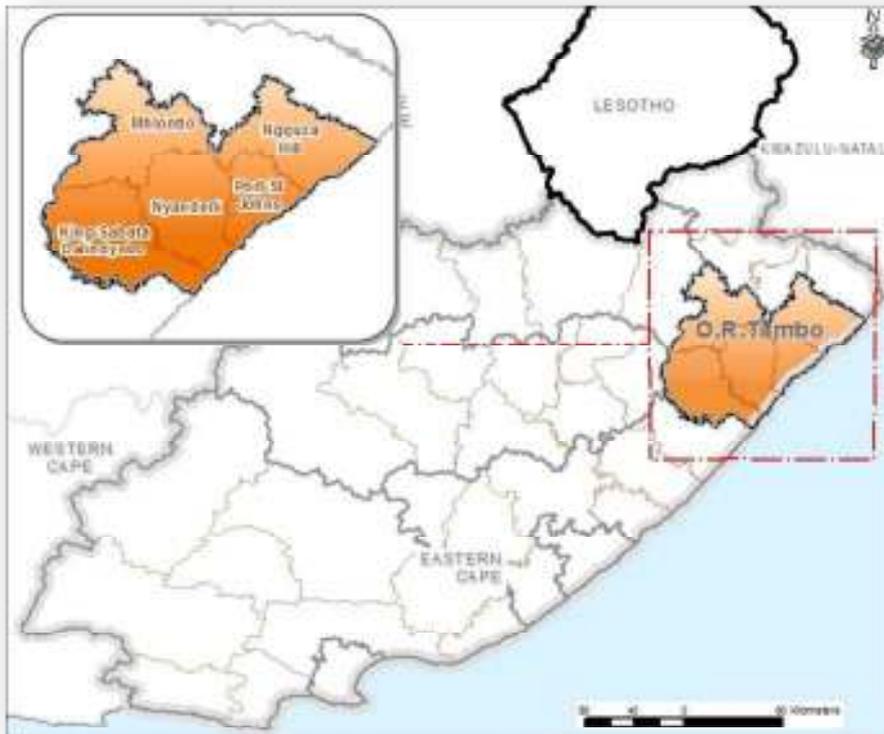


UNIVERSAL ACCESS PLAN PHASE 2 – PROGRESSIVE DEVELOPMENT OF A REGIONAL CONCEPT PLAN FOR THE OR TAMBO DISTRICT MUNICIPALITY

CONTRACT NO. 2015/178



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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 didn't 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 ORTambo District Municipality, Eastern cape Province and hence forth, information reflected relates to this WSA.

B. DEMOGRAPHICS

Census 2011 indicated that there is approximately 1,3 million people within 286 000 households (HH) residing within five Local Municipalities (LMs) located within ORTDM. The average number of people per HH is 4,6. The largest portion of the district population is concentrated in the western part of the district around the main urban centre, Mthatha. 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 also 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, are presented in **Table B**.

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

Local Municipality	2011		2035	
	Population	Households	Population	Households
Ngquza Hill	58 085	288 382	69 341	344 266
Port St Johns	33 525	159 992	37 941	181 086
Nyandeni	62 799	296 694	70 116	331 082
Mhlontlo	42 288	183 541	37 619	163 148
King Sabata Dalindyebo	108 394	466 260	127 323	547 454
Grand Total	305 090	1 394 868	342 341	1 567 035

The number of people and households are expected to increase by an estimated 0,6% per annum due to natural growth and migration. The Mhlontlo LM however is projected to have a negative population growth rate of 1,2% per annum. The Ngquza Hill LM is projected to have the highest population growth rate of 1,8% per annum.

C. WATER SERVICE LEVELS AND WATER REQUIREMENTS

The consumers in the ORTDM 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.

The ORTDM 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 ORTDM 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 for the calculations to determine the theoretical water requirements and adjusted for water losses.

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

Local Municipality	Households (2011)	HH Below RDP (2011)	Water Requirements (Million m ³ /a)				
			2015	2020	2025	2030	2035
King Sabata Dalindyebo	104 900	50 704	24,136	28,656	33,343	35,606	37,856
Mhlontlo	43 172	23 718	6,073	7,247	8,464	8,594	8,658
Ngquza Hill	55 930	44 793	7,220	10,729	14,375	15,745	17,087
Nyandeni	61 421	44 054	7,950	11,027	14,211	15,316	16,351
Port St Johns	31 562	24 077	4,204	5,978	7,813	8,441	9,035
TOTAL	296 985	187 346	49,583	63,637	78,205	83,702	88,988

The King Sabata Dalindyebo 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.

The OR Tambo water schemes also supply water across district municipality borders. The breakdown of the supply per municipality including the municipalities under Alfred Nzo DM and Joe Gqabi DM that are supplied from OR Tambo schemes is detailed in **Table D** below.

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

District Municipality	Local Municipality	Households (2011)	HH Below RDP (2011)	Water Requirements (Mℓ/d)				
				2015	2020	2025	2030	2035
OR Tambo DM	King Sabata Dalindyebo	104 900	50 704	66,126	78,510	91,356	97,549	103,716
	Mhlontlo	43 172	23 718	16,636	19,858	23,190	23,544	23,722
	Ngquza Hill	55 930	44 793	19,785	29,392	39,378	43,139	46,813
	Nyandeni	61 421	44 054	21,780	30,213	38,933	41,962	44,802
	Port St Johns	31 562	24 077	11,518	16,379	21,406	23,125	24,754
Sub-Total for OR Tambo DM		296 985	187 346	135,845	174,351	214,263	229,318	243,807
Alfred Nzo DM	Matatiele			0,034	0,058	0,082	0,087	0,092
	Umzimvubu			2,545	3,418	4,317	4,448	4,540
	Ntabankulu			0,081	0,085	0,090	0,092	0,093
Sub-Total for Alfred Nzo DM				2,660	3,561	4,488	4,627	4,725
Joe Gqabi DM	Elundini		5,893	7,832	9,837	10,322	10,740	10,740
Sub-Total for Joe Gqabi DM				5,893	7,832	9,837	10,322	10,740
TOTAL				144,397	185,741	228,585	244,271	259,268

D. WATER CONSERVATION AND WATER DEMAND MANAGEMENT

Water losses and unaccounted for water are a major concern in the ORTDM. The 2015/16 WSDP for the ORTDM reports that the status of non-revenue water within the WSA is 23%. The DM currently does not have a WC&DM strategy and a potential project has been identified to address this shortcoming.

E. WATER RESOURCES

The Mzimvubu to Keiskamma WMA is one of the few remaining water management areas with a positive water balance and huge water surplus. The water availability and potential water resource development of the Mzimvubu River was investigated in numerous studies, indicating the potential for further development and possible transfer of water across the basin boundaries, albeit at very high cost due to the deeply incised river valleys, necessitating very high pumping heads to reach water users. Recent groundwater studies indicate a significant potential for further groundwater development across the municipal area.

There is currently only one major dam, the Mthatha Dam, and few small dams for domestic use within the OR Tambo DM area of jurisdiction. Most of the water supply for the towns and rural areas comes from stand-alone schemes using streams, springs and boreholes.

A list of the relevant dams with information about yield and allocation is given in **Table E** below.

Table E: Major dams for domestic supply in OR Tambo DM area (from Mzimvubu to Keiskamma (ISP; DWA, 2004)

Dam Name	Capacity (million m ³)	Yield (Million m ³ /a)		
		Domestic	Irrigation	Other / Surplus
Mthatha	228,0	19,0	0,0	0
Corana	0,71	0,34	0,0	0
Mabeleni	2,0	1,73	0,0	0
Mhlanga	1,53	0,78	0,0	0
Magwa	2,6	N/a	0,0	0
Total	234,84	21,85		

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	Population (2015)	2035 Demand (Mm ³ per annum)	Existing Resources Yield		Proposed Additional under UAP Phase 2 (Mm ³ per annum)	Total	Balance (Mm ³ per annum)
			(Mm ³ per annum)				
KSD001 WSIA: Mthatha RWSS	399 625	33,94	147,54	Mthatha Dam	-	145,54	-

WSS	Population (2015)	2035 Demand (Mm ³ per annum)	Existing Resources Yield		Proposed Additional under UAP Phase 2 (Mm ³ per annum)	Total	Balance (Mm ³ per annum)
			(Mm ³ per annum)				
KSD002 WSIA: Mthatha Regional Borehole Development	8 221	0,45	No data	Boreholes	-	No data	Boreholes
KSD003 WSIA: Mqanduli Corridor Development	74 888	4,33	No data*		-	No data*	Mthatha Dam
KSD004 WSIA: Lukwethu Water supply	94 725	5,31	No data*		-	No data*	Mthatha Dam
KSD005 WSIA: Coffee Bay RWSS	37 487	2,12	No data	Mthatha River	-	No data*	
MHLO001 WSIA: Umzimvubu RWSS-	276 218	13,45	2 987	Umzimvubu River	60	No data	-
NQH001 WSIA: Ngqushwa Hill RBWSS	291073	17,1	1,02	Xura River	-	1,02	To be supplied from the proposed Nxuzi Dam
NQH002 WSIA: Msikaba BRWSS	59 635	3,4	No data	Msikaba River	-	No data	
NYA001 WSIA: Second Falls RWSS	56 450	3,01	No data*	Mthatha River	-	No data*	
NYA002 WSIA: Tombo RWSS	26 434	1,51	2 987	Mngazi River	-	No data	
NYA003 WSIA: Ngqeleni RWSS	57 928	3,16	0,995*	Nzwakazi Dam, Mtyu & Mtakatye Rivers	-	0,995*	To be supplied from Mthatha River or Dam
NYA004 WSIA: Cibeni-Ntlambeni RWSS	93 041	4,98	2 987	Umzimvubu River	-	2 987	Umzimvubu River
PSJ001 WSIA: Port St Johns RWSS	22 929	1,24	No data	Mngazi River	-	No data	
PSJ002 WSIA: Port ST Johns Town Supply	6 597	0,64	0,36	Bulolo River	-	0,28(made up through WCDM initiatives)	
Grand Total-	1 505 251	94,64	3 136,55			3 134,84	

*Figures are planned for extraction from Mthatha River system. ORTDM is planning for the construction of Ntabelanga Dam on the Tsitsa River with a capacity of 60Mm³. The yield of the dam has not been established at this stage.

G. PLANNED AND IMPLEMENTATION PROJECTS

The existing regional bulk projects were considered and evaluated to identify potential gaps within the existing project footprints to the extent that a total “wall-to-wall” bulk water services needs perspective is

visualised and realised. This was done in the context to improve access to basic services but at the same time support economic growth and development and ensure sustainable services.

The funding streams available for infrastructure development over the next three years within ORTDM amount to R 2,999 billion. However, the existing cost requirement for water services within ORTDM is R 16 billion and does not yet represent a wall to wall coverage of the total need. However, substantial planning studies have been conducted that were taken in consideration when the overall bulk supply intervention areas were determined. The extent of the proposed planning studies was extended to ultimately result in a wall to wall coverage. 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
King Sabata Dalindyebo	ECR012 // E/ECDC1 5/002/W	Mthatha Regional WSS - Mthatha dam source	Construction of Rosedale Water Treatment Plant, abstraction works and associated infrastructure	R 475 000 000	R 0	R 0	R 0
King Sabata Dalindyebo	ECR019	OR Tambo: Mthatha KSD Bulk Water Supply	KSD: Mthatha KSD Water (30km radius). Includes Airport Corridor, Mqanduli Corridor, Mthatha Corridor, Nqadu Corridor, Libode Corridor, Ngeleni Corridor & Second Falls Corridor.	R 1 732 681 700	R 319 000 000	R 300 000 000	R 340 283 877
King Sabata Dalindyebo	N/DC15/0 54/W	Mthatha Regional WSS - Borehole development	Drilling of deep well boreholes in areas that cannot be accessed by the Mthatha Dam water	R 994 383 000	R 0	R 0	R 0
Mhlontlo	MIS 205342	Sidwadweni Regional Water Supply	Tsitsa River Source Development - Construction of a 5M ³ /day packaged WTP	R 120 000 000	R 0	R 0	R 0
Ngquza Hill	ECR003 // F/ECDC1 5/003/W	Ingquza Hill Regional Bulk Water Supply Scheme	Ingquza Hill Regional Bulk Water Supply Scheme - phase 2 & 3	R 850 000 000	R 1 200 000	R 0	R 0
Ngquza Hill	N/DC15/0 55/W	Msikaba Regional Bulk Water Services Supply	Msikaba River Source. Phase 1 - Feasibility Study & Preliminary Design	R 850 000 000	R 0	R 0	R 0
Ngquza Hill	N/DC15/0 56/W	Kwanyati Regional Bulk Water Supply Scheme	Kwanyathi Village and surrounding areas (is a sub-project of the Ingquza Hill Master Plan)	R 1 200 000 000	R 0	R 0	R 0
Nyandeni	N/DC15/0 10/W	Mdumbi Regional Water Supply	Development of a Regional Scheme downstream of	R 1 034 000 000	R 0	R 0	R 0

LM	Project No	Project Name	Project Description	Total Cost Requirement	FY 2015/16	FY 2016/17	FY 2017/18
			Second Falls to supply water up to Mdumbi & Coffee Bay areas				
				R 7 256 064 700	R 320 200 000	R 300 000 000	R 340 283 877

The total MTEF 2015/18 RBIG allocation over the next three years shows a total allocation of approximately R 960,5 million. However, the total bulk requirement is R 7,2 billion. This would result in ORTDM taking at least 21 years to address their total bulk infrastructure needs.

H. BULK WATER SUPPLY INTERVENTIONS CONSIDERED

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

Table H Conceptual Scheme Areas, Households and Water Requirements

WSIA Name	Households (2015)	Population (2015)	Water Requirements (Million m ³ per annum)	
			2015	2035
KSD001 WSIA: Mthatha RWSS	98 916	399 625	24,18	33,94
KSD002 WSIA: Mthatha Regional Borehole Development	1 680	8 221	0.16	0.45
KSD003 WSIA: Mqanduli Corridor Development	15 291	74 888	1.65	4.33
KSD004 WSIA: Lukwethu Water supply	19 560	94 725	2.20	5.31
KSD005 WSIA: Coffee Bay RWSS	6 662	37 487	0.88	2.12
MHLO001 WSIA: Umzimvubu RWSS	68 453	276 218	8,52	13,45
NQH001 WSIA: Ngqushwa Hill RBWSS	57 190	291 073	7,34	17,10
NQH002 WSIA: Msikaba BRWSS	12 236	59 635	1,33	3,40
NYA001 WSIA: Second Falls RWSS	11 024	56 450	1,37	3,01

WSIA Name	Households (2015)	Population (2015)	Water Requirements (Million m ³ per annum)	
			2015	2035
NYA002 WSIA: Tombo RWSS	6 475	26 434	0,96	1,51
NYA003 WSIA: Ngqeleni RWSS	12 035	57 928	1,29	3,16
NYA004 WSIA: Cibeni-Ntlambeni RWSS	19 191	93 041	1,86	4,98
PSJ001 WSIA: Port St Johns RWSS	4 394	22 929	0,45	1,24
PSJ002 WSIA: Port ST Johns Town Supply	2 353	6 597	0,50	0,64
Grand Total	335 460	1 505 251	52,71	94,63

A total of 94,633 Million m³ per annum is required, with the Mthatha RWSS requiring the largest portion at 29,1% of the total water demand in ORTDM. A total estimate of R20 462 358 417 is required to eradicate the anticipated water services backlog by 2035. The base year cost requirement is 2015. The total cost requirement per WSIA is tabled below.

Table I: Total Cost Requirement per WSIA

WSIA (Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Additional Costs	TOTAL
	(Construction)	(Fees, Geotech & survey)	(EIA, ISD, Contingencies etc)	
KSD001 WSIA: Mthatha RWSS	R 1 032 504 154	R 202 171 679	R 652 477 617	R 1 887 153 450
KSD002 WSIA: Mthatha Regional Borehole Development	R 0	R 5 000 000	R 0	R 5 000 000
KSD003 WSIA: Mqanduli Corridor Development	R 370 314 378	R 107 945 193	R 235 298 058	R 713 557 629
KSD004 WSIA: Lukwethu Water supply	R 809 539 768	R 214 794 196	R 512 010 054	R 1 536 344 018
KSD005 WSIA: Coffee Bay RWSS	R 225 953 791	R 43 982 149	R 144 350 888	R 414 286 828
MHLO001 WSIA: Umzimvubu RWSS-	R 2 878 077 573	R 287 101 129	R 1 815 188 871	R 4 980 367 573
NQH001 WSIA: Ngqushwa Hill RBWSS	R 2 747 632 229	R 605 601 012	R 1 733 008 304	R 5 086 241 545
NQH002 WSIA: Msikaba BRWSS	R 802 454 426	R 129 805 892	R 507 546 289	R 1 439 806 607
NYA001 WSIA: Second Falls RWSS	R 632 925 926	R 101 500 284	R 400 743 334	R 1 135 169 544

WSIA (Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Additional Costs	TOTAL
	(Construction)	(Fees, Geotech & survey)	(EIA, ISD, Contingencies etc)	
NYA002 WSIA: Tombo RWSS	R 151 577 043	R 85 637 881	R 129 177 252	R 366 392 176
NYA003 WSIA: Ngqeleni RWSS	R 488 695 332	R 76 472 431	R 309 878 059	R 875 045 822
NYA004 WSIA: Cibeni-Ntlambeni RWSS	R 992 614 337	R 161 354 861	R 627 347 032	R 1 781 316 230
PSJ001 WSIA: Port St Johns RWSS	R 65 217 749	R 13 915 574	R 37 543 673	R 116 676 995
PSJ002 WSIA: Port ST Johns Town Supply	R 106 250 000	R 15 625 000	R 3 125 000	R 125 000 000
TOTAL	R 11 303 756 706	R 2 050 907 281	R 7 107 694 431	R 20 462 358 417

The cost requirement for primary bulk is tabled below. The base year cost requirement is 2015.

Table J: Primary Bulk Cost Requirement per WSIA

WSIA (Base year cost requirement 2015)		Direct Est Cost	Indirect Est Cost	Additional Costs	TOTAL
		(Construction)	(Fees, Geotech & survey)	(EIA, ISD, Contingencies etc)	
KSD001	Mthatha RWSS	R 640 830 316	R 100 572 504	R 403 723 099	R 1 145 125 919
KSD002	Mthatha Regional Borehole Development	R 0	R 5 000 000	R 0	R 5 000 000
KSD003	Mqanduli Corridor Development	R 330 427 676	R 37 678 950	R 208 169 436	R 576 276 061
KSD004	Lukwethu Water supply	R 178 244 620	R 44 297 881	R 114 294 111	R 336 836 611
KSD005	Coffee Bay RWSS	R 69 498 000	R 6 324 318	R 43 783 740	R 119 606 058
MHLO001	Umzimvubu RWSS	R 2 603 641 038	R 239 434 529	R 1 640 293 854	R 4 483 369 421
NQH001	Ngqushwa Hill RBWSS	R 1 259 910 263	R 199 002 637	R 793 743 466	R 2 252 656 367
NQH002	Msikaba BRWSS	R 451 053 869	R 66 998 059	R 284 163 938	R 802 215 866
NYA001	Second Falls RWSS	R 289 698 277	R 42 948 508	R 182 509 914	R 515 156 700
NYA002	Tombo RWSS	R 29 088 467	R 3 817 825	R 18 325 734	R 51 232 026

WSIA (Base year cost requirement 2015)		Direct Est Cost	Indirect Est Cost	Additional Costs	TOTAL
		(Construction)	(Fees, Geotech & survey)	(EIA, ISD, Contingencies etc)	
NYA003	Ngqeleni RWSS	R 149 724 325	R 20 454 429	R 94 326 325	R 264 505 078
NYA004	Cibeni-Ntlambeni RWSS	R 110 781 600	R 10 081 126	R 69 792 408	R 190 655 134
PSJ001	Port St Johns RWSS	R 20 968 800	R 1 908 161	R 11 427 996	R 34 304 957
PSJ002	Port ST Johns Town Supply	R 106 250 000	R 15 625 000	R 3 125 000	R 125 000 000
Total		R 6 240 117 251	R 794 143 927	R 3 867 679 021	R 10 901 940 198

I. CONCLUSIONS AND RECOMMENDATIONS

The ORTDM 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 187 000 households not having access to some form of formalised water supply infrastructure, across the whole of ORTDM'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 ORTDM 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 ORTDM to address their water supply requirements.

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

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

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

- KSD001 WSIA: Mthatha RWSS;
- KSD002 WSIA: Mthatha Regional Borehole Development;
- KSD003 WSIA: Mqanduli Corridor Development;
- KSD004 WSIA: Lukwethu Water supply;
- KSD005 WSIA: Coffee Bay RWSS;
- NYA001 WSIA: Second Falls RWSS;
- NYA002 WSIA: Tombo RWSS;
- NYA003 WSIA: Ngqeleni RWSS;
- NYA004 WSIA: Cibeni-Ntlambeni RWSS;
- NQH001 WSIA: Ngqushwa Hill RBWSS;
- NQH002 WSIA: Msikaba BRWSS;
- PSJ001 WSIA: Port St Johns RWSS;
- PSJ002: WSIA: Port St Johns Town Supply; and
- MHLO001 WSIA: Umzimvubu RWSS.

A visual presentation of the split between the primary, secondary and tertiary bulk infrastructure is illustrated within the Figure 1: Bulk Infrastructure Requirements per WSIA below.

Figure 1: Bulk Infrastructure Requirements per WSIA

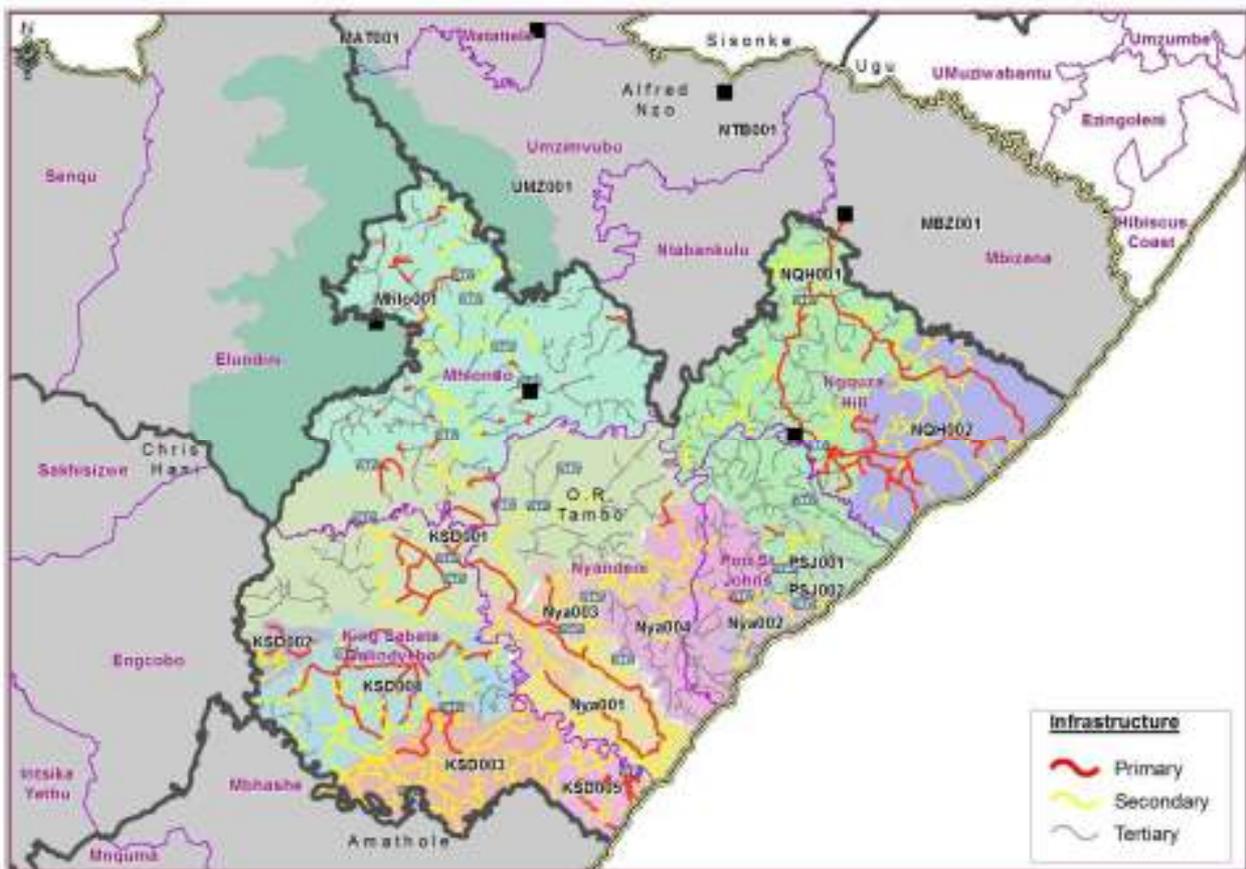


TABLE OF CONTENTS

1. OBJECTIVES AND METHODOLOGY.....	1
1.1 Background and Introduction.....	1
1.2 Purpose of the Report	1
1.3 Specific targets of the Study.....	2
1.4 Information Sources	2
1.5 Study Process.....	3
1.5.1 Stakeholder Engagement	3
1.6 Water Requirements Model.....	4
1.7 DWS Reference Framework Geodatabase	5
1.8 Reconciliation Report	5
2. STUDY AREA.....	6
2.1 Context	6
2.2 Physical Characteristics of the Study Area	6
2.3 Climate	8
2.4 Topography, Geology and Soils	8
2.5 Environmental	8
2.6 Institutional Arrangement for Water Supply.....	9
3. DEMOGRAPHICS.....	12
3.1 Existing Population Distribution	12
3.2 Social and Economic Indicators	12
3.3 Population Growth Scenarios.....	13
3.4 Main Development Nodes.....	13
3.4.1 Nodes.....	13
3.4.2 Corridors	14
4. WATER REQUIREMENTS	15
4.1 Water Supply Service Level	15
4.2 Water Losses and Demand Management	17
4.3 Water Demand Model.....	17
4.3.1 Water Demand for OR Tambo District Municipality.....	18
4.3.2 Demand per Regional Water Scheme.....	20
5. EXISTING WATER SUPPLY INFRASTRUCTURE	24
5.1 Water Resource Availability	24
5.2 King Sabata Dalindyebo Local Municipality	25
5.2.1 Mthatha Town Water Supply Scheme.....	25

5.2.2	Rosedale Water Supply Scheme	26
5.2.3	Mthatha Peri-urban Water Supply Scheme.....	26
5.3	Nyandeni Municipality.....	28
5.3.1	Libode Town Water Supply.....	28
5.3.2	Corana Regional Water Supply.....	29
5.4	Mhlontlo Local Municipality.....	29
5.4.1	Qumbu Town Water Supply.....	29
5.4.2	Tsolo Town Water Supply Scheme.....	29
5.4.3	Mjika Water Supply Scheme.....	30
5.5	Ngquza Hill Local Municipality.....	30
5.5.1	Lusikisiki Regional Water Supply Scheme.....	30
5.5.2	Flagstaff Regional Water Supply Scheme.....	30
5.5.3	Mkambati Weir Scheme	30
5.5.4	Holy Cross Hospital Scheme (Taweni Village Scheme).....	31
5.5.5	Magwa Tea Estate Water Scheme	31
5.6	Nyandeni Local Municipality	31
5.6.1	Ngqeleni Town Water Supply	31
5.6.2	Mhlanga Rural Water Supply Scheme	32
5.7	Port St Johns Local Municipality.....	32
5.7.1	Port St Johns Spatial Development Initiative (SDI) Water Supply Scheme	32
5.7.2	Umzimvubu 18 Villages WSS	33
6.	BULK WATER SUPPLY PROJECTS CURRENTLY IN PLANNING	34
6.1	Regional Bulk Water Projects in Planning	34
6.1.1	ECR012 // E/ECDC15/002/W: Mthatha Regional WSS -Mthatha dam source and ECR019: OR Tambo - Mthatha KSD Bulk Water Supply.....	36
6.1.2	N/DC15/054/W: Mthatha Regional WSS - Borehole development	37
6.1.3	MIS 205342 Sidwadweni Regional Water Supply.....	37
6.1.4	ECR003 // F/ECDC15/003/W: Ingquza Hill (IHLM) Regional Bulk Water Supply Scheme.....	37
6.1.5	N/DC15/055/W: Msikaba Regional Bulk Water Services Supply.....	37
6.1.6	N/DC15/056/W: Kwanyati Regional Bulk Water Supply Scheme.....	37
6.1.7	N/DC15/010/W: Mdumbi Regional Water.....	37
7.	SYNOPSIS OF EXISTING AND COMMITTED SCHEMES	42
7.1	Gap Analysis	42
7.1.1	KSD001 WSIA: Mthatha regional Bulk Water Supply	42
7.1.2	KSD002 WSIA: Mthatha Regional Borehole Development	43
7.1.3	KSD003 WSIA: Mqanduli Corridor Development	44

7.1.4	KSD004 WSIA: Lukwethu Water Supply.....	45
7.1.5	KSD005 WSIA: Coffee Bay Regional Water Supply	45
7.1.6	NYA001 WSIA: Second Falls RWSS.....	46
7.1.7	NYA002 WSIA: Tombo RWSS	47
7.1.8	NYA003 WSIA: Ngqeleni RWSS.....	47
7.1.9	NYA004 WSIA: Cibeni-Ntlambeni RWSS	48
7.1.10	NQH001 WSIA: Ngqushwa Hill RBWSS.....	49
7.1.11	NQH002 WSIA: Msikaba BRWSS.....	50
7.1.12	PSJ001 WSIA: Port St Johns RBWSS	51
7.1.13	PSJ002 WSIA: Port St Johns Town Supply	51
7.1.14	MHLO001 WSIA: Umzimvubu RWSS.....	52
7.2	Scheme Re-demarcation	52
8.	BULK WATER SUPPLY INTERVENTIONS CONSIDERED – RECONCILIATION	53
8.1	Proposed Wall-to-Wall Water Supply Intervention Areas.....	53
8.2	KSD001 WSIA: Mthatha Regional Bulk Water Supply.....	53
8.2.1	<i>Demand Model Intervention</i>	<i>53</i>
8.2.2	<i>Existing Proposed Infrastructure Intervention.....</i>	<i>54</i>
8.3	KSD002 WSIA: Mthatha Regional Borehole Development.....	59
8.3.1	<i>Demand model Intervention.....</i>	<i>59</i>
8.3.2	<i>Existing Proposed Infrastructure Intervention.....</i>	<i>59</i>
8.4	KSD003 WSIA: Mquanduli Corridor Development	60
8.4.1	<i>Demand Model Intervention</i>	<i>60</i>
8.4.2	<i>Existing Proposed Infrastructure Intervention.....</i>	<i>61</i>
8.5	KSD004 WSIA: Lukwethu Water Supply	63
8.5.1	<i>Demand Model Intervention</i>	<i>63</i>
8.5.2	<i>Existing Proposed Infrastructure Intervention.....</i>	<i>64</i>
8.6	KSD005 WSIA: Coffee Bay RWSS	65
8.6.1	<i>Demand model Intervention.....</i>	<i>65</i>
8.6.2	<i>Existing Proposed Infrastructure Intervention.....</i>	<i>66</i>
8.7	Mhlo001 WSIA: Umzimvubu Dam Development	67
8.7.1	<i>Demand Model Intervention</i>	<i>67</i>
8.7.2	<i>Existing Proposed Infrastructure Intervention.....</i>	<i>69</i>
8.8	NQH001 WSIA: NgquZa Hill RBWSS.....	72
8.8.1	<i>Demand Model Intervention</i>	<i>72</i>
8.8.2	<i>Existing Proposed Infrastructure Intervention.....</i>	<i>73</i>

8.9	NQH002 WSIA: Msikaba Bulk Regional Water Supply Scheme	75
8.9.1	<i>Demand Model Intervention</i>	75
8.9.2	<i>Existing Proposed Infrastructure Intervention</i>	75
8.9.3	<i>Water Resource Consideration</i>	76
8.10	Nya001 WSIA: Second Falls Bulk Water Supply.....	77
8.10.1	<i>Demand Model Intervention</i>	77
8.10.2	<i>Existing Proposed Infrastructure Intervention</i>	78
8.11	Nya002 WSIA: Tombo RWSS	79
8.11.1	<i>Demand Model Intervention</i>	79
8.11.2	<i>Existing Proposed Infrastructure Intervention</i>	80
8.12	Nya003 WSIA: Ngqeleni RWSS	81
8.12.1	<i>Demand Model Intervention</i>	81
8.12.2	<i>Water Demand</i>	81
8.12.3	<i>Water Resource Consideration</i>	81
8.12.4	<i>Water Supply Infrastructure</i>	81
8.12.5	<i>Financial Requirement</i>	82
8.12.6	<i>Existing Proposed Infrastructure Intervention</i>	82
8.13	Nya004 WSIA: Cibeni-Ntlambeni RWSS.....	84
8.13.1	<i>Demand Model Intervention</i>	84
8.13.2	<i>Existing Proposed Infrastructure Intervention</i>	85
8.14	PSJ001 WSIA: Port St Johns RWSS	86
8.14.1	<i>Demand Model Intervention</i>	86
8.14.2	<i>Existing Proposed Infrastructure Intervention</i>	87
8.15	PSJ002 WSIA: Port St Johns Town WSS	87
8.15.1	<i>Demand Model Intervention</i>	87
8.15.2	<i>Existing Proposed Infrastructure Intervention</i>	88
9.	SUMMARY	90
9.1	Total Water Demand per WSIA	90
9.2	Total Water Resources Required.....	91
9.2.1	<i>Mthatha Dam System</i>	92
9.3	Financial Requirements	93
9.4	Funding Options	95
9.5	Implementation Programme	95
10.	RECOMMENDATIONS	97
10.1	Responsibilities.....	97

10.2 Selection of Solutions	97
10.3 Pertinent Legislation.....	97
10.3.1 Municipal Structures Act	98
10.3.2 Municipal Systems Act.....	98
10.3.3 Water Services Act.....	98

LIST OF ANNEXURES

ANNEXURE A – Reference

ANNEXURE B – Map Series

LIST OF TABLES

Table 1.1: Settlement or Town Categories and Water Use	4
Table 2.1: Topographical Profile	8
Table 3.1: Census 2011 Population and Households.....	12
Table 4.1: Stats SA Census 2011 Water Supply Levels.....	15
Table 4.2: Settlement or Town Categories and Water Use	17
Table 4.3: Water Requirements (Million M ³ per annum), Per Local Municipality.....	18
Table 4.4: Water Requirements (Mℓ/d), Per Local Municipality.....	19
Table 4.5: Water Requirements (million m ³ per annum), Per Existing WSS and Potential WSIA.....	20
Table 4.6: Water Requirements (million m ³ per annum), Per Existing WSS and Potential WSIA.....	21
Table 4.7: Water Requirements (Mℓ/d), Per Existing WSS and Potential WSIA.....	22
Table 5.1: Major dams for domestic supply in OR Tambo DM area (from Mzimvubu to Keiskamma (ISP; DWA, 2004)	24
Table 6.1: Grant Funding Streams	35
Table 6.2: RBIG Water Supply Interventions currently in planning	35
Table 6.3: ORT DM MIG Water Supply Projects.....	39
Table 7.1: Mthatha Regional Scheme Summary.....	42
Table 7.2: Mthatha Regional Scheme Gap Analysis.....	43
Table 7.3: Mthatha Regional Borehole Development	44
Table 7.4: Mqanduli Corridor Development.....	44
Table 7.5: Lukwethu Regional Scheme Gap Analysis.....	45
Table 7.6: Coffee Bay Regional Scheme Gap Analysis	46
Table 7.7: Second Falls RWSS Gap Analysis	46
Table 7.8: Tombo RWSS Gap Analysis	47
Table 7.9: Ngqeleni RWSS Summary.....	47

Table 7.10: Ngqeleni RWSS Gap Analysis	48
Table 7.11: Cibeni-Ntlambeni Regional Scheme Gap Analysis	49
Table 7.12: Ngquza Hill RWSS Summary.....	49
Table 7.13: Ngquza Hill RWSS Gap Analysis.....	50
Table 7.14: Msikaba RWSS Gap Analysis	50
Table 7.15: Port St Johns RBWSS Scheme Gap Analysis	51
Table 7.16: Port St Johns Town Scheme Gap Analysis.....	51
Table 7.17: Umzimvubu RWSS Gap Analysis	52
Table 8.1: Allocation of Mthatha Dam Raw Water Yield	53
Table 8.2: KSD001 Cost Requirement	54
Table 8.3: Projected Demand as Per ORTDM Planning	55
Table 8.4: Allocation of Mthatha Dam Raw Water Yield	55
Table 8.5: KSD001 Cost Requirement	58
Table 8.6 Reservoirs proposed for the Mquanduli Corridor.....	62
Table 8.7: ORTDM Planning Demand Scenarios	72
Table 8.8: Demand Scenario	73
Table 8.9: Estimated Water Demand.....	78
Table 8.10: Estimated Water Demand.....	82
Table 9.1: Water Requirements (Mm ³ per annum) per WSIA	90
Table 9.2: Water Requirements (Mm ³ per annum) per WSIA	91
Table 9.3: Mthatha Dam Water Resource (Mℓ/d) per WSIA	92
Table 9.4: Financial Requirements based on Demand Model Interventions.....	93
Table 9.5: Primary Bulk Cost requirement per WSIA.....	94
ANNEXURE A – Reference.....	100
ANNEXURE B – Map Series	103

LIST OF DIAGRAMS

Diagram 2.1: Land erosion.....	9
Diagram 2.2: Municipal Structure.....	10
Diagram 4.1: 2035 Demand Per LM – OR Tambo District.....	19
Diagram 4.2: 2035 Water Demand per LM.....	20

1. OBJECTIVES AND METHODOLOGY

This report is the Bulk Water Master Plan report for the study titled “Universal Access Plan Phase 2 – Towards the Progressive Development of Conceptual Bulk Water Master Plan for the OR Tambo District Municipality”, 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 titled “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 with regards to water supply in the Province. There was 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 OR Tambo and Alfred Nzo 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 didn't 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.

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 Regional Water Master Plan. This document was prepared for the OR Tambo District Municipality (ORTDM) that includes the following Local Municipalities:

- King Sabata Dalindyebo Local Municipality;
- Mhlontlo Local Municipality;
- Ngquza Hill Local Municipality;
- Nyandeni Local Municipality; and
- Port St John 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 ORTDM.

1.4 INFORMATION SOURCES

Information used in this study was obtained from current and existing technical reports, regional studies and inputs from knowledgeable municipal officials. It includes 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 ORTDM 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 Phase 1 of the 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 – aims 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 again includes the whole of the KZN province, but has been extended into 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 thus aims 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, in July 2015. The PSP's 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 Report has now been 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 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's engaged with each WSA to determine the current and planned levels 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 – **OR Tambo 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	>R1 228 000	410
2	Upper middle income: detached houses, large flats	R153 601 – R1 228 000	295
3	Average Middle Income: 2 - 3 bedroom houses or flats with 1 or 2 WC, kitchen, and one bathroom, shower	R38 401 – R153 600	228
4	Low middle Income: Small houses or flats with WC, one kitchen, one bathroom	R9 601– R38 400	170
5	Low income: flatlets, bedsits with kitchen & bathroom, informal household	R1 – R9 600	100
6	No income & informal supplies with yard connections		100
7	Informal with no formal connection		70
8	Informal below 25 ℓ/c/d		12

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 were also 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 that have been applied where possible.

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

2. STUDY AREA

This section provides an overview of the study area, setting the scene and discusses the institutional arrangements for water supply. It also provides a brief overview of the demographics in the area and the development opportunities.

2.1 CONTEXT

The OR Tambo District Municipality (ORTDM) is one of the six District Municipalities in the Eastern Cape Province. It is located in the eastern half of the Province with its eastern border being the Indian Ocean coastline of South Africa. To the north, it is bordered by the Alfred Nzo District Municipality, to the northwest, by the Joe Gqabi District Municipality, to the west, by the Chris Hani District Municipality, and to the southwest, by the Amathole District Municipality.

The District includes within its borders five Local Municipalities, namely:

- Ngquza Hill Local Municipality;
- Port St Johns Local Municipality;
- Nyandeni Local Municipality;
- Mhlontlo Local Municipality; and
- King Sabata Dalindyebo Local Municipality

The District covers an area of 12 082km² and is divided administratively into the five (5) aforementioned Local Municipalities (LMs). Mthatha is the main centre, and the OR Tambo DM covers most of the Wild Coast and Pondoland. The district has a sub-tropical coastal belt, especially from Port St Johns northwards. It has some game reserves that have indigenous forests. The hills beyond the coast rise to high levels of up to 1 500 meters beyond Mthatha. The district has many rivers and is well-watered, with an average of 700mm of rainfall per year. Pondoland, being nearly the most fertile areas in South Africa, has warm temperatures and good soils with frost-free conditions. The other major towns in the district are Mqanduli, Port St. Johns, Qumbu, Lusikisiki, Ngceleni, Libode, Tsolo and Flagstaff.

2.2 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

2.2.1.1 Ngquza Hill Local Municipality

The Ngquza Hill LM has a population of 278 496 people residing within 55 930 households (Source: Census 2011). After King Sabata Dalindyebo Municipality and Nyandeni Municipality, the Ngquza Hill LM has the third largest population in the District with an average household size of 5 persons/household, a comparably high population density.

The Ngquza Hill LM is characterized by limited coastal settlements and widely dispersed settlements in traditional rural villages at approximately 120 persons/km² in the LM of 2 328km². The municipal area is furthermore characterised by large forest areas in close proximity to the coastline, with a total of ten rivers flowing through it. The Mkambati Nature Reserve is situated within the coastal zone. The urban and peri-urban nodes of Lusikisiki and Flagstaff, linked by the R61 running south from Durban to Mbizana, are the primary economic hubs of the municipal area. The LM is believed to hold significant Tourism, Forestry, and Marine Aquaculture potential.

2.2.1.2 Port St Johns Local Municipality

This municipality, in the heart of the former Transkei, is situated along the Indian Ocean coastline. Its most well-known settlement is the town of Port St Johns that is located at the mouth of the Umzimvubu River, approximately 90km east of Mthatha. The municipality has a strong tourism industry ascribed to the variety of hills, dunes, rivers, and the mountainous terrain that meet its picturesque beaches. In terms of settlement pattern, the municipal area is characterized by a predominantly scattered rural settlement pattern over the municipal area of 1 225km² at an average density of 127 persons/km². Nearly 90% of all the dwellings in the municipality are located in traditional tribal settlements. Port St. Johns is the only real urban area, and is the regional economic centre and supply site for the nearby villages and communities.

Topographically the area is characterised by a high-lying northern hinterland with undulating plains decreasing in a southern direction to a largely flat coastal belt. Eight prominent rivers traverse the hinterland from north-west to south-east creating prominent valleys, gorges and inaccessible ravines. Access to and from the various parts of the municipal area is made very difficult by this undulating topography.

2.2.1.3 Nyandeni Local Municipality

Nyandeni Local Municipality, like many of the other LMs within the District, is predominantly rural with widely dispersed traditional and village-type settlements. The main Municipal Office is located in one of these small settlements in the town of Libode, located approximately 30km from Mthatha, along the route to the popular tourist destination of Port St. Johns. While a comparatively small proportion of the population reside in formal dwellings, most of the inhabitants of the municipality still rely on subsistence agriculture in areas marked by communal tenure. The LM is regarded as having considerable agricultural potential, although there has been limited exploitation of this potential.

In 2001, the LM had a population of 290 400 residing within 61 421 households with an average household size of 4,73 persons/household. The area has an average density of 123 persons/km² spread over the municipal area of 2 354km². In terms of topography, the municipal area ranges in altitude from 1 200m above sea level in the north-western part to the low-lying coastal area in the south east. The municipality is drained by four (4) perennial rivers, the Mngazi, Mngazana, Mtata and Mneni Rivers. As for vegetation, valley thicket occurs along the steep slopes of the periphery of the municipal area, while the coast is characterised by Coastal Bushveld and Grassland. The interior is marked mainly by Eastern Thorn Bushveld and Moist Upland Grassland.

2.2.1.4 Mhlontlo Local Municipality

The Mhlontlo LM is predominantly rural, hosts Tsolo and Qumbu as local service centres. These towns are located near the N2 that runs through the municipality from the southwest to the northeast. The majority of land is used for agricultural purposes and subsistence farming, notably for grazing, in areas marked by communal tenure. Mhlontlo population is estimated at 188 224 residing in approximately 43 172 households. The municipality has an average household size of 4,4 persons per household.

The area boasts a number of tourist attractions including the Tsitsa Falls and Tina Falls, the Tina River ribbon and the Mabeleni Dam, which is famous for its trout fishing.

2.2.1.5 2.3.5 King Sabata Dalindyebo Municipality

King Sabata Dalindyebo Local Municipality (KSDLM) is home to Mthatha, the economic centre of the District and the host to both the Local and District Municipality's Offices. Comprising four

amalgamated entities, KSDLM includes both Mthatha and Mqanduli urban and rural magisterial areas. The municipality has both an urban and a rural character, including a prominent national urban settlement and regional economic hub, as well as dispersed village-type rural settlements. The average number of people per km² is 157 and therefore hosts the highest number of people within the district i.e. 451 735 people residing within 104 900 households.

Situated at the heart of the KSD LM, Mthatha is a major transport and regional service centre, dissected by the N2 running southwest to northeast through the town. As a gateway to a wide range of tourism offerings, Mthatha is a popular stop-over point on the way to tourist attractions like Coffee Bay and Hole-in-the-Wall in the KSDLM and Port St Johns and Mbotyi in neighbouring LMs. Linked to East London by the Kei Rail, the municipality is also an economic home to two of the other economic activities in the District, viz. Forestry and Agriculture.

2.3 CLIMATE

The climate in the district varies with distance and elevation away from the warm Indian Ocean current. Temperatures range from a mean minimum of 14,3°C – 19,8°C in January to 1,8°C – 13,4°C in July to a mean maximum of 14,3°C – 25,3°C in January to 19,5°C – 21,4°C in July. Annual rainfall generally exceeds 800mm, but it decreases as one move inland with the least rain falling in the major river valleys. An appreciable amount of rain falls in the winter months in the coastal areas, but the inland areas generally receive more than 80% of their rain in the 6 months from October – March.

2.4 TOPOGRAPHY, GEOLOGY AND SOILS

The OR Tambo District is largely characterised by rolling and broken topography due to the large number of rivers and the drop in elevation from the foothills of the mountains in the north to sea level in the south. This terrain has tended to force settlements to grow along ridges, following the main access roads and pathways. Table 2.1: Topographical Profile below summarises the topographical character of the area.

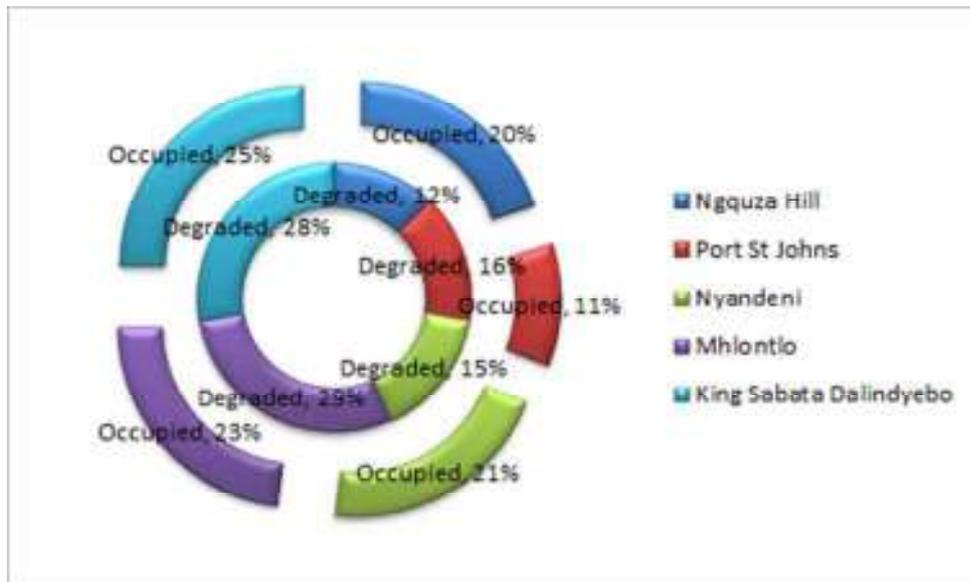
Table 2.1: Topographical Profile

Topography type	Percentage of total municipal area
Mountainous	Nil
Rolling	92%
Flat	2%
Coastal	6%

2.5 ENVIRONMENTAL

Environmental degradation, soil erosion in particular, is a major concern in the OR Tambo DM. The WSDP of 2015/16 depicted the total land area per local municipality as a percentage of the entire district as illustrated within Diagram 2.1: Land erosion. King Sabata Dalindyebo LM is the largest occupying 25% of the district's area followed by Mhlontlo LM with 23%. The inner ring diagrams represent the environmental degradation per LM as a percentage of the LM's total area. Mhlontlo LM has the largest degraded area with 29% of its surface eroded, followed by King Sabata Dalindyebo LM with 28%.

Diagram 2.1: Land erosion

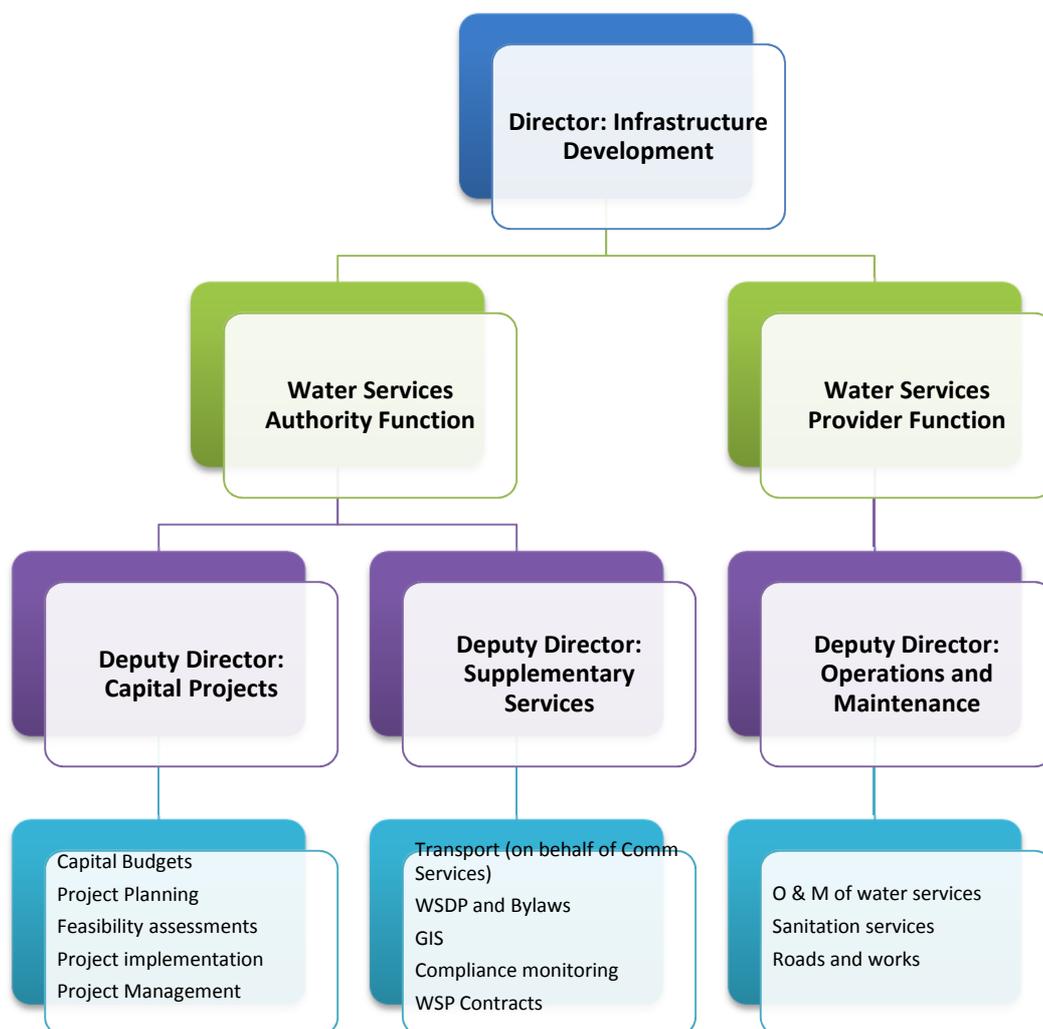


2.6 INSTITUTIONAL ARRANGEMENT FOR WATER SUPPLY

The OR Tambo District Municipality is the legislated Water Services Authority 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. This internal mechanism involved the provision of water services through three (3) decentralised water services units (WSUs), each controlled by an appropriate manager.

The OR Tambo District Municipality achieves this separation of powers by assigning each function to different Deputy Directors within the Infrastructure Directorate, as illustrated in the following organogram.

Diagram 2.2: Municipal Structure



The WSDP of 2015/16 stated that the current approved municipal structure still makes provision for three (3) WSUs and Water Services Teams within each of the Local Municipalities.

The criteria adopted for defining the boundaries of the WSUs was that they should have:

- Similar geographical areas;
- Sharing of water resources boundaries; and
- Balancing of available resources (i.e. human resources).

Given the above criteria, the decision was taken to create the following three Water Service units:

- WSU 1: King Sabata Dalindyebo and Nyandeni Municipalities;
- WSU 2: Port St Johns and Ngquza Hill Municipalities; and
- WSU 4: Mhlontlo Municipality.

Current Numbers					
Staff Level	Post Demand (Posts Required)	Post Supply (Filled)	Vacant	% Vacant	% Filled
Management*	9	3	6	67	33
Technical	128	64	64	50	50
Labour	469	140	329	70	30
Support	499	324	175	35	65
Total	1 105	531	574	52	48

A total of 52% of the required Water Services posts are currently vacant. The Technical and Management levels are experiencing the highest vacancy levels followed by the Support Level and Labour Level. With only 48% of the total Water Services posts in the Municipality filled, it will be challenging for OR Tambo DM to fulfil its prescribed duties as the WSA and the WSP. Of particular concern are the substantial vacancies at Management and Technical Levels.

3. DEMOGRAPHICS

3.1 EXISTING POPULATION DISTRIBUTION

Census 2011 indicated that there is approximately 1,3 million people within 286 000 households (HH) residing within five Local Municipalities (LMs) located within ORTDM. The average number of people per HH is 4,6. The details per LM are tabled within 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
EC153	Ngquza Hill	278 496	56 179	4,96
EC154	Port St Johns	156 146	31 694	4,93
EC155	Nyandeni	290 400	61 594	4,71
EC156	Mhlonlo	188 224	43 383	4,34
EC157	King Sabata Dalindyebo	451 735	105 175	4,30
TOTAL		1 365 001	298 025	4,58

The largest portion of the district population is concentrated in the western part of the district around the main urban centre, Mthatha. The King Sabata Dalindyebo (KSD) Municipality has the largest population in the district with 451 735 people and accounts for nearly 33% of the total district population. It also has the highest population density of 157 persons/km². The next largest town in the district is Port St Johns, set on the eastern coast about 100 kilometres from Mthatha. In this municipality, the density is 127 persons/km². In general, the last decade has witnessed sizeable migration from smaller to larger villages and towards villages located on the main roads in the district.

The average household size according to Census 2001 was approximately 4,8 individuals per household as compared to the 4,6 persons per household in Census 2011. This is as a result of a higher growth in the number of households as compared to the growth in the population.

3.2 SOCIAL AND ECONOMIC INDICATORS

OR Tambo's economy is made up of various industries. The GVA-R variable provides a sectoral breakdown, where each sector is measured in terms of its "value added" produced in the local economy. The greatest contributor towards the GVA of the local municipalities is the community sector (ranging from 48% for the King Sabata Dalindyebo Local Municipality to 63% for Nyandeni Local Municipality), with the King Sabata Dalindyebo Local Municipality community services contributing 33% or R 5,4 billion to the total Gross value added of the OR Tambo District Municipality.

Relative to the other local municipalities, the King Sabata Dalindyebo Local Municipality also contributes more to the financial sector and trade sector of the OR Tambo District Municipality – R 2,4 billion (15%) and R 2,1 billion (13%) respectively. In 2011 OR Tambo District Municipality's economy was dominated by the tertiary sector as a whole, which is primarily focused on community services. Community services accounted for half of the GVA with a 51,5% contribution to the total economic activity in OR Tambo District Municipality in 2011 that is the largest sector contribution to

economic activity. The community services consist of public administration (14,3%), education (23,4%), health and social work (9,2%) and other community services (4,6%). The trade sector at 18,5% is the second largest contributor to the economic activity.

3.3 POPULATION GROWTH SCENARIOS

OR Tambo District Municipality housed 2,6% of the total South African population in 2011. Between 2001 and 2011 population growth averaged 0,53% per annum that is 0,93% lower than that of South Africa as a whole, but higher as the total provincial growth which is 0,19%. The only local municipality that had a decrease in population is the Mhlontlo Local Municipality, where the population decreased at an average annual rate of 0,76%. Key reasons for this are (1) migration from the district for economic reasons; (2) ill health and an increase in the mortality rate largely due to poverty; and (3) the high incidence of HIV/AIDS and TB in the district. The municipality with the highest population increase is the Ngquza Local Municipality at 0,90% average annual growth. The King Sabata Dalindyebo Local Municipality too has a relatively high average annual increase of 0,82% - probably due to the in-migration to a more developed economy

3.4 MAIN DEVELOPMENT NODES

The OR Tambo District Municipality SDF of 2010 identified proposed and existing development nodes and development corridors that will assist the development of the district. The details are as follows:

3.4.1 NODES

The nodes are defined as follows:

- Primary Nodes (PN): These are high order centres providing educational facilities, administrative functions and highest level of access to shopping and social services in the district. Mthatha is the only primary node in the district.
- Secondary Nodes (SN): These are towns identified as having important local and district level development functions relating to commerce and tourism. Lusikisiki, and Port St. Johns are the secondary nodes of the district.
- Tertiary Nodes (TN): These towns are seen as lower order service centers where goods and services can be accessed by the local residents and residents of surrounding rural settlement areas. Libode, Mqanduli, Ngqeleni, Tsolo, Qumbu, Flagstaff and Mzamba fall within this category.
- Higher order Rural Nodes (HoRN): These are rural villages where higher order rural-level services are prioritized. Nkozo, Mbozisa, Baziya, Kwaaiman, Langeni, Mpeko, Mqekezweni, Gengqe, Meje, Sulenkama, Bomvini, Mfundisweni, isilindeni, Canzibe, Marubeni, Bambisana Mission and Isilimela are under this category.
- Tourism Nodes: these are settlements where the principal function has been identified as being related to the development of a viable and sustainable Coastal Tourism sector. Mzamba, Port St. Johns, Umtata Mouth, and Coffee Bay are primary tourism nodes. Mphalane, Mnyameni, Kwayimane, Sikombe, Mbotyi, Mngazana, Sihangwana, Lwandile, Presley Bay and Hole in the Wall are identified as the secondary tourism nodes.

3.4.2 CORRIDORS

Corridors are defined as follows:

- Primary corridor (PC): High-density development on sections of this corridor. The main mobility route of goods and people through the district. East London/Mthatha-Kokstad N2, Railway Corridor are the primary corridors identified in the District.
- Mobility routes (MB): these routes carry passing traffic and provide access between local areas in the district and centers further afield. N2, R61, Ugie-Langeni Road, R394 and proposed N2 Toll Road are the mobility routes within the district.
- Special Routes-Tourism Focus (SP-TF): these relate to tourism destinations and links between tourism nodes and main mobility routes. Wild Coast Meander, Thunga Thunga Route, Mandela Route, R394- Mthatha via Mqanduli towards the coast fall under this category.

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 OR Tambo 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 tabled in Table 4.1: Stats SA Census 2011 Water Supply Levels as shown 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	26 376	37%
	Yard Connection	30 599	
At RDP Standards	Communal Standpipe within 200m	53 704	
Below RDP Standard but with Infrastructure	Communal Standpipe within 200m - 500m	21 019	12%
	Communal Standpipe within 500m - 100m	8 726	
	Communal Standpipe within > 1 000m	5 817	
No Services	No Services	151 784	51%
Sub-Total for OR Tambo		298 025	
Above RDP Standards	House Connection	2 057	20%
	Yard Connection	2 643	
At RDP Standards	Communal Standpipe within 200m	6 686	
Below RDP Standard but with Infrastructure	Communal Standpipe within 200m - 500m	3 351	11%
	Communal Standpipe within 500m - 100m	1 429	
	Communal Standpipe within > 1 000m	1 140	
No Services	No Services	38 873	69%
Sub-Total for Ngquza Hill		56 179	
Above RDP Standards	House Connection	848	24%
	Yard Connection	1 515	

Water Supply Service Level	Description	Number of Households	% of Total Per LM
At RDP Standards	Communal Standpipe within 200m	5254	
Below RDP Standard but with Infrastructure	Communal Standpipe within 200m - 500m	1591	11%
	Communal Standpipe within 500m - 100m	856	
	Communal Standpipe within > 1 000m	925	
No Services	No Services	20 705	65%
Sub-Total for Port St Johns		31 694	
Above RDP Standards	House Connection	1 681	28%
	Yard Connection	2 255	
At RDP Standards	Communal Standpipe within 200m	13 604	
Below RDP Standard but with Infrastructure	Communal Standpipe within 200m - 500m	6 169	16%
	Communal Standpipe within 500m - 100m	2 105	
	Communal Standpipe within > 1 000m	1 700	
No Services	No Services	34 080	55%
Sub-Total for Nyandeni		61 594	
Above RDP Standards	House Connection	1 742	45%
	Yard Connection	3 962	
At RDP Standards	Communal Standpipe within 200m	13 961	
Below RDP Standard but with Infrastructure	Communal Standpipe within 200m - 500m	4 605	16%
	Communal Standpipe within 500m - 100m	1 712	
	Communal Standpipe within > 1 000m	690	
No Services	No Services	16 711	39%
Sub-Total for Mhlontlo		43 383	
Above RDP Standards	House Connection	20 048	52%
	Yard Connection	20 224	
At RDP Standards	Communal Standpipe within 200m	14 199	
Below RDP Standard but with Infrastructure	Communal Standpipe within 200m - 500m	5 303	9%
	Communal Standpipe within 500m - 100m	2 624	
	Communal Standpipe within > 1 000m	1 362	
No Services	No Services	41 415	39%
Sub-Total for King Sabata Dalindyebo		105 175	

The majority of the backlogs reside within Port St Johns (65%) and Ngquza Hill (69%) respectively.

4.2 WATER LOSSES AND DEMAND MANAGEMENT

Water losses and unaccounted for water is a major concern in the DM. The 2015/16 WSDP for the ORTDM reports that the status of non-revenue water within the WSA is 23%. The DM currently does not have a WC&DM strategy and a potential project has been identified to address this shortcoming.

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's 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 – **ORTDM** – 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 4.2: 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 4.2: 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	>R1 228 000	410
2	Upper middle income: detached houses, large flats	R153 601 – R1 228 000	295
3	Average Middle Income: 2 - 3 bedroom houses or flats with 1 or 2 WC, kitchen, and one bathroom, shower	R38 401 – R153 600	228
4	Low middle Income: Small houses or flats with WC, one kitchen, one bathroom	R9 601– R38 400	170
5	Low income: flatlets, bedsits with kitchen & bathroom, informal household	R1 - R9 600	100
6	No income & informal supplies with yard connections		100
7	Informal with no formal connection		70
8	Informal below 25 l/c/d		12

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.

4.3.1 WATER DEMAND FOR OR TAMBO DISTRICT MUNICIPALITY

The water requirements (in million m³ per annum and Mℓ/d) for the ORTDM are presented per Local Municipality within Table 4.3: Water Requirements (Million M³ per annum), Per Local Municipality and Table 4.4: Water Requirements (Mℓ/d), 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 for the calculations to determine the theoretical water requirements and adjusted for water losses.

Table 4.3: Water Requirements (Million M³ per annum), Per Local Municipality

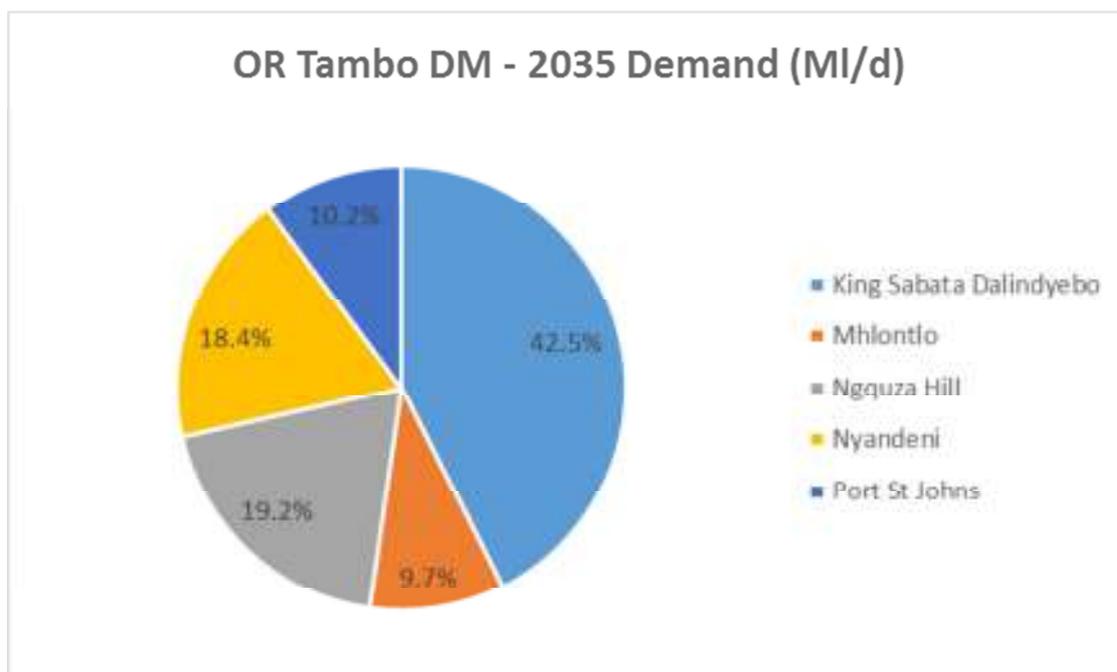
Local Municipality	Households (2011)	HH Below RDP (2011)	Water Requirements (Million m ³ per annum)				
			2015	2020	2025	2030	2035
King Sabata Dalindyebo	104 900	50 704	24,136	28,656	33,343	35,606	37,856
Mhlontlo	43 172	23 718	6,073	7,247	8,464	8,594	8,658
Ngquza Hill	55 930	44 793	7,220	10,729	14,375	15,745	17,087
Nyandeni	61 421	44 054	7,950	11,027	14,211	15,316	16,351
Port St Johns	31 562	24 077	4,204	5,978	7,813	8,441	9,035
TOTAL	296 985	187 346	49,583	63,637	78,205	83,702	88,988

All of the LMs in the District, with the exception of King Sabata Dalindyebo Local Municipality (KSDLM), are classified as Category B4-Municipalities, signifying a rural, mainly subsistence economy. Settlements in these municipalities are generally small and the incomes of their inhabitants low, which means very few opportunities for markets. SMME formation and LED initiatives.

The KSDLM is classified as a Category B2-Municipality meaning it has a large core town (Mthatha) with considerable market and business activities and opportunities, surrounded by a reasonably productive agricultural area. Mthatha is a major transport and regional service centre, dissected by the N2 running southwest to northeast through the town. As a gateway to a wide range of tourism offerings, Mthatha is a popular stop-over point on the way to tourist attractions like Coffee Bay and Hole-in-the-Wall in the KSDLM and Port St Johns and Mbotyi in neighbouring LMs. Linked to East London by the Kei Rail, the municipality is also an economic home to two of the other economic activities in the District, viz. Forestry and Agriculture.

The 2035 water requirements per LM are presented within Diagram 4.1: 2035 Demand Per LM – OR Tambo District in the form of a pie chart, illustrating that the King Sabata Dalindyebo LM will be the largest water consumer in the ORTDM, requiring 42,5% of all water. Please note that the demand model exceeded the boundaries of the OR Tambo District Municipality due to the proposed Umzimvubu water resource development. The proposed Umzimvubu development's footprint includes consumers from the Joe Gqabi and Alfred Nzo District Municipality.

Diagram 4.1: 2035 Demand Per LM – OR Tambo District



The OR Tambo water schemes also supply water across district municipality borders. The breakdown of the supply per municipality including the municipalities under Alfred Nzo DM and Joe Gqabi DM that are supplied from OR Tambo schemes is detailed in Table 4.4: Water Requirements (Mℓ/d), Per Local Municipality.

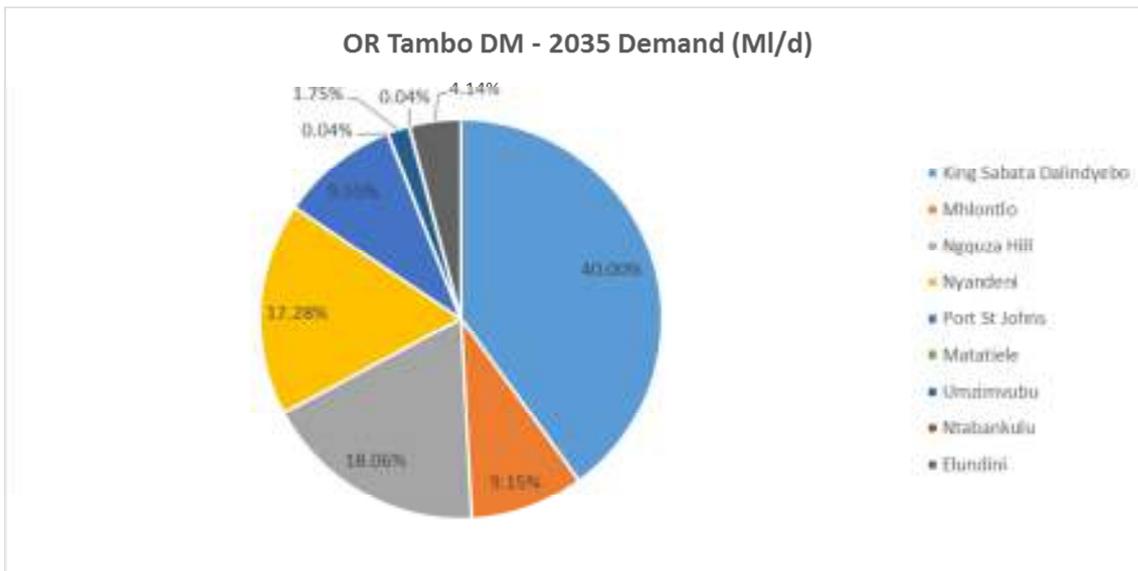
Table 4.4: Water Requirements (Mℓ/d), Per Local Municipality

District Municipality	Local Municipality	Households (2011)	HH Below RDP (2011)	Water Requirements (Mℓ/d)				
				2015	2020	2025	2030	2035
OR Tambo DM	King Sabata Dalindyebo	104 900	50 704	66,126	78,510	91,351	97,552	103,715
	Mhlontlo	43 172	23 718	16,638	19,856	23,188	23,545	23,721
	Ngquza Hill	55 930	44 793	19,781	29,395	39,382	43,138	46,815
	Nyandeni	61 421	44 054	21,781	30,210	38,933	41,961	44,798
	Port St Johns	31 562	24 077	11,517	16,378	21,406	23,126	24,755
Sub-Total for OR Tambo DM		296 985	187 346	135,844	174,349	214,260	229,321	243,804
Alfred Nzo DM	Matatiele			0,034	0,058	0,082	0,087	0,092
	Umzimvubu			2,545	3,418	4,317	4,448	4,540
	Ntabankulu			0,081	0,085	0,090	0,092	0,093
Sub-Total for Alfred Nzo DM				2,660	3,561	4,488	4,627	4,725
Joe Gqabi DM	Elundini			5,893	7,832	9,837	10,322	10,740

District Municipality	Local Municipality	Households (2011)	HH Below RDP (2011)	Water Requirements (Mℓ/d)				
				2015	2020	2025	2030	2035
Sub-Total for Joe Gqabi DM				5,893	7,832	9,837	10,322	10,740
TOTAL				144,397	185,741	228,585	244,271	259,268

The 2035 water requirements per LM are presented in Diagram 4.2: 2035 Water Demand per LM in the form of a pie chart, illustrating that the King Sabata Dalindyebo LM will be the largest water consumer in requiring 40.00% of the total demand. A total of 5,76% of the 2035 demand will be supplied to Matatiele, Umzimvubu, Ntabankulu and Elundini Municipalities that fall outside the OR Tambo DM boundary.

Diagram 4.2: 2035 Water Demand per LM



4.3.2 DEMAND PER REGIONAL WATER SCHEME

The water schemes in OR Tambo have been planned such that they supply water across the district municipality boundaries. The schemes that supply across the ORTDM boundaries are summarized within Table 4.5: Water Requirements (million m³ per annum), Per Existing WSS and Potential WSIA below.

Table 4.5: Water Requirements (million m³ per annum), Per Existing WSS and Potential WSIA

Water Scheme Name	District Municipality	Local Municipality	Water Requirements (Million m ³ per annum)				
			2015	2020	2025	2030	2035
Umzimvubu RWSS	Alfred Nzo DM	Matatiele	0,012	0,021	0,030	0,032	0,034
		Umzimvubu	0,929	1,247	1,576	1,624	1,657
		Ntabankulu	0,030	0,031	0,033	0,034	0,034

Water Scheme Name	District Municipality	Local Municipality	Water Requirements (Million m ³ per annum)				
			2015	2020	2025	2030	2035
Umzimvubu RWSS	Joe Gqabi DM	Elundini	2,151	2,859	3,590	3,768	3,920
TOTAL			3,122	4,158	5,229	5,457	5,645

The water requirements for ORTDM are presented in this section, per existing Water Supply Scheme (WSS) area and potential future Water Supply Intervention Area (WSIA) area for the entire DM, thus covering all consumers in the municipality. Table 4.6: Water Requirements (million m³ per annum), 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

WSIA No	WSIA Name	Households (2015)	Population (2015)	Water Requirements (Million m ³ per annum)				
				2015	2020	2025	2030	2035
NYA004	Cibeni-Ntlambeni RWSS	19 191	93 041	1,86	3,04	4,26	4,64	4,98
KSD005	Coffee Bay RWSS	6 662	37 487	0,88	1,33	1,79	1,96	2,12
KSD004	Lukwethu Water supply	19 560	94 725	2,20	3,32	4,48	4,90	5,31
KSD003	Mquandulu Corridor Development	15 291	74 888	1,65	2,63	3,65	3,99	4,33
NQH002	Msikaba BRWSS	12 236	59 635	1,33	2,07	2,84	3,12	3,40
KSD002	Mthatha Regional Borehole Development	1 680	8 221	0,16	0,27	0,38	0,42	0,45
KSD001	Mthatha RWSS	98 916	399 625	24,18	27,23	30,39	32,17	33,94
NYA003	Ngqeleni RWSS	12 035	57 928	1,29	2,00	2,73	2,95	3,16
NQH001	Ngquza Hill RBWSS	57 190	291 073	7,34	10,84	14,47	15,80	17,10

WSIA No	WSIA Name	Households (2015)	Population (2015)	Water Requirements (Million m ³ per annum)				
				2015	2020	2025	2030	2035
PSJ001	Port St Johns RWSS	4 394	22 929	0,45	0,75	1,06	1,15	1.24
PSJ002	Port St Johns Town Supply	2 353	6 597	0,50	0,55	0,59	0,62	0.64
NYA001	Second Falls RWSS	11 024	56 450	1,37	1,98	2,61	2,82	3,01
NYA002	Tombo RWSS	6 475	26 434	0,96	1,14	1,32	1,42	1,51
MHLO001	Umzimvubu RWSS	68 453	276 218	8,52	10,65	12,86	13,20	13,45
Total		335 460	1 505 251	52.71	67,80	83,43	89,16	94,63

The demand per water supply scheme provided in Mℓ/day is detailed within Table 4.7: Water Requirements (Mℓ/d), Per Existing WSS and Potential WSIA's below.

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

WSIA No	WSIA Name	Households (2015)	Population (2015)	Water Requirements (Mℓ/d)				
				2015	2020	2025	2030	2035
KSD001	Mthatha RWSS	98 916	399 625	66,25	74,61	83,26	88,14	92,99
KSD002	Mthatha Regional Borehole Development	1 680	8 221	0,43	0,73	1,04	1,14	1,24
KSD003	Mqanduli Corridor Development	15 291	74 888	4,52	7,21	9,99	10,94	11,85
KSD004	Lukwethu Water supply	19 560	94 725	6,04	9,1	12,27	13,43	14,55
KSD005	Coffee Bay RWSS	6 662	37 487	2,41	3,63	4,91	5,36	5,8
MHLO001	Umzimvubu RWSS	68 453	276 218	23,35	29,19	35,23	36,17	36,84
NQH001	Ngqushwa Hill RBWSS	57 190	291 073	20,11	29,69	39,63	43,28	46,84
NQH002	Msikaba BRWSS	12 236	59 635	3,64	5,67	7,78	8,55	9,31

WSIA No	WSIA Name	Households (2015)	Population (2015)	Water Requirements (Mℓ/d)				
				2015	2020	2025	2030	2035
NYA001	Second Falls RWSS	11 024	56 450	3,76	5,43	7,16	7,72	8,25
NYA002	Tombo RWSS	6 475	26 434	2,64	3,13	3,63	3,9	4,15
NYA003	Ngqeleni RWSS	12 035	57 928	3,54	5,48	7,48	8,09	8,65
NYA004	Cibeni-Ntlambeni RWSS	19 191	93 041	5,1	8,33	11,68	12,7	13,66
PSJ001	Port St Johns RWSS	4 394	22 929	1,23	2,05	2,9	3,15	3,39
PSJ002	Port ST Johns Town Supply	2 353	6 597	1,38	1,5	1,63	1,69	1,75
Grand Total		335 460	1 505 251	144.4	185,75	228,59	244,26	259,27

The Mthatha RWSS supplying water only to the Local Municipalities within the OR Tambo DM has the highest current and projected 2035 demand. The projected 2035 demand amounts to 35,9% of the total demand from all the water schemes.

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 ORTDM. 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 ORTDM. Only settlements or areas currently served by an existing scheme are reported on in this section.

5.1 WATER RESOURCE AVAILABILITY

The Mzimvubu to Keiskamma WMA is one of the few remaining water management areas with a positive water balance and huge water surplus. The water availability and potential water resource development of the Mzimvubu River was investigated in numerous studies, indicating the potential for further development and possible transfer of water across the basin boundaries, albeit at very high cost due to the deeply incised river valleys, necessitating very high pumping heads to reach water users.

Recent groundwater studies indicate a significant potential for further groundwater development across the municipal area.

There is currently only one major dam, the Mthatha Dam, and few small dams for domestic use within the OR Tambo DM area of jurisdiction. Most of the water supply for the towns and rural areas comes from stand-alone schemes using streams, springs and boreholes.

A list of the relevant dams with information about yield and allocation is given in Table 5.1: Major dams for domestic supply in OR Tambo DM area (from Mzimvubu to Keiskamma (ISP; DWA, 2004) below.

Table 5.1: Major dams for domestic supply in OR Tambo DM area (from Mzimvubu to Keiskamma (ISP; DWA, 2004)

Dam Name	Capacity (million m ³)	Yield (million m ³ /a)		
		Domestic	Irrigation	Other / Surplus
Mthatha	228,0	19,0	0,0	0
Corana	0,71	0,34	0,0	0
Mabeleni	2,0	1,73	0,0	0
Mhlanga	1,53	0,78	0,0	0
Magwa	2,6	N/av.	0,0	0
Total	234,84	21,85		

The existing water supply infrastructure is further discussed under this section per local municipality.

5.2 KING SABATA DALINDYEBO LOCAL MUNICIPALITY

5.2.1 MTHATHA TOWN WATER SUPPLY SCHEME

The Mthatha Town Water Supply Scheme that supplies the town of Mthatha and the surrounding peri-urban villages with water, receives its raw water from the Mthatha Dam. The Mthatha Dam is located about 6km north-west of the town centre and also has a pump station and balancing pond. The dam has a 1 in 50 year yield of 145,5 million m³ per annum of which 21,9 million m³ per annum (60Mℓ/d) is allocated to Mthatha Town Water Supply for domestic and industrial usage. The rest is allocated to Eskom for hydropower generation. The hydropower stations are located at First and Second Falls of the Mthatha River.

The water gravitates through two raw water pipelines (600mm dia and 800mm dia) from Mthatha Dam to the Thornhill Water Treatment Plant at a combined flow rate of 700 ℓ/s. When the level of the dam drops below a predetermined level the system is changed so that the 600mm line is used as the suction manifold to the pump station and the 800mm line is used as the delivery line that maintains the required flow to the Plant. The balancing pond is used as a backup in times of maintenance and repair to the pump station.

Clear water is pumped through three pumping mains (2 x 600mm diameter to Fort Gale and 1 x 450mm diameter to Ncamedlana Low Level). Two booster pumps at Fort Gale pump water (through 450mm and 350mm dia) to the two reservoirs at Signal Hill. The 350mm diameter line acts as pumping and gravity line i.e. when not pumping; the line is used as a gravity line feeding the Fort Gale reservoirs. The Signal Hill reservoirs feed the peri-urban villages as well as the surrounding residential areas. Fort Gale reservoirs supply the CBD and the surrounding residential areas. Other residential areas like Northcrest and Norwood are supplied from the Ncamedlana High Level reservoir. Ncamedlana reservoir feeds Maydene Farm and the surrounding peri-urban villages (Lower Corana).

The scheme has the following infrastructure:

- Thornhill Water Treatment Plant (60Mℓ/day) currently being upgraded in stages to an ultimate 150Mℓ/day;
- Pumpstations;
- Three clear water pumping mains (2 x 600mm diameter and 1 x 450mm diameter);
- Storage reservoirs (combined total capacity of 79,1Mℓ);
- Booster pump and gravity mains; and
- Reticulation network.

The scheme also supplies the following rural or peri-urban schemes:

- Mpeko Water Supply Schemes at Mpeko from Signal Hill Reservoirs;
- Lower Corana Water Supply Scheme from Maydene Farm Reservoir; and
- Zimbane Water Supply Scheme from Zamukulungisa Reservoir.

During the development of the Mthatha Water Master plan development a decision was taken to use the Mthatha River as a natural division for the supply zones for the two main Water Treatment Plant,

Thornhill and Rosedale. Rosedale WTP would supply the areas north of Mthatha River and the Thornhill WTP would supply all the areas south of the Mthatha River.

5.2.2 ROSEDALE WATER SUPPLY SCHEME

The scheme has a package Water Treatment Plant and sources water from the Mthatha Dam and can be summarized as follows:

- Raw water submersible pump station 2 x 44,2 l/s @ 75 kW;
- 2 No. 200 KVA transformers;
- 0,4km long 300mm diameter MPVC rising main;
- 150kℓ/h (3,0Mℓ/d) water purification package plant;
- Pump station (2 x 36,8ℓ/s @ 55kW) from waterworks to 3Mℓ reservoir;
- 2,1km long 250mm diameter mPVC rising main to 3Mℓ;
- 160mm diameter mPVC gravity main from reservoir to Ntilini;
- 3Mℓ reinforced concrete reservoir;
- Gravity mains from reservoir to villages (160mm, 110mm, 90mm diameter);
- Village reticulation of approximate total length of 25,31km with varying diameters of 90mm to 50mm; and
- 90 metered standpipes.

The scheme supplies the villages of Rosedale, Highbury, Ncambele, Ntilini and Qelene.

5.2.3 MTHATHA PERI-URBAN WATER SUPPLY SCHEME

The Mthatha Peri-Urban water supply scheme consists of various independent water supply schemes. These schemes are located within a 30km radius from Mthatha. There are three different water sources used for these schemes, namely the Mabeleni, Mthatha and Corana Dams, Mhlahlane (Upper and Lower) and Upper Corana Water Supply Scheme.

5.2.3.1 Upper and Lower Mhlahlane Waterworks:

The scheme receives its water from a dam on the Mhlahlane River some 25km north east of Mthatha. Raw water gravitates from the dam to the Mhlahlane weir from where it is conveyed through a 1,35km gravity line to the Mhlahlane Water Treatment Plant. A 350mm diameter FC main conveys water (by means of gravity) from the treatment Plant to the villages and the Mthatha airport. The estimated capacity of the Water Treatment Plant, based on the size of the sedimentation tank (56m² at a surface loading of 1,1 m³/m²/hr) and pressure sand filters (4,8m² at a surface loading of 12,5m³/m² /hr) is approximately 1,5Mℓ/d. The existing Plant is however operating for periods at a time at close to 3Mℓ/d.

5.2.3.2 Rosedale Package Plant:

This 3Mℓ/d plant draws from Mthatha Dam and supplies a limited rural area to the immediate north of Mthatha. This will become redundant once the proposed Rosedale Water Treatment Plant is commissioned.

5.2.3.3 Mpheko Scheme:

The scheme is fed from the Thornhill WTP and serves about 25 769 people within 16 villages.

5.2.3.4 Mqanduli RWSS

This scheme supplies water to the town of Mqanduli from a small weir on the Manqondo River. Raw water is pumped from the weir to a Water Treatment Plant situated in the town using a single submersible pump and 160mm uPVC rising main with a capacity of 6ℓ/s (0,189 million m³ per annum). After treatment, the clear water is pumped to the clear water storage reservoirs situated on the edge of Mqanduli via a single pump and 75mm diameter rising main capable of supplying 4 ℓ/s (0,126 million m³ per annum). The reservoirs have a combined capacity of 1,22Mℓ (1 220m³). Clear water gravitates to the town from the reservoirs.

5.2.3.5 Qunu Bulk Water Supply Scheme (Ngaphezulu WSS)

The Qunu Water Supply Scheme (WSS) consists of five independent water supply schemes that supply five villages with potable water. The scheme was designed for RDP standards (25 ℓ/c/d), and has a total storage capacity of 1,7Mℓ (1 700m³). The five Qunu schemes were named according to the villages they serve and are as follows:

- Kotishini WSS (Kusigiba WSS): This scheme receives its water from a borehole equipped with a three-phase submersible electric pump. Water is pumped through a 75mm diameter uPVC pipe to a 382kℓ (382m³) reservoir. Reticulation is by means of gravity uPVC and HDPE pipes ranging in size from 32 to 160mm in diameter and 11 standpipes.
- Lwalweni WSS: The scheme receives its water from a borehole equipped with two three phase submersible electrical pumps. Water is pumped through a 75mm diameter uPVC pipe to a 483kℓ (483m³) reservoir. Reticulation is by means of gravity uPVC and HDPE pipes ranging in size from 32 to 75mm in diameter to 28 standpipes.
- Nkhalane/Magubu WSS (Ngweni WSS): This scheme also receives its water from a borehole equipped with a three-phase submersible electrical pump that pumps water through a 110mm diameter uPVC pipe to a 292kℓ (292m³) reservoir. There is also a three-phase multistage vertical pump that is used as a booster pump. It pumps water through a 75mm diameter uPVC pipe to a 173kℓ (173m³) elevated steel tank. Another 10kℓ (10m³) tank is connected to this pumping main as an emergency back-up supply to Matyeni village. Reticulation is by means of gravity uPVC and HDPE pipes that range in size from 25 to 75mm in diameter. Thirty-Seven (37) standpipes distribute water to consumers.
- Mandlaneni WSS: Mandlaneni WSS receives its water from an electrical borehole pump (three-phase submersible that pumps water through a 75mm diameter uPVC pipe to a 332kℓ (322m³) steel reservoir. Water is then reticulated to 34 standpipes through a network of uPVC and HDPE pipelines ranging in size from 32 to 110mm in diameter.
- Kwadlomo/Mmangweni WSS: The scheme receives its water from a three-phase submersible electrical borehole pump. Water is pumped through a 75mm diameter uPVC rising main to a 55kℓ (55m³) elevated steel reservoir. There is also 50mm HDPE gravity main to a 15kℓ (15m³) elevated steel tank. Reticulation is by means of uPVC and HDPE gravity lines ranging in size from 32 to 50mm in diameter to 15 standpipes.

5.2.3.6 Xhugxwala Eyethu Water Scheme:

The Xhugxwala Water Project supplies an area situated approximately 25km south of Mthatha on the west side of the N2 near Viedgesville. The scheme is divided into two sections as follows:

- North: A new borehole is equipped with an electrical pump that supplies a new 90kℓ (90m³) reservoir. Water is distributed to seven standpipes.
- South: A new borehole is equipped with an electrical pump that supplies an existing 40kℓ (40m³) reservoir. Reticulation supplies seven standpipes.

5.2.3.7 Emtebe village Water Supply Scheme:

The Emtebe Village Water Supply Scheme is situated approximately 15km south of Mthatha. The scheme consists of a borehole supply and spring supply. An existing borehole and windmill have been refurbished, as have the reservoir and reticulation. A perennial spring has been protected and clear water pumped to a 40kℓ (40m³) reservoir.

5.2.3.8 Coffee Bay RWSS

The Coffee Bay RWSS comprises of the following infrastructure:

- A raw water intake works and rising pipeline from the Mthatha River;
- A Water Treatment Plant;
- A clear water pump station and rising main to Xonyeni Command Reservoir;
- Bulk gravity mains, village reservoirs and reticulation to six villages with a population of 4 394 in the southern part of Coffee Bay Administrative Area and part of Ngqeleni Administrative area;
- Booster Pump station;
- 1 x Command Reservoir (1Mℓ);
- 12 x Village Reservoirs;
- Break Pressure Tank;
- Rising Main;
- Bulk Gravity Mains; and
- Village Reticulation.

5.3 NYANDENI MUNICIPALITY

5.3.1 LIBODE TOWN WATER SUPPLY

The Libode Town scheme receives its water from three boreholes that are supplemented by an additional 133kℓ/d from Mhlanga WSS. Both supplies feed into three reservoirs that are interlinked. The scheme supplies the town's residential and commercial areas with potable water. The estimated population served by the scheme is 3 567. Water from the boreholes is chlorinated (by means of tablets system) before storage. This water is then distributed via a recently upgraded pipe network. The borehole scheme has the following infrastructure:

- 3 boreholes (equipped with electrical pumps – 580kℓ/d);
- 75mm diameter pumping mains (2 No.);

- Chemical dosing room;
- 3 Reservoirs; and
- Reticulation mains.

5.3.2 CORANA REGIONAL WATER SUPPLY

The Corana Regional Water Supply Scheme (RWSS) receives its water from Corana Dam that is situated about 27km north of Mthatha town. It forms part of the Mthatha Peri-Urban WSS that is described in 5.1.1. This scheme was originally commissioned in 1979 and has recently been upgraded to try and meet the current demand. The scheme supplies 18 villages (population of 39 400) with potable water at RDP standards. The scheme has the following infrastructure:

- Water Treatment Plant (950m³/day);
- Booster pump station (100m³/day);
- Bulk rising and gravity mains (47km), Reticulation mains (102km); and
- 21 Reservoirs and 500 standpipes.

The assured yield of the Corana Dam is 0,336 million m³ per annum (1:50 year). Raw water gravitates from the dam to the treatment Plant. Clarification is undertaken using two 36m² up-flow clarifiers and filtration is achieved using pressure filters. The conveyance of the clear water is divided into an upper high-level zone (Upper Corana) supplying the northern villages using a pumped supply; and a low level zone (Lower Corana) supplying the southern villages under gravity. Villages supplied have service reservoirs supplied from branches off the main line.

5.4 MHLONTLO LOCAL MUNICIPALITY

5.4.1 QUMBU TOWN WATER SUPPLY

Qumbu Town receives its water from the Cengcane River about 20km away. Submersible pumps lift the raw water to a 100kℓ buffer reservoir, located approximately 200m uphill from the Water Treatment Plant. From the buffer reservoir, water gravitates into the various units of the Water Treatment Plant. There are two pump sets: one that pumps water to a 200kℓ reservoir and supplies the surrounding rural areas and another that pumps water to a 400kℓ reservoir for Qumbu Town.

5.4.2 TSOLO TOWN WATER SUPPLY SCHEME

Tsolo Town has a population of approximately 11 000 people. Tsolo has been experiencing water shortages in the past few years, however the system has recently been upgraded. Fixing the weir and upgrading the Water Treatment Plant have significantly addressed the water conservation and demand management measures.

There are a number of rural water supply schemes in Mhlontlo Municipality. Most notably are the several schemes that were constructed under the DWAF BoTT programme including:

- Gqukungu Water Supply Scheme;
- Caba Water Supply Scheme; and
- Qanda Water Supply Scheme.

5.4.3 MJIKA WATER SUPPLY SCHEME

The Mjika Water Supply Scheme is divided into a number of sub-schemes according to water sources and the villages served. The scheme consists of four independent water supply schemes that supply an estimated projected population of 10 923 people (from nine villages) with potable water. These schemes were named according to the villages they serve and/or their water sources, namely Gungululu, Mahlubini, Qolombane and Upper Mjika.

5.5 NGQUZA HILL LOCAL MUNICIPALITY

5.5.1 LUSIKISIKI REGIONAL WATER SUPPLY SCHEME

The raw water is presently abstracted at a weir on the Xura River, located under the bridge on the main road between Lusikisiki and Flagstaff, some 7km northwest of Lusikisiki. All components of the bulk supply infrastructure have design capacities of 2 760m³/day (32l/s gross). The water is pumped from the weir to the Water Treatment Plant through a raw water pump station located near the weir, through 650m long (ND 200mm) raw water pumping main. The pump station is equipped with two duty and one stand-by centrifugal pumps (combined capacity of 32l/s and design head of 60m).

The Water Treatment Plant is situated just off the main road (R61) to Flagstaff. The treatment process comprises chemical dosing, flocculation, sedimentation, slow sand filtration and chlorination. The slow sand filtration system consists of three duty and one standby filter bays designed for a maximum head loss of 1,5m and a total duty capacity of 32l/s.

The clear water pump station located within the Water Treatment Plant consists of two duty and one standby pumps, with a total design duty capacity of 32l/s and pumping head of 80m. The clear water is conveyed by a 2 200m long, 200mm diameter AC rising main to the bulk storage reservoir (Reservoir A, 1 400m³). This reservoir then gravity feeds a further bulk reservoir (Reservoir B, 1 000m³) and 24 service reservoirs, varying in size between 20 and 90m³, supplying the rural villages.

A number of bulk users, including the town, draw water directly from the bulk main between reservoirs A and B, even though this pipeline has a limited conveyance capacity.

5.5.2 FLAGSTAFF REGIONAL WATER SUPPLY SCHEME

The scheme currently supplies the domestic and industrial requirements for the town of Flagstaff (300 houses) and the surrounding peri-urban areas.

The scheme obtains raw water from four boreholes (total yield of 0,1 x Mm³ per annum) and a diversion weir (1:50 assured yield of 0,11 x Mm³ per annum) with a total available yield of about 0,21 x 106m³/a. The raw water from the weir is pumped to the Water Treatment Plant consisting of a settling tank and a pressure filter, with a capacity of 0,22 x 106m³ per annum. The clear surface water and the borehole water are mixed into two bulk reservoirs located at command position. The water is then distributed to the consumers by gravity.

5.5.3 MKAMBATI WEIR SCHEME

The scheme supplies an existing clinic and staff (200 people) and the Main Camp at the nature reserve (44 beds). The Point cottages are situated near the coast and obtain water from a tank that is replenished using a mobile water cart filled up at the Main Camp.

The scheme is approximately 50 years old. The concrete weir is located on the Mkambati River and is approximately 10m long. The water is pumped at a rate of approximately 8l/s from the weir to two concrete reservoirs with a total capacity of 450m³. One duty and one standby pump hosted in a masonry pump house are powered by Lister diesel engines. The water is distributed by gravity from the reservoirs to the consumer nodes.

A separate small weir scheme, located about 7km north-east from the main camp supplies about 50 consumers in Gwe Gwe resort with water.

5.5.4 HOLY CROSS HOSPITAL SCHEME (TAWENI VILLAGE SCHEME)

The Holy Cross Hospital is presently supplied from two small dams - Mcwesane Dam (storage 11 000m³, yield 40 000m³ per annum) and Mketengeni Dam (storage 30 000m³, yield 141 000 m³ per annum). The estimated capacity of the scheme is 0,18 x Mm³ per annum, supplying a total number of 1 500 people including patients and staff.

The raw water is being pumped from both water sources into the Water Treatment Plant. The Plant consist of sedimentation tank and slow sand filters with a capacity of 396m³/d. A total bulk storage capacity of 760m³ is available to the scheme.

5.5.5 MAGWA TEA ESTATE WATER SCHEME

This scheme is supported by a Dam on the Mkozi River and a Water Treatment Plant which provides the domestic and industrial water requirements for the Magwa Tea Estate. Approximately 5 000 people are serviced by this scheme.

5.6 NYANDENI LOCAL MUNICIPALITY

5.6.1 NGQELENI TOWN WATER SUPPLY

Ngqeleni Town is situated about 27km southeast of Mthatha and the Ngqeleni Water Supply dates back to as early as 1930 when the weir on the Ngqeleni stream was first constructed to supply the town with water. The scheme receives its water from three different sources (combined capacity of 449kl/day), an earth dam on Ngqeleni stream, a weir on Ngqeleni stream and two boreholes equipped with electrical pumps. Raw water gravitates from the storage dam to a Water Treatment Plant. Water from the weir and boreholes is pumped to the treatment Plant. The scheme provides approximately 6 179 people living in Ngqeleni Town with potable water.

The scheme has the following infrastructure:

- Raw water storage dam;
- Weir and boreholes (2 No.);
- Raw water gravity line from the dam to waterworks (3,5 m, 90mm uPVC);
- Raw water pumping main from boreholes to waterworks (1,9km, 63mm steel and 1,6km, 63mm uPVC);
- Water Treatment Plant;
- Clear water reservoirs (300kl); and
- Distribution network.

The current capacity of the scheme is inadequate to cater for the current demand.

5.6.2 MHLANGA RURAL WATER SUPPLY SCHEME

The Mhlanga Water Supply Scheme can be accessed either off the N2 road between Mthatha and Qumbu or off the R61 road between Mthatha and Port St Johns. The scheme provides 63 843 people of Mhlanga community (from 66 villages) and Libode Town with potable water and has the following infrastructure:

- Raw water dam;
- Raw water storage reservoir;
- Raw water pumpstation (3,5Mℓ /day);
- Raw water rising main (250mm diameter, 2,8km long);
- Water Treatment Plant (2,3Mℓ /day);
- Service reservoirs;
- Gravity bulk and reticulation mains; and
- Standpipes.

Raw water is supplied via a gravity pipeline from Mhlanga Dam (with a dam capacity at full supply of 1,6 x Mm³) to the Mhlanga Pump Station. From the Mhlanga Pump Station, raw water is pumped through a rising main into a 750m³ concrete raw water reservoir situated at the Mhlanga Water Treatment Plant. From the raw water reservoir, raw water gravitates to the 2,3Mℓ /day WTP. A flocculating agent (polyelectrolyte) is mixed into the raw water before it passes into two rapid gravity sand filters. From the filters, clear water is gas chlorinated before entering the 750m³ clear water concrete reservoir. The treated bulk water gravity system consists of approximately 172km of pipeline, 68 reservoirs and 12 break pressure tanks. The sludge from the desludging sedimentation tanks and the backwashing filters is collected in a sludge lagoon and the settled water from the sludge lagoons is returned to the head of the Plant by a rising main.

The Mhlanga Water Supply Scheme was originally commissioned in the nineties to supply the surrounding villages with potable water. This supply was based on 25ℓ/capita/day. The scheme has over the years been extended to include supply to the Peri-urban areas of Mthatha. This increased demand prompted the ORTDM to commission an upgrade of the Mhlahlane Water Treatment Plant (MWTP) in 1999. This upgrade met the demands at the time.

More villages have since been added to the scheme yet some of the villages around Mhlahlane area are still without potable water. The inclusion of these villages in the scheme has been proposed. This however required a careful consideration of the water source and the capacity of the Mhlahlane WTP. An investigation carried out by GIBB in 2011 revealed that the Mhlahlane WTP is overloaded and struggling to meet the demands. This increase in water demand can be attributed to an increase in a number of informal settlements in the Peri-urban areas. To relieve Mhlahlane WTP from the increasing water demands it will be connected to supply from Thornhill Water Treatment Plant:

5.7 PORT ST JOHNS LOCAL MUNICIPALITY

5.7.1 PORT ST JOHNS SPATIAL DEVELOPMENT INITIATIVE (SDI) WATER SUPPLY SCHEME

The area served by this scheme is located to the west of the Umzimvubu River, to the south of the Mthatha - to Port St Johns Road (R61) and to the east of the watershed between the Mngazi and

Mngazanana rivers. The scheme receives raw water from the two Bulolo Dams and a weir, which are situated on the Bulolo River. The second dam commands a catchment area of 3,2km² and an estimated capacity of 3000m³. The main Bulolo Dam has a catchment area of 6,8km² and a capacity of 255 000m³ and Bulolo Weir with a catchment area of 10,2km² and capacity of 3 000m³. The yield, based on 1:50 year return period, of all existing dams in the system amounts to an estimated 0,36Mm³ per annum, or a fraction under 1 000m³/day made up of approximately 960m³/day from dams and 40m³/day from the weir.

The bulk supply infrastructure is generally new and has a remaining life of 10 to 20 years, except for the older portions of the scheme, which have a remaining life of approximately 5 to 10 years. The bulk main into town leaks and requires remedial works, whilst the Bulolo Dams require riprap and other minor remedial works. The reticulation in the rural villages is new, whilst that in the town is in a good condition. Telemetry is required in order to improve the scheme's operations and supply efficiency. The scheme was implemented in a number of phases and it consists of the following:

- River abstraction and two storage dams. To supplement the dam storage, off-channel from Mngazi River will be utilised in future;
- 250mm diameter raw water pumping main and Water Treatment Plant of 4Mℓ/day capacity;
- Clear water pumping main to a main reservoir, which services six villages via 32km of internal reticulation and 107 communal standpipes;
- A gravity main supplies the town of Port St Johns with about 50km of reticulation network; and the Silaka Nature Reserve via the old Water Treatment Plant converted to storage facilities; and
- The total length of bulk mains is about 48km.

5.7.2 UMZIMVUBU 18 VILLAGES WSS

The Umzimvubu 18 Villages Water Supply Scheme is situated about 5km upstream of Port St Johns SDI Water Supply Scheme. The scheme is based on surface water abstraction from run-of-river flow in the Mngazi River. The scheme serves 18 villages under the administration areas of Tombo, Gomolo, Mawosheni and Swazini. The scheme was commissioned in 2000 and consists of the following:

- River abstraction from Mngazi River and raw water pumping main;
- Water Treatment Plant with a capacity of 2Mℓ/day;
- The two CURO model 65/80 LTF pumps powered by 65/75 kW 2 pole motors. This system has a capacity of 20ℓ/s;
- Clear water pumping main to a main reservoir of 340kℓ capacity. The rising main is 150mm diameter steel and is protected by a Bermad surge anticipating valve installed in the pump house;
- Gravity bulk mains of a total length of about 54km supplying 23 reservoirs; and
- About 55km of internal reticulation and 236 communal standpipes.

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 macro¹ or sub regional ²scale (over vast distances³), with internal bulk and reticulation systems or any bulk supply infrastructure that may have a significant impact on water resources in terms of quantity and quality. The bulk infrastructure that would have a “significant impact on water resources” includes:

- Any bulk scheme that is designed for maximum demand of 5Mℓ/day or more
- Any waste Water Treatment Plant that discharges into a fresh water resource system
- Any Water Treatment Plant that is designed for a maximum demand of more than 2Mℓ/day.

An Interim/Intermediate Water Supply Programme (IIWSP) was initiated in 2012 by the Minister of Water Affairs as a 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 where there are gaps and to also 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.

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

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 5km

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	35	R 423 631 797	R 124 303 000	R 85 675 000	R 155 337 000	R 365 315 000
MIG	34	R 8 358 042 724	R 532 295 000	R 554 186 000	R 587 000 000	R 1 673 481 000
RBIG	8	R 7 256 064 700	R 320 200 000	R 300 000 000	R 340 283 877	R 960 483 877
		R 16 037 739 221	R 976 798 000	R 939 861 000	R 1 082 620 877	R 2 999 279 877

The existing cost requirement for water services within ORTDM is R 16 billion rand and does not yet represent a wall to wall coverage of the total need. However, substantial planning studies have been conducted that were taken in consideration when the overall bulk supply intervention areas were determined. The extent of the proposed planning studies was extended to ultimately result in a wall to wall coverage. 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
King Sabata Dalindyebo	ECR012 // E/ECDC15 /002/W	Mthatha Regional WSS - Mthatha dam source	Construction of Rosedale Water Treatment Plant, abstraction works and associated infrastructure	R 475 000 000	R 0	R 0	R 0
King Sabata Dalindyebo	ECR019	OR Tambo: Mthatha KSD Bulk Water Supply	KSD: Mthatha KSD Water (30km radius). Includes Airport Corridor, Mqanduli Corridor, Mthatha Corridor, Nqadu Corridor, Libode Corridor, Ngeleni Corridor & Second Falls Corridor.	R 1 732 681 700	R 319 000 000	R 300 000 000	R 340 283 877
King Sabata Dalindyebo	N/DC15/054/W	Mthatha Regional WSS - Borehole development	Drilling of deep well boreholes in areas that cannot be accessed by the Mthatha Dam water	R 994 383 000	R 0	R 0	R 0
Mhlontlo	MIS 205342	Sidwadweni Regional Water Supply	Tsitsa River Source Development - Construction of a 5Ml/day packaged WTP	R 120 000 000	R 0	R 0	R 0
Ngquza Hill	ECR003 // F/ECDC15 /003/W	Ingquza Hill Regional Bulk Water Supply Scheme	Ingquza Hill Regional Bulk Water Supply Scheme - phase 2 & 3	R 850 000 000	R 1 200 000	R 0	R 0
Ngquza	N/DC15/0	Msikaba	Msikaba River	R 850 000 000	R 0	R 0	R 0

LM	Project No	Project Name	Project Description	Total Cost Requirement	FY 2015/16	FY 2016/17	FY 2017/18
Hill	55/W	Regional Bulk Water Services Supply	Source. Phase 1 - Feasibility Study & Preliminary Design				
Ngquza Hill	N/DC15/056/W	Kwanyati Regional Bulk Water Supply Scheme	Kwanyathi Village and surrounding areas (is a sub-project of the Ingquza Hill Master Plan)	R 1 200 000 000	R 0	R 0	R 0
Nyandeni	N/DC15/010/W	Mdumbi Regional Water Supply	Development of a Regional Scheme downstream of Second Falls to supply water up to Mdumbi & Coffee Bay areas	R 1 034 000 000	R 0	R 0	R 0
				R 7 256 064 700	R 320 200 000	R 300 000 000	R 340 283 877

The total MTEF 2015/18 over the next three years shows a total allocation of approximately R 960,5 million for regional bulk. However, the total bulk requirement is R 7,2 billion. This would result in ORTDM taking at least 21 years to address their total bulk infrastructure needs. The details of the projects are provided within the paragraphs hereafter.

6.1.1 ECR012 // E/ECDC15/002/W: MTHATHA REGIONAL WSS -MTHATHA DAM SOURCE AND ECR019: OR TAMBO - MTHATHA KSD BULK WATER SUPPLY

This project is a result from the King Sabata Dalindyebo's Presidential Intervention Project to stimulate economic growth in and around Mthatha by improving the level of services provided. The following elements would be included:

- Upgrading the delivery of raw water from Mthatha Dam to Thornhill Water Treatment Plant;
- Extending the capacity of the Thornhill Waterworks by 20Mℓ/d to 80Mℓ/d (current) and by a further 40Mℓ/d in the short-to-medium term;
- Upgrading the clear water pumping capacity to Mthatha town and Southern and Eastern surrounds out of Thornhill Waterworks;
- Constructing a new 25Mℓ/d waterworks (Rosedale), upgradable in 25Mℓ/d modules to 100Mℓ/d, to supply the areas to the North and West of Mthatha town; and
- Constructing a new system of bulk supply rising and gravity mains and reservoirs to transfer the clear water pumped out of the Thornhill and Rosedale Waterworks to the extended areas of supply along five corridors that will ultimately cover the whole of the King Sabata Dalindyebo Local Municipality:
 - Mqanduli Corridor (to the South)
 - Ngqeleni Corridor (to the SE)
 - Libode Corridor (to the East)
 - Nqadu Corridor (to the North)
 - Airport Corridor (to the West)

Various phases of these two projects are currently in progress (construction).

6.1.2 N/DC15/054/W: MTHATHA REGIONAL WSS - BOREHOLE DEVELOPMENT

This project is not included within the current 3-year MTEF but has been included within the Provincial Regional Bulk Master plan of March 2015. The project will investigate the groundwater potential within five (5) wards to the west of King Sabata Dalindyebo, i.e. Wards 17,18,21, 22, and 27. This project is currently still in a planning phase.

6.1.3 MIS 205342 SIDWADWENI REGIONAL WATER SUPPLY

The Sidwadeni project would be designed to provide bulk water to the south western parts of the Mhlontlo Local Municipality and will include the towns of Tsolo, Qumbu, and Mount Frere. Water will be sourced from the Tsitsa river from where it will be treated, distributed and stored within various reservoirs. However, this scheme has now been included within the Umzimvubu project that entails the development of the Ntabelanga dam as well as the Lalini Dam Hydropower scheme. The Tsitsa River system can be utilised for a multi-purpose use (i.e. the Ntabelanga Dam and the Lalini Dam) due to the high water resources availability in the catchment. The consumptive uses could sustainably include domestic water supply, irrigation and hydropower.

6.1.4 ECR003 // F/ECDC15/003/W: INGQUZA HILL (IHLM) REGIONAL BULK WATER SUPPLY SCHEME

This project entails the development of a storage facility on the Mzintlavana River, Zalu Dam. It would include bulk storage that would allow the entire IHLM to be supplied under gravity via approximately 290km of Primary and Secondary bulk. This project is currently in a planning phase

6.1.5 N/DC15/055/W: MSIKABA REGIONAL BULK WATER SERVICES SUPPLY

This project investigates the abstraction of water from the Msikiba river. The raw water will be abstracted from the water source and pumped into the off-channel storage, before gravitating to the proposed Water Treatment Plant. A clear water pump station would be constructed near the proposed Water Treatment Plant that would pump the treated water to the command reservoir. The pumps will be sized for the summer daily demand. The pump station will be equipped with at least two pumps, one duty and one standby pump.

From the main storage reservoir, the water would gravitate to the planned five zonal reservoirs. A total of five zone concrete reservoirs, ranging from 350kℓ to 1.25Mℓ are also proposed. The proposed Plant entail the installation of approximately 220km of bulk supply pipelines, ranging from 50mm to 315mm in diameter. Twenty-eight (28) concrete service reservoirs, ranging from 30kℓ to 750kℓ are proposed. These reservoirs will be gravity fed from the zonal supply reservoirs. This project is currently still in the planning phase.

6.1.6 N/DC15/056/W: KWANYATI REGIONAL BULK WATER SUPPLY SCHEME

This project investigates the augmentation of the water supply within 14 zonal areas from the surplus capacity from the new Zalu Dam and the upgraded Xura river Water Treatment Plant.

6.1.7 N/DC15/010/W: MDUMBI REGIONAL WATER

This project involves the investigation to supply six (6) Wards, ward 22 up to ward 26 as well as ward 28 with secure water within the Nyandeni Local Municipality. It is proposed to supply the entire project area from the Rosedale Water Treatment Plant. The current offtake to the Ngqeleni Town

(Nggeleni Corridor) from the proposed Libode Corridor (Lalini Reservoir) could be upgraded to 15km long pipeline that would transfer water to the proposed Command Reservoir from where it would be gravitated to all six wards.

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

Table 6.3: ORT DM MIG Water Supply Projects

LM	Project Number	Project Name and Description		Total Cost Requirement	FY 2015/16	FY 2016/17	FY 2017/18	Total MTEF
King Sabata Dalindyebo	ECDC15/00 3/W	Coffee Bay Water Supply	Reticulation and Stand pipes in wards 23, 24 & 25 (phases 1,2 & 3)	R 193 714 000	R 44 222 008	R 20 000 000	R 0	R 64 222 008
King Sabata Dalindyebo	MIS 204248	Thornhill Bulk Water Supply - Upgrade & Rehabilitation	Upgrade of the raw water mains, pumpstation and WTP	R 121 600 612	R 0	R 0	R 0	R 0
King Sabata Dalindyebo	MIS 205189	Upper Mhlahalane Water Supply Augmentation Scheme	Upgrade of Mhlahlane WTP, construction of reservoirs and related bulk infrastructure and extension to villages	R 148 608 000	R 15 000 000	R 0	R 0	R 15 000 000
King Sabata Dalindyebo	N/DC15/03 5/W	Mthatha Regional WSS: Mqanduli Corridor (KSD PI)	Construction of 10,4km DN400 gravity main & 13km DN250 pipelines (to KuGxwalibomvu & Mahlathini), 50kℓ reservoir at Kwamkhulu, 2Mℓ reservoir at KuGxwalibomvu, 3Mℓ reservoir @ Mahlathini & 12Mℓ @ Mqanduli. Pump stations at Zamukulungisa & Kwamkhulu	R 210 234 530	R 136 757 025	R 48 386 032	R 0	R 185 143 057
King Sabata Dalindyebo	N/DC15/06 3/W	Mthatha Regional WSS - Water Supply to Lukwethu and surrounding villages	Water Supply to Lukwethu and surrounding villages	R 1 201 000 000	R 35 000 000	R 75 000 000	R 75 000 000	R 185 000 000
King Sabata Dalindyebo	N/DC15/06 5/W	Mthatha RWS - Rosedale/Ngqeleni Corridor (KSD PI)	Construction of 10Mℓ Maydene Reservoir. Construction of 3,8km of gravity mains from Maydene Reservoir to BNG	R 32 188 786	R 28 245 373	R 10 000 000	R 0	R 38 245 373
King Sabata Dalindyebo	N/DC15/06 6/W	Mthatha Regional WSS: Airport Corridor (KSD PI)	Construction of 400mm main from Area 1 to Fairfield reservoir. Construction of 10Mℓ Fairfield reservoir. Construction of 3,9km & 4,3km gravity mains from Signal Hill. Construction of 6Mℓ Area 6 reservoir. Construction of 5,3km	R 143 153 335	R 92 035 178	R 44 549 956	R 0	R 136 585 134

LM	Project Number	Project Name and Description		Total Cost Requirement	FY 2015/16	FY 2016/17	FY 2017/18	Total MTEF
			gravity mains					
King Sabata Dalindyebo	N/DC15/07 3/W	Coffee Bay bulk WTP	Coffee Bay bulk WTP	R 130 000 000	R 0	R 0	R 0	R 0
Mhlontlo	MIS 203262	Upper Culunca Regional Water Supply	Upgrading of WTP and reticulation to additional villages	R 45 000 000	R 2 100 000	R 22 000 000	R 0	R 24 100 000
Mhlontlo	N/DC15/03 1/W	Mangxamfu Water Supply Scheme	Extension to Mangxamfu Water Supply Scheme	R 52 125 000	R 20 000 000	R 29 910 000	R 0	R 49 910 000
Mhlontlo	N/DC15/06 2/W	Sidwadweni Regional Water Supply	Extension of Sidwadweni to Tsolo Junction Water Supply (phase 1 & 2) and construction of a 5ML/day packaged WTP	R 437 586 863	R 25 700 000	R 97 500 000	R 113 174 875	R 236 374 875
Mhlontlo	W/EC/8595 /11/13	Mvumelwano Water Supply	Extension of Mvumelwano Water Supply - Phase 4	R 61 199 522	R 0	R 0	R 0	R 0
Ngquza Hill	ECDC15/08 9/W/07/08	Flagstaff Regional Water Supply Scheme	Supply of water from the Mzintlava River to 43 villages and Flagstaff town	R 81 560 391	R 22 500 000	R 30 000 000	R 29 060 391	R 81 560 391
Ngquza Hill	N/DC15/00 8/W	Lusikisiki Regional Water Supply	Bulk pipeline and reticulation from Zalu dam	R 450 000 000	R 0	R 0	R 0	R 0
Ngquza Hill	N/DC15/00 9/W	Rehabilitation and Upgrade on Hlabathi Water Schemes	Hlabathi Water Schemes - Msikaba River as water source	R 345 000 000	R 0	R 0	R 0	R 0
Ngquza Hill	N/DC15/06 0/W	Mfinizweni Water Supply	Mfinizweni Water Supply	R 28 378 217	R 0	R 0	R 0	R 0
Nyandeni	N/DC15/01 4/W	Ntsonyini Ngqowongweni Regional Water Supply Scheme	Regional Water Scheme using the Mngazana River (Wards 6 & 18)	R 750 000 000	R 44 570 240	R 130 000 000	R 200 000 000	R 374 570 240
Nyandeni	N/DC15/01 6/W	Upgrading of Cibeni - Ntlambeni Regional Water Supply	Upgrading of Cibeni - Ntlambeni Regional Water Supply - Umzimvubu River Water Source (Feasibility Study)	R 1 200 000 000	R 2 500 000	R 75 000 000	R 200 000 000	R 277 500 000
Nyandeni	N/DC15/01	Upgrading of	Upgrading of Mhlanganisweni	R 450 000 000	R 2 750 000	R 65 000 000	R 150 000 000	R 217 750 000

LM	Project Number	Project Name and Description		Total Cost Requirement	FY 2015/16	FY 2016/17	FY 2017/18	Total MTEF
	7/W	Mhlanganisweni Water Supply Scheme	Water Supply Scheme into a Regional Water Supply Scheme. Phase 1 (Feasibility Study) - Tsitsa river source					
Nyandeni	N/DC15/02 0/W	Thekwini Water Supply Scheme Phase 2 & 3	Thekwini Water Supply Scheme Phase 2 & 3 (Wards 14, 21, 22, 23 & 24)	R 144 570 240	R 0	R 0	R 0	R 0
Nyandeni	N/DC15/03 9/W	Lwandile Regional Water Supply Scheme	Upgrading of existing water supply	R 450 000 000	R 2 750 000	R 65 000 000	R 150 000 000	R 217 750 000
Nyandeni	N/DC15/06 4/W	Completion of Ngqeleni Regional Water Supply	Completion of Ngqeleni Regional Water Supply - 27 Villages	R 100 000 000	R 25 300 000	R 0	R 0	R 25 300 000
Nyandeni	W/EC/3818 /07/09	Mthatha RWS - Rosedale/Ngqeleni Corridor (KSD PI)	Construction of reticulation infrastructure in Dumasi and surrounding areas (Wards 13, 14 & 21)	R 196 000 000	R 3 600 000	R 75 000 000	R 117 400 000	R 196 000 000
Nyandeni	W/EC/8848 /11/14	Rosedale to Libode Water Supply	Extension of Rosedale Water Supply to Libode and surrounding rurals (Wards 7,8,15,16,17,30)	R 146 750 062	R 34 645 500	R 65 125 000	R 34 479 562	R 134 250 062
Port St Johns	N/DC15/01 8/W	Port St Johns Regional Water Supply	PSJ RWS - Phase 4 - construction of off-channel storage dam. Phase 5 - river abstraction works & mechanical & electrical installations	R 95 373 166	R 39 719 459	R 20 557 912	R 0	R 60 277 371
Port St Johns	N/DC15/04 6/W	Upgrading of PSJ Town Supply	Upgrading of PSJ Town Supply	R 125 000 000	R 0	R 0	R 0	R 0
Port St Johns	N/DC15/04 9/W	Inguza Hill Regional Water Supply Scheme	Regional Water Supply Scheme to areas bordering Inguza Hill	R 450 000 000	R 0	R 0	R 0	R 0
				R 7 789 042 724	R 577 394 783	R 873 028 900	R 1 069 114 828	R 2 519 538 511

7. SYNOPSIS OF EXISTING AND COMMITTED SCHEMES

7.1 GAP ANALYSIS

A gap analysis has been undertaken for the water schemes in the OR Tambo DM. The gap analysis has taken into account current planning interventions by the WSA. In this regard, the entire OR Tambo District has been demarcated into regional water schemes in line with short and long term plans by the WSA. Fourteen (14) regional schemes have been identified as follows:

- KSD001 WSIA: Mthatha RWSS
- KSD002 WSIA: Mthatha Regional Borehole Development
- KSD003 WSIA: Mqanduli Corridor Development
- KSD004 WSIA: Lukwethu Water supply
- KSD005 WSIA: Coffee Bay RWSS
- NYA001 WSIA: Second Falls RWSS
- NYA002 WSIA: Tombo RWSS
- NYA003 WSIA: Ngqeleni RWSS
- NYA004 WSIA: Cibeni-Ntlambeni RWSS
- NQH001 WSIA: Ngqushwa Hill RBWSS
- NQH002 WSIA: Msikaba BRWSS
- PSJ001 WSIA: Port St Johns RWSS
- PSJ002: WSIA: Port St Johns Town Supply
- MHLO001 WSIA: Umzimvubu RWSS

The gap analysis for the 14 regional schemes is discussed under this section.

7.1.1 KSD001 WSIA: MTHATHA REGIONAL BULK WATER SUPPLY

The Mthatha Regional WSS is composed of three water schemes namely Mthatha Town Water Supply Scheme, Mhlahlane WSS and Corana Regional Scheme. These schemes combined supply water to the Town of Mthatha and surrounding villages. The details of the schemes are summarised in the table below.

Table 7.1: Mthatha Regional Scheme Summary

Scheme Name	Source	Dam Capacity (Million m ³)	Dam Yield (Mm ³ /a)	WTP Name	Capacity (Mℓ/d)
Mthatha Town WSS	Mthatha Dam	253,7	145,5	Thornhill WTP	60
				Rosedale WTP	3
Mhlahlane WSS	Mabeleni Dam		1,7	Mhlahlane WTP	1,7
Corana Regional Scheme	Corana Dam		0,336	Corana WTP	0,95
Other Schemes	Boreholes				
Total		253,7	147,536		65,65

The allocation of supply to Mthatha Town from the Mthatha Dam is 21,9 million m³ per annum. However, the registered abstraction given in the WARMS database is 13,5 million m³ per annum. and the balance of the water is allocated to Eskom for hydro-power generation.

OR Tambo DM has planned projects to upgrade the capacity of the Mthatha Regional WSS as follows:

- Upgrade of Thornhill WTP by a total of 20Mℓ/day from 60Mℓ/d to 80Mℓ/day. The upgrade is currently under implementation;
- Upgrade of Rosedale WTP from 3Mℓ/d to 25Mℓ/d in order to supply Greater Mthatha areas north of Mthatha River, Libode, Nqadu and Ngqeleni Corridors. Bulk infrastructure extensions from the WTP to Libode is under construction;
- Upgrade of gravity raw water bulk pipeline from 600mm diameter to 1 200mm diameter; and
- Extension of Rosedale water supply footprint through phased construction of bulk and reticulation supply pipelines and command reservoirs. Phase 1 of this project is currently under implementation.

The planned works of which some are currently under implementation have been combined with existing capacities so that a comparison may be made with the projected demand for 2035. This comparison is provided in the table below.

Table 7.2: Mthatha Regional Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2035	Additional Requirements
Dam Yield (Mm ³ /a)	145,5	-	145,5	33,94	-
Water Treatment (Mℓ/d)	65,65	88,5	154,215	93,0	-
Storage (Mℓ)	83,6	24	107,6	118,7	12,0
Bulk conveyance - Raw Water (Mℓ/d)	90,3	58,6	148,9	93,0	-
Bulk conveyance - Clear Water (Mℓ/d)	72,8	47,0	119,8	93,0	-

According to the Reconciliation Strategy for Mthatha and Surrounding Village Structure Report dated June 2011, 21,9 million m³ per annum of water in Mthatha Dam is allocated to Mthatha Town for domestic and industrial use with the registered abstraction given in the WARMS database as 13,5 million m³ per annum. The actual allocations of water for consumption and hydro power generation need to be confirmed between DWS, Eskom and OR Tambo District Municipality for the projected future 2035 demand.

Based on the capacities of existing and planned infrastructure, there appears to be no gaps in water supply requirements for the projected 2035 demand. The shortfall in bulk storage could be as a result of inaccurate information of the total storage available in the scheme area.

7.1.2 KSD002 WSIA: MTHATHA REGIONAL BOREHOLE DEVELOPMENT

The area covered by this scheme is ward 17 under King Sabata Dalindyebo LM. The area is sparsely populated and OR Tambo plans to develop boreholes as a source of water supply. There is

no information on the status of existing infrastructure if any. However, the projected 2035 demand requirements are detailed in the table below.

Table 7.3: Mthatha Regional Borehole Development

Criteria	Existing Capacity	Planned Additional	Total	Desired 2035	Additional Requirements
Borehole Yields (Mm ³ /a)	No data	No data	No data	0,450	-
Water Treatment (Mℓ/d)	No data	No data	No data	1,2	-
Storage (Mℓ)	No data	No data	No data	2,0	-
Bulk conveyance - Raw Water (Mℓ/d)	No data	No data	No data	1,2	-
Bulk conveyance - Clear Water (Mℓ/d)	No data	No data	No data	1,2	-

In the absence of planning information from ORTDM, geo-hydrological studies would be required to determine groundwater availability and quality thereof to enable proper infrastructure requirements determination.

7.1.3 KSD003 WSIA: MQANDULI CORRIDOR DEVELOPMENT

In terms of ORTDM planning, the Mqanduli Corridor would ultimately receive its potable water supply from the Zamukulungisa reservoir (Mthatha RWSS) where it is envisaged that 27Mℓ/d will be pumped to the 20Mℓ Viedgesville reservoir. The Viedgesville reservoir will feed the Mqanduli corridor as well as 5Mℓ/day to the 10Mℓ Qweqwe reservoir. The remaining 22Mℓ is the daily supply that shall be used to feed the Mqanduli Corridor.

The Mqanduli Corridor Development covers water supply to wards 21, 22, 23, 27 and parts of 20 and 28 under the King Sabata Dalindyebo Local Municipality. The projected 2035 demand requirements are detailed within Table 7.4: Mqanduli Corridor Development below.

Table 7.4: Mqanduli Corridor Development

Criteria	Existing Capacity	Planned Additional	Total	Desired 2035	Additional Requirements
Borehole Yields (Mm ³ /a)	No data	No data	No data	4,33	-
Water Treatment (Mℓ/d)	60	20	80	11,9	-
Storage (Mℓ)	1,22	14,75	15,97	17,6	2,03
*Bulk conveyance - Raw Water (Mℓ/d)	-	-	-	-	-
Bulk conveyance - Clear Water (Mℓ/d)	0,35	20,4	20,75	11,9	-

This water treatment capacity has already been factored into the planned upgrade of the Thornhill WTP which is currently being upgraded to 80Mℓ/d and ultimately to 120Mℓ/day. *The bulk raw water requirements have also been factored into the upgrade works of the 600mm diameter raw water AC pipeline to 1 200mm diameter.

Based on the capacities of existing and planned infrastructure, there appears to be no gaps in water supply requirements for the projected 2035 demand.

7.1.4 KSD004 WSIA: LUKWETHU WATER SUPPLY

The Lukwethu WSS supplies water to Wards 18, 19, 26, 28, 29, 31, 32 & 35 under the King Sabata Dalindyebo Local Municipality covering a total of 249 villages. The source of water for the Lukwethu WSS comprises of protected and unprotected springs and 3 boreholes.

According to the Scoping Report for Study Funding Application for the Proposed Lukwethu Regional Water Supply Scheme dated February 2015, a 20Mℓ storage reservoir, positioned around Viedgesville Area, will receive potable water from Thornhill WTP. The construction of the 20Mℓ storage tank is implemented as part of the bulk water infrastructure Presidential Intervention in the Mqanduli Corridor.

This project is currently at feasibility study stage with a consultant having been appointed to undertake the required works. The gap analysis could thus be summarized as follows:

Table 7.5: Lukwethu Regional Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2035	Additional Requirements
Mthatha Dam Yield (Mm ³ /a)	145,5	-	145,5	5,31	-
Water Treatment (Mℓ/d)	2,7	12,3	15,0	14,6	-
Storage (Mℓ)	5,1	20,0	25,1	28,9	4,0
Bulk conveyance - Raw Water (Mℓ/d)	-	-	-	-	-
Bulk conveyance - Clear Water (Mℓ/d)	-	14,6	14,6	14,6	-

The 20Mℓ storage reservoir proposed being the source of water would not able to store the desired 2035 water requirement of 28,9Mℓ/day for the Lukwethu RWSS .

7.1.5 KSD005 WSIA: COFFEE BAY REGIONAL WATER SUPPLY

The Coffee Bay Regional WSS supplies water to Wards 24 and 25 of the King Sabata Dalindyebo Local Municipality, made up of Coffee Bay Town and surrounding 40 villages. The Coffee Bay RWSS comprises of the following infrastructure:

- A raw water intake works and rising pipeline from the Mthatha River. The yield of the river has not been established;
- A 2.7Mℓ/day Water Treatment Plant;
- A clear water pump station and rising main to 1Mℓ Xonyeni Command Reservoir; and
- Village Reticulation.

The planned works, some of which are currently under implementation have been combined with existing capacities so that a comparison may be made with the projected 2035 demand. This comparison is provided in Table 7.6: Coffee Bay Regional Scheme Gap Analysis overleaf.

Table 7.6: Coffee Bay Regional Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2035	Additional Requirements
Mthatha River Yield (Mm ³ /a)	-	-	-	2,12	-
Water Treatment (Mℓ/d)	2,7	12,3	15,0	5,8	-
Storage (Mℓ)	5,1	13,15	18,25	11,4	-
Bulk conveyance - Raw Water (Mℓ/d)	-	12,3	12,3	5,8	-
Bulk conveyance - Clear Water (Mℓ/d)	-	12,3	12,3	5,8	-

The registered abstraction from the Mthatha River downstream of the Mthatha Dam is 2,7Mℓ/d (1,0 million m³ per annum). The yield of the Mthatha River towards the Indian Ocean needs to be verified to assess the sustainability of the scheme with a treatment capacity of 2,12Mm³ per annum. However, based on the capacities of existing and planned infrastructure, there appears to be no gaps in water supply requirements for the projected 2035 demand.

7.1.6 NYA001 WSIA: SECOND FALLS RWSS

The Second Falls RWSS is intended to supply communities in Wards 22, 23, 24, 25, 26 and 28 under the Nyandeni Local Municipality. The communities currently obtain water from springs, boreholes and rivers. ORTDM is planning to provide infrastructure to supply the communities under the Second Falls RWSS footprint. The planned infrastructure capacity is compared with the projected 2035 demand. This comparison is provided in Table 7.7: Second Falls RWSS Gap Analysis below.

Table 7.7: Second Falls RWSS Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2035	Additional Requirements
Mthatha River Yield (Mm ³ /a)	-	-	-	3,01	-
Water Treatment (Mℓ/d)	0	-	-	8,2	8,2
Storage (Mℓ)	0	19,9	19,9	12,5	-
Bulk conveyance - Raw Water (Mℓ/d)	0	8,20	8,20	8,20	-
Bulk conveyance - Clear Water (Mℓ/d)	0	8,20	8,20	8,20	-

The raw water source is the Second Falls site on the Mthatha River downstream of Mthatha Dam. The yield of the Mthatha Dam is 145,5 million m³/a with an allocation of 13,5 million m³ per annum allocated for domestic usage in Mthatha Town and surrounding villages. It is anticipated that the Second Falls RWSS demand of 3,01 million m³ per annum can easily be met downstream of the second falls where Eskom undertakes hydro power generation (Eskom allocation being 132 million m³ per annum).

7.1.7 NYA002 WSIA: TOMBO RWSS

The Tombo RWSS supplies water to Wards 2, 4 and 5 under the Port St Johns LM. The 2,5Mℓ Tombo WTP feeds from 1 command reservoir to 23 village reservoirs through bulk pipelines. However, the Census 2011 data specifies the area covered by the scheme as having adequate formal access to water services. The projected 2035 demand infrastructure requirements are provided in the table below.

Table 7.8: Tombo RWSS Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2035	Additional Requirements
River Yield (Mm ³ /a)	No Data	No Data	No Data	1,51	-
Water Treatment (Mℓ/d)	2,5	-	2,5	4,1	1,6
Storage (Mℓ)	No Data	No Data	No Data	8,0	-
Bulk conveyance - Raw Water (Mℓ/d)	No Data	No Data	No Data	4,1	-
Bulk conveyance - Clear Water (Mℓ/d)	No Data	No Data	No Data	4,1	-

In order to meet the 2035 demand of 4,1Mℓ per day, the existing infrastructure needs to be augmented and it is proposed to increase the capacity of the WTP to 4,1Mℓ/day.

7.1.8 NYA003 WSIA: NGQELENI RWSS

The scheme area covers the southern part of the Nyandeni LM extending from Libode up to the coast. The areas are predominantly rural with one main service centre namely the Ngqeleni Town. The Ngqeleni RWSS comprises of the following water schemes and infrastructure capacities:

Table 7.9: Ngqeleni RWSS Summary

Scheme Name	Source	Dam Capacity (Million m ³)	Dam Yield (Mm ³ per annum)	WTP Name	Capacity (Mm ³ per annum)
Ngqeleni Town WSS	Nzwakwazi Dam		0,103	Ngqeleni WTP	0,197
	Ngqeleni Weir		0,023		
	boreholes		0,038		
Ngqeleni Rural WSS	Mtyu River Dam		0,831	Lutsheko WTP	No data
	Mtakatye River				
Totals			0,995		0,197

The planned infrastructure capacity combined with the existing is compared with the projected 2035 demand. This comparison is provided within Table 7.10: Ngqeleni RWSS Gap Analysis overleaf.

Table 7.10: Ngqeleni RWSS Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2035	Additional Requirements
Nzwakwazi Dam, Ngqeleni Weir & boreholes (Mm ³ /a)	0,164		0,164	3,16	2,996
Water Treatment (Mℓ/d)	0,540		0,540	8,7	8,16
Storage (Mℓ)	0,29		0,29	16,8	16,51
Bulk conveyance - Raw Water (Mℓ/d)	0,98		0,98	8,7	7,72
Bulk conveyance - Clear Water (Mℓ/d)	0,81		0,81	8,7	7,89

From the table above, it is noted that the existing infrastructure does not have adequate capacity to meet the 2035 demand. Of particular importance is the availability of raw water supplies, which are inadequate at present. ORTDM is undertaking feasibility studies into the supply of the Ngqeleni Water Scheme from the Mthatha Dam. This could be achieved through the extension of the Mthatha Regional Bulk Water Supply Scheme with potable water supplied from the Rosedale WTP or from the Second Falls abstraction on the Mthatha River.

7.1.9 NYA004 WSIA: CIBENI-NTLAMBENI RWSS

The Cibeni/Ntlambela Regional Water Supply Scheme currently supplies water to 8 wards within the Port St Johns Local Municipality and 6 wards within the Nyandeni Local Municipality. These two local municipalities fall under the jurisdiction of the OR Tambo District Municipality. According to the Project Technical Report dated August 2014 and prepared by IQhawe Consulting Engineers (Pty) Ltd, the proposed scheme would be extended to provide water to a total of fourteen wards, namely, wards 1, 2, 3, 4, 7, 8, 9 and 16 of the Port St Johns Local Municipality and wards 2, 6, 17, 18, 19 and 20 of the Nyandeni Local Municipality.

The project area is located in the Wild Coast region of the Eastern Cape, and is situated approximately 26km north-east Libode, towards Port St Johns. Only a few of the villages within the scheme area have some form of access to water supply infrastructure. The existing schemes do not meet the basic level of service required of rural water supply schemes and most of the communal standpipes are located far from many of the households, and supply is erratic, with some villages only receiving water for three or four days in three months.

The source of water for the schemes is low-yield boreholes and unreliable springs. Most of the schemes have, as a result collapsed with some boreholes having dried up.

There is an existing Water Treatment Plant, the Mngazana Water Treatment Plant, that supplies four (4) villages in ward 6 of Nyandeni LM. The capacity of the Plant is unknown. There are also a few service reservoirs most of which are undersized and are located in positions where they cannot provide sufficient pressure throughout the system.

ORTDM has planned upgrade works for the scheme which include the following infrastructure:

- Abstraction and Water Treatment Plant on the banks of Umzimvubu River;
- A 11Mℓ command reservoir;

- A total of 610km of bulk pipelines ranging from 50mm to 500mm diameter ;
- A number of service reservoirs with a total combined capacity of 7,4Mℓ; and
- Reticulation pipelines and standpipes.

The planned infrastructure capacity is compared with the projected 2035 demand. This comparison is provided in Table 7.11: Cibeni-Ntlambeni Regional Scheme Gap Analysis below.

Table 7.11: Cibeni-Ntlambeni Regional Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2035	Additional Requirements
Umzimvubu River Yield (Mm ³ /a)	*2 987			4,98	-
*Water Treatment (Mℓ/d)	No data	*11,0	*11,0	13,7	2,7
Storage (Mℓ)	No data	18,4	18,4	27,4	9,0
Bulk conveyance - Raw Water (Mℓ/d)	No data	*11,0	11,0	13,7	2,7
Bulk conveyance - Clear Water (Mℓ/d)	No data	*11,0	11,0	13,7	2,7

*The yield of the Umzimvubu River is quoted from the Nqeleni Water Scheme Reconciliation Strategy Report. The waterworks is assumed to be 11Mℓ/d based on the proposed size of the command reservoir. Based on the aforementioned, there appears to be a shortfall in water supply requirements for the projected 2035 demand when compared with the ORTDM planned infrastructure.

7.1.10 NQH001 WSIA: NGQUSHWA HILL RBWSS

The Ngqushwa Hill RBWSS is made up of the following water schemes:

Table 7.12: Ngquza Hill RWSS Summary

Scheme Name	Source	Dam Capacity (Million m ³)	Dam Yield (Mm ³ per annum)	WTP Name	Capacity (Mℓ/d)
KwaNyathi RWSS	Nxuzi Dam	No data	No data	No data	No data
Lusikisiki RWSS	Xura River Weir		0,929	Lusikisiki WTP	2,76
	boreholes		0,091		
Flagstaff RWSS	boreholes		0,0000106		
	Weir		0,00001166		
Totals			1,0200223		2,7

The planned infrastructure capacity combined with the existing is compared with the projected 2035 demand. This comparison is provided in Table 7.13: Ngquza Hill RWSS Gap Analysis overleaf.

Table 7.13: Ngquza Hill RWSS Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2035	Additional Requirements
Nxuzi Dam, Xura River Weir & boreholes (Mm ³ /a)	1,020		1,020	17,10	16,08
Water Treatment (Mℓ/d)	2,76		2,76	46,8	44,04
Storage (Mℓ)	2,4		2,4	68,7	66,3
Bulk conveyance - Raw Water (Mℓ/d)	2,76		2,76	46,8	44,04
Bulk conveyance - Clear Water (Mℓ/d)	2,76		2,76	46,8	44,04

The ORTDM is planning the implementation of the KwaNyathi RWSS that would mitigate against the shortfall in infrastructure capacities. The scheme includes the construction of a new dam on the Nxuzi River just before it confluences with the Umzintlava River close to Tabankulu Town.

7.1.11 NQH002 WSIA: MSIKABA BRWSS

The area covered by the Msikaba RBWSS is sparsely populated with very little habitation on the north east and western sides. These are the areas around Mkhambathi, Port Grosvenor in the east and Cutwini Village towards the southern end falling under wards 22, 23, 24, 25 and 28 of the Ngquswa Hill Local Municipality. The communities in the area obtain water supplies from springs and boreholes that are not reliable. There is one scheme under ward 20, the Magwa Tea Estate Water Scheme that supplies water to the tea estate and approximately 5 000 people in the area. The source of water for the scheme is a small dam on the Mkozi River. There is no detailed information on the yield of the dam and the capacities of existing infrastructure.

The projected 2035 demand for the scheme area is provided in Table 7.14: Msikaba RWSS Gap Analysis below.

Table 7.14: Msikaba RWSS Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2035	Additional Requirements
Mkozi River Dam, (Mm ³ /a)	No data	No data	No data	3,4	3,4
Water Treatment (Mℓ/d)	No data	No data	No data	9,3	9,3
Storage (Mℓ)	No data	No data	No data	14,2	14,2
Bulk conveyance - Raw Water (Mℓ/d)	No data	No data	No data	9,3	9,3
Bulk conveyance - Clear Water (Mℓ/d)	No data	No data	No data	9,3	9,3

On the basis of the table above, it may be concluded that the Msikaba RWSS requires further investigations. OR Tambo DM is planning to roll out the Msikaba Regional Scheme to address the gaps as identified above. The proposed source of water will be the Msikaba River.

7.1.12 PSJ001 WSIA: PORT ST JOHNS RBWSS

The area served by this scheme is located to the west of the Umzimvubu River, to the south of the Mthatha - to Port St Johns Road (R61) and to the east of the watershed between the Mngazi and Mngazanana rivers. The capacities of the infrastructure constituting the Port St Johns Water Scheme are compared with the projected 2035 demand. This comparison is provided in Table 7.15: Port St Johns RBWSS Scheme Gap Analysis below.

Table 7.15: Port St Johns RBWSS Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2035	Additional Requirements
Mngazi River (Mm ³ /a)	No data	No data	No data	1,24	1,24
Water Treatment (Mℓ/d)	2,0	-	2,0	3,4	1,4
Storage (Mℓ)	0,34	-	No data	6,80	4,86
Bulk conveyance - Raw Water (Mℓ/d)	2,0	-	2,0	3,4	1,4
Bulk conveyance - Clear Water (Mℓ/d)	2,0	-	2,0	3,4	1,4

The yield of the Mngazi River needs to be established through a detailed hydrological study of the river to determine the possibility of increasing the draw off from the river.

7.1.13 PSJ002 WSIA: PORT ST JOHNS TOWN SUPPLY

The water scheme supplies the Town of Port St Johns and surrounding villages. Raw water is supplied from the Bulolo River where a dam and a weir are sources for the town. The raw water is pumped to a 4Mℓ/day Water Treatment Plant after which it gravitates to the Port St Johns Town. The capacities of the infrastructure constituting the Port St Johns Town Water Scheme are compared with the projected 2035 demand. This comparison is provided in Table 7.16: Port St Johns Town Scheme Gap Analysis below.

Table 7.16: Port St Johns Town Scheme Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2035	Additional Requirements
Bulolo Dam Yield (Mm ³ /a)	0,360	-	0,360	0,64	0,28
Water Treatment (Mℓ/d)	4,0	-	4,0	1,8	-
Storage (Mℓ)	No data	-	No data	1,9	-
Bulk conveyance - Raw Water (Mℓ/d)	5,1	-	5,1	1,8	-
Bulk conveyance - Clear Water (Mℓ/d)	4,1	-	4,1	1,8	-

OR Tambo DM is planning to develop additional off channel storage to increase the availability of raw water resources for the scheme. The bulk main into town leaks and requires remedial works, whilst the Bulolo Dams require riprap and other minor remedial works. The yield of the river is 0,360 million m³ per annum and does not meet the projected 2035 water requirements. A water transfer from the nearby Umzimvubu River to Bulolo Dam could be considered.

7.1.14 MHLO001 WSIA: UMZIMVUBU RWSS

The area served by this scheme includes municipal wards in Mhlontlo, Umzimvubu and Elundini Municipalities under ORTDM, ANDM and Joe Gqabi DM respectively. The projected 2035 demand requirements are provided in Table 7.17: Umzimvubu RWSS Gap Analysis below.

Table 7.17: Umzimvubu RWSS Gap Analysis

Criteria	Existing Capacity	Planned Additional	Total	Desired 2035	Additional Requirements
Ntabelanga Dam Yield(Mm ³ per annum)	-	*60Mm ³	*60Mm ³	13,45	-
Water Treatment (Ml/d)	No data	No data	No data	36,8	-
Storage (Ml)	No data	No data	No data	51,0	-
Bulk conveyance - Raw Water (Ml/d)	No data	No data	No data	36,8	-
Bulk conveyance - Clear Water (Ml/d)	No data	No data	No data	36,8	-

The Tsitsa River system would be utilised for a multi-purpose use due to the high water resources availability in the catchment. The consumptive uses could sustainably include potable water supply, irrigation and hydropower. *According to ORTDM planning, the proposed Ntabelanga Dam on the Tsitsa River could supply the projected 2050 potable and irrigation water requirement of 60,2 million m³ per annum at a 98% assurance of supply from a relatively small impoundment of 60,0 million m³ (0,15 MAR).

7.2 SCHEME RE-DEMARCATON

As previously stated, the ORTDM has embarked on the development of substantial regional water supply development plans to address their water supply need. Some areas were still excluded but through this process, wall-to-wall supply areas were determined by the most sustainable water resource and the extent of these water supply intervention areas (WSIAs) were not limited in all instances to Local Municipal Boundaries. Dam developments were proposed in some areas with specific reference to the Ntabelanga Dam that would supply water beyond ORTDM's area of jurisdiction. Existing scheme infrastructure would be augmented or upgraded where possible to accommodate the increased supply volumes. All the existing proposed interventions were consolidated into the proposed water supply intervention areas. The proposed intervention areas will also fall within the ORTDM'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 ORTDM – considering existing use and future supplies and water sources, per scheme area. It must be noted that the water supply intervention areas (WSIAs) were demarcated based on all the existing planning initiatives that are currently underway within the ORTDM. 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 developments.

8.2 KSD001 WSIA: MTHATHA REGIONAL BULK WATER SUPPLY

8.2.1 DEMAND MODEL INTERVENTION

8.2.1.1 Water Demand and Projections

The KSD001 WSIA includes the development of the Mthatha town and surrounds by constructing a new system of bulk supply rising and gravity mains and reservoirs to transfer the increased volume of water from the Mthatha dam. The water would be pumped out of the upgraded Thornhill and Rosedale Water Treatment Plant. According to ORTDM planning records, the bulk supply scheme components were designed and sized to meet the projected water demand for the period up to 2035, a 20-year design horizon. The resultant projected 2035 demand is 93Mℓ/d (33,94 million m³ per annum).

8.2.1.2 Water Resource Consideration

The Mthatha Dam will be used as a sole source of raw water supply to the treatment Plant. This dam has a capacity of 253,7 million m³ and a yield of 145,5 million m³ per annum. The current Water Use Licence (WUL) dated April 2011 allows OR Tambo DM to abstract 55 080 000m³ per annum (equivalent to 150Mℓ/d) for both Thornhill and Rosedale WTPs. This allocation covers the combined upgraded capacity of Thornhill WTP 80Mℓ/Day and Phase 2 of Rosedale WTP (50Mℓ/Day). The abstraction is adequate to meet the 2035 demand projections for the Mthatha RWSS. The allocations for the water use in the Mthatha Dam is summarised in the table below.

Table 8.1: Allocation of Mthatha Dam Raw Water Yield

Year	Allocation For Provision Of Potable Water		Allocation For Hydro Power		TOTAL
	Mm ³ per annum	Mℓ/day	Mm ³ per annum	Mℓ/day	Mm ³ per annum
Current	55,08	151	90,42	248	145,5
2033	55,08	151	90,42	248	145,5
Ultimate	80,3	220	65,2	179	145,5

8.2.1.3 Water Supply Infrastructure

The water supply infrastructure proposed includes the following:

- Upgrade of the Rosedale WTP from 30Mℓ/d to 50Mℓ/d;

- Additional storage of 36Ml;
- 21km of primary bulk pipelines;
- 7km of secondary bulk pipelines; and
- 159km of tertiary pipelines.

8.2.1.4 Financial Implication

The bulk cost requirement for KSD001 WSIA is tabled below.

Table 8.2: KSD001 Cost Requirement

(Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Additional Costs	TOTAL
	(Construction)	(Fees, Geotech & survey)	(EIA, ISD, Contingencies etc)	
Primary Bulk	R 640 830 316	R 100 572 504	R 403 723 099	R 1 145 125 919
Secondary Bulk	R 70 683 235	R 9 584 651	R 44 530 438	R 124 798 323
Tertiary Bulk	R 320 990 603	R 92 014 524	R 204 224 080	R 617 229 207
Total	R 1 032 504 154	R 202 171 679	R 652 477 617	R 1 887 153 450

The scheme development cost per household is R 19 078. 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 KSD001 WSIA includes the development of the Mthatha town and surrounds by constructing a new system of bulk supply rising and gravity mains and reservoirs to transfer the increased volume of water from the Mthatha dam. The water would be pumped out of the upgraded Thornhill and Rosedale Water Treatment Plant. According to ORTDM planning records, the bulk supply scheme components were designed and sized to meet the projected water demand for the period up to 2033, a 20 year design horizon. The annual population growth factor used was 1,5%. The projected water demands have been based on the following assumptions:

- 6 persons per household;
- A typical AADD of 220l/c/d for towns, 100l/c/d for small town communities & 125l/c/d for Libode town communities, 90l/c/d for peri-urban communities and 60l/c/d for rural communities;
- 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.

The projected demand as per ORTDM planning is tabled overleaf.

Table 8.3: Projected Demand as Per ORTDM Planning

Rural/Urban	Summer Peak Demand (Mℓ/d)				
	2011	2013	2023	2033	2038
Airport Corridor @ 125 AADD			6,1	7	7,6
Ngqeleni Main Corridor @ 100 AADD			0,2	0,2	0,3
Ngqeleni Corridor Surrounds @ 90 AADD			2,3	2,7	2,9
Rural Ngqeleni Corridor @ 60 AADD			4,1	4,8	5,2
Nqadu Main Corridor @ 100 AADD			0	0	0
Nqadu Corridor Surrounds @ 90 AADD			0,9	1,1	1,2
Rural Nqadu Corridor @ 60 AADD			1,7	2	2,1
Libode Main Corridor @ 125 AADD			0,9	1	1,1
Libode Corridor Surrounds @ 90 AADD			5,4	6,2	6,7
Rural Libode Corridor @ 60 AADD			3,3	3,8	4,1
Mthatha BNG central			16	19	20
Mthatha Existing	31	32	37	43	46
Mthatha Peri Urban	13,5	14	16,2	18,8	20,2
Mthatha Informal Settlement	6,5	6,7	7,7	9	10
Commercial / Institutional	6	6,2	7,2	8,3	9
Strategic Links (airport, hosp, military)			1,3	1,6	1,9
Total (Summer Peak Mℓ/d)	57	58,9	110,3	128,5	138,3
75% of rural population served by 2033					

8.2.2.2 Water Resource Consideration

The Mthatha Dam will be used as a sole source of raw water supply to the treatment Plant. This dam has a capacity of 253,7 million m³ and a yield of 145,5 million m³ per annum. The current Water Use Licence (WUL) dated April 2011 allows OR Tambo DM to abstract 55 080 000m³ per annum (equivalent to 150Mℓ/d) for both Thornhill and Rosedale. This allocation covers the combined upgraded capacity of Thornhill WTP 80Mℓ/d and Phase 2 of Rosedale WTP (50Mℓ/d).

While the current Water Use Licence covers the Rosedale Phase 2 requirements, it will need adjustment in the long term for subsequent phases.

Table 8.4: Allocation of Mthatha Dam Raw Water Yield

Year	Allocation For Provision Of Potable Water		Allocation For Hydro Power		TOTAL
	M m ³ per annum	Mℓ/d	M m ³ per annum	Mℓ/d	M m ³ per annum
Current	55,08	151	90,42	248	145,5
2033	55,08	151	90,42	248	145,5
Ultimate	80,3	220	65,2	179	145,5

8.2.2.4 Water Supply Infrastructure

8.2.2.4.1 Thornhill Water Treatment Plant (WTP)

Thornhill WTP has a number of regional reservoirs near its supply area. The current water supply from the Thornhill Water Treatment Plant is delivered in two directions, Fortgale to other regional reservoirs, and Ncambedlana (Northcrest) to other regional reservoirs. The raw water conveyance from the Mthatha Dam into Thornhill Water Treatment Plant is currently being upgraded to 120Mℓ/day. The new arrangement for the conveyance of water to the Thornhill WTP comprises:

- Refurbishing the emergency booster pump station; and
- Two new 800mm steel pipes in parallel for approximately 2/3 of the distance to the waterworks. These pipes are laid parallel to the existing 800mm diameter and 600mm diameter pipelines (to replace the two old pipelines which are to be decommissioned). A new 1 200mm steel pipe will be joined to the above two 800mm pipes for the remainder of the distance to the waterworks;
- Upgrade of the Thornhill Water Treatment Plant from 60Mℓ/d to 80Mℓ/d is the first phase, which is currently under construction and the second phase is an upgrade by 40Mℓ/d to 120Mℓ/d;
- Rehabilitation and upgrade of the existing raw water pipeline through the construction of a new DN1200 raw water steel pipe;
- Refurbishment of the existing DN800 steel pipe and the existing raw water pump station; and
- Construction of new 2No x DN800 raw water steel pipes.

8.2.2.4.2 Rosedale Water Treatment Plant

The Rosedale Water Treatment Plant would be designed for an ultimate treated water delivery capacity of 100Mℓ/d but constructed in 4 x 25Mℓ/d phases. The proposed infrastructure components are as follows:

- A new raw water pump station building, associated pumping and electrical control equipment next to the existing Thornhill WTP raw water pump station;
- A 2,2km 600mm diameter steel raw water rising main from the abovementioned pump station to the Rosedale WTP;
- Phase 1 of the proposed Rosedale WTP (50Mℓ/d) and all associated raw and clear water balancing reservoirs;
- A clear water pump station to the Rosedale Command Reservoir and Soyini Reservoir;
- A 1,7km 600mm diameter steel clear water Rising Main from the clear water pump station at the Rosedale WTP to the Rosedale Command Reservoir;
- A new dedicated 11kV overhead powerline from the Thornhill Substation to the Rosedale WTP via the current and future raw water pump stations. It would be sized for the ultimate power requirements; namely:
 - Thornhill & Rosedale raw water pump stations supplied directly from Mthatha Dam: 1MVA

- Future Rosedale (Phases 2 to 4) raw water pump station drawing from the dam spillway channel: 4MVA
- Rosedale WTP (ultimate 100Mℓ/d) and clear water pump stations: 6MVA

The WTP will ultimately supply all the existing Greater Mthatha areas to the North of the Mthatha River and also the Libode, Nqadu and Ngqeleni Corridors.

8.2.2.4.3 Nqadu Corridor

The Nqadu Corridor's water would be supplied from the proposed 50Mℓ/d Rosedale waterworks and would require the construction of the following infrastructure components

- Two(2) new 300mm diameter pipelines from Rosedale reservoir to Soyini and to Gungululu and a 200mm diameter pipe to Nqadu; and
- A 2Mℓ reservoir at Soyini, a Nqadu Corridor 1Mℓ reservoir at Gungululu and a 3Mℓ reservoir at Nqadu.

The pipes of the Nqadu Corridor range from 63mm HDPE pipes to 160 diameter mPVC pipes with a total length of approximately 20 750m. A total of four (4) reservoirs is proposed, 2 x 500kℓ , 1 x 250kℓ and 1 x 200kℓ reservoir.

8.2.2.4.4 Airport Corridor

The 400mm GRP bulk supply gravity main from Signal Hill to Fairfield Reservoir provides the 'backbone' for the Airport Corridor. It has been designed for a Year 2033 flow of 10Mℓ/d. The bulk pipelines proposed for the area are as follows:

- 3,8km of 900mm diameter rising main from Thornhill Water Treatment Plant to Signal Hill Reservoir;
- 2,4km of 250mm and 2,0km of 200mm diameter gravity mains from Maydene Reservoir to BNG Area 5;
- 4,3km of 400mm diameter gravity main from Signal Hill Reservoir to an offtake to BNG Area 1;
- 5,8km of 400mm diameter gravity main from BNG Area 1 to Fairfield Reservoir;
- 1,9km of 400mm diameter then 3,7km of 300mm diameter gravity main from Fairfield Reservoir to Kaplan village;
- 2,4km and 1,9km of 250mm diameter offtakes from Kaplan gravity main to Sheshegu village and Link Reservoir;
- 1,3km of 300mm diameter connection to KD Matanzima Airport off the Signal Hill to Fairfield main;
- 2,0km of 200mm diameter connection to 14SAI Military Base off the Signal Hill to Fairfield main;
- 3,9km of 300mm diameter gravity main from Signal Hill to a future reservoir in BNG Area 6;
- 3,0km of 300mm diameter gravity main from Zamukulungisa reservoir to BNG Area 7;
- 1,0km of 200mm diameter gravity main from Vulindlela Heights to BNG Area 8;
- 1,4km of 200mm diameter gravity main from Zimbane Reservoir to BNG Area 8; and

- 3,0km of 300mm diameter gravity main from Zamukulungisa reservoir to BNG Area 7.

8.2.2.4.5 Libode Corridor

The Libode towns and surrounding villages would receive their water from the proposed upgraded Rosedale WTP and depend on the completion of the following proposed main bulk infrastructure components:

- Constructing a new 50Mℓ/d waterworks (Rosedale);
- Construction of a 400mm diameter line to Lalini;
- Construction of a 1Mℓ exchange reservoir and pump station at Lalini;
- Construction of a 400mm diameter rising mains to 10Mℓ Misty Mount Reservoir;
- Construction of 300mm GRP gravity mains to 10Mℓ Megacon reservoir and 300mm GRP to 1Mℓ Mandlovini reservoir; and
- Construction of 200mm GRP gravity main to 1Mℓ Enjiveni reservoir; and Construction of Misty Mount, Megacon, Mandlovini and Enjiveni reservoirs.

The proposed rising mains and proposed gravity mains would be sized as follows:

- 13,8km of 300mm diameter
- 14km of 250mm diameter
- 11km of 200mm diameter

The storage is sized for a 48hr AADD (Pumped storage requirements). The reservoir specifications are as follows: 1 x 3Mℓ, 4 x 1Mℓ, 3 x 500kℓ, 2 x 200kℓ and 1 x100kℓ

8.2.2.5 Financial Implication

The bulk cost requirement for KSD001 WSIA is tabled below.

Table 8.5: KSD001 Cost Requirement

Item (Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Total
	(Construction)	(Fees, Geotech, EIA, Disb Etc)	(Inc Contingencies, Escalation, VAT)
Thornhill WTP & Raw Water Pipeline	R 192 524 112.00	R 30 803 858.00	R 223 327 970.00
Rosedale WTP & Abstraction & Raw Pipeline	R 387 023 616.00	R 61 923 779.00	R 448 947 395.00
Thornhill Pumpstation, Signal Hill Pipeline & Reservoir	R 164 873 209.00	R 26 379 713.00	R 191 252 922.00
Primary Bulk	R 744 420 937.00	R 119 107 350.00	R 863 528 287.00
Mthatha Central Bngs & Pipe Refurbishment	R 97 454 564.00	R 15 592 730.00	R 113 047 294.00
Airport Corridor & Assoc Outer Bngs	R 237 872 390.00	R 38 059 582.00	R 275 931 973.00
Libode Corridor	R 278 250 516.00	R 44 520 083.00	R 322 770 599.00
Nqadu Corridor	R 77 281 056.00	R 12 364 969.00	R 89 646 025.00

Item (Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Total
	(Construction)	(Fees, Geotech, EIA, Disb Etc)	(Inc Contingencies, Escalation, VAT)
Secondary Bulk	R 690 858 526.00	R 110 537 364.00	R 801 395 891.00
Total			R 1 664 924 178.00

The scheme development cost per household is R 16 832. Due to the size of the project, it will take at least seven years to complete.

8.3 KSD002 WSIA: MTHATHA REGIONAL BOREHOLE DEVELOPMENT

8.3.1 DEMAND MODEL INTERVENTION

8.3.1.1 Water Demand

The KSD002 WSIA project will investigate the groundwater potential within five (5) wards to the west of King Sabata Dalindyebo, i.e. Wards 17,18,21, 22, and 27. This project is currently still in a planning phase. The estimated 2035 demand projections for the project footprint are 0,35Mm³ per annum (0.95Mℓ/d).

8.3.1.2 Water Resource Consideration

The sparse population nature of the villages in the area makes ground water supply the most ideal source of water for the community. The ORTDM is planning a borehole development project for the area.

8.3.1.3 Water Supply Infrastructure

The envisaged infrastructure for the project includes inter alia the following:

- Boreholes equipped with motorised borehole pumps;
- Localised command reservoirs;
- Bulk and reticulation pipelines; and
- Water to be accessed from standpipes.

8.3.1.4 Financial Requirements

The cost estimate for the Mthatha Borehole Development Scheme is R 5 000 000. This estimate is for the undertaking of detailed investigations of ground water resources in the water scheme footprint. Currently, the water must be sourced from newly drilled boreholes from where up to approximately 10km bulk pipelines need to be constructed. The cost per HH is R 2 976.

8.3.2 EXISTING PROPOSED INFRASTRUCTURE INTERVENTION

8.3.2.1 Water Demand

The KSD002 WSIA project will investigate the groundwater potential within five (5) wards to the west of King Sabata Dalindyebo, i.e. Wards 17,18,21, 22, and 27. This project is currently still in a planning phase. The estimated 2035 demand projections for the project footprint are 0,35Mm³ per annum (0.95Mℓ/d).

8.3.2.2 Water Resource Consideration

The sparse population nature of the villages in the area makes ground water supply the most ideal source of water for the community. The ORTDM is planning a borehole development project for the area.

8.3.2.3 Water Supply Infrastructure

The envisaged infrastructure for the project includes inter alia the following:

- Boreholes equipped with motorised borehole pumps;
- Localised command reservoirs;
- Bulk and reticulation pipelines; and
- Water to be accessed from standpipes.

8.3.2.4 Financial Requirements

The cost estimate for the Mthatha Borehole Development Scheme is R 1 000 000. This estimate is for the undertaking of detailed investigations of ground water resources in the water scheme footprint. The scheme development cost per household is R 595. Currently, the water must be sourced from newly drilled boreholes from where up to approximately 10km bulk pipelines need to be constructed.

8.4 KSD003 WSIA: MQUANDULI CORRIDOR DEVELOPMENT

8.4.1 DEMAND MODEL INTERVENTION

8.4.1.1.1 Water Demand

The demand of this area was based on the location of the village from the main collector roads. Household demand is assumed to be a minimum of 100ℓ/c/d in the rural and peri-urban and 170ℓ/c/d in the existing town areas. The villages covered under this project have a potential of being peri-urban in the years to come. A summer peak factor of 1,2 and distribution losses of 10% have been included for sizing of the infrastructure.

8.4.1.1.2 Water Resource Consideration

The Mquanduli Corridor would ultimately receive potable water from the Mthatha RWSS. Potable water supplies will be delivered to Zamukulungisa reservoir where it is envisaged that 27Mℓ/d will be pumped to the 20Mℓ Viedgesville reservoir. The Viedgesville reservoir will feed the Mqanduli corridor as well as 5Mℓ/day to the 10Mℓ Qweqwe reservoir. The remaining 22Mℓ is the daily supply that shall be used to feed the Mqanduli Corridor.

8.4.1.1.3 Water Supply Infrastructure

The Mqanduli Corridor depends on the completion of the following main bulk Infrastructure projects some of which are currently under construction and estimated to be completed by the end of 2016:

- Phase 2 upgrade of the Thornhill WTP by 40Mℓ/d from 80Mℓ/d to an ultimate capacity of 120Mℓ/d;
- Additional storage of 17Mℓ;
- 39km of primary bulk pipelines;

- 339km of secondary bulk pipelines; and
- 2,5km of tertiary pipelines.

8.4.1.1.4 Financial Requirements

The bulk cost requirement for KSD003 WSIA is tabled below.

(Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Additional Est Cost	TOTAL
	(Construction)	(Fees, Geotech & survey)	(EIA, ISD, Contingencies etc)	
Primary Bulk	R 330 427 676	R 37 678 950	R 208 169 436	R 576 276 061
Secondary Bulk	R 35 398 164	R 69 369 964	R 22 300 844	R 127 068 972
Tertiary Bulk	R 4 488 537	R 896 279	R 4 827 778	R 10 212 595
Total	R 370 314 378	R 107 945 193	R 235 298 058	R 713 557 628

The scheme development cost per household is R 46 665.

8.4.2 EXISTING PROPOSED INFRASTRUCTURE INTERVENTION

8.4.2.1 Water Demand

The demand of this area was based on the location of the village from the main collector roads. Household demand is assumed to 100l/c/d in peri-urban and 125l/c/d in the existing town areas. The villages covered under this project have a potential of being peri-urban in the years to come. A summer peak factor of 1,2 and distribution losses of 10% have been included for sizing of the infrastructure.

8.4.2.2 Water Resource Consideration

The Mqanduli Corridor would ultimately receive potable water from the Zamukulungisa reservoir where it is envisages that 27Ml/d will be pumped to the 20Ml Viedgesville reservoir. The Viedgesville reservoir will feed the Mqanduli corridor as well as 5Ml/day to the 10Ml Qweqwe reservoir. The remaining 22Ml is the daily supply that shall be used to feed the Mqanduli Corridor.

8.4.2.3 Water Supply Infrastructure

The Mqanduli Corridor depends on the completion of the following Main Bulk Infrastructure projects that is currently under construction and estimated to be completed by the end of 2016:

- Phase 2 upgrade of the Thornhill WTP (40Ml/d);
- 600mm diameter Pipeline to, and additional storage at, Zamukulungisa as the first stage of the Mqanduli Corridor infrastructure;
- Construction of 600mm diameter steel pipe from Zamukulungisa to Viedgesville reservoir;
- Construction of 500mm diameter steel pipe to Mqanduli and the rest of the GRP pipes in the area;
- The 20Ml/d Viedgesville reservoir; and
- The 10Ml/d Mqanduli reservoir.

The secondary bulk would tee off from the main bulk 500mm diameter steel pipe and would range from 50mm HDPE pipes to 400mm diameter GRP pipes with a total length of approximately 117 655m. The proposed storage reservoirs sized for a 48hr AADD are as follows:

Table 8.6 Reservoirs proposed for the Mquanduli Corridor

Reservoir size	No of Reservoirs
6Mℓ	1
3Mℓ	1
2Mℓ	2
1.5Mℓ	6
1Mℓ	4
500kℓ	11
250kℓ	1
200kℓ	6
150kℓ	5
100kℓ	7
50kℓ	2

8.4.2.4 Financial Requirements

The bulk cost requirement for KSD003 WSIA is tabled below.

	Primary Bulk	Secondary and Tertiary Bulk
Zamukulungisa Gravity Main	R 39 978 714	
Mqanduli CRS Gravity main	R 107 729 361	
Viedgesville Reservoir	R 38 713 397	
Refurbishment at Mqanduli WTP	R 14 292 422	R 4 684 733
Viedgesville rising main		R 51 302 636
Signal Hill Rising Main		R 45 660 899
Zamukulungisa Pumpstation		R 2 735 788
Kwamkhulu Pumpstation		R 256 448
Kwamkhulu gravity main		R 29 433 993
KuGxwalibomvu village gravity main		R 5 744 436
Kwamkhulu rising main		R 3 245 606
Mqanduli CRS gravity main		R 1 738 718
Mqanduli CRS Reservoir		R 24 619 013
Kwamkhulu Reservoir		R 2 082 358
Mahlathini Reservoir		R 8 349 948
KuGxwalibomvu Reservoir		R 3 262 019
Total A:	R 200 713 894	R 183 116 595
Add Contingencies (10%)	R 20 071 389	R 18 311 660
Add CPA (8%)	R 17 662 823	R 16 114 260
Sub Total 1	R 238 448 106	R 217 542 515
Add Fees	R 35 526 359	R 32 411 637

	Primary Bulk	Secondary and Tertiary Bulk
Sub Total 2	R 273 974 465	R 249 954 152
Add VAT (14%)	R 38 356 425	R 34 993 581
Grand Total	R 312 330 890	R 284 947 733
		R 597 278 623

The scheme development cost per household is R 35 704. Due to the size of the project, it will take at least seven years to complete.

8.5 KSD004 WSIA: LUKWETHU WATER SUPPLY

8.5.1 DEMAND MODEL INTERVENTION

8.5.1.1 Water Demand

The current and future water demand was calculated based on the population figures using a daily consumption of 100l/c/d for the future demand (2035). The total of 14 550m³/day (14.55Ml/d) has been estimated for 2035.

8.5.1.2 Water Resource Consideration

A 20Ml storage tank would store treated water from the Mthatha Dam and would be located around Viedgesville Area. The construction of the proposed storage is planned and it will serve as a supply (command) reservoir to the project area.

8.5.1.3 Water Supply Infrastructure

The following infrastructure is proposed for the Lukwethu Water Scheme:

- Additional storage of 9Ml;
- 53km of primary bulk pipelines;
- 196km of secondary bulk pipelines; and
- 73km of tertiary pipelines.

Approximately 320km of pipelines of steel, uPVC and HDPE will be constructed under the project.

8.5.1.4 Financial Requirement

The bulk cost requirement for KSD004 WSIA is tabled below.

(Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Additional Costs	TOTAL
	(Construction)	(Fees, Geotech & survey)	(EIA, ISD, Contingencies etc)	
Primary Bulk	R 178 244 620	R 44 297 881	R 114 294 111	R 336 836 611
Secondary Bulk	R 483 922 104	R 128 176 967	R 304 870 925	R 916 969 996
Tertiary Bulk	R 147 373 044	R 42 319 349	R 92 845 018	R 282 537 411
Total	R 809 539 768	R 214 794 196	R 512 010 054	R 1 536 344 018

The scheme development cost per household is R 78 545. Due to the size of the project, it will take at least approximately 8 years to complete.

8.5.2 EXISTING PROPOSED INFRASTRUCTURE INTERVENTION

8.5.2.1 Water Demand

The current and future water demand was calculated based on the population figures using a daily consumption of 60l/c/d for the future demand (2041). The summer demand was calculated at 20% and water losses at 10%. A total of 653,11m³/day (0,65Ml) has been estimated.

8.5.2.2 Water Resource Consideration

A 20Ml storage tank would store treated water from the Mthatha Dam and would be located around Viedgesville Area. The construction of the proposed storage is planned and it will serve as a supply (command) reservoir to the project area.

8.5.2.3 Water Supply Infrastructure

Approximately 720km of bulk pipelines (modified PVC) and steel pipes will be constructed. HDPE pipes were recommended for use in reticulation pipes

8.5.2.4 Financial Requirement

The bulk cost requirement for KSD004 WSIA is tabled below.

ITEMS	Primary Bulk	Secondary and Tertiary Bulk
Preliminary & General	R 57 329 661	
Balancing (service) Tanks	R 5 400 000	
Command Reservoir	R 600 000	
Bulk Main	R 1 200 000	
Secondary Mains		R 188 026 857
Reticulation Mains		R 316 858 740
Pump Station		R 950 000
Eskom Connection		R 3 000 000
Fittings and other		R 59 411 014
Sub Total A	R 64 529 661	R 568 246 611
Contingencies (10%)	R 6 452 966	R 56 824 661
Sub Total B	R 70 982 627	R 625 071 272
Professional Fees		R 97 116 446
EIA		R 2 913 493
Survey		R 4 855 822
Geohydrological Investigation		
SUB TOTAL C	R 70 982 627	R 729 957 033
14% VAT	R 9 937 568	R 102 193 985
GRAND TOTAL	R 80 920 195	R 832 151 018
		R 913 071 213

The scheme development cost per household is R 46 685. Due to the size of the project, it will take at least three years to complete.

8.6 KSD005 WSIA: COFFEE BAY RWSS

8.6.1 DEMAND MODEL INTERVENTION

8.6.1.1 Water Demand

According to the Coffee Bay Water Scheme Design Report dated 20 January 2015, the original design brief was based on water usage of 60 l/c/d for bulk infrastructure and 25 l/c/d for reticulation. However, this was revised to 125l/c/d for bulk infrastructure and 60l/c/d for reticulation. For this UAP Phase 2, the total demand for the water scheme has been estimated based on a minimum of 100l/c/d resulting in an estimated demand of 5,8Ml/d (2,12million m³ per annum).

8.6.1.2 Water Resource Consideration

The current water source is the Mthatha River Abstraction Plant and Coffee Bay Water Treatment Plant. There is sufficient water available for abstraction. This was captured in the approved water abstraction permit for 2 700kl/d. The Coffee Bay Water Treatment Plant may require upgrading to meet the future demands of the Coffee Bay and Hole-in-the-Wall Development Nodes. A new water-use licence would also be required.

The Coffee Bay WTP was upgraded from 900kl/day of potable water to 2 700kl/d with the plant operating 24hrs/d. After losses from de-sludging and backwashing the current output from the Plant is \pm 2 550kl/day. This capacity will not meet the demand up to the year 2035.

8.6.1.3 Water Supply Infrastructure

Potable water is pumped from the existing Coffee Bay Water Treatment Plant to the existing Xonyeni Reservoir. Water would then be pumped to three 2Ml Command Reservoirs from where water would then be distributed by means of Bulk Gravity Pipelines and Bulk Reservoirs.

The following infrastructure is proposed for the Coffee Bay Water Scheme:

- 14Ml of storage reservoirs
- 56km of secondary bulk pipelines

8.6.1.4 Financial Requirement

The cost estimate for infrastructure is tabled below.

(Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Additional Est Costs	TOTAL
	(Construction)	(Fees, Geotech & survey)	(EIA, ISD, Contingencies etc)	
Primary Bulk	R 69 498 000	R 6 324 318	R 43 783 740	R 119 606 058
Secondary Bulk	R 156 455 791	R 37 657 831	R 100 567 148	R 294 680 770
Total	R 225 953 791	R 43 982 149	R 144 350 888	R 414 286 828

The scheme development cost per household is R 62 196. Due to the size of the project, it will take at least seven years to complete.

8.6.2 EXISTING PROPOSED INFRASTRUCTURE INTERVENTION

8.6.2.1 Water Demand

The original design brief was based on water usage of 60ℓ/c/d for bulk infrastructure and 25ℓ/c/d for reticulation. However, this was revised to 125ℓ/c/d for bulk infrastructure and 60ℓ/c/d for reticulation.

8.6.2.2 Water Resource Consideration

The current water source is the Mthatha River Abstraction Plant and Coffee Bay Water Treatment Plant. There is sufficient water available for abstraction. This was captured in the approved water abstraction permit for 2 700kℓ/d. The Coffee Bay Water Treatment Plant may require upgrading to meet the future demands of the Coffee Bay and Hole-in-the-Wall Development Nodes. A new water-use licence would also be required.

The Coffee Bay WTP was upgraded from 900kℓ/day of potable water to 2 700kℓ/d with the plant operating 24hrs/d. After losses from de-sludging and backwashing the current output from the Plant is ± 2 550kℓ/day. This increased capacity would meet the demand up to the year 2026 at 25ℓ/c/d

8.6.2.3 Water Supply Infrastructure

Potable water is pumped from the existing Coffee Bay Water Treatment Plant to the existing Xonyeni Reservoir. Water would then be pumped to three 2Mℓ Command Reservoirs from where water would then be distributed by means of Bulk Gravity Pipelines and Bulk Reservoirs.

The total length of rising mains to be installed as part of this project is approximately 11,52km, consisting of varying pipeline diameters and classes suitably designed for operating and surge pressures. The total lengths of bulk gravity pipelines to be installed is approximately 27,38km, consisting of varying pipe diameters and classes ranging from 90mm diameters to 250mm diameters. Bulk Gravity Mains will be fitted with Flow/Level control valves to control both inflow rates and levels of Reservoirs.

Village reticulation is supplied from both the Bulk Reservoirs and Command reservoirs, suitably positioned at elevations enabling gravity supply. The reticulation networks consist of varying pipe diameters and classes ranging from 50mm HDPE to 315mm uPVC with a total length of approximately 258,35km.

8.6.2.4 Financial Requirement

The final cost requirement is tabled below.

Description	Amount
Preliminary and General	R 31,127,768
Bulk Rising Mains	R 17,378,916
Bulk Gravity Mains	R 25,762,737
Bulk Reservoirs	R 27,499,624
Village Reticulations	R 78,154,923
Booster Pump Stations	R 1,327,032
Sub Total	R 181,251,000
Contingencies	R 12,602,323

Description	Amount
CPA	R 41,550,120
Sub Total	R 235,403,443
Add 14% Value-Added Tax (Vat)	R 32,956,482
Total Construction Cost	R 268,359,925

The scheme development cost per household is R 40 282. Due to the size of the project, it will take at least seven years to complete.

8.7 MHLO001 WSIA: UMZIMVUBU DAM DEVELOPMENT

8.7.1 DEMAND MODEL INTERVENTION

8.7.1.1 Water Demand

The design criteria used for the development of the scheme were:

- Domestic water requirement – rural: 60 litres per capita per day (ℓ/c/d)
- Domestic water requirement – urban: 125ℓ/c/d
- Allowance for transmission losses: 10%
- Allowance for Water Treatment Plant losses: 5%
- Summer peak factor for bulk water supply: 1,2 x Annual Average Daily Demand (AADD)
- Bulk water transfer pipelines peak factor: 1,2 (20 hours pumping per day)
- Population growth rate 1% per annum.

Based on the above design criteria and the fact that the project will extend across three DMs, the proposed water demand for the total area is 63 000 Mm³ per annum in 2020 and 85 000 Mm³ per annum in 2050. The total average daily water requirement for domestic purposes in the year 2050 is expected to be **32,4 million m³ per annum**.

8.7.1.2 Water Resource Consideration

The Tsitsa River system would be utilised for a multi-purpose use due to the high water resources availability in the catchment. The consumptive uses could sustainably include, inter alia:

- Potable water supply;
- Irrigation; and
- Hydropower.

Two dam sites are planned and are as follows:

- The Ntabelanga Dam that could supply the projected 2050 potable and irrigation water requirement of 60,2 million m³ per annum at a 98% assurance of supply from a relatively small impoundment of 60,0 million m³ (0,15 MAR);

- The Lalini Dam that would provide additional balancing storage volume and consistent downstream flow releases to generate significant hydropower for supply into the national grid.

8.7.1.3 Water Supply Infrastructure

The proposed Ntabelanga Dam has the following characteristics:

➤ Full Supply Level (FSL):	947.3 m.a.s.l.
➤ Non-Overspill Crest Level – right flank (NOCL):	953.9 m.a.s.l.
➤ Minimum bed level in river at dam:	886.7 m.a.s.l.
➤ Crest width:	6m
➤ Minimum operating level (MOL):	918.00 m.a.s.l.
➤ Emergency drawdown minimum outlet level:	907.00 m.a.s.l.
➤ Maximum dam wall height to NOC:	66.1m
➤ Wall crest length (incl. spillway):	407m
➤ Spillway crest length:	150m
➤ Gross stored volume at FSL:	490 million m ³
➤ Mean Annual Runoff at dam:	415 million m ³
➤ Storage below MOL (V50 sedimentation):	37 million m ³
➤ Surface area of lake behind dam:	31,5km ²
➤ Backwater reach upstream of dam:	15,5km

A Water Treatment Plant (WTP) with capacity to supply the above water requirement would be constructed close to the Ntabelanga Dam, and would be supplied with raw water by a gravity pipeline fed from multiple draw-offs at the dam outlet works. Treated water will be transferred from the clear water pumping stations PS1 and PS3 at the Water Treatment Plant to four primary command reservoirs. Treated water will then be delivered to the projected 726 616 consumers predominantly by gravity via the secondary bulk conveyance pipelines and command reservoirs that feed the tertiary lines to villages and urban centres such as Tsolo and Mount Frere.

The bulk infrastructure required for the scheme is split operationally into four supply zones and again into primary, secondary and tertiary infrastructure. The primary infrastructure consists of the Water Treatment Plant (supplied with raw water from the Ntabelanga Dam), potable water pumping stations from the treatment Plant to transfer water to primary command reservoirs, and the bulk water pipelines delivering from this primary storage to the downstream bulk water infrastructure. From the Water Treatment Plant (WTP), treated water would be pumped from pumping station 1 (PS1) via a rising main going north to primary command reservoir 1 which would then gravity feed the bulk water distribution system.

A pumping station (PS2) would lift water from primary command reservoir 1 to primary command reservoir 2 which is located at a higher elevation. From this reservoir, water would be gravity fed to the bulk water supply system in the higher elevations of the Tsitsa valley watershed, as well as supplying some of the neighbouring DM settlements over the watershed and reaching to the southern outskirts of the town of Mount Frere. This is designated as supply Zone 2. Similarly on the southern side of the river, potable water would be pumped from pumping station PS3 at the WTP to primary command reservoir 3 from where gravity fed bulk mains would transfer water to the settlements in Zone 3.

A pumping station (PS4) at primary command reservoir 3 would pump water in a westerly direction to the higher lying primary command reservoir 4, which would also deliver water by gravity in the direction of Maclear, and to settlements in the Tsitsa River valley adjacent to the flooded area of impoundment once the dam is constructed.

Secondary infrastructure links these primary command reservoirs to the secondary command storage reservoirs, which then, via the tertiary lines, feed the village reservoirs located at the settlements. The design approach is to assume the need to construct a new village reservoir at each settlement, but some of the secondary command reservoirs are existing, albeit that some of these storage facilities would need to be expanded to meet minimum storage requirements.

The secondary bulk water distribution system consists of the main bulk pipelines fed by gravity from the above primary command reservoirs 1, 2, 3 and 4. The secondary systems transfer water in bulk to secondary command reservoirs, which form the second level of strategic storage. In keeping with the planning being undertaken by the DMs, these secondary system command storage sites generally coincide with sites of existing reservoirs that are located at strategic high points,

8.7.1.4 Financial Requirement

The total cost for the dam development is estimated at R4,98 billion. The scheme development cost per household is R18 031. Due to the size of the project, DWS has indicated that the estimated completion date is 2022.

(Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Additional Costs	TOTAL
	(Construction)	(Fees, Geotech & survey)	(EIA, ISD, Contingencies etc)	
Primary Bulk	R 2 603 641 038	R 239 434 529	R 1 640 293 854	R 4 483 369 421
Secondary Bulk	R 64 372 991	R 5 825 756	R 40 554 984	R 110 753 731
Tertiary Bulk	R 210 063 545	R 41 840 844	R 134 340 033	R 386 244 422
Total	R 2 878 077 573	R 287 101 129	R 1 815 188 871	R 4 980 367 573

The scheme development cost per household is R 72 756.

8.7.2 EXISTING PROPOSED INFRASTRUCTURE INTERVENTION

8.7.2.1 Water Demand

The design criteria used for the development of the scheme were:

- Domestic water requirement – rural: 60 litres per capita per day (ℓ/c/d)
- Domestic water requirement – urban: 125ℓ/c/d
- Allowance for transmission losses: 10%
- Allowance for Water Treatment Plant losses: 5%
- Summer peak factor for bulk water supply: 1,2 x Annual Average Daily Demand (AADD)
- Bulk water transfer pipelines peak factor: 1,2 (20 hours pumping per day)
- Population growth rate 1% per annum.

Based on the above design criteria and the fact that the project will extend across three DMs, the proposed water demand for the total area is 63 000Mm³ per annum in 2020 and 85 000Mm³ per annum in 2050. The total average daily water requirement for domestic purposes in the year 2050 is expected to be **32.4 million m³ per annum**.

8.7.2.2 Water Resource Consideration

The Tsitsa River system would be utilised for a multi-purpose use due to the high water resources availability in the catchment. The consumptive uses could sustainably include, inter alia:

- Potable water supply;
- Irrigation; and
- Hydropower.

Two dam sites are planned and are as follows:

- The Ntabelanga Dam that could supply the projected 2050 potable and irrigation water requirement of 60,2 million m³ per annum at a 98% assurance of supply from a relatively small impoundment of 60,0 million m³ (0.15 MAR);
- The Lalini Dam that would provide additional balancing storage volume and consistent downstream flow releases to generate significant hydropower for supply into the national grid.

8.7.2.3 Water Supply Infrastructure

The proposed Ntabelanga Dam has the following characteristics:

- Full Supply Level (FSL): 947.3 m.a.s.l.
- Non-Overspill Crest Level – right flank (NOCL): 953.9 m.a.s.l.
- Minimum bed level in river at dam: 886.7 m.a.s.l.
- Crest width: 6m
- Minimum operating level (MOL): 918.00 m.a.s.l.
- Emergency drawdown minimum outlet level: 907.00 m.a.s.l.
- Maximum dam wall height to NOC: 66.1m
- Wall crest length (incl. spillway): 407m
- Spillway crest length: 150m
- Gross stored volume at FSL: 490 million m³
- Mean Annual Runoff at dam: 415 million m³
- Storage below MOL (V50 sedimentation): 37 million m³
- Surface area of lake behind dam: 31,5km²
- Backwater reach upstream of dam: 15,5km

A Water Treatment Plant (WTP) with capacity to supply the above water requirement would be constructed close to the Ntabelanga Dam, and would be supplied with raw water by a gravity pipeline fed from multiple draw-offs at the dam outlet works. Treated water will be transferred from the clear water pumping stations PS1 and PS3 at the Water Treatment Plant to four primary command reservoirs. Treated water will then be delivered to the projected 726 616 consumers

predominantly by gravity via the secondary bulk conveyance pipelines and command reservoirs that feed the tertiary lines to villages and urban centres such as Tsolo and Mount Frere.

The bulk infrastructure required for the scheme is split operationally into four supply zones and again into primary, secondary and tertiary infrastructure. The primary infrastructure consists of the Water Treatment Plant (supplied with raw water from the Ntabelanga Dam), potable water pumping stations from the treatment Plant to transfer water to primary command reservoirs, and the bulk water pipelines delivering from this primary storage to the downstream bulk water infrastructure. From the Water Treatment Plant (WTP), treated water would be pumped from pumping station 1 (PS1) via a rising main going north to primary command reservoir 1 which would then gravity feed the bulk water distribution system.

A pumping station (PS2) would lift water from primary command reservoir 1 to primary command reservoir 2 which is located at a higher elevation. From this reservoir, water would be gravity fed to the bulk water supply system in the higher elevations of the Tsitsa valley watershed, as well as supplying some of the neighbouring DM settlements over the watershed and reaching to the southern outskirts of the town of Mount Frere. This is designated as supply Zone 2. Similarly on the southern side of the river, potable water would be pumped from pumping station PS3 at the WTP to primary command reservoir 3 from where gravity fed bulk mains would transfer water to the settlements in Zone 3.

A pumping station (PS4) at primary command reservoir 3 would pump water in a westerly direction to the higher lying primary command reservoir 4, which would also deliver water by gravity in the direction of Maclear, and to settlements in the Tsitsa River valley adjacent to the flooded area of impoundment once the dam is constructed.

Secondary infrastructure links these primary command reservoirs to the secondary command storage reservoirs, which then, via the tertiary lines, feed the village reservoirs located at the settlements. The design approach is to assume the need to construct a new village reservoir at each settlement, but some of the secondary command reservoirs are existing, albeit that some of these storage facilities would need to be expanded to meet minimum storage requirements.

The secondary bulk water distribution system consists of the main bulk pipelines fed by gravity from the above primary command reservoirs 1, 2, 3 and 4. The secondary systems transfer water in bulk to secondary command reservoirs, which form the second level of strategic storage. In keeping with the planning being undertaken by the DMs, these secondary system command storage sites generally coincide with sites of existing reservoirs that are located at strategic high points,

Pipelines range in size from 50mm diameter to 900mm diameter. The materials chosen for pipelines are High Density Polyethylene (HDPE) for the smallest pipelines, Polyvinylchloride (PVC) for the range from 75mm to 355mm, and steel pipelines for all high pressure, above ground, pumping applications, and for sizes greater than 355mm.

The proposed reservoirs range in capacity from 10m³ to 750m³ in the respective secondary and tertiary systems with the command reservoirs in the primary system being in the order of 2 500m³ to 33 000m³. The proposed reservoir construction materials range from pressed steel tanks for capacities less than 500m³, modular pre-fabricated systems for the medium sized reservoirs, and conventional reinforced concrete reservoirs for the capacities greater than 2 000m³.

8.7.2.4 Financial Requirement

The total cost for the dam development is estimated at R 12,3 billion. The scheme development cost per household is R 179 685. Due to the size of the project, it will take at least seven years to complete although the DWS has indicated that the estimated completion date is 2022.

Item	Cost
Primary Bulk	
Ntanelanga Dam and associated works	R 1 846 000 000
Ntabelanga WTP	R 1 027 000 000
Bulk Rising Mains	R 581 511 498
Lalini Dam and hydro power scheme	R 3 686 000 000
Primary Total	R 7 140 511 498
Secondary Bulk	
Bulk Distribution	R 3 664 488 502
Secondary Total	R 3 664 488 502
Ntabelanga irrigation	R 975 000 000
Other	R 550 000 000
Reticulation Total	R 1 525 000 000
Total	R 12 330 000 000

The scheme development cost per household is R 179 685.

8.8 NQH001 WSIA: NGQUZA HILL RBWSS

8.8.1 DEMAND MODEL INTERVENTION

8.8.1.1 Water Demand

According to ORTDM planning, water demand was derived with the assumption that the water consumption would start at 25l/c/d gradually increase over the 30-year planning horizon to eventually reach 75l/c/d. This scenario leads to an ultimate demand of 19,02Ml/d. A population growth of 0% was used. The water demand is shown in Table 8.8: Demand Scenario below.

Table 8.7: ORTDM Planning Demand Scenarios

Zone	Year						
	2008	2013	2018	2023	2028	2033	2038
Zone 1	1,56	1,63	1,81	2,09	2,54	3,09	3,91
Zone 2	1,49	1,56	1,73	2,00	2,43	2,96	3,74
Zone 3	1,21	1,26	1,40	1,62	1,97	2,39	3,02
Zone 4	1,44	1,51	1,68	1,94	2,36	2,87	3,62
Zone 5	1,88	1,97	2,19	2,52	3,07	3,74	4,72
TOTAL DEMAND (Ml/d)	7,58	7,93	8,82	10,17	12,37	15,05	19,02

In terms of this UAP Phase 2 Reconciliation Strategy Report the projected 2035 demand is 46,8Ml/d which is more than double the ORTDM projected demand. The cause of the variance is mainly due to the use of a 0% population growth rate and the lower per capita demand by ORTDM.

8.8.1.2 Water Resources Considered

The two major rivers flowing through this catchment are the Mzintlavana and its tributary the Mbandana River. A possible resource development site is the Mzintlavana Dam. With a proposed 610m long, 30m high dam wall with a Full Supply Level (FSL) of 900m this site is ideally positioned to supply the whole of the Ngquza hill.

8.8.1.3 Water Supply Infrastructure

Water would be sourced from a new dam to be constructed on the Nxuzi River, about 2km upstream of the confluence with the Mzintlava River as well as from the surplus capacity from the new Zalu River Dam and the upgraded Water Treatment Plant adjacent to Xura River. This regional scheme would involve treatment at a new WTP before pumping through a bulk distribution network to secondary bulk reservoirs in various supply zones envisaged. The project proposed 14 supply zones. The bulk supply would arrive in each zone through a bulk pipeline from the new Regional Reservoir located at Lutshampuphu.

8.8.1.4 Financial Implication

The proposed cost is R 5,1 billion broken down in detail in the table hereunder.

(Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Additional Costs	TOTAL
	(Construction)	(Fees, Geotech & survey)	(EIA, ISD, Contingencies etc)	
Primary Bulk	R 1 259 910 263	R 199 002 637	R 793 743 466	R 2 252 656 367
Secondary Bulk	R 597 196 169	R 140 167 011	R 376 233 586	R 1 113 596 766
Tertiary Bulk	R 890 525 797	R 266 431 363	R 563 031 252	R 1 719 988 412
Total	R 2 747 632 229	R 605 601 012	R 1 733 008 304	R 5 086 241 545

The scheme development cost per household is R 88 935. Due to the size of the project, it will take at least ten years to complete.

8.8.2 EXISTING PROPOSED INFRASTRUCTURE INTERVENTION

8.8.2.1 Water Demand

The demand was derived with the assumption that the water consumption would start at 25l/c/d gradually increase over the 30 year planning horizon to eventually reach 75l/c/d. This scenario leads to an ultimate demand of 19,02Ml/d. A population growth of 0% was used. The water demand is shown in Table 8.8: Demand Scenario below.

Table 8.8: Demand Scenario

Zone	Year						
	2008	2013	2018	2023	2028	2033	2038
Zone 1	1,56	1,63	1,81	2,09	2,54	3,09	3,91
Zone 2	1,49	1,56	1,73	2,00	2,43	2,96	3,74

Zone	Year						
	2008	2013	2018	2023	2028	2033	2038
Zone 3	1,21	1,26	1,40	1,62	1,97	2,39	3,02
Zone 4	1,44	1,51	1,68	1,94	2,36	2,87	3,62
Zone 5	1,88	1,97	2,19	2,52	3,07	3,74	4,72
TOTAL DEMAND (Mℓ/d)	7,58	7,93	8,82	10,17	12,37	15,05	19,02

8.8.2.2 Water Resources Considered

The two major rivers flowing through this catchment are the Mzintlavana and its tributary the Mbandana River. A possible resource development site is the Mzintlavana Dam. With a proposed 610m long, 30m high dam wall with a Full Supply Level (FSL) of 900m this site is ideally positioned to supply the whole of the Ngquza hill.

8.8.2.3 Water Supply Infrastructure

Water would be sourced from a new dam to be constructed on the Nxuzi River, about 2km upstream of the confluence with the Mzintlava River as well as from the surplus capacity from the new Zalu River Dam and the upgraded Water Treatment Plant adjacent to Xura River. This regional scheme would involve treatment at a new WTP before pumping through a bulk distribution network to secondary bulk reservoirs in various supply zones envisaged. The project proposed 14 supply zones. The bulk supply would arrive in each zone through a bulk pipeline from the new Regional Reservoir located at Lutshampuphu.

8.8.2.4 Financial Implication

The proposed cost is tabled below.

Item	Cost
Primary Bulk	
Raw Water Abstraction and Storage Dam	R 70 000 000
Mzintlava WTP	R 45 000 000
Bulk Rising Mains	R 22 775 000
Bulk Storage	R 36 927 223
Bulk Pump Stations	R 14 000 000
Primary Total	R 188 702 223
Secondary Bulk	
Bulk Distribution Storage	R 27 695 417
Bulk Distribution Network	R 115 625 000
Crossings	R 4 825 000
Secondary Total	R 148 145 417
Reticulation	R 283 900 000
Consumer Standpipes	R 12 000 000
Reticulation Total	R 295 900 000
Total	R 632 747 640

The scheme development cost per household is R 11 064. Due to the size of the project, it will take at least seven years to complete.

8.9 NQH002 WSIA: MSIKABA BULK REGIONAL WATER SUPPLY SCHEME

8.9.1 DEMAND MODEL INTERVENTION

8.9.1.1 Water Demand

The capacity of the proposed sources must be sufficient to supply the long-term demand, and should therefore be able to supply 100ℓ/c/d of the present population, with a minimum of 48-hour storage capacity. The projected 2035 water requirements are 3,4 million m³ per annum.

8.9.1.2 Water Resource Consideration

The Msikaba River has been identified as the most preferred source.

8.9.1.3 Water Supply Infrastructure

Raw water from the Msikaba river would be treated within the Thombo WTP. Raw water and clear water reservoirs would be constructed near the treatment plant. Command reservoirs would be strategically placed to gravity feed zone storage reservoirs at different zones. A 4Mℓ command concrete reservoir is envisaged to be used. Water would be pumped from the source into the main storage reservoir, from which it would gravitate to the five zonal reservoirs. Approximately 290km of bulk supply pipelines, ranging from 50mm to 315mm in diameter would be installed.

8.9.1.4 Financial implication

The total estimated project cost is R1,4 billion as detailed in the table below.

(Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Additional Costs	TOTAL
	(Construction)	(Fees, Geotech & survey)	(EIA, ISD, Contingencies etc)	
Primary Bulk	R 451 053 869	R 66 998 059	R 284 163 938	R 802 215 866
Secondary Bulk	R 351 400 557	R 62 807 833	R 223 382 351	R 637 590 740
Tertiary Bulk	R 0	R 0	0	0
Total	R 802 454 426	R 129 805 892	R 507 546 289	R 1 439 806 607

The scheme development cost per household is R 117 669. Due to the size of the project, it will take at least seven years to complete.

8.9.2 EXISTING PROPOSED INFRASTRUCTURE INTERVENTION

8.9.2.1 Water Demand

The capacity of the proposed sources must be sufficient to supply the long-term demand, and should therefore be able to supply 60ℓ/c/d of the present population, with a minimum of 48-hour storage capacity. Allowance will be made for water losses that should be allowable at 10%, summer peak demands and downtime. The estimated summer peak demand for the proposed scheme is 4,8Mℓ/day. A population growth of 0% was used.

8.9.3 WATER RESOURCE CONSIDERATION

The Msikaba River has been identified as the most preferred source.

8.9.3.1 Water Supply Infrastructure

Raw water from the Msikaba river would be treated within the Thombo WTP. Raw water and clear water reservoirs would be constructed near the treatment plant. Command reservoirs would be strategically placed to gravity feed zone storage reservoirs at different zones. A 4Mℓ command concrete reservoir is envisaged to be used. Water would be pumped from the source into the main storage reservoir, from which it would gravitate to the five zonal reservoirs. A total of five (5) concrete reservoirs, ranging from 350kℓ to 1,25Mℓ are proposed in five supply zones. Approximately 220km of bulk supply pipelines, ranging from 50mm to 315mm in diameter would be installed. The bulk supply pipelines will be designed to convey the summer daily demand. Twenty-eight (28) concrete service reservoirs, ranging from 30kℓ to 750kℓ are proposed. These reservoirs will be gravity fed from zonal supply reservoirs.

8.9.3.2 Financial Implication

The total estimated project cost is R 606 330 000 and detailed below.

Item	Amount	P&Gs @ 10%	Contingencies @ 10%	Estimated Amount
Primary Main				
Source Development	R 35 999 250.00	R 39 599 175.00	R 3 959 917.50	R 43 559 092.50
Raw water abstraction				
Off-channel storage				
WTP upgrade				
Bulk Supply Primary	R 25 200 000.00	R 27 720 000.00	R 2 772 000.00	R 30 492 000.00
Command Reservoirs	R 15 994 382.00	R 17 593 820.20	R 1 759 382.02	R 19 353 202.22
				R 93 404 294.72
Secondary Main	R 69 938 391.00	R 76 932 230.10	R 7 693 223.01	R 84 625 453.11
Zone Command Reservoirs	R 8 044 666.00	R 8 849 132.60	R 884 913.26	R 9 734 045.86
				R 94 359 498.97
Tertiary Main	R 46 140 549.00	R 50 754 603.90	R 5 075 460.39	R 55 830 064.29
Village Reservoirs	R 11 908 840.00	R 13 099 724.00	R 1 309 972.40	R 14 409 696.40
				R 70 239 760.69
Village Internal Reticulation	R 93 975 000.00	R 103 372 500.00	R 10 337 250.00	R 113 709 750.00
Access Roads	R 35 700 000.00	R 39 270 000.00	R 43 197 000.00	R 47 516 700.00
Professional Fees	R 112 638 243.87			R 112 638 243.87
Total A				R 531 868 248.25
Grand Total				R 606 329 803.01

The scheme development cost per household is R 49 553. Due to the size of the project, it will take at least seven years to complete.

8.10 NYA001 WSIA: SECOND FALLS BULK WATER SUPPLY

8.10.1 DEMAND MODEL INTERVENTION

8.10.1.1 Water Demand

The water demand of this area for all the villages was calculated at an AADD of 100ℓ/c/d. The resultant demand from the supply area is 8,2Mℓ/d (3,01 million m³ per annum).

8.10.1.2 Water Resource Consideration

The source of raw water supplies shall be the Mthatha River. There will be an abstraction point below the Eskom Hydropower station at Second Falls Abstraction Point. This abstraction will enable approximately 8,5Mℓ/d to be abstracted from the Mthatha River. The water will then be pumped to a new 9Mℓ/d capacity Water Treatment Plant that would be situated close to the Eskom Hydropower station.

8.10.1.3 Water Supply Infrastructure

From the Second Falls WTP, 9Mℓ/d will be pumped to a 3Mℓ command reservoir at Kundlunkulu at an elevation of 660 m.a.s.l from where it will be distributed to the Second Falls villages. The infrastructure to be provided will included the following:

- River abstraction works on the Mthatha River
- 9Mℓ/d Water Treatment Plant
- Storage reservoirs with a combined capacity of 13Mℓ
- 85km of primary bulk pipelines
- 140km of secondary bulk pipelines

The pipes of the Second Falls Corridor will range from 50mm HDPE pipes to 300mm diameter. The storage for the Second Falls Corridor is sized for a 48hr AADD (pumped storage requirements). All the villages shall be provided with 48hr storage, although not necessarily in the local reservoir, they are balanced with other storages along their route.

8.10.1.4 Financial Requirements

The proposed cost for this development is R 1 135 billion. A feasibility study for the project is currently underway and has been budgeted to the value of R8 million. The scheme development cost per household is R 49 553. Due to the size of the project, it will take at least seven years to complete.

(Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Additional Costs	TOTAL
	(Construction)	(Fees, Geotech & survey)	(EIA, ISD, Contingencies etc)	
Primary Bulk	R 289 698 277	R 42 948 508	R 182 509 914	R 515 156 700
Secondary Bulk	R 343 227 649	R 58 551 776	R 218 233 419	R 620 012 845
Tertiary Bulk	R 0	R 0	R 0	R 0
Total	R 632 925 926	R 101 500 284	R 400 743 334	R 1 135 169 544

The scheme development cost per household is R 102 972.

8.10.2 EXISTING PROPOSED INFRASTRUCTURE INTERVENTION

8.10.2.1 Water Demand

The demand was based on the location of the village from the main collector roads. Potential urbanized areas were identified and given the ultimate AADD of 100ℓ/c/d. Villages that are close to towns or have easy access to the main roads were seen as places that will potentially develop to peri-urban villages, were given an AADD of 90ℓ/c/d. Villages that are far from the main roads and towns are rural and given 60ℓ/c/d AADD.

The demand analysis for this project assumed 60ℓ/c/d with an increase of 1% over a 30-year planning horizon. The projected ultimate 30-year Annual Average Daily Demand (AADD) is assumed to be approximately 7Mℓ/d.. The demands are summarized in Table 8.9: Estimated Water Demand.

Table 8.9: Estimated Water Demand

Demand : 60ℓ/c/d with 1% Growth & 20% Losses (AADD) (Mℓ/d)							
Year	2014	2019	2024	2029	2034	2039	2044
Ward 22	1,19	1,25	1,32	1,38	1,45	1,53	1,61
Ward 23	0,94	0,99	1,04	1,09	1,15	1,21	1,27
Ward 24	0,77	0,81	0,85	0,89	0,94	0,98	1,03
Ward 25	0,59	0,62	0,65	0,69	0,72	0,76	0,80
Ward 26	0,77	0,80	0,85	0,89	0,93	0,98	1,03
Ward 28	0,85	0,90	0,94	0,99	1,04	1,10	1,16
Total Demand	5,11	5,37	5,65	5,93	6,23	6,56	6,90

8.10.2.2 Water Resource Consideration

There will be an abstraction point below the Eskom Hydropower station at Second Falls Abstraction Point. This abstraction will enable approximately 6Mℓ/d to be abstracted from the Mthatha River. The water will be pumped to a new 6Mℓ/d capacity Water Treatment Plant that would be situated close to the Eskom Hydropower works.

8.10.2.3 Water Supply Infrastructure

From the Second Falls WTP, 6Mℓ/d will be pumped to a 3Mℓ command reservoir at Kundlunkulu at an elevation of 660 masl from where it will be distributed to the Second Falls villages. The pipes of the Second Falls Corridor range from 50mm HDPE pipes to 400mm diameter GRP pipes with a total length of approximately 90km. The storage for the Second Falls Corridor is sized for a 48hr AADD

(pumped storage requirements). All the villages are provided with 48hr storage, although not necessarily in the local reservoir, they are balanced with other storages along their route. The local storage is sized for a minimum of 24hrs and based on standard reservoir sizes the reservoirs at times have an additional storage that adds towards the required 48hr storage. Reservoirs that have water being pumped to them have been given a local 48hr storage and the exchange reservoirs keep an additional 4hr pumping storage for the pumping exchange storage.

8.10.2.4 Financial Requirements

The proposed cost for this development is R 1 034 billion. A feasibility study is currently underway to the value of R8 million. The scheme development cost per household is R 49 553. Due to the size of the project, it will take at least seven years to complete.

Secondary Bulk Item	Cost
Pipe Lines (90km)	R 106 128 521.08
Reservoirs (23)	R 97 757 441.16
Pump Stations	R 2 795 000.00
	R 206 680 962.24
P&G @ 15%	R 31 002 144.33
	R 237 683 106.57
Contingencies @ 10%	R 23 768 310.66
Sub Total	R 261 451 417.23
Escalation 2.8%	R 20 916 113.38
Professional fees	R 35 652 465.98
Sub Total	R 318 019 996.59
Vat @ 14%	R 44 522 799.52
Total	R 362 542 796.11

8.11 NYA002 WSIA: TOMBO RWSS

8.11.1 DEMAND MODEL INTERVENTION

8.11.1.1 Water Demand

The original scheme was designed for a basic supply of 60l/c/d. Bulk supply pipelines was designed for the summer daily demand of 75l/c/d. Allowance was made for water losses, summer peak demands and downtime. However, the demand model used in this study indicated that the 2035 water demand would be 4,1Ml/d and is based on a scheme design capacity of a basic supply of 100l/c/d.

8.11.1.2 Water Resource Consideration

The main raw water source is the Mzimvubu river from where the water is treated at the existing 2,5Ml Tombo WTP.

8.11.1.3 Water Supply Infrastructure

The existing Tombo WTP would need to be upgraded to 5Mℓ/day to meet the 2035 water demand, an increase of 2,5Mℓ/d. Water would be stored at a command reservoir from where it will be distributed to the service reservoirs. The upgrade of infrastructure includes the following:

- Upgrade of the WTP by an additional 2Mℓ/d;
- Construction of storage reservoirs with a combined capacity of 6Mℓ; and
- Construction of approximately 6km of primary bulk pipelines and 80km of secondary and tertiary pipelines.

8.11.1.4 Financial Requirements

The cost estimate for the required upgrade works to meet the 2035 demand amounts to R 366,4 million and is detailed in the table below.

(Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Additional Costs	TOTAL
	(Construction)	(Fees, Geotech & survey)	(EIA, ISD, Contingencies etc)	
Primary Bulk	R 29 088 467	R 3 817 825	R 18 325 734	R 51 232 026
Secondary Bulk	R 109 940 664	R 18 980 534	R 69 262 619	R 198 183 817
Tertiary Bulk	R 12 547 911	R 62 839 522	R 41 588 899	R 116 976 332
Total	R 151 577 043	R 85 637 881	R 129 177 252	R 366 392 175

The scheme development cost per household is R 56 585. Due to the size of the project, it will take at least eight years to complete.

8.11.2 EXISTING PROPOSED INFRASTRUCTURE INTERVENTION

8.11.2.1 Water Demand

The original scheme was designed for a basic supply of 60 ℓ/c/d. Bulk supply pipelines was designed for the summer daily demand of 75ℓ/c/d. Allowance was made for water losses, summer peak demands and downtime. However, the demand model used in this study indicated that the 2035 water demand would be 3,2Mℓ/d and is based on a scheme design capacity of a basic supply of 100ℓ/c/d.

8.11.2.2 Water Resource Consideration

The main water source is the Mzimvubu river from where the water is treated by the existing 2,5Mℓ Tombo WTP.

8.11.2.3 Water Supply Infrastructure

The existing Tombo WTP would need to be eventually upgraded to 3,5Mℓ/d to meet the 2035 water demand, an increase of 1Mℓ/d. Water would be stored within one (1) 2Mℓ/d command reservoir from where it will be distributed to 23 service reservoirs ranging from 100kℓ to 500kℓ. The proposed bulk supply pipelines of 88km would range from 50mm to 500mm in diameter.

8.11.2.4 Financial Requirements

The cost estimate for the required upgrade works to meet the 2035 demand amounts to R72.2 million and is tabled overleaf.

Corridor	Direct Est Cost	Indirect Est Cost	Total
	(Construction)	(Fees, Geotech, EIA, Disb Etc)	(Inc Contingencies, Escalation, VAT)
	Tombo RWSS	R 37 907 058	R 34 341 267

The scheme development cost per household is R 11 158. Due to the size of the project, it will take at least seven years to complete.

8.12 NYA003 WSIA: NGQELENI RWSS

8.12.1 DEMAND MODEL INTERVENTION

8.12.2 WATER DEMAND

According to ORTDM planning, the demand analysis was carried out with the assumption of 60ℓ/c/d with an increase of 1% over a 20-year planning horizon. The projected ultimate 20-year (2024) Annual Average Daily Demand (AADD) is assumed to be 2,75Mℓ/d. In terms of this UAP Phase 2, the projected 2035 demand based on a minimum per capita demand of 100 litres is 8,65Mℓ/d.

8.12.3 WATER RESOURCE CONSIDERATION

Water would be sourced from two different sources, e.g. the Lalini reservoir and the Second Falls Abstraction. Both are fed from the Mthatha river. In the case of the Second Falls Abstraction, a water use application for 6Mℓ/d is currently under consideration along the Mthatha River downstream of the Second Falls Eskom Power Station to supply a wider area, possibly including wards 13, 14 and 21 and other parts of Nyandeni Local Municipality too.

Water will be pumped from the Lalini reservoir (7,4Mℓ capacity) to the 500kℓ Mdoni reservoir. From the Mdoni reservoir water would be pumped to the 10Mℓ Polini reservoir from where it will continue to gravitate to the Ngqeleni reservoir. The corridor of Ngqeleni would be fed from the reservoirs and tee off from the gravity line.

8.12.4 WATER SUPPLY INFRASTRUCTURE

The current Eskom Second Falls abstraction works would be the water source. Water would be abstracted from the Mthatha River downstream of the Eskom weir. Water will be treated close to the abstraction point (elevation 530m) and then pumped for about 3 700m over a 300m head to a Command Reservoir at elevation 850m. The infrastructure to be provided will thus include the construction of an abstraction facility, treatment Plant and storage and pump station at Second Falls. From this point it will be necessary to pump water to a Command Reservoir at elevation 850m. From the Command Reservoir it will be possible to gravitate to distribution reservoirs in each ward including.

8.12.5 FINANCIAL REQUIREMENT

The proposed scheme development cost is R 875 045 822 broken down as detailed in the table overleaf.

(Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Additional Costs	TOTAL
	(Construction)	(Fees, Geotech & survey)	(EIA, ISD, Contingencies etc)	
Primary Bulk	R 149 724 325	R 20 454 429	R 94 326 325	R 264 505 078
Secondary Bulk	R 331 911 173	R 54 790 171	R 209 104 039	R 595 805 383
Tertiary Bulk	R 7 059 834	R 1 227 832	R 6 447 695	R 14 735 361
Total	R 488 695 332	R 76 472 431	R 309 878 059	R 875 045 822

The scheme development cost per household is R 72 708. Due to the size of the project, it will take at least nine years to complete

8.12.6 EXISTING PROPOSED INFRASTRUCTURE INTERVENTION

8.12.6.1 Water Demand

The demand analysis was carried out with the assumption of 60ℓ/c/d with an increase of 1% over a 30-year planning horizon. The projected ultimate 30-year Annual Average Daily Demand (AADD) is **assumed to be 3Mℓ/d**. The demands are summarized in Table 8.10: Estimated Water Demand below.

Table 8.10: Estimated Water Demand

Demand : 60ℓ/c/d with 1% Growth & 20% Losses (AADD) (Mℓ/d)							
Year	2014	2019	2024	2029	2034	2039	2044
Nyandeni Villages							
Ward 13	0,71	0,74	0,78	0,82	0,86	0,91	0,95
Ward 14	1,00	1,05	1,11	1,16	1,22	1,28	1,35
Ward 21	0,55	0,58	0,61	0,64	0,67	0,71	0,74
Total Demand	2,26	2,37	2,50	2,62	2,75	2,90	3,04

8.12.6.2 Water Resource Consideration

Water would be sourced from two different sources, e.g. the Lalini reservoir and the Second Falls Abstraction. Both are fed from the Mthatha river. In the case of the Second Falls Abstraction, a water use application for 6Mℓ/d is currently under consideration along the Mthatha River downstream of the Second Falls Eskom Power Station to supply a wider area, possibly including wards 13, 14 and 21 and other parts of Nyandeni Local Municipality too.

Water will be pumped from the Lalini reservoir (7,4Mℓ capacity) to the 500kℓ Mdoni reservoir. From the Mdoni reservoir water would be pumped to the 10Mℓ Polini reservoir from where it will continue to gravitate to the Ngqeleni reservoir. The corridor of Ngqeleni would be fed from the reservoirs and tee off from the gravity line.

8.12.6.3 Water Supply Infrastructure

The current Eskom Second Falls abstraction works would be the water source. Water would be abstracted from the Mthatha River downstream of the Eskom weir. Water will be treated close to the abstraction point (elevation 530m) and then pumped for about 3 700m over a 300m head to a Command Reservoir at elevation 850m. It will also include the construction of an abstraction facility, treatment Plant and storage and pump station at Second Falls at elevation. From this point it will be necessary to pump water to a Command Reservoir (24 hrs storage) at elevation 850m. From the Command Reservoir it will be possible to gravitate to distribution reservoirs in each ward including Ward 14 and 21 Reservoirs. This option can also supplement supply to the Ngqeleni Corridor.

The Ngqeleni Corridor depends on the completion of the following Main Bulk Infrastructure projects:

- Constructing a new 50Mℓ/d waterworks (Rosedale);
- Construction of a 400mm diameter line to Lalini;
- Construction of a 1Mℓ exchange reservoir and pump station at Lalini;
- Construction of two 300mm diameter rising mains to Mdoni and Polini;
- Construction of a 300mm diameter gravity main to Ngqeleni; and
- Construction of Mdoni (500kℓ), Polini (10Mℓ) and Ngqeleni (Mℓ) Reservoirs.

The pipes of the Ngqeleni Corridor range from 63mm HDPE pipes to 250mm diameter GRP pipes with a total length of approximately 33km. The storage for the Ngqeleni Corridor is sized for a 48hr AADD (Pumped storage requirements). All the villages are provided with 48hr storage, although not necessarily in the local reservoir, they are balanced with other storages along their route. Approximately 9 reservoirs are planned.

8.12.6.4 Financial Requirement

The proposed scheme development cost is R 431 456 336. The scheme development cost per household is R 35 850. Due to the size of the project, it will take at least seven years to complete.

Secondary Bulk Item	Amount
Pipe Lines (90km)	R 18 232 451.89
Reservoirs (23)	R 41 468 537.32
Pump Stations	R 935 000.00
	R 60 635 989.21
P&G @ 15%	R 9 095 398.38
	R 69 731 387.59
Contingencies @ 10%	R 6 973 138.76
Sub Total	R 76 704 526.35
Escalation 2.8%	R 6 136 362.11
Professional fees	R 10 459 708.14
Sub Total	R 93 300 596.60
Vat @ 14%	R 13 062 083.52
Total	R 106 362 680.12

8.13 NYA004 WSIA: CIBENI-NTLAMBENI RWSS

8.13.1 DEMAND MODEL INTERVENTION

8.13.1.1 Water Demand

The demand analysis was carried out with the assumption of 100ℓ/c/d and the resultant 2035 demand is 13,7Mℓ/d (4,98 million m³ per annum). This is an increase of 168% over a 20-year period when compared to the 5,1Mℓ/d 2015 demand.

8.13.1.2 Water Resource Consideration

The source would be the Mzimvubu River which is has not been largely utilized for water supply purposes. The yield of the river is quoted as 2 987Mm³ per annum.

8.13.1.3 Water Supply Infrastructure

A command reservoir will be positioned strategically to gravity feed zonal storage reservoirs, which will in turn supply different zones. Water will be pumped from the treatment plant into the main command reservoir, from which it will gravitate to the zonal reservoirs. The proposed infrastructure includes the following:

- Abstraction works on the Mzimvubu River;
- A 14Mℓ/d Mngazana WTP upgrade;
- Storage reservoirs with a combined capacity of 28Mℓ;
- Secondary bulk pipelines; and
- Tertiary pipelines with a combined capacity of 292km.

8.13.1.4 Financial requirement

The proposed project cost is estimated at R 1 770 billion and tabled below.

(Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Additional Costs	TOTAL
	(Construction)	(Fees, Geotech & survey)	(EIA, ISD, Contingencies etc)	
Primary Bulk	R 110 781 600	R 10 081 126	R 69 792 408	R 190 655 134
Secondary Bulk	R 292 340 560	R 40 652 279	R 184 174 553	R 517 167 392
Tertiary Bulk	R 589 492 177	R 110 621 456	R 373 380 071	R 1 073 493 704
Total	R 992 614 337	R 161 354 861	R 627 347 032	R 1 781 316 230

The scheme development cost per household is R 92 820. Due to the size of the project, it will take at least ten years to complete.

8.13.2 EXISTING PROPOSED INFRASTRUCTURE INTERVENTION

8.13.2.1.1 Water Demand

The demand analysis was carried out with the assumption of 60ℓ/c/d with an increase of 1% over a 30-year planning horizon. The projected summer peak demand for the proposed scheme is 14,08Mℓ/d.

8.13.2.2 Water Resource Consideration

The source would be the Mzimvubu River which is has not been largely utilized for water supply purposes. The yield of the river is quoted as 2 987Mm³ per annum.

8.13.2.3 Water Supply Infrastructure

A command reservoir will be positioned strategically to gravity feed zonal storage reservoirs, which will in turn supply different zones. Water will be pumped from the treatment plant into the main command reservoir, from which it will gravitate to the zonal reservoirs. Ten (10) zone concrete reservoirs, ranging from 500kℓ to 1,65Mℓ are proposed in ten supply zones. The proposed works would require the installation of approximately 610km of bulk supply pipelines, ranging from 50mm to 500mm in diameter. The bulk supply pipelines would be designed to convey the summer daily demand. 160 concrete service reservoirs, ranging from 30kℓ to 500kℓ are proposed. These reservoirs will be gravity feed from zonal reservoirs.

8.13.2.4 Financial requirement

The proposed project cost is estimated at R 1 246 million and tabled below.

Item	Amount	P&Gs @ 10%	Contingencies @ 10%	Estimated Amount
Primary Main				
Command Reservoirs	R 15 994 382.00	R 17 593 820.20	R 1 759 382.02	R 19 353 202.22
Secondary Main	R 168 363 262.69	R 185 199 588.96	R 18 519 958.90	R 203 719 547.85
Zone Command Reservoirs	R 15 654 486.00	R 17 219 934.60	R 1 721 993.46	R 18 941 928.06
Tertiary Main	R 171 186 091.00	R 188 304 700.10	R 18 830 470.01	R 207 135 170.11
Village Reservoirs	R 50 340 946.00	R 55 375 040.60	R 5 537 504.06	R 60 912 544.66
Village Internal Reticulation	R 208 851 250.00	R 229 736 375.00	R 22 973 637.50	R 252 710 012.50
Access Roads	R 184 800 000.00	R 203 280 000.00	R 20 328 000.00	R 223 608 000.00
Professional Fees	R 106 815 202.49			R 106 815 202.49
Total excl VAT				R 1 093 195 607.89
Grand Total				R 1 246 242 993.00

The scheme development cost per household is R 64 939. Due to the size of the project, it will take at least seven years to complete.

8.14 PSJ001 WSIA: PORT ST JOHNS RWSS

8.14.1 DEMAND MODEL INTERVENTION

8.14.1.1 Water Demand

The scheme will supply mainly rural communities hence the demand is not expected to exceed 100ℓ/c/d.

8.14.1.2 Water Resource Consideration

The scheme is based on surface water abstraction from run-of-river flow in the Mngazi River. The scheme serves 17 villages under the administration areas of Tombo, Gomolo, Mawosheni and Swazini.

8.14.1.3 Water Supply Infrastructure

The scheme was commissioned in 2000 and consisted of the following:

- River abstraction from Mngazi River and raw water pumping main;
- Water Treatment Plant with a capacity of 2Mℓ/d;
- The two CURO model 65/80 LTF pumps powered by 65/75kW 2 pole motors. This system has a capacity of 20ℓ/s;
- Clear water pumping main to a main reservoir of 340kℓ capacity. The rising main is 150mm diameter steel and is protected by a Bermad surge anticipating valve installed in the pump house;
- Gravity bulk mains of a total length of about 54km supplying 23 reservoirs; and
- About 55km of internal reticulation and 236 communal standpipes.

The upgrade works required to meet the projected 2035 demand include upgrading of the abstraction works, Water Treatment Plant and storage reservoirs with construction of reticulation/tertiary pipelines.

8.14.1.4 Financial Requirement

The cost estimate to upgrade the works to meet the 2035 demand amounts to R 116,7 million and is tabled below.

(Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Additional Costs	TOTAL
	(Construction)	(Fees, Geotech & survey)	(EIA, ISD, Contingencies etc)	
Primary Bulk	R 20 968 800	R 1 908 161	R 11 427 996	R 34 304 957
Secondary Bulk	R 15 029 533	R 1 367 688	R 8 191 096	R 24 588 317
Tertiary Bulk	R 29 219 415	R 10 639 725	R 17 924 581	R 57 783 722
Total	R 65 217 749	R 13 915 574	R 37 543 673	R 116 676 995

The scheme development cost per household is R 26 553. Due to the size of the project, it will take at least seven years to complete.

8.14.2 EXISTING PROPOSED INFRASTRUCTURE INTERVENTION

8.14.2.1 Water Demand

The scheme will supply mainly rural communities hence the demand is not expected to exceed 100ℓ/c/d.

8.14.2.2 Water Resource Consideration

The scheme is based on surface water abstraction from run-of-river flow in the Mngazi River. The scheme serves 18 villages under the administration areas of Tombo, Gomolo, Mawosheni and Swazini.

8.14.2.3 Water Supply Infrastructure

The scheme was commissioned in 2000 and consisted of the following:

- River abstraction from Mngazi River and raw water pumping main;
- Water Treatment Plant with a capacity of 2Mℓ/d;
- The two CURO model 65/80 LTF pumps powered by 65/75kW 2 pole motors. This system has a capacity of 20ℓ/s;
- Clear water pumping main to a main reservoir of 340kℓ capacity. The rising main is 150mm diameter steel and is protected by a Bermad surge anticipating valve installed in the pump house;
- Gravity bulk mains of a total length of about 54km supplying 23 reservoirs; and
- About 55km of internal reticulation and 236 communal standpipes.

8.14.2.4 Financial Requirement

The cost estimate to upgrade the works to meet the 2035 demand amounts to R97,5 million and is tabled below.

Corridor (Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Total
	(Construction)	(Fees, Geotech, EIA, Disb Etc)	(Inc Contingencies, Escalation, VAT)
Port St Johns RWSS	R 68 746 017	R 28 796 232	R 97 542 249

The scheme development cost per household is R 22 199. Due to the size of the project, it will take at least seven years to complete.

8.15 PSJ002 WSIA: PORT ST JOHNS TOWN WSS

8.15.1 DEMAND MODEL INTERVENTION

8.15.1.1 Water Demand

The projected 2035 demand is 0,64Mm³ per annum (1,8Mℓ/d). This demand will exceed the yield of 0.360Mm³ per annum (1,0Mℓ/d) on the Bulolo River. This demand shortfall of 0,28Mm³ per annum (0,8Mℓ/d) could be managed by implementing water conservation and demand management initiatives due to the relatively small magnitude of the shortfall.

8.15.1.2 Water Resource Consideration

The area served by this scheme is located to the west of the Umzimvubu River, to the south of the Mthatha - to Port St Johns Road (R61) and to the east of the watershed between the Mngazi and Mngazanana rivers. The scheme receives raw water from the two Bulolo Dams and a weir, which are situated on the Bulolo River. The second dam commands a catchment area of 3,2km² and an estimated capacity of 3 000m³. The main Bulolo Dam has a catchment area of 6,8km² and a capacity of 255 000m³ and Bulolo Weir with a catchment area of 10,2km² and capacity of 3 000m³. The yield, based on 1:50 year return period, of all existing dams in the system amounts to an estimated 0,36Mm³ per annum, or a fraction under 1 000m³/d made up of approximately 960m³/d from dams and 40m³/d from the weir.

8.15.1.3 Water Supply Infrastructure

The bulk supply infrastructure is generally new and has a remaining life of 10 to 20 years, except for the older portions of the scheme, which have a remaining life of approximately 5 to 10 years. The bulk main into town leaks and requires remedial works, whilst the Bulolo Dams require riprap and other minor remedial works. The reticulation in the rural villages is new, whilst that in the town is in a good condition. Telemetry is required in order to improve the scheme's operations and supply efficiency. The scheme has been implemented in number of phases and it consists of the following infrastructure:

- River abstraction and two storage dams. To supplement the dam storage, off-channel from Mngazi River will be utilised in future;
- 250mm diameter raw water pumping main and Water Treatment Plant of 4Mℓ/d capacity;
- Clear water pumping main to a main reservoir, which services six villages via 32km of internal reticulation and 107 communal standpipes;
- A gravity main supply the town of Port St Johns with about 50km of reticulation network and the Silaka Nature Reserve via the old Water Treatment Plant converted to storage facilities; and
- The total length of bulk mains is approximately 48km.

8.15.1.4 Financial Requirement

The bulk main into town leaks and requires remedial works, whilst the Bulolo Dams require riprap and other minor remedial works. There are therefore no bulk water supply infrastructure interventions required except for O&M related interventions. ORTDM has estimated the required maintenance works at R125 000 000. (Base year cost requirement 2015) The scheme cost per household is R 53 123.

8.15.2 EXISTING PROPOSED INFRASTRUCTURE INTERVENTION

8.15.2.1 Water Demand

The projected 2035 demand will exceed the yield of the available raw water resources by 0,19Mm³ per annum (0,52Mℓ/d). This demand shortfall could be managed by implementing water conservation and demand management initiatives.

8.15.2.2 Water Resource Consideration

The area served by this scheme is located to the west of the Umzimvubu River, to the south of the Mthatha - to Port St Johns Road (R61) and to the east of the watershed between the Mngazi and

Mngazanana rivers. The scheme receives raw water from the two Bulolo Dams and a weir, which are situated on the Bulolo River. The second dam commands a catchment area of 3,2km² and an estimated capacity of 3 000m³. The main Bulolo Dam has a catchment area of 6,8km² and a capacity of 255 000m³ and Bulolo Weir with a catchment area of 10,2km² and capacity of 3 000m³. The yield, based on 1:50 year return period, of all existing dams in the system amounts to an estimated 0,36Mm³ per annum, or a fraction under 1 000m³/d made up of approximately 960m³/d from dams and 40m³/d from the weir.

8.15.2.3 Water Supply Infrastructure

The bulk supply infrastructure is generally new and has a remaining life of 10 to 20 years, except for the older portions of the scheme, which have a remaining life of approximately 5 to 10 years. The bulk main into town leaks and requires remedial works, whilst the Bulolo Dams require riprap and other minor remedial works. The reticulation in the rural villages is new, whilst that in the town is in a good condition. Telemetry is required in order to improve the scheme's operations and supply efficiency. The scheme was been implemented in number of phases and it consists of the following:

- River abstraction and two storage dams. To supplement the dam storage, off-channel from Mngazi River will be utilised in future;
- 250mm diameter raw water pumping main and Water Treatment Plant of 4Mℓ/d capacity;
- Clear water pumping main to a main reservoir, which services six villages via 32km of internal reticulation and 107 communal standpipes;
- A gravity main supply the town of Port St Johns with about 50km of reticulation network and the Silaka Nature Reserve via the old Water Treatment Plant converted to storage facilities; and
- The total length of bulk mains is approximately 48km.

8.15.2.4 Financial Requirement

The bulk main into town leaks and requires remedial works, whilst the Bulolo Dams require riprap and other minor remedial works. The estimate for the envisaged works is R 125 000 000. The scheme development cost per household is R 53 124. 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 (Mm³ per annum) per WSIA below.

Table 9.1: Water Requirements (Mm³ per annum) per WSIA

WSIA Name	Households (2015)	Population (2015)	Water Requirements (Million m ³ per annum)	
			2015	2035
KSD001 WSIA: Mthatha RWSS	98 916	399 625	24,18	33,94
KSD002 WSIA: Mthatha Regional Borehole Development	1 680	8 221	0,16	0,45
KSD003 WSIA: Mquandulu Corridor Development	15 291	74 888	1,65	4,33
KSD004 WSIA: Lukwethu Water supply	19 560	94 725	2,20	5,31
KSD005 WSIA: Coffee Bay RWSS	6 662	37 487	0,88	2,12
MHLO001 WSIA: Umzimvubu RWSS	68 453	276 218	8,52	13,45
NQH001 WSIA: Ngqushwa Hill RBWSS	57 190	291 073	7,34	17,10
NQH002 WSIA: Msikaba BRWSS	12 236	59 635	1,33	3,40
NYA001 WSIA: Second Falls RWSS	11 024	56 450	1,37	3,01
NYA002 WSIA: Tombo RWSS	6 475	26 434	0,96	1,51
NYA003 WSIA: Ngqeleni RWSS	12 035	57 928	1,29	3,16
NYA004 WSIA: Cibeni-Ntlambeni RWSS	19 191	93 041	1,86	4,98
PSJ001 WSIA: Port St Johns RWSS	4 394	22 929	0,45	1,24
PSJ002 WSIA: Port ST Johns Town Supply	2 353	6 597	0,50	0,64
Grand Total	335 460	1 505 251	52,71	94,63

A total of 94,633 Million m³ per annum is required with the Mthatha RWSS requiring the largest portion at 35,9% of the total water demand in ORTDM.

9.2 TOTAL WATER RESOURCES REQUIRED

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 9.2: Water Requirements (Mm³ per annum) per WSIA below.

Table 9.2: Water Requirements (Mm³ per annum) per WSIA

WSS	Population (2015)	2035 Demand (Mm ³ per annum)	Existing Resources Yield		Proposed Additional under UAP Phase 2 (Mm ³ /a)	Total	Balance
			(Mm ³ per annum)				(Mm ³ per annum)
KSD001 WSIA: Mthatha RWSS	399 625	33,94	147,54*	Mthatha Dam	-	145,54	-
KSD002 WSIA: Mthatha Regional Borehole Development	8 221	0,45	No data	Boreholes	-	No data	Boreholes
KSD003 WSIA: Mqanduli Corridor Development	74 888	4,33	No data*		-	No data*	Mthatha Dam
KSD004 WSIA: Lukwethu Water supply	94 725	5,31	No data*		-	No data*	Mthatha Dam
KSD005 WSIA: Coffee Bay RWSS	37 487	2,12	No data	Mthatha River	-	No data*	
MHLO001 WSIA: Umzimvubu RWSS	276 218	13,45	2 987	Umzimvubu River	60	No data	-
NQH001 WSIA: Ngqushwa Hill RWSS	291073	17,1	1,02	Xura River	-	1,02	To be supplied from the proposed Nxuzi Dam
NQH002 WSIA: Msikaba RWSS	59 635	3,4	No data	Msikaba River	-	No data	
NYA001 WSIA: Second Falls	56 450	3,01	No data*	Mthatha River	-	No data*	

WSS	Population (2015)	2035 Demand (Mm ³ per annum)	Existing Resources Yield		Proposed Additional under UAP Phase 2 (Mm ³ /a)	Total	Balance
			(Mm ³ per annum)				(Mm ³ per annum)
RWSS							
NYA002 WSIA: Tombo RWSS	26 434	1,51	2 987	Mngazi River	-	No data	
NYA003 WSIA: Ngqeleni RWSS	57 928	3,16	0,995*	Nzwakazi Dam, Mtyu & Mtakatye Rivers	-	0,995*	To be supplied from Mthatha River or Dam
NYA004 WSIA: Cibeni-Ntlambeni RWSS	93 041	4,98	2 987	Umzimvubu River	-	2 987	Umzimvubu River
PSJ001 WSIA: Port St Johns RWSS	22 929	1,24	No data	Mngazi River	-	No data	
PSJ002 WSIA: Port ST Johns Town Supply	6 597	0,64	0,36	Bulolo River	-	0,28(made up through WCDM initiatives)	
Grand Total-	1 505 251	94,64	3136,55			3134,84	

*Figures are planned for extraction from Mthatha River system. ORTDM is planning for the construction of Ntabelanga Dam on the Tsitsa River with a capacity of 60Mm³. The yield of the dam has not been established at this stage.

9.2.1 MTHATHA DAM SYSTEM

The Mthatha Dam is planned a source of water for a number of the regional water scheme. This results in the Mthatha RWSS having the highest current and projected demand. The availability of water resources in Mthatha Dam for these schemes is analysed in the table below.

Table 9.3: Mthatha Dam Water Resource (Mℓ/d) per WSIA

WSS	Households (2015)	Population (2015)	2035 Demand (Mm ³ per annum)
KSD004 WSIA: Lukwethu Water supply	19 560	94 725	5,31
KSD003 WSIA: Mqanduli Corridor Development	15 291	74 888	4,33

WSS	Households (2015)	Population (2015)	2035 Demand (Mm ³ per annum)
KSD001 WSIA: Mthatha RWSS	98 916	399 625	33,94
NYA003 WSIA: Ngqeleni RWSS	12 035	57 928	3,16
Total			46,74

The yield of the Mthatha Dam is 145,5 million m³ per annum. The current Water Use Licence (WUL) dated April 2011 allows OR Tambo DM to abstract 55.080 million m³/a (equivalent to 150Ml/d) for both Thornhill and Rosedale WTPs. This allocation covers the combined upgraded capacity of Thornhill WTP to 80Ml/d and Phase 2 of Rosedale WTP to 50Ml/d. The abstraction allocation is adequate to meet the 2035 demand projections for the Mthatha RWSS. The balance of the water is used for hydro electrical power generation by Eskom.

NYA001 WSIA: Second Falls RWSS will also obtain water from Mthatha River downstream of the dam and downstream of the Second Falls post hydro electrical power generation by Eskom. It is thus envisaged that the 2035 demand of 2,3055Mm³ per annum should be met without problems.

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 9.4: Financial Requirements based on Demand Model Interventions

WSIA (Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Additional Costs	TOTAL
	(Construction)	(Fees, Geotech & survey)	(EIA, ISD, Contingencies etc)	
KSD001 WSIA: Mthatha RWSS	R 1 032 504 154	R 202 171 679	R 652 477 617	R 1 887 153 450
KSD002 WSIA: Mthatha Regional Borehole Development	R 0	R 5 000 000	R 0	R 5 000 000
KSD003 WSIA: Mqanduli Corridor Development	R 370 314 378	R 107 945 193	R 235 298 058	R 713 557 629
KSD004 WSIA: Lukwethu Water supply	R 809 539 768	R 214 794 196	R 512 010 054	R 1 536 344 018
KSD005 WSIA: Coffee Bay RWSS	R 225 953 791	R 43 982 149	R 144 350 888	R 414 286 828
MHLO001 WSIA: Umzimvubu RWSS-	R 2 878 077 573	R 287 101 129	R 1 815 188 871	R 4 980 367 573
NQH001 WSIA: Ngqushwa Hill RBWSS	R 2 747 632 229	R 605 601 012	R 1 733 008 304	R 5 086 241 545
NQH002 WSIA: Msikaba BRWSS	R 802 454 426	R 129 805 892	R 507 546 289	R 1 439 806 607
NYA001 WSIA: Second Falls RWSS	R 632 925 926	R 101 500 284	R 400 743 334	R 1 135 169 544

WSIA (Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Additional Costs	TOTAL
	(Construction)	(Fees, Geotech & survey)	(EIA, ISD, Contingencies etc)	
NYA002 WSIA: Tombo RWSS	R 151 577 043	R 85 637 881	R 129 177 252	R 366 392 176
NYA003 WSIA: Ngqeleni RWSS	R 488 695 332	R 76 472 431	R 309 878 059	R 875 045 822
NYA004 WSIA: Cibeni-Ntlambeni RWSS	R 992 614 337	R 161 354 861	R 627 347 032	R 1 781 316 230
PSJ001 WSIA: Port St Johns RWSS	R 65 217 749	R 13 915 574	R 37 543 673	R 116 676 995
PSJ002 WSIA: Port ST Johns Town Supply	R 106 250 000	R 15 625 000	R 3 125 000	R 125 000 000
TOTAL	R 11 303 756 706	R 2 050 907 281	R 7 107 694 431	R 20 462 358 417

A total estimate of R20 462 358 417 is required to eradicate the anticipated water services backlog by 2035. The primary bulk cost requirement comprises of 53,3% (R 10, 9 billion) of the total cost. The detail per WSIA for primary bulk is tabled within Table 9.5: Primary Bulk Cost requirement per WSIA below.

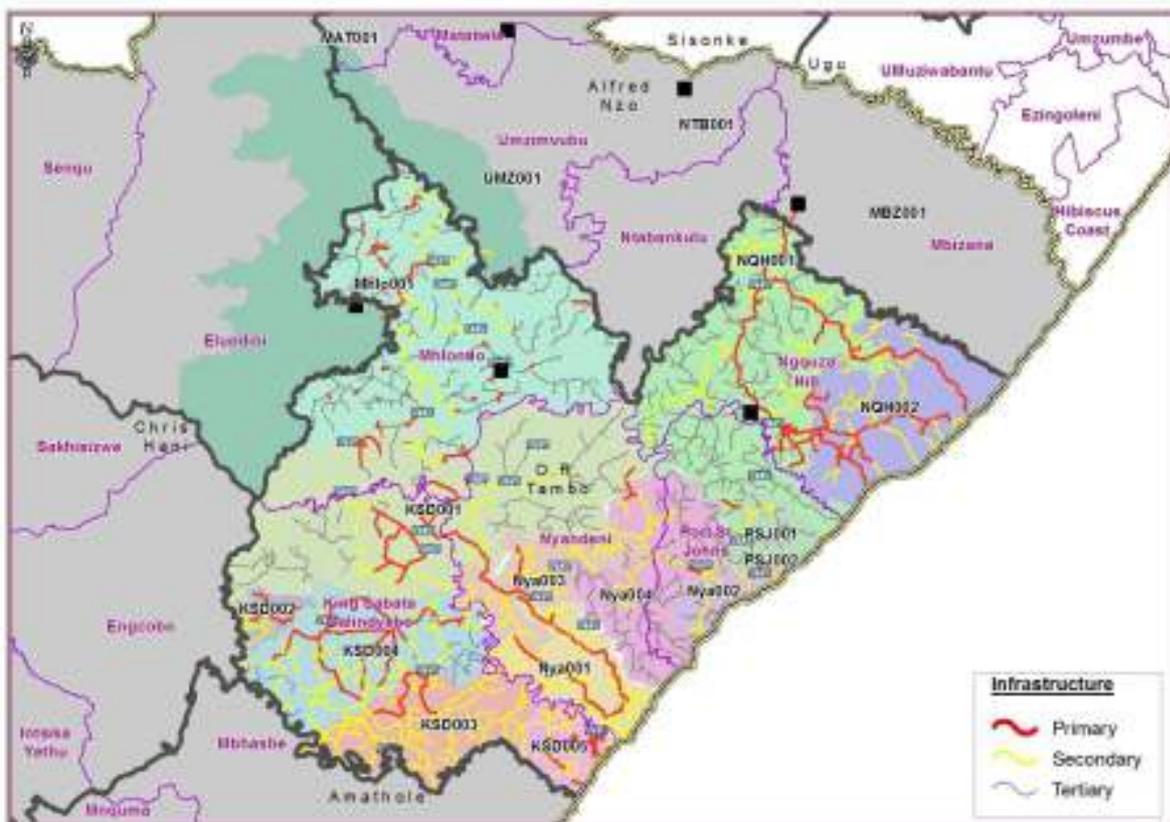
Table 9.5: Primary Bulk Cost requirement per WSIA

WSIA (Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Additional Costs	TOTAL
	(Construction)	(Fees, Geotech & survey)	(EIA, ISD, Contingencies etc)	
KSD001 Mthatha RWSS	R 640 830 316	R 100 572 504	R 403 723 099	R 1 145 125 919
KSD002 Mthatha Regional Borehole Development	R 0	R 5 000 000	R 0	R 5 000 000
KSD003 Mqanduli Corridor Development	R 330 427 676	R 37 678 950	R 208 169 436	R 576 276 061
KSD004 Lukwethu Water supply	R 178 244 620	R 44 297 881	R 114 294 111	R 336 836 611
KSD005 Coffee Bay RWSS	R 69 498 000	R 6 324 318	R 43 783 740	R 119 606 058
MHLO001 Umzimvubu RWSS	R 2 603 641 038	R 239 434 529	R 1 640 293 854	R 4 483 369 421
NQH001 Ngqushwa Hill RBWSS	R 1 259 910 263	R 199 002 637	R 793 743 466	R 2 252 656 367
NQH002 Msikaba BRWSS	R 451 053 869	R 66 998 059	R 284 163 938	R 802 215 866
NYA001 Second Falls RWSS	R 289 698 277	R 42 948 508	R 182 509 914	R 515 156 700
NYA002 Tombo RWSS	R 29 088 467	R 3 817 825	R 18 325 734	R 51 232 026
NYA003 Ngqeleni RWSS	R 149 724 325	R 20 454 429	R 94 326 325	R 264 505 078
NYA004 Cibeni-Ntlambeni RWSS	R 110 781 600	R 10 081 126	R 69 792 408	R 190 655 134
PSJ001 Port St Johns RWSS	R 20 968 800	R 1 908 161	R 11 427 996	R 34 304 957
PSJ002 Port ST Johns Town	R 106 250 000	R 15 625 000	R 3 125 000	R 125 000 000

WSIA (Base year cost requirement 2015)	Direct Est Cost	Indirect Est Cost	Additional Costs	TOTAL
	(Construction)	(Fees, Geotech & survey)	(EIA, ISD, Contingencies etc)	
Supply				
	R 6 240 117 251	R 794 143 927	R 3 867 679 021	R 10 901 940 198

The distinction between primary, secondary and tertiary bulk is illustrated within Figure 2: Bulk Infrastructure Requirements per WSIA below.

Figure 2: Bulk Infrastructure Requirements per WSIA



9.4 FUNDING OPTIONS

The ORTDM 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 ORTDM to address their water supply requirements. Another funding option that the ORTDM 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 ORTDM 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 fourteen (14) 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 ORTDM as the WSA. The ORTDM 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 ORTDM to take this process further.

10.2 SELECTION OF SOLUTIONS

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

- KSD001 WSIA: Mthatha RWSS;
- KSD002 WSIA: Mthatha Regional Borehole Development;
- KSD003 WSIA: Mqanduli Corridor Development;
- KSD004 WSIA: Lukwethu Water supply;
- KSD005 WSIA: Coffee Bay RWSS;
- NYA001 WSIA: Second Falls RWSS;
- NYA002 WSIA: Tombo RWSS;
- NYA003 WSIA: Ngqeleni RWSS;
- NYA004 WSIA: Cibeni-Ntlambeni RWSS;
- NQH001 WSIA: Ngqushwa Hill RBWSS;
- NQH002 WSIA: Msikaba BRWSS;
- PSJ001 WSIA: Port St Johns RWSS;
- PSJ002: WSIA: Port St Johns Town Supply; and
- MHLO001 WSIA: Umzimvubu RWSS.

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 as well as 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 – REFERENCE

Reference List

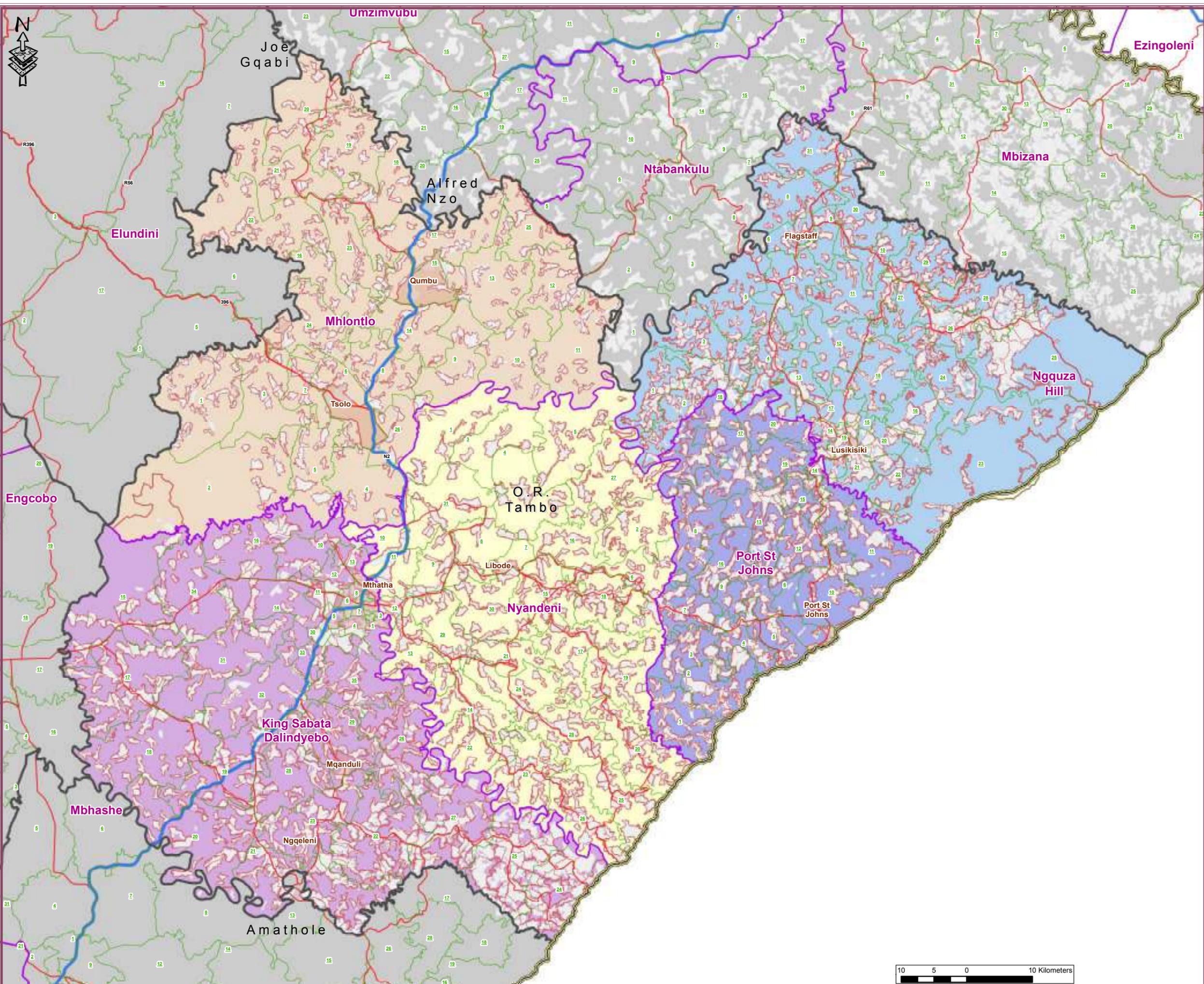
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ANNEXURE B – MAP SERIES

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 – King Sabata Dalindyebo
Figure 6.1.1	Existing Scheme Areas and Infrastructure Components – KSD001
Figure 6.1.2	Existing Scheme Areas and Infrastructure Components – KSD002
Figure 6.1.3	Existing Scheme Areas and Infrastructure Components – KSD003
Figure 6.1.4	Existing Scheme Areas and Infrastructure Components – KSD004
Figure 6.1.5	Existing Scheme Areas and Infrastructure Components – KSD005
Figure 6.2.	Existing Scheme Areas and Infrastructure Components – Mhlontlo
Figure 6.2.1	Existing Scheme Areas and Infrastructure Components – Mhlo001
Figure 6.3	Existing Scheme Areas and Infrastructure Components – Ngquza Hill
Figure 6.3.1	Existing Scheme Areas and Infrastructure Components – NQH001
Figure 6.3.2	Existing Scheme Areas and Infrastructure Components – NQH002
Figure 6.4	Existing Scheme Areas and Infrastructure Components – Nyandeni
Figure 6.4.1	Existing Scheme Areas and Infrastructure Components – Nya001
Figure 6.4.2	Existing Scheme Areas and Infrastructure Components – Nya002
Figure 6.4.3	Existing Scheme Areas and Infrastructure Components – Nya003
Figure 6.4.4	Existing Scheme Areas and Infrastructure Components – Nya004
Figure 6.5	Existing Scheme Areas and Infrastructure Components – Port St Johns
Figure 6.5.1	Existing Scheme Areas and Infrastructure Components – PSJ001
Figure 6.5.2	Existing Scheme Areas and Infrastructure Components – PSJ002
Figure 7	Projects –OR Tambo
Figure 7.1	Projects – King Sabata Dalindyebo
Figure 7.2	Projects – Mhlontlo
Figure 7.3	Projects – Ngquza Hill
Figure 7.4	Projects – Nyandeni
Figure 7.5	Projects –Port St Johns
Figure 8	Bulk Project Interventions –Alfred Nzo
Figure 8.1	Bulk Project Interventions – KSD001
Figure 8.2	Bulk Project Interventions – KSD002
Figure 8.3	Bulk Project Interventions – KSD003
Figure 8.4	Bulk Project Interventions – KSD004
Figure 8.5	Bulk Project Interventions – KSD005
Figure 8.6	Bulk Project Interventions – Mhlo001
Figure 8.7	Bulk Project Interventions – NQH001
Figure 8.8	Bulk Project Interventions – NQH002
Figure 8.9	Bulk Project Interventions – Nya001
Figure 8.10	Bulk Project Interventions – Nya002
Figure 8.11	Bulk Project Interventions – Nya003
Figure 8.12	Bulk Project Interventions – Nya004
Figure 8.13	Bulk Project Interventions – PSJ001
Figure 8.14	Bulk Project Interventions – PSJ002



Legend

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

DWS: Dept. of Water & Sanitation



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PROJECT TITLE

**OR Tambo DM: Universal Access
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MAP TITLE:

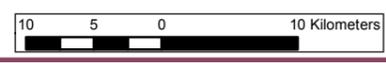
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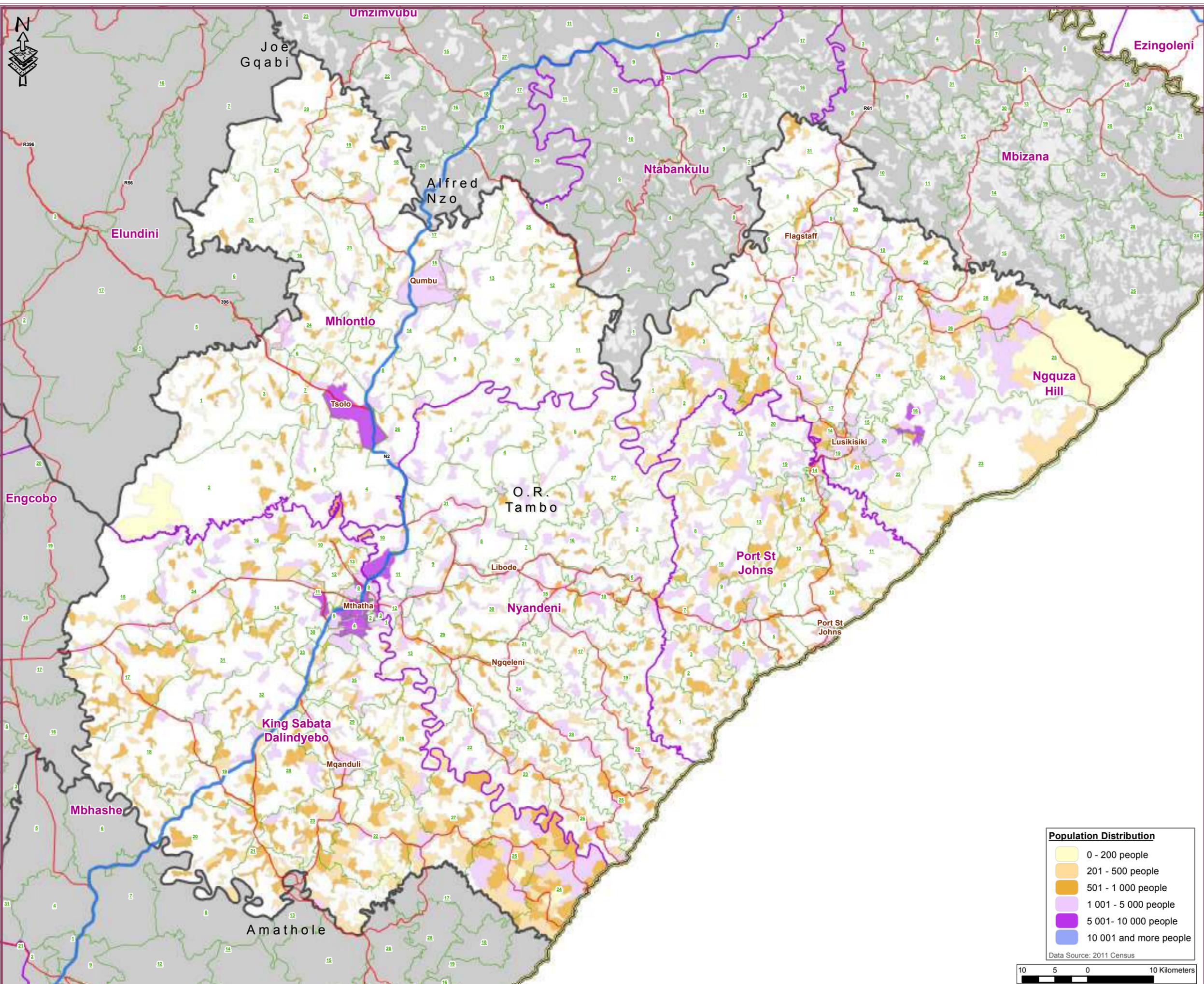
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2016/05/25

MAP NO.:

DC15 Figure 1





Legend

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
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MAP TITLE:

**General Orientation
 Population Distribution**

DATE COMPLETED:

2016/05/25

MAP NO.:

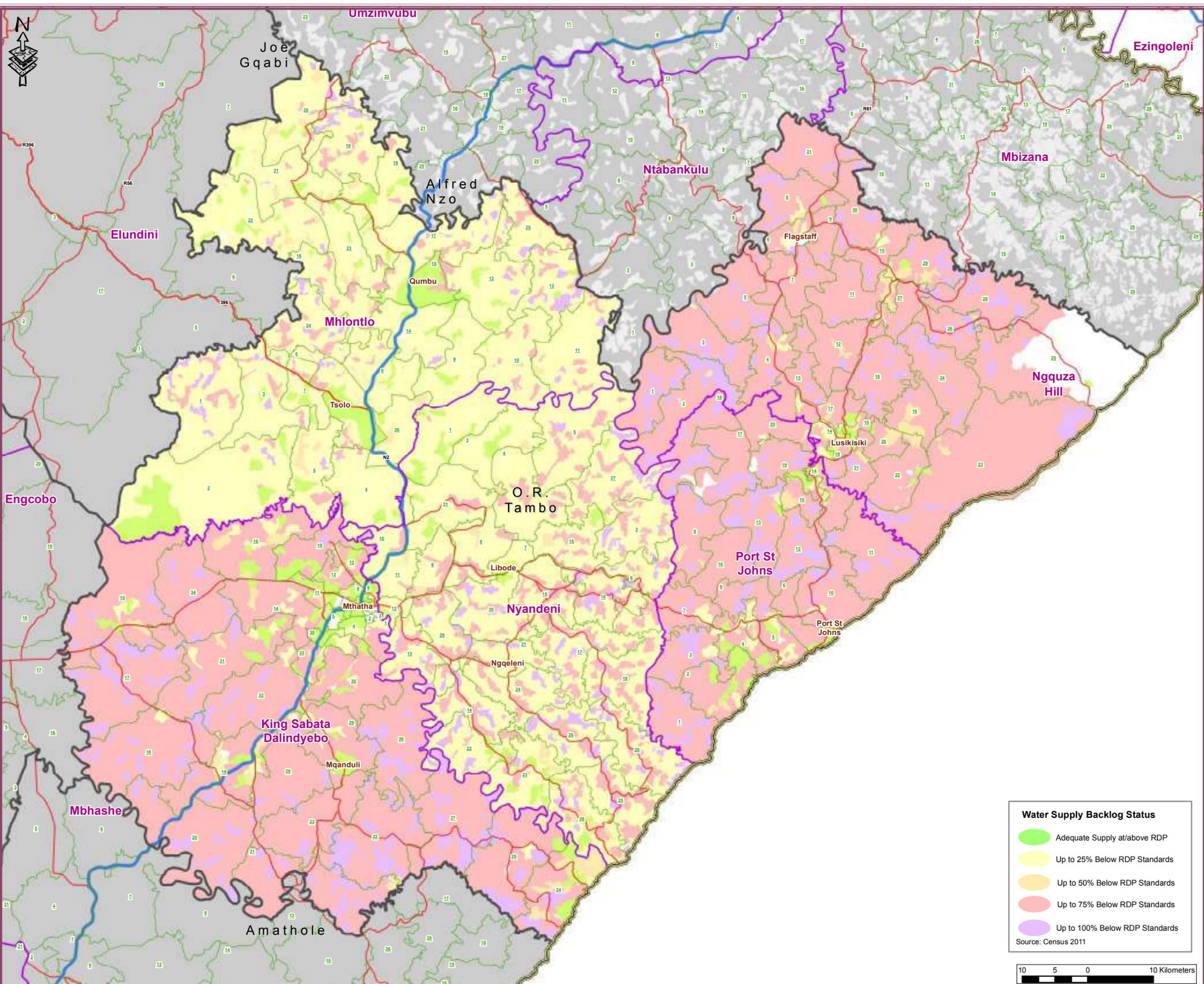
DC15 Figure 2

Population Distribution

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

Data Source: 2011 Census





Legend

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MAP TITLE:

Water Supply Backlog Status

DATE COMPLETED:

2016/05/25

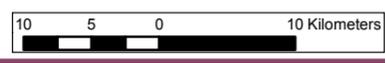
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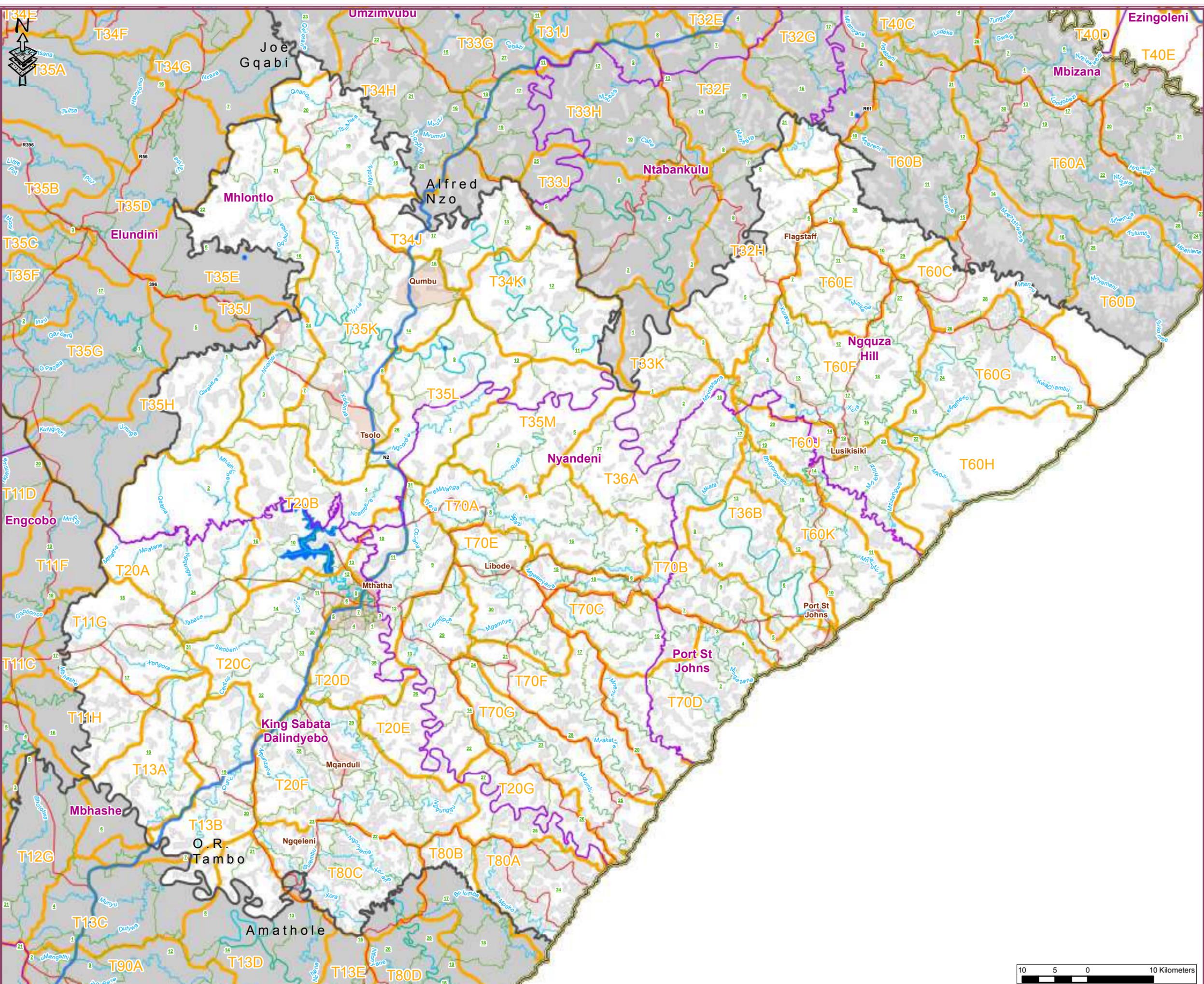
DC15 Figure 3

Water Supply Backlog Status

- Adequate Supply at/above RDP
- Up to 25% Below RDP Standards
- Up to 50% Below RDP Standards
- Up to 75% Below RDP Standards
- Up to 100% Below RDP Standards

Source: Census 2011

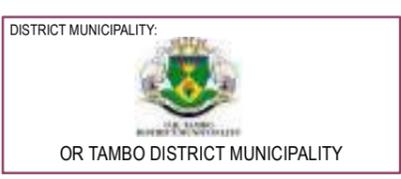




Legend

- 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

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MAP TITLE:

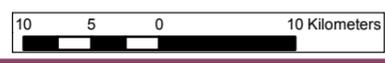
Surface Water Resources

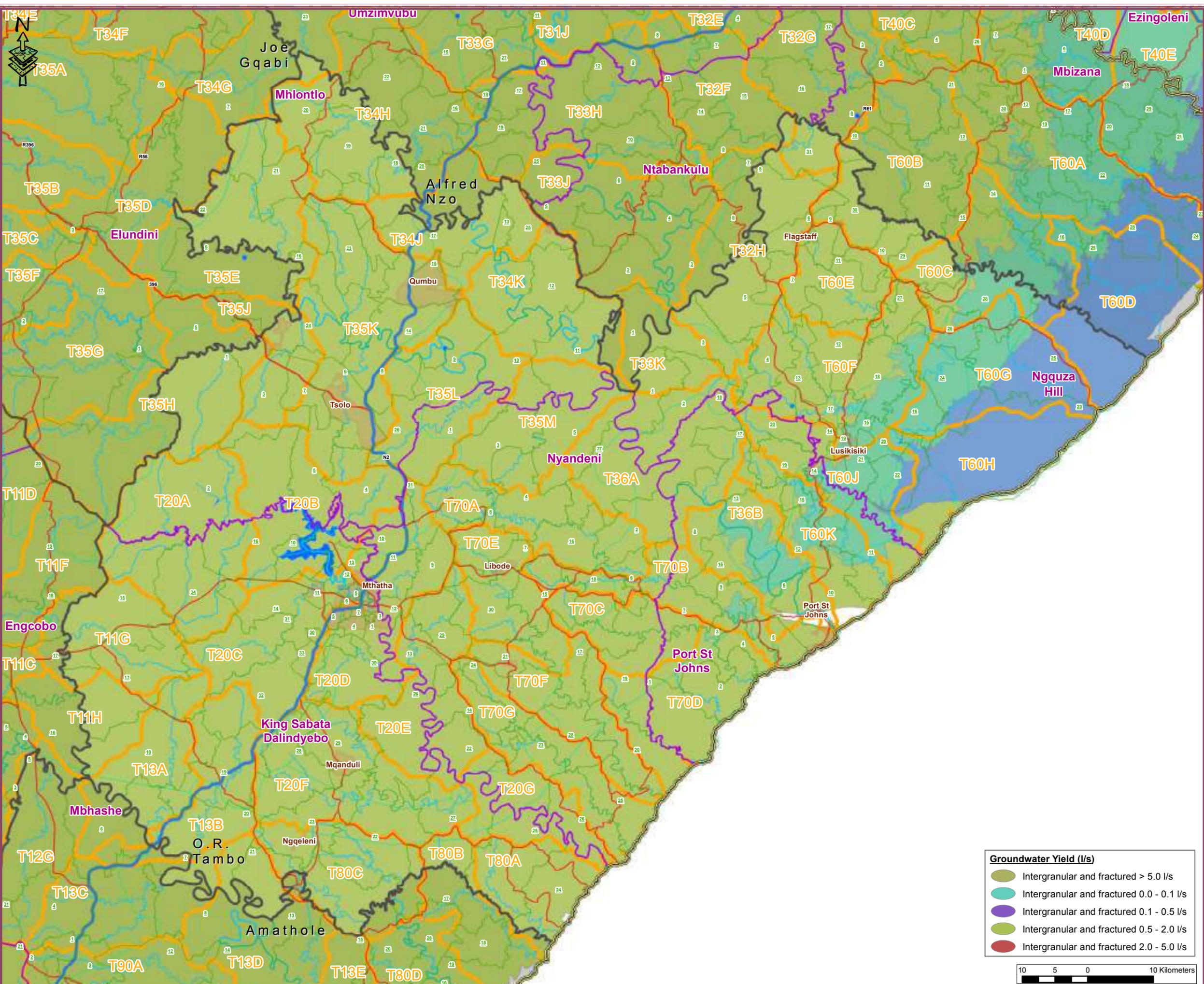
DATE COMPLETED:

2016/05/26

MAP NO.:

DC15 Figure 4





Legend

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Ward Boundaries & Numbers
- Census Main Places
- National Roads
- Main Roads
- Groundwater Aquifer Class: Minor

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MAP TITLE:

Gorundwater Resources

DATE COMPLETED:

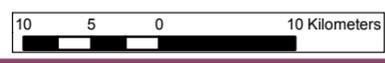
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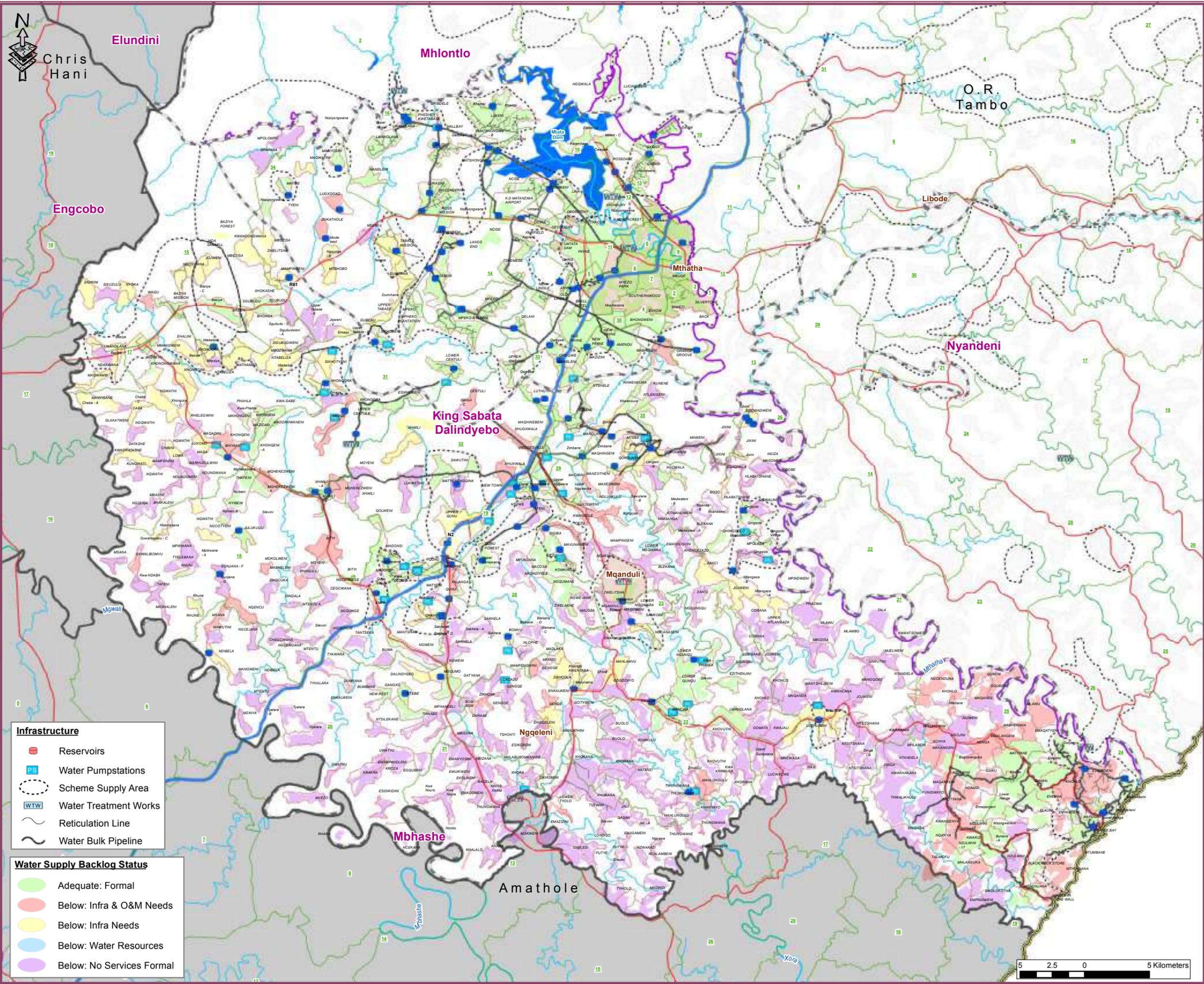
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DC15 Figure 5

Groundwater Yield (l/s)

- Intergranular and fractured > 5.0 l/s
- Intergranular and fractured 0.0 - 0.1 l/s
- Intergranular and fractured 0.1 - 0.5 l/s
- Intergranular and fractured 0.5 - 2.0 l/s
- Intergranular and fractured 2.0 - 5.0 l/s





Infrastructure

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

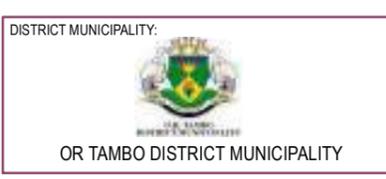
Water Supply Backlog Status

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

Legend

- Provincial Boundaries
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- 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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MAP TITLE:

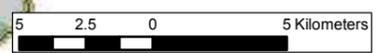
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 and Infrastructure Components:
 King Sabata Dalindyebo**

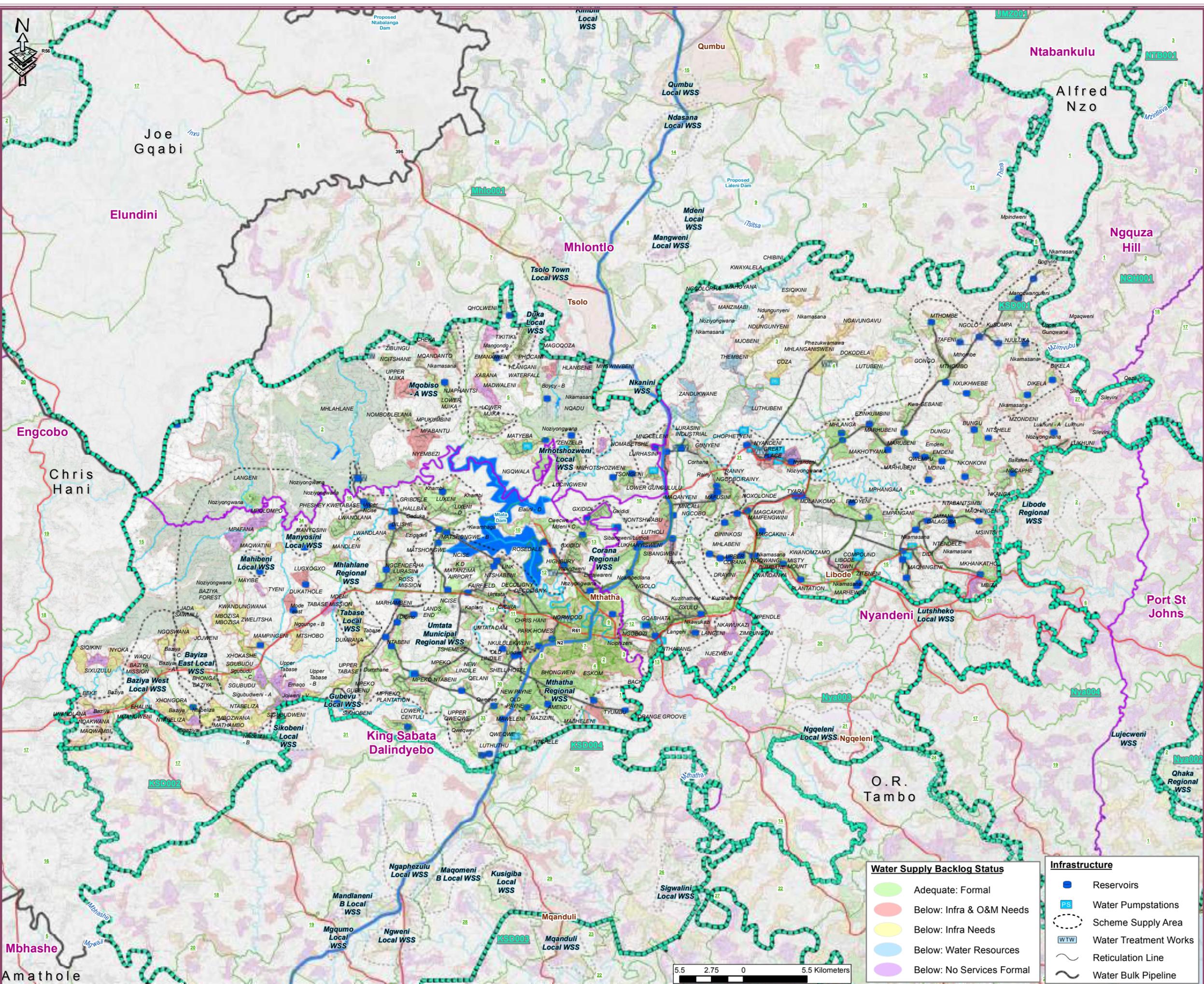
DATE COMPLETED:

2016/05/24

MAP NO.:

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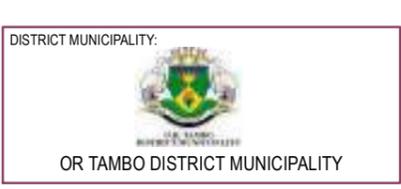




Legend

- 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
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PROJECT TITLE

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 Development of a Regional Water
 Supply Master Plan**

MAP TITLE: **Existing Scheme Areas
 and Infrastructure Components:
 King Sabata Dalindyebo -
 KSD001 Mthatha RWSS**

DATE COMPLETED: 2016/05/24

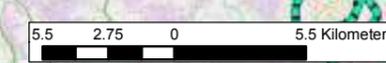
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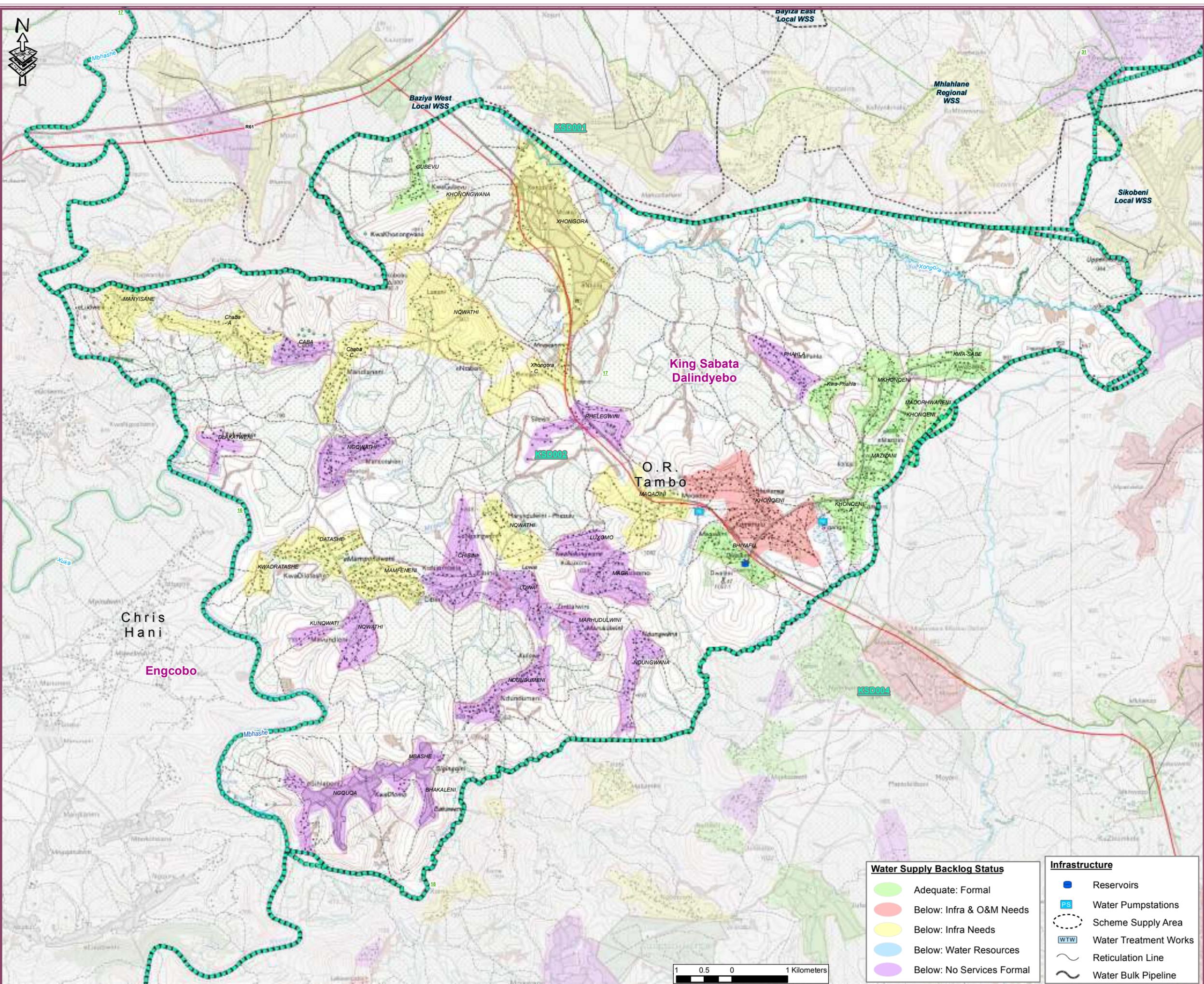
Water Supply Backlog Status

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

Infrastructure

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





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

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PROJECT TITLE

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

MAP TITLE: **Existing Scheme Areas and Infrastructure Components: King Sabata Dalindyebo - KSD002 Mhlahlane Regional Water Bulk Pipe**

DATE COMPLETED: 2016/05/24

MAP NO.: **DC15 Figure 6.1.2**

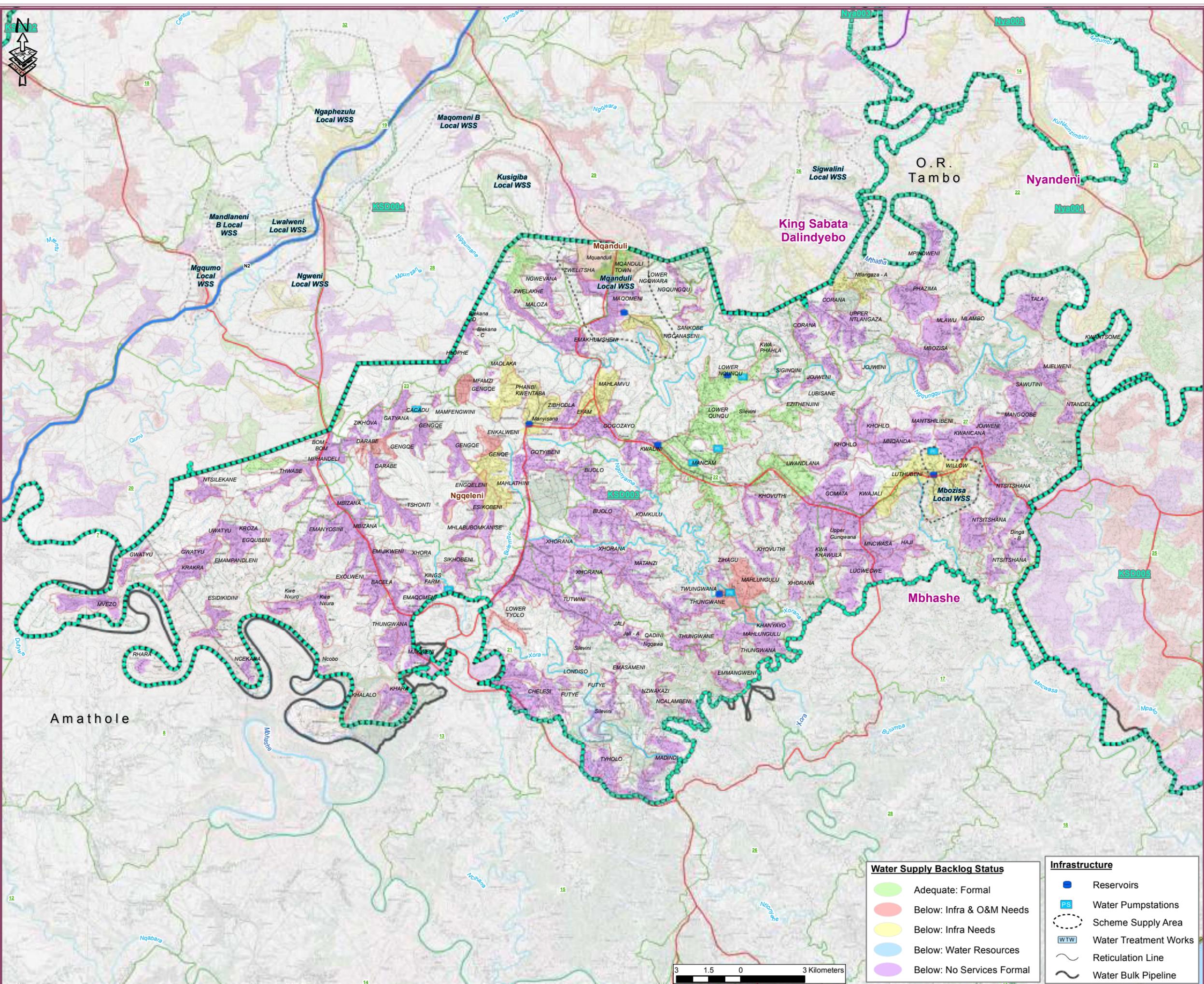
Water Supply Backlog Status

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

Infrastructure

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





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

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PROJECT TITLE

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

MAP TITLE: **Existing Scheme Areas and Infrastructure Components: King Sabata Dalindyebo - KSD003 Mqanduli Corridor Day**

DATE COMPLETED: 2016/05/24

MAP NO.: **DC15 Figure 6.1.3**

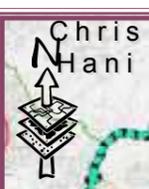
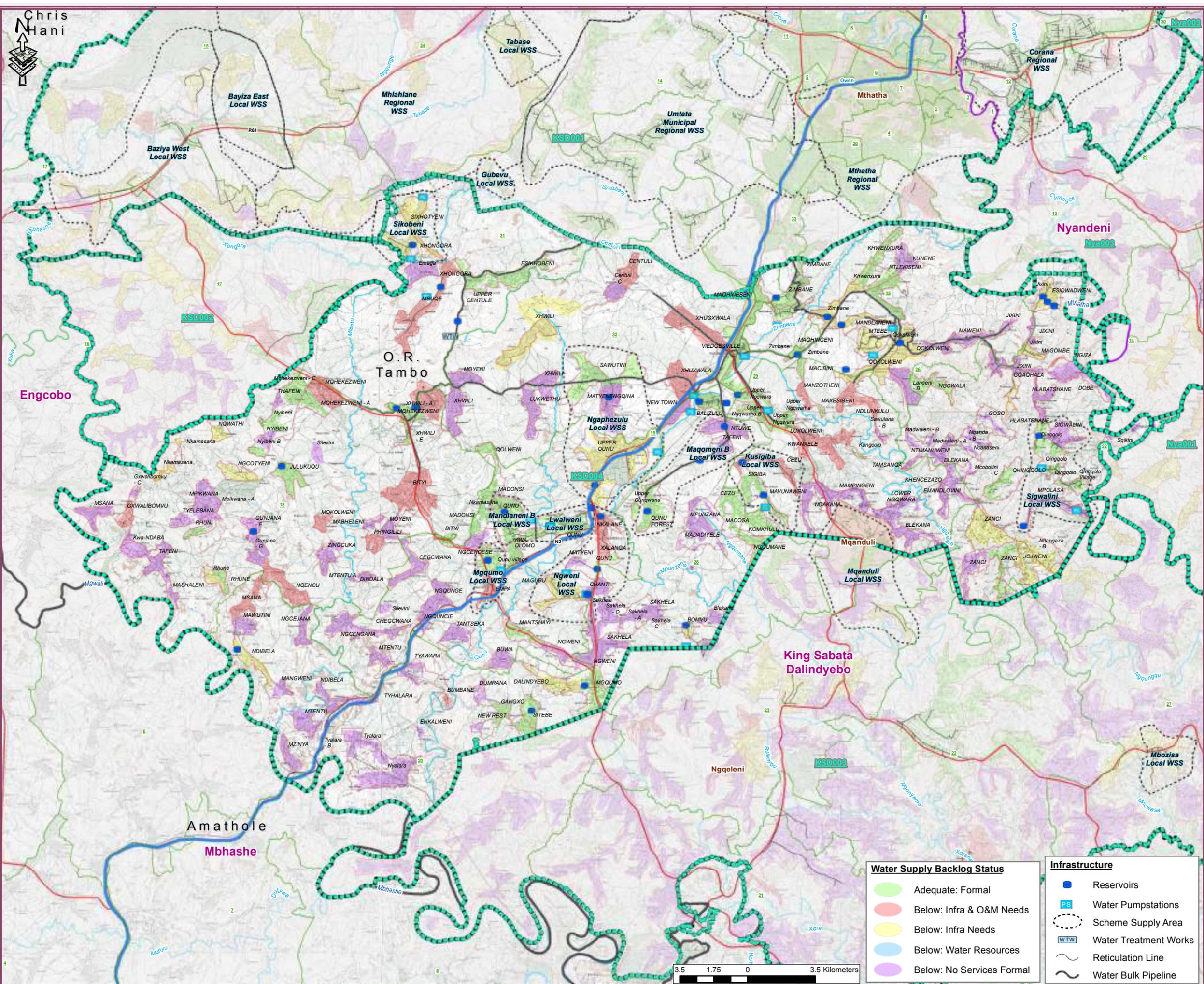
Water Supply Backlog Status

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

Infrastructure

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

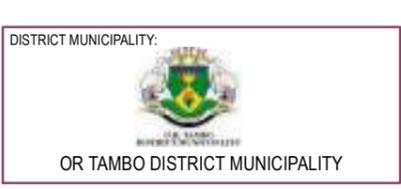




Legend

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

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PROJECT TITLE
**OR Tambo DM: Universal Access
 Plan Phase 2 - Progressive
 Development of a Regional Water
 Supply Master Plan**

MAP TITLE: **Existing Scheme Areas
 and Infrastructure Components:
 King Sabata Dalindyebo -
 KSD004 Lubuwa Water Supply**

DATE COMPLETED: 2016/05/24

MAP NO.: **DC15 Figure 6.1.4**

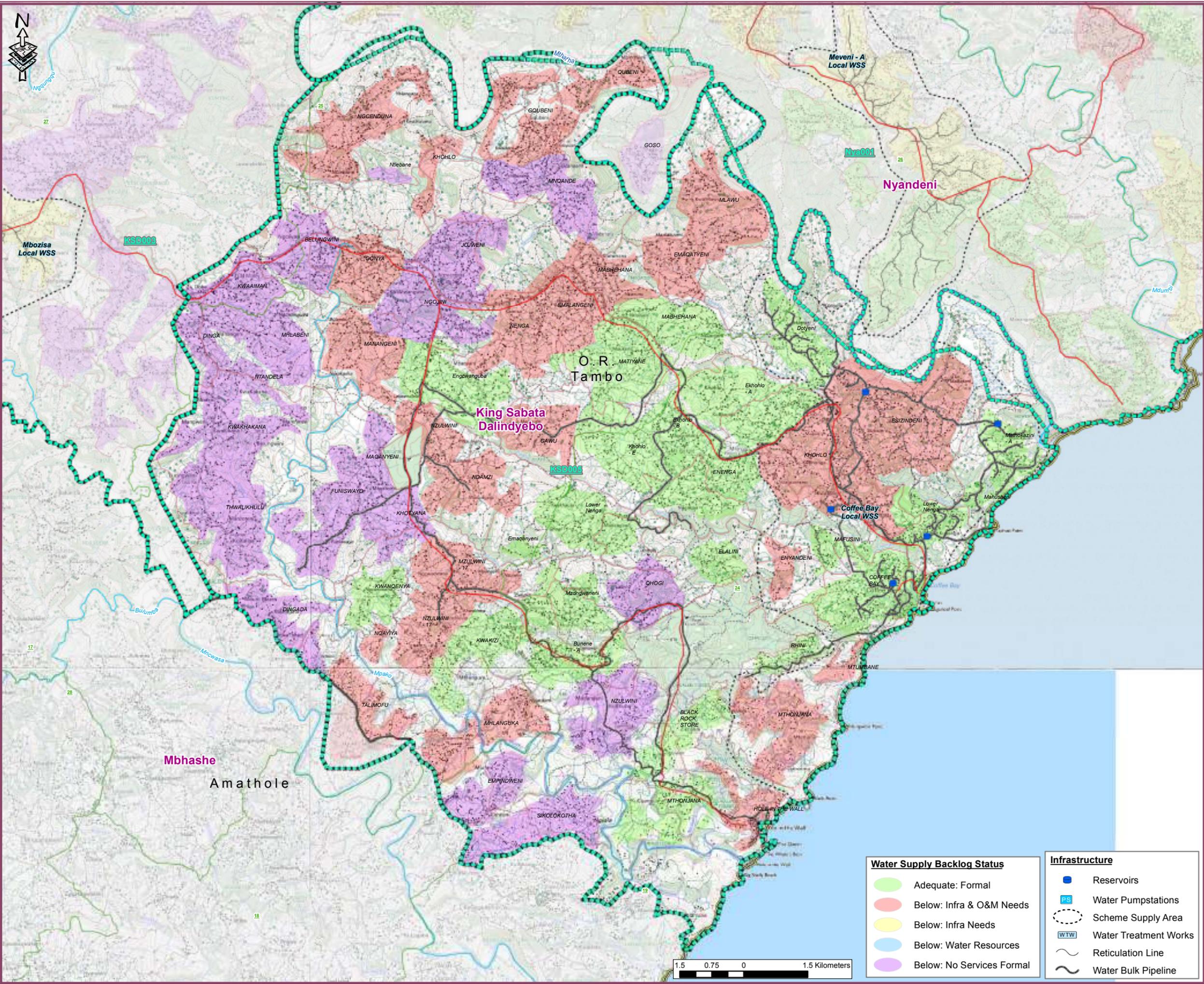
Water Supply Backlog Status

- Adequate: Formal
- Below: Infra & O&M Needs
- Below: Infra Needs
- Below: Water Resources
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Infrastructure

- Reservoirs
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Legend

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PROJECT TITLE

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

MAP TITLE: **Existing Scheme Areas and Infrastructure Components: King Sabata Dalindyebo - KSD001 Coffee Bay WSS**

DATE COMPLETED: 2016/05/24

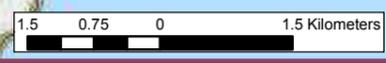
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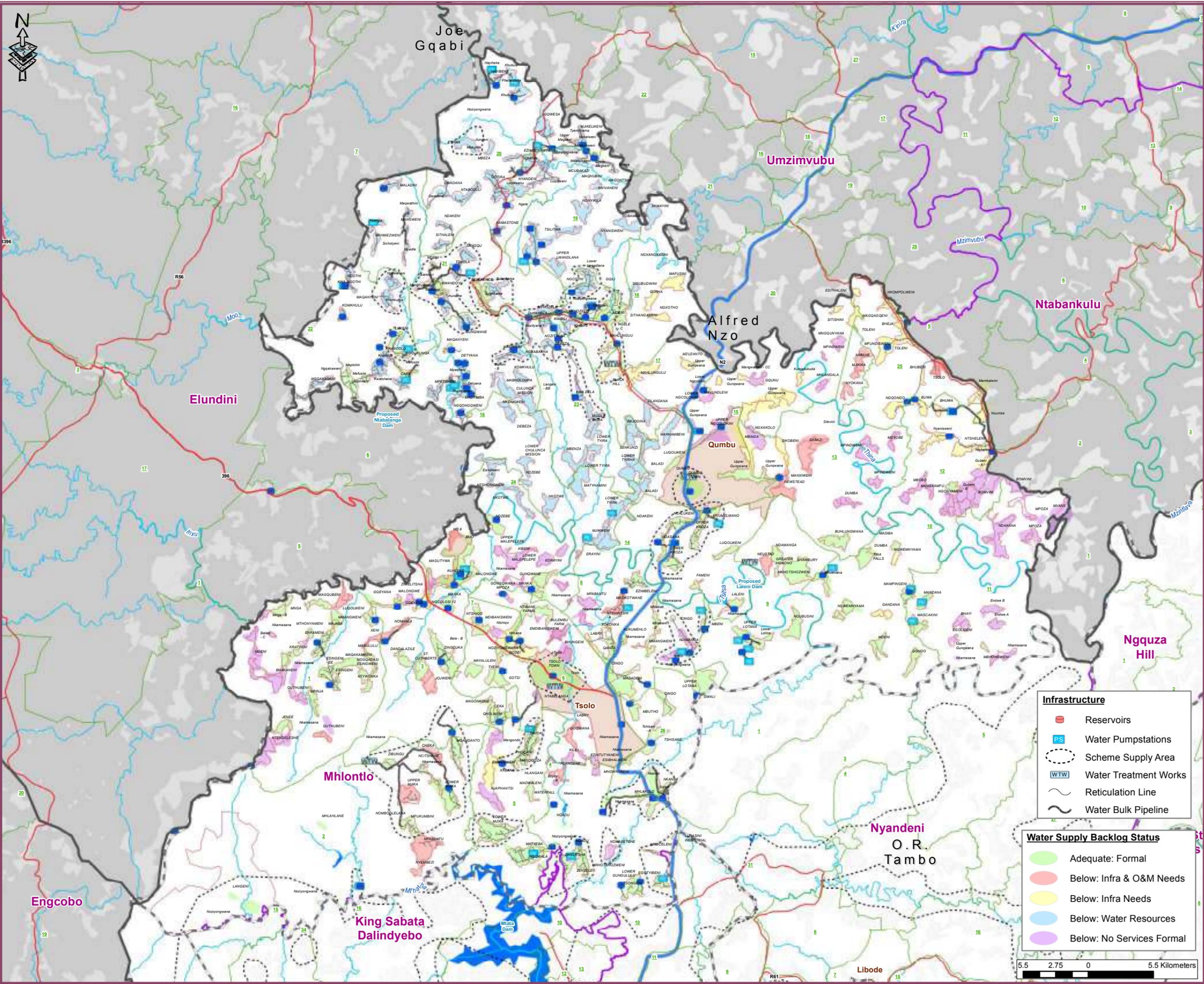
Water Supply Backlog Status

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- Below: Infra & O&M Needs
- Below: Infra Needs
- Below: Water Resources
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- Existing All Town Strategy Water Supply Areas
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PROJECT TITLE

**OR Tambo DM: Universal Access
 Plan Phase 2 - Progressive
 Development of a Regional Water
 Supply Master Plan**

MAP TITLE:

**Existing Scheme Areas
 and Infrastructure Components:
 Mhlontlo**

DATE COMPLETED:

2016/05/24

MAP NO.:

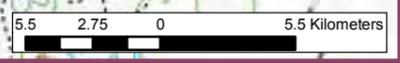
DC15 Figure 6.2

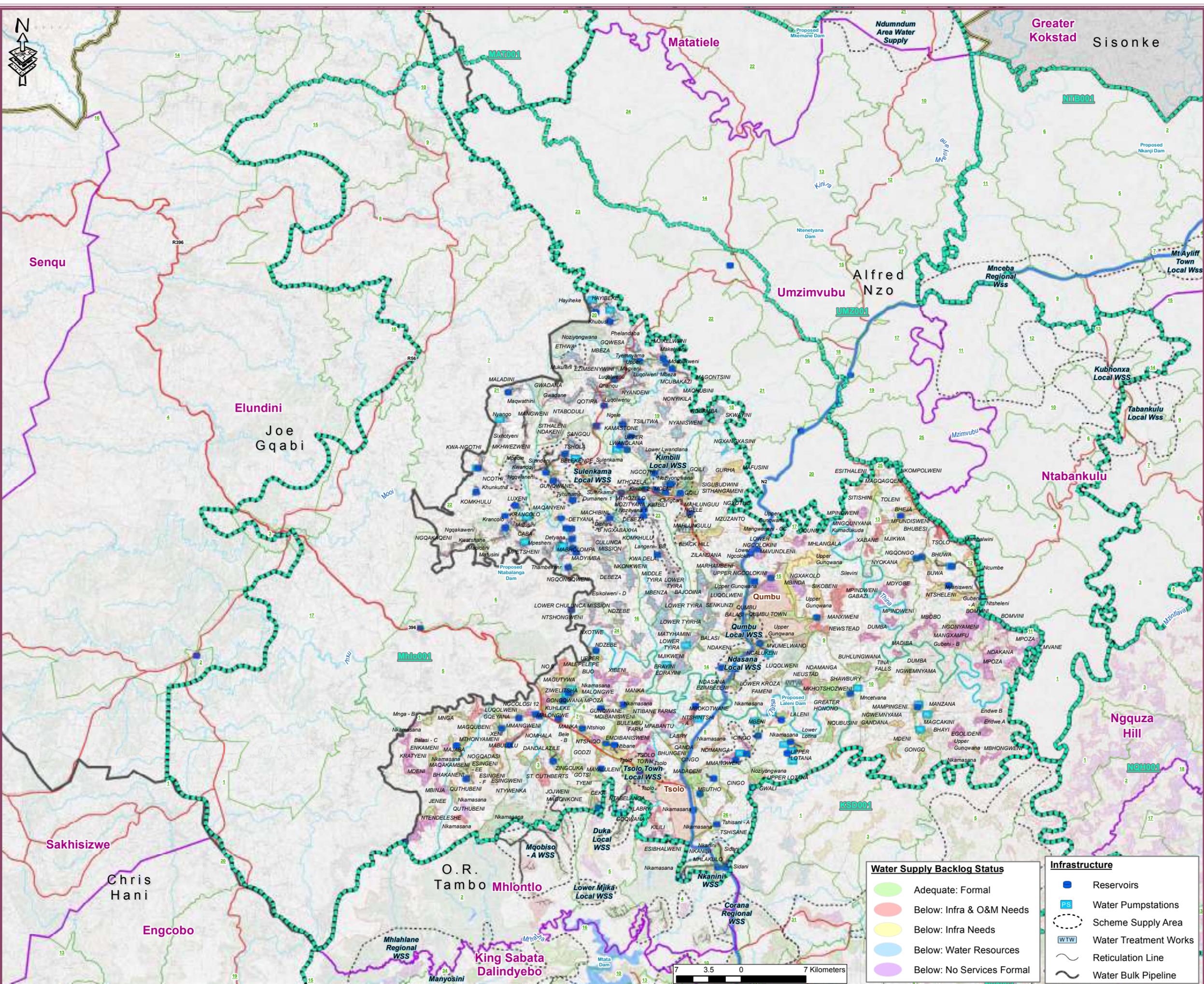
Infrastructure

- 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
- 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



CLIENT:

DISTRICT MUNICIPALITY:

OR TAMBO DISTRICT MUNICIPALITY

CONSULTANTS:

UWP Consulting
 PO Box 25549, Monument Park
 Pretoria, 0105

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

Project No.: 27811

PROJECT TITLE

**OR Tambo DM: Universal Access
 Plan Phase 2 - Progressive
 Development of a Regional Water
 Supply Master Plan**

MAP TITLE: **Existing Scheme Areas
 and Infrastructure Components:
 Mhlontlo -
 Mhlontlo Umzimvubu WSS**

DATE COMPLETED: 2016/05/24

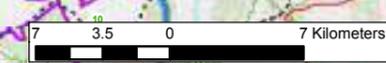
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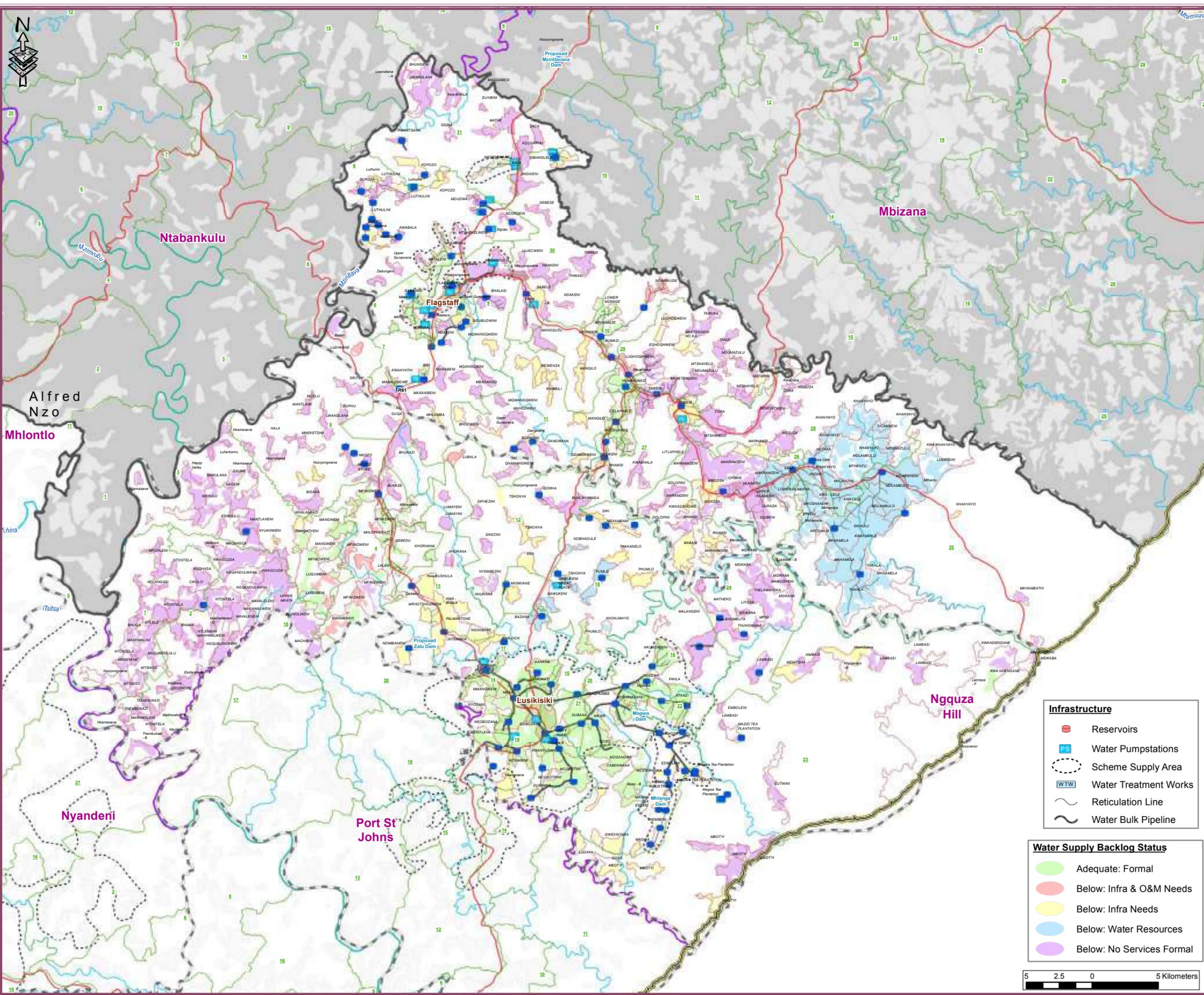
Water Supply Backlog Status

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

Infrastructure

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





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

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Project No.: 27811

PROJECT TITLE
**OR Tambo DM: Universal Access
 Plan Phase 2 - Progressive
 Development of a Regional Water
 Supply Master Plan**

MAP TITLE:
**Existing Scheme Areas
 and Infrastructure Components:
 Ngquza Hill**

DATE COMPLETED: 2016/05/24

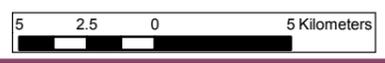
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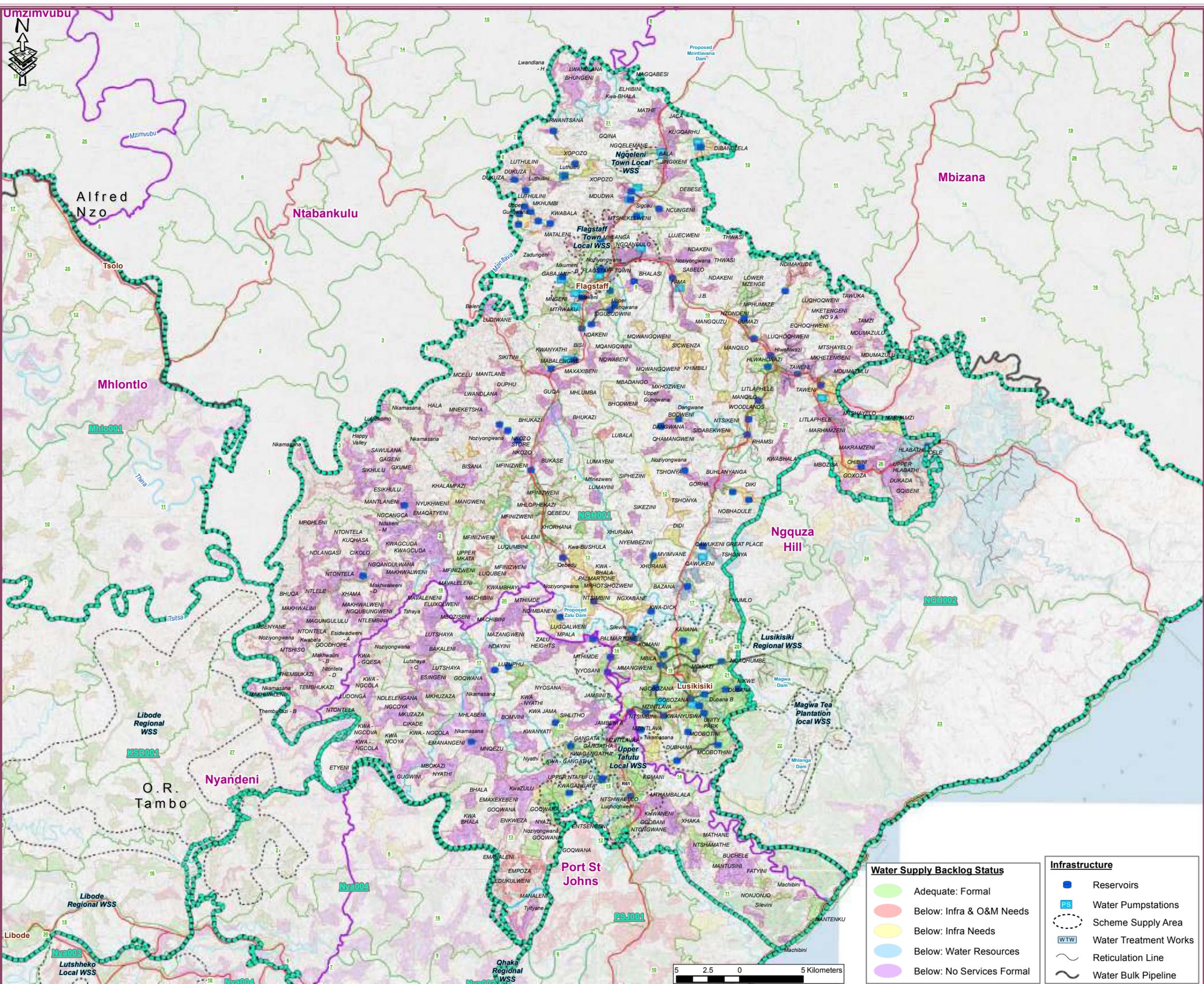
Infrastructure

- 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

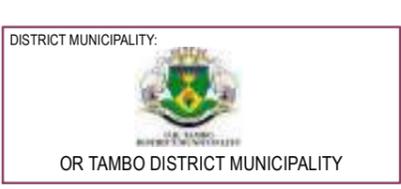




Legend

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Ward Boundaries & Numbers
- Census Main Places
- National Roads
- Main Roads
- Proposed Water Supply Intervention Area
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Project No.: 27811

PROJECT TITLE

**OR Tambo DM: Universal Access
 Plan Phase 2 - Progressive
 Development of a Regional Water
 Supply Master Plan**

MAP TITLE: **Existing Scheme Areas
 and Infrastructure Components:
 Ngquza Hill -
 Nq9001 Nq9002 Nq9003 Nq9004 Nq9005**

DATE COMPLETED: 2016/05/24

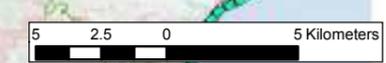
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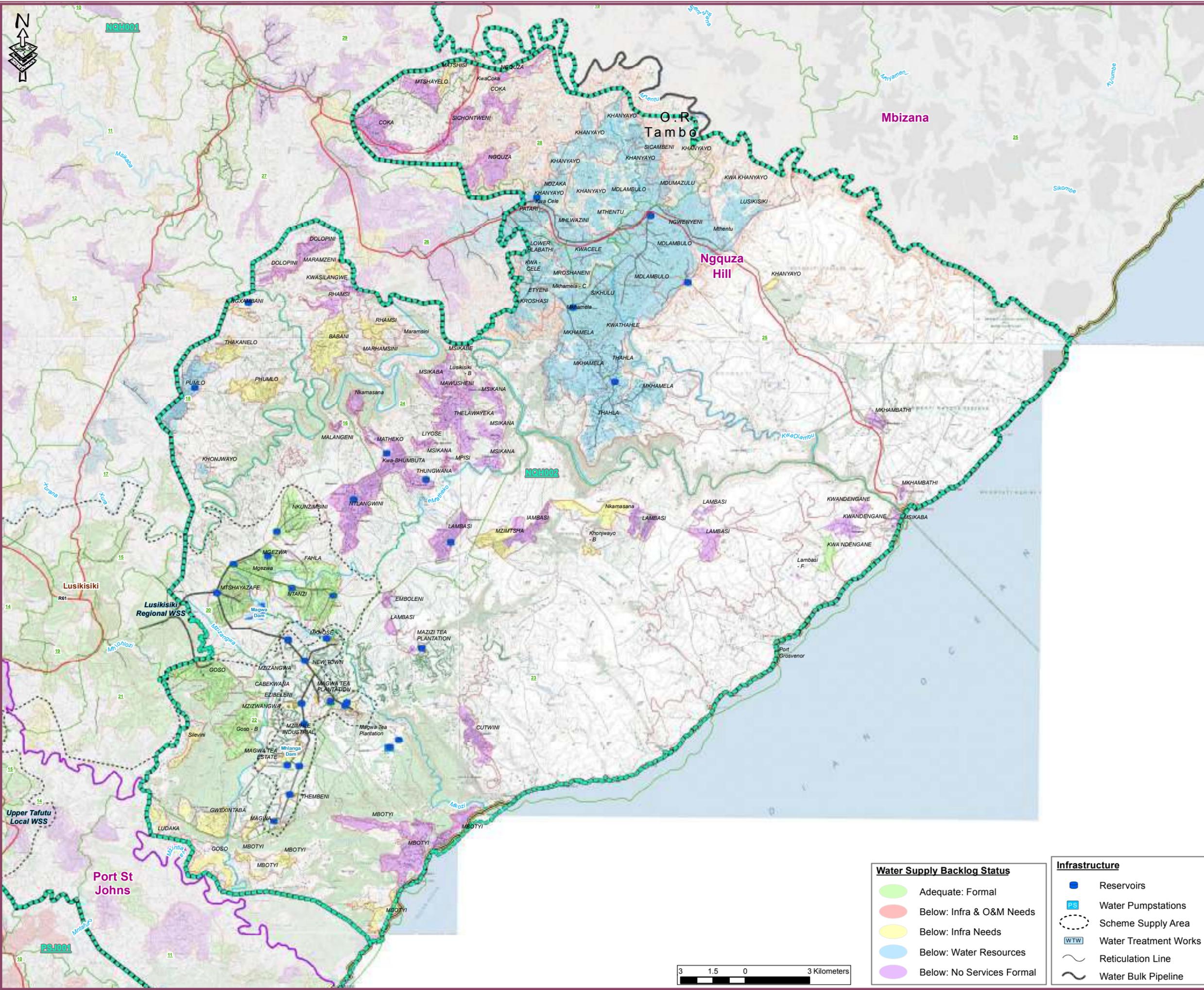
Water Supply Backlog Status

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

Infrastructure

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

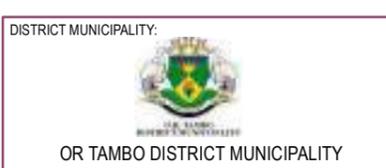




Legend

- 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
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Project No.: 27811

PROJECT TITLE

**OR Tambo DM: Universal Access
 Plan Phase 2 - Progressive
 Development of a Regional Water
 Supply Master Plan**

MAP TITLE: **Existing Scheme Areas
 and Infrastructure Components:
 Ngquza Hill -
 NQGH02 MaMaba BWSA**

DATE COMPLETED: 2016/05/24

MAP NO.: **DC15 Figure 6.3.2**

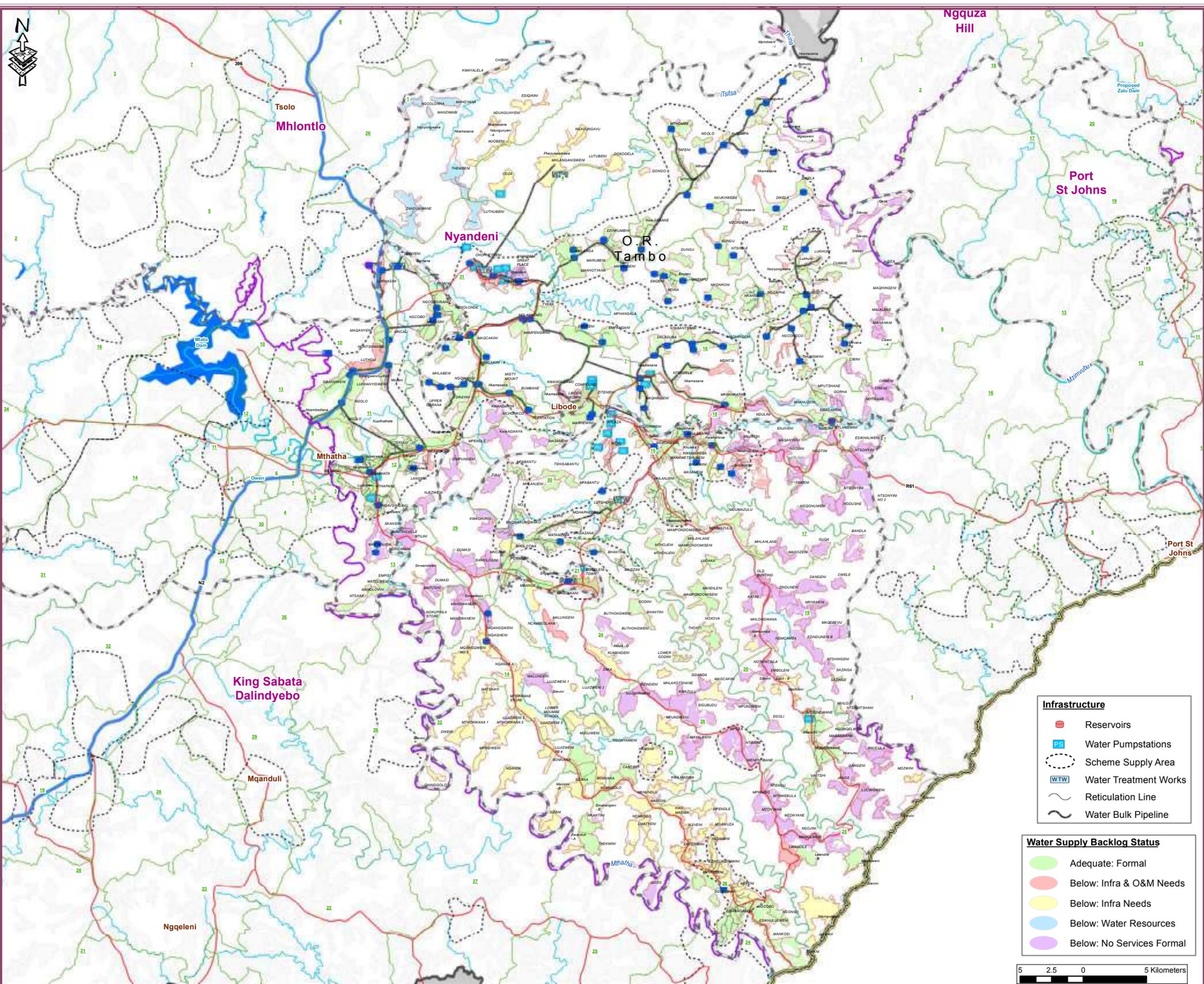
Water Supply Backlog Status

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

Infrastructure

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

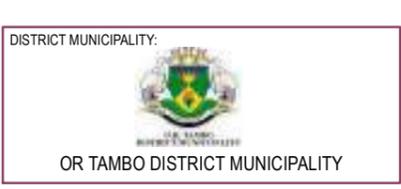




Legend

- 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

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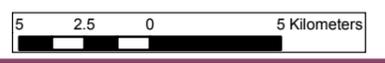
Project No.: 27811

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

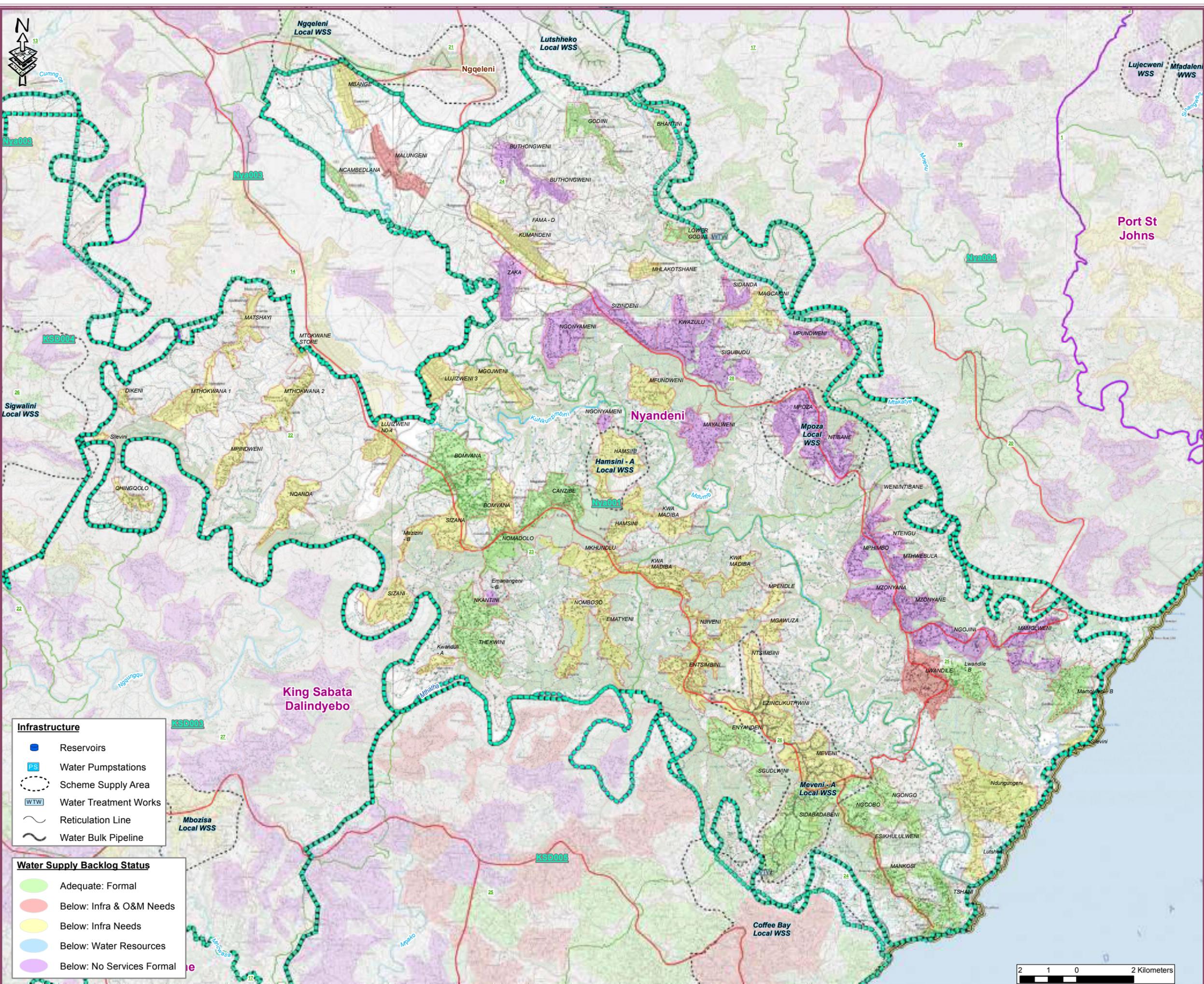


PROJECT TITLE
**OR Tambo DM: Universal Access
 Plan Phase 2 - Progressive
 Development of a Regional Water
 Supply Master Plan**

MAP TITLE:
**Existing Scheme Areas
 and Infrastructure Components:
 Nyandeni**

DATE COMPLETED: 2016/05/24

MAP NO.: **DC15 Figure 6.4**



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

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Project No.: 27811

PROJECT TITLE

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

MAP TITLE: **Existing Scheme Areas and Infrastructure Components: Nyandeni - Nya001 Second Falls LWSS**

DATE COMPLETED: 2016/05/24

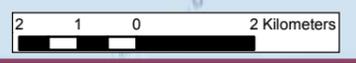
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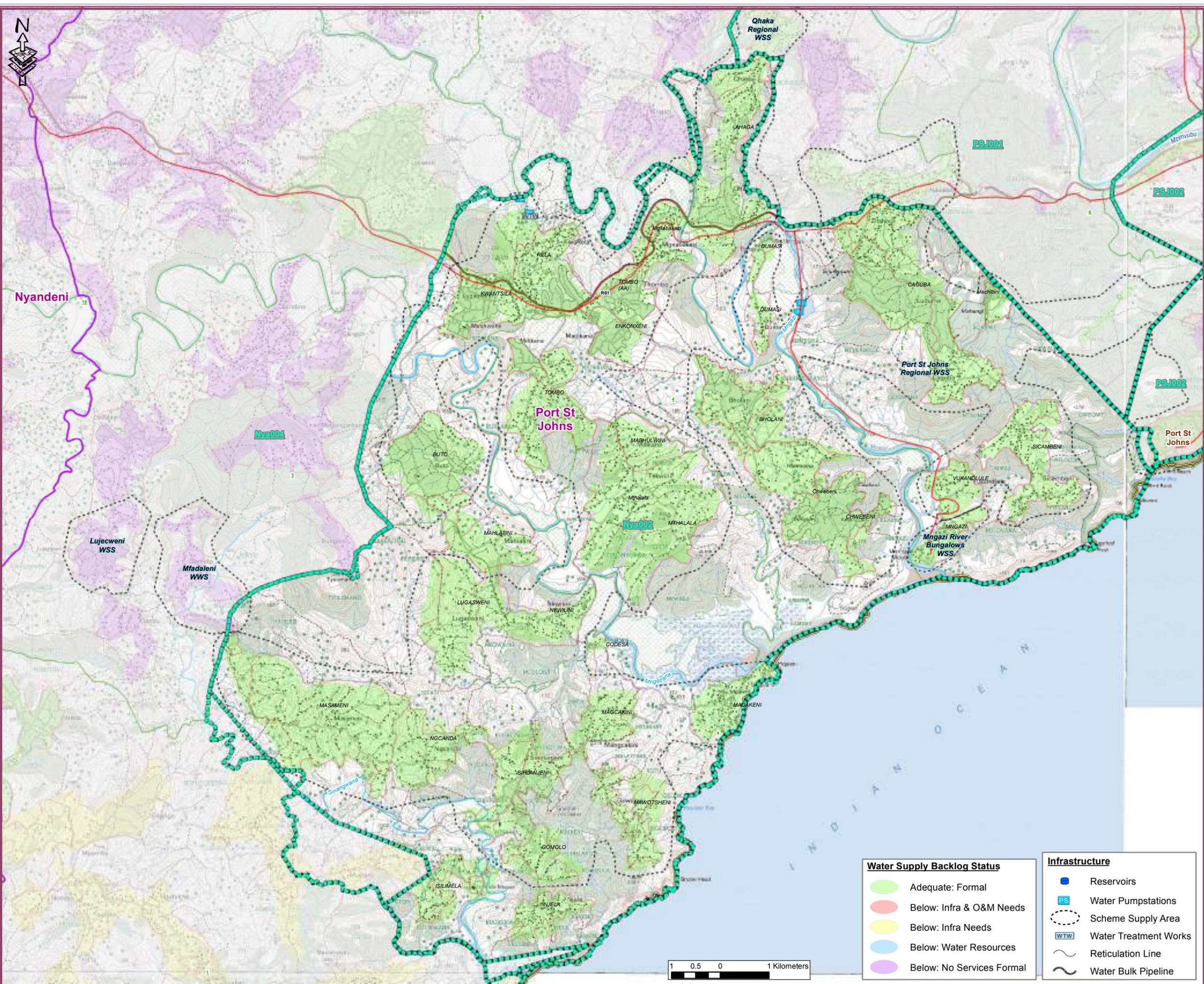
Infrastructure

- 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
- Local Municipality Boundaries
- Ward Boundaries & Numbers
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- Main Roads
- Proposed Water Supply Intervention Area
- Dams & Dam Names
- Primary Rivers
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Project No.: 27811

PROJECT TITLE

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

MAP TITLE: **Existing Scheme Areas and Infrastructure Components: Nyandeni - Nva002 Tombo WSS**

DATE COMPLETED: 2016/05/24

MAP NO.: **DC15 Figure 6.4.2**

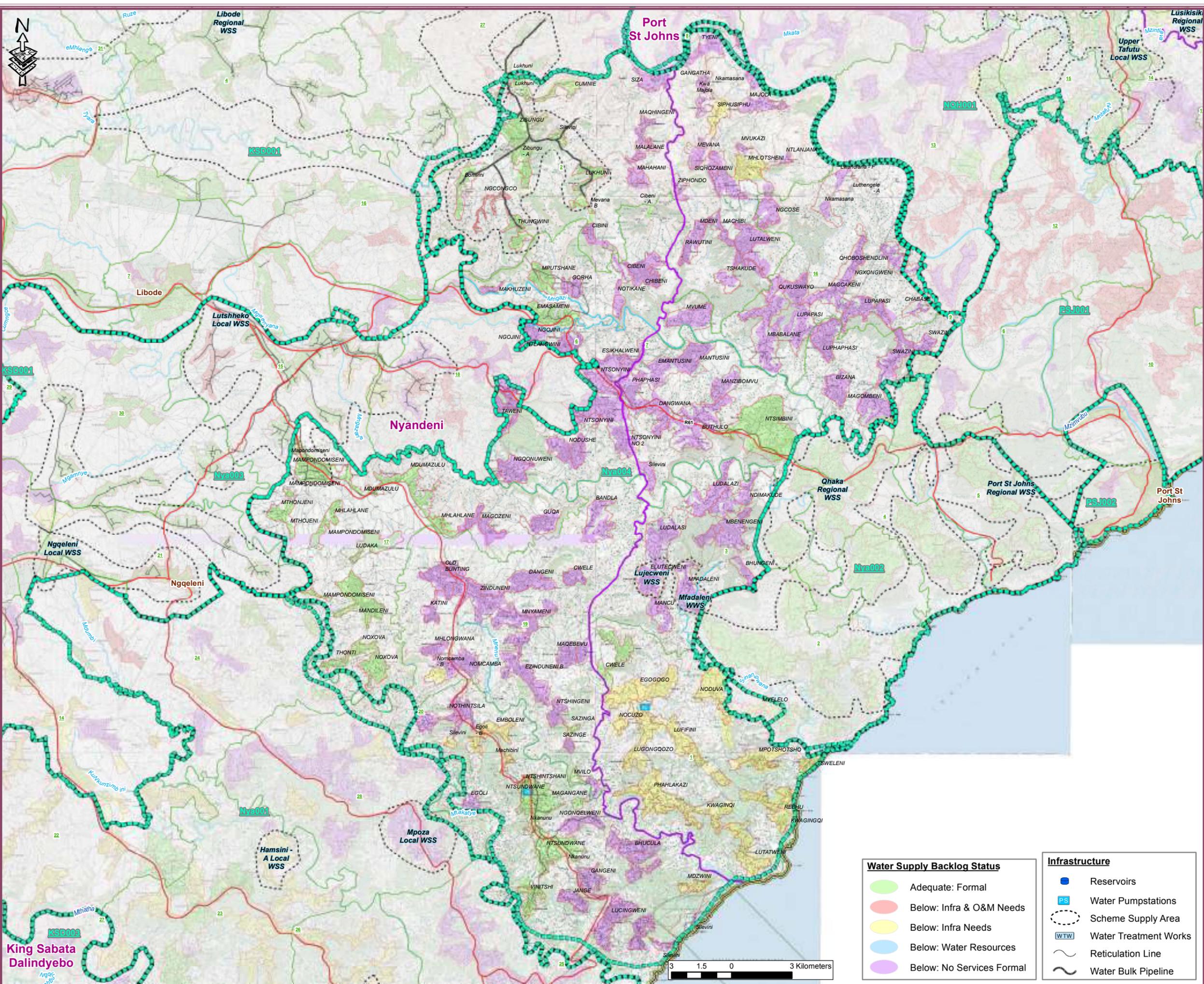
Water Supply Backlog Status

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

Infrastructure

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





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



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DISTRICT MUNICIPALITY:

OR TAMBO DISTRICT MUNICIPALITY

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 Email: pretoria@uwp.co.za

Project No.: 27811

PROJECT TITLE

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

MAP TITLE: **Existing Scheme Areas and Infrastructure Components: Nyandeni - Nya004 Cibezi-Nkamasana WSS**

DATE COMPLETED: 2016/05/24

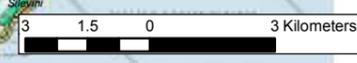
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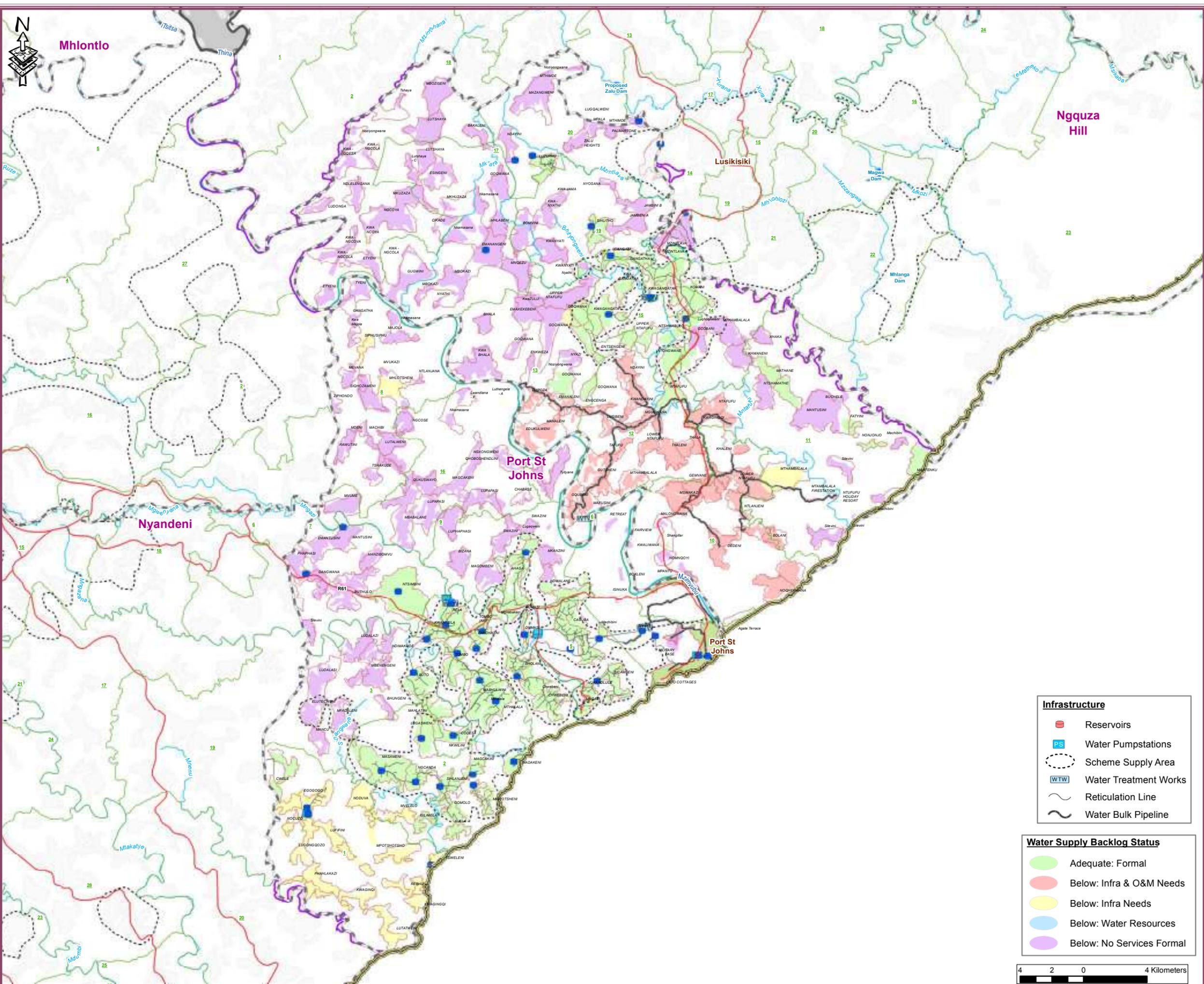
Water Supply Backlog Status

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

Infrastructure

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

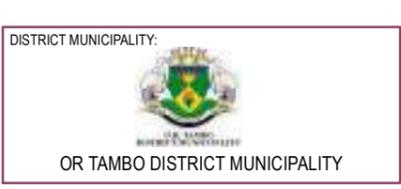




Legend

- 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



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Project No.: 27811

PROJECT TITLE

**OR Tambo DM: Universal Access
 Plan Phase 2 - Progressive
 Development of a Regional Water
 Supply Master Plan**

MAP TITLE:

**Existing Scheme Areas
 and Infrastructure Components:
 Port St Johns**

DATE COMPLETED:

2016/05/24

MAP NO.:

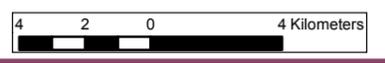
DC15 Figure 6.5

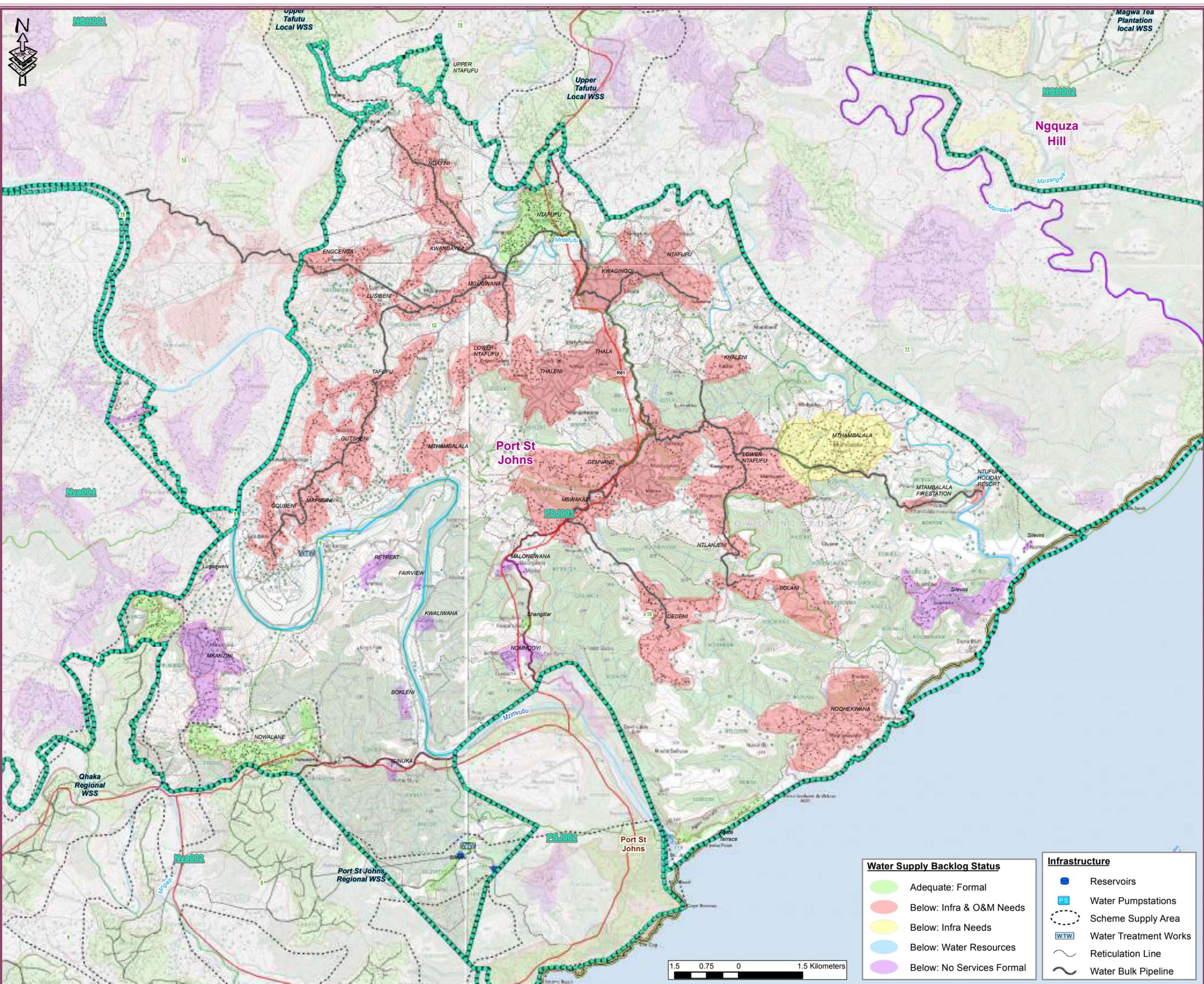
Infrastructure

- 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
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Legend

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



CLIENT:

DISTRICT MUNICIPALITY:

OR TAMBO DISTRICT MUNICIPALITY

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Project No.: 27811

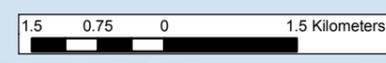
PROJECT TITLE

**OR Tambo DM: Universal Access
 Plan Phase 2 - Progressive
 Development of a Regional Water
 Supply Master Plan**

MAP TITLE: **Existing Scheme Areas
 and Infrastructure Components:
 Port St Johns -
 PSJ001 Port St Johns WSS**

DATE COMPLETED: 2016/05/24

MAP NO.: **DC15 Figure 6.5.1**

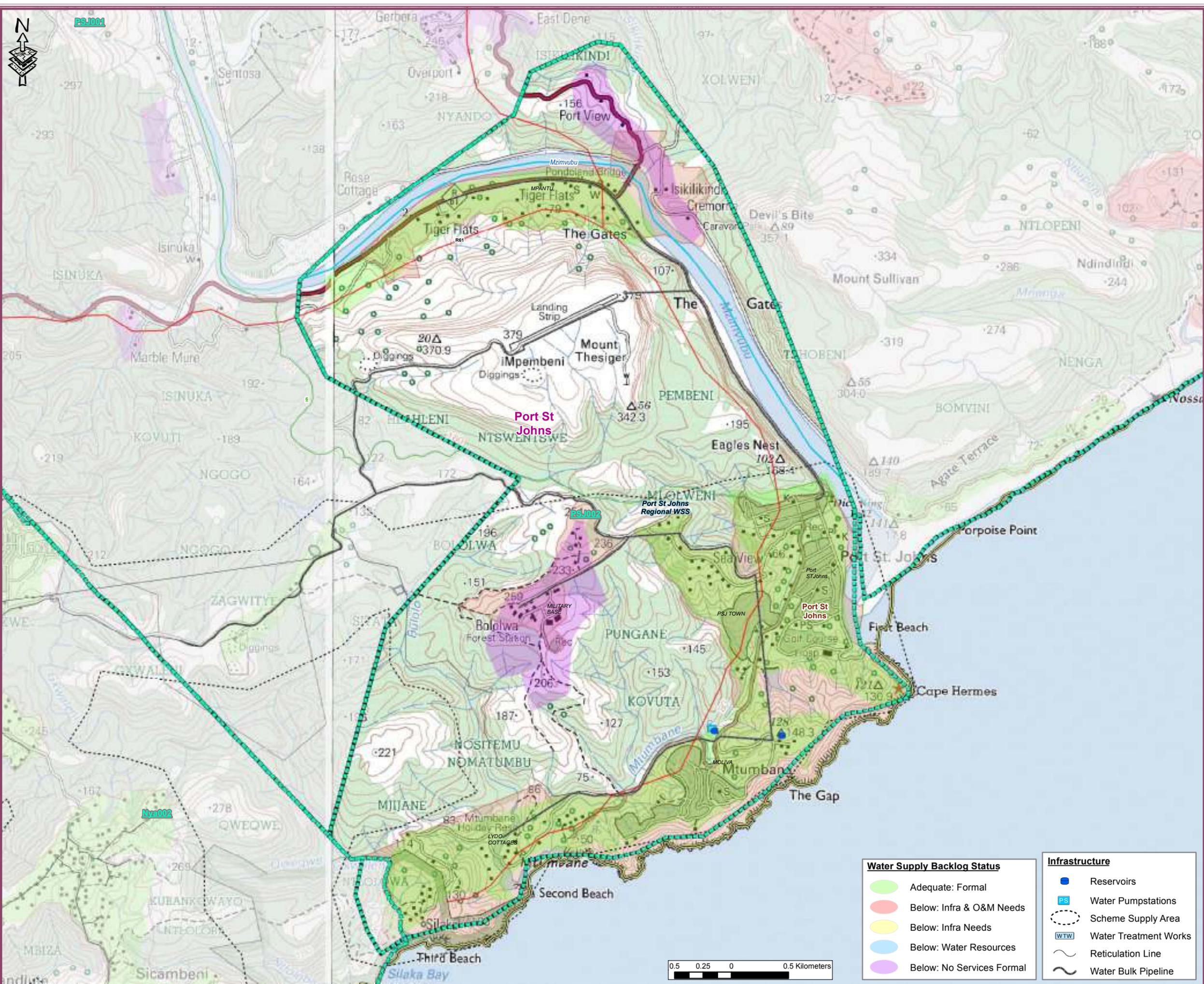


Water Supply Backlog Status

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

Infrastructure

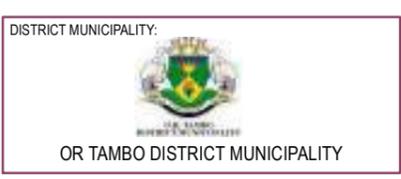
- Reservoirs
- Water Pumpstations
- Scheme Supply Area
- Water Treatment Works
- Reticulation Line
- Water Bulk Pipeline



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



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Project No.: 27811

PROJECT TITLE

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

MAP TITLE: **Existing Scheme Areas and Infrastructure Components: Port St Johns - PS1002 Port St Johns Town Supply**

DATE COMPLETED: 2016/05/24

MAP NO.: **DC15 Figure 6.5.2**

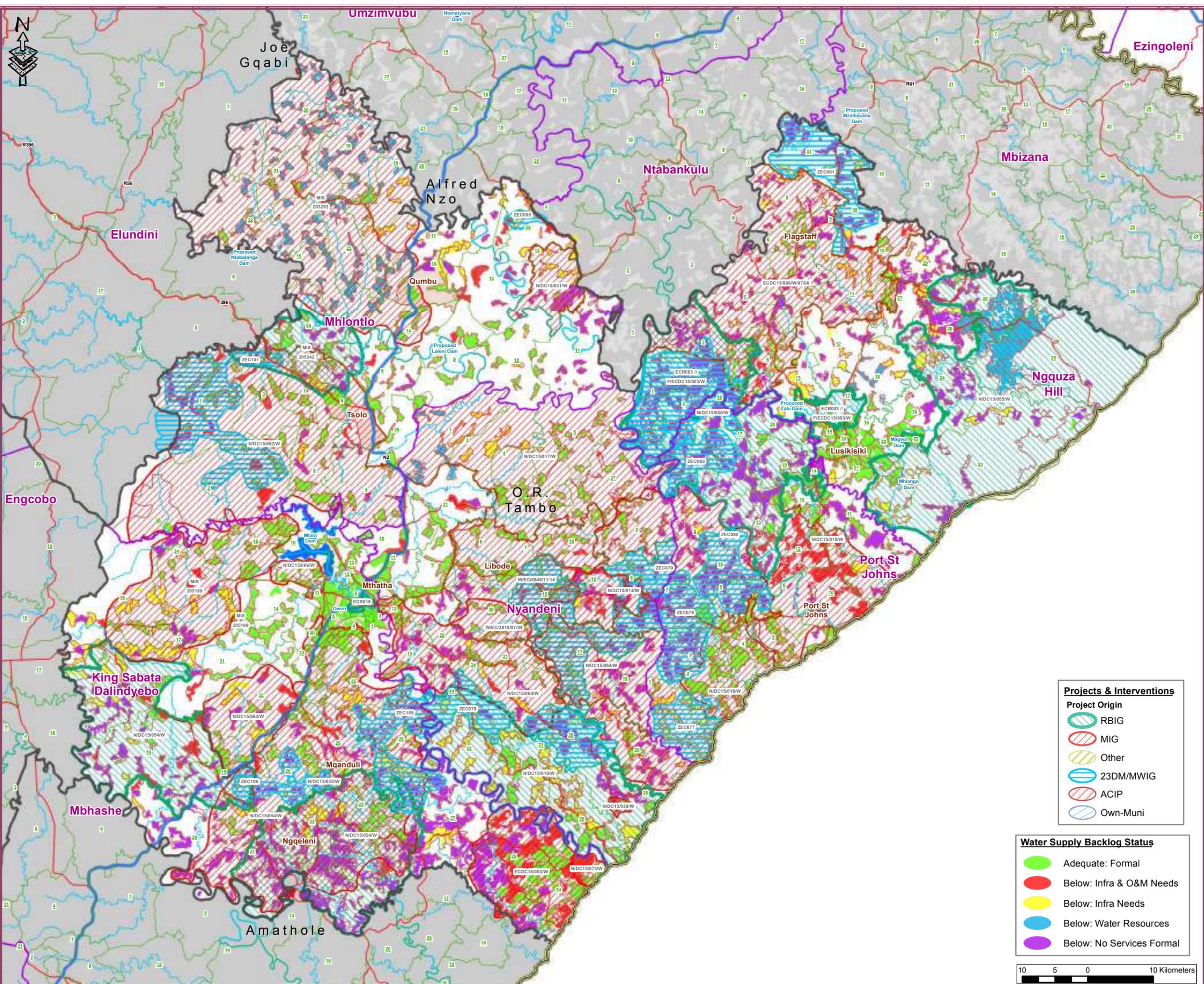
Water Supply Backlog Status

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

Infrastructure

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





Legend

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

DWS: Dept. of Water & Sanitation



CLIENT:

DISTRICT MUNICIPALITY:

OR TAMBO DISTRICT MUNICIPALITY

CONSULTANTS:

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PROJECT TITLE

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

MAP TITLE:

Projects and Interventions

DATE COMPLETED:

2016/05/23

MAP NO.:

DC15 Figure 7

Projects & Interventions

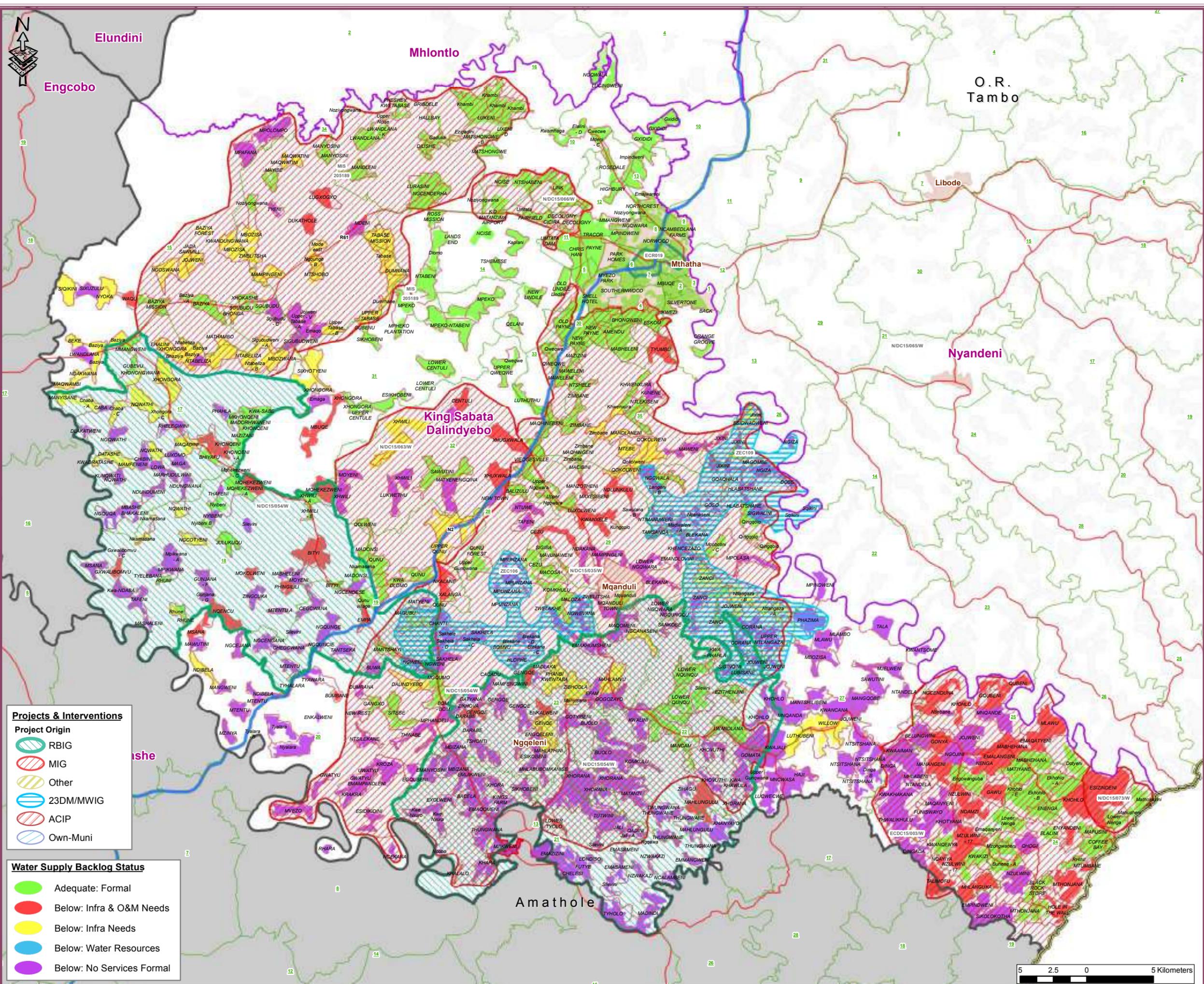
Project Origin

- 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





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

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



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Project No.: 27811

PROJECT TITLE

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

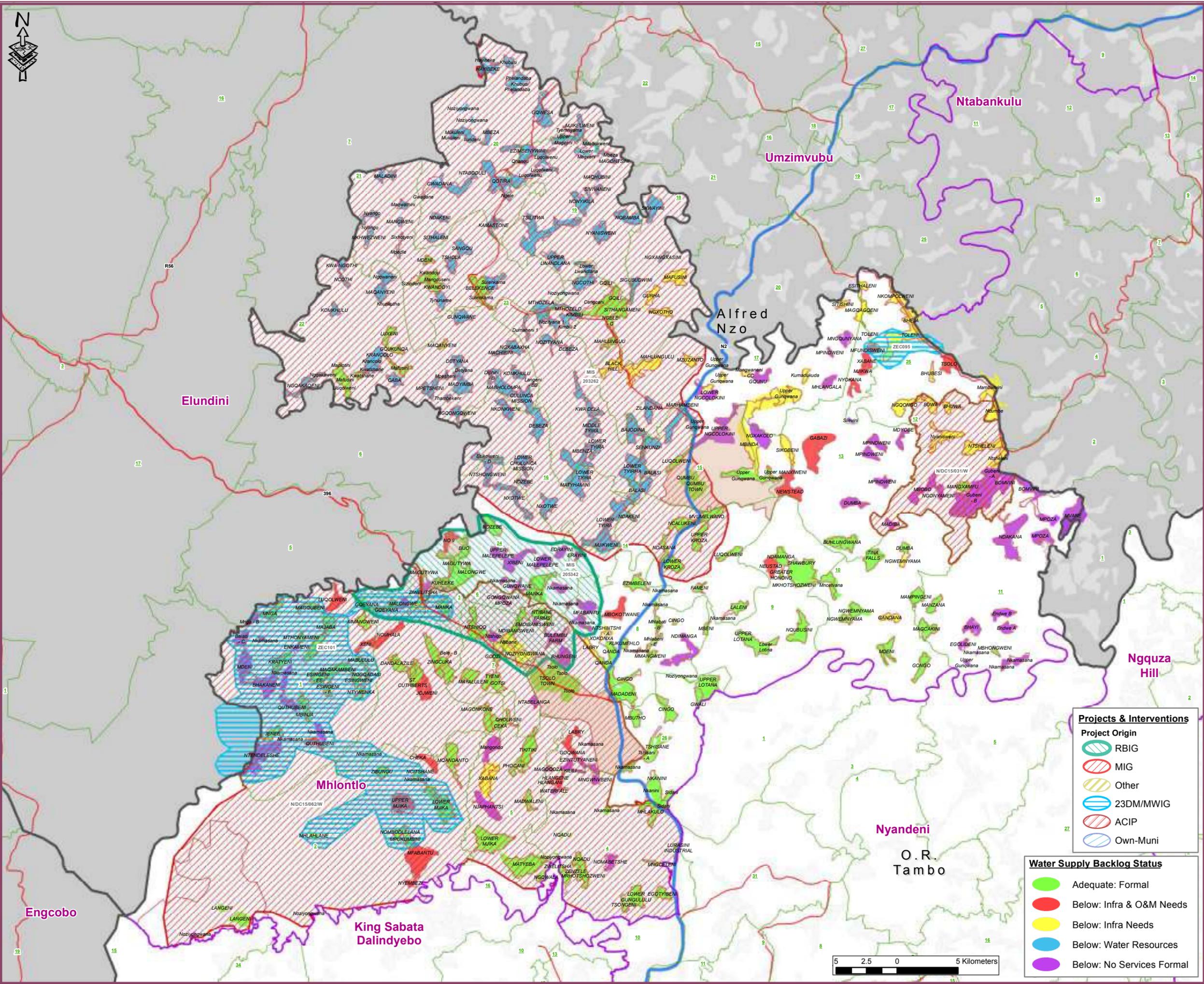
MAP TITLE:

Projects and Interventions: King Sabata Dalindyebo

DATE COMPLETED: 2016/05/23

MAP NO.: DC15 Figure 7.1

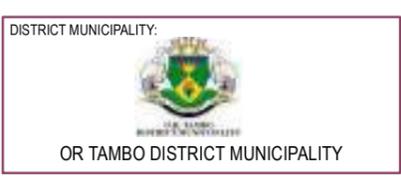




Legend

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

DWS: Dept. of Water & Sanitation



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Project No.: 27811

PROJECT TITLE

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

MAP TITLE:

Projects and Interventions: Mhlontlo

DATE COMPLETED: 2016/05/23

MAP NO.: **DC15 Figure 7.2**

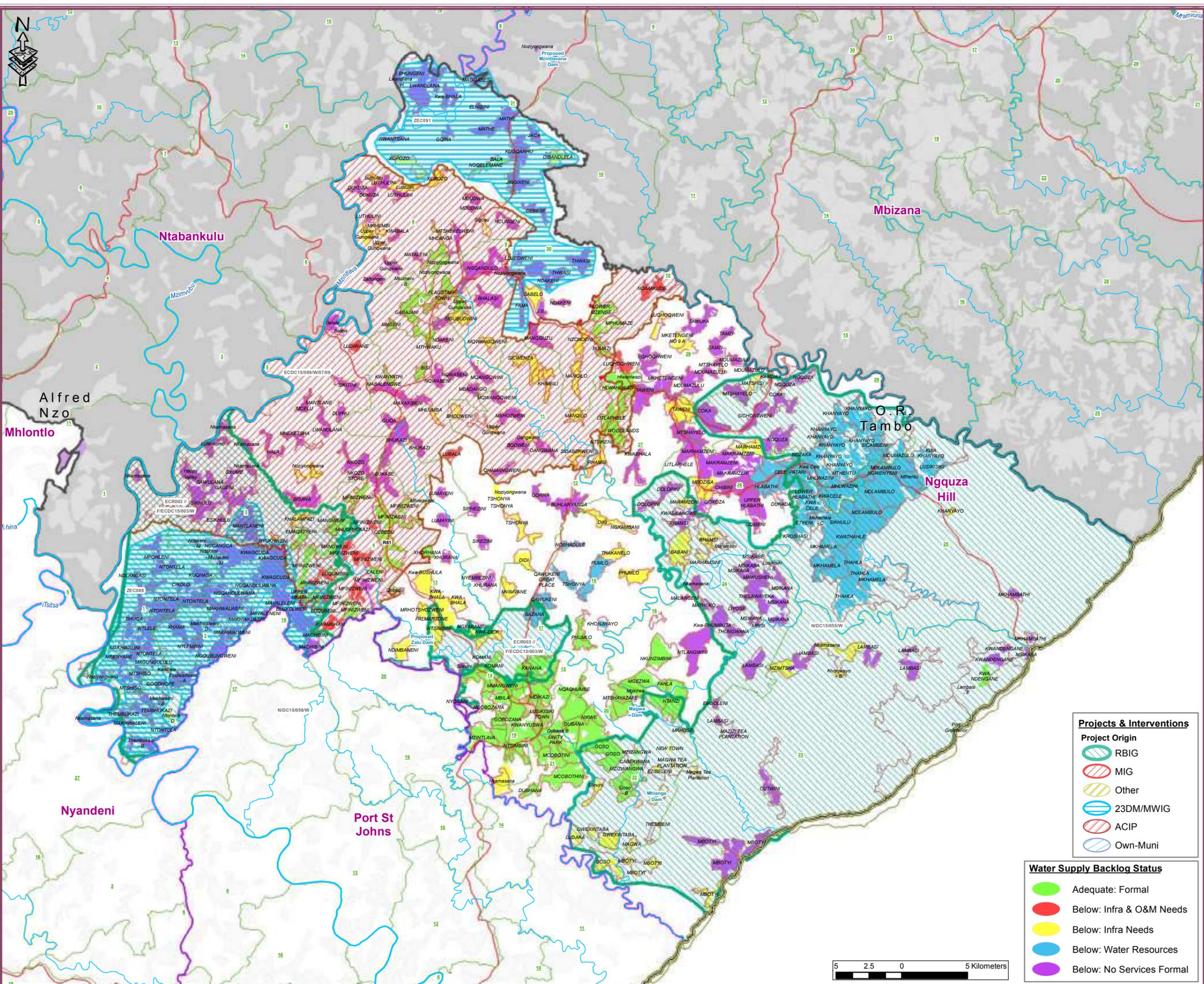
Projects & Interventions

- 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

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

LOCALITY:

CLIENT:

DISTRICT MUNICIPALITY:

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Project No.: 27811

PROJECT TITLE

**OR Tambo DM: Universal Access
 Plan Phase 2 - Progressive
 Development of a Regional Water
 Supply Master Plan**

MAP TITLE:

**Projects and Interventions:
 Ngquza Hill**

DATE COMPLETED:

2016/05/23

MAP NO.:

DC15 Figure 7.3

Projects & Interventions

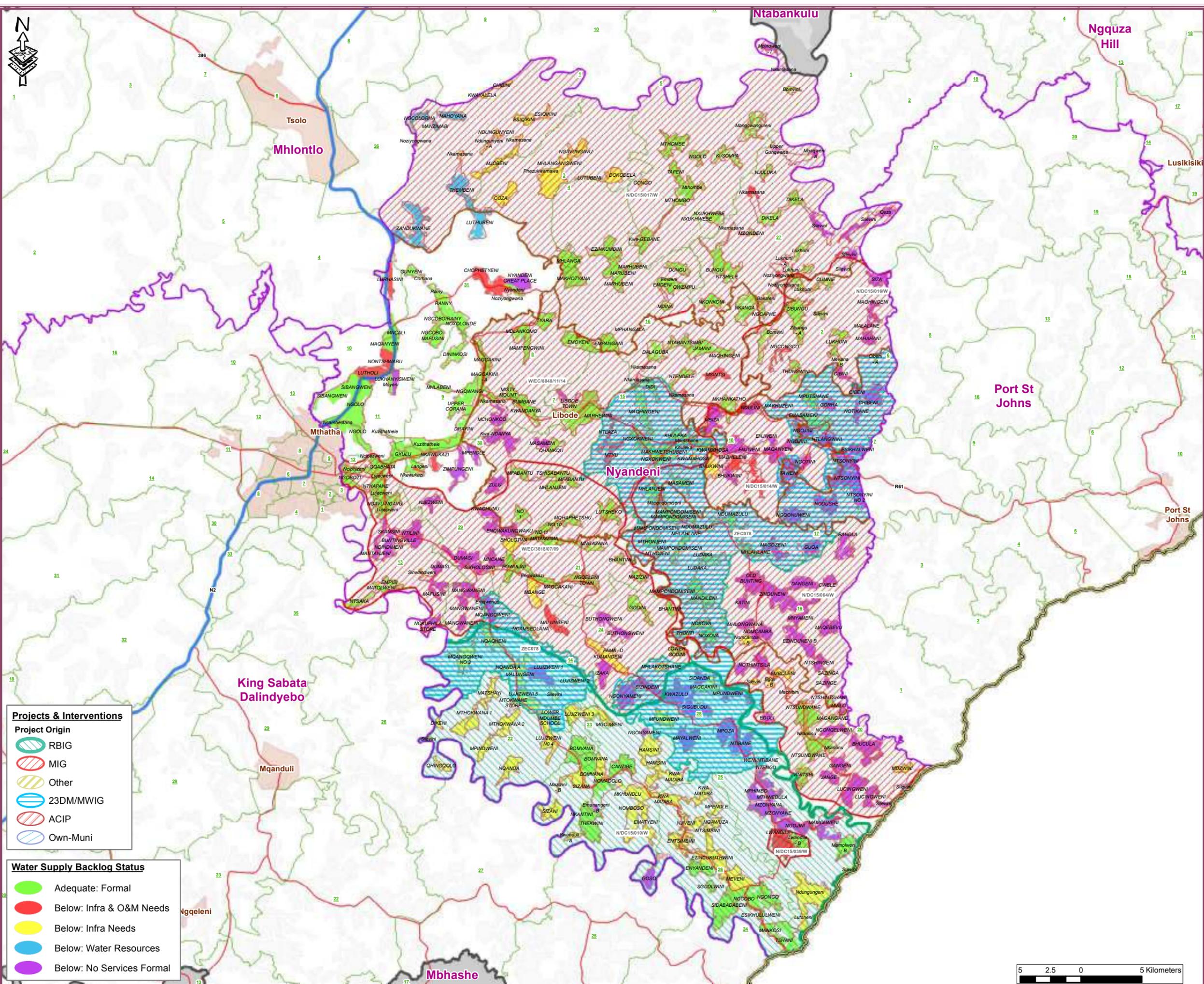
Project Origin

- 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
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Projects & Interventions

Project Origin

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- MIG
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- 23DM/MWIG
- ACIP
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Water Supply Backlog Status

- Adequate: Formal
- Below: Infra & O&M Needs
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Project No.: 27811

PROJECT TITLE

**OR Tambo DM: Universal Access
 Plan Phase 2 - Progressive
 Development of a Regional Water
 Supply Master Plan**

MAP TITLE:

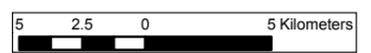
**Projects and Interventions:
 Nyandeni**

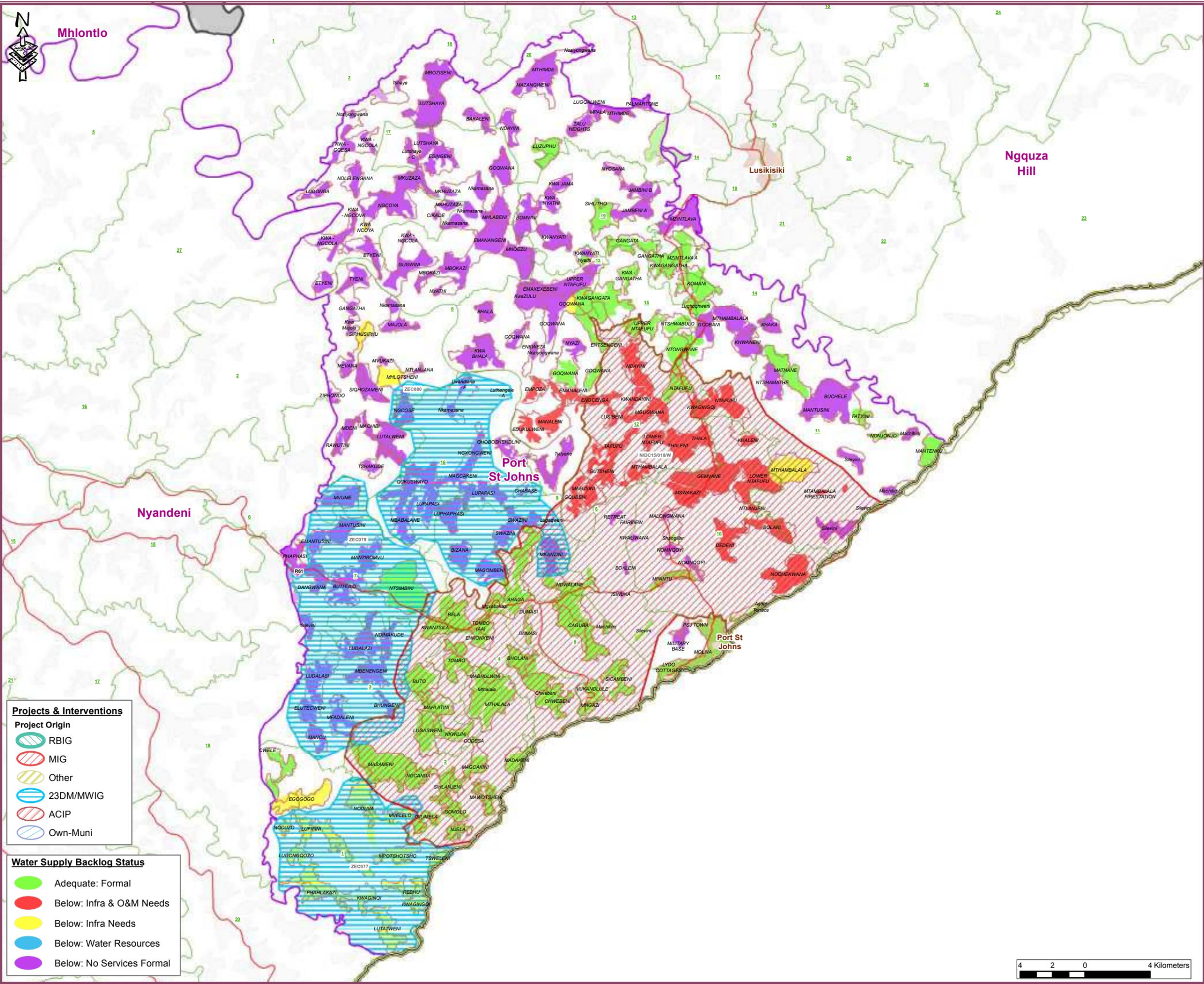
DATE COMPLETED:

2016/05/23

MAP NO.:

DC15 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

Legend

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

DWS: Dept. of Water & Sanitation



CLIENT:

DISTRICT MUNICIPALITY:

CONSULTANTS:

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PROJECT TITLE

**OR Tambo DM: Universal Access
 Plan Phase 2 - Progressive
 Development of a Regional Water
 Supply Master Plan**

MAP TITLE:

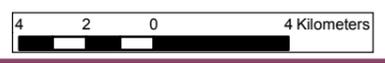
**Projects and Interventions:
 Port St Johns**

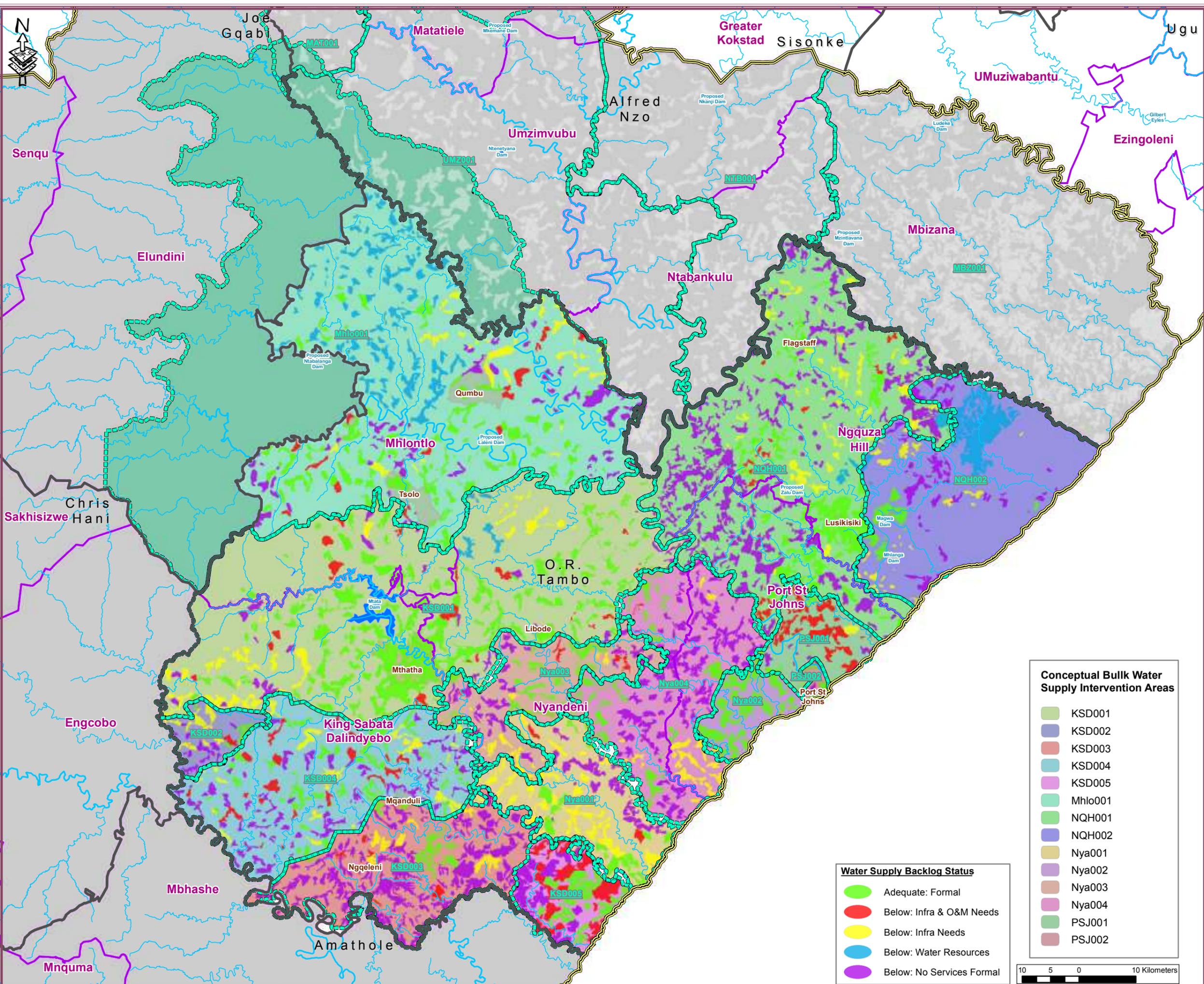
DATE COMPLETED:

2016/05/23

MAP NO.:

DC15 Figure 7.5

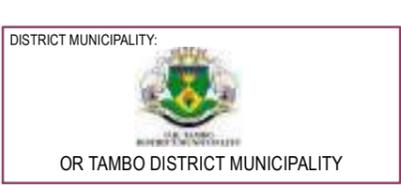




Legend

- Provincial 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



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PROJECT TITLE:

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MAP TITLE:

Conceptual Bulk Water Supply Interventions

DATE COMPLETED:

2016/05/20

MAP NO.:

DC15 Figure 8

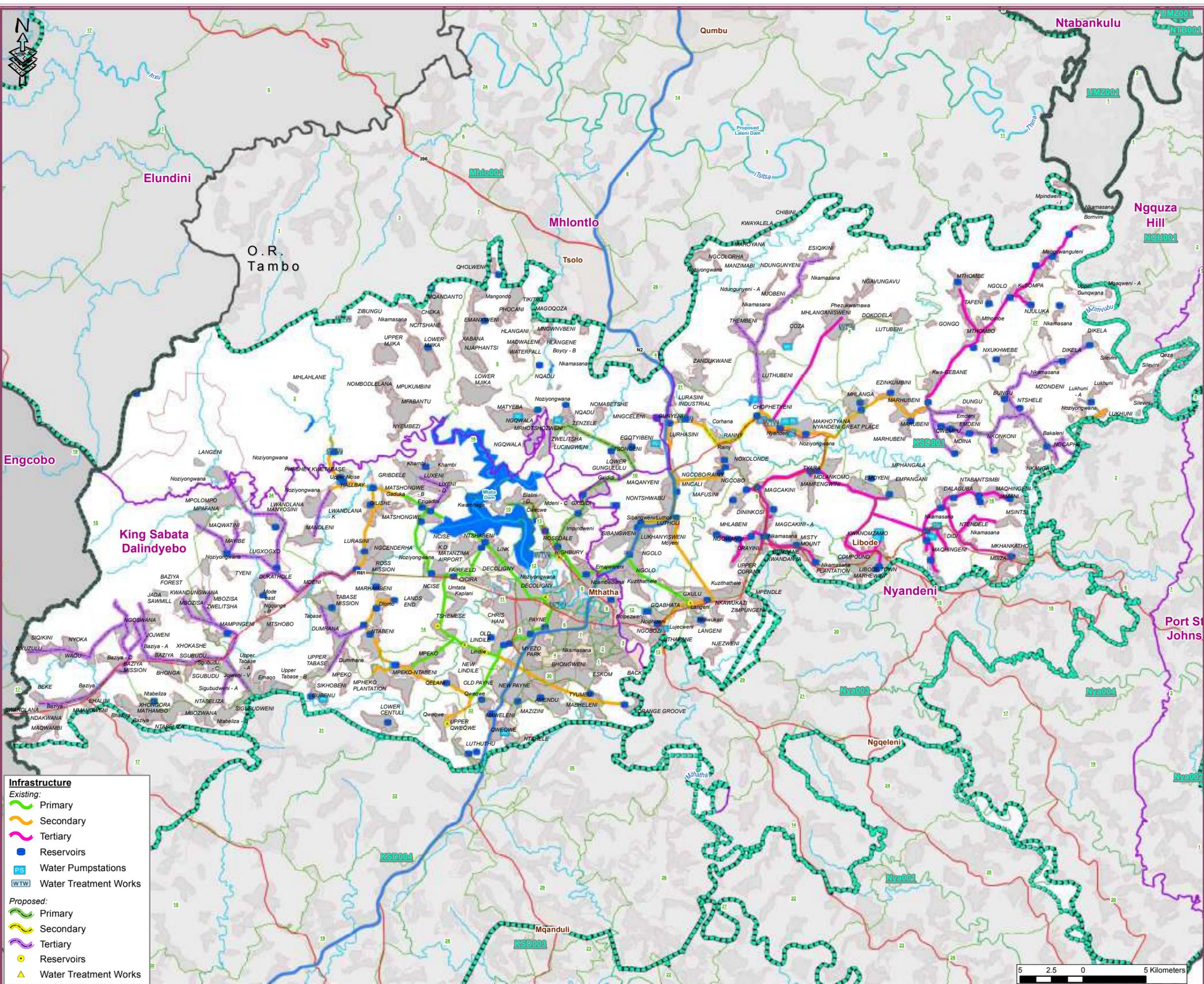
Conceptual Bulk Water Supply Intervention Areas

- KSD001
- KSD002
- KSD003
- KSD004
- KSD005
- Mhlo001
- NQH001
- NQH002
- Nya001
- Nya002
- Nya003
- Nya004
- PSJ001
- PSJ002

Water Supply Backlog Status

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





Infrastructure

Existing:

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

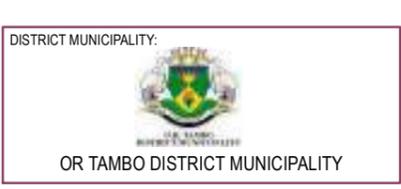
Proposed:

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

Legend

- Provincial 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

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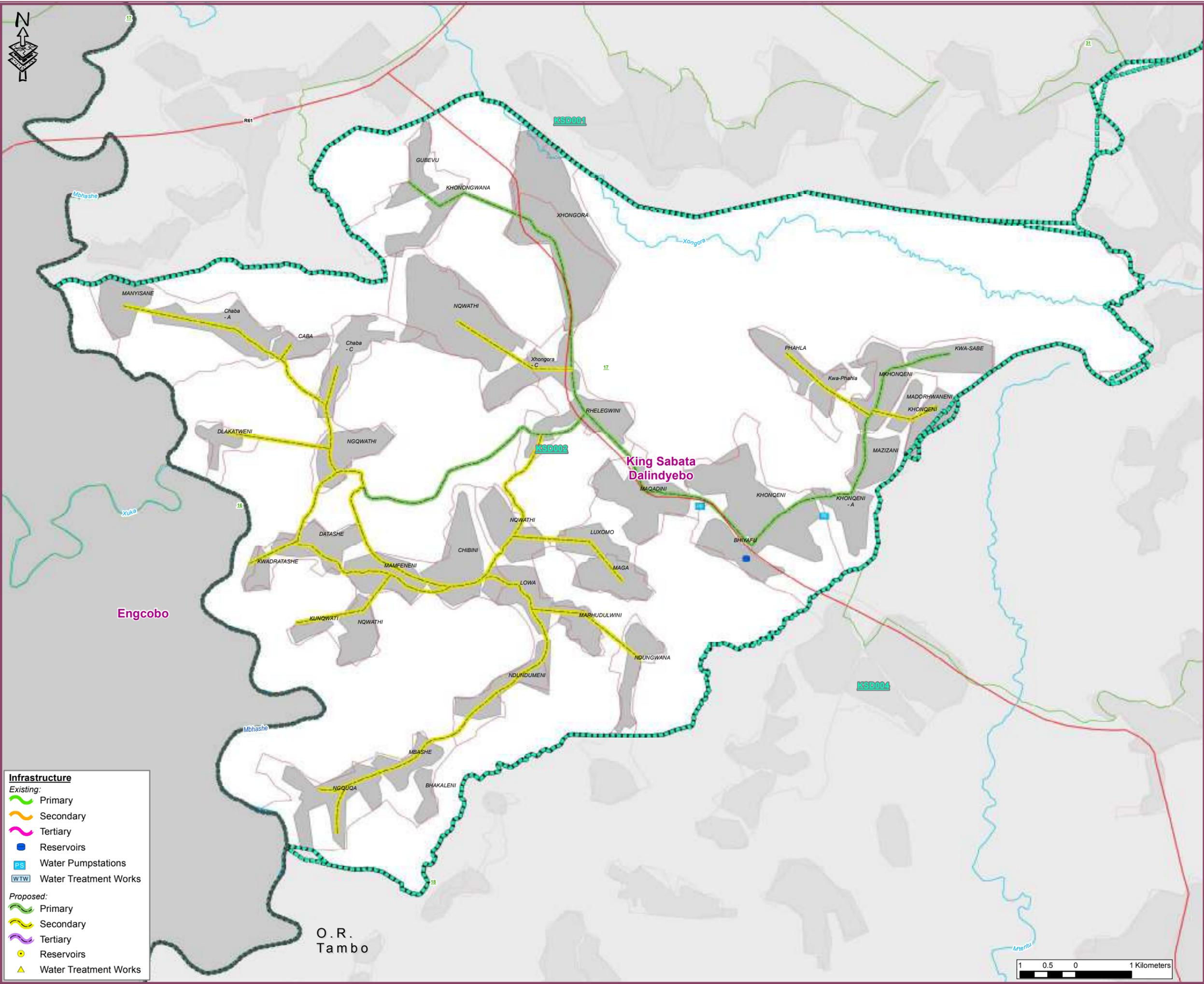
PROJECT TITLE
**OR Tambo DM: Universal Access
 Plan Phase 2 - Progressive
 Development of a Regional Water
 Supply Master Plan**

MAP TITLE:
**Conceptual Bulk Water Supply
 Interventions:**
KSD001 Mthatha RWSS

DATE COMPLETED: 2016/05/20

MAP NO.: **DC15 Figure 8.1**





Infrastructure

Existing:

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

Proposed:

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

Legend

- Provincial 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:

DISTRICT MUNICIPALITY:

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Project No.: 27811

PROJECT TITLE

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

MAP TITLE:

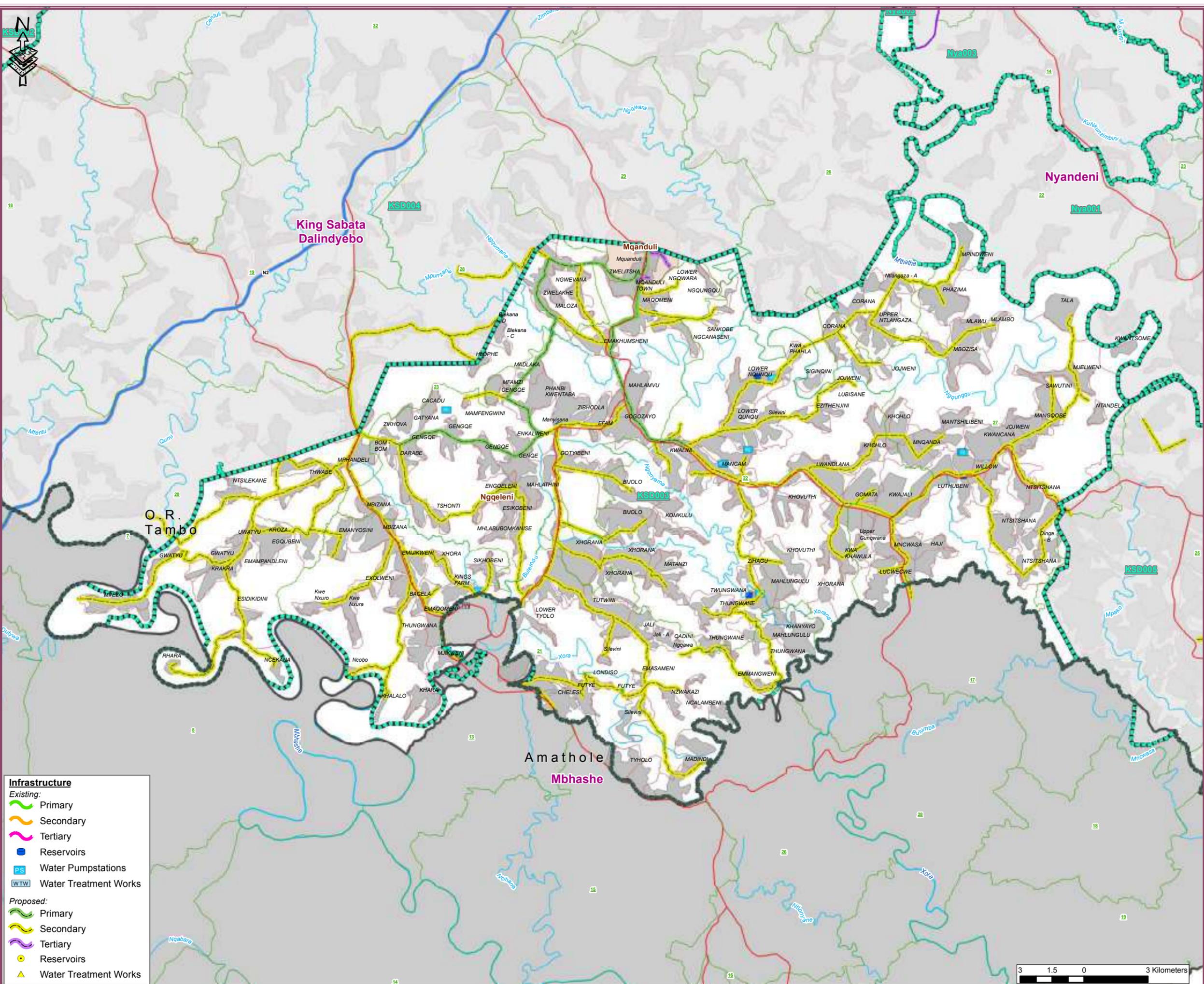
Conceptual Bulk Water Supply Interventions:
KSD002 Mthatha Regional Borehole Dev

DATE COMPLETED:

2016/05/20

MAP NO.:

DC15 Figure 8.2



Infrastructure

Existing:

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

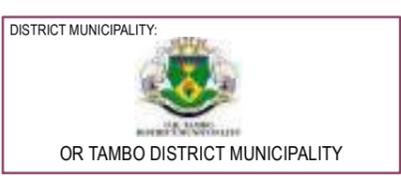
Proposed:

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

Legend

- Provincial 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

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Project No.: 27811

PROJECT TITLE

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 Development of a Regional Water
 Supply Master Plan**

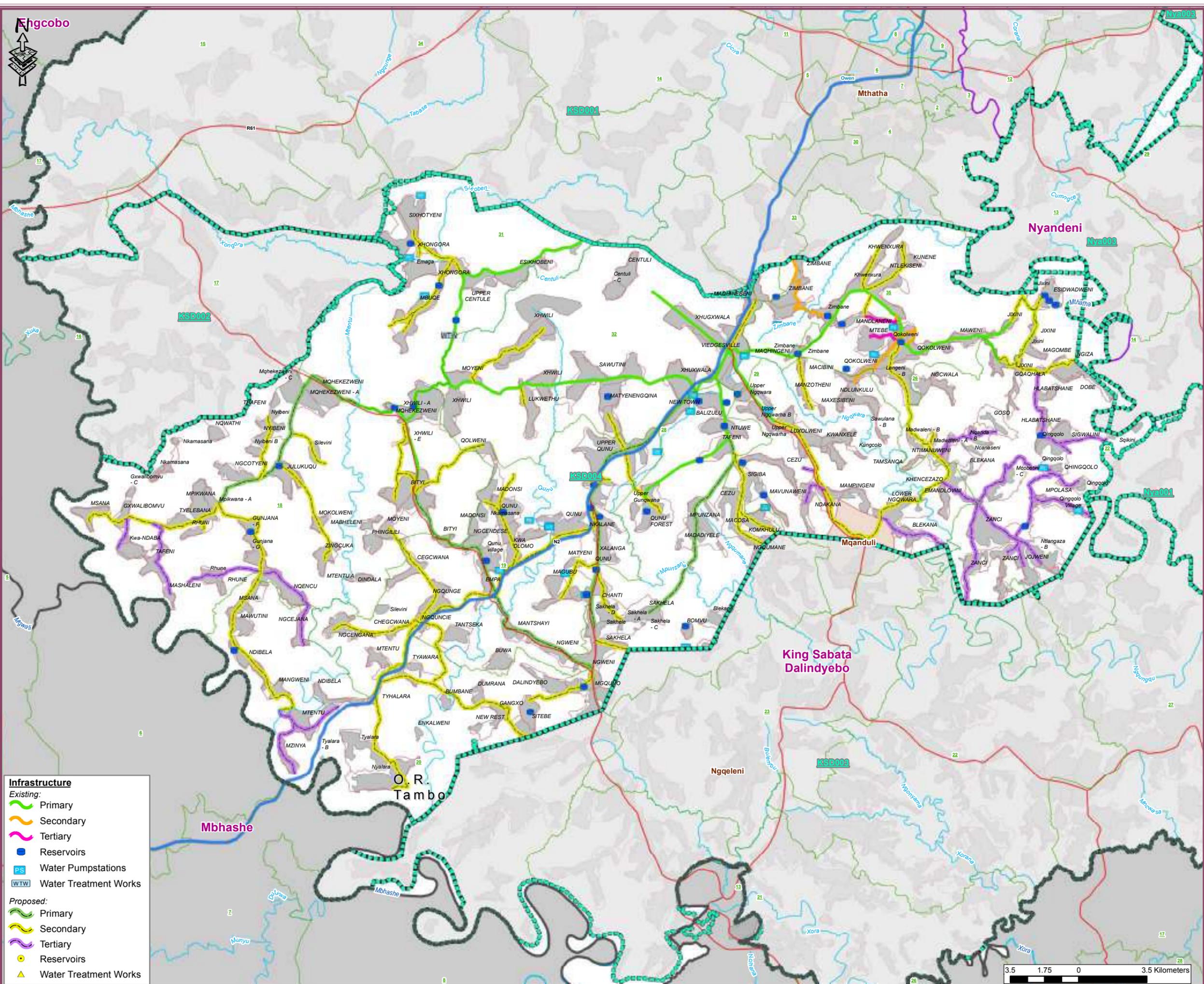
MAP TITLE:

**Conceptual Bulk Water Supply
 Interventions:**
KSD003 Mqanduli Corridor Bay

DATE COMPLETED: 2016/05/23

MAP NO.: **DC15 Figure 8.3**





Infrastructure

Existing:

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

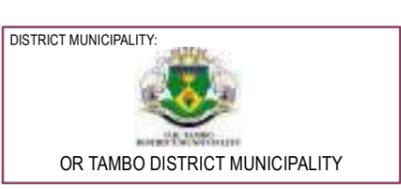
Proposed:

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

Legend

- Provincial 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

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Project No.: 27811

PROJECT TITLE

**OR Tambo DM: Universal Access
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 Development of a Regional Water
 Supply Master Plan**

MAP TITLE:

**Conceptual Bulk Water Supply
 Interventions:**

KSD004 Lukwethu Water Supply

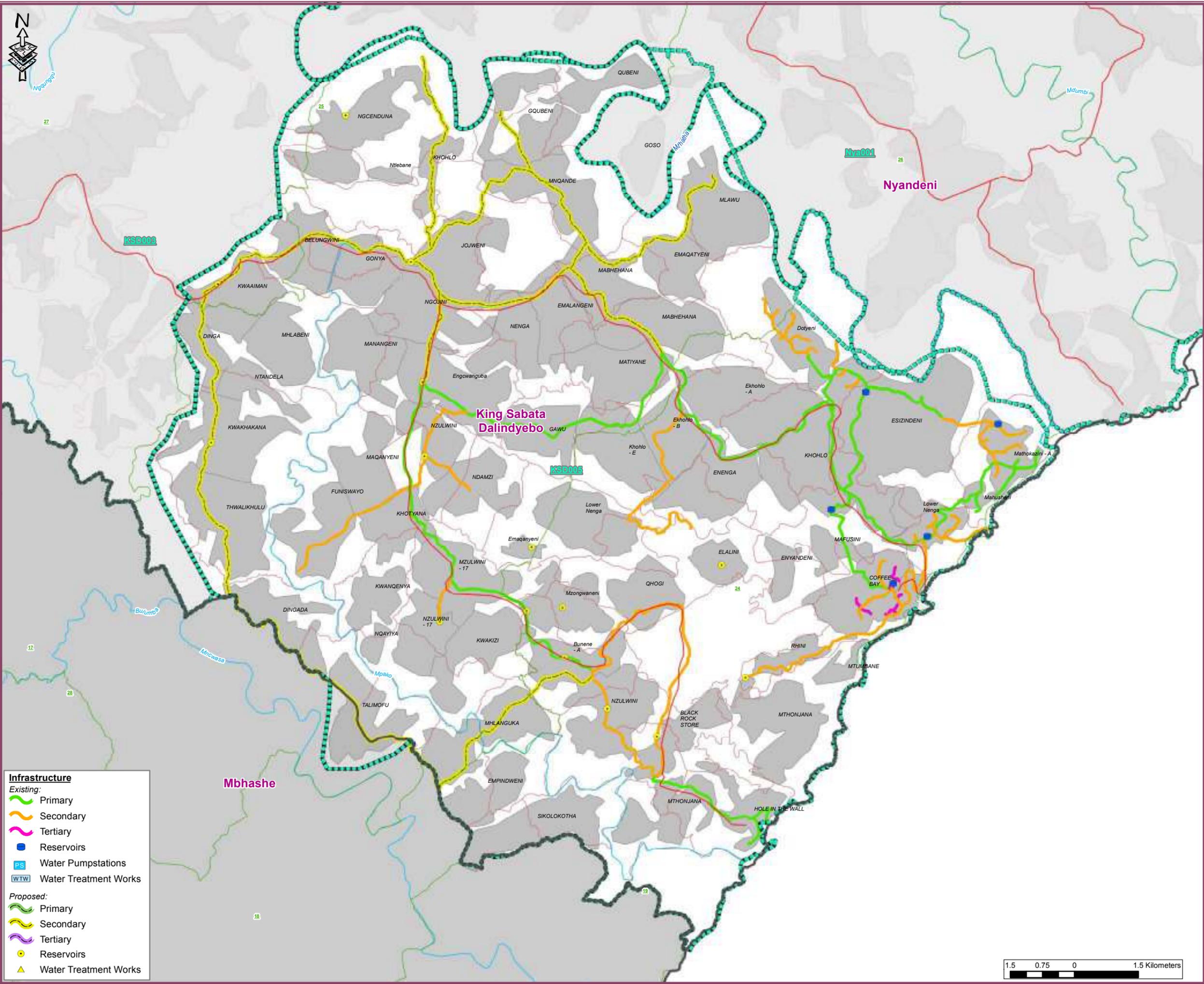
DATE COMPLETED:

2016/05/20

MAP NO.:

DC15 Figure 8.4





Infrastructure

Existing:

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

Proposed:

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

Legend

- Provincial 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

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PROJECT TITLE

**OR Tambo DM: Universal Access
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 Supply Master Plan**

MAP TITLE:

**Conceptual Bulk Water Supply
 Interventions:**

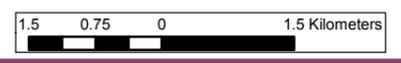
KSD003 Coffee Bay RWSS

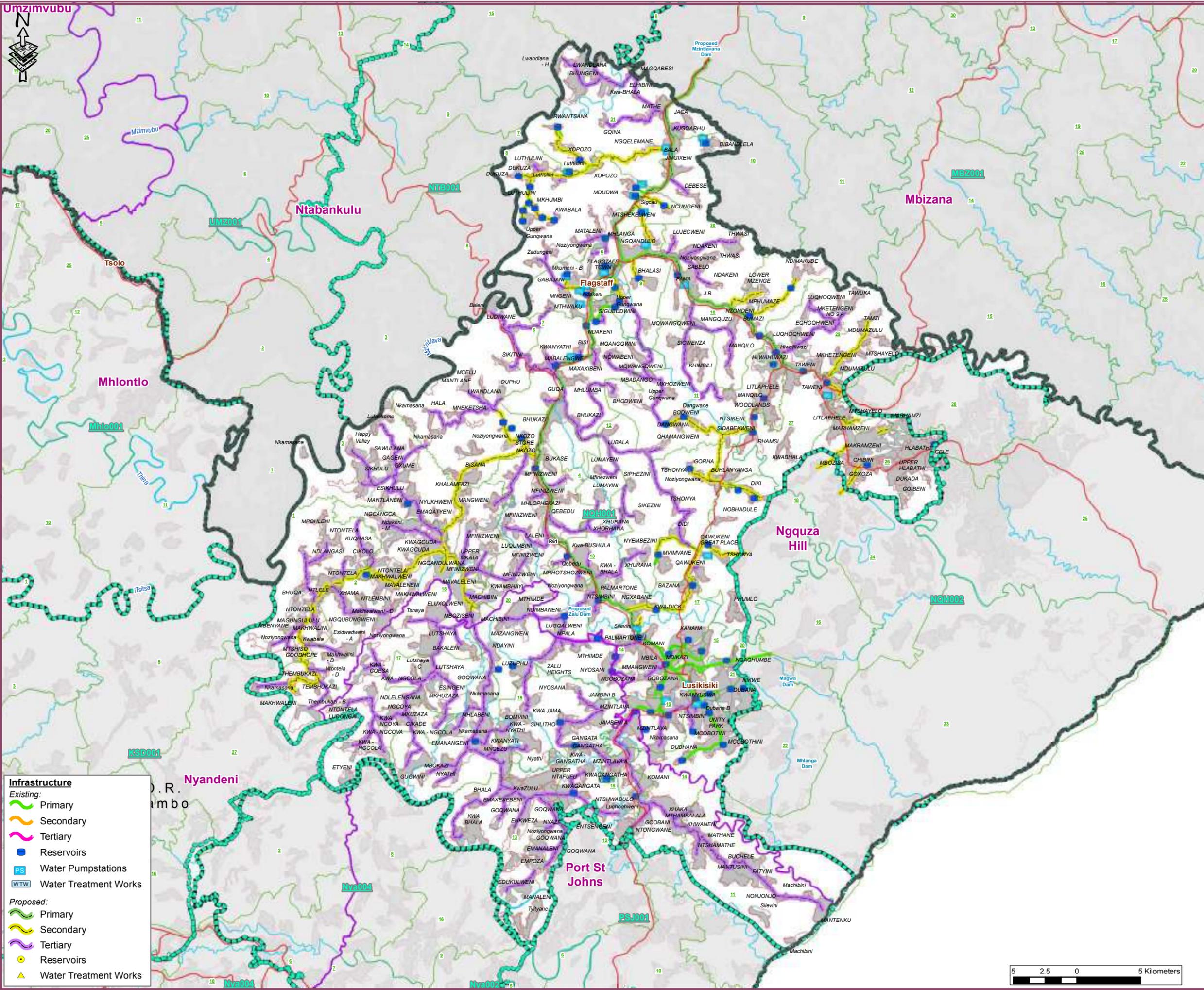
DATE COMPLETED:

2016/05/20

MAP NO.:

DC15 Figure 8.5





Infrastructure

Existing:

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

Proposed:

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

Legend

- Provincial 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

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PROJECT TITLE

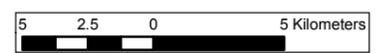
OR Tambo DM: Universal Access Plan Phase 2 - Progressive Development of a Regional Water Supply Master Plan

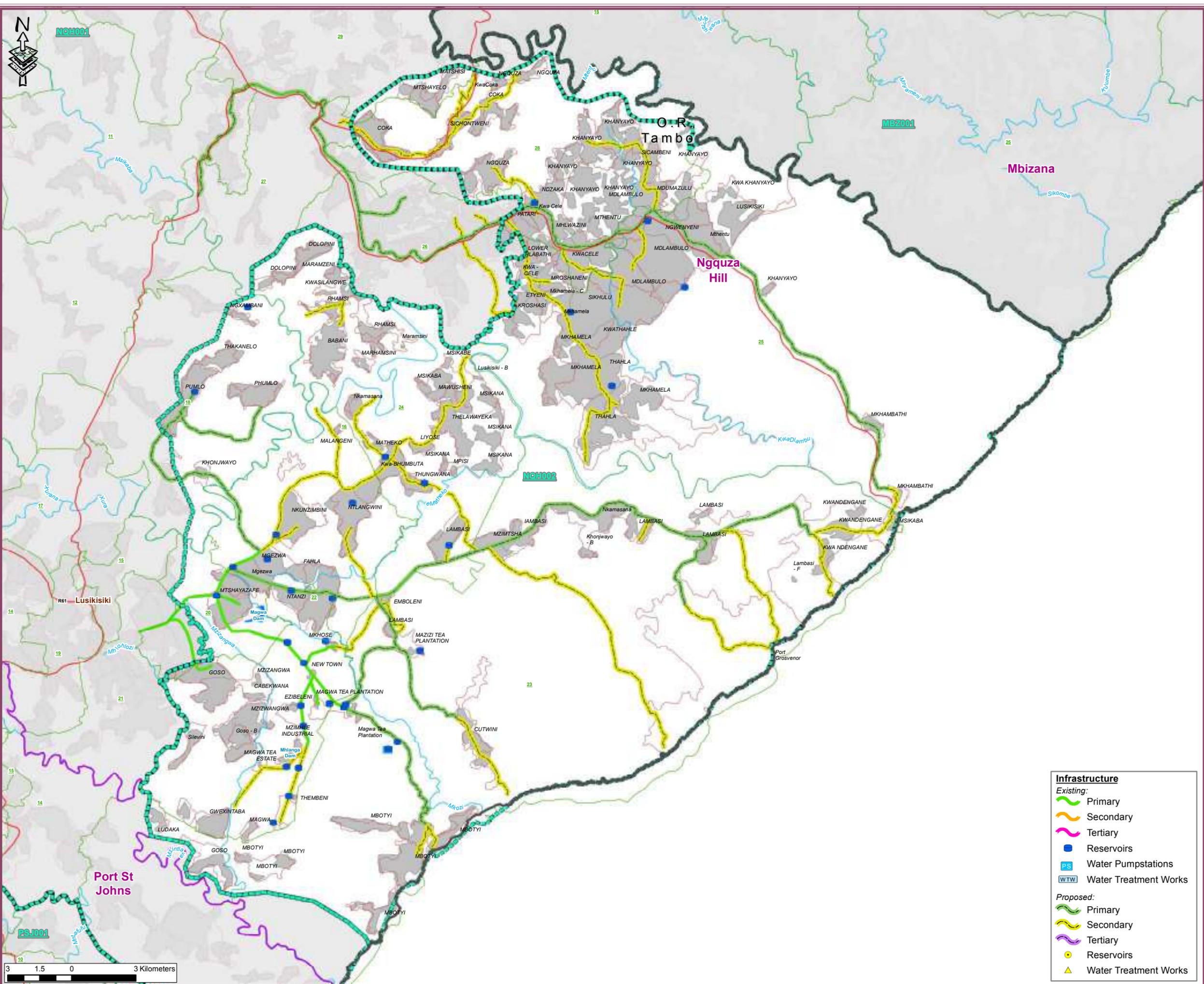
MAP TITLE:

Conceptual Bulk Water Supply Interventions:
NQH001 Ngqushwa Hill RBWSS

DATE COMPLETED: 2016/05/20

MAP NO.: **DC15 Figure 8.7**

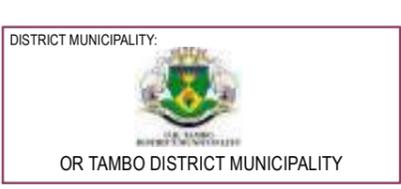




Legend

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

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PROJECT TITLE
**OR Tambo DM: Universal Access
 Plan Phase 2 - Progressive
 Development of a Regional Water
 Supply Master Plan**

MAP TITLE:
**Conceptual Bulk Water Supply
 Interventions:
 NCH002 Mzikaba BRWSS**

DATE COMPLETED: 2016/05/20

MAP NO.: **DC15 Figure 8.8**

Infrastructure

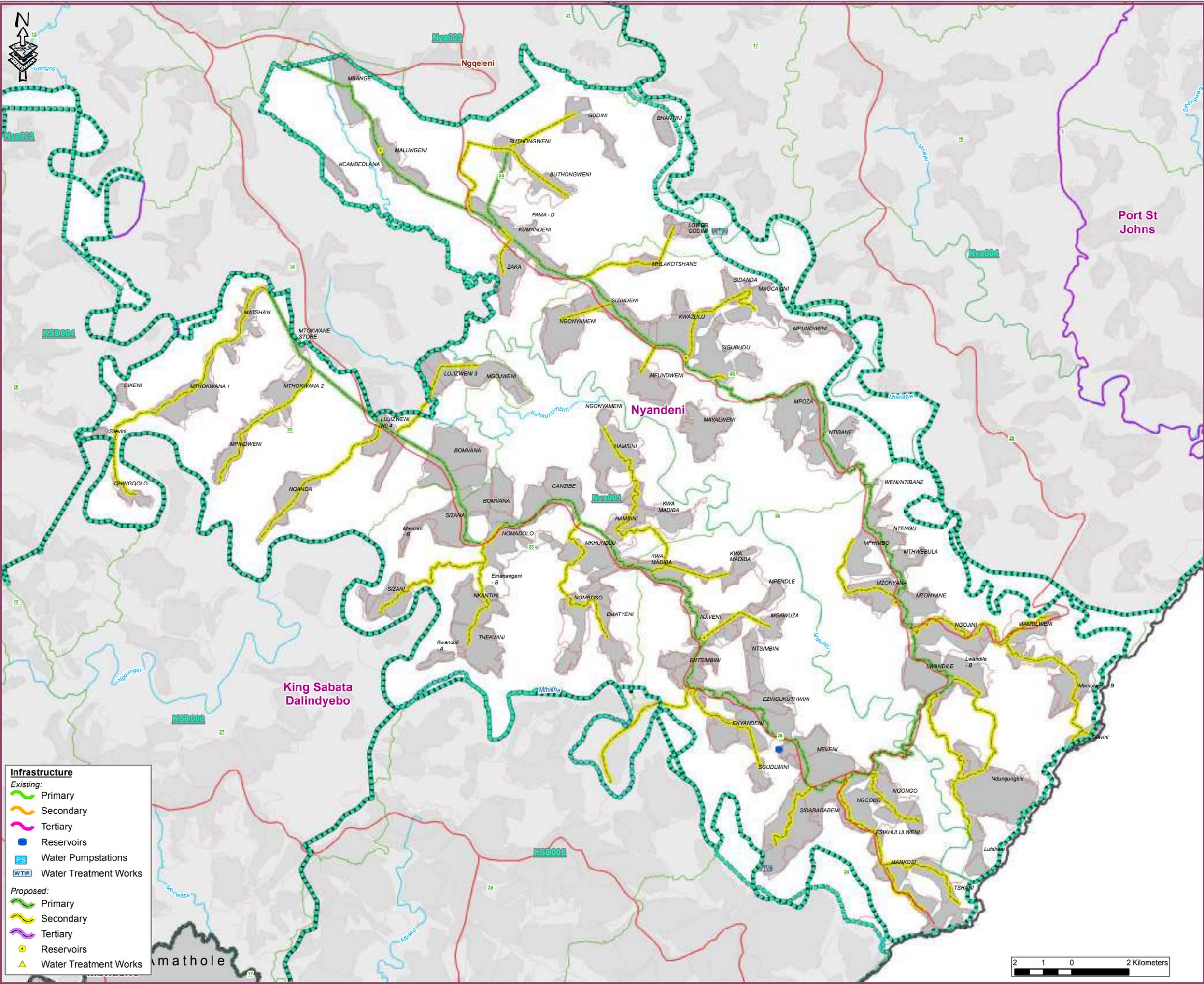
Existing:

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

Proposed:

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





Infrastructure

Existing:

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

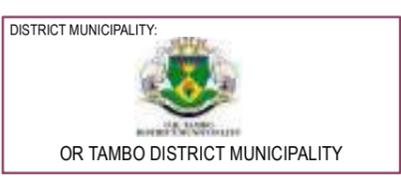
Proposed:

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

Legend

- Provincial Boundaries
- District Municipality Boundaries
- Local Municipality Boundaries
- Ward Boundaries & Numbers
- Census Main Places
- National Roads
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- Conceptual Water Supply Intervention Areas
- Dams & Dam Names
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PROJECT TITLE

**OR Tambo DM: Universal Access
 Plan Phase 2 - Progressive
 Development of a Regional Water
 Supply Master Plan**

MAP TITLE:

**Conceptual Bulk Water Supply
 Interventions:**

Nya001 Second Falls RWSS

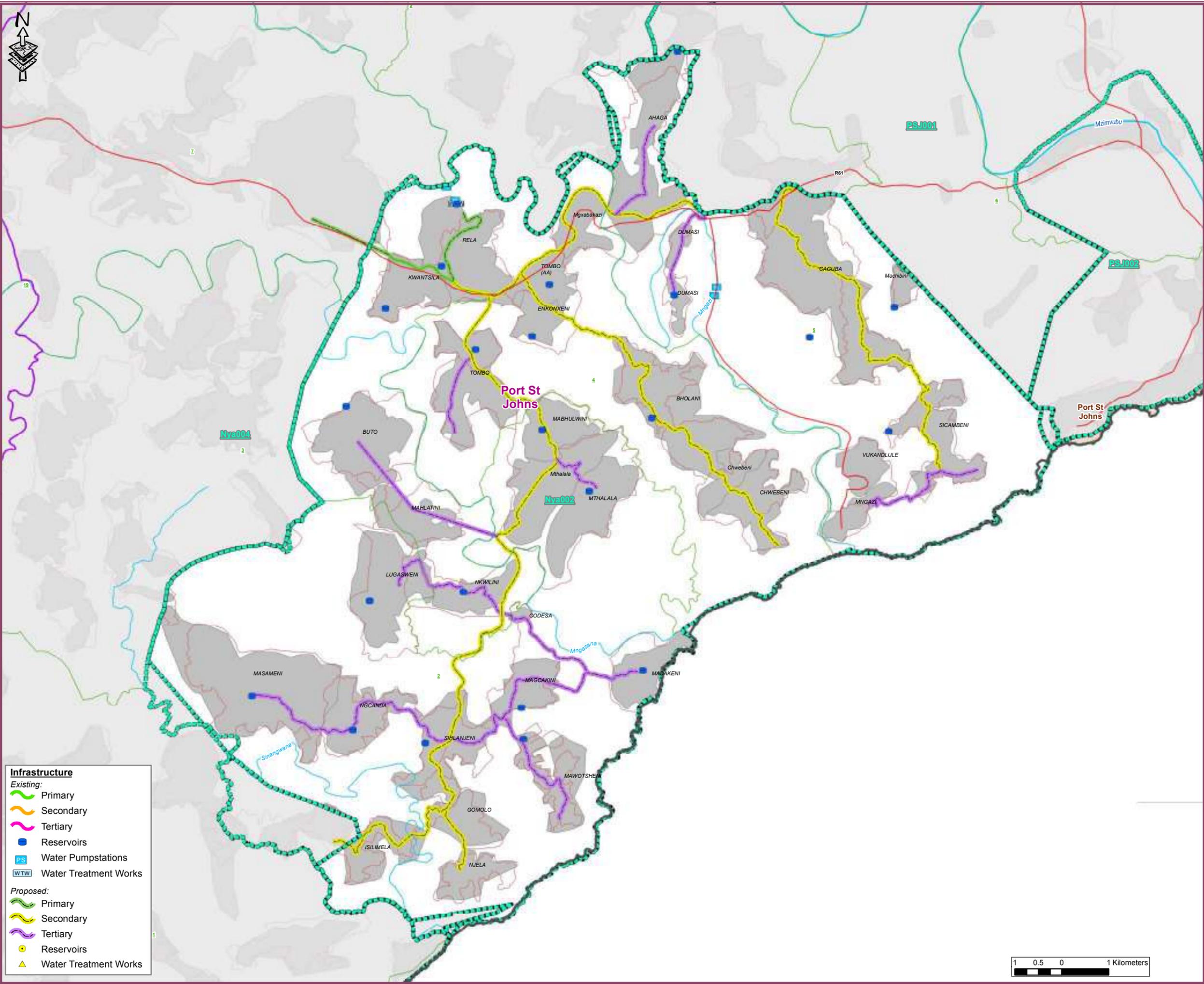
DATE COMPLETED:

2016/05/20

MAP NO.:

DC15 Figure 8.9





Infrastructure

Existing:

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

Proposed:

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

Legend

- Provincial 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:

DISTRICT MUNICIPALITY:

OR TAMBO DISTRICT MUNICIPALITY

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Project No.: 27811

PROJECT TITLE

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 Development of a Regional Water
 Supply Master Plan**

MAP TITLE:

**Conceptual Bulk Water Supply
 Interventions:
 Nya002 Tombo RWSS**

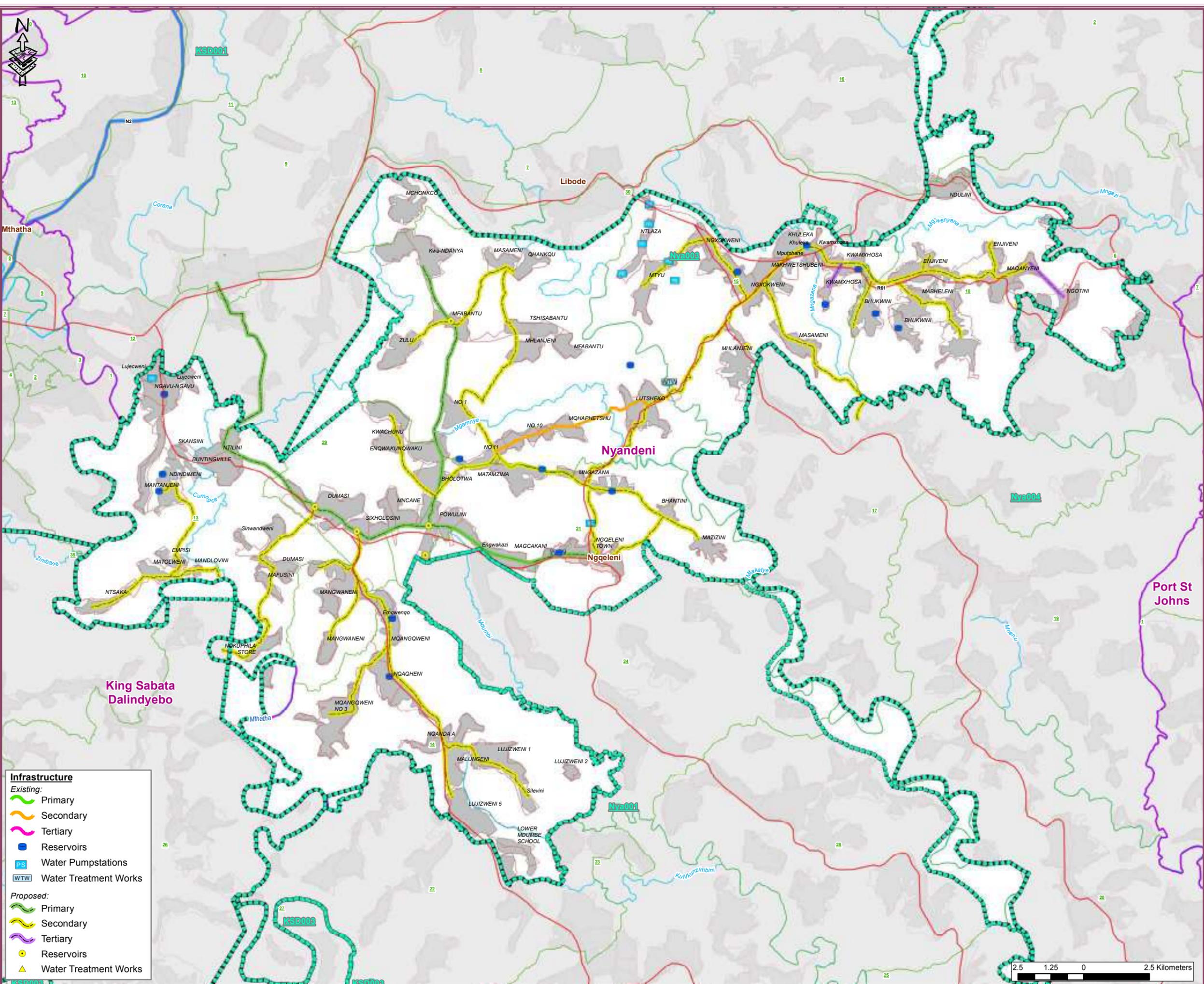
DATE COMPLETED:

2016/05/20

MAP NO.:

DC15 Figure 8.10





Infrastructure

Existing:

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

Proposed:

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

Legend

- Provincial 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

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Project No.: 27811

PROJECT TITLE

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 Development of a Regional Water
 Supply Master Plan**

MAP TITLE:

**Conceptual Bulk Water Supply
 Interventions:
 Nya003 Ngqeleni RWSS**

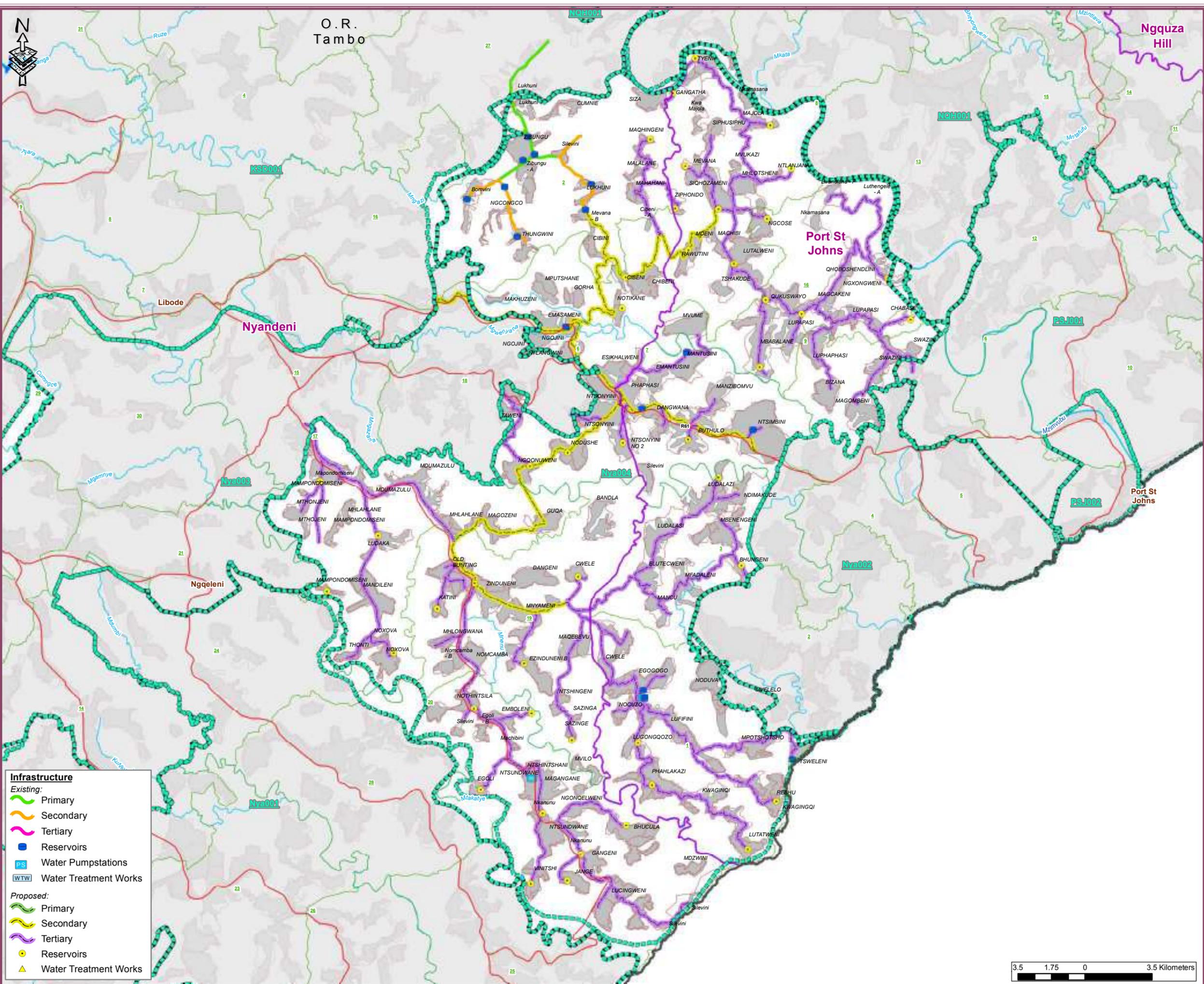
DATE COMPLETED:

2016/05/20

MAP NO.:

DC15 Figure 8.11





Infrastructure

Existing:

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

Proposed:

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

Legend

- Provincial 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

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CLIENT:

DISTRICT MUNICIPALITY:

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Project No.: 27811

PROJECT TITLE

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

MAP TITLE:

Conceptual Bulk Water Supply Interventions:

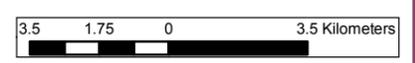
Nya004 Cibenl-Nilambeni RWSS

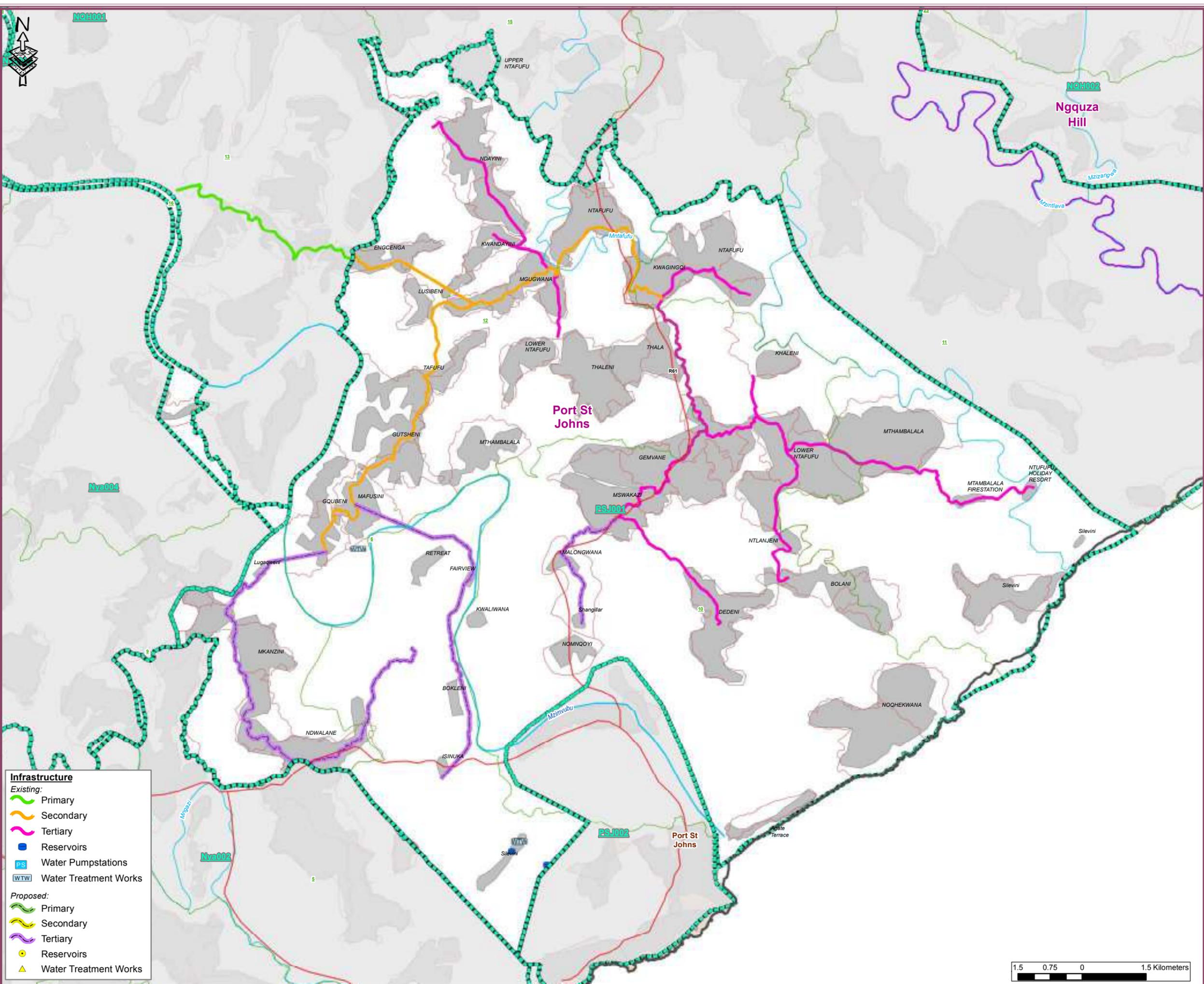
DATE COMPLETED:

2016/05/20

MAP NO.:

DC15 Figure 8.12





Infrastructure

Existing:

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

Proposed:

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

Legend

- Provincial 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

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 Email: pretoria@uwp.co.za

Project No.: 27811

PROJECT TITLE

**OR Tambo DM: Universal Access
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 Supply Master Plan**

MAP TITLE:

**Conceptual Bulk Water Supply
 Interventions:**

PS-1001 Port St Johns RWSS

DATE COMPLETED:

2016/05/20

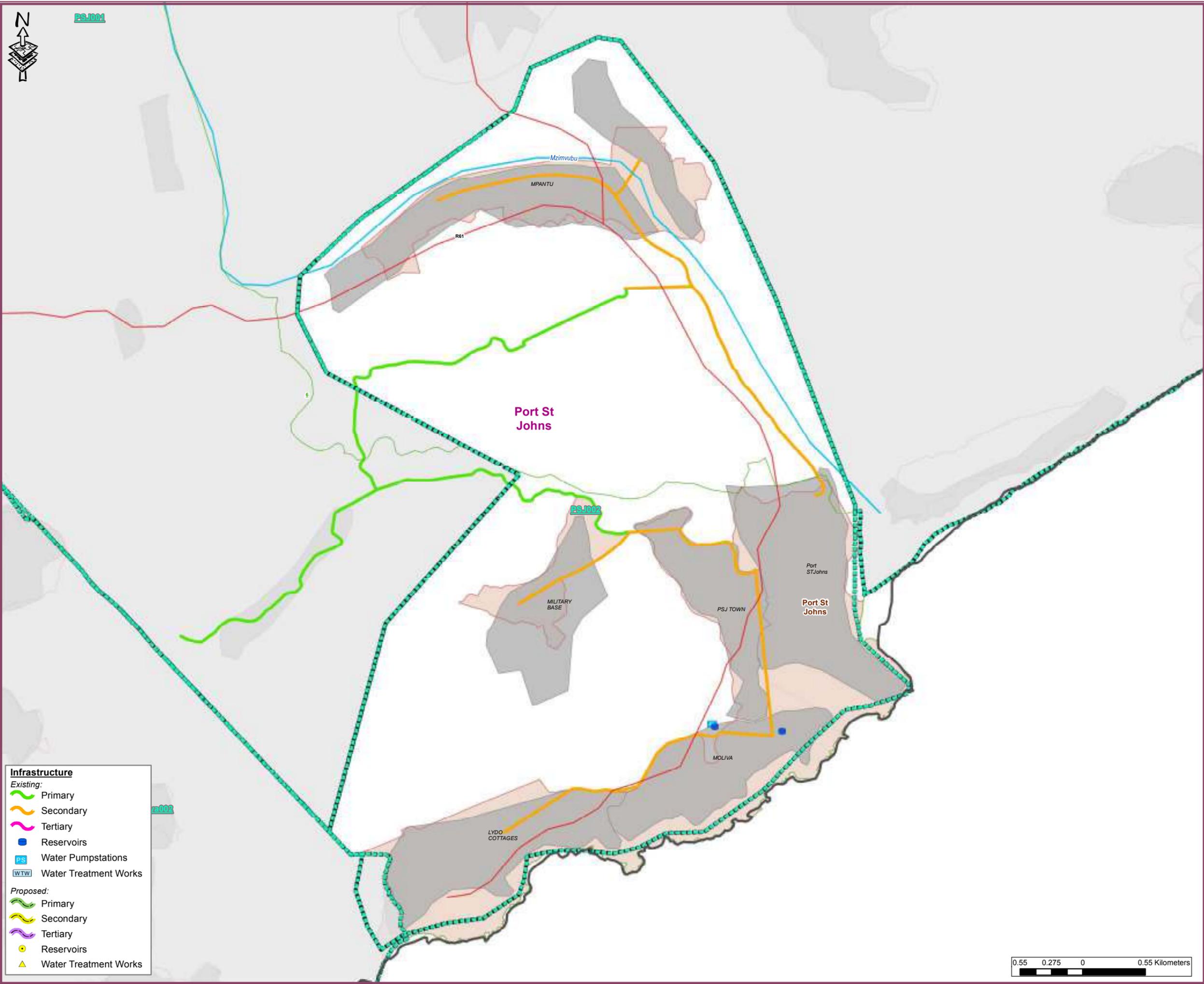
MAP NO.:

DC15 Figure 8.13





PS-001



Infrastructure

Existing:

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

Proposed:

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

Legend

- Provincial 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:

DISTRICT MUNICIPALITY:

OR TAMBO DISTRICT MUNICIPALITY

CONSULTANTS:

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Project No.: 27811

PROJECT TITLE

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 Supply Master Plan**

MAP TITLE:

**Conceptual Bulk Water Supply
 Interventions:**

PS-002 Port St Johns Town Supply

DATE COMPLETED:

2016/05/20

MAP NO.:

DC15 Figure 8.14

