



**water & sanitation**

Department:  
Water and Sanitation  
REPUBLIC OF SOUTH AFRICA



**RESERVE DETERMINATION STUDIES FOR SELECTED SURFACE WATER,  
GROUNDWATER, ESTUARIES AND WETLANDS IN THE USUTU/MHLATUZE  
WATER MANAGEMENT AREA  
WP 10544**

**BASIC HUMAN NEEDS RESERVE**

**FINAL**

**JULY 2016**

**Report No. RDM/WMA6/CON/COMP/2513**





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**DEPARTMENT OF WATER & SANITATION**

**CHIEF DIRECTORATE: WATER ECOSYSTEMS**

**CONTRACT NO. WP 10544**

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WATER, GROUNDWATER, ESTUARIES AND WETLANDS IN THE  
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**This report should be cited as:**

Department of Water & Sanitation (DWS) 2016. Chief Directorate – Water Ecosystems: Reserve determination study of selected surface water and groundwater resources in the Usutu/Mhlathuze Water Management Area. Basic Human Needs Reserve. Prepared by Tlou Consulting (Pty) Ltd. Report no: RDM/WMA6/CON/COMP/2513.

Contract Title: Reserve determination studies for selected surface water, groundwater, estuaries and wetlands in the Usutu - Mhlathuze Water Management Area

Report Title: Basic Human Needs

Author: A Singh

Revision	Date	Report Status
Draft 1	7 December 2015	Draft for external comment
Final	12 January 2016	Final

Consultants: Tlou Consulting (Pty) Ltd

Approved for the Consultants by:



.....

A Singh

Project Leader

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Client: Department of Water & Sanitation

Approved for the DWS:

.....

N Mohapi

Chief Director: Water Ecosystems

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## **ACKNOWLEDGEMENTS**

This report was compiled by Ms A Singh with specialist GIS input from Ms Ciska Engelbrecht.

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## ABBREVIATIONS AND ACRONYMS

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CD:RDM	Chief Directorate: Resource Directed Measures
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
EWR	Ecological Water Requirement
WMA	Water Management Area

## GLOSSARY OF TERMS

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Basic Human Needs Reserve	Provides for the essential needs of individuals served by the water resource in question and includes water for drinking, for food preparation and for personal hygiene.
Ecological Category	Defines the ecological condition of a river in terms of the deviation of biophysical components from the reference condition. There are six Ecological Categories that range from A (natural) to F (critically modified).
EcoClassification	The determination and categorisation of the Present Ecological Status or various biophysical attributes of rivers relative to the natural and/or reference condition.
EcoStatus	The totality of features and characteristics of the river and its riparian areas that bear upon its ability to support an appropriate natural flora and fauna and its capacity to provide a variety of goods and services.
Ecological Water Requirements	The pattern (magnitude, timing and duration) and quality of flow needed to maintain an aquatic ecosystem in a particular condition (Ecological Category).
Ecological Reserve	The quantity and quality of water required to satisfy basic human needs by securing a basic water supply and in order to ensure ecologically sustainable development and use of water resources, as prescribed in the NWA.
Reserve	Means the quantity and quality of water required – (a) to satisfy basic human needs by securing a basic water supply, as prescribed under the Water Serves Act, 1997 (Act No. 108 of 1997), for people who are now or who will, in the reasonably near future be (i) relying upon; (ii) taking water from; or (iii) being supplied from, the relevant water resource; and (b) to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource.

# 1 INTRODUCTION

## 1.1 Background to the study

The Chief Directorate: Resource Directed Measures issued an open tender invitation for the “Appointment of a Professional Service Provider to undertake Reserve Determinations for selected Surface water, Groundwater, Estuaries and Wetlands in the Usutu to Mhlatuze Basins”. The focus on this area was a result of the high conservation status and importance of various water resources in the basin and the significant development pressures in the area affecting the availability of water.

Preliminary Reserve determinations are required to assist the DWS in making informed decisions regarding the authorisations of future water use and the magnitude of the impacts of the proposed developments on the water resources in the WMA, and to provide the input data for Classification of the area’s water resources, and eventual gazettement of the Reserve (DWAFF1999a).

DWS appointed Tlou Consulting to undertake the project in July 2013.

## 1.2 Study objectives

The objectives of the study are to:

- determine the Ecological Reserve (DWAFF 1999a), at various levels of detail, for the Nyoni, Matigulu, Mlalazi, Mhlatuze, Mfolozi, Nyalazi, Hluhluwe, Mzinene, Mkuze, Assegai and Pongola Rivers;
- determine the Ecological Reserve, at an Intermediate level for the Pongola floodplain;
- determine the Ecological Reserve, at an Intermediate level for the St Lucia/Mfolozi, Estuary System;
- determine the Ecological Reserve, at a Rapid level for the Mlalazi Estuary;
- determine the Ecological Reserve, at a Rapid level for the Amatikulu Estuary;
- determine the Ecological Reserve, at an Intermediate level for Lake Sibaya;
- determine the Ecological Reserve, at a Rapid level for Kozi Lake and Estuary;
- classify the causal links between water supply and condition of key wetlands
- incorporate existing EWR assessments on the Mhlatuze (river and estuary) and Nhlabane (lake and estuary) into study outputs;
- determine the groundwater contribution to the Ecological Reserve, with particular reference to the wetlands;
- determine the Basic Human Needs Reserve for the Usutu/Mhlatuze WMA;
- outline the socio-economic water use in the Usutu/Mhlatuze WMA;

- build the capacity of team members and stakeholders with respect to EWR determinations and the ecological Reserve.

### 1.3 This report

This report documents the basic human needs requirements for the population currently and in the reasonably near future, who would be relying upon, taking water from or being supplied from the water resource for their essential needs of drinking water, food preparation and personal hygiene.

The results are provided per river catchment and provide for an average population growth factor of 1% per annum.

## 2 APPROACH TO DETERMINING THE BASIC HUMAN NEEDS REQUIREMENT

### 2.1 Study area

The extent of the study area is shown in (Figure 2-1). It comprises the following catchment areas, and main rivers:

- Mhlatuze (W1), including:
  - Mhlatuze River;
  - Matigulu River;
  - Mfule River;
  - Nseleni River;
  - Mlalazi River.
- Mfolozi (W2), including:
  - Mfolozi River;
  - White Mfolozi River;
  - Black Mfolozi River;
  - Mvunyane River;
  - Nondweni River;
  - Hlonyane River;
  - SikweBezi River;
  - Mona River;
  - Msunduzi River.
- Mkuze (W3), including:
  - Mkuze River;
  - Nkongolwana River;
  - Msunduzi River;
  - Mzinene River;
  - Nzimane River;
  - Hluhluwe River;
  - Nylalazi River.
- Pongola (W4), including:
  - Pongola River;
  - Bivane River;
  - Manzana River;
  - Mozana River;
  - Ngwavuma River.
- Upper Usutu (W5), including:
  - Assegaai River;
  - Ohlelo River;
  - Ngwempisi River;

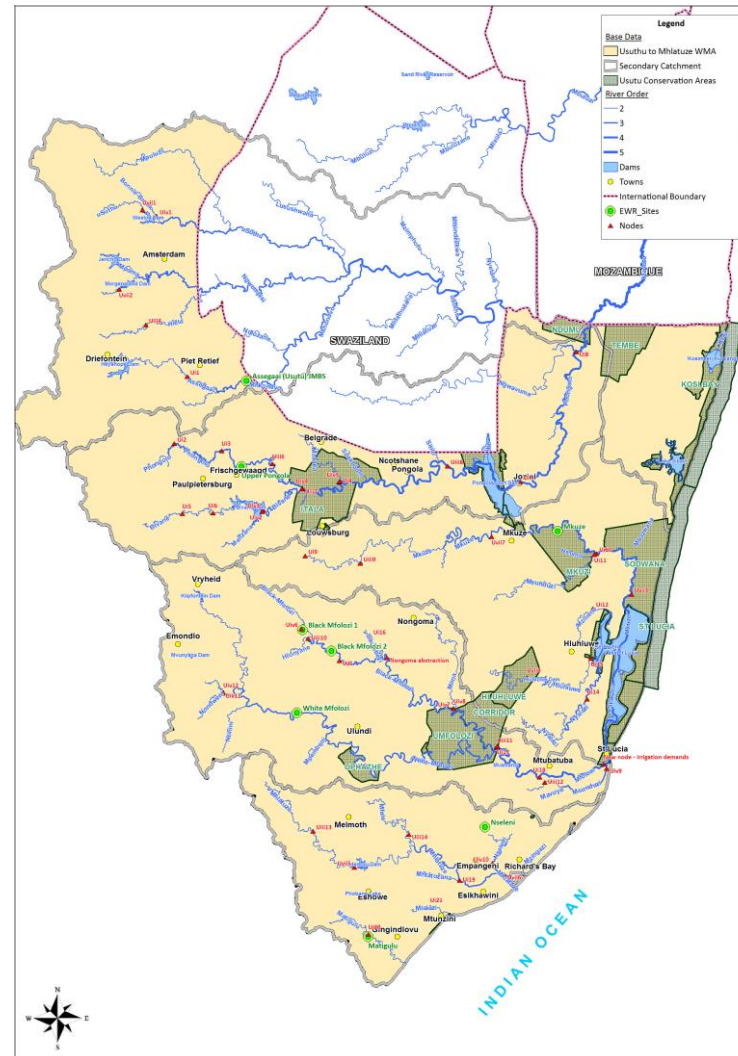


Figure 2-1 Map of the study area

- Usuthu River;
- Bonnie Brook River.
- Lake Sibaya / Kosi (W7).

## 2.2 Approach

Communities likely to be reliant on run of river were identified in the study area using Geographic Information Spatial mapping and the Census 2011. A series of steps were undertaken to determine the population within a 5km boundary along the water resource in each quaternary catchment. These were as follows:

- Establishing those Enumerator Areas (this is the smallest unit of population area in the Census) with the study area.
- Determining the population per Enumerator Area in the 5 km buffer on either side of the main rivers in the study area
- Determining the population per Enumerator Area per quaternary catchment
- Determining the population per quaternary catchment
- Determining the population per quaternary catchment that falls within the buffer zone.

Having calculated the population that could possibly access water directly from the resource, the next step was to project the population to a target date. In this case a target date of 2040 was used. The population was projected using generic growth rates applicable to the municipalities in the study area, economic forecasts and historic trends. The growth rate used in this study was 1%, based on movement within the study area. The population projections are provided in Table 1.

**Table 1. Projected population growth**

Quaternary Catchment	Population Growth						
	2011	2015	2020	2025	2030	2035	2040
W11A	20056	20858	21901	22996	24145	25353	26620
W11B	7872	8187	8596	9026	9477	9951	10449
W11C	20883	21719	22805	23945	25142	26399	27719
W12A	16468	17126	17983	18882	19826	20817	21858
W12B	18576	19319	20285	21299	22364	23483	24657
W12C	28719	29868	31361	32929	34575	36304	38119
W12D	41149	42795	44935	47181	49541	52018	54618
W12E	30353	31567	33145	34802	36542	38369	40288
W12F	146295	152147	159754	167742	176129	184935	194182
W12G	29708	30896	32441	34063	35766	37554	39432
W12H	67388	70084	73588	77267	81131	85187	89447
W12J	6141	6386	6705	7041	7393	7762	8151
W13A	56105	58349	61266	64330	67546	70923	74470
W13B	20234	21044	22096	23201	24361	25579	26858

Quaternary Catchment	Population Growth						
	2011		2020	2025	2030	2035	2040
W21A	45806	47638	50020	52521	55147	57904	60800
W21B	3041	3163	3321	3487	3662	3845	4037
W21C	413	430	451	474	497	522	548
W21D	325	338	355	373	392	411	432
W21F	1473	1532	1608	1689	1773	1862	1955
W21G	3400	3536	3713	3898	4093	4298	4513
W21H	11619	12084	12688	13322	13989	14688	15422
W21J	4653	4839	5081	5335	5602	5882	6176
W21K	42545	44247	46460	48782	51222	53783	56472
W21L	4200	4368	4586	4815	5056	5309	5574
W22A	3725	3874	4067	4271	4484	4708	4944
W22B	1357	1411	1481	1556	1633	1715	1801
W22C	6678	6945	7292	7657	8040	8442	8864
W22D	2355	2450	2572	2701	2836	2977	3126
W22E	490	509	535	561	590	619	650
W22F	19402	20178	21187	22246	23358	24526	25752
W22G	3789	3940	4138	4344	4562	4790	5029
W22H	6265	6515	6841	7183	7542	7919	8315
W22J	16609	17273	18137	19043	19996	20995	22045
W22K	2203	2291	2406	2526	2652	2785	2924
W22L	5516	5737	6024	6325	6641	6974	7322
W23A	52325	54418	57138	59995	62995	66145	69452
W23B	28090	29214	30674	32208	33819	35510	37285
W23C	11253	11703	12288	12903	13548	14225	14937
W23D	39729	41318	43384	45553	47831	50222	52733
W31A	8480	8819	9260	9723	10210	10720	11256
W31B	4424	4601	4831	5072	5326	5592	5872
W31C	1119	1164	1222	1284	1348	1415	1486
W31D	1560	1622	1703	1789	1878	1972	2071
W31E	1193	1241	1303	1368	1437	1508	1584
W31F	1583	1647	1729	1815	1906	2002	2102
W31G	5457	5675	5959	6257	6569	6898	7243
W31H	7086	7369	7738	8125	8531	8958	9405
W31J	13565	14108	14813	15554	16331	17148	18005
W31K	8714	9063	9516	9992	10491	11016	11567
W31L	2387	2482	2606	2737	2873	3017	3168
W32A	7031	7312	7677	8061	8464	8888	9332
W32B	8370	8705	9141	9598	10077	10581	11110
W32C	22910	23826	25018	26269	27582	28961	30409
W32D	9371	9746	10233	10745	11282	11846	12439
W32E	17553	18255	19168	20126	21132	22189	23298
W32F	20800	21632	22713	23849	25041	26293	27608
W32F	20800	21632	22713	23849	25041	26293	27608
W32G	65773	68404	71825	75416	79187	83146	87303
W32H	38617	40162	42170	44278	46492	48817	51257



Quaternary Catchment	Population Growth						
	2011		2020	2025	2030	2035	2040
W41A	537	558	586	616	646	679	713
W41B	1633	1699	1784	1873	1967	2065	2168
W41C	1089	1133	1190	1249	1311	1377	1446
W41D	1297	1349	1416	1487	1561	1639	1721
W41E	9760	10150	10658	11191	11750	12338	12955
W41F	1302	1354	1422	1493	1567	1646	1728
W41G	2092	2176	2285	2399	2519	2645	2777
W42A	2447	2545	2672	2805	2946	3093	3248
W42B	4633	4818	5059	5312	5577	5856	6149
W42C	1329	1382	1452	1524	1600	1680	1764
W42D	6667	6934	7281	7645	8027	8428	8850
W42E	24929	25926	27222	28584	30013	31513	33089
W42F	679	706	741	778	817	858	901
W42G	8346	8680	9114	9569	10048	10550	11078
W42H	1480	1540	1616	1697	1782	1871	1965
W42J	4604	4788	5028	5279	5543	5820	6111
W42L	374	388	408	428	450	472	496
W42M	3414	3550	3728	3914	4110	4316	4531
W43F	8517	8858	9301	9766	10254	10767	11305
W44A	3263	3393	3563	3741	3928	4124	4331
W44B	14966	15564	16343	17160	18018	18919	19865
W44C	1025	1066	1119	1175	1234	1296	1361
W44D	973	1012	1063	1116	1172	1231	1292
W44E	3319	3452	3624	3806	3996	4196	4406
W45A	50446	52463	55087	57841	60733	63770	66958
W45B	35415	36831	38673	40607	42637	44769	47007
W51A	2705	2813	2954	3101	3256	3419	3590
W51B	10042	10444	10966	11514	12090	12695	13329
W51C	3825	3978	4177	4386	4605	4835	5077
W51D	50865	52900	55545	58322	61238	64300	67515
W52A	194	202	212	222	233	245	257
W52B	709	737	774	813	854	896	941
W52D	26	27	28	30	31	33	34
W53A	1187	1235	1296	1361	1429	1501	1576
W53B	279	291	305	320	336	353	371
W53C	8873	9228	9689	10174	10682	11217	11777
W53D	2808	2921	3067	3220	3381	3550	3728
W53E	628	654	686	721	757	794	834
W54A	322	335	352	369	388	407	427
W54B	1210	1258	1321	1387	1457	1529	1606
W54C	473	492	517	543	570	599	628
W54D	2352	2446	2569	2697	2832	2974	3122
W54E	242	252	265	278	292	306	322
W55D	2121	2205	2316	2432	2553	2681	2815
W57J	1283	1334	1401	1471	1545	1622	1703

Quaternary Catchment	Population Growth						
	2011		2020	2025	2030	2035	2040
W57K	677	704	739	776	815	856	899
W70A	108	112	118	124	130	136	143

Using the population figures, a basic human need requirement for the qualifying population was estimated per quaternary catchment. The results are provided in Chapter 3.

### **3 BASIC HUMAN NEEDS REQUIREMENT**

The Basic Human Needs Requirement was calculated for a range of per capita requirements 25; 60; 80 and 100 litres per capita per day. This is set out in Table 2.





Year	Per Capita (l/p/d)	2015				2020				2025				2030				2035				2040			
		25	60	80	100	25	60	80	100	25	60	80	100	25	60	80	100	25	60	80	100	25	60	80	100
	W51A	0,03	0,06	0,08	0,10	0,03	0,06	0,09	0,11	0,03	0,07	0,09	0,11	0,03	0,07	0,10	0,12	0,03	0,07	0,10	0,12	0,03	0,08	0,10	0,13
	W51B	0,10	0,23	0,30	0,38	0,10	0,24	0,32	0,40	0,11	0,25	0,34	0,42	0,11	0,26	0,35	0,44	0,12	0,28	0,37	0,46	0,12	0,29	0,39	0,49
	W51C	0,04	0,09	0,12	0,15	0,04	0,09	0,12	0,15	0,04	0,10	0,13	0,16	0,04	0,10	0,13	0,17	0,04	0,11	0,14	0,18	0,05	0,11	0,15	0,19
	W51D	0,48	1,16	1,54	1,93	0,51	1,22	1,62	2,03	0,53	1,28	1,70	2,13	0,56	1,34	1,79	2,24	0,59	1,41	1,88	2,35	0,62	1,48	1,97	2,46
	W52A	0,00	0,00	0,01	0,01	0,00	0,00	0,01	0,01	0,00	0,00	0,01	0,01	0,00	0,01	0,01	0,01	0,00	0,01	0,01	0,01	0,00	0,01	0,01	0,01
	W52B	0,01	0,02	0,02	0,03	0,01	0,02	0,02	0,03	0,01	0,02	0,02	0,03	0,01	0,02	0,02	0,03	0,01	0,02	0,03	0,03	0,01	0,02	0,03	0,03
	W52D	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	W53A	0,01	0,03	0,04	0,05	0,01	0,03	0,04	0,05	0,01	0,03	0,04	0,05	0,01	0,03	0,04	0,05	0,01	0,03	0,04	0,05	0,01	0,03	0,05	0,06
	W53B	0,00	0,01	0,01	0,01	0,00	0,01	0,01	0,01	0,00	0,01	0,01	0,01	0,00	0,01	0,01	0,01	0,00	0,01	0,01	0,01	0,00	0,01	0,01	0,01
	W53C	0,08	0,20	0,27	0,34	0,09	0,21	0,28	0,35	0,09	0,22	0,30	0,37	0,10	0,23	0,31	0,39	0,10	0,25	0,33	0,41	0,11	0,26	0,34	0,43
	W53D	0,03	0,06	0,09	0,11	0,03	0,07	0,09	0,11	0,03	0,07	0,09	0,12	0,03	0,07	0,10	0,12	0,03	0,08	0,10	0,13	0,03	0,08	0,11	0,14
	W53E	0,01	0,01	0,02	0,02	0,01	0,02	0,02	0,03	0,01	0,02	0,02	0,03	0,01	0,02	0,02	0,03	0,01	0,02	0,02	0,03	0,01	0,02	0,02	0,03
	W54A	0,00	0,01	0,01	0,01	0,00	0,01	0,01	0,01	0,00	0,01	0,01	0,01	0,00	0,01	0,01	0,01	0,00	0,01	0,01	0,01	0,00	0,01	0,01	0,02
	W54B	0,01	0,03	0,04	0,05	0,01	0,03	0,04	0,05	0,01	0,03	0,04	0,05	0,01	0,03	0,04	0,05	0,01	0,03	0,04	0,06	0,01	0,04	0,05	0,06
	W54C	0,00	0,01	0,01	0,02	0,00	0,01	0,02	0,02	0,00	0,01	0,02	0,02	0,01	0,01	0,02	0,02	0,01	0,01	0,02	0,02	0,01	0,01	0,02	0,02
	W54D	0,02	0,05	0,07	0,09	0,02	0,06	0,08	0,09	0,02	0,06	0,08	0,10	0,03	0,06	0,08	0,10	0,03	0,07	0,09	0,11	0,03	0,07	0,09	0,11
	W54E	0,00	0,01	0,01	0,01	0,00	0,01	0,01	0,01	0,00	0,01	0,01	0,01	0,00	0,01	0,01	0,01	0,00	0,01	0,01	0,01	0,00	0,01	0,01	0,01
	W55D	0,02	0,05	0,06	0,08	0,02	0,05	0,07	0,08	0,02	0,05	0,07	0,09	0,02	0,06	0,07	0,09	0,02	0,06	0,08	0,10	0,03	0,06	0,08	0,10
	W57J	0,01	0,03	0,04	0,05	0,01	0,03	0,04	0,05	0,01	0,03	0,04	0,05	0,01	0,03	0,05	0,06	0,01	0,04	0,05	0,06	0,02	0,04	0,05	0,06
	W57K	0,01	0,02	0,02	0,03	0,01	0,02	0,02	0,03	0,01	0,02	0,02	0,03	0,01	0,02	0,02	0,03	0,01	0,02	0,02	0,03	0,01	0,02	0,03	0,03
	W70A	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01

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## **4 REFERENCES**

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