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UNIVERSAL ACCESS PLAN PHASE 2 – PROGRESSIVE DEVELOPMENT OF A REGIONAL CONCEPT PLAN FOR THE ALFRED NZO DISTRICT MUNICIPALITY

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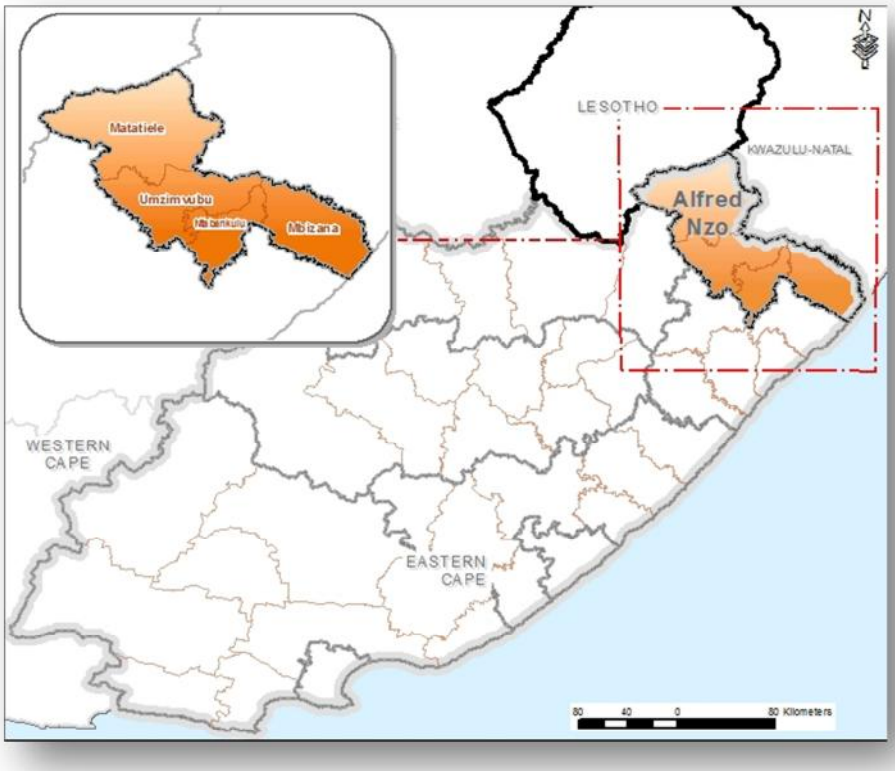

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Prepared for: Umgeni Water

Contact Person : Vernon Perumal

Tel: 033-341 1232 | Cell: 082 852 9308

vernon.perumal@umgeni.co.za

Prepared by: UWP Consulting (Pty) Ltd

Contact Person : Sandra Munnik

Tel: 012-424 9707 | Cell: 082 822 8211

sandram@uwp.co.za

In Association with:

ZIYANDA consulting
Engineering Solutions through Sustainable Relationships

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Prepared for:	**Client's Name:** Umgeni Water		**Contact Person:** Vernon Perumal **Tel No.:** Tel: 033-341 1232 | Cell: 082 852 9308 **Email address:** vernon.perumal@umgeni.co.za	
Prepared at / by:	**Office:** Pretoria		**Division:** Infrastructure Planning	
Verification Process:	**Name:**	**Capacity:**	**Signature:**	**Date:**
Verification by Author:	**S Munnik**			**15 June 2016**
Checked by:	**S Munnik**	**Study Leader and Project Director**		**15 June 2016**
Authorised by:	**S Munnik**	**Study Leader and Project Director**		**15 June 2016**

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EXECUTIVE SUMMARY

A. INTRODUCTION

Umgeni Water initiated a study in 2014 to develop Universal Access Plans (Phase 1) for bulk water supply, for all District Municipalities in the KwaZulu-Natal Province (KZN). The study culminated in a rudimentary report for each District Municipality that provides the water requirements and conceptual scheme areas and costing to provide access to bulk water supply, based on information at hand at the time.

Umgeni Water, together with the Department of Water & Sanitation (DWS) and the KZN Department of Cooperative Governance and Traditional Affairs (COGTA) sought to improve on the existing studies and initiated the follow-up study: Universal Access Plan (UAP) Phase 2 – Progressive Development of a Regional Concept Plan, again for each District Municipality in the KZN, as well as the Alfred Nzo and OR Tambo District Municipalities within the Eastern Cape Province. Various Professional Service Providers (PSP's) were appointed to conduct the studies based on Water Services Authority (WSA) status.

The 2011 Census as well as updated Eskom Spot Building Count datasets could be applied for the improved studies. Furthermore, the DWS expressed the need to review and update their Reference Framework Geodatabase (2013) – especially the settlements and infrastructure components as part of the UAP Phase 2 study.

The objectives of the UAP Phase 2 study were to review and update the UAP Phase 1 study reports in order to improve the following:

- The Phase 1 study focused on small, localised schemes for universal access in the near future, however these proposed schemes are not necessarily sustainable;
- The proposed schemes were largely designed in isolation and took little cognisance of other water planning studies and recommendations;
- Many of the Water Services Development Plans were being updated during the course of the Phase 1 study, and need to be incorporated into UAP Phase 2;
- The study didn't go as far as Umgeni Water's extended area into the Eastern Cape Province; and
- The footprints did not take cognisance of town planning type information that would give an indication of future demands.

The UAP Phase 2 study aimed to improve on the above and to ensure a more aligned approach between the various PSP's appointed for the different study areas.

This report is the UAP Phase 2 report for the Alfred Nzo District Municipality (ANDM), Eastern Cape Province and hence forth, information reflected relates to this WSA.

B. DEMOGRAPHICS

Census 2011 indicated that there is approximately 801 000 people within 168 000 households (HH) residing within four Local Municipalities (LMs) within ANDM. The average number of people per HH is 4.75. The population details per LM are provided in Table 3.1: Census 2011 Population and Households below. The largest portion of the district population is concentrated within the Mbizana Local Municipality at 281 890 people and accounts for nearly 35% of the total district population. It also has the highest

population density of 100 persons/ km^2. For the purpose of this study, the 2011 Census was used as base as it is available for the whole of South Africa and is used by the municipalities for their planning and reporting purposes.

The population figures were projected according to calculated growth rates from Statistics SA (growth profiles, migration and updated household surveys) as well as local knowledge of the study areas. The demographics from the 2011 Census (sub-place level, summarised per LM) and projected to 2035 (20 years), are presented in **Table B**.

Table B Demographics Summary: 2011 Census and 2035 (Projected)

Local Municipality	2011		2035	
	Households	Population	Households	Population
Matatiele	49 488	203 860	54 091	220 257
Mbizana	48 418	281 890	68 378	391 227
Ntabankulu	23 380	123 974	22 157	109 576
Umzimvubu	46 857	191 612	43 967	179 376
Grand Total	**168 143**	**801 336**	**188 593**	**900 436**

The number of people and households are expected to increase by an estimated 2% per annum due to natural growth and migration. The Umzimvubu and Ntabankulu Local Municipalities both projected negative population growth rates of 0,51% and 0,45 % per annum respectively. The Mbizana LM is projected to have the highest population growth rate of 1,4% per annum.

C. WATER SERVICE LEVELS AND WATER REQUIREMENTS

The consumers in the ANDM have access to water supply in various forms, ranging from no formal access (obtain water directly from natural water sources), to formal and high levels of service in the form of household connections and waterborne sanitation. According to Census 2011, the extent of the water supply backlog within the Alfred Nzo District Municipality is 63% with the majority of the households that still have no access to any water supply infrastructure.

The ANDM has initiated several projects to improve access to water supply – both reticulated supply and bulk water services. The water requirements (in million m³ per annum) for the ANDM are presented per Local Municipality within **Table C** below. These water requirements were calculated for consumers having formal water supply schemes and for consumers not yet supplied from a formal water supply scheme. The Methodology Section in this report explains the approach to determine the theoretical water requirements and adjusted for water loss calculations.

Table C: Water Requirements (million m³ per annum), Per Local Municipality

Local Municipality	Households (2011)	HH Below RDP (2011)	Water Requirements (Million m³ per annum)				
			2015	2020	2025	2030	2035
Matatiele	49 488	21 512	8,732	10,173	11,655	12,286	12,880
Mbizana	48 418	24 901	6,604	10,766	15,132	17,008	18,932
Ntabankulu	23 380	43 739	3,391	4,325	5,288	5,415	5,490
Umzimvubu	46 857	14 977	6,865	8,087	9,346	9,.521	9,629
TOTAL	**168 143**	**105 129**	**25,592**	**33,352**	**41,421**	**44,230**	**46,931**

The Mbizana LM has by far the highest water requirements due to the larger number of people residing in the area, large number of industries and expected future developments.

D. WATER CONSERVATION AND WATER DEMAND MANAGEMENT

Water Conservation and Demand Management is conducted by the Water Services Provider Unit within ANDM. While WCDM falls organisationally under the WSA unit, many of the water conservation issues have a direct bearing on water services operations. Specific, ongoing challenges that the WSP unit faces include:

- High water losses;
- Lack of meter information;
- Confusion over meter reading date (i.e. consistent time of the month);
- Inaccurate / incomplete reading and inaccurate data capturing;
- Position of WCDM in organogram;
- Delays in meter installation programme;
- Excessive reliance on consultants; and
- WCDM is not an isolated project but an ongoing approach underpinning all water services activities.

The ANDM has a number of ongoing water conservation and demand management initiatives under way at present.

E. WATER RESOURCES

According to the National Water Resource Strategy, the Mzimvubu to Keiskamma Water Management Area will have a positive water balance of 458 million m³ per annum until the year 2025. Although the rainfall in the area is not especially high, water requirements are less than the available yield of the catchments, with the result that the area is one of the few in the country that has surplus water available on a catchment wide basis. Although it is estimated that significant quantities of groundwater could be abstracted in the area, the actual use of groundwater is relatively small. This is mainly attributed to the generally well-watered nature of the area and the wide occurrence of perennial surface streams, which reduces the need for groundwater abstraction

There is currently only one major dam, the Ludeke Dam, but some smaller dams and run-of-river schemes exist throughout the ANDM area to supply water to the domestic users. In addition, there are several borehole schemes as well as single borehole supply for some villages.

A list of the relevant dams with information about yield and allocation is given in **Table E** Table 5.1: Major dams for domestic supply in ANDM area below.

Table E: Major dams for domestic supply in ANDM area

Dam Name	Capacity (million m³)	Yield (million m³ per annum)		
		Domestic	Irrigation	Other / Surplus
Ludeke Dam	14,945	8,8	TBC	TBC
Mountain Dam	1,082	1,08*	0	0
Annie's Valley Dam	0,24	-	-	-
Bon Accord No.2 Dam	0,084	-	-	-
Harbin Dam	0,073	-	-	-
Ntenteyana Dam	1,4	2,2	0	0

Dam Name	Capacity (million m³)	Yield (million m³ per annum)		
		Domestic	Irrigation	Other / Surplus
Belfort Dam	0,602	0,471	0	0,131
Total	**17,981**	**12,551**	**-**	**0,131**

(Source: ATS 2011)
**Yield is for the combined mountain and town dam*

F. EXISTING WATER SUPPLY SCHEMES AND WATER REQUIREMENTS

The total volume of water required is compared to the existing proposed water supply interventions to determine shortfalls and the reasons thereof. This comparison is detailed in the **Table F** below.

Table F: Water Requirements (Mm³ per annum) per WSIA

WSS	Households (2015)	Population (2015)	2035 Demand (Mm^3 per annum)	Existing Resources (Mm^3 per annum)	Proposed Additional under UAP Phase 2 (Mm^3 per annum)	Total	Balance (Mm^3 per annum)
MAT001:Kinira River Dam	46 958	190 942	12,154	3,711	10,4*	14,111	-
MBZ001: Mbizana RBWSS	51 985	297 667	18,932	8,8*	10,13	18,93	-
UMZ001: Mkhemane Dam Integrated Regional Water Scheme	46 073	194 686	9,388	2,201*	4,459	6,660	-2,73
NTB001: Nkanji Dam Integrated Regional Water Scheme	29 461	134 598	6,457	0,621	8,42*	9,041	2,58
TOTAL	**174 477**	**817 893**	**46,931**	**15,333**	**33,41**	**48,742**	**-0,15**

**Figures are actual dam yields*

From the table above, it is noted that with the exception of Mkhemane RBWSS all the other schemes will have adequate raw water resources to meet the 2035 demand requirements. The Mkhemane RBWSS will be short by 0,15Mm³ per annum (1,6%). This shortfall could be made up from implementing a water conservation and demand management project to ensure that the quantities of unaccounted for water are kept to a minimum.

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 total cost requirement for water services within ANDM is R 8,6 billion and represents a wall-to-wall coverage of the total need. The total MTEF 2015/18 over the next three years shows a total allocation of R 539 million for regional bulk with the total bulk requirement allocation of R 4,7 billion. This would result

in ANDM taking at least seven (7) years to address their total bulk infrastructure needs. The existing bulk interventions currently in planning are tabled within **Table G** below.

Table G: RBIG Water Supply Interventions currently in planning

LM	Project No	Project Name	Project Description	Total Cost Requirement	FY 2015/16	FY 2016/17	FY 2017/18
Matatiele	ECR001 // F/ECDC44 /001/W	Matatiele Bulk Water Supply Scheme	Feasibility for development of Kinira Valley Dam, includes 5ML Reservoir	R 872 397 365	R 25 000 000	R 66 000 000	R 36 209 372
Mbizana	ECR008	Mbizana Regional Bulk WS (Phase 1)	Mbizana Regional Bulk Water Supply. Phases 2 - 4 to follow.	R 910 843 303	R 13 081 967	R 90 000 000	R 120 936 884
Ntabankulu	ECR044 // N/ECDC4 4/038/W	Ntabankulu Regional Bulk Water Supply	Ntabankulu Regional Bulk Water Supply	R 1 492 145 109	R 0	R 1 500 000	R 11 000 000
Umzimvubu	ECR036	Mount Ayliff Bulk Water Supply Scheme	Mount Ayliff Bulk Water Supply Scheme	R 164 200 000	R 1 897 920	R 50 000 000	R 40 642 908
Umzimvubu	N/ANDM/ PMU/33/1 8/10/07	Alfred Nzo (Umzimvubu LM) Regional Bulk Water Supply	Mkemane Regional BWSS	R 1 101 266 560	R 0	R 2 500 000	R 10 000 000
Umzimvubu	N/ECDC4 4/002/W/S	Mount Ayliff - Bulk Peri Urban Water Supply	Phase 1 to Phase 3	R 187 358 000	R 2 500 000	R 20 000 000	R 48 000 000
Umzimvubu	N/ECDC4 4/039/W	Alfred Nzo (Umzimvubu LM) Regional Bulk Water Supply	Feasibility for development of Soroqobeni River Dam in Mount Ayliff	R 35 000 000	R 0	R 0	R 0
				R 4 763 210 337	**R 42 479 887**	**R 230 000 000**	**R 266 789 164**

H. BULK WATER SUPPLY INTERVENTIONS CONSIDERED

This study aims to ensure that the ANDM 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 was 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 2035.

Water Supply Intervention Areas (WSIAs) were identified during this process based on areas that can be served either by linkage to existing schemes or through planned scheme developments (planned projects). These WSIAs, number of applicable households, population and their water requirements are illustrated in **Table H.**

Table H Conceptual Scheme Areas, Households and Water Requirements

WSIA Name	Households (2015)	Population (2015)	Water Requirements (Million m³ per annum)	
			2015	2035
MAT001: Kinira River Dam	46 958	190 942	8,284	12,154
MBZ001: Mbizana RBWS	51 985	297 667	6,604	18,932
UMZ001: Mkhemane Dam Integrated Regional Water Scheme	46 073	194 686	6,184	9,388
NTB001: Nkanji Dam Integrated Regional Water Scheme	29 461	134 598	4,521	6,457
TOTAL	**46 958**	**190 942**	**25,592**	**46,931**

A total of 46,93 Million m³ per annum is required, with the Mbizana RBWSS requiring the largest portion at 40,3% of the total water demand in ANDM. With the exception of Mkhemane RBWSS all the other schemes will have adequate raw water resources to meet the 2035 demand requirements. The Mkhemane RBWSS will be short by 0,15Mm³ per annum (1,6%). This shortfall could be made up from implementing a water conservation and demand management project to ensure that the quantities of unaccounted for water are kept to a minimum.

I. CONCLUSIONS AND RECOMMENDATIONS

The ANDM 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. There are an estimated 105 000 households not having access to some form of formalised water supply infrastructure, across the whole of ANDM's geographic extent. Furthermore, there are areas where the existing water supply infrastructure as well as water source, are insufficient to meet current and projected future water requirements. New developments and urbanisation put further strain on existing supplies and resources.

The ANDM relies mainly on grant funding programmes to fund their water supply projects. These funding programmes are mainly MIG and RBIG. Based on all the current funding streams available to the District Municipality over the MTEF period, it will take a minimum of twenty-one years for the ANDM to address their water supply requirements.

The ANDM has developed regional wall-to-wall bulk water plans to address their bulk water supply needs. Some of these studies are already funded through the RBIG funding programme whilst others are in the process to be prepared for implementation readiness and submission to the Eastern Cape Technical Assessment Committee (ECTAC). These projects are included within the latest council endorsed IDP and WSDP of the DM as well as included within the DWS' Provincial Regional Bulk Master Plan dated March 2015.

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 four intervention areas 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 ANDM as the WSA. The ANDM 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 ANDM to take this process further.

The four (4) proposed water supply intervention areas (WSIAs) are the appropriate solutions for bulk water supply development within ANDM and are as follows:

- MAT001 WSIA: Kinira River Dam Regional Water Supply Scheme;
- UMZ001 WSIA: Mkhemane Dam Water Supply Scheme;
- NTB001 WSIA: Nkanji Dam Water Supply Scheme; and
- MBZ001 WSIA: Mbizana Water Supply Scheme.

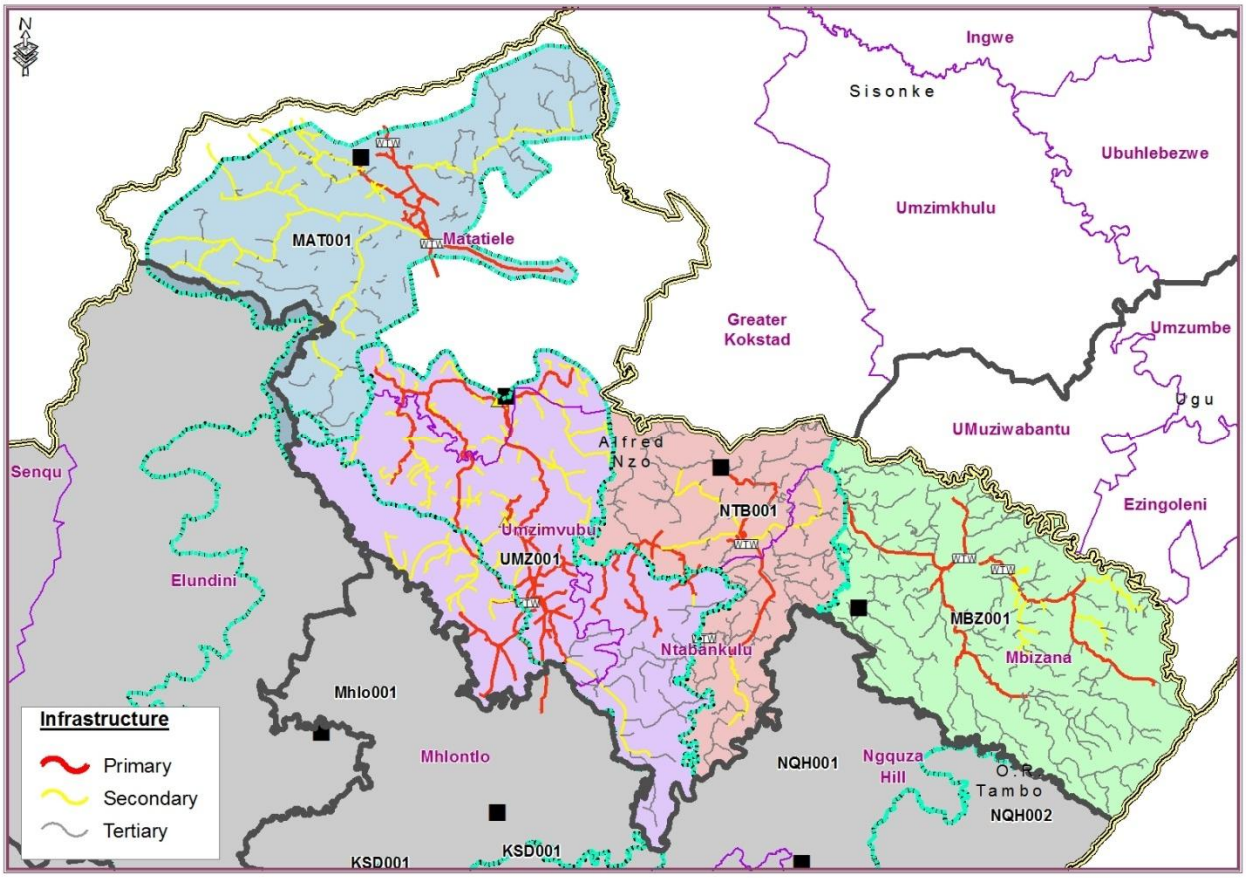
The total cost requirement is as follows. The base year cost requirement is for 2015.

WSIA	Direct Est Cost (Construction)	Indirect Est Cost (Fees, Geotech, EIA, Disb Etc)	Total (Including Contingencies, Escalation, VAT)
MAT001: Kinira River Dam WSS	R 3 221 199 190	R 256 216 400	R 3 477 415 589
UMZ: Mkhemane Dam WSS	R 3 869 596 867	R 361 507 416	R 4 231 104 283
NTB001: Nkanji Dam IWSS	R 3 118 799 060	R 272 077 822	R 3 390 876 882
MBZ001: Mbizana RBWSS	R 3 181 061 507	R 327 288 184	R 3 508 349 692
TOTAL	**R 13 390 656 624**	**R 1 217 089 822**	**R 14 607 746 446**

The primary bulk cost requirement is as follows:

WSIA		Direct Est Cost (Construction)	Indirect Est Cost (Fees, Geotech, EIA, Disbursements etc)	Total (including contingencies, Escalation& VAT)
MAT001: Kinira River Dam WSS	Primary Bulk	R 1 124 652 126	R 810 296 861	R 1 934 948 988
UMZ: Mkhemane Dam WSS	Primary Bulk	R 1 727 311 778	R 106 681 182	R 1 833 992 960
NTB001: Nkanji Dam IWSS	Primary Bulk	R 2 061 612 903	R 158 044 300	R 2 219 657 203
MBZ001: Mbizana RBWSS	Primary Bulk	R 478 675 199	R 344 917 144	R 823 592 343
TOTAL		**R 5 392 252 006**	**R 1 419 939 487**	**R 6 812 191 494**

The primary, secondary and tertiary infrastructure is illustrated in the figure overleaf.


Ingwe
Sisonke
Ubuhlebezwe
Umzimkhulu
MAT001
Matatiele
Greater Kokstad
Umzumbe
UMuziwabantu
Ezingoleni
Alfred Nzo
NTB001
Umzimvubu
UMZ001
Senqu
Elundini
MBZ001
Mbizana
Ntabankulu
Mhlo001
Mhlontlo
NQH001
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O.R. Tambo
NQH002
KSD001
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Infrastructure
Primary
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1. OBJECTIVES AND METHODOLOGY

This report is the Regional Water Master Plan report for the study entitled "Universal Access Plan Phase 2 – Progressive Development of a Regional Concept Plan for the Alfred Nzo District Municipality (ANDM)", an appointment in the series of appointments made by Umgeni Water in February 2015.

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

1.1 BACKGROUND AND INTRODUCTION

This study follows the first study: Development of a Universal Access Plan (UAP) for Water Services for each of the District Municipalities in the KwaZulu-Natal Province. The outcome of the 2014 UAP provided a fair amount of base information concerning water supply in the Province. There were however, a number of areas identified for improvement in order to proceed to a more detailed level of investigation.

Since the release of the 2011 Census data in the latter half of 2013, Umgeni Water decided to review the Phase 1 UAP and furthermore extend the study area into the Eastern Cape Province, hence the inclusion of the Alfred Nzo and OR Tambo District Municipalities within the study area.

This resulted in the Universal Access Plan Phase 2 study that commenced during 2015.

1.2 PURPOSE OF THE REPORT

Umgeni Water appointed UWP Consulting (Pty) Limited, in association with ZIYANDA Consulting cc, to review the Phase 1 UAP through the development of UAP – Phase 2, for the following areas:

- Amajuba District Municipality (ADM), in the KwaZulu-Natal province;
- Newcastle Local Municipality (NLM), in the KwaZulu-Natal province;
- Uthukela District Municipality (UDM), in the KwaZulu-Natal province;
- Alfred Nzo District Municipality (ANDM), in the Eastern Cape province; and
- OR Tambo District Municipality (ORTDM), in the Eastern Cape Province.

The above municipalities were all allocated Water Services Authority (WSA) status for their respective areas of jurisdiction, except for the whole of the ADM. The ADM's responsibilities as WSA exclude the area of Newcastle LM which itself is a WSA.

The UAP Phase 2 aims to review and update the UAP Phase 1 study reports in order to improve the following shortcomings:

- The project focused on small, localised schemes for universal access in the near future, however these proposed schemes are not necessarily sustainable;
- The proposed schemes were largely designed in isolation and took little cognisance of other water planning studies and recommendations;
- Many of the WSDP's were being updated during the course of the project, and need to be incorporated into UAP planning;
- The project didn't go as far as Umgeni Water's extended area into the Eastern Cape; and
- The footprints did not take cognisance of town planning type information that would give an indication of future demands.

The deliverables of the UAP Phase 2 study are divided into two phases:

- Phase 1: Development of an Interim Regional Bulk Scheme Report; and
- Phase 2: Reconnaissance into the Proposed Regional Bulk Schemes per Water Services Authority.

Phase 1 includes the information review and development of a High Level Status Quo Assessment: this document.

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

The UAP Phase 2 study information would be used to update the DWS Reference Framework (RF) geodatabase where possible.

1.3 SPECIFIC TARGETS OF THE STUDY

This document is the second deliverable of the study, namely the needs analysis, culminating in a Bulk Water Master Plan. This document was prepared for the Alfred Nzo District Municipality (ANDM) that includes the following Local Municipalities:

- Matatiele Municipality;
- Umzimvubu Local Municipality;
- Mbizana Local Municipality; and
- Ntabankulu Local Municipality.

The following sections set the scene, provide the current and future water requirements and reconcile it with the available water sources to ensure universal bulk water supply access to all within the ANDM.

1.4 INFORMATION SOURCES

Information used in this study was obtained from current and existing technical reports, regional studies and inputs from municipal and knowledgeable officials. It included feasibility studies (where available), master plans and studies such as the 2011 All Towns Reconciliation Strategies prepared for this area.

A number of meetings were held with the area managers and technical staff of the ANDM to obtain their input and to ensure that the latest available specifications and information is applied for the purpose of this study.

Furthermore, existing spatial and non-spatial databases were used as reference such as the 2001 and 2011 Census and the Department of Water and Sanitation (DWS) Reference Framework geodatabase.

A reference list is provided in **Annexure A**.

1.5 STUDY PROCESS

This study follows the first Development of a Universal Access Plan for Bulk Water Supply for Water Services Authorities in the KwaZulu-Natal (KZN) Province, completed in 2014. Umgeni Water,

together with the DWS and COGTA, identified the need to further the study to improve the planning capacity of not only the benefiting Water Services Authorities (WSA's), but also for the DWS and COGTA – the supporting water services entities.

This study – Phase 2 – aimed to improve on the level of detail, taking into account current project and master planning, implementation of projects and recent updates on available water sources. Furthermore, the study included the whole of the KZN province, but has been extended to the Eastern Cape to include the Alfred Nzo and OR Tambo District Municipalities.

The Professional Service Provider (PSP) teams appointed for the various study areas worked closely together with Umgeni Water, DWS and COGTA to ensure an aligned study approach. This included the utilisation of the 2011 Census as base data for the calculation of water requirements between 2011 and 2035.

This study would aim to update the DWS Reference Framework geodatabase, particularly the settlement footprint and bulk water supply infrastructure.

1.5.1 STAKEHOLDER ENGAGEMENT

This study was presented to all WSA's in the KZN Province during a WSDP workshop held by the DWS, during July 2015. The PSP has subsequently engaged each WSA individually during inception meetings to introduce the study, its objectives and detailed approach.

The first deliverable was a Status Quo report on demographics, bulk water supply infrastructure status quo, water requirements and institutional arrangements of the WSA's. The Status Quo reports were also presented to each WSA and submitted to Umgeni Water.

The Status Quo was followed by the development of a water requirements model, improvement of information available on existing and planned water supply infrastructure as well as available water sources and development of the water requirements model.

During this process, further individual engagements were held with knowledgeable individuals from each WSA, particularly water scheme managers or supervisors. It included site visits to some of the supply areas.

The result was the development of a draft Reconciliation Report – this report – to present the alignment of water requirements – for all areas in a WSA – with existing and planned infrastructure and available water sources in order to provide universal access to bulk water services.

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.

1.6 WATER REQUIREMENTS MODEL

It was agreed that all PSP teams would utilise the 2011 Census as base database for demographics and service levels to apply to the water requirements model. The water requirements were calculated for the period from 2011 to 2035, in five-year increments, starting from 2015. Umgeni Water provided the calculated demographic growth rates, per Census sub-place for the KZN province, which were incorporated into the model. The demographic growth rates for the Eastern Cape Province were obtained from the latest Municipal IDPs that was based on Census 2011.

The PSP engaged with each WSA to determine the current and planned level of service, which informed the potential development and service level growth for each settlement or town area. Furthermore, for the purpose of this study area – **Alfred Nzo DM** – the PSP utilised an approach also used in the All Towns Reconciliation Study for the DWS Northern Planning Region. In this approach, three scenarios were identified to make provision for progressively higher levels of service in areas, depending on the settlement or town type (guided by the characteristic of the settlement or town).

The water use categories applied for the various settlement or town categories are presented in Table 1.1: Settlement or Town Categories and Water Use. These categories were applied together with the service level scenarios and population growth rates, to determine the water requirements up to 2035.

Table 1.1: Settlement or Town Categories and Water Use

Category	Description	Household Income Per Annum	Consumption (l/c/d)
1	Very High Income; villas, large detached house, large luxury flats	>R 1 228 000	410
2	Upper middle income: detached houses, large flats	R 153 601 – R 1 228 000	295
3	Average Middle Income: 2 - 3 bedroom houses or flats with 1 or 2 WC, kitchen, and one bathroom, shower	R 38 401 – R 153 600	228
4	Low middle Income: Small houses or flats with WC, one kitchen, one bathroom	R 9 601– R 38 400	170
5	Low income: flatlets, bedsits with kitchen & bathroom, informal household	R 1 – R 9 600	100
6	No income & informal supplies with yard connections		100
7	Informal with no formal connection		100
8	Informal below 25 l/c/d		100

It was found that the theoretical model's water requirements, which also made provision for water losses, aligned reasonably well with the actual water supply. Opportunities for WC/WDM could also be identified based on the expected water use and the actual water use.

1.7 DWS Reference Framework Geodatabase

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

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

1.8 RECONCILIATION REPORT

The final deliverable of this study is a Reconciliation 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 and these 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 and 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

Alfred Nzo District Municipality is situated in the north-eastern corner of the Eastern Cape Province. It stretches from the Drakensberg Mountains, borders Lesotho in the west, Harry Gwala District Municipality to the north and OR Tambo District Municipality in the east and south. The District includes within its borders four (4) Local Municipalities, namely:

- Matatiele Local Municipality;
- Umzimvubu Local Municipality;
- Mbizana Local Municipality; and
- Ntabankulu Local Municipality.

The Alfred Nzo District comprises 11 119km^2 and is divided administratively into the four (4) aforementioned Local Municipalities (LMs). The municipal area is predominantly rural with large number of villages scattered across the district. The N2 highway between Kokstad, located in Harry Gwala District Municipality and Mthatha transects the most central part of the district. This route serves as the main linkage road from Kokstad through the central section of OR Tambo District Municipality to East London. Kokstad is some 37km from Mount Ayliff and 80km from Matatiele, and serves as an important commercial linkage town located outside of the ANDM to the Kwazulu-Natal province.

The District falls within the Umzimvubu River Basin. The terrain is largely mountainous and extends to more than 1 000m above sea level and rises to the Drakensberg Mountains on the border of Lesotho. On average, the altitude ranges between 700mm - 800m above sea level. It has steep river valleys. The northern areas below the escarpment have extensive wetlands, which are not fed by flowing water or rivers. Rainfall is relatively high at 900mm - 1500mm annually and increasing near the escarpment with excellent agricultural soils near the rivers. The Alfred Nzo District Municipality is predominantly mountainous in the eastern and central areas with large tracts of grasslands in the north-western section.

The district is predominantly rural. The majority of land within the district is covered by dispersed low density traditional settlements, with the exceptions of some areas in the north and north-east and around Mount Frere in the south. There are seven urban centres. The primary urban centres are Mount Ayliff, Mount Frere, Matatiele, Ntabankulu and Mbizana. The secondary urban centres include Maluti and Cedarville. The majority of the population is rural with 94% of the population residing in rural areas.

2.2 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

2.2.1 MATATIELE LOCAL MUNICIPALITY

Matatiele Local Municipality (MLM) is located on the northern part of the Eastern Cape Province. It adjoins onto Elundini Municipality to the south-west, Greater Kokstad Municipality (KZN) to the east, Umzimvubu Municipality to the south, and Lesotho to the north. The R56 road is a major arterial and trade route running through the municipality in an east-west direction linking Matatiele with Kokstad

to the east and Mount Fletcher to the west. It links the municipality with KwaZulu-Natal Province and parts of the Eastern Cape Province located south of Matatiele Municipality. The western parts of the area (commercial agricultural farms) forms part of high production potential land stretching from Matatiele and Kokstad in the south through the KwaZulu-Natal Midlands to the north-western parts of KwaZulu-Natal. Matatiele Municipal area is composed of the commercial farmlands surrounding the service centre of Matatiele, the town of Cedarville together with the R293 township of Maluti. The municipality is predominantly rural in nature, with 91% of households classified as rural and only 9% as urban. The district is dominated by expansive poorly developed rural villages.

The Matatiele LM has a population of 203 860 people residing within 49 488 households (Source: Census 2011). After Mbizana and Ntabankulu Local Municipalities, the Matatiele LM has the third largest population in the District with an average household size of 4,6 persons/household. The LM has widely dispersed settlements in traditional rural villages at approximately 46 persons/km^2 in the LM of 4 352km^2.

2.2.2 UMZIMVUBU LOCAL MUNICIPALITY

Umzimvubu LM is an inland Local Municipality in the north-eastern extremities of the Eastern Cape Province, neighbouring the Kwa-Zulu Natal Province. The municipal area comprise of 27 administrative wards and two main urban centres known as Mount Frere and Mount Ayliff. The municipality is operating from two offices in Mt Frere and Mt Ayliff towns. The headquarters are in Mt Frere. The municipal area covers an area of approximately 2 506km² with a total population of about 191 612 within 46 857 households of which 10% of the total population live in the urban area. The municipal area accommodates a significant rural/traditional population, both community-based and communal farming. The average number of people per km^2 is 76. The climate in the summer rainfall ranges from very pleasant warm summers to mild winters. Annual rainfall ranges between 650mm to 1 100 mm with thunderstorms and hail being, a common feature in summer.

2.2.3 MBIZANA LOCAL MUNICIPALITY

Mbizana Local Municipality is made up of the main town of Mbizana and surrounding predominantly rural villages. Mbizana, the political and administrative municipal seat, is located on the R61 road connecting KwaZulu Natal South Coastal boundary to the N2 leading to Mthatha. Dominant land uses within Mbizana Municipality are mostly rural with a large emphasis on subsistence agriculture in the interior and some tourism development along the coast. The natural environment in the coastal belt of the area is in an unspoiled condition and has exceptionally high conservation value. Mbizana local municipality has an estimated population of 281 890 residing within 48 418 households within an area covering 2 806km². The estimated average number of people per household is 5,8.

2.2.4 NTABANKULU LOCAL MUNICIPALITY

Ntabankulu Local Municipality is situated in Alfred Nzo District Municipality, off the National Road (N2) between Mt Frere and Mt Ayliff. Towns in close proximity are Mt. Ayliff, Kokstad and Mt Frere. Flagstaff is accessible through T19 gravel road to the south of Ntabankulu town. There is a high agricultural, forestry and tourism potential.

The municipality falls within the great Umzimvubu and Umzintlava Rivers. The terrain is largely mountainous and extends to about 800m and 1 600m above sea level. The area is largely surrounded by forestry raging from commercial to indigenous. Rainfall is relatively high at about 900mm – 1 500mm annually and increasing near the escarpment.

The Ntabankulu Local Municipality occupies 1 455km^2 of Alfred Nzo District Municipality, which accounts for 13% of the District Area. The population is estimated at 123 974 residing within 23 380 households. The municipality is regarded as the poorest in the province with high levels of illiteracy and unemployment as the majority of the population does not actively contribute towards the local economy, with only about 11% of households that are in formal employment.

2.3 CLIMATE

The steep altitudinal gradients from the coast to the escarpment, gives rise to strong climatic changes across the ANDM. The climate ranges from very pleasant warm summers to mild to cold winters with snow in high lying areas. The District experiences climatic extremes in the form of storms, tornadoes and floods which have resulted in soil erosion and deep crevices. The average minimum temperature ranges from 7°C to 10°C in winter and 18°C to 24°C in summer. Annual rainfall ranges between 650mm and 1 100mm. Rainfall patterns in the west and central areas are influenced by the orographic effect of the Drakensberg Mountains, with the general precipitation gradient decreasing eastwards from Matatiele going to the interior of the district to Umzimvubu, and lessening even more in Ntabankulu because of the rain shadow effect.

2.4 TOPOGRAPHY, GEOLOGY AND SOILS

The district has a fragmented topography and comprises a plateau, which falls within the Umzimvubu River Basin that ranges from 800m to 1400m above sea level and a high plateau leading to the Drakensberg Mountains that ranges between 1 500m and 2 200m above sea level. The terrain is therefore mountainous with steep valleys. The northern areas below the escarpment have extensive palustrine wetlands (wetlands that are not connected to any river), and the extreme south is undulating and consist of coastal belt. The topography, however, also poses a multitude of challenges to development as accessibility is limited and settlement has taken place in a dispersed and haphazard manner.

Most of the perennial streams in the area converge to form the primary tributaries of the upper Umzimvubu catchment, and the stream valleys are fairly steep sided with good groundcover. The geology is predominantly cave sandstone, underlain by silt and mudstones. In addition, the undulating landscape has some flatter portions in the lower lying areas, especially in the river valleys. Soils with high erosion potential are predominant with a significant number of unstable landscapes. Pockets of bush veld thicket and aloes in the southern Umzimvubu area are common.

2.5 ENVIRONMENTAL

A number of environmental challenges face the Alfred Nzo District Municipality and they are identified as follows:

- Poor waste management, both in urban and rural areas;
- Unauthorized excavation, building construction and mining for sand and gravel that takes place in around the district; and
- Law enforcement needs to be firmer. Land degradation and soil erosion is a great concern around the whole district.

Environmental education and training, as well as a programme for the rehabilitation of dongas are necessary to address this. Currently very little attention is being given to this matter.

2.6 INSTITUTIONAL ARRANGEMENT FOR WATER SUPPLY

The Alfred Nzo District Municipality is the legislated Water Services Authority (WSA) for its entire area of jurisdiction. In addition, following the initial Section 78 assessment, it has been fulfilling the Water Services Provision function through an "internal" mechanism. The ANDM, in its capacity as WSA, deals with planning as well as the regulatory functions, i.e. the Water Service Development Plan, Water Conservation and Demand Management and Sanitation Master Planning. As the Water Service Provider function lies also with ANDM, it deals with bulk purchases, source development and distribution of water as well as operations and maintenance. Further to this, the ANDM's Infrastructure Development and Municipal Services department also deals with waste water management as well as the implementation of both bulk water supply and reticulation projects as well as sanitation programmes (rural and urban). It also deals with emergency services to address sudden water supply breakages, electricity breakdowns, attending spillage of poisonous and dangerous substances and water quality monitoring.

3. DEMOGRAPHICS

3.1 EXISTING POPULATION DISTRIBUTION

Census 2011 indicated that there is approximately 801 000 people within 168 000 households (HH) residing within four Local Municipalities (LMs) within ANDM. The average number of people per HH is 4.8. The population details per LM are provided in Table 3.1: Census 2011 Population and Households below.

Table 3.1: Census 2011 Population and Households

LM No	LM Name	No of People	No of HH	Persons per HH
EC441	Matatiele	203 860	49 488	4,1
EC442	Umzimvubu	191 612	46 857	4,1
EC443	Mbizana	281 890	48 418	5,8
EC444	Ntabankulu	123 974	23 380	5,3
TOTAL		**801 336**	**168 143**	**4,8**

The largest portion of the district population is concentrated within the Mbizana Local Municipality at 281 890 people and accounts for nearly 35% of the total district population. It also has the highest population density of 100 persons/km^2. The next largest population is located within the Matatiele LM, however it also has the highest number of households at 49 488. The lower household density would result in a higher scheme development cost. The Ntabankulu LM has the lowest number of persons and households but the second highest number of persons per household. This can be ascribed to the more rural and traditional nature of the Local Municipality.

3.2 SOCIAL AND ECONOMIC INDICATORS

The district economy is characterized by limited formal economic activity and high dependency on the public sector for employment and social grants. Its proximity to the more developed towns of KwaZulu Natal such as Kokstad results in consumer spending leakage of funds outside of the district into the nearby Harry Gwala and Ugu District Municipal areas.

Alfred Nzo is the least significant contributor to the provincial GVA, contributing less than 1% of the province's GVA. The district local economy is heavily reliant on the Community Services sector, which contributes 28% of the Gross Value Adding (GVA) in the District. This includes salaries and wages for government employees such as office workers, nurses, teachers and doctors. The second highest contributor to the District' economy is Wholesale / Trade (15% of GVA).

This sector is underpinned by the public sector based expenditure through government employment and social grants. The third highest contributor to the District's economy is Agriculture (12% of GVA) and Manufacturing is the fourth highest contributor by 10% to the district economy. The contribution of the other sectors is very limited with construction contributing only 6% and transport sector contributing 6,4%. This is a reflection of a relatively large number of informal taxi operators in the area.

3.3 MAIN DEVELOPMENT NODES

The Alfred Nzo District Municipality's IDP of 2015/16 identified the following development nodes and development corridors that would assist in the development of the district. The details are as follows:

3.3.1 PRIMARY NODES

Mount Ayliff is one of the main urban centres within Alfred Nzo District. It is strategically located at the central parts of the district and it plays an important role as a regional centre within the district. It has a good potential as a primary node for investment promotion and centre of supply of services in the district. It forms part of the provincial spatial systems and is identified in the PSDP as one of the economic hubs. This node has administrative, social, and economic potential and there is provision of concentration of different activities of services. As a regional node, the following activities should be strengthened in Mount Ayliff Town:

- Development of commercial activities serving the entire district municipal area and the surrounding areas (region);
- Location of district and sub-district offices of various government departments and service delivery agencies;
- Location of facilities and services for an effective administration;
- Industrial development, focusing mainly on the processing of raw materials produced within the sub-region; and
- Location of public facilities serving the whole sub-region and beyond. These may include district hospital, sports facilities and transportation facilities.

3.3.2 SECONDARY NODES

There are three secondary nodes identified within the district and these are:

- Matatiele;
- Mount Frere; and
- Mbizana

These nodes currently function as the main urban centres for the local municipalities that they serve. Similar to the primary node, these areas are well located within the main transportation routes that connect nodes with various settlements within each local municipality. As a sub-regional node, the following activities should be strengthened in these secondary nodes:

- Development of commercial activities serving the whole local municipal areas and the surrounding areas (sub-region);
- Light Industrial development, focusing mainly on the processing of raw materials produced within the sub-region and the neighbouring areas – agri-processing centre;
- Location of public facilities serving the local municipalities. These may include sports and transportation facilities; and
- Location of facilities and services for an effective administration and local governance of the municipalities.

3.3.3 TERTIARY NODES

While the primary and secondary nodes serve as regional and sub-regional centres, at least three other areas present an opportunity for the development of tertiary nodes with much less threshold/sphere of influence, namely:

- Maluti;
- Cedarville; and
- Mzamba.

Three main factors have influenced the selection of these areas, such as:

- Location in relation to major access routes, tertiary nodes that are located either along a primary or secondary corridor or at the intersection of the primary and secondary corridors;
- Location in relation to large rural or urban settlements, which provides a threshold for services, rendered from these areas; and
- Development potential based on the above two factors, and broad overview of the historical development of the areas as well as the current level of development.

3.4 DEVELOPMENT CORRIDORS

Development corridors in Alfred Nzo District Municipality occur at different scales depending on function and categorization of the transportation route that forms the basis of the corridor. They carry the flows of people and trade between two points (origin and destination) and encourages nodal development at strategic point.

3.4.1 PRIMARY CORRIDOR

The N2 is identified in the NSDP as a national corridor, and is recognised as such (strategic transport route) in the PSDP. It runs in a north to south direction almost dividing Alfred Nzo District Municipality into half and link the area with KwaZulu-Natal towards the north as well as Eastern Cape towards the south. The N2 is a high-speed limited access road providing access and intermodal connections at a national and provincial level. At a regional and local level, it presents an opportunity for the integration of Alfred Nzo to the national and provincial trade routes. It is a tourist route to the major tourist destinations in Eastern Cape. Development along this route should occur as follows:

- Facilitate the establishment of mixed land-use activity nodes at the intersection of the N2 and the regional or provincial routes. Activities that may locate in these areas include logistics, warehousing, light industry and commercial facilities.

In the short to medium term, high value agricultural and located along the corridor should be protected, but in the long term, strategically located areas abutting onto the mixed land use nodes should be opened for development as mixed land use precincts.

3.4.2 SECONDARY CORRIDORS

R56 and R61 are the provincial routes that link Alfred Nzo with external significant nodes such as Kokstad, Port Edward and Mount Fletcher. Secondary to the N2, these routes serve as the main link between the Eastern Cape Province and KwaZulu-Natal Province. These are identified in the Provincial Spatial Development Plan (PSDP) - Eastern Cape as some of the Strategic Transport Routes.R56 is a multi-sectoral corridor as it facilitates access to agricultural zones in the Cedarville-Matatiele Area, tourism zones in the Ongeluksnek area and commerce and industry in Matatiele. It forms the basis for a road system that connects different parts of the municipal area.

Due to the current settlement patterns and population distribution, R61 has attracted a lot of settlement and establishment of business uses dependent on accessibility and population concentrations. The on-going densification along this route is resulting in R61 fulfilling the role of a

residential access road. Development along R61 and R56 Development Corridor should follow the following guidelines:

- R61 and R56 are regional limited access and high speed public transport routes, as such direct access onto this road should be subject to the provincial road transport regulations.
- Higher order land uses should be accommodated in the nodes, but lower order land uses could develop in a linear fashion subject to alternative access opportunities.
- A 15m buffer should be observed from the boundary of the road reserve. This has implications for settlements that have encroached onto the buffer areas.

3.4.3 TERTIARY CORRIDORS

There are a number of existing roads that have potential to develop as tertiary development These corridors create opportunities to unlock new development areas through the use of a network of tertiary corridors. The key existing tertiary corridors include:

- The road from Matatiele to Lesotho through Maluti is one of the roads that carry huge volumes of vehicular and trade related traffic. It also provides access to a large number of peri- urban and rural settlements located just outside of Maluti. This road requires regular maintenance and upgrade as it has huge volumes of traffic;
- Road to Ongeluksnek, which stretches nearly 15km outside of Matatiele. This road provides access to a tourist destination (tourism node) and block of high potential agricultural land located in the area. It also requires substantial upgrading and maintenance;
- Proposed Maluti–Kingscote link road. This road will run along the foothills of the Drakensburg Range and thus provide strategic linkages and unlock tourism development potential of this area;
- Road linking Matatiele and Ongeluksnek; Road linking Swartburg with both Matatiele and Cedarville; Road from Ntabankulu to N2 (leading to Mount Frere);
- Road from Ntabankulu to Isilindeni; Mzamba-Mtentu Road; and
- Other district roads provide access to clusters of rural service nodes and settlements.

There is also proposed national route (i.e. Wild Coast toll route) that would be positioned from Mbizana (Mzamba) to Lusikisiki. According to the discussion with the South African Roads Agency Limited (SANRAL), this toll road will not replace the existing N2. Both routes will be under the authority of the Department of Transport but the description of the existing N2 may change.

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).

Note that Water Supply Scheme (WSS) boundaries do not necessarily coincide with municipal boundaries. There are supply areas that traverse more than one Local Municipality. 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.

4.1 WATER SUPPLY SERVICE LEVEL

According to Census 2011, the extent of the water supply backlog within the Alfred Nzo District Municipality is 63% with the majority of the households that still have no access to any water supply infrastructure. The details per LM are provided in Table 4.1: Stats SA Census 2011 Water Supply Levels below.

Table 4.1: Stats SA Census 2011 Water Supply Levels

Water Supply Service Level	Description	Number of Households	% of Total Per LM
Above RDP Standards	House Connection	9 799	37%
	Yard Connection	17 181	
At RDP Standards	Communal Standpipe within 200m	36 034	
Below RDP Standard but with Infrastructure	Communal Standpipe within 200m - 500m	13 342	13%
	Communal Standpipe within 500m - 100m	4 978	
	Communal Standpipe within > 1 000m	3 512	
No Services	No Services	84 297	50%
Alfred Nzo Sub Total		**168 143**	
Above RDP Standards	House Connection	6 026	57%
	Yard Connection	7 632	
At RDP Standards	Communal Standpipe within 200m	14 318	
Below RDP Standard but with Infrastructure	Communal Standpipe within 200m - 500m	5 275	17%
	Communal Standpipe within 500m - 100m	2 107	
	Communal Standpipe within > 1 000m	1 276	
No Services	No Services	12 854	26%
Matatiele Sub Total		**49 488**	
Above RDP Standards	House Connection	2 041	47%
	Yard Connection	5 990	
At RDP Standards	Communal Standpipe within 200m	13 925	
Below RDP Standard but with	Communal Standpipe within 200m - 500m	4 332	15%

Water Supply Service Level	Description	Number of Households	% of Total Per LM
Infrastructure	Communal Standpipe within 500m - 100m	1 487	
	Communal Standpipe within > 1 000m	985	
No Services	No Services	18 097	39%
Umzimvubu Sub Total		**46 857**	
Above RDP Standards	House Connection	1 089	10%
	Yard Connection	2 256	
At RDP Standards	Communal Standpipe within 200m	1 334	
Below RDP Standard but with Infrastructure	Communal Standpipe within 200m - 500m	1 079	5%
	Communal Standpipe within 500m - 100m	743	
	Communal Standpipe within > 1 000m	778	
No Services	No Services	41 139	85%
Mbizana Sub Total		**48 418**	
Above RDP Standards	House Connection	643	36%
	Yard Connection	1 303	
At RDP Standards	Communal Standpipe within 200m	6 457	
Below RDP Standard but with Infrastructure	Communal Standpipe within 200m - 500m	1 656	12%
	Communal Standpipe within 500m - 100m	641	
	Communal Standpipe within > 1 000m	473	
No Services	No Services	12 207	52%
Ntabankulu Sub Total		**23 380**	

The majority of the backlogs reside within Mbizana LM (85%) and Ntabankulu LM (52%) as percentage of each LM's total households. The Mbizana LM has the largest backlog in the ANDM of 43 739 households below RDP standards.

4.2 WATER LOSSES AND DEMAND MANAGEMENT

Water Conservation and Demand Management is conducted by the Water Services Provider Unit within ANDM. While WCDM falls organisationally under the WSA unit, many of the water conservation issues have a direct bearing on water services operations. Specific, ongoing challenges that the WSP unit faces include:

- High water losses;
- Lack of meter information;
- Confusion over meter reading date (i.e. consistent time of the month);
- Inaccurate / incomplete reading and inaccurate data capturing;
- Position of WCDM in organogram;
- Delays in meter installation programme;
- Excessive reliance on consultants; and
- WCDM is not an isolated project but an ongoing approach underpinning all water services activities.

The ANDM has a number of ongoing water conservation and demand management initiatives under way at present that include those detailed in Table 4.2: ANDM Water Conservation and Demand Management Initiatives overleaf.

Table 4.2: ANDM Water Conservation and Demand Management Initiatives

Project No.	Project Name/Description	Objective	Status Quo/Comment
1	Costing of Water Service Provisioning, Tariff Policy and Tariff Modelling Tool.	To determine the cost of water provisioning. To develop a tariff policy for the ANDM. To develop a tariff modelling tool.	Service provider had been appointed to undertake the above stated project i.e. Worley Parsons SA is currently engaged with acquiring relevant information to develop the tool.
2	Review of the WCDM strategy	To review the current WCDM strategy document to include the Ntabankulu and Mbizana LMs.	Service provider had been appointed but the project is still at Inception stage.
3	Water Conservation Awareness Campaigns in the ANDM	To educate the communities of the ANDM about the importance of conserving water (thus, save water and report leakages in the water supply system). Paying for water and sanitation services.	Plenary sessions are being held incorporation with Environmental Section of WSA Unit, Income Section of BTO, DEAET, SANBI in preparation of the community outreach campaigns.
4	Water Resource Monitoring	To install water level monitoring devices in borehole water sources, dams and reservoirs. Endeavour to compile an accurate calculation of water resources' levels at the end of the financial year as required by the Auditor General.	The Service Provider had been appointed to supply, install monitoring devices and train the ANDM personnel on the operation of the automatic data logging system.
5	Installation of automatic data logging system and bulk meters at the WWTP and WTP inlets and outlets.	To enhance water balance calculations and improve on curbing water losses. To improve the operation of the water treatment plants as required for the BDS and GDS compliance.	The Project was advertised and is still at Tender stage.
6	Supply and Installation of consumer meters and devices in urban areas of the ANDM.	To enhance the revenue collection system in the ANDM taking into account the FBW Service of 6 kℓ/HH/month.	The Project had been advertised for the Highlands Township at Bizana, still at tender stage.
7	Eradication of IAP's and restoration of ANDM Catchments	To eradicate IAP's (Wattle, in particular) and reduce erosion effects in the ANDM Dam Catchments as one of the ANDM Catchment Management Strategy.	The project had been completed with 360 ha of wattle eradicated at Ntenetyana Dam Catchment. Preparation had been made to move the project to the Belfort Dam Catchments such preparations include desktop mapping with production of GIS map sheets.
8	Water Inventory	To improve on the billing system. To address issues pertaining to water losses. To enhance water balance calculations	The 2012 /2013 meter audit was conducted for the entire ANDM. Active visible leak detection survey is currently being undertaken for the entire ANDM. Installation of PRV's at Mt Frere, Mt Ayliff, Matatiele, Maluti and Cedarville is currently being undertaken by the appointed Service Provider, though the Project is poorly performed. Installation of bulk meters at the key billing points and zones including government institutions is currently being undertaken. Training of barefoot plumbers to attend to repairing of leaks was completed.

Project No.	Project Name/Description	Objective	Status Quo/Comment
9	Exploring other revenue collection system	To seek other means of revenue collection system in the ANDM.	The Project had been advertised and is still at tender stage.
10	Installation of consumer meters and devices in urban areas of the ANDM.		Continuation of the project to other areas i.e. Mt Frere, Ntabankulu and Mt Ayliff.
11	Asset Replacement Plan		The project will be undertaken under the water inventory objectives, a service provider will be sought to develop the Infrastructure Continuation of the project to other areas i.e. Mt Frere, Ntabankulu and Mt Ayliff.
12	Zone metering		Installation of zone meters for detailed analysis of water balance – project will be undertaken under the water inventory objectives.
13	Eradication of IAPs and restoration of ANDM Catchments		Similar approach as Ntenetyana Dam Catchment will be used at Belfort Dam catchment to eradicate IAPs.

Assessing demands includes water losses within the distribution network. The quantum of water loss is unknown, although, effective WCDM measures are required to allow the current systems to meet demands in the short term. The District Municipality's non-revenue water is estimated to be 47,5%.

4.3 WATER DEMAND MODEL

It was agreed that all PSP teams would utilise the 2011 Census as base database for demographics and service levels to apply to the water requirements model. The water requirements were calculated for the period from 2011 to 2035, in five-year increments, starting from 2015. Umgeni Water provided the calculated demographic growth rates, per Census sub-place for the KZN province, which were incorporated into the model.

The PSP engaged with each WSA to determine the current and planned level of service, which informed the potential development and service level growth for each settlement or town area. Furthermore, for the purpose of this study area – **ANDM** – the PSP utilised an approach also used in the All Towns Reconciliation Study for the DWS Northern Planning Region. In this approach, three scenarios were identified to make provision for progressively higher levels of service in areas, depending on the settlement or town type (guided by the characteristic of the settlement or town).

The water use categories applied for the various settlement or town categories are presented in Table 4.3: Settlement or Town Categories and Water Use. These categories were applied together with the service level scenarios and population growth rates, to determine the water requirements up to 2035.

Table 4.3: Settlement or Town Categories and Water Use

Category	Description	Household Income Per Annum	Consumption (l/c/d)
1	Very High Income; villas, large detached house, large luxury flats	>R 1 228 000	410
2	Upper middle income: detached houses, large flats	R 153 601 – R 1 228 000	295
3	Average Middle Income: 2 - 3 bedroom houses or flats with 1 or 2 WC, kitchen, and one bathroom, shower	R 38 401 – R 153 600	228
4	Low middle Income: Small houses or flats with WC, one kitchen, one bathroom	R 9 601– R 38 400	170
5	Low income: flatlets, bedsits with kitchen & bathroom, informal household	R 1 – R 9 600	100
6	No income & informal supplies with yard connections		100
7	Informal with no formal connection		100
8	Informal below 25 l/c/d		100

It was found that the theoretical model's water requirements that also made provision for water losses, aligned reasonably well with the actual water supply. Opportunities for WC/WDM could also be identified based on the expected water use and the actual water use.

4.3.1 WATER DEMAND FOR ALFRED NZO DISTRICT MUNICIPALITY

Table 4.4: Water Requirements (million m3 per annum) per Local Municipality and Table 4.5 Water Requirements (Mℓ/d), Per Local Municipality represents the water requirements (in million m³ per annum and Mℓ/d) for the ANDM and per Local Municipality. These water requirements were calculated for consumers having formal water supply schemes and for consumers not yet supplied from a formal water supply scheme. The Methodology Section in this report explains the approach to determine the theoretical water requirements and adjusted for water loss calculations.

Table 4.4: Water Requirements (million m^3 per annum) per Local Municipality

Local Municipality	Households (2011)	HH Below RDP (2011)	Water Requirements (Million m³ per annum)				
			2015	2020	2025	2030	2035
Matatiele	49 488	21 512	8,732	10,173	11,655	12,286	12,880
Mbizana	48 418	43 739	6,604	10,766	15,132	17,008	18,.932
Ntabankulu	23 380	14 977	3,391	4,325	5,288	5,415	5,490
Umzimvubu	46 857	24 901	6,865	8,087	9,346	9,521	9,629
TOTAL	**168 143**	**105 129**	**25,592**	**33,352**	**41,421**	**44,230**	**46,931**

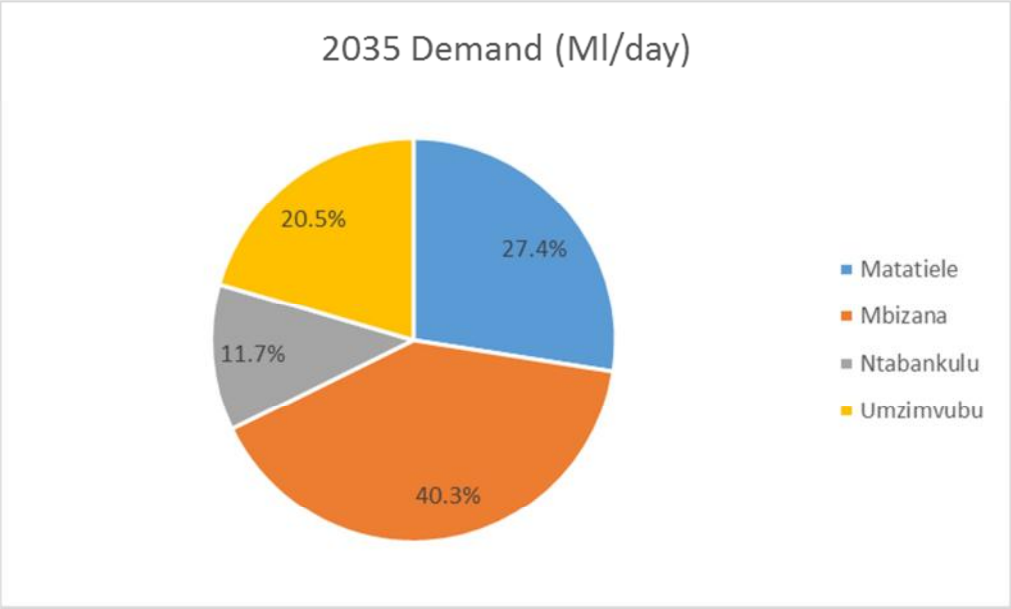
All of the LMs in the District are largely rural, although there is at least one town in each of the municipalities. Furthermore the district comprises about 1 400 villages ranging in size from 4 to 8 540 people and extensive farmland around Cedarville under the Matatiele LM. According to the All Town Reconciliation Strategy Report for ANDM dated August 2011, the water supply situation in the urban centres is mostly adequate, except for Matatiele and water supply in the rural villages is not sufficient.

Table 4.5 Water Requirements (Mℓ/d), Per Local Municipality

Local Municipality	Households (2011)	HH Below RDP (2011)	Water Requirements (Mℓ/d)				
			2015	2020	2025	2030	2035
Matatiele	49 488	21 512	23,922	27,871	31,933	33,662	35,286
Mbizana	48 418	43 739	18,093	29,494	41,455	46,600	51,869
Ntabankulu	23 380	14 977	9,291	11,852	14,490	14,832	15,039
Umzimvubu	46 857	24 901	18,808	22,158	25,605	26,085	26,381
TOTAL	**168 143**	**105 129**	**70,113**	**91,375**	**113,483**	**121,178**	**128,576**

The 2035 water requirements per LM are presented in in the form of a pie chart, illustrating that the Mbizana LM will be the largest water consumer in the ANDM, requiring 40,3% of all water.

Diagram 4.1: 2035 Demand Per LM



4.3.1.1 Demand per Regional Water Scheme

The water requirements for ANDM are presented in this section, per existing Water Supply Scheme (WSS) area and potential future Water Supply Intervention Area (WSIA) for the entire DM, thus covering all consumers in the municipality. Table 4.6: Water Requirements (million m³ per annum), Per Existing WSS and Potential WSIA and Table 4.7: Water Requirements (Mℓ/d), Per Existing WSS and Potential WSIA represent the water requirements in million m³ per annum and Mℓ/d respectively.

Table 4.6: Water Requirements (million m³ per annum), Per Existing WSS and Potential WSIA

Local Municipality	Households (2015)	Population (2015)	Water Requirements (Million m³ per annum)				
			2015	2020	2025	2030	2035
Kinira River Dam WSS	46 958	190 942	8,284	9,627	11,009	11,600	12,154
Mbizana RBWS	51 985	297 667	6,604	10,766	15,132	17,008	18,932
Mkemane Dam Integrated RWSS	46 073	194 686	6,184	7,569	8,996	9,227	9,388
Nkanji Dam Integrated RWSS	29 461	134 598	4,521	5,390	6,283	6,395	6,457
TOTAL	**174 477**	**817 893**	**25,592**	**33,352**	**41,421**	**44,230**	**46,931**

The demand per water supply scheme provided in Mℓ/day is detailed in the table below.

Table 4.7: Water Requirements (Mℓ/d), Per Existing WSS and Potential WSIA

Local Municipality	Households (2015)	Population (2015)	Water Requirements (Mℓ/d)				
			2015	2020	2025	2030	2035
MAT001: Kinira River Dam Regional Water Supply Scheme	46 958	190 942	22,693	26,376	30,162	31,781	33,297
MBZ001: Mbizana Regional Water Supply Scheme	51 985	297 667	18,093	29,494	41,455	46,600	51,869
UMZ001: Mkhemane Dam Integrated Regional Water Supply Scheme	46 073	194 686	16,941	20,739	24,649	25,281	25,721
THB001: Nkanji Dam Integrated Regional Water Supply Scheme	29 461	134 598	12,386	14,766	17,217	17,517	17,689
TOTAL	**174 477**	**817 893**	**70,113**	**91,375**	**113,483**	**121,178**	**128,576**

The Mbizana RBWSS supplying water to communities under the Mbizana LM has the largest projected 2035 demand amounting to 40,3% of the total demand from all the water schemes.

The aforementioned water requirements will be compared with the water demands used in all the existing regional planning studies that are currently underway within the ANDM.

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) in the ANDM. The figures illustrating the schemes are provided in **Annexure B** of this document.

Population figures were provided based on the 2011 Census, but the current water supplied, were obtained and confirmed from officials and based on recent technical reports.

The Water Supply Scheme (WSS) footprints were initially obtained from the DWS Reference Framework geodatabase (spatial database), but have been updated based on discussions with officials from the ANDM as well as the DM's asset register. Only settlements or areas currently served by an existing scheme are reported on in this section.

5.1 WATER RESOURCE AVAILABILITY

According to the National Water Resource Strategy, the Mzimvubu to Keiskamma Water Management Area will have a positive water balance of 458 million m³ per annum until the year 2025. In the South African context, the area has abundant water resources and is not considered a water scarce area. However, the problem is that water resources are not utilised efficiently and water conservation is rarely practiced.

Although the rainfall in the area is not especially high, water requirements are less than the available yield of the catchments, with the result that the area is one of the few in the country that has surplus water available on a catchment wide basis.

Although it is estimated that significant quantities of groundwater could be abstracted in the area, the actual use of groundwater is relatively small. This is mainly attributed to the generally well-watered nature of the area and the wide occurrence of perennial surface streams, which reduces the need for groundwater abstraction

There is currently only one major dam, the Ludeke Dam, but some smaller dams and run-of-river schemes exist throughout the ANDM area to supply water to the domestic users. In addition, there are several borehole schemes as well as single borehole supply for some villages.

A list of the relevant dams with information about yield and allocation is given in Table 5.1: Major dams for domestic supply in ANDM area below.

Table 5.1: Major dams for domestic supply in ANDM area

Dam Name	Capacity (million m³)	Yield (million m³ per annum)		
		Domestic	Irrigation	Other / Surplus
Ludeke Dam	14,5	8,8	TBC	TBC
Mountain Dam	1,082	1,08*	0	0
Annie's Valley Dam	0,24	-	-	-
Bon Accord No.2 Dam	0,084	-	-	-
Harbin Dam	0,073	-	-	-

Dam Name	Capacity (million m³)	Yield (million m³ per annum)		
		Domestic	Irrigation	Other / Surplus
Ntenteyana Dam	1,4	2,2	0	0
Belfort Dam	0,602	0,471	0	0,131
Total	**17,981**	**12,551**	**-**	**0,131**

(Source: ATS 2011)
**Yield is for the combined mountain and town dam*

5.2 AVAILABLE WATER RESOURCES AND INTERVENTIONS

Currently all towns are supplied by local surface water schemes, some of which are augmented by groundwater. In order to alleviate the shortfall in water supply and to allow for the required upgrade in the level of water services in some of the towns, several local intervention options are available, e.g.:

- Implement Water Conservation and Water Demand Management measures, to limit losses;
- Upgrade of existing infrastructure to increase yield or assurance of supply;
- Groundwater development;
- Surface water schemes;
- Water re-use for urban centres; and
- Rainwater harvesting.

5.3 URBAN AND BULK WATER SUPPLY: PHYSICAL INFRASTRUCTURE

The urban and bulk water supply schemes are briefly described here, focusing on the source of abstraction, treatment (Water Treatment Plant – WTP), pumping, bulk distribution, storage and reticulation per Local Municipality. The information is sourced from the following various planning documents that are available:

- ANDM WSDP 2015/16;
- Stats SA Census 2011;
- DWS Reference Framework, November 2014; and
- All Towns Reconciliation Strategies, 2011 (some currently under review).

5.3.1 MATATIELE LOCAL MUNICIPALITY

5.3.1.1 Matatiele Town Water Supply

The town of Matatiele is currently supplied with potable water by a water treatment plant situated in the southern part of town. The town also receives water from a series of boreholes utilised predominantly for the new housing development of Harry Gwala Park. The 2Mℓ/d water treatment plant obtains raw water from two sources, namely Mountain Dam and Mountain Lake.

The current volume of water supplied by the water treatment plant and produced from the boreholes has been measured as approximately 3,1Mℓ/d (or 36ℓ/s). Of this total, the estimated supply from the boreholes is 0,35Mℓ/d (4ℓ/s) representing 11%. (This data has been sourced largely from recent water demand management and regional planning studies).

In winter, the water level in the Mountain Dam can drop dramatically and supplementation of flow from the Mountain Lake is limited by the pipe size. In addition, inadequate monitoring and maintenance of the boreholes limit their effectiveness in supplementing supply to the town. Water from the water treatment plant is distributed under gravity to a network of domestic, commercial and institutional connections in the town. The boreholes located in the area of the old town pump directly into the network. The boreholes in the Harry Gwala Park pump to a high-level reservoir from where consumers are supplied under gravity.

The current population of the town is estimated at 7 150, although much of the water demand is from shops, institutions and businesses. The current estimated demand is 9,3Mℓ/d whereas the supply is around 3,1Mℓ/d.

To address this shortfall in supply, Alfred Nzo District Municipality is currently developing infrastructure to augment the supply to the town from a new wellfield that is being developed in the Kinira River Valley.

Eleven exploratory boreholes were drilled and tested, and three of these exploratory boreholes were identified as potential production boreholes to meet the short-term needs of Matatiele Town.

A Service Provider (Beacon Consulting Engineers) has been appointed to manage design and construction of the rising main and equipping of the boreholes to augment the Matatiele town water supply.

5.3.1.2 Maluti Town Water Supply

The Maluti Water Supply Scheme was built in the early 1980s by the former Transkei Government and was transferred to Alfred Nzo District Municipality in 2004. The scheme is located in the northern area of the Municipality and sources water from the Belfort Dam that is located on the slopes of the Drakensberg Mountains close to the Lesotho border. The scheme supplies potable water to the Town of Maluti, 15 rural villages and a military garrison that currently functions as a police camp. The total population served by the scheme is estimated to be 25 000 people.

Water from the Belfort Dam is fed under gravity to the Belfort Water Treatment Plant (sometimes also referred to as the Maluti Water Treatment Plant) through 13,5 km of steel and AC pipes. There are numerous leaks on the raw water line and considerable water is lost. The town of Maluti is currently supplied with potable water by a water treatment plant situated north-east of the town. The water treatment plant obtains raw water from the Belfort Dam, located approximately 15km to the north. The current volume of water being processed by the water treatment plant has been measured at approximately 0,6Mℓ/d (or 7ℓ/s).

Water from the water treatment plant is distributed under gravity to a network of domestic, commercial and institutional connections in the town. The boreholes pump directly into the main town storage reservoir.

The current population of the town is 6 046 residing within 1 464 households. There are also large informal areas surrounding the town that receive water from the same system. Much of the water demand is from shops, institutions, businesses and surrounding informal settlements and the current total water demand is estimated at 7,8Mℓ/d. The water treatment plant is a conventional plant with flocculent dosing, sedimentation, filtration through pressure filters and chlorination. The water treatment plant is able to operate at 13ℓ/s (1,12Mℓ/d), limited by the flow in the raw water line from the dam and the throughput of the filter pumps. Downstream from the treatment plant is a bulk

supply system including over 30km of bulk supply pipelines, 7 pump stations and 19 storage reservoirs.

Internal reticulation to the RDP standard is provided to 15 villages. The town of Maluti has reticulated water supply with most consumers within the formal boundaries of the town enjoying household connections. The military garrison is fully reticulated and even has provision for the watering of horses that were used by the military in the past. It now operates as a police camp. Since transfer to the Alfred Nzo District Municipality, the scheme has suffered from numerous leaks and pipe bursts and many components may be getting to the end of their design life.

5.3.1.3 Cedarville Water Supply

The town of Cedarville is currently supplied with potable water from three boreholes located within the town. No water meters are installed at the pump stations and it is therefore only possible to estimate the volume of water being abstracted. This is estimated to be 0.2Mℓ/day. Water from the boreholes is distributed under gravity to a network of domestic, commercial and institutional connections in the town after it has been disinfected at the high level reservoirs to the south of the town. The current population of the town is estimated at 4 400, although a significant proportion of the total demand may be from shops, institutions and businesses.

5.3.1.4 Standalone Rural Water Schemes in Matatiele LM

In addition to the larger schemes, there are numerous standalone water schemes serving other rural communities in Matatiele. A number of these schemes are fed from groundwater sources by diesel-driven pumps; although a large number are also fed under gravity from springs and streams in the mountains. Rural operators are employed on a part-time basis and paid a monthly allowance to assist with the operation and maintenance of the water supply schemes.

5.3.2 MBIZANA LOCAL MUNICIPALITY

Water services infrastructure in the Mbizana LM is dominated by a substantial regional water supply scheme that supplies communities from the Ludeke Dam constructed on the Ludeke River. There are approximately 20 standalone water schemes in other communities and the majority of communities are very poorly served – below RDP standards for water supply and sanitation.

5.3.2.1 Ludeke Dam

The Ludeke Dam is a clay cored rockfill dam with a side channel concrete-lined spillway constructed at the confluence of Ludeke and KuNtlamvukazi rivers. Intake works comprise of a reinforced concrete tower with an internal diameter of 4,0m. Outlet works comprise pipes with control valves. The Dam would ultimately be the main source of water supply to the whole of the Mbizana LM. Raw water is pumped from the Ludeke Darn for purification at the Nomlacu WTP.

5.3.2.2 Nomlacu Water Treatment Plant

The Nomlacu WTP has a current capacity of 10,5Mℓ/d and but was designed in such a way that it could easily be upgraded to a 20Mℓ/d WTP. The raw water storage reservoir at the end of the pumping main has a capacity of 2 250 m^3. The plant is designed to operate on two streams — each designed for 5Mℓ/d plus 10% losses to be delivered over 20 hours. The existing clarifying structures treat the sludge from the clarifiers and the backwash streams. The clear water storage is sized at 1 650m^3 with allowance for a further 1 000m^3 in the future. The treated water is conforming to SANS 241 Class 1 standards. However, once the whole of the Mbizana LM is connected to the source, the plant would be needed to be upgraded to a 33Mℓ/d.

5.3.2.3 Standalone Rural Water Schemes in Mbizana LM

There are approximately 20 standalone water schemes serving other communities in Mbizana. The majority of schemes are fed with water by diesel-driven pumps.

5.3.3 NTABANKULU LOCAL MUNICIPALITY

Water Services in Ntabankulu are now managed by the Alfred Nzo District Municipality, which fulfils the role of both Water Services Authority and Water Services Provider. The area previously fell under OR Tambo District, until July 2011 when it was transferred to Alfred Nzo District.

Water infrastructure has been developed in the area over the years and includes:

- Former DWS Schemes;
- Small standalone schemes (constructed by agencies such as Mvula Trust);
- New schemes constructed by the District Municipality; and
- Schemes recently funded by other agencies (i.e. Japanese Government).

5.3.3.1 Ntabankulu Town Water Supply

Ntabankulu Town Water Supply Scheme receives its water from two sources, namely two boreholes and the Ntabankulu Forest Dam. Raw water gravitates to the waterworks through an approximately 4,3km long, 160 mm diameter pipeline. The water from the boreholes is pumped through a 75mm diameter pipe to one of the two clear water reservoirs located at the treatment plant (0,84 Mℓ/d capacity). The town and its residential areas are supplied from these two reservoirs through a 160mm diameter pipeline that decreases to various diameters within the reticulation network.

Treatment at the Ntabankulu Water Treatment Plant is achieved through dosing the raw water with aluminium sulphate (“alum”), water clarification in an up-flow clarifier, filtration in an enclosed vertical, self-backwashing, filter and disinfection with HTH tablets.

5.3.3.2 Standalone Water Schemes in Ntabankulu LM

There are approximately 50 standalone water schemes serving other communities in Ntabankulu. The majority of schemes are fed with water by diesel-driven pumps. A particular challenge in Ntabankulu is that the steep valleys mean that considerable pumping is required to bring water to the people. An example is the Dambeni Water Supply Scheme (funded by the Japanese Government), where multi-stage pumping using electrical pumps is required.

5.3.4 UMZIMVUBU LOCAL MUNICIPALITY

5.3.4.1 Mount Ayliff Town Water Supply

The town of Mount Ayliff is currently supplied with potable water from a water treatment plant situated to the west of the town. This water treatment plant obtains raw water from two sources, namely a pumped water supply from the Mzintlava River and a weir that captures spring water from the valley above the works. The current volume of water being processed by the water treatment plant has been measured at approximately 1,4Mℓ/d (or 161ℓ/s). Of this, around 40ℓ/s (25%) is sourced from the gravity weir and 121ℓ/s (75%) from the Mzintlava River.

In order to address the water supply challenges faced by Mount Ayliff, Alfred Nzo DM, is progressively rolling out Regional Bulk Water Infrastructure across the whole district. In the Mount Ayliff area, this proposed regional bulk infrastructure centres on a proposed future dam in the Sirhoqobeni Valley, some 10km from the town. Such a dam will take many years to develop. In the

short-term, a new weir supply is being developed to supply the town. The new weir supply will feed raw water from four weirs on Ntsizwa Mountain to the water treatment plant at Mount Ayliff. These weirs are in the valleys of Sirhoqobeni, Ndikini and Nkanji.

The weirs are projected to supply an additional 40ℓ/s to the water treatment plant to augment the current supply from the gravity weir and from the Mzintlava River. The DM also has plans to upgrade the capacity of the current Mount Ayliff Water Treatment Plant to accommodate this additional raw water supply.

5.3.4.2 Mount Frere Water Supply

The town of Mount Frere is currently supplied with potable water by a water treatment plant situated above the town. This water treatment plant obtains raw water from the Ntenetyana Dam that is situated 17km upstream. The Dam is an earthfill embankment structure situated on the Ntenetyana stream, which is a tributary of the Mzimvubu River. The Ntenetyana Dam is an existing Category 2 dam, some 24m high and with a full supply capacity of 0,6 MAR or 1,62 million m^3 and is the sole source of water for the KwaBacha RWSS. The updated 98% yield of the dam is 0,9 million m^3 per annum or 2,5Mℓ/d incorporating provision for a Class C EFR amounting to 22,5% MAR.

ANDM is currently implementing augmentation works at the Ntenetyana Dam, including provision of a raw water pump station and new WTP facility, as well as duplication of the existing 300ND gravity main with a new 400ND pipeline, discharging to the existing KwaBacha WTP located on the outskirts above Mount Frere. The planned Phase 1 capacity of the WTP is 6,5Mℓ/d with provision for duplication in the future to 13,0Mℓ/d. On commissioning of Phase 1, it is planned to de-commission the existing KwaBacha WTP.

6. 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 Municipal Water infrastructure Grant (MWIG). 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[1] or sub regional [2]scale (over vast distances[3]), 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 5 Mℓ/d or more;
- Any waste water treatment plant that discharges into a fresh water resource system; and
- Any water treatment plant that is designed for a maximum demand of more than 2Mℓ/d.

An Interim/Intermediate Water Supply Programme (IIWSP) was initiated in 2012 by the Minister of Water Affairs as recognition of the plight of the many people without services, particularly in rural areas. The purpose of this programme was not to duplicate other existing programmes or initiatives but to supplement them were there are gaps and to provide some short-term and quick win solutions. The programme also envisaged addressing functionality related problems and not only addressing new infrastructure requirements. This resulted in the establishment of the MWIG to fund the IIWSP.

6.1 REGIONAL BULK WATER PROJECTS IN PLANNING

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 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 for infrastructure development over the next three years are tabled within Table 6.1: Grant Funding Streams overleaf.

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

[2] "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

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

Table 6.1: Grant Funding Streams

Grant Funding Programme	No of Projects	Total Cost Requirement	FY 2015/16	FY 2016/17	FY 2017/18	Total MTEF
23DM/MWIG	57	R 172 295 000	R 91 071 000	R 90 219 000	R 167 241 000	R 348 531 000
MIG	47	R 3 699 378 850	R 532 295 000	R 554 186 000	R 587 000 000	R 1 673 481 000
RBIG	8	R 4 763 210 337	R 42 479 887	R 230 000 000	R 266 789 164	R 539 269 051
		R 8 634 884 187	**R 766 555000**	**R 665 845 887**	**R 874 405 000**	**R 1 021 030 164**

The existing cost requirement for water services within ANDM is R 8,6 billion rand and represents a wall-to-wall coverage of the total need. Substantial planning studies have been conducted that were taken in consideration when the overall bulk supply intervention areas were determined. The existing bulk interventions currently in planning are tabled within Table 6.2: RBIG Water Supply Interventions currently in planning below.

Table 6.2: RBIG Water Supply Interventions currently in planning

LM	Project No	Project Name	Project Description	Total Cost Requirement	FY 2015/16	FY 2016/17	FY 2017/18
Matatiele	ECR001 // F/ECDC44 /001/W	Matatiele Bulk Water Supply Scheme	Feasibility for development of Kinira Valley Dam, includes 5ML Reservoir	R 872 397 365	R 25 000 000	R 66 000 000	R 36 209 372
Mbizana	ECR008	Mbizana Regional Bulk WS (Phase 1)	Mbizana Regional Bulk Water Supply. Phases 2 - 4 to follow.	R 910 843 303	R 13 081 967	R 90 000 000	R 120 936 884
Ntabankulu	ECR044 // N/ECDC4 4/038/W	Ntabankulu Regional Bulk Water Supply	Ntabankulu Regional Bulk Water Supply	R 1 492 145 109	R 0	R 1 500 000	R 11 000 000
Umzimvubu	ECR036	Mount Ayliff Bulk Water Supply Scheme	Mount Ayliff Bulk Water Supply Scheme	R 164 200 000	R 1 897 920	R 50 000 000	R 40 642 908
Umzimvubu	N/ANDM/PMU/33/18/10/07	Alfred Nzo (Umzimvubu LM) Regional Bulk Water Supply	Mkemane Regional BWSS	R 1 101 266 560	R 0	R 2 500 000	R 10 000 000
Umzimvubu	N/ECDC4 4/002/W/S	Mount Ayliff - Bulk Peri Urban Water Supply	Phase 1 to Phase 3	R 187 358 000	R 2 500 000	R 20 000 000	R 48 000 000
Umzimvubu	N/ECDC4 4/039/W	Alfred Nzo (Umzimvubu LM) Regional Bulk Water Supply	Feasibility for development of Soroqobeni River Dam in Mount Ayliff	R 35 000 000	R 0	R 0	R 0
				R 4 763 210 337	**R 42 479 887**	**R 230 000 000**	**R 266 789 164**

The total MTEF 2015/18 over the next three years shows a total allocation of R 539 million for regional bulk. However, the total bulk requirement is R 4,7 billion. This would result in ANDM taking

at least seven (7) years to address their total bulk infrastructure needs. The details of the projects are provided within the paragraphs hereafter.

6.1.1 ECR001//F/ECDC44/001/W: MATATIELE BULK WATER SUPPLY SCHEME

The scope of work includes the provision of bulk water to the Matatiele LM, including the towns of Matatiele, Maluti, Cedarville, and all of the rural villages in the 26 Wards within the boundaries of the Local Municipality. The project objective is to investigate, develop, design and implement an economic, sustainable and viable regional bulk water supply infrastructure for the entire Matatiele Local Municipality.

The recommended development option includes the development of the proposed Kinira River Dam as primary bulk water source with the wellfields as interim and supplementary water source and would therefore comprise of the following.

- The Kinira River Dam development;
- Incorporation of the Wellfield development;
- Incorporation of existing water sources, where possible;
- Water Treatment Plant;
- Primary Bulk Distribution Network; and
- Secondary Bulk Water Distribution Network.

6.1.2 ECR008: MBIZANA REGIONAL BULK WS (PHASE 1)

This project commenced in 2009 and comprised of the development of the Ludeke Dam on the Ludeke River that would ultimately supply the whole of the Mbizana LM. The construction of the Ludeke Dam and the Nomlacu WTP is now completed. The construction of the raw water pumping infrastructure with a capacity of 22Mℓ/d was completed in December 2013. The dam construction was completed in 2014. The capacity of the dam is 6Mm^3 per annum or average 16,5Mℓ/d. The upgrade and extension of the Nomlacu Water Treatment Plant (WTP) was completed in April 2012.

6.1.3 INTEGRATED UMZIMVUBU AND NTABANKULU REGIONAL BULK WATER SUPPLY

The integrated supply will include the following RBIG projects:

- ECR044 // N/ECDC44/038/W Ntabankulu Regional Bulk Water Supply;
- ECR036: Mount Ayliff Bulk Water Supply Scheme;
- N/ANDM/PMU/33/18/10/07:: Alfred Nzo (Umzimvubu LM) Regional Bulk Water Supply;
- N/ECDC44/002/W/S: Mount Ayliff - Bulk Peri Urban Water Supply; and
- N/ECDC44/039/W: Alfred Nzo (Umzimvubu LM) Regional Bulk Water Supply.

It is envisaged that the Mkemane Dam would supply water to the Mount Frere area of Umzimvubu Municipality as well as western and southern regions of Ntabankulu Municipality. The Nkanji/Mvalweni dam would supply the Mount Ayliff area of Umzimvubu Municipality as well as northern and eastern regions of Ntabankulu Municipality. Water treatment plant will be located downstream of the proposed dams and bulk potable water supply pipelines will convey potable water from the WTPs to command reservoirs strategically placed within each supply region. Initial investigations have indicated that the bulk pipelines would generally operate under gravity except for isolated localised areas that might require booster pumps. Internal bulk gravity water schemes will be devised to link the command reservoirs to existing and proposed new localised terminal reservoirs within the communities.

The aforementioned RBIG projects are supplemented by MIG projects to address the internal water reticulation. The following MIG projects are included within ANDM's 3-year MTEF funding plan and listed below.

Table 6.3: ANDM MIG Water Supply Projects

LM	Project Number	Project Name and Description		Total Cost Requirement	FY 2015/16	FY 2016/17	*FY 2017/18*
Matatiele	N/ANDM/PMU/06/07/MIG 001-003	Maluti /Ramohlakoana - Bulk Water Supply	Not in Phases	R 44 500 000	R 6 500 000	R 0	R 0
Matatiele	N/ECDC44/014/W	Balfour Dam	Not In Phases	R 7 000 000	R 0	R 0	R 0
Matatiele	N/ECDC44/022/W	Ngqumane Villages Water Supply	Ngqumane Villages Water Supply	R 18 954 943	R 0	R 0	R 0
Matatiele	N/ECDC44/033/W	Matatiele Ward 5 Water Project	Matatiele Ward 5 Water Project (includes feasibility study)	R 204 103 706	R 0	R 0	R 0
Matatiele	N/ECDC44/034/W	Matatiele Ward 7 Water Project	Matatiele Ward 7 Water Project	R 136 918 078	R 0	R 0	R 0
Matatiele	N/ECDC44/035/W	Matatiele Ward 15 Water Project	Matatiele Ward 15 Water Project (includes feasibility study)	R 93 310 748	R 0	R 0	R 0
Matatiele	N/ECDC44/036/W	Matatiele Ward 16 Water Supply & Storage Project	Matatiele Ward 16 Water Supply & Storage Project (includes feasibility)	R 19 450 000	R 3 300 000	R 0	R 0
Matatiele	N/ECDC44/037/W	Matatiele Ward 22 Water Project	Matatiele Ward 22 Water Project (includes feasibility study)	R 153 061 502	R 0	R 0	R 0
Matatiele	N/ECDC44/038/W	Matatiele Water 4 Water Supply Scheme	Matatiele Water 4 Water Supply Scheme	R 45 746 142	R 0	R 0	R 0
Matatiele	N/ECDC44/040/W	Tholang Water Supply	Tholang Water Supply	R 5 353 426	R 0	R 0	R 0
Matatiele	N/ECDC44/042W	Bedford Bulk Pipes	Bedford Bulk Pipes	R 8 000 000	R 0	R 0	R 0
Matatiele	N/ECDC44/066/W	Hlomdenlini Water Supply Scheme	Hlomdenlini Water Supply Scheme - Phase 2	R 3 647 674	R 0	R 0	R 0
Matatiele	W/EC/6929/09/12	Fobane Sub Regional	Fobane Sub Regional - Phase 1 and Phase 2	R 301 851 060	R 10 500 000	R 0	R 0
Matatiele	W/EC/7656/09/11	Tholamela Sub-Regional water supply	Tholamela Sub-Regional	R 84 000 000	R 15 000 000	R 0	R 0

LM	Project Number	Project Name and Description		Total Cost Requirement	FY 2015/16	FY 2016/17	*FY 2017/18*
Mbizana	EC532	Mbizana Raw Water Augmentation Scheme (Ludeke Dam)	Mbizana Raw Water Augmentation Scheme (Ludeke Dam)	R 74 933 583	R 0	R 0	R 0
Mbizana	N/DC15/067/W	Mbizana Water supply to Wards 11, 14 & 16	Mbizana Water supply to Wards 11, 14 & 16	R 191 004 600	R 0	R 0	R 0
Mbizana	N/DC15/068/W	Mbizana Feasibility Study for Wards 21, 23 & 24	Mbizana Feasibility Study for Wards 21, 23 & 24	R 9 854 616	R 0	R 0	R 0
Mbizana	N/DC15/069/W	Mbizana Feasibility Study Water Supply Cluster 3 for Wards 25, 27 & 28	Mbizana Feasibility Study Water Supply Cluster 3 for Wards 25, 27 & 28	R 14 072 730	R 0	R 0	R 0
Mbizana	N/DC15/070/W	Mbizana Water Supply Scheme to Wards 10, 12, 13 & 15	Mbizana Water Supply Scheme to Wards 10, 12, 13 & 15	R 258 423 871	R 0	R 0	R 0
Mbizana	N/ECDC44/041/W	Greater Mbizana Water Supply Phase Reticulation (Phase 1A & 1B)	Greater Mbizana Water Supply Phase Reticulation (Phase 1A & 1B)	R 848 166 678	R 20 000 000	R 0	R 0
Mbizana	N/ECDC44/069/W	Mbizana Ward 29 & 30 Feasibility Study	Mbizana Ward 29 & 30 Feasibility Study	R 8 180 480	R 0	R 0	R 0
Ntabankulu	N/DC15/032/W	Nyokweni Water / Bomvini Regional Bulk Supply - Phase 2	Upgrading of abstraction point and Bomveni	R 73 664 610	R 7 000 000	R 0	R 0
Ntabankulu	N/DC15/033/W	Extension of Mfundisweni Water Supply	Extension of Mfundisweni Water Supply	R 5 000 000	R 0	R 0	R 0
Ntabankulu	N/DC15/037/W	Ntabankulu Ward 14 Feasibility Study Potable Water	Ntabankulu Ward 14 Feasibility Study Potable Water	R 3 053 359	R 0	R 0	R 0
Ntabankulu	N/DC15/038/W	Ntabankulu Ward 3 & 4 Water Supply Scheme Feasibility Phase	Ntabankulu Ward 3 & 4 Water Supply Scheme Feasibility Phase	R 4 943 699	R 0	R 0	R 0
Ntabankulu	N/ECDC44/067/W	Ntabankulu Ward 17 & 18 Water Supply Feasibility Study	Ntabankulu Ward 17 & 18 Water Supply Feasibility Study	R 5 476 228	R 0	R 0	R 0

LM	Project Number	Project Name and Description		Total Cost Requirement	FY 2015/16	FY 2016/17	*FY 2017/18*
Ntabankulu	N/ECDC44/068/W	Ntabankulu Ward 12 Feasibility Study Potable Water	Ntabankulu Ward 12 Feasibility Study Potable Water	R 2 610 178	R 0	R 0	R 0
Umzimvubu	EC346	Toleni Water Supply Phase 2	Toleni Water Supply Phase 2	R 2 000 000	R 0	R 0	R 0
Umzimvubu	ECDC15/106/W/06/07	Umzimvubu Regional Water Supply	Umzimvubu Regional Water Supply	R 116 251 036	R 25 000 000	R 0	R 0
Umzimvubu	N/DC15/071/W	Umzimvubu Potable water supply Cluster 2 to Wards 3 & 17	Umzimvubu Potable water supply Cluster 2 to Wards 3 & 17	R 12 617 290	R 0	R 0	R 0
Umzimvubu	N/DC15/072/W	Umzimvubu Feasibility Study Cluster 1 to Wards 20 & 21 Water Supply Scheme	Umzimvubu Feasibility Study Cluster 1 to Wards 20 & 21 Water Supply Scheme	R 5 632 461	R 0	R 0	R 0
Umzimvubu	N/ECDC44/001/W/S	Mount Frere Water and Sewerage Provision	Not In Phases	R 29 500 000	R 0	R 0	R 0
Umzimvubu	N/ECDC44/002/W	Cabazana Bulk Water Supply	Cabazana Bulk Water Supply (Phase 1 and Phase 2)	R 100 501 789	R 6 806 850	R 0	R 0
Umzimvubu	N/ECDC44/015/W	Mt.Frere Bulk Water Supply	Not in Phases	R 26 000 000	R 0	R 0	R 0
Umzimvubu	N/ECDC44/023/W	Siqhingeni Water Supply	Siqhingeni Water Supply (includes feasibility study)	R 30 092 055	R 1 500 000	R 0	R 0
Umzimvubu	N/ECDC44/026/W	Fog Water Harvest	Fog Water Harvest	R 2 000 000	R 0	R 0	R 0
Umzimvubu	N/ECDC44/027/W	Umzimvubu Ward 6 Water Supply Project	Umzimvubu Ward 6 Water Supply Project (feasibility phase)	R 69 984 874	R 0	R 0	R 0
Umzimvubu	N/ECDC44/028/W	Umzimvubu Ward 13 Bulk Water Supply Project	Umzimvubu Ward 13 Bulk Water Supply (includes source development)	R 121 896 096	R 5 000 000	R 0	R 0
Umzimvubu	N/ECDC44/029/W	Umzimvubu Ward 14 Water Supply Scheme	Umzimvubu Ward 14 Water Supply Scheme - Implementing Phase	R 123 601 108	R 15 000 000	R 0	R 0

LM	Project Number	Project Name and Description		Total Cost Requirement	FY 2015/16	FY 2016/17	*FY 2017/18*
Umzimvubu	N/ECDC44/030/W	Umzimvubu Ward 22 Water Project	Umzimvubu Ward 22 Water Project (feasibility study included)	R 51 253 668	R 0	R 0	R 0
Umzimvubu	N/ECDC44/032/W	Umzimvubu Ward 24 Water Project	Umzimvubu Ward 24 Water Project - Implementing Phase	R 95 528 684	R 0	R 0	R 0
Umzimvubu	W/EC/6701/06/08	Ntibane Water Supply	Ntibane Water Supply - Phase 2	R 88 798 481	R 20 000 000	R 0	R 0
Umzimvubu	W/EC/7163/09/10	Hlane Water Supply	Not In Phases	R 36 000 000	R 1 500 000	R 0	R 0
Umzimvubu	W/EC/8450/08/11	KwaBaca Regional Water Supply	Section 1 - 4	R 56 894 231	R 0	R 0	R 0
Umzimvubu	W/EC/8650/10/12	Qwidlana Water Supply Project Area 5	Qwidlana Water Supply Project Area 5	R 78 730 353	R 15 000 000	R 0	R 0
Umzimvubu	W/EC/8735/10/12	Cabazi Water Supply	Cabazi Water Supply	R 24 814 813	R 0	R 0	R 0
Umzimvubu	Cabazi Water Supply	Cabazi Water Supply	24814813	R 0	R 0	R 0	
				R 3 697 378 850	**R 152 106 850**	**R 0**	**R 0**

7. SYNOPSIS OF EXISTING AND COMMITTED SCHEMES

7.1 GAP ANALYSIS

A gap analysis has been undertaken for the water schemes in the ANDM. The gap analysis has taken into account all current planning interventions by the WSA. In this regard, the entire Alfred Nzo District has been demarcated into regional water schemes in line with short and long-term plans by the WSA. A total of four (4) schemes have been identified and are as follows:

1. MAT001: Kinira River Dam WSS;
2. BIZ001: Mbizana RBWSS;
3. UMZ001: Mkhemane Dam Integrated Regional WSS; and
4. TBN001: Nkanji Dam Integrated Regional WSS.

The gap analysis for the four regional schemes is discussed under this section.

7.1.1 MAT001: KINIRA RIVER DAM WSS

The town of Matatiele is currently supplied by a 3,1Mℓ/d water treatment plant situated above the town. The town also receives water from a series of boreholes. This is particularly true of the new housing development known as Harry Gwala Park. The water treatment plant obtains raw water from two sources, namely the 'so-called' Mountain Dam and Mountain Lake. The current volume of water being processed by the water treatment plant and produced from the boreholes has been measured at approximately 3,1Mℓ/day (or 36ℓ/s). Of this total, the estimated supply from the boreholes is 0,35Mℓ/day (4ℓ/s) representing 11%. *(This data has been sourced largely from recent water demand management and regional planning studies).*

In winter, the water level in the Mountain Dam can drop dramatically and supplementation of flow from the Mountain Lake is limited by the pipe size. Water from the water treatment plant is distributed under gravity to a network of domestic, commercial and institutional connections in the town. The boreholes located in the area of the old town pump directly into the network. The boreholes in Harry Gwala Park pump to a high-level reservoir from where consumers are supplied under gravity.

The current population of the town is estimated at 4 000, although much of the water demand is from shops, institutions and businesses. The current estimated demand is 5,5 Mℓ/day whereas the supply is around 3,1Mℓ/d.

To address this shortfall in supply, Alfred Nzo District Municipality is currently developing infrastructure to augment the supply to the town from a new wellfield that is being developed in the Kinira River Valley. Three of the boreholes were identified as potential production boreholes to meet the short-term needs of Matatiele Town. A Service Provider (Beacon Consulting Engineers) has been appointed to manage design and construction of the rising main and equipping of the boreholes to augment the Matatiele water supply.

The supply area is also composed of a number of standalone schemes that source water from weirs and springs. The water is supplied to the communities without treatment.

Table 7.1: Kinira River Dam WSS Summary

Scheme Name	Source	Dam Capacity (Mm³)	Dam Yield (Mm³ per annum)	WTP Name	Capacity (Mm³ per annum)	2035 Demand Requirement (Mm³ per annum)
Matatiele Town Supply	Mountain Dam (Keneka River)	1,082	1,080	Matatiele WTP	1,095	12,15
Harry Gwala Park	6 Boreholes		0,630			
Maluti Scheme	Belfort Dam		0,602	Maluti WTP	0,365	
	Boreholes		0,095			
Masalaka Water Scheme	Boreholes & Springs		0,088	Nil		
Madlangala Water Scheme	Weir		0,123	Nil		
Other Rural Schemes	Weirs		1,093	Nil		
Total			**3,711**		**1,460**	**12,15**

There is a shortfall of 8,439 Mm³ per annum (23,12Mℓ/d) in the available raw water supplies to the meet the projected 2035 water scheme area requirements. There is also a 10,69 Mm³ per annum (29,3Mℓ/d) shortfall in the water treatment requirements. There is no data on bulk pipeline (raw and clear water) as well storage capacities to make a gap analysis. In determining the requirements for bulk pipelines and storage, it will be assumed that there is no infrastructure for analysis purposes.

7.1.2 UMZ001: MKHEMANE DAM INTEGRATED REGIONAL WATER SCHEME

Mount Frere Town and surrounding villages are supplied from Ntenetyana Dam via the KwaBhaca Water Supply Scheme. The dam is situated on the Ntenetyana River and has a capacity of 1,7 million m^3. It is an earthfill dam with a 24m high wall and a side channel spillway. The entire yield of the dam is estimated at 2,201 Mm^3 per annum with all the water allocated for domestic supply to the scheme. This yield is currently restricted by the capacity of the water treatment plant, which can only treat 1,095 million m^3 per annum (3,0Mℓ/d).

Other villages in the water scheme footprint are supplied from a combination of springs and boreholes. The summary of the Mkhemane Dam Integrated Regional Water Supply Scheme is as detailed in the table below.

Table 7.2: Mkhemane Dam Integrated Regional Water Scheme Summary

Scheme Name	Source	Dam Capacity (Million m³)	Dam Yield (Mm³ per annum)	WTP Name	Capacity (Mm³ per annum)	2035 Demand Requirement (Mm³ per annum)
KwaBhaca Water Supply Scheme	Ntenetyana Dam (Ntenetyana River)	1,7	2,201	Mount Frere WTP	1,095	9,388
Other Rural Schemes	Springs and boreholes		No data	Nil		
Total			**2,201**		**1,095**	**9,388**

From the table above, it is noted that there is a shortfall of 7,187,Mm³ per annum(19,7Mℓ/d) in the available raw water supplies to meet the water scheme area requirements. There is also an 8,293Mm³ per annum (22,7Mℓ/d) shortfall in the water treatment requirements. There is no data on bulk pipeline (raw and clear water) as well storage capacities to make a gap analysis. In determining the requirements for bulk pipelines and storage, it will be assumed that there is no infrastructure for analysis purposes.

7.1.3 NTB001: NKANJI DAM INTEGRATED REGIONAL WATER SCHEME

The town of Mount Ayliff is currently supplied with potable water from a water treatment plant situated above the town. This water treatment plant obtains raw water from two sources, namely a pumped water supply from the Mzintlava River and a weir that captures spring water from the valley above the works. The current volume of water being processed by the water treatment plant has been measured at approximately 1,4Mℓ/d (or 161ℓ/s). Of this, around 40ℓ/s (25%) is sourced from the gravity weir and 121ℓ/s (75%) from the Mzintlava River. Mount Ayliff WTP is a conventional plant with a capacity of 2,5 Mℓ/d (0,913 million m^3 per annum).

Other villages in the water scheme footprint are supplied from a combination of springs and boreholes and there is no information on the water treatment facilities thereof. The summary of the Nkanji Dam Integrated Regional Water Supply Scheme is detailed in the table below.

Table 7.3: Mkhemane Dam Integrated Regional Water Scheme Summary

Scheme Name	Source	Dam Capacity (Million m³)	Dam Yield (Mm³ per annum)	WTP Name	Capacity (Mm³/a)	2035 Demand Requirement (Mm³ per annum)
Mount Ayliff Water Scheme	Mzintlava River & spring	-	0,621	Mt Ayliff WTP	0,913	6,457
Other Rural Schemes	Springs and boreholes		No data	Nil		
Total			**0,621**		**0,913**	**6,457**

From the table above, it is noted that there is a shortfall of 5,836Mm³ per annum (16Mℓ/d) in the available raw water supplies to meet the water scheme area requirements. There is also a 5,544Mm³ per annum (15,2Mℓ/d) shortfall in the water treatment requirements. There is no data on bulk pipeline (raw and clear water) as well storage capacities to make a gap analysis. In determining the requirements for bulk pipelines and storage, it will be assumed that there is no infrastructure for analysis purposes.

7.1.4 MBZ001: MBIZANA REGIONAL BULK WATER SCHEME

Bizana Town is supplied from a regional bulk water supply scheme that will, once fully developed, be able to supply 20 Mℓ/day of potable water to 266 000 people within the Mbizana Local Municipality (with an average of 75 litres per capita per day).

The source of raw water is the Ludeke Dam, which is located at the confluence of the Ludeke and kuNtlamvukazi Rivers (tributaries of the Mtamvuna River) approximately 16km north-west of Bizana Town. From the Ludeke Dam raw water is pumped to the Nomlacu Water Treatment Plant for treatment and onward supply to Bizana Town and communities within the municipality.

The Nomlacu WTP (which originally had a capacity of approximately 1.5Mℓ/d and was supplied by the Bizana Dam and a weir on the Ludeke River) has been upgraded and extended to a Phase 1 capacity of 10Mℓ/d. When completed, Phase 2 of the works will have a capacity of 20Mℓ/d.

There are approximately 20 stand-alone water schemes serving other communities in Mbizana. The majority of schemes are fed with water by diesel-driven pumps. The summary of the Mbizana RBWSS is detailed in the table below.

Table 7.4: Mbizana Regional Bulk Water Supply Scheme Summary

Scheme Name	Source	Dam Capacity (Million m³)	Dam Yield (Mm³/a)	WTP Name	Capacity (Mm³/a)	2035 Demand Requirement (Mm³/a)
Mbizana RBWSS	Ludeke Dam	14,945	5,128 (at 98% assurance of supply)	Nomlacu WTP	Phase 1: 3,650 Phase 2: 7,300	7,300
Other Rural Schemes	Springs and boreholes	N/A	N/A	Nil	No data	
Total		**14,945**	**5,128**		**7,300**	**7,300**

From the table above, there is a shortfall of 2,172 Mm^3 per annum in available raw water when compared to a projected demand of 7,300 Mm^3 per annum. Augmentation from the Mtamvuna River could be considered to meet future raw water requirements. Based on the estimated 2035 demand requirements, sufficient treated water capacity will be available once Nomlacu WTP Phase 2 has been completed.

The Raw Water Supply System is owned by the Department of Water and Sanitation, and is currently being operated by Umgeni Water under an interim two-year contract until August 2017. The Nomlacu WTP and Bulk Treated Water Supply System are being operated by Alfred Nzo District Municipality. Ownership will be transferred by the Department of Water and Sanitation in due course.

7.2 SCHEME RE-DEMARCATION

As previously stated, the ANDM has embarked on the development of wall-to-wall regional bulk water plans to address their water supply need. These wall-to-wall supply areas were determined by the most sustainable water resource and the extent of these water supply intervention areas were not limited in all instances to Local Municipal Boundaries. Dam developments were proposed in all four areas with the Ludeke Dam already operational within the Mbizana Local Municipality. These dam developments will ultimately be the only major sources that would supply water to all the consumers within the ANDM's area of jurisdiction and existing scheme infrastructure will be augmented or upgraded where possible to accommodate the increased supply volumes. The proposed intervention areas will also fall within the ANDM's current water services provision and operational arrangements.

8. BULK WATER SUPPLY INTERVENTIONS CONSIDERED – RECONCILIATION

8.1 PROPOSED WALL-TO-WALL WATER SUPPLY INTERVENTION AREAS

This section details the water supply reconciliation options for bulk water services within the ANDM – considering exiting use and future supplies and water sources, per scheme area. It must be noted that the water supply intervention areas (WSIAs) were demarcated based on all the existing planning initiatives that are currently underway within the ANDM. However, the demand model that was proposed to be used within this project will be used to test the viability of these existing proposed infrastructure interventions. The cost requirements for the demand model interventions are based on the infrastructure development cost proposed by the Client and these interventions will also be compared to the cost requirements of the existing proposed infrastructure interventions.

8.2 MAT001 WSIA: MATATIELE REGIONAL BULK WATER SUPPLY

8.2.1 DEMAND MODEL INTERVENTION

8.2.1.1 Water Demand

The water demand of this area for all the villages was calculated at an AADD of 100ℓ/c/d.

8.2.1.2 Water Resource Consideration

ANDM is planning to construct a new dam, Kinira River Dam on the Kinira River (a tributary of Umzintlava River) with gravity and pumped bulk reticulation. Regional bulk pipelines extending to Ongeluksnek and to the south-west will be constructed. In addition, groundwater sources for isolated villages will be developed. Kinira Dam will have a wall height of 24m with a wall length of 375m and a storage volume of 11,1 million m^3.

According to the report titled *"Kinira Dam, Planning, Investigations, and Assessments"* dated May 2013 prepared by Aurecon, Sektor Consulting (Pty) Ltd and Monde Consulting Engineers, the first order yield estimates for the dam are as follows:

Methodology	Yield (million m^3 per annum)	
	99%	80%
Storage – Draft - Frequency	10,4	17,3
Deficient – flow -Duration - Frequency	10,6	18,1

From the table above, the estimated yield of the dam will be assumed to be 10,4 million m^3 per annum (28,5Mℓ/d) at 99% assurance (lowest yield or worst-case scenario). This yield is adequate to cover the shortfall of 8,439Mm³ per annum (23,12Mℓ/d) of the projected 2035 demand.

8.2.1.3 Water Supply Infrastructure

The following infrastructure will be required in order to adequately supply the Kinira River Dam WSS footprint:

- Construction of Kinira Dam with a capacity of 11,0Mm^3 complete with abstraction works;
- Upgrade of the Matatiele WTP from a capacity of 3Mℓ/d to 30Mℓ/d;
- Construction of 600mm diameter primary bulk pipelines;

- Construction of secondary and tertiary pipelines with a combined length of approximately 310km; and
- Storage reservoirs with a combined capacity of 54Mℓ (assuming no storage presently due to lack of data).

8.2.1.4 Financial Requirements

The bulk cost requirement for MAT001 WSIA is tabled below.

Corridor	Direct Est Cost (Construction)	Indirect Est Cost (Fees, Geotech, EIA, Disbursements etc)	Total (including contingencies, Escalation& VAT)
Primary Bulk	R 1 124 652 126	R 810 296 861	R 1 934 948 988
Secondary bulk	R 503 776 557	R 389 895 400	R 893 671 956
Tertiary	R 358 731 311	R 290 063 335	R 648 794 645
Total	**R 1 987 159 994**	**R 1 490 255 596**	**R 3 477 415 589**

The base year cost requirement is 2015

The scheme development cost per household is R 74 054. Due to the size of the project, it will take at least seven years to complete.

8.2.2 EXISTING PROPOSED INFRASTRUCTURE INTERVENTION

8.2.2.1 Water Demand and Projections

The current water demand was based on 176l/c/d for urban areas and 60l/c/d for rural areas. This resulted in a total current water demand of 20,4 Mℓ/d. The annual population growth rate used was 0,5%. The future water demand for 2038 is estimated at 29,9Mℓ/d.

8.2.2.2 Water Resource Consideration

The current available water is only 7 788 m³/d that is sourced from the Balfour Dam, the Mountain Dam and lake as well as borehole supply. The water source needs to be augmented and that will only be achieved through the development of the proposed Kinira River Dam on the Kinira river as primary bulk water source with the wellfields as interim and supplementary water source.

Groundwater (boreholes) appears to be of abundant supply and of adequate capacity to supply the water demands of the project area. The hydrological baseline assessment that was already conducted indicated a total groundwater potential in the order of 62Mℓ/d, but it is located within the Kinira River Basin and Cedarville wetland areas. However, the strike rate for drilling boreholes in this area was very poor and only 25,3% of the drilled boreholes had recorded yields. Therefore, even if adequate bulk water abstraction is possible within the proposed wellfield areas, a bulk water distribution system will be required to convey potable water to the areas with current water shortages and/or no water supply. The proposed wellfield could yield 40ℓ/s (3 456m^3/d).

8.2.2.3 Water Supply Infrastructure

The proposed Kinira River Dam would be approximately 370m long, 32m high and an estimated wall volume of 408 000m^3 . The initial hydrological discharge is estimated to be 1 440m^3/s that requires a spillway of at least 140m wide. A side channel spillway is recommended. The capacity of the

proposed Water Treatment Plant (WTP) will depend on the final system design, and may range in size from a 5,5Mℓ/d, 15Mℓ/d or ultimately a 25Mℓ/d facility. Three options for further investigations were identified for the position of the proposed WTP, namely:

- A new bulk WTP located at the proposed Kinira River Dam, from where bulk treated water will be distributed to the entire project area, including the towns of Maluti, Matatiele and Cedarville, and possibly also Kokstad. This option will imply that the Matatiele WTP would still be operational to treat water from the existing surface sources (Belfort Dam, Mountain Dam and Town Dam), as well as to possibly treat the well field water;
- The augmentation of the Matatiele WTP, to upgrade the existing WTP to accommodate the ultimate water demand of 25Mℓ/d. This option will require bulk raw water to be pumped from the Kinira River Dam, treated at the augmented Matatiele WTP, and then distributed to the various towns and rural areas. The water from the wellfields could then possibly just be blended with the water at the WTP; and
- The third option was to build a WTP somewhere between the proposed Kinira River Dam and Matatiele, from where raw water from the dam and other dams could be pumped, treated and then distributed to the various towns and villages.

The total pipeline route was estimated to be 26km long and a total of 26 command reservoirs will be constructed.

8.2.2.4 Financial Implication

The total proposed development cost for the Matatiele RWSS as planned by the ANDM is tabled below.

Component Description	Cost Estimate
Total Primary Bulk	**R 221 010 000.00**
Dam development	R 65 000 000.00
WTP	R 80 020 000.00
Primary Bulk Pipes, PS and Reservoirs	R 75 990 000.00
Secondary Bulk Pipes, PS and Reservoirs	**R 418 100 000.00**
Ancillary Works	**R 18 500 000.00**
Professional Service Providers - Design Phase and Environmental, Geotechnical, Hydrological, Geohydrological and ISDP	R 30 837 561.00
Engineering Fees - Planning Studies, Site Supervision and Standard Services	R 76 813 285.97
Project Cost Estimate	**R 765 260 846.97**
VAT @14%	R 107 136 518.58
Total Project Cost Estimate	**R 872 397 365.55**

The scheme development cost per household is R 18 580. Due to the size of the project, it will take at least seven years to complete.

8.3 NTB001 WSIA: INTEGRATED NKANJI DAM REGIONAL WATER SUPPLY SCHEME

The Umzimvubu and Ntabankulu Local Municipalities could potentially be supplied through an Integrated Regional Water Supply Scheme that covers the entire area. The supply areas would be referred to as the Mt Ayliff Scheme and the Mt Frere Scheme.

8.3.1 DEMAND MODEL INTERVENTION

8.3.1.1 Water Resource Consideration

ANDM is planning to construct a new dam on the Siroqobeni River, a tributary of the Mzintlava River located 9,5km from Mount Ayliff. The dam site is in the core of a narrow valley, which opens a short distance of the site from mountainous terrain into a large open pediment valley floor. Access is via a gravel road off the N2 highway. Conservative estimates of surface runoff demonstrate that there is sufficient runoff to meet projected water requirements. The dam site is situated in the upper part of the catchment where, due in part to topography, the rainfall and consequently the runoff is likely to be higher than in the rest of the catchment. An increased estimate of runoff would reduce the size of the dam wall required. Water quality for this option appears to be relatively good as there is little erosion in the catchment and limited settlement. The proposed dam will have a 49,5m high wall and a capacity of 9 million m^3.

The gap analysis indicates that there is a shortfall of 5,84Mm³ per annum (16,0Mℓ/d) in the available raw water supplies to the meet the water scheme area requirements. This shortfall will be made up from the proposed Nkanji Dam. According to the Alfred Nzo DM report titled *"Integrated Regional Water Supply for Umzimvubu and Ntabankulu Municipalities Areas: Assessment of Dam Sites (water Hydrology Assessment*)" dated July 2013, the proposed Nkanji Dam yield estimates vary with rate of transfer from Umzintlava River into the dam. A yield of 8,42 million m^3 per annum in 20 years' time may be achieved with 0,20m^3/s (6,3Mm³ per annum) transfer from Umzintlava River. The balance of 2,58 million m^3 per annum (7,1Mℓ/d) will be transferred into the UMZ001 WSIA: Mkhemane Dam Integrated Regional Water Supply Scheme as detailed under Section 8.4.1.

8.3.1.2 Water Supply Infrastructure

The following infrastructure will be required in order to adequately supply the Nkanji Dam IWSS footprint:

- Construction of Nkanji Dam complete with abstraction works;
- Construction of WTP at Nkanji Dam with a capacity of 8,42 million m^3 (23Mℓ/d);
- 500mm diameter x 2km long bulk transfer pipeline from Umzintlava River to Nkanji Da;
- Primary and secondary bulk pipelines and tertiary pipelines with a combined length of approximately 478km; and
- Storage reservoirs with a combined capacity of 25,0Mℓ (assuming no storage presently due to lack of data).

8.3.1.3 Financial Requirements

The bulk cost requirement for NTB001 WSIA is tabled overleaf.

	Direct Est Cost (Construction)	Indirect Est Cost (Fees, Geotech & survey)	TOTAL
Primary Bulk	R 1 727 311 778	R 106 681 182	R 1 833 992 960
Secondary bulk	R 350 884 092	R 34 875 254	R 385 759 346
Tertiary	R 1 040 603 189	R 130 521 386	R 1 171 124 575
Total	**R 3 118 799 060**	**R 272 077 822**	**R3 390 876 882**

The base year cost requirement is 2015

The scheme development cost per household is R 73 598. Due to the size of the project, it will take at least seven years to complete.

8.3.2 EXISTING PROPOSED INFRASTRUCTURE INTERVENTION

8.3.2.1 Water Demand

The following assumptions were made to determine the water demand (design scenario):

- Population:
  - Census 2011 populations by ward;
  - Ward shape files (including house counts per ward);
  - 2008 individual house counts;
  - Settlement shape files with population (WSDP 2007); and
  - Supply zone shape files (with house counts per supply zone).
- Service Levels Catered for:
  - Rural: Based on DWA guidelines and Communal Standpipe (60ℓ/c/d)
  - Growth Nodes: Based on CSIR Red Book:
    - Peri-Urban Villages – Yard tap and dry sanitation (80ℓ/c/d);
    - Peri-Urban Informal Housing – Yard tap and flush toilet (100ℓ/c/d);
    - Formal housing – small erven less than 1 000 m^2 – house connection (130ℓ/c/d);
    - Formal housing – more than 1 000m^2 – house connection (140ℓ/c/d);
    - Urban- Hospital Beds (300ℓ/d/bed);
    - Urban-Schools (6 000ℓ/d/school);
    - Urban-Clinics (3 000ℓ/d/clinic);
    - Urban-Business Area (400ℓ/m^2/d); and
- Projected population Growth Rates:
    - Rural - 0%; and
    - Growth Nodes - 2%
- Allowances for Water Losses: Based on DWA Guidelines:
  - Treatment Losses: 10%
  - Conveyance Losses: 10%
- Design Horizon: The design horizon is 2043, with 2013 being the base year, for a 32-year design period.

The water demand scenarios considered the following that resulted in three different water demand scenarios within the integrated Nkanji WSIA:

- The ANDM WSDP's service level policy states "...higher than basic services should be provided only where households can afford these levels of service, due to the necessity of recovering the increased capital and operating and maintenance costs.";
- Based on the policy, three service levels have been investigated (i.e. low, moderate and high level. All three levels were applied to both rural and urban households. The highest demand scenario would be used when sizing the proposed infrastructure; and
- Projected water demands were calculated based on the three levels of service. Additional water demands for existing schools, clinics and hospitals were also considered in the final calculations.

The final projected water demands for each of the levels of service are listed below. The demand scenario outcome for Mount Ayliff is tabled below:

Table 8.1: Projected Water Demand per Service Level for Mount Ayliff

Level of Service	Total Demand 2011 (Mℓ/d)	Total Demand 2043 (Mℓ/d)
High/Moderate**	9**	13**
Moderate/Low	7	11
Low/Basic	6	9

*** Design Scenario*

The demand scenario outcome for Mount Frere is tabled below:

Table 8.2: Projected Water Demand per Service Level for Mount Frere

Supply Area:	Population		Raw Water Requirements *	
	2008	2043	2043 (Mℓ/d)	2043 (Mm^3 per annum)
Mount Frere: Total Supply Area	147 344	171 260	19,53	7,13

** Design Scenario*

The demand scenario outcome for Ntabankulu is tabled below.

Table 8.3: Projected Water Demand per Service Level for Ntabankulu

Low Level					
Description	**Unit**	**Urban**	**Rural**	**Other**	**Total**
Projected Population	No.	6 155	120 708	-	-
Low Level of Service	ℓ/c/d	80	25	-	-
Demands	Mℓ/d	0,49	3,02	0,89	**3,51**
Moderate Level					
Description	**Unit**	**Urban**	**Rural**	**Other**	**Total**
Projected Population	No.	6 155	120 708	-	-
Moderate Level of Service	ℓ/c/d	100	60	-	-
Demands	Mℓ/d	0,62	7,24	0,89	**7,86**
High Level					
Description	**Unit**	**Urban**	**Rural**	**Other**	**Total**
Projected Population	No.	6 155	120 708	-	-
High Level of Service	ℓ/c/d	130	80	-	-
Demands	Mℓ/d	0,80	9,66	0,89	**11,35**

The projected water demand in the area in the design year (2043) is presented below:

Scope of Work	Design Demand 2043 (Mℓ /day)
Mount Frere Supply Zone	19,53
Mount Ayliff Supply Zone	13,00
Ntabankulu Western and Southern Supply Zones (Supplied from Mount Frere)	5,53
Northern and Eastern Supply Zones (Supplied from Mount Ayliff)	5,82
Total Ntabankulu and Umzimvubu Supply Area	**43,88**

8.3.3 WATER RESOURCE CONSIDERATION

The challenging topography and lack of suitable bulk water sources in Ntabankulu mean that the most feasible solution for a regional scheme may require the development of sources outside of the municipality. Various raw water sources have been considered in both the western (Mount Frere) and eastern (Mount Ayliff) portions of Umzimvubu Municipality. Such sources may include a new dam on the Mkhemane (Mount Frere) and/or one close to Mount Ayliff on the Nkanji (possibly augmented by RoR abstraction), the Sirhoqobeni or the Mvalweni Rivers. The existing Ntenetyana Dam may also contribute bulk water for a regional scheme.

8.3.3.1 Nkanji Dam

For the Umzimvubu Mount Ayliff supply area, three dam sites were assessed as potential sources of water storage and supply e.g. the Sirhoqobeni site, the Nkanji site and the Mvalweni site. The assessment consequently looked at augmenting the water supply of Nkanji dam site by abstracting water from the nearby Mzintlava River. A range of abstraction rates were considered corresponding to a range of dam heights. Moreover, the option to abstract water over the entire year was assessed against limiting water abstraction to the wet season. Historic firm yields were estimated for the different cases considered. The following conclusions were made:

- The augmentation of Nkanji dam site with the contribution of run-of-river (RoR) abstraction from the nearby Mzintlava river can meet the projected water demands;
- A 50m high dam at Nkanji site with a RoR abstraction of 0,3 m^3/s for four (4) months (Jan-Apr) would yield 4,93 million m³ per annum; and
- The final selection of the optimal pumping rate from the Mzintlava River and the associated dam height required at Nkanji dam site should be pursued.

8.3.3.2 Ntenetyana Dam

The Ntenetyana dam is an existing Category 2 dam, some 24m high and storing 0,6MAR or 1,61 million m^3. The dam is located on a tributary of the Kinira River and is the source of water for the KwaBhaca water supply that services the Mt Frere growth point. The 98% yield of the dam is 1,34Mm^3 per annum or 3,67Mℓ/d incorporating provision for a Class C EFR of 22,5%MAR. It is planned to implement extensions to the above source such that the existing supply could fully service the future requirements of the Mt Frere growth node and furthermore deliver supplies to three adjacent supply zones.

The projected 2043 raw water requirement is 5,01Mm^3 per annum or 13,73Mℓ/d. It is envisaged that this requirement will be met through the following extensions to the bulk supply:

- 5m raising of the dam to a 1,0MAR live storage capacity of 2,6Mm^3. Estimated 98% yield is 2,15Mm^3 per annum or 5,9Mℓ/d including provision for a Class C EFR of 22,5%MAR; and
- Augmentation through provision of a RoR off-take on the Kinira river located to the north of the dam, raw water pump station and water pipeline delivering top-up flows into the dam.

8.3.3.3 Mkhemane Dam

A proposed new dam site was located on the Mkhemane River, a tributary of the Mzimvubu River. It is envisaged that the site will be required to provide the water requirements to both the north-eastern portion and the north-western portions of the Mt Frere supply area. Preliminary updated stream-flow hydrology for the site was prepared and has delivered yield reliability curves for a 1,0MAR, 1,5MAR and 2,0MAR size of dam respectively incorporating the current desktop reserve Class B EFR of 29,5%MAR. The envisaged raw water requirements from the Mkhemane dam to service the Mt Frere region assuming full development of the planned extensions to the Ntenetyana Dam system, and excluding possible supplies to the Ntabankulu region amount to 2,12Mm^3 per annum or 5,8Mℓ/d. Alternatively should only partial development of the Ntenetyana system take place, comprising of the planned 5m raising of the dam, but excluding the planned ROR off-take from the Kinira river, then the Ntenetyana dam system will deliver a reduced yield of 2,15Mm^3 per annum or 5,9Mℓ/d to the Mt Frere growth node only. The Mkhemane dam will then be required to deliver additional supplies with the total raw water requirement amounting to 4,98Mm^3 per annum or 13,63Mℓ/d.

It is envisaged that the Mkemane dam would supply water to the Mount Frere area of Umzimvubu Municipality as well as western and southern regions of Ntabankulu Municipality. The Nkanji/Mvalweni dam would supply the Mount Ayliff area of Umzimvubu Municipality as well as northern and eastern regions of Ntabankulu Municipality.

8.3.4 WATER SUPPLY INFRASTRUCTURE

Water treatment plant will be located downstream of the proposed dams and bulk potable water supply pipelines will convey potable water from the WTPs to command reservoirs strategically placed within each supply region. Initial investigations have indicated that the bulk pipelines would generally operate under gravity except for isolated localised areas that might require booster pumps. Internal bulk gravity water schemes will be designed to link the command reservoirs to existing and proposed new localised terminal reservoirs within the communities.

8.3.5 FINANCIAL REQUIREMENT

A preliminary high level cost estimate was prepared but still requires substantial investigation by the appointed Services Provider and is tabled below.

Bulk Component	Current Capital Cost Estimate
Nkanji Dam	R 944 784 000
Nkanji WTP	R 84 104 339
Umzimvubu East (Mt Ayliff & Surrounds) Bulk Reservoirs & Pipes	R 285 637 378
Ntabankulu North - Bulk Reservoirs, Pumps & Pipes	R 73 063 296
Ntabankulu East - Bulk Reservoirs, Pumps & Pipes	R 104 556 096
	R 1 492 145 109

The scheme development cost per household is R 32 386. Due to the size of the project, it will take at least seven years to complete.

8.4 UMZ001 WSIA: MKHEMANE DAM INTEGRATED REGIONAL WATER SUPPLY SCHEME

8.4.1 DEMAND MODEL INTERVENTION

8.4.1.1 Water Resource Consideration

ANDM is planning to construct a new dam on the Mkemane River located approximately 35km due north of Mount Frere. Access is from a gravel road located east of the main gravel road between Mount Frere and the surfaced road linking Mount Fletcher and Matatiele. Estimates of surface runoff demonstrate that there is sufficient runoff to meet projected water requirements. Water quality for this option appears to be relatively good as there is little erosion in the catchment and limited settlement. The dam would have a capacity of 8,1 million m^3 with a wall height of 35m. This option presents the opportunity to serve the northern areas of the scheme without extensive pumping.

The gap analysis indicates that the 2035 water requirements will be 9.388Mm³/a (25.7Mℓ/d) resulting in a shortfall of 7.187 Mm³/a (19.7Mℓ/d). This shortfall will be made up from the following interventions:

Intervention	Yield (million m^3 per annum)
Raising the Ntenetyana Dam by 5m to obtain a live storage of 3.0Mm^3 and a yield of 2,41Mm^3 per annum	2,41
2,0 MAR size Mkemane Dam (30m high dam wall) would deliver a 98% assured yield of 4,25 million m^3/a or 11,6Mℓ/d, also incorporating a Class C EWR;	4,25
Transfer from the Nkanji Dam supply system (refer to Section 8.3.1)	2,58
Savings from WCDM initiatives	0,15
Total	**9,39**

Source: Alfred Nzo DM report titled "Integrated Regional Water Supply for Umzimvubu and Ntabankulu Municipalities Areas: Assessment of Dam Sites (water Hydrology Assessment)" dated July 2013.

8.4.1.2 Water Supply Infrastructure

The following infrastructure will be required in order to adequately supply the Mkhemane Dam IWSS footprint:

- Raising Ntenetyana Dam by 5m to increase storage to 3 million m^3;
- Construction of Mkhemane Dam complete with abstraction works;
- Construction of WTP at Mkemane Dam with a capacity of 16Mℓ/d;
- Primary bulk pipelines from Mkemane Dam to Mt Frere command Reservoir;
- Storage reservoirs with a combined capacity of 37Mℓ.

8.4.1.3 Financial Requirements

The bulk cost requirement for UMZ001 WSIA is tabled below

	Direct Est Cost (Construction)	Indirect Est Cost (Fees, Geotech & survey)	TOTAL
Primary Bulk	R 2 061 612 903	R 158 044 300	R 2 219 657 203
Secondary bulk	R 1 375 373 649	R 149 201 416	R 1 524 575 065
Tertiary	R 432 610 315	R 54 261 700	R 486 872 014
Total	**R 3 869 596 867**	**R 361 507 416**	**R 4 231 104 283**

The base year cost requirement is 2015

The scheme development cost per household is R 81 391. Due to the size of the project, it will take at least seven years to complete.

8.4.2 EXISTING PROPOSED INFRASTRUCTURE INTERVENTION

8.4.2.1 Water Demand

8.4.2.1.1 Population Data

The population data for the Study Area, as per DWA 2013, is as summarized below:

- Total population : 162 462 persons
- Mt Frere growth node : 30 951 persons (19% of the total population)
- Rural villages : 131 511 persons (81% of the total population)

8.4.2.1.2 Unit Water Requirements

The following unit water requirements have been adopted for the purpose of this report:

- Urban households : 130ℓ/c/d
- Rural households : 100ℓ/c/d

No provision for agricultural or any other water supply, other than domestic, has been considered for the purposes of this report.

8.4.2.1.3 Total Water Requirement

Based on the above, the current (2013) raw water requirements for the Study Area are as follows:

- Mt Frere growth node : 1,78 million m^3 per annum
- Mt Frere rural villages : 3,39 million m^3 per annum
- Total : 5,17 million m^3 per annum

8.4.2.2 Water Resource Consideration

8.4.2.2.1 Groundwater

Recent groundwater studies for this area indicated that it is unlikely that the groundwater resource will meet the above water requirements, and for certain areas, this resource may be adequate only for local and augmentation.

8.4.2.2.2 Surface Water

- Mkhemane Dam
  - A 1,5MAR size dam (26m high dam wall) at the proposed Mkhemane Dam site would deliver a 98% assured yield of some 3,9 million m^3 per annum or 10,7Mℓ/d, with a Class C EWR catered for;
  - A 2,0MAR size dam (30m high dam wall) would deliver a 98% assured yield of 4,25 millionm^3 per annum or 11,6Mℓ/d, also incorporating a Class C EWR; and
  - There appears to be viable additional yield benefit in further upsizing the dam, i.e. a 2,0 MAR size dam appears optimal.
    - It should however be noted that:
      - The Mkhemane River is ungauged;
      - WR90 quaternary catchment level rainfall and evaporation data was utilized for modelling, which is assessed as conservative; and
      - Dam investigations are based on 10m contour information.
- Ntenetyana Dam
  - Nominal yield benefits would be delivered from possible dam raising options as previously mooted by others;
  - Significant yield benefit could however be achieved from topping-up of the dam by pumping raw water from a RoR abstraction site on the Kinira River; and
  - A 100ℓ/s top-up option is considered optimal, which delivers a 98% assured system yield of 4,0 million m^3 per annum or some 11Mℓ/d, with a Class C EWR catered for.
    - It should however be noted that:
      - The dam commands a small ungauged catchment and that no site specific rainfall, evaporation or stream flow data was obtained;
      - WR90 quaternary catchment hydrology data was therefore used for modelling purposes, which is assessed as conservative; and
      - A Class C EWR at desktop level was assumed

8.4.2.3 Water Supply Infrastructure

A reconnaissance level evaluation of the Mkhemane Dam site has been completed and yielded that the Mkhemane Dam development is feasible and should proceed. Access to the Mkhemane Dam site is from a 21km gravel road located east of the main gravel road between Mount Frere and the surfaced road linking Mount Fletcher and Matatiele. Site access requires a lengthy walk into a relatively deep ravine across several ridges. Access roads will therefore need to be constructed in advance of detailed geological and geotechnical investigations.

Three dam type arrangements for a 30m high 2,0MAR size of dam were identified. Various investigations were completed to locate and evaluate possible water treatment plant (WTP) sites adjacent to the dam, together with feasible raw and treated water pump station sites, raw water holding dam sites and associated pipeline routes. A suitable site was located and preliminary designs prepared, based on best available 10m contour interval mapping. Appropriate solutions for raw water pumping from the dam to the WTP, and for potable water pumping from the WTP to the two command reservoir sites were delivered.

The reconnaissance level cost estimate for the proposed 14Mℓ/d water treatment plant inclusive of holding dam, pump stations, rising mains and associated works amounts to R 64 million excluding VAT.

A comparative technical and capital cost calculation was completed for two alternative bulk supply system options from the Mkhemane Dam.

For Option 1 (preferred option), raw water from each of the Mkhemane and Ntenetyana Dams would be provided each to its own separate stand-alone water purification works (WTP) located nearby. Thereafter, treated water from both systems would be delivered into the bulk treated water pipeline gravity distribution system.

For Option 2, one only larger water purification plant (WTP) would be provided adjacent to the Ntenetyana Dam. A relatively long raw water pumped and gravity main pipeline would deliver raw water from the Mkhemane Dam into this WTP. Thereafter treated water would be distributed into both pumped and gravity pipeline distribution systems

Two treated water command reservoir sites were selected serving the western, as well as the southern and eastern portions of the Mount Frere region, inclusive of Ntabankulu. With appropriate design, these sites should permit gravity distribution to over 99% of the Mt Frere and Ntabankulu supply regions. Some 500km of bulk treated water buried pipeline of sizes ranging between 500mmØ and 50mmØ will be required to service the area, together with some 100 reservoirs and tanks varying in size from 10Mℓ to 10kℓ.

8.4.2.4 Financial Requirements

The bulk cost requirement for UMZ001 WSIA as planned by the ANDM is tabled below.

Construction Costs					**R 805 019 415.00**
P&G's (Excl P&Gs for Eskom works)				**20.00%**	**R 126 169 903.00**
Primary Bulk					**R 309 886 398.79**
Mkhemane Dam; 30m; 2.0MAR	1	No.	R	145 000 000	R 145 000 000.00
Raw water pump station & rising main	2,65	km	R	4 574 670	R 12 122 875.00
Water purification plant, 14Mℓ/d	14	Mℓ/d	R	1 958 845	R 27 423 835.00
Treated water pump station & rising main	5,5	km	R	2 510 991	R 13 810 450.00
Command reservoirs	2	No.	R	6 750 000	R 13 500 000.00
Primary Bulk Gravity Lines	186,69	km	R	525 091	R 98 029 238.79
Secondary Bulk					**R 280 417 381.21**
Bulk gravity pipelines	332,31	km	R	525 091	R 174 492 990.21
Village reservoirs and BP tanks	98	No.	R	335 963	R 32 924 391.00
Access roads	1	sum	R	25 000 000	R 25 000 000.00
Eskom connection and bulk electrical works	1	Sum	R	48 000 000	R 48 000 000.00
Sub total					**R 590 303 780.00**
Contingency				**15.00%**	**R 88 545 589.00**
Total					**R 678 849 369.00**
SITE INVESTIGATIONS, PROFESSIONAL FEES AND RECOVERABLE COSTS:				**20%**	**R 161 003 883.00**
Sub-total					**R 966 023 155.00**

Vat at 14%					R 135 243 241.70
TOTAL					**R 1 101 266 396.70**

Cost per person (2013) - Mt Frere only	incl.VAT	R 6 779
Cost per household (2013) - Mt Frere only	incl.VAT	R 27 701

The scheme development cost per household is R 23 899. Due to the size of the project, it will take at least seven years to complete.

8.5 MBZ001 WSIA: MBIZANA REGIONAL BULK WATER SUPPLE SCHEME

This project commenced in 2009 and comprised of the development of the Ludeke Dam on the Ludeke River that would ultimately supply the whole of the Mbizana LM. The construction of the Ludeke Dam and the Nomlacu WTP is completed. The construction of the raw water pumping infrastructure with a capacity of 22Mℓ/d was completed in December 2013. The dam construction was completed in 2014 and has a capacity of 14,9Mm^3. The upgrade and extension of the Nomlacu Water Treatment Plant (WTP) were completed in April 2012. The reticulation need now to be connected to the augmented bulk treated water supply system.

8.5.1 DEMAND MODEL INTERVENTION

8.5.1.1 Water Resource Consideration

The Ludeke Dam has a capacity of 14,9Mm^3 per annum. The historical yield of the river is reported to be 8,8 million m^3 per annum. The source of raw water is the Ludeke Dam, which is located at the confluence of the Ludeke and kuNtlamvukazi Rivers (tributaries of the Mtamvuna River) approximately 16 km north-west of Bizana Town. From the Ludeke Dam raw water is pumped to the Nomlacu Water Treatment Plant for treatment and onward supply to Bizana Town and communities within the municipality.

The Nomlacu WTP (that originally had a capacity of approximately 1,5 Mℓ/day, supplied by the Bizana Dam and a weir on the Ludeke River) has been upgraded and extended to a Phase 1 capacity of 10 Mℓ/day. When completed, Phase 2 of the works will have a capacity of 20 Mℓ/day. There will therefore still be a shortfall amounting to 15,1 Mm³ per annum (41,4Mℓ/d) in the water treatment requirements

8.5.1.2 Water Supply Infrastructure

The following infrastructure will be required in order to adequately supply the Ludeke Dam IWSS footprint assuming that raw and clear water bulk pipelines are capable of delivering the 20Mℓ/d as per the capacity of the Nomlacu WTP:

- Upgrade of the Nomlacu WTP from 10,5Mℓ/d to 42Mℓ/d;
- 8km long x 650mm diameter bulk transfer line from Umtamvuna River to Ludeke Dam;
- 13km long x 650mm diameter bulk line from Ludeke Dam to Nomlacu WTP;
- Storage reservoirs with a combined capacity of 70Mℓ; and
- Tertiary pipelines with a combined length of 709km.

8.5.1.3 Financial Requirements

The bulk cost requirement for MBZ001 WSIA is tabled below.

	Direct Est Cost (Construction)	Indirect Est Cost (Fees, Geotech & survey etc)	TOTAL
Primary Bulk	R 478 675 199	R 344 917 144	R 823 592 343
Secondary bulk	R 52 372 991	R 39 190 061	R 91 563 051
Tertiary	R 1 431 335 457	R 1 161 858 841	R 2 593 194 298
Total	**R 1 962 383 647**	**R 1 545 966 045**	**R 3 508 349 692**

The base year cost requirement is 2015

The scheme development cost per household is R 119 085. Due to the size of the project, it will take at least seven years to complete.

8.5.2 EXISTING PROPOSED INFRASTRUCTURE INTERVENTION

8.5.2.1 Demand

The bulk supply scheme components were designed and sized to meet the projected water demand of a 30-year design horizon. The annual population growth factor used was 0,5 %. The projected water demands have been based on the following assumptions:

- 6 persons per household;
- A typical AADD 60ℓ/c/d;
- A Summer Peak Factor of 1,2 x Annual Average Daily Demand;
- All villages that are fed from rising mains are given 48hr AADD storage;
- Water losses of 10% of AADD; and
- Raw Water Source.

8.5.2.2 Water Resource Consideration

The Ludeke Dam would be the primary source.

8.5.2.3 Water Supply Infrastructure

Pipelines leading from the Nomlacu Water Treatment Plant would supply all the supply zones and are as follows: .

- South Eastern Feeder - The South Eastern Feeder would supply, by gravity flow, zone C, D (which includes Bizana Town), F, H, I, J and K.
- North Western Feeder - This pipeline would be a pumping main to supply zones 0, P and Q.
- Southern Feeder - This pipeline would supply by gravity flow, G, L, M and N.
- Zones around Nomlacu WTP - Zones A, B, and E would be supplied from reservoirs close to Nomlacu WTP

The proposed future phased development (expected to be two phases) are as follows:

- Continuation of the South Eastern Feeder –
  - A 8 630m long 315mm pipeline would continue from KwaNikhwe to Redoubt, to supply zone 1. From Redoubt the existing 3 080m long 160mm pipeline supplies Mnyaka reservoir to supply zone J;

- A 19 371m long, 160mm pipe would be routed from Redoubt toward Mzamba reservoir to supply zone K. Two break pressure tanks would be located along the pipeline as part of pressure management.

➢ The North Western Feeder is a pumping supply main in the Phase 1 Bulk Distribution system comprising 9 216m long 300mm pipeline to KuSiwisa reservoir from where zone will be supplied. From KuSiwisa there are two further future pumping stages required, viz:-

- 17 144m long 250mm to Ndindini reservoir — zone P and further pumping to Ntlontlane; and
- 8 667m long 160mm to Ntlontlane reservoir — zone Q.

➢ The Southern Feeder would comprise under future phases the following:

- From Nomlacu to Mbongweni reservoir (Zone L) 36 576m of 160mm up to a 355mm diameter pipeline; and
- At 8 500m from Nomlacu, a 4 835m long 160mm up to a 200mm diameter pipeline would branch to Nqabeni reservoir (Zone N);
- At 15 400m from Nomlacu a 1 700m long 200mm diameter branch to Entsimbeni reservoir (Zone G); and
- At 24 373m from Nomlacu a 4 400m 160mm diameter to 110mm diameter branch to Luthulini reservoir (Zone M).

8.5.2.4 Financial Requirement

The bulk cost requirement for MBZ001 WSIA is tabled below.

Item	Amount
Secondary Bulk	**R 353 878 040.00**
Village Reservoirs	R 73 087 616.00
Connector Mains -	
Earthworks	R 122 768 936.00
Connector Mains	
Pipelines	R 154 467 188.00
Village Internal	**R 333 970 040.00**
Reticulation - Water	
Draw-Off Points	R 13 949 304.00
Village Internal Reticulation - Earthworks	R 190 473 484.00
Village Internal Reticulation - Pipelines	R 79 204 296.00
Break Pressure Tanks	R 6 318 524.00
Reservoir Inlets	R 6 770 852.00
Reservoir Outlets	R 9 559 120.00
Road Crossings	R 401 008.00
River Crossings	R 7 385 452.00
Access Roads to River	

Item	Amount
Sites	R 19 908 000.00
Sub-Total1	**R 687 848 080.00**
Add Contingency (20%)	R 137 569 616.00
Sub-Total2	**R 825 417 696.00**
VAT @ 14%	R 115 558 477.44
TOTAL	**R 940 976 173.44**

The scheme development cost per household is R 18 120.55. Due to the size of the project, it will take at least seven years to complete.

9. SUMMARY

9.1 TOTAL WATER DEMAND PER WSIA

Based on the demand model, the demand per water supply intervention area is summarized in detail within Table 9.1: Water Requirements (Mm^3 per annum) per WSIA below.

Table 9.1: Water Requirements (Mm^3 per annum) per WSIA

WSIA Name	Households (2015)	Population (2015)	Water Requirements (Million m³ per annum)	
			2015	2035
MAT001: Kinira River Dam	46 958	190 942	8,284	12,154
MBZ001: Mbizana RBWS	51 985	297 667	6,604	18,932
UMZ001: Mkhemane Dam Integrated Regional Water Scheme	29 461	134 598	6,184	9,388
NTB001: Nkanji Dam Integrated Regional Water Scheme	46 073	194 686	4,521	6,457
TOTAL	**174 477**	**817 893**	**25,592**	**46,931**

A total of 46,9 Million m³ per annum is required with the Mbizana RBWSS requiring the largest portion at 40,3% of the total water demand in ANDM.

9.2 TOTAL WATER RESOURCES REQUIRED VS PROPOSED WATER SUPPLY INTERVENTIONS

The total volume of water required is compared to the existing proposed water supply interventions to determine shortfalls and the reasons thereof. This comparison is detailed in the table Table 9.2: Water Requirements (Mℓ/d) per WSIA below.

Table 9.2: Water Requirements (Mℓ/d) per WSIA

WSS	Households (2015)	Population (2015)	2035 Demand (Mm3 per annum)	Existing Resources (Mm3 per annum)	Proposed Additional under UAP Phase 2 (Mm3 per annum)	Total	Balance (Mm3 per annum)
MAT001:Kinira River Dam	46 958	190 942	12,154	3,711	10,4*	14,111	-
MBZ001: Mbizana RBWSS	51 985	297 667	18,932	8,8*	10,13	18,93	-
UMZ001: Mkhemane Dam Integrated Regional Water Scheme	46 073	194 686	9,388	2,201*	4,459	6,660	-2,73
NTB001: Nkanji Dam Integrated Regional Water Scheme	29 461	134 598	6,457	0,621	8,42*	9,041	2,58

WSS	Households (2015)	Population (2015)	2035 Demand (Mm3 per annum)	Existing Resources (Mm3 per annum)	Proposed Additional under UAP Phase 2 (Mm3 per annum)	Total	Balance (Mm3 per annum)
TOTAL	**174 477**	**817 893**	**46,931**	**15,333**	**33,41**	**48,742**	**-0,15**

*Figures are actual dam yields

From the table above, it is noted that with the exception of Mkhemane RBWSS all the other schemes will have adequate raw water resources to meet the 2035 demand requirements. The Mkhemane RBWSS will be short by 0,15Mm^3 per annum (1,6%). This shortfall could be made up from implementing a water conservation and demand management project to ensure that the quantities of unaccounted for water are kept to a minimum.

9.3 FINANCIAL REQUIREMENTS

The financial requirements for the provision of the infrastructure to eradicate the water supply backlog based on the demand model intervention by 2035 is summarised in the table below.

Table 9.3: Financial Requirements based on Demand Model Interventions

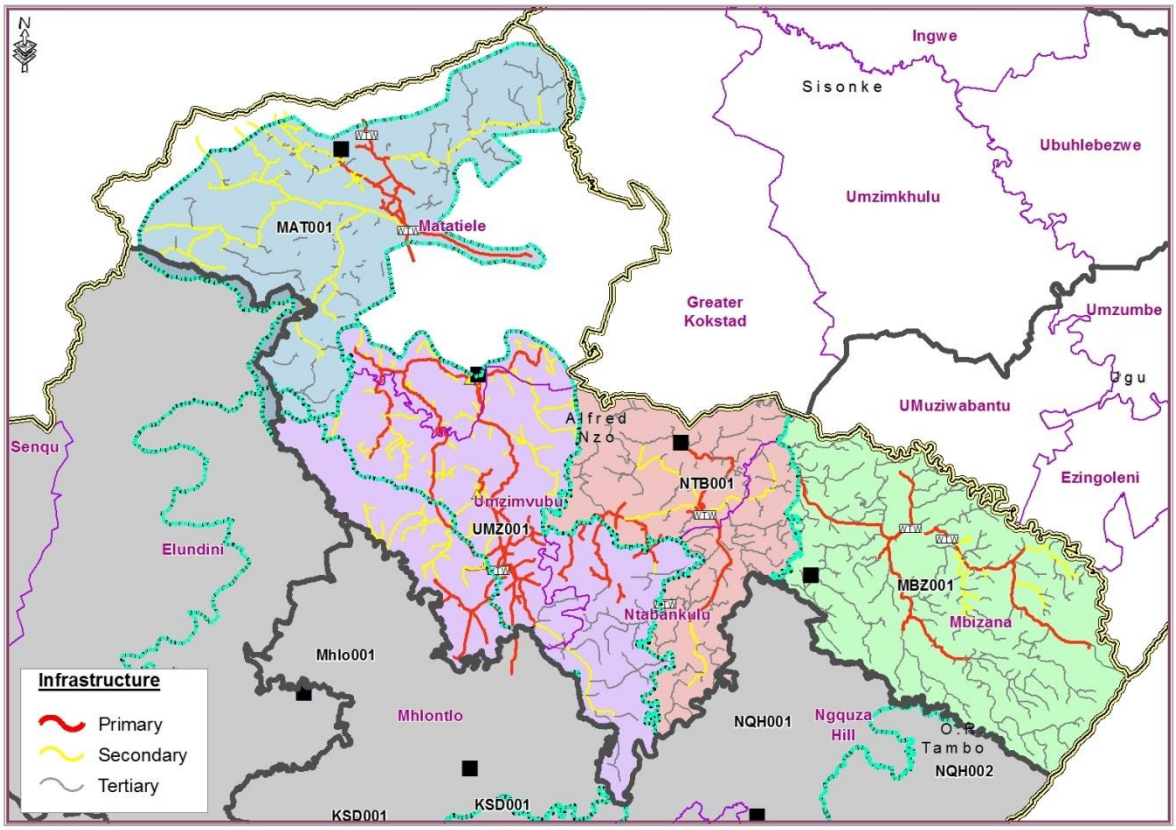
WSIA	Direct Est Cost (Construction)	Indirect Est Cost (Fees, Geotech, EIA, Disb Etc)	Total (Including Contingencies, Escalation, VAT)
MAT001: Kinira River Dam WSS	R 3 221 199 190	R 256 216 400	R 3 477 415 589
UMZ: Mkhemane Dam WSS	R 3 869 596 867	R 361 507 416	R 4 231 104 283
NTB001: Nkanji Dam IWSS	R 3 118 799 060	R 272 077 822	R 3 390 876 882
MBZ001: Mbizana RBWSS	R 3 181 061 507	R 327 288 184	R 3 508 349 692
TOTAL	**R 13 390 656 624**	**R 1 217 089 822**	**R 14 607 746 446**

A total estimate of R14,6 billion is required to eradicate the anticipated water services backlog by 2035. The primary bulk component costs comprises of 46% (R 6,8 billion) of the total cost and is indicated in the table below.

WSIA		Direct Est Cost (Construction)	Indirect Est Cost (Fees, Geotech, EIA, Disbursements etc)	Total (including contingencies, Escalation& VAT)
MAT001: Kinira River Dam WSS	Primary Bulk	R 1 124 652 126	R 810 296 861	R 1 934 948 988
UMZ: Mkhemane Dam WSS	Primary Bulk	R 1 727 311 778	R 106 681 182	R 1 833 992 960
NTB001: Nkanji Dam IWSS	Primary Bulk	R 2 061 612 903	R 158 044 300	R 2 219 657 203

WSIA		Direct Est Cost (Construction)	Indirect Est Cost (Fees, Geotech, EIA, Disbursements etc)	Total (including contingencies, Escalation& VAT)
MBZ001: Mbizana RBWSS	Primary Bulk	R 478 675 199	R 344 917 144	R 823 592 343
TOTAL		**R 5 392 252 006**	**R 1 419 939 487**	**R 6 812 191 494**

The map below indicates the distinction between the primary bulk, secondary and tertiary infrastructure.



The financial requirements for the provision of the infrastructure to eradicate the water supply backlog based on the existing proposed infrastructure interventions by 2035 is summarised in the table below.

Table 9.4: Total Cost Requirement per proposed WSIA

WSIA	Proposed Cost requirement	No of HH per WSIA	Average Scheme Development Cost per HH
MAT001: Kinira River Dam WSS	R 3 477 415 589	46 958	R 74 054
UMZ001: Mkhemane Dam WSS	R 4 231 104 283	51 985	R 81 391
NTB001: Nkanji Dam IWSS	R 3 390 876 882	46 073	R 73 598
MBZ001: Mbizana RBWSS	R 3 508 349 692	29 461	R 119 085
TOTAL	**R 14 607 746 446**	**174 477**	**R 87 032**

9.4 FUNDING OPTIONS

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

9.5 IMPLEMENTATION PROGRAMME

The ANDM has developed regional wall-to-wall bulk water plans to address their bulk water supply needs. Some of these studies are already funded through the RBIG funding programme whilst others are in the process to be prepared for implementation readiness and submission to the Eastern Cape Technical Assessment Committee (ECTAC). These projects are included within the latest council endorsed IDP and WSDP of the DM as well as included within the DWS' Provincial Regional Bulk Master Plan dated March 2015.

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 four 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.

10. RECOMMENDATIONS

10.1 RESPONSIBILITIES

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

10.2 SELECTION OF SOLUTIONS

The four (4) proposed water supply intervention areas (WSIAs) are the appropriate solutions for bulk water supply development within ANDM and are as follows:

- MAT001 WSIA: Kinira River Dam Regional Water Supply Scheme;
- UMZ001 WSIA: Mkhemane Dam Water Supply Scheme;
- NTB001 WSIA: Nkanji Dam Water Supply Scheme; and
- MBZ001 WSIA: Mbizana Water Supply Scheme.

The ANDM would like to move towards a minimum supply level of yard connections that would require a basic supply of 100ℓ/c/d. The existing demand model caters for an average supply of 95ℓ/c/d and therefore the proposed solutions will still be the most feasible infrastructure intervention.

10.3 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.

10.3.1 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.

10.3.2 MUNICIPAL SYSTEMS ACT

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

10.3.3 WATER SERVICES ACT

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

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

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

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

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

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

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

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

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

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

ANNEXURE A – REFERENCES

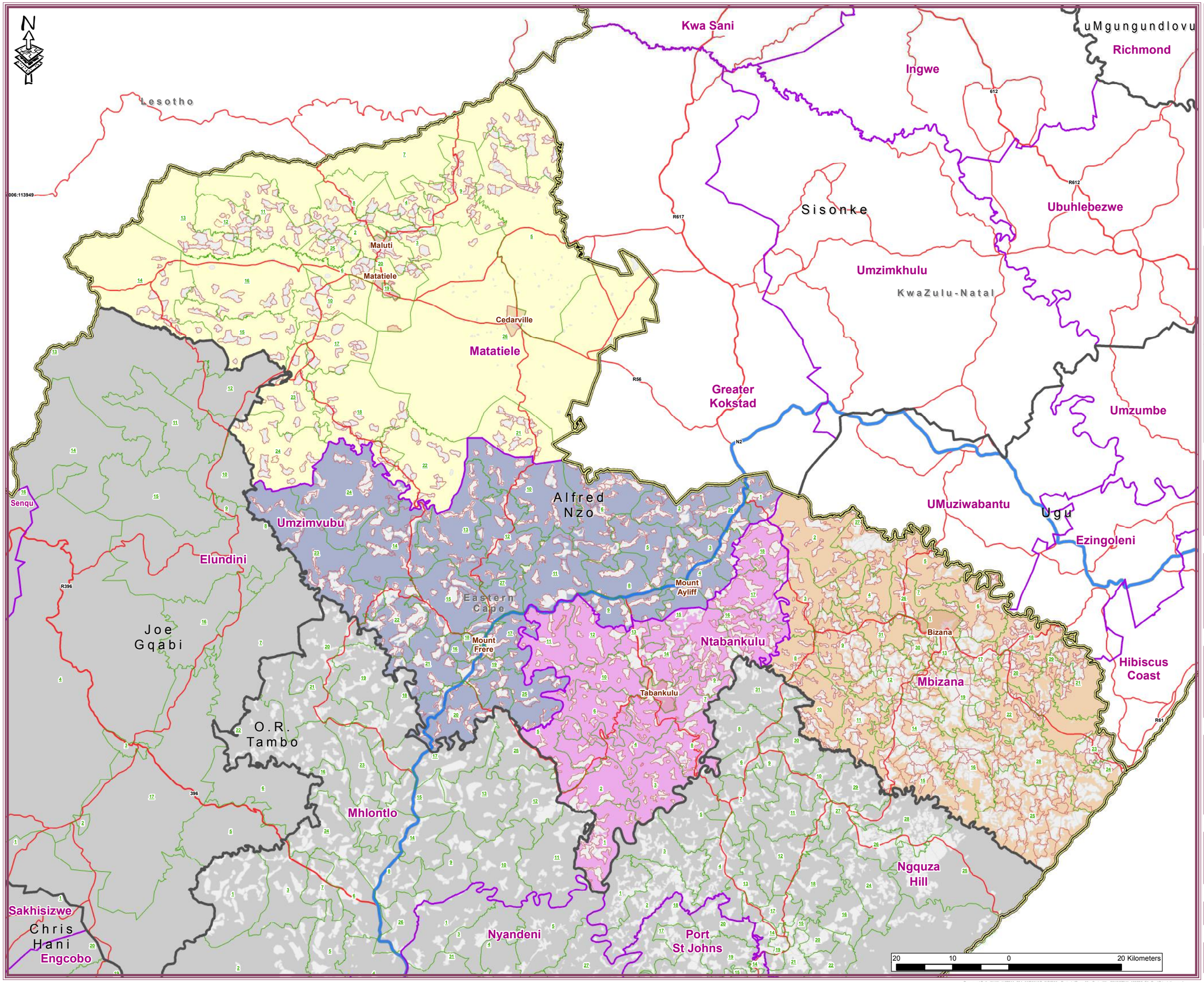
Reference List

DWS (2011)	*Support to the Implementation and Maintenance of Reconciliation Strategies for Towns in the Southern Region, 2011*
DWS (2014)	*Reference Framework Geo database, December 2014*
Statistics SA	*Census 2011*
WSDP	*Alfred Nzo 2014/15 WSDP, March 2015*
IDP	*Alfred Nzo District Municipality IDP 2014/15 Financial Year, June 2015*
	Mount Frere Long term Water Planning Project Report – Mkemane Dam, February 2014 – US Consortium
	Alfred Nzo District Municipality Mount Ayliff RBIG Water Supply Long Term Planning Scoping report, June 2014 – GIBB Africa
	Greater Ntabankulu Regional Water Supply RBIG Long Term Planning Report, May 2014- Consortium of PSPs
	Matatiele Local Municipality Bulk Water Long Term Planning Scoping Report, November 2013 – Sektor, Aurecon and Monde Consulting
	KInira Dam – ANDM/IDMS-RBIG/96/26/10/11 – Matatiele Bulk Water Supply Scheme, Planning, Studies, Investigations and Assessments – May 2013
	Integrated Regional Water Supply for Umzimvubu and Ntabankulu Municipal Areas Conceptual Report – June 2013
	Greater Mbizana Water Supply Feasibility Report, November 2012 – Camdecon Engineers

ANNEXURE B – MAP SERIES

Map Series

Figure 1	*Study Area*
Figure 2	*Population Distribution*
Figure 3	*Water Supply Backlog Status*
Figure 4	*Surface Water*
Figure 5	*Groundwater*
Figure 6.1	*Existing Scheme Areas and Infrastructure Components – Matatiele*
Figure 6.1.1	*Existing Scheme Areas and Infrastructure Components – MAT001*
Figure 6.2.	*Existing Scheme Areas and Infrastructure Components – Mbizana*
Figure 6.2.1	*Existing Scheme Areas and Infrastructure Components – MBZ001*
Figure 6.3	*Existing Scheme Areas and Infrastructure Components – Ntabankulu*
Figure 6.3.1	*Existing Scheme Areas and Infrastructure Components – NTB001*
Figure 6.4	*Existing Scheme Areas and Infrastructure Components – Umzimvubu*
Figure 6.4.1	*Existing Scheme Areas and Infrastructure Components – UMZ001*
Figure 7	*Projects –Alfred Nzo*
Figure 7.1	*Projects – Matatiele*
Figure 7.2	*Projects – Mbizana*
Figure 7.3	*Projects – Ntabankulu*
Figure 7.4	*Projects - Umzimvubu*
Figure 8	*Bulk Project Interventions –Alfred Nzo*
Figure 8.1	*Bulk Project Interventions – MAT001*
Figure 8.2	*Bulk Project Interventions – MBZ001*
Figure 8.3	*Bulk Project Interventions – NTB001*
Figure 8.4	*Bulk Project Interventions – UMZ001*



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Ward Boundaries & Numbers
- Census Main Places
- National Roads
- Main Roads

DWS: Dept. of Water & Sanitation

LOCALITY:

CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

ALFRED NZO

ALFRED NZO DISTRICT MUNICIPALITY

CONSULTANTS:
UWP CONSULTING
ZIYANDA consulting
Project No.: 27811
UWP Consulting
PO Box 25549, Monument Park
Pretoria, 0105
Tel: + 27 (0) 12 424 9700
Fax: + 27 (0) 12 460 4071
Email: pretoria@uwp.co.za

PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE:

General Orientation Study Area

DATE COMPLETED:

2016/05/26

MAP NO.:

DC44_Figure 1

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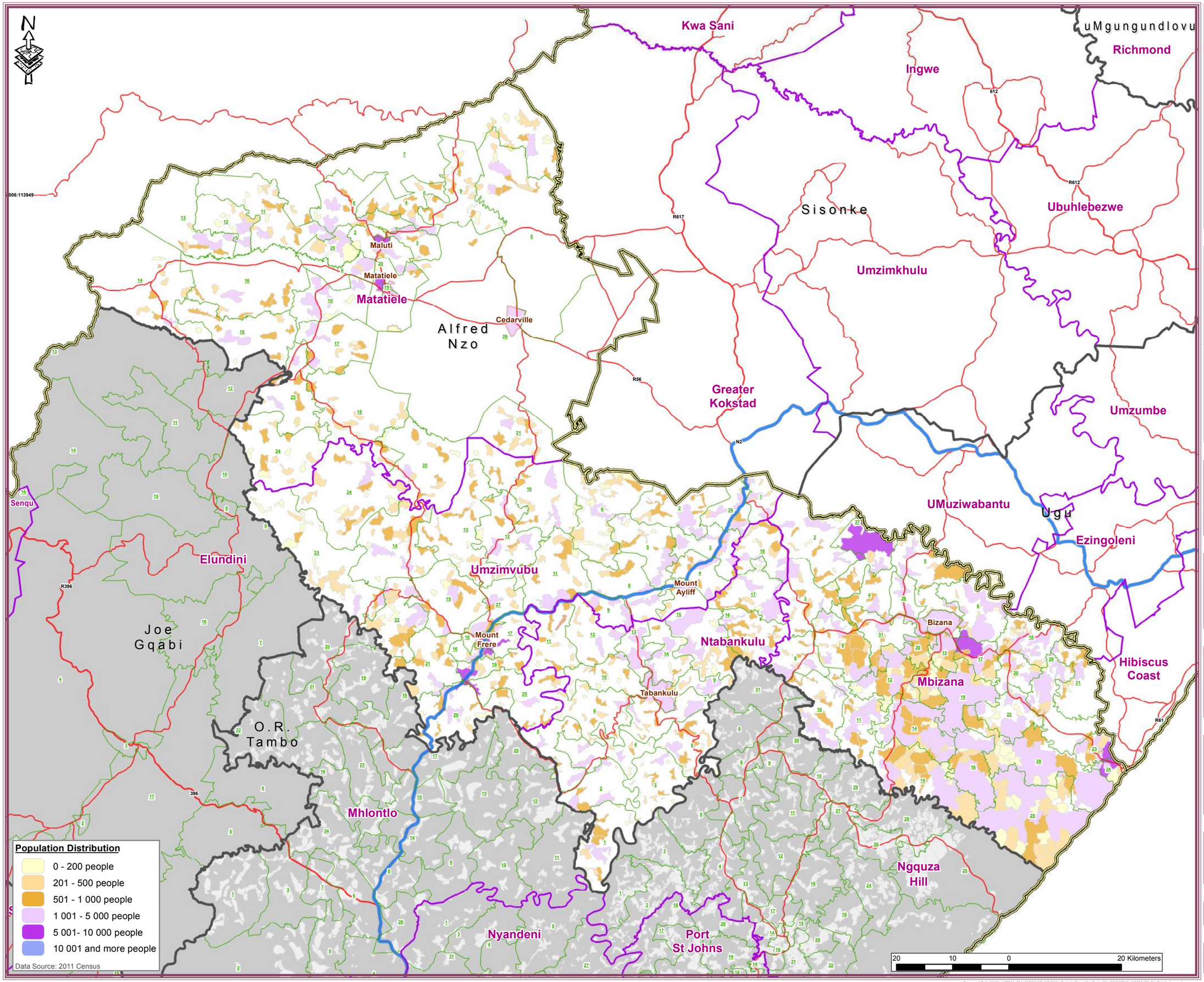

Legend

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CONSULTANTS:
UWP CONSULTING
ZIYANDA
Project No.: 27811
UWP Consulting
PO Box 25549, Monument Park
Pretoria, 0105
Tel: + 27 (0) 12 424 9700
Fax: + 27 (0) 12 460 4071
Email: pretoria@uwp.co.za

PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE:

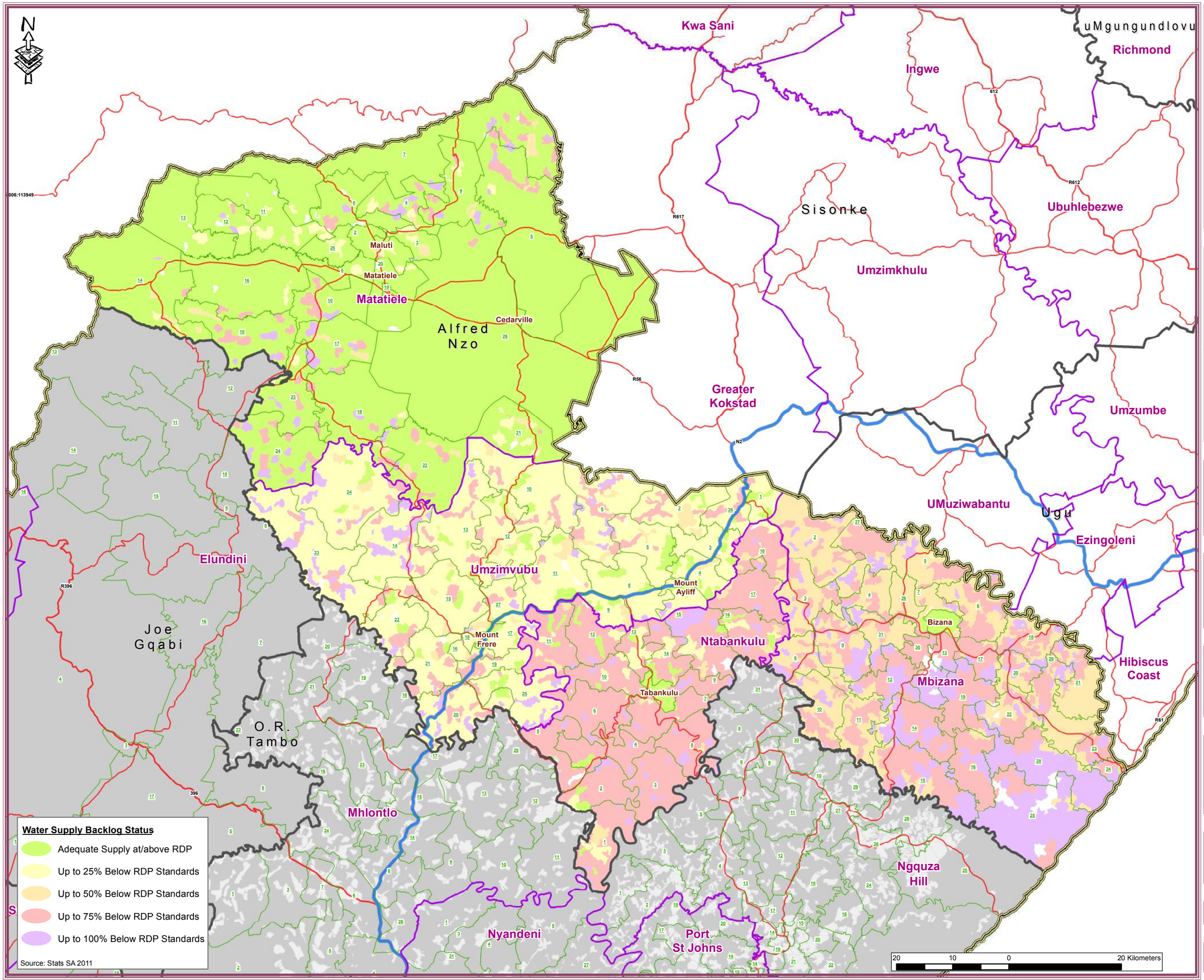
General Orientation Population Distribution

DATE COMPLETED:

2016/05/26

MAP NO.:

DC44_Figure 2



Legend

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- District Municipality Boundaries
- Local Municipality Boundaries
- Ward Boundaries & Numbers
- Census Main Places
- National Roads
- Main Roads

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DISTRICT MUNICIPALITY:

ALFRED NZO

ALFRED NZO DISTRICT MUNICIPALITY

CONSULTANTS:
UWP CONSULTING
ZIYANDA consulting
UWP Consulting
PO Box 25549, Monument Park
Pretoria, 0105
Tel: + 27 (0) 12 424 9700
Fax: + 27 (0) 12 460 4071
Email: pretoria@uwp.co.za

Project No.: 27811

PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE:

Water Supply Backlog Status

DATE COMPLETED:

2016/05/26

MAP NO.:

DC44_Figure 3

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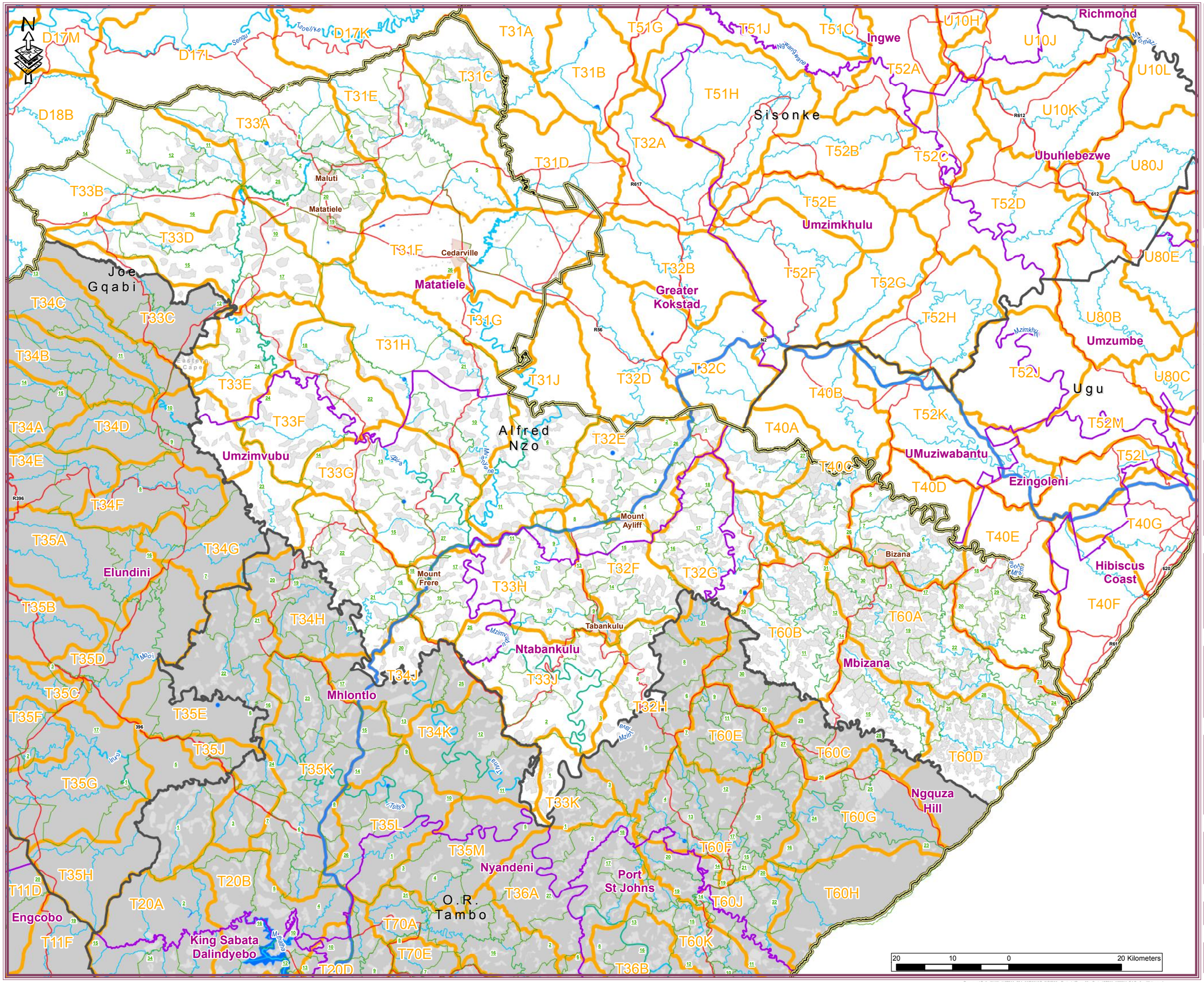


Legend

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Ward Boundaries & Numbers
- Census Main Places
- National Roads
- Main Roads
- Dams & Dam Names
- Primary Rivers
- Secondary Rivers
- Quaternary Catchments

DWS: Dept. of Water & Sanitation

LOCALITY:

CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

ALFRED NZO DISTRICT MUNICIPALITY

CONSULTANTS:

UWP CONSULTING

ZIYANDA consulting

Project No.: 27811

UWP Consulting
PO Box 25549, Monument Park
Pretoria, 0105

Tel: + 27 (0) 12 424 9700
Fax: + 27 (0) 12 460 4071
Email: pretoria@uwp.co.za

PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE:

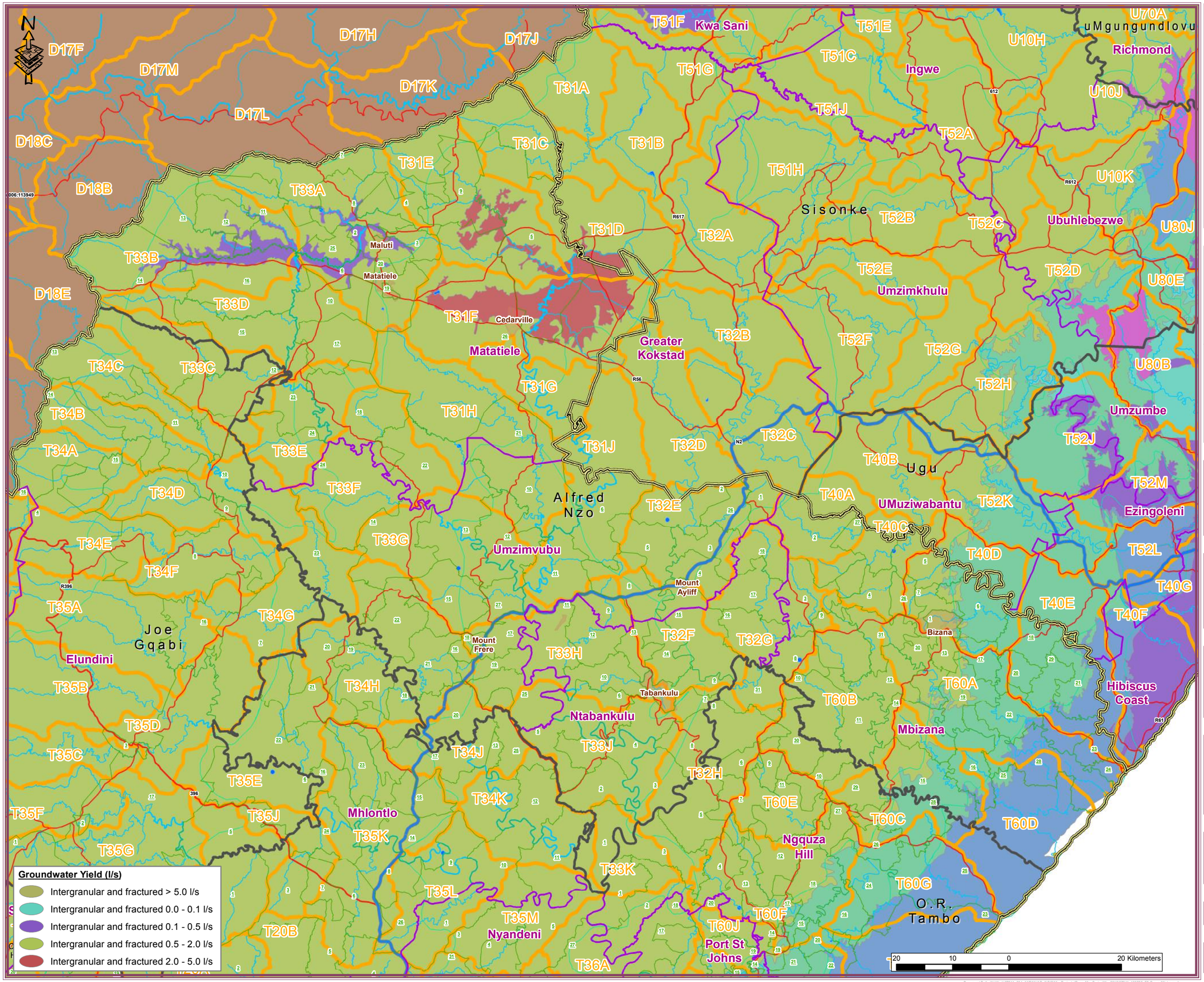
Surface Water Resources

DATE COMPLETED:

2016/05/26

MAP NO.:

DC44_Figure 4



Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Ward Boundaries & Numbers
- Census Main Places
- National Roads
- Main Roads
- Groundwater Aquifer Class: Minor (whole of the Alfred Nzo DM)

DWS: Dept. of Water & Sanitation

LOCALITY:

CLIENT:

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ALFRED NZO

ALFRED NZO DISTRICT MUNICIPALITY

CONSULTANTS:
UWP CONSULTING
ZIYANDA consulting
Project No.: 27811
UWP Consulting
PO Box 25549, Monument Park
Pretoria, 0105
Tel: + 27 (0) 12 424 9700
Fax: + 27 (0) 12 460 4071
Email: pretoria@uwp.co.za

PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE:

Groundwater Resources

DATE COMPLETED:

2016/05/26

MAP NO.:

DC44_Figure 5

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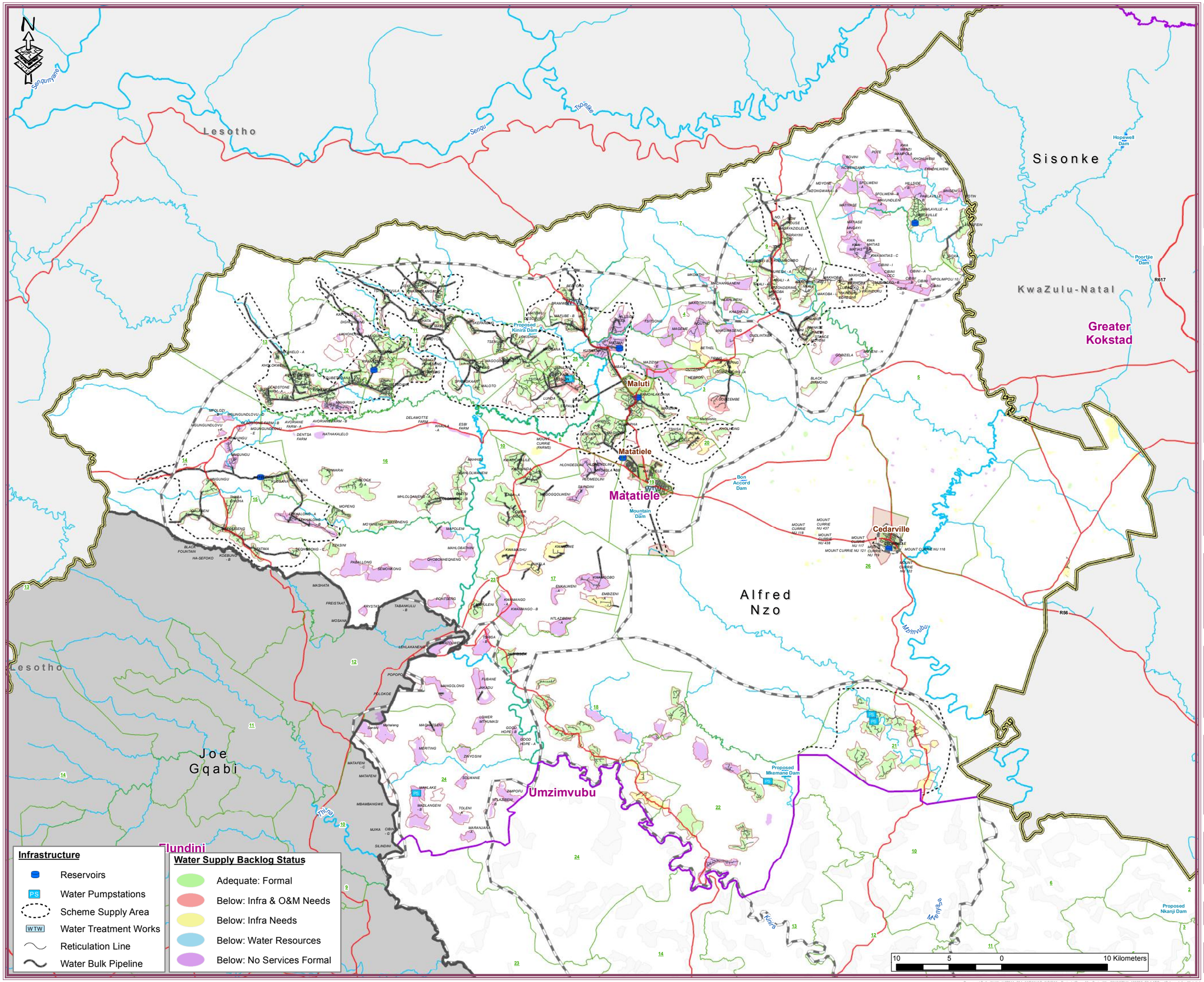

Infrastructure

- Reservoirs
- Water Pumpstations
- Scheme Supply Area
- Water Treatment Works
- Reticulation Line
- Water Bulk Pipeline

Water Supply Backlog Status

- Adequate: Formal
- Below: Infra & O&M Needs
- Below: Infra Needs
- Below: Water Resources
- Below: No Services Formal

Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Ward Boundaries & Numbers
- Census Main Places
- National Roads
- Main Roads
- Existing All Town Strategy Water Supply Areas
- Dams & Dam Names
- Primary Rivers
- Secondary Rivers

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ALFRED NZO DISTRICT MUNICIPALITY

CONSULTANTS:
UWP CONSULTING
ZIYANDA consulting
Project No.: 27811
UWP Consulting
PO Box 25549, Monument Park
Pretoria, 0105
Tel: + 27 (0) 12 424 9700
Fax: + 27 (0) 12 460 4071
Email: pretoria@uwp.co.za

PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE:

Existing Scheme Areas and Infrastructure Components: Matatiele

DATE COMPLETED:

2016/05/26

MAP NO.:

DC44_Figure 6.1

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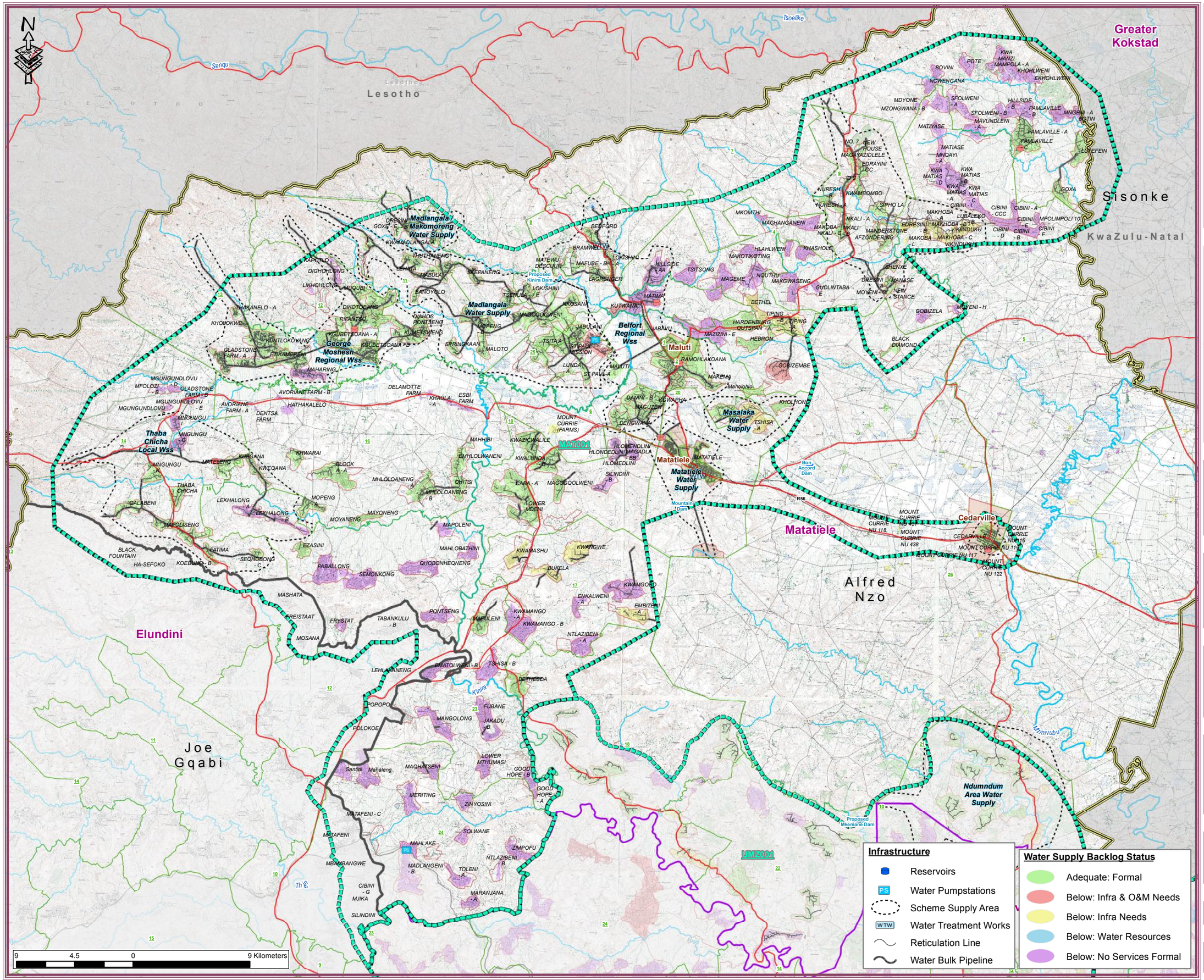

Legend

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Ward Boundaries & Numbers
- Census Main Places
- National Roads
- Main Roads
- Proposed Water Supply Intervention Area
- Dams & Dam Names
- Primary Rivers
- Secondary Rivers

DWS: Dept. of Water & Sanitation

LOCALITY:

CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

ALFRED NZO DISTRICT MUNICIPALITY

CONSULTANTS:
UWP CONSULTING
ZIYANDA
Project No.: 27811
UWP Consulting
PO Box 25549, Monument Park
Pretoria, 0105
Tel: + 27 (0) 12 424 9700
Fax: + 27 (0) 12 460 4071
Email: pretoria@uwp.co.za

PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE: **Existing Scheme Areas and Infrastructure Components: Matatiele - MAT001 Kinira Dam Integrated RWS**

DATE COMPLETED: 2016/05/26

MAP NO.: **DC44_Figure 6.1.1**

Infrastructure

- Reservoirs
- Water Pumpstations
- Scheme Supply Area
- Water Treatment Works
- Reticulation Line
- Water Bulk Pipeline

Water Supply Backlog Status

- Adequate: Formal
- Below: Infra & O&M Needs
- Below: Infra Needs
- Below: Water Resources
- Below: No Services Formal

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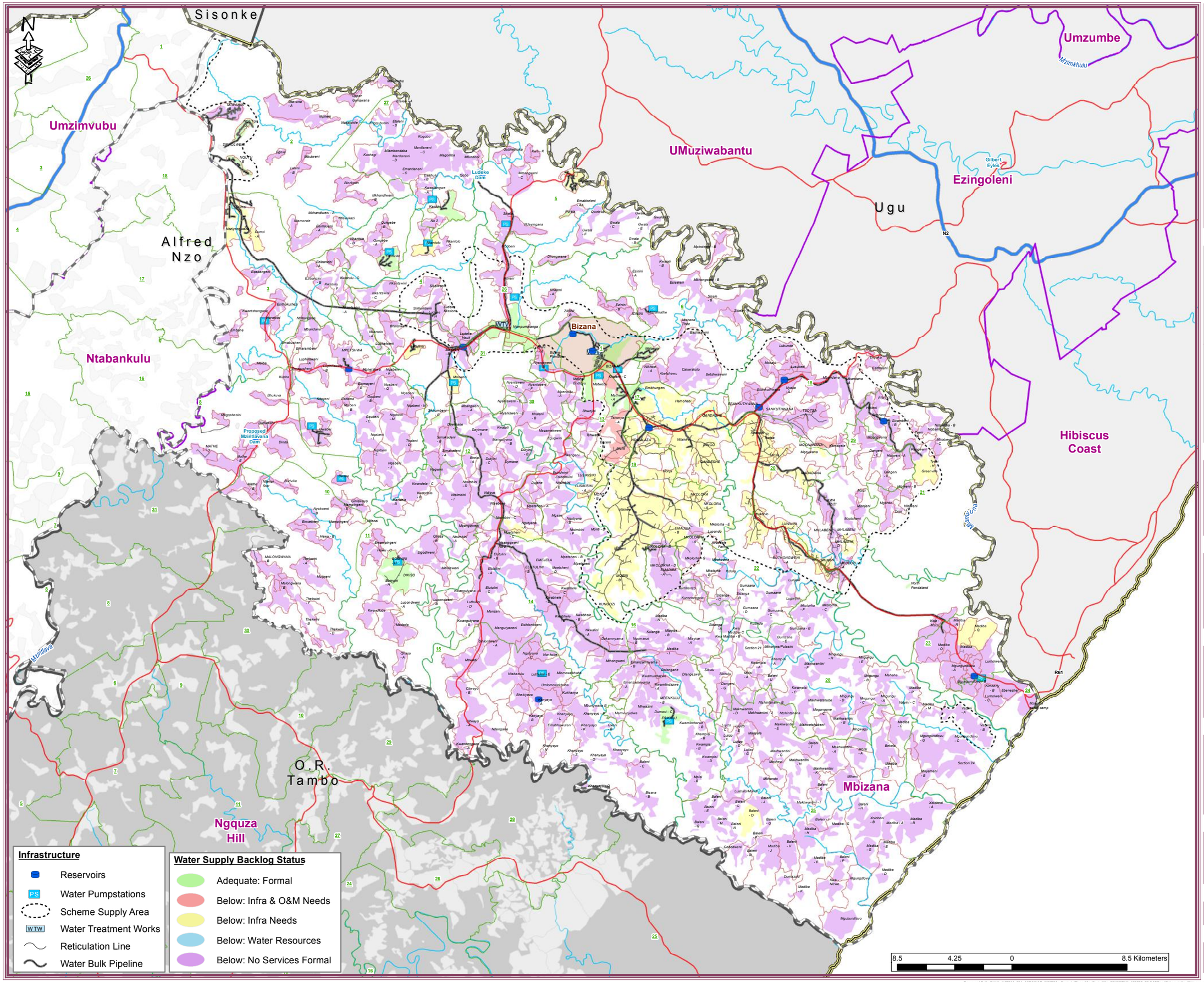

Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
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- National Roads
- Main Roads
- Existing All Town Strategy Water Supply Areas
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DWS: Dept. of Water & Sanitation

Infrastructure

- Reservoirs
- Water Pumpstations
- Scheme Supply Area
- Water Treatment Works
- Reticulation Line
- Water Bulk Pipeline

Water Supply Backlog Status

- Adequate: Formal
- Below: Infra & O&M Needs
- Below: Infra Needs
- Below: Water Resources
- Below: No Services Formal

LOCALITY:

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UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

ALFRED NZO DISTRICT MUNICIPALITY

CONSULTANTS:

UWP CONSULTING

ZIYANDA consulting

UWP Consulting
PO Box 25549, Monument Park
Pretoria, 0105

Tel: + 27 (0) 12 424 9700
Fax: + 27 (0) 12 460 4071
Email: pretoria@uwp.co.za

Project No.: 27811

PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE:

Existing Scheme Areas and Infrastructure Components: Mbizana

DATE COMPLETED:

2016/05/26

MAP NO.:

DC44_Figure 6.2

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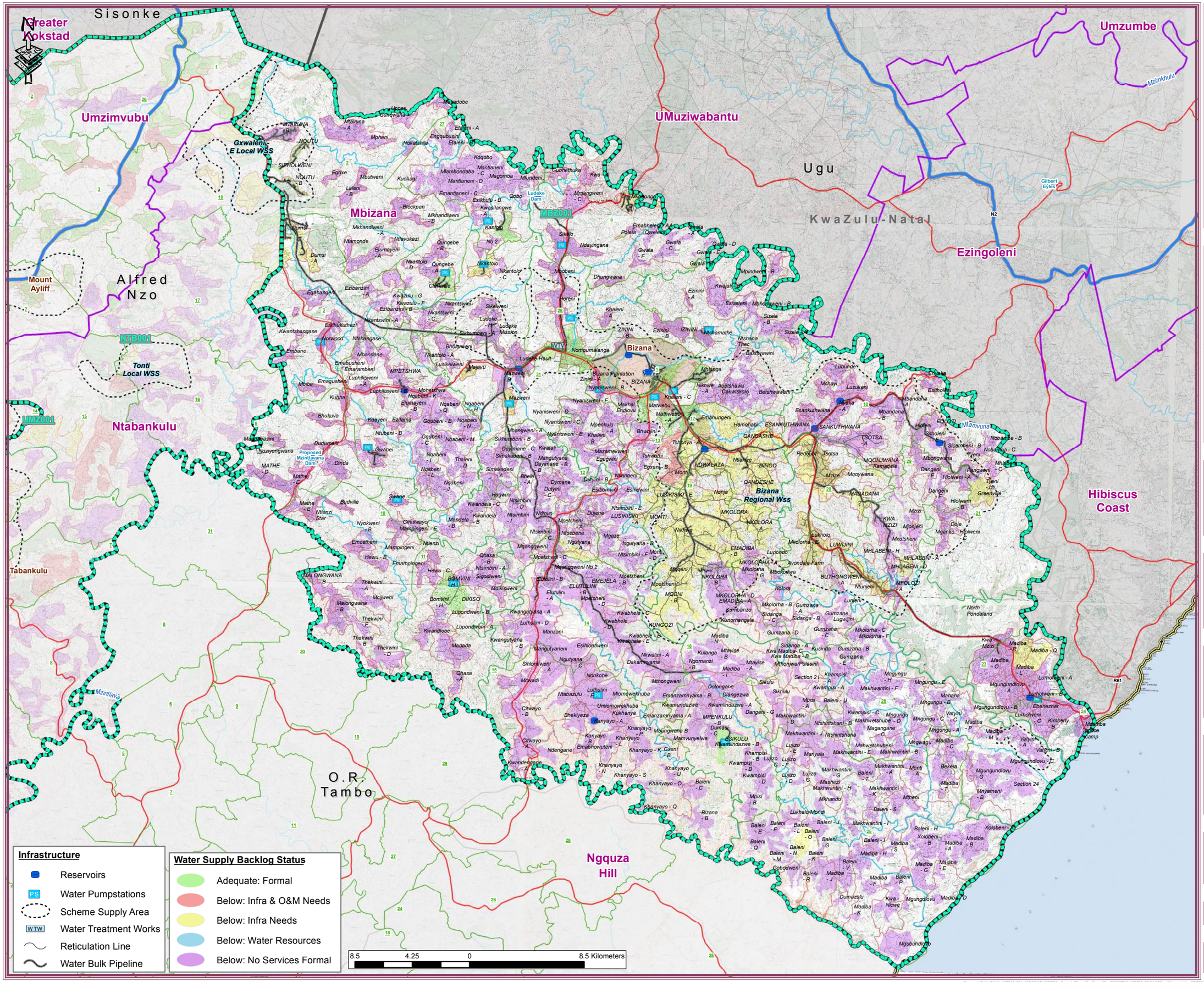

Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Ward Boundaries & Numbers
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- National Roads
- Main Roads
- Proposed Water Supply Intervention Area
- Dams & Dam Names
- Primary Rivers
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DWS: Dept. of Water & Sanitation

LOCALITY:

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ALFRED NZO

ALFRED NZO DISTRICT MUNICIPALITY

CONSULTANTS:
UWP CONSULTING
ZIYANDA
UWP Consulting
PO Box 25549, Monument Park
Pretoria, 0105
Tel: + 27 (0) 12 424 9700
Fax: + 27 (0) 12 460 4071
Email: pretoria@uwp.co.za

Project No.: 27811

PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE: **Existing Scheme Areas and Infrastructure Components: Mbizana - MBZ001 Mbizana RBWS**

DATE COMPLETED: 2016/05/26

MAP NO.: **DC44_Figure 6.2.1**

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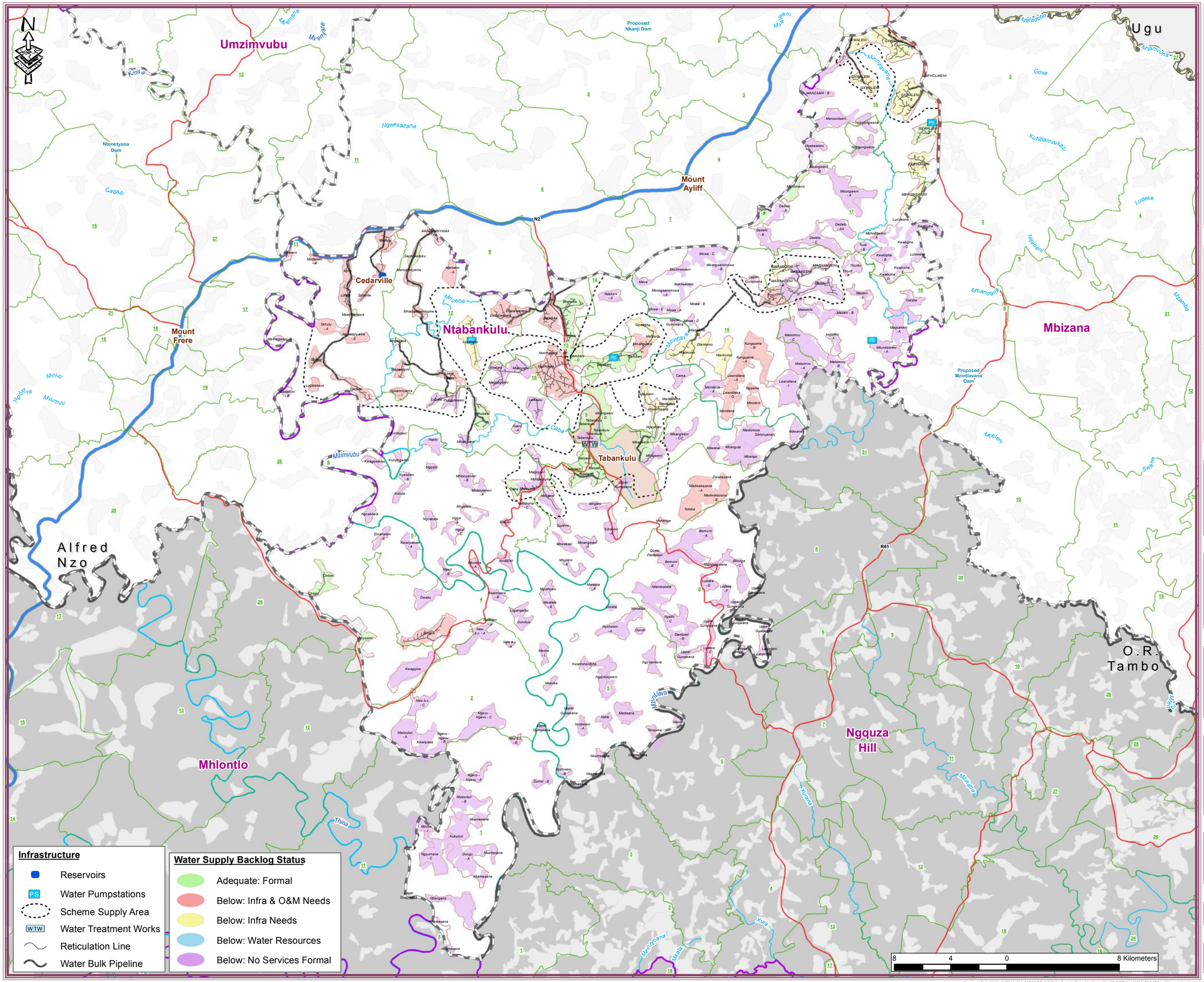

Infrastructure

- Reservoirs
- Water Pumpstations
- Scheme Supply Area
- Water Treatment Works
- Reticulation Line
- Water Bulk Pipeline

Water Supply Backlog Status

- Adequate: Formal
- Below: Infra & O&M Needs
- Below: Infra Needs
- Below: Water Resources
- Below: No Services Formal

Legend

- Provincial Boundaries
- District Municipality Boundaries
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- Main Roads
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- Dams & Dam Names
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DWS: Dept. of Water & Sanitation

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ALFRED NZO

ALFRED NZO DISTRICT MUNICIPALITY

CONSULTANTS:

UWP CONSULTING

ZIYANDA

UWP Consulting
PO Box 25549, Monument Park
Pretoria, 0105

Tel: + 27 (0) 12 424 9700
Fax: + 27 (0) 12 460 4071
Email: pretoria@uwp.co.za

Project No.: 27811

PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE:

Existing Scheme Areas and Infrastructure Components: Ntabankulu

DATE COMPLETED:

2016/05/26

MAP NO.:

DC44_Figure 6.3

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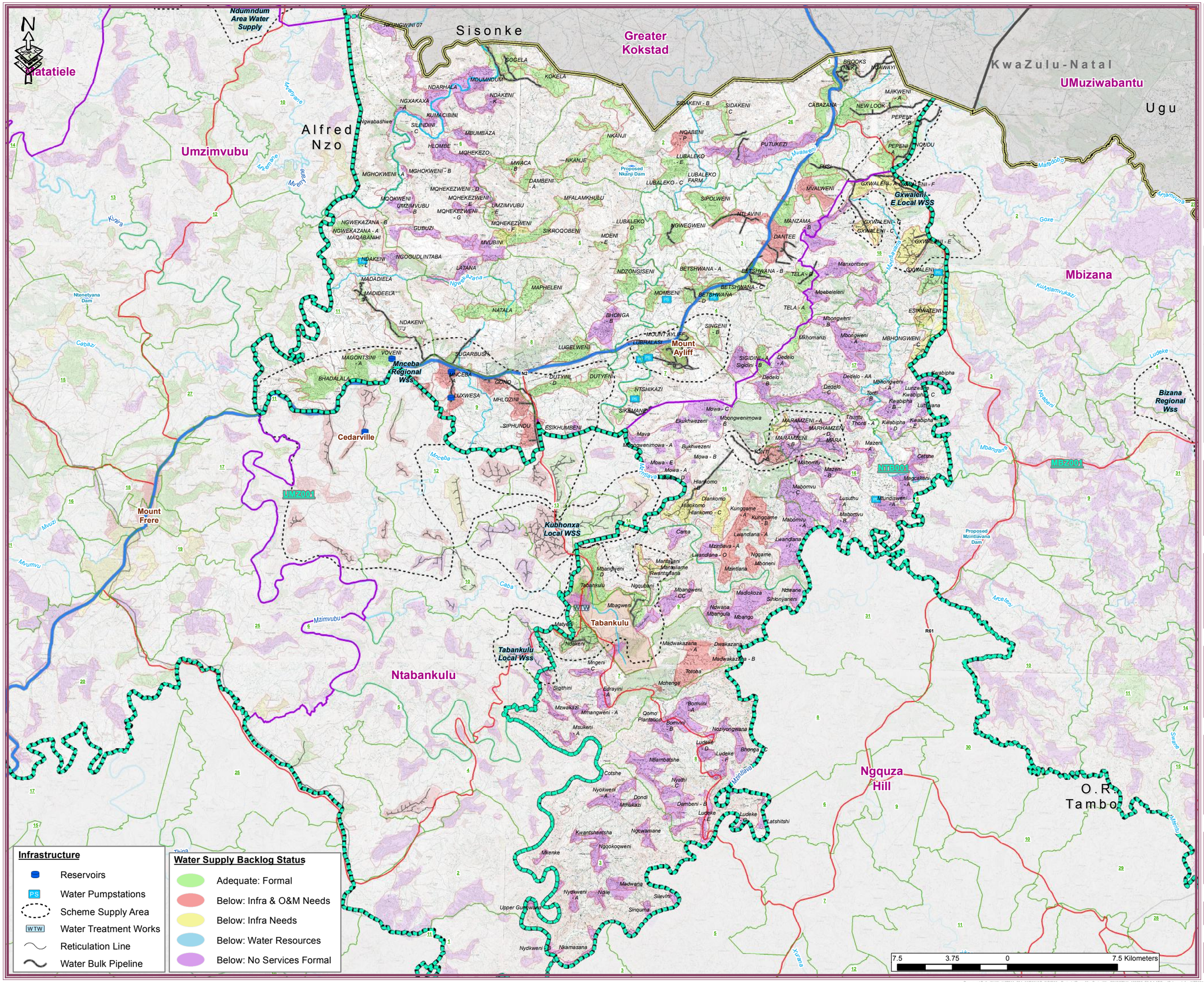

Legend

- Provincial Boundaries
- District Municipality Boundaries
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- Dams & Dam Names
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DWS: Dept. of Water & Sanitation

LOCALITY:

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ALFRED NZO DISTRICT MUNICIPALITY

CONSULTANTS:

Project No.: 27811

UWP Consulting
PO Box 25549, Monument Park
Pretoria, 0105

Tel: + 27 (0) 12 424 9700
Fax: + 27 (0) 12 460 4071
Email: pretoria@uwp.co.za

PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE: **Existing Scheme Areas and Infrastructure Components: Ntabankulu - NTB001 Ntanji Dam Integrated RWS**

DATE COMPLETED: 2016/05/26

MAP NO.: **DC44_Figure 6.3.1**

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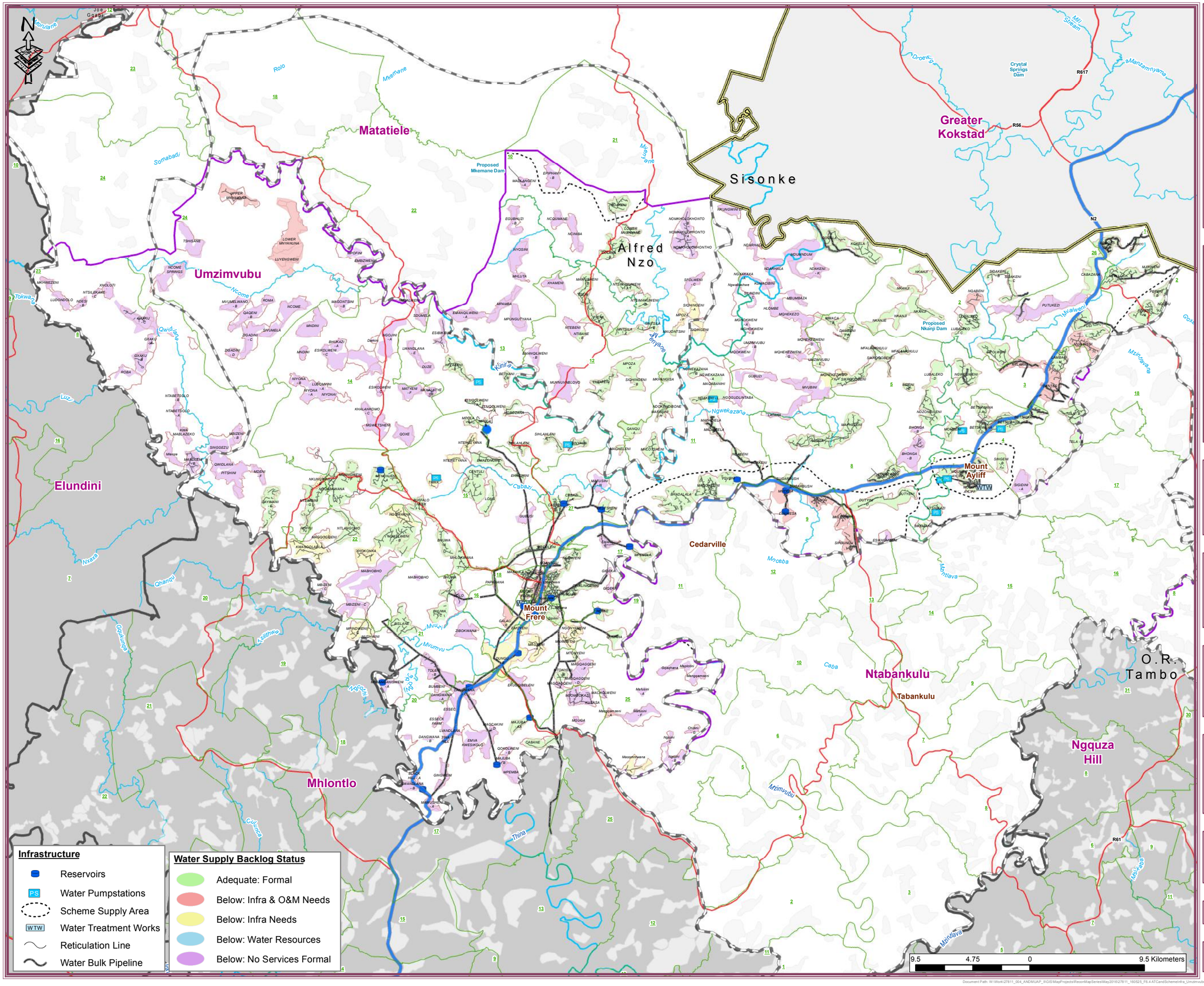

Legend

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Ward Boundaries & Numbers
- Census Main Places
- National Roads
- Main Roads
- Existing All Town Strategy Water Supply Areas
- Dams & Dam Names
- Primary Rivers
- Secondary Rivers

DWS: Dept. of Water & Sanitation

LOCALITY:

CLIENT:

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DISTRICT MUNICIPALITY:

ALFRED NZO DISTRICT MUNICIPALITY

CONSULTANTS:

Project No.: 27811

UWP Consulting
PO Box 25549, Monument Park
Pretoria, 0105

Tel: + 27 (0) 12 424 9700
Fax: + 27 (0) 12 460 4071
Email: pretoria@uwp.co.za

PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE:

Existing Scheme Areas and Infrastructure Components: Umzimvubu

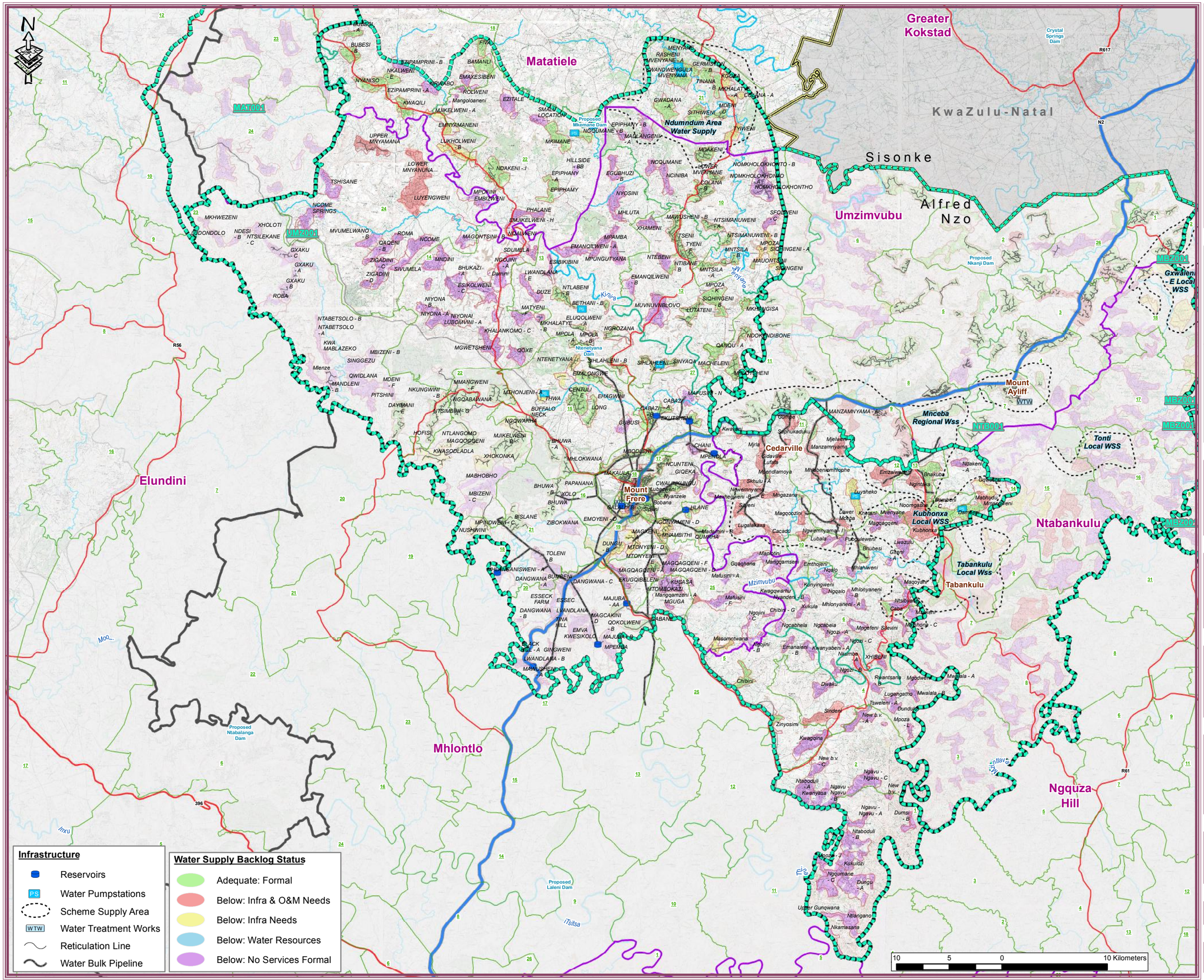
DATE COMPLETED:

2016/05/26

MAP NO.:

DC44_Figure 6.4

Document Path: W:\Work\27811_004_ANDMUAP_IlGIS\MapProjects\ReconMapSeries\May2016\27811_160525_F6.4 ATCandSchemeInfra_Umzimvubu.mxd



Legend

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Ward Boundaries & Numbers
- Census Main Places
- National Roads
- Main Roads
- Proposed Water Supply Intervention Area
- Dams & Dam Names
- Primary Rivers
- Secondary Rivers

DWS: Dept. of Water & Sanitation

LOCALITY:

CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

ALFRED NZO DISTRICT MUNICIPALITY

CONSULTANTS:

UWP Consulting
PO Box 25549, Monument Park
Pretoria, 0105

Tel: + 27 (0) 12 424 9700
Fax: + 27 (0) 12 460 4071
Email: pretoria@uwp.co.za

Project No.: 27811

PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE: **Existing Scheme Areas and Infrastructure Components: Umzimvubu - UMZ001 Mkemane Dam Integrated RWS**

DATE COMPLETED: 2016/05/26

MAP NO.: **DC44_Figure 6.4.1**

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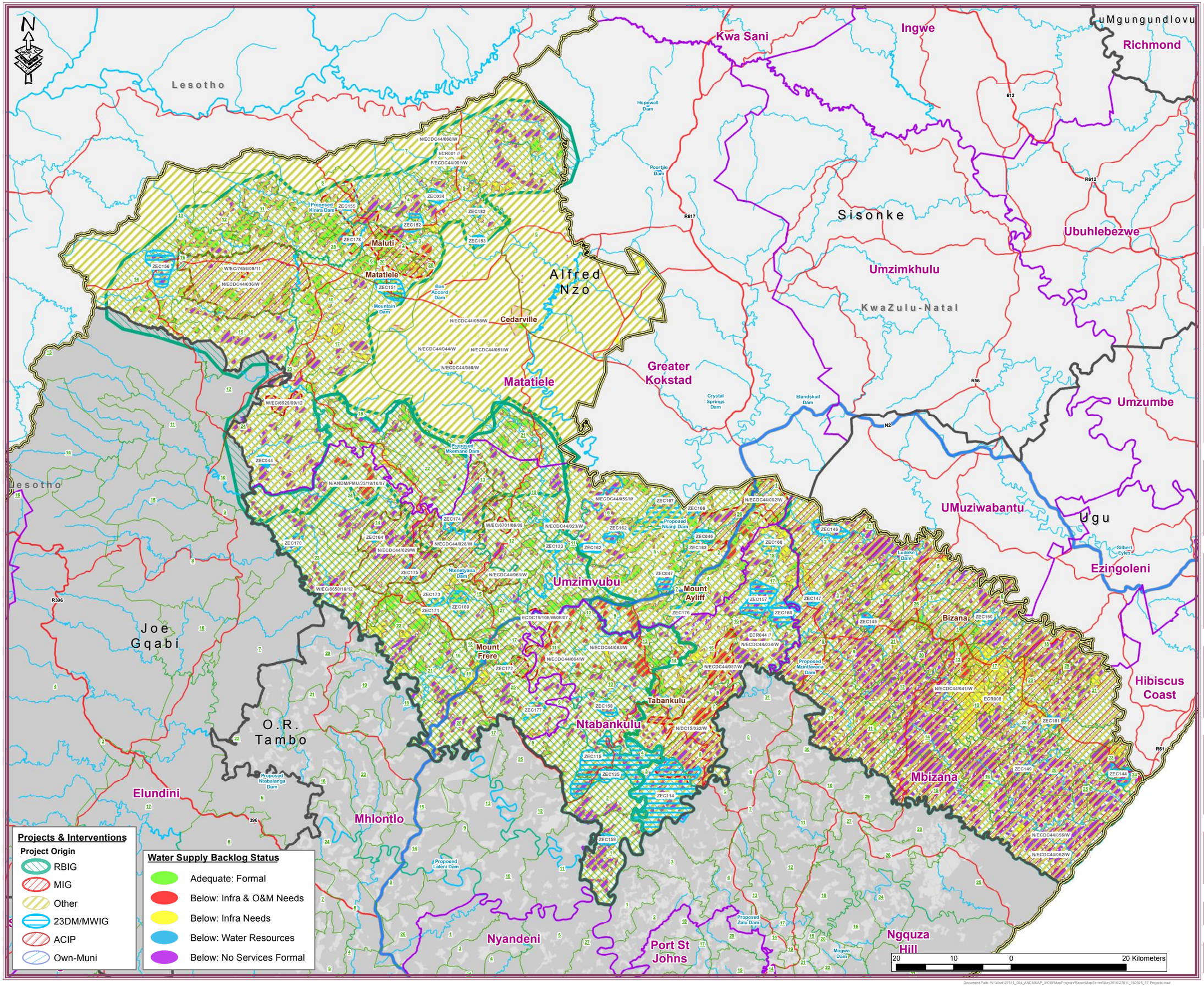

Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Ward Boundaries & Numbers
- Census Main Places
- National Roads
- Main Roads

DWS: Dept. of Water & Sanitation

LOCALITY:

CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

ALFRED NZO DISTRICT MUNICIPALITY

CONSULTANTS:
UWP Consulting
PO Box 25549, Monument Park
Pretoria, 0105

Tel: + 27 (0) 12 424 9700
Fax: + 27 (0) 12 460 4071
Email: pretoria@uwp.co.za

Project No.: 27811

PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE:

Projects and Interventions

DATE COMPLETED:

2016/05/25

MAP NO.:

DC44_Figure 7

Projects & Interventions

Project Origin

- RBIG
- MIG
- Other
- 23DM/MWIG
- ACIP
- Own-Muni

Water Supply Backlog Status

- Adequate: Formal
- Below: Infra & O&M Needs
- Below: Infra Needs
- Below: Water Resources
- Below: No Services Formal

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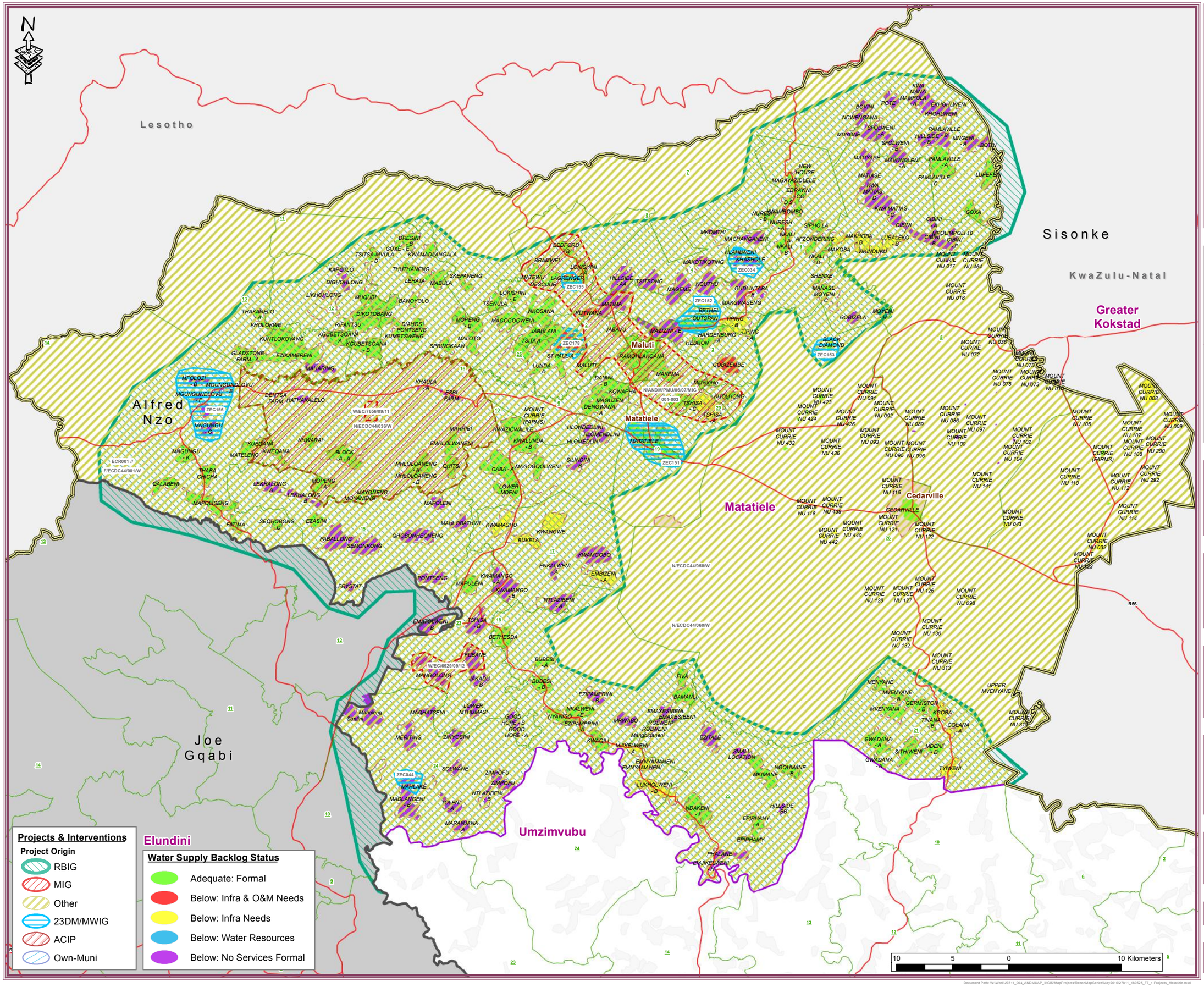

Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Ward Boundaries & Numbers
- Census Main Places
- National Roads
- Main Roads

DWS: Dept. of Water & Sanitation

LOCALITY:

CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

ALFRED NZO

ALFRED NZO DISTRICT MUNICIPALITY

CONSULTANTS:

Project No.: 27811

UWP CONSULTING

ZIYANDA

UWP Consulting
PO Box 25549, Monument Park
Pretoria, 0105

Tel: + 27 (0) 12 424 9700
Fax: + 27 (0) 12 460 4071
Email: pretoria@uwp.co.za

PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE:

Projects and Interventions: Matatiele

DATE COMPLETED:

2016/05/25

MAP NO.:

DC44_Figure 7.1

Projects & Interventions

Project Origin

- RBIG
- MIG
- Other
- 23DM/MWIG
- ACIP
- Own-Muni

Water Supply Backlog Status

- Adequate: Formal
- Below: Infra & O&M Needs
- Below: Infra Needs
- Below: Water Resources
- Below: No Services Formal

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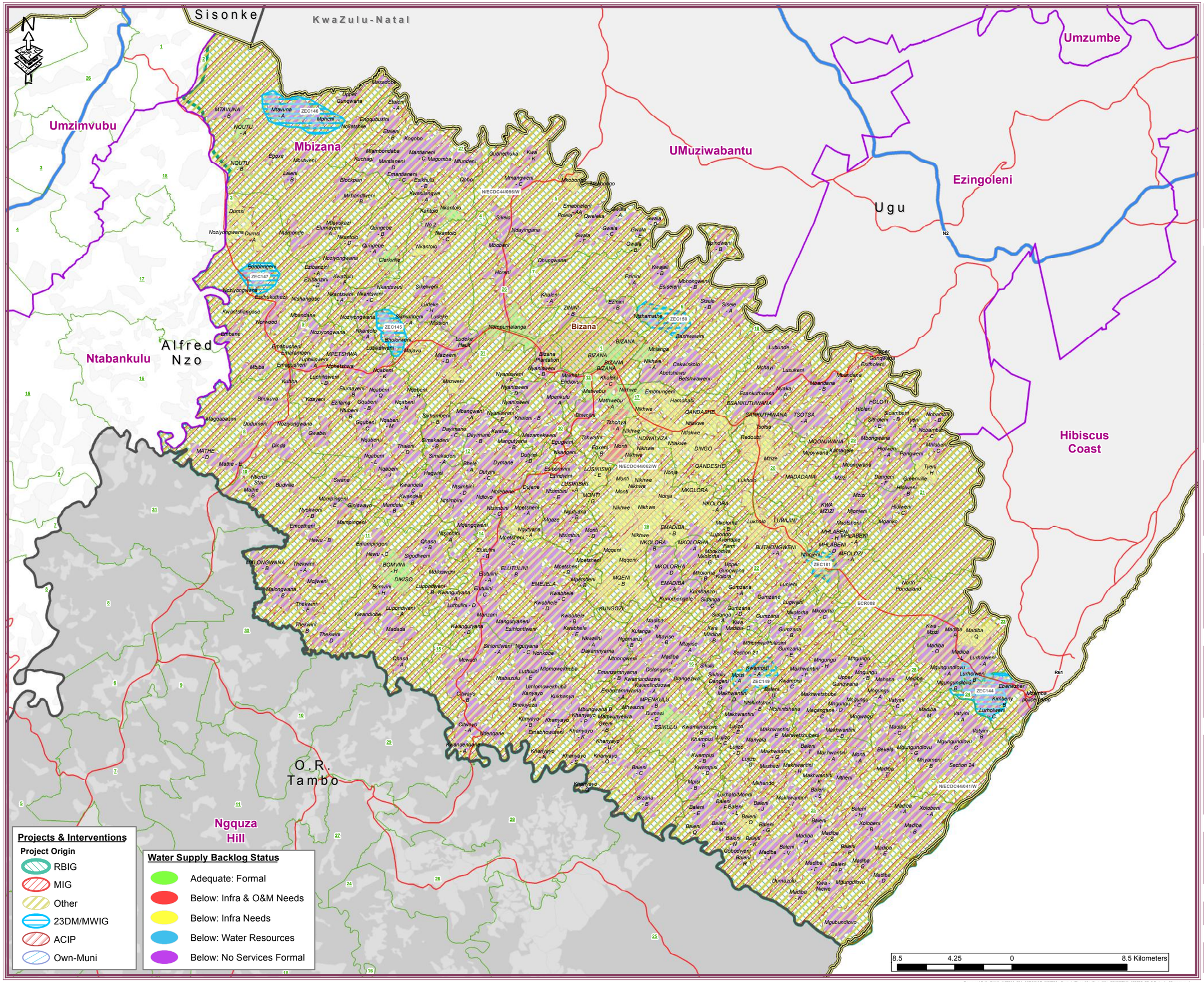

Projects & Interventions

Project Origin

- RBIG
- MIG
- Other
- 23DM/MWIG
- ACIP
- Own-Muni

Water Supply Backlog Status

- Adequate: Formal
- Below: Infra & O&M Needs
- Below: Infra Needs
- Below: Water Resources
- Below: No Services Formal

Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Ward Boundaries & Numbers
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- National Roads
- Main Roads

DWS: Dept. of Water & Sanitation

LOCALITY:

CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

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ZIYANDA

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PO Box 25549, Monument Park
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Tel: + 27 (0) 12 424 9700
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Project No.: 27811

PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE:

Projects and Interventions: Mbizana

DATE COMPLETED:

2016/05/25

MAP NO.:

DC44_Figure 7.2

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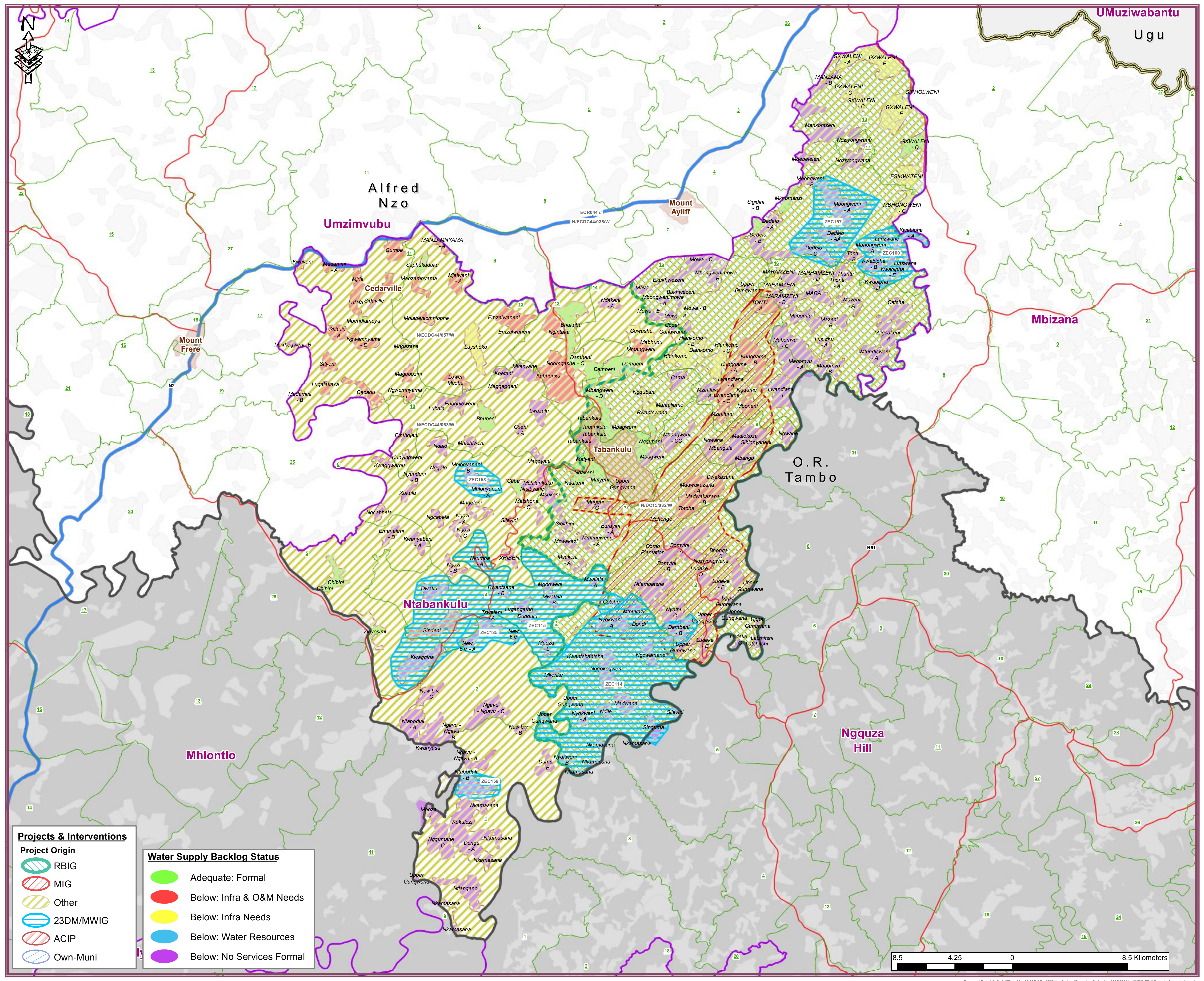

Legend

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Ward Boundaries & Numbers
- Census Main Places
- National Roads
- Main Roads

DWS: Dept. of Water & Sanitation

LOCALITY:

CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

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CONSULTANTS:
UWP Consulting
PO Box 25549, Monument Park
Pretoria, 0105
Tel: + 27 (0) 12 424 9700
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Email: pretoria@uwp.co.za
ZIYANDA consulting

Project No.: 27811

PROJECT TITLE

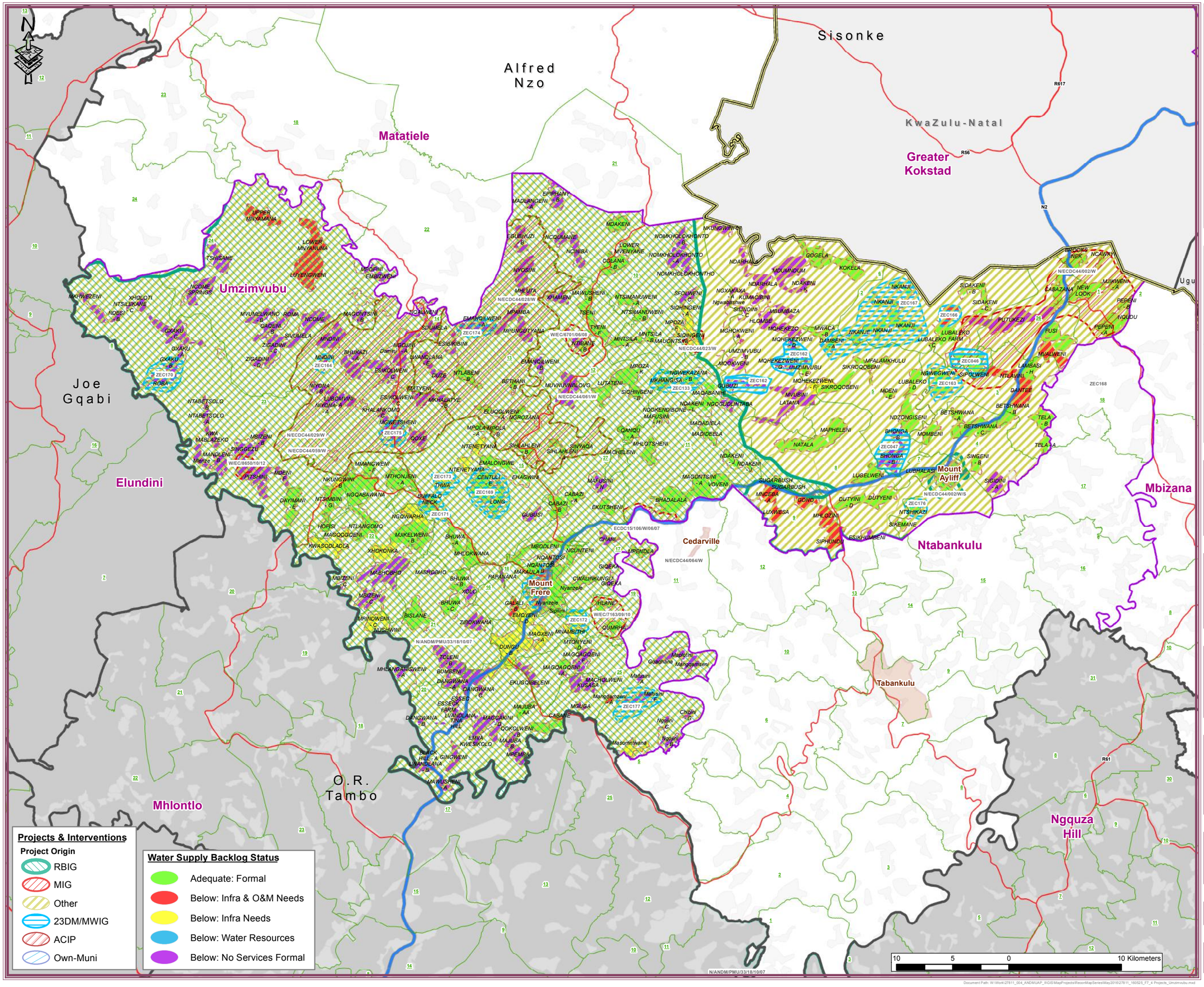
Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE:

Projects and Interventions: Ntabankulu

DATE COMPLETED: 2016/05/25

MAP NO.: **DC44_Figure 7.3**



Legend

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DWS: Dept. of Water & Sanitation

LOCALITY:

CLIENT:

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CONSULTANTS: Project No.: 27811

UWP Consulting
PO Box 25549, Monument Park
Pretoria, 0105

Tel: + 27 (0) 12 424 9700
Fax: + 27 (0) 12 460 4071
Email: pretoria@uwp.co.za

PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE:

Projects and Interventions: Umzimvubu

DATE COMPLETED: 2016/05/25

MAP NO.: **DC44_Figure 7.4**

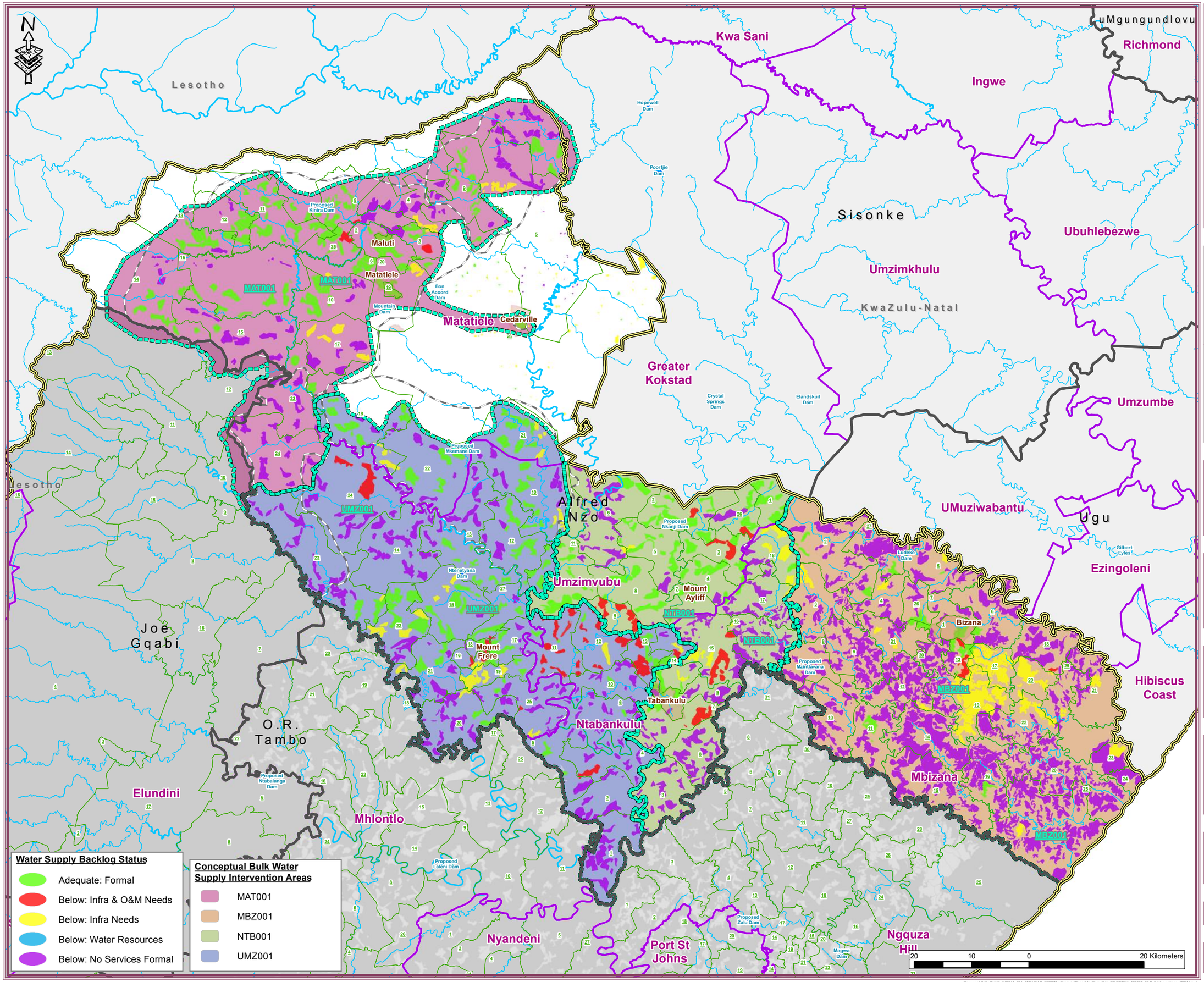
Projects & Interventions

Project Origin

- RBIG
- MIG
- Other
- 23DM/MWIG
- ACIP
- Own-Muni

Water Supply Backlog Status

- Adequate: Formal
- Below: Infra & O&M Needs
- Below: Infra Needs
- Below: Water Resources
- Below: No Services Formal



Water Supply Backlog Status

- Adequate: Formal
- Below: Infra & O&M Needs
- Below: Infra Needs
- Below: Water Resources
- Below: No Services Formal

Conceptual Bulk Water Supply Intervention Areas

- MAT001
- MBZ001
- NTB001
- UMZ001

Legend

- Provinical Boundaries
- District Municipality Boundaries
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LOCALITY:

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PO Box 25549, Monument Park
Pretoria, 0105

Tel: + 27 (0) 12 424 9700
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Project No.: 27811

PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE:

Conceptual Bulk Water Supply Interventions

DATE COMPLETED:

2016/05/26

MAP NO.:

DC44_Figure 8

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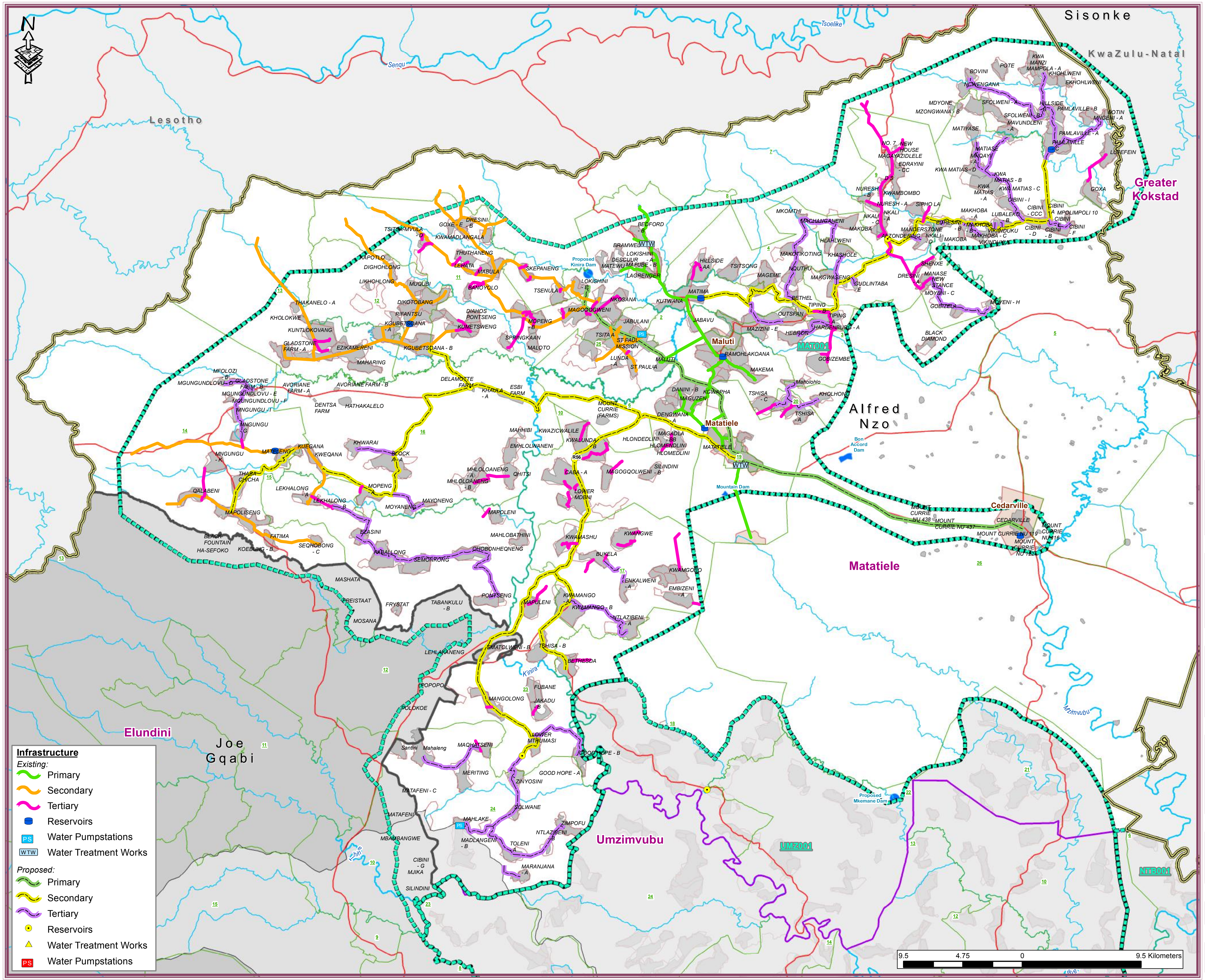

Legend

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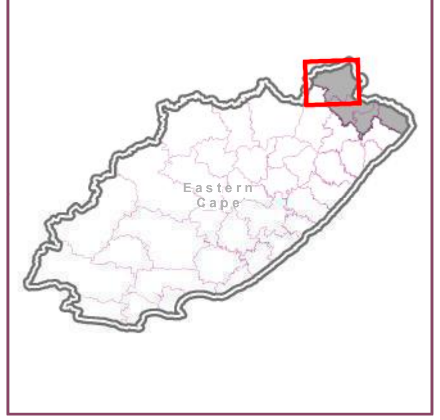
DWS: Dept. of Water & Sanitation

LOCALITY:



CLIENT:

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DISTRICT MUNICIPALITY:

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PO Box 25549, Monument Park
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Tel: + 27 (0) 12 424 9700
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PROJECT TITLE

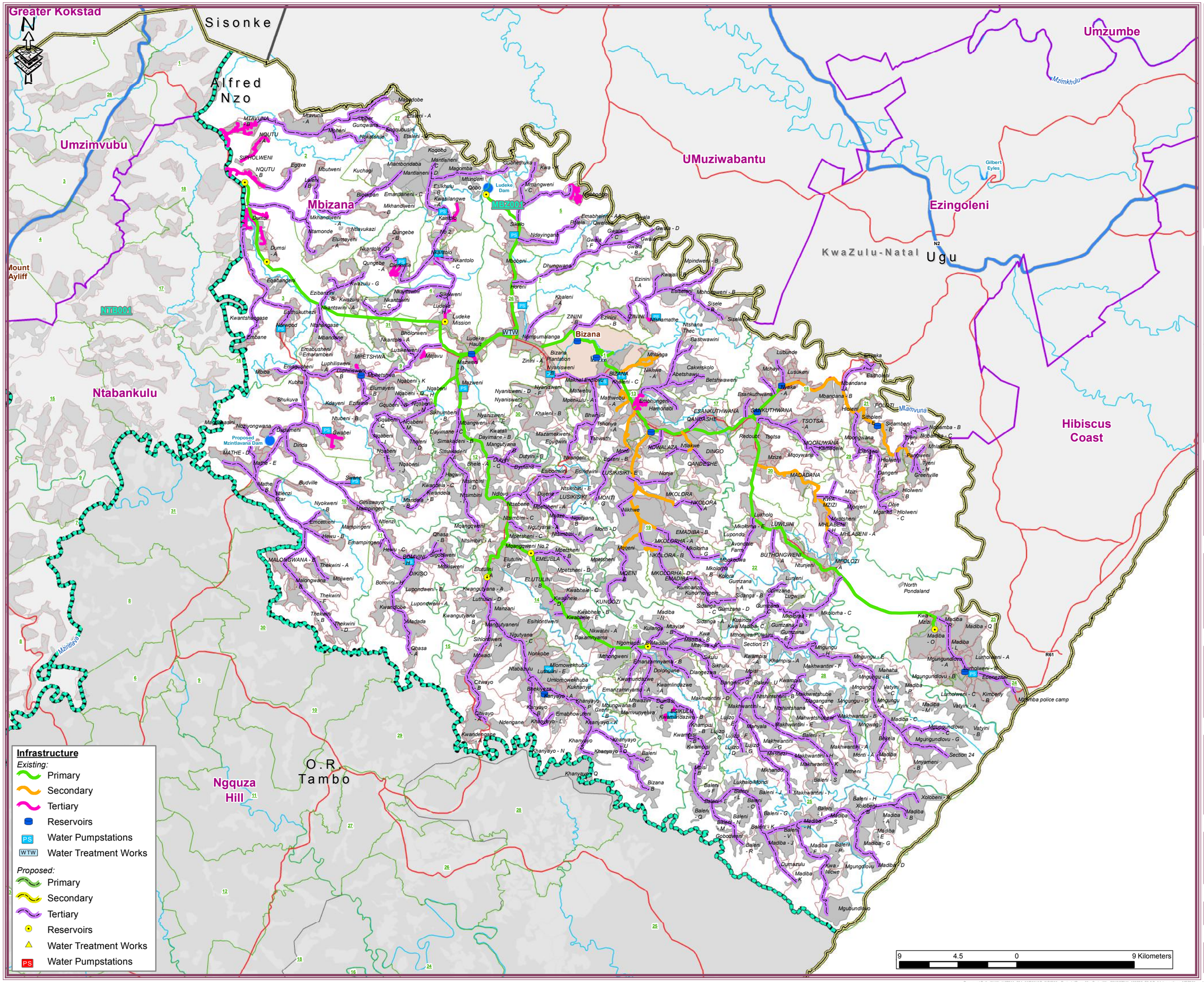
Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE:

Conceptual Bulk Water Supply Interventions:
MAT001 Kinira River Dam

DATE COMPLETED: 2016/05/26

MAP NO.: **DC44_Figure 8.1**



Legend

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CONSULTANTS:
Project No.: 27811
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PO Box 25549, Monument Park
Pretoria, 0105

Tel: + 27 (0) 12 424 9700
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PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE:

Conceptual Bulk Water Supply Interventions:

MBZ001 Mbizana RBWS

DATE COMPLETED:

2016/05/25

MAP NO.:

DC44_Figure 8.2

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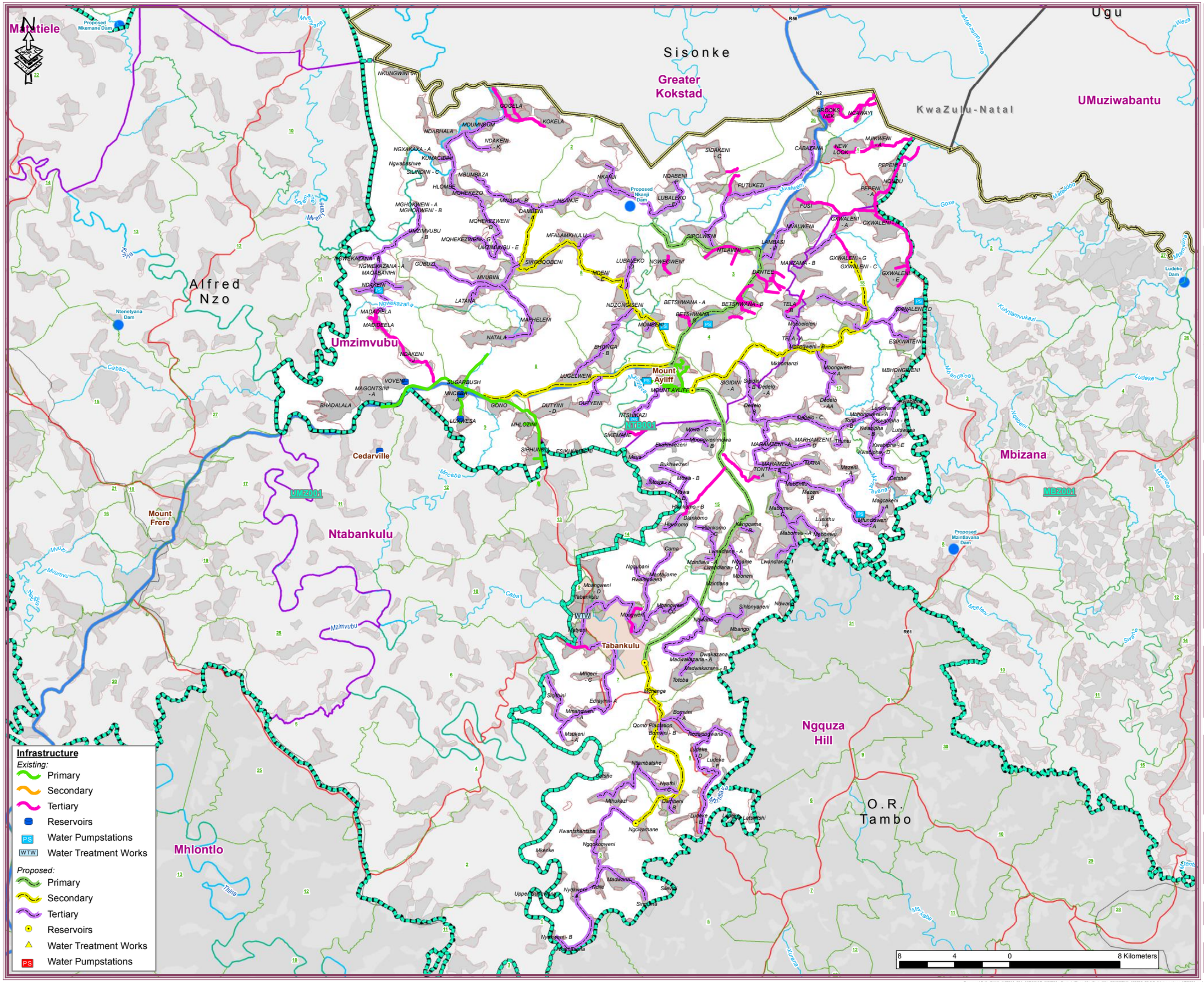

Legend

- Provinical Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Ward Boundaries & Numbers
- Census Main Places
- National Roads
- Main Roads
- Conceptual Water Supply Intervention Areas
- Dams & Dam Names
- Primary Rivers
- Secondary Rivers

DWS: Dept. of Water & Sanitation

LOCALITY:

CLIENT:

UMGENI WATER · AMANZI

DISTRICT MUNICIPALITY:

ALFRED NZO DISTRICT MUNICIPALITY

CONSULTANTS:
UWP CONSULTING
ZIYANDA consulting
Project No.: 27811
UWP Consulting
PO Box 25549, Monument Park
Pretoria, 0105
Tel: + 27 (0) 12 424 9700
Fax: + 27 (0) 12 460 4071
Email: pretoria@uwp.co.za

PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE:

Conceptual Bulk Water Supply Interventions:

NTB001 Nkanji Dam Integrated RWS

DATE COMPLETED:

2016/05/25

MAP NO.:

DC44_Figure 8.3

Infrastructure

Existing:

- Primary
- Secondary
- Tertiary
- Reservoirs
- Water Pumpstations
- Water Treatment Works

Proposed:

- Primary
- Secondary
- Tertiary
- Reservoirs
- Water Treatment Works
- Water Pumpstations

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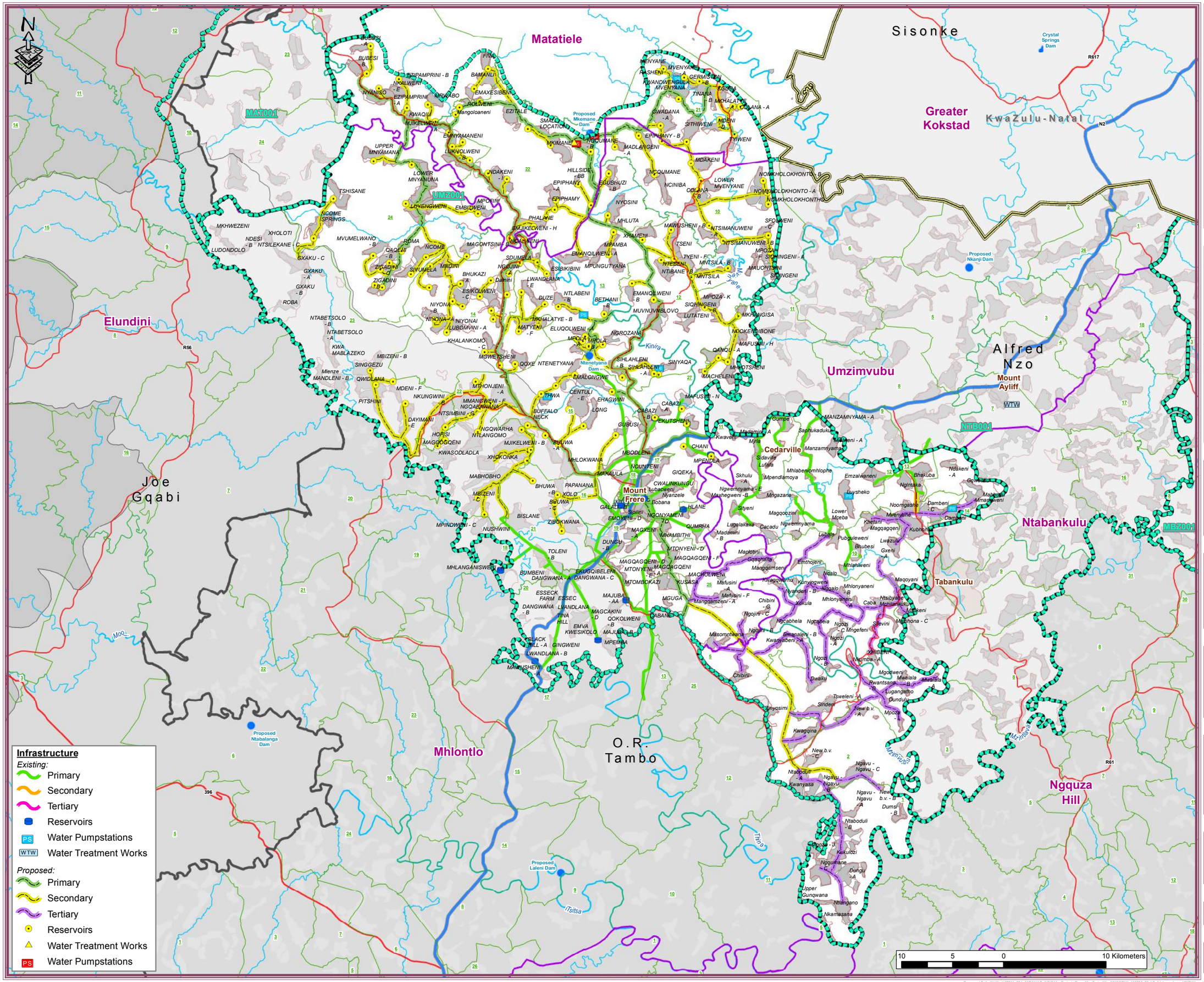

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UWP Consulting
PO Box 25549, Monument Park
Pretoria, 0105

Tel: + 27 (0) 12 424 9700
Fax: + 27 (0) 12 460 4071
Email: pretoria@uwp.co.za

PROJECT TITLE

Alfred Nzo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

MAP TITLE:

Conceptual Bulk Water Supply Interventions:

UMZ001 Mkemane Dam Integrated RWS

DATE COMPLETED:

2016/05/25

MAP NO.:

DC44_Figure 8.4

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