# 3. WATER RESOURCE PROFILE

## 3.1 Water sources

All water supplied by the ZDM to the community is from sources within the DM's area of jurisdiction, except for the Mandhlakazi Regional Scheme where water is obtained from the Pongolapoort dam via a private farmer. With a population count of approximately 805 055, ZDM requires at least 2 108 Mℓ of water per month or 25 295 Mℓ per year to supply the population with basic water services. This does not account for commercial or industrial requirements.

The ZDM falls within the Mfolozi (W2), Mkuze (W3) and Pongola (W4) secondary catchments of the Usuthu/Mhlathuze Water Management Area (WMA)[1]. The aerial extent of the ZDM occupies approximately 22% of this WMA. The total available water and requirements as at year 2000, based on a 98% assurance of supply within these sub-areas, is summarised in Table 3.1[2]. It is evident that apart from the Pongola catchments, water from these sub-areas is currently over-utilised and a deficit is created. However, according to Basson and Rossouw[3], this deficit is a result of the provision made for future implementation of the Reserve. The Reserve is a legislated requirement of the amount of water required to satisfy the ecological needs of a river system (provisionally estimated at 20%), as well as the basic human needs (that have been established as 25 litres per person per day).

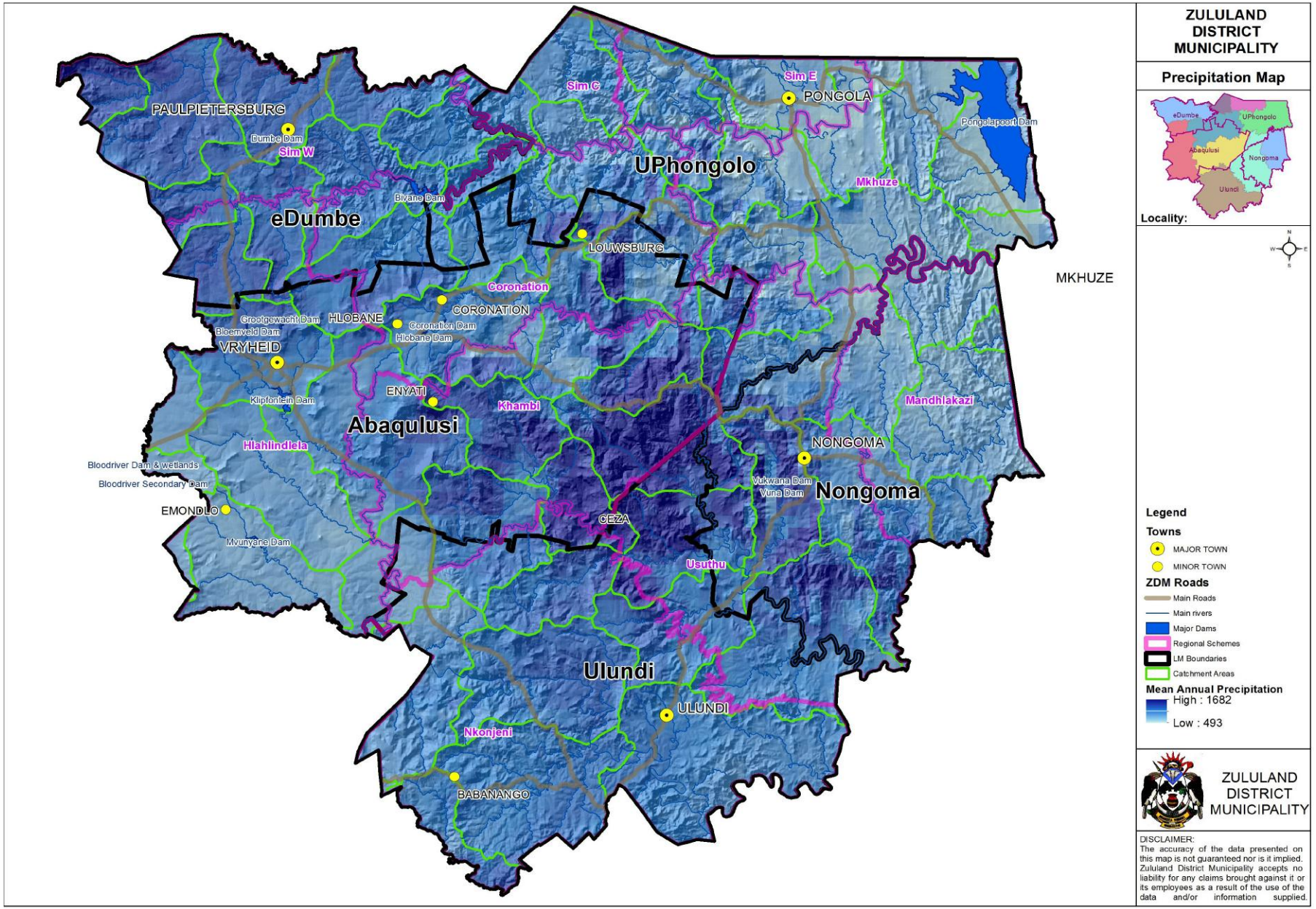
**Table 3.1: Water balance - summary of the water available and required within Zululand District Municipality for the year 2000 (Million m³ (kℓ) per annum).**

| | | | Mfolozi | Mkuze | Pongola | Total |
|---|---|---|---|---|---|---|
| Available water | Natural resource | surface water | 36 | 15 | 616 | 667 |
| | | groundwater | 5 | 12 | 8 | 25 |
| | Usable return flow | Irrigation | 5 | 6 | 21 | 32 |
| | | Urban | 4 | 0 | 0 | 4 |
| | | Mining & bulk | 1 | 0 | 0 | 1 |
| | Total local yield* | | **51** | **33** | **645** | **729** |
| | Transfers in | | 0 | 30 | 0 | 30 |
| | **Total available** | | **51** | **63** | **645** | **759** |
| Water requirements | Consumer groups | Irrigation | 51 | 61 | 213 | 325 |
| | | Urban** | 12 | 1 | 1 | 14 |
| | | Rural** | 11 | 10 | 6 | 27 |
| | | Mining & bulk industrial*** | 4 | 0 | 1 | 5 |
| | | Afforestation**** | 2 | 6 | 34 | 42 |
| | Total local requirements | | **80** | **78** | **255** | **413** |
| | Transfers out | | 18 | 0 | 30 | **48** |
| | **Total used** | | **98** | **78** | **285** | **461** |
| **Balance** | | | **-47** | **-15** | **360** | **298** |

*Source: Basson and Rossouw (2003).*
**Includes allowance for impacts of the ecological component of the Reserve, river losses, alien vegetation, rain-fed agriculture and urban run-off on yield.*
***Includes allowance for basic human needs component of the Reserve (25 ℓ/c/d).*
****Mining and bulk industrial water uses that are not part of the urban system.****Afforestation quantities refer to the impact on yield only.*

[1] The Usuthu/Mhlathuze WMA is one of 19 areas defined across South Africa in terms of the National Water Act, 1998 (Act 36 of 1998). These WMAs have been defined to improve water resource management within South Africa. With time, each of the WMAs will establish a catchment management agency (CMA) for the regulation and control of water use in the WMA.
[2] Data for this table have been extracted from Basson and Rossouw (2003). *Usuthu to Mhlathuze Water Management Area: Overview of water resources availability and utilisation, September 2003*. DWAF: BKS. Report no. P WMA 06/000/00/0203. 31pp. At 13 & 21.
[3] Op cit 2 at 23.

**Figure 3.1 Precipitation & Catchment Areas within ZDM**



### 3.1.1 White Umfolozi Catchment (Hlahlindlela Regional Water Supply and Nkonjeni Regional Water supply Area)

A detailed catchment study for the Mfolozi River has not been undertaken before. The catchment has however been included in national water resource studies such as the Surface Water Resources of South Africa 1990 (WR90) and the Water Resources of South Africa 2005 (WR2005) studies of the Water Research Commission. Although the Usuthu to Mhlathuze Water Management Area (WMA6) is not considered by the Department of Water Affairs (DWA) to be a water stressed area as a whole, the Mfolozi River catchment is considered to have a net deficit in the water balance for the catchment according to the National Water Resource Strategy (September 2004 edition). The National Water Resource Strategy also indicates that there will be no net increase in water requirements within the catchment from 2000 to 2025. However there has been growing water demand over the past decade mainly due to an increase in the provision of water services to the large rural population within the catchment.

A reconnaissance level water resource catchment study for the White Mfolozi River was undertaken in 2009/2010. The yield analyses indicate that there is **insufficient** water to currently meet the requirements of eMondlo at 98% assurance and by 2030 there will be significant shortfalls in the water availability to meet the requirements of all the main towns, especially if the Reserve are released from the main dams. One of the recommendations of the study was that the Water Resource Planning Model (WRPM) be used to determine the scheduling requirements for new infrastructure and to recommend operating rules for the system.

ZDM undertook a Water Resource Modelling of **the upper White uMfolozi River System** during 2011/2012. Areas served by this System are Vryheid Town and surrounding suburbs, Bhekuzulu, Lakeside, eMondlo Town and surrounding areas (Hlahlindlela Regional Water Supply Scheme), Mpumanhlope, Ulundi, Babanango (Nkonjeni Regional Water supply Scheme) and Nondweni (Umzimyathi District Municipality).

The Water Resource Planning Model (WRPM) will be utilized to incorporate the water requirement projection (growth) and the current system storage states as at the beginning of January 2012 into the systems model, for the following benefits;

1. To determine the resource capability of the various sub-systems at different storage states.
2. To determine the required water resource augmentation dates to ensure that planning and implementation of new schemes are done timeously to avoid water restrictions at unacceptable levels.

The WRPM system's main focus it implementation scheduling and planning as well as operating analysis, as it takes into account the current status of the system, the growing water requirements, changing return flows and the scheduling of new infrastructure. The WRPM is ideally suited to analysing a multi-catchment system and has been used successfully on many of the complex water resource system in South Africa, such as the Vaal River System, the Orange River System, the Berg River System and the Umgeni System. This is the first time it will be applied to the White Mfolozi System.

The Planning Model has been setup for the White Mfolozi system and analyses done for three water demand scenarios.

**Table 3.2: Low, Medium and High Growth Scenarios**

| Growth Scenario | Vryheid Area (%) | eMondlo Area (%) | Ulundi Area (%) |
|---|---|---|---|
| **Low** | 1.4 | 1.2 | 2 |
| **Median** | 2.3 | 2.4 | 3.2 |
| **High** | 3.2 | 3.7 | 4.5 |

The model indicates that the yield from Mvunyane dam **is insufficient** to meet the water requirements at the desired levels of assurance and should be augmented very soon, to avoid the risk of restrictions occurring. The operating rules for Mvunyane should be implemented to protect higher assurance users.

For the **low growth scenario**, the yield from Klipfontein combined with the other existing dams is sufficient to meet the water requirements of Vryheid and Ulundi as well as the link to eMondlo until at least 2030.

For the **median growth scenario**, the yield from Klipfontein combined with the other existing dams is sufficient to meet the water requirements of Vryheid, Ulundi and eMondlo until 2024. After 2024, the existing water resource infrastructure of the White Mfolozi will need augmentation to meet the projected water requirements.

For the **high growth scenario**, the yield from Klipfontein combined with the other existing dams is sufficient to meet the water requirements of Vryheid, Ulundi and eMondlo until 2021. After 2021 the existing water resource infrastructure of the White Mfolozi will need augmentation to meet the projected water requirements.

It is therefore important that the required work to plan for the next water resource augmentation be undertaken, due to the long lead times required to implement a water resource development projects.

In applying the Planning Model approach to the development planning of water resource systems it is important that analyses are regularly updated to account for changes in storage and any revised projections of demands. These analyses should be undertaken annually around the decision month of May. The updated analyses should include any proposed new resource development or change in reuse strategy.

The following recommendations are proposed:

- **Take immediate action to augment the water supply to eMondlo.**
- **Start the necessary pre-feasibility and /or feasibility studies to be prepared for the next Water Resource Augmentation project.**
- **Implement the proposed operating rules for Mvunyane, Bloemveld and Grootgewacht Dams**

- **Make a decision on a restriction strategy for eMondlo. Implement restrictions to eMondlo based on the short term yield curves and the water requirement projections.**
- **Continue to track the actual water usage in the system and update the water demand projections regularly.**
- **Monitor all dam levels on a daily basis, including the rainfall and evaporation.**
- **Monitor water abstractions and return flows on a daily basis.**
- **Rerun the WRPM every year in May with the updated system storage information and the updated water projections to revise the projected implementation date for the next water resource augmentation project.**
- **Review the recommendations made in the First Order Reconciliation strategies done during Small Town Studies, particular attention should be paid to Water Conservation and Demand Management Strategies in the ZDM supply areas.**
- **Review the option of raising Klipfontein dam as proposed in the First Order Reconciliation strategies with other water resource development alternatives to improve the system yield. The raising of Klipfontein Dam is likely to be expensive due to the potential impact on the road and railway line.**

### 3.1.2 Black Umfolozi Catchment (Usuthu Regional Water Supply)

ZDM investigated the available water resources in the upper Black Mfolozi River during 2011.

The purpose of the investigation was twofold:

- An assessment was undertaken to determine the available water resources of the upper Black Mfolozi River which involved quantifying the divertable flows at the existing weir on the river near Nongma upstream of the Kwa Nkweme River confluence. This represents the situation prior to construction of the off-channel storage dam on the Kwa Nkweme River. Analyses were performed for 18.6 Ml/day (2025 demand) and 25 Ml/day (2035 demand).

- Detailed yield analyses were undertaken to determine the water resources capability of a proposed system on the upper Black Mfolozi River, which consists of a new off-channel storage dam on the Kwa Nkweme River. Water for this off-channel storage dam will be supplied by diverting available flows from the existing weir on the Black Mfolozi River. The performance of the system was evaluated for a variety of possible configurations including a range of dam (storage) sizes, flow diversion capacities and downstream environmental flow requirements (EFR's).

Based on the results of the water resource assessment it is concluded that:

> *Prior to the construction of the proposed off-channel storage dam on the Kwa Nkweme River, a run-of-river scheme on the upper Black Mfolozi River could supply a target abstraction of 18.6Ml/day (or 6.8 million m³/a, the projected water requirement for the proposed scheme in 2025) with an annual*

*risk of failure of 64% (recurrence interval of 1:1.6 years). This risk is well above accepted levels for schemes of this increase the supply capability (assurance of supply) of the system.*

A storage capacity of 7.9 million m³ (30% of the maximum capacity) is adequate to meet the target abstraction of 6.8 million m³/a. This, however, requires a fairly large diversion works capacity of 0.6m³/s. For a larger dam of 10.6 million m³ (40% of the maximum capacity) diversion works with a capacity of only 0.4m³/s would be adequate to meet the target abstraction.

The option recommended was the construction of a 75m high earthfill dam at estimated construction cost of R370m, but due to the limited geotechnical information available, the level of the dam options investigation (layouts and design) and related cost estimates can be classified as pre-feasibility.

A detailed survey of the dam basin is required, prior to any further designs and cost estimates. The survey information will be used on the area capacity calculations of the dam, as well as the design of the dam wall (length, height, spillway type, etc.) and other structures.

A detailed geotechnical investigation is also required, prior to any further designs and cost estimates.

### 3.1.3 Pongola Catchment (Mandhlakazi, Mkuze and Simdlangentsha Regional Water supply Area)

The Pongola catchment is currently under-utilised and the only catchment area not under stress. This catchment area supplies the Mandhlakazi Regional Water Supply Scheme from Senekal Boerdery via the Jozini Dam.

Due to the high cost involved for the construction of an off-storage Facility for the Usuthu Regional Scheme, the augmentation of the Mandhlakazi and Usuthu Regional Water Supply Schemes is currently investigated. The following items should be considered:

- Alternative sites for the off-channel storage facility should be investigated.
- The possibility to reduce the capacity of the off-channel storage dam on the Kwa Nkweme River should be investigated. The associated risk should be taken into account.
- The Operational cost should also be taken into account (including levies payable to Mr Senekal.)
- ZDM will have to assess their agreement with Senekal and negotiate upgrading and extensions of the existing agreement if necessary for the Usuthu supply.
- Additional and future DWA water allocations and licences from Jozini Dam.
- The existing abstraction works at Jozini Dam needs to be investigated.

### 3.1.4 Groundwater sources

**Groundwater sources – aquifer characteristics**

Groundwater is a useful water resource with potential quality and quantity being controlled by the geology of an area (see Figure 3.1 below). The Zululand district is underlain predominantly by Karoo Sequence basalts, shales, siltstones, sandstones and conglomerates that have been intruded by dolerite dykes, sills and plugs of Jurassic age (i.e. post Karoo; see Appendix 6 for geological maps). The formations making up the Karoo Supergroup sediments are often relatively massive such that primary storage and permeability is negligible. Groundwater storage and movement is confined to joints and bedding planes within the rock mass that yield between 0.5 and 2 ℓ/s. In the absence of faulting or dolerite intrusions, the groundwater potential of these sediments is marginal to poor (i.e. 0 to 0.5 ℓ/s (0 to 1,800 ℓ/h)). In addition, water quality is generally poor (Class 2) and some boreholes produce high concentrations of dissolved salts (Nyoka Formation), with high NaCl and $SO_4$ concentrations (Vryheid and Dwyka Formations) or high Iron and/or Manganese (Pietermaritzburg Formation). The indurated contact zones in the sediments adjacent to the intrusive Jurassic age dolerite intrusions are often highly fractured and these discrete zones enhance groundwater storage and rockmass permeability. As a result, boreholes drilled to intersect these structures usually produce higher yields and superior quality groundwater than that of the surrounding host rock. These contact zones usually produce yields ranging from 0.1 – 10 l/s and groundwater quality range from Class 0 to Class 3 depending on the composition of the sedimentary host rock.

The groundwater development potential of each of the quaternary catchments have been characterized using the criteria outlined as follows:

- The geological information underlying each quaternary and associated median yields for the geological formations.
- The ambient groundwater quality each of the geological formations.
- The renewable resource derived from rainfall recharge as a percentage of MAP over the effective surface area of the quaternary (base flow included in the estimates).
- Current utilization was calculated using the following assumptions
    - Handpumps - 250 l/hr for 12 hours = 3 kl/day
    - Motorized systems - 1000 l/hr for 10 hours = 10 kl/day

The potential extractable volume was derived from the difference between renewable groundwater resource (recharge) and current utilization (groundwater abstraction).

In general the overall groundwater quality in the ZDM is good in the northern parts (see Appendix 6), with the water quality in eDumbe, uPhongola and Abaqulusi LMs falling within Class 0 and 1 (Kempster Classification). In the southern parts the water quality is generally poor however, with most boreholes falling in Class 3. It is pertinent to note that a large number of the Traditional Authority areas are situated within these areas of poorer groundwater quality. The deterioration of groundwater quality from west to east, can be ascribed to:

- Declining rainfall from west to east.
- Concentration of dissolved solids from through flow below the Dwyka Formation and coal seams in the Vryheid Formation in the central and eastern regions of the catchments.

The sedimentary rocks that underlie the study area represent a secondary or fractured rock aquifer with negligible primary porosity or permeability. Groundwater storage and movement is therefore mainly confined to fractures and joints that occur within the rock mass, and is therefore structurally controlled.

The groundwater development potential within each of the quaternary catchments is adequate to meet the basic water demand of rural communities either through:

- Stand-alone basic levels of water supply by boreholes equipped with hand pumps; or
- Limited reticulation schemes through production boreholes that target structural features offering high groundwater development potential.

**Groundwater monitoring**

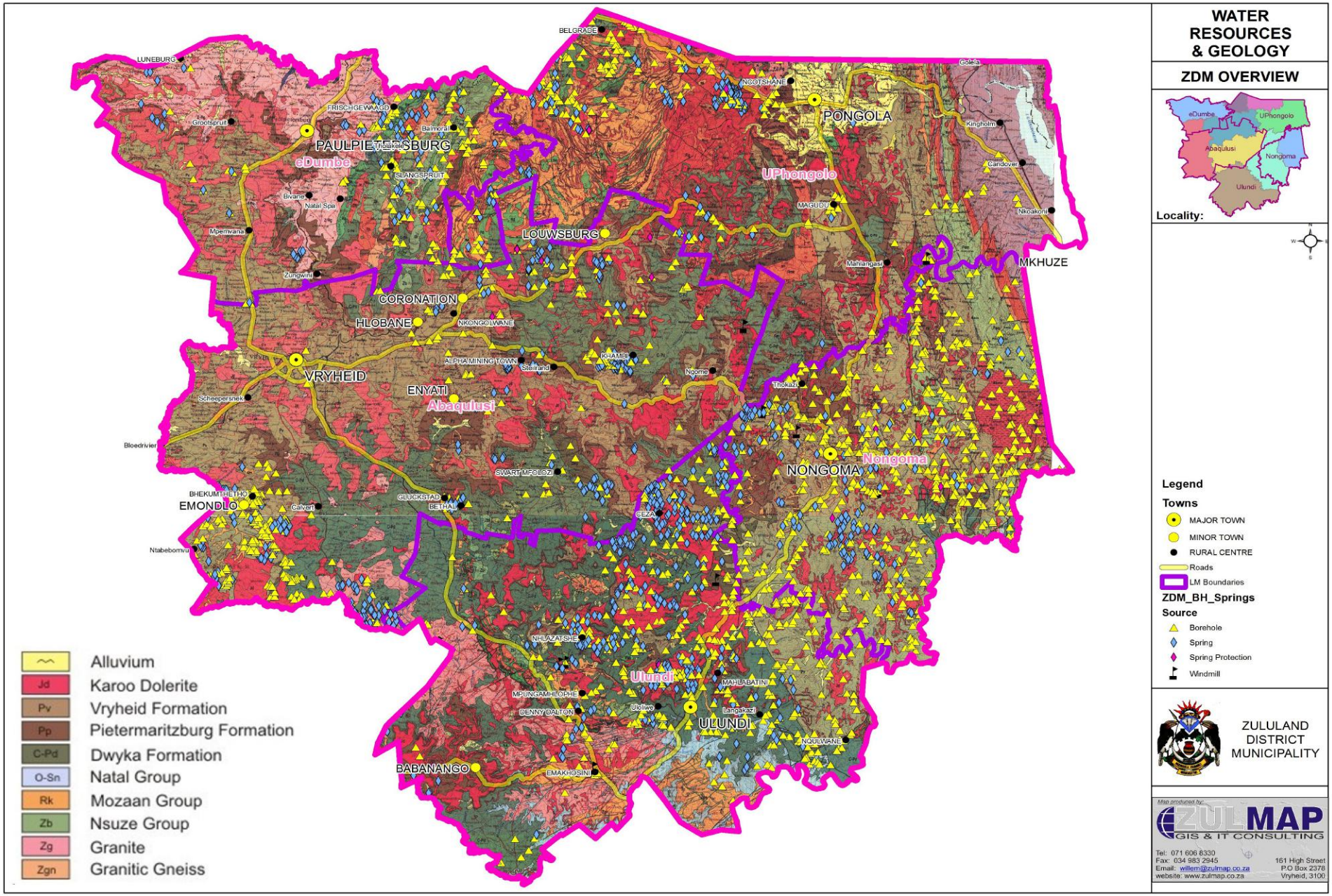
Owing to the fact that groundwater is utilised extensively in the supply of water services to the rural communities of the ZDM, it is important that groundwater levels and quality are monitored to ensure sustainability and SABS drinking water standards. The outbreak of cholera in KZN in 2000 resulted in extensive emergency work into the protection of surface water resources and sanitation supply. However groundwater quality is only occasionally monitored.

**External sources (where the WSA purchases water from others)**

All water currently supplied by the ZDM to the communities is from water resources within the DM's area of jurisdiction. However, as part of the regional scheme planning to alleviate the water services backlogs, the ZDM is approaching the surrounding WSAs to determine whether water can either be purchased from or supplied to others more cost effectively.

**Water returned to resources**

Water is returned through discharge from Wastewater Treatment Works (WWTW) in the urban areas into the Pongola and White Mfolozi River systems. However, the quantities of water returned to resources still needs to be obtained from the WWTWs and the current ZDM reporting systems will be extended to start monitoring the volumes discharged.


WATER RESOURCES & GEOLOGY
ZDM OVERVIEW
Locality:
eDumbe
UPhongolo
Abaqulusi
Nongoma
Ulundi
BELGRADE
LUNEBURG
FRISCH GEWAAGD
Grootspruit
Balmoral
PAULPIETERSBURG
eDumbe
TSLANGSPRUIT
Bivane
Natal Spa
Mpemvana
Zungwini
LOUWSBURG
NGOTSHANE
PONGOLA
Golela
Kingholm
Candover
UPhongolo
MAGUDU
Nkoakoni
MKHUZE
Mahlangasi
CORONATION
HLOBANE
NKONGOLWANE
VRYHEID
ALPHA MINING TOWN
Stellrand
KHAMBI
Ngome
Thokazi
ENYATI
Abaqulusi
Scheepersnek
Bloedrivier
SWART MFOLOZI
NONGOMA
Nongoma
BHEKUMTHETHO
EMONDLO
Calvert
GLUCKSTAD
BETHAL
CEZA
Ntabebomvu
NHLAZATSHE
Ulundi
MAHLABATINI
MPUNGAMHLOPHE
DENNY DALTON
Uloliwe
ULUNDI
Langakazi
NQULWANE
BABANANGO
EMAKHOSINI
Alluvium
Karoo Dolerite
Vryheid Formation
Pietermaritzburg Formation
Dwyka Formation
Natal Group
Mozaan Group
Nsuze Group
Granite
Granitic Gneiss
Jd
Pv
Pp
C-Pd
O-Sn
Rk
Zb
Zg
Zgn
Legend
Towns
MAJOR TOWN
MINOR TOWN
RURAL CENTRE
Roads
LM Boundaries
ZDM_BH_Springs
Source
Borehole
Spring
Spring Protection
Windmill
ZULULAND DISTRICT MUNICIPALITY
Map produced by:
ZULMAP
GIS & IT CONSULTING
Tel: 071 606 8330
Fax: 034 983 2945
Email: willem@zulmap.co.za
website: www.zulmap.co.za
161 High Street
P.O Box 2378
Vryheid, 3100

### 3.1.5 Drought Relief

The current drought situation within the ZDM area has deteriorated to such an extent that emergency drought relief had to be implemented. An amount of R37 493 000 was made available in 2015 for drought relief interventions within ZDM, and a planned 7 880 households were to benefit from this funding allocation. A summary of the interventions can be seen in the next table.

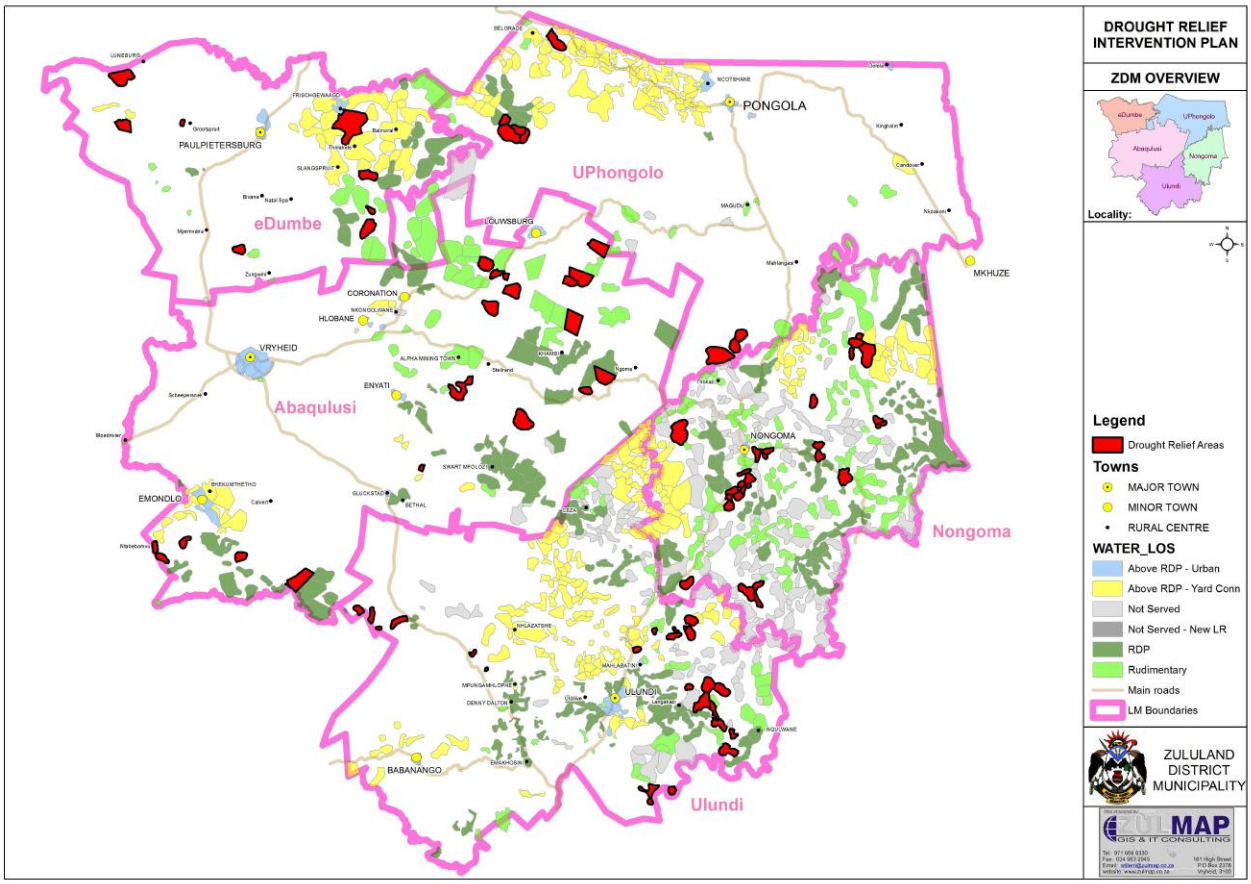
**Table 3.3: Drought Relief Intervention Summary Table**

| Municipal Name | Spring Protection | Water Tankers rental (6 months' period) | Boreholes Drilling and equipping | Refurbish Non-functioning Schemes |
|---|---|---|---|---|
| | Qty | Qty | Qty | Qty |
| **Abaqulusi LM** | 4 | | | |
| | | 1 | | |
| | | | 14 | |
| | | | | 1 |
| **Nongoma LM** | 2 | | | |
| | | 2 | | |
| | | | 27 | |
| | | | | 3 |
| **uLundi LM** | 2 | | | |
| | | 2 | | |
| | | | 18 | |
| | | | | 2 |
| **eDumbe LM** | 6 | | | |
| | | 1 | | |
| | | | 8 | |
| **uPhongolo LM** | 4 | | | |
| | | 1 | | |
| | | | 10 | |

The above details can also be reviewed in Figure 3.1.

A joint emergency committee was also established in January 2016 to assess the water situation within ZDM on a weekly basis. The committee consist of representatives from DWS, COGTA, ZDM and local authorities and meet on a weekly basis.

**Figure 3.1: Drought Relief Intervention Summary Map**



## 3.2 Water quality

The quality of bulk water taken from the resource is measured at the source; water treatment works (WTW) and the reservoir (Table 3.4). More detailed information on water quality and monitoring frequency per WTW and WWTW is given in Section 7 of this document.

**Table 3.4 (a): Water quality monitoring.**

| | At source | At treatment plant | At reservoir | At tap |
|---|---|---|---|---|
| Is water quality measured? | Yes | Yes | Yes | Yes |
| Do you monitor it yourself? | Yes | Yes | Yes | Yes |
| If no, who does? | n/a | n/a | n/a | n/a |
| Monitoring intervals | Daily | Daily | Daily | Monthly |
| Are these results available in electronic format? | Yes | Yes | Yes | Yes |
| % time (days) within SABS 241 standards per year | 100 | 100 | 100 | unknown |

Monitoring of water quality within the rural areas is dependent upon the water source. Water supplied through boreholes and protected springs are not monitored for quality. In these instances the boreholes are not equipped, nor the springs protected if the water quality does not satisfy the SABS drinking water specifications. Water abstracted from surface water or supplied from urban areas is usually treated at a WTW and will have undergone the necessary quality monitoring and testing.

**Reporting on quality of water:**

ZDM has developed a water quality reporting system where all water quality test results are captured and management reports drawn for immediate interventions where needed. ZDM also reports monthly to DWA on water quality results, as part of the DWA regulation process. Schemes that indicate inferior water quality results are then immediately acted upon to resolve such issues. The actual report for each month is available from the ZDM MANZI system on request.

The Blue Drop Assessment also serves to evaluate different aspects of water provision and quality within ZDM. The latest results can be reviewed further-on in this report.

**Quality of water returned to the resource**

The water returned to the resources in the urban areas is from the WWTW and storm water systems. Monitoring of stormwater quality does not occur. The WWTW treat domestic wastewater and wet industrial effluent, and once treated the return effluent is sampled. The effluent produced by "wet" industries needs to be monitored and sampled to ensure compliance with the municipal by-laws in terms of discharge into the WWTW.

There is no formal wastewater treatment process in the rural areas as the rural areas are supplied through dry-pit VIPs and not waterborne sewerage systems. The quality of sewage returned to the water sources must also be monitored and reported to DWA on a monthly basis but at this stage limited information is available and useful reports do not yet exist.

**Pollution contingency measures**

The ZDM forms part of the Usuthu/Mhlathuze WMA and as such will form part of the CMA for this region. A proposal for the establishment of the Usuthu/Mhlathuze CMA has been put forward to national government. Once established the ZDM and all other water users within the Usuthu/Mhlathuze WMA will have input into, and have to comply with, the Usuthu/Mhlathuze catchment management strategy (CMS). This strategy should include pollution contingency measure/s that may be required to maintain the desired river reach classes. However, although groundwater forms part of holistic water resource management it is likely that this aspect may be treated as secondary by the CMA and it will therefore fall on the ZDM to ensure that they put suitable contingency measures in place.

## 3.3 Abstraction licenses and effluent permits

ZDM is in the process of registering all water and sewage works in the district with DWA. Shown below in Table 3.5 (a) is a list of the water and sewage works in the district and the status of the license registration processes.

**Table 3.5 (a): List of water permits**

| WTW Name | Latitude | Longitude | Registration Status |
|---|---|---|---|
| Babanango Town | -28.398321 | 31.071465 | Forms Submitted - Pending |
| Belgrade Township | -27.280166 | 31.279082 | Forms Submitted - Pending |
| Ceza WTW | -27.995517 | 31.375931 | Forms Submitted - Pending |
| eDumbe | -27.439965 | 30.820735 | Forms Submitted - Pending |
| Makhosini | -28.356472 | 31.272092 | Forms Submitted - Pending |
| Enyokeni Royal Palace | -27.959809 | 31.521190 | Forms Submitted - Pending |
| Frischgewaagd Town/Blinkwater | -27.389440 | 30.954311 | Forms Submitted - Pending |
| Itshelejuba | -27.276854 | 31.346154 | Forms Submitted - Pending |
| Khangela Royal Palace | -27.738193 | 31.705480 | Forms Submitted - Pending |
| Khiphunyawo | -27.311995 | 31.209771 | Forms Submitted - Pending |
| Khombuzi WTW | -27.730019 | 31.727438 | Forms Submitted - Pending |
| Mandlakazi RWSS | -27.680543 | 31.916534 | Forms Submitted - Pending |
| Mountain View | -27.784817 | 31.427912 | Forms Submitted - Pending |
| Mpungamhlope | -28.234665 | 31.271593 | Forms Submitted - Pending |
| Msibi | -27.351458 | 31.206944 | Forms Submitted - Pending |
| Mvuzini | -28.004120 | 30.679364 | Forms Submitted - Pending |
| Nkonjeni | -28.228463 | 31.423898 | Forms Submitted - Pending |
| Nkosentsha | -27.390240 | 31.254435 | Forms Submitted - Pending |
| Ophuzane | -27.491598 | 30.939828 | Forms Submitted - Pending |
| Osingisingini | -27.997320 | 31.685002 | Forms Submitted - Pending |
| Pongola/Ncotshane Town | -27.389033 | 31.617976 | Forms Submitted - Pending |
| Sidinsi | -27.955112 | 31.773067 | Forms Submitted - Pending |
| SpekBoom | -27.304730 | 31.395382 | Forms Submitted - Pending |
| Tholakela | -27.442931 | 30.970889 | Forms Submitted - Pending |
| Thulasizwe | -27.951000 | 31.366717 | Forms Submitted - Pending |
| Ulundi Town | -28.281655 | 31.340042 | Forms Submitted - Pending |
| Nongoma Town | -27.962509 | 31.613695 | Forms Submitted - Pending |
| Ncome | -27.944885 | 30.659276 | Forms Submitted - Pending |
| Coronation RWSS | -27.677210 | 31.052570 | Forms Submitted - Pending |
| Klipfontein | -27.791003 | 30.786818 | Forms Submitted - Pending |
| Bloemveldt | -27.727868 | 30.746585 | Forms Submitted - Pending |
| eMondlo Township | -27.971017 | 30.691998 | Forms Submitted - Pending |
| Hlobane Region | -27.717325 | 31.031722 | Forms Submitted - Pending |
| Louwsburg Town | -27.580634 | 31.271741 | Forms Submitted - Pending |
| Enyathi Town | -27.813338 | 31.060888 | Forms Submitted - Pending |
| Khambi RWSS | -27.773071 | 31.227059 | Forms Submitted - Pending |
| Purim WTW | -28.016124 | 30.758741 | Forms Submitted - Pending |
| Masokaneni WTW | -28.187636 | 31.738694 | Forms Submitted - Pending |

**Table 3.5 (b): List of sewage effluent permits**

| WWTW Name | Latitude | Longitude | Registration Status |
|---|---|---|---|
| Pongolo WWTW | -27.38861111 | 31.61805556 | Forms Submitted - Pending |
| Itshelejuba WWTW | -27.27341506 | 31.35323088 | Forms Submitted - Pending |
| Dumbe WWTW | -27.40916667 | 30.81444444 | Forms Submitted - Pending |
| Ulundi WWTW | -28.34812720 | 31.42949714 | Forms Submitted - Pending |
| James Nxumalo WWTW | -28.33960865 | 31.39827575 | Forms Submitted - Pending |
| St Francis WWTW | -28.22511079 | 31.47935490 | Forms Submitted - Pending |
| Nkonjeni WWTW | -28.22638889 | 31.41916667 | Forms Submitted - Pending |
| Ceza WWTW | -27.99833333 | 31.37777778 | Forms Submitted - Pending |
| Thulasizwe WWTW | -27.95194444 | 31.36777778 | Forms Submitted - Pending |
| Coronation WWTW | -27.66906843 | 31.06491781 | Forms Submitted - Pending |
| Hlobane WWTW | -27.71695336 | 31.00818335 | Forms Submitted - Pending |
| Vryheid WWTW | -27.79237777 | 30.78693412 | Forms Submitted - Pending |