the water requirements already committed.

5.1.1.2 Mhlathuze River and Lake Phobane

According to DWS's Water Reconciliation Strategy Study (2014), the Mhlathuze is fully allocated and the DWS embarked on a licensing process to review allocations and to revise allocations where an existing lawful use (ELU) was not fully utilised. The drought also emphasised that the system is being heavily utilised, and that water availability of the lakes is less than it seems. During the drought periods Lake Phobane is heavily dependent upon and limited growth in water requirements are provided for. A major water user in the Mhlathuze River catchment is irrigation, mainly sugarcane as well as industrial users.

The Mhlathuze water supply system (WSS) supplies to King Cetshwayo DM and the City of uMhlathuze. The integrated WSS consists of:

- ✓ Lake Phobane is the largest water resource in the WSS and feeds water to the Goedertrouw WTP below the dam wall as well as releasing water for irrigation and for abstraction at the Mhlathuze Weir from which industry and domestic water use is supplied;
- ✓ The coastal lakes include Lake Nsezi, Lake Cubhu, Lake Mzingazi and Lake Nhlabane. These lakes are augmented by abstractions from the Mfolozi River;
- ✓ The Middledrift transfer scheme was built as a drought emergency scheme in 1997. This scheme can pump around 1m³/s from the Thukela River over the divide into the Lake Phobane Dam. A doubling of the Middledrift Transfer Scheme capacity from 1 to 2m³/s has recently been commissioned.

Table 5-1 below details the water scheme supply areas with their respective sources of supply.

Table 5-1: Regional Scheme Supply Areas with their respective Water Sources

Regional Scheme Supply Area	Sub-Supply Area	Local Municipality	Surface Water Source
Greater Mthonjaneni (Goedertrouw)	Mthonjaneni	uMlalazi / Mthonjaneni	Lake Phobane (previously Goedertrouw Dam)
	Kwahlokohloko		
	Eshowe		Ruthledge & Ihlazi Dams
Middledrift	Eshowe/Nkandla	uMlalazi / Nkandla	Thukela River
Vutshini-Nkandla	Vutshini	Nkandla	Nsuze River, Vove Dam, Thukela River
Upper Nseleni	Upper Nseleni Mhlana	uMfolozi	Lake Mzingazi & Nsezi
	Mhlana-Somopho		
Mbonambi	Nzalabantu / Sokhulu	uMfolozi	Lake Mzingazi (City of uMhlathuze)

Source: King Cetshwayo District Municipality Final IDP Review, 2019/2020

The King Cetshwayo Integrated Development Plan, 2019-2020 Review listed the state of the water sources in the District as follows:

Table 5-2: State of Water Sources in the District

LM Name	River, Dam, Lake	Comments
uMfolozi	uMfolozi River	Currently dry
	Small, localised dams throughout the Municipality	Dry
City of uMhlathuze	Nsezi	70% capacity
	Mhlathuze River	45
	Lake Chubu	90% capacity
	Lake Mzingazi	80% capacity
uMlalazi	Mhlathuzana	45
	Ruthledge	95% capacity
	Sihlangu	100% capacity
	Ntenjane	30
	Matigulu River	60

LM Name	River, Dam, Lake	Comments
	Lake Phobane	45.5% capacity
	Ndlovini	Dry
	Thukela River	40% capacity
Mthonjaneni	Melmoth Dam	95% capacity
Nkandla	Mhlathuze River	45
	Nsuze River	60
	Thukela River	40

Source: King Cetshwayo District Municipality Final IDP Review, 2019/2020

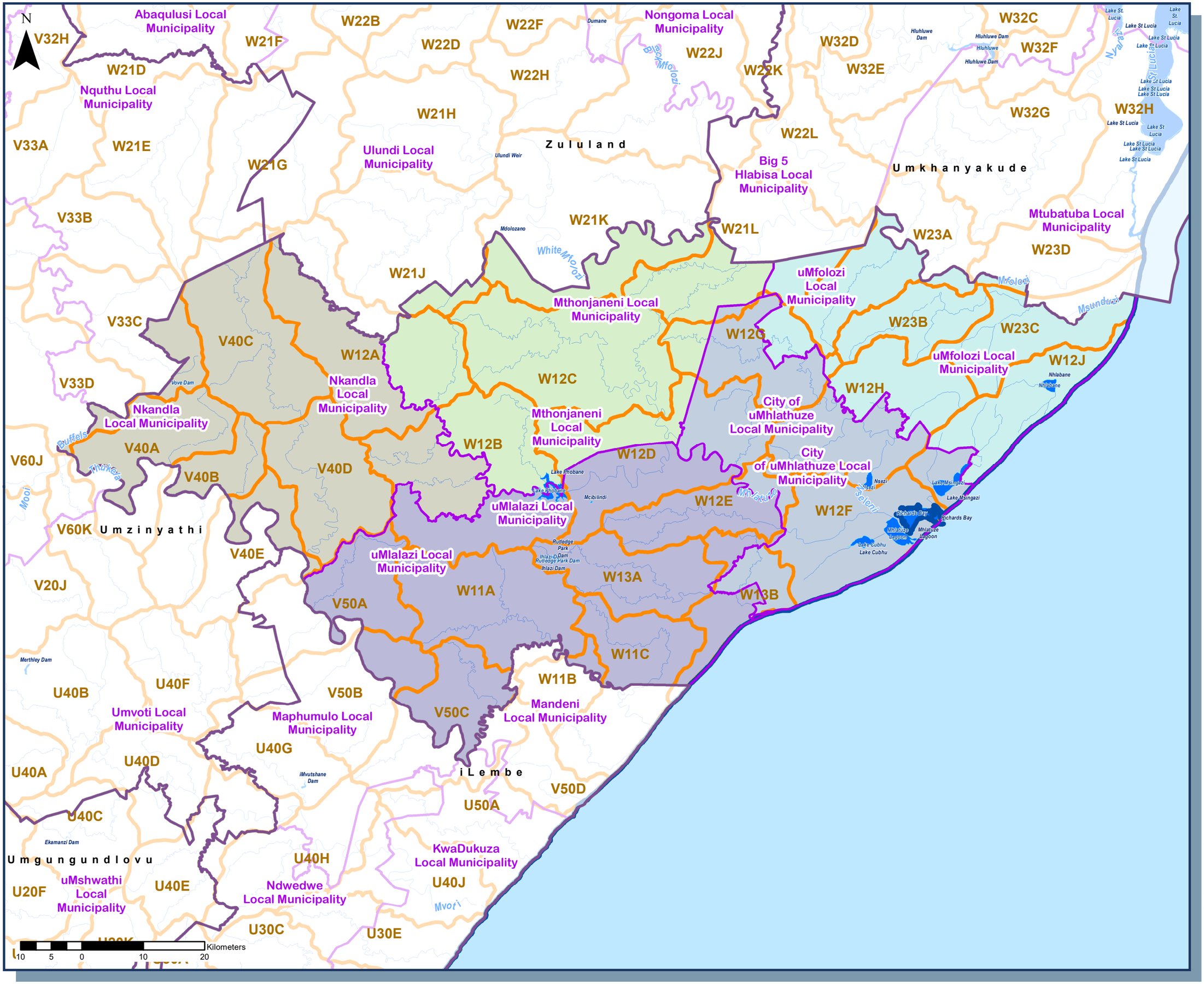
The Department of Water and Sanitation prepared an Annual Operating Analysis for the Mhlathuze Water Supply System and Lake Phobane (previously Goedertrouw Dam) in KZN in October 2017. The purpose of an annual operating analysis (AOA) is to define and optimise the short-term (annual) allocation of water by means of operating rules. The operating rules take into consideration the reservoir storage level at a given point in time. The operating rule also takes into consideration a defined risk of non-supply for water users in the system. The outcome of the AOA is to minimise the risk of non-supply to high priority water use in the system, e.g. strategic, industrial, and domestic (basic human needs). The annual operating rules for 2017/2018 operating year were as follows:

- ✓ Proposed restrictions for the 2017/2018 operating year for the Mhlathuze WSS are:
    - o Industry 10% (which is a total sector allocation of 44 million m³/a);
    - o Domestic:20% (which is a total sector allocation of 36 million m³/a); and
    - o Irrigation 70% of original allocations (which equates to 62.5% of the revised allocations and 40% of the current unrestricted requirements of 75 million m³/a as a sector).
- ✓ Transfer from Thukela-Phobane to be maintained at 1m³/s;
- ✓ Continue pumping from Thukela until Lake Phobane is above 75%; and
- ✓ Maximise utilisation of local resources e.g. lakes, desalination plant etc.

5.1.2 Groundwater

There are approximately 220 small, stand-alone supply schemes in the King Cetshwayo District that supply water to many rural areas. At least 145 of these schemes are supplied by boreholes or springs. Unfortunately, these groundwater resources are either not reliable or the yield is too low to be relied upon for the establishment of bulk supply systems. For this reason, surface water resources are relied upon to a greater degree to feed the bulk water systems while groundwater resources are used in the interim to maintain existing services levels and provide a survival level of service in remote and drought affected areas in the District.

Springs and boreholes have proven to be unreliable and have limited capacity to sustain an increased demand. Groundwater quality is largely affected by the surrounding environment which makes it susceptible to pollution. Overdrawing of water from the aquifers is also a challenge. High abstraction rates do not allow the aquifers to recover.



Legend

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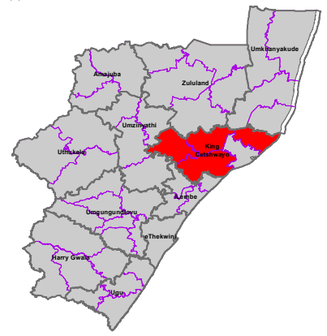
- Quaternary Boundaries & Numbers (W22F)

LOCALITY:



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CONSULTANTS: Project No.: 27814

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PROJECT TITLE
King Cetshwayo DM: Universal Access Plan Phase III - Progressive Development of a Regional Concept Secondary Bulk Water Master Plan

MAP TITLE:
Water Resources
King Cetshwayo District Municipality

DATE COMPLETED:
30 September 2020

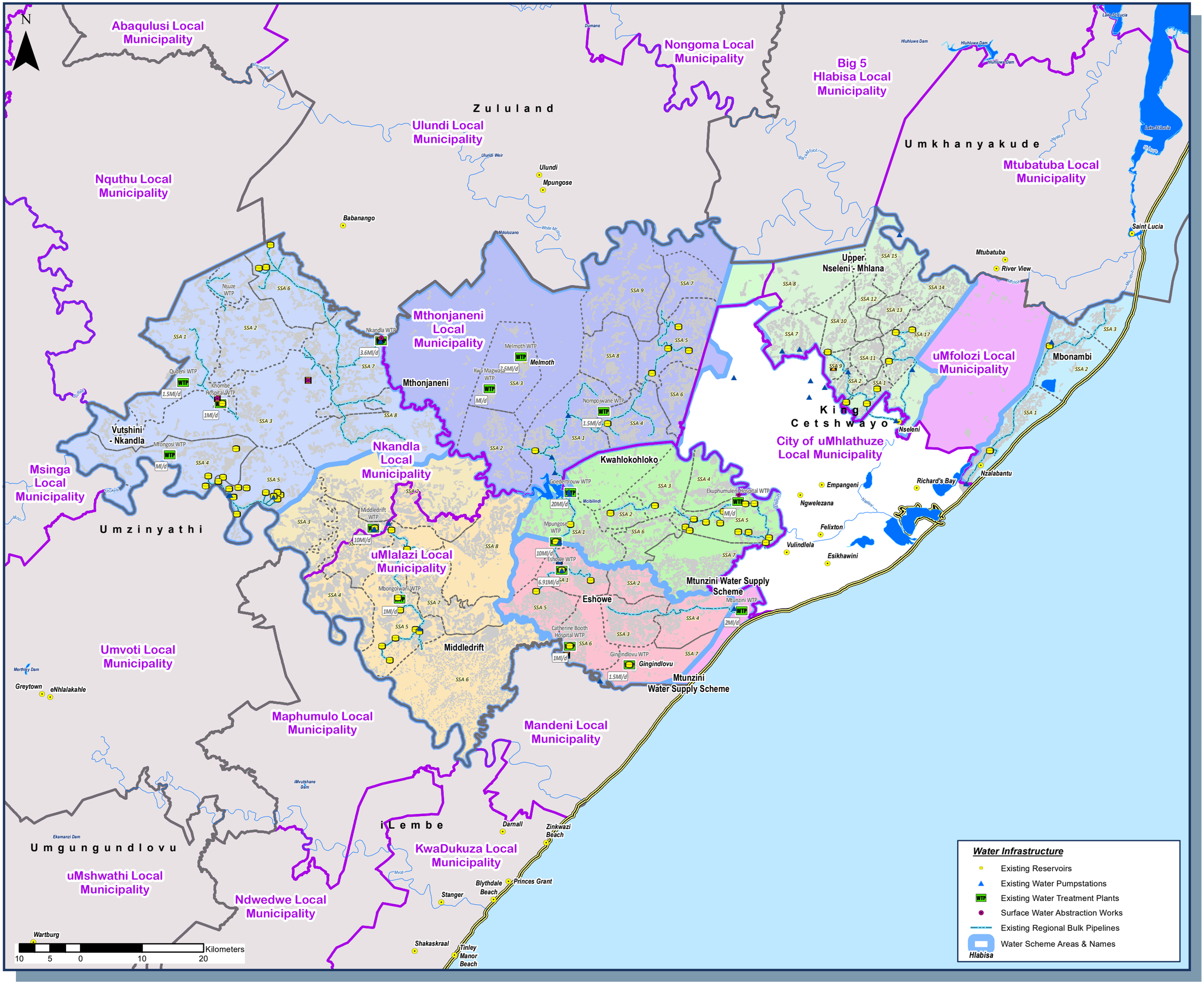
MAP NO.:
DC28: Figure 5.1

5.2 WATER SUPPLY SCHEMES

The seven (7) regional schemes covering KCDM schemes and are as follows:

- ✓ Eshowe (uMlalazi LM)
- ✓ Greater Mthonjaneni (Mthonjaneni LM)
- ✓ Kwahlokohloko (uMlalazi LM)
- ✓ Mbonambi (uMfolozi LM)
- ✓ Middledrift (uMlalazi LM)
- ✓ Upper Nseleni-Mhlana (uMfolozi LM); and
- ✓ Vutshini-Nkandla (Nkandla LM).

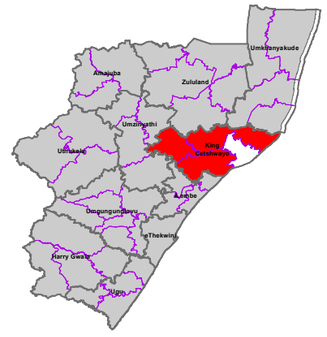
The water supply scheme areas and existing infrastructure for KCDM are illustrated in Figure 5-2.



Legend

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns (Eshowe)
- Sub-Supply Areas (SSA 1)

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

LOCAL MUNICIPALITY:

KING CETSHWAYO DISTRICT MUNICIPALITY

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PROJECT TITLE

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components
King Cetshwayo District Municipality

DATE COMPLETED:

30 September 2020

MAP NO.:

DC28 Figure 5.2

5.3 MTHONJANENI & UMLALAZI LOCAL MUNICIPALITIES

5.3.1 Greater Mthonjaneni Regional Water Supply Scheme (Goedertrouw Regional Scheme):

The Greater Mthonjaneni Regional Scheme with Lake Phobane remains the most viable source to supply water to Mthonjaneni, Kwahlokohloko and Eshowe supply areas. The Regional Scheme therefor supplies both the northern areas which form part of the Mthonjaneni Local Municipality as well as the southern areas which lie within the uMlalazi Local Municipality.

Raw water is abstracted from Lake Phobane. Water gravitates to the Goedertrouw WTP (20Mℓ) where it is purified. Water is then pumped from the WTP to the northern area (Mthonjaneni Water Supply Area) into a 2.5Mℓ reservoir approximately 9.5km from the WTP. Water is pumped to the southern areas into an 8Mℓ reservoir at Kwahlokohloko. Water gravitates into the Kwahlokohloko and Eshowe supply areas to the WTP and to the Rutledge Dam at Eshowe. Water also flows from the Msunduzi River to the Nompojwana WTP. Extraction from the source is via an existing 1.8m diameter steel pipe to the water treatment plant. The scheme has a number of smaller schemes from run-of-river abstractions as well as from borehole schemes supplying the rural villages.

The Goedertrouw WTP currently has a capacity of 20Mℓ, with provision to upgrade it to 40Mℓ and later 80Mℓ. An application to increase the abstraction permit to 40Mℓ was submitted to DWS in November 2005 but approval for the application is still outstanding. The Overall Master Plan for KCDM reports that the future water demand for the Greater Mthonjaneni Regional BWSS in 2035 is estimated at 81.1Mℓ/day and therefore the proposed 60 Mℓ/day capacity of the WTP will not be sufficient to meet the ultimate demand. KCDM has indicated that the WTP be upgraded to 80Mℓ/day to cater for future demands. Upgrades of the Goedertrouw WTP will take on a phased approach.

5.3.1.1 Mthonjaneni Water Supply Area

The Overall KCDM Master Plan proposed to subdivide the Goedertrouw Regional scheme again into three (3) previous regional schemes to supply the Eshowe, Kwahlokohloko and Mtonjaneni areas to reduce pumping costs.

According to the KCDM Overall Master Plan and individual Master Plans, each scheme is divided into sub-supply areas of which some sub-supply areas have existing infrastructure constructed. Currently there are 9 Sub-Supply Areas within the Mthonjaneni Water Supply Area of which sub-supply areas 1, 4 & 5 have existing infrastructure.

The Mthonjaneni Water Supply Scheme area is supplied by two main water treatment plants (WTPs) at Lake Phobane and Mthonjaneni WTP (Nompojwana), which gets raw water from the Hlambanyathi River, a tributary of the Mhlatuze River.

A 450 diameter ductile iron rising main from the Goedertrouw WTP supplies water to a 2.5Mℓ concrete reservoir and four pump stations (Zigigaya Booster1, Zigigaya Booster 2, Zimela Booster and PSA). The Mthonjaneni Command Reservoir (2.5Mℓ) serves Sub-Supply Area 1. Approximately 45km bulk pipeline (ranging from 355mm Ø - 640mm Ø) services Sub-Supply Area 1.

Sub-Supply areas 4 & 5 are provided with water through 5 reservoirs (1 & 4 reservoirs respectively) and almost 38km bulk pipeline (8km & 30km and ranging from ø 110mm – ø 400mm). See Figure 5-3 indicating the existing infrastructure and sub-supply areas within the Mthonjaneni Water Supply Scheme.

The Master Plan for the Goedertrouw Regional Water Scheme, 2015 Revision makes provision for additional infrastructure to be constructed in the remainder of the sub-supply areas in order to supply water to the whole regional scheme area and is discussed in Section 8.5.

N

Ulundi Local Municipality

Zululand

Umkhanyakude

Big 5 Hlabisa Local Municipality

Upper Nseleni - Mhlana

City of uMhlathuze Local Municipality

Mthonjaneni Local Municipality

King Cetshwayo

Mthonjaneni

Vutshini - Nkandla

Nkandla Local Municipality

Middledrift

uMlalazi Local

uMlalazi Local Municipality

Kwahlokohloko

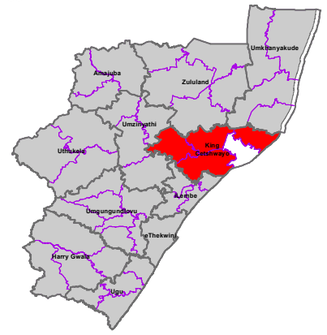
Mdolozano
Nqekwane
Mbojane
Lumbi 02
Kumhlosheni
Dlebe
Gandolo
SSA 9
SSA 7
Lumbi 01
Mthonjaneni NU 06
KwaMawanda
Mopukanqola
Mkhandwini
Phezukwehlanze
KwaZululiyaduma
Ezinkawini
Mashwila
Gobihlahla
Nobugalaza
Emaphikaqala
Mahele
Nlabayenkosi
Ndondondwana
Obuka C
825Kl
Ncanyini
Imfuli Mission
Mthonjaneni NU 10
Mthonjaneni NU 02
Mthonjaneni NU 08
Mthonjaneni NU 03
Obuka B
Mhoyiza
Emfeceni
Ongelweni
OQhabiyeni
SSA 5
Kwabhadaza
245Kl
883Kl
Njomelwano
SSA 8
Obuka A
Esidakeni
Dlomodlomo
623Kl
Mthonjaneni NU 01
Mthonjaneni NU 09
SSA 3
Melmoth WTP
3.6Ml/d
Melmoth
Kwa Magwasa WTP
Ml/d
KwaMagwaza
Mabhanda
KwaGama
SSA 6
Emahlabathini
Makhosaneni
Emukhindini
Qomintaba
Mthonjaneni NU 07
Mthonjaneni NU 04
Nompojwane WTP
1.5Ml/d
Nomponjwana
485Kl
Ndundulu
SSA 4
Esichothweni
Wambaza
Emasangweni
Nduro
Enkwenkwe
103Kl
Edubeni
1Kl
SSA 1
Zimbube
Goedgeloof A
Ekuthuleni
Mabungu
SSA 2
2500Kl
Isibaya Esikhulu
Bedlane
Eyingwenya
KwaDloziyana
Ziqagayi
50Kl
Ingwenya
KwaMazulu
Mehlalasha
Goedertrouw WTP
20Ml/d
Lake Phobane
Mcibilindi

Kilometers
5 2.5 0 5 10

Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names (Dried Dam)
- Rivers
- Settlements & Settlement Names (St Paul)
- Major Towns (Eshowe)
- Sub-Supply Areas (SSA 1)

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

LOCAL MUNICIPALITY:

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PROJECT TITLE

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Mthonjaneni
King Cetshwayo District Municipality

DATE COMPLETED: 30 September 2020

MAP NO.: **DC28 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)

5.3.1.2 Kwahlokohloko & Eshowe Water Supply Areas

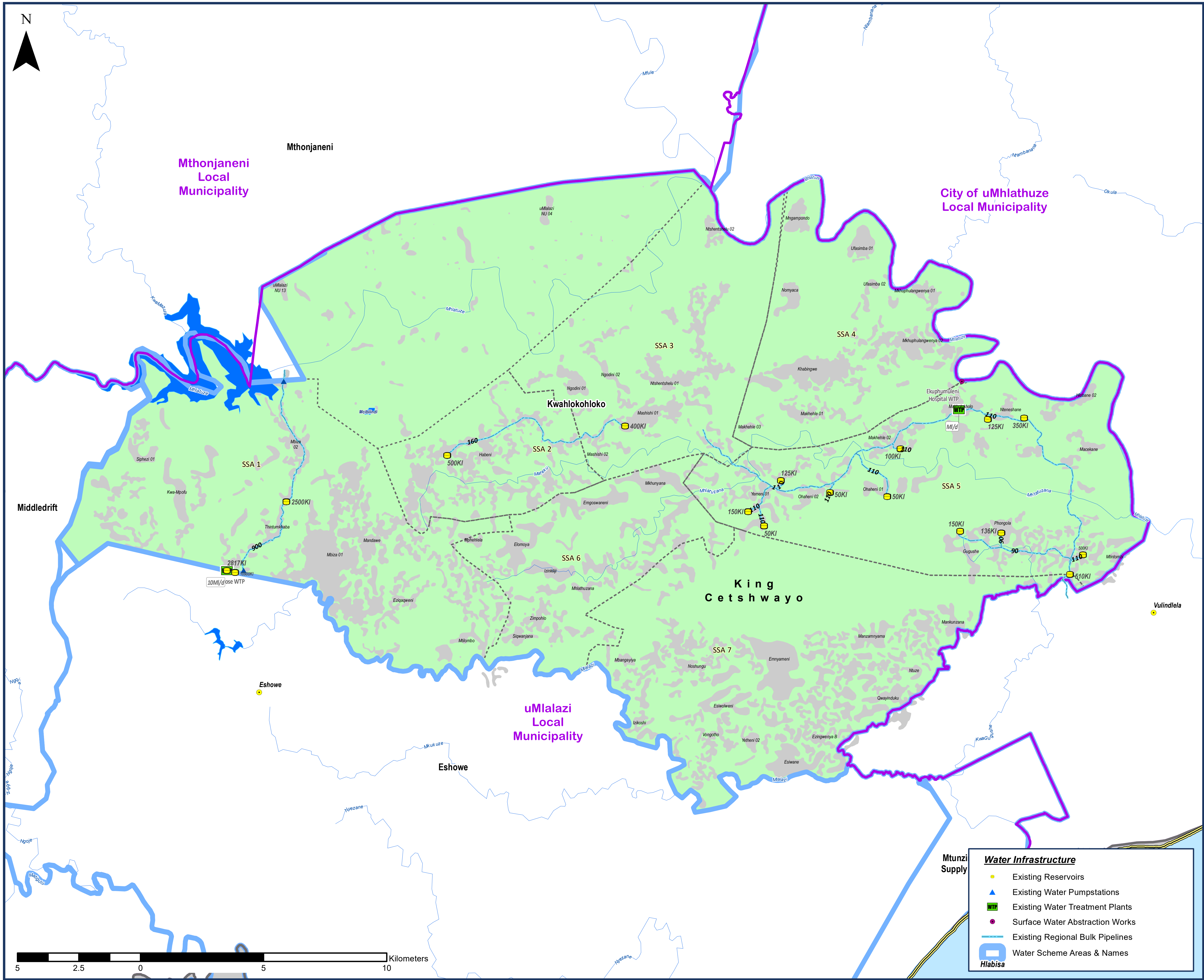
The Overall KCM Master Plan proposed to subdivide the Goedertrouw Regional scheme again into three (3) previous regional schemes to supply the Eshowe, Kwahlokohloko and Mtonjaneni areas to reduce pumping costs.

The Kwahlokohloko Water Supply area is supplied by the Mpungose WTP which gets its raw water from Lake Phobane situated in the uMhlatuze River. The scheme has a number of smaller schemes abstracting from run-of-river abstractions (e.g. Gingindlovu Water Supply Scheme) or from boreholes.

The existing bulk infrastructure for the Kwahlokohloko & Eshowe Water Supply Areas consist of a ø 300mm raw water pipeline from Lake Phobane to Goedertrouw WTP and further to Ruthledge Dam at Eshowe. The Eshowe WTP (6.91Mℓ/day) is situated in the town of Eshowe. Raw water is supplied from Ruthledge and Ihlazi (also known as Eshlazi Dam) situated in the Mlalazi River, a tributary of the Mhlatuze River. The Ruthledge Dam is very small and is supplemented by raw water supplies from Lake Phobane. The main source of water supply for the Eshowe Water Supply Scheme is from Lake Phobane as confirmed by KCDM. The Matigulu River also supplies irrigation areas within the Eshowe Water Supply Scheme area. Commercial forestry within this area does, however, have an effect on the runoff and yield that can be obtained from the Matigulu River (Umgeni Water IMP, 2020, Volume 8).

Water is currently provided to Sub-Supply Area 1 in Kwahlokohloko Supply Area through two (2) pump stations, two (2) reservoirs (10.9Mℓ & 2.5Mℓ) and 10km bulk pipeline (ø 900mm). Currently there are seven (7) Sub-Supply Areas within the Kwhlokohloko Supply Area of which sub-supply areas 1, 2 & 5 have existing infrastructure. See Figure 5-4 indicating the existing infrastructure and sub-supply areas within the Kwahlokohloko Water Supply Scheme.

The Master Plan for the Goedertrouw Regional Water Scheme, 2015 Revision makes provision for additional infrastructure to be constructed in the remainder of the sub-supply areas in order to supply water to the whole regional scheme area and is discussed in Section 8.3.



Legend

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names
- Rivers
- Settlements & Settlement Names
- Major Towns
- Sub-Supply Areas

LOCALITY:

CLIENT: UMGENI WATER · AMANZI

LOCAL MUNICIPALITY: KING CETSHWAYO DISTRICT MUNICIPALITY

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PROJECT TITLE

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Kwahlokohloko
King Cetshwayo District Municipality

DATE COMPLETED: 30 September 2020

MAP NO.: DC28 Figure 5.4

The Gingindlovu Water Supply Scheme comprises of raw water abstraction from the Matigulu River, the Gingindlovu WTP (1.5Mℓ/day) in town and bulk service storage infrastructure. The 3-month maximum abstraction during low flow periods at the Gingindlovu abstraction point was determined to be approximately 2.3 million m^3 (25.14 Mℓ/day) which is more than adequate to meet the low flow requirements for all the water users downstream of the dams and dependent on run-of-river abstraction.

Eshowe Supply Area has seven (7) Sub-supply Areas with sub-supply area 1 in Eshowe Water Supply Area having the following infrastructure constructed: one (1) pump station, three (3) reservoirs (two (2) reservoirs are 1Mℓ each and the other one 8Mℓ) and approximately 13km bulk pipeline (ranging from 350mm Ø – 1100mm Ø). Sub-Supply Area 5 has one (1) reservoir and seven (7) km bulk pipeline (300mm Ø) to provide water to the area. See Figure 5-5 indicating the existing infrastructure and sub-supply areas within the Eshowe Water Supply Scheme & Mtunzini Water Supply Scheme.

The Master Plan for the Goedertrouw Regional Water Scheme, 2015 Revision makes provision for additional infrastructure to be constructed in the remainder of the sub-supply areas in order to supply water to the whole regional scheme area and is discussed in Section 8.1.

5.3.2 Mtunzini Water Supply Scheme

For the purposed of this report, the Mtunzini WSS is discussed in conjunction with the Eshowe Regional Scheme as the Mtunzini WSS is supplied through the City of uMhlathuze.

The Mtunzini Water Supply Scheme is supplied by the Mtunzini WTP (1.5Mℓ/day), which gets its raw water from a weir in the Ntuze River, 700m upstream of the confluence with Mlalazi River. Furthermore, the scheme is supplemented by eight (8) boreholes and recently a treated water bulk supply main from City of uMhlathuze Local Municipality.

The total raw water abstracted for treatment at the Mtunzini WTP in 2008, was estimated as 0.66 million m^3/a (1.81 Mℓ/day) based on the estimated treated water production with 12% losses. The treated water production was provided as measured to be 0.58 million m^3/a (1.59 Mℓ/day).

The 3-month maximum abstraction during low flow periods at the Mtunzini abstraction point was determined to be approximately 0.43 million m^3 (4.7 Mℓ/day) which is insufficient to meet the low flow requirements for all the water users in the future. Although KCDM has a Service Level Agreement with City of uMhlathuze to supply the Mtunzini Water Supply Scheme with treated bulk water, the water supply to the scheme is insufficient and augmentation interventions are required.

N

Mthonjaneni

Kwahlokohloko

uMlalazi Local Municipality

City of uMhlathuze Local Municipality

King Cetshwayo

Mandeni Local Municipality

iLembe

Middledrift

Eshowe

Mtunzini Water Supply Scheme

Gingindlovu

32000Kl

1100

uMlalazi NU 12

Kwa-Mfana

Mfenjana

uMlalazi NU 11

Eshowe WTP

Eshowe

650

1000Kl

6.93Ml/d

300

350

1000Kl

410Kl

SSA 1

SSA 2

SSA 3

SSA 4

SSA 5

SSA 6

SSA 7

Gezinsila

Nyanini

Thawini

Ngeza

Nyathini

Hologo

Mpungose

Nozandla

Amakhilimba

Mawudlu

Mabhudle

Kwa-Jazi

Mathibelana

Phaphu

Isidibini

Madala

Gawula

Nhlabo

Hemfane

Sebeka

Nguqu

Maqhulu

Amahubhu

Vekeza

Obanjeni 01

Obanjeni 02

Izingeni 02

Obanjeni 03

Zamokuhle

Emaqeleni

Sibhamu

uMlalazi NU 09

uMlalazi NU 08

uMlalazi NU 06

uMlalazi NU 07

uMlalazi NU 05

uMlalazi NU 14

Mtunzini WTP

2Ml/d

Catherine Booth Hospital WTP

1Ml/d

Izingwenya A

Gingindlovu WTP

1.5Ml/d

Amatikulu

Kilometers

5 2.5 0 5 10

Water Infrastructure

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

Hlabisa

Legend

- Provinical Boundaries
- District Municipality Boundaries
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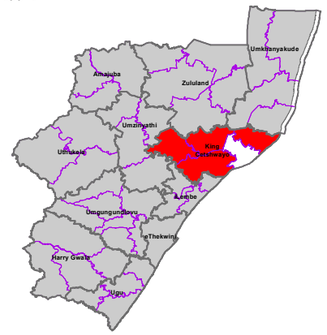
- Dams & Dam Names
- Rivers
- Settlements & Settlement Names
- Major Towns
- Sub-Supply Areas

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

LOCAL MUNICIPALITY:

KING CETSHWAYO DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

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PROJECT TITLE

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Eshowe & Mtunzini King Cetshwayo District Municipality

DATE COMPLETED: 30 September 2020

MAP NO.: **DC28 Figure 5.5**

5.3.3 *Middledrift Regional Water Supply Scheme*

The Middledrift Regional Water Supply Scheme area is supplied using the Thukela Transfer scheme abstraction works from where water is pumped to the Middledrift WTP (10Mℓ/day currently with plans to upgrade it to 13.86Mℓ/day) which supplies the various communities in the supply area.

The Thukela Transfer Scheme pipeline is 1.5m in diameter and has a design capacity of 1.2m³/s. Water is pumped from the Thukela River via two (2) high lift pump stations to a tributary of the Mhlathuze River, above Lake Phobane (previously Goedertrouw Dam). Bulk raw water is supplied to the Middledrift WTP via a 500mm diameter steel off-take upstream of the second high lift pump station.

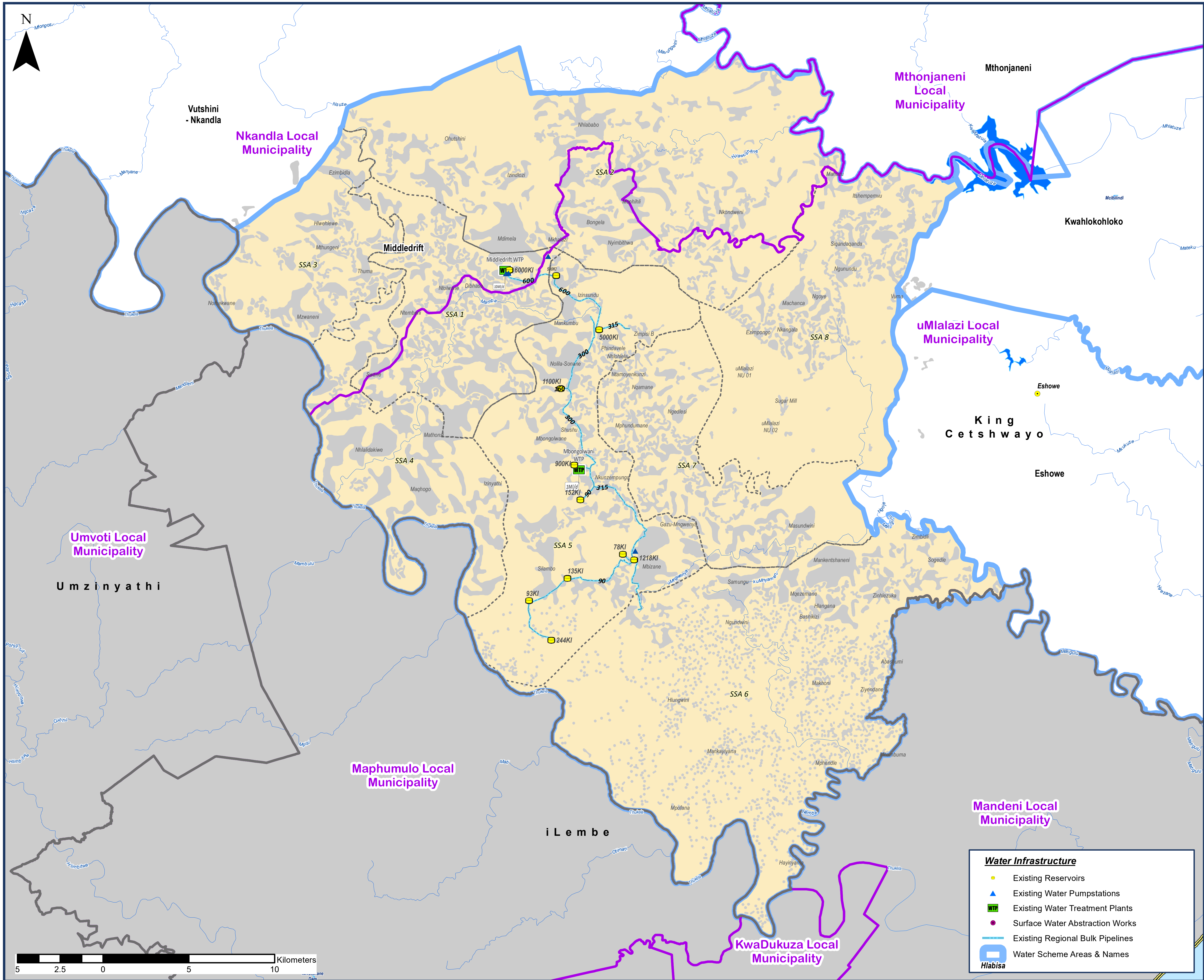
When the Thukela Transfer scheme is not operating, a single river abstraction pump is used to supply the Madungela de-sanding works. Two (2) smaller high lift pumps within the Madungela pump station, supply raw water to the reservoir at the Middledrift WTP via the transfer scheme's pipeline. Alternatively, two (2) river abstraction pumps are used in conjunction with a single train of the scheme's high lift pumps to supply the raw water reservoir at the water treatment plant.

When the Thukela Transfer scheme is in operation, the WTP is supplied by the main transfer scheme pumps. This reduces the capacity of the second high lift pump station by reducing the available upstream pressure. As a result, less raw water may be transferred to Lake Phobane.

The Thukela Transfer scheme is undergoing a capacity upgrade where an additional 1.2m³/s has been allocated for transfer to Lake Phobane. The capacity upgrade includes the installation of additional river abstraction pumps, the construction of a parallel de-sanding works, parallel high lift pump stations and a parallel rising main from the second high lift pump station to the Mvuzane stream which feeds Lake Phobane.

Middledrift Regional Scheme has 8 Sub-supply Areas with sub-supply areas 1 & 5 having infrastructure constructed. The following infrastructure is constructed to supply Sub-Supply Area 1: three (3) pump stations, two (2) reservoirs (6Mℓ & 500kℓ) and approximately three (3) km bulk pipeline (ø 600mm). Sub-Supply Area 5 is supplied through three (3) reservoirs (5Mℓ, 1.1Mℓ & 900kℓ respectively) and 16km bulk pipeline (ranging from ø 110mm – ø 300mm). See Figure 5-6 indicating the existing infrastructure and sub-supply areas within the Middledrift Regional Water Supply Scheme.

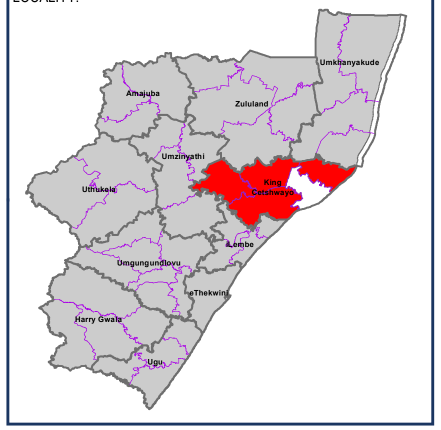
The individual Master Plan for the Middledrift Regional Water Scheme, 2015 Revision makes provision for additional infrastructure to be constructed in the remainder of the sub-supply areas in order to supply water to the whole regional scheme area and is discussed in Section 8.4.



Legend

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names
- Rivers
- Settlements & Settlement Names
- Major Towns
- Sub-Supply Areas

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

LOCAL MUNICIPALITY:

KING CETSHWAYO DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

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PROJECT TITLE

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Middledrift
King Cetshwayo District Municipality

DATE COMPLETED:
30 September 2020

MAP NO.:
DC28 Figure 5.6

5.4 NKANDLA LOCAL MUNICIPALITY

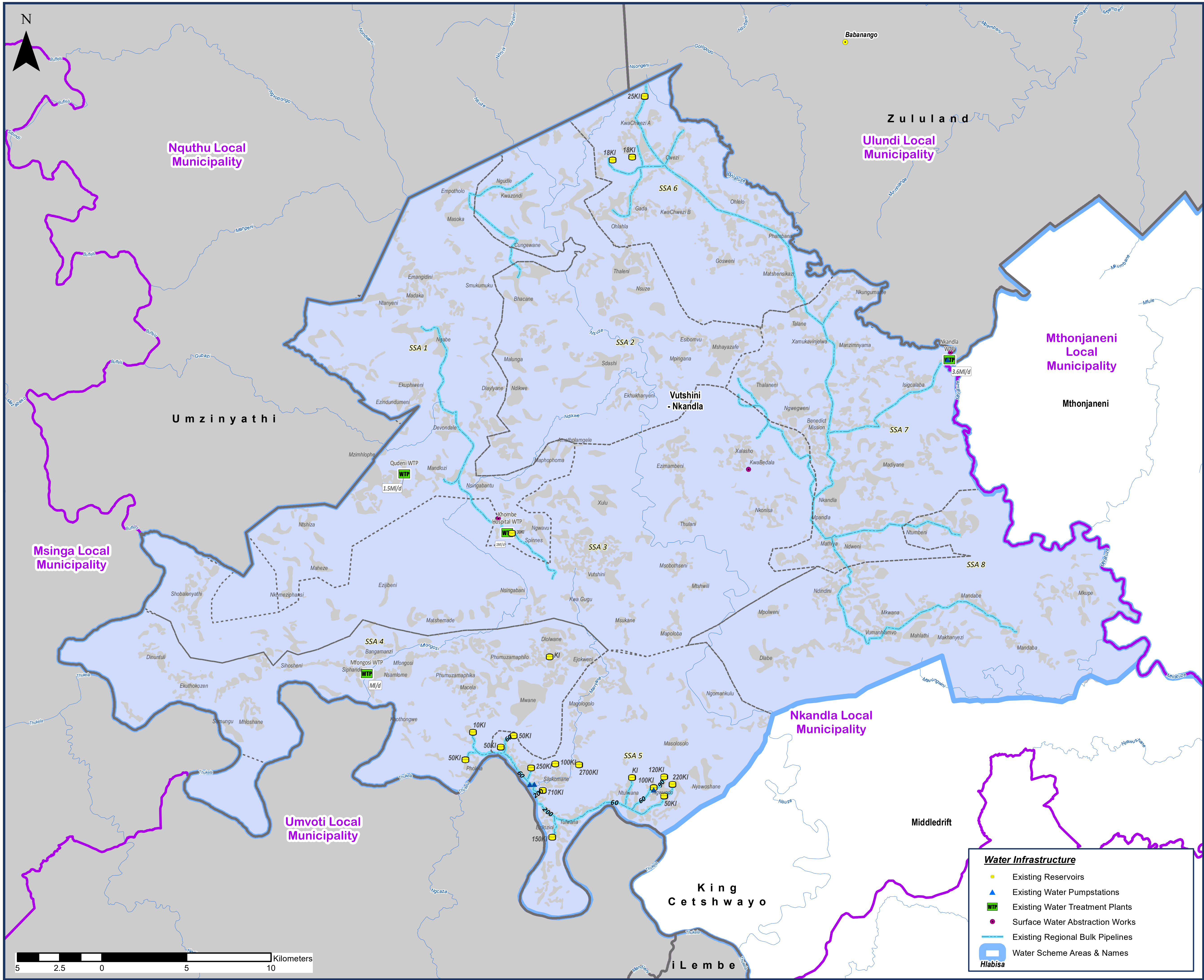
5.4.1 Vutshini-Nkandla Regional Water Supply Scheme:

The Vutshini-Nkandla Regional Water Supply Scheme area is supplied mainly from run-of-river abstraction from the Vutshini Stream, a tributary of the Nsuze River, the Vove Dam (yield of 0.55Mℓ/day) on the Vove River and the Mhlathuze River (yield of 1.34Mℓ/day) and a water treatment plant (Nkandla WTP, 2.5Mℓ/day) near the river from where water is pumped to the Mpungose Tribal Authority, towards Nkandla town. There are also several small water supply schemes still supplying some of the areas in the water supply scheme area.

The Master Plan - Vutshini-Nkandla Regional Scheme, 2015 Revision, recommends further investigations into dam sighting and sustainable yield calculations for the proposed Nsuzu Dam (11.8 million m^3) as current abstraction is insufficient to meet the water requirements for all the water users in the future.

Vutshini-Nkandla Regional Scheme has eight (8) sub-supply Areas with sub-supply area 5 having infrastructure constructed. Currently the following infrastructure is constructed to supply sub-supply area 5 in the Vutshini-Nkandla Supply Scheme: two (2) pump stations, nine (9) reservoirs (ranging from 50kℓ - 2.7Mℓ) and approximately 24km bulk pipeline (ranging from ø 60mm – ø 200mm). . See Figure 5-7 indicating the existing infrastructure and sub-supply areas within the Vutshini-Nkandla Regional Scheme.

The individual Master Plan for the Vutshini-Nkandla Regional Water Scheme, 2015 Revision, makes provision for additional infrastructure to be constructed in order to supply water to the whole regional scheme area and is discussed in Section 8.7.



Legend

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names
- Rivers
- Settlements & Settlement Names
- Major Towns
- Sub-Supply Areas

LOCALITY:

CLIENT:

UMGENI WATER · AMANZI

LOCAL MUNICIPALITY:

KING CETSHWAYO DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

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PROJECT TITLE

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Vutshini-Nkandla
King Cetshwayo District Municipality

DATE COMPLETED:
30 September 2020

MAP NO.:
DC28 Figure 5.7

5.5 uMfolozi Local Municipality

5.5.1 Upper Nseleni-Mhlana Regional Water Supply Scheme

The existing Nseleni bulk water pipeline supplies water to Upper Nseleni, Khoza, Nseleni Town and KwaMbonambi town areas. This pipeline is connected to the Mandlazini bulk reservoirs in Richards Bay with the Mzingazi WTP at the Mzingazi Lake as the source. Water is supplied from the Mandlazini reservoirs to the Nseleni town reservoir from where the water is pumped into the abovementioned areas. The Upper-Nseleni Master Plan reports that this source is reliable and has sufficient capacity to sustain a regional scheme.

King Cetshwayo District Municipality has a supply agreement with the City of uMhlathuze for the supply of 2.8Mℓ/day for the Upper Nseleni scheme and 0.7Mℓ/day for the KwaMbonambi town bulk. The Nseleni bulk pipeline has a reserve capacity of 5.5Mℓ/d and 2.5Mℓ/d available for the Upper Nseleni and KwaMbonambi bulk, respectively. The City of uMhlathuze has also indicated that further capacity is available if so required. The Nseleni treatment works with the Nseleni River as the source has a capacity of 4.6Mℓ/day to supplement the supply to the Upper Nseleni-Mhlana scheme if required (Master Plan Upper-Nseleni Mhlana Regional Scheme, 2015 Revision).

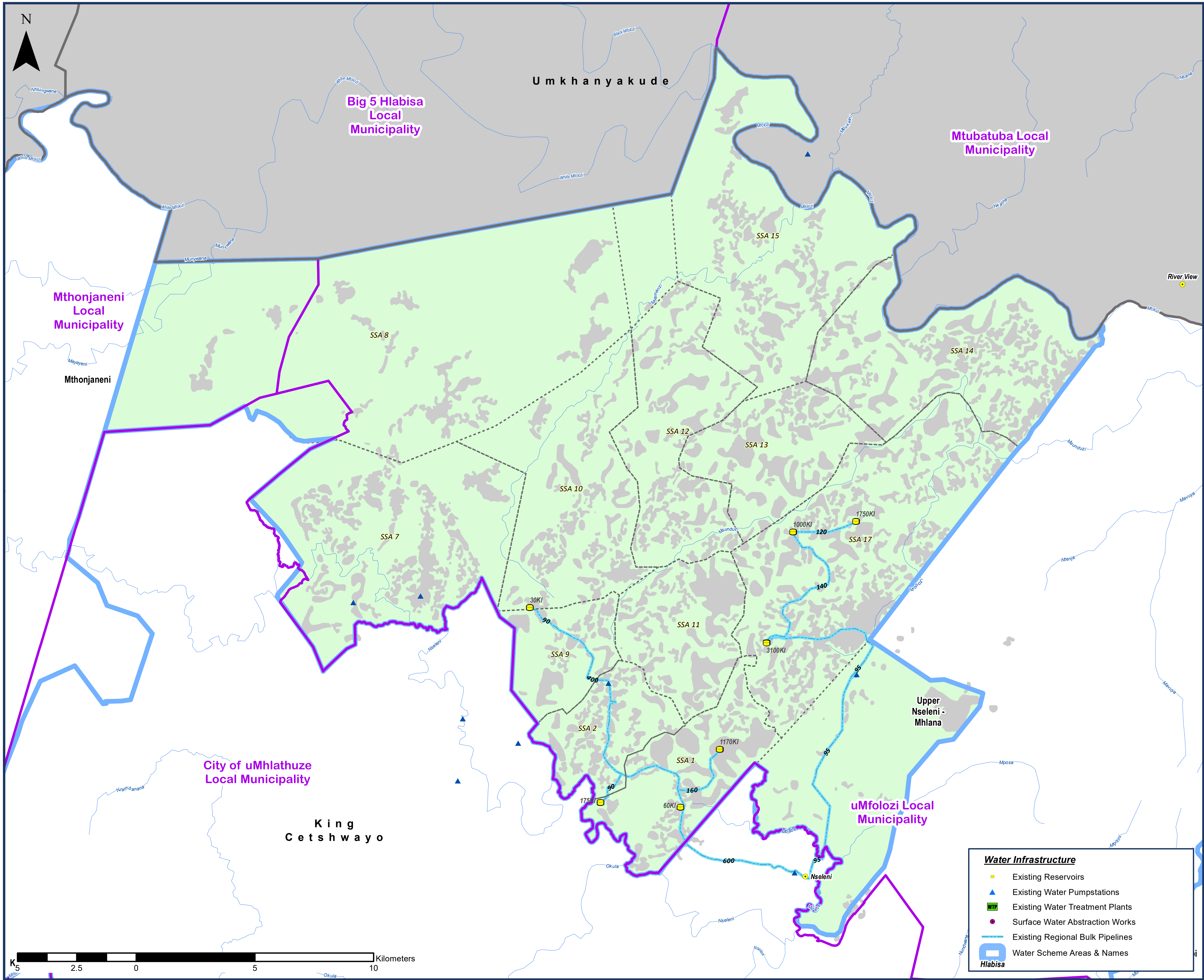
The Nkolokotho WTP with abstraction north of the Mfolozi River is situated in the uMkhanyakude District Municipality and provides treated water to both the Mpukunyoni Tribal Authority and Mhlana / Somopho bulk water supply.

Various developed boreholes serve water to existing small schemes within the supply areas. These have proven to be unreliable where frequent water supply interruptions occur during winter months.

There is existing licensing in place for raw water abstraction from the Mfolozi River (5Mℓ/d) and the Mzingazi Lake (66.25Mℓ/d).

According to the Individual Master Plan Upper Nseleni-Mhlana Regional Scheme, 2015 Revision has 15 Sub-supply Areas, but the footprint of the Upper Nseleni-Mhlana Scheme has changed since then as most of the Ntambanana LM has been incorporated with the City of uMhlathuze Local Municipality. Sub-Supply Areas 1,2,9 & 17 are currently served through two (2) pump stations, seven (7) reservoirs (ranging from 60kℓ - 1.2Mℓ) and approximately 26km bulk pipeline (ranging from ø 90mm – ø 600mm) (Master Plan Upper-Nseleni Mhlana Regional Scheme, 2015 Revision). See Figure 5-8 indicating the existing infrastructure and sub-supply areas within the Upper Nseleni-Mhlana Regional Water Supply Scheme.

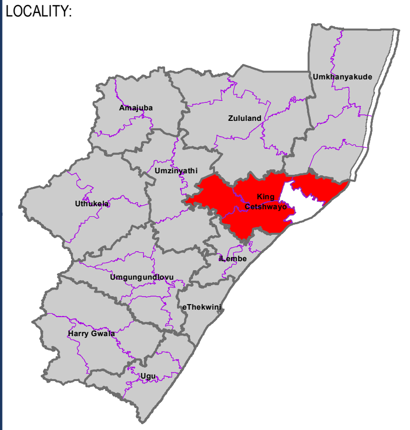
The Master Plan for the Upper Nseleni-Mhlana Regional Water Scheme makes provision for additional infrastructure to be constructed in order to supply water to the whole regional scheme area and is discussed in Section 8.6.



Legend

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names
- Rivers
- Settlements & Settlement Names
- Major Towns
- Sub-Supply Areas

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

LOCAL MUNICIPALITY:

KING CETSHWAYO DISTRICT MUNICIPALITY

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PROJECT TITLE

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Upper Nseleni-Mhlana
King Cetshwayo District Municipality

DATE COMPLETED:

30 September 2020

MAP NO.:

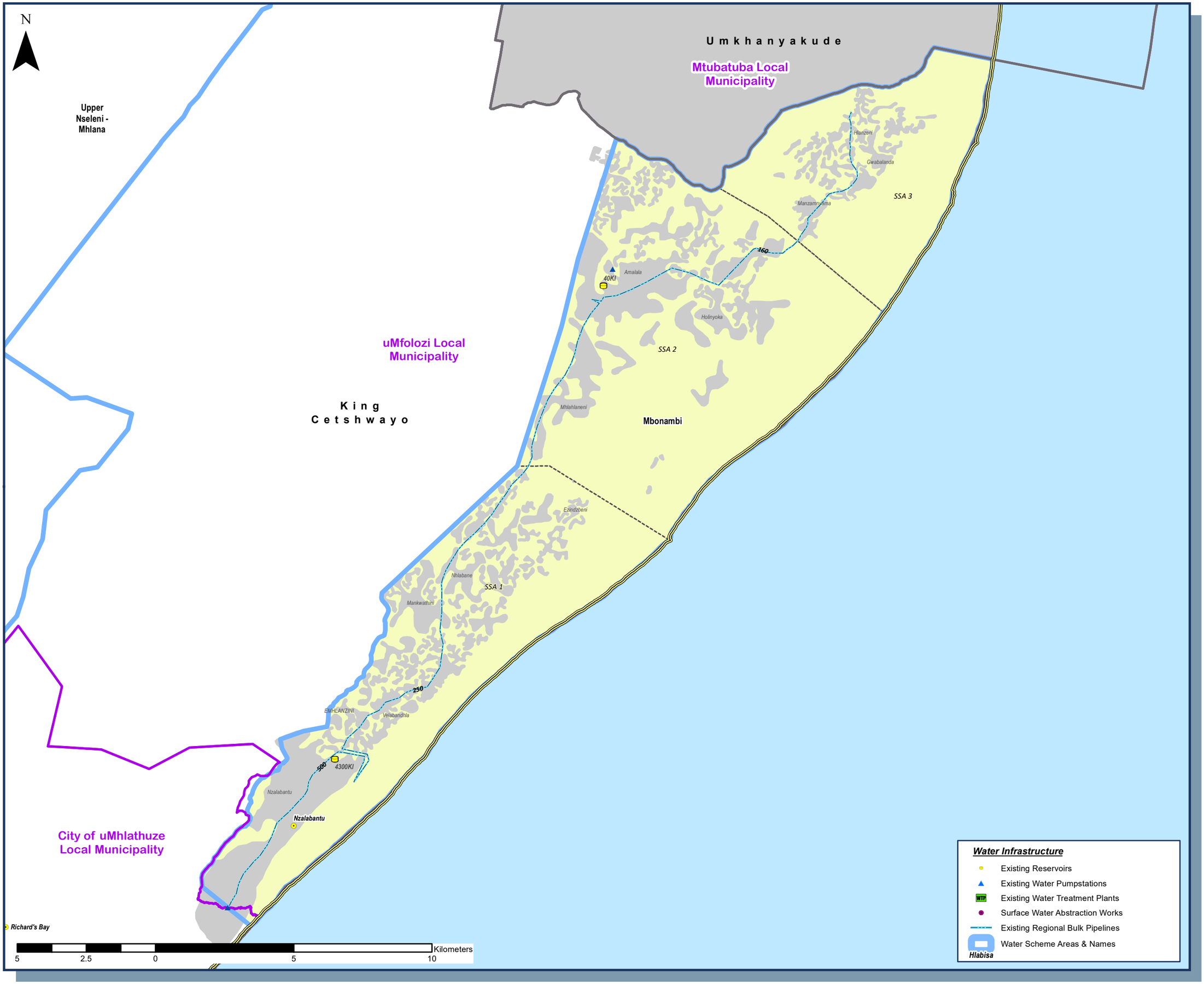
DC28 Figure 5.8

5.5.2 *Mbonambi Regional Water Supply Scheme*

The Mbonambi Regional Water Supply Scheme is supplied from Lake Mzingazi and Nsezi in the City of uMhlathuze, which has a yield of 2 Mℓ/day (after all other allocations). The total water supply needed for this scheme is in excess of 4 Mℓ/day but this can currently not be supplied by Mhlathuze Water and an augmentation of the scheme is necessary.

The Individual Master Plan Mbonambi Regional Scheme, 2015 Revision accounts that the following infrastructure is available to supply water to Sub-Supply Areas 1 & 2 through one (1) pump station, two (2) reservoirs (4.3Mℓ & 40kℓ) and approximately 31km bulk pipeline (ranging from ø 250mm – ø 500mm). Currently there are three (3) sub-supply areas within Mbonambi Regional Scheme. See Figure 5-9 indicating the existing infrastructure and sub-supply areas within the Mboanambi Regional Water Supply Scheme.

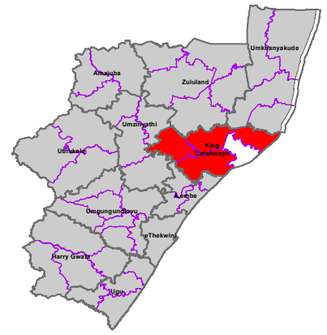
The individual Master Plan for the Mbonambi Regional Water Scheme makes provision for additional infrastructure to be constructed the remainder of the sub-supply areas in order to supply water to the whole regional scheme area and is discussed in Section 8.2.



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names
- Rivers
- Settlements & Settlement Names
- Major Towns
- Sub-Supply Areas

LOCALITY:



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PROJECT TITLE

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Mbonambi
King Cetshwayo District Municipality

DATE COMPLETED:
30 September 2020

MAP NO.:
DC28 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

6. EXISTING SANITATION BULK INFRASTRUCTURE

6.1 SANITATION SERVICE LEVEL

One of KCDM's Key Strategic objectives is to ensure a basic standard of living for all through the provision of basic sanitation delivery in the form of a Ventilated Improved Pit latrine (VIP).

KCDM reports that planning for future requirements has been done based on a master planning study that investigated various options considering their economic, technical, environmental, social suitability and cost. Sanitation has therefore been covered fully in all four Local Municipalities and is illustrated in Table 6-1 and Figure 6-1.

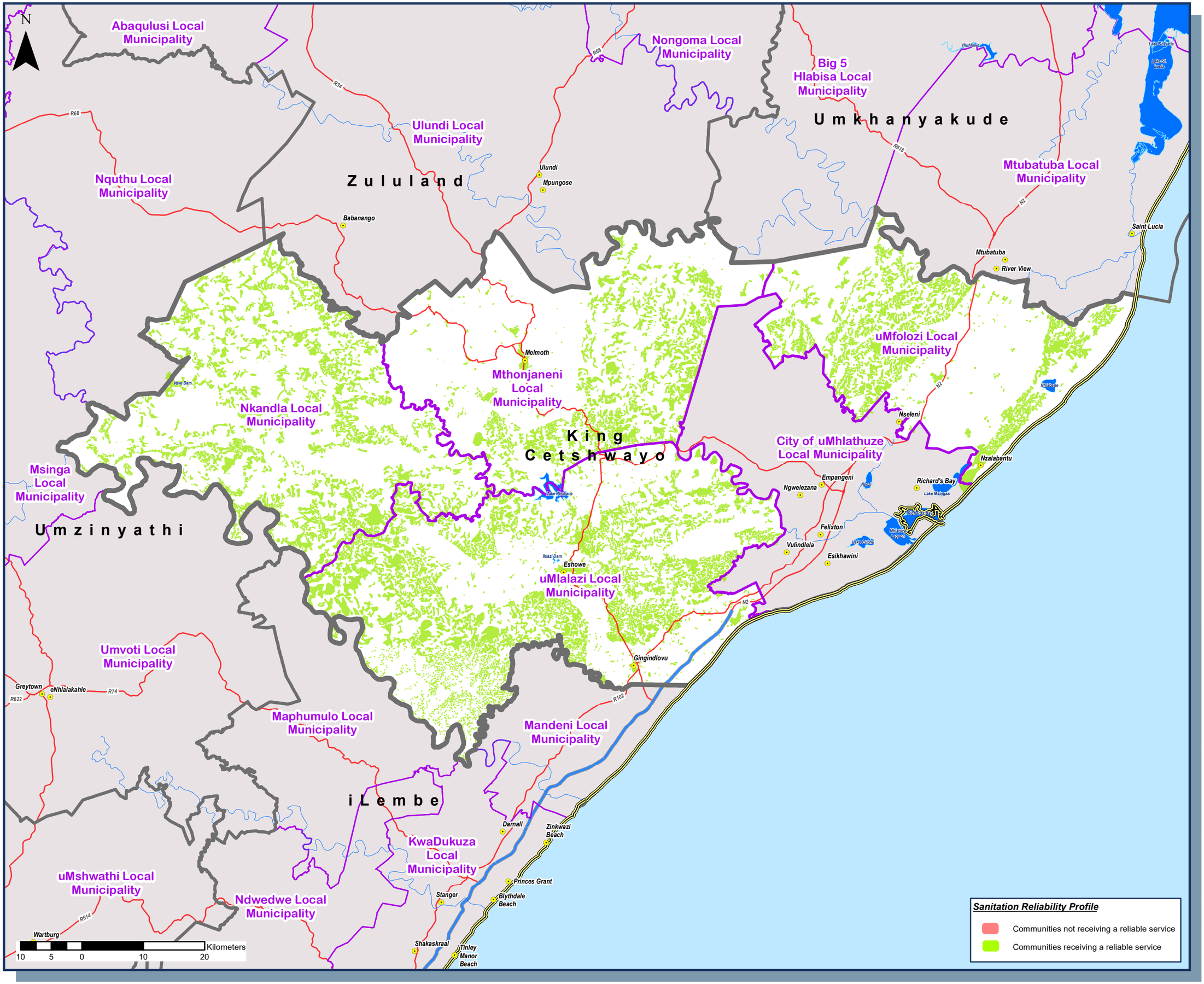
Table 6-1: Sanitation Backlogs within King Cetshwayo District Municipality

LM Name	Nr of Households	Households with Sanitation	Households without Sanitation	Backlog 2019/2020
Mthonjaneni	17 759	17 759	0	0%
Nkandla	22 484	22 484	0	0%
uMfolozi	24 802	24 802	0	0%
uMlalazi	43 851	38 633	0	0%
Total: King Cetshwayo	**108 896**	**103 678**	**0**	**0%**

Source: KCDM during Consultation, June 2019

Currently the DM is only busy with small infill sanitation projects. These are due to the relocation and/or expansion of existing homes, new houses and the general aging of infrastructure. The majority of the archloo type toilets have reached their design life span and this type of structure are now in need of new infrastructure.

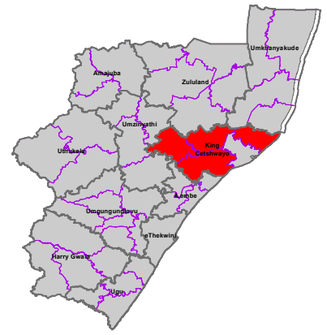
Precast toilets appear to be the most resilient and stable structure of the considered sanitation options and KCDM has adopted these facilities for use going forward.



Legend

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

LOCALITY:



CLIENT:

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PROJECT TITLE

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

MAP TITLE:

Sanitation Reliability Profile
King Cetshwayo District Municipality

DATE COMPLETED: 30 September 2020

MAP NO.: **DC28: Figure 6.1**

Sanitation Reliability Profile

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

6.2 EXISTING SANITATION BULK INFRASTRUCTURE

Information on KCDMs existing sanitation bulk infrastructure detailed in the paragraphs to follow, were sourced from KCDM's Rural Sanitation Plan, 2016 update, prepared by Aecom, and included an assessment on all the wastewater treatment works. Minimal work has been completed in terms of the wastewater treatment works in the KCDM service area and new information on the treatment works is limited.

KCDM has been performing poorly during the Green Drop reviews performed by DWS. DWS has recommended that the DM actively prepare for the next review and provide all necessary information required to improve their risk rating. Effluent water quality results for all the treatment works were not available at the time of the assessment. KCDM indicated that an external service provider is being procured to assist with the effluent water quality results.

Unfortunately, no flow data was available to establish the current flows to the wastewater treatment works. Details of the sanitation infrastructure is illustrated in Figure 6-2.

N

Abaqulusi Local Municipality

Nongoma Local Municipality

Big 5 Hlabisa Local Municipality

Ulundi Local Municipality

Zululand

Umkhanyakude

Nquthu Local Municipality

Mtubatuba Local Municipality

Dumane

Hluhluwe Dam

Lake St Lucia

Ulundi Weir

Ulundi

Mpungose

Babanango

Mdolozana

Saint Lucia

Mtubatuba

River View

uMfolozi Local Municipality

Melmoth

MELMOTH

KWABADALA

NKANDLA

EKHOMBE

Nkandla Local Municipality

Mthonjaneni Local Municipality

OWEN SITHOLE AGRIC COLLEGE

Nseleni

City of uMhlathuze Local Municipality

Nzalabantu

Msinga Local Municipality

Umzinyathi

King Cetshwayo

uMlalazi Local Municipality

EKUPHUMULENI HOSPITAL

Empangeni

Richard's Bay

Ngwelezana

Felixton

Vulindlela

Esikhawini

Mcibilindi

ESHOWE - FORT NONQUAI

Eshowe

KING DINIZULU

OCEAN VIEW

MBONGOLWANE

MTUNZINI

CATHERINE BOOTH HOSPITAL

Gingindlovu

GINGINDLOVU PONDS

Umvoti Local Municipality

Merthley Dam

Greytown

eNhlalakahle

Maphumulo Local Municipality

Mandeni Local Municipality

iMvutshane Dam

iLembe

KwaDukuza Local Municipality

Darnall

Zinkwazi Beach

Ekamanzi Dam

Umgungundlovu

uMshwathi Local Municipality

Princes Grant

Blythdale Beach

Stanger

Ndwedwe Local Municipality

Shakaskraal

Timley Manor Beach

Wartburg

10 5 0 10 20 Kilometers

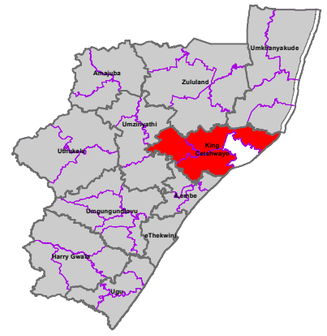
Sanitation Infrastructure

- Existing Wastewater Treatment Plants
- Existing Sewer Pump Stations
- Sanitation Scheme Areas

Legend

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

LOCALITY:



CLIENT:

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LOCAL MUNICIPALITY:

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PROJECT TITLE

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

MAP TITLE:

Existing Sanitation Infrastructure
King Cetshwayo District Municipality

DATE COMPLETED:
30 September 2020

MAP NO.:
DC28 Figure 6.2

6.2.1 Mthonjaneni Local Municipality

One wastewater treatment work is located in the Mthonjaneni Local Municipality, namely the Melmoth WWTP.

6.2.1.1 Melmoth WWTP

The Melmoth WWTP consists of the following units:

- ✓ Inlet works;
- ✓ Primary facultative pond;
- ✓ Maturation ponds; and
- ✓ Disinfection.

The concrete inlet works consists of one (1) manual screen and grit channels. Provision is made for flow metering but is not in operation. The primary facultative pond is concrete lined. Water flows from the primary facultative pond into a series of four maturation ponds. Effluent from the last maturation pond is chlorinated by using HTH tablets.

The current plant capacity is estimated at 375m³/day, with a loading rate of 115kg BOD/day. The plant capacity can be increased by altering the current operation thereof and to improve the flow distribution in the pond in order to prevent short-circuiting.

The site is neatly maintained however, the following areas as sighted in the assessment, require attention:

- ✓ No fence is surrounding the treatment works causing cattle to graze freely in the vicinity of the ponds;
- ✓ The plastic linings of the ponds are worn, and parts of the lining are floating on the surface. This will need to be replaced in order to prevent short-circuiting in the ponds as well as possible ground water contamination;
- ✓ Operation and maintenance of the inlet works are problematic; and
- ✓ Excessive vegetation in the ponds needs to be removed.

6.2.2 Nkandla Local Municipality

Two (2) wastewater treatment works, namely the Nkandla and Nkandla-KwaBadala WWTP, are located within the Nkandla Local Municipality.

6.2.2.1 Nkandla WWTP

The Nkandla WWTP consist of two identical trains with the following units:

- ✓ Primary facultative pond;
- ✓ Maturation ponds; and
- ✓ Disinfection.

The incoming raw sewage is split into two (2) streams, each flowing to one (1) of the two (2) trains of ponds. The primary facultative pond is concrete lined. Water from the primary facultative pond flows into a series of four (4) maturation ponds. Effluent from the last maturation pond is collected in 5 000ℓ plastic tanks where it is chlorinated by using HTH granules.

The current plant capacity is estimated at 840m³/day, with a loading rate of 250kg BOD/day. The plant capacity can be increased by altering the current operation thereof and to improve the flow distribution in the pond in order to prevent short-circuiting.

The site is neatly maintained with the fence surrounding the WWTP in very good condition, with locked entrance gates. However, the following areas as sighted in the assessment, require attention:

- ✓ Pond-overflows seemed to be blocked as some of the ponds is overflowing, causing low water levels in subsequent ponds;
- ✓ Operation and maintenance of the inlet works are problematic; and
- ✓ Excessive vegetation in the ponds needs to be removed.

6.2.2.2 Nkandla-KwaBadala WWTP

The Nkandla-KwaBadala WWTP consists of the following units:

- ✓ Inlet works;
- ✓ Primary facultative pond; and
- ✓ Maturation ponds.

The concrete inlet works consists of one manual screen with flow metering not currently in operation. Waste collected from the manual screen is burned on site. Sewage is treated in a primary facultative pond from where the water flows into a series of two maturation ponds (the third pond is dry). No disinfection system is currently in operation.

The current plant capacity is estimated at 85m³/day, with a loading rate of 20kg BOD/day. The plant capacity can be increased by altering the current operation thereof and to improve the flow distribution in the pond in order to prevent short-circuiting.

The site is neatly maintained with the fence surrounding the WWTP in very good condition, with locked entrance gates. However, the following areas as sighted in the assessment, require attention:

- ✓ The second maturation pond's overflow seemed to be blocked as the third maturation pond is dry;
- ✓ Operation and maintenance of the inlet works are problematic; and
- ✓ Excessive vegetation in the ponds needs to be removed.

6.2.3 uMlalazi Local Municipality

The following five wastewater treatment works located in the uMlalazi Local Municipality:

- ✓ Mtunzini WWTP;
- ✓ Gingindlovu WWTP;
- ✓ Eshowe – King Dinizulu WWTP;
- ✓ Eshowe – Ocean View; and
- ✓ Eshowe – Fort Nonquai.

6.2.3.1 Mtunzini WWTP

The Mtunzini WWTP consists of the following units:

- ✓ Inlet works;
- ✓ Flow balancing tank;
- ✓ Biological reactor (Extended aeration process);
- ✓ Clarifiers;
- ✓ Disinfection; and
- ✓ Sludge drying beds.

The concrete inlet works consists of one (1) manual screen, grit channels and one (1) venturi flow meter. Waste collected from the manual screen is burned on site. The biological reactor is a prefabricated mild steel structure, containing the balancing tank, biological reactor and the clarifiers. The balancing tank is equipped with one (1) mixer, while the biological reactor consists of two (2) aerobic basins equipped with a bubble aeration system. A clarifier with four (4) hoppers is separating the reactor activated sludge effluent from the treated effluent.

Effluent from the clarifiers is collected in two (2) 5 000ℓ plastic tanks where it is chlorinated by using HTH tablets. The effluent is discharged onto a wetland. Waste sludge from the biological process is withdrawn from the clarifiers and dried in one of three drying beds.

The current plant capacity is estimated at 320m³/day. However, the sludge handling capacity of the plant will become strained when this capacity is reached.

The site is neatly maintained, however, the following areas as sighted in the assessment, require attention:

- ✓ Parts of the steel reactor structure indicated excessive corrosion; and
- ✓ The state of the mechanical equipment is unknown, as the electricity to the plant was disrupted.

6.2.3.2 Gingindlovu WWTP

The Gingindlovu WWTP consists of the following units:

- ✓ Inlet works;
- ✓ Anaerobic ponds;
- ✓ Secondary facultative pond;
- ✓ Maturation ponds;
- ✓ Disinfection; and
- ✓ Sludge drying beds.

The concrete inlet works consists of one (1) manual screen and grit channels. The two (2) anaerobic ponds are a later addition to the plant and are concrete lined. The secondary facultative pond as well as the first maturation pond is equipped with one (1) floating aerator on each pond. The secondary facultative pond as well as the first two (2) maturation ponds is lined with a plastic lining. Water from the second maturation pond flows via a concrete channel to a series of four (4) maturation ponds. Effluent from the last maturation pond is recycled to the anaerobic ponds to minimize the scum layer on the surface of the anaerobic ponds. Final effluent is chlorinated by using HTH tablets. Waste sludge from the anaerobic ponds is pumped and dried in one of two drying beds.

The current plant capacity is estimated at 130m³/day, with a loading rate of 20kg BOD/day. The plant capacity can be increased by altering the current operation thereof.

The site is neatly maintained, however, the following areas as sighted in the assessment, require attention:

- ✓ No fencing surrounding the WWTP;
- ✓ The plastic linings of the ponds are worn, and parts of the lining are floating on the surface. This will need to be replaced in order to prevent short-circuiting in the ponds as well as possible ground water contamination;
- ✓ Operation and maintenance of the inlet works are problematic; and
- ✓ Excessive vegetation in the ponds needs to be removed.

6.2.3.3 Eshowe – King Dinizulu WWTP

The Eshowe-King Dinizulu WWTP consists of the following units:

- ✓ Inlet works;
- ✓ Activated sludge reactor;
- ✓ Clarifier;
- ✓ Disinfection; and
- ✓ Sludge lagoons.

The concrete Inlet Works, consisting of one (1) manual screen, grit channels and one (1) venturi flow meter, which is not currently in operation. The biological reactor consists of an anoxic section and an aerobic basin. The aerobic basin is designed to allow for plug flow conditions. It is equipped with a series of aerators.

One (1) clarifier is treating the reactor effluent. Effluent from the clarifier is chlorinated with chlorine gas before entering the chlorine contact tank. Waste sludge from the biological process is treated in sludge lagoons.

The current plant was upgraded to accommodate a capacity of estimated at 1 500m³/day.

The site is neatly maintained, however the following as sighted in the assessment, require attention:

- ✓ No fencing surrounding the WWTP;
- ✓ The mechanical equipment on the biological reactor is not well maintained;
- ✓ Dead areas (short-circuiting) in the biological reactor;
- ✓ Operation and maintenance of the inlet works are problematic; and
- ✓ Process control of the biological reactor requires attention, as the surface is covered in foam.

6.2.3.4 Eshowe – Ocean View WWTP

The Eshowe – Ocean View WWTP was recently upgraded (construction completed in April 2017) from 137kℓ/day capacity to 587kℓ/d. The current upgraded works consists of the following units:

- ✓ Buffer tank;
- ✓ Activate sludge reactor;
- ✓ Clarifiers;
- ✓ Disinfection tank;
- ✓ Sludge drying beds;
- ✓ Maturation ponds; and
- ✓ Container with control panels.

The concrete inlet works consists of one (1) manual screen, a grit channel and one (1) non-functional venturi flow meter. The works consists of three (3) prefabricated mild steel biological reactor structures. Each structure contains a biological reactor; a clarifier and two (2) hoppers. The biological reactors each consists of one (1) aerobic basin equipped with one (1) aerator. The three (3) clarifiers with two (2) hoppers each, are separating the reactor activated sludge effluent from the treated effluent. Effluent from the clarifiers is collected in three (3) jojo tanks, with chlorine disinfection taking place. The chlorine dosed effluent is discharged into a maturation pond. Waste sludge from the biological process is treated using any of the ten (10) drying beds.

As a method of measuring the actual flows through the WWTP an ultrasonic flow measuring device was installed at the outlet of the plant. These measurements were recorded over a period of 16 days and the average daily flow rate was calculated to be 446.8m³/d.

The plant is operational and in good condition.

6.2.3.5 Eshowe – Fort Nonquai WWTP

The Eshowe-Fort Nonquai WWTP consists of the following units:

- ✓ Inlet works;
- ✓ Anaerobic digester;
- ✓ Maturation ponds; and
- ✓ Sludge drying beds.

The concrete inlet works consists of one (1) manual screen. Hereafter, sewage enters the newly constructed anaerobic tank from where it flows to a series of five (5) maturation ponds from where the effluent is irrigated. Waste sludge from the anaerobic tanks is dried in one (1) of three (3) drying beds.

The plant capacity was upgraded to accommodate a capacity of 700m³/day.

The site is neatly maintained, however the following as sighted in the assessment, require attention:

- ✓ No fencing surrounding the WWTP;
- ✓ Operation and maintenance of the inlet works are problematic; and
- ✓ Excessive vegetation in the ponds needs to be removed.

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 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[2] or sub regional [3] scale (over vast distances [4]), with internal bulk and reticulation 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 works 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 the 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

The KCDM mainly receives their funding from MIG and WSIG. Only two regional bulk infrastructure projects receive funding from RBIG.

The funding streams for infrastructure development over the next three years are tabled in Table 7-1 below.

Table 7-1: Grant Funding Streams

Grant Funding Programme	2019/2020 (R '000)	2020/2021 (R '000)	2021/2022 (R '000)	Total Funding over Next 3 Financial Years
Municipal Infrastructure Grant (MIG)	R170 818	R180 826	R195 224	R546 868
Water Services Infrastructure Grant (WSIG)	R100 000	R98 115	R105 000	R303 115
Regional Bulk Infrastructure Grant (RBIG)	R91 519	R80 000	R87 316	R258 835
	R362 337	**R358 941**	**R387 540**	**R1 108 818**

Source: Division of Revenue Bill Schedule (DORA), 2019/2020

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

[3] "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

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

Table 7-2 indicates the RBIG funding allocated for the next three financial years to two bulk projects within KCDM.

Table 7-2: RBIG Funding in terms of DORA for KCDM

Local Municipality	Project Name	2019/2020 (R '000)	2020/2021 (R '000)	2021/2022 (R '000)
Mthonjaneni/ Nkandla Local Municipalities	Greater Mthonjaneni Bulk Water Supply	R30 000	R30 000	R37 316
Nkandla Local Municipality	Middledrift (Nkandla) Regional Bulk Water Supply	R61 519	R50 000	R50 000
Total King Cetshwayo District Municipality		**R91 519**	**R80 000**	**R87 316**

Source: Division of Revenue Bill Schedule (DORA), 2019/2020

The funding allocations per Local Municipality as presented in DORA, is presented in Table 7-3 below.

Table 7-3: Three-Year Medium-Term Expenditure Framework (MTEF) per Local Municipality in KCDM

LM Name	Municipal Infrastructure Grant (MIG)			Water Services Infrastructure Grant (WSIG)		
	2019/2020 (R '000)	2020/2021 (R '000)	2021/2022 (R '000)	2019/2020 (R '000)	2020/2021 (R '000)	2021/2022 (R '000)
Total: King Cetshwayo	**170 818**	**180 826**	**195 224**	**100 000**	**98 115**	**105 000**

Source: Division of Revenue Bill Schedule (DORA), 2019/2020

Table 7-4 lists KCDM's capital projects with the gazetted funding allocations per funding source as provided by KCDM officials.

Table 7-4: Capital Projects for KCDM for the next three financial years

Project Name	Funding Source	FY 19/20 Budget Gazetted	FY 20/21 Budget Gazetted	FY 21/22 Budget Gazetted
Kwahlokohloko SSA 1: Bulk and Reticulation	MIG	R0	R25 000 000	R25 000 000
Eshowe SSA 1: Bulk and Reticulation	MIG	R400 000	R10 000 000	R10 000 000
Greater Mthonjaneni SSA 2: Reticulation	MIG	R0	R0	R0
Greater Mthonjaneni SSA 4: Reticulation	MIG	R0	R0	R0
Middledrift Phase 2: Bulk and Reticulation	MIG	R34 670 273	R17 000 000	R15 000 000
Middledrift SSA3: Bulk & Reticulation	MIG	R0	R10 000 000	R10 000 000
Vutshini: Bulk	MIG	R2 000 000	R20 000 000	R10 000 000
Mbonambi Water Phase 2: Bulk & Reticulation	MIG	R0	R0	R0
Greater Mthonjaneni SSA 5: Reticulation	MIG	R0	R0	R2 000 000
Mpungose Phase 1D: Bulk & Reticulation	MIG	R0	R0	R2 000 000
Nkandla Vutshini S/A SSA5: Bulk & Reticulation	MIG	R28 100 000	R17 000 000	R17 000 000
Kwahlokohloko S/A SSA5: Bulk & Reticulation	MIG	R18 990 000	R0	R15 000 000
Mhlana Somopho Phase 3C: Bulk & Reticulation	MIG	R0	R20 000 000	R10 000 000
Middledrift SSA 5: Bulk & Reticulation	MIG	R39 073 824	R10 000 000	R10 000 000
Eshowe Sewer Upgrade: Reticulation & WWTW	MIG	R22 000 000	R6 000 000	R12 000 000
Mbonambi Water SSA 2: Bulk & Reticulation	MIG	R0	R0	R0
Eshowe SSA 3: Bulk Water & Reticulation	MIG	R0	R0	R0
Greater Mthonjaneni SSA 8 Water Supply	MIG	R0	R0	R0
Greater Mthonjaneni SSA 6 Water Supply	MIG	R0	R0	R0
Gazetted MIG Allocations:		**R164 265 755**	**R167 000 000**	**R172 000 000**
Tanker Reduction Strategy (MWIG)	WSIG	R27 000 000	R25 000 000	R20 000 000
WC/WDM Strategy Implementation	WSIG	R40 000 000	R30 000 000	R30 000 000
Smart Meter Installation	WSIG	R23 000 000	R20 000 000	R25 000 000
Nkandla Weir	WSIG	R5 000 000	R13 115 000	R10 000 000
Water and sewer plants refurbishment	WSIG	R5 000 000	R10 000 000	R20 000 000
Gazetted WSIG Allocations		**R100 000 000**	**R98 115 000**	**R105 000 000**
Greater Mthonjaneni SSA 2: Bulk	RBIG	R15 000 000	R5 000 000	R10 000 000
Eshowe SSA 1: Bulk	RBIG	R0	R0	R15 000 000
Middledrift SSA2: Bulk	RBIG	R0	R15 000 000	R10 000 000
Middledrift SSA3: Bulk	RBIG	R0	R0	R10 000 000
Middledrift SSA5: Bulk	RBIG	R0	R0	R10 000 000
Kwahlokohloko SSA 1: Bulk	RBIG	R76 519 000	R60 000 000	R32 316 000
Gazetted RBIG Allocations		**R91 519 000**	**R80 000 000**	**R87 316 000**

Source: KCDM, June 2019

8. SYNOPSIS OF EXISTING AND COMMITTED SCHEMES

UAP Phase II made recommendations taking into consideration the KCDM Overall Master Plan, 2015 (5 regional schemes). However, since UAP Phase II, KCDM updated their Overall Master Plan of Water Supply (2015 Revision), dated March 2017. Discussions with KCDM Officials during this project clarified that the District Municipality agrees with their Overall Master Plan for KCDM (2015 Revision), dated March 2017, in terms of their seven supply schemes and that these schemes should be used for all future planning. Reference is also made to the previous recommendations made under UAP Phase II for completeness where applicable but the KCDM Overall Master Plan will be used as the basis for the gap analysis of existing and proposed planning interventions when comparing with UAP III.

Therefore, the gap analysis has considered current planning interventions by the WSA. In this regard, the entire KCDM has been demarcated into regional water schemes in line with short- and long-term plans by the WSA. Seven (7) regional schemes have been identified and are as follows:

- ✓ UTG002: Eshowe Scheme;
- ✓ UTG006: Mbonambi Scheme;
- ✓ UTG007 Kwahlokohloko Scheme;
- ✓ UTG009: Middledrift Scheme;
- ✓ UTG010: Mthonjaneni Scheme;
- ✓ UTG014: Upper Nseleni-Mhlana Scheme and
- ✓ UTG016: Vutshini – Nkandla Scheme.

The gap analysis for the seven (7) regional schemes is discussed under this section.

8.1 UTG002: ESHOWE SCHEME

The Eshowe WTP (7Mℓ/day) is situated in the town of Eshowe. Raw water is supplied from the Ruthledge Park and Ihlazi Dams situated in the Mlalazi River, a tributary of the Mhlatuze River. The Ruthledge Park Dam is very small and is supplemented by raw water supplies from Lake Phobane. Two (2) small treatment plants, namely Catherine Booth Hospital and Obanjeni WTPs, supply the surrounding communities. According to DWS, 2016, both Ihlazi and Ruthledge Dams operate as a unit and their combined firm yield is 1.29 million m³ (3.53Mℓ/day). These dams also supply the Eshowe Water Supply Scheme.

UAP Phase II recommended that the Lower Thukela Bulk Water Supply Scheme be extended to transfer 60 Mℓ/day via a 60km long, ø 1 000mm bulk pipeline to supply the Goedertrouw Regional Scheme (Eshowe, Kwahlokohloko and Mthonjaneni) at a cost of R2.3 billion. According to the Master Plan Goedertrouw Regional Scheme, 2015 Revision, seven (7) additional reservoirs and 59km of bulk pipelines ranging from ø 90mm to ø 600mm are envisaged to be constructed to supply water to the whole regional scheme area as well as the upgrade / refurbishment of the Eshowe WTP to 30Mℓ/day.

However, the infrastructure will still not be sufficient to meet the 2050 demand and will be augmented during UAP III. Alternative options could also be proposed.

A MIG project was identified to upgrade the existing distribution network around Eshowe to the value of approximately R 24 million as well as an RBIG project earmarked for an amount of R 15 million only in 2021/22. The latter should be considered when planning the bulk infrastructure requirements.

In evaluating whether the existing infrastructure would meet the demand for 2050, the current water source is sufficient, but the bulk distribution and storage need to be increased. The proposal to upgrade the Eshowe WTP to 30 Mℓ /day might therefore not be feasible. This comparison is provided in Table 8-1.

Table 8-1: Eshowe Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
***Water Treatment (Mℓ/d)**	6.9	23.1	30	-	-
Storage (Mℓ)	15.24	9	24.24	51.34	36.11
Bulk conveyance - Raw Water (Mℓ/d)	-	-	-	-	-
Bulk conveyance - Clear Water (Mℓ/d)	126.8	0	126.8	161.14	34.46

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 secondary and tertiary reservoirs would need to be increased to meet the demand of 2050.

8.2 UTG006: MBONAMBI SCHEME

The Mbonambi Regional Water Supply Scheme is supplied from Lake Mzingazi and Nsezi in the City of uMhlathuze, which has a yield of 2 Mℓ/day (after all other allocations). The individual Master Plan for the Mbonambi Regional Water Scheme indicates that the total water supply needed for this scheme was in excess of 4 Mℓ/day but this can currently not be supplied by Mhlathuze Water and an augmentation of the scheme is necessary.

UAP Phase II recommended that the Lower Thukela Bulk Water Supply Scheme be extended to transfer 60 Mℓ/day via a 60km long, ø 1 000mm bulk pipeline to Richard's Bay and to Mfolozi LM at a cost of R2.33 billion. According to the Master Plan Mbonambi Regional Scheme, 2015 Revision, one (1) additional reservoir, one (1) pump station and 15km of ø 160mm bulk pipelines are envisaged to be constructed to supply water to the whole area.

UAP Phase III proposes to extend / upgrade the existing and planned infrastructure to meet the 2050 demand. It also recommends that a Serivce Level Agreement with the City of uMhlathuze be signed to provide for the addititional water demand needed for the Mbonambi Scheme.

No projects are currently planned for the next three financial years for the upgrade of the Mbonambi scheme.

The current water source is insufficient, and the treatment, bulk distribution and storage need to be increased when compared with the projected 2050 demand of 12.63 Mℓ/day. This comparison is provided in Table 8-2 below.

Table 8-2: Mbonambi Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
***Water Treatment (Mℓ/d)**					
Storage (Mℓ)	4.5	9	4.5	25.3	20.7
Bulk conveyance - Raw Water (Mℓ/d)	-	-	-	-	-
Bulk conveyance - Clear Water (Mℓ/d)	25.26	0	25.26	35.36	10.10

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 secondary and tertiary reservoirs would need to be increased to meet the demand of 2050.

8.3 UTG007 KWAHLOKOHLOKO SCHEME

The Kwahlokohloko Water Supply area is supplied by the Mpungose WTPs which gets its raw water from Lake Phobane (previously Goedertrouw Dam) situated in the Mhlatuze River.

The current water source is sufficient and according to the Master Plan Goedertrouw Regional Scheme 2015 Revision, the bulk distribution network and storage need to be increased to meet the future demand.

UAP Phase II recommended that the Lower Thukela Bulk Water Supply Scheme be extended to transfer 60 Mℓ/day via a 60km long, ø 1 000mm bulk pipeline to supply the Goedertrouw Regional Scheme (Eshowe, Kwahlokohloko and Mthonjaneni) at a cost of R2.3 billion. According to the Master Plan Goedertrouw Regional Scheme, 2015 Revision, 12 additional reservoirs, one (1) pump station and 110km km of bulk pipelines ranging from ø 90mm to ø 800mm are envisaged to be constructed to supply water to the whole regional scheme area.

However, the infrastructure will still not be sufficient to meet the 2050 demand and will be augmented in UAP Phase III.

Two (2) MIG project were identified to upgrade the existing distribution network around Kwahlokohloko sub-supply area 1 to the value of approximately R 84 million as well as an RBIG project earmarked for an amount of R 168 million over the next three years.

In evaluating whether the existing and planned infrastructure would meet the demand for 2050, the current water source is sufficient, but the bulk distribution and storage need to be increased. The projected 2050 demand is 17.82 Mℓ/day. This comparison is provided in Table 8-3 below.

Table 8-3: Kwahlokohloko Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
***Water Treatment (Mℓ/d)**	10	0	10	76.5	66.5
Storage (Mℓ)	26.25	9	26.25	49.38	23.13
Bulk conveyance - Raw Water (Mℓ/d)	-	-	-	-	-
Bulk conveyance - Clear Water (Mℓ/d)	150.03	0	150.03	185.36	35.33

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 secondary and tertiary reservoirs would need to be increased to meet the demand of 2050.

8.4 UTG009: Middledrift Scheme

The Middledrift Regional Water Supply Scheme area is supplied using the Thukela Transfer scheme abstraction works from where water is pumped to the Middledrift WTP (9.85Mℓ/day currently with KCDM planning to upgrade it to 13.86Mℓ/day) which supplies the various communities in the supply area. Taking the projected 2050 demand into consideration, the WTP would need to be upgraded to 19Mℓ/day.

UAP II recommended that additional raw water is supplied from the Thukela River to Lake Phobane (Goedertrouw Dam) at Middledrift via a ø 850mm pipeline together with three pump stations to the value of R 779.6 million. The aforementioned was substantially expanded during the WSA's master planning process and proposed to subdivide the Goedertrouw Regional scheme again into three (3) previous regional schemes to supply the Eshowe, Kwahlokohloko and Mtonjaneni areas to reduce pumping costs.

According to the Master Plan Middledrift Regional Scheme, 2015 Revision, 51 additional reservoirs, seven (7) pump stations and 260km km of bulk pipelines ranging from ø 90mm to ø 350mm are envisaged to be constructed to supply water to the whole regional scheme area. However, the infrastructure will still not be sufficient to meet the 2050 demand and will be further augmented in UAP Phase III.

Three (3) MIG project were identified to upgrade the existing bulk and reticulation distribution network for the Middledrift Scheme to the value of approximately R 145.75 million as well as three (3) RBIG projects are earmarked for an amount of R 45 million to commence in 2020.

In evaluating whether the existing and planned infrastructure would meet the demand for 2050, the current water source is sufficient, but the treatment capacity, bulk distribution and storage need to be increased. The projected 2050 demand is 19.71 Mℓ/day. This comparison is provided in Table 8-4 below.

Table 8-4: Middledrift Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
***Water Treatment (Mℓ/d)**	10	3.86	13.86	19	5.14
Storage (Mℓ)	36.86	0	36.86	51.2	14.3
Bulk conveyance - Raw Water (Mℓ/d)	-	-	-	-	-
Bulk conveyance - Clear Water (Mℓ/d)	129.73	0	129.73	155.24	25.87

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 treatment works, the bulk pipelines and secondary and tertiary reservoirs would need to be increased to meet the demand of 2050.

8.5 UTG010: MTHONJANENI SCHEME

The Greater Mthonjaneni Regional Scheme with Lake Phobane remains the most viable source to supply water to Mthonjaneni, Kwahlokohloko and Eshowe supply areas. The Regional Scheme therefor supplies both the northern areas which form part of the Mthonjaneni Local Municipality as well as the southern areas (Eshowe & Kwahlokohloko) which lie within the uMlalazi Local Municipality.

UAP Phase II recommended that the Lower Thukela Bulk Water Supply Scheme bulk pipeline be extended to supply the Goedertrouw Regional Scheme (Eshowe, Kwahlokohloko and Mthonjaneni). It was proposed to construct a 22 km long 800mm diameter pipeline from Eshowe Command Reservoir to supply the Mthonjaneni Scheme.at a cost of R 872.2 million. According to the Master Plan Goedertrouw Regional Scheme, 2015 Revision, 26 additional reservoirs, seven (7) pump stations and 115km of bulk pipelines ranging from ø 90mm to ø 400mm are envisaged to be constructed to supply water to the whole regional scheme area.

However, the infrastructure will still not be sufficient to meet the 2050 demand and will be further augmented in UAP Phase III.

There are no MIG projects planned for the next three years for the Mthonjaneni Scheme. One (1) RBIG project is earmarked for implementation over the next three years to the value of R 30 million.

In evaluating whether the existing and planned infrastructure would meet the demand for 2050, the current water source is sufficient, but the capacity of the treatment plant, bulk distribution network and storage need to be increased. The projected 2050 demand is 22.02 Mℓ/day. This comparison is provided in Table 8-5 below.

Table 8-5: Mthonjaneni Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
***Water Treatment (Mℓ/d)**	20	40	60	65	5
Storage (Mℓ)	36.86	0	36.86	51.2	14.3
Bulk conveyance - Raw Water (Mℓ/d)	-	-	-	-	-
Bulk conveyance - Clear Water (Mℓ/d)	**129.73**	**0**	**129.73**	**155.24**	**25.87**

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 treatment works, the bulk pipelines and secondary and tertiary reservoirs would need to be increased to meet the demand of 2050.

8.6 UTG014: Upper Nseleni-Mhlana Scheme

King Cetshwayo District Municipality have a supply agreement with the City of uMhlathuze for the supply of 2.8Mℓ/day for the Upper Nseleni scheme and 0.7Mℓ/day for the KwaMbonambi town bulk. The Nseleni bulk pipeline has a reserve capacity of 5.5Mℓ/d and 2.5Mℓ/d available for the Upper Nseleni and KwaMbonambi bulk, respectively. The City of uMhlathuze has also indicated that further capacity up to16 Mℓ/day is available if so required. The Nseleni treatment works with the Nseleni River as the source has a capacity of 4.6Mℓ/day to supplement the supply to the Upper Nseleni-Mhlana scheme if required.

UAP Phase II recommended a possible dam and WTP on the Mfule River at a cost of R9.3 billion. However, as indicated above, the City of uMhlathuze has indicated additional capacity is available to augment the Upper Nseleni-Mhlana Scheme if required. According to the Master Plan Upper Nseleni-Mhlana Regional Scheme, 2015 Revision, 30 additional reservoirs, four (4) pump stations and 145km of bulk pipelines ranging from ø 90mm to ø 450mm are envisaged to be constructed to supply water to the whole regional scheme area.

However, the infrastructure will still not be sufficient to meet the 2050 demand and will be further augmented in UAP Phase III.

One (1) MIG reticulation project is earmarked for implementation in 2020/2021 and 2021/2022 financial years to the value of R 30 million and is included within the 3-year MTEF for the Upper Nseleni-Mhlana Scheme.

In evaluating whether the existing and planned infrastructure would meet the demand for 2050, the current water source is sufficient, but the bulk distribution and storage need to be increased. The projected 2050 demand is 20.2 Mℓ/day. This comparison is provided in Table 8-6 below.

Table 8-6: Nseleni-Mhlana Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
***Water Treatment (Mℓ/d)**	204	0	204	204	0
Storage (Mℓ)	20.8	0	20.8	48.1	27.3
Bulk conveyance - Raw Water (Mℓ/d)	-	-	-	-	-
Bulk conveyance - Clear Water (Mℓ/d)	**264.75**	**0**	**264.75**	**319.34**	**54.59**

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 treatment works, the bulk pipelines and secondary and tertiary reservoirs would need to be increased to meet the demand of 2050

8.7 UTG016: VUTSHINI – NKANDLA SCHEME

The Vutshini-Nkandla Regional Water Supply Scheme area is supplied mainly from run-of-river abstraction from the Vutshini Stream, a tributary of the Nsuze River, and the Vove Dam (yield of 0.55Mℓ/day) on the Vove River and the Mhlathuze River (yield of 1.34Mℓ/day) and a water treatment plant (Nkandla WTP, 2.5Mℓ/day) near the river from where water is pumped to the Mpungose Tribal Authority, towards Nkandla town. There are also several small water supply schemes still supplying some of the areas in the water supply scheme area.

UAP Phase II recommended two possible options to supply the Vutshini-Nkandla Scheme. The first option is to supply Vutshini-Nkandla from the Dundee Bulk Scheme at a cost of R842 million or a possible dam and WTP on the Nsuzu River at a cost of R1.8 billion. The Master Plan - Vutshini-Nkandla Regional Scheme, 2015 Revision, also recommends further investigations into dam sighting and sustainable yield calculations for the proposed Nsuzu Dam as current abstraction is insufficient to meet the water requirements for all the water users in the future. A new water treatment plant of 20Mℓ/day at the possible dam site will also be required.

According to the Master Plan Upper Nseleni-Mhlana Regional Scheme, 2015 Revision, 51 additional reservoirs, 22 pump stations and 198km of bulk pipelines ranging from ø 90mm to ø 355mm are envisaged to be constructed to supply water to the whole regional scheme area.

However, the infrastructure will still not be sufficient to meet the 2050 demand and will be further augmented in UAP Phase III.

Two (2) MIG projects are currently underway to the value of R 94,1 million.

In evaluating whether the existing and planned infrastructure would meet the demand for 2050, the current water source is sufficient, but the bulk distribution and storage need to be increased. The projected 2050 demand is 24,38 Mℓ/day. This comparison is provided in Table 8-7 below.

Table 8-7: Vutshini-Nkandla Scheme Gap Analysis

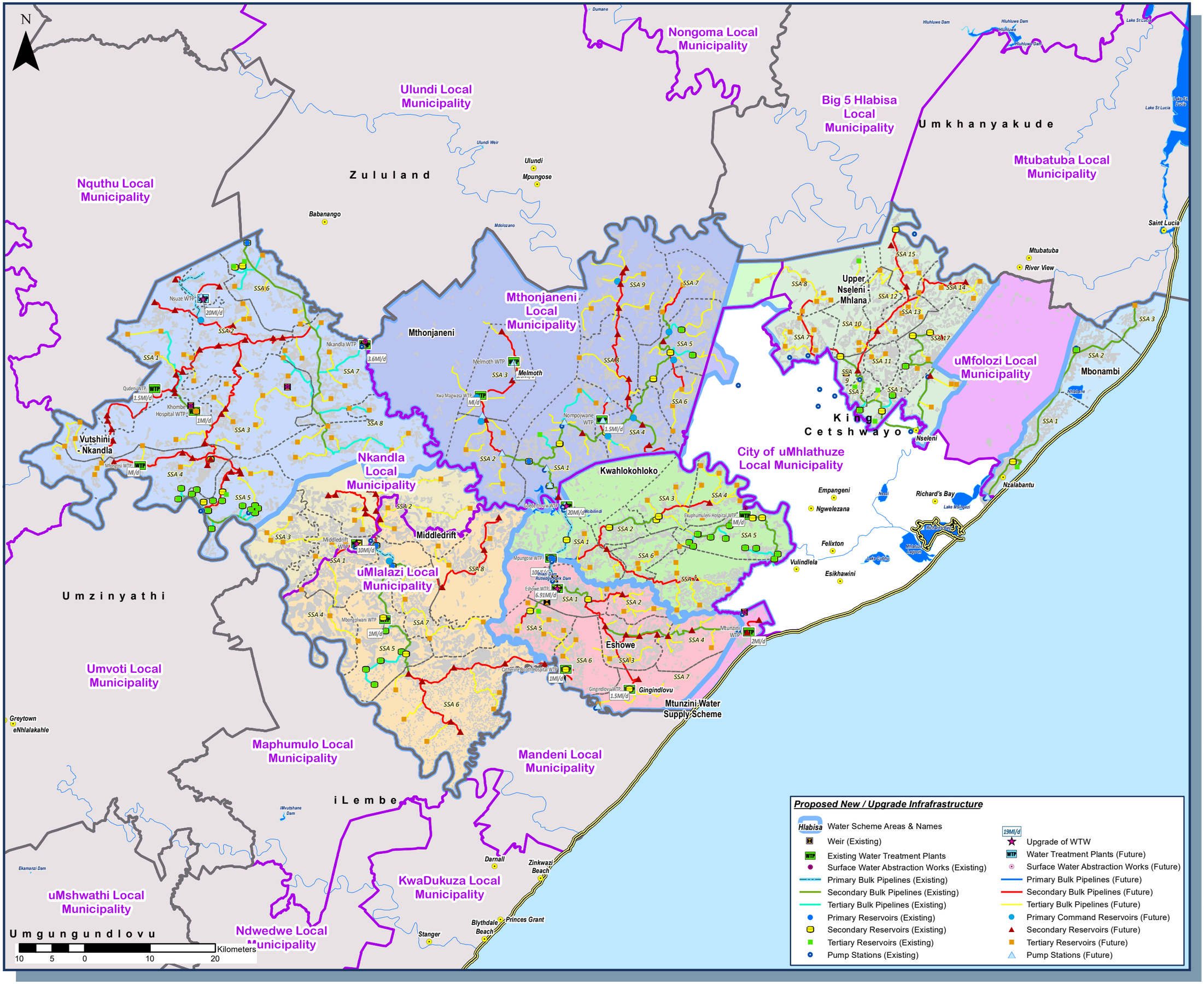
Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
***Water Treatment (Mℓ/d)**	4	20	24	25	1
Storage (Mℓ)	32.93	0	32.93	65.02	32.09
Bulk conveyance - Raw Water (Mℓ/d)	-	-	-	-	-
Bulk conveyance - Clear Water (Mℓ/d)	**80.08**	**0**	**80.08**	**104.23**	**24.15**

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 treatment works, the bulk pipelines and secondary and tertiary reservoirs would need to be increased to meet the demand of 2050.

9. PROPOSED BULK WATER SUPPLY INTERVENTIONS

This section details the water supply reconciliation options for bulk water services within the King Cetshwayo 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.

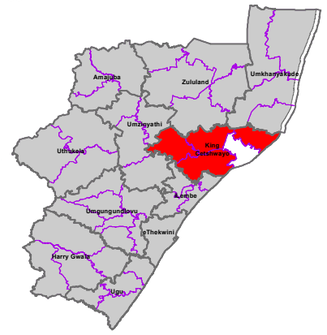
The details of the each WSIA split between existing upgrade and future additional requirements are provided per WSIA within the paragraphs hereafter and illustrated for the entire WSA within Figure 9-1 and per proposed WSIA.



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names
- Rivers
- Settlements
- Major Towns (Eshowe)
- Sub-Supply Areas (SSA 1)

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

LOCAL MUNICIPALITY:

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PROJECT TITLE

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

MAP TITLE:

Total Bulk Water Supply Interventions
King Cetshwayo District Municipality

DATE COMPLETED: 30 September 2020

MAP NO.: **DC28 Figure 9.1**

Proposed New / Upgrade Infrafrastructure

- Hlabisa — Water Scheme Areas & Names
- Weir (Existing)
- 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 WTW
- Water Treatment Plants (Future)
- 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)

9.1 UTG002: ESHOWE SCHEME

9.1.1 Demand Model Intervention

9.1.1.1 Water Demand

The water demand for the Eshowe WSIA was determined for 2020 and 2050 and included within Table 9-1. It includes approximately 47 communities of which only Eshowe is a formal urban town and the rest rural communities. The scheme serves the town of Eshowe from where the scheme is extended to the surrounding rural communities. Eshowe Scheme is expected to have a demand of 23Mℓ in 2050.

Table 9-1: Population and Water Demand 2020 and 2050 for the Eshowe WSIA

Population	**Population 2020**	**Population 2050**
	87 737	103 835
Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	18.94	**23.03**

9.1.1.2 Water Resource Consideration

The existing bulk infrastructure for the Eshowe Water Supply Areas consists of a ø 300mm raw water pipeline from Lake Phobane to Goedertrouw WTP and further to Ruthledge Dam at Eshowe. Raw water is supplied from Ruthledge and Ihlazi Dams (also known as Eshlazi Dam) situated in the Mlalazi River, a tributary of the Mhlatuze River. They are located north of the Dlinza Nature Reserve and Eshowe. The main source of water supply for the Eshowe Water Supply Scheme is from Lake Phobane. The Mlalazi River catchment is also one of the sources of supply to the Eshowe Scheme. The Ruthledge Dam is very small and is supplemented by raw water supplies from Lake Phobane. Both Ihlazi and Rutledge Dams operate as a unit and their combined firm yield is 1.29 million m³ (3.53Mℓ/day). These dams also supply the Eshowe Water Supply Scheme. Raw water from Ruthledge Dam is constrained and additional raw water will have to come from Lake Phobane.

The Matigulu River also supplies irrigation areas within the Eshowe Water Supply Scheme area. Commercial forestry within this area does, however, influence the runoff and yield that can be obtained from the Matigulu River.

The Goedertrouw WTP needs to be upgraded from 20Mℓ/day to 80Mℓ/day and the Eshowe WTP be upgraded to 30Mlℓ/day.

9.1.2 Water Supply Infrastructure

9.1.2.1 Bulk Conveyance

- ✓ Sub-Supply Area 1 is supplied with raw water from the Ruthledge and Ihlazi Dama via 4km primary bulk pipeline ø 1100mm to the Eshowe WTP located within the Eshowe town;

- ✓ From the Eshowe WTP an existing 7km secondary pipeline (ranging between ø 350mm and ø 650mm) runs east towards Nyanini. The secondary pipeline (ø 200mm) would need to be extended a further 2.5km towards the east to serve Thawini. From the existing secondary pipeline, another secondary pipeline (±7km) is necessary to run south into Sub-Supply Area 3;
- ✓ From Thawini, the secondary pipeline would be extended another 5km into Sub-Supply Area 2. Tertiary pipelines ranging between ø 50mm and ø 125mm are required to supply the communities of Hologo, Mpungose, Nozndla, Mawudla and Amkhilimba;
- ✓ Sub-Supply Area 3 has an existing secondary bulk pipeline (11km) ranging from ø 200mm to ø 315mm that supplies water from Gawula eastwards past Hemfane into Sub-Supply Area 4 and all the way through to Mtunzini WTP in the Mtunzini Supply Area. An additional secondary pipeline would be required to run parralel to the existing secondary pipeline. From Gawula another 6km secondary pipeline ranging from ø 200mm to ø 315mm, will run south past Amahubhu and Vekeza into Sub-Supply Area 7. Tertiary pipelines totalling approximately 26km will branch of the secondary pipelines to supply the remainder of the communities within Sub-supply Area 3;
- ✓ Tertiary pipelines (totalling 16km) need to branch off from the existing Mtunzini secondary pipeline to supply the remainder of the communities within Sub-Supply Area 4. Tertiary pipes to range from ø 63mm to ø 200mm;
- ✓ In Sub-Supply Area 7, it is proposed to extend the secondary bulk pipeline from the Gingindlovu WTP (1.5Mℓ/day) and join the secondary pipeline from Sub-Supply 3. Tertiary pipelines (ø 75mm) from the Amatikulu pump station at the Matigulu River to the Gingindlovu WTP, would be required. From the WTP another tertiary pipeline would extend to the east to supply uMlalazi NU06;
- ✓ A secondary pipeline from the upgraded pump station to the WTP would be necessary to supply Sub-Supply Area 6;
- ✓ Sub-Supply Area 5 is supplied via the existing secondary bulk pipeline from the Eshowe WTP. The existing secondary pipeline (ø 140mm) would need to be extended further (2.8km) in a south westerly direction with tertiary pipelines joining to serve Mathibelana. From the planned extention point of the secondary pipeline, tertiary pipelines (±14km) would be requied to serve Mabhudle,Kwa-Jazi and Pahbu ranging from ø 75mm to ø 200mm and will continue into Sub-Supply Area 6 with a further 8km tertiary pipelines ranging from ø 63mm to ø 110mm.

Bulk distribution to supply the whole Regional Scheme would need to be increased and an additional 154km secondary and tertiary bulk pipelines ranging from ø 50mm – ø 450mm is necessary to supply the whole of the Eshowe WSIA.

9.1.2.2 Storage

- ✓ The existing storage reservoirs in Sub-Supply Area 1 need to be upgraded from 1Mℓ to 13.22Mℓ and from 1Mℓ to 1.02Mℓ;
- ✓ Current primary and secondary storage capacity in Eshowe WSIA totals 35Mℓ and would need to be upgraded with an additional 17Mℓ;

- ✓ One secondary and three tertiary reservoirs with capacities of between 970kℓ and 1.86Mℓ are to be added to Sub-Supply Area 2;
- ✓ Sub-Supply Area 3 would need secondary and tertiary reservoirs to supply sufficient water to the communities. Capacities to vary between 320kℓ and 2.36Mℓ;
- ✓ An additional secondary (3.56Mℓ) and tertiary reservoir (380kℓ) would be needed for Sub-Supply Area 4;
- ✓ The existing tertiary reservoir in Sub-Supply Area 5 to be upgraded from 410kℓ to 880kℓ. Five (5) additional tertiary reservoirs need to be added to sufficiently supply the area;
- ✓ The existing secondary reservoir in Sub-Supply Area 6 need to be upgraded from 104kℓ to 780kℓ with two new tertiary reservoirs to be added totalling 2.38Mℓ; and
- ✓ The existing secondary reservoir in Sub-Supply Area 7 to be upgraded from 1Mℓ to 1.98Mℓ with two new tertiary reservoirs to be added totalling 3.94Mℓ.

The storage capacity for the remainder of the Sub-Supply area would need to be increased with an additional 33Mℓ to meet the 2050 water demand and to connect it to the Regional Scheme.

9.1.2.3 Water Pump Stations

- ✓ Upgrade pump station (3kW) next to the Amatikulu community at the Matigulu River to the Gingindlovu WTP; and
- ✓ Upgrade pump station (15kW) at the Matigulu River to the Catherine Booth WTP (1Mℓ/day).

9.1.3 Proposed Interventions

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

- ✓ Upgrade the Goedertrouw WTP to 80Mℓ and Eshowe WTP to 30Mℓ/day;
- ✓ Upgrade approximately 30km secondary bulk pipelines ranging between ø 200mm and ø 650mm;
- ✓ Extend the secondary and tertiary bulk mains by adding approximately 47km secondary bulk ranging between ø 63mm and ø 450mm and 107km of tertiary bulk ranging between ø 63mm and ø 450mm;
- ✓ The existing primary storage capacity (32Mℓ) to be increased to 32.78Mℓ and the secondary storage 3Mℓ to 16.22Mℓ. The existing tertiary storage capacity needs to increase from 410kℓ to 880kℓ;
- ✓ The additional secondary storage to be added is ±18Mℓ and tertiary storage 15.4Mℓ;
- ✓ The pump station at Matigulu River (next to Amatikulu community) to be upgraded to 3kW;
- ✓ Upgrade the pump station (15kW) at Matigulu River to the Catherine Booth WTP; and
- ✓ Extend the Lower Thukela pipeline to feed into the Eshowe WTP clear well which will shift the demand from the Goedertrouw WTP.

Design details of all the infrastructure components for UTG002: Eshowe Scheme are provided within Annexure B.

N

uMlalazi Local Municipality

Kwahlokohloko

King Cetshwayo

City of uMhlathuze Local Municipality

Eshowe

Middledrift

Mandeni Local Municipality

iLembe

Mtunzini Water Supply Scheme

32000kl

1100

30Ml/d

Eshowe WTP

6.91Ml/d

SSA 1

SSA 2

SSA 3

SSA 4

SSA 5

SSA 6

SSA 7

1000kl

1020kl

970kl

1866kl

1535kl

1500kl

320kl

1260kl

960kl

860kl

1800kl

3500kl

1.5Ml/d

Gingindlovu

1443kl

1820kl

880kl

1500kl

440kl

Amatikulu

Catherine Booth Hospital WTP

1Ml/d

3560kl

2360kl

380kl

340kl

2480kl

2Ml/d

Mtunzini WTP

Kilometers

2.5 1.25 0 2.5 5

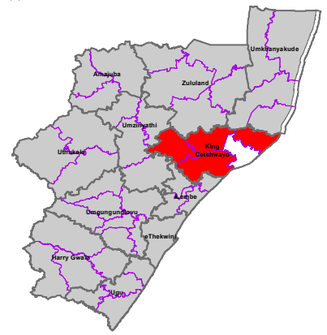
Proposed New / Upgrade Infrafrastructure

- Hlabisa — Water Scheme Areas & Names
- Weir (Existing)
- 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 WTW
- Water Treatment Plants (Future)
- 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)

Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names
- Rivers
- Settlements & Settlement Names
- Major Towns
- Sub-Supply Areas

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

LOCAL MUNICIPALITY:

KING CETSHWAYO DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

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PROJECT TITLE

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

MAP TITLE:

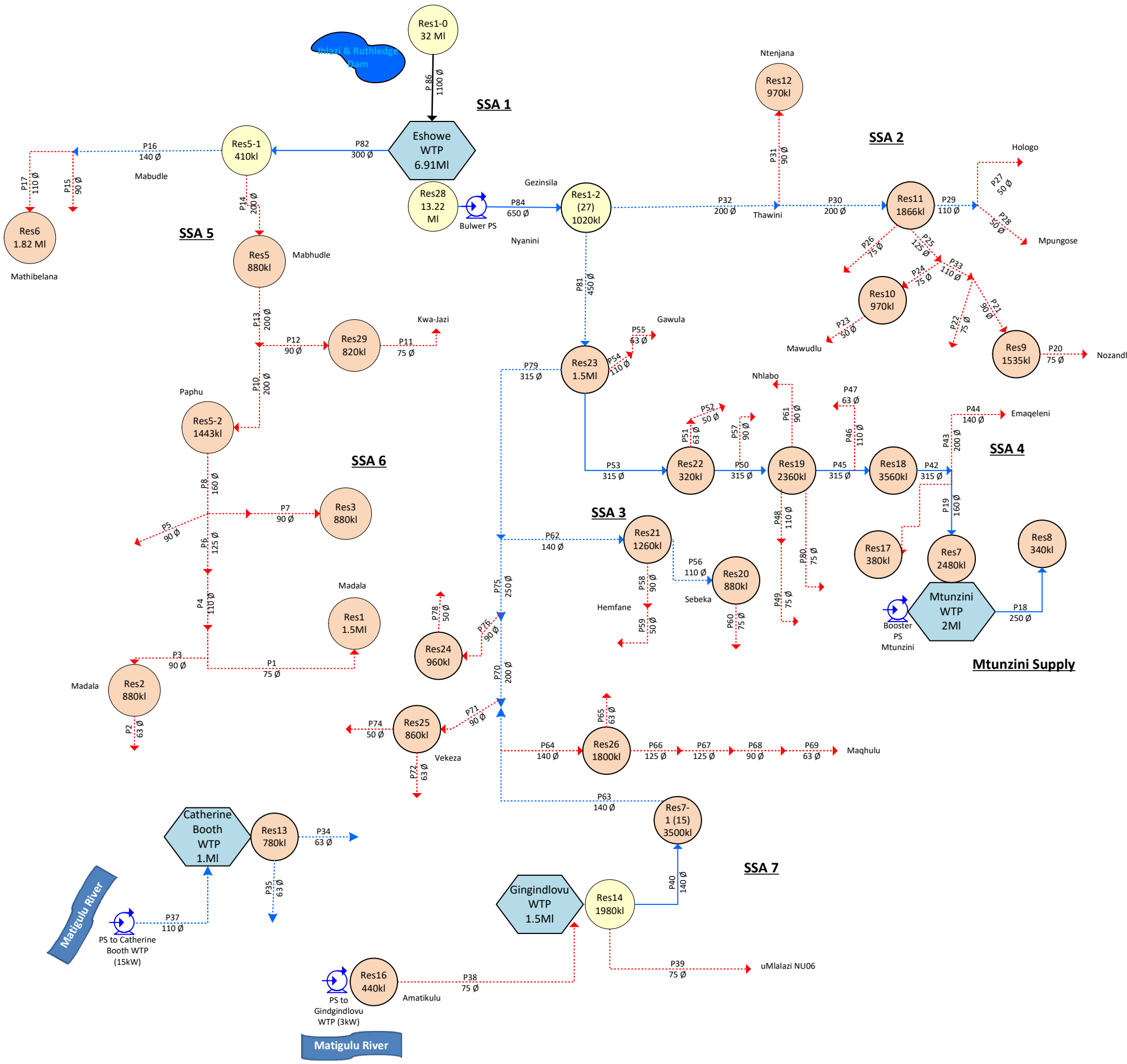
Total Bulk Water Supply Interventions - UTG002: Eshowe & Mtunzini King Cetshwayo District Municipality

DATE COMPLETED: 30 September 2020

MAP NO.: DC28 Figure 9.2

Figure 9.3

UTG002 WSIA: Eshowe



9.1.4 Financial Requirements

The bulk cost requirement for UTG002: Eshowe WSIA is tabled within Table 9-2 below.

Table 9-2: UTG002 Eshowe Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	R80 291 390	R8 029 139	R88 320 529
Secondary	R216 114 000	R21 611 400	R237 725 400
Tertiary	R91 278 000	R9 127 800	R100 405 800
Total	**R387 683 390**	**R38 768 339**	**R426 451 729**

The total bulk cost requirement for the Eshowe Scheme is R 426.4 million (excl VAT) and detailed within the table above. The scheme development cost per household is approximately R 26 284. Due to the size of the project, it will take close to 15 years to complete.

9.2 UTG006: Mbonambi Scheme

9.2.1 Demand Model Intervention

9.2.1.1 Water Demand

The water demand for the Mbonambi WSIA was determined for 2020 and 2050 and included within Table -9-3. Mbonambi includes approximately 12 communities of which all are rural. The scheme serves the town of KwaNambi from where the scheme is extended to the surrounding rural communities. Mbonambi Scheme is expected to have a demand of approximately 13Mℓ in 2050.

Table -9-3: Population and Water Demand 2020 and 2050 for the Mbonambi WSIA

Population	**Population 2020**	**Population 2050**
	55 037	65 135
Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	10.36	**12.63**

9.2.1.2 Water Resource Consideration

Lake Nsezi is considered to have a significant groundwater component but is largely controlled by the Nseleni River. Lake Nsezi obtains water via a weir on the uMhlathuze River to supplement water that is abstracted from the lake for industrial and domestic use. The southern part of Lake Mzingazi is approximately 14m below mean sea level at its deepest point and quite susceptible to saline intrusion under adverse conditions.

The Mbonambi Scheme is supplied from Lake Mzingazi and Lake Nsezi in the City of uMhlathuze, which has a yield of 2 Mℓ/day (after all other allocations). In 2015 the total water supply needed for this scheme was in excess of 4 Mℓ/day but this can currently not be supplied by Mhlathuze Water and an augmentation of the scheme is necessary. A Service Level Agreement with the City of uMhlathuze is recommended to provide for

the addititional water demand needed for the Mbonambi Scheme. Initiate a feasibility study to investigate the construction of a desalination plant.

9.2.2 Water Supply Infrastructure

9.2.2.1 Bulk Conveyance

- ✓ The existing 9km secondary bulk pipeline running through the Sub-Supply Area 1 needs to be upgraded to ø 560mm;
- ✓ A 22km existing secondary ø 250mm bulk pipeline extends into Sub-Supply Area 2 and needs to be upgraded from ø 250mm to ø 400mm; and
- ✓ Sub-Supply Area 3 is supplied with water through a 14km ø 160mm bulk pipeline and needs to be upgraded to ø 315mm.

9.2.2.2 Storage

- ✓ The storage capacities of all 3 reservoirs in the Mbonambi WSIA would need to be increased to 8.4Mℓ each to accommodate the 2050 demand.

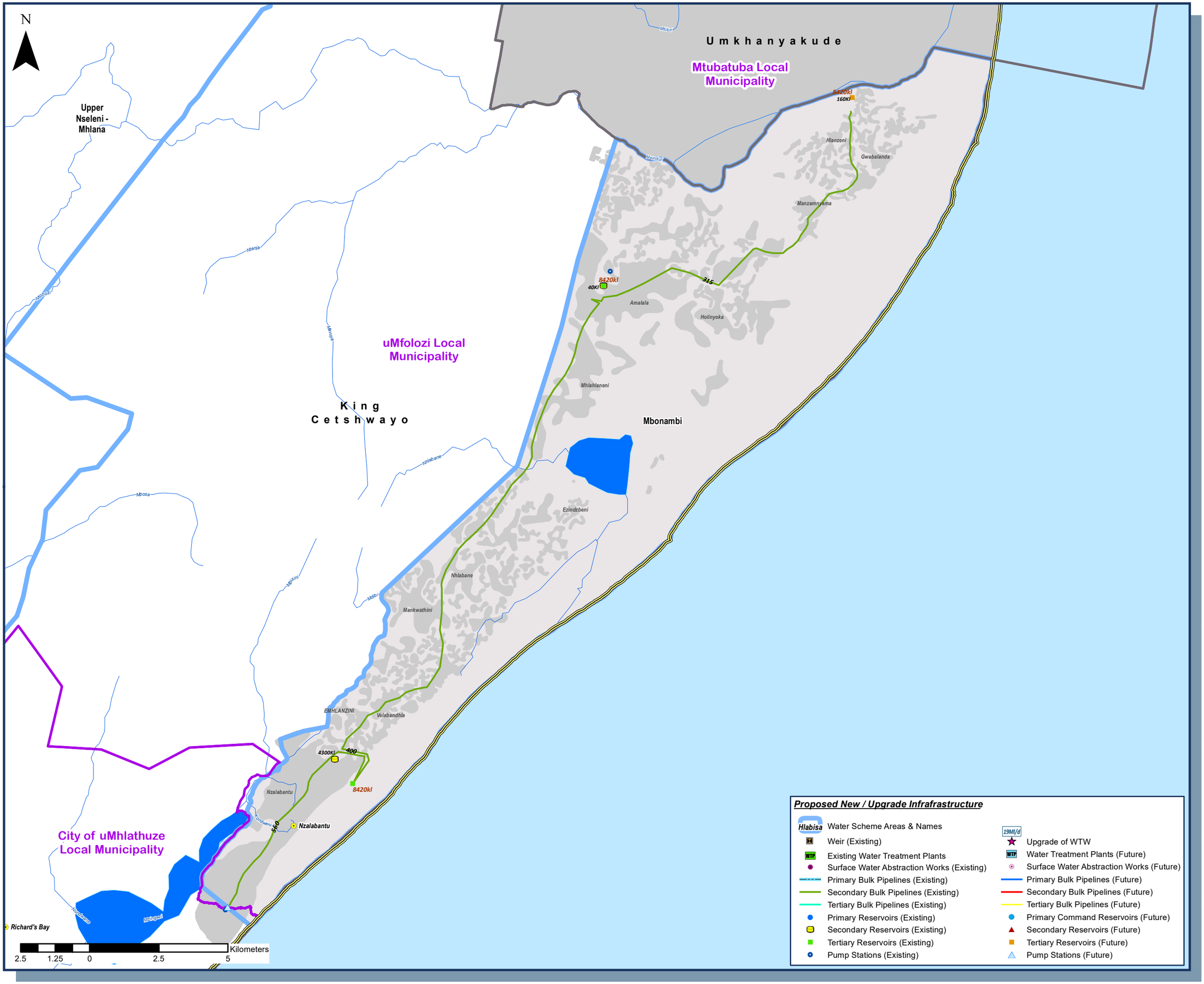
9.2.3 Proposed Interventions

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

- ✓ Initiate a feasibility study to investigate the construction of a desalination plant and negotiate a Service Level Agreement with City of uMhlathuze to provide the additional water demand needed that can not be provided by Mhlathuze Water. The following extensions and upgrades can then be implemented:

    - o Upgrade the secondary bulk mains (9km) from ø 500mm to ø 560mm, 22km from ø 250mm to ø 400mm and 14km from ø 160mm to ø 315mm pipelines;
    - o The existing tertiary storage should be increased from 4.2Mℓ to 16.82Mℓ with additional storage of 8.4Mℓ to be added. Total storage capacity needed would be approximately 25.5Mℓ; and
    - o Sign a Service Level of Agreement with City of uMhlathuze to provide for the additonal water demand needed that can not be provided by Mhlathuze Water;

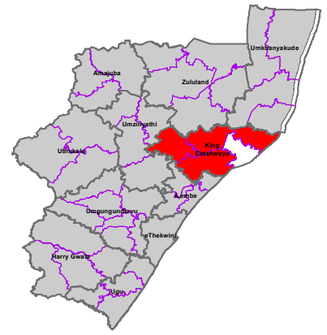
Design details of all the infrastructure components for UTG006: Mbonambi Scheme are provided within Annexure B.



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names
- Rivers
- Settlements & Settlement Names
- Major Towns
- Sub-Supply Areas

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

LOCAL MUNICIPALITY:

KING CETSHWAYO DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

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PROJECT TITLE

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

MAP TITLE:

Total Bulk Water Supply Interventions - UTG006: Mbonambi
King Cetshwayo District Municipality

DATE COMPLETED: 30 September 2020

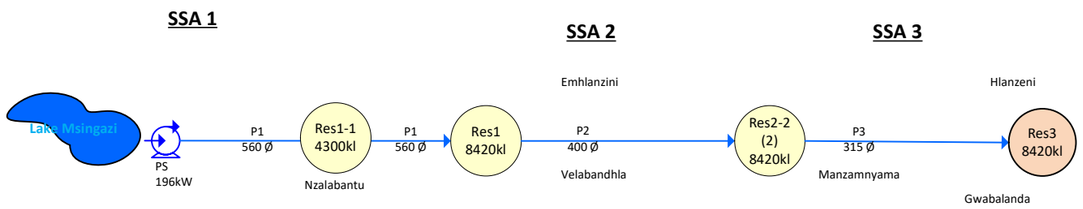
MAP NO.: DC28 Figure 9.4

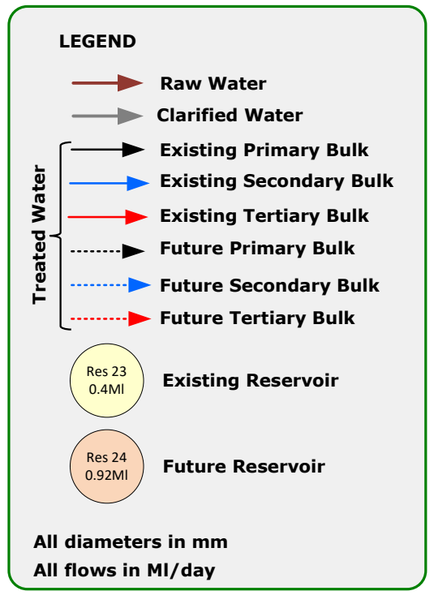
Proposed New / Upgrade Infrafrastructure

- Hlabisa — Water Scheme Areas & Names
- Weir (Existing)
- 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 WTW
- Water Treatment Plants (Future)
- 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 9.5

UTG006 WSIA: Mbonambi





9.2.4 Financial Requirements

The bulk cost requirement for UTG006: Mbonambi WSIA is tabled within Table 9-4 below.

Table 9-4: UTG006 Mbonambi Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	R 20 024 000	R 2 002 400	R22 026 400
Secondary	R 234 463 000	R 23 446 300	R 257 909 300
Tertiary	R 66 897 000	R 6 689 700	R 73 586 700
Total	**R321 384 000**	**R32 138 400**	**R353 522 400**

The total bulk cost requirement for the Mbonambi Scheme is R 353.5 million (excl VAT) and detailed within the table above. The scheme development cost per household is approximately R 37 992. Due to the size of the project, it will take close to 15 years to complete.

9.3 UTG007: KWAHLOKOHLOKO SCHEME

9.3.1 Demand Model Intervention

9.3.1.1 Water Demand

The water demand for the Kwahlokohloko WSIA was determined for 2020 and 2050 and included within Table -9-5. It includes approximately 49 communities of which all are rural communities. The water supply infrastructure is currently constructed in Sub-Supply Area 1 and extends into Sub-Supply Area 2 and 5 to the surrounding rural communities. Kwahlokohloko Scheme is expected to have a demand of close to 18Mℓ in 2050.

Table -9-5: Population and Water Demand 2020 and 2050 for the Kwahlokohloko WSIA

Population	**Population 2020**	**Population 2050**
	83 576	98 912
Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	14.47	17.82

9.3.1.2 Water Resource Consideration

The existing bulk infrastructure for the Kwahlokohloko consists of a ø 300mm raw water pipeline from Lake Phobane to Goedertrouw WTP. The Kwahlokohloko Water Supply area is supplied by the Mpungose WTP (10Mℓ/day) which gets its raw water from Lake Phobane situated in the Mhlatuze River. The scheme has a number of smaller schemes abstracting from run-of-river abstractions (e.g. Gingindlovu Water Supply Scheme) or from boreholes. The scheme supplies a rudimentary level of service with infrastructure being upgraded and constructed as the Sub-Supply Areas are connected to the Regional Scheme.

9.3.2 Water Supply Infrastructure

9.3.2.1 Bulk Conveyance

- ✓ Sub-supply Area 1 is supplied through a ø 900mm 10km bulk pipeline from Lake Phobane to Mpungose WTP and the pipeline is sufficient;
- ✓ A new ø 630mm primary bulk pipeline (4.6km) from Mpungose WTP running east towards Mbiza 01 is proposed to supply the eastern part of Sub-Supply Area 1 from where a ø 450mm secondary pipeline (4.2km) would be required to supply Sub-Supply Area 2. Tertiary pipelines ranging from ø 140mm to ø 160mm would branch off the proposed secondary pipe to feed Mandawe and Eziqaqeni communities. The pipe need to extend a further 4.5km in a northerly direction into Sub-Supply Area 2 and join with the existing secondary ø 315mm pipeline. 4.5km of tertiary pipelines (ranging from ø 75mm to ø 110mm) need to branch off from the secondary pipeline to supply the communities of Ntshentshelu 01, Ngodini 02 and Mashisi 01 in Sub-Supply Area 3;
- ✓ A new secondary bulk pipeline ranging from ø 250mm to ø 355mm (8km) would be required to be extended from Sub-Supply Area 1 in a south easterly direction into Sub-Supply Area 6 & 7. From Sub-Supply Area 1 it would be extended with a further 12km from where tertiary pipelines (±26km) ranging from ø 63mm to ø 250mm, need to branch off to supply the remainder of the communities in Sub-Supply Areas 6 & 7;
- ✓ The existing secondary pipeline in Sub-Supply Area 2 runs east into Sub-Supply Area 3 to Mashishi and would extend a further 8km into Sub-Supply Area 4 ranging from ø 200mm to ø 250mm, towards Khabingwe. 26km of tertiary pipelines ranging from ø 63mm to ø 125mm, would supply Makhehle 01, Nomyaca, Ufasimba 01 and Mkhuphulangwenya 01;
- ✓ From Sub-Supply Area 2 where the existing and proposed secondary bulk pipeline join, a ø 110mm tertiary pipeline (7.2km) running south east towards Sub-Supply Area 5, would be required; and
- ✓ From Ekuphumuleni Hospital WTP, a 20km existing secondary pipeline runs from the east and the west of the WTP ranging from ø 75mm to ø 250mm, to supply Ohaheni 02, Ohaheni 01, Makhehle 02, Makholokholo; Macekane and Mtintombi on the municipal border with City of uMhlathuze. Tertiary pipelines required to supply the communities of Phongola and Gugushe.

Bulk distribution to supply the whole Regional Scheme would need to increase and an additional 122km bulk pipeline ranging from ø 50mm – ø 630mm is necessary to supply the whole Kwahlokohloko WSIA.

9.3.2.2 Storage

- ✓ The existing storage reservoirs need to be upgraded to between 75kℓ and 500kℓ per reservoir. Current storage capacity totals 5.7Mℓ and need to be upgraded to approximately 11Mℓ;
- ✓ One secondary and three tertiary reservoirs with capacities of between 540kℓ and 2.7Mℓ are needed for Sub-Supply Area 1;
- ✓ Sub-Supply Area 2 would need primary, secondary and tertiary reservoirs to supply sufficient water to the communities. Capacities to vary between 440kℓ and 760kℓ;
- ✓ Sub-Supply Area 3 would need two (2) tertiary reservoirs (720kℓ & 980kℓ);

- ✓ One (1) additional secondary reservoir and six (6) tertiary reservoirs with capacities between 340kℓ and 3.4Mℓ would be needed for Sub-Supply Area 4;
- ✓ All twelve (12) existing tertiary reservoirs in Sub-Supply Area 5 need to be upgraded – capacities to vary between 120kℓ and 880kℓ;
- ✓ Four (4) additional tertiary reservoirs would be needed to supplement the in supply Sub-Supply Area 6; and
- ✓ Eleven (11) existing tertiary reservoirs need to be upgraded to supplement the supply to Sub-Supply Area 7 (120kℓ & 520kℓ). One (1) additional secondary and ten (10) tertiary reservoirs with capacities between 240kℓ and 1.42Mℓ are required.

To accommodate for the 2050 water demand and to connect the remainder of the Sub-Supply Areas to the Regional Scheme, the storage capacities would need to increase with an additional 30Mℓ.

9.3.2.3 Water Pump Stations

- ✓ Upgrade the pump station at Goedertrouw WTP to Command Reservoir 2, to 1 342kW.

9.3.3 Proposed Interventions

The following infrastructure upgrades will be required in order to adequately supply the Kwahlokohloko WSIA and is illustrated within Figure 9-6 followed by the schematic layout of the WSIA within Figure 9-7.

- ✓ Upgrade approximately 31km existing secondary bulk pipelines ranging between ø 900mm and ø 315mm;
- ✓ Add 4.6km of primary bulk pipeline (ø 630mm). Extend the secondary pipelines with approximately 37km with pipes ranging between ø 200mm and ø 450mm. Tertiary bulk mains to be extended with 80km of pipelines ranging between ø 90mm and ø 250mm;
- ✓ Increase existing secondary storage capacity from 3.8Mℓ to 7.8Mℓ and existing tertiary storage capacity (1.8Mℓ) to 3.2Mℓ;
- ✓ The additional secondary storage to be added is 7.4Mℓ and tertiary storage 17.2Mℓ; and
- ✓ The pump station at Goedertrouw WTP to Command Reservoir 2, to be upgraded to 1 342kW.

Design details of all the infrastructure components for UTG007: Kwahlokohloko Scheme are provided within Annexure B.

N

Mthonjaneni

Mthonjaneni Local Municipality

King Cetshwayo

City of uMhlathuze Local Municipality

Kwahlokohloko

Middledrift

Eshowe

uMlalazi Local Municipality

Eshowe

Vulindlela

SSA 1

SSA 2

SSA 3

SSA 4

SSA 5

SSA 6

SSA 7

Ekuphumuleni Hospital WTP

Mpungose WTP

Kilometers

5 2.5 0 5 10

Proposed New / Upgrade Infrafrastructure

- Hlabisa — Water Scheme Areas & Names
- Weir (Existing)
- 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 WTW
- Water Treatment Plants (Future)
- 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)

Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names
- Rivers
- Settlements & Settlement Names
- Major Towns
- Sub-Supply Areas

LOCALITY:

CLIENT:

UMGENI WATER · AMANZI

LOCAL MUNICIPALITY:

KING CETSHWAYO DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

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PROJECT TITLE

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

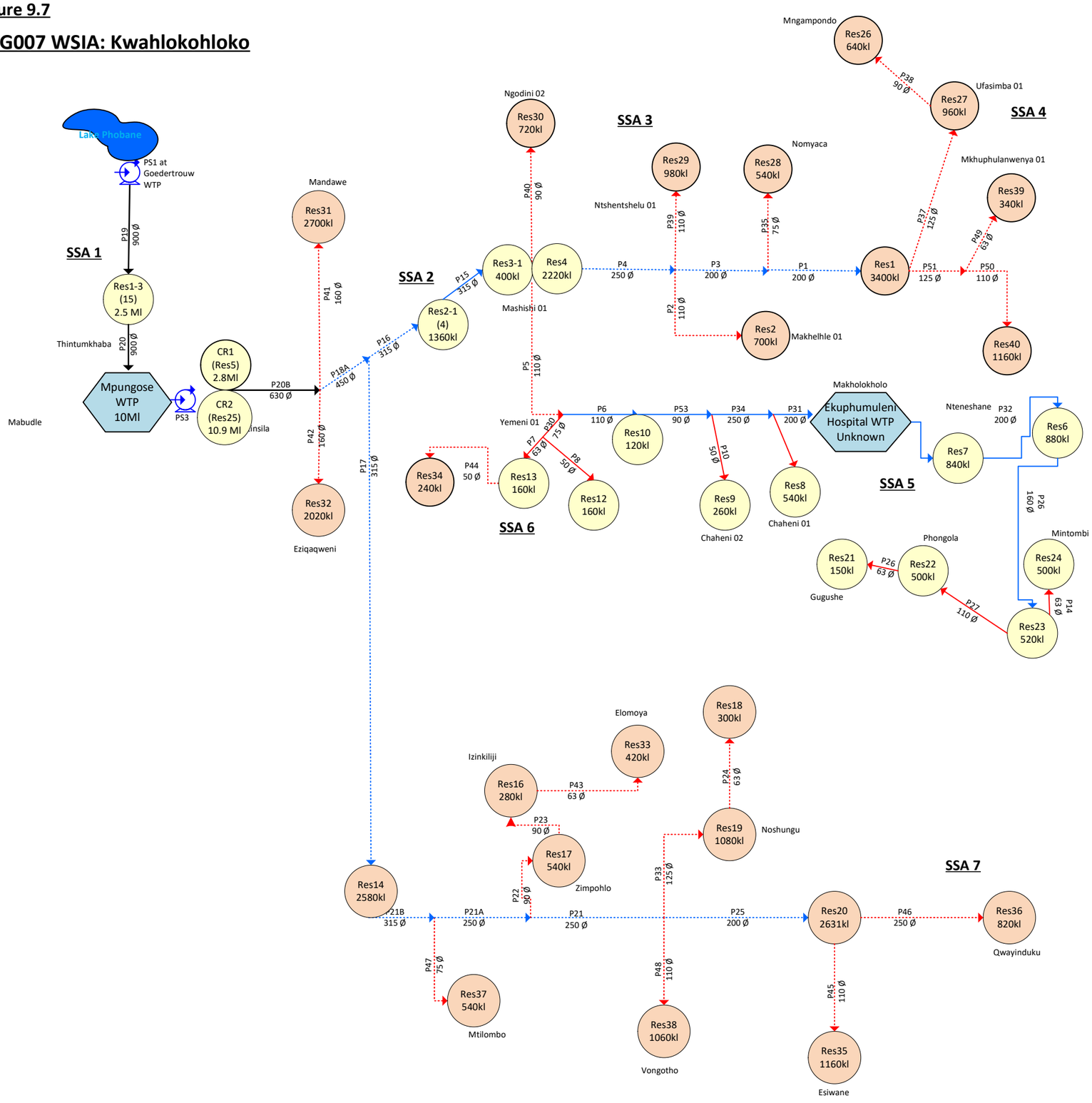
Total Bulk Water Supply Interventions - UTG007: Kwahlokohloko
King Cetshwayo District Municipality

DATE COMPLETED: 30 September 2020

DC28 Figure 9.6

Figure 9.7

UTG007 WSIA: Kwahlokohloko



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

9.3.4 Financial Requirements

The bulk cost requirement for UTG007: Kwahlokohloko WSIA is tabled within Table 9-6 below.

Table 9-6: UTG007 Kwahlokohloko Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	R 121 990 000	R 12 199 000	R 134 189 000
Secondary	R172 717 000	R 17 271 700	R 181 046 800
Tertiary	R 134 771 000	R 13 477 100	R 148 248 100
Total	**R 429 478 000**	**R 42 947 800**	**R472 425 800**

The total bulk cost requirement for the Kwahlokohloko Scheme is R 463.4 million (excl VAT) and detailed within the table above. The scheme development cost per household is approximately R 30 567. Due to the size of the project, it will take close to 15 years to complete.

9.4 UTG009: Middledrift Scheme

9.4.1 Demand Model Intervention

9.4.1.1 Water Demand

The water demand for the Middledrift WSIA was determined for 2020 and 2050 and included within Table -9-7. It includes approximately 70 communities of which all are rural small villages with less than 5 000 people per community. The water supply infrastructure is currently constructed in Sub-Supply Area 1 and extends into Sub-Supply Area 5 to the surrounding rural communities. Middledrift Scheme is expected to have a demand of approximately 20Mℓ in 2050.

Table -9-7: Population and Water Demand 2020 and 2050 for the Middledrift WSIA

Population	**Population 2020**	**Population 2050**
	89 619	106 063
Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	16.00	19.71

9.4.1.2 Water Resource Consideration

The Middledrift Regional Water Supply Scheme area is supplied from the uThukela Transfer scheme abstraction works downstream of the uThukela-Nsuze confluence. Water is pumped to the Middledrift WTP (10Mℓ/day) which supplies the various communities in the supply area. The Thukela Transfer Scheme pipeline is 1.5m in diameter and water is pumped from the uThukela River to a tributary of the uMhlathuze River, above Lake Phobane. Raw water is supplied to the Middledrift WTP via a 500mm diameter steel off-take upstream. The Middledrift WTP is at the Middledrift village and supplies the village and surrounding villages up to Msobothseni in the north east and Ntingwe in the south. The Middledrift WTP needs to be upgraded to 19Mℓ/day.

The Thukela Transfer scheme is undergoing a capacity upgrade where an additional 1.2m³/s has been allocated for transfer to Lake Phobane. The capacity upgrade includes the installation of additional river abstraction pumps, the construction of a parallel de-sanding works, parallel high lift pump stations and a parallel rising main from the second high lift pump station to the Mvuzane stream which feeds Lake Phobane.

9.4.2 Water Supply Infrastructure

9.4.2.1 Bulk Conveyance

- ✓ Sub-supply Area 1 is supplied through a ø 600mm 3km primary bulk pipeline from Middledrift WTP to the east and into Sub-Suppy Area 5. The pipeline is sufficient to carry the future demand. A 7km secondary pipeline ranging from ø 200mm to ø 315mm is needed from the Middledrift WTP to the west of WTP and would be joined by tertiary pipelines (±14km) ranging between ø 110mm and ø 200mm branching off to Ntembeni, Ntolwane and Mathonsi in the south of Sub-Supply Area 1;
- ✓ The tertiary pipeline towards Ntolwane needs to be extended further (16km) to reach Sub-Supply Area 3. The tertiary pipeline ranging from ø 90mm to ø 160mm would pass through Thuma, Mthungweni, Nothekwane and Hlwehlew;
- ✓ From the existing primary bulk pipeline in Sub-Supply Area 1, a 5km secondary pipeline with ø 200mm is needed to run in a northerly direction into Sub-Supply Area 2 and further extended by 6km to Nhlababo. From Nhlababo a ø 90mm tertiary pipeline (approximately 12km) needs to extend towards the east to supply the outskirts of Nhlababo. A tertiary pipeline (ranging from ø 90mm to ø 160mm) needs to extend to supply the middle and southern part of the supply area (approximately 20km);
- ✓ At the join with the proposed secondary pipe as described above, another secondary pipeline need to veer off to the left pass Izindlozi to Othushini to reach the western part of Sub-Supply Area 2. Tertiary pipelines ranging between ø 90mm and ø 125mm need to branch off to supply Izindlozi and Mdimela (6km);
- ✓ From the Mathonsi community in the south of Sub-Supply Area 1, the tertiary pipeline ranging between ø 90mm and ø 160mm need to be further extended into Sub-Supply Area 4 to serve Maqhogo and Izinyathi;
- ✓ The existing ø 600mm 3km primary bulk pipeline from Middledrift WTP running south east towards Sub-Supply Area 5 (at Phindavele) is joined by an existing secondary bulk pipeline extending for approximately 21km in a southerly direction towards the Mbongolwani WTP and further south to Mbizane and into Sub-Supply Area 6 The first 10km of the existing pipeline need to be upgraded from ø 300mm to ø 500mm. At Mbizane,an existing tertiary pipeline (8km) runs to the south west to serve Silambo;
- ✓ From Sub-Supply Area 6, a 25km secondary pipeline ranging between ø 90mm and ø 315mm needs to extend further to the east of Sub-Supply Area 6 and will serve Mqezemane, Mankentshaneni, Zinhlezuka and Sogedle. At Mqezemane, a 13km tertiary pipeline ranging from ø 110mm, is needed to run in a southerly direction towards Ziyendane. From where the 25km secondary pipeline runs east, another secondary pipeline joins and is needed to run further south into Sub-Supply Area 6 towards Mphendle. This pipeline would be approximately 13km long and range from ø 90mm to ø 200mm;
- ✓ From Phindavele in Sub-Supply Area 5, an existing secondary pipeline (3km) runs east towards Sub-Supply Areas 7 & 8. A secondary bulk pipeline is need to join the existing secondary pipe and needs to

run east towards Sub-Supply Area 8 to Nkangala. From Nkangala the pipe needs to extend further north into the supply area past Ngoye, Ngunundu, Siqandaqanda and towards Itshempemvu. Tertiary pipelines ranging between ø 90mm and ø 160mm are needed to run in a northerly direction from this secondary pipe to serve Ezimpongo (approximately 6km);

- ✓ Also from Phindavele, where the existing and new secondary pipelines join, a tertiary pipeline is needed to run south into Sub-Supply Area 7 and to serve Mphundumane, Nkunzempunga, Gazu-Mngwenya and Masundwini. The 26km tertiary pipeline would range between ø 110mm and ø 250mm.

Bulk distribution to supply the whole Regional Scheme would need to be increased and an additional 234km secondary and tertiary bulk pipelines ranging from ø 90mm – ø 355mm is necessary to supply the whole of the Middledrift WSIA.

9.4.2.2 Storage

- ✓ Only a few of the existing storage reservoirs in Sub-Supply Areas 1 & 5 need to be upgraded. Current storage capacity totals 15.4Mℓ and should be upgraded to approximately 17Mℓ;
- ✓ Two (2) tertiary reservoirs with capacities of 340kℓ and 1Mℓ are to be added to Sub-Supply Area 1;
- ✓ Sub-Supply Area 2 would need eight (8) secondary and nine (9) tertiary reservoirs to supply sufficient water to the communities. Capacities to vary between 60kℓ and 960kℓ;
- ✓ Sub-Supply Area 3 would need an additonal four (4) tertiary reservoirs (200kℓ, 240kℓ, 620kℓ & 1.14Mℓ);
- ✓ Three (3) additional tertiary reservoirs would be needed for Sub-Supply Area 4 (680kℓ, 1.8Mℓ, & 2.14Mℓ;
- ✓ The existing reservoirs in Sub-Supply Area 5 are to be supplemented with one (1) primary (520kℓ), a secondary reservoir (320kℓ) and one (1) tertiary reservoir (300kℓ);
- ✓ Sub-Supply Area 6 would need seven (7) additional secondary reservoirs totalling 1.3Mℓ and five (5) tertiary reservoir with capcities ranging between 620kℓ and 1Mℓ;
- ✓ Three (3) additional tertiary reservoirs will be needed to supply Sub-Supply Area 7 (1Mℓ, 1.32Mℓ & 1.8Mℓ); and
- ✓ An additional three (3) secondary and two (2) tertiary reservoirs are needed to eventually supply the entire Sub-Supply Area 8.

The storage capacity for the remainder of the Sub-Supply area would need to be increased with an additional 34Mℓ to meet the 2050 water demand and to connect it to the Regional Scheme.

9.4.2.3 Proposed Interventions

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

- ✓ To meet the 2050 demand, the existing Middledrift WTP needs to be upgraded to 19Mℓ;
- ✓ Upgrade approximately 24.5km existing secondary bulk pipelines ranging from ø 315mm to ø 500mm;
- ✓ Upgrade 12.5km existing tertiary bulk pipelines from ø 90mm to ø 110mm;

- ✓ Extend the secondary and tertiary bulk mains by adding approximately 93km secondary bulk ranging between ø 90mm and ø 355mm and 140km of tertiary bulk ranging between ø 90mm and ø 250mm;
- ✓ The existing primary storage should be increased from 5.5Mℓ to 5.56Mℓ and the existing tertiary storage should be increased from 702kℓ to 1.9 Mℓ;
- ✓ The additional secondary storage of approximately 9.5Mℓ and tertiary storage of 24Mℓ would be necessary (total future capacity increase of 34Mℓ); and
- ✓ The pump station at Middledrift WTP to Command Reservoir (Res30), should be upgraded to 463kW,

Design details of all the infrastructure components for UTG009: Middledrift Scheme are provided within Annexure B.

9.4.3 Financial Requirements

The bulk cost requirement for UTG009: Middledrift WSIA is tabled within Table 9-8 below.

Table 9-8: UTG009 Middledrift Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	R 57 405 000	R 5 740 500	R 63 145 500
Secondary	R 255 861 000	R 25 586 100	R 281 447 100
Tertiary	R 169 243 000	R 16 924 300	R 186 167 300
Total	**R 482 509 000**	**R 48 250 900**	**R 530 759 900**

The total bulk cost requirement for the Middledrift Scheme is R 530.7 million (excl VAT) and detailed within the table above. The scheme development cost per household is approximately R 31 526. Due to the size of the project, it will take close to 15 years to complete.

N

Nkandla Local Municipality

Vutshini - Nkandla

Mthonjaneni Local Municipality

Mthonjaneni

Kwahlokohloko

uMlalazi Local Municipality

King Cetshwayo

Eshowe

Umvoti Local Municipality

Umzinyathi

Maphumulo Local Municipality

iLembe

Mandeni Local Municipality

KwaDukuza Local Municipality

Eshowe

Gingindlovu

Middledrift

Middledrift WTP 19Ml/d 10Ml/d

Mbongolwani WTP 1Ml/d

SSA 1

SSA 2

SSA 3

SSA 4

SSA 5

SSA 6

SSA 7

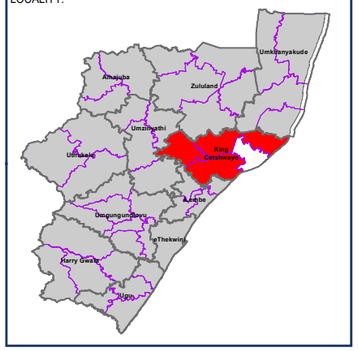
SSA 8

Kilometers
5 2.5 0 5 10

Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names
- Rivers
- Settlements & Settlement Names
- Major Towns
- Sub-Supply Areas

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

LOCAL MUNICIPALITY:

KING CETSHWAYO DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

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PROJECT TITLE

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

MAP TITLE:

Total Bulk Water Supply Interventions - UTG009: Middledrift King Cetshwayo District Municipality

DATE COMPLETED: 30 September 2020

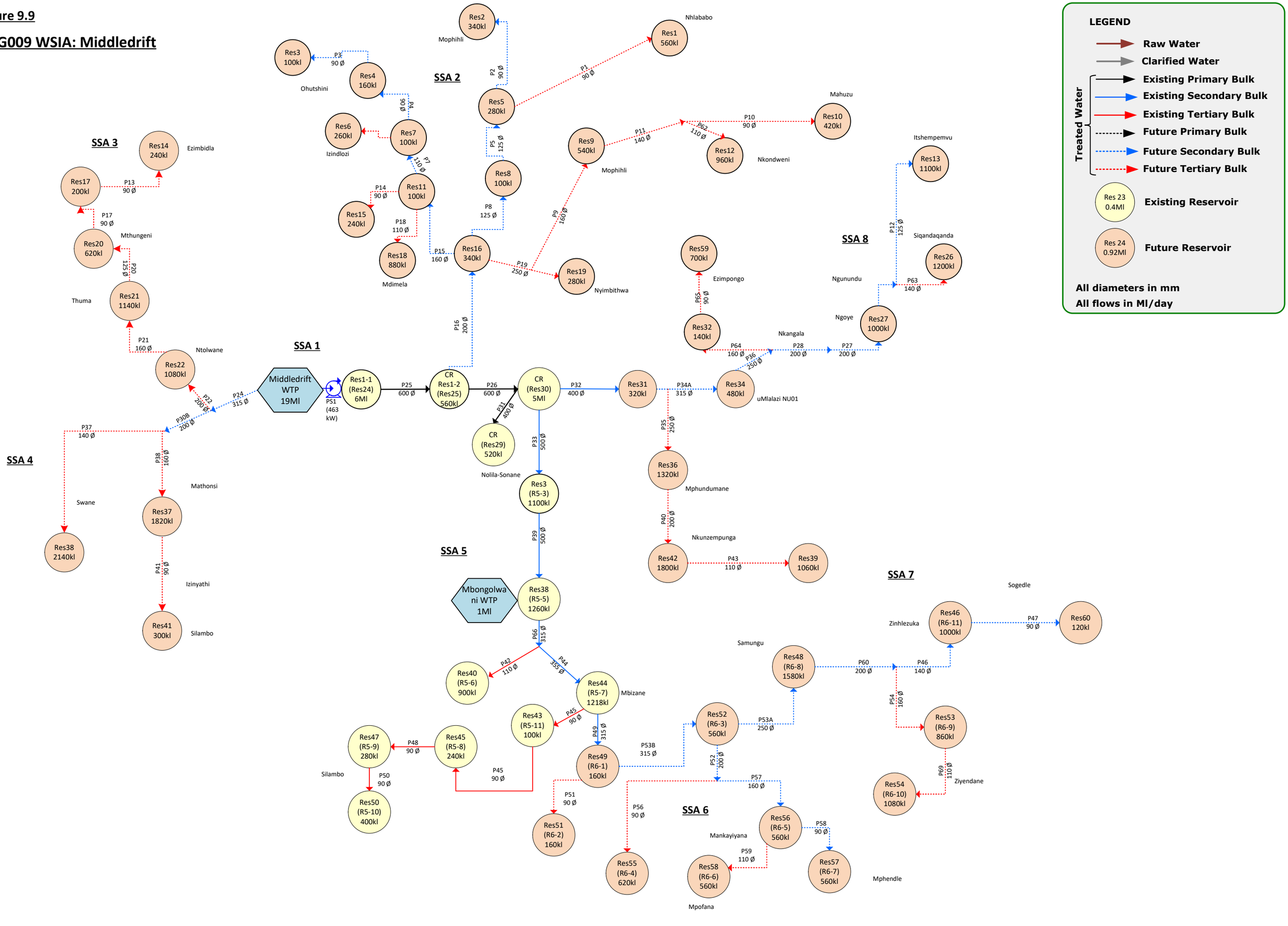
MAP NO.: DC28 Figure 9.8

Proposed New / Upgrade Infrafrastructure

- Hlabisa — Water Scheme Areas & Names
- Weir (Existing)
- 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 WTW
- Water Treatment Plants (Future)
- 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 9.9

UTG009 WSIA: Middledrift



9.5 UTG010: MTHONJANENI SCHEME

9.5.1 Demand Model Intervention

9.5.1.1 Water Demand

The water demand for the Mthonjaneni WSIA was determined for 2020 and 2050 and included within Table -9-9. It includes approximately 76 communities of which only Melmoth being an urban formal town with the rest mostly rural scattered villages. The water supply infrastructure is currently constructed in Sub-Supply Area 1 and extends into Sub-Supply Area 5 to the surrounding rural communities. Mthonjaneni Scheme is expected to have a demand of 22Mℓ in 2050.

Table -9-9: Population and Water Demand 2020 and 2050 for the Mthonjaneni WSIA

Population	**Population 2020**	**Population 2050**
	95 749	113 317
Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	17.94	22.02

9.5.1.2 Water Resource Consideration

Lake Phobane remains the most viable and largest source to supply water to the Greater Mthonjaneni Regional Scheme which includes Mthonjaneni, Kwahlokohloko and Eshowe supply areas. Raw water is abstracted from Lake Phobane. Abstraction from the dam is via an existing 1.8 m diameter steel pipe to the Goedertrouw WTP from where potable water is distributed to pump stations serving the north and south supply areas.

Lake Phobane is on the uMhlathuze River and the yield is augmented by an inter basin transfer from the uThukela River. Water abstracted from the uThukela River is transferred to the Mhlatuze catchment upstream of Lake Phobane. During drought periods Lake Phobane is heavily dependent upon and limited growth in water requirements are provided for. During the drought of 1994, an emergency augmentation scheme was put in place (commissioned in 1997) that has the capacity to deliver 37million m³/annum (1.2m³/s) to the Mvuzane stream, a tributary of the uMhlathuze River. The emergency scheme includes a second high-lift pump-station (Mkhalazi) at the end of the 1 800mm pipeline, to pump the water over the watershed, through an extra rising main and gravity main.

The Department of Water and Sanitation prepared an Annual Operating Analysis for the Mhlathuze Water Supply System and Lake Phobane. The annual operating rules were as follows:

✓ Proposed restrictions for the 2017/2018 operating year for the Mhlathuze WSS are:

- Industry 10% (which is a total sector allocation of 44 million m³/a);
- Domestic:20% (which is a total sector allocation of 36 million m³/a); and

- Irrigation 70% of original allocations (which equates to 62.5% of the revised allocations and 40% of the current unrestricted requirements of 75 million m³/a as a sector).

- ✓ Transfer from Thukela-Phobane to be maintained at 1m³/s;
- ✓ Continue pumping from Thukela until Lake Phobane is above 75%; and
- ✓ Maximise utilisation of local resources eg. lakes, desalination plant etc.

The Water Reconciliation Strategy for Richards Bay and Surrounding Towns (September 2014) reports Lake Phobane is over allocated and without substantial development and augmentation in the lower reaches of the uMhlathuze system, large shortages will be experienced in the near future.

The Goedertrouw WTP (20Mℓ/day) is a conventional treatment plant that is located next to Lake Phobane. The WSA has indicated that a provision is made to upgrade the WTP to 40Mℓ/day and later to 80Mℓ/day. Upgrades of the WTP will follow a phased approach.

9.5.2 Water Supply Infrastructure

9.5.2.1 Bulk Conveyance

- ✓ Upgrade the existing 450 mm diameter ductile iron rising main from the Goedertrouw WTP at Lake Phobane to a ø 660mm primary and secondary bulk pipeline (6km) that extends to Sub-Supply Area 1. The current secondary bulk mains runs north east towards Nompojwane WTP with upgrades to the pipeline ranging from ø 500mm – ø 560mm. Tertiary pipelines ranging from ø 50mm – ø 140mm to extend from the secondary bulk pipe to Edubeni, Zigagayi, Mabungu and Emahlabathini communities;
- ✓ An approximate 8km secondary bulk pipeline (ranging from ø355mm – ø 400mm) to be extended from the Mthonjaneni Command Reservoir into Sub-Supply Area 2 with secondary bulk pipelines ranging from ø 110mm – ø 355mm and tertiary bulk pipelines ranging from 50mm – ø 110mm reaching the Goedgeloof A, Eyinwenya, KwaMazulu communities;
- ✓ From Sub-Supply Area 2, secondary bulk pipelines (approximately 22km) to be extended further into Sub-Supply Area 3 to the KwaMagwasa WTP and Melmoth WTP and with tertiary bulks (±20km) ranging from ø 50mm – ø 90mm;
- ✓ The secondary pipeline from Sub-Supply Area 1 extends further into Sub-Supply Area 4 and the 5-km extention needs to be upgraded from ø 400mm to ø 450mm. The pipe extends further up north towards Sub-Supply Area 5 up to OQhabiyeni. From Nomponjwana a secondary bulk (ranging from ø 110mm - ø125mm) runs south-east down towards Emasangweni;
- ✓ From OQabiyeni in Sub-Supply Area 5, a ø 160mm secondary pipeline (±7km) extends down south to KwaGama in Sub-Supply Area 6. Tertiary bulk pipelines would further extend into Sub-Supply Area 6 ranging between ø 63mm – ø 110mm. Secondary (ø 160mm) and tertiary bulk pipelines (ranging from ø 63mm – ø 140mm) will extend east accross Sub-Supply Area 5 to serve the Obuka C and Esidakeni communities;
- ✓ Also from OQabiyeni, the secondary bulk pipe (ø 200mm) extends further north into Sub-Supply Area 7 to Mopukanqola. From Mopukanqola an approximate 6km secondary bulk pipeline (ø 110mm) would

need to be added to extend further north as well as tertiary bulk ranging from ø 50mm – ø 63mm to the east of the supply area;

- ✓ From Nomponjwana in Sub-Supply Area 4, a secondary ø 315mm bulk pipeline extends into Sub-Supply Area 8 (approximately 11km) to Kwabhadaza from where a ø 250mm secondary pipeline runs further north into Sub-Supply Area 9 upto Lumbi 01. Tertiary bulk lines ranging from ø 50mm – ø 140mm runs to the west and east of the secondary pipeline to feed the remainder of the two sub-supply areas.

Bulk distribution to supply the whole Regional Scheme would need to be increased and an additional 252km secondary and tertiary bulk pipelines ranging from ø 50mm – ø 355mm is necessary to supply the whole of the Mthonjaneni WSIA.

9.5.2.2 Storage

- ✓ The existing storage reservoirs in Sub-Supply Areas 1, 4 & 5 need to be upgraded to between 50kℓ and 3Mℓ per reservoir. Current storage capacity totals 5.7Mℓ and would be upgraded to approximately 13.5Mℓ;
- ✓ Three (3) secondary and three (3) tertiary reservoirs with capacities of between 40kℓ and 1.8Mℓ are to be added to Sub-Supply Area 1;
- ✓ Sub-Supply Area 2 would need primary, secondary and tertiary reservoirs to supply sufficient water to the communities. Capacities to vary between 440kℓ and 760kℓ;
- ✓ Sub-Supply Area 3 would need a primary (1.5Mℓ) reservoir and three (3) secondary reservoirs (680kℓ, 2.2Mℓ & 4.7Mℓ);
- ✓ Four (4) additional primary and secondary reservoirs would be needed for Sub-Supply Area 4;
- ✓ The existing reservoirs in Sub-Supply Area 5 are to be supplemented with two (2) primary (1.2Mℓ & 1.5Mℓ) and a secondary reservoir (300kℓ);
- ✓ Three (3) additional tertiary reservoirs would be needed to supply Sub-Supply Area 6;
- ✓ Two (2) tertiary reservoirs would be needed to supplement the supply to Sub-Supply Area 7 (400kℓ & 1.2Mℓ);
- ✓ Sub-Supply Area 8 would need four (4) additional secondary reservoirs totalling 1.3Mℓ and one (1) tertiary reservoir (960kℓ);
- ✓ One (1) primary (250kℓ), four (4) secondary and two (2) tertiary reservoirs would be needed to eventually supply the entire Sub-Supply Area 9.

The storage capacity for the remainder of the Sub-Supply area would need to be increased with an additional 39Mℓ to meet the 2050 water demand and to connect it to the Regional Scheme.

9.5.2.3 Water Pump Stations

- ✓ The existing Zigigaya Booster 1, Zigigaya Booster 2 and Zimela Booster pumping capacities would need to be increased to 800kW, 576kW and 795kW; and
- ✓ Four (4) new pump stations at the Melmoth WTP (76kW) , Nompojwane WTP (32kW and 35kW) and KwaMagwasa WTP (87kW) are also required.

9.5.3 Proposed Interventions

The following infrastructure upgrades and augmentation will be required in order to adequately supply the Mthonjaneni WSIA and is illustrated within Figure 9-10 overleaf followed by the schematic layout of the WSIA within Figure 9-11.

- ✓ To meet the 2050 demand, the existing Goedertrouw WTP needs to be upgraded to 80Mℓ;
- ✓ Upgrade the existing primary bulk pipeline (2km) from ø 450mm to ø 660mm;
- ✓ Upgrade 64km existing secondary pipelines ranging between ø 125mm and ø 660mm and upgrade approximately 24km existing tertiary pipelines ranging from ø 75mm to ø 160mm;
- ✓ Extend the secondary and tertiary bulk mains by adding approximately 80km secondary bulk ranging between ø 50mm and ø 355mm and approimately 171km of tertiary bulk ranging between ø 50mm and ø 140mm;
- ✓ Existing primary storage capacity to increase from 5.3Mℓ to 7.5Mℓ and existing secondary storage capacity (1.4Mℓ) would need to increase to 5.8Mℓ. Existing tertiary storage capacity also needs to increase from 1.8Mℓ to 5.1Mℓ;
- ✓ Additional secondary storage capacity of approximately 16Mℓ and tertiary storage of 13Mℓ would be required (total future capacity increase of 39Mℓ); and
- ✓ Increase pumping capacities of the existing Zigigaya Booster 1, Zigigaya Booster 2 and Zimela Booster pump stations (800kW, 576kW & 795kW);
- ✓ Add four (4) new pump stations - One (1) at Melmoth WTP (76kW) to Res 1, one (1) pump station at the Mfule River towards Nompojwane WTP (35kW) and one(1) pump station at the WTP (32kW) and a pump station at KwaMagwasa WTP (87kW).

Design details of all the infrastructure components for UTG010: Mthonjaneni Scheme are provided within Annexure B.

9.5.4 Financial Requirements

The bulk cost requirement for UTG010: Mthonjaneni WSIA is tabled within Table 9-10 below.

Table 9-10: UTG010 Mthonjaneni Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	R382 091 000	R38 209 100	R420 300 100
Secondary	R527 879 000	R52 787 900	R580 666 900
Tertiary	R112 747 000	R11 274 700	R124 021 700
Total	**R1 022 717 000**	**R102 271 700**	**R1 124 988 700**

The total bulk cost requirement for the Mthonjaneni Scheme is R 1.124 billion (excl VAT) and detailed within the table above. The scheme development cost per household is approximately R 62 545. Due to the size of the project, it will take close to 15 years to complete.

N

Ulundi Local Municipality

Zululand

Umkhanyakude

Big 5 Hlabisa Local Municipality

Upper Nseleni - Mhlana

Mthonjaneni Local Municipality

King Cetshwayo

Mthonjaneni

City of uMhlathuze Local Municipality

Vutshini - Nkandla

Nkandla Local Municipality

Middledrift

uMlalazi Local

SSA 1

SSA 2

SSA 3

SSA 4

SSA 5

SSA 6

SSA 7

SSA 8

SSA 9

Melmoth WTP 3.6Ml/d

Kwa Magwasa WTP 1.5Ml/d

Nompojwane WTP 1.5Ml/d

Goedertrou WTP 20Ml/d

Kilometers

5 2.5 0 5 10

Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names
- Rivers
- Settlements & Settlement Names
- Major Towns
- Sub-Supply Areas

LOCALITY:

CLIENT:

UMGENI WATER · AMANZI

LOCAL MUNICIPALITY:

KING CETSHWAYO DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

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

PROJECT TITLE

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

MAP TITLE:

Total Bulk Water Supply Interventions - UTG010: Mthonjaneni King Cetshwayo District Municipality

DATE COMPLETED:

30 September 2020

MAP NO.:

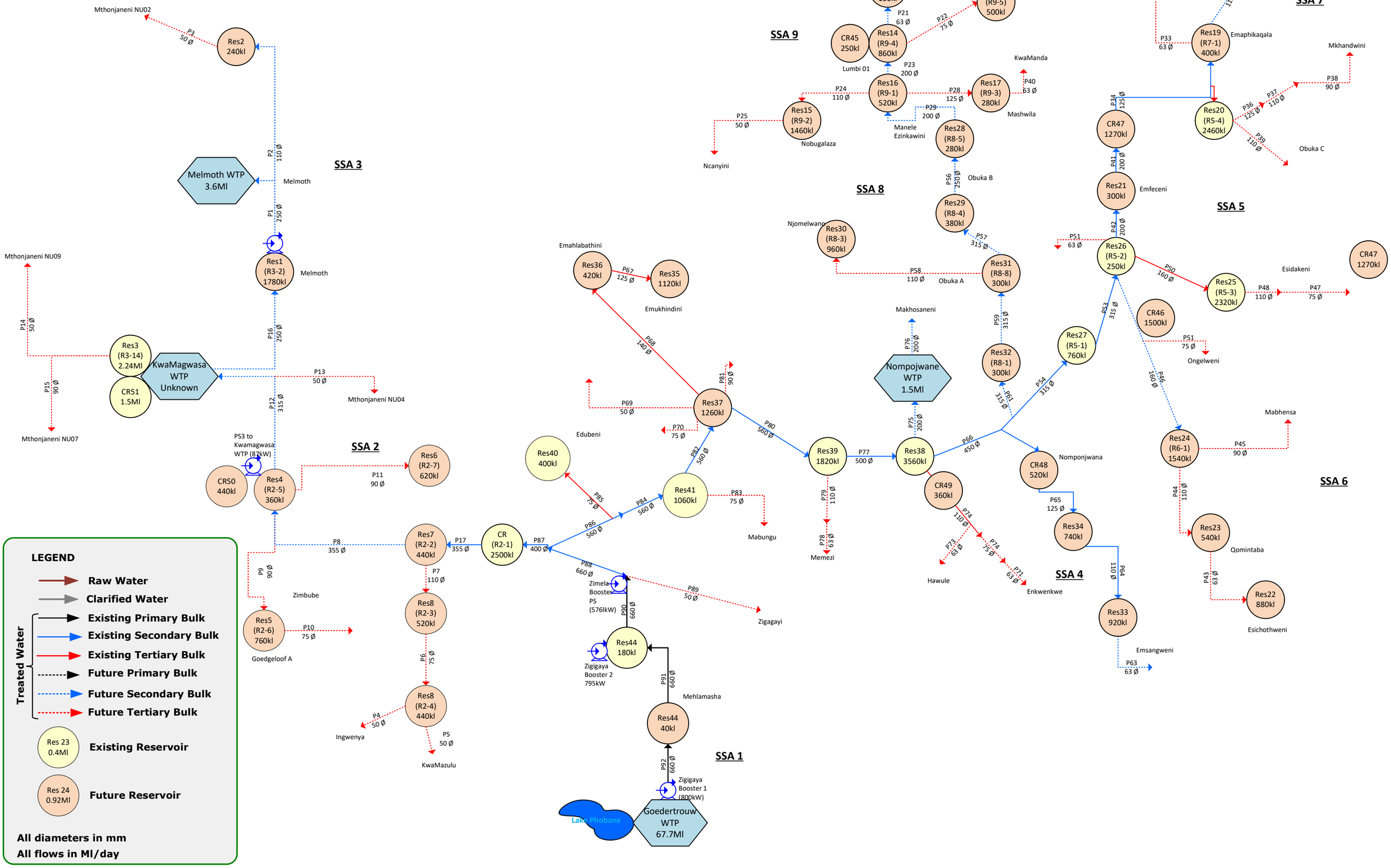
DC28 Figure 9.10

Proposed New / Upgrade Infrafrastructure

- Water Scheme Areas & Names
- Weir (Existing)
- 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 WTW
- Water Treatment Plants (Future)
- 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 9.11

UTG010 WSIA: Mthonjaneni



9.6 UTG014: UPPER NSELENI-MHLANA SCHEME

9.6.1 Demand Model Intervention

9.6.1.1 Water Demand

The water demand for the Upper Nseleni-Mhlana WSIA was determined for 2020 and 2050 and included within Table -9-11. It includes approximately 42 communities with most communities being rural small villages with only KwaMbonambi being an urban town. Some water supply infrastructure is currently constructed in Sub-Supply Areas 1, 2, 9 & 17. Upper Nseleni-Mhlana Scheme is expected to have a demand of 20.2Mℓ in 2050.

Table -9-11: Population and Water Demand 2020 and 2050 for the Upper Nseleni-Mhlana WSIA

Population	**Population 2020**	**Population 2050**
	94 940	112 360
Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	16.61	20.28

9.6.1.2 Water Resource Consideration

The existing Nseleni bulk pipeline is connected to the Mandlazini bulk reservoirs in Richard's Bay with the Mzingazi WTP at Lake Mzingazi as the source. The source is reliable and has sufficient capacity to sustain a regional scheme.

KCDM has a supply level agreement with the City of uMhlathuze for the supply of 2.8Mℓ/day for the Upper Nseleni-Mhlana scheme and 0.7Mℓ/day for the KwaMbonambi town. The Nseleni bulk pipeline has a reserve capacity of 5.5Mℓ/d and 2.5Mℓ/d available for the Upper Nseleni and KwaMbonambi bulk, respectively. The City of uMhlathuze has also indicated that further capacity is available if so required. The Nseleni WTP with the Nseleni River as the source has a capacity of 4.6Mℓ/day to supplement the supply to the Upper Nseleni-Mhlana scheme if required.

Various developed boreholes serve water to existing small schemes within the supply areas. These have proven to be unreliable where frequent water supply interruptions occur during winter months.

Licensing is in place to abstract raw water from the Mfolozi River (5Mℓ/day) and the Mzingazi Lake (66.25Mℓ/day) if necessary.

9.6.2 Water Supply Infrastructure

9.6.2.1 Bulk Conveyance

- ✓ Upgrade the existing 600mm Nseleni bulk pipeline to a ø 630mm bulk pipeline (5km) that extends to Sub-Supply Area 1 from Nseleni town. The existing secondary bulk mains runs from Mhlana north west towards Obizo with upgrades to the pipeline ranging from ø 560mm – ø 630mm. Existing tertiary pipelines

to be upgraded ranging between ø 90mm – ø 160mm running towards Ntweni and the outskirts of Mhlana. Additional ø 140mm tertiary pipelines will be required to supply the Mabhuyeni community;

- ✓ The secondary bulk pipeline from Sub-supply Area 1 extends into Sub-Supply Area 2 (5km) and need to be upgraded from a ø 400mm to a ø 560mm pipe;
- ✓ Sub-Supply Area 9 is supplied through an existing secondary bulk pipeline (±3.5km) but an upgrade from a ø 90mm to a ø 315mm pipe is required. It would need to be extended (approximately 16km) further north to supply Mahlahwa in Sub-Supply Area 7 with the pipeline diameter ranging from ø 200mm – ø 315mm;
- ✓ The secondary pipeline from Sub-Supply Area 9 needs to be extended further to run through Sub-Supply Area 10 and further north to Sub-Supply Areas 12 & 13. The 15-km extention would range from ø 315mm to ø 450mm. Tertiary bulk pipelines will further extend into Sub-Supply Area 12 and 13 ranging between ø 63mm – ø 125mm to reach Enxebeni and Entobozi;
- ✓ An approximate 9km secondary bulk pipeline (ranging from ø 140mm – ø 250mm) needs to be extended from Sub-Supply Area 13 into Sub-Supply Area 14 as well as tertiary bulk pipelines ranging from 140mm – ø 160mm to reach the Mazawula and Enhlabosini communities;
- ✓ Also from Sub-Supply Area 13, an approximate 16km secondary bulk pipeline (ranging from ø 75mm – ø 200mm) needs to be extended into Sub-Supply Area 15 and with tertiary bulk pipelines ranging from 90mm – ø 140mm to reach the Fuleni Reserve and KwaGcoba;
- ✓ From Nseleni town an existing secondary pumping main (4.6km) runs north towards Sub-Supply Area 17 and would need to be upgraded from a ø 95mm to a ø 315mm bulk pipeline. The secondary pipeline (6.7km) reaches Bumbaneni from where it runs further north towards Ematholeni and Nozambula with the pipelines needing to be upgraded ranging from ø 160mm to ø 215mm in diameter. From Nozambula the secondary pipeline needs to be extended a further 2.5km to reach outskirts of Nozambula. A tertiary pipeline (±2km) would be required to supply some of the Ndanyeni households;
- ✓ Sub-Supply Area 8 would require additional tertiary pipelines (18km) ranging from ø 90 to ø 160mm to supply the entire Sub-Supply Area;
- ✓ Sub-Supply Area 10 would also require additional tertiary pipelines (7km) to reach Sabhuza, Manembeni & Nxebeni. Pipe diameters to range between ø 63mm to ø 140mm;

Bulk distribution to supply the whole Regional Scheme would need to be increased and an additional 160km secondary and tertiary bulk pipelines ranging from ø 63mm – ø 450mm is necessary to supply the whole of the Upper Nseleni-Mhlana WSIA.

9.6.2.2 Storage

- ✓ The existing storage reservoirs in Sub-Supply Areas 1, 2, 9 & 17 need to be upgraded. The current storage capacity totals ±8Mℓ and needs to be upgraded to approximately 12Mℓ;
- ✓ Five (5) tertiary reservoirs with capacities of between 300kℓ and 1.3Mℓ are to be added to Sub-Supply Area 7;
- ✓ Sub-Supply Area 8 would need tertiary reservoirs to supply sufficient water to the communities of Sangoyana, Fuyeni and Mahlahuva. Capacities to vary between 20kℓ and 1.38kℓ;

- ✓ Three (3) additional tertiary reservoirs would be needed for Sub-Supply Area 10;
- ✓ Two (2) tertiary reservoirs would be needed to supplement the supply to Sub-Supply Area 11 (420kℓ& 1Mℓ);
- ✓ Sub-Supply Area 12 would need one (1) additional secondary reservoirs and three (3) tertiary reservoirs totalling 3.3Mℓ);
- ✓ Three (3) tertiary reservoirs would be needed to eventually supply the entire Sub-Supply Area 13;
- ✓ Two (2) secondary and four (4) additional tertiary reservoirs would be required for Sub-Supply Area 14; and
- ✓ Sub-Supply Area 15 would need an additional two (2) secondary and two (2) tertiary reservoirs totalling approximately 2Mℓ.

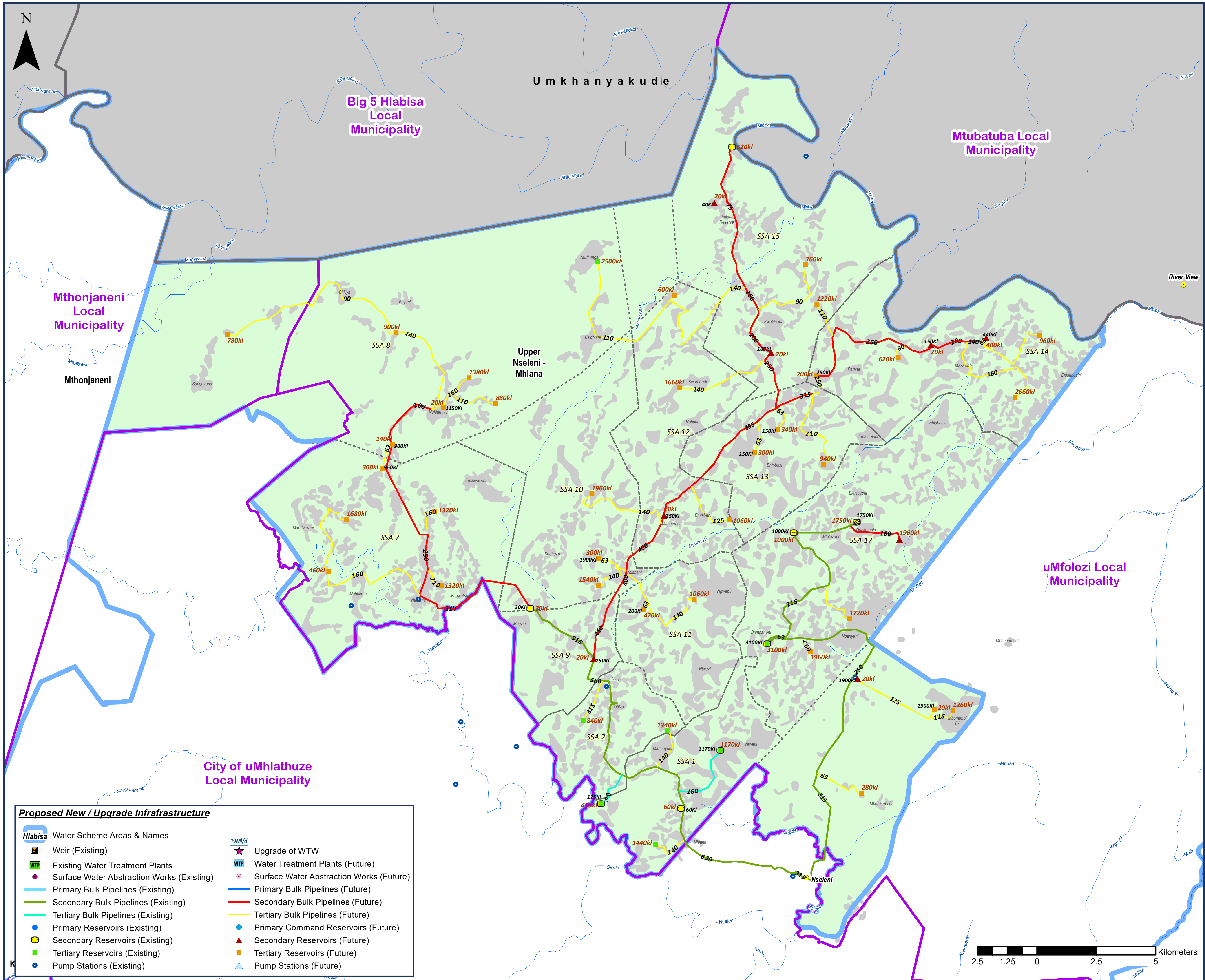
The storage capacity for the remainder of the Sub-Supply area would need to be increased with an additional 34Mℓ to meet the 2050 water demand and to connect it to the Regional Scheme.

9.6.3 Proposed Interventions

The following infrastructure upgrades will be required in order to adequately supply the Upper Nseleni-Mhalana WSIA and is illustrated within Figure 9-12 followed by the schematic layout of the WSIA within Figure 9-13

- ✓ Upgrade approximately 48km existing secondary pipelines ranging between ø 215mm and ø 630mm;
- ✓ Extend the secondary and tertiary bulk mains by adding approximately 56km secondary bulk ranging between ø 75mm and ø 450mm and approximately 104km of tertiary bulk ranging between ø 63mm and ø 315mm;
- ✓ Upgrade the existing primary storage capacity of 40kℓ to 540kℓ;
- ✓ Upgrade the exsting secondary storage capicity from 2.8Mℓ to 3.3Mℓ and the tertiary capacity from 4.8Mℓ to 8.3Mℓ;
- ✓ Additional secondary storage capacity of approximately 2.5Mℓ and tertiary storage of 31.5Mℓ would be required.

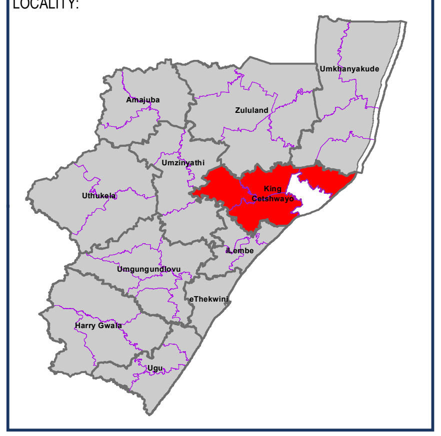
Design details of all the infrastructure components for UTG014: Upper Nseleni-Mhlana Scheme are provided within Annexure B.



Legend

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names
- Rivers
- Settlements & Settlement Names
- Major Towns
- Sub-Supply Areas

LOCALITY:



CLIENT: UMGENI WATER · AMANZI

LOCAL MUNICIPALITY: KING CETSHWAYO DISTRICT MUNICIPALITY

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PROJECT TITLE

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

MAP TITLE:

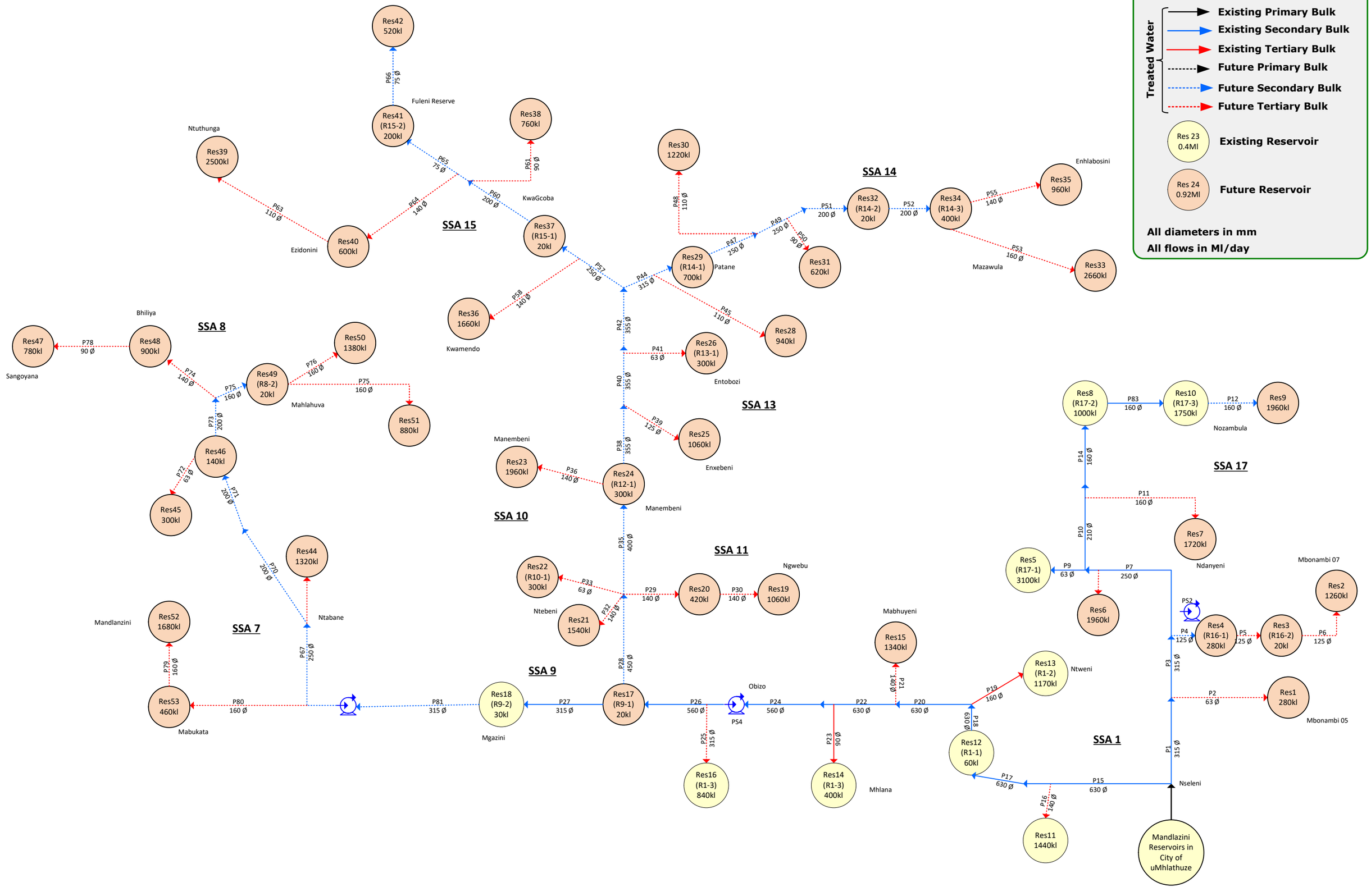
Total Bulk Water Supply Interventions - UTG014: Upper Nseleni-Mhlana King Cetshwayo District Municipality

DATE COMPLETED: 30 September 2020

MAP NO.: DC28 Figure 9.12

Figure 9.13

UTG014 WSIA: Upper Nseleni-Mhlana



9.6.4 Financial Requirements

The bulk cost requirement for UTG014: Upper Nseleni-Mhlana WSIA is tabled within Table 9-12 below.

Table 9-12: UTG014 Upper Nseleni-Mhlana Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	-	-	-
Secondary	R 353 240 000	R 35 324 000	R 388 564 000
Tertiary	R 232 581 000	R23 258 100	R 255 839 100
Total	**R 585 821 000**	**R 58 582 100**	**R 644 403 100**

The total bulk cost requirement for the Upper Nseleni-Mhlana Scheme is R 644.4 million (excl VAT) and detailed within the table below. The scheme development cost per household is approximately R 40 146. Due to the size of the project, it will take close to 15 years to complete.

9.7 UTG016: VUTSHINI-NKANDLA SCHEME

9.7.1 Demand Model Intervention

9.7.1.1 Water Demand

The water demand for the Vutshini-Nkandla WSIA was determined for 2020 and 2050 and included within Table -9-13. It includes 109 with most communities being rural scattered villages. Vutshini-Nkandla Scheme is expected to have a demand of 24Mℓ in 2050.

Table -9-13: Population and Water Demand 2020 and 2050 for the Vutshini-Nkandla WSIA

Population	**Population 2020**	**Population 2050**
	108 741	128 694
Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	19.96	24.38

9.7.1.2 Water Resource Consideration

The Vutshini-Nkandla Regional Water Supply Scheme area is supplied mainly from run-of-river abstraction from the Vutshini Stream, a tributary of the Nsuze River, and the Vove Dam (yield of 0.55Mℓ/day) on the Vove River and the Mhlathuze River (yield of 1.34Mℓ/day) and a water treatment plant (Nkandla WTP, 2.5Mℓ/day) near the river from where water is pumped to the Mpungose Tribal Authority, towards Nkandla town. There are also several small water supply schemes still supplying some of the areas in the water supply scheme area.

There are no known major water quality problems in the Vutshini Water Supply Scheme area. It is, however, likely that the quality of the Vutshini River is significantly affected during periods of low flow due to the land use activities upstream and soil erosion[5].

Further investigations into dam sighting and sustainable yield calculations for the proposed Nsuzu Dam (11.8 million m³) is recommended as current abstraction is insufficient to meet the water requirements for all the water users in the future.

9.7.2 Water Supply Infrastructure

9.7.2.1 Bulk Conveyance

- ✓ From Silokomane in Sub-Supply Area 5, a secondary bulk pipeline (10km) would run north towards Magologolo ranging from ø 50mm to ø 200mm. Tertiary pipelines ranging from ø 50mm to ø 250mm would be required to supply the remainder of Sub-Supply Area 5;
- ✓ The secondary bulk pipeline (24km) will extend from Magologolo north westerly into Sub-Supply Area 4 towards Mfongosi WTP (capacity unknown). From the WTP the secondary pipe would run further west towards Sihosheni in Sub-Supply Area 4;
- ✓ From Dlolwane in Sub-Supply Area 4, a secondary bulk pipeline (20km) should extend in a northerly direction through Sub-Supply Area 3 past Vutshini and Xulu and into Sub-Supply Area 2 with the pipeline ranging from ø 355 – ø 400mm. At Sdashi the pipe will join a secondary bulk pipeline heading in a westwards direction (13km) through Sub-Supply Area 2 ranging from ø 160mm to ø 200mm to Malunga and Ndikwe;
- ✓ An existing secondary pipeline from Khombe Hosptal WTP (1Mℓ/day) runs south east towards Sub-Supply Area 3 to join with a future secondary bulk pipeline (20km). Tertiary pipelines will branch off from the secondary pipe to serve Nsingabani, Xulu, Msukane, Ezimambeni and Amatholamgele.
- ✓ From Khombe Hospital WTP the existing secondary pipeline runs in a northerly direction and would need to join with a secondary pipeline (ø 200mm) coming from Qudeni WTP (1.5Mℓ/day). The secondary pipe would extend (±19km) from the WTP west towards the bottom part of SSA 1 and the outlying areas of Sub-Supply Area 3 ranging from ø 140mm – ø 160mm to serve Ntshiza, Maheze and Nkomeziphansi. Tertiary pipelines are to be extended further west (approximately 21km) ranging from ø 75mm to ø 110mm;
- ✓ A new proposed Nsuze Dam site and Nsuze WTP is recommended to augment the supply of water to the Vutshini-Nkandla Scheme. The possible dam, impounding 30.66 Mcm with a yield of 19Mℓ/day, together with a water treatment plant on the Nsuze River. The proposed bulk pipeline (ø 500mm) from the dam to WTP would be linked to the existing and proposed pipelines. The proposed capacity of the Nsuze WTP is 20Mℓ/day but with the demand calculations prepared for this study, it is recommended that the capacity be 21Mℓ/day;

[5] Department of Water Affairs Vutshini All Town Study, 2011

- ✓ Sub-Supply Area 2 will be served via 11km ø 630mm pipeline that runs through the supply area in a north westerly direction to the upper northern area of Sub-Supply Area 1;
- ✓ Sub-Supply Area 6 is served via an existing 9km secondary pipeline ranging from ø 200mm to ø 355mm. Existing tertiary pipelines serving Chwezi, Ohlahla and Gade would need to be upgraded to ø 90mm and ø 110mm and additional tertiary pipelines would be needed to serve KwaChwezi B and Matshensikazi;
- ✓ From the Nkandla WTP (3.6Mℓ/day) in Sub-Supply Area 7, an existing pipeline runs south west to join the secondary pipeline coming from Sub-Supply Area 6. Approximately 10km tertiary pipelines ranging from ø 90mm to ø 160mm will be required to serve Manzimnyama, Madiyane and Nkandla;
- ✓ From the existing secondary pipeline coming from Sub-Supply Areas 6 & 7, a tertiary pipeline (±18km) will extend to the west to feed the eastern part of Sub-Supply Area 3. An existing tertiary pipeline of 5km runs from Mthiya east towards Ndweni & Ntumbeni in Sub-Supply Area 8 and would need to be upgraded to ø 125mm;
- ✓ Sub-Supply Area 8 is fed by the same existing secondary pipeline coming from Sub-Supply Area 7 extends into an existing tertiary pipeline eastward to Mandaba. From Mandaba a tertiary pipeline 110mm will be required to serve Mkupe. Additional tertiary pipelines, approximately 23km and ranging from ø 50mm to ø 125mm will extend from the secondary bulk pipeline to serve Mpolweni, Dlabe Mkwana and Makhanyezi.

Bulk distribution to supply the whole Regional Scheme would need to be increased and an additional 290km secondary and tertiary bulk pipelines ranging from ø 50mm – ø 630mm is necessary to supply the whole of the Vutshini-Nkandla WSIA.

9.7.2.2 Storage

- ✓ Ten (10) secondary reservoirs and six (6) tertiary reservoirs will be required in Sub-Supply Area 1 to supplement the supply. Capacities would vary from between 30kℓ and 860kℓ;
- ✓ Sub-Supply Area 2 would need a primary, secondary (8) and tertiary reservoirs (4). A command reservoir (12.4Mℓ) close to the new proposed Nsuze WTP would be needed;
- ✓ Sub-Supply Area 3 would need secondary (4) and tertiary reservoirs (14) scattered across the sub-supply are to supply sufficient water to the communities. Capacities to vary between 110kℓ and 1.36Mℓ;
- ✓ The existing storage reservoirs in Sub-Supply Areas 5 should be upgraded to between 20kℓ and 120kℓ per reservoir. Current storage capacity totals 4.9Mℓ and should be upgraded to approximately 6.4Mℓ;
- ✓ Eleven (11) additional secondary and tertiary reservoirs would be needed for Sub-Supply Area 4 with capacities ranging between 100kℓ and 680kℓ. Two existing tertiary reservoirs need to be upgraded from 10kℓ and 50kℓ to 110kℓ and 290kℓ;
- ✓ The primary reservoir in Sub-Supply Area 6 would need to be upgraded from 25kℓ to 580kℓ and the existing tertiary reservoirs from 18kℓ to 180kℓ and 640kℓ respectively. Additional tertiary reservoirs would also be required;
- ✓ Seven (7) tertiary reservoirs would be needed to supplement the supply to Sub-Supply Area 7. Capacities to range between 400kℓ and 2.24Mℓ; and
- ✓ Sub-Supply Area 8 would need nine (9) additional tertiary reservoirs totalling 6.4Mℓ.

The existing storage capacity would need to increase from 4.9Mℓ to 8.2Mℓ with an additional total storage capacity of 57.2Mℓ needed to meet the 2050 water demand.

9.7.2.3 Water Pump Stations

- ✓ One (1) new pump station (389kW) at the proposed Nsuze WTP will be required.

9.7.3 Proposed Interventions

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

- ✓ Investigations (Feasibility Study) into dam sighting and sustainable yield calculations for the proposed Nsuzu Dam (as current abstraction is insufficient to meet the water requirements for all the water users in the future);
- ✓ Construction of a new Nsuze WTP (21Mℓ/day) and the construction of the dam at the possible site;
- ✓ Upgrade the existing primary bulk pipeline (12km) to ø 660mm;
- ✓ Upgrade approximately 54km existing secondary pipelines ranging between ø 60mm and ø 355mm and approximately 76km existing tertiary pipelines ranging between ø 50mm and ø 250mm;
- ✓ Extend the secondary and tertiary bulk mains by adding approximately 143km secondary bulk ranging between ø 50mm and ø 630mm and approximately 147km of tertiary bulk ranging between ø 50mm and ø 200mm;
- ✓ Increase existing primary storage capacity from 25kℓ to 540kℓ and the secondary storage capacity from 284kℓ to 454kℓ. The existing tertiary storage capacity is required to increase from 4.6Mℓ to 7.2Mℓ;
- ✓ Additional primary storage capacity of 12.4Mℓ and secondary storage capacity of approximately 10.9Mℓ and tertiary storage of 33.8Mℓ would be required; and
- ✓ Add one new pump station (389kW) at the proposed Nsuze WTP.

Design details of all the infrastructure components for UTG016: Vutshini-Nkandla Scheme are provided within Annexure B.

N

Nquthu Local Municipality

Zululand

Ulundi Local Municipality

Mthonjaneni Local Municipality

Mthonjaneni

Umzinyathi

Msinga Local Municipality

Umvoti Local Municipality

Nkandla Local Municipality

King Cetshwayo

iLembe

Vutshini - Nkandla

SSA 1

SSA 2

SSA 3

SSA 4

SSA 5

SSA 6

SSA 7

SSA 8

Babanango

Nkandla WTP 3.6Ml/d

Qudeni WTP 5Ml/d

Mfongosi WTP Ml/d

Nsuze WTP 21Ml/d 20Ml/d

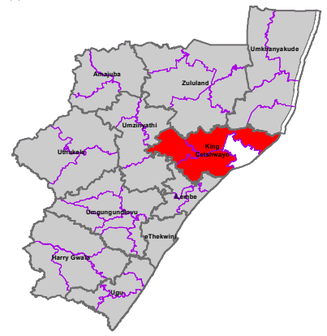
Khombe Hospital WTP 1Ml/d

Kilometers
5 2.5 0 5 10

Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names
- Rivers
- Settlements & Settlement Names
- Major Towns
- Sub-Supply Areas

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

LOCAL MUNICIPALITY:

KING CETSHWAYO DISTRICT MUNICIPALITY

CONSULTANTS: Project No.: 27814

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PROJECT TITLE

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

MAP TITLE:

Total Bulk Water Supply Interventions - UTG016: Vutshini-Nkandla
King Cetshwayo District Municipality

DATE COMPLETED:
30 September 2020

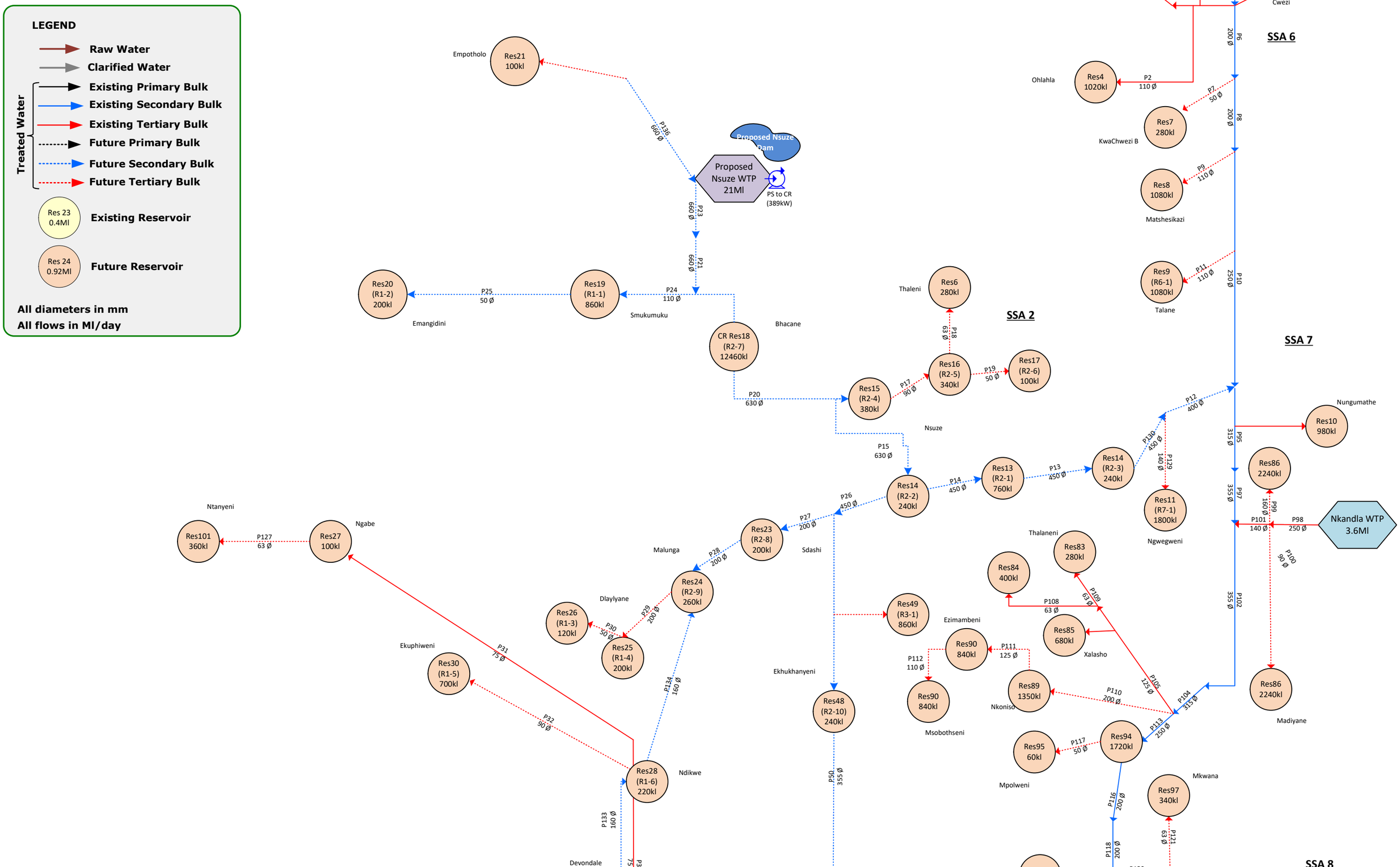
MAP NO.:
DC28 Figure 9.14

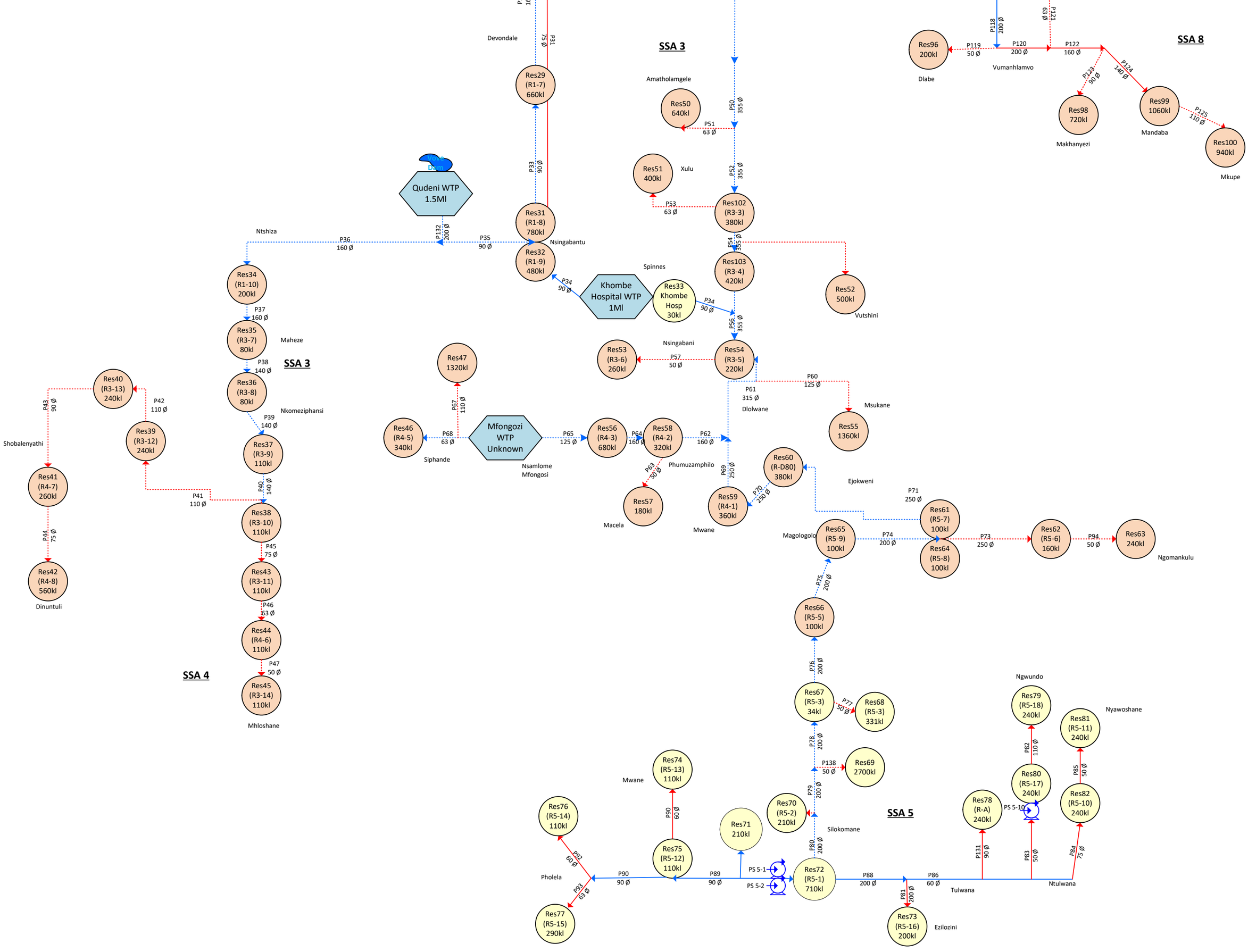
Proposed New / Upgrade Infrafrastructure

- Hlabisa Water Scheme Areas & Names
- Weir (Existing)
- 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 WTW
- Water Treatment Plants (Future)
- 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 9.15

UTG016 WSIA: Vutshini-Nkandla




SSA 3
SSA 8
SSA 4
SSA 5
Devondale
Res29 (R1-7) 660kl
P31 75 Ø
P33 90 Ø
Qudeni Dam
Qudeni WTP 1.5Ml
P132 200 Ø
Res31 (R1-8) 780kl
Nsingabantu
Res32 (R1-9) 480kl
P34 90 Ø
Khombe Hospital WTP 1Ml
Spinnes
Res33 Khombe Hosp 30kl
Amatholamgele
Res50 640kl
P50 355 Ø
P51 63 Ø
Res51 400kl
Xulu
P52 355 Ø
P53 63 Ø
Res102 (R3-3) 380kl
P54 355 Ø
Res103 (R3-4) 420kl
Res52 500kl
Vutshini
P56 355 Ø
Nsingabani
Res53 (R3-6) 260kl
P57 50 Ø
Res54 (R3-5) 220kl
P61 315 Ø
Dlolwane
P60 125 Ø
Msukane
Res55 1360kl
Ntshiza
P36 160 Ø
P35 90 Ø
Res34 (R1-10) 200kl
P37 160 Ø
Res35 (R3-7) 80kl
Maheze
P38 140 Ø
Res36 (R3-8) 80kl
Nkomeziphansi
P39 140 Ø
Res37 (R3-9) 110kl
P40 140 Ø
Res38 (R3-10) 110kl
P45 75 Ø
Res43 (R3-11) 110kl
P46 63 Ø
Res44 (R4-6) 110kl
P47 50 Ø
Res45 (R3-14) 110kl
Mhloshane
P41 110 Ø
Res40 (R3-13) 240kl
P43 90 Ø
Shobalenyathi
P42 110 Ø
Res39 (R3-12) 240kl
Res41 (R4-7) 260kl
P44 75 Ø
Res42 (R4-8) 560kl
Dinuntuli
Res47 1320kl
P67 110 Ø
Res46 (R4-5) 340kl
P68 63 Ø
Siphande
Mfongozi WTP Unknown
Nsamlome Mfongosi
P65 125 Ø
Res56 (R4-3) 680kl
P64 160 Ø
Res58 (R4-2) 320kl
P62 160 Ø
P63 50 Ø
Phumuzamphilo
Res57 180kl
Macela
Res59 (R4-1) 360kl
Mwane
P69 250 Ø
P70 250 Ø
Res60 (R-D80) 380kl
Ejokweni
P71 250 Ø
Res61 (R5-7) 100kl
Magologolo
Res65 (R5-9) 100kl
P74 200 Ø
Res64 (R5-8) 100kl
P73 250 Ø
Res62 (R5-6) 160kl
P94 50 Ø
Res63 240kl
Ngomankulu
P75 200 Ø
Res66 (R5-5) 100kl
P76 200 Ø
Res67 (R5-3) 34kl
P77 50 Ø
Res68 (R5-3) 331kl
P78 200 Ø
P138 50 Ø
Res69 2700kl
P79 200 Ø
Res70 (R5-2) 210kl
Silokomane
P80 200 Ø
Res71 210kl
Res72 (R5-1) 710kl
PS 5-1
PS 5-2
P88 200 Ø
P81 200 Ø
Res73 (R5-16) 200kl
Ezilozini
P86 60 Ø
Tulwana
Ntulwana
P131 90 Ø
Res78 (R-A) 240kl
PS 5-10
P83 50 Ø
Res80 (R5-17) 240kl
P82 110 Ø
Res79 (R5-18) 240kl
Ngwundo
P84 75 Ø
Res82 (R5-10) 240kl
P85 50 Ø
Res81 (R5-11) 240kl
Nyawoshane
P89 90 Ø
P90 90 Ø
P90 60 Ø
Res74 (R5-13) 110kl
Mwane
Res75 (R5-12) 110kl
P92 60 Ø
P93 63 Ø
Res76 (R5-14) 110kl
Pholela
Res77 (R5-15) 290kl
Res96 200kl
Dlabe
P119 50 Ø
P118 200 Ø
P120 200 Ø
Vumanhlamvo
P121 63 Ø
P122 160 Ø
P123 90 Ø
Res98 720kl
Makhanyezi
P124 140 Ø
Res99 1060kl
Mandaba
P125 110 Ø
Res100 940kl
Mkupe

9.7.4 Financial Requirements

The bulk cost requirement for UTG016: Vutshini-Nkandla WSIA is tabled within Table 9-14 below.

Table 9-14: UTG016 Vutshini-Nkandla Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (Excl VAT)
Primary	R1 057 526 000	R105 752 600	R1 163 278 600
Secondary	R436 218 000	R43 621 800	R479 839 800
Tertiary	R261 179 000	R26 117 900	R287 296 900
Total	**R1 754 923 000**	**R175 492 300**	**R1 930 415 300**

The total bulk cost requirement for the Vutshini-Nkandla Scheme is R 1.9 billion million (excl VAT) and detailed within the table below. The scheme development cost per household is approximately R 96 000. Due to the size of the project, it will take close to 15 years to complete.

10. CONCLUSIONS

10.1 Total Water Demand per Water Supply Intervention Area

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

Table 10-1: Total Water Demand 2050 per WSIA

WSIA No	WSIA Name	Population 2020	Population 2050	Demand2020 (Mℓ/day)	Demand 2050 (Mℓ/day)
UTG002	Eshowe	87 737	103 835	18.94	23.03
UTG006	Mbonambi	55 037	65 135	10.36	12.63
UTG007	Kwahlokohloko	83 576	98 912	14.47	17.82
UTG009	Middledrift	89 619	106 063	16.00	19.71
UTG010	Mthonjaneni	95 749	113 317	17.94	22.02
UTG014	Upper Nseleni - Mhlana	94 940	112 360	16.61	20.28
UTG016	Vutshini - Nkandla	108 741	128 694	19.96	24.38
King Cetshwayo		**615 399**	**728 315**	**114.28**	**139.87**

A total of 139.87Mℓ/day is required for the entire WSA in 2050 with the Vutshini-Nkandla WSIA and Eshowe WSIA requiring the largest portion at 17% and 16% respectively.

10.2 Total Water Resources Required vs Proposed Water Supply Interventions (WSI)

The total volume of water required is compared to the existing proposed water supply interventions are tabled within Table 10-2.

Table 10-2: Water Resources Required vs Proposed WSI

Water Supply Scheme / WSIA		Population (2050)	2050 Demand (Mℓ/day)	2050 Demand (Mm^3/a)	Existing Resources (Mm^3/a)	Proposed Additional under UAP Phase 3 (Mm^3/a)	Total (Mm^3/a)	Balance (Mm^3/a)
UTG002	Eshowe	103 835	23.03	8.40	1.29	3.78	5.07	-3.33
UTG006	Mbonambi	65 135	12.63	4.61	0.73	0	0.73	-3.88
UTG007	Kwahlokohloko	98 912	17.82	6.50	60.23	17.41	77.64	71.13
UTG010	Mthonjaneni	113 317	22.02	8.04				69.60
UTG009	Middledrift	106 063	19.71	7.19	40.15	3.285	43.44	36.24
UTG014	Upper Nseleni - Mhlana	112 360	20.28	7.40	4.60	0	4.60	-2.80
UTG016	Vutshini - Nkandla	128 694	24.38	8.90	1.60	7.6	9.27	0.37
King Cetshwayo		**728 315**	**139.87**	**51.05**	**108.59**	**32.1419**	**140.74**	**89.68**

From the table above, it is noted that not all the schemes will have adequate raw water resources to meet the 2050 demand requirements.

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 UTG002: Eshowe WSIA

Table 10-3: UTG002: Eshowe WSIA Summary

Eshowe Regional Water Scheme						
Item	**Description**					
4	**Infrastructure**				**Size / No**	**Capacity (Mℓ/d or Length or kW)**
4.1	**Existing**	WTP	Goedertrouw WTP	Primary Bulk	20	80
			Eshowe WTP	Primary Bulk	6.91	30
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	ø 650mm - ø 1100mm	5.65km
				Secondary Bulk	ø 200mm - ø 450mm	39.31km
				Tertiary Bulk	-	-
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	4	780 - 13 220Kℓ
			Supply Reservoirs	Tertiary Bulk	1	880Kℓ
		Pump stations	PS at Matigulu River to Gingindlovu WTP	Primary Bulk	0.018333M3/s	3kW
4.2	**Future**	Bulk Pipelines		Primary Bulk	-	-
				Secondary Bulk	ø 63mm - ø 450mm	47.37km
				Tertiary Bulk	ø 50mm - ø 450mm	107.4km
		WTP		Primary Bulk	-	-
				Secondary Bulk	-	-
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	10	880 - 3500Kℓ
			Supply Reservoirs	Tertiary Bulk	15	140 - 1800Kℓ
		Pump stations	PS at Matigulu River to Catherine Booth WTW	Primary Bulk	-	15kW

10.3.2 UTG006: Mbonambi WSIA

Table 10-4: WSIA Summary for the UTG006: Mbonambi WSIA

Mbonambi Regional Water Scheme						
Item	**Description**					
4	**Infrastructure**				**Size / No**	**Capacity (Mℓ/d or Length or kW)**
4.1	**Existing**	WTP		Primary Bulk		
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	-	-
				Secondary Bulk	ø 315 – ø 560mm	45.64km
				Tertiary Bulk	-	-
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	-	-
			Supply Reservoirs	Tertiary Bulk	2	8420Kℓ
		Pump stations	PS at Mbonambi/Northern WSS boundary	Primary Bulk	0.233889M ^{3}/s	196kW
4.2	**Future**	Bulk Pipelines		Primary Bulk	-	-
				Secondary Bulk	-	-
				Tertiary Bulk	-	-
		WTP		Primary Bulk	-	-
				Secondary Bulk	-	-
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	-	-
			Supply Reservoirs	Tertiary Bulk	1	8420Kℓ
		Pump stations		Primary Bulk	-	-

10.3.3 UTG007: Kwahlokohloko WSIA

Table 10-5: UTG007: Kwahlokohloko WSIA Summary

Kwahlokohloko Regional Water Scheme						
Item	**Description**					
4	**Infrastructure**				**Size / No**	**Capacity (Mℓ/d or Length or kW)**
4.1	**Existing**	WTP	Goedertrouw WTP	Primary Bulk	20	80
			Mpungose WTP	Primary Bulk	10	10
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	ø 900mm	10.12km
				Secondary Bulk	ø 63mm - ø 450mm	29.5km
				Tertiary Bulk	ø 90mm -ø 110mm	14.51km
		Reservoirs	Command Reservoir	Primary Bulk	2	1090 - 2817Kℓ
			Command Reservoir	Secondary Bulk	5	830 - 3400Kℓ
			Supply Reservoirs	Tertiary Bulk	10	120 - 500Kℓ
		Pump stations	PS at Goedertrouw WTP to CR 2	Primary Bulk	0.246667M^3/s	1342kW
4.2	**Future**	Bulk Pipelines		Primary Bulk	ø 630 mm	4.63km
				Secondary Bulk	ø 200mm - ø 450mm	37.11km
				Tertiary Bulk	ø 90mm – ø 250mm	80.17km
		WTP		Primary Bulk	-	-
				Secondary Bulk	-	-
		Reservoirs	Command Reservoir	Primary Bulk	0	-
			Command Reservoir	Secondary Bulk	3	1420 - 3400Kℓ
			Supply Reservoirs	Tertiary Bulk	20	240 - 2700Kℓ
		Pump stations		Primary Bulk	-	-

10.3.4 UTG009: Middledrift WSIA

Table 10-6: WSIA Summary for the UTG009 -Middledrift WSIA

Middledrift Regional Water Scheme						
Item	**Description**					
4	**Infrastructure**				**Size / No**	**Capacity (Mℓ/d or Length or kW)**
4.1	**Existing**	WTP	Middledrift WTP	Primary Bulk	10	19
				Primary Bulk	-	-
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	ø 400mm - ø 600mm	9.3km
				Secondary Bulk	ø 315mm - ø 355mm	25.5km
				Tertiary Bulk	ø 90mm	12.5km
		Reservoirs	Command Reservoir	Primary Bulk	2	560 -5000Kℓ
			Command Reservoir	Secondary Bulk	4	110 - 6000Kℓ
			Supply Reservoirs	Tertiary Bulk	5	100 -900Kℓ
		Pump stations	PS at Middledrift WTP to Res 30	Primary Bulk	0.11 M^3/s	463kW
4.2	**Future**	Bulk Pipelines		Primary Bulk		
				Secondary Bulk	ø 90mm - ø 355mm	93.12km
				Tertiary Bulk	ø 90mm - ø 250mm	140.7km
		WTP		Primary Bulk	-	-
				Secondary Bulk	-	-
		Reservoirs	Command Reservoir	Primary Bulk	1	520Kℓ
			Command Reservoir	Secondary Bulk	19	160 -1260Kℓ
			Supply Reservoirs	Tertiary Bulk	29	200 -2140Kℓ
		Pump stations		Primary Bulk	-	-

10.3.5 UTG010: Mthonjaneni WSIA

Table 10-7: UTG010 -Mthonjaneni WSIA Summary

Mthonjaneni Regional Water Scheme						
Item	**Description**					
4	**Infrastructure**				**Size / No**	**Capacity (Mℓ/d or Length or kW)**
4.1	**Existing**	WTP	Goedertrouw WTP	Primary Bulk	20	80
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	ø 660mm	2.03km
				Secondary Bulk	ø 110 mm - ø 660mm	68km
				Tertiary Bulk	ø 75 mm - ø 160mm	24.2km
		Reservoirs	Command Reservoir	Primary Bulk	1	2500Kℓ
			Command Reservoir	Secondary Bulk	5	180 - 3560Kℓ
			Supply Reservoirs	Tertiary Bulk	3	400 - 2460Kℓ
		Pump stations	PS4	Primary Bulk	0.345926M ^{3}/s	576kW
			PS5	Primary Bulk	0.353519M^3/s	795kW
			PS6 (at Goedertrouw WTP)	Primary Bulk	0.355556M ^{3}/s	800kW
4.2	**Future**	Bulk Pipelines		Primary Bulk	-	-
				Secondary Bulk	ø 50 mm - ø 355mm	80.63km
				Tertiary Bulk	ø 63 mm - ø 140mm	171km
		WTP		Primary Bulk	-	-
				Secondary Bulk	-	-
		Reservoirs	Command Reservoir	Primary Bulk	7	360 - 1 500Kℓ
			Command Reservoir	Secondary Bulk	19	40 - 4780Kℓ
			Supply Reservoirs	Tertiary Bulk	16	380 - 1540Kℓ
		Pump stations		Primary Bulk	7	4 - 222kW

10.3.6 UTG014: Upper Nseleni-Mhlana WSIA

Table 10-8: UTG014 -Upper Nseleni Mhlana WSIA Summary

Upper Nseleni - Mhlana Water Scheme						
Item	**Description**					
4	**Infrastructure**				**Size / No**	**Capacity (Mℓ/d or Length or kW)**
4.1	**Existing**	WTP	Nsezi WTP	Primary Bulk	204	204
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	-	-
				Secondary Bulk	ø 63mm - ø 630mm	48.31km
				Tertiary Bulk	ø 50mm - ø 250mm	4.66km
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	5	30 - 1750Kℓ
			Supply Reservoirs	Tertiary Bulk	7	20 - 1960Kℓ
		Pump stations		Primary Bulk		
4.2	**Future**	Bulk Pipelines		Primary Bulk	-	-
				Secondary Bulk	ø 75mm - ø 450mm	56.51km
				Tertiary Bulk	ø 63mm - ø 315mm	104.15km
		WTP		Primary Bulk	-	-
				Secondary Bulk	-	-
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	8	40 - 3100Kℓ
			Supply Reservoirs	Tertiary Bulk	33	20 - 2660Kℓ
		Pump stations		Primary Bulk		

10.3.7 UTG016: Vutshini-Nkandla WSIA

Table 10-9: WSIA Summary for the UTG016 -Vutshini-Nkandla WSIA

Vutshini - Nkandla Regional Water Scheme						
Item	**Description**					
4	**Infrastructure**				**Size / No**	**Capacity (Mℓ/d or Length or kW)**
4.1	**Existing**	WTP	Nkandla WTP	Primary Bulk	2.5	2.5
			Qudeni WTP	Primary Bulk	1.5	1.5
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	ø 660mm	12km
				Secondary Bulk	ø 50mm - ø 355mm	65km
				Tertiary Bulk	ø 50mm - ø250mm	81.1km
		Reservoirs	Command Reservoir	Primary Bulk	1	580 Kℓ
			Command Reservoir	Secondary Bulk	2	34 - 420Kℓ
			Supply Reservoirs	Tertiary Bulk	3	110 - 2700Kℓ
		Pump stations				
4.2	**Future**	Bulk Pipelines		Primary Bulk	-	-
				Secondary Bulk	ø 50mm - ø 630mm	143.5km
				Tertiary Bulk	ø 50mm - ø 200mm	146.6km
		Dams	Proposed New Nsuze Dam	Primary Bulk	30.66Mcm	Yield of 19Mℓ/day
		WTP	Nsuze WTP (new)	Primary Bulk	-	21
				Secondary Bulk	-	-
		Reservoirs	Command Reservoir	Primary Bulk	1	12460Kℓ
			Command Reservoir	Secondary Bulk	31	80 - 860K ℓ
			Supply Reservoirs	Tertiary Bulk	53	30 - 2240Kℓ
		Pump stations	PS at Nsuzu WTP to CR	Primary Bulk	0.376806M ^{3}/s	389kW

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 Table 10-10 below.

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

WSIA	WSIA Name	Total Cost Requirement				
		Primary	Secondary	Tertiary	10% Contingencies	Total Cost (Excl VAT)
UTG002	Eshowe	R80 291 390	R216 114 000	R91 278 000	R38 768 339	R426 451 729
UTG006	Mbonambi	R20 024 000	R234 463 000	R66 897 000	R32 138 400	R353 522 400
UTG007	Kwahlokohloko	R121 990 000	R172 717 000	R134 771 000	R42 947 800	R472 425 800
UTG009	Middledrift	R57 405 000	R255 861 000	R169 243 000	R48 250 900	R530 759 900
UTG010	Mthonjaneni	R382 091 000	R527 879 000	R112 747 000	R102 271 700	R1 124 988 700
UTG014	Upper Nseleni - Mhlana	R0	R353 240 000	R232 581 000	R58 582 100	R644 403 100
UTG016	Vutshini - Nkandla	1 057 526 000	R436 218 000	R261 179 000	R175 492 300	R1 930 415 300
King Cetshwayo		**R1 719 327 390**	**R2 196 492 000**	**R1 068 696 000**	**R498 451 539**	**R5 482 966 929**

A total estimate of approximately R 5.48 billion is required to address the total bulk water supply requirement by 2050.

10.5 Funding Options

The KCDM relies mainly on grant funding programmes to fund their water supply projects. These funding programmes are mainly MIG and RBIG. 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 KCDM could consider is loan funding through the Development Bank of Southern Africa (DBSA). Special submissions to National Treasury could also be considered to create an awareness of the DM's planning and implementation readiness. Umgeni Water can also be considered as a funding partner

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. All seven (7) area interventions would be an implementation priority for the WSA, it is proposed to consider the following priorities detailed within Table 10-11. It is also proposed to follow a phased approach for the implementation e.g. initiate only the upgrade to the WTP at first and then when funding permits, can the bulk conveyance and storage be extended, upgraded or constructed.

However, the order would most likely be determined by the availability of funds or intervention programmes and should be confirmed with the WSA.

Table 10-11: Proposed Implementation Order (Phased Approach)

Proposed Priorities (Phased Approach)	WSIA No and Name		Proposed Project Name	Proposed Estimated Project Value
1	UTG002	Eshowe	Upgrade the existing Goedertrouw WTP to 80Ml/day inclusive of an 800kW pump station at the WTP. This proposed project will benefit all 3 regional schemes	R185 977 000
	UTG007	Kwahlokohloko		
	UTG010	Mthonjaneni		
2	UTG016	Vutshini - Nkandla	Investigate a possible dam sighting for the Nsuze Dam (Feasibility Study)	R5 000 000
			Construction of a 21Ml/day WTP at the proposed dam (Nsuze Dam)	R50 242 500
			Construction of the proposed Nsuze Dam	R800 000 000
3	UTG006	Mbonambi	Initiate a feasibility study to construct a desalination plant Renegotiate service level of agreement with City of uMhlathuze to supply the additional water demand	R5 000 000

11. RECOMMENDATIONS

11.1 RESPONSIBILITIES

The provision of water services remains the responsibility of the KCDM as the WSA. The KCDM 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 KCDM to take this process further.

11.2 SELECTION OF SOLUTIONS

The seven (7) proposed water supply intervention areas (WSIAs) are the appropriate solutions for bulk water supply development within KCDM and are as follows:

- ✓ UTG002 WSIA: Eshowe;
- ✓ UTG006 WSIA: Mbonambi;
- ✓ UTG007 WSIA: Kwahlokohloko;
- ✓ UTG009 WSIA: Middledrift;
- ✓ UTG010 WSIA: Mthonjaneni;
- ✓ UTG014 WSIA: Upper Nseleni-Mhlana; and
- ✓ UTG016 WSIA: Vutshini-Nkandla.

The following three WSI are prioritised for consideration:

- ✓ Priority 1 UTG002, UTG007 and UTG010: Upgrade the existing Goedertrouw WTP to 80Mℓ/day inclusive of an 800kW pump station at the WTP. This proposed project will benefit all 3 regional schemes:
- ✓ Priority 2 UTG016: Vutshini-Nkandla:
    - o Investigate a possible dam sighting for the Nsuze Dam (Feasibility Study)
    - o Construction the proposed Nsuze Dam;
    - o Construction of a 21Ml/day WTP at the proposed dam (Nsuze Dam).
- ✓ Priority 3 UTG006: Mbonambi –
    - o Investigate the possibility of a desalination plant (Feasibility Study).
    - o Renegotiate service level of agreement with City of uMhlathuze to supply the additional water demand.

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

DWS (2011)	Support to the Implementation and Maintenance of Reconciliation Strategies for Towns in the Southern Region, 2016
DWS (2018)	Reference Framework Geo database, March 2018
DWS	Department of Water Affairs Vutshini All Town Study, 2011
Umgeni Water	UAP Phase II: Towards the Development of a Regional Bulk Water Requirements for the King Cetshwayo District Municipality, June 2015
Umgeni Water	Infrastructure Master Plan, 2020
Statistics SA	Census 2011; Community Survey 2016
Overall Master Plan	Overall Master Plan 2016 REV_June 2018
Individual Master Plans per Regional Scheme	Master Plan for Goedertrouw Regional Scheme, 2015 Revision Master Plan for Mbonambi Regional Scheme, 2015 Revision Master Plan for Middledrift Regional Scheme, 2015 Revision Master Plan for Nseleni-Mhlana Regional Scheme, 2015 Revision Master Plan for Vutshini-Nkandla Regional Scheme, 2015 Revision Mtunzini Water and Sanitation Master Plan, 2009
IDP	King Cetshwayo Final IDP Review, 2019/2020
Department of Environmental Affairs	Climate Change Adaptation Strategy, October 2017
KCDM	Environmental Management Framework, Draft Baseline Report, June 2018
KCDM	MTREF, 2018/2019 – 2020/21

ANNEXURE B – DETAILED PROPOSED WSI INFRASTRUCTURE DETAIL

UTG002 WSIA: Eshowe Scheme

The total bulk cost requirement for the Eshowe Scheme is R 426.4 million (excl VAT) and detailed within the table below. The scheme development cost per household is approximately R 26 284. Due to the size of the project, it will take close to 15 years to complete.

Eshowe Scheme Proposed Bulk Water Supply Intervention

Eshowe Scheme						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Eshowe Regional Water Scheme	UTG002	87 737	103 835	
		Total		**87 737**	**103 835**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Eshowe Regional Water Scheme	UTG002	18.94	23.03	
		Total		18.94	23.03	
3	**Water Resource**		**HFY (Mm3/a)**	**HFY (Mℓ/d)**	**Comments**	
		Dams	Ruthledge and Ihlazi Dams situated in the Mlalazi River			
		River				
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Mℓ/d or Length or kW)**
4.1	**Existing**	WTP	Goedertrouw WTP	Primary Bulk	20	80
			Eshowe WTP	Primary Bulk	6.91	30
			Gingindlovu WTP	Primary Bulk	1.5	1.5
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	ø 650mm - ø 1100mm	
				Secondary Bulk	ø 200mm - ø 450mm	
				Tertiary Bulk	-	
		Reservoirs		Primary Bulk	-	
			Res 13	Primary Bulk	104	780
			Res 14	Secondary Bulk	1000	1980
			Res 27	Secondary Bulk	1000	1020
			Res 28	Secondary Bulk	1000	13220
			Res 5	Tertiary Bulk	410	880
		Pump stations	PS at Matigulu River to Gingindlovu WTP	Primary Bulk	0.018333M^3/s	3kW
4.2	**Future**	Bulk Pipelines		Primary Bulk	-	-
				Secondary Bulk	ø 63mm - ø 450mm	47.37km
				Tertiary Bulk	ø 50mm - ø 450mm	107.4km
		WTP		Primary Bulk	-	

				Secondary Bulk	-	
		Reservoirs		Primary Bulk	-	
			Res 11	Secondary Bulk	1866	1866
			Res 15	Secondary Bulk	3500	3500
			Res 18	Secondary Bulk	73	3560
			Res 19	Secondary Bulk	0	2360
			Res 20	Secondary Bulk	200	880
			Res 21	Secondary Bulk	105	1260
			Res 22	Secondary Bulk	0	320
			Res 23	Secondary Bulk	1500	1500
			Res 7	Secondary Bulk	0	2480
			Res 8	Secondary Bulk	0	340
			Res 1	Tertiary Bulk	1500	1500
			Res 10	Tertiary Bulk	0	970
			Res 12	Tertiary Bulk	0	970
			Res 16	Tertiary Bulk	0	440
			Res 17	Tertiary Bulk	0	380
			Res 2	Tertiary Bulk	0	880
			Res 24	Tertiary Bulk	0	960
			Res 25	Tertiary Bulk	3	860
			Res 26	Tertiary Bulk	0	1800
			Res 29	Tertiary Bulk	0	820
			Res 3	Tertiary Bulk	0	880
			Res 30	Tertiary Bulk	0	140
			Res 4	Tertiary Bulk	1443	1443
			Res 6	Tertiary Bulk	0	1820
			Res 9	Tertiary Bulk	1535	1535
		Pump stations	PS at Matigulu River to Catherine Booth WTW	Primary Bulk	-	15
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	R80 291 390	R8 029 139	R88 320 529	
		Secondary	R216 114 000	R21 611 400	R237 725 400	
		Tertiary	R91 278 000	R9 127 800	R100 405 800	
		Total	**R387 683 390**	**R38 768 339**	**R426 451 729**	

The total bulk cost requirement for the Mbonambi Scheme is R 353 million (excl VAT) and detailed within the table. The scheme development cost per household is approximately R 37 992. Due to the size of the project, it will take close to 15 years to complete.

Mbonambi Scheme Proposed Bulk Water Supply Intervention

Mbonambi Scheme						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Mbonambi Regional Water Scheme	UTG006	55 037	65 135	
		Total		**55 037**	**65 135**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Mbonambi Regional Water Scheme	UTG006	10.36	12.63	
		Total		**10.36**	**12.63**	
3	**Water Resource**		**HFY (Mm^3/a)**	**HFY (Mℓ/d)**	**Comments**	
		Dams	Lake Mzingazi and Nsezi in the City of uMhlathuze, which has a yield of 2 Mℓ/day (after all other allocations).			
		River				
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Mℓ/d or Length or kW)**
4.1	**Existing**	WTP	Mzingazi WTP in Northern WSS	Primary Bulk	65	65
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	-	-
				Secondary Bulk	ø 315 – ø 560mm	45.64km
				Tertiary Bulk	-	-
		Reservoirs		Primary Bulk		
				Secondary Bulk		
			Res 1	Tertiary Bulk	4300	8420
			Res 2	Tertiary Bulk	40	8420
		Pump stations	PS at Mbonambi/Northern WSS boundary	Primary Bulk	0.233889M^3/s	196kW
4.2	**Future**	Bulk Pipelines		Primary Bulk	-	-
				Secondary Bulk	-	-
				Tertiary Bulk	-	-
		WTP		Primary Bulk	-	
				Secondary Bulk	-	
		Reservoirs		Primary Bulk	-	

				Secondary Bulk	-	-
				Tertiary Bulk	160	8420
		Pump stations		Primary Bulk	-	-
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	R20 024 000	R2 002 400	R22 026 400	
		Secondary	R234 463 000	R23 446 300	R257 909 300	
		Tertiary	R66 897 000	R6 689 700	R73 586 700	
		Total	**R321 384 000**	**R32 138 400**	**R353 522 400**	

UTG007 WSIA: Kwahlokohloko Scheme

The total bulk cost requirement for the Kwahlokohloko Scheme is R 472 million (excl VAT) and detailed within the table below. The scheme development cost per household is approximately R 30 567. Due to the size of the project, it will take close to 15 years to complete.

Kwahlokohloko Scheme Proposed Bulk Water Supply Intervention

Kwahlokohloko Scheme						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Kwahlokohloko Regional Water Scheme	UTG007	83 576	98 912	
		Total		**83 576**	**98 912**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Kwahlokohloko Regional Water Scheme	UTG007	14.47	17.82	
		Total		**14.47**	**17.82**	
3	**Water Resource**		**HFY (Mm^3/a)**	**HFY (Mℓ/d)**	**Comments**	
		Dams	Goedertrouw Dam			
			Ruthledge Dam			
			Eshlazi Dams		Small dam augmented by Lake Phobane	
		River	Matigulu River			
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Mℓ/d or Length or kW)**
4.1	**Existing**	WTP	Goedertrouw WTP	Primary Bulk	20	80
			Mpungose WTP	Primary Bulk	10	10
			Gingindlovu WTP	Primary Bulk	1.5	1.5
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	ø 900mm	10.12km
				Secondary Bulk	ø 63mm - ø 450mm	29.5km

				Tertiary Bulk	ø 90mm -ø 110mm	14.51km
		Reservoirs	CR (Res 25)	Primary Bulk	10900	10900
			CR (Res 5)	Primary Bulk	2817	2817
			Res 3	Secondary Bulk	400	2220
			Res 4	Secondary Bulk	500	1360
			Res 6	Secondary Bulk	350	880
			Res 7	Secondary Bulk	125	840
			Res 15	Secondary Bulk	2500	2500
			Res 8	Tertiary Bulk	100	540
			Res 9	Tertiary Bulk	50	260
			Res 10	Tertiary Bulk	50	120
			Res 11	Tertiary Bulk	125	125
			Res 12	Tertiary Bulk	50	160
			Res 13	Tertiary Bulk	150	160
			Res 21	Tertiary Bulk	150	380
			Res 22	Tertiary Bulk	136	500
			Res 23	Tertiary Bulk	510	520
			Res 24	Tertiary Bulk	500	500
		Pump stations	PS at Goedertrouw WTP to CR 2	Primary Bulk	0.246667M^3/s	1342kW
4.2	**Future**	Bulk Pipelines		Primary Bulk	ø 630 mm	4.63km
				Secondary Bulk	ø 200mm - ø 450mm	37.11km
				Tertiary Bulk	ø 90mm – ø 250mm	80.17km
		WTP		Primary Bulk	-	
				Secondary Bulk	-	
		Reservoirs		Primary Bulk	-	
			Res 1	Secondary Bulk	2600	3400
			Res 14	Secondary Bulk	186	2580
			Res 20	Secondary Bulk	2631	1420
			Res 2	Tertiary Bulk	469	700
			Res 16	Tertiary Bulk	273	280
			Res 17	Tertiary Bulk	469	540
			Res 18	Tertiary Bulk	61	300
			Res 19	Tertiary Bulk	151	1080
			Res 26	Tertiary Bulk	0	640
			Res 27	Tertiary Bulk	0	960
			Res 28	Tertiary Bulk	0	540
			Res 29	Tertiary Bulk	0	980
			Res 30	Tertiary Bulk	0	720
			Res 31	Tertiary Bulk	0	2700
			Res 32	Tertiary Bulk	0	2020
			Res 33	Tertiary Bulk	0	420

			Res 34	Tertiary Bulk	0	240
			Res 35	Tertiary Bulk	0	1160
			Res 36	Tertiary Bulk	0	820
			Res 37	Tertiary Bulk	0	540
			Res 38	Tertiary Bulk	0	1060
			Res 39	Tertiary Bulk	0	340
			Res 40	Tertiary Bulk	0	1160
		Pump stations		Primary Bulk	-	-
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	R 121 990 000	R 12 199 000	R 134 189 000	
		Secondary	R 172 717 000	R 17 271 700	R 189 988 700	
		Tertiary	R 34 771 000	R 13 477 100	R 148 248 100	
		Total	**R 429 478 000**	**R 42 947 800**	**R 472 425 800**	

UTG009 WSIA: Middledrift Scheme

The total bulk cost requirement for the Middledrift Scheme is R 530.7 million (excl VAT) and detailed within the table below. The scheme development cost per household is approximately R 31 526. Due to the size of the project, it will take close to 15 years to complete.

Middledrift Scheme Proposed Bulk Water Supply Intervention

Middledrift Regional Water Scheme						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Middledrift Regional Water Scheme	UTG009	89 619	106 063	
		Total		**89 619**	**106 063**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Middledrift Regional Water Scheme	UTG009	16.00	19.71	
		Total		**16.00**	**19.71**	
3	**Water Resource**	Dams	**HFY (Mm^3/a)**	**HFY (Mℓ/d)**	**Comments**	
		River	Water is pumped from the Thukela River			
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Mℓ/d or Length or kW)**
4.1	**Existing**	WTP	Middledrift WTP	Primary Bulk	10	19
				Primary Bulk	-	-
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	ø 400mm - ø 600mm	9.3km
				Secondary Bulk	ø 315mm - ø 355mm	25.5km
				Tertiary Bulk	ø 90mm	12.5km
		Reservoirs	CR (Res 25)	Primary Bulk	500	560
			CR (Res 30)	Primary Bulk	5000	5000
			Res 24	Secondary Bulk	6000	6000
			Res 33	Secondary Bulk	1100	1100
			Res 38	Secondary Bulk	900	1260
			Res 44	Secondary Bulk	1218	1218
			Res 40	Tertiary Bulk	152	900
			Res 43	Tertiary Bulk	78	100
			Res 45	Tertiary Bulk	135	240
			Res 47	Tertiary Bulk	93	280
			Res 50	Tertiary Bulk	244	400
		Pump stations	PS at Middledrift WTP to Res 30	Primary Bulk	0.11 M^3/s	463kW
4.2	**Future**	Bulk Pipelines		Primary Bulk	-	-
				Secondary Bulk	ø 90mm - ø 355mm	93.12km
				Tertiary Bulk	ø 90mm - ø 250mm	140.7km
		WTP		Primary Bulk	-	
				Secondary Bulk	-	
		Reservoirs	CR (Res 29)	Primary Bulk	1100	520
			Res 2	Secondary Bulk	75	340
			Res 3	Secondary Bulk	274	500
			Res 4	Secondary Bulk	96	160
			Res 5	Secondary Bulk	574	280

			Res 7	Secondary Bulk	220	100
			Res 8	Secondary Bulk	1000	100
			Res 11	Secondary Bulk	55	60
			Res 13	Secondary Bulk	157	1100
			Res 16	Secondary Bulk	879	340
			Res 27	Secondary Bulk	428	1000
			Res 31	Secondary Bulk	701	320
			Res 34	Secondary Bulk	688	480
			Res 46	Secondary Bulk	230	1000
			Res 48	Secondary Bulk	2098	1580
			Res 49	Secondary Bulk	1121	160
			Res 52	Secondary Bulk	798	560
			Res 56	Secondary Bulk	404	560
			Res 57	Secondary Bulk	552	720
			Res 60	Secondary Bulk	0	120
			Res 1	Tertiary Bulk	145	560
			Res 6	Tertiary Bulk	340	260
			Res 9	Tertiary Bulk	600	540
			Res 10	Tertiary Bulk	90	420
			Res 12	Tertiary Bulk	692	960
			Res 14	Tertiary Bulk	130	240
			Res 15	Tertiary Bulk	75	240
			Res 19	Tertiary Bulk	258	280
			Res 17	Tertiary Bulk	110	200
			Res 18	Tertiary Bulk	130	880
			Res 20	Tertiary Bulk	250	620
			Res 21	Tertiary Bulk	780	1140
			Res 22	Tertiary Bulk	203	1080
			Res 23	Tertiary Bulk	100	340
			Res 26	Tertiary Bulk	581	1200
			Res 28	Tertiary Bulk	72	680
			Res 32	Tertiary Bulk	1529	1460
			Res 35	Tertiary Bulk	900	2140
			Res 36	Tertiary Bulk	324	1320
			Res 37	Tertiary Bulk	200	1820
			Res 39	Tertiary Bulk	168	1060
			Res 41	Tertiary Bulk	300	300
			Res 42	Tertiary Bulk	807	1800
			Res 51	Tertiary Bulk	98	280
			Res 53	Tertiary Bulk	139	860
			Res 54	Tertiary Bulk	505	1080
			Res 55	Tertiary Bulk	240	620
			Res 58	Tertiary Bulk	220	980
			Res 59	Tertiary Bulk	0	700

		Pump stations		Primary Bulk	-	-
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	R 57 405 000	R5 740 500	R 63 145 500	
		Secondary	R 255 861 000	R25 586 100	R 281 447 100	
		Tertiary	R 169 243 000	R16 924 300	R186 167 300	
		Total	**R482 509 000**	**R48 250 900**	**R530 759 900**	

UTG010 WSIA: Mthonjaneni Scheme

The total bulk cost requirement for the Mthonjaneni Scheme is R 1 124.9 billion (excl VAT) and detailed within the table below. The scheme development cost per household is approximately R 62 545. Due to the size of the project, it will take close to 15 years to complete.

Mthonjaneni Proposed Bulk Water Supply Intervention

Mthonjaneni Regional Water Scheme						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Mthonjaneni Regional Water Scheme	UTG010	95 749	113 317	
		Total		**95 749**	**113 317**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Mthonjaneni Regional Water Scheme	UTG010	17.94	22.02	
		Total		**17.94**	**22.02**	
3	**Water Resource**		**HFY (Mm^3/a)**	**HFY (Mℓ/d)**	**Comments**	
		Dams				
		River	Hlambanyathi River, a tributary of the Mhlatuze River.			
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Mℓ/d or Length or kW)**
4.1	**Existing**	WTP	Goedertrouw WTP	Primary Bulk	20	80
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	ø 660mm	2.03km
				Secondary Bulk	ø 110 mm - ø 660mm	68km
				Tertiary Bulk	ø 75 mm - ø 160mm	24.2km
		Reservoirs	CR (Res 10)	Primary Bulk	2500	2500
			CR (Res 30)	Primary Bulk	2817	5000
			Res 26	Secondary Bulk	245	250
			Res 27	Secondary Bulk	623	760
			Res 38	Secondary Bulk	485	3560
			Res 41	Secondary Bulk	1	1060
			Res 43	Secondary Bulk	50	180
			Res 20	Tertiary Bulk	825	2460
			Res 25	Tertiary Bulk	883	2320
			Res 40	Tertiary Bulk	103	400
		Pump stations	PS4	Primary Bulk	0.345926M^3/s	576kW
			PS5	Primary Bulk	0.353519M^3/s	795kW
			PS6 (at Goedertrouw WTP)	Primary Bulk	0.355556M^3/s	800kW

4. 2	**Future**	Bulk Pipelines		Primary Bulk	-	-
				Secondary Bulk	ø 63 mm - ø 315mm	80.63km
				Tertiary Bulk	ø 63 mm - ø 110mm	171km
		WTP		Primary Bulk	-	
				Secondary Bulk	-	
		Reservoirs		Primary Bulk	-	
			Res 1	Secondary Bulk	4100	4780
			Res 11	Secondary Bulk	292	180
			Res 12	Secondary Bulk	220	100
			Res 14	Secondary Bulk	250	860
			Res 16	Secondary Bulk	616	520
			Res 2	Secondary Bulk	0	680
			Res 21	Secondary Bulk	0	300
			Res 28	Secondary Bulk	1700	280
			Res 29	Secondary Bulk	275	380
			Res 3	Secondary Bulk	1280	2240
			Res 31	Secondary Bulk	645	340
			Res 32	Secondary Bulk	547	300
			Res 33	Secondary Bulk	0	920
			Res 34	Secondary Bulk	0	740
			Res 39	Secondary Bulk	0	1820
			Res 4	Secondary Bulk	1150	360
			Res 42	Secondary Bulk	0	820
			Res 44	Secondary Bulk	0	40
			Res 7	Secondary Bulk	1266	440
			Res 13	Tertiary Bulk	102	500
			Res 15	Tertiary Bulk	694	1460
			Res 17	Tertiary Bulk	554	1020
			Res 18	Tertiary Bulk	852	1200
			Res 19	Tertiary Bulk	340	400
			Res 22	Tertiary Bulk	261	380
			Res 23	Tertiary Bulk	0	540
			Res 24	Tertiary Bulk	1000	1540
			Res 30	Tertiary Bulk	330	960
			Res 35	Tertiary Bulk	0	1120
			Res 36	Tertiary Bulk	0	420
			Res 37	Tertiary Bulk	0	1260
			Res 5	Tertiary Bulk	698	760
			Res 6	Tertiary Bulk	117	620
			Res 8	Tertiary Bulk	34	520
			Res 9	Tertiary Bulk	120	440
		Pump stations	PS1 at Melmoth WTP to Res 1	Primary Bulk	0.044259/s	76kW

			PS2 at Res 1 to Res 2	Primary Bulk	0.006296M^3/s	4kW
			PS3 to Kwamagwasa WTP	Primary Bulk	0.065M^3/s	87kW
			PS10	Primary Bulk	0.102963M^3/s	222kW
			PS7 to Res 36	Primary Bulk	0.014259M^3/s	8kW
			PS8 to Nompojwana WTP	Primary Bulk	403M^3/s	35kW
			PS9 at Nompojwana WTP	Primary Bulk	0.27778M^3/s	32kW
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	R382 091 000	R38 209 100	R420 300 100	
		Secondary	R527 879 000	R52 787 900	R580 666 900	
		Tertiary	R112 747 000	R11 274 700	R124 021 700	
		Total	**R1 022 717 000**	**R102 271 700**	**R1 124 988 700**	

UTG014 WSIA: Upper Nseleni-Mhlana Scheme

The total bulk cost requirement for the Upper Nseleni-Mhlana Scheme is R 644.9 million (excl VAT) and detailed within the table below. The scheme development cost per household is approximately R 40 146. Due to the size of the project, it will take close to 15 years to complete.

Upper Nseleni -Mhlana Proposed Bulk Water Supply Intervention

Upper Nseleni - Mhlana Scheme						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Upper Nseleni - Mhlana Water Scheme	UTG014	94 940	112 360	
		Total		**94 940**	**112 360**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Upper Nseleni - Mhlana Water Scheme	UTG014	16.61	20.28	
		Total		**16.61**	**20.28**	
3	**Water Resource**		**HFY (Mm^3/a)**	**HFY (Mℓ/d)**	**Comments**	
		Dams	Nsezi WTP via the Mandlazini reservoirs located in the Northern Scheme			
			Lake Mzingazi	61.4		
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Mℓ/d or Length or kW)**
4.1	**Existing**	WTP	Nsezi WTP	Primary Bulk	204	204
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	-	-
				Secondary Bulk	ø 63mm - ø 630mm	48.31 km
				Tertiary Bulk	ø 50mm - ø 250mm	4.66km
		Reservoirs		Primary Bulk	40	540
			Res 8	Secondary Bulk	1 000	1000
			Res 10	Secondary Bulk	1 750	1750
			Res 12	Secondary Bulk	60	60
			Res 18	Secondary Bulk	30	30
			Res 42	Secondary Bulk	10	520
			Res 5	Tertiary Bulk	3100	3100
			Res 11	Tertiary Bulk	91	1440
			Res 13	Tertiary Bulk	1170	1170
			Res 14	Tertiary Bulk	175	400
			Res 15	Tertiary Bulk	70	1340
			Res 16	Tertiary Bulk	254	840
		Pump stations		Primary Bulk		
4.2		Bulk Pipelines		Primary Bulk	-	-

	Future			Secondary Bulk	ø 75mm - ø 450mm	56.51km
				Tertiary Bulk	ø 63mm - ø 315mm	104.15km
		WTP		Primary Bulk	-	-
				Secondary Bulk	-	-
		Reservoirs		Primary Bulk		
			Res 4	Secondary Bulk	1900	20
			Res 9	Secondary Bulk	0	1960
			Res 17	Secondary Bulk	150	20
			Res 24	Secondary Bulk	250	20
			Res 32	Secondary Bulk	150	20
			Res 34	Secondary Bulk	440	400
			Res 37	Secondary Bulk	100	20
			Res 41	Secondary Bulk	40	20
			Res 1	Tertiary Bulk	0	280
			Res 2	Tertiary Bulk	0	1260
			Res 3	Tertiary Bulk	1900	20
			Res 6	Tertiary Bulk	0	1960
			Res 7	Tertiary Bulk	0	1720
			Res 19	Tertiary Bulk	0	1060
			Res 20	Tertiary Bulk	200	420
			Res 21	Tertiary Bulk	0	1540
			Res 22	Tertiary Bulk	1900	300
			Res 23	Tertiary Bulk	0	1960
			Res 25	Tertiary Bulk	0	1060
			Res 26	Tertiary Bulk	150	300
			Res 27	Tertiary Bulk	150	340
			Res 28	Tertiary Bulk	0	940
			Res 29	Tertiary Bulk	250	700
			Res 30	Tertiary Bulk	0	1220
			Res 31	Tertiary Bulk	0	620
			Res 33	Tertiary Bulk	0	2660
			Res 35	Tertiary Bulk	0	960
			Res 36	Tertiary Bulk	0	1660
			Res 38	Tertiary Bulk	0	760
			Res 40	Tertiary Bulk	0	600
			Res 43	Tertiary Bulk	0	1320
			Res 44	Tertiary Bulk	0	1320
			Res 45	Tertiary Bulk	960	300
			Res 46	Tertiary Bulk	900	140
			Res 47	Tertiary Bulk	0	780
			Res 48	Tertiary Bulk	0	900
			Res 49	Tertiary Bulk	1150	20

			Res 50	Tertiary Bulk	0	1380
			Res 51	Tertiary Bulk	0	880
			Res 52	Tertiary Bulk	0	1680
			Res 53	Tertiary Bulk	0	460
		Pump stations		Primary Bulk		
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	-	-	-	
		Secondary	R 353 240 000	R 35 324 000	R 388 564 000	
		Tertiary	R 232 581 000	R23 258 100	R 255 839 100	
		Total	**R 585 821 000**	**R 58 582 100**	**R 644 403 100**	

UTG016 WSIA: Vutshini-Nkandla Scheme

The total bulk cost requirement for the Vutshini-Nkandla Scheme is R 1.9 billion (excl VAT) and detailed within the table below. The scheme development cost per household is approximately R 96 000. Due to the size of the project, it will take close to 15 years to complete.

Vutshini-Nkandla Proposed Bulk Water Supply Intervention

Vutshini - Nkandla Regional Scheme						
Item	**Description**					
1	**Population**	**Scheme Name**	**Scheme No**	**Population 2020**	**Population 2050**	
		Vutshini - Nkandla Regional Water Scheme	UTG016	108 741	128 694	
		Total		**108 741**	**128 694**	
2	**Demand**	**Scheme Name**	**Scheme No**	**Demand 2020**	**Demand 2050**	
		Vutshini - Nkandla Regional Water Scheme	UTG016	19.96	24.38	
		Total		**19.96**	**24.38**	
3	**Water Resource**		**HFY (Mm^3/a)**	**HFY (Mℓ/d)**	**Comments**	
		Dams	Vove Dam	0.55		
		River	Run-of-river abstraction from the Vutshini Stream, a tributary of the Nsuze River	1.34		
			Mhlathuze River			
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Mℓ/d or Length or kW)**
		WTP	Nkandla WTP	Primary Bulk	3.6	3.6

4.1	**Existing**		Qudeni WTP	Primary Bulk	1.5	1.5
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	ø 660mm	12km
				Secondary Bulk	ø 50mm - ø 355mm	65km
				Tertiary Bulk	ø 50mm - ø250mm	81.1km
		Reservoirs	Res 1	Primary Bulk	25	580
			Res 67	Secondary Bulk	34	34
			Res 71	Secondary Bulk	250	420
			Res 2	Tertiary Bulk	18	180
			Res 3	Tertiary Bulk	18	640
			Res 68	Tertiary Bulk	331	331
			Res 69	Tertiary Bulk	2700	2700
			Res 70	Tertiary Bulk	100	210
			Res 72	Tertiary Bulk	710	710
			Res 75	Tertiary Bulk	50	110
			Res 73	Tertiary Bulk	150	200
			Res 74	Tertiary Bulk	50	110
			Res 76	Tertiary Bulk	10	110
			Res 77	Tertiary Bulk	50	290
			Res 78	Tertiary Bulk	0	240
			Res 79	Tertiary Bulk	120	240
			Res 80	Tertiary Bulk	100	240
			Res 81	Tertiary Bulk	220	240
			Res 82	Tertiary Bulk	50	240
		Pump Stations		Primary Bulk	-	-
4.2	**Future**	Bulk Pipelines		Primary Bulk	-	-
				Secondary Bulk	ø 50mm - ø 630mm	143.5km
				Tertiary Bulk	ø 50mm - ø 200mm	146.6km
		Dams	Proposed new Nsuze Dam	Primary Bulk	30.66Mcm	Yield of 19Mℓ/d
		WTP	Nsuze WTP (new)	Primary Bulk	-	21
		Reservoirs	CR (Res 18)	Primary Bulk	1200	12460
			Res 102	Secondary Bulk	1200	380
			Res 103	Secondary Bulk	732	420
			Res 12	Secondary Bulk	1611	380
			Res 13	Secondary Bulk	2929	760
			Res 14	Secondary Bulk	1183	240
			Res 15	Secondary Bulk	551	380
			Res 19	Secondary Bulk	676	860
			Res 20	Secondary Bulk	2421	200
			Res 21	Secondary Bulk	15	100
			Res 22	Secondary Bulk	0	740

			Res 23	Secondary Bulk	585	200
			Res 24	Secondary Bulk	729	260
			Res 28	Secondary Bulk	602	220
			Res 29	Secondary Bulk	492	660
			Res 31	Secondary Bulk	920	780
			Res 32	Secondary Bulk	779	480
			Res 34	Secondary Bulk	588	200
			Res 35	Secondary Bulk	205	80
			Res 36	Secondary Bulk	219	80
			Res 37	Secondary Bulk	196	110
			Res 46	Secondary Bulk	615	340
			Res 48	Secondary Bulk	741	240
			Res 54	Secondary Bulk	505	220
			Res 56	Secondary Bulk	235	680
			Res 58	Secondary Bulk	273	320
			Res 59	Secondary Bulk	1200	360
			Res 60	Secondary Bulk	50	380
			Res 61	Secondary Bulk	88	180
			Res 64	Secondary Bulk	33	160
			Res 65	Secondary Bulk	69	420
			Res 66	Secondary Bulk	174	100
			Res 10	Tertiary Bulk	38	980
			Res 100	Tertiary Bulk	31	940
			Res 101	Tertiary Bulk	0	360
			Res 104	Tertiary Bulk	0	200
			Res 11	Tertiary Bulk	700	1800
			Res 16	Tertiary Bulk	153	340
			Res 17	Tertiary Bulk	250	100
			Res 25	Tertiary Bulk	67	200
			Res 26	Tertiary Bulk	59	120
			Res 27	Tertiary Bulk	0	100
			Res 30	Tertiary Bulk	199	700
			Res 33	Tertiary Bulk	30	30
			Res 38	Tertiary Bulk	94	110
			Res 39	Tertiary Bulk	193	240
			Res 4	Tertiary Bulk	18	1020
			Res 40	Tertiary Bulk	272	240
			Res 41	Tertiary Bulk	130	260
			Res 42	Tertiary Bulk	584	560
			Res 43	Tertiary Bulk	136	100
			Res 44	Tertiary Bulk	70	200
			Res 45	Tertiary Bulk	126	220
			Res 47	Tertiary Bulk	0	1320
			Res 49	Tertiary Bulk	1359	860

			Res 5	Tertiary Bulk	0	1160
			Res 50	Tertiary Bulk	672	640
			Res 51	Tertiary Bulk	0	400
			Res 52	Tertiary Bulk	0	500
			Res 53	Tertiary Bulk	97	260
			Res 55	Tertiary Bulk	0	1360
			Res 57	Tertiary Bulk	15	180
			Res 6	Tertiary Bulk	18	280
			Res 62	Tertiary Bulk	141	200
			Res 63	Tertiary Bulk	0	240
			Res 7	Tertiary Bulk	25	280
			Res 8	Tertiary Bulk	28	1080
			Res 83	Tertiary Bulk	19	280
			Res 84	Tertiary Bulk	0	400
			Res 85	Tertiary Bulk	39	680
			Res 86	Tertiary Bulk	1	2240
			Res 87	Tertiary Bulk	50	760
			Res 88	Tertiary Bulk	20	2180
			Res 89	Tertiary Bulk	18	1350
			Res 9	Tertiary Bulk	336	1080
			Res 90	Tertiary Bulk	48	840
			Res 91	Tertiary Bulk	19	880
			Res 92	Tertiary Bulk	27	820
			Res 93	Tertiary Bulk	15	620
			Res 94	Tertiary Bulk	83	1720
			Res 95	Tertiary Bulk	0	60
			Res 96	Tertiary Bulk	0	200
			Res 97	Tertiary Bulk	10	340
			Res 98	Tertiary Bulk	24	720
			Res 99	Tertiary Bulk	20	1060
		Pump stations	PS at Nsuzu WTP to CR	Primary Bulk	0.376806M^3/s	389kW
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary	R1 057 526 000	R105 752 600	R1 163 278 600	
		Secondary	R436 218 000	R43 621 800	R479 839 800	
		Tertiary	R261 179 000	R26 117 900	R287 296 900	
		Total	**R1 754 923 000**	**R175 492 300**	**R1 930 415 000**	