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

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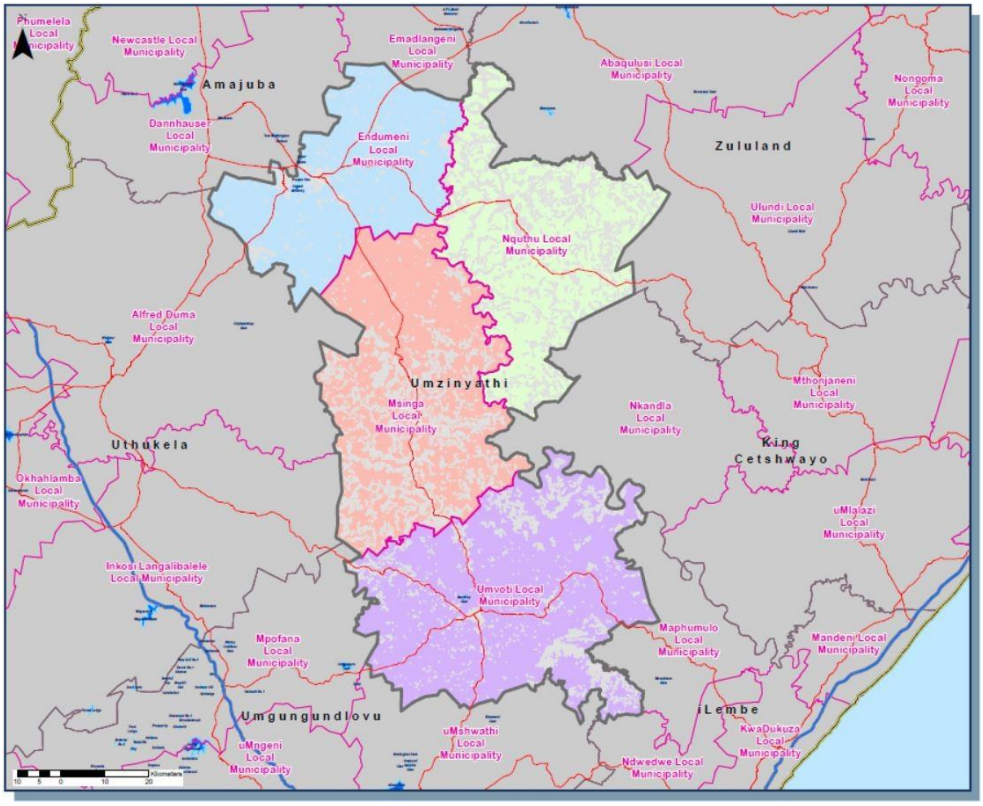

Reconnaissance Report

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.

B. Demographics

The Umzinyathi District Municipality (UZDM) is located in the central region of the Kwazulu-Natal Province in South Africa. The UZDM comprises of the following Local Municipalities:

- ✓ Endumeni Local Municipality (KZN241);
- ✓ Nquthu Local Municipality (KZN242);
- ✓ Msinga Local Municipality (KZN244); and
- ✓ Umvoti Local Municipality (KZN245);

UZDM recorded a total population of 578 208 people within 149 312 households, resulting in an average of 3.87 persons per household.

Table B-1: UZDM Population and Households per Local Municipalities

LM Name	No of Households	No of Population	People per Household
Endumeni	22 350	80 327	3.59
Msinga	56 302	192 733	3.42
Nquthu	34 243	178 081	5.20
Umvoti	36 417	127 067	3.49
Umzinyathi DM	**149 312**	**578 208**	**3.87**

Source: DWS Reference Framework, April 2019

Population growth was determined until 2050 that resulted in the projected number of people residing within Umzinyathi DM will be approximately 795 000 people. The projected population per Municipality is tabled within Table B-2 below.

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

Municipality	DWS RF Pop 2019	Population						
		2020	2025	2030	2035	2040	2045	2050
Endumeni	80 327	96 004	101 606	107 912	113 937	120 297	127 013	134 103
Nquthu	178 081	203 485	215 355	228 723	241 491	254 972	269 205	284 235
Msinga	192 733	91 500	96 838	102 849	108 590	114 652	121 052	127 810
Umvoti	127 067	178 425	188 834	200 555	211 751	223 572	236 053	249 231
Total	**578 208**	**569 414**	**602 633**	**640 039**	**675 769**	**713 493**	**753 324**	**795 379**

C. Service Levels

C.1 Water

The main source for 29% of households within UZDM is communal stand at a distance below 200m. The UZDM exhibits a water backlog of approximately 49%.

C.2 Sanitation

Approximately 52% of households within UZDM use a pit latrine/toilet with a ventilation pipe. The current sanitation backlog within UZDM is at approximately 22%.

D. Water Resources

The main rivers within the district are the Buffalo, Mooi and the Mvoti River. The Buffalo River flows through the centre of the District feeding into the Thukela River east of Ngubevu and then traverses the boundary between Msinga and Nkandla. The Mooi River flows into the Thukela River at Keate's Drift. The Mvoti River drains the southern section of the district.

The DM is supplied via river abstractions, weirs, dams and boreholes within the various LM's.

E. Existing Water Supply Schemes and Water Requirements

The existing water supply schemes within the UZDM are as follows:

- ✓ **Dundee/Glencoe WSS** - is supplied from the Buffalo River
- ✓ **Tugela Ferry WSS** - is supplied from the Thukela River and boreholes
- ✓ **Nqutu WSS** - is supplied from the Buffalo River

- ✓ **Greytown WSS** - is supplied from Lake Merthley and boreholes
- ✓ **Kranskop WSS** - is supplied from groundwater schemes
- ✓ **Muden WSS** - is supplied from the Mooi River and boreholes

The projected water requirements as per the demand model generated for the UZDM up to 2050 amounts to 166.75 Mℓ/d.

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

LM	2020 Population	2050 Population	2020 (Mℓ/d)	2050 (Mℓ/d)
Endumeni	79 254	110 705	23.29	33.22
Nquthu	195 118	272 548	34.72	50.35
Msinga	191 900	268 053	33.58	48.88
Umvoti	121 702	169 998	23.75	34.30
Umzinyathi DM	**587 974**	**821 304**	**115.34**	**166.75**

F. Existing Sanitation Supply Schemes

There are nine (9) sanitation schemes and nine (9) wastewater treatment plants, of which seven (7) WTP's are currently in operation within HGDM. All of them are in need of refurbishment and improved operations and maintenance.

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 UZDM amount to approximately R858 652 000. Only one regional bulk infrastructure project receives funding from the Regional Bulk Infrastructure Grant (RBIG), namely the Greytown Regional Bulk Scheme.

H. Bulk Water Supply Interventions Considered

This study aims to ensure that the UZDM 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 (WSIA's) 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 WSIA's, number of applicable households, population and their water requirements are illustrated within **Table H-1.**

Table H-1 Conceptual Scheme Areas, Households and Water Requirements

WSIA No	WSIA Name	Population 2020	Population 2050	Water Demand 2020	Water Demand 2050
UZ001	Dundee/Glencoe	71 425	99 768	21.67	35.02
UZ002	Nquthu	116 003	162 038	20.99	30.41
UZ003	Nondweni	49 416	69 027	8.62	12.50
UZ004	Ngolokodo	15 590	21 777	2.76	4.01
UZ005	Pomeroy	35 553	49 662	6.06	8.82
UZ006	Tugela Ferry	44 702	62 442	8.34	12.12
UZ007	Keates Drift	56 723	79 232	9.94	14.48
UZ008	Muden	11 942	16 681	2.09	3.03
UZ009	Greytown	20631	28 818	5.84	8.30
UZ010	Matimatolo	45 054	62 933	7.62	11.10
UZ011	Kranskop	1 787	2 497	0.43	0.62
UZ012	Makhabeleni	8 450	11 803	1.46	2.12
UZ013*	Spring Grove RBWSS	136 137	190 161	25.92	37.53
UZ014*	Nquthu BWSS	116 003	162 038	20.99	30.41
Umzinyathi		**556 391**	**777 188**	**95.82**	**142.53**
*** The Spring Grove RBWSS and Nquthu BWSS is not included in the final totals as it is proposed as an intervention to augment supply.**					

The Nquthu WSIA and the Dundee/Glencoe WSIA has the highest water demand of approximately 32% and 20% respectively.

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

Table H2: Water Resources Required vs proposed WSI

WSIA	WSIA Name	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)
UZ001	Dundee/Glencoe	**99 768**	**35.00**	12.78	6.49	6.28	12.78	0.00
UZ002	Nquthu	162 038	30.41	11.10	4.58	13.79	18.38	7.28
UZ003	Nondweni	69 027	12.50	4.56	3.58	1.17	4.75	0.18
UZ004	Ngolokodo	21 777	4.01	1.46	0.00	1.46	1.46	0.00
UZ005	Pomeroy	49 662	8.82	3.22	1.93	1.28	3.21	-0.01
UZ006	Tugela Ferry	62 442	12.11	4.42	4.38	-4.38	0.00	-4.42

WSIA	WSIA Name	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)
UZ007	Keats Drift	79 232	14.48	5.29	2.63	2.63	5.26	-0.03
UZ008	Muden	16 681	3.03	1.11	1.10	0.01	1.11	0.00
UZ009	Greytown	28 818	8.30	3.03	1.75	5.91	7.67	4.64
UZ010	Matimatolo	62 933	11.10	4.05	0.00	4.05	4.05	0.00
UZ011	Kranskop	2 497	0.62	0.23	0.18	0.18	0.37	0.14
UZ012	Makhabeleni	11 803	2.12	0.77	1.46	0.00	1.46	0.69
TOTAL		**666 678**	**142.50**	**52.01**	**28.09**	**32.39**	**60.48**	**8.46**

From the table above, it is noted not all the schemes will have adequate raw water resources to meet the 2050 demand requirements. The investigation to augment the water shortage within the WSIAs from the Spring Grove Regional Bulk Water Supply Scheme, the Dundee/Glencoe Scheme and the Nquthu Bulk Water Supply Scheme should be prioritised.

A total estimate of approximately R 6 billion is required to address the total bulk water supply requirement by 2050. The total cost requirement per WSIA is tabled within Table H-3

H-3: Total Cost requirement

WSIA	WSIA Name	Total Cost Requirement				
		Primary	Secondary	Tertiary	10% Contingencies	Total Cost (Excl VAT)
UZ001	Dundee/Glencoe	R80 622 000	R80 562 309	R35 706 788	R19 689 110	R216 580 206
	Proposed Extension from Nyonyana to Zenzele	R68 739 807	R37 882 871	R31 584 851	R13 820 753	R152 028 282
UZ002	Nquthu	R649 575 095	R335 177 400	R32 244 833	R101 699 733	R1 118 697 061
UZ003	Nondweni	R102 771 383	R58 046 804	R31 373 256	R19 219 144	R211 410 588
UZ004	Ngolokodo	-	R18 914 020	R12 971 891	R3 188 591	R35 074 503
UZ005	Pomeroy	R39 075 000	R20 980 286	R10 942 485	R7 099 777	R78 097 548
UZ006	Tugela Ferry	-	-	-	-	-
UZ007	Keates Drift	-	-	-	-	-
UZ008	Muden	-	-	-	-	-
UZ009	Greytown	R2 796 600 621	R112 935 557	R24 411 269	R293 394 745	R3 227 342 191
UZ010	Matimatolo	-	R28 843 735	R18 686 138	R4 752 987	R52 282 860
UZ011	Kranskop	-	-	-	-	-
UZ012	Makhabeleni	-	-	-	-	-
UZ013	Spring Grove RBWSS	R742 945 974	R77 796 101	R4 359 014	R82 510 109	R907 611 198
UZ014	Nquthu BWSS	R7 000 000	R56 958 453	R19 230 700	R8 318 915	R91 508 068
Total		**R4 487 329 880**	**R828 097 536**	**R221 511 225**	**R553 693 864**	**R6 090 632 505**

I. Conclusions and Recommendations

The UZDM 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. 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 UZDM 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 UZDM to address their bulk water supply requirements.

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 fourteen area interventions would be an implementation priority for the DM but the order would most likely be determined by the availability of funds or intervention programmes.

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

The fourteen (14) proposed water supply intervention areas (WSIAs) are the appropriate solutions for bulk water supply development within UZDM and are as follows:

- ✓ Dundee/Glencoe
- ✓ Nquthu
- ✓ Nondweni
- ✓ Ngolokodo
- ✓ Pomeroy
- ✓ Tugela Ferry
- ✓ Keates Drift
- ✓ Muden
- ✓ Greytown
- ✓ Matimatolo
- ✓ Kranskop
- ✓ Makhabeleni
- ✓ Spring Grove RBWSS
- ✓ Nquthu BWSS

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 fourteen (14) 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.

I-1: Proposed Implementation Order (Phased Approach)

Proposed Priorities (Phased Approach)	WSIA No and Name		Proposed Project Name	Proposed Estimated Project Value
1	UZ013	Spring Grove RBWSS	Augmentation of supply to Muden, Mooi-Mpofana and Greytown WTP	R907 611 198
2	UZ014	Nquthu BWSS	Nquthu Bulk Water Supply Upgrade and extension of supply to Nondweni	R91 508 068
3	UZ001	Dundee/Glencoe	Dundee/Glencoe Water Supply Scheme Upgrade (Dundee Bulk)	R216 580 206

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LIST OF ABBREVIATIONS

CoGTA	Department of Cooperative Governance and Traditional Affairs
CR	Command Reservoir
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
KZN	KwaZulu-Natal
ℓ/c/d	Liters per capita per day
LED	Local Economic Development Programme
LM	Local Municipality
LoS	Level of Service
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
UZDM	Umzinyathi District Municipality
VAT	Value Added Tax
WMA	Water Management Area

WSA	Water Services Authority
WSDP	Water Services Development Plan
WSI	Water Supply Intervention
WSIA	Water Supply Intervention Area
WSIG	Water Services Infrastructure Grant
WSP	Water Service Provider
WSS	Water Supply Scheme
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

1. OBJECTIVES AND METHODOLOGY

This report is the Bulk Water Master Plan for the study titled "Universal Access Plan Phase III – Progressive Development of a Regional Concept Secondary Bulk Water Master Plan for the Umzinyathi District Municipality (UZDM)" – 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 (CouM);
- ✓ Harry Gwala District Municipality (HGDM);
- ✓ Ilembe District Municipality (IDM);
- ✓ King Cetshwayo District Municipality (KCDM);
- ✓ Newcastle Local Municipality (NLM);
- ✓ The Msunduzi Local Municipality (TMLM);
- ✓ Ugu District Municipality (Ugu);
- ✓ Umgungundlovu District Municipality (UMDM)
- ✓ Umkhanyakude District Municipality (UKDM);
- ✓ uMzinyathi District Municipality (UZDM);
- ✓ uThukela District Municipality (UTDM); and
- ✓ Zululand District Municipality (ZDM).

The abovementioned municipalities were allocated WSA status for their respective areas of jurisdiction. Amajuba, King Cetshwayo and Umgungundlovu's responsibilities as WSA excludes the areas covered by the

Newcastle, City of uMhlathuze, and The Msunduzi Local Municipalities which themselves are WSA's. UAP Phase III reports are developed per WSA, i.e. 13 reports are prepared.

1.2 Purpose of the Report

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

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

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

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

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

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

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

1.3 Information Sources

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

- ✓ StatsSA Community Survey, 2016;
- ✓ UAP Phase II, Umzinyathi District Municipality, 2016;
- ✓ UAP Phase II, Umgungundlovu District Municipality, 2016;
- ✓ Umzinyathi District Municipality Water Services Development Plan, 2018 - 2019;

- ✓ Umzinyathi District Municipality Draft Integrated Development Plan, 2019 – 2020
- ✓ Msinga Regional Bulk Water Project – Water Resource Assessment – Bosch Stemele, 2012
- ✓ Msinga Regional Bulk Layouts - Ibhongo Consulting;
- ✓ Update of Water Reconciliation Strategies of the Nondweni, Nqutu, Pomeroy, Sampofu, Dundee/Glencoe and the Buffalo River System Schemes - Tlou Consulting, 2014; and
- ✓ Monthly water balance reports as submitted by DWS (KZN) for each WSA.

Meetings were held with managers and technical staff of the UZDM 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 UZDM Water Services Development Plan that is currently being updated. 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 connections 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.

1.5.1.1 Base Data

The base data used for this study includes the following:

- ✓ 2011 Census: Spatial data for the Main Places, Sub-Places and Small Areas Layer. Main Places are similar to the level of towns, Sub-Places are similar to the level of suburbs and the Small Areas Layer are of a smaller level of detail than Sub-Places, encompassing a number of enumerated census areas;
- ✓ 2011 Census: alpha-numeric data, linking to the spatial data, for household income categories, combined with water Level of Service (LoS). The derived household income and LoS information was combined into categories as follows:
    - Category 1 (Very High Income): Households with a house connection and an income more than R 1 228 000 per year;
    - Category 2 (Upper Middle Income): Households with a house connection and an income between R 153 601 and R 1 228 000 per year;
    - Category 3 (Average Middle Income): Households with a house connection and an income of between R 38 401 and R 153 600 per year;
    - Category 4 (Low Middle Income): Households with a house connection and an income of between R 9 601 and R 38 400 per year;
    - Category 5 (Low Income): Households with a house connection and an income between R1 and R 9 600 per year;
    - Category 6 (Yard Connections): all Households with a Yard Connection;
    - Category 7 Households with access to interim services and
    - Category 8 Households with access to below interim services.
- ✓ 2011 Census: categorisation of Main Places – similar to town level data, based on best-known characteristics of the Main Place. The types of Towns/Centre categories include:
    - Category 1: Long Established Metropolitan Centres (M): Large conurbation of a number of largely independent local authorities generally functioning as an entity;

- Category 2: City (c): Substantial authority functioning as a single entity isolated or part of a regional conurbation;
- Category 3: Town: Industrial (Ti): A town serving as a centre for predominantly industrial activities;
- Category 4: Town: Isolated (Tis): A town functioning generally as a regional centre of essentially minor regional activities;
- Category 5: Town: Special (Ts): A town having significant regular variations of population consequent on special functions. (Universities, holiday resorts, etc.);
- Category 6: Town: Country (Tc): A small town serving essentially as a local centre supporting only limited local activities.
- Category 7: Contiguous (Nc): A separate statutory authority or a number of authorities adjacent to, or close to, a metropolis or city and functioning as a component part of the whole conurbation;
- Category 8: Isolated (Nis): A substantial authority or group of contiguous authorities not adjacent to an established metropolis or authority;
- Category 9: Minor (Nm): Smaller centres with identifiable new or older established centres not constituting centres of significant commercial or industrial activity;
- Category 10: Rural (Nr): All other areas not having significant centres.

✓ Population Growth: Population numbers per Small Areas Layer as provided by Umgeni Water that developed with Statistics South Africa the population growth for the following years:

- 2016; 2020; 2025; 2030; 2035; 2040; 2045 and 2050.

✓ 2019 Updated Levels of Service as provided by Water Services Authorities. The 2019 LoS may be recorded in different formats and at different spatial levels (settlement / town, ward, other). The following categories were applicable the pilot WSA, based on wards and spatially allocated to the Small Areas Layer:

- 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.

1.5.1.2 Assumptions

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

✓ That the ratio of population within each income category in the House Connection LoS category has not changed since 2011. The assumption is that the individuals in each category may be earning more since 2011, but that the categories themselves should have also then moved upwards by the same average quantum. The ratio of population in each category may then be assumed to have stayed more or less the same, even though the actual income values may have changed. This will not influence the demand allocated to each category.

✓ That the categorisation of Centres has not changed since the 2011 Census. The categorisation of Main Places may be reviewed if necessary

- ✓ The projected population growth numbers as provided by Umgeni Water was used without any further analyses.
- ✓ The 2019 updated Level of Service as provided for the pilot WSA was used, which also indicated potential future levels of service. However, it was found that some areas are marked as below standpipe level when the 2011 Census recorded these areas as above RDP level. We assumed that these areas may have been marked as below standpipe level subsequent to the Census due to factors such as water availability / reliability or other factors. It was decided, in these cases, that the infrastructure probably still exists in these areas as recorded during the Census and that it would be prudent, for water demand modelling purposes, to assume the Census RDP levels still apply. In cases where the WSA indicated areas to be in higher categories than recorded in the Census, the WSA for Level of Service was used, since it is assumed that these areas have since been upgraded to a higher level of service. No area was therefore downgraded from the Census data, but some areas were upgraded to a higher LoS with the new 2019 data.
- ✓ Average of the Annual Average Daily Demand (AADD) values (Direct Demands) were assumed, as shown in Table 1-1. 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 per Centre category.

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

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

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

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

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

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.

1.5.1.3 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.

1.6 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.

1.7 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 Umzinyathi District Municipality (DC24) is located in the northern central region of the KwaZulu-Natal Province and it covers an area of approximately 8 079 km². UZDM is bordered to the north by the Amajuba District Municipality, to the west by the uThukela District Municipality, to the south-west by the uMgungundlovu District Municipality, to the south-east by the iLembe District Municipality and to the east by King Cetshwayo District Municipality.

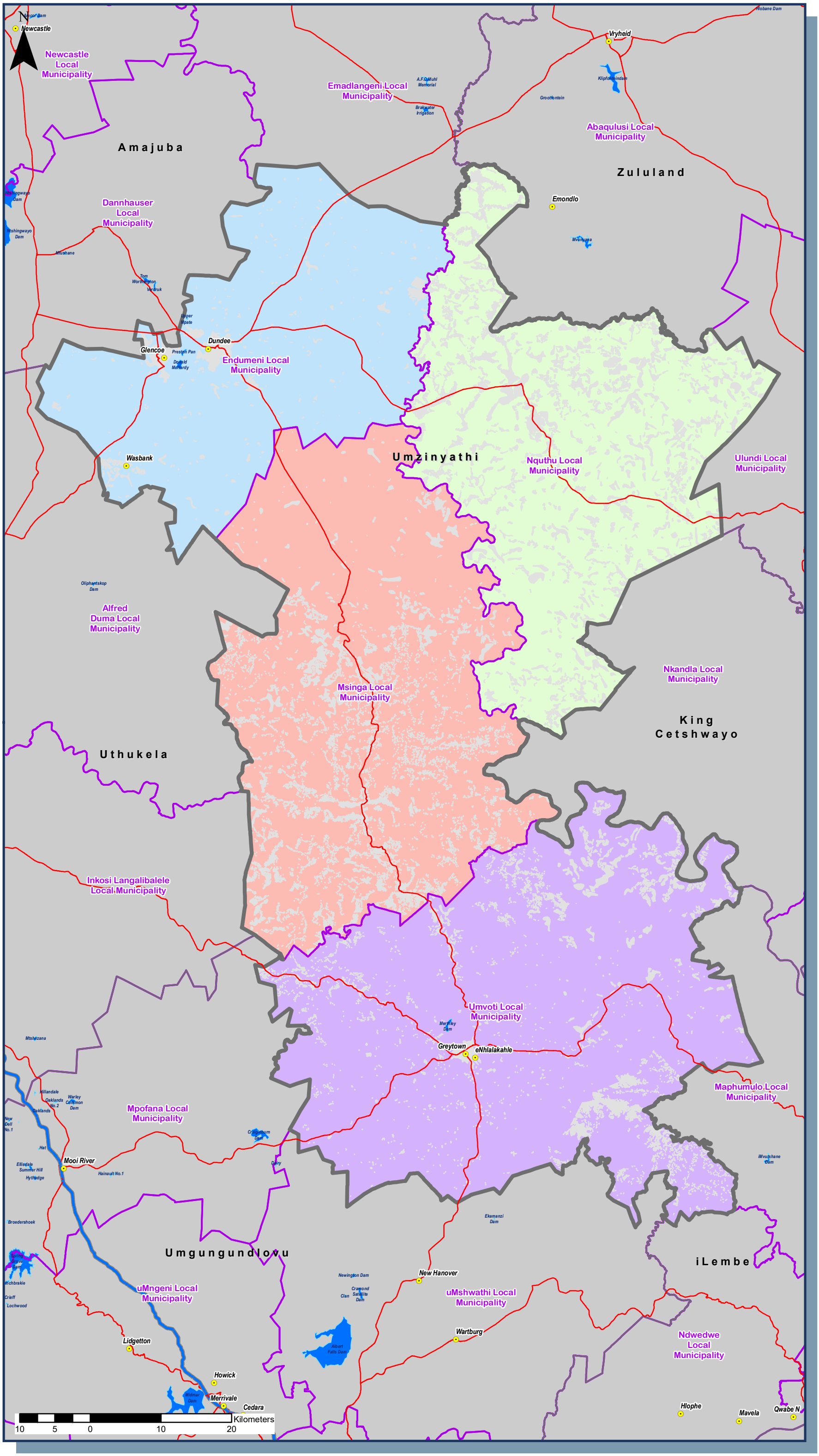
The UZDM comprises of the following four Local Municipalities:

- ✓ Endumeni Local Municipality (KZN241);
- ✓ Nquthu Local Municipality (KZN242);
- ✓ Msinga Local Municipality (KZN244); and
- ✓ Umvoti Local Municipality (KZN245);

The UZDM lies between the main N3 Corridor between Durban and Gauteng and the Coastal Corridor, running along the east coast. The seat of uMzinyathi DM is Dundee. The more developed urban areas include Dundee and Greytown, which can be viewed as strong regional centres with substantial commercial and agricultural activity.

Umzinyathi District Municipality, in conjunction with its north western neighbour Amajuba Municipality, is branded as the “custodian” of the “Battlefields region of the Zulu Kingdom”. The “Battlefields of the Zulu Kingdom” are located in the hinterland and lie “in the shadow” of the majestic Drakensberg mountains spanning the western boundary of KwaZulu-Natal. This branding is of international and regional significance. In conjunction with the Beaches of the South and North Coast and Big Five Game attractions in the East of KwaZulu-Natal, the “Battlefields of the Zulu Kingdom” form a vital role in the spatial economy of the province from a tourism perspective.

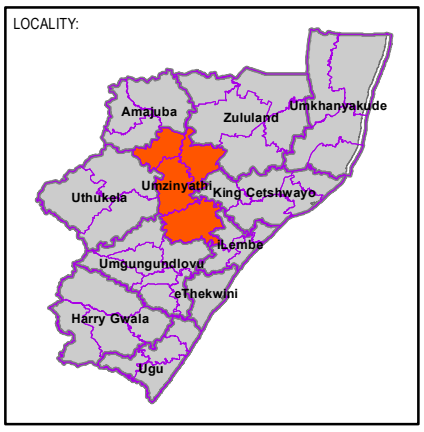
The locality of UZDM is illustrated in **Figure 2-1** overleaf.



Legend

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

LOCALITY:



CLIENT:

UMGENI WATER • AMANZI

MUNICIPALITY:

UMZINYATHI DISTRICT MUNICIPALITY

CONSULTANTS

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PROJECT TITLE

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

MAP TITLE:

Locality Map

Umzinyathi District Municipality

DATE COMPLETED:

January 2021

MAP NO.:

DC 24 Figure 2-1

2.2 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

Umzinyathi DM includes some of the poorest and most underdeveloped rural areas within KwaZulu-Natal, most notably the Msinga and Nquthu Municipalities. The rural-urban split of the DM is approximately 93% and 7% respectively. In Nquthu and Msinga there is a dominance of the three peri-urban settlements of Tugela Ferry, Pomeroy and Keates Drift. The population densities of these three areas are higher than those of the rest of the area. The DM has 17 Tribal Authorities. Endumeni is the only Municipality that does not have any tribal land and the majority of the land in the DM (60%) is under the control of the Ingonyama Trust situated mainly in Nqutu and Msinga.

The R33 is considered the primary corridor which is primarily a movement corridor within the DM, connecting the main administrative districts being Endumeni, Msinga and Mvoti local municipalities. The R33 traverses the district in a north south direction and is of vital importance to link the impoverished areas of Msinga and Nquthu to the regional economic opportunities within Endumeni and uMvoti. The main link between the District and the Pietermaritzburg Regional Airport is the R33 which is in a bad condition. The poor quality of the R33 limits the possibilities of optimally utilising this road as an economic or agricultural corridor.

The UZDM falls within three main catchments, namely the Thukela catchment, the Mvoti Catchment and the Mfolozi catchment. The main rivers within the district are the Buffalo, Mooi and the Mvoti Rivers.

2.2.1 Endumeni Local Municipality

The Endumeni LM is approximately 1 610 km^2 in area and is located 290km north of Durban and 360km south-east of Johannesburg, with well-established road, rail and air infrastructure making the Endumeni region the geographic centre of northern KwaZulu-Natal. It is the smallest of four municipalities in the DM.

Dundee is the service centre for the abundant northern KZN, a town of learning and also the geographical and administrative heart of northern KZN. At the base of the Endumeni Mountain, the highest peak in the Biggarsberg range of mountains is Wasbank.

Dundee and Glencoe have well-established and serviced areas for light-to-medium industry. Their towns have a good, consistent supply of water, with six dams and a pipeline from the uMzinyathi/Buffalo River feeding the area. Regional offices of a number of state and provincial departments have been established here and Endumeni schools are renowned for their high standard of education. A large, well-equipped provincial hospital caters for the whole district.

With its variety of service facilities, infrastructure and a stable labour supply, Endumeni offers every opportunity for the businessman, industrialist and investor, as well as the tourist.

2.2.2 Nquthu Local Municipality

The Nquthu LM is approximately 1 962 km^2 making up a quarter of the geographical area of the DM and is located along the north-eastern boundary of the DM.

Isandlwana, the site of the historic Anglo-Zulu War battle, is a well-known tourist destination worldwide. Nquthu Town is a small but stable urban area that has established itself as the primary commercial, administrative and service centre for the municipality as a whole. Nquthu is an isiZulu name meaning 'the back of the head'.

The LM is predominantly rural in nature, with expansive rural settlements being one of the major features. It is mainly accessed through the R68 linking Ulundi to Newcastle/Dundee. Other important roads through the municipality are the R33, passing through the northern areas, passing east of Nondweni before linking Vryheid with the R68. A gravel road links Nquthu with Kranskop.

2.2.3 Msinga Local Municipality

The Msinga LM, located in the south-western part of the DM, is approximately 2 375 km^2 in area making up almost a third of the geographical area of the DM.

The nature of the topography is such that Msinga LM is largely located in deep gorges of the Thukela and Buffalo Rivers. This effectively isolates the area from the immediate surrounding municipal areas. The LM is accessible via the R33, linking it with Dundee, Ladysmith, Pietermaritzburg, Kranskop and Weenen.

Owing to its rugged terrain Msinga's population is relatively dispersed and where services exist they are concentrated along road infrastructure and water sources such as the Thukela River. It is a largely rural area, with 70% of its area being traditional authority land held in trust by the Ingonyama Trust. The remaining 30% of land is commercial farmland, all of which is located to the north of Pomeroy. Due to the rural nature of the municipality, approximately 99% of the population lives in traditional areas.

The population dynamics result in a growing rural area and a declining urban area in Msinga, contrary to most other areas in the country. This can be attributed to the fact that the urban areas of the LM are very small and are unable to provide the normal range of goods and services provided in urban areas. As a result, the population utilises the neighbouring areas of Emnambithi and Umvoti for urban services.

The strong traditional culture, particularly prevalent in Msinga LM, is a valuable asset that must be preserved and valued. These traditional areas provide support mechanisms for the communities, as well as living custodians of the culture.

2.2.4 *Umvoti Local Municipality*

The Umvoti LM, located along the eastern border of the DM, is approximately 2 705 km^2 in area making up almost a third of the geographical area of the DM. The LM is about 65km from Dundee and approximately 70km from Pietermaritzburg.

Umvoti LM comprises five traditional authority areas, all of which are located beyond a 40km radius from Greytown, which is the main centre within the municipal area. The central part of the area is generally covered with high-potential commercial farmland and is characterised by low population density.

Service levels in urban areas are high except for informal areas, in commercial agricultural areas they are relatively high as farmers provide their own services and in tribal authority areas they are low to moderate.

The LM is well-served by provincial and regional roads, given its location at the intersection of the roads to Pietermaritzburg, the coast, the Drakensberg and the Battlefields Route.

2.3 Climate and Climate Change

The UZDM is characterised with a temperate climate, with warm to hot summers and mild to cool winters. Frost occurs in mid-May in most of the areas but somewhat earlier in the areas around Greytown.

Temperature variations occur at the local levels of the DM but in general the southern parts of the DM and the mountainous areas north of Greytown has the lowest maximum temperatures with average maximums below 25°C in summer. The plateau landscape and foothills are slightly warmer in summer with maximum temperatures approaching 30°C, and higher temperatures are found in the Thukela valley where maximum average temperatures exceed 30°C in summer.

The DM falls within the coastal summer rainfall areas. Rainfall is often orographic in nature due to its topography and mountains. Orographic can be described as rain or any other precipitation that is produced when moist air is lifted as it moves over a mountain range. As the air rises and cools, orographic clouds form and serve as a source of precipitation. Rainfall ranges between 500mm to more than 1000mm per annum with the south-eastern mountainous area exceeding 1000mm per annum. (Ezemvelo KZN Wildlife, 2014)

The climatic conditions measured in UZDM are summarised in **Table 2-1** per LM.

Table 2-1: Climate variables of UZDM

	Low	High
Annual mean Precipitation (mm)	1 265	1 400
	Low	**High**
Annual mean Temperature (°C)	14.2	18

Source: Ezemvelo KZN Wildlife, 2014

Umzinyathi DM faces various environmental disasters and challenges as a result of climate change. Areas of Msinga Local Municipality within UZDM experience annual floods during the December month which result in fatalities, houses and infrastructure being washed away resulting in numerous deaths of the people of Msinga. These floods are just one of the outcomes of climate change which the district needs to adapt and mitigate. Recent studies within South Africa which involve climate change modelling and associated projections all show conclusively that the symptoms of climate change in South Africa are likely to include:

- ✓ Higher temperatures;
- ✓ Altered rainfall patterns;
- ✓ More frequent or intense extreme weather events including heat-waves, droughts, storms and floods; and
- ✓ Rising sea levels along coastal municipalities.

The implications of the above predicted weather and climatic changes will impact on the physical environment which will ultimately impact on the sustainability of human livelihoods. It is crucial that future planning initiative programmes take into consideration the risks, impacts and limitations imposed by climate change, such as increased temperatures; changes in precipitation levels; increased storm events; tidal surges and sea-level rise; and consider adaptation measures.

UZDM appointed consultants to undertake a climate change and adaptation strategy during the 2016/17 financial year. The project aims to assist Umzinyathi District Municipality to better respond to climate change.

2.4 TOPOGRAPHY, GEOLOGY AND SOILS

The altitude of UZDM ranges from 145m to 1788m above sea level. With the Endumeni LM area ranging from 994m to 1788m above sea level, Msinga LM area from 405m (minimum) to 1726m (maximum), Nquthu LM area ranging from 544m (minimum) to 1739m and Umvoti LM has the lowest point being 145m above sea level and the highest being 1614m above sea level. The DM is characterised by extensive variation with deep river gorges, rolling grasslands, extensive wetlands, hills and valley bushveld. The DM can be divided into three topography areas, the northern plateau with the Biggarsberg and the Buffalo River valley dominating

the landscape; the southern landscape defined by the mountains immediately north of Greytown and the Mvoti River valley; and the prominent Thukela River valley, into which the valleys carved by the Buffalo and Mooi Rivers feed into, which is characterised by deep gorges and steep slopes.

Table 2-2: Topological variables of UZDM per LM

	Local Municipalities				UZDM
	Endumeni	**Msinga**	**Nquthu**	**Umvoti**	
	Area (km^2)				
	1 610.23	2 501.14	1 962.26	2 515.53	8 079
Elevation (meters above sea level)					
Minimum	994	405	544	145	145
Maximum	1 788	1 726	1 739	1 614	1 788

Source: Ezemvelo KZN Wildlife, 2014

The geology of UZDM mostly consists of the Ecca group, about 250 million years old, overlain with patches of the Drakensberg from about 65 million years ago. The Ecca group largely consist of shale and sandstone, which are sedimentary rocks while the Drakensberg group consists of basalts and dolerite (Igneous rock). Metamorphic rocks are also present especially amphibolite and gneiss in the south-eastern part of the DM.

Arenite is the most common rock covering the municipal area. Shale is also found through the area and Tillite is present along the Buffalo River but only in the mountainous areas before joining the Thukela River. These sedimentary formations are topped by dolerite that is still exposed in the higher parts of the mountains.

The varied topography and geology has created a variety of soils within the DM, and these are briefly described below per LM:

- ✓ **Endumeni LM** is characterised mostly by the sedimentary soils of the Ecca group arenite which is a dominant feature in the District and fragmented patches of Shale, mudstone and dolerite.
- ✓ **Nquthu LM** is characterised mostly by Dolerite, Ecca group arenite and Shale.
- ✓ **Umvoti LM** the geological formation of Umvoti Municipality comprises of igneous, metamorphic and sedimentary rocks. It is characterised by Amphibolite, Dolerite, Peridotite, Schist, Shale, Tillite, Tonalite, Natal group arenite, Ecca group arenite and Gneiss.
- ✓ **Msinga LM** consists of conglomerate, dolerite, schist, shale, tillite, nsuze group, basalt, tonalite, ecca group arenite and natal granite.

2.5 ENVIRONMENTAL[1]

The dominant land cover within the DM is natural land cover (56.7%), agricultural and forestry related (24.4%) with 13.8% described as degraded land. Apart from natural land cover that is the dominant land cover in all four LM's, the most prominent characteristics at municipal level include:

- ✓ A very high proportion of 40.7% of the land cover of Umvoti LM consists of agriculture and forestry activities
- ✓ Land degradation is particularly severe in the Nquthu LM (20.3% of total land cover) and Msinga LM (18.7%)
- ✓ 33.8% of all built-up areas in the district are located in the Nquthu LM

The natural land cover is dominated by grassland (30.3% of district land area) and dense bush (11.0%), with grassland forming a particularly proportion of the total land area in the Endumeni LM (52.3%). A total of 24.4% of the district land area comprises of agriculture and forestry activities. The most dominant subcategories at district level are subsistence agriculture (8.9%), plantations (7.7%), and annual commercial dry land crops (4.1%). Subsistence agriculture represents as much as 24.9% of the total land area of Nquthu LM and 9.6% of the Msinga LM. More than 92% of all plantations in the district are located in the Umvoti LM where it comprises as much as 24.4% of the total municipal land area. Commercial farming with annual dry land crops is mainly concentrated in the Endumeni LM (48.5% of the district total) and Umvoti LM (31.2% of commercial dry land farming in the district) with only very limited commercial farming in the Msinga and Nquthu LMs. Irrigated commercial farming is limited in the district (just over 1% of the district land area) and very equally distributed between the Endumeni and Umvoti LMs.

Land degradation is a particularly severe problem, covering a total of 13.8% of the district land area (1 180km^2) and with more than 222km^2 classified as areas of severe erosion. The degraded areas are mainly located in Msinga LM (39.6% of total degraded area in the district) and Nquthu LM (33.6% of the district total). Areas of severe erosion are mostly located in the Nquthu LM, with 50% of severely eroded areas in the district located in this municipal area. The majority of the built-up footprint of the district (62.6%) comprises of low density rural settlements, mostly located in the Nquthu and Msinga LMs.

The UZDM traverses four biomes, namely Forest, Savanna, Grassland and Wetland and contains 23 vegetation types.. These biomes provide the basic template for defining the extent of species-specific habitat that potentially supports a wide variety of biodiversity.

[1] Sourced from Umzinyathi District Municipality - Biodiversity Sector Plan 2014

The National Department of Environmental Affairs (DEA) has published a list of threatened terrestrial ecosystems, which classifies all threatened or protected ecosystems in South Africa in terms of four categories: Critically Endangered (CR), Endangered (EN), Vulnerable (VU), or Protected. The purpose of categorising these ecosystems was to prioritise conservation areas, to reduce the rates of ecosystem and species extinction, as well as to prevent further degradation and loss of structure, function and composition of these ecosystems.

Within the UZDM, the DEA has identified 15 threatened ecosystems; this includes five (5) endangered and 10 vulnerable ecosystems.

UZDM has four (4) provincial nature reserves, namely Blinkwater Nature Reserve, Isandlwana, Ntinini Training Centre and Umvoti Vlei Nature Reserve. Umvoti Vlei nature Reserve contains a large wetland ecosystem and provides habitat for a number of wetland birds. Within the reserve, there are two hot natural springs, namely Lilani and Shushu. Blinkwater Nature Reserve is home to indigenous forests, categories as ''Mist belt Podocarpus'' upland grasslands, vleis, streams and is also home to the endangered Oribi and rare Blue Swallow. Isandlwana Historic Reserve and surrounds has historical significance as it is the place where one of the Anglo-Zulu War took place, and the Reserve has cairns which mark mass graves of British soldiers who fought and died at Isandlwana

Important areas of environmental significance need to be identified to protect and preserve valued ecosystems, natural habitats and special case areas in order to minimise negative impacts. In terms of land use management, the specific ecosystems and vegetation communities that require environmental management are wetlands, grasslands, and indigenous forests that contain the habitats of important species. It should be noted that environmental management need not be limited to the protection/preservation but also areas may be identified for opportunities that a particular environment may provide such as the rehabilitation of wetlands, eco-tourism opportunities etc.

2.6 INSTITUTIONAL ARRANGEMENTS FOR WATER SUPPLY

In terms of Section 1 of the Water Services Act, 1997, the Umzinyathi DM is the water service authority (WSA) and water service provider (WSP) to its four local municipalities, namely:

- ✓ Endumeni Local Municipality (KZN241);
- ✓ Nquthu Local Municipality (KZN242);
- ✓ Msinga Local Municipality (KZN244); and
- ✓ Umvoti Local Municipality (KZN245);

The UZDM is mandated by the Water Services Act to progressively ensure efficient, affordable, economical and sustainable access to water services for all consumers and potential consumers within its area of jurisdiction.

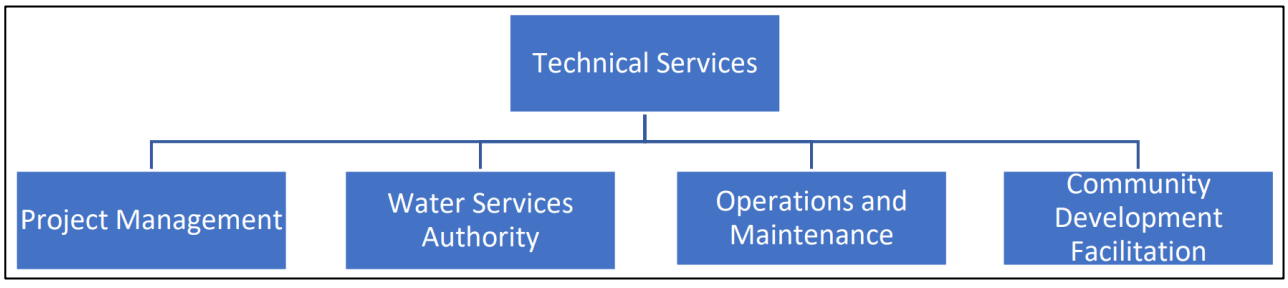
Table 2-3 below presents the departmental outline for the UZDM, while **Figure 2-2** below depicts the organogram of the UZDM Technical Services department.

Table 2-3: UZDM Departmental Outline

Name	Position
Mr LH Mthembu Acting	Acting Municipal Manager
Mr Edward Bonga	Senior Manager: Planning and Economic Development
Mr G Vilakazi	Acting Senior Manager: Corporate Services
Mrs N Mkhwanazi	Chief Financial Officer
Mr L Mthembu	Senior Manager: Technical Services

Source: UZDM IDP, 2019/2020

Figure 2-2: Technical Services organogram



The functions of the Technical Services department include, and are not limited to, the provision of water and sanitation, operations and maintenance of infrastructure assets, management of water quality, facilitation of community development programmes and projects and management of infrastructure projects.

3. DEMOGRAPHICS

3.1 EXISTING POPULATION DISTRIBUTION

The UZDM is in the process to review and update their WSDP and has updated their demographics accordingly in the 2018/2019 Water Services Development Plan.

As the WSDP demographics for UZDM has not been updated to date and does not reflect the latest demographics when compared to the reference framework, the UAP Phase III will adopt the figures reflected by the DWS Reference Framework (2019).

There is currently 578 208 people within 149 312 households residing within 369 settlements within UZDM. The average household size is 3.87 persons per household. The population distribution of UZDM is illustrated in **Figure 3-1** overleaf.

The population and household figures per Local Municipality are tabled in **Table 3-1** below.

Table 3-1: Population & Household Figures for UZDM

Municipality	No of Population	No of Households	People per Household
Endumeni	80 327	22 350	3.59
Msinga	192 733	56 302	3.42
Nquthu	178 081	34 243	5.20
Umvoti	127 067	36 417	3.49
Total	**578 208**	**149 312**	**3.87**

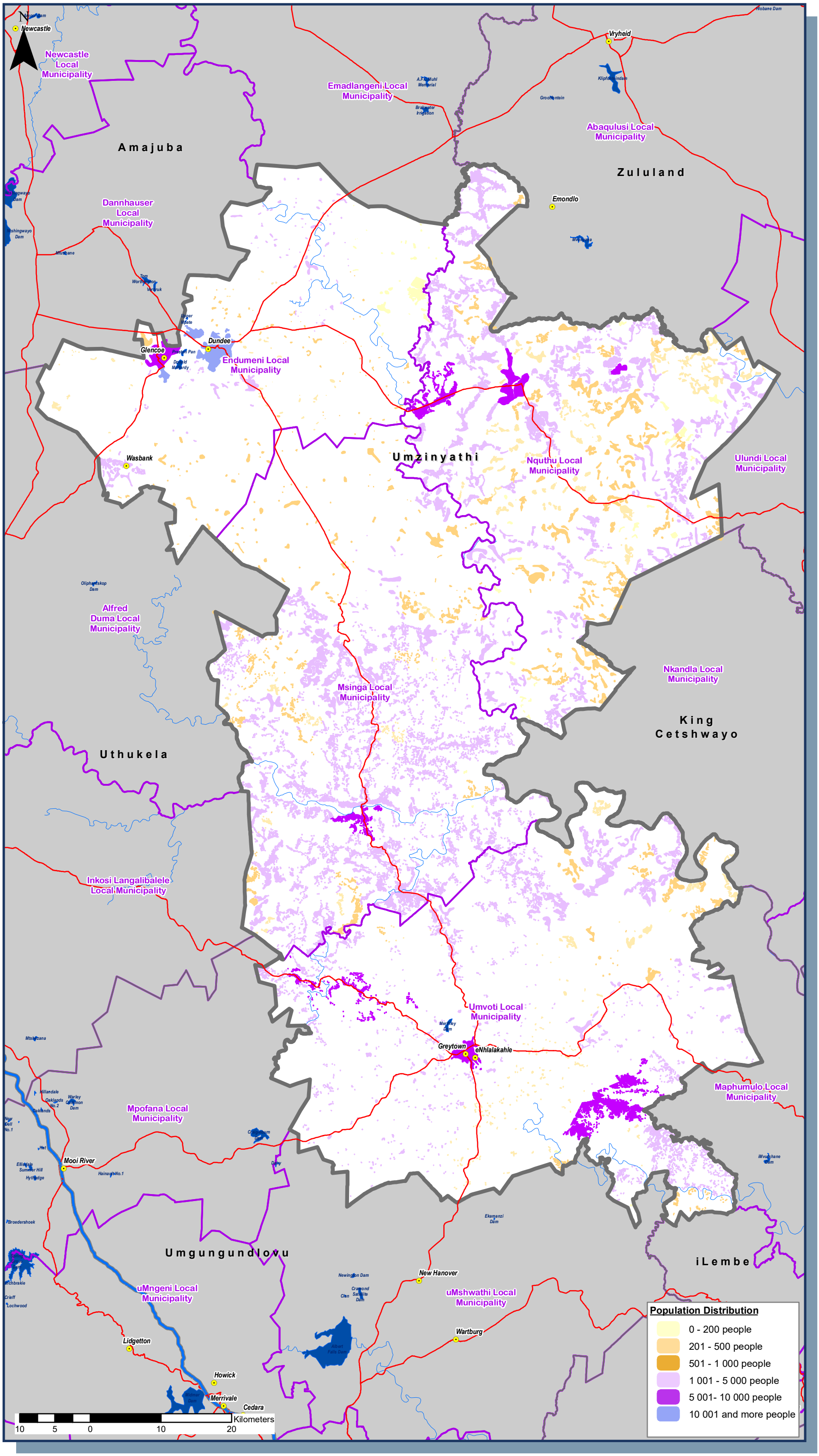
Source: DWS Reference Framework, April 2019

The Community Survey 2016 yielded a growth rate of 1.74% for the UZDM from 2011 to 2016. The Endumeni LM recorded the largest growth rate within this period and is presented in **Table 3-2** below.

Table 3-2: Population and Growth Rate: 2011 - 2016

Municipality	Population 2011	Population 2016	Population Growth	Growth Rate
Endumeni	64 862	76 639	11 777	3.79
Msinga	169 145	184 494	15 349	0.81
Nquthu	165 307	171 325	6 018	1.97
Umvoti	114 715	122 423	7 708	1.48
Total	**514 029**	**554 881**	**40 852**	**1.74**

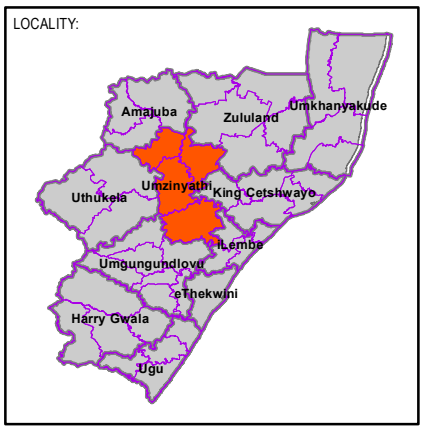
Source: StatsSA, Community Survey 2016



Legend

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

LOCALITY:



CLIENT:

UMGENI WATER • AMANZI

MUNICIPALITY:

UMZINYATHI DISTRICT MUNICIPALITY

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PROJECT TITLE

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

MAP TITLE:

Population Distribution

Umzinyathi District Municipality

DATE COMPLETED:

January 2021

MAP NO.:

DC 24 Figure 3-1

3.2 SOCIAL AND ECONOMIC INDICATORS

The UZDM constitutes 8.5% of the area and ±5% of the population of KZN. Most industries in the DM is associated with agriculture or hand work (carpets, beadwork) by trained artisans. The municipal area has extensive grasslands in the north supporting the primary agricultural sector based on cattle ranching for beef, small scale sheep and mixed farming and maize cultivation. In the southern areas substantial forestry is prevalent. Sugar cane and smaller scale fruit farming such as avocado and kiwi fruit cultivation also occur.

The area has high potential for growth in agricultural crop production (maize, soybean and sugar cane). In rural areas, particularly in the Msinga and Nquthu LM's, animals are not kept as farming commodities and are seldom slaughtered or sold. There is a need for farmer support programmes to improve stock management. It is important to broaden rural livelihoods through targeted agricultural production. There is very little product beneficiation with most products being exported to major markets for further processing and/or export. (UZDM IDP, 2019)

Mineral deposits found in the DM include coal and metal ores. Only coal was mined on a large scale in the Endumeni LM. The coal mining industry is undergoing a restructuring process. There is a decline in corporate interest in the industry, however there is interest in the small scale regeneration of the coal belt for SMME development. A small amount of stone quarrying occurs in the district. Within Endumeni LM, Dundee has the main economic activities ranging from retail trade, tourism and farming. Dundee is a centre from which tourism based on the cultural heritage of the Zulu Kingdom and "Battlefields" is emphasised and managed to some extent, and there is also Glencoe which serves as a secondary centre to Dundee.

Greytown, in the Umvoti LM, is the agricultural centre of the DM and contributes substantially to the economic viability of the district. Nquthu and Msinga Local Municipalities are rural based subsistence economies with cultural heritage areas that attract some tourists but need to be substantially developed.

UZDM has the advantage of being situated along the well renowned Battlefields. Historical sites such as the Isandlwana Mountain, Talana Mountain, Rorkes Drift, Bambatha Ambush Rock and the Prince Imperial Memorial site form part of the rich history and heritage of the area. Moreover the area is also know to host the now popular annual events such as the Isandlwana battle commemoration, the Talana Live, the Biltong Fees, Msinga Drift Khana car event and the Dundee July Rural Horse racing. (UZDM IDP, 2019)

While international tourists visit this area, the percentage of tourists who come through to the Battlefields is minuscule when compared to those who visit destinations such as Durban, Pietermaritzburg, the Elephant Coast and Zululand. This therefore implies that much effort and resources still have to be channeled towards marketing the area as one of the preferred tourism destinations.

UZDM is characterized by the socio-economic indicators such as low revenue base, poor and ageing infrastructure especially water and sanitation infrastructure, limited access to services and low economic base; high levels of poverty, unemployment, skills shortage, lack of resources and low level of education; under-developed land and settlement patterns that make it difficult to plan for effective service delivery.

Development challenges facing the district include urbanization and the associated informal settlements, poverty, service backlogs and general lack of investment in the rural areas, particularly traditional council areas, land issues and lack of infrastructure investment (bulk infrastructure).

The total size of the district economy as measured by the total GVA has grown from R3.2 billion in 2001 to approximately R5.8 billion in 2011. Although growing from a very small base, it is indicative of relatively strong economic growth of just over 7% per annum over this period. Although this growth rate declined slightly from 2008, the impact of the global economic crisis seems to have impacted the growth rate of the district economy as severely as in other areas.

The manufacturing sector increased its contribution to total GVA from 12.3% to 19.0%, and the transport and communication sector by 2.5%. Although still growing in absolute terms, the proportional contribution of the agricultural sector (declining from 15.0% to 10.8%) and the general government sector (20.4% to 16.9%) showed the biggest decline between 2001 and 2011. Other sectors with a declining contribution to the district economy include retail (decline from 17.1% to 15.2%) and the community and social services sector (8.3% to 7.3% contribution). (UZDM G&DP, 2015)

Table 3-3 below shows Umzinyathi DM's GVA contribution per sector as reflected in the Growth and Development Plan.

Table 3-3: UZDM GVA per economic sector

Sector	% Contribution 2001	% Contribution 2011
Agriculture, forestry and fishing	15.0%	10.8%
Mining and quarrying	2.6%	2.2%
Manufacturing	12.3%	19.0%
Electricity, gas and water	1.8%	2.3%
Construction	2.9%	3.6%
Wholesale and retail trade, catering and accommodation	17.1%	15.2%
Transport, storage and communication	6.7%	9.3%
Finance, insurance, real estate and business services	12.8%	13.3%
Community, social and personal services	8.3%	7.3%
General government	20.4%	16.9%

Source: UZDM G&DP, 2015

Overall, the employment market in the UZDM indicates an increasing trend between 2012 and 2016 with a marginal increase in both the informal and formal sector employment opportunities. The Informal Sector showed an increase from 1 948 to 11 416 in 2012 to 13 364 in 2016 whilst the formal sector increased from 5 071 from 36 484 to 41 555 in 2016.

This could be ascribed to an increase in the overall literacy rate within UZDM. The statistics indicated that there is rapid growth within the urban areas of the DM whilst the rural areas are growing slowly. This aspect will also act as an important push factor in migration decision-making of the district population and is likely to contribute to the out migration of the economically active population from the district. (UZDM IDP, 2019)

The sources of employment of the employed population are reflected in the table below. The employment sectors of Umzinyathi DM are Mining, Manufacturing, Electricity, Construction, Trade, Finance, Community Services, Agriculture & Forestry and Households. (UZDM IDP, 2019)

Table 3-4 below shows Umzinyathi DM's employment percentage per sector as reflected in the IDP.

Table 3-4: UZDM Sector Employment percentage

Sector	Employment % (2016)
Agriculture, forestry and fishing	14%
Mining and quarrying	1%
Manufacturing	5%
Electricity, gas and water	0%
Construction	8%
Wholesale and retail trade, catering and accommodation	23%
Transport, storage and communication	4%
Finance, insurance, real estate and business services	9%
Community, social and personal services	17%
General government	19%

Source: UZDM IDP, 2019/2020

The majority of the employed population in the district is active in the formal sector which is divided into skilled (18%), semi-skilled (29%) and low skilled (24%). There is however a worrying trend as none of the three formal sector categories has improved from 2011 to 2016. The informal sector is also increasing by 25% in 2011 and 29% in 2016. This reiterates the need for promotion of skills development to encourage formal employment and further shows that there are fewer employment opportunities to absorb household heads in the DM's labour market which is typical of rural areas.

The sector is a strong contributor to economic growth and employment opportunities and as such the municipality should focus on growing the informal sector by initiating Local Economic Development programmes that promote their growth into the formal sector. (UZDM IDP, 2019)

3.3 Population Growth Scenarios

Population and economic growth rates are used to determine future developmental requirements within the UZDM. This determines the required increase or decrease in water services. Non-domestic consumer unit growth, particularly commercial, industrial and agricultural growth, also gives an indication of the expected increase in water demand and associated wastewater flow discharges. Factors that affect population growth rate include:

- ✓ Immigration due to displaced farm labour, land restitution and declining job opportunities in neighbouring provinces;
- ✓ Emigration to urban centres or outward migration from the region in search of job opportunities; and
- ✓ The HIV/AIDS epidemic that is predicted to seriously affect economically active persons (18-45 years). Full-blown AIDS sufferers who are unable to continue working may return home to the rural areas. This may be an internal urban/rural shift, or migration from urban areas outside the DM. With the prevalence of HIV/AIDS, especially in KZN, it is important to ensure adequate water services provision in the rural areas.

There is currently 578 208 people within 149 312 households residing within 369 communities within UZDM. As mentioned earlier in Section 3.1, the Community Survey 2016 yielded a growth rate of 1.74% for the UZDM from 2011 to 2016. There seems to be some migration from the rural areas to the various urban centres in the district as well as where infrastructure is provided.

3.4 Main Development Nodes

The importance of development nodes is a reflection of an area's economic development potential and the range of service that should be provided.

Primary nodes are areas that provide the highest order of commercial densities and the greatest variety of services and housing typologies within a district. They are intended to have the character of a central business district (CBD). As regional destinations, primary nodes typically contain high order retail stores, entertainment, offices and a mix of higher density housing. Within UZDM the following two towns are regarded as primary nodes:

- ✓ Dundee
- ✓ Glencoe

Secondary nodes provide a second order service to surrounding locals in the form of acceptable infrastructure service, basic social amenities such as healthcare facilities, schools, community halls etc. Secondary nodes within the UZDM are primarily the main towns/administrative centres of the smaller local municipalities namely:

- ✓ Greytown
- ✓ Nqutu
- ✓ Tugela Ferry

Rural nodes would typically be established around existing traditional administration centres and accessible rural points. These nodes typically have a semi-rural, rustic character, they are intended to provide for limited development of service centers outside of existing urbanized areas and are considered urban districts amid more rural communities. Within UZDM the following two tows are regarded as Rural Service Centers:

- ✓ Pomeroy
- ✓ Keates Drift
- ✓ Wasbank
- ✓ Kranskop

Tourism and recreational nodes are those nodes with a particular focus on tourism and reaction. Within UZDM the following two towns are regarded as recreational and tourist nodes:

- ✓ Isandlwana (Nquthu)
- ✓ Itshe lika Bambatha (Msinga)
- ✓ Battlefields, Blood river (Endumeni)
- ✓ Lilani Hot Springs (Umvoti)

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

Service levels currently differ across the UZDM, predominantly based on a rural/urban split. In general urban areas have water services equal to or higher than, and many rural areas have either no water services or these services do not meet, the compulsory national standards determined by the Minister of Water & Sanitation in terms of Section 9(1)(a) of the Water Services Act, 1997 (Table 4a).

The Municipality is a Water Services Authority and provides free basic services, that are part of the municipality's mandate, to its registered indigents. The indigent register was developed only for the urban communities or water users to the exclusion of the rural community. The rural communities are not included in the indigent register but they receive free water services at an RDP level of service, but not accounted for as indigents.

The number of qualifying indigent applicants reflecting on the indigent register is 27 620 households. In the 2018/2019 financial year the current cost of providing 6kℓ of free water to qualifying indigent households is R7 600 411.00. (UZDM IDP, 2019)

The municipality aims to annually review and adopt its indigent policy together with budget related policies. This assists in ensuring that the municipality provides basic services to those residents who cannot afford, provided they apply to be part of the Indigent Register.

The UZDM WSDP 2018/2019 reports that the current water backlog for the District is as follows:

Table 4-1: Water Backlogs within Umzinyathi District Municipality

Direct Backlogs	Totals
Direct settlement backlog water households. Total household of settlement with a water need (irrelevant the type of need)	53 811
Direct settlement backlog water population. Total population of settlement with a water need (irrelevant the type of need)	260 142

Source: UZDM WSDP, 2018

According to the DWS reference framework database, the main source for the majority of households within UZDM is a communal stand at a distance below 200m (approximately 29%). (DWS, 2019)

Table 4-2 below presents the distribution of households by main source of water for drinking.

Table 4-2: Distribution of households by main source of water for drinking, DWS RF 2019

LM Name	Piped (tap) water inside the dwelling/house	Piped (tap) water inside yard	Distance below 200m	Distance greater than 200m	Borehole	Spring	Rain-water tank	Dam/pool/stagnant water	River/stream	Water vendor	Other	Total
Endumeni	10 927	5 821	2 449	122	495	131	558	0	15	1 600	237	**22 350**
Msinga	1 101	6 261	17 950	0	9 326	3 002	1 866	0	13 474	3 377	35	**56 302**
Nquthu	1 318	14 282	10 925	1 572	3 344	412	0	0	2 182	140	141	**34 243**
Umvoti	4 759	7 194	11 401	999	1 820	591	630	458	5 765	2 783	83	**36 417**
Total	**18 105**	**33 558**	**42 725**	**2 693**	**14 985**	**4 136**	**3 054**	**458**	**21 436**	**7 900**	**496**	**149 312**

Source: DWS Reference Framework, April 2019

The service levels for UZDM is depicted in **Figure 4-1** overleaf.

Legend

- Provinical Boundaries
- District Municipality Boundaries
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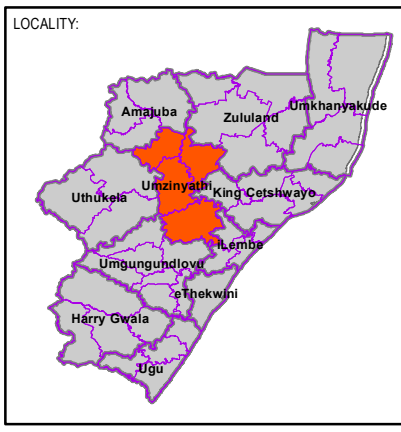

CLIENT:

UMGENI WATER • AMANZI

MUNICIPALITY:

UMZINYATHI DISTRICT MUNICIPALITY

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PROJECT TITLE

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

MAP TITLE:

Water Supply Reliability Profile

Umzinyathi District Municipality

DATE COMPLETED:

January 2021

MAP NO.:

DC 24 Figure 4-1

Water Reliability Profile

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

Kilometers
10 5 0 10 20

4.2 WATER LOSSES AND DEMAND MANAGEMENT

The Department of Water and Sanitation requested the municipalities to reduce water loss due to water scarcity in the country and also limited resources for providing water. Water loss is being attributed to ageing infrastructure and poor operations and maintenance of the water schemes. During the 2015/16 financial year, Umzinyathi District Municipality received funding from COGTA and DWS to implement an intervention with the aim of reducing water loss.

Through the funding provided, the municipality first implemented the intervention at Endumeni LM where pressure reducing valves were installed due to high water pressures which were leading to the bursting of pipes (40% - 50% water losses were being experienced within Endumeni LM). The Endumeni LM has managed to save two million litres a day which can be utilised for consumption. The DM is currently rolling out the programme to other local municipalities within the district to reduce water losses.

A number of interventions which do not have a direct water savings impact, but are vital for the success of any WC/WDM implementation plan could assist in this regard, namely, bulk meter installations, system monitoring, NRW reduction teams and logging equipment, training and awareness campaigns, etc.

The activities that should be prioritized for NRW Reduction are:

- ✓ Pressure Management: PRV Maintenance and Additional Pressure Management Zones (Advance Pressure Management - only certain areas);
- ✓ Leak Detection and Repair;
- ✓ New Metered Connections;
- ✓ Billing data base and data collection improvements and
- ✓ Metering of all SIV meters for all the systems such that reasonably accurate water balances can be calculated.

4.3 WATER BALANCE

The WSA prepares monthly water balances, in the IWA format, on a local municipality level, for submission to the DWS. These water balances help provide a greater understanding of each of the supply systems/waterworks and also assist in the preparation of specific intervention strategies and cost/benefit calculations.

The latest available water balance for the WSA is presented overleaf in **Table 4-3** for the month of December 2018.

Table 4-3: UZDM Water Balance, December 2018

Total System Input Volume 1 176 956 m^3/month 39.23 Mℓ/d	Authorised Consumption 457 633 m^3/month Percentage of SIV = 38.9% 15.25 Mℓ/d	Billed Authorised Consumption 457 633 m^3/month Percentage of SIV = 38.9% 15.25 Mℓ/d	Billed Metered Consumption-Domestic 334 037 m^3/month Percentage of SIV = 28.4%	Revenue Water 457 633 m^3/month Percentage of SIV = 38.9% 15.25 Mℓ/d
			Billed Metered Consumption-Commercial 123 596 m^3/month Percentage of SIV = 10.5%	
			Export Volume - m^3/month Percentage of SIV = 0.0%	
			Billed Unmetered Consumption - m^3/month Percentage of SIV = 0.0%	
		Unbilled Authorised Consumption - m^3/month Percentage of SIV = 0.0% - Mℓ/d	Unbilled Metered Consumption - m^3/month Percentage of SIV = 0.0%	Non-Revenue Water 719 323 m^3/month Percentage of SIV = 61.1% 23.98 Mℓ/d
			Unbilled Unmetered Consumption - m^3/month Percentage of SIV = 0.0%	
	Water Losses 719 323 m^3/month Percentage of SIV = 61.1% 23.98 Mℓ/d	Apparent Losses 474 753 m^3/month Percentage of SIV = 40.3% 15.83 Mℓ/d	Unauthorised Consumption - m^3/month Percentage of SIV = 0.0%	
			Metering Inaccuracies - m^3/month Percentage of SIV = 0.0%	
		Real Losses 244 570 m^3/month Percentage of SIV = 21% 8.15 Mℓ/d	Mains and Dsitribution Leaks - m^3/month Percentage of SIV = 0.0%	
			Reservoir Overflows - m^3/month Percentage of SIV = 0.0%	
			Service Connection Leaks - m^3/month Percentage of SIV = 0.0%	

Source: KZN IWA Water Balances, 2018

The non-revenue water for the DM in 2018 was at 23.98 Mℓ/d. If using a rate of R6.00/kℓ, this amounts to a loss of R143 880 per day. Only 15.25 Mℓ/d of the SIV of 39.23 Mℓ/d can be billed and accounted for.

4.4 Water Demand Model

This section provides an overview of the water requirements as calculated using the demand model developed for the purpose of this study. As mentioned in Section 1.5 of this report, the water demand model, approved by Umgeni Water, for this study was applied to determine the demands for all areas included in the study, at least at a town level. The water demands were modelled in five year increments up to 2050, with the minimum level of service as yard connections at 100ℓ capita per day. The base data used for the modelling is explained in Section 1.6.

The water demands for UZDM is presented below per LM and per supply scheme area. It must be noted that the Water Supply Scheme (WSS) boundaries do not necessarily coincide with municipal boundaries. There

are supply areas that traverse more than one LM. The water requirements reported on are per LM and if a WSS is split by a LM, the water requirements are reported based on this split.

4.4.1 Water Demand for Umzinyathi District Municipality

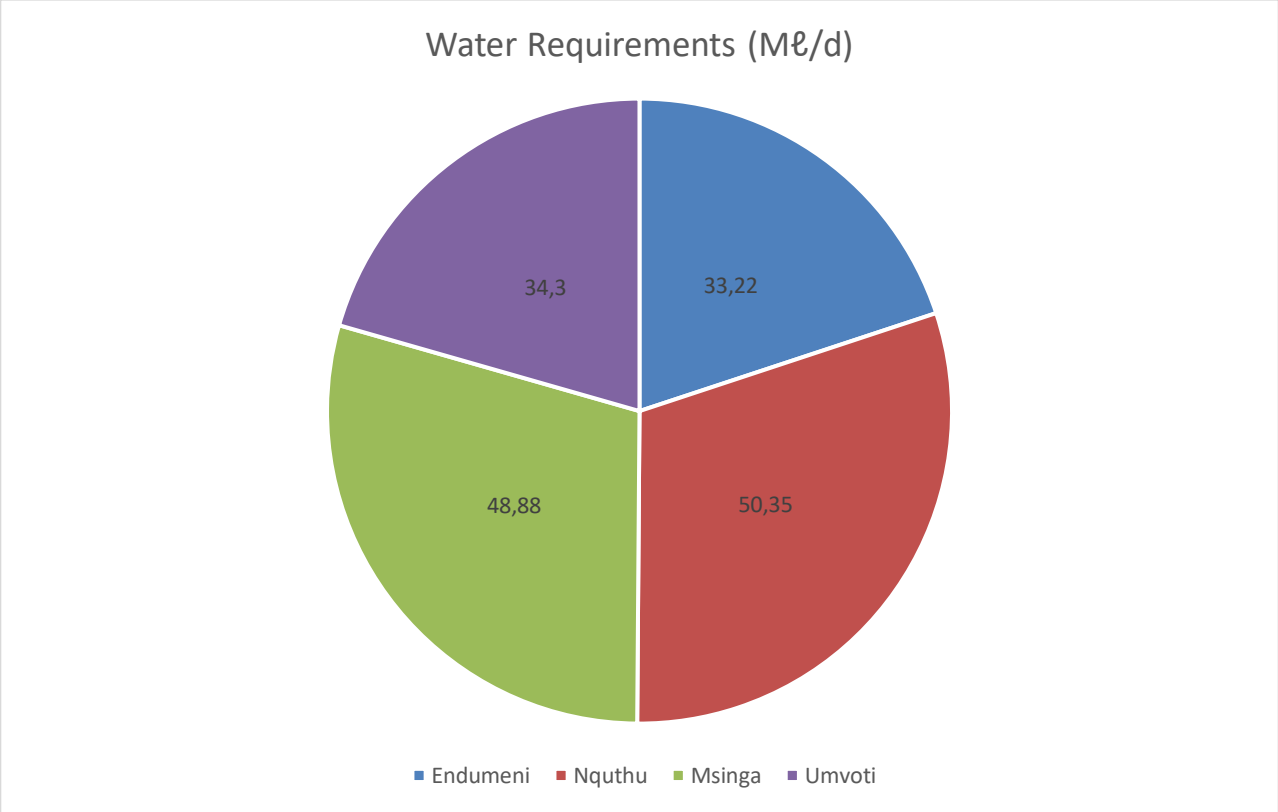
The water requirements (in Mℓ/d) for UZDM are presented per Local Municipality within **Table 4-4**. These water requirements were calculated for consumers having formal water supply schemes and for consumers not yet supplied from a formal water supply scheme. Section 1.5 Water Demand Methodology in this report explains the approach for the calculations to determine the theoretical water requirements and adjusted for water losses. The UZDM would require 166.75 Mℓ/day by the year 2050.

The 2050 water requirements per LM are presented below in **Figure 4-2** in the form of a pie chart, illustrating that the Nquthu LM will be the largest water consumer in the UZDM requiring 30% of all water followed by the Msinga LM with 29%.

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

LM	2050 Population	2020 (Mℓ/d)	2025 (Mℓ/d)	2030 (Mℓ/d)	2040 (Mℓ/d)	2045 (Mℓ/d)	2050 (Mℓ/d)
Endumeni	110 705	23.29	24.72	26.34	29.56	31.33	33.22
Nquthu	272 548	34.72	36.93	39.44	44.50	47.32	50.35
Msinga	268 053	33.58	35.74	38.19	43.14	45.90	48.88
Umvoti	169 998	23.75	25.25	26.95	30.37	32.27	34.30
Umzinyathi DM	**821 304**	**115.34**	**122.64**	**130.92**	**147.57**	**156.82**	**166.75**

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



4.4.2 *Demand per Water Scheme*

The water demands for the Water Supply Schemes (WSS) within UZDM is presented below in **Table 4-5.**

Table 4-5: UZDM Water supply scheme demands

LM	WSS	2050 Population	2020 (Mℓ/d)	2025 (Mℓ/d)	2030 (Mℓ/d)	2040 (Mℓ/d)	2045 (Mℓ/d)	2050 (Mℓ/d)
Endumeni	Endumeni Scheme Area 2	10 936	1.62	1.72	1.83	2.06	2.18	2.32
	Dundee/Glencoe Future WSS TBC	3 742	0.44	0.47	0.50	0.57	0.61	0.65
	Dundee	96 027	21.23	22.53	24.00	26.93	28.54	30.25
Nquthu	Nqutu Scheme Area 1	21 777	2.76	2.94	3.14	3.55	3.77	4.01
	Nqutu Scheme Area 2	114 606	15.21	16.17	17.26	19.46	20.68	21.99
	Nqutu Scheme Area 3	69 027	8.62	9.16	9.79	11.04	11.75	12.50
	Nqutu Scheme Area 4	12 259	1.48	1.58	1.68	1.90	2.02	2.15
	Nqutu Scheme Area 5	35 172	4.30	4.58	4.89	5.53	5.89	6.27
	Nqutu Scheme Area 6	6 215	0.74	0.79	0.84	0.95	1.01	1.08
	Nqutu Scheme Area 7	13 491	1.61	1.72	1.83	2.07	2.21	2.35
Msinga	Ntabankulu	11 687	1.40	1.49	1.59	1.79	1.91	2.03
	Nocomboshe	15 705	1.91	2.03	2.17	2.46	2.62	2.79
	Tugela Ferry	62 442	8.34	8.88	9.48	10.71	11.39	12.12
	Mumbe	23 398	2.83	3.01	3.22	3.64	3.87	4.12
	Keates Drift	79 233	9.94	10.58	11.31	12.78	13.60	14.48
	Sidumbeni	25 925	3.10	3.30	3.52	3.98	4.24	4.51
	Pomeroy	49 662	6.06	6.45	6.89	7.79	8.29	8.82
Umvoti	Umvoti Scheme Area 1	16 682	2.09	2.22	2.37	2.68	2.85	3.03
	Umvoti Scheme Area 2	10 511	1.35	1.43	1.53	1.73	1.84	1.96
	Umvoti Scheme Area 3	7 125	0.86	0.91	0.98	1.10	1.17	1.25
	Umvoti Scheme Area 4	11 804	1.46	1.55	1.66	1.88	1.99	2.12
	Umvoti Scheme Area 5	62 934	7.62	8.11	8.67	9.79	10.42	11.10
	Umvoti Scheme Area 6	29 627	4.11	4.37	4.66	5.25	5.58	5.93
	Umvoti Scheme Area 7	28 819	5.84	6.19	6.59	7.39	7.83	8.30
	Umvoti Scheme Area 8	2 497	0.43	0.46	0.49	0.55	0.58	0.62

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).

The proportion of households provided with water through regional and local water schemes in the DM is only 40% compared to the provincial figure of 71.6%. In addition, as much as 30.3% of households are utilising untreated sources of water directly from springs, dams or rivers, a figure significantly higher than the provincial total of 13.4%.

The percentage of households (40%) provided with water through regional and local water schemes is the second lowest in the province after Harry Gwala DM (38%). The levels of access to household water infrastructure vary greatly amongst the LM's in the district. A total of 84.8% of households in the Endumeni LM is provided with water through a regional or local water scheme, compared to figures of lower than 40% in the other three LM's (as low as 23.1% in the case of Msinga). Conversely, only 4% of households in Endumeni are reliant on untreated sources of water such as springs, dams or rivers. The comparative figures in Msinga and Umvoti are as high as 43.4% and 39.5%. Groundwater is also an important source of water for households in Nquthu and Msinga with 27.3% and 24.6% of households reliant on boreholes. (UZDM G&DP, 2015)

For remote communities where no bulk services are feasible or possible (cannot be served by the Regional Scheme or Intermediate Schemes), a rudimentary water level of service is implemented in the form of boreholes with handpumps, or spring protections. In some areas a small reticulation scheme with RDP level of services will be constructed where possible.

5.1 WATER RESOURCE AVAILABILITY

5.1.1 Surface Water

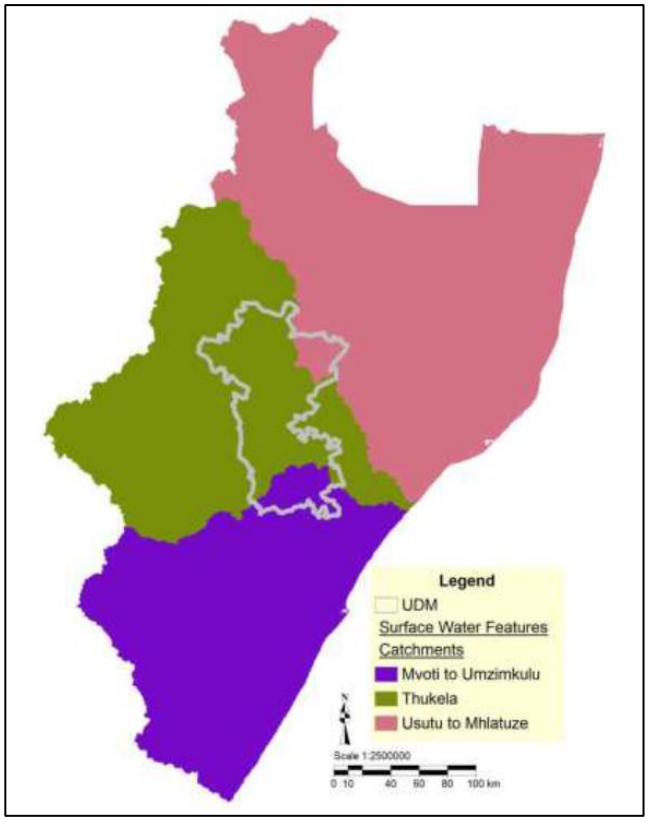
The Umzinyathi DM is situated in the Pongola-Umzimkulu Water Management Area (WMA). The WMA is the result of the amalgamation of the Thukela, Mvoti-Mzimkulu and Mhlatuze-half of the Usutu. This WMA is especially complex, as it covers an area of high season rainfall, with heavy demands on water resources from the agricultural sector, industrial, mining and urban domestic sectors.

The UZDM mainly falls within the Thukela catchment; however portions of two (2) other catchments occur within the district, namely the Mvoti Catchment which is located in the south below Greytown and Kranskop and the Mfolozi catchment which is in the north eastern section of the District, east of Nquthu and Silutshana (shown in **Figure 5-1** overleaf). (UZDM IDP, 2019)

Key considerations from a catchment management perspective include the following:

- ✓ The largest water requirement in the WMA is for irrigation in the agricultural sector;
- ✓ While the WMA has high overall water yield, and over the whole WMA has a positive water balance, nine of the fourteen areas have the requirements outstrip the yield; and
- ✓ The water quality within the WMA is declining.

Figure 5-1: UZDM in relation to the Pongola-Umzimkulu WMA



The main rivers within the district are the Buffalo, Mooi and the Mvoti River. The Buffalo River flows through the centre of the District feeding into the Thukela River east of Ngubevu and then traverses the boundary between Msinga and Nkandla. The Mooi River flows into the Thukela River at Keate's Drift. The Mvoti River drains the southern section of the district. (UZDM IDP, 2019)

The water resources of UZDM is illustrated in **Figure 5-2** overleaf.

N

Newcastle Local Municipality
Emadlangeni Local Municipality
Abaqulusi Local Municipality
Dannhauser Local Municipality
Endumeni Local Municipality
Nquthu Local Municipality
Ulundi Local Municipality
Pongola
Mtamvuna
Alfred Duma Local Municipality
Msinga Local Municipality
Nkandla Local Municipality
Inkosi Langalibalele Local Municipality
Umvoti Local Municipality
Mpofana Local Municipality
uMshwathi Local Municipality
uMngeni Local Municipality
Maphumulo Local Municipality
Ndwedwe Local Municipality

V32B V31K V32C V32G W31A W21A W21B V31G V32D V32H W21C V31E V32E V32F W21D W21F V60D V60B V33A W21E W21G V33B V60E V12A V60C V33C V40C V60F V33D V60H V14E V60G V60J V40A V40D V14D V40B V60K V40E V20J V70G V70F V20H V50A V20G V33D U40B V50B V20E U40A U40G U40D V20F U40E V20D U20D U20F U40H U30E U20B U20E U20K U30C U20C U20G U30A U20A

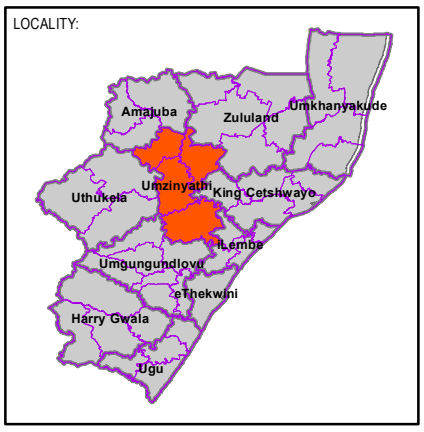
Hlobane Dam
Klipfontein Dam
Grootfontein
A.F.C. Muhl Memorial
Brakwater Irrigation
Ntshingwayo Dam
Mfushane
Tom Worthington Verdruk
Upper Mfate
Preston Pan
Donald McHardy
Mvunyana
Oliphantskop Dam
Mtshezana
Hillandale
Oaklands No.2
Oaklands
Warley Common Dam
New Dell No.1
Craigieburn Dam
Hat
Ellisdale
Summer Hill
Hythedge
Hainault No.1
Dairy
Broedershoek
Spring Grove Dam
Irichbrakie
Crieff
Lochwood
Newington Dam
Cramond Satellite Dam
Clan
Albert Falls Dam
Midmar Dam
Ekamanzi Dam
iMvutshane Dam
Merrivale Dam

Kilometers
10 5 0 10 20

Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names
- Rivers
- Water Management Area
- Quaternary Boundaries & Numbers (W13A)

LOCALITY:



CLIENT:

UMGENI WATER • AMANZI

MUNICIPALITY:

UMZINYATHI DISTRICT MUNICIPALITY

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PROJECT TITLE

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

MAP TITLE:

Water Resources

Umzinyathi District Municipality

DATE COMPLETED:

January 2021

MAP NO.:

DC 24 Figure 5-2

The Umzinyathi DM has several wetland systems which are listed as a National Freshwater Ecosystem Priority Area, including the uMvoti vlei. The uMvoti vlei is situated near Greytown in the upper reaches of uMvoti catchment and is 2800 ha in extent. Most of the uMvoti vlei is permanently waterlogged, which means that a considerable volume of water is stored throughout the year in the portion of the catchment. (NEMAI, 2018)

The UAP Phase II studies further describe the status of the water sources found in the DM as follows:

5.1.1.1 Endumeni LM

The main surface water source of supply in the Endumeni LM is the Buffalo River at the Tayside Weir. There are other sources of supply consisting of four dams in the area; namely Tom Worthington Dam and Verdruk Dam located in the Ngobiya River, a tributary of the Sterkstroom River; Donald McHardy Dam and the Upper and Lower Mpati Dams which are located in the Sterkstroom River, a tributary of the Buffalo River. The dams are the source of water supply to the Biggarsberg Water Treatment Plant (WTP) which has a design capacity of 16 Mℓ/day.

5.1.1.2 Msinga LM

The main source of supply of the Msinga LM is the run-off-abstraction, yielding 3 Mℓ/day, from the Thukela River. The Thukela River is well regulated with a number of dams in the upstream catchment which are mainly for the pumped storage scheme and transfer of water to the Vaal River system with the exception of Spioenkop Dam.

5.1.1.3 Nquthu LM

The major source of supply is the raw water abstraction from the Buffalo River below the confluence of the Blood and Buffalo Rivers.

The cumulative natural Mean Annual Run-off (MAR) in the Buffalo River catchment system up to the last quaternary catchment V32F at the abstraction point at Vants Drift weir, but excluding the quaternary catchment upstream of Ntshingwayo Dam and Zaaihoek Dam is 505.25 Mm^3/a. This MAR was adopted to determine the available water at the abstraction point for the scheme. The MAR determined does not take into account the uptake of water by commercial forestry and alien vegetation as well as upstream abstraction by the agricultural sector. The irrigation agriculture upstream was found to be approximately 24.35 Mm^3/a, at low assurance of supply.

5.1.1.4 Umvoti LM

The Umvoti LM consists of Greytown, Muden, Kranskop and Matimatolo towns. Greytown is supplied by Lake Merthley Dam and fifteen boreholes which have a combined yield of 4 Mℓ/day. Water is fed via gravity from

Lake Merthley Dam to the Water Treatment Plant (WTP). This gravity main was upgraded in 2010. Water from the boreholes is fed directly to the WTP.

Muden is supplied by the Mooi River and boreholes where raw water is transferred to the Muden WTP. Kranskop is supplied by a number of boreholes which feed the Kranskop WTP.

5.2 PHYSICAL INFRASTRUCTURE

The existing schemes of Umzinyathi District Municipality are summarised in **Table 5-1** below showing the water supply scheme areas, treatment plant and their capacity, abstraction sources and supply areas.

Table 5-1: Summary of Existing Infrastructure per Water Supply Scheme Area

Scheme Area	Source	WTP	Reservoir Capacity (Mℓ)
Dundee Glencoe	Buffalo River	Biggarsberg WTP - 16.00 Mℓ/day conventional plant	43.5
Tugela Ferry	Thukela River	Tugela Ferry WTP - 2.00 Mℓ/day conventional plant	Unknown
	Borehole	Borehole – 1.42Mℓ/day	Unknown
Nqutu	Buffalo River	Vants Drift WTP - 9.00Mℓ/day conventional plant	9.0
Greytown	Lake Merthley	Greytown WTP - 7.00 Mℓ/day, Conventional plant	Unknown
Kranskop	Groundwater	Kranskop WTP - 0.92Mℓ/day, Conventional plant	0.60
Muden	Mooi River	Muden WTP – 3.00Mℓ/day, Conventional plant	Unknown
	Boreholes	Borehole – 1.58Mℓ/day	-

Source: UAP Phase II, 2016

A map showing the existing water supply schemes identified in the UAP Phase II study is shown in **Figure 5-3**. Based on the UAP Phase II reconnaissance study, the DM was re-demarcated into 35 supply areas.

5.2.1 Matimatolo Regional Water Supply Scheme

According to the UAP Phase II study, there is currently no regional bulk water supply scheme in the proposed project area. The towns of Kranskop and Hermannsburg have existing water supplies, which require augmentation. Areas 1, 5 and 6 is currently served from boreholes and the residents of Areas 2, 3 and 4 are depending on water from springs and streams for domestic use. Individual schemes which operate hand pump boreholes and springs are in Areas 2, 3 and 4 but sometimes residents are forced to use water from stagnant

water pools during the dry seasons of which the water quality varies from poor to too dangerous for human consumption. The quality will not pass the Blue Drop standards test.

The following bulk water source options were previously investigated (Concept and Viability Phase of previous project):

- ✓ Option 1 Groundwater Investigations
- ✓ Option 2 New Dam/Surface water investigations
- ✓ Option 3 Craigieburn/Greytown water supply schemes.

Ultimately the plan is to develop the proposed Mvotipoort Dam as a regional bulk water source, which will ultimately also include the Umzinyathi DM region. However, it is estimated that the dam will only become operational and service the area beyond the 30-year design period of this project.

The Umzinyathi DM therefore proposed the following interim to medium term bulk water supply approach:

- ✓ Interim supply — Groundwater Development (5-10 years);
- ✓ Medium Term — Proposed surface dam (10 -30 years); and
- ✓ Long Term Proposed — Mvotipoort Dam (>30 years).

5.2.2 Nqutu Water Supply Scheme

The Nquthu Water Supply Scheme comprises raw water abstraction from the Buffalo River downstream of the confluence with the Blood River.

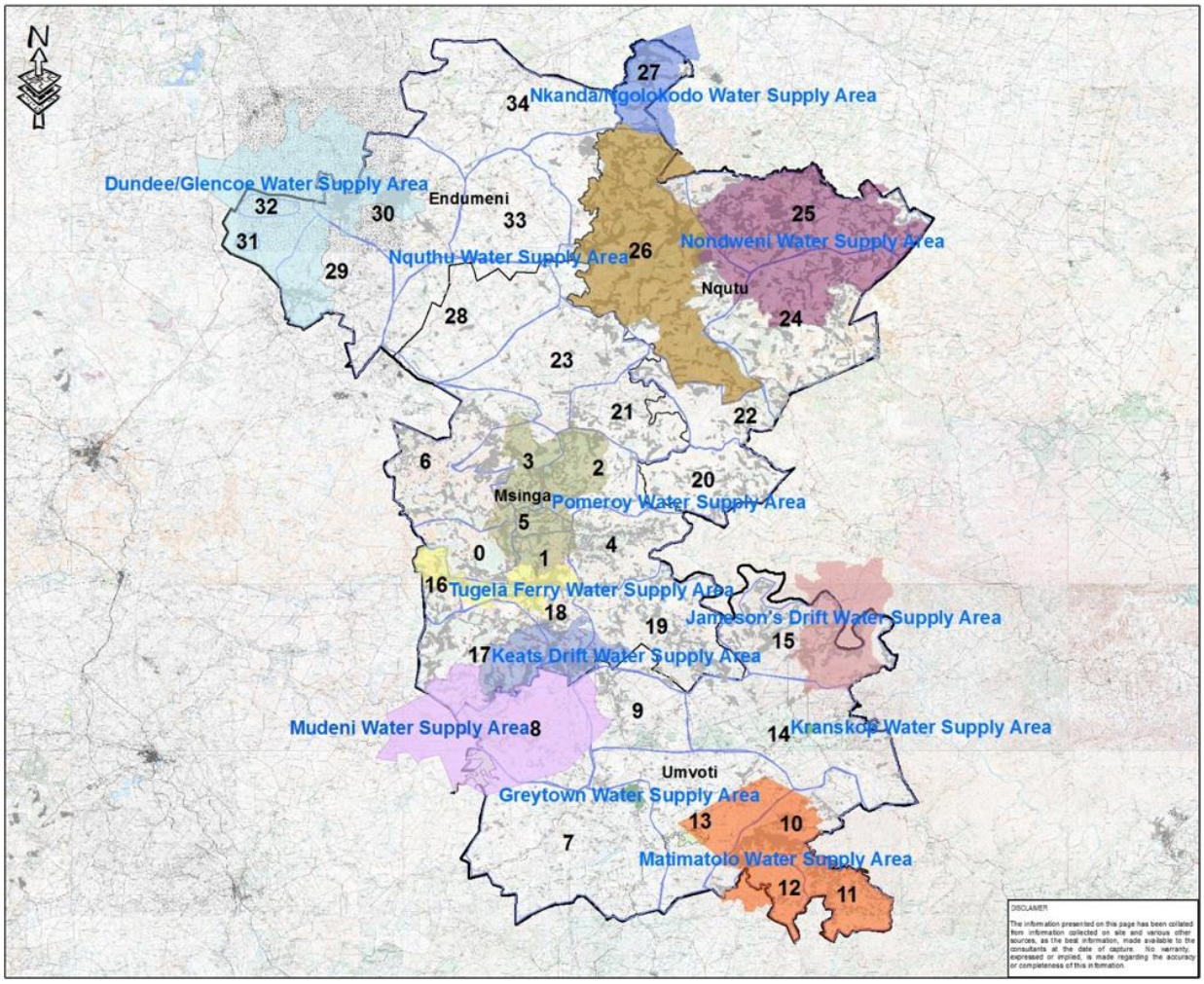
The maximum capacity of the raw water abstraction works from the Buffalo River system is not well known. However, given the design capacity of the Vants Drift water treatment plant of 8 Mℓ/day and the current abstraction of 11-12 Mℓ/day, the existing raw water pumping infrastructure appears to have insufficient capacity to meet the capacity of the existing water treatment plant. An additional clarifier is needed, high lift pumps are required to pump extra water away and the rising main needs an upgrade.

The raw water from the Buffalo River is delivered to Vants Drift WTP where it is treated to potable drinking water quality standards. This is the only treatment plant that supplies the scheme area. The peak hydraulic design capacity of the water treatment plant is 8 Mℓ/day or 2.9 Mm^3/a (WSDP, 2008).

The Vants Drift WTP is a conventional treatment plant. After treatment, the potable water is then pumped to the various command reservoirs in the supply area.

The current utilisation of the bulk water supply infrastructure is approximately 107%. The existing bulk water supply infrastructure does not have sufficient capacity to meet the current water requirements of Nqutu Water Supply Scheme on a sustainable basis and does not have sufficient capacity to meet future water requirements on a long term sustainable basis.

Figure 5-3: Existing Water Supply Schemes (UAP Phase II)



The existing bulk scheme areas of Umzinyathi District Municipality are depicted in **Figure 5-4** overleaf along with the existing infrastructure within the UZDM and its respective LM's thereafter within **Figures 5-5** to **5-9**.

N

Newcastle Local Municipality

Emadlangeni Local Municipality

Vryheid

A.F.C.Muhl Memorial

Klipfonteindam

Groottfontein

Brakwater Irrigation

Abaqulusi Local Municipality

Dannhauser Local Municipality

Nqutu Scheme Area 1

Emondlo

Mvunyana

Mfushane

Tom Worthington

Verdruk

Upper Mpate

Dundee

Glencoe

Preston Pan

Donald McHardy

Dundee/Glencoe Future WSS TBC

Endumeni Scheme Area 2

Endumeni Local Municipality

Dundee

Wasbank

Nqutu Scheme Area 2

Nqutu Scheme Area 3

Nquthu Local Municipality

Ulundi Local Municipality

Nqutu Scheme Area 5

Nqutu Scheme Area 4

Oliphantskop Dam

Nqutu Scheme Area 6

Alfred Duma Local Municipality

Ntabankulu

Mumbe

Pomeroy

Nqutu Scheme Area 7

Nocomboshe

Nkandla Local Municipality

Tugela Ferry

Msinga Local Municipality

Sidumbeni

Umvoti Scheme Area 3

Umvoti Scheme Area 4

Inkosi Langalibalele Local Municipality

Keates Drift

Umvoti Scheme Area 2

Umvoti Local Municipality

Umvoti Scheme Area 8

Umvoti Scheme Area 1

Umvoti Scheme Area 6

Merthley Dam

Greytown

eNhlalakahle

Umvoti Scheme Area 7

Umvoti Scheme Area 5

Maphumulo Local Municipality

Hillandale

Oaklands No.2 Oaklands

Warley Common Dam

Mpofana Local Municipality

Craigieburn Dam

Hat

Mooi River

Dairy

Hainault No.1

iMvutshane Dam

Ekamanzi Dam

uMshwathi Local Municipality

Ndwedwe Local Municipality

uMngeni Local Municipality

Newington Dam

New Hanover

Cramond Satellite Dam

Clan

Wartburg

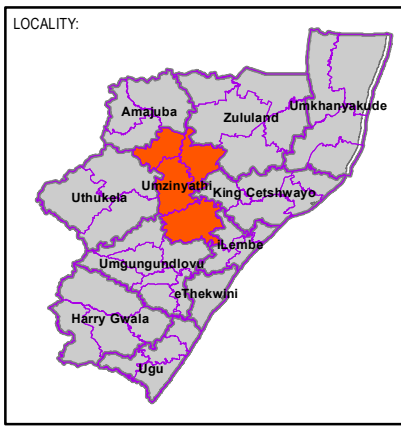
Albert Falls Dam

10 5 0 10 20 Kilometers

Legend

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

LOCALITY:



CLIENT:

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PROJECT TITLE

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

MAP TITLE:

Water Scheme Areas

Umzinyathi District Municipality

DATE COMPLETED:

January 2021

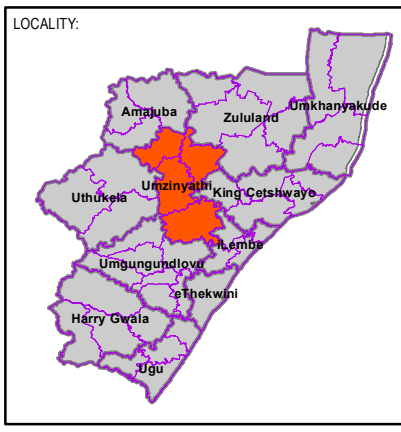
MAP NO.:

DC 24 Figure 5-4

Legend

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

LOCALITY:



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PROJECT TITLE

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components
Umzinyathi District Municipality

DATE COMPLETED:

January 2021

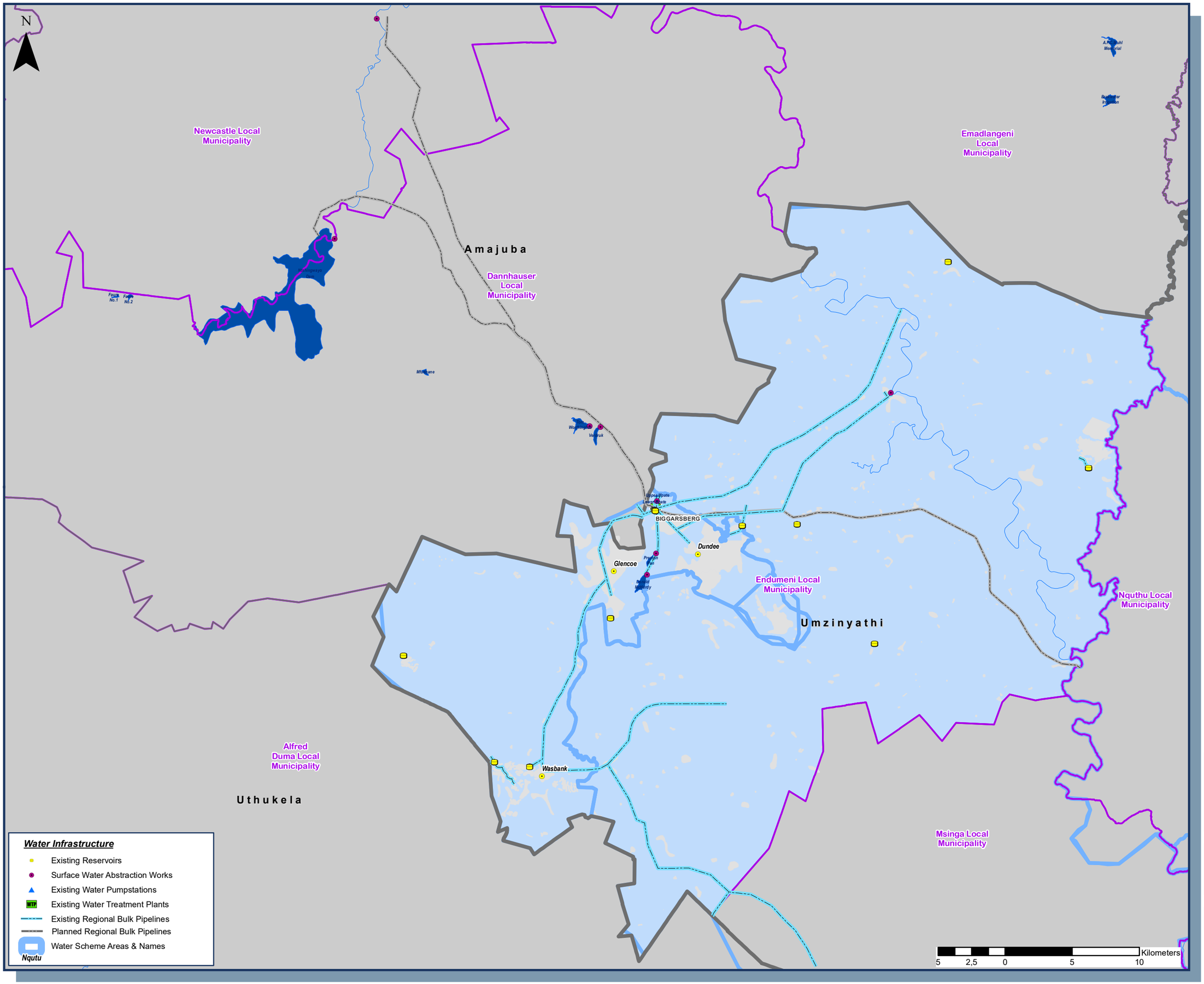
MAP NO.:

DC 24 Figure 5-5

Water Infrastructure

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

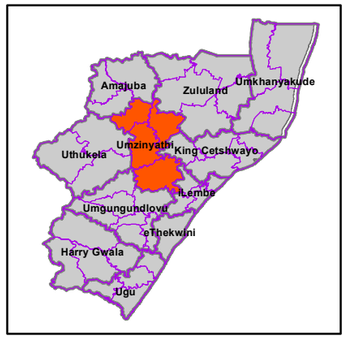
Kilometers: 10 5 0 10 20



Legend

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

LOCALITY:



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PROJECT TITLE

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Endumeni Umzinyathi District Municipality

DATE COMPLETED:

January 2021

MAP NO.:

DC 22 Figure 5-6

N

Brakwater Irrigation

Emadlangeni Local Municipality

Amajuba

Emondlo

Abaqulusi Local Municipality

Zululand

Endumeni Local Municipality

NONDWENI WTP

VANTS DRIFT WTP

Nquthu Local Municipality

Umzinyathi

Ulundi Local Municipality

RIVER ABSTRACTION WORKS

Msinga Local Municipality

QHUDENI WTP

King Cetshwayo

Nkandla Local Municipality

Umvoti Local Municipality

Umzinyathi

5 2,5 0 5 10 Kilometers

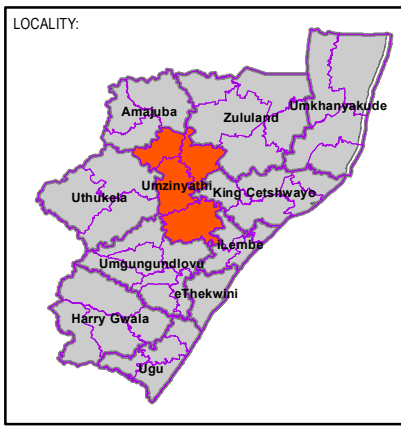
Legend

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

Water Infrastructure

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

LOCALITY:



CLIENT:

UMGENI WATER • AMANZI

MUNICIPALITY:

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PROJECT TITLE

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Nquthu

Umzinyathi District Municipality

DATE COMPLETED:

January 2021

MAP NO.:

DC 24 Figure 5-7

N

Endumeni Local Municipality

Nquthu Local Municipality

Alfred Duma Local Municipality

POMEROY WTP

Umzinyathi

Msinga Local Municipality

Uthukela

Nkandla Local Municipality

King Cetshwayo

TUGELA FERRY WTP

TUGELA FERRY WTP

FABENI WTW WTP

KEATS DRIFT WTP

Inkosi Langalibalele Local Municipality

Umvoti Local Municipality

Mpofana Local Municipality

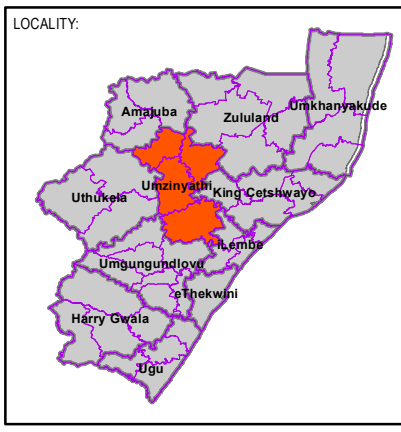
Umgungundlovu

5 2,5 0 5 10 Kilometers

Legend

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

LOCALITY:



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PROJECT TITLE

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Msinga
Umzinyathi District Municipality

DATE COMPLETED:

January 2021

MAP NO.:

DC 24 Figure 5-8

Water Infrastructure

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

N

King Cetshwayo

Nkandla Local Municipality

Msinga Local Municipality

Umzinyathi

Umvoti Local Municipality

Greytown

eNhlalakahle

Maphumulo Local Municipality

iLembe

Mpofana Local Municipality

uMshwathi Local Municipality

Umgungundlovu

Ndwedwe Local Municipality

Kilometers

5 2,5 0 5 10

Water Infrastructure

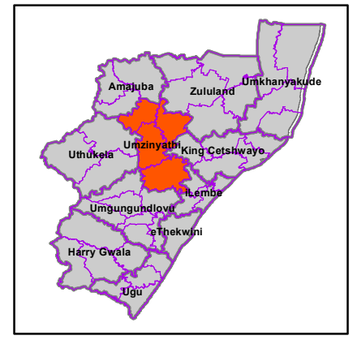
- Existing Reservoirs
- Surface Water Abstraction Works
- Existing Water Pumpstations
- Existing Water Treatment Plants
- Existing Regional Bulk Pipelines
- Water Scheme Areas & Names

Nqutu

Legend

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

LOCALITY:



CLIENT:

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PROJECT TITLE

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

MAP TITLE:

Existing Scheme Areas & Infrastructure Components - Umvoti Umzinyathi District Municipality

DATE COMPLETED:

January 2021

MAP NO.:

DC 22 Figure 5-9

6. EXISTING SANITATION BULK INFRASTRUCTURE

6.1 SANITATION SERVICE LEVEL

The National Water and Sanitation Master Plan (NW&SMP), prepared in 2018 for South Africa, puts an emphasis on the reliability of water services (water and sanitation). The NW&SMP reported that "In the 27 priority district municipalities the water reliability is only 42%, with the worst 10 WSA's below 30% reliability" and that "Approximately 56% of the over 1 150 WWTP and approximately 44% of the 962 WTPs are in poor or critical condition and in need of urgent rehabilitation."

Reliability of services are affected by aging infrastructure, operation and maintenance, reliability of electricity supply, stormwater ingress into sewer systems, vandalism and theft, or extreme weather events. All these then affect sanitation security to consumers and may have negative impacts on the environment.

The DWS Reference Framework database yields that majority of households within UZDM use a pit latrine/toilet with a ventilation pipe (approximately 52%).

Table 6-1 below presents the distribution of households by type of toilet facility as per the DWS Reference Framework database as at 2019.

Table 6-1: Distribution of households by type of toilet facility, DWS RF 2019

LM Name	Flush toilet connected to a public sewerage system	Flush toilet connected to a septic tank or conservancy tank	Chemical toilet	Pit latrine/toilet with ventilation pipe	Pit latrine/toilet without ventilation pipe	None	Bucket toilet (collected by municipality) – Bucket toilet (emptied by household)	Total
Endumeni	16 849	150	4 098	109	72	867	209	**22 350**
Msinga	356	44	6 522	47 616	0	1 708	54	**56 302**
Nquthu	919	192	2 256	15 197	8 073	5 144	2 456	**34 243**
Umvoti	7 060	276	9 091	14 875	393	3 936	476	**36 417**
Total	**25 184**	**662**	**21 967**	**77 797**	**8 538**	**11 655**	**3 195**	**149 312**

Source: DWS Reference Framework, April 2019

As per the IDP, the municipality has disputed the number of households using the bucket system, as the bucket system was eradicated by the municipality in 2008.

The current sanitation backlog is at approximately 22% as illustrated in the WSDP and in **Table 6-2** below. However, settlements are continuously expanding, and household growth will maintain an increase in the future.

The UZDM WSDP 2018/2019 reports that the current sanitation backlog for the District is as follows:

Table 6-2: Sanitation Backlogs within Umzinyathi District Municipality

Direct Backlogs	Totals
Direct settlement backlog sanitation households. Total household of settlement with a sanitation need (irrelevant the type of need)	24 692
Direct settlement backlog sanitation population. Total population of settlement with a sanitation need (irrelevant the type of need)	113 614

Source: UZDM WSDP, 2018

6.2 EXISTING SANITATION BULK INFRASTRUCTURE

Planning is required in the urban areas to confirm the suitability of the bulk infrastructure, especially with regards to increased pressures on the infrastructure due to an increasing urbanisation trend that has been occurring and also to allow for future growth in population.

According to the DWS Reference Framework, the following nine sanitation schemes are currently operating within UZDM:

- ✓ Greytown
- ✓ Nqutu Hospital
- ✓ Pomeroy
- ✓ Wasbank
- ✓ Tugela Ferry
- ✓ Dundee-Glencoe
- ✓ Nqutu
- ✓ Kranskop
- ✓ Nondweni

The UZDM has nine (9) wastewater treatment plants of which seven (7) are operational. The WWTP's are listed in **Table 6-4** below.

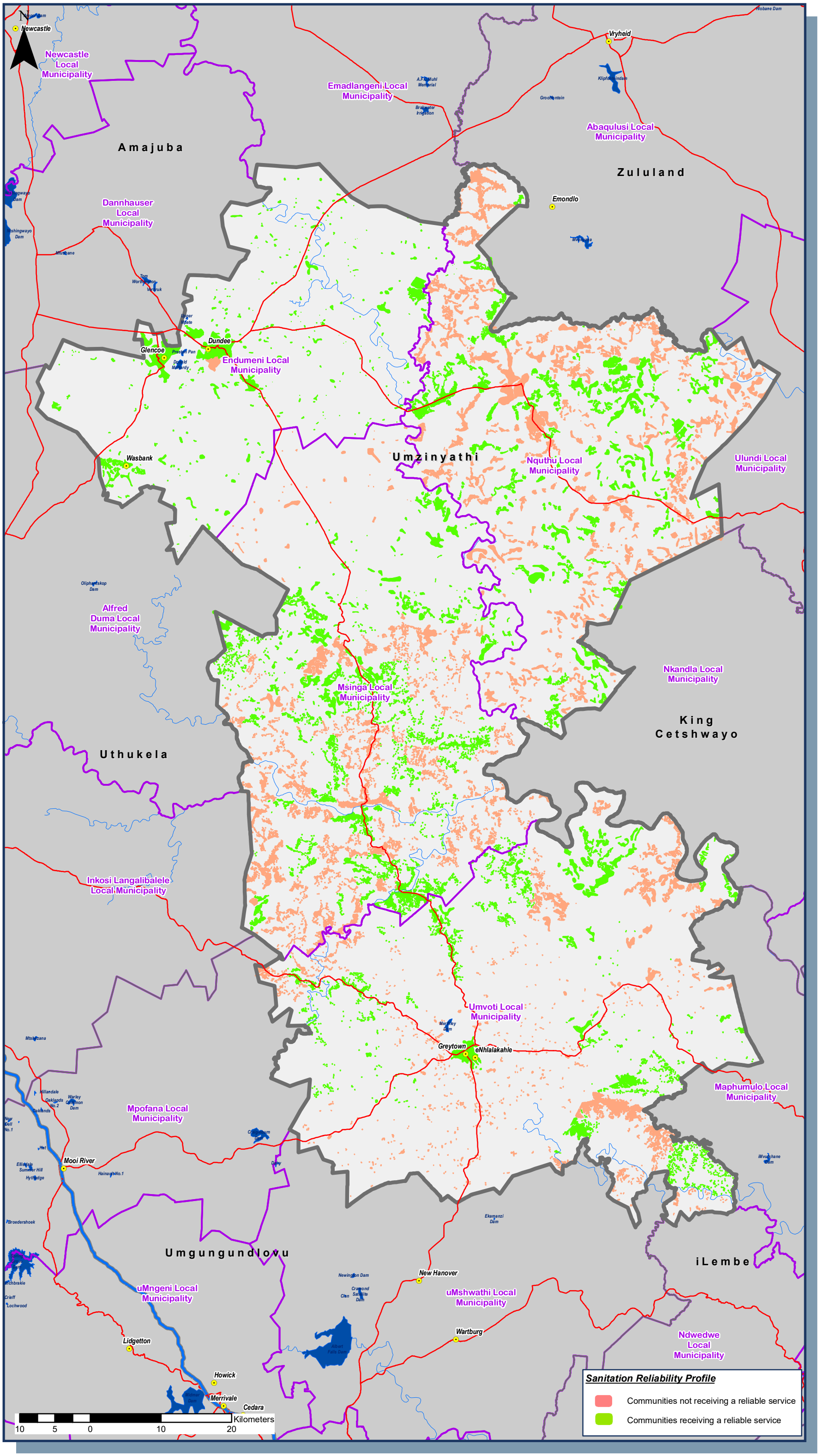
Table 6-3: List of Wastewater Treatment Plants

WWTP	Description	Owner	Class	Capacity Sufficient	ADWF Capacity (Mℓ/day)	People Served	Operational	Critical Refurbishment	Cost Estimate
Tugela Ferry	Activated Sludge	uThukela Water	D	N	0.5	625	Y	Aerators, Ponds	R 746 000
Dundee-Glencoe	Activated Sludge	uThukela Water	B	Y	10	12500	Y	Sludge management, Digesters, Disinfection	R 5 676 000
Greytown	Activated Sludge	uThukela Water	D	N	3.2	4000	Y	Pumps, Aerators, Electrical, Ponds, Grounds, Security	R 5 698 000
Kranskop	None	uThukela Water	E	N	0.0	63	N	No existing plant – discharge of raw sewage into the bush	Unknown
Nondweni	Oxidation Ponds	uThukela Water	D	Y	0.0	625	N	Aurecon BP available	Unknown
Nqutu Hospital	Activated Sludge	uThukela Water	D	Y	2.0	2500	Y	None	Unknown
Nqutu Ponds	Oxidation Ponds	uThukela Water	E	Y	3.0	Unknown	Y	Weed control, Fencing	R 125 000
Pomeroy	Oxidation Ponds	uThukela Water	D	Y	1.0	1250	Y	Pond walls, Disinfection	R1 003 000
Wasbank	Activated Sludge	uThukela Water	D	Y	0.25	625	Y	Unknown	Unknown

Source: UW IMP, 2020

The challenge with sanitation infrastructure in the DM is emphasized by the DWS Green Drop assessments, indicating that the wastewater services in the district are not being managed according to the expectations of the regulation programmed. The Green Drop requirements are largely not met and result in a low overall municipal score of 33.2% for the district, resulting in the second lowest ranking (13th) on the provincial performance log of WSA's. Only 12.5% of the evaluated systems achieved a score higher than 50%.

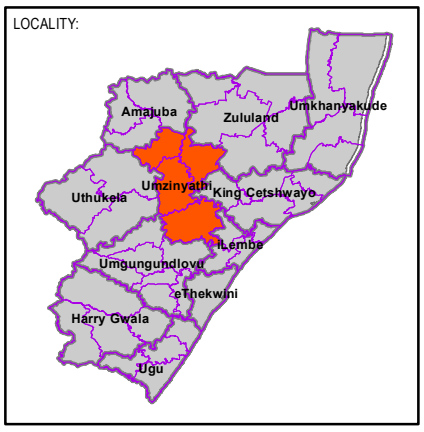
The sanitation reliability profile and existing infrastructure are presented in **Figure 6-1** and **Figure 6-2** overleaf.



Legend

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

LOCALITY:



CLIENT:

UMGENI WATER • AMANZI

MUNICIPALITY:

UMZINYATHI DISTRICT MUNICIPALITY

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PROJECT TITLE

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

MAP TITLE:

Sanitation Reliability Profile

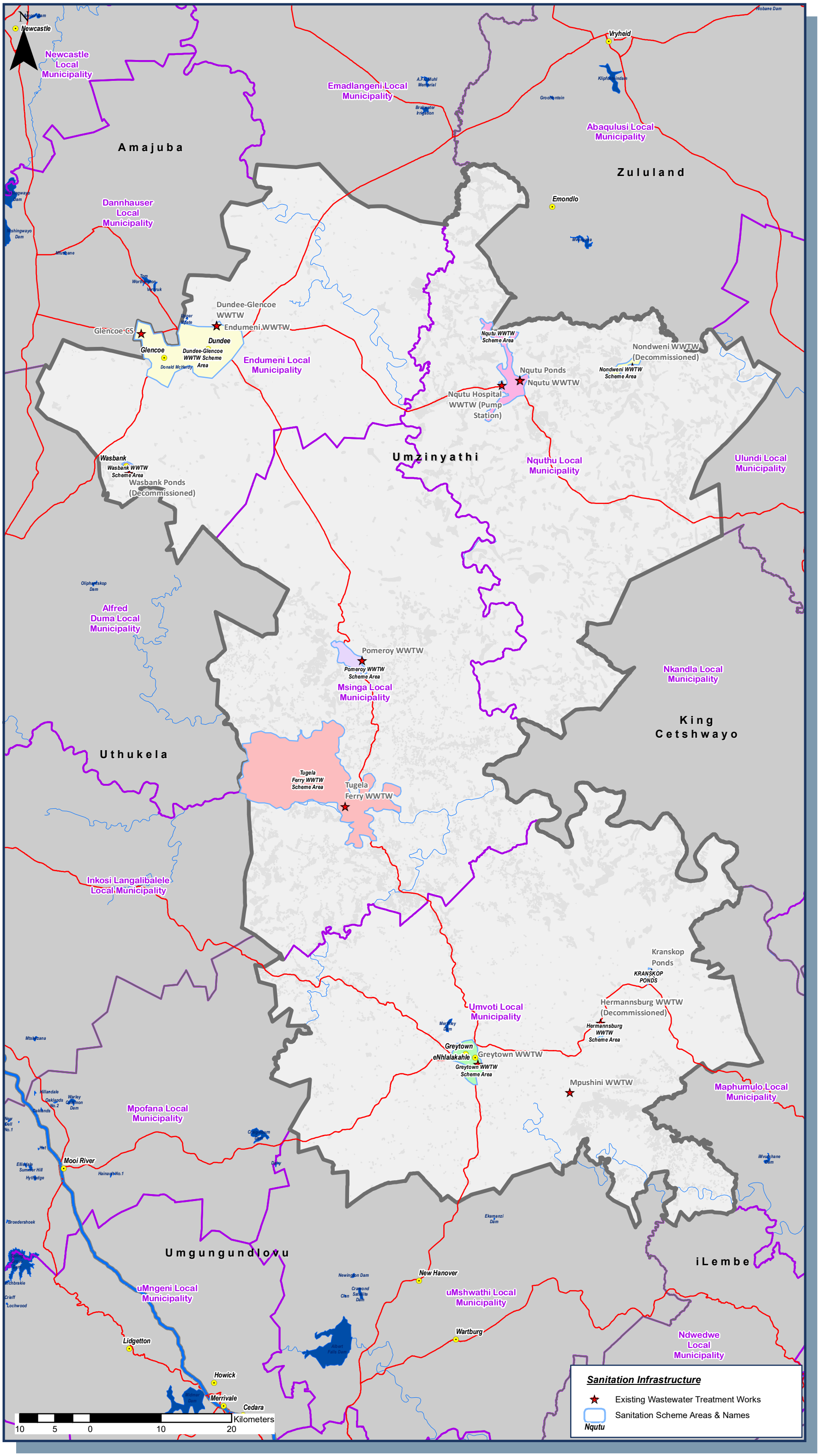
Umzinyathi District Municipality

DATE COMPLETED:

January 2021

MAP NO.:

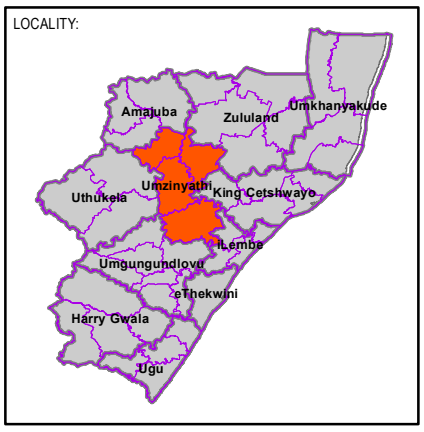
DC 24 Figure 6-1



Legend

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

LOCALITY:



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PROJECT TITLE

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

MAP TITLE:

Existing Sanitation Infrastructure

Umzinyathi District Municipality

DATE COMPLETED:

January 2021

MAP NO.:

DC 24 Figure 6-2

Sanitation Infrastructure

- Existing Wastewater Treatment Works
- Sanitation Scheme Areas & Names (Nqutu)

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

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

This chapter provides a brief overview of existing and planned bulk water infrastructure projects sourced from the UZDM Water Services Development Plan.

7.1 REGIONAL BULK WATER PROJECTS IN PLANNING

The UZDM mainly receives their funding from MIG and WSIG. Only one regional bulk infrastructure project receive funding from RBIG.

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

[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 7-1: 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)	R188 488	R199 563	R215 495	**R603 546**
Water Services Infrastructure Grant (WSIG)	R68 374	R78 235	R75 000	**R221 609**
Regional Bulk Infrastructure Grant (RBIG)	R20 000	R13 497	-	**R33 497**
Total: Umzinyathi District Municipality	**R276 862**	**R291 295**	**R290 495**	**R858 652**

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

Table 7-2 indicates the RBIG funding allocated for the next three financial years to one bulk project within UZDM.

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

Local Municipality	Project Name	2019/2020 (R '000)	2020/2021 (R '000)	2021/2022 (R '000)
Umvoti	Greytown Regional Bulk Scheme	R20 000	R13 497	-
Total Umzinyathi District Municipality		**R20 000**	**R13 497**	**-**

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

The funding allocations for UZDM, 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 UZDM

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)
Umzinyathi District Municipality	R188 488	R199 563	R215 495	R68 374	R78 235	R75 000

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

The following list of water services projects are presented within the WSDP for the 2021 financial year.

Table 7-4: Capital Infrastructure Investment Programme for 2019/20 Financial Year

Project Title	2019/20 (R)	2020/21 (R)	2021/22 (R)
Municipal Infrastructure Grant (MIG) Programmes			
PMU Operational Costs	4 000 000	4 000 000	4 000 000
Umzinyathi Disaster Centre	4 581 381	10 000 000	-
Hlazakazi Water Scheme Phase 1 - Isandlwana	10 000 000	20 000 000	21 240 000
Mbono Water	10 000 000	10 187 000	15 000 000
Douglas Water	18 500 000	10 000 000	15 000 000
Msinga bulk	30 799 269	30 700 000	28 000 000
Muden - (Muden Regional)	32 000 000	27 000 000	30 000 000
Mthembu West - Extension	10 000 000	18 676 000	15 000 000
Ntinini Regional Water	24 000 000	20 000 000	25 000 000
Ophathe - Water	11 000 000	13 000 000	10 000 000
Eradication of Sanitation Backlogs in Mvoti LM	11 607 350	12 000 000	13 000 000
Umzinyathi DM Sanitation Programme Phase 4: Mbono Mkhuphula Sanitation	11 000 000	12 000 000	13 000 000
Eradication of Sanitation Backlogs in Nquthu LM	11 000 000	12 000 000	13 000 000
Total	**188 488 000**	**199 563 000**	**202 240 000**
Water Services Infrastructure Grant (WSIG) Programmes			
KwaKopi Water Supply Scheme	21 172 951	20 140 882	-
Makhabeleni Water Supply Scheme	14 000 000	31 997 227	33 981 055
Biggarsberg Water Supply Scheme	-	9 000 000	9 558 000
Endumeni Sanitation	3 500 000	10 000 00,00	50 438 118
Drought Relief Programme (Boreholes)	8 000 00,00	7 576 167	8 045 889
Othame Water Supply Scheme	16 850 553	-	--
Nseleni Water Supply Scheme	-	10 400 000	-
Seven Water Project	26 723 568	-	-
Billabong	21 734 787	-	-
Total	**103 981 860**	**79 114 275**	**102 023 062**
Regional Bulk Infrastructure Grant (RBIG) Programmes			
Umvoti Bulk	25 000 000	-	-
Total	25 000 000	-	-

8. SYNOPSIS OF EXISTING AND COMMITTED SCHEMES

A gap analysis has been undertaken for the water schemes in the Umzinyathi DM. The purpose of the gap analysis is to check the adequacy of infrastructure to allow the 2050 water demand to be supplied, and where necessary identify upgrades to infrastructure.

The gap analysis has taken into account current planning interventions by the WSA. The interventions required to meet the 2050 water demand inclusive of infrastructure planning and recommended water resource investigations is discussed in Chapter 9 of this study.

The entire UZDM has been demarcated into regional water schemes in line with short and long-term plans by the WSA. gap analysis has been undertaken for the water schemes in the Umzinyathi DM. The gap analysis has taken into account current planning interventions by the WSA. Twelve (12) regional schemes have been identified and are as follows:

- ✓ UZ001 WSIA: Dundee/Glencoe;
- ✓ UZ002 WSIA: Nquthu;
- ✓ UZ003 WSIA: Nondweni;
- ✓ UZ004 WSIA: Ngolokodo;
- ✓ UZ005 WSIA: Pomeroy;
- ✓ UZ006 WSIA: Tugela Ferry;
- ✓ UZ007 WSIA: Keates Drift;
- ✓ UZ008 WSIA: Muden;
- ✓ UZ009 WSIA: Greytown;
- ✓ UZ010 WSIA: Matimatolo;
- ✓ UZ011 WSIA: Kranskop;
- ✓ UZ012 WSIA: Makhabeleni;

The gap analysis for the fifteen (12) regional schemes is discussed under this section.

8.1 UZ001 WSIA: DUNDEE/GLENCOE SCHEME

The Dundee/Glencoe supply area is supplied with water from the Buffalo River system which comprises the Donald McHardy and Tom Worthington Dams in the Sterkstroom River, a tributary of the Buffalo River, as well as an abstraction from the Buffalo River at Tayside weir. The total available water including the historical firm yield (HFY) of the small dams, as well as the registered water use from Tayside weir, is 4.2 Mm^3/a. The 3-month low flow at the weir without releases from Ntshingwayo Dam was estimated at 4.97 Mm^3/a which is equivalent to 19.86 Mm^3/a. It is important to note that there are major irrigation activities taking place upstream of Tayside, dependent on run-off-river abstraction. A water balance assessment was determined based on the releases from the Ntshingwayo Dam of approximately 8.0 Mℓ/day or 2.92 Mm^3/a which is the registered water use to supply the Dundee/Glencoe supply area in the Umzinyathi DM. The water is treated at the Biggarsburg WTP which has capacity of 14 Mℓ/day. The capacity of the WTP is 16 Mℓ/day or 5.8 Mm^3/a.

The total service storage capacity of the Dundee/Glencoe Water Supply Scheme area is given in the WSDP as 42.5 Mℓ ranging from 0.5 Mℓ to 20 Mℓ reservoirs.

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

Table 8-1: Dundee/Glencoe Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	16	1.79	17.79	35.0	17.21
Storage (Mℓ)	42	-	42	35.0	N/A
Bulk conveyance - Raw Water (Mℓ/d)	14	1.79	15.79	35.0	19.21
Bulk conveyance - Clear Water (Mℓ/d)	-	-	-	35.0	35

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 existing WTP as well as the bulk pipelines would need to be increased to meet the demand of 2050.

8.2 UZ002 WSIA: NQUTHU SCHEME

The maximum capacity of the raw water abstraction works from the Buffalo River system is 9.32 Mℓ/day. The current utilisation of the bulk water supply infrastructure is approximately 107%. The existing bulk water supply infrastructure does not have sufficient capacity to meet the current water requirements of Nqutu Water Supply Scheme on a sustainable basis and does not have sufficient capacity to meet future water requirements on a long-term sustainable basis.

In the UAP Phase II study a proposed intervention to extend the Dundee Bulk Supply was investigated to abstract raw water from the Ntshingwayo Dam to feed the Biggarsburg WTP. The Biggarsburg WTP will then be able to supply raw water to the Vants Drift WTP. The details of the proposed intervention are as follows:

- ✓ A proposed 40 km, 600mm ø raw water pipeline from the Ntshingwayo Dam on the Buffalo River to the Biggarsberg WTP to supply Glencoe and Dundee;
- ✓ Upgrade of Biggarsberg WTP to 65 Mℓ/day; and
- ✓ A proposed 47 km, 450mm ø raw water pipeline from Biggarsberg to Vants Drift to supply Nquthu LM.

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

Table 8-2: Nquthu Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	10	2.56	12.56	31.0	18.44
Storage (Mℓ)	20.98	2.56	23.54	31.0	6.87
Bulk conveyance - Raw Water (Mℓ/d)	-	-	-	31.0	31.0
Bulk conveyance - Clear Water (Mℓ/d)	10	2.56	12.56	31.0	18.44

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

8.3 UZ003 WSIA: NONDWENI SCHEME

The Nondweni river is inadequate to sustain the demand of the scheme. The yield/allowable water available is 0.22 Mm^3/a and the current abstraction is 0.543 Mm^3/a. The geology of the Nondweni supply area is such that the groundwater recharge capacity is limited as it is confined to joints and bedding planes. The average yield of the boreholes ranges between 0.1 ℓ/s to 0.6 ℓ/s.

The Nondweni WTP was upgraded from 1.8 Mℓ/day to 4.8 Mℓ/day to meet the 2040 demand of the scheme.

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

Table 8-3: Nondweni Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	4.8	5	9.8	13.0	3.2
Storage (Mℓ)	8.63	-	8.63	13.0	3.87
Bulk conveyance - Raw Water (Mℓ/d)	0.54	8	8.54	13.0	4.46
Bulk conveyance - Clear Water (Mℓ/d)	2.7	-	2.7	13.0	10.3

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

8.4 UZ004 WSIA: NGOLOKODO SCHEME

The Ngolokodo Water Supply Scheme is one of the stand-alone localised schemes within the Nquthu LM. The scheme is supplied via boreholes. The borehole capacities are unknown.

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

Table 8-4: Ngolokodo Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	-	-	-	4.01	4.01
Storage (Mℓ)	-	-	-	4.01	4.01
Bulk conveyance - Raw Water (Mℓ/d)	-	-	-	4.01	4.01
Bulk conveyance - Clear Water (Mℓ/d)	-	-	-	4.01	4.01

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

8.5 UZ005 WSIA: POMEROY SCHEME

The main source of supply for the Pomeroy scheme is the Sampofu River. Raw water is abstracted from the river where it is pumped to the Pomeroy water treatment plant. The maximum capacity of the raw water abstraction works is 1.98 Mℓ/day. The average flow rate of the treatment plant is 0.5 Mℓ/day. The existing raw water pumping infrastructure may have sufficient capacity to meet the capacity of the existing water treatment plant however it may not be sufficient to meet future demands.

The outlying rural communities of the Pomeroy supply area are dependent on groundwater. All boreholes are equipped with handpumps or diesel generators and the average yield of the boreholes is 1.1 ℓ/s.

There is potential to develop an off channel storage (OCS) dam in the Nyandu or Sampofu River, located near the border of the Pomeroy supply system. This OCS can then potentially supply not just the Sampofu supply area, but also the Pomeroy supply system. Water will be pumped from an abstraction weir in the Thukela River to the proposed OCS in the Nyandu River for storage and use during the low flow periods when releases cannot be abstracted from the Spioenkop Dam that has been allocated for downstream users (DWA 2014).

There have been preliminary investigations that have been conducted in the Nyandu or Sampofu River. There is also a potential to develop a dam with a storage capacity of 10 Mm^3. The proposed dam will have a potential capacity of up to 25 Mℓ/day. This will be sufficient to supply both the Sampofu supply area as well as Pomeroy including the surrounding communities in the Msinga LM.

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

Table 8-5: Pomeroy Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
***Water Treatment (Mℓ/d)**	0.5	4.8	5.3	8.8	3.5
Storage (Mℓ)	0.5	-	0.5	8.8	8.3
Bulk conveyance - Raw Water (Mℓ/d)	1.98	-	1.98	8.8	6.82
Bulk conveyance - Clear Water (Mℓ/d)	2.48	-	2.48	8.8	6.32

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

8.6 UZ006 WSIA: TUGELA FERRY SCHEME

The Sampofu WTP receives raw water from the Thukela River where it is abstracted and pumped approximately 26 km to the Sampofu WTP.

The maximum capacity of the raw water abstraction works from the Thukela River system is not known. Given that the WTP capacity is 12 Mℓ/d, the existing raw water pumping infrastructure is likely to have sufficient capability to meet the capacity of the existing water treatment plant. This may not be sufficient to meet the future demands. Based on a 3-month low flow duration, the maximum abstraction at the Thukela abstraction point was estimated to be 6.8 Mm^3/a for 3 months (or a summer peak of 18.6 Mℓ/d) assuming no abstractions are taking place upstream.

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

Table 8-6: Tugela Ferry Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	12.0	-	12.0	12.1	0.1
Storage (Mℓ)	12.0	-	12.0	12.1	0.1
Bulk conveyance - Raw Water (Mℓ/d)	12.0	-	12.0	12.1	0.1
Bulk conveyance - Clear Water (Mℓ/d)	12.0	-	12.0	12.1	0.1

Based on the capacities of existing and planned infrastructure, there are no gaps within the water supply requirements for the projected 2050 demand.

8.7 UZ007 WSIA: KEATES DRIFT SCHEME

The scheme receives its potable water supply from the 0.3 Mℓ/day Keates Drift WTP. The raw water is currently abstracted directly from the tributary of the Thukela River. The abstraction rate is unknown.

According to the UAP Phase II Study, Keates Drift was proposed to be upgraded from 0.3 Mℓ/day to 6.9 Mℓ/day and will be the primary source of treated water to the Ndaya and Keates Drift schemes. This upgrade will be motivated by the proposed upgrade of the Muden Scheme as most of the supply is received from the Muden WTP.

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

Table 8-7: Keates Drift Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	0.3	6.9	7.2	14.4	7.2
Storage (Mℓ)	-	6.9	6.9	14.4	7.5
Bulk conveyance - Raw Water (Mℓ/d)	-	-	-	14.4	14.4
Bulk conveyance - Clear Water (Mℓ/d)	0.3	6.	0.3	14.4	13.1

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

8.8 UZ008 WSIA: MUDEN SCHEME

The Muden Water Supply Scheme covers the Umvoti and Umshwathi LM's in the Umzinyathi and uMgungundlovu DM's respectively. The scheme is currently supplied from boreholes and abstractions from the Mooi River. The borehole and reservoir capacities are unknown.

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

Table 8-8: Muden Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	3.0	-	3.0	3.03	0.03
Storage (Mℓ)	3.0	-	3.0	3.03	0.03
Bulk conveyance - Raw Water (Mℓ/d)	3.0	-	3.0	3.03	0.03
Bulk conveyance - Clear Water (Mℓ/d)	3.0	-	3.0	3.03	0.03

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

8.9 UZ009 WSIA: GREYTOWN SCHEME

Water resources in the Greytown WTP supply area consists of Lake Merthley Dam and six boreholes (currently not in use due to low levels or completely dry), which have a combined yield of 4 Mℓ/day. Water is fed via gravity from Lake Merthley Dam to the WTP. A further thirteen boreholes have been drilled under a project funded by CoGTA and these have sufficient yield to meet the current demand. Water from the boreholes is fed directly to the WTP. The projected 2050 demand for the Greytown Scheme includes the areas of Matimatolo, Eshane and Kranskop. An intervention is underway to augment water supply to the Greytown WTP from Craigieburn Dam. The approved water use licence for this augmentation scheme is 12.3 Mℓ/day and will meet the long-term needs of Greytown.

The UAP Phase II Study investigated the possibility of bulk water augmentation to the Greytown Supply node via the existing uMshwathi Regional Bulk Water Supply Scheme. The possibility of extending this pipeline along the R33/R614 junction was investigated. A 58 km pipeline was proposed to supply Greytown. It was then possible to supply water under gravity for approximately 20 km from the R33/R614 intersection whereafter a pump station will be required to pump the water to a reservoir at Seven Oaks. Water was then proposed to gravitate from the Seven Oaks Reservoir to within 2 km of Greytown where another pump station was required to pump water to the Greytown reservoir.

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

Table 8-9: Greytown Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	4.8	-	4.8	8.3	3.5
Storage (Mℓ)	4.8	-	4.8	8.3	3.5
Bulk conveyance - Raw Water (Mℓ/d)	2.16	12.3	14.46	8.3	N/A
Bulk conveyance - Clear Water (Mℓ/d)	4.8	-	4.8	8.3	4.5

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

8.10 UZ010 WSIA: MATIMATOLO SCHEME

The Matimatolo Water Supply Scheme is supplied by multiple boreholes (yield unknown). Villages such as Dayingubo and Njengabantu have small stand-alone schemes which are supplied by groundwater schemes. The capacities of the existing reservoirs at the Matimatolo WTP are unknown.

The existing infrastructure capacity is compared with the projected 2050 demand. This comparison is provided in **Table 8-10** overleaf.

Table 8-10: Matimatolo Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	-	-	-	11.1	11.1
Storage (Mℓ)	-	-	-	11.1	11.1
Bulk conveyance - Raw Water (Mℓ/d)	-	-	-	11.1	11.1
Bulk conveyance - Clear Water (Mℓ/d)	-	-	-	11.1	11.1

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

8.11 UZ011 WSIA: KRANSKOP SCHEME

The Kranskop Water Supply Scheme is an isolated scheme with adequate infrastructure using boreholes as a water source. The Kranskop WTP is estimated to yield 0.5 Mℓ/day.

A detailed design has been undertaken for the scheme by MSW Consulting.

Table 8-11: Kranskop Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	0.5	-	0.5	0.62	0.12
Storage (Mℓ)	0.5	-	0.5	0.62	0.12
Bulk conveyance - Raw Water (Mℓ/d)	0.5	-	0.5	0.62	0.12
Bulk conveyance - Clear Water (Mℓ/d)	0.5	-	0.5	0.62	0.12

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

8.12 UZ012 WSIA: MAKHABELENI SCHEME

The Thukela River is the main raw water source for the Makhabeleni Scheme. The Makhabeleni WTP yields 2 Mℓ/day.

Table 8-12: Makhabeleni Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2050	Additional Requirements
Water Treatment (Mℓ/d)	2	-	2	2.1	N/A
Storage (Mℓ)	4	-	4	2.1	N/A
Bulk conveyance - Raw Water (Mℓ/d)	4	-	4	2.1	N/A
Bulk conveyance - Clear Water (Mℓ/d)	4	-	4	2.1	N/A

Based on the capacities of existing and planned infrastructure, there are no gaps within the water supply requirements for the projected 2050 demand.

9. PROPOSED BULK WATER SUPPLY INTERVENTIONS

This section details the water supply reconciliation options for bulk water services within the Umzinyathi DM – considering existing use and future supplies and water sources, per scheme area. It must be noted that the Water Supply Intervention Areas (WSIA's) 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.

It is recommended that the predominantly farmland, stand-alone areas not covered by schemes, be supplied by localised schemes (boreholes etc.) due to the sparse population and the proximity of the area in relation to the other regional schemes.

During the UAP Phase II study, the Umzinyathi DM was divided into 35 Supply Zones based on existing & proposed schemes, topography, physical boundaries (rivers, mountains etc.) and settlement patterns which are depicted in **Figure 9-1** below.

The following recommendations were taken from the UAP Phase II study:

- ✓ *The Msinga Bulk Scheme will address bulk water supply requirements to the Msinga LM north of the Thukela River. The option of extending this scheme further north to supply Zone 21 was investigated. This option requires three stage pumping and thus not recommended for further investigation.*
- ✓ *The option of extending the Msinga Bulk Scheme south of the Thukela River towards Keates Drift will require pumping heads of over 500m. This will involve high capital and O&M costs. No further investigations into this option are thus recommended.*
- ✓ *The Umvoti LM requires a long-term raw water resource augmentation that will support the Umvoti Regional Scheme that will supply Greytown, Matimatolo and Kranskop. It is recommended that a detailed feasibility study of the Mvotipoort Dam be undertaken to supply this scheme and to also provide downstream storage for the Ilembe DM*
- ✓ *The water resource availability in the Mgeni catchment will affect supply further to the Umvoti Catchment and Greytown. It is however recommended that a feasibility study be undertaken into the extension of the Umshwathi Regional scheme to supply the Umvoti Regional Scheme with the option of reverse flow at some point in the future when the development of the Mvotipoort Dam together with an upgraded treatment plant at Greytown becomes feasible.*
- ✓ *The Dundee Bulk Scheme is in the detailed feasibility phase and the project business plan is due to be presented to DWS at the end of June 2016. The intention of the scheme is to supply the Endumeni and Nquthu LM's with bulk water. A dam on the Buffalo River has been proposed by uThukela Water as an*

option to supply the Nquthu LM with bulk water. It is recommended that this option be investigated in detail should the Dundee Bulk option to supply Nquthu LM not be approved by DWS.

Figure 9-1: UZDM Supply Zones (UAP Phase II, 2016)

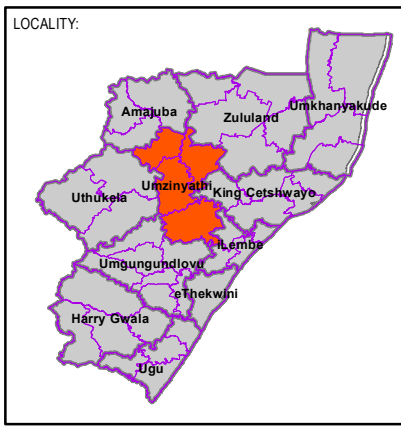
The details of each proposed upgrade and future additional requirements/interventions are provided per WSIA within the sections and paragraphs hereafter and illustrated for the entire WSA within **Figure 9-2**.

N

Legend

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

LOCALITY:



CLIENT:

UMGENI WATER • AMANZI

MUNICIPALITY:

UMZINYATHI DISTRICT MUNICIPALITY

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PROJECT TITLE

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

MAP TITLE:

Total Bulk Water Supply Interventions
Umzinyathi District Municipality

DATE COMPLETED:

January 2021

MAP NO.:

DC 24 Figure 9-2

Proposed New / Upgrade Infrastructure

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

10 5 0 10 20 Kilometers

9.1 UZ001 WSIA: DUNDEE/GLENCOE SCHEME

This scheme covers Zones 6, 28, 29, 30, 31 and 32. (**Figure 9-1**)

9.1.1 Demand Model Intervention

9.1.1.1 Water Demand

The water demand for the Dundee/Glencoe Scheme was determined for 2020 and 2050 and included within **Table 9-1** below.

Table 9-1: Population and Water demand 2020 and 2050 for the Dundee/Glencoe WSIA

Population	**Population 2020**	**Population 2050**
	71 425	99 768
Water Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	21.67	35.02

9.1.1.2 Water Resource Consideration

The Dundee/Glencoe supply area is supplied with water from the Buffalo River system, including the Donald McHardy and Tom Worthington Dams on the Sterkstroom River, which is a tributary of the Buffalo River. Supply is augmented from an abstraction on the Buffalo River at Tayside weir. The yield at these abstraction points is unknown. (Tlou Consulting, WATER RECONCILIATION STRATEGY OF THE SCHEMES IN THE BUFFALO RIVER SYSTEM FOR THE PERIOD - 2015 TO 2045, 2016)

A detailed hydrological study needs to be undertaken of the Buffalo River system including the existing impoundments to determine whether the 2050 water demand can be sustainably supplied from the current abstractions or if an additional impoundment in the form of a weir, dam/off channel will be necessary.

The analysis would inform whether the Tayside weir height could be increased, thereby increasing its yield. The yield of the Ntshingwayo Dam is 173 Mm^3/a. This dam has spare capacity of 23.0 Mm^3/a (DWS 2014). This could be used conjunctively with the Tayside weir to provide the shortfall of 21 Mℓ/day required to supply the 2050 demand to Glencoe & Dundee. (Tlou Consulting, UPDATE OF THE WATER RECONCILIATION STRATEGY OF THE DUNDEE/GLENCOE SUPPLY AREA - 2012 TO 2040, 2014)

9.1.2 Water Supply Infrastructure

9.1.2.1 Bulk conveyance and Storage

The Dundee/Glencoe Supply Scheme abstracts raw water from the Buffalo River system and gets treated at the Biggarsburg WTP that has a current capacity of 14 Mℓ/day. There are two (2) existing command reservoirs

which have a capacity of 0.5 Mℓ and 20 Mℓ respectively at the Biggarsburg WTP. Water from the command reservoirs are pumped to intermediate Glencoe reservoir (1395m) via a 160mm Ø pipeline.

The Glencoe reservoir supply the existing 3 Mℓ Sithembile reservoir (1 361m) via an existing pipeline of unknown diameter. The Glencoe reservoir then distributes water via gravity to existing terminal reservoirs at the Wasbank, Nyonyana and Zenzele sub-scheme areas via a pipeline that ranges from 90mm Ø to 110mm Ø. The terminal reservoirs and supply pipelines in the areas need to be upgraded. Water from the command reservoir at Biggarsburg also supplies Dundee and surrounding areas directly to the reticulation via an existing pipeline diameter of unknown diameter.

9.1.2.2 Proposed Interventions

The following infrastructure upgrades will be required in order to adequately supply the Dundee/Glencoe WSIA and is illustrated within **Figure 9-3** followed by the schematic layout of the WSIA within **Figure 9-4**.

- ✓ The Biggarsburg WTP needs to be upgraded to 35 Mℓ/day to meet the 2050 demand.
- ✓ Reservoir 1 (1 347m) and Reservoir 2 (1 346m) at the WTP need to be upgraded to provide 35 Mℓ storage for the 2050 demand.
- ✓ The pump station in the WTP needs to be upgraded to 205kW.
- ✓ The existing rising main from the WTP to the existing intermediate reservoir at Glencoe needs to be upgraded to a 300mm ø pipeline. The secondary reservoir in Glencoe needs to be upgraded to 17 Mℓ.
- ✓ The gravity pipeline from the Glencoe reservoir to Sithembile Reservoir requires an upgrade to a 200mm ø pipeline.
- ✓ An off take on the pipeline from the Glencoe Reservoir to the Sithembile Reservoir that supplies the Wasbank Reservoir (1 151m) needs to be upgraded to a 160mm ø. The Wasbank Reservoir should be upgraded to provide 1 Mℓ of storage.
- ✓ Another off take on the pipeline from the Sithembile Reservoir to the Wasbank Reservoir that supplies the Nyonyana Reservoir (1 312m) at Mumbe will also require an upgrade to a 160mm ø. The Nyonyana Reservoir needs to be upgraded to 2 Mℓ of storage.
- ✓ The Nyonyana reservoir will also supply the proposed 1 Mℓ reservoir (1 330m) that will serve as a distribution reservoir for the Mkuzeni scheme via a 110mm ø pipeline.
- ✓ As per Figure 9-1, Zones 33 and 34, that are within the Dundee/Glencoe Scheme, are scattered farmlands which are proposed to be supplied via rudimentary schemes

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

9.1.3 Financial Requirements

The bulk cost requirement for Dundee/Glencoe WSIA is summarised within **Table 9-2** and **Table 9-3** below.

Table 9-2: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (excl VAT)
Primary	R80 622 000.00	R8 062 200.00	R88 684 200.00
Secondary	R80 562 309.16	R8 056 230.92	R88 618 540.07
Tertiary	R35 706 787.58	R3 570 678.76	R39 277 466.34
Total	**R196 891 096.73**	**R19 689 109.67**	**R216 580 206.41**

The total bulk cost requirement for the Dundee/Glencoe Scheme is R 216 580 206.41 (excl VAT). The scheme development cost per household is approximately R 31 920.

Table 9-3: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (excl VAT)
Primary	R68 739 807	R6 873 981	R75 613 788
Secondary	R37 882 871	R3 788 287	R41 671 158
Tertiary	R31 584 851	R3 158 485	R34 743 336
Total	**R138 207 529**	**R10 662 268**	**R117 284 946**

The total bulk cost requirement for the Dundee/Glencoe Scheme (Proposed Extension from Nyonyana to Zenzele) is R 117 284 946 (excl VAT). The scheme development cost per household is approximately R 20 050.

N

Kilometers
5 2,5 0 5 10

Amajuba

Umzinyathi

Uthukela

Endumeni Local Municipality

Nquthu Local Municipality

Dannhauser

Durancol

Vants Drift

BIGGARSBERG

Biggarsberg

31Ml/d

1000kl

4000kl

Dundee

Glencoe

Wasbank

2000kl

25kl

160

300

400

110

0

UTRECHT NU 09

DUNDEE NU 13

DUNDEE NU 21

DUNDEE NU 17

UTRECHT NU 08

NDATSHANA 08

DUNDEE NU 01

DUNDEE NU 07

GLENCOE NU 13

GLENCOE NU 02

DUNDEE NU 14

WASBANK NU

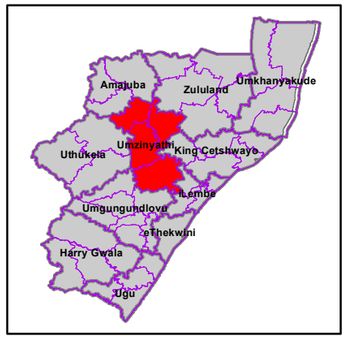
DUNDEE

GLENCOE

Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names (Dried Dam)
- Rivers
- Settlements (Ncxola)
- Major Towns (Hilton)

LOCALITY:



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JTN CONSULTING

PROJECT TITLE

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

MAP TITLE: **Total Bulk Water Supply Interventions - UZ001: Dundee/Glencoe Umzinyathi District Municipality**

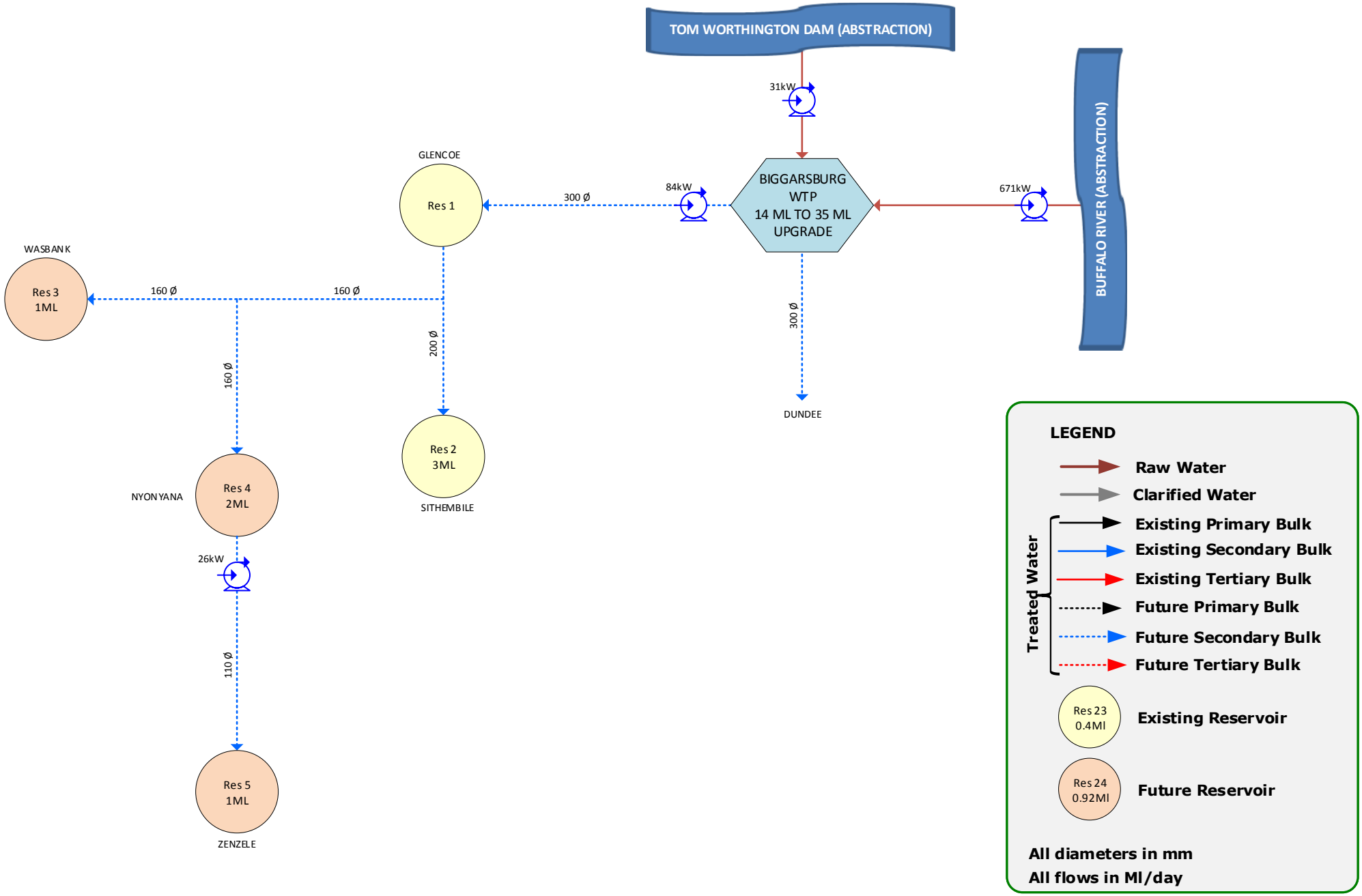
DATE COMPLETED: January 2021

MAP NO.: **DC 24 Figure 9-3**

Proposed New / Upgrade Infrastructure

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

Figure 9-4
UZ001 WSIA: DUNDEE/GLENCOE WSS



9.2 UZ002 WSIA: NQUTHU SCHEME

This scheme covers Zones 21, 22, 23, 24 and 26. (**Figure 9-1**)

9.2.1 Demand Model Intervention

9.2.1.1 Water Demand

The water demand for the Nquthu Scheme was determined for 2020 and 2050 and included within **Table 9-4** below.

Table 9-4: Population and Water demand 2020 and 2050 for the Nquthu WSIA

Population	**Population 2020**	**Population 2050**
	195 118	272 548
Water Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	20.99	30.41

9.2.1.2 Water Resource Consideration

The Nquthu area is supplied with water from an abstraction on the Buffalo River. The yield as well as capacity of the raw water abstraction works from the Buffalo River is unknown. The Kwa-Ngobese, Hlazakazi, Kwa-Nyoni, Mathutshana, Esgqumeni, Bhekabani, Fahlaza and Frischgewa areas are supplied from an abstraction on the tributary of Buffalo River and treated at the Isandlwana Package plant. This river is non-perennial resulting in the plant not being operated at certain times of the year. (Tlou Consulting, UPDATE OF THE WATER RECONCILIATION STRATEGY OF THE NQUTU SUPPLY AREA - 2012 TO 2040, 2014)

A detailed hydrological investigation is thus necessary to confirm whether a run of river abstraction at the Buffalo river will still be possible or an impoundment in the form of a weir, dam/off channel storage dam will be necessary for supply to the Nquthu scheme.

9.2.2 Water Supply Infrastructure

9.2.2.1 Bulk conveyance and Storage

The Nquthu WSS comprises of the following sub schemes:

- ✓ Nquthu Scheme Area 2 is supplied via a 160mm ø pipeline from the Vants Drift WTP to the command reservoir at Ekucabangeni. The current area demand is 15.21 Mℓ/day including areas such as Jabavu Hlathi Dlamini, Rorke's Drift, Nquthu Town, Masotsheni, Luvisi and Ngwebeni. The pipeline sizes to this area ranges from 63mm ø to 200mm ø.

- ✓ Nquthu Scheme Area 5 is also supplied via the Vants Drift pipeline from the Command Reservoir near Nquthu Town. The current demand for this area is 4.3 Mℓ/day including the Isandlwana scheme area. The pipeline sizes to this area vary from 63mm ø to 200mm ø.
- ✓ Nquthu Scheme Area 4 is close to the Zululand DM border. This area is an extension of the Nquthu Scheme Area 5. The pipe sizes in scheme area 4 is unknown but the current demand is 1.48 Mℓ/day. The total service storage capacity of the Nquthu Water Supply Scheme area is not known. It is therefore not known whether there is sufficient storage to meet the current summer peak requirements of the scheme area. The reservoirs will be sized as per the proposed inventions below.

The treated water from the treatment plant in the Nqutu Water Supply Scheme is pumped to various service reservoirs in the scheme area before distribution into the scheme's reticulation network.

9.2.2.2 Proposed Interventions

The following infrastructure upgrades will be required in order to adequately supply the Nquthu WSIA and is illustrated within **Figure 9-5** followed by the schematic layout of the WSIA within **Figure 9-6**.

In the UAP Phase II Study a dam was proposed downstream on the Buffalo River (-28.2591 S; 30.5048 E) as a long-term intervention. The dam was proposed to supply the entire Nquthu LM. A feasibility study for this dam should be undertaken to determine if it could yield 50.35 Mℓ/day. Only then, the following interventions should be considered:

- ✓ A water resource assessment needs to be undertaken to determine if the dam can yield the 2050 demand.
- ✓ A proposed 20 km, 600mm ø raw water steel pipeline from the proposed dam to Vants Drift WTP will be required.
- ✓ The rising main from Vants Drift WTP (1 096m) to the command reservoir (1 336m) at Ekucabangeni should be upgraded from a 160mm to 1000mm ø pipeline.
- ✓ The pipeline to Rorke's Drift should be upgraded from 110mm to 200mm ø.
- ✓ The Isandlwana WTP will be supplied via a 110mm ø pipeline from an off take on the Vants Drift to Rorkes Drift pipeline.
- ✓ A proposed 110mm ø pipeline rising main from Isandlwna WTP to Ncepheni Reservoir (1 250m). The Isandlwana WTP will require a 14kW pump to be installed at the WTP.
- ✓ The Ncepheni reservoir should be upgraded to 500 kℓ. The Ncepheni reservoir will also supply the Ngedla, Ncepheni and Masotsheni areas.
- ✓ Rising mains after the command reservoir at Ekucabangeni should be upgraded to a 900mm ø pipeline to Nquthu service reservoir 1 and 2.

- ✓ The pipeline that supplies the Ntanyandlovu reservoir 1 (1 263m) at Luvisi needs be upgraded from a 200mm to 315mm ø pipeline and additional storage of 5 Mℓ will be required.
- ✓ Nquthu Reservoir 1 (1 385m) needs to be upgraded to 40 Mℓ and Reservoir 2 (1 500m) to 36 Mℓ.
- ✓ The existing Thelezini reservoir (1 412m) needs to be upgraded to 3 Mℓ.
- ✓ Thelezeni Reservoir (1 412m) will be supplied via a proposed 300mm ø rising main pipeline from Ekucabangeni Command (1 336m).
- ✓ The supply to Bloed River will be via a proposed 110mm ø pipeline that offtakes from the pipeline that supplies Mkhonjane Reservoir (1 289m). The existing Bloed River reservoir (1 128m) needs to be upgraded to a 200 kℓ reservoir.
- ✓ The proposed pipeline supplying Ngolokodo has a 110mm ø offtake that supplies Ndatshana. An existing reservoir at Ndatshana (1 112m), capacity unknown, needs an additional capacity of 200kℓ.
- ✓ In the UAP Phase II Study there was a proposal to supply Zone 21 via the Msinga Bulk system which was found to be not feasible. In this study a 2.5 Mℓ reservoir at Rorke's Drift (Zone 23) was proposed to supply Zone 21 via a 110mm ø pipeline to a proposed 1 Mℓ at Elanskraal.
- ✓ Another option to supply Zone 21 via the St Augustine reservoir in Zone 26 was also proposed within the Phase II study.

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

9.2.3 Financial Requirements

The bulk cost requirement for Nquthu WSIA is summarised within **Table 9-5** below.

Table 9-5: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (excl VAT)
Primary	R649 575 095.15	R64 957 509.52	R714 532 604.67
Secondary	R335 177 400.28	R33 517 740.03	R368 695 140.30
Tertiary	R32 244 832.62	R3 224 483.26	R35 469 315.88
Total	**R1 016 997 328.05**	**R101 699 732.80**	**R1 118 697 060.85**

The total bulk cost requirement for the Nquthu Scheme is R 1 118 697 060.85 (excl VAT). The scheme development cost per household is approximately R 27 600.

N

Kilometers
6 3 0 6 12

Emadlangeni Local Municipality

Dannhauser Local Municipality

Endumeni Local Municipality

Abaqulusi Local Municipality

Ulundi Local Municipality

Nquthu Local Municipality

Msinga Local Municipality

Nkandla Local Municipality

Alfred Duma Local Municipality

Emondlo

Dundee

Glencoe

Babanango

Nqutu Scheme Area 1

Nqutu Scheme Area 2

Nqutu Scheme Area 3

Nqutu Scheme Area 4

Nqutu Scheme Area 5

Nqutu Scheme Area 6

Nqutu Scheme Area 7

9Ml/d

51Ml/d

1,8Ml/d

0Ml/d

0,5Ml/d

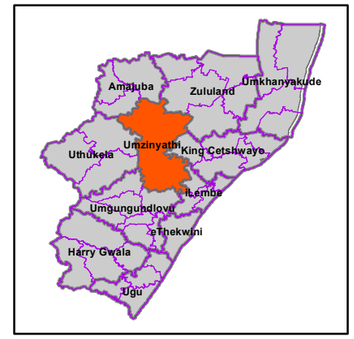
Proposed New / Upgrade Infrastructure

- Eston — Water Scheme Areas & Names
- WTP — Existing Water Treatment Plants
- Surface Water Abstraction Works (Existing)
- Primary Bulk Pipelines (Existing)
- Secondary Bulk Pipelines (Existing)
- Tertiary Bulk Pipelines (Existing)
- Primary Reservoirs (Existing)
- Secondary Reservoirs (Existing)
- Tertiary Reservoirs (Existing)
- Pump Stations (Existing)
- 19Ml/d — Upgrade of WTW
- 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
- Ncxola — Settlements
- Hilton — Major Towns

LOCALITY:



CLIENT:

UMGENI WATER • AMANZI

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PROJECT TITLE

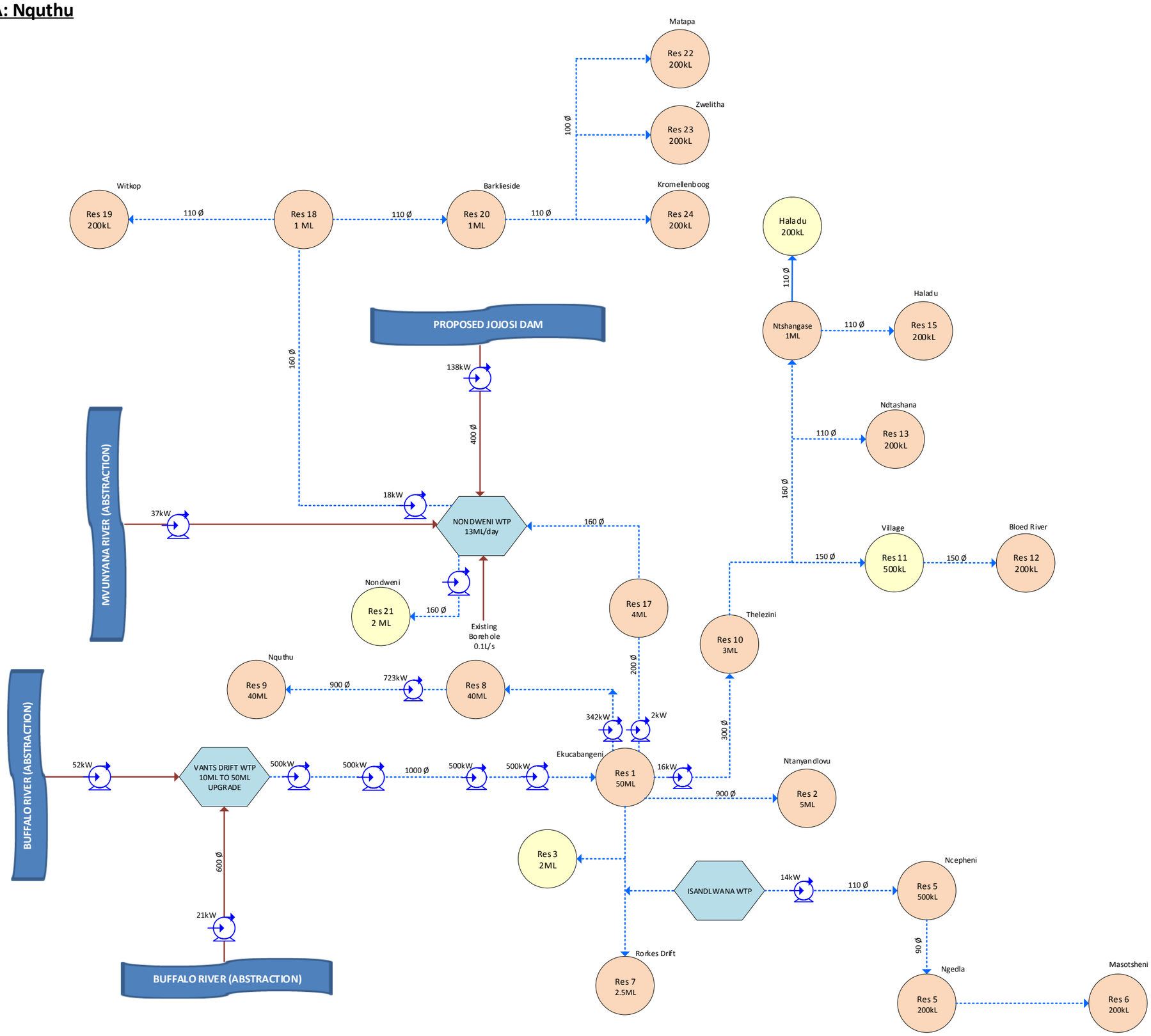
Umzinyathi DM: Universal Access Plan Phase III - Progressive Development of a Regional Concept Secondary Bulk Water Master Plan

MAP TITLE: **Total Bulk Water Supply Interventions - UZ002 & UZ014: Nquthu Bulk Umzinyathi District Municipality**

DATE COMPLETED: January 2021

MAP NO.: **DC 24 Figure 9-5**

Figure 9-6
UZ002 WSIA: Nquthu



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 UZ003 WSIA: NONDWENI SCHEME

This scheme covers Zone 25. (**Figure 9-1**)

9.3.1 Demand Model Intervention

9.3.1.1 Water Demand

The water demand for the Nondweni Scheme was determined for 2020 and 2050 and included within **Table 9-6** below.

Table 9-6: Population and Water demand 2020 and 2050 for the Nondweni WSIA

Population	**Population 2020**	**Population 2050**
	49 416	69 027
Water Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	8.62	12.50

9.3.1.2 Water Resource Consideration

The Nondweni scheme area is supplied with raw water from the Nondweni River, a tributary of the Mvunyana River. Abstraction takes place at a weir where the 3-month low flow at 99% exceedance was determined at 0.4 Mm^3/a, which is equivalent to 1.2 Mℓ/day during the winter periods.

The current water requirements based on the population and average per capita consumption of the area is 1.75 Mm^3/a (4.8 Mℓ/day). This demand includes the rural areas which are currently being supplied by standalone boreholes which are not adequate. (Tlou Consulting, UPDATE OF THE WATER RECONCILIATION STRATEGY OF THE NONDWENI SUPPLY AREA - 2012 TO 2040, 2014)

A water resource investigation will need to be undertaken to determine if the weir abstraction will be sufficient to cater for the 2050 demand or if there is a need for an impoundment such as an off-channel dam.

9.3.2 Water Supply Infrastructure

9.3.2.1 Bulk conveyance and Storage

The existing Nondweni run-of-river abstraction is not adequate to supply the water requirements of Nondweni town and the surrounding communities. The situation is compounded by a lack of sufficient bulk infrastructure to service the outlying rural communities.

The Nondweni WTP is the only treatment plant that supplies the scheme area. The capacity of the water treatment plant is 4.8 Mℓ/day. (WSDP, 2008) Potable water is then pumped from the WTP to a high level command reservoir (1 226m) in the supply area.

9.3.2.2 Proposed Interventions

The following infrastructure upgrades will be required in order to adequately supply the Nondweni WSIA and is illustrated within **Figure 9-7** followed by the schematic layout of the WSIA within **Figure 9-8**.

- ✓ A proposed supply from the Ekucabangeni command reservoir (1 336m) to the Nondweni WTP reservoir (1 102m) will require investigation as an option to increase supply within the Nondweni scheme.
- ✓ The Nondweni Scheme can extend the supply of potable water to the following areas with the following infrastructure:
    - Witkop Scheme – A proposed 200 kℓ reservoir (1 074m) supplied via a 110mm ø pipeline, 7.15 km long direct from an existing distribution reservoir (1 187m) to the Witkop scheme.
    - Barklieside Scheme – A proposed 1 Mℓ reservoir (1 045m) supplied via a 110mm ø pipeline, 4.15 km long. The Barklieside reservoir will also serve as a distribution reservoir for Kromellenboog Matapa.
    - Kromellenboog Scheme – A proposed 200 kℓ reservoir (964m) supplied via a 110mm ø pipeline, 7.5 km long. The supply will come from the Barklieside reservoir.
    - Matapa Scheme - A proposed 200 kℓ reservoir (895m) supplied via 110mm ø pipeline 8.57 km long. The supply will come from the Barklieside reservoir.
- ✓ The proposed Jojosi Dam, at (28.135312 S; 30.794724 E), can supply raw water via a proposed 400mm ø rising main pipeline from the proposed dam to the Nondweni WTP. A water resource assessment needs to be undertaken to determine if the dam can yield the 2050 demand.

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

9.3.3 Financial Requirements

The bulk cost requirement for Nondweni WSIA is summarised within **Table 9-7** below.

Table 9-7: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (excl VAT)
Primary	R102 771 383.47	R10 277 138.35	R113 048 521.81
Secondary	R58 046 803.72	R5 804 680.37	R63 851 484.09
Tertiary	R31 373 256.15	R3 137 325.62	R34 510 581.77
Total	**R192 191 443.34**	**R19 219 144.33**	**R211 410 587.67**

The total bulk cost requirement for the Nondweni Scheme is R 211 410 587.67 (excl VAT). The scheme development cost per household is approximately R 12 250.

N

Kilometers
2 1 0 2 4

Abaqulusi Local Municipality

Nquthu Local Municipality

Ulundi Local Municipality

Nquthu Scheme Area 3

MAGABENI 01
MAGABENI 03
MAGABENI 05
MHLUNGWANE 10
MHLUNGWANE 09
MHLUNGWANE 05
MHLUNGWANE 15
MHLUNGWANE 02
MADULADULA 04
MADULADULA 08
MADULADULA 03
MANYONGAZANE
OTHAKA 01
NONDWENI 02
VUMANKALA 01
BARKLIESIDE 01
NHLAMBAMASOKA 07
NHLAMBAMASOKA 06
NTABABOMVU 03
NHLAMBAMASOKA 10
NHLAMBAMASOKA 03
NHLAMBAMASOKA 08
NONDWENI 01
MAGONGOLOZA 02
OHALENI 05
NQUTU 01
PATSOANA 09
PATSOANA 03
PATSOANA 04
PATSOANA 01
MBEWUNYE 05
MBEWUNYE 03
GRAZING 03
GRAZING 20
GRAZING 04
GRAZING 07
KWA-VUMA 05
MAGALA 01
MABULULWANE 02
DRIEFONTEIN 03
DRIEFONTEIN 05
DRIEFONTEIN 06
DRIEFONTEIN 04
DRIEFONTEIN 02
HLABANKOSI 06
SEVEN 08
SEVEN 09
BHEKABANTU 01
BHEKABANTU 03
BHEKABANTU 06
BHEKABANTU 02
OGAZINI 04
OGAZINI 09
SIGQOBHELENI 02
MATAPA 02
VRYHEID NU 04
VRYHEID NU 21
NSUBENI 06

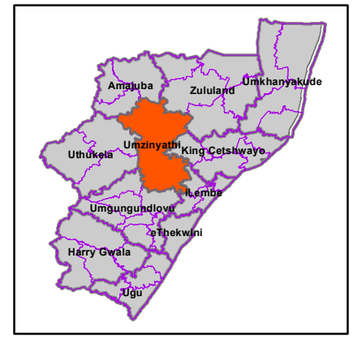
200kl
500kl
4000kl
150kl
100kl
150kl
25kl
25kl
25kl
25kl
25kl
25kl
25kl
25kl
25kl
25kl
25kl
25kl
25kl
13Ml/d
1,8Ml/d
100kl
100kl
100kl
100kl
200kl
200kl
200kl
25kl
973kl
918kl
25kl
257kl
25kl
2102kl
452kl
200kl

400
400
200
160
63
315
50
75
90
160
90
110
110
110
110
110
110
110
90
90

Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names
- Rivers
- Settlements (Ncxola)
- Major Towns (Hilton)

LOCALITY:



CLIENT:

UMGENI WATER • AMANZI

MUNICIPALITY:

UMZINYATHI DISTRICT MUNICIPALITY

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Project No.: 27814

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PROJECT TITLE

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

MAP TITLE: **Total Bulk Water Supply Interventions - UZ003: Nondweni Umzinyathi District Municipality**

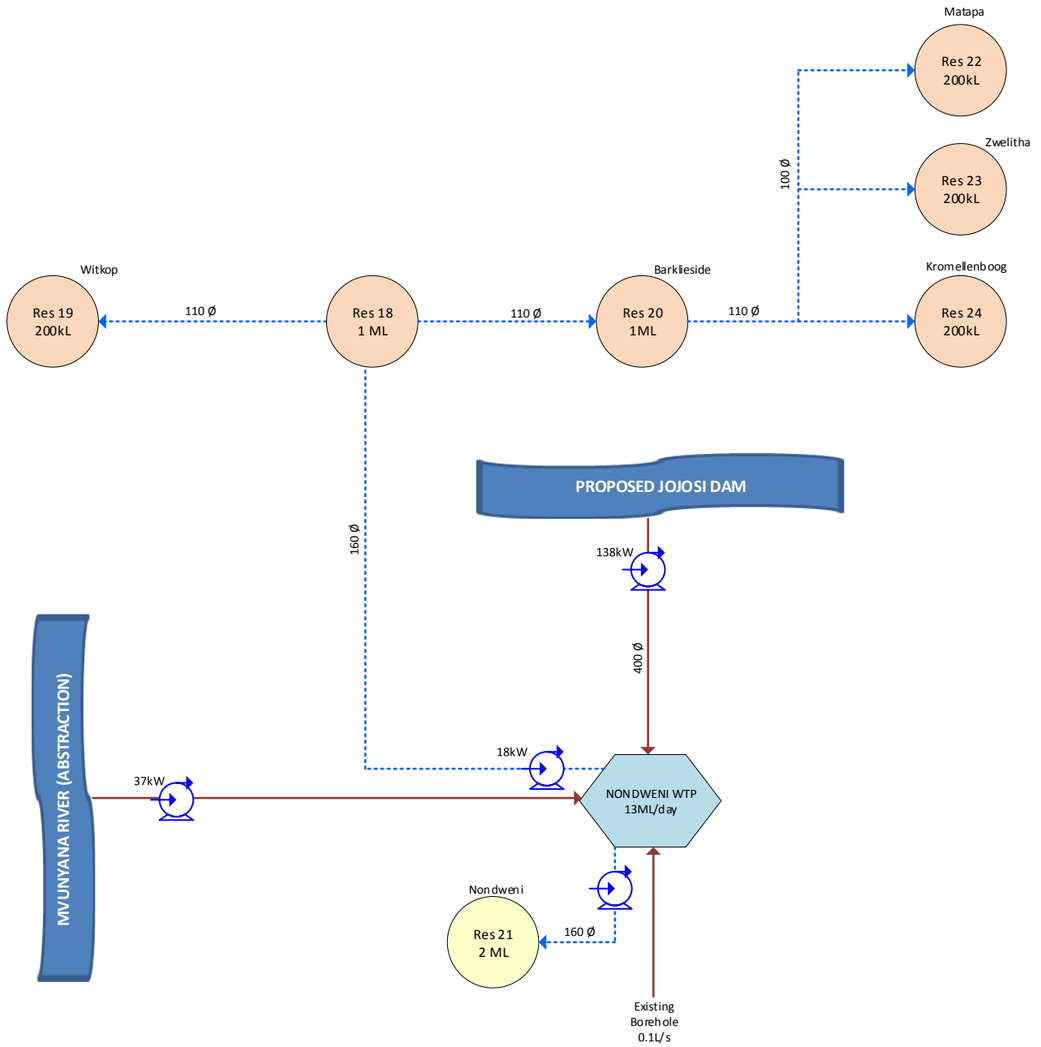
DATE COMPLETED: January 2021

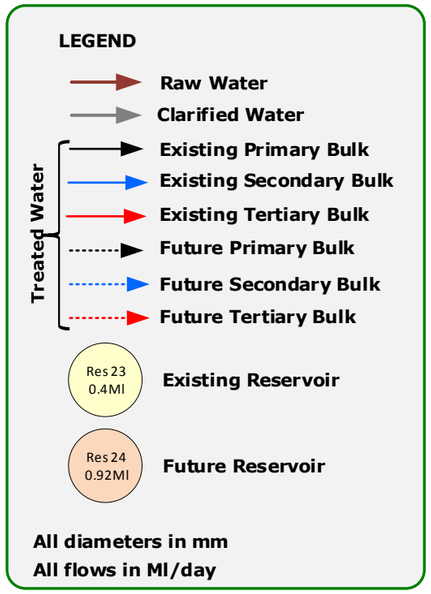
MAP NO.: **DC 24 Figure 9-7**

Proposed New / Upgrade Infrastructure

- Eston — Water Scheme Areas & Names
- WTP — Existing Water Treatment Plants
- Surface Water Abstraction Works (Existing)
- Primary Bulk Pipelines (Existing)
- Secondary Bulk Pipelines (Existing)
- Tertiary Bulk Pipelines (Existing)
- Primary Reservoirs (Existing)
- Secondary Reservoirs (Existing)
- Tertiary Reservoirs (Existing)
- Pump Stations (Existing)
- 19Ml/d — Upgrade of WTW
- 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 9-8
UZ003 WSIA: Nondweni Scheme





9.4 UZ004 WSIA: NGOLOKODO SCHEME

This scheme covers Zone 27. (**Figure 9-1**)

9.4.1 Demand Model Intervention

9.4.1.1 Water Demand

The water demand for the Ngolokodo Scheme was determined for 2020 and 2050 and included within **Table 9-8** below.

Table 9-8: Population and Water demand 2020 and 2050 for the Ngolokodo WSIA

Population	**Population 2020**	**Population 2050**
	15 590	21 777
Water Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	2.76	4.01

9.4.1.2 Water Resource Consideration

The Ngolokodo Water Supply Scheme is made up of small schemes. These schemes are stand-alone schemes serviced by boreholes. The borehole yields and reservoir capacities are unknown.

9.4.2 Water Supply Infrastructure

9.4.2.1 Bulk conveyance and Storage

The Haladu Scheme, within the Ngolokodo Scheme, is supplied via two boreholes of unknown yield and rising main pipe diameter. The rising main pipelines supply two JoJo Tanks with unknown capacity. The Nsthangase/Ngolokodo Scheme is supplied by various boreholes with rising mains pumping to different reservoirs, capacities are unknown. The Nhlokoma Scheme is a small localised scheme with a borehole as a source of unknown yield. The rising main supplies a JoJo Tank and is then pumped to a reservoir.

9.4.2.2 Proposed Interventions

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

- ✓ A proposed supply from Thelezini reservoir (1 412m) to Ntshangase Reservoir (1 109m) via a 160mm Ø pipeline to Nkanda which will thereafter supply Ngolokodo, St Mathews, Kwa-Mbunda, Esigqumeni and Haladu.
- ✓ Supply to Haladu reservoir (1 116m) from Ntshangase reservoir via a 110mm Ø.

- ✓ Upgrade of the Thelezini reservoir to 3 Mℓ to supply the Ntshangase Reservoir via a 160mm ø pipeline, 14 km long.
- ✓ The Ntshangase reservoir is proposed to be a command reservoir for the area and needs to be upgraded to 1 Mℓ.
- ✓ The Ngolokodo, Nkanda, St Mathews, Kwa-Mbunda, Esigqumeni and Haladu reservoirs also need to be upgraded to 200 kℓ. The existing reservoir capacities are unknown.

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

9.4.3 Financial Requirements

The bulk cost requirement for Ngolokodo WSIA is summarised within **Table 9-9** below.

Table 9-9: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (excl VAT)
Primary	-	-	-
Secondary	R18 914 020.21	R1 891 402	R20 805 422
Tertiary	R12 971 891.39	R1 297 189	R14 269 081
Total	**R31 885 912**	**R3 188 591**	**R35 074 503**

The total bulk cost requirement for the Ngolokodo Scheme is R35 074 503 (excl VAT). The scheme development cost per household is approximately R 6 400.

N

Kilometers
3 1,5 0 3 6

Emadlangeni Local Municipality

Endumeni Local Municipality

Nquthu Local Municipality

Abaqulusi Local Municipality

Emondlo

Nqutu Scheme Area 1

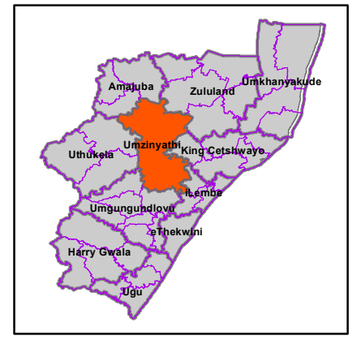
200kl
200kl
200kl
200kl
917kl
200kl
1000kl
200kl

VANTS DRIFT WTP
9Ml/d
51Ml/d

Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names (Driel dam)
- Rivers
- Settlements (Ncxola)
- Major Towns (Hilton)

LOCALITY:



CLIENT:
UMGENI WATER • AMANZI

MUNICIPALITY:
UMZINYATHI DISTRICT MUNICIPALITY

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

MAP TITLE: **Total Bulk Water Supply Interventions - UZ004: Ngolokodo Umzinyathi District Municipality**

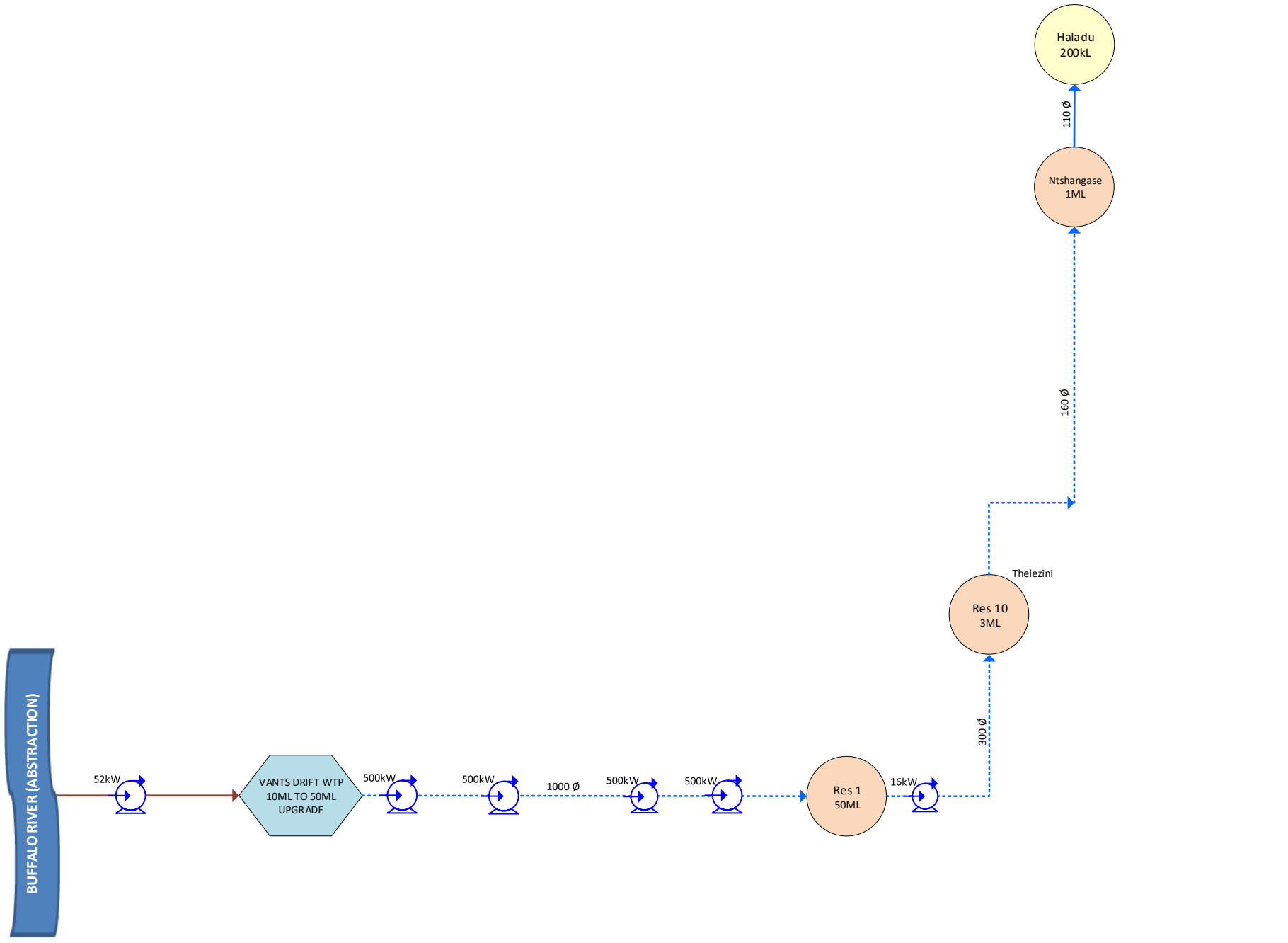
DATE COMPLETED: January 2021

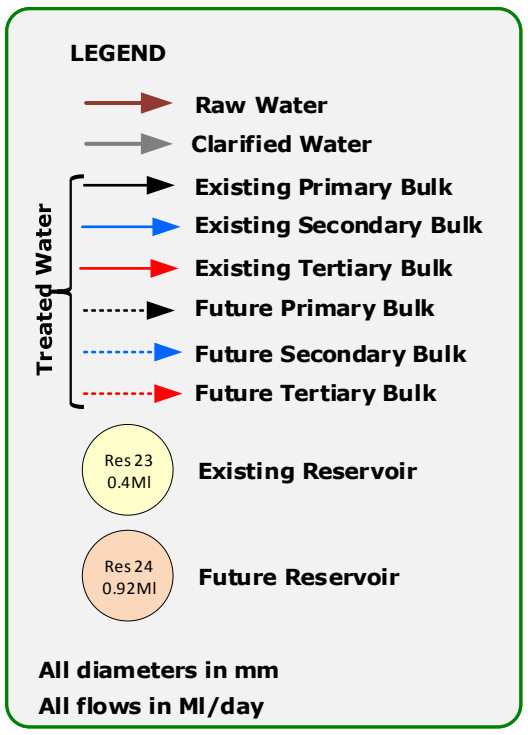
MAP NO.: **DC 24 Figure 9-9**

Proposed New / Upgrade Infrastructure

- Eston — Water Scheme Areas & Names
- WTP — Existing Water Treatment Plants
- Surface Water Abstraction Works (Existing)
- Primary Bulk Pipelines (Existing)
- Secondary Bulk Pipelines (Existing)
- Tertiary Bulk Pipelines (Existing)
- Primary Reservoirs (Existing)
- Secondary Reservoirs (Existing)
- Tertiary Reservoirs (Existing)
- Pump Stations (Existing)
- 19Ml/d — Upgrade of WTW
- 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 9-10
UZ004 WSIA: NGOLOKODO_SCHEME_





9.5 UZ005 WSIA: POMEROY SCHEME

This scheme covers Zones 2, 3 and 5. (**Figure 9-1**)

9.5.1 Demand Model Intervention

9.5.1.1 Water Demand

The water demand for the Pomeroy Scheme was determined for 2020 and 2050 and included within **Table 9-10** below.

Table 9-10: Population and Water demand 2020 and 2050 for the Pomeroy WSIA

Population	**Population 2020**	**Population 2050**
	35 553	49 662
Water Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	6.06	8.82

9.5.1.2 Water Resource Consideration

Pomeroy receives its water supply from groundwater and an abstraction system from Thukela River. The raw water goes to the Sampofu WTP before distribution to the Msinga and Pomeroy command reservoirs. There are water services backlogs in the scheme area due to water resource shortages as well as infrastructure capacity limitations.

The Msinga Bulk Water Supply was implemented in 2015 which aimed to eliminate the backlog of water supply at Pomeroy. The raw water from the Thukela River is delivered to Sampofu WTP which was recently upgraded to 12 Mℓ/day in order to meet the demand for the Msinga Bulk Water Scheme. (Tlou Consulting, UPDATE OF THE WATER RECONCILIATION STRATEGY OF THE POMEROY SUPPLY AREA - 2012 TO 2040, 2014)

9.5.2 Water Supply Infrastructure

9.5.2.1 Bulk conveyance and Storage

Treated water from Sampofu WTP is conveyed to Pomeroy by means of a 300mm Ø rising main to the existing Msinga reservoir 1 intermediate storage. The water at Msinga reservoir is then pumped to the Msinga reservoir 2 via an existing pipeline that requires an upgrade. Water is also pumped to Msinga reservoir 3 via an existing rising main that also requires an upgrade. Water at Msinga reservoir 3 is pumped to Msinga reservoir 4 via an existing rising main where it is then pumped to Msinga Reservoir 6. The Msinga reservoir also feeds the existing Mumbe and Ngabayane reservoirs via existing gravity mains. The Pomeroy reservoir supplies the Ngabayane reservoir in Matshematshe by means of an existing rising main of unknown diameter.

9.5.2.2 *Proposed Interventions*

The following infrastructure upgrades will be required in order to adequately supply the Pomeroy WSIA and is illustrated within **Figure 9-11** followed by the schematic layout of the WSIA within **Figure 9-12**.

- ✓ The Pomeroy reservoir (1 103m) will supply the Mumbe reservoir (1 410) via a proposed 160mm Ø rising main. The Mumbe reservoir needs an additional storage capacity of 500kℓ.
- ✓ The existing pipeline from Pomeroy reservoir to Ngabayane reservoir 2 (1 171m) needs to be upgraded to a 110mm Ø rising main. The Ngabayane reservoir also needs additional storage capacity of 500kℓ.
- ✓ Ngabayane reservoir 2 (1 171m) will supply Ngabayane reservoir 1 (907m) via a 90mm Ø pipeline. Ngabayane reservoir 2 will also supply the Ngongeni reservoir (902m) and other surrounding reservoirs by gravity mains ranging from 63mm Ø to 90mm Ø. All existing tertiary reservoirs supplied by the Ngabayane reservoir needs to be upgraded to a 200kℓ storage capacity.
- ✓ A proposed option to extend the Msinga bulk to the Ntabankulu Scheme (Zone 21) was investigated within UAP Phase II and the option was found to be unfeasible due to the settlements being sparsely populated along with mountainous terrain. There was also a proposed bulk line from Pomeroy WTP to Mumbe Scheme (Zone 6) that was investigated which will require further investigation.

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

9.5.3 *Financial Requirements*

The bulk cost requirement for Pomeroy WSIA is summarised within **Table 9-11** below.

Table 9-11: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (excl VAT)
Primary	R39 075 000.00	R3 907 500.00	R42 982 500.00
Secondary	R20 980 285.84	R2 098 028.58	R23 078 314.43
Tertiary	R10 942 485.28	R1 094 248.53	R12 036 733.81
Total	**R70 997 771.12**	**R7 099 777.11**	**R78 097 548.24**

The total bulk cost requirement for the Pomeroy Scheme is R 78 097 548.24 (excl VAT). The scheme development cost per household is approximately R 4 800.

N

Kilometers
3 1,5 0 3 6

Uthukela

Mumbe

Pomeroy

Umzinyathi

Msinga Local Municipality

Uthukela

MAKHASANA 03
EMTHALENI 04
MBINDOLO 02
MNGENI 19
MATSHEMATSHE 11
NGCENGENI 05
GOQHIBAHULAZI 14
ENYANDU 13
SAMPOFU 06
ESIDAKINI 01
GXOBUNYAWO 04

160 1000kl 500kl
25kl 500kl
110
25kl 500kl
90
25kl 200kl
90
151kl 63 200kl
90
200kl 25kl
90
63 25kl 200kl
63
25kl 200kl
75
25kl 25kl 25kl
25kl 25kl 25kl
90 25kl 301kl
110
75
25kl
90
25kl 25kl 25kl 25kl
300
25kl
75
90
Tugela Ferry 250 PTP 12Ml/d
150

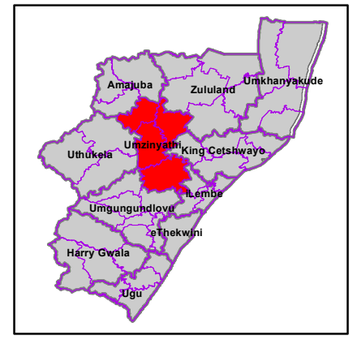
Proposed New / Upgrade Infrastructure

- Eston — Water Scheme Areas & Names
- WTP — Existing Water Treatment Plants
- Surface Water Abstraction Works (Existing)
- Primary Bulk Pipelines (Existing)
- Secondary Bulk Pipelines (Existing)
- Tertiary Bulk Pipelines (Existing)
- Primary Reservoirs (Existing)
- Secondary Reservoirs (Existing)
- Tertiary Reservoirs (Existing)
- Pump Stations (Existing)
- 19Ml/d — Upgrade of WTW
- 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 (Ncxola)
- Major Towns (Hilton)

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

MUNICIPALITY:

UMZINYATHI DISTRICT MUNICIPALITY

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PROJECT TITLE

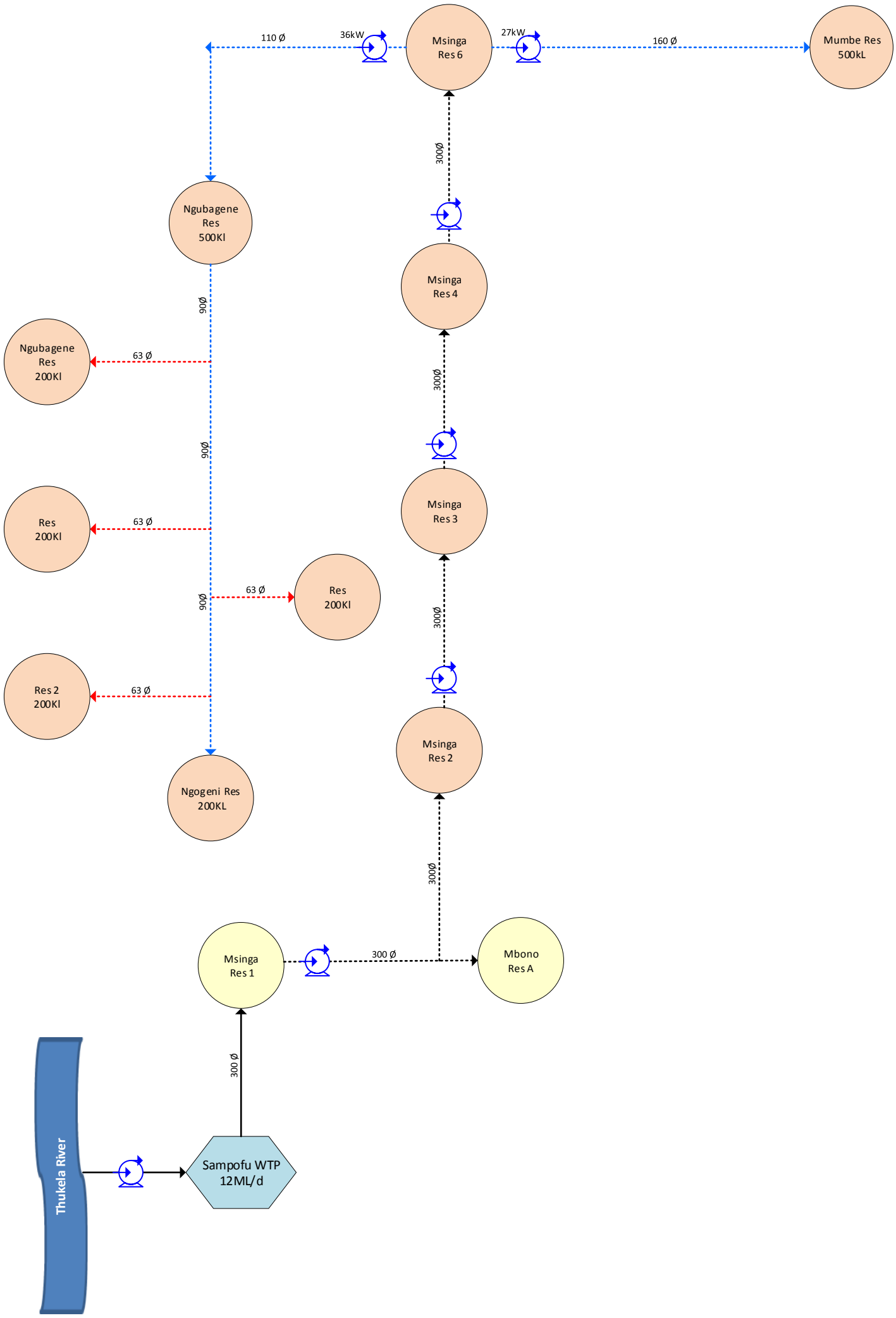
Umzinyathi DM: Universal Access Plan Phase III - Progressive Development of a Regional Concept Secondary Bulk Water Master Plan

MAP TITLE: **Total Bulk Water Supply Interventions - UZ005: Pomeroy Umzinyathi District Municipality**

DATE COMPLETED: January 2021

MAP NO.: **DC 24 Figure 9-11**

Figure 9-12
UZ005 WSIA: POMEROY SCHEME



9.6 UZ006 WSIA: TUGELA FERRY SCHEME

This scheme covers Zones 0, 1, 4 and 5. (**Figure 9-1**)

9.6.1 Demand Model Intervention

9.6.1.1 Water Demand

The water demand for the Tugela Ferry Scheme was determined for 2020 and 2050 and included within **Table 9-12** below.

Table 9-12: Population and Water demand 2020 and 2050 for the Tugela Ferry WSIA

Population	**Population 2020**	**Population 2050**
	44 702	62 442
Water Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	8.34	12.12

9.6.1.2 Water Resource Consideration

The Tugela Ferry scheme receives its water from Thukela River (current yield is unknown). The raw water from the Thukela River is pumped to Sampofu WTP for treatment. The WTP augments supply to the Mbabane, Jolwayo, Mashunka, Ngubo, Esijozini, Sompofu, Tugela Ferry, Ezingulubeni sub-scheme areas which are supplied by boreholes of unknown yield. The Sampofu WTP has been upgraded to 12 Mℓ/day.

9.6.2 Water Supply Infrastructure

9.6.2.1 Bulk conveyance and Storage

Potable water is pumped from Sampofu WTP to Msinga reservoir 1 via a 300mm Ø steel pipeline. Water from Msinga reservoir 1 is then pumped to and Mbono reservoir A and Msinga reservoir 2 via a 300mm Ø steel pipeline. The Sampofu WTP also supplies Fabeni which is located near Keates Drift WTP.

Treated water from the Sampofu WTP is conveyed to Pomeroy by means of a 300mm Ø rising main to an existing Msinga reservoir 1 (856m) intermediate storage. The water at Msinga reservoir is pumped to Msinga reservoir 2 (876m) via an existing pipeline that needs an upgrade. Water is also pumped to Msinga reservoir 3 (900m) via an existing rising main that also requires an upgrade. Water at Msinga reservoir 3 is then pumped to Msinga reservoir 4 (914m) via an existing rising main where water is pumped to Msinga Reservoir 6 (1103). Msinga reservoir 6 feeds the existing Mumbe and Ngabayane reservoirs via gravity mains.

The proposed intervention from the Muden Water Supply Scheme will allow extra capacity to supply the Fabeni Scheme via the Keates Drift WTP. The proposed 100mm ø pipeline from Keates Drift WTP to Fabeni Scheme will connect to the existing 100mm ø steel rising main to supply the Fabeni Scheme. Fabeni WTP

will then supply other sub scheme areas in Keates Drift. Storage at Fabeni WTP needs an additional storage capacity of 500kℓ. The proposed supply from Keates Drift WTP to Fabeni WTP will reduce the demand at Tugela Ferry WTP thereby allowing extra capacity to supply other areas. (Tlou Consulting, UPDATE OF THE WATER RECONCILIATION STRATEGY OF THE SAMPOFU SUPPLY AREA - 2012 TO 2040, 2014)

9.6.2.2 Proposed Interventions

No upgrades or interventions are proposed for the Tugela Ferry Scheme Area. As per Section 8.6 there are no gaps in supply as the scheme area is adequately covered for the 2050 demand horizon by existing and planned infrastructure.

The Tugela Ferry WSIA is illustrated within **Figure 9-13** followed by the schematic layout of the WSIA within **Figure 9-14**.

N

Nquthu Local Municipality

Msinga Local Municipality

Umzinyathi

Uthukela

Umvoti Local Municipality

Tugela Ferry

NGULULE 01
PHALAFINI 06
PHALAFINI 03
NGUBO 06
MASHUNKA 01
MASHONKA 12
MSABANE 03
ESITJINI 01
EZINGULUBENI 01
ESIDAKINI 03
GXOBUNYAWO 02
NGUBEVU 05
NOLUBEVU 01
OTHAME 07
MALOMENI 10

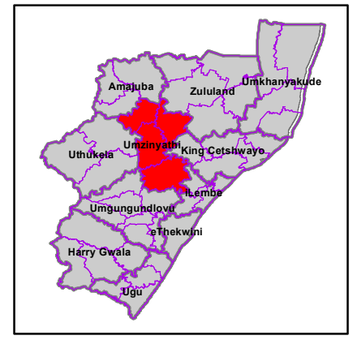
50kl
75
250kl
110
125
100kl
150
90
160
200
12Ml/d
315
850kl
250kl
532kl
176kl
271kl
203kl
0

Kilometers
3 1,5 0 3 6

Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names
- Rivers
- Settlements (Ncxola)
- Major Towns (Hilton)

LOCALITY:



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MUNICIPALITY:

UMZINYATHI DISTRICT MUNICIPALITY

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PROJECT TITLE

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

MAP TITLE: **Total Bulk Water Supply Interventions - UZ006: Tugela Ferry Umzinyathi District Municipality**

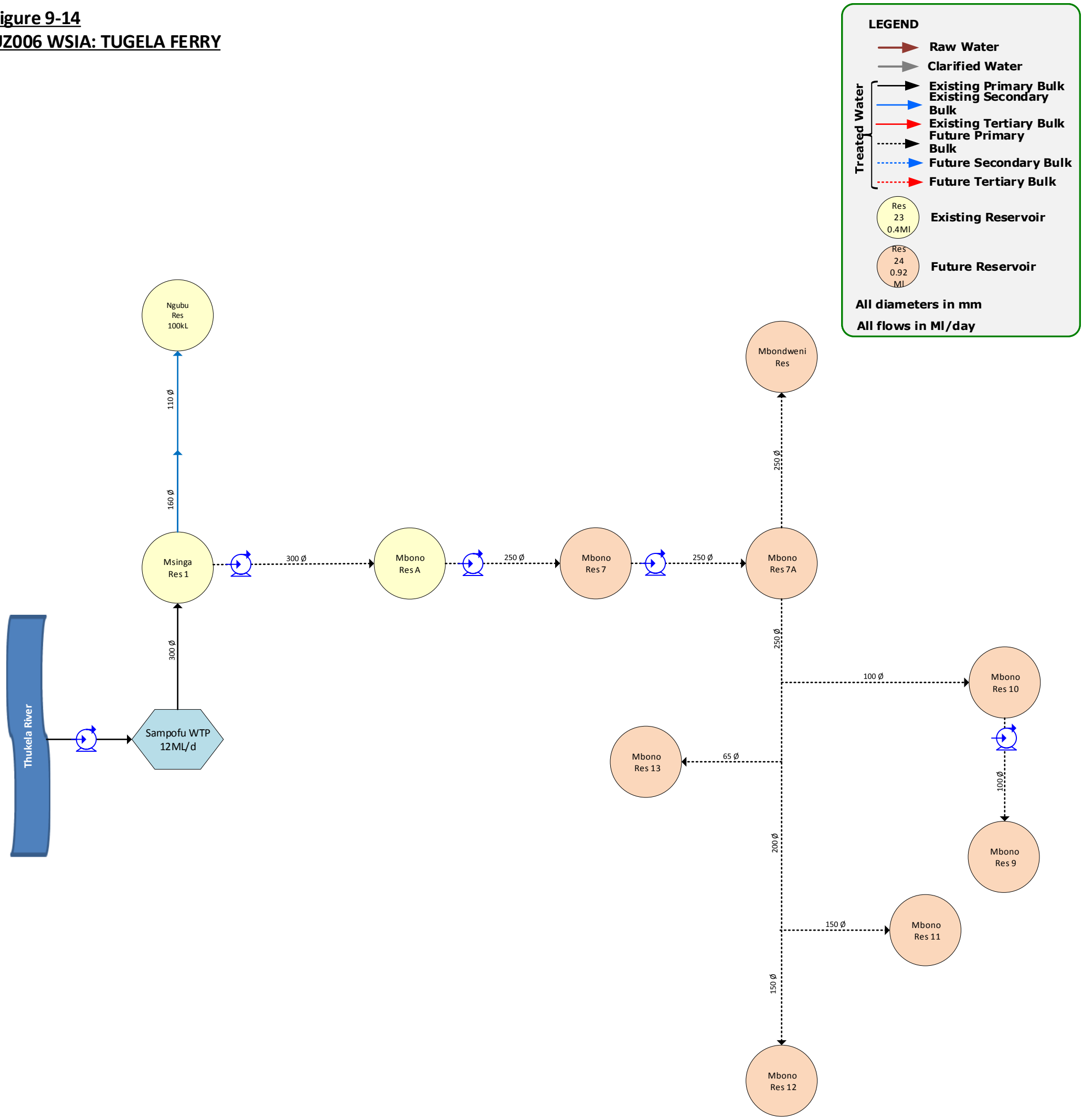
DATE COMPLETED: January 2021

MAP NO.: **DC 24 Figure 9-13**

Proposed New / Upgrade Infrastructure

- Eston — Water Scheme Areas & Names
- WTP — Existing Water Treatment Plants
- Surface Water Abstraction Works (Existing)
- Primary Bulk Pipelines (Existing)
- Secondary Bulk Pipelines (Existing)
- Tertiary Bulk Pipelines (Existing)
- Primary Reservoirs (Existing)
- Secondary Reservoirs (Existing)
- Tertiary Reservoirs (Existing)
- Pump Stations (Existing)
- 19Ml/d — Upgrade of WTW
- 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 9-14
UZ006 WSIA: TUGELA FERRY



9.7 UZ007 WSIA: KEATES DRIFT SCHEME

This scheme covers Zones 17, 18 and 19. (**Figure 9-1**)

9.7.1 Demand Model Intervention

9.7.1.1 Water Demand

The water demand for the Keates Drift Scheme was determined for 2020 and 2050 and included within **Table 9-13** below.

Table 9-13: Population and Water demand 2020 and 2050 for the Keates Drift WSIA

Population	**Population 2020**	**Population 2050**
	56 723	79 232
Water Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	9.94	14.48

9.7.1.2 Water Resource Consideration

The Keates Drift receives its raw water supply from an abstraction at the Thukela River. The raw water is pumped to Keates Drift WTP that has a capacity of 0.3 Mℓ/day. The WTP will be upgraded to a capacity of 14.48 Mℓ/day by year 2050. The Keates Drift WTP also supplies Ndaya, Othulini, Thulini Lwezulu Mawozini, Latha, Mpanza and Keates Drift sub-schemes. This upgrade will be viable after the proposed implementation upgrade of the Muden WTP. The supply to Keates Drift will be from the Muden WTP that is proposed to receive water via the Spring Grove Regional Bulk Water Supply Scheme (Section 9.13).

9.7.2 Water Supply Infrastructure

9.7.2.1 Bulk conveyance and Storage

Water from the Keates Drift WTP is pumped via a 100mm Ø pipeline to an existing terminal reservoir at Fabeni WTP. The treated water from the Fabeni WTP and the stored water from Keates Drift also supplies tertiary reservoirs at Mawozini, Mpanza and Mngome.

9.7.2.2 Proposed Interventions

The implementation of the Spring Grove Regional Bulk Water Supply Scheme is proposed to adequately cover the Keates Drift scheme area for the 2050 demand horizon. This proposed intervention is detailed further in Section 9.13.

The Keates Drift WSIA is illustrated within **Figure 9-15** followed by the schematic layout of the WSIA within **Figure 9-16**.

N

Kilometers
3 1,5 0 3 6

Uthukela

Msinga Local Municipality

Umzinyathi

Umvoti Scheme Area 1

Umvoti Local Municipality

Umgungundlovu

TUGELA FERRY

MASHUNKA 07
GUQA 06
GUQA 01
GUQA 05
GUQA 14
GUQA 10
GUQA 07
GUQA 13
GUJINI 02
GUJINI 04
GUJINI 09
SINYAMA 03
SINYAMA 07
SINYAMA 04
OPHATHE 01
EKUVUKENI 11
EKUVUKENI 08
EKUVUKENI 07
EKUVUKENI 09
WEENEN NU 20
MADULANE 05
MADULANE 01
MADULANE 03
MALOMENI 10
EMBANGWENI 08
DUNGAMANZI 01
OTHULINI/WEZULU 01
OTHULINI/WEZULU 06
OTHULINI/WEZULU 12
LATHA 06

300kl
363kl
202kl
1767kl
0,041Ml/d WTP FABENI WTP
100kl
50kl
500kl
500kl
50kl
50kl
100kl
150kl
250kl
200kl
100kl
50kl
100kl
300kl
KEATS DRIFT WTP 15Ml/d 0,328Ml/d
MUDENI WTP WTP 1Ml/d

0 32 50 100 110 75 63 80 90 315 160 200 300 500

Proposed New / Upgrade Infrastructure

- Eston — Water Scheme Areas & Names
- WTP — Existing Water Treatment Plants
- Surface Water Abstraction Works (Existing)
- Primary Bulk Pipelines (Existing)
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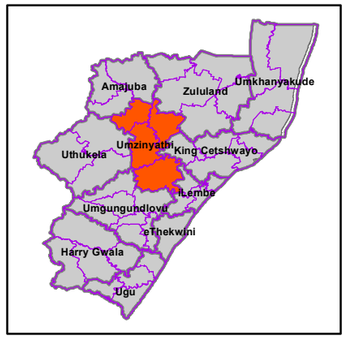
- Tertiary Bulk Pipelines (Existing)
- Primary Reservoirs (Existing)
- Secondary Reservoirs (Existing)
- Tertiary Reservoirs (Existing)
- Pump Stations (Existing)
- 19Ml/d — Upgrade of WTW
- Surface Water Abstraction Works (Future)
- Primary Bulk Pipelines (Future)
- Secondary Bulk Pipelines (Future)
- 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
- N1 — National Roads
- Main Roads
- Dam Nam — Dams & Dam Names
- Rivers
- Settlements
- Hilton — Major Towns

LOCALITY:



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MUNICIPALITY:

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PROJECT TITLE

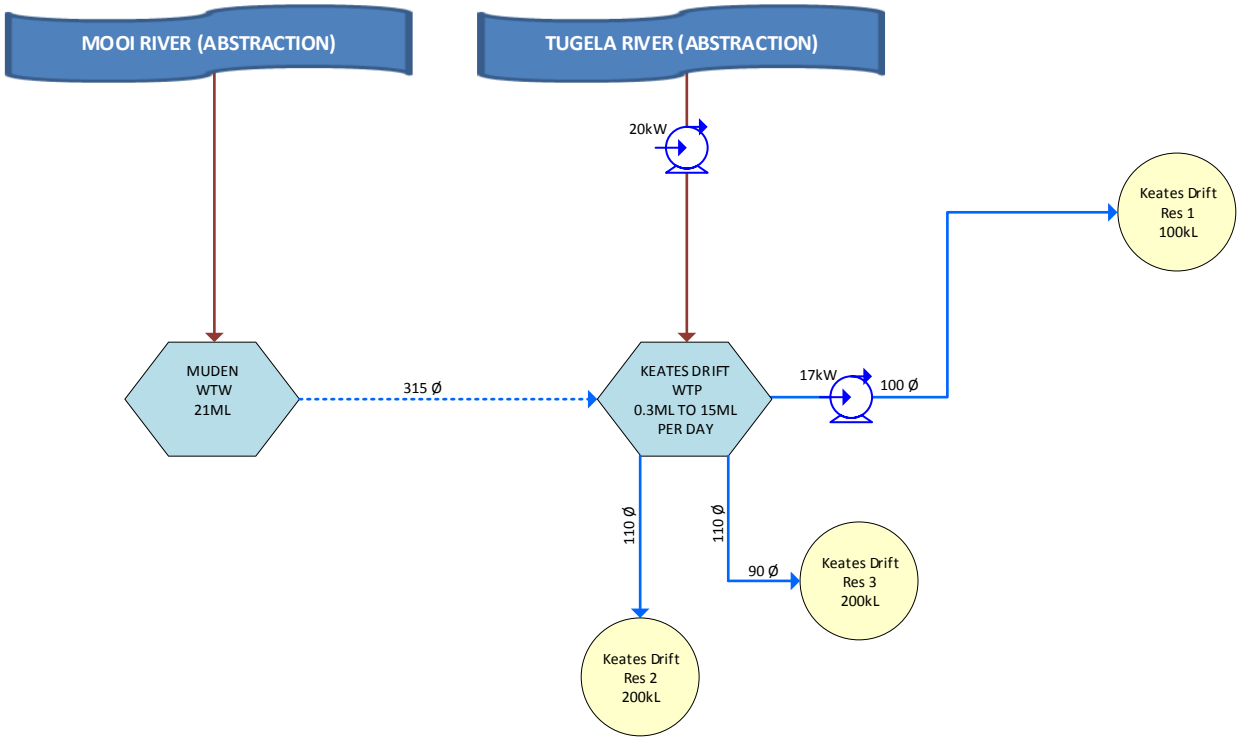
Umzinyathi DM: Universal Access Plan Phase III - Progressive Development of a Regional Concept Secondary Bulk Water Master Plan

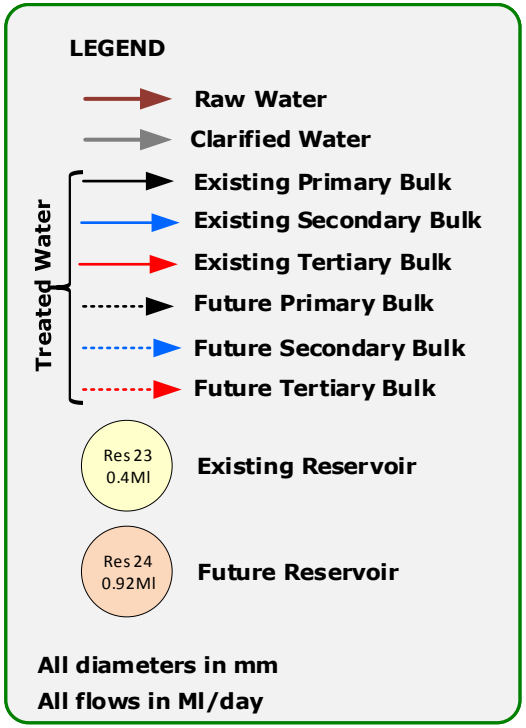
MAP TITLE: **Total Bulk Water Supply Interventions - UZ007: Keates Drift Umzinyathi District Municipality**

DATE COMPLETED: January 2021

MAP NO.: **DC 24 Figure 9-15**

Figure 9-16
UZ007: KEATES DRIFT SCHEME





9.8 UZ008 WSIA: MUDEN SCHEME

This scheme covers Zones 8, 9 and 17. (**Figure 9-1**)

9.8.1 Demand Model Intervention

9.8.1.1 Water Demand

The water demand for the Muden Scheme was determined for 2020 and 2050 and included within **Table 9-14** below.

Table 9-14: Population and Water demand 2020 and 2050 for the Muden WSIA

Population	**Population 2020**	**Population 2050**
	11 942	16 681
Water Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	2.09	3.03

9.8.1.2 Water Resource Consideration

The Muden Scheme covers the Umvoti and Mpofana LM's in the UZDM and UMDM respectively. The scheme is currently supplied by boreholes and abstractions from the canal on the Mooi River that pumps raw water to the Muden WTP. The Muden WTP also extends its supply to a reservoir at Keates Drift WTP. The 20.11 Mℓ/day capacity at Muden WTP caters for 2050 projected demands for Ndaya, Fabeni and Keates Drift sub-schemes. The supply to the Muden Scheme is proposed to be augmented via the Spring Grove Regional Bulk Water Supply Scheme (Section 9.13).

9.8.2 Water Supply Infrastructure

9.8.2.1 Bulk conveyance and Storage

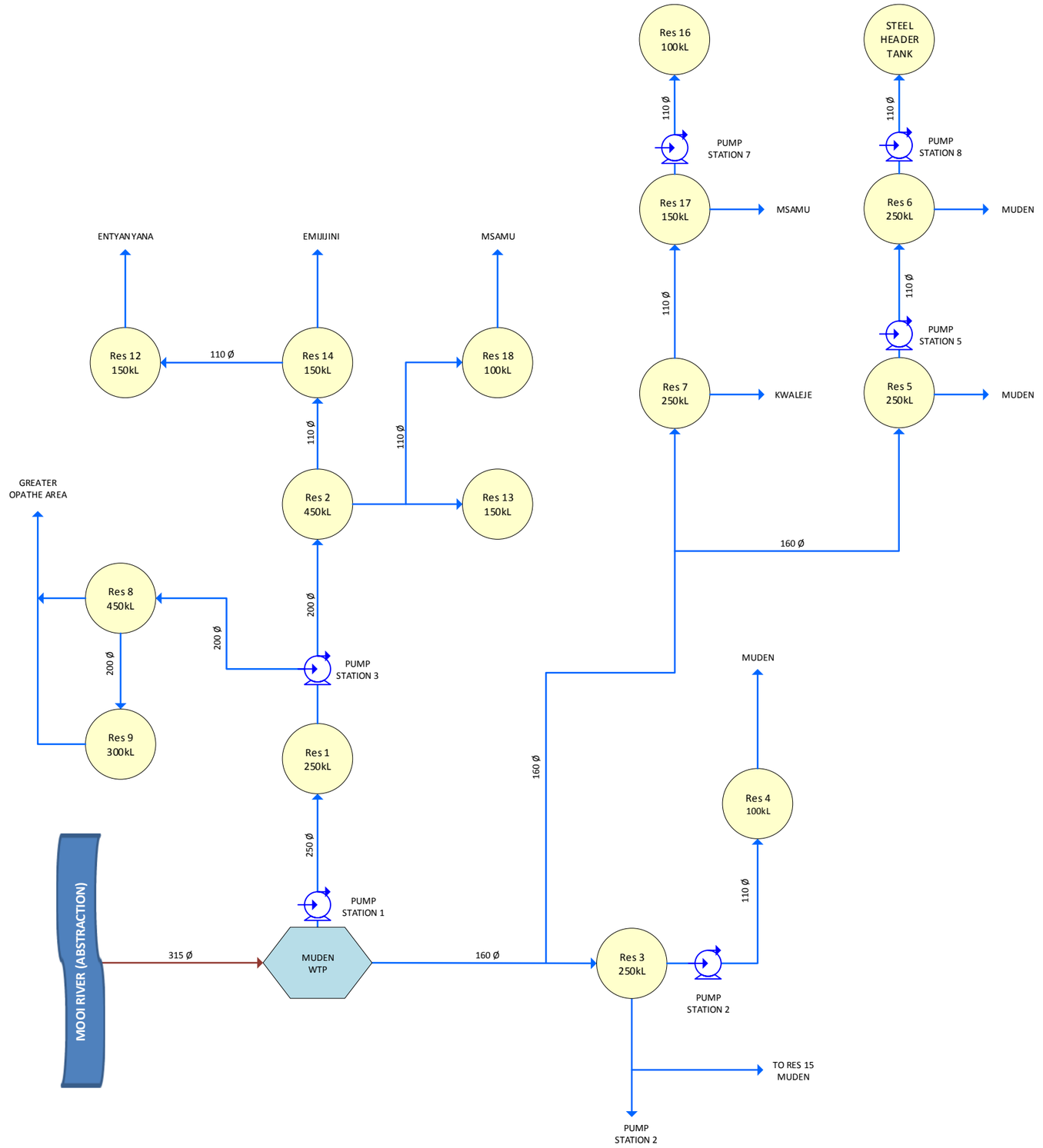
The Muden WTP supplies the reservoir at the Keates Drift WTP via a 315mm ø rising main. The treated water from Muden WTP is also pumped to a reservoir in the Ophathe supply area via a 250mm ø rising main. The Ophathe reservoir capacity is unknown. The Muden WTP also supplies the areas of Gujini, Sinyama, Mhlangana and eNhlalakahle via rising and gravity mains ranging from 75mm Ø – 160mm Ø.

9.8.2.2 Proposed Interventions

The implementation of the Spring Grove RBWSS is proposed to adequately augment the Muden scheme area for the 2050 demand horizon. This proposed intervention is detailed further in Section 9.13.

The Muden WSIA is illustrated within **Figure 9-18** and the schematic layout of the WSIA within **Figure 9-17**.

Figure 9-17
UZ008 WSIA: MUDEN SCHEME



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

9.9 UZ009 WSIA: GREYTOWN SCHEME

This scheme covers Zones 7 and 13. (**Figure 9-1**)

9.9.1 Demand Model Intervention

9.9.1.1 Water Demand

The water demand for the Greytown Scheme was determined for 2020 and 2050 and included within **Table 9-15** below.

Table 9-15: Population and Water demand 2020 and 2050 for the Greytown WSIA

Population	**Population 2020**	**Population 2050**
	20 631	28 818
Water Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	5.84	8.30

9.9.1.2 Water Resource Consideration

The raw water source for the Greytown scheme is from Lake Merthley that has a yield of 2.16 Mℓ/day and existing boreholes that yield 0.6 Mℓ/day. The scheme caters for the Matimatolo, Eshane and Kranskop sub-schemes. An intervention is currently underway to augment water supply to Greytown WTP via the Craigieburn Dam pipeline. In addition, the supply to the Greytown Scheme is proposed to be augmented via the Spring Grove Regional Bulk Water Supply Scheme (Section 9.13).

The proposed Mvotipoort Dam was investigated in the UAP Phase II study as an alternate source to supply the Umvoti LM as well as parts of the Ilembe DM. A feasibility study will be required in order to ascertain if the impoundment can sufficiently supply the scheme area as well as parts of the Ilembe DM. (see **Figure 9-20**)

9.9.2 Water Supply Infrastructure

9.9.2.1 Bulk conveyance and Storage

Raw water is abstracted from Lake Merthley and conveyed to the Greytown WTP. Treated water is then gravitated to the Sasko reservoir and Nhlalakahle reservoir. Water from the Nhlalakahle reservoir is then distributed to several villages. The Sasko reservoir supplies Greytown.

9.9.2.2 Proposed Interventions

The following infrastructure upgrades will be required in order to adequately supply the Greytown WSIA and is illustrated within **Figure 9-18** followed by the schematic layout of the WSIA within **Figure 9-19**.

- ✓ The Greytown Water Supply Scheme is planned to be extended to supply Matimatolo and Kranskop. For the scheme to have adequate supply, the infrastructure will need to be upgraded. The following are proposed:

    - The Greytown WTP should be upgraded to 21 Mℓ/day. This includes the demand for Matimatolo, Eshane and Kranskop.
    - A proposed supply from Spring Grove Dam to Greytown WTP, via pipelines ranging from 200mmØ – 700mmØ, will augment the supply to Greytown, Matimatolo, Eshane, Kranskop and Ngcebo Scheme (iLembe DM). Section 9.13 discusses this option further.
    - The pipeline from Greytown WTP to Nhlalakahle reservoir should be upgraded to a 500mm ø pipeline to augment the supply to Matimatolo, Eshane and Kranskop.

- ✓ In the UAP Phase II study, a proposed augmentation from uMshwathi Bulk to Greytown WTP was investigated. A 58 km pipeline was proposed to supply Greytown under gravity for 20 km and then pump up to a reservoir at Seven Oaks. It was then proposed to gravitate water from Seven oaks Reservoir to within 2 km of Greytown, at an elevation of 1 070m, where another booster pump station was required to pump water to Greytown WTP reservoir. This proposal from the Phase II study is incorporated into this study as an alternative option.

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

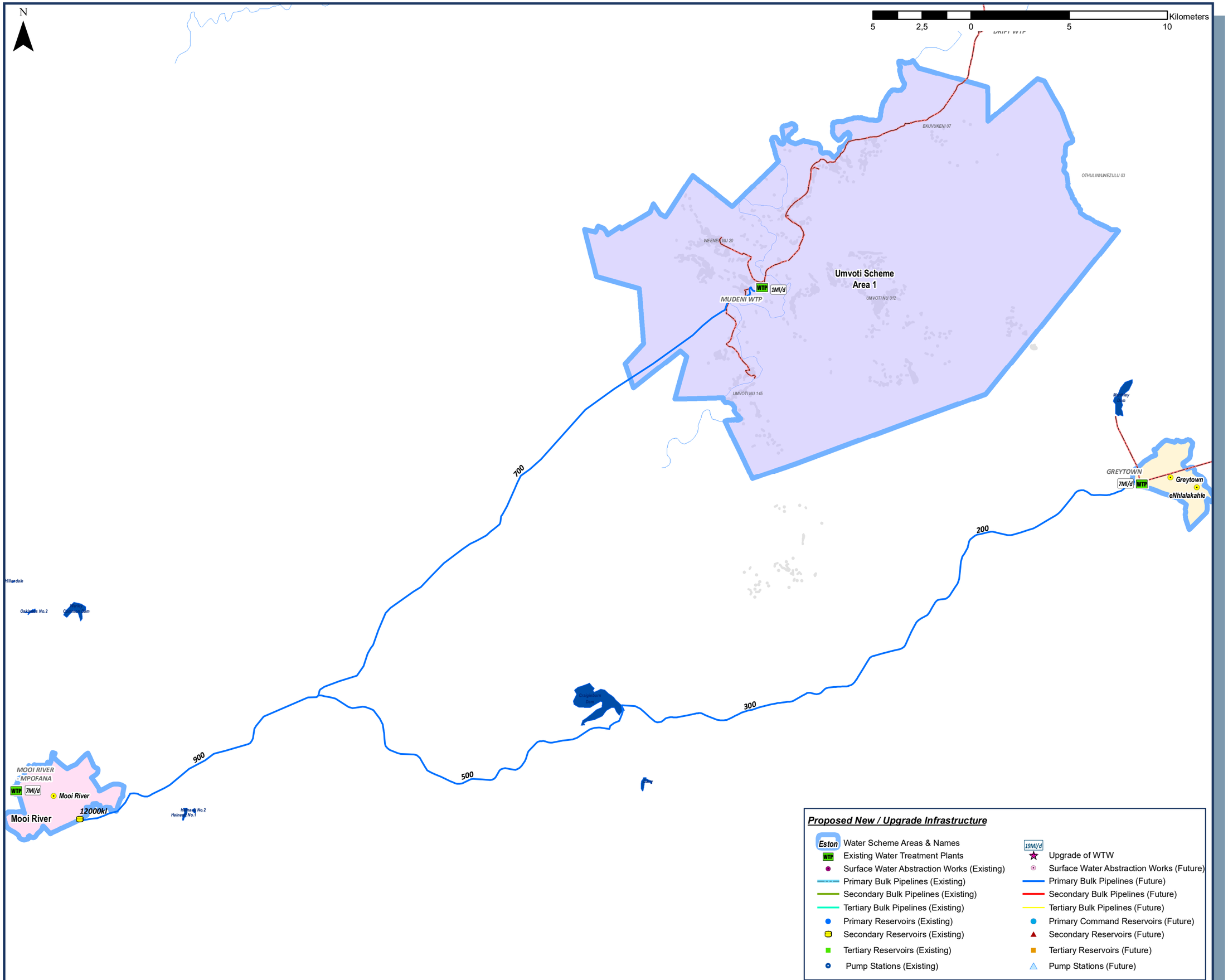
9.9.3 Financial Requirements

The bulk cost requirement for Greytown WSIA is summarised within **Table 9-16** below.

Table 9-16: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (excl VAT)
Primary	R2 796 600 621	R279 660 062	R3 076 260 683
Secondary	R112 935 557	R11 293 556	R124 229 112
Tertiary	R24 411 269	R2 441 127	R26 852 395
Total	**R2 933 947 446**	**R293 394 745**	**R3 227 342 191**

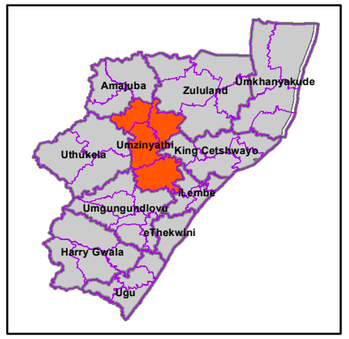
The total bulk cost requirement for the Greytown Scheme is R3 227 342 190.67 (excl VAT). The scheme development cost per household is approximately R 280 800.



Legend

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

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

MUNICIPALITY:

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PROJECT TITLE

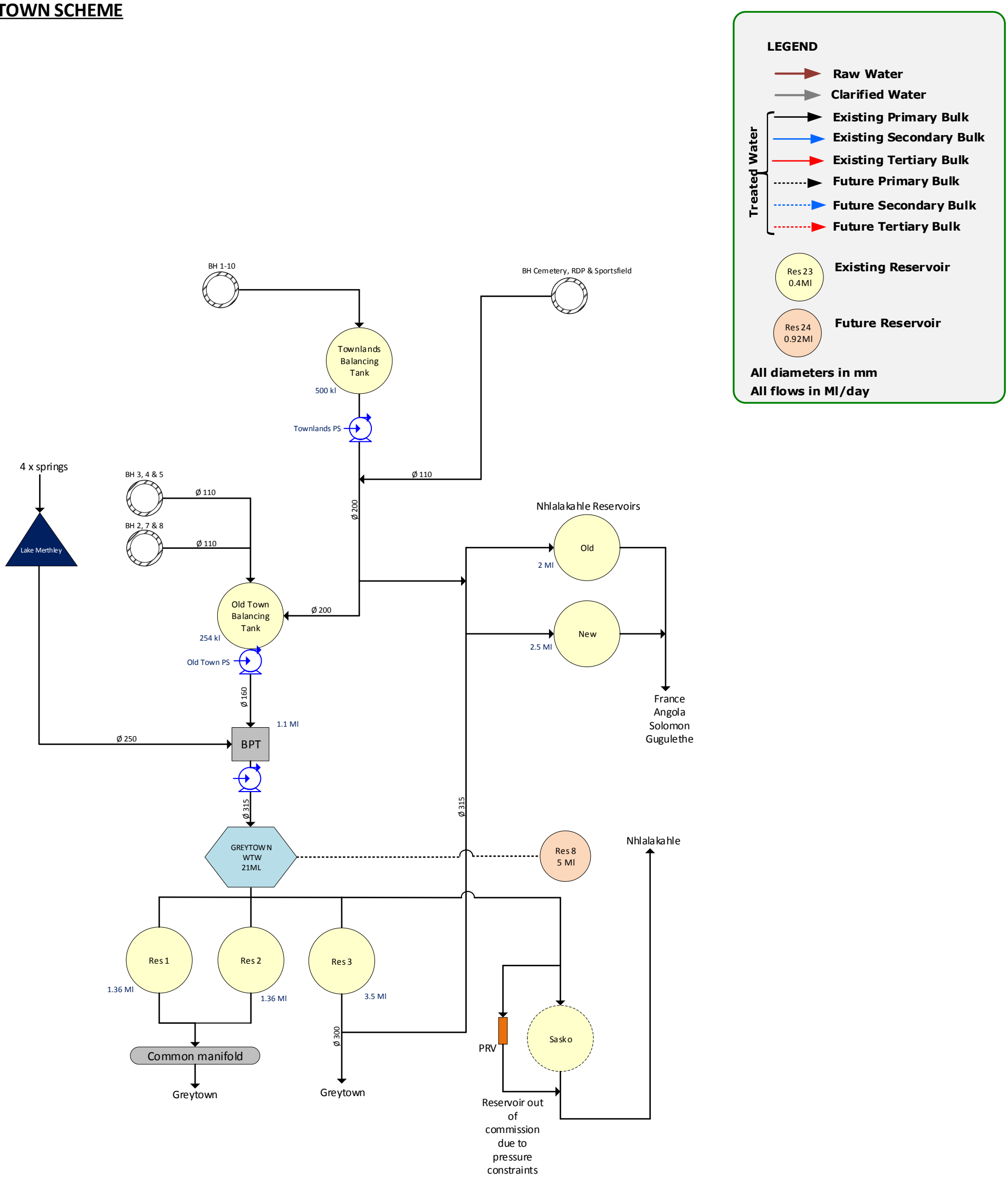
Umzinyathi DM: Universal Access Plan Phase III - Progressive Development of a Regional Concept Secondary Bulk Water Master Plan

MAP TITLE: **Total Bulk Water Supply Interventions - UZ008 & UZ009: Muden/Greytown Umzinyathi District Municipality**

DATE COMPLETED: January 2021

MAP NO.: **DC 24 Figure 9-18**

Figure 9-19
UZ009: GREYTOWN SCHEME



9.10 UZ010 WSIA: MATIMATOLO SCHEME

This scheme covers Zones 10, 11 and 12. (**Figure 9-1**)

9.10.1 Demand Model Intervention

9.10.1.1 Water Demand

The water demand for the Matimatolo Scheme was determined for 2020 and 2050 and included within **Table 9-17** below.

Table 9-17: Population and Water demand 2020 and 2050 for the Matimatolo WSIA

Population	**Population 2020**	**Population 2050**
	45 054	62 933
Water Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	7.62	11.10

9.10.1.2 Water Resource Consideration

The towns of Kranskop and Hermannsburg have existing water supplies from boreholes, which require augmentation. The Matimatolo Water Supply Scheme is supplied by multiple boreholes of unknown yields.

9.10.2 Water Supply Infrastructure

9.10.2.1 Bulk conveyance and Storage

The water from the boreholes ae pumped to the Matimatolo WTP (capacity unknown). Water from the Matimatolo WTP supplies the areas of Sangweni, Matimatolo and surrounding villages.

9.10.2.2 Proposed Interventions

The following infrastructure upgrades will be required in order to adequately supply the Matimatolo WSIA and is illustrated within **Figure 9-20** followed by the schematic layout of the WSIA within **Figure 9-21**.

- ✓ The Matimatolo WTP should be upgraded to 12 Mℓ/day to meet the future demand of the supply area.
- ✓ The pipeline from the Matimatolo WTP to Sangweni, Matimatolo and six (6) other terminal reservoirs will require an upgrade to a 200mm ø pipeline.
- ✓ Section 9.13 discusses a proposed intervention to augment the supply to Matimatolo, Eshane and Kranskop from the Greytown WTP.

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

9.10.3 Financial Requirements

The bulk cost requirement for Matimatolo WSIA is summarised within **Table 9-18** below.

Table 9-18: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (excl VAT)
Primary	**-**	**-**	**-**
Secondary	R28 843 734.54	R2 884 373	R31 728 108
Tertiary	R18 686 137.93	R1 868 614	R20 554 752
Total	**R47 529 872**	**R4 752 987**	**R52 282 860**

The total bulk cost requirement for the Matimatolo Scheme is R52 282 860 (excl VAT). The scheme development cost per household is approximately R 3 200.

N

Kilometers
3 1,5 0 3 6

Supply to Kranskop

Umvoti Local Municipality

Umzinyathi

Umvoti Scheme Area 5

iLembe

Mvoti

ndlovu

Merthley Dam

Mvoti River Dam

GREYTOWN

Greytown

eNhlalakahle

WTP 7Ml/d

13000kl

500kl

1500kl 1500kl

MATIMATOLO PACKING PLANT

1000kl

200kl

63

250kl

300kl

150kl

200kl

UMVOTI NU 144

UMVOTI NU 111

THAFAMASI

UMVOTI NU 062

THULILE

SHANE

EMBANGWENI 13

ZIBA 01

NDUKUMAHLATHI 01

NKOMBELWE 01

MASIHAMBISANE

MGAGA 02

MTULWA

MTULWA

NTANZI

MDLELANTO 02

FAYA02

MAKENI

0 0 500 200 550 200 160 400 160 200 25 500 63 200 160 500 63 300 75 200 160 90 150 75 300 90 200

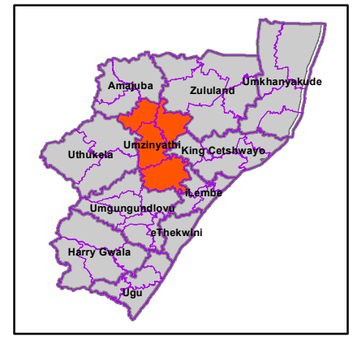
Proposed New / Upgrade Infrastructure

- Eston — Water Scheme Areas & Names
- WTP — Existing Water Treatment Plants
- Surface Water Abstraction Works (Existing)
- Primary Bulk Pipelines (Existing)
- Secondary Bulk Pipelines (Existing)
- Tertiary Bulk Pipelines (Existing)
- Primary Reservoirs (Existing)
- Secondary Reservoirs (Existing)
- Tertiary Reservoirs (Existing)
- Pump Stations (Existing)
- 19Ml/d — Upgrade of WTW
- 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 (Ncxola)
- Major Towns (Hilton)

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

MUNICIPALITY:

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PROJECT TITLE

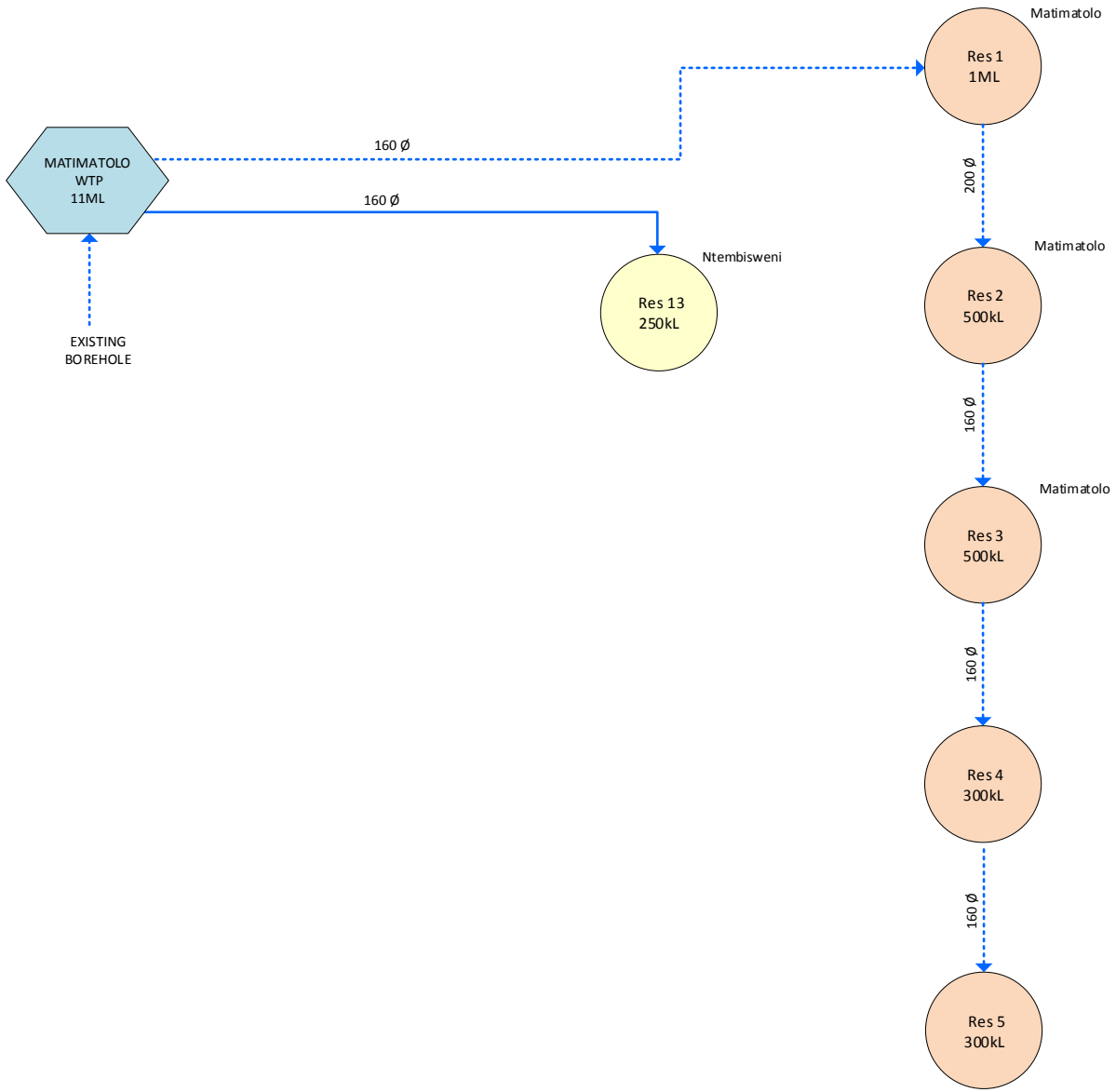
Umzinyathi DM: Universal Access Plan Phase III - Progressive Development of a Regional Concept Secondary Bulk Water Master Plan

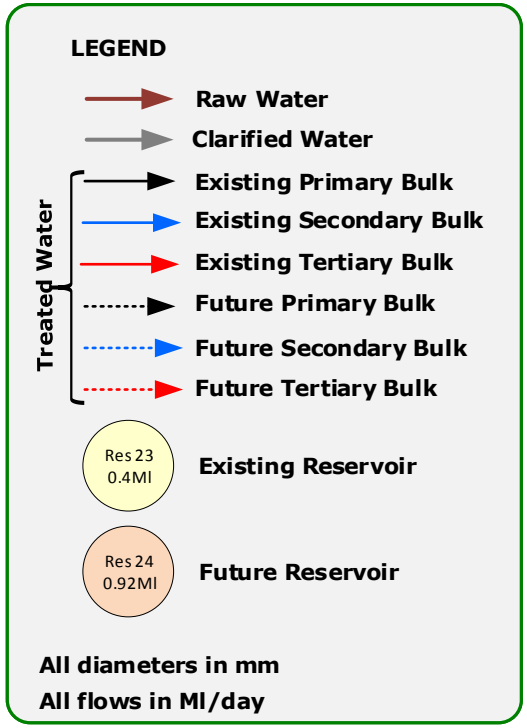
MAP TITLE: **Total Bulk Water Supply Interventions - UZ010: Matimatolo Umzinyathi District Municipality**

DATE COMPLETED: January 2021

MAP NO.: **DC 22 Figure 9-20**

Figure 9-21
UZ010: MATIMATOLO SCHEME





9.11 UZ011 WSIA: KRANSKOP SCHEME

This scheme covers Zone 14. (**Figure 9-1**)

9.11.1 Demand Model Intervention

9.11.1.1 Water Demand

The water demand for the Kranskop Scheme was determined for 2020 and 2050 and included within **Table 9-19** below.

Table 9-19: Population and Water demand 2020 and 2050 for the Kranskop WSIA

Population	**Population 2020**	**Population 2050**
	1 787	2 497
Water Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	0.43	0.62

9.11.1.2 Water Resource Consideration

The Kranskop Scheme is a small isolated scheme with adequate infrastructure, the scheme is supplied by a high yielding borehole as a water source. The Kranskop WTP is estimated to yield 0.5 Mℓ/day at which there is a surplus of 0.07 Mℓ/day from the current 2020 demand.

9.11.2 Water Supply Infrastructure

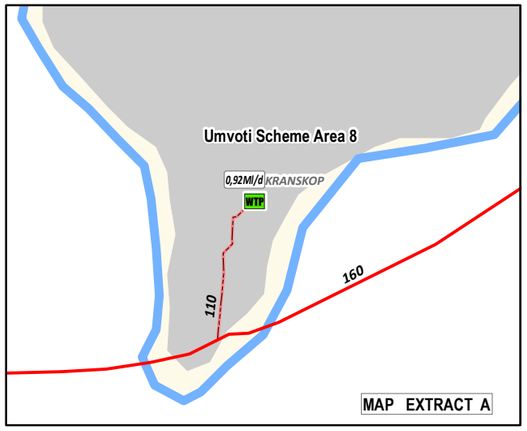
9.11.2.1 Bulk conveyance and Storage

The water from the borehole is pumped to the Kranskop WTP. The Kranskop WTP supplies Kranskop town and surrounding areas where pipe sizes are unknown.

9.11.2.2 Proposed Interventions

No upgrades or interventions are proposed for the Kranskop Scheme Area. The scheme area is adequately covered for the 2050 demand horizon by existing and planned infrastructure.

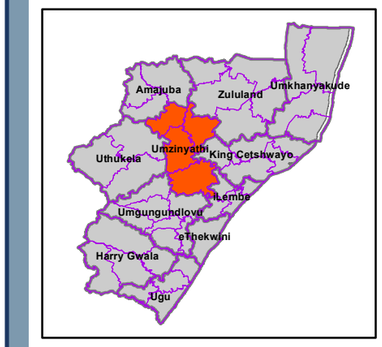
The Kranskop WSIA is illustrated within **Figure 9-22** followed by the schematic layout of the WSIA within **Figure 9-23**.



Legend

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

LOCALITY:



CLIENT:

UMGENI WATER · AMANZI

MUNICIPALITY:

UMZINYATHI DISTRICT MUNICIPALITY

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PROJECT TITLE

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

MAP TITLE: **Total Bulk Water Supply Interventions - UZ011: Kranskop Umzinyathi District Municipality**

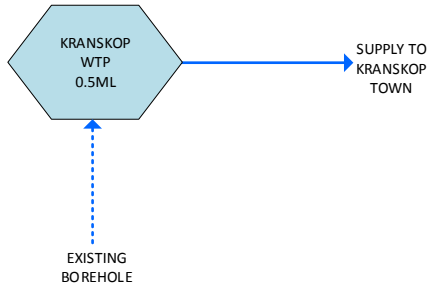
DATE COMPLETED: January 2021

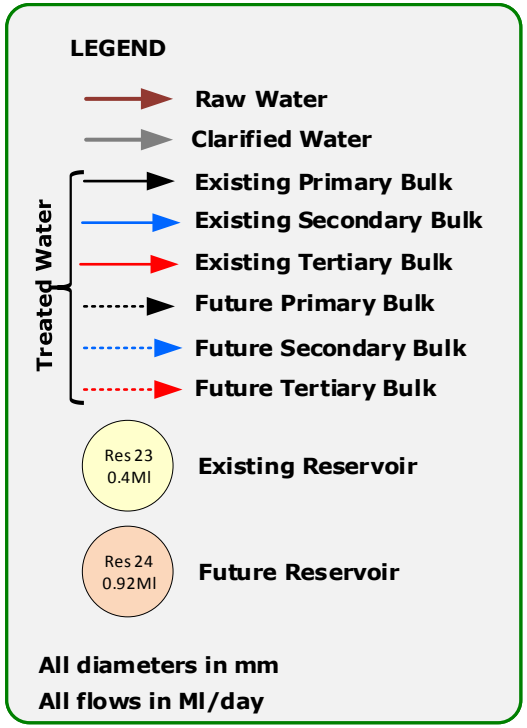
MAP NO.: **DC 22 Figure 9-24**

Proposed New / Upgrade Infrastructure

- Eston — Water Scheme Areas & Names
- WTP — Existing Water Treatment Plants
- Surface Water Abstraction Works (Existing)
- Primary Bulk Pipelines (Existing)
- Secondary Bulk Pipelines (Existing)
- Tertiary Bulk Pipelines (Existing)
- Primary Reservoirs (Existing)
- Secondary Reservoirs (Existing)
- Tertiary Reservoirs (Existing)
- Pump Stations (Existing)
- 19Ml/d — Upgrade of WTW
- 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 9-23
UZ011: KRANSKOP SCHEME





9.12 UZ012 WSIA: MAKHABELENI SCHEME

This scheme covers Zone 15. (**Figure 9-1**)

9.12.1 Demand Model Intervention

9.12.1.1 Water Demand

The water demand for the Makhabeleni Scheme was determined for 2020 and 2050 and included within **Table 9-20** below.

Table 9-20: Population and Water demand 2020 and 2050 for the Makhabeleni WSIA

Population	**Population 2020**	**Population 2050**
	8 450	11 803
Water Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	1.46	2.12

9.12.1.2 Water Resource Consideration

The Thukela River is the main raw water source for the Makhabeleni Scheme. The Makhabeleni WTP has a capacity of 4Mℓ/day which is adequate to supply the scheme until 2050.

9.12.2 Water Supply Infrastructure

9.12.2.1 Bulk conveyance and Storage

Raw water is abstracted from the Thukela River and is treated at the 4 Mℓ/day Makhebeleni WTP. Water from Makhabeleni WTP is pumped to a command reservoir via a 160mm ø rising main. The command reservoir supplies the areas of Nophethu, Sibuyane and surrounding villages via pipelines ranging from 63mm ø to 160mm ø.

9.12.2.2 Proposed Interventions

No upgrades or interventions are proposed for the Makhabeleni Scheme Area. As per Section 8.12 there are no gaps in supply as the scheme area is adequately covered for the 2050 demand horizon by existing and planned infrastructure.

The Makhabeleni WSIA is illustrated within **Figure 9-24** followed by the schematic layout of the WSIA within **Figure 9-25**.

N

Kilometers
2 1 0 2 4

Supplied via Umvoti Scheme Area 3

4Ml/d
MAKABELENI WTP

Nkandla Local Municipality

Umvoti Local Municipality

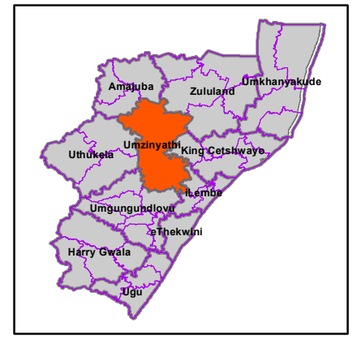
Umvoti Scheme Area 4

Maphumulo Local Municipality

Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Dams & Dam Names
- Rivers
- Settlements (Ncxola)
- Major Towns (Hilton)

LOCALITY:



CLIENT:

UMGENI WATER • AMANZI

MUNICIPALITY:

UMZINYATHI DISTRICT MUNICIPALITY

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PROJECT TITLE

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

MAP TITLE: **Total Bulk Water Supply Interventions - UZ012: Makhabeleni Umzinyathi District Municipality**

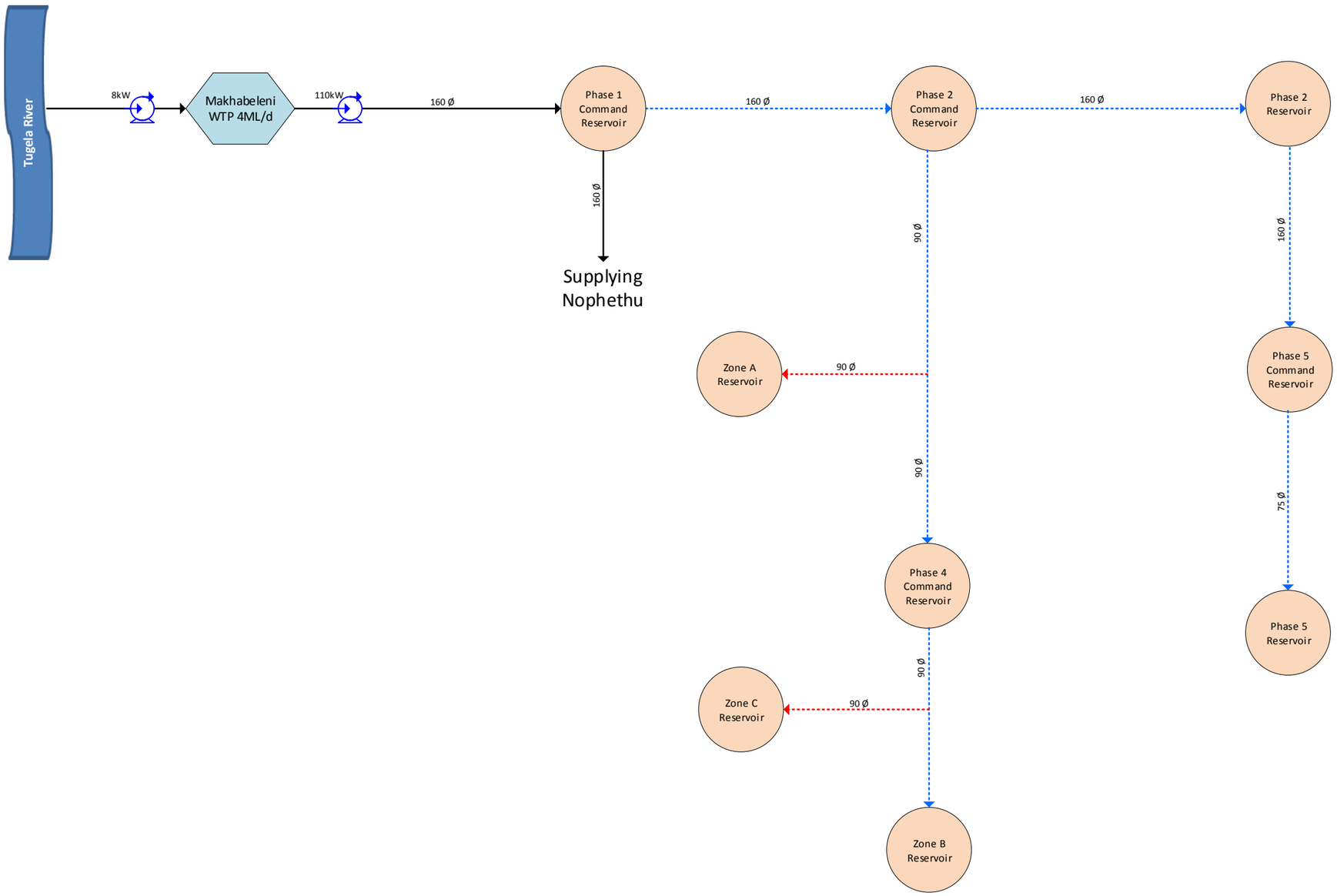
DATE COMPLETED: January 2021

MAP NO.: **DC 24 Figure 9-24**

Proposed New / Upgrade Infrastructure

- Water Scheme Areas & Names (Eston)
- Existing Water Treatment Plants (WTP)
- 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)
- Secondary Reservoirs (Future)

Figure 9-25
UZ012 WSIA: MAKHABELENI WSS



9.13 UZ013 WSIA: SPRING GROVE REGIONAL BULK SCHEME

9.13.1 Demand Model Intervention

9.13.1.1 Water Demand

The water demand for the Spring Grove Regional Bulk Scheme was determined for 2020 and 2050 and included within **Table 9-21** below.

Table 9-21: Population and Water demand 2020 and 2050 for the Spring Grove Regional Bulk Scheme WSIA

Population	**Population 2020**	**Population 2050**
	136 137	190 161
Water Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	25.92	37.53

9.13.1.2 Water Resource Consideration

The Rosetta WTP at Spring Grove Dam will be commissioned in 2020. This WTP has a capacity of 20Mℓ/d and has been planned to be extended to 60Mℓ/d.

The Spring Grove WTP however, has potential to supply beyond the Mpofana LM into the Mvoti LM in the Umzinyathi DM. The 12Mℓ Bruntville Reservoir was completed in 2020 as part of Phase 1 of the Mpofana BWSS.

The 12Mℓ Bruntville terminal bulk reservoir on the Mpofana Bulk Water Supply Scheme Phase 1 was completed in 2020 as part of Phase 1 of the Mpofana BWSS. The bulk reservoir is strategically positioned (with eventual storage upgrades) to be a Primary Bulk Reservoir that could supply water to regional schemes in the uMgungundlovu, uMzinyathi and possibly even the iLembe District Municipalities. This will address existing backlogs and augment bulk water supply to existing water schemes. The Bruntville reservoir would have to be upgraded to 30 Mℓ to cater for the 2050 demands. The following areas/schemes could be supplied from the Spring Grove Regional Bulk Water Supply Scheme.

- ✓ Mpofana Rural 6 WSS (included within the UMDM UAP Phase III study)
- ✓ Remainder of Mpofana LM around Craigieburn Dam Ward 4 as well as KwaMathwanya
- ✓ Muden including augmentation of the Muden Regional Scheme (Umzinyathi DM)
- ✓ Greytown Regional Scheme (Umzinyathi DM)
- ✓ Mvoti Regional Scheme (Umzinyathi DM)
- ✓ Augmentation of Ngcebo Scheme (iLembe DM)

The Spring Grove Regional Bulk Water Supply Scheme could be implemented in two main phases that will allow connection to existing infrastructure and either augment existing schemes or provide water supply to current backlog areas.

Phase 1: Muden Bulk Water Pipeline

- ✓ Bulk water supply to Muden and augmentation of Muden and Keates Drift Regional Schemes; and
- ✓ Supply to Mpofana Rural 6 en route.

Phase 2: Greytown Bulk Water Pipeline

- ✓ Offtake on the Muden Bulk Water Pipeline to Craigie Burn Dam;
- ✓ Tie into existing raw water bulk pipeline from Craigie Burn Dam to Greytown; and
- ✓ Supply remainder of Ward 4 including KwaMathwanya en route.

9.13.2 Water Supply Infrastructure

9.13.2.1 Proposed Interventions

The following infrastructure and augmentations will be required in order to adequately supply the Spring Grove Regional Bulk Scheme WSIA and is illustrated within **Figure 9-26** followed by the schematic layout of the WSIA within **Figure 9-27**.

Phase 1: Muden Bulk Water Supply

A 47.6km pipeline (14.5 km, 900mm ø and 33.1 km 500mm ø) from the Bruntville Command reservoir will allow water supply under gravity to Muden to augment the Muden and Keates Drift Regional Schemes. The projected demand at 2050 for Muden and Keates Drift schemes combined is 20.11 Mℓ/day

The Mpofana Rural 6 scheme area can be supplied en route. This area is currently being supplied by borehole/rudimentary schemes without an existing formal water supply. The projected demand at 2050 for the Mpofana Rural 6 scheme area is 0.82 Mℓ/day.

In this option, water will be supplied via a 160mm ø, 7.2km long pipeline via an off take from the Bruntville-Muden gravity main to a proposed distribution reservoir (1 306m).

Phase 2: Off-take to Greytown

An off take at approximately 15km on the Muden Bulk Pipeline will allow bulk water supply to Greytown. This will be proposed by connecting into the already constructed Craigie Burn to Greytown Raw Water Pipeline

thereby converting this pipeline to a potable water pipeline. The projected demand for Greytown, Matimatolo, Eshane, Kranskop and Ngcebo Scheme is 25.94 Mℓ/day

The remainder of Mpofana Ward 4 including the KwaMathwanya area can be supplied en route.

The UZDM was re-demarcated into 35 supply zones. This option of the Spring Grove RBWSS will cater for zones 7 to 15 and 17 to 19. (**Figure 6-1**)

Greytown Bulk Water Supply Scheme

The Greytown WTP supply is proposed to be extended via secondary bulk pipelines to cater for the Kranskop, Ngcebo Scheme and Matimatolo areas as the upgrade of the WTP will allow supply to the Mvoti LM and further into iLembe DM. The Greytown WTP supplies an existing Nhlalakahle command reservoir (1 110m) north-east of Greytown. A proposed 500mm ø, 14.7 km long rising main to a proposed 13 Mℓ distribution Ahrens reservoir (1 265m) is proposed as the source to extend north to Kranskop and the Ngcebo Scheme and south-east to Matimatolo. The Matimatolo WTP will be fed by the Ahrens reservoir via a 400mm ø, 7.1 km long pipeline. En route to Matimatolo an offtake is proposed to the Eshane existing reservoir via a 160mm ø, 6.29 km pipeline. From the Ahrens reservoir there is proposed 1 Mℓ reservoir near Kranskop which is proposed to augment the Kranskop WTP and feed the 500kℓ Ngcebo scheme reservoir via a 160mm ø and 90mm ø gravity main.

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

9.13.3 Financial Requirements

The bulk cost requirement for Spring Grove Regional Bulk Scheme WSIA is summarised within **Table 9-27** below.

Table 9-22: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (excl VAT)
Primary	R742 945 974	R74 294 597	R817 240 571
Secondary	R77 796 101	R7 779 610	R85 575 711
Tertiary	R4 359 014	R435 901	R4 794 916
Total	**R825 101 089**	**R82 510 109**	**R907 611 198**

The total bulk cost requirement for the Spring Grove Regional Bulk Water Supply Scheme is R 907 611 198 (excl VAT). The scheme development cost per household is approximately R 14 100.

N

Kilometers
2 1 0 2 4

MOOI RIVER
- MPOFANA
WTP 7Ml/d

Mooi River

12000kl

Umgungundlovu

ROSETTA
WTP 0,32Ml/d

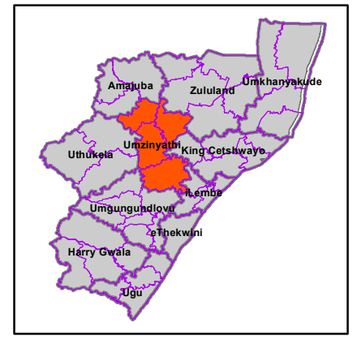
SPRING
GROVE
WTW
WTP 20Ml/d

Spring
Grove Dam

Legend

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

LOCALITY:



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PROJECT TITLE

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

MAP TITLE: **Total Bulk Water Supply Interventions - UZ013: Springrove RBWSS Umzinyathi District Municipality**

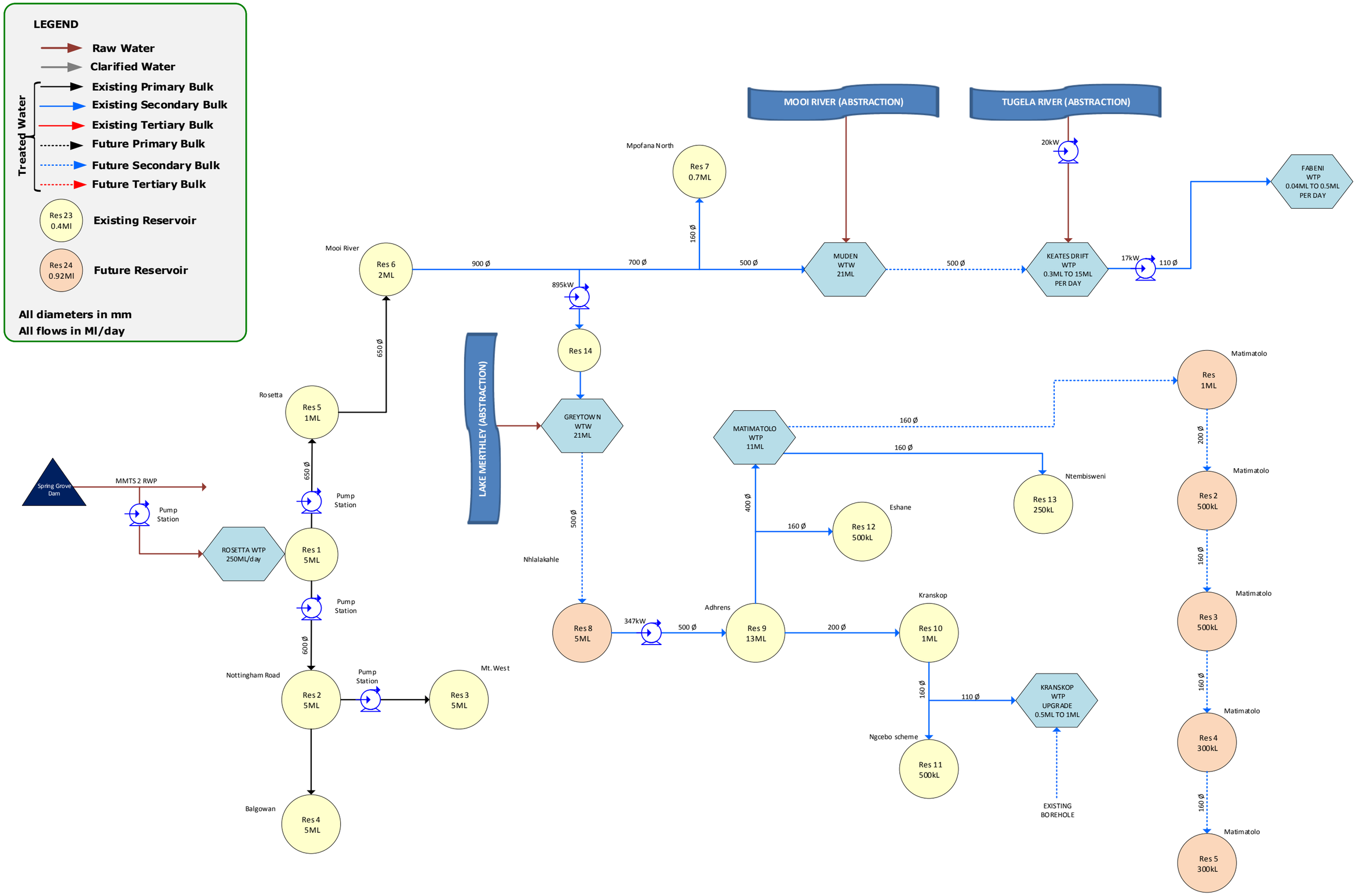
DATE COMPLETED: January 2021

MAP NO.: **DC 24 Figure 9-26**

Proposed New / Upgrade Infrastructure

- Water Scheme Areas & Names
- Existing Water Treatment Plants
- Surface Water Abstraction Works (Existing)
- Primary Bulk Pipelines (Existing)
- Primary Reservoirs (Existing)
- Secondary Reservoirs (Existing)

Figure 9-27
UZ013: SPRING GROVE REGIONAL BULK SCHEME



9.14 UZ014 WSIA: NQUTHU BULK SCHEME

9.14.1 Demand Model Intervention

9.14.1.1 Water Demand

The water demand for the Nquthu Bulk Scheme was determined for 2020 and 2050 and included within **Table 9-23** below.

Table 9-23: Population and Water demand 2020 and 2050 for the Nquthu Bulk Scheme WSIA

Population	**Population 2020**	**Population 2050**
	116 003	162 038
Water Demand	**Demand 2020 (Mℓ/day)**	**Demand 2050 (Mℓ/day)**
	20.99	30.41

9.14.1.2 Water Resource Consideration

The Nquthu area is supplied with water from an abstraction on the Buffalo River. The safe yield as well as capacity of the raw water abstraction works from the Buffalo River is unknown. The raw water is then treated at the Vants Drift WTP. The proposed intervention outlined in Section 9.3 will allow the Ekucabangeni reservoir to feed the Nondweni WTP reservoir. The proposed Nquthu Bulk Water Supply Scheme proposes to augment the supply to the Nondweni scheme.

9.14.2 Water Supply Infrastructure

9.14.2.1 Bulk conveyance and Storage

The raw water abstraction on the Buffalo River is pumped to Vants Drift WTP where potable water is then pumped via a 160mm Ø rising main to an existing Ekucabangeni command reservoir, of which the capacity is unknown.

9.14.2.2 Proposed Interventions

The following infrastructure upgrades and augmentations will be required in order to adequately supply the Nquthu Bulk Scheme WSIA and is illustrated within **Figure 9-5** followed by the schematic layout of the WSIA within **Figure 9-6**.

- ✓ Potable water will be pumped from the Ekucabangeni command reservoir (1 336m) to a proposed 4 Mℓ intermediate reservoir (1 339m) via a 200mmØ rising main.
- ✓ From the intermediate reservoir, water will gravitate to the Nondweni WTP reservoir (1 102m) via a 160mm Ø pipeline.

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

9.14.3 Financial Requirements

The bulk cost requirement for Nquthu Bulk Scheme WSIA is summarised within **Table 9-24** below.

Table 9-24: Cost Requirement

	Capital Cost	10% Contingencies	Total Cost (excl VAT)
Primary	R7 000 000.00	R700 000.00	R7 700 000.00
Secondary	R56 958 452.64	R5 695 845.26	R62 654 297.90
Tertiary	R19 230 700.28	R1 923 070.03	R21 153 770.30
Total	**R83 189 152.91**	**R8 318 915.29**	**R91 508 068.20**

The total bulk cost requirement for the Nquthu Bulk Water Supply Scheme is R 91 508 068.20 (excl VAT). The scheme development cost per household is approximately R 2 300.

10. CONCLUSIONS

10.1 TOTAL WATER DEMAND PER SUPPLY AREA

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

Table 10-1: Total Water Demand 2050 per WSIA

Water Supply Scheme / WSIA		Population 2020	Water Requirements (Mℓ/d)						
			2020	2025	2030	2035	2040	2045	2050
UZ001	Dundee/Glencoe	71 425	21.67	26.01	27.72	29.43	31.14	33.02	35.02
UZ002	Nquthu	116 003	20.99	22.32	23.83	25.36	26.89	28.59	30.41
UZ003	Nondweni	49 416	8.62	9.16	9.79	10.42	11.04	11.75	12.50
UZ004	Ngolokodo	15 590	2.76	2.94	3.14	3.35	3.55	3.77	4.01
UZ005	Pomeroy	35 553	6.06	6.45	6.89	7.34	7.79	8.29	8.82
UZ006	Tugela Ferry	44 702	8.34	8.88	9.48	10.10	10.71	11.39	12.12
UZ007	Keats Drift	56 723	9.94	10.58	11.31	12.05	12.78	13.60	14.48
UZ008	Muden	11 942	2.09	2.22	2.37	2.53	2.68	2.85	3.03
UZ009	Greytown	20631	5.84	6.19	6.59	6.99	7.39	7.83	8.30
UZ010	Matimatolo	45 054	7.62	8.11	8.67	9.23	9.79	10.42	11.10
UZ011	Kranskop	1 787	0.43	0.46	0.49	0.52	0.55	0.58	0.62
UZ012	Makhabeleni	8 450	1.46	1.55	1.66	1.77	1.88	1.99	2.12
UZ013	Spring Grove RBWSS	136 137	25.92	27.56	29.43	31.31	33.19	35.28	37.53
UZ014	Nquthu BWSS	116 003	20.99	22.32	23.83	25.36	26.89	28.59	30.41
TOTAL			**556 391**	**95.82**	**104.87**	**111.94**	**119.07**	**126.19**	**134.08**

A total of 134.08 Mℓ/d is required for the entire WSA in 2050 with the Dundee/Glencoe WSIA and Nquthu WSIA requiring the largest portion at 25% and 21% 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** below:

Table 10-2: Water Resources Required vs proposed WSI

WSIA	WSIA Name	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)
UZ001	Dundee/Glencoe	99 768	35.00	12.78	6.49	6.28	12.78	0.00
UZ002	Nquthu	162 038	30.41	11.10	4.58	13.79	18.38	7.28
UZ003	Nondweni	69 027	12.50	4.56	3.58	1.17	4.75	0.18
UZ004	Ngolokodo	21 777	4.01	1.46	0.00	1.46	1.46	0.00
UZ005	Pomeroy	49 662	8.82	3.22	1.93	1.28	3.21	-0.01
UZ006	Tugela Ferry	62 442	12.11	4.42	4.38	-4.38	0.00	-4.42
UZ007	Keats Drift	79 232	14.48	5.29	2.63	2.63	5.26	-0.03
UZ008	Muden	16 681	3.03	1.11	1.10	0.01	1.11	0.00
UZ009	Greytown	28 818	8.30	3.03	1.75	5.91	7.67	4.64
UZ010	Matimatolo	62 933	11.10	4.05	0.00	4.05	4.05	0.00
UZ011	Kranskop	2 497	0.62	0.23	0.18	0.18	0.37	0.14
UZ012	Makhabeleni	11 803	2.12	0.77	1.46	0.00	1.46	0.69
TOTAL		**666 678**	**142.50**	**52.01**	**28.09**	**32.39**	**60.48**	**8.46**

From the table above, it is noted not all the schemes will have adequate raw water resources to meet the 2050 demand requirements. The investigation to augment the water shortage within the WSIAs from the Spring Grove Regional Bulk Water Supply Scheme, the Dundee/Glencoe Scheme and the Nquthu Bulk Water Supply Scheme should be prioritised.

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 UZ001 WSIA: Dundee/Glencoe

Table 10-3: WSIA Summary for the UZ001: Dundee/Glencoe WSIA

Dundee/Glencoe Scheme						
Item	**Description**					
1	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or Length or kW)**
1.1	**Existing**	WTP	Various	Regional Bulk	0	0
		WTP	Various	Internal Bulk	0	0
		Pump Stations	Various	Regional Bulk	0	0
		Pump Stations	Various	Internal Bulk	0	0
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	0.00
				Secondary Bulk	160 ø mm - 300 ømm	0.00
				Tertiary Bulk	50 ø mm - 110 ømm	2862.05
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	4	25 kl to 25 kl
			Supply Reservoirs	Tertiary Bulk	-	-
1.2	**Future**	WTP	Dundee	Primary Bulk	-	17
		Bulk Pipelines		Primary Bulk	>350	0
				Secondary Bulk	160 ø mm - 300 ømm	64.03
				Tertiary Bulk	50 ø mm - 110 ømm	0
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	2	1000 kl to 2000 kl
			Supply Reservoirs	Tertiary Bulk	-	-
		Pump stations	Primary PS	Primary Bulk	-	671
			Primary PS	Primary Bulk	-	84
			Primary PS	Primary Bulk	-	26

Dundee/Glencoe Scheme (Proposed Extension from Nyonyana to Zenzele)						
Item	**Description**					
1	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or Length or kW)**
1.1	**Existing**	WTP	Various	Regional Bulk	0	0
		WTP	Various	Internal Bulk	0	0
		Pump Stations	Various	Regional Bulk	0	0
		Pump Stations	Various	Internal Bulk	0	0
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	0.00
				Secondary Bulk	160 ø mm - 300 ømm	0.00
				Tertiary Bulk	50 ø mm - 110 ømm	2862.05
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	4	25 kl to 25 kl
			Supply Reservoirs	Tertiary Bulk	-	-
1.2	**Future**	Bulk Pipelines		Primary Bulk	>350	12.1
				Secondary Bulk	160 ø mm - 300 ømm	43.49
				Tertiary Bulk	50 ø mm - 110 ømm	10.62
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	2	500 kl to 1000 kl
			Supply Reservoirs	Tertiary Bulk	-	-
		Pump stations	Primary PS	Primary Bulk	0,091 M3/s	198
			Secondary PS	Primary Bulk	0,006 M3/s	13

10.3.2 UZ002 WSIA: Nquthu

Table 10-4: WSIA Summary for the UZ002: Nquthu WSIA

Nquthu Scheme						
Item	**Description**					
1	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or Length or kW)**
1.1	**Existing**	WTP	Various	Regional Bulk	2	9
		WTP	Various	Internal Bulk	0	0
		Pump Stations	Various	Regional Bulk	1	0
		Pump Stations	Various	Internal Bulk	0	0
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	2899.00
				Secondary Bulk	160 ø mm - 300 ømm	432582.00
				Tertiary Bulk	50 ø mm - 110 ømm	243441.19
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	22	9 kl to 1073 kl
			Supply Reservoirs	Tertiary Bulk	-	-
1.2	**Future**	WTP	Nquthu	Primary Bulk	-	40
		Bulk Pipelines		Primary Bulk	>350	43.27
				Secondary Bulk	160 ø mm - 300 ømm	34
				Tertiary Bulk	50 ø mm - 110 ømm	0
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	9	200 kl to 50000 kl
			Supply Reservoirs	Tertiary Bulk	-	-
		Pump stations	Primary PS	Primary PS	-	2000
			Primary PS	Primary PS	-	723
			Primary PS	Primary PS	-	342
			Primary PS	Primary PS	-	52
			Primary PS	Primary PS	-	21
			Primary PS	Primary PS	-	16

10.3.3 UZ003 WSIA: Nondweni

Table 10-5: WSIA Summary for the UZ003: Nondweni WSIA

Nondweni Scheme						
Item	**Description**					
1	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or Length or kW)**
1.1	**Existing**	WTP	Various	Regional Bulk	1	1.8
		WTP	Various	Internal Bulk	0	0
		Pump Stations	Various	Regional Bulk	0	0
		Pump Stations	Various	Internal Bulk	0	0
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	2245.00
				Secondary Bulk	160 ø mm - 300 ømm	27674.00
				Tertiary Bulk	50 ø mm - 110 ømm	69164.36
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	14	25 kl to 973 kl
			Supply Reservoirs	Tertiary Bulk	-	-
1.2	**Future**	WTP	Nondweni	Primary Bulk	-	11
		Bulk Pipelines		Primary Bulk	>350	11
				Secondary Bulk	160 ø mm - 300 ømm	29
				Tertiary Bulk	50 ø mm - 110 ømm	27.1
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	7	200 kl to 4000 kl
			Supply Reservoirs	Tertiary Bulk	-	-
		Pump stations	Primary PS	Primary Bulk	-	138
			Primary PS	Primary Bulk	-	37
			Primary PS	Primary Bulk	-	18

10.3.4 UZ004 WSIA: Ngolokodo

Table 10-6: WSIA Summary for the UZ004: Ngolokodo WSIA

Ngolokodo Scheme						
Item	**Description**					
1	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or Length or kW)**
1.1	**Existing**	WTP	Various	Regional Bulk	1	0
		WTP	Various	Internal Bulk	0	0
		Pump Stations	Various	Regional Bulk	0	0
		Pump Stations	Various	Internal Bulk	0	0
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	0.00
				Secondary Bulk	160 ø mm - 300 ømm	0.00
				Tertiary Bulk	50 ø mm - 110 ømm	45712.88
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	14	25 kl to 25 kl
			Supply Reservoirs	Tertiary Bulk	-	-
1.2	**Future**	Bulk Pipelines		Primary Bulk	>350	0
				Secondary Bulk	160 ø mm - 300 ømm	18.5
				Tertiary Bulk	50 ø mm - 110 ømm	6.08
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	2	200 kl to 1000 kl
			Supply Reservoirs	Tertiary Bulk	-	-
		Pump stations	Primary PS	Primary Bulk	0,091 M3/s	198
			Secondary PS	Primary Bulk	0,006 M3/s	13

10.3.5 UZ005 WSIA: Pomeroy

Table 10-7: WSIA Summary for the UZ005: Pomeroy WSIA

Pomeroy Scheme						
Item	**Description**					
1	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or Length or kW)**
1.1	**Existing**	WTP	Various	Regional Bulk	0	0
		WTP	Various	Internal Bulk	1	0.25
		Pump Stations	Various	Regional Bulk	0	0
		Pump Stations	Various	Internal Bulk	0	0
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	0.00
				Secondary Bulk	160 ø mm - 300 ømm	15481.00
				Tertiary Bulk	50 ø mm - 110 ømm	3420.86
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	23	25 kl to 25 kl
			Supply Reservoirs	Tertiary Bulk	-	-
1.2	**Future**	WTP	Keats Drift	Primary Bulk	-	15
		Bulk Pipelines		Primary Bulk	>350	0
				Secondary Bulk	160 ø mm - 300 ømm	7.14
				Tertiary Bulk	50 ø mm - 110 ømm	30.58
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	7	500 kl to 200 kl
			Supply Reservoirs	Tertiary Bulk	-	-
		Pump stations	Primary PS	Primary Bulk	-	36
			Primary PS	Primary Bulk	-	27

10.3.6 UZ009 WSIA: Greytown

Table 10-8: WSIA Summary for the UZ009: Greytown WSIA

Greytown Scheme						
Item	**Description**					
1	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or Length or kW)**
1.1	**Existing**	WTP	Various	Regional Bulk	0	0
		WTP	Various	Internal Bulk	3	0.92
		Pump Stations	Various	Regional Bulk	0	0
		Pump Stations	Various	Internal Bulk	0	0
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	0.00
				Secondary Bulk	160 ø mm - 300 ømm	55094.00
				Tertiary Bulk	50 ø mm - 110 ømm	19880.61
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	14	0.6 kl to 25 kl
			Supply Reservoirs	Tertiary Bulk	-	-
1.2	**Future**	WTP	Greytown	Primary Bulk	-	21
			Muden	Primary Bulk	-	21
		Bulk Pipelines		Primary Bulk	>350	26.3
				Secondary Bulk	160 ø mm - 300 ømm	34.09
				Tertiary Bulk	50 ø mm - 110 ømm	0
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	7	500 kl to 13000 kl
			Supply Reservoirs	Tertiary Bulk	-	-
		Pump stations	Primary PS	Primary Bulk	-	347

10.3.7 UZ010 WSIA: Matimatolo

Table 10-9: WSIA Summary for the UZ010: Matimatolo WSIA

Matimatolo Scheme						
Item	**Description**					
1	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or Length or kW)**
1.1	**Existing**	WTP	Various	Regional Bulk	0	0
		WTP	Various	Internal Bulk	2	0
		Pump Stations	Various	Regional Bulk	0	0
		Pump Stations	Various	Internal Bulk	0	0
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	0.00
				Secondary Bulk	160 ø mm - 300 ømm	55094.00
				Tertiary Bulk	50 ø mm - 110 ømm	19879.46
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	9	25 kl to 25 kl
			Supply Reservoirs	Tertiary Bulk	-	-
1.2	**Future**	Bulk Pipelines		Primary Bulk	>350	0
				Secondary Bulk	160 ø mm - 300 ømm	25.2
				Tertiary Bulk	50 ø mm - 110 ømm	0
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	9	100 kl to 500 kl
			Supply Reservoirs	Tertiary Bulk	-	-
		Pump stations	Primary PS	Primary Bulk	0,091 M3/s	198
			Secondary PS	Primary Bulk	0,006 M3/s	13

10.3.8 UZ013 WSIA: Spring Grove Regional Bulk Water Supply Scheme

Table 10-10: WSIA Summary for the UZ013: Spring Grove Regional Bulk Water Supply Scheme WSIA

Spring Grove Regional Bulk Scheme						
Item	**Description**					
1	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or Length or kW)**
1.1	**Existing**	WTP	Various	Regional Bulk	0	0
		WTP	Various	Internal Bulk	0	0
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	21360.00
				Secondary Bulk	160 ø mm - 300 ømm	139716.00
				Tertiary Bulk	50 ø mm - 110 ømm	160855.42
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	96	2.2 kl to 2749 kl
			Supply Reservoirs	Tertiary Bulk	-	-
1.2	**Future**	Bulk Pipelines		Primary Bulk	>350	66.8
				Secondary Bulk	160 ø mm - 300 ømm	7.2
				Tertiary Bulk	50 ø mm - 110 ømm	0
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	3	700 kl to 30000 kl
			Supply Reservoirs	Tertiary Bulk	-	-
		Pump stations	Primary PS	Primary Bulk	0,177 M3/s	687
			Secondary PS	Primary Bulk	-	-

10.3.9 UZ014 WSIA: Nquthu Bulk Water Supply Scheme

Table 10-11: WSIA Summary for the UZ014: Nquthu Bulk Water Supply Scheme WSIA

Nquthu Bulk Water Supply Scheme						
Item	**Description**					
1	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or Length or kW)**
1.1	**Existing**	WTP	Various	Regional Bulk	2	9
		WTP	Various	Internal Bulk	0	0
		Pump Stations	Various	Regional Bulk	1	0
		Pump Stations	Various	Internal Bulk	0	0
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	2899.00
				Secondary Bulk	160 ø mm - 300 ømm	432582.00
				Tertiary Bulk	50 ø mm - 110 ømm	243441.19
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	22	9 kl to 1073 kl
			Supply Reservoirs	Tertiary Bulk	-	-
1.2	**Future**	Bulk Pipelines		Primary Bulk	>350	0
				Secondary Bulk	160 ø mm - 300 ømm	26.5
				Tertiary Bulk	50 ø mm - 110 ømm	35.87
		Reservoirs	Command Reservoir	Primary Bulk	-	-
			Command Reservoir	Secondary Bulk	4	500 kl to 200 kl
			Supply Reservoirs	Tertiary Bulk	-	-
		Pump stations	Primary PS	Primary Bulk	-	2

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 10-12** below.

Table 10-12: Financial Requirements based on Demand Model Interventions

WSIA	WSIA Name	Total Cost Requirement				
		Primary	Secondary	Tertiary	10% Contingencies	Total Cost (Excl VAT)
UZ001	Dundee/Glencoe	R80 622 000	R80 562 309	R35 706 788	R19 689 110	R216 580 206
	Proposed Extension from Nyonyana to Zenzele	R68 739 807	R37 882 871	R31 584 851	R13 820 753	R152 028 282
UZ002	Nquthu	R649 575 095	R335 177 400	R32 244 833	R101 699 733	R1 118 697 061
UZ003	Nondweni	R102 771 383	R58 046 804	R31 373 256	R19 219 144	R211 410 588
UZ004	Ngolokodo	-	R18 914 020	R12 971 891	R3 188 591	R35 074 503
UZ005	Pomeroy	R39 075 000	R20 980 286	R10 942 485	R7 099 777	R78 097 548
UZ006	Tugela Ferry	-	-	-	-	-
UZ007	Keates Drift	-	-	-	-	-
UZ008	Muden	-	-	-	-	-
UZ009	Greytown	R2 796 600 621	R112 935 557	R24 411 269	R293 394 745	R3 227 342 191
UZ010	Matimatolo	-	R28 843 735	R18 686 138	R4 752 987	R52 282 860
UZ011	Kranskop	-	-	-	-	-
UZ012	Makhabeleni	-	-	-	-	-
UZ013	Spring Grove RBWSS	R742 945 974	R77 796 101	R4 359 014	R82 510 109	R907 611 198
UZ014	Nquthu BWSS	R7 000 000	R56 958 453	R19 230 700	R8 318 915	R91 508 068
Total		**R4 487 329 880**	**R828 097 536**	**R221 511 225**	**R553 693 864**	**R6 090 632 505**

A total estimate of approximately R 6 billion is required to address the total bulk water supply requirement by 2050.

10.5 Funding Options

The UZDM relies mainly on grant funding programmes to fund their water supply projects. These funding programmes are mainly MIG, RBIG and WSIG. Based on all the current funding streams available to the District Municipality over the MTEF period, it will take a minimum of 30 years for the WSA to address their water supply requirements. Another funding option that the UZDM 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.

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. Although all fourteen (14) area interventions would be an implementation priority for the DM, it is proposed to consider the following three (3) priorities detailed within **Table 10-13**. 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 10-13: Proposed Implementation Order (Phased Approach)

Proposed Priorities (Phased Approach)	WSIA No and Name		Proposed Project	Proposed Estimated Project Value
1	UZ013	Spring Grove RBWSS	Augmentation of supply to Muden, Mooi-Mpofana and Greytown WTP	R907 611 198
2	UZ014	Nquthu BWSS	Nquthu Bulk Water Supply Upgrade and extension of supply to Nondweni	R91 508 068
3	UZ001	Dundee/Glencoe	Dundee/Glencoe Water Supply Scheme Upgrade (Dundee Bulk)	R216 580 206

11. RECOMMENDATIONS

11.1 RESPONSIBILITIES

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

11.2 SELECTION OF SOLUTIONS

The fourteen (14) proposed water supply intervention areas (WSIA's) are the appropriate solutions for bulk water supply development within UZDM and are as follows:

- ✓ Dundee/Glencoe
- ✓ Nquthu
- ✓ Nondweni
- ✓ Ngolokodo
- ✓ Pomeroy
- ✓ Tugela Ferry
- ✓ Keates Drift
- ✓ Muden
- ✓ Greytown
- ✓ Matimatolo
- ✓ Kranskop
- ✓ Makhabeleni
- ✓ Spring Grove RBWSS
- ✓ Nquthu BWSS

The following three WSI are prioritised for consideration:

- ✓ Priority 1 UZ013: Spring Grove RBWSS - Augmentation of supply to Muden, Mooi-Mpofana and Greytown WTP
- ✓ Priority 2 UZ014: Nquthu Bulk Water Supply Upgrade and extension of supply to Nondweni
- ✓ Priority 3 UZ001: Dundee/Glencoe Water Supply Scheme Upgrade (Dundee Bulk)

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

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- ✓ UZDM IDP. (2019). *Umzinyathi District Municipality 2019-2020 Draft Integrated Development Plan.*

ANNEXURE B – DETAILED PROPOSED WSI INFRASTRUCTURE COMPONENT DETAIL

UZ001: Dundee/Glencoe WSIA

The total bulk cost requirement for the Dundee/Glencoe Scheme is R 216 580 206.41 (excl VAT). The scheme development cost per household is approximately R 31 920.

Dundee/Glencoe Scheme						
Item	**Description**					
1	**Population**	**Scheme Name**	**Subscheme No**	**Population 2020**	**Population 2050**	
		Dundee/Glencoe Water Supply Upgrade	TK0787	2 679	3 742	
			MGA005	16 751	23 398	
		Total		**19 430**	**27 140**	
2	**Demand**	**Scheme Name**	**Subscheme No**	**Demand 2020**	**Demand 2050**	
		Dundee/Glencoe Water Supply Upgrade	TK0787	0.44	0.65	
			MGA005	2.83	4.12	
		Total		**3.27**	**4.76**	
3	**Water Resource**	**Source**	**HFY (Mm3/a)**	**HFY (Ml/d)**	**Comments**	
		Buffalo River, Tom Worthington Dam	-	-	-	
4	**Infrastructure**		**WTP Name**	**Class**	**Scheme Number**	**Capacity (Ml/d or Length or kW)**
4.1	**Existing**	**WTP**	-	-	-	-
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	0.00
				Secondary Bulk	160 ø mm - 300 ømm	0.00
				Tertiary Bulk	50 ø mm - 110 ømm	2862.05
		Pump stations	-	-	-	-
		Reservoirs	Mzweni Reservoir 1	Secondary Bulk	1	25.00
			Mzweni Reservoir 2	Secondary Bulk	1	25.00
			Nkhalane Reservoir	Secondary Bulk	1	25.00
			Mkhuzeni Reservoir 1	Secondary Bulk	1	25.00
4.2	**Future**	WTP	Dundee	Primary Bulk	-	17.00
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	0
				Secondary Bulk	160 ø mm - 300 ømm	64.03
				Tertiary Bulk	50 ø mm - 110 ømm	0
		Reservoirs	Reservoir	Secondary Bulk	1	2000
			Reservoir	Secondary Bulk	1	1000

		Pump stations	Primary PS	Primary Bulk	-	671
			Primary PS	Primary Bulk	-	84
			Primary PS	Primary Bulk	-	26
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary Bulk	**R80 622 000.00**	**R8 062 200.00**	**R88 684 200.00**	
		Secondary Bulk	**R80 562 309.16**	**R8 056 230.92**	**R88 618 540.07**	
		Tertiary Bulk	**R35 706 787.58**	**R3 570 678.76**	**R39 277 466.34**	
		Total	**R196 891 096.73**	**R19 689 109.67**	**R216 580 206.41**	

The total bulk cost requirement for the Dundee/Glencoe Scheme (Proposed Extension from Nyonyana to Zenzele) is R 117 284 946 (excl VAT). The scheme development cost per household is approximately R 20 050.

Dundee/Glencoe Scheme (Proposed Extension from Nyonyana to Zenzele)						
Item	**Description**					
1	**Population**	**Scheme Name**	**Subscheme No**	**Population 2020**	**Population 2050**	
		Proposed Extension from Nyonyana to Zenzele	MGA005	16 751	23 398	
		Total		**16 751**	**23 398**	
2	**Demand**	**Scheme Name**	**Subscheme No**	**Demand 2020**	**Demand 2050**	
		Proposed Extension from Nyonyana to Zenzele	MGA005	2.83	4.12	
		Total		**2.83**	**4.12**	
3	**Water Resource**	**Source**	**HFY (Mm3/a)**	**HFY (Ml/d)**	**Comments**	
		Buffalo River, Tom Worthington Dam	-	-	-	
4	**Infrastructure**		**WTP Name**	**Class**	**Scheme Number**	**Capacity (Ml/d or Length or kW)**
4.1	**Existing**	**WTP**	-	-	-	-

		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	0.00
				Secondary Bulk	160 ø mm - 300 ømm	0.00
				Tertiary Bulk	50 ø mm - 110 ømm	2862.05
		Pump stations	-	-	-	-
		Reservoirs	Mzweni Reservoir 1	Secondary Bulk	1	25.00
			Mzweni Reservoir 2	Secondary Bulk	1	25.00
			Nkhalane Reservoir	Secondary Bulk	1	25.00
			Mkhuzeni Reservoir 1	Secondary Bulk	1	25.00
4.2	**Future**	Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	12.1
				Secondary Bulk	160 ø mm - 300 ømm	43.49
				Tertiary Bulk	50 ø mm - 110 ømm	10.62
		Reservoirs	Reservoir	Secondary Bulk	1	1000
			Reservoir	Secondary Bulk	1	500
		Pump stations	Primary PS	Primary Bulk	0,091 M3/s	198
			Secondary PS	Primary Bulk	0,006 M3/s	13
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary Bulk	**R68 739 807.36**	**R6 873 981**	**R75 613 788**	
		Secondary Bulk	R37 882 871.08	**R3 788 287**	**R41 671 158**	
		Tertiary Bulk	R31 584 850.81	**R3 158 485**	**R34 743 336**	
		Total	**R106 622 678**	**R10 662 268**	**R117 284 946**	

UZ002: Nquthu WSIA

The total bulk cost requirement for the Nquthu Scheme is R 1 118 697 060.85 (excl VAT). The scheme development cost per household is approximately R 27 600.

Nquthu Scheme						
Item	**Description**					
1	**Population**	**Scheme Name**	**Subscheme No**	**Population 2020**	**Population 2050**	
		Nquthu Bulk Water Supply Scheme Upgrade	NQT002	82 047	114 606	
			NQT004	8 776	12 259	
			NQT005	25 180	35 172	
		Total		**116 003**	**162 038**	
2	**Demand**	**Scheme Name**	**Subscheme No**	**Demand 2020**	**Demand 2050**	
		Nquthu Bulk Water Supply Scheme Upgrade	NQT002	15.21	21.99	
			NQT004	1.48	2.15	
			NQT005	4.30	6.27	
		Total		**20.99**	**30.41**	
3	**Water Resource**	**Source**	**HFY (Mm3/a)**	**HFY (Ml/d)**	**Comments**	
		Buffalo River	-	-	-	
4	**Infrastructure**		**WTP Name**	**Class**	**Scheme Number**	**Capacity (Ml/d or Length or kW)**
4.1	**Existing**	**WTP**	VANTS DRIFT	Regional Bulk	NQT002	9
			RIVER ABSTRACTION WORKS	Regional Bulk	NQT004	0
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	2899.00
				Secondary Bulk	160 ø mm - 300 ømm	432582.00
				Tertiary Bulk	50 ø mm - 110 ømm	243441.19
		Pump stations	Unknown	Regional Bulk	NQT005	0
		Reservoirs	Unknown	Secondary Bulk	1	9.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			500 Reservoir	Secondary Bulk	1	25.00

			Mkhonjane Reservoir	Secondary Bulk	1	25.00
			Ndatshana Reservoir	Secondary Bulk	1	25.00
			Duniso Reservoir	Secondary Bulk	1	25.00
			Res 01 UAPUMZEND23	Secondary Bulk	1	1073.00
			Res 02 UAPUMZEND23	Secondary Bulk	1	1073.00
			Res 04 UAPUMZEND23	Secondary Bulk	1	1073.00
			Res 03 UAPUMZEND23	Secondary Bulk	1	1073.00
			Isandlawana WTP Final Reservoir	Secondary Bulk	1	25.00
			Isandlawana Bulk Reservoir 01	Secondary Bulk	1	25.00
			Isandlawana Bulk Reservoir 02	Secondary Bulk	1	25.00
			Nhloya Spring Reservoir	Secondary Bulk	1	25.00
			Mgaga Reservoir	Secondary Bulk	1	25.00
			Mazibuko Tribal Court Reservour	Secondary Bulk	1	25.00
			Section K Reservoir	Secondary Bulk	1	25.00
		WTP	Nquthu	Primary Bulk	-	40
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	43.27
				Secondary Bulk	160 ø mm - 300 ømm	34
				Tertiary Bulk	50 ø mm - 110 ømm	0
4.2	**Future**	**Reservoirs**	Reservoir	Secondary Bulk	1	50000
			Reservoir	Secondary Bulk	1	40000
			Reservoir	Secondary Bulk	1	36000
			Reservoir	Secondary Bulk	1	5000
			Reservoir	Secondary Bulk	1	3000
			Reservoir	Secondary Bulk	1	2500
			Reservoir	Secondary Bulk	3	200
			Reservoir	Secondary Bulk	0	3500
		Pump stations	Primary PS	Primary PS	-	2000
			Primary PS	Primary PS	-	723
			Primary PS	Primary PS	-	342
			Primary PS	Primary PS	-	52
			Primary PS	Primary PS	-	21
			Primary PS	Primary PS	-	16
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary Bulk	**R649 575 095.15**	**R64 957 509.52**	**R714 532 604.67**	

		Secondary Bulk	R335 177 400.28	**R33 517 740.03**	**R368 695 140.30**	
		Tertiary Bulk	R32 244 832.62	**R3 224 483.26**	**R35 469 315.88**	
		Total	**R1 016 997 328.05**	**R101 699 732.80**	**R1 118 697 060.85**	

UZ003: Nondweni WSIA

The total bulk cost requirement for the Nondweni Scheme is R 211 410 587.67 (excl VAT). The scheme development cost per household is approximately R 12 250.

Nondweni Scheme						
Item	**Description**					
1	**Population**	**Scheme Name**	**Subscheme No**	**Population 2020**	**Population 2050**	
		Nondweni Water Supply Scheme Proposed Intervention	NQT003	49 417	69 027	
		Total		**49 417**	**69 027**	
2	**Demand**	**Scheme Name**	**Subscheme No**	**Demand 2020**	**Demand 2050**	
		Nondweni Water Supply Scheme Proposed Intervention	NQT003	8.62	12.50	
		Total		**8.62**	**12.50**	
3	**Water Resource**	**Source**	**HFY (Mm3/a)**	**HFY (Ml/d)**	**Comments**	
		Mvunyana River	-	-	-	
4	**Infrastructure**		**WTP Name**	**Class**	**Scheme Number**	**Capacity (Ml/d or Length or kW)**
4.1	**Existing**	**WTP**	NONDWENI	Regional Bulk	NQT003	1.8
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	2245.00
				Secondary Bulk	160 ø mm - 300 ømm	27674.00
				Tertiary Bulk	50 ø mm - 110 ømm	69164.36
		Pump stations	-	-	-	-
		Reservoirs	Magongoloza Spring Reservoir	Secondary Bulk	1	25.00
			Res 01 UAPUMZEND26	Secondary Bulk	1	936.00
			Res 01 UAPUMZEND29	Secondary Bulk	1	973.00
			Res 01 UAPUMZEND30	Secondary Bulk	1	918.00
			Res 01 UAPUMZEND31	Secondary Bulk	1	560.00
			Res 01 UAPUMZEND32	Secondary Bulk	1	257.00
			Zwelitsha Jojo Tank	Secondary Bulk	1	25.00
			Magongoloza Jojo Tank 01 & 02	Secondary Bulk	1	25.00
			Magongoloza Jojo Tank 01 & 02	Secondary Bulk	1	25.00
			Magongoloza Jojo Tank 01 & 02	Secondary Bulk	1	25.00

			Magongoloza Jojo Tank 01 & 02	Secondary Bulk	1	25.00
			Magongoloza Borehole 05 Jojo Tank	Secondary Bulk	1	25.00
			Magongoloza Borehole 03 Jojo Tank	Secondary Bulk	1	25.00
			Magongoloza Borehole 04 Reservoir	Secondary Bulk	1	25.00
		WTP	Nondweni	Primary Bulk	-	11.00
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	11
				Secondary Bulk	160 ø mm - 300 ømm	29
				Tertiary Bulk	50 ø mm - 110 ømm	27.1
4.2	**Future**	Reservoirs	Reservoir	Secondary Bulk	1	4000
			Reservoir	Secondary Bulk	2	1000
			Reservoir	Secondary Bulk	4	200
		Pump stations	Primary PS	Primary Bulk	-	138
			Primary PS	Primary Bulk	-	37
			Primary PS	Primary Bulk	-	18
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary Bulk	**R102 771 383.47**	**R10 277 138.35**	**R113 048 521.81**	
		Secondary Bulk	R58 046 803.72	**R5 804 680.37**	**R63 851 484.09**	
		Tertiary Bulk	R31 373 256.15	**R3 137 325.62**	**R34 510 581.77**	
		Total	**R192 191 443.34**	**R19 219 144.33**	**R211 410 587.67**	

UZ004: Ngolokodo WSIA

The total bulk cost requirement for the Ngolokodo Scheme is R35 074 503 (excl VAT). The scheme development cost per household is approximately R 6 400.

Ngolokodo Scheme						
Item	**Description**					
1	**Population**	**Scheme Name**	**Subscheme No**	**Population 2020**	**Population 2050**	
		Ngolokodo Water Supply Intervention	NQT001	15 590	21 777	
		Total		**15 590**	**21 777**	
2	**Demand**	**Scheme Name**	**Subscheme No**	**Demand 2020**	**Demand 2050**	
		Ngolokodo Water Supply Intervention	NQT001	2.76	4.01	
		Total		**2.76**	**4.01**	
3	**Water Resource**	**Proposed Source**	**HFY (Mm3/a)**	**HFY (Ml/d)**	**Comments**	
		Buffalo River	-	-	-	
4	**Infrastructure**		**WTP Name**	**Class**	**Scheme Number**	**Capacity (Ml/d or Length or kW)**
4.1	**Existing**	**WTP**	NKANDLA/NGOLOKODO	Regional Bulk	NQT001	0
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	0.00
				Secondary Bulk	160 ø mm - 300 ømm	0.00
				Tertiary Bulk	50 ø mm - 110 ømm	45712.88
		Pump stations	-	-	-	-
		Reservoirs	Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Nkande Reservoir 03	Secondary Bulk	1	25.00
			Ngolokodo Concrete Reservoir 01	Secondary Bulk	1	25.00
			Ngolokodo Jojo 01	Secondary Bulk	1	25.00
			Ngolokodo Jojo 02	Secondary Bulk	1	25.00
			Ngolokodo Jojo 03	Secondary Bulk	1	25.00
			Ngolokodo Jojo 04	Secondary Bulk	1	25.00
			Ngolokodo Jojo 05	Secondary Bulk	1	25.00
			Ngolokodo Jojo 06	Secondary Bulk	1	25.00
			Ngolokodo Concrete Reservoir 02	Secondary Bulk	1	25.00

			Leneha Reservoir	Secondary Bulk	1	25.00
			Sgqumeni Reservoir	Secondary Bulk	1	25.00
			Kaheng Reservoir 01	Secondary Bulk	1	25.00
4.2	**Future**	Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	0
				Secondary Bulk	160 ø mm - 300 ømm	18.5
				Tertiary Bulk	50 ø mm - 110 ømm	6.08
		Reservoirs	Reservoir	Secondary Bulk	1	1000
			Reservoir	Secondary Bulk	1	200
		Pump stations	Primary PS	Primary Bulk	0,091 M3/s	198
			Secondary PS	Primary Bulk	0,006 M3/s	13
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary Bulk	**R0.00**	**R0**	**R0**	
		Secondary Bulk	R18 914 020.21	**R1 891 402**	**R20 805 422**	
		Tertiary Bulk	R12 971 891.39	**R1 297 189**	**R14 269 081**	
		Total	**R31 885 912**	**R3 188 591**	**R35 074 503**	

UZ005: Pomeroy WSIA

The total bulk cost requirement for the Pomeroy Scheme is R 78 097 548.24 (excl VAT). The scheme development cost per household is approximately R 4 800.

Pomeroy Scheme						
Item	**Description**					
1	**Population**	**Scheme Name**	**Subscheme No**	**Population 2020**	**Population 2050**	
		Pomeroy Water Supply interventions	MGA002	11 244	15 705	
			UMZ012	35 554	49 662	
		Total		**46 797**	**65 368**	
2	**Demand**	**Scheme Name**	**Subscheme No**	**Demand 2020**	**Demand 2050**	
		Pomeroy Water Supply interventions	MGA002	1.91	2.79	
			UMZ012	6.06	8.82	
		Total		**7.97**	**11.61**	
3	**Water Resource**	**Source**	**HFY (Mm3/a)**	**HFY (Ml/d)**	**Comments**	
		Thukela River	-	-	-	
4	**Infrastructure**		**WTP Name**	**Class**	**Scheme Number**	**Capacity (Ml/d or Length or kW)**
4.1	**Existing**	**WTP**	POMEROY	Internal Bulk	UMZ012	0.25
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	0.00
				Secondary Bulk	160 ø mm - 300 ømm	15481.00
				Tertiary Bulk	50 ø mm - 110 ømm	3420.86
		Pump stations	-	-	-	-
		Reservoirs	Gqohi JoJo Tank 4	Secondary Bulk	1	25.00
			Gqohi JoJo Tank 1	Secondary Bulk	1	25.00
			Gqohi JoJo Tank 2	Secondary Bulk	1	25.00
			Gqohi JoJo Tank 3	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Sampufo WTP Concrete Reservoir	Secondary Bulk	1	25.00
			Ngabayane Reservoir 1	Secondary Bulk	1	25.00
			Ngabayane Reservoir 2	Secondary Bulk	1	25.00
			Oqothweni Reservoir	Secondary Bulk	1	25.00

			Nkamba Reservoir 1a, JoJo Tanks	Secondary Bulk	1	25.00
			Nkamba Reservoir 1b, JoJo Tanks	Secondary Bulk	1	25.00
			Emthaleni Reservoir 1a	Secondary Bulk	1	25.00
			Mbindolo Reservoir 1, JoJo Tanks	Secondary Bulk	1	25.00
			Mbindolo Reservoir 2, JoJo Tanks	Secondary Bulk	1	25.00
			Mbindolo Reservoir 3, JoJo Tanks	Secondary Bulk	1	25.00
			Mbindolo Reservoir 4, JoJo Tanks	Secondary Bulk	1	25.00
			Mbindolo Concrete Reservoir	Secondary Bulk	1	25.00
			Makhasana Reservoir	Secondary Bulk	1	25.00
			Gordon Reservoir	Secondary Bulk	1	25.00
			Madazane Reservoir	Secondary Bulk	1	25.00
			Mumbe Steel Reservoir	Secondary Bulk	1	25.00
4.2	**Future**	WTP	Keats Drift	Primary Bulk	-	15
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	0
				Secondary Bulk	160 ø mm - 300 ømm	7.14
				Tertiary Bulk	50 ø mm - 110 ømm	30.58
		Reservoirs	Reservoir	Secondary Bulk	2	500
			Reservoir	Secondary Bulk	5	200
		Pump stations	Primary PS	Primary Bulk	-	36
			Primary PS	Primary Bulk	-	27
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary Bulk	**R39 075 000.00**	**R3 907 500.00**	**R42 982 500.00**	
		Secondary Bulk	R20 980 285.84	**R2 098 028.58**	**R23 078 314.43**	
		Tertiary Bulk	R10 942 485.28	**R1 094 248.53**	**R12 036 733.81**	
		Total	**R70 997 771.12**	**R7 099 777.11**	**R78 097 548.24**	

UZ009: Greytown WSIA

The total bulk cost requirement for the Greytown Scheme is R3 227 342 190.67 (excl VAT). The scheme development cost per household is approximately R 280 800.

Greytown Scheme						
Item	**Description**					
1	**Population**	**Scheme Name**	**Subscheme No**	**Population 2020**	**Population 2050**	
		Greytown Water supply Extention	UMV005	47 463	66 463	
			UMV008	1 787	2 497	
		Total		**49 250**	**68 960**	
2	**Demand**	**Scheme Name**	**Subscheme No**	**Demand 2020**	**Demand 2050**	
		Greytown Water supply Extention	UMV005	8.02	11.70	
			UMV008	0.43	0.62	
		Total		**8.45**	**12.32**	
3	**Water Resource**	**Dams**	**HFY (Mm3/a)**	**HFY (Ml/d)**	**Comments**	
		Lake Merthley, Spring Grove & Proposed Mvotipoort Dam	-	-	-	
4	**Infrastructure**		**WTP Name**	**Class**	**Scheme Number**	**Capacity (Ml/d or Length or kW)**
4.1	**Existing**	**WTP**	MATIMATOLO PACKING PLANT	Internal Bulk	UMV005	0
			UNKNOWN	Internal Bulk	UMV005	0
			KRANSKOP	Internal Bulk	UMV008	0.92
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	0.00
				Secondary Bulk	160 ø mm - 300 ømm	55094.00
				Tertiary Bulk	50 ø mm - 110 ømm	19880.61
		Pump stations	-	-	-	-
		Reservoirs	Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00

		WTP	Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Kranskop Reservoir	Secondary Bulk	1	0.60
			Old res to be decommissioned	Secondary Bulk	1	25.00
			Old res to be decommissioned	Secondary Bulk	1	25.00
			Elevated tank to be moved on top of new Res	Secondary Bulk	1	25.00
			Elevated tank to be moved on top of new Res	Secondary Bulk	1	25.00
			Mvotipoort Dam & Feasibility Study	Primary Bulk	-	-
			Mvotipoort WTP	Primary Bulk	-	-
			Greytown	Primary Bulk	-	21
			Muden	Primary Bulk	-	21
4.2	**Future**	Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	26.3
				Secondary Bulk	160 ø mm - 300 ømm	34.09
				Tertiary Bulk	50 ø mm - 110 ømm	0
		Reservoirs	Reservoir	Secondary Bulk	1	13000
			Reservoir	Secondary Bulk	1	11000
			Reservoir	Secondary Bulk	2	1000
			Reservoir	Secondary Bulk	3	500
		Pump stations	Primary PS	Primary Bulk	-	-
			Primary PS	Primary Bulk	-	347
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary Bulk	**R2 796 600 620.80**	**R279 660 062.08**	**R3 076 260 682.88**	
		Secondary Bulk	R112 935 556.68	**R11 293 555.67**	**R124 229 112.35**	
		Tertiary Bulk	R24 411 268.59	**R2 441 126.86**	**R26 852 395.45**	
		Total	**R2 933 947 446.06**	**R293 394 744.61**	**R3 227 342 190.67**	

UZ010: Matimatolo WSIA

The total bulk cost requirement for the Matimatolo Scheme is R52 282 860 (excl VAT). The scheme development cost per household is approximately R 3 200.

Matimatolo Scheme						
Item	**Description**					
1	**Population**	**Scheme Name**	**Subscheme No**	**Population 2020**	**Population 2050**	
		Matimatolo water supply upgrade	UMV005	47 463	66 463	
		Total		**47 463**	**66 463**	
2	**Demand**	**Scheme Name**	**Subscheme No**	**Demand 2020**	**Demand 2050**	
		Matimatolo water supply upgrade	UMV005	8.02	11.70	
		Total		**8.02**	**11.70**	
3	**Water Resource**	**Dams**	**HFY (Mm3/a)**	**HFY (Ml/d)**	**Comments**	
		Lake Merthley, Spring Grove	-	-	-	
4	**Infrastructure**		**WTP Name**	**Class**	**Scheme Number**	**Capacity (Ml/d or Length or kW)**
4.1	**Existing**	**WTP**	MATIMATOLO PACKING PLANT	Internal Bulk	UMV005	0
			UNKNOWN	Internal Bulk	UMV005	0
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	0.00
				Secondary Bulk	160 ø mm - 300 ømm	55094.00
				Tertiary Bulk	50 ø mm - 110 ømm	19879.46
		Pump stations	-	-	-	-
		Reservoirs	Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
4.2	**Future**	Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	0
				Secondary Bulk	160 ø mm - 300 ømm	25.2
				Tertiary Bulk	50 ø mm - 110 ømm	0

		Reservoirs	Reservoir	Secondary Bulk	1	500
			Reservoir	Secondary Bulk	1	100
			Reservoir	Secondary Bulk	6	50
		Pump stations	Primary PS	Primary Bulk	0,091 M3/s	198
			Secondary PS	Primary Bulk	0,006 M3/s	13
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary Bulk	**R0**	**R0**	**R0**	
		Secondary Bulk	R28 843 734.54	**R2 884 373**	**R31 728 108**	
		Tertiary Bulk	R18 686 137.93	**R1 868 614**	**R20 554 752**	
		Total	**R47 529 872**	**R4 752 987**	**R52 282 860**	

UZ013: Spring Grove Regional Bulk Water Supply Scheme WSIA

The total bulk cost requirement for the Spring Grove Regional Bulk Water Supply Scheme is R 907 611 198 (excl VAT). The scheme development cost per household is approximately R 14 100.

Springrove Regional Water Supply Bulk Scheme						
Item	**Description**					
1	**Population**	**Scheme Name**	**Subscheme No**	**Population 2020**	**Population 2050**	
		Spring Grove Regional Bulk Scheme	MGA006	56 723	79 233	
			UMV001	11 942	16 682	
			UMV002	7 525	10 511	
			UMV003	5 101	7 125	
			UMV004	8 450	11 804	
			UMV005	47 463	66 463	
			UMV006	21 210	29 627	
			UMV007	20 631	28 819	
			UMV008	1 787	2 497	
			UMG035	3 063	4 488	
		Total		**183 897**	**257 248**	
2	**Demand**	**Scheme Name**	**Subscheme No**	**Demand 2020**	**Demand 2050**	
		Spring Grove Regional Bulk Scheme	MGA006	9.94	14.48	
			UMV001	2.09	3.03	
			UMV002	1.35	1.96	
			UMV003	0.86	1.25	
			UMV004	1.46	2.12	
			UMV005	8.02	11.70	
			UMV006	4.11	5.93	
			UMV007	5.84	8.30	
			UMV008	0.43	0.62	
			UMG035	0.54	0.82	
		Total		**34.63**	**50.21**	
3	**Water Resource**	**Dams**	**HFY (Mm3/a)**	**HFY (Ml/d)**	**Comments**	
		Spring Grove Dam	76.6	209.86	Water is sourced from the Spring Grove Dam	
4	**Infrastructure**			**Class**	**Size / No**	**Capacity (Ml/d or Length or kW)**

		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	21360.00
				Secondary Bulk	160 ø mm - 300 ømm	139716.00
				Tertiary Bulk	50 ø mm - 110 ømm	160855.42
	Existing	Reservoirs	NOKWEJA BPT 22	Secondary Bulk	1	5.00
			NOKWEJA BPT 23	Secondary Bulk	1	5.00
			NOKWEJA RES	Secondary Bulk	1	470.00
			NOKWEJA BPT 21	Secondary Bulk	1	5.00
			NOKWEJA RES D	Secondary Bulk	1	900.00
			NOKWEJA RES 1	Secondary Bulk	1	420.00
			NOKWEJA BPT 24	Secondary Bulk	1	5.00
			Gqohi JoJo Tank 4	Secondary Bulk	1	25.00
			Gqohi JoJo Tank 1	Secondary Bulk	1	25.00
			Gqohi JoJo Tank 2	Secondary Bulk	1	25.00
			Gqohi JoJo Tank 3	Secondary Bulk	1	25.00
			Res 01 UAPMSI17	Secondary Bulk	1	2749.00
			Res 01 UAPMSI28	Secondary Bulk	1	165.00
			NJUNGA GALAXY	Secondary Bulk	0	0.00
			NJUNGA RES 2	Secondary Bulk	0	0.00
			NJUNGA RES 1	Secondary Bulk	0	0.00
			NJUNGA TOWER	Secondary Bulk	0	0.00
			NJUNGA JOJO 1	Secondary Bulk	1	2500.00
			NGWINJINI JOJO 6	Secondary Bulk	1	10.00
			NGWINJINI JOJO 4	Secondary Bulk	1	10.00
			NGWINJINI JOJO 2	Secondary Bulk	1	10.00
			NGWINJINI JOJO 5	Secondary Bulk	1	10.00
			NGWINJINI JOJO 3	Secondary Bulk	1	10.00
			NGWINJINI JOJO 1	Secondary Bulk	1	10.00
			NGWANQA RES 2	Secondary Bulk	0	0.00
			NGWANQA RES 1	Secondary Bulk	0	0.00
			NOMANDLOVU RES 10	Secondary Bulk	1	2.20
			LUWAMBENI RES 1	Secondary Bulk	1	10.00
			NOMANDLOVU RES 1	Secondary Bulk	1	2.20
			NOMANDLOVU RES 9	Secondary Bulk	1	2.20
			NOMANDLOVU RES 22	Secondary Bulk	1	10.00
			NOMANDLOVU RES 25	Secondary Bulk	0	0.00

NOMANDLOVU RES 3	Secondary Bulk	1	2.20
NOMANDLOVU RES 11	Secondary Bulk	1	2.20
NOMANDLOVU RES 26	Secondary Bulk	0	0.00
NOMANDLOVU RES 4	Secondary Bulk	1	2.20
NOMANDLOVU RES 19	Secondary Bulk	1	2.20
NOMANDLOVU RES 13	Secondary Bulk	1	2.20
NOMANDLOVU RES 12	Secondary Bulk	1	10.00
NOMANDLOVU RES 18	Secondary Bulk	1	2.20
NOMANDLOVU RES 6	Secondary Bulk	1	10.00
NOMANDLOVU RES 17	Secondary Bulk	1	10.00
NOMANDLOVU RES 5	Secondary Bulk	1	10.00
NOMANDLOVU RES 20	Secondary Bulk	1	2.20
NOMANDLOVU RES 14	Secondary Bulk	1	10.00
NOMANDLOVU RES 21	Secondary Bulk	1	2.20
KWASOKHELA RES 10	Secondary Bulk	1	10.00
KWASOKHELA RES 8	Secondary Bulk	1	10.00
KWASOKHELA RES 2	Secondary Bulk	1	10.00
KWASOKHELA RES 6	Secondary Bulk	1	10.00
KWASOKHELA RES 9	Secondary Bulk	1	10.00
OKHETHENI CON RES	Secondary Bulk	1	240.00
KWASOKHELA RES 1	Secondary Bulk	1	10.00
NOMANDLOVU RES 16	Secondary Bulk	1	10.00
NOMANDLOVU RES 15	Secondary Bulk	1	10.00
KWASOKHELA RES 7	Secondary Bulk	1	20.00
KWASOKHELA RES 3	Secondary Bulk	1	20.00
OKHETHENI JOJO 2	Secondary Bulk	1	10.00
KWASOKHELA RES 5	Secondary Bulk	1	10.00
OKHETHENI JOJO 1	Secondary Bulk	1	10.00
OKHETHENI JOJO 5	Secondary Bulk	1	5.00
OKHETHENI JOJO 3	Secondary Bulk	1	5.00
OKHETHENI JOJO 4	Secondary Bulk	1	5.00
KWASOKHELA RES 4	Secondary Bulk	1	10.00
NGCESHENI JOJO TANK 1	Secondary Bulk	1	10.00
NGCESHENI JOJO TANK 2	Secondary Bulk	1	5.00
NGCESHENI JOJO TANK 3	Secondary Bulk	1	5.00

MNYWANENI JOJO TANK 1	Secondary Bulk	1	38.00
QULASHE AREA JOJO TANK 7	Secondary Bulk	1	10.00
QULASHE AREA JOJO TANK 10	Secondary Bulk	1	10.00
QULASHE AREA JOJO TANK 8	Secondary Bulk	1	10.00
QULASHE AREA JOJO TANK 2	Secondary Bulk	1	10.00
QULASHE AREA JOJO TANK 9	Secondary Bulk	1	10.00
QULASHE AREA JOJO TANK 5	Secondary Bulk	1	10.00
QULASHE AREA JOJO TANK 1	Secondary Bulk	1	10.00
QULASHE AREA JOJO TANK 4	Secondary Bulk	1	10.00
QULASHE AREA JOJO TANK 3	Secondary Bulk	1	10.00
GALA RES 5	Secondary Bulk	1	100.00
GALA JOJO TANK 1	Secondary Bulk	1	5.00
QULASHE AREA JOJO TANK 6	Secondary Bulk	1	10.00
GALA RES 3	Secondary Bulk	1	2.20
GALA RES 4	Secondary Bulk	1	2.20
SANDANEZWE CON RES 4	Secondary Bulk	1	10.00
SANDANEZWE CON RES 6	Secondary Bulk	1	30.00
MNQUNDEKWENI JOJO TANK 1	Secondary Bulk	1	5.00
GALA RES 2	Secondary Bulk	1	500.00
SANDANEZWE CON RES 2	Secondary Bulk	1	15.00
SANDANEZWE CON RES 9	Secondary Bulk	1	30.00
GALA RES 1	Secondary Bulk	0	0.00
SANDANEZWE CON RES 12	Secondary Bulk	1	20.00
SANDANEZWE CON RES 13	Secondary Bulk	1	30.00
SANDANEZWE CON RES 14	Secondary Bulk	1	30.00
SANDANEZWE CON RES 1	Secondary Bulk	1	30.00
MNQUNDEKWENI JOJO TANK 2	Secondary Bulk	1	5.00
SANDANEZWE CON RES 10	Secondary Bulk	1	20.00
SANDANEZWE CON RES 3	Secondary Bulk	1	30.00
SANDANEZWE CON RES 11	Secondary Bulk	1	20.00
SANDANEZWE CON RES 5	Secondary Bulk	1	10.00
SANDANEZWE CON RES 7	Secondary Bulk	1	10.00
SANDANEZWE CON RES 8	Secondary Bulk	1	30.00
ENHLANHLENI RES 2	Secondary Bulk	1	25.00

			ENHLANHLENI RES 1	Secondary Bulk	1	100.00
			ENHLANHLENI JOJO TANK 2	Secondary Bulk	1	10.00
			ENHLANHLENI JOJO TANK 1	Secondary Bulk	1	10.00
			ENHLANHLENI JOJO TANK 3	Secondary Bulk	1	10.00
4.2	**Future**	Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	66.8
				Secondary Bulk	160 ø mm - 300 ømm	7.2
				Tertiary Bulk	50 ø mm - 110 ømm	0
		Reservoirs	Reservoir	Secondary Bulk	1	30000
			Reservoir	Secondary Bulk	1	1000
			Reservoir	Secondary Bulk	1	700
		Pump stations	Primary PS	Primary Bulk	0,177 M3/s	687
			Secondary PS	Primary Bulk	-	-
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary Bulk	**R742 945 974**	**R74 294 597**	**R817 240 571**	
		Secondary Bulk	R77 796 101	**R7 779 610**	**R85 575 711**	
		Tertiary Bulk	R4 359 014	**R435 901**	**R4 794 916**	
		Total	**R825 101 089**	**R82 510 109**	**R907 611 198**	

UZ014: Nquthu Bulk Water Supply Scheme WSIA

The total bulk cost requirement for the Nquthu Bulk Water Supply Scheme is R 91 508 068.20 (excl VAT). The scheme development cost per household is approximately R 2 300.

Nquthu Bulk Water Supply Scheme						
Item	**Description**					
1	**Population**	**Scheme Name**	**Subscheme No**	**Population 2020**	**Population 2050**	
		Nquthu Proposed Interventions	NQT002	82 047	114 606	
			NQT004	8 776	12 259	
			NQT005	25 180	35 172	
		Total		**116 003**	**162 038**	
2	**Demand**	**Scheme Name**	**Subscheme No**	**Demand 2020**	**Demand 2050**	
		Nquthu Proposed Interventions	NQT002	15.21	21.99	
			NQT004	1.48	2.15	
			NQT005	4.30	6.27	
		Total		**20.99**	**30.41**	
3	**Water Resource**	**Source**	**HFY (Mm3/a)**	**HFY (Ml/d)**	**Comments**	
		Buffalo River	-	-	-	
4	**Infrastructure**		**WTP Name**	**Class**	**Scheme Number**	**Capacity (Ml/d or Length or kW)**
4.1	**Existing**	**WTP**	VANTS DRIFT	Regional Bulk	NQT002	9
			RIVER ABSTRACTION WORKS	Regional Bulk	NQT004	0
		Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	2899.00
				Secondary Bulk	160 ø mm - 300 ømm	432582.00
				Tertiary Bulk	50 ø mm - 110 ømm	243441.19
		Pump stations	Unknown	Regional Bulk	NQT005	0
		Reservoirs	Unknown	Secondary Bulk	1	9.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			Unknown	Secondary Bulk	1	25.00
			500 Reservoir	Secondary Bulk	1	25.00

			Mkhonjane Reservoir	Secondary Bulk	1	25.00
			Ndatshana Reservoir	Secondary Bulk	1	25.00
			Duniso Reservoir	Secondary Bulk	1	25.00
			Res 01 UAPUMZEND23	Secondary Bulk	1	1073.00
			Res 02 UAPUMZEND23	Secondary Bulk	1	1073.00
			Res 04 UAPUMZEND23	Secondary Bulk	1	1073.00
			Res 03 UAPUMZEND23	Secondary Bulk	1	1073.00
			Isandlawana WTP Final Reservoir	Secondary Bulk	1	25.00
			Isandlawana Bulk Reservoir 01	Secondary Bulk	1	25.00
			Isandlawana Bulk Reservoir 02	Secondary Bulk	1	25.00
			Nhloya Spring Reservoir	Secondary Bulk	1	25.00
			Mgaga Reservoir	Secondary Bulk	1	25.00
			Mazibuko Tribal Court Reservour	Secondary Bulk	1	25.00
			Section K Reservoir	Secondary Bulk	1	25.00
4.2	**Future**	Bulk Pipelines	uPVC, Steel, HDPE, AC	Primary Bulk	>350	0
				Secondary Bulk	160 ø mm - 300 ømm	26.5
				Tertiary Bulk	50 ø mm - 110 ømm	35.87
		Reservoirs	Reservoir	Secondary Bulk	1	500
			Reservoir	Secondary Bulk	3	200
		Pump stations	Primary PS	Primary Bulk	-	2
5	**Cost Requirement**		**Capital Cost**	**10% Contingencies**	**Total Cost (Excl VAT)**	
		Primary Bulk	**R7 000 000.00**	**R700 000.00**	**R7 700 000.00**	
		Secondary Bulk	R56 958 452.64	**R5 695 845.26**	**R62 654 297.90**	
		Tertiary Bulk	R19 230 700.28	**R1 923 070.03**	**R21 153 770.30**	
		Total	**R83 189 152.91**	**R8 318 915.29**	**R91 508 068.20**	