LIMPOPO PROVINCIAL WATER MASTER PLAN

JUNE 2016

water & sanitation
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

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EXECUTIVE SUMMARY AND STRATEGIC ANALYSES

This Executive Summary presents the salient points of each topic (chapter) that cover all the activities in the water services provisioning cycle. The aim of water services is to develop and maintain a sustainable water supply chain – the "Source-to-Tap-to-Source" concept. The Water and Sanitation Summit held in 2015 was instrumental in directing this Water Master Plan and many of the issues raised at the summit were addressed in this master plan. This document should be seen as a first stage toward documenting water services master planning in Limpopo Province – it contains a wealth of information and guidance on issues that need to be addressed. This document should be the base for a consultative process augmented by technical support over the next 9 months, which should result in well- defined strategies which should be incorporated in an updated water master plan. Progress should be monitored by way of strategic measurement systems so that this master plan can be updated and improved on an annual basis. The strategies are translated in specific actions and projects which are required for the implementation of the master plan and are contained in Section 12.

DEMOGRAPHICS

A consolidated population data set is developed in this water master plan which was derived from the data set (FormG13) compiled and maintained by the Department of Water & Sanitation (DWS) and the Water Services Authorities (WSAs). The new data set is aligned with the latest Census figures and trends. This planning population dataset allows infrastructure capacity design to cater for circular migration and for travellers/tourists. Population projections up to 2045 are made on the basis of differentiated growths according to the Limpopo Spatial Rationale settlement hierarchy and customised for each local municipality. The number of households in 2015 amounts to 1 582 906 and is projected to grow to 2 018 337 in 2045. The planning population grows from 5 997 649 in 2015 to 7 152 225 in 2045. Population growth for the Province declines from a 0.77%/annum growth in 2015 to 0.44%/annum in 2045. Average household size is expected to decrease from 3.78 persons/household to 3.54 persons/household. Rapid growth is expected in major towns, especially in the growth points that are identified in the LDP. The most rapid growth is likely to be in Polokwane, Lephalale, Burgersfort, Musina, Louis Trichardt and Mokopane . Outmigration of young people could cause a decline in growth and population in scattered rural settlements.

Strategic planning issues on demographics are:

(i) Promote the use of the provincial demographic data set for water planning – use the household, population and growth rates per settlement for water services planning purposes
(ii) Evaluate the use of the provincial demographic GIS data set (households, settlement polygons) as basis for other infrastructure master plans for the province
(iii) Establish a task team to increase the confidence level of information on the expected growth (and decline) of settlements and towns

WATER SERVICES LEVELS and DOMESTIC WATER DEMAND

Current levels of water supply availability to infrastructure reflect that 23% of the population are below RDP service standards, with 24% at RDP standards and the remaining 53% at higher service levels. Dysfunctional systems and inadequate water resources are two of the main reasons why so many people are still below RDP service levels. The national target (cabinet decision Jul 2014) of 90% reliability in water supply to all citizens by 2019 is acknowledged and needs active interventions by Limpopo Province WSAs and stake holders to achieve. More than 60% of households are still below RDP sanitation service standards (i.e. less than VIP sanitation). This matter of concern was also raised at the Limpopo Water Summit in 2015.

The National Water Policy Review: Water Policy Positions of 2013 (Gazette No 36798) provides for a policy change to define access to basic water as the infrastructure necessary to supply potable water to a formal connection at the boundary of a stand. The policy further states that, WSAs should plan for basic yard connections, as well as for higher levels of services, which includes productive water use where applicable.

This water master plan developed a spread sheet-based calculation model built up from settlement demographics with current and projected levels of water supply. The change in levels of services, in 5 year intervals, forms the backbone of the calculation. The 2045 scenario provides for water supply levels as follows: at RDP level 7%; yard connections at 32% (the split is low yard use 29.2% and high yard use 70.8%) and house connections at 61% (the split is low house connection use 41.7% and high house connection use 58.3%). The domestic water demand model determines supply requirement at each settlement and calculates a water balance per scheme area from ground water and available surface water sources. This model was developed specifically for the Limpopo Province Water Master Plan and is available for further use for management, monitoring and planning purposes.

Detailed information from WSAs on current levels of services and backlogs is not forthcoming and the data from DWS data set is to be relied upon after reconciliation with census information.

Strategic planning issues and recommendations regarding water services levels:

(i) The backlog eradication for access to basic water supply and sanitation can only be addressed effectively if information on backlogs is accurate. A provincial initiative should be launched to update the current services level data in each village. Such an update should include assessments at each settlement, alignment with Census information, considering the WSDPs, etc.
(ii) The Office of the Premier should evaluate the further use of the Spatial Rationale a basis for the prioritisation of service level upgrades. The confirmation of the reviewed Spatial Development Rationale would assist in more accurate forecasts and planning.
(iii) The water demand model should be presented to WSAs and water planners for buy-in and use. **A task team should be established to oversee the process** and to take ownership to promote and update the model.
(iv) A task team should be established to determine and oversee implementation of the most appropriate technical and water resources solutions.
(v) Establish a task team to increase the confidence level of information on the expected growth (and decline) of settlements and towns in the Province.
(vi) Assess the consequences of different sanitation service level upgrade scenarios on bulk infrastructure requirements and environmental aspects.

EXECUTIVE SUMMARY AND STRATEGIC ANALYSES

WATER DEMAND for DOMESTIC USE

The probable scenario domestic water demand increases from the current 678.3 Mℓ/d (247.5 Mm³/a) to 1 278 Mℓ/d (466.5 Mm³/a) in 2045, which is a doubling of the provincial water requirement for residential consumers in the next 30 years (see illustration alongside). The water demand increase is mainly expected in the provincial growth points (the towns of Polokwane, Lephalale and Mokopane are especially affected). This 88% increase in demand is due to higher levels of services and a 19% increase in population.

The largest use of water is experienced in Functional Towns and Growth Points at 57% of the water demand, which is predicted to increase to 63% in 2035 as a result of higher levels of services and urbanisation. Although rural-scattered settlements comprise 38% of the population in 2015, their consumption is 19% of the total water demand. The rural population decreases to 27% of the population with a water use drop to 15% in 2045.

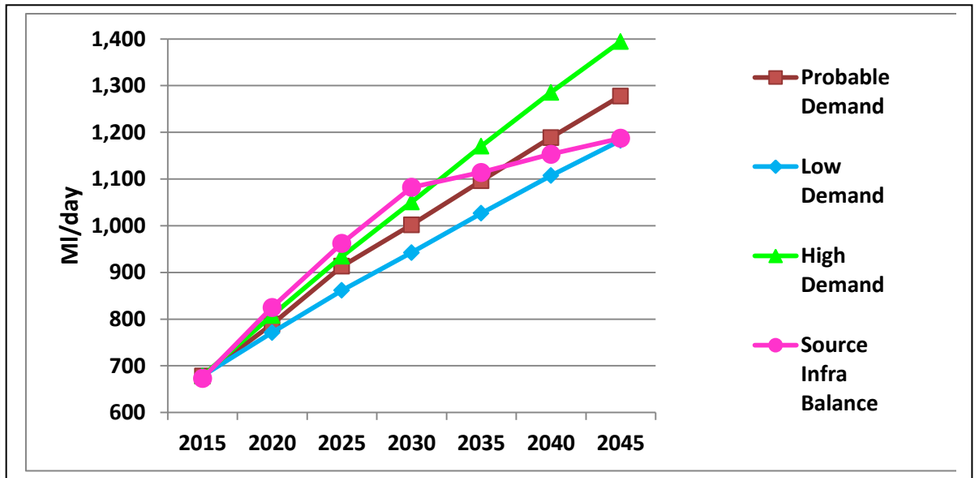
Strategic planning issues on domestic water demand are:

(i) The water demand determination relies heavily on theoretical household consumption and cannot be calibrated against historic metered records due to the unavailability thereof. WSAs should be encouraged to develop systems and keep record accurate water use figures that can be relied upon.

(ii) The increased water demand is a threat to sustainability of supply as the water sources are seriously limited. WC&WDM systems should be implemented and maintained.

(iii) The cost of potable water (at an average 2016 rate of R 7.82/kℓ) will increase from the current R 1 936 M/annum to R 3 650 M/annum in 2045 due to higher water demand.

Domestic Water Demand (GAADD) vs. Resource Infrastructure



TOTAL WATER DEMAND for LIMPOPO PROVINCE

The total water demand for Limpopo Province includes water use by other sectors. Best estimates based on available documentation and practical knowledge is presented in this master plan. Total water requirements are projected to increase from 1 677 Mm³/a to 2 301 Mm³/a (37%). Further refinement of total water demand must be done continuously.

Key aspects on the determination of the water demand of the others sectors include:

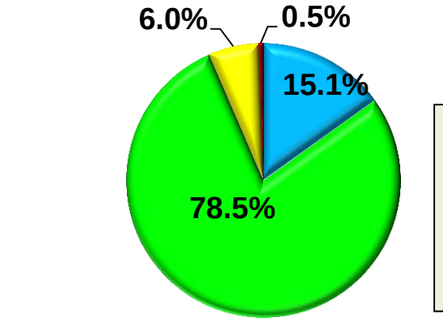
- Irrigation for agriculture: 28.7% of the Province is deemed potential arable land, of which 1.5% (i.e. 158 530 ha) is currently under irrigation. DAFF plans to develop a further 41 470 ha for irrigation by 2019. The irrigation demand for water thereafter was increased by 0.5%/annum. Irrigation water demand increases from a current 1 268 Mm³/a to 1 473 Mm³/a in 2045.
- Mining: Large scale mining activities in all the districts of Limpopo Province were estimated to increase from the current 98 Mm³/a to 297 Mm³/a in 2045. This is a growth of 202% over 30 years.
- Industrial: Industrial and commercial water use is expected to increase from the current 36 Mm³/a to 68 Mm³/a in 2045. The majority of this increase is expected in urban areas.
- Livestock and Game: The current water demand of 30 Mm³/a was projected with a 0.1%/annum increase to derive a 31 Mm³/a demand by 2045. This annual increase is a provisional figure which needs verification
- Forestry: The registered area for forestry water use for in Limpopo is 44 966 ha. The estimated current water use for this area is 33 Mm³/a. Forestry demand increases to 34 Mm³/a in 2045 at an estimated growth of 0.1%/annum. This annual increase is a provisional figure which needs verification.

STRATEGIC PLANNING for TOTAL WATER DEMAND

Strategic planning aspects regarding sectoral water demand determination include:

- A review of irrigation, mining, industrial, livestock, game and forestry demand projections is critical to obtain better understanding and accuracy of these sectors.
- Re-use of effluent from WWTWs and mines must be part of the water use cycle. Final effluent quality must be addressed.
- Irrigation uses the bulk of the available water resources in Limpopo. There are a number of areas where irrigation should be optimised for more efficient use. A strategic plan for irrigation practices and the sustainability of water allocation for irrigation is needed.
- The mining sector shows the largest increase in water demand and is also a major opportunity for investment and job creation – planners needs to ensure that the volume is available. Long lead time is required for realising such large volumes of water.
- Game and livestock: This forms part of the Agricultural water demand. The economic and social value of this sector should be investigated and documented for planners to include in water demand.
- Forestry: Water demand from water use licensing is to be evaluated against plantations and calibrated for planning use. Working for Water initiative should be extended in Limpopo.
- Estimates for expansion of irrigation, livestock and forestry are not scientific and need to be evaluated.

Total Water Demand



Water Demand	Sector	2015 Volume Mm³/a	2045 Volume Mm³/a
	Domestic	247.6	466.5
	Agricultural	1 290.5	1 495.9
	Mining and Industrial	98.3	297.0
	Wildlife	8.1	8.4
	Total Water Demand	**1 644.5**	**2 267.7**

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SOCIO-ECONOMIC ASSESSMENT

Limpopo Province is a water-intensive economic production area as irrigated food production is a competitive advantage and 26% of the value of all production is from mining. Mining activity will increase and the associated need for water to sustain it must be planned for. All industrial water users should be expected to demonstrate their efficiency of water use and justify the quantities they consume.

Most of the population of the province is residing in communal areas where water services (infrastructure and O&M) are financed by government. The 2011 census indicated that 55% of households cannot afford to pay for water. The high levels of indigent population places severe pressure on WSAs in achieving financial stability. Affordability levels are gradually rising, but are capped by high unemployment rates. Blanket subsidization of residential water consumption is unsustainable for the fiscus, and the supply of free basic water should only be reserved for the indigent. Polokwane City is growing rapidly as the primary provincial service point and supporting infrastructure should be provided in time.

Water scheme development and upgrading priorities should be informed by the population densities and the Growth Point Development Programme (as well as the Spatial Rationale). The Office of the Premier should confirm the relevance of the Spatial Rationale as a development framework for the Province.

BULK INFRASTRUCTURE : CROSS BOUNDARY TRANSFER SCHEMES

Water is transported over long distances in Limpopo Province by means of bulk water transfer systems. Several existing transfer systems are to be expanded and a number of new transfer systems are being planned and developed. Transfer schemes are often complex, require long planning horizons and expensive to build. They require dedicated attention as well as institutional arrangements and planning coordination that span across WSA and province boundaries.

The following critical strategic actions are needed for transfer schemes that are either under stress, under construction or being planned:

(i) Luvhuvhu Government River Transfer Scheme (LRGWS) – Nandoni Dam and its bulk distribution systems:
- Capacity adequacy of the Nandoni WTW needs to be evaluated for Phase 2 extension (the next 60 Mℓ/d module)
- All planning, funding and programme issues for the pipe to Giyani must be addressed adequately
- Assistance to Vhembe DM to fund downstream bulk infrastructure requirements of approx R 650 M.

(ii) Magalies WB Transfer to Bela-Bela, Mookgophong and Modimolle – increased capacity for transfer system is urgently required
- Office of the Premier to assist with prioritization of this upgrade so that all obstacles can be addressed
- Funding of about R 2 700 M needs to be secured

(iii) Olifants River Water Resources Development Project (ORWRDP and ORWSDP) – De Hoop Dam bulk and Water Services Regional Bulk distribution:
- Signing of water supply agreements by commercial users (mines) and WSAs should be pursued as a priority.
- Construction of bulk water resources and conveyance infrastructure need to be rolled out at the same time as the municipal water services in order to minimize the risk of water infrastructure being vandalized.
- The three regional WTWs (Ga-Malekane, Steelpoort and Mooihoek) and potable water distribution infrastructure need to be commissioned in order to provide water to communities and put an end to service delivery protests and vandalism of infrastructure.
- The pipeline to Olifantspoort WTW must be completed to improve surety of supply to Lepelle Nkumpi and Polokwane Municipalities.
- Secure RBIG funding to finalise and implement WSA RBIG distribution systems in parallel with reticulation systems. IRS and feasibility studies are required for some of these schemes and need to commence urgently (Nebo Plateau, Lebalelo and Tubatse)
- Provincial Government, with support from CoGTA and National Treasury to facilitate financial support to municipalities for them to provide water to domestic users at affordable tariffs.
- Additional funding to be provided to assist Polokwane and other municipalities to refurbish & upgrade infrastructure in order to reduce losses.

(iv) Mogalakwena Augmentation from Flag Boshielo Dam – Mining Development and Domestic Water distribution:
- Urgent intervention to expedite the Flag Boshielo raw water pipe from the dam to Mokopane by engaging with DWS and TCTA. The programming of this pipe was recently changed for later implementation due to delayed mining development. Mogalakwena LM has exhausted available sources and needs this augmentation for potable water requirements as they are in a deficit situation already.
- The need for an additional R 1 350 M was proven by Mogalakwena Municipality to accelerate the implementation of their downstream 2020 bulk conveyance system for residential and mining requirements

(v) Mokolo and Crocodile Water Augmentation Project (MCWAP):
- TCTA to proceed with the implementation of Phase 2 of MCWAP as mandated by the Minister of the Dept of Water and Sanitation
- Provision of water to local communities in the region must be accelerated by developing the available groundwater resources (as per All Towns Reconciliation Strategy for Lephalale Municipality).

(vi) Groot Letaba River Water Development Project (GLeWaP) – the construction of the Nwamitwa Dam and its water distribution infrastructure.
- Pursue and finalize availability of funds and confirm the sources. The construction cost of the infrastructure components of the project is estimated to be in excess of R 3 000 M.
- Lepelle Northern Water (as the Implementing Agent) for the construction of the Nwamitwa Dam and for raising of the Tzaneen Dam to commence with the detail design of both projects as a matter of priority.
- The estimate of the availability of water should be reviewed as a matter of urgency once the hydrology of the Groot Letaba River has been recalibrated.

Refurbishment and preventative maintenance of existing water infrastructure (which includes abandoned and vandalized infrastructure) must be given priority over the construction of new schemes. Consideration to involve others (such as a Regional Water Utility) to manage these schemes could be investigated.

EXECUTIVE SUMMARY AND STRATEGIC ANALYSES

WATER SERVICES INFRASTRUCTURE

Each settlement and community is allocated to a water supply scheme with supply boundaries that are dictated by source, institutional arrangements, topography, locality and logical distribution. This scheme delineation facilitates water service planning and O&M support. The water scheme naming and nomenclature is entrenched at the WSAs and DWS and should be retained to ensure continuity. Limpopo Province has 206 water supply schemes.

Water Treatment Works (WTW) are generally in a fair condition and expansions have generally kept up with the demand growth. However, refurbishment and on-going maintenance is a challenge and needs dedicated attention. Waste Water Treatment Works (WWTW) are generally in a poor condition. Urgent attention is required to address processes, capacity, outflow and refurbishment requirements. Blue Drop performance evaluation by DWS for Water Treatment Works and Green Drop for Waste Water Treatment Works work well and encourages compliance. However, the DWS evaluations are dated and are not done for all the works. It is proposed that this evaluation activity is overseen by the Office of the Premier to ensure that it gets done each year at a fixed month of each year.

Additional performance evaluation certification for water and sanitation scheme area operations is also recommended to measure a wider range of performances and as a motivator for compliance. It is recommended that the Office of the Premier investigate the oversight effectiveness of the Blue Drop and Green Drop process and the mechanisms that will be needed to institute an expanded evaluation system for the operation of water and sanitation schemes.

Regional and internal bulk infrastructure that was assessed as needing High and Medium Refurbishment Interventions, must be prioritised. Technical and visual condition surveys must be conducted and maintenance needs of infrastructure must be determined and addressed. An estimated R 3 575 M is required for the period 2016 up to 2020 for the Rehabilitation Projects Priority list. Thereafter at least R 11 000 M would be required up to 2045 to address the rehabilitation backlog.

All Water Services Authorities are to implement Infrastructure Management Systems. The effective use of these systems should be overseen and monitored by the Office of the Premier.

OPERATION AND MAINTENANCE (O&M)

More than 93% of communities in Limpopo Province have serious functionality problems with their water supply systems. A significant portion of the dysfunctionality can be ascribed to the lack of effective O&M systems and conservation and demand management systems.

Poor O&M is due to a myriad of issues resorting under institutional, operational, functional and financial aspects. Vandalism and theft of government property is further crippling attempts to supply sustainable services. Corruption and poor selection of service providers also exacerbate the problem. A completely new strategy for O&M is required, starting at a very high level. Clean administration and strict management is required with enforcement of harsh punitive measures on government property vandalism and theft. Social intervention programmes should be devised (from school level upwards) so that the general population appreciate and protect state assets – e.g. so that illegal connections can be removed without vigilante reaction, unauthorised use of water be punished, civil unrest does not cause damage to property, etc. A task team should be established to look into all possible ways to protect infrastructure and stop theft – e.g. unique engraved marking on government property with unauthorised possession be reason for arrest, aluminium cables from transmission line to transformer, etc.

The MuSSA self assessment on WSA capacity indicates that 54% have ineffective O&M teams, 50% have shortage of skills/staff, 36% have inadequate workshops/facilities and 27% do no preventative maintenance. The result is that 73% of WSAs in Limpopo are classified as having a Very High Vulnerability index.

The absence of a well-trained, motivated and effective supervised workforce in most WSAs results in services not properly rendered, rapid depreciation as assets are not properly maintained and violent community protests.

Proposed interventions to improve O&M include:

- Ring-fenced water services units in WSAs, with mandate to budget, incur expenditure and receive revenue for the provision of services. Cost recovery would be targeted as well.
- Appointment of appropriately skilled technical managers with authority to ensure implementation of municipal plans as detailed in WSDP and IDP.
- Review funding model of Free Basic Services to allow for WSA sustainability and Implementation of cost based tariff setting with alignment of service levels to ability and willingness to pay.
- All WSAs to prepare and implement Operation and Maintenance Management plan, as well as Preventative Maintenance management systems.
- Transfer of bulk water systems and critical infrastructure like WWTWs and cross-border schemes to a Regional Water Utility (if capacity can be established if not available)
- Training of water services interns in all systems to create skills in the water sector.
- Resuscitation of the National Community Water and Sanitation Training Institute (NCWSTI) as a key vehicle for skills development in the sector with programmes streamlined by a stakeholder advisory body.
- Establishment of effective customer care centres in each WSA
- Water conservation and demand management implementation and prioritisation in all WSAs.

ASSOCIATED WATER SERVICE USERS

Water supply to government and community service complexes (such as hospitals, health care centres, police stations, magistrate buildings, etc) are generally being provided for by the department offering the service (e.g. Dept of Health has just completed a programme in 2015 to equip all health care centres and clinics with a water supply system and they are now implementing a management and upgrading phase). This is not the core business of such a department and it is the responsibility of the WSA to have adequate water available. It is also not cost effective for each complex to have its own separate system. WSAs should be encouraged to plan for and make available sustainable water services to such facilities.

The data on water services supply to government institutions and complexes (including schools) is not readily available as part of the WSA/DWS dataset. This data should be improved, updated and maintained to facilitate the water services planning process.

WATER RESOURCE: GROUNDWATER

Groundwater as stand-alone supply or in conjunctive use with a surface water source is a common practice in Limpopo Province. Inadequate management, limited or incorrect data and insufficient maintenance of the groundwater resource contributes to a negative attitude towards groundwater. Groundwater is a sustainable and the most economical source if managed properly.

Due to historic reasons, production boreholes supplying settlements are usually within a short distance (<2 km) from communities and very few ground water wellfields exist within the province. Wellfield development in high ground water potential areas can be used for bulk supply and especially to supplement bulk surface water systems. All future planning of water sources for water schemes should address potential wellfield development. A social awareness programmes on groundwater being a common resource should be prioritised - due to water shortages, as individual communities become protective about “their” borehole and will not allow any sharing of it.

The GRIP data set on boreholes was maintained from 2001 until about 2013 when all formal management of this system was stopped. This has very negative consequences because the system prevented overexploitation, enforced proper logging and reporting of groundwater development. It also ensured that each borehole is numbered with the unique “H” number and a steel pole was planted in the ground at each borehole. This process must be resumed as a matter of priority. An estimated 50 boreholes are drilled in Limpopo Province daily. The Office of the Premier should take over the implementation and maintenance of the GRIP programme so that the database is maintained for planning and monitoring purposes, or mandate a utility to do so.

Technically qualified and responsible staff should be appointed to manage, operate and maintain boreholes. Communities have often taken on this responsibility through former programmes such as Mvula Trust, or through desperation to get water.

Without monitoring motorised boreholes, communities are often without water for long periods, because the development of additional sources and the equipping thereof take months. The volume of ground water stored underground is not visible, but the monitoring of water levels ensures feasible production of the boreholes. The existing DWS monitoring network needs to be expanded and maintained. Monitoring data from large industrial users (e.g. mines and irrigators) should be recorded and housed in the GRIP data set. Artificial recharge needs to be considered at a regional level for potential groundwater source enhancement.

The total groundwater availability as source was included in the water demand model. Groundwater figures used in the model are as follows: Current abstracted volume for all use is 1 409 Mℓ/d and further development potential is estimated at 746 Mℓ/d, resulting is a total of 2 155 Mℓ/d groundwater resource available. Of this, the groundwater availability for domestic use is 319 Mℓ/d currently with an additional potential of 215 Mℓ/d, resulting in a total domestic potential of 534 Mℓ/d. A significant groundwater potential can still be harnessed as an estimated 89% of the communities have potential for further groundwater development. Historic results show that 38.2% of the boreholes have water quality problems that need to be addressed before use (by treatment or blending) – the unutilised groundwater is expected to have an equal or higher incidence of water quality issues. An in-depth study should be undertaken to quantify the exploitability of remaining groundwater available and to give guidance to planners on the most appropriate utilisation strategy.

WATER RESOURCE: SURFACE WATER

Surface water is mainly from dams and in limited cases from run-of-river. Options for new surface water development in Limpopo Province are limited as indicated below:

- The existing Mokolo Dam can be raised and there is potential to construct a new dam in the upper reaches of the Mokolo River.
- The possibility of constructing another dam (possibly the Rooipoort Dam) in the Olifants River should be reconsidered.
- Growing domestic requirements in Modimolle and Mookgophong will require additional 8.5 Mm^3/a by 2040 which will be supplied by the Roodeplaat Dam or Klipvoor Dam (Crocodile River West system).
- In the Nzhelele sub-area, raising the Nzhelele Dam (irrigation water supply) and the raising Mutshedzi Dam (domestic water supply) are possible future options. Importing water from Mutale River or Vondo Dam and transferring from Zhove Dam in Zimbabwe to supply the coal mining developments and to augment irrigation supply could be a feasible option. Approximately 30 Mm^3/a can be purchased from ZINWA. Transfer from Nandoni Dam is also a possibility.
- In the Sand River Sub-area possible future water sources identified include development of Albasini, Welgevonden, Nooitgedacht, Sand River and Louis Trichardt wellfields. Alternative development options include the proposed Mapungubwe Dam and the Vryheid Dam.

WATER RESOURCE: SURFACE WATER continued…..

Other potential surface water development options include:

- Raising of the Tzaneen Dam and possibly the Ebenezer Dam
- Construction of the : Nwamitwa, Janetsi, the Hobson's, and the Mulele Dam (if feasible) in the Letaba catchment area
- An urgent drought analysis for the Thabina Dam is required.

A feasibility study to get water from Tokwe Mukosi dam in Zimbabwe to supply Limpopo Province has been tabled.

Interventions to consider reducing the water requirements in the Olifants catchment area include:

- Water Conservation and Demand Management for the Irrigation, Urban and Mining Water Use Sectors with target saving of 58 Mm^3/a – (starting in 2016 and phased in over 5 years for the former two sectors and over 10 years for the latter). Eliminating unlawful water use – phased in over 5 years from 2015.

Interventions to increase the water supply in the Olifants Water Management Area include:

- Removal of invasive alien plants (IAPs) – implemented over 25 years from 2010.
- Treatments of additional decant water from existing, decommissioned and rehabilitated coal mines.

Interventions with respect to the future water availability and optimal utilisation of water in the Luvuvhu and Letaba water management areas are:

- Luvuvhu/Mutale subarea: Portion of domestic requirement to come from the Nandoni dam. Should coal fields be developed in future in the north of WMA, then water could be sourced from a possible new dam on the Mutale River or by abstraction from the Limpopo River.
- Shingwedzi subarea: Augmentation from Nandoni Dam where ground water is insufficient as it is the primary source of water.
- Groot Letaba subarea: There is need for compulsory licensing to reorganise water use in the catchment. Potential mining developments could be supplied from the proposed Nwamitwa Dam on the Groot Letaba River.

WATER BALANCE

The water balance reflects the available surplus or deficit after deducting the water demand from the available water resources. The water balance is presented per water scheme area. The 2015 scenario reflects the current situation and two scenarios are presented for 2045.

The first scenario assumes that no further infrastructure development will be done to secure more water resources and the second scenario assumes that all the available water sources will be fully developed. Both scenarios project a significant water deficit in Limpopo Province. The current water deficit can be mitigated to some extent by the measures proposed (see adjacent table) but does not resolve the shortfall by 2045.

The provincial water balance is negatively affected by the following conditions that can be addressed by way of effective management and visionary leadership:

- WSAs find it extremely difficult to manage, regulate and control water uses as very limited systems are available to monitor actual water consumption.
- The aggressive and violent behaviour of many water users and limited capacity of the WSAs prevents the effective enforcement of by-laws.
- Revenue collection is virtually non-existent in many areas where payment is affordable.
- The notion in some communities that water is free undermines the concept of water conservation.
- The lack of WC&WDM is threatening resource sustainability and the financial sustainability of WSAs, which could result in further social and financial instability.

The water sector in Limpopo Province is in need of inspirational leadership and effective management interventions.

The overall water balance (all sectors) for the province remains in deficit and urgent intervention is required to mitigate this. The following investigations should form part of the ongoing strategic water planning process:

- An investigation to determine where water can be made available between sectors
- The loss of potential income (estimated at R 552M/a) from un-billed domestic water supply can be used to make systems more efficient

This water balance is a first attempt by water services planners to collate all water sector use. The detailed water in each sector must be determined to allow for a more accurate water balance.

LIMPOPO PROVINCE OVERALL WATER BALANCE		2015	2045
	Sector	Volume Mm^3/a	Volume Mm^3/a
Water Demand	Domestic Water Demand	248	466
	Agricultural Water Demand	1 290	1 496
	Mining and Industrial Water Demand	98	297
	Wildlife	8	8
	Estimated Total Water Demand	**1 645**	**2 268**
Water Resources	Estimated direct abstraction from rivers	184	184
	Estimated total yield from dams	336	336
	Estimated total from boreholes (Current tested)	378	557
	Estimated total from boreholes (Future & Testing)	90	159
	Total Water Resources	**988**	**1 236**
WATER BALANCE OF EXISTING WATER RESOURCES		**-656**	**-1 032**
Re-use and Savings	Effluent Municipalities WWTW	0	75
	Effluent Mines (AMD Transfer)	0	100
	WCDM from primary water demand	0	73
	Irrigation savings	0	295
	Rain Water Harvesting	0	48
	Total estimated re-use potential	**0**	**590**
WATER BALANCE AFTER USE OF SAVINGS		**-656**	**-442**

EXECUTIVE SUMMARY AND STRATEGIC ANALYSES

FINANCIAL ANALYSES

Grant funding for capital works for water supply services is firstly required to address the backlog (i.e. infrastructure below RDP standard of supply) and thereafter for a higher levels of service. The scarcity of water, the long distances required to make water available and the acknowledgement that bulk supply infrastructure needs to cater for higher levels of services as well, requires funding for capital works which must provide mixed levels of services. Current funding for water services capital works amounts to about R 5 600 M/a. Historic figures reflect unspent grant funding amounting to between R 595 M and R 897 M per year– this aspect should be addressed so that available grants are utilised in each financial year.

Funding mechanisms for capital works programmes are well structured and coordinated to complement each other. Notwithstanding the complexity of the funding streams and their requirements, provincial departments and municipalities are generally well equipped to implement these programmes. Implementation should not be influenced by procurement practices which are not in line with the finance management acts and competent services providers should be employed (a proper mechanism should be put in place to oversee this).

Operation and maintenance planning and funding mechanisms are not well established. Although capital works grant funding requires proof of adequate O&M functionality, it is accepted as statements of intent and not implemented. Proper O&M systems should be demonstrated and confirmed before any grant funding is released.

Equitable share transfers to WSAs seem to be adequate to cover production and delivery costs. This aspect should be evaluated as the lack of services is often reported as a lack of finances. An analysis of the use of equitable share transfers should be done and evaluated. The Free Basic Water volume will increase from the current estimated 126 Mℓ/d (2016) to 224 Mℓ/d (2045) which will require increased equitable share allocations.

Funds required from 2016/17 to achieve the 2019 goal of water and sanitation services to everybody to at least RDP standards amount to R 28 025 M (this is from RBIG, MIG, MWIG and own funds). The allocated funds in DoRA up to 2017/18 amount to 25% of this requirement, leaving an outstanding amount of R 21 056 M required in less than 2 years to meet the goal. These funds are not available and need to be sourced for the 2019 goal to be met.

Consideration for planning the next level of water supply service to rural areas (after RDP street taps) should receive attention. Upgrading the reticulation to upgrade communal street taps to metered yard connections should provide systems which are easier to operate, manage and maintain. The in-principle acceptance would be a first step followed by reviewed guidelines. Funding of at least R 3 500 M will be required to upgrade the reticulation systems to basic yard connections.

Water supply services to communities are in a bad shape and are a cause for sporadic civil unrest often resulting in violent protests in several areas – it is not located to a specific area and affects the whole province. WSAs require at least R 2 553 M to address functionality problems and R 623 M to address water conservation and demand management interventions. Increased institutional financial support is required by WSAs to improve water and sanitation services..

Sanitation to RDP standards for all citizens (VIP as a minimum service) requires at least R 6 000 M in the next 3 to 4 years to reach the 2019 access to RDP services by 2019. Current budgets are not sufficient and need to be augmented. Sanitation programmes should be planned for and made ready for accelerated implementation. The suitability of conventional VIPs in densely populated semi-urban areas requires further

INSTITUTIONAL ARRANGEMENTS

The Municipal Strategic Self-Assessment (MuSSA) is a monitoring mechanism that is used by DWS to identify and prioritise areas of vulnerability in the municipal part of the water cycle. The latest assessment was conducted in 2013/14 when it was found that the most critical vulnerabilities in Limpopo were related to wastewater/environmental safety and green-drop status, technical staff capacity in terms of numbers, water resource management, technical skills of staff and customer care. Six of the 11 Water Services Authorities (WSAs) in Limpopo were considered to be extremely vulnerable on these counts and the remaining 5 were classified as highly vulnerable. None of the WSAs assessed in Limpopo have moderate or low vulnerability levels for water service management.

In situations where capacity is constrained, the predictable response is to compromise on maintenance. This may not reflect immediately in institutional assessments, but is costly to reverse once it is institutionalised. Analyses of community protests in South Africa reflect strong public discontent with respect to municipal service delivery and an increasing tendency to commit violent crimes during protests. Progress with the implementation of Municipal Priority Action Plans must be monitored on a quarterly basis by the DWS Provincial Office as recommended in the MuSSA report so that timeous action can be taken to refine priorities and mobilise additional resources if necessary. MPAPs should be compiled for all WSAs that do not have them yet.

The Stats SA GHS for 2014 reported that only 35.3% of households in Limpopo rated water services as good compared to 61.4% for the country. This was the lowest among all provinces. The proportion of households in Limpopo reporting water supply disruptions for more than two days has increased from 59.1% in 2010 to 61.4% in 2014. A gap is emerging between the physical provision of infrastructure and the functionality of it. All Water Services Authorities in Limpopo are institutionally vulnerable, specifically with regards to technical staff capacity and skills. This requires strategic intervention.

Intentions regarding institutional restructuring and consolidation within the water cycle, including the formation and capacitating of catchment management areas, as well as water user associations, should be clarified as a matter of urgency in order to avoid stakeholder alienation. Government policies and strategies for improved sanitation services also require more clarification and integration with water services.

INSTITUTIONAL ARRANGEMENTS CONTINUED……

In terms of the National Water Act and Water Services Act, every WSA must plan its water services business and publish certain documents in terms of this legislation. The Water Services Development Plan (WSDP) needs to be compiled by each WSA (in at least a five year cycle). Very few WSAs adhere to this requirement. DWS require feasibility studies and technical reports to be submitted for approval prior to any other services being implemented. Intervention is required so that WSAs compile WSDPs and submit the annual reports on the implementation of the WSDP.

CUSTOMER CARE

Water service quality and customer care are two of the 16 water service attributes that are measured and monitored in the Municipal Strategic Self-Assessment (MuSSA) of Water Service Providers (WSAs). Customer care was found to be one of the most critical vulnerabilities in Limpopo in 2013/14, with an extreme vulnerability index of 55%. All four district municipalities that are WSAs, as well as the local municipalities of Mogalakwena and Mookgophong, were found to be extremely vulnerable. From 2012 to 2013 there was a further deterioration in the customer service vulnerability of Capricorn and Mopani districts, but Lephalale LM showed an improvement.

On water service quality, the provincial index for extreme vulnerability for 2013/14 was 36% and 18% for high vulnerability. This reflects considerable improvement on the 2012 assessment, when water quality was one of the most vulnerable attributes of the water business in Limpopo. The vulnerability relating to water service quality was particularly acute in the district municipalities of Mopani, Sekhukhune and Vhembe, as well as in the local municipality of Polokwane as reflected in the 2013/14 assessment.

Three WSAs (out of 11 in Limpopo) do not have customer representatives or a complaints register, while another two WSAs are not sure if they have it. Two more WSAs indicated that their respective customer care systems are not functional.

DWS has a clear policy and strategy for customer care, which must be reflected in MPAPS where this attribute is found to be vulnerable. If institutional capacity is a constraint in WSAs, then that constraint must be specifically addressed. This must be carefully considered because it could be an important determinant of water service quality and the level of customer care. Functionality has to be the key consideration and not only the physical existence of systems.

The feasibility of creating electronic databases of consumer information for every WSA should be investigated. A sms-based communication functionality within the database will enable households to log complaints from their cellular phones. Formal logging of complaints will facilitate systematic responses and the monitoring of these responses. The concept of a social contract between government and consumers provides for improved recognition that the sustainable provision of quality water services implies responsibilities for consumers as well as for all agencies in the water cycle. Responsibilities of residential consumers include payment for water used in excess of the free basic service allocation.

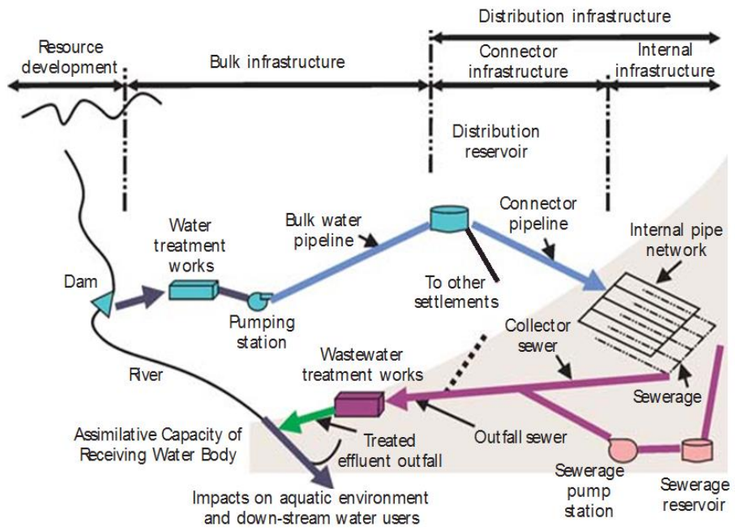
NOMENCLATURE AND COMPILER INFORMATION

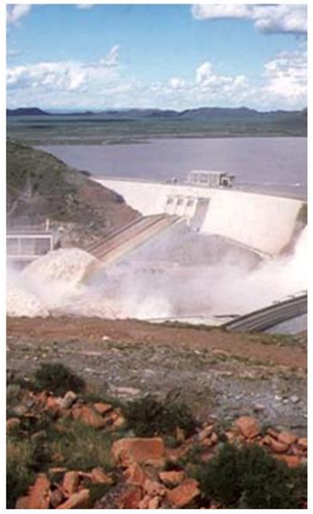
The purpose of this reference framework document is to give a provincial status quo perspective of water services and planning information in Limpopo Province. The focus is to highlight current information and issues of concern which should be addressed on provincial and higher levels. Although each Water Services Authority (WSA) has its own Water Services Development Plan (WSDP), there are cross boundary aspects and common areas of concern which need to be addressed collectively to achieve effective water and sanitation services. The structure of the document leads the reader through the topics that affect water services by providing Statements, Statistics, Explanatory Notes, Strategic Analyses and recommended Actions.

The entry point for demographics, levels of services and water demand is at the settlement level. Thereafter the water balance is built up from water resources (per logical grouping) to present a provincial overview. The level of information that was available varied from detailed and accurate to vague and often conflicting data. The compilers of this document made use of official information local knowledge of the area to present the most relevant information as accurately as possible. This document presents the macro picture, which should have sufficient information to support high level decision making and to guide the water services business to a more efficient and sustainable level of service delivery. The reader is asked to grasp the major issues that are present and to actively pursue those issues.

The information and planning guidance presented is the best effort that could be made within the short duration that was allowed for the compilation of this master plan. Future revisions and WSA master plans could build on this framework after specific studies and investigations are completed as proposed in this document.

Developing a Sustainable Water Supply-Chain: "Source-to-Tap-to-Source"





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Topic:	1	2a	2b	2c	3	4	5	6	7a	7b	8	9	10	11	12
Strategic Context	**Demographics and WS backlogs**	**Water Services Demand**	**Water Requirements (Agriculture)**	**Water Requirements (Mining and Industrial)**	**Socio-Economics**	**Water Services Infrastructure**	**Operation and Maintenance**	**Associated Services**	**Water Resources (Ground Water)**	**Water Resources (Surface water)**	**Water Balance**	**Financial analysis**	**Institutional Arrangements**	**Social and Customer**	**Data Management, Compiler Team and GIS**
Nnete Consulting Engineers HWA Engineers & Project Managers and G Steyn & Associates	Nnete Cons Eng and G Steyn & Associates	Aecom	B Badenhorst	B Badenhorst	G Steyn & Associates	HWA Engineers & Project Managers	HWA Engineers & Project Managers	Nnete Consulting Engineers	WR Water Resources	VSA Leboa and Ages	Aecom and B Badenhorst	Nnete Consulting Engineers	G Steyn & Associates	G Steyn & Associates	Nnete Consulting Engineers and Invirocon

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ABBREVIATIONS

ABBREVIATIONS AND ACRONYMS

The use of abbreviations and acronyms in this document are often presented without an initial explanation. This was allowed for the sake of brevity and typing space. The reader is therefore requested to refer to this page for clarity in this regard. All abbreviations and acronyms used in this document should be reflected in this list.

AFASA	African Farmers Association of South Africa
CoGTA	Department of Cooperative Governance and Traditional Affairs
CIDB	Construction Industry Development Board
CMA	Catchment Management Agency
DAFF	Department of Agriculture, Forestry and Fisheries
DM	District Municipality
DWS	Department of Water and Sanitation
DGP	Domestic Growth Point
FBW	Free Basic Water
GDP	Gross Domestic Product
GHS	General Household Survey
GIS	Geographical Information Systems
GLeWaP	Groot Letaba Water Augmentation Project
GRIP	Ground Water Resource Information Project
ha	Hectare
IAM	Infrastructure Asset Management
IAP	Invasive Alien Plant
IDP	Integrated Development Plan
IRS	Implementation Ready Studies
IWSP	Interim Water Supply Programme
kℓ	Kilolitre
KNP	Kruger National Park
ℓ/c/d	Litre per capita per day
ℓ/s	Litre per second
LDP	Limpopo Development Plan
LM	Local Municipality
LPWMP	Limpopo Provincial Water Master Plan
LRGWS	Luvhuvhu River Government Water Scheme
LSP	Local Service Point
LSU	Large Stock Unit
MAP	Mean Annual Precipitation
MCWAP	Mokolo Crocodile Water Augmentation Project
MDG	Millennium Development Goals
MIG	Municipal Infrastructure Grant
MISA	Municipal Infrastructure Support Agent
MGP	Municipal Growth Point
$m^3/ha/a$	Cubic metre per hectare per annum
Mm^3/a	Million cubic metre per annum
Mℓ	Megalitre
MPAP	Municipal Priority Action Plan
MuSSA	Municipal Strategic Self Assessment
MWIG	Municipal Water Infrastructure Grant
NAFU	National African Farmers Union
NCWSTI	Resuscitation of National Community Water and Sanitation Training Institute
NPO	Non Profit Organisation
O&M	Operation and Maintenance
ORWRDP	Olifants River Water Resources Development Project
PCP	Population Concentration Point
PGP	Provincial Growth Point
PMO	Project Management Office
RBIG	Regional Bulk Infrastructure Grant
RDP	Reconstruction and Development Program
SIC	Standard Industrial Classification
SIP	Strategic Infrastructure Plan
sms	Short Message Service
SSA	Statistics South Africa
TCTA	Trans Caledon Tunnel Authority
TDS	Total Dissolved Solids
TLU	Transvaal Landbou Unie
UN	United Nations
VIP	Ventilated Improved Pit Latrine
WARMS	Water Authorisation and Registration Management System
WB	Water Board
WMA	Water Management Area
WSA	Water Services Authority
WSDP	Water Services Development Plan
WRC	Water Research Commission
WTW	Water Treatment Works
WWTW	Waste Water Treatment Works
WUA	Water Users Association
ZINWA	Zimbabwe National Water Authority

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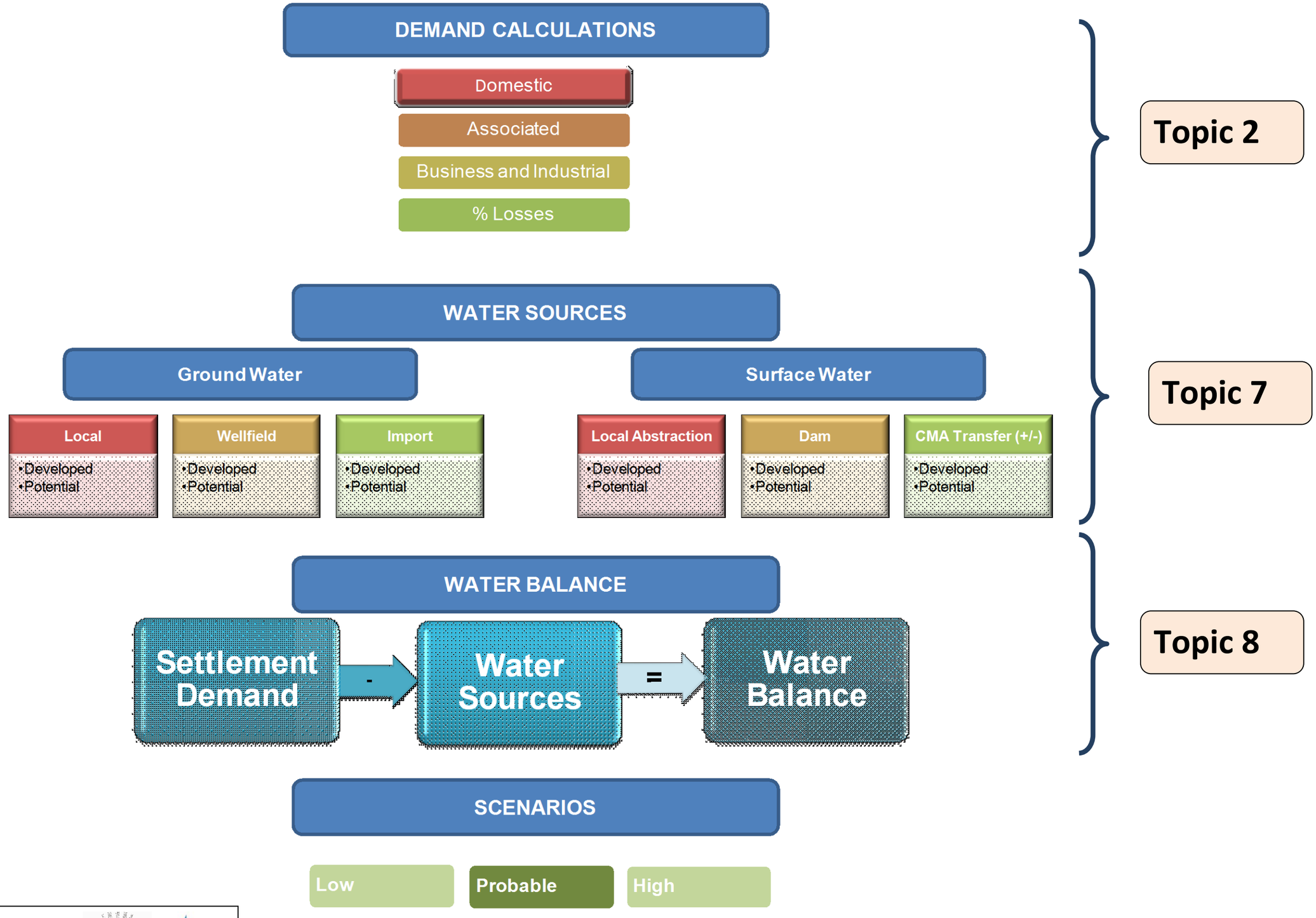
COMPONENTS OF THE DOMESTIC WATER BALANCE CALCULATION MODEL

The water balance calculation for the domestic water use was developed in a spreadsheet format which has the components as depicted below.



INTRODUCTION TO WATER MASTER PLAN REFERENCE FRAMEWORK

INTRODUCTION

The purpose of the Limpopo Provincial Water Master Plan (LPWMP) is to provide a strategic framework that will guide the planning, development, operation and maintenance of appropriate infrastructure for the provision of water and sanitation services in response to consumer needs and as a strategy to unlock the development potential of the Province in a sustainable manner.

The Limpopo Provincial Water Master Plan will reflect important national objectives and considerations such as adequate water sector services for all people, socio-economics, bulk water availability, waste water treatment works, the effectiveness and efficiency of institutions and funding channels, as well as water conservation and demand management. It will also express the water strategy implications of the Limpopo Development Plan (LDP), such as the need to alleviate residential water service backlogs and the need for industrial water to unlock the development potential of growth points in the Province. The green economy, with its implications for rainwater harvesting, is emphasised in the LDP and is therefore also addressed. With regard to water service backlogs, Census 2011 indicated that 27.2% of households in Limpopo were below the RDP standard of water services in that year, compared to 14.9% of households at the national level. The proportion of households in Limpopo that were below RDP standards on services was considerably higher in 2011.

The South Africa Government is committed to ensure that all citizens have access to reliable, sustainable, safe and affordable water services. Initial targets to eliminate basic water supply backlogs by 2008 and basic sanitation backlogs by 2010, were not achieved. These targets were extended to 2014 in accordance with the Millennium Development Goals (MDG). However, a considerable number of households in Limpopo Province remain below RDP standards in terms of water and sanitation services as indicated in this Master Plan. An additional funding stream (the Municipal Water Infrastructure Programme) was created by National Treasury in 2013 to achieve at least an intermediate water supply in 27 priority District Municipalities, which include all DMs of Limpopo Province except Polokwane LM. The new national target that was announced in July 2014 by Cabinet is that Government will provide water services with 90% reliability to all citizens by 2019. The main focus of the national strategy is the eradication of basic water service backlogs through the collaboration and co-operation of all spheres of government. A Project Management Office (PMO) has been established within the Department of Co-operative Governance and Traditional Affairs (CoGTA) to co-ordinate and monitor the process of achieving the new targets for water services.

Compilation of this Water Master Plan for Limpopo was preceded by a provincial Water Summit that was held in July 2015. Keynote addresses were made by the National Minister of Water and Sanitation and by the Premier of Limpopo. Delegates went into commissions to deliberate on the Provision of Bulk Infrastructure, Water and Sanitation for households, Water to support Economic Development; and Waste Water Treatment Works. The Summit concluded with the following resolutions taken:

- The development of and circulation of a draft Limpopo Water Infrastructure Master Plan for stakeholder inputs
- Develop a Provincial Sanitation Plan, including alternative technology to deal with backlogs
- Establish a dedicated Technical Team to consider approval of technical reports
- Develop an Implementation Plan focusing on water service hotspots (such as Polokwane, Mogalakwena and Mopani)
- Fill vacant posts for Technical Services Managers
- Develop a sustainability plan for the existing river system, and
- Develop a comprehensive Wastewater Treatment Works Plan, including refurbishment; further capital investment; alternative technology and regulatory compliance matters; as well as a sector skills development plan.

The broad architecture of this Limpopo Provincial Water Master Plan is firstly to consider this national and provincial water policy and strategic planning context. Secondly, water requirements for all groups of users will be estimated. Residential requirements are estimated from a village-level demographic analysis, population growth projections from 2015 to 2045; and from water/sanitation service levels. Business, industrial and other water requirements are estimated from current use with provision for new developments, especially in the provincial growth points. Provision is also made for water losses, which are gradually reduced over the master planning period on the assumption that effective water conservation and demand management practices will be implemented.

Thirdly, surface and ground water sources are analysed and described with a distinction being made between developed and potential sources.

A water balance for Limpopo is then calculated from the information on requirements and resources and this is the basis from which a strategy must be formulated to achieve water sector development objectives in the Province. The strategy must include institutional and financial considerations that will facilitate the implementation process. Financial considerations require that changes to water consumption patterns should be part of the strategy in cases where current consumption patterns are not sustainable. Increases in supply can never be the only strategy in a water stressed Province such as Limpopo.

The Water Master Plan is therefore a building block of the Limpopo Development Plan, which anticipates improved approaches towards water resource management and identifies options for resource augmentation in order to avoid the risk of a future water deficit in Limpopo and can be used by the private sector for project planning purposes. The Water Master Plan will form part of an Integrated Infrastructure Master Plan for Limpopo, in which the national Strategic Infrastructure Projects will be reflected, such as SIP 1 and SIP 18 on Water and Sanitation. SIP 1 covers water supply augmentation to unlock the development resources of Limpopo, including the Waterberg. SIP 18 deals with backlogs in residential water and sanitation services. All institutions that work with these strategic projects are therefore custodians of the Limpopo Provincial Water Master Plan.

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The Limpopo Provincial Water Master Plan will also provide a framework for the updating and consolidation of district and municipal water master plans. Custodians of these water master plans are therefore also important stakeholders in the Provincial Water Master Plan. This water master plan has a 30 year planning horizon and should be updated annually.

CONSOLIDATED DEMOGRAPHIC DATASET FOR LIMPOPO PROVINCE

TOPIC 1 – DEMOGRAPHICS

01.1

DEMOGRAPHIC DATA: DEPT WATER & SANITATION AND STATISTICS SOUTH AFRICA DATA AS BASIS

The Department of Water and Sanitation (DWS) has created and maintained a demographic and water services backlog database since 1996. Population numbers at the time were derived from the Census of 1996. The need for this parallel data set within DWS arose for four reasons. Firstly, census information initially provided insufficient coverage of water service information, although this was subsequently addressed by Statistics South Africa and included in the Census of 2001 and of 2011. The initial five-year and then the 10-year time lapse from one census to the next is too long for effective water service planning and monitoring, which is the second reason why a parallel data base became necessary. Thirdly, settlement development, including new RDP housing projects are dynamic and new names are given to settlement extensions on a regular basis. Water and sanitation services have to be planned at this micro-settlement level. Small places in the Census are generally associated with a main place name, which means that census information is not always extractable for a specific new settlement extension. Finally, census information only captures resident population, whereas circular migration is a particular feature of South African society. DWS is obliged to provide for the water service needs of circular migrant workers and relatives with their own households elsewhere, who return to Limpopo for frequent visits. The concept of a planning population was created for this purpose. It makes allowance for visitors so that water infrastructure will be adequate to provide water at any location to cater for circular migration and for other travellers.

The DWS demographic dataset is built from settlement level upwards (each settlement has a unique number derived from its locality in a water catchment quaternary area) comprising of the following:

- Polygons (boundary) for each settlement with unique number and settlement name
- Household count and population for current year, with projections based on a distinct growth rate per settlement classification in each municipality
- Water services (water and sanitation) levels of services that reflect the backlog in services regarding infrastructure and functionality aspects
- Water services infrastructure with the focus on resource, bulk and connector services
- Very detailed data on the water treatment works and waste water treatment works
- Data to support backlog eradication planning and costing

Numerous water service planning documents have been compiled to present selected perspectives on the basis of this demographic data set. It is calibrated to Stats SA census information after every census, with the last calibration of household sizes and other population information being done in 2013 when 2011 census information was released. A description of this updating process is provided in the text box below. This dataset is therefore used for the compilation and validation of water service development plans. Additional calibration to census information, especially with regard to water services at the settlement level, was done in 2015/16 for the compilation of the Limpopo Provincial Water Master Plan.

THE DATA UPDATING PROCESS

New Reporting Requirements

The Water Services Planning Sector is a dynamic ever changing business, similar to South Africa's fast growing demographic and economic trends. The need arose to redefine the methods of reporting on water and sanitation needs and backlog figures and to ensure that the current data accurately reflects the fast changing demographics of South Africa. A Strategic process was launched in March 2013 to ensure that data was captured on a GIS base platform utilizing up to date Information Systems Technology as well as to align with other Government and Non Governmental stakeholders.

AIM

The aim of the initiative was that the process itself would assist in the development of a Backlog Eradication Strategy. The process was developed in such a manner that the newly designed data reporting classifications would serve as a guideline for a detailed step by step data gathering and updating process. Intensive data capturing, evaluating, processing and analysis were performed on settlement level to complete the structures. The reporting result of data from these structures automatically describes the service levels, requirements and focused solutions in a strategic manner.

The 2013 Spatial Data Analysis

- Used 2008 aerial photography as backdrop
- Google Earth images were consulted
- Obtained 2012 SPOT 5 Satellite images
- Overlay DWA 2011 RF Settlements GIS dataset (FormF11)
- Evaluated data to identify possible new or expansion developments
- Alignment of data with STATS Census 2011

Output

- The December 2013 demographic data (Households & Population) with backlogs was finalized as FormG13. The new village spatial polygon dataset supports this new information

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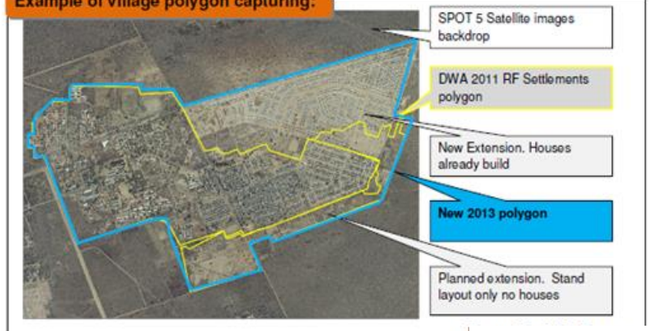
Example of village polygon capturing:



CONSOLIDATED LIMPOPO MASTER PLAN DEMOGRAPHIC DATASET:

The methodology that was used to compile the demographic dataset for this provincial water master plan is described below:

1. DWS Form G13 (Dec 2013), which was derived from Spot 5 satellite images, was used as settlement basis and for household counts
2. Calibration of household counts with 2011 census
3. Census 2011 household size used as basis to derive population from the calibrated household counts
4. Longer term migration and extended stay included to obtain a planning population (+/- 4% impact from evidence provided by the National Transport Master Plan for Limpopo)
5. Differentiated growth up to 2045 derived from growth rate differentials at the settlement level between Census 2001 and Census 2011 for the first period until 2015. Thereafter the Probabilistic growth projections for SA by the UN Population Division from 2015 to 2045 (2015 Revision) were used as a guide to project population growth per municipality in Limpopo in five-year intervals.
6. Settlement classification from the 2007 Limpopo Spatial Rationale was used to calibrate census small place names with DWS settlement names.

ACTIONS

1. It is advisable that this standard demographic dataset should be used for all infrastructure and water service planning purposes in Limpopo. It is calibrated to the census, but includes updated information and settlement names that are used and understood by all stakeholders. Each settlement has a unique identity number that will facilitate integrated infrastructure planning.

2. The WSDPs for most previous versions of the Limpopo Province WSAs are based on the DWS/ WSA dataset. WSAs can be requested to verify the Water Master Plan dataset for further use.

3. Re-establishment of the Provincial Water Forum for information sharing, coordination and overall planning between the relevant municipalities, provincial departments and organisations, is recommended. This Forum was operational for a number of years

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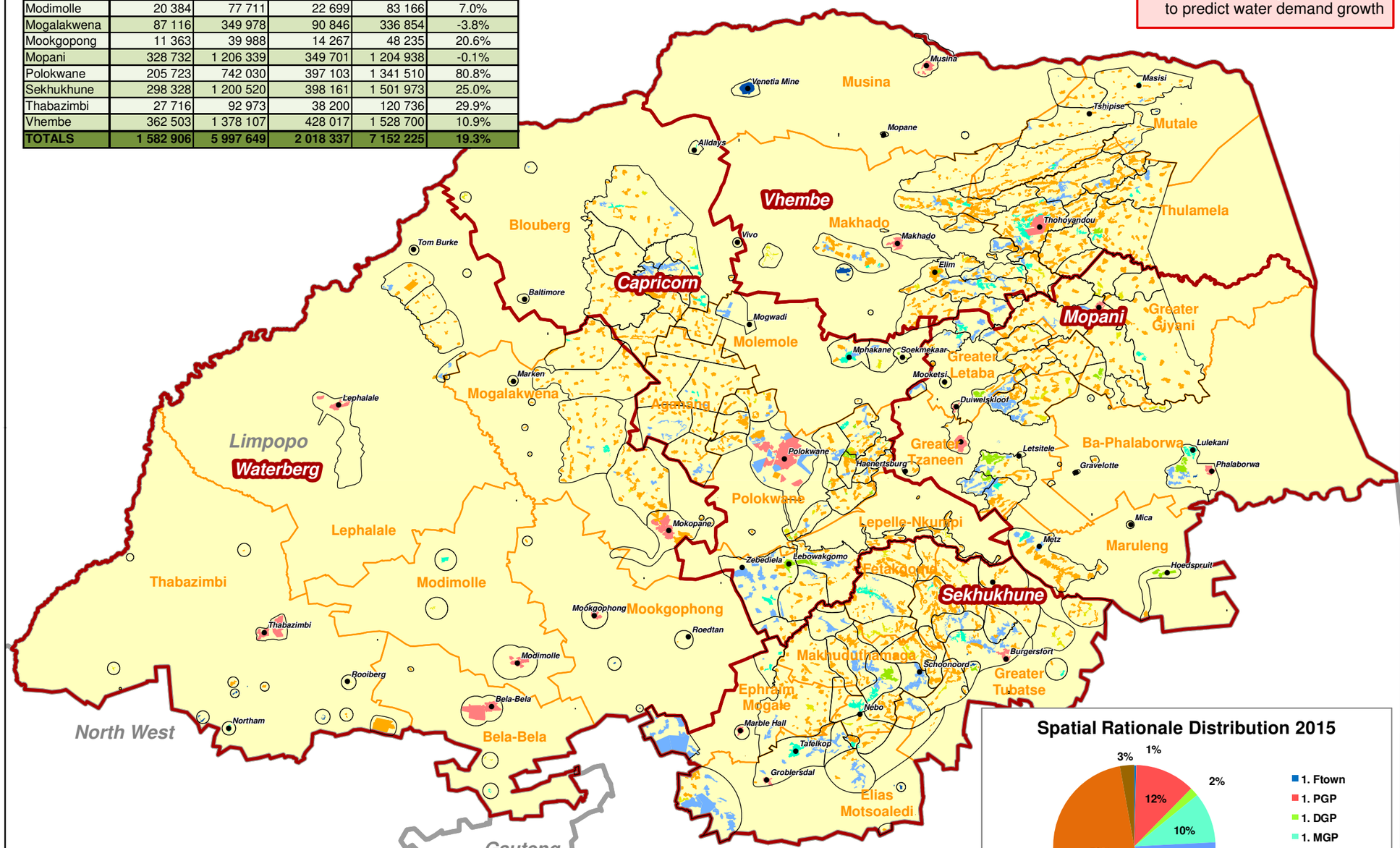
CONSOLIDATED DEMOGRAPHIC DATASET AND GROWTH

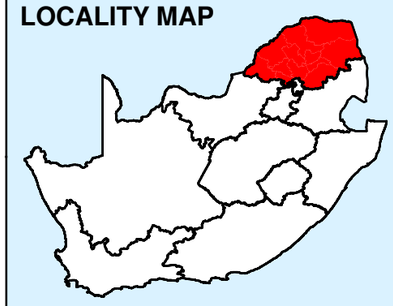
WSA	2015		2045		Population Growth over 30 Yrs
	Households	Population	Households	Population	
Bela-Bela	20 422	73 756	30 506	105 448	43.0%
Capricorn	186 530	704 522	173 783	614 522	-12.8%
Lephalale	34 089	131 726	75 053	266 142	102.0%
Modimolle	20 384	77 711	22 699	83 166	7.0%
Mogalakwena	87 116	349 978	90 846	336 854	-3.8%
Mookgopong	11 363	39 988	14 267	48 235	20.6%
Mopani	328 732	1 206 339	349 701	1 204 938	-0.1%
Polokwane	205 723	742 030	397 103	1 341 510	80.8%
Sekhukhune	298 328	1 200 520	398 161	1 501 973	25.0%
Thabazimbi	27 716	92 973	38 200	120 736	29.9%
Vhembe	362 503	1 378 107	428 017	1 528 700	10.9%
TOTALS	**1 582 906**	**5 997 649**	**2 018 337**	**7 152 225**	**19.3%**

Planning of Water Supply:

- Each settlement falls within a water supply scheme area
- Settlement categorisation used to predict water demand growth



LOCALITY MAP



Settlement Categorisation

1. Functional Town (FTown)
1. Provincial Growth Point (PGP)
1. District Growth Point (DGP)
1. Municipal Growth Point (MGP)
2. Population Concentration Point (PCP)
3. Local Service Point (LSP)

4&5. Scattered

Farms

(Adopted review from Spatial Rationale 2007)

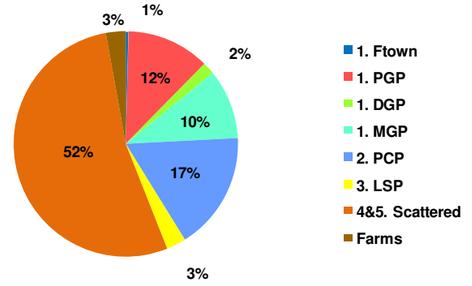
Planning Notes:

There are 2 691 settlements in the Limpopo Province

Planning Notes:

- More than half the population reside in rural and scattered settlements

Spatial Rationale Distribution 2015



BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries
- Water Scheme Areas
- Settlements

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TOPIC 1 - DEMOGRAPHICS

01.2

DEMOGRAPHIC PROFILE OF LIMPOPO PROVINCE

TOPIC 1 – DEMOGRAPHICS

01.3

STATEMENTS

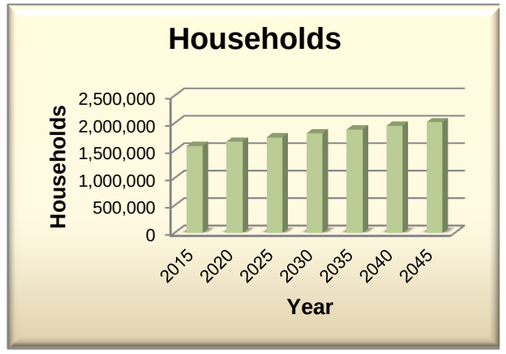
The 2015 Planning Population for Limpopo province is 5 997 649 people living in 1 582 906 households. It is expected to grow to 7 152 225 people and 2 018 337 households in 2045. Capricorn is the most populated District, with 24% of the provincial population and Waterberg is the most sparsely populated, with only 12.7% of the total. Population growth is currently the highest in Sekhukhune District at approximately 1.1% per year and lowest in Mopani District at 0.36% per year. The share of Sekhukhune District in the provincial population is therefore expected to increase over the planning period from 20% at present. The share of Mopani District is likely to shrink.

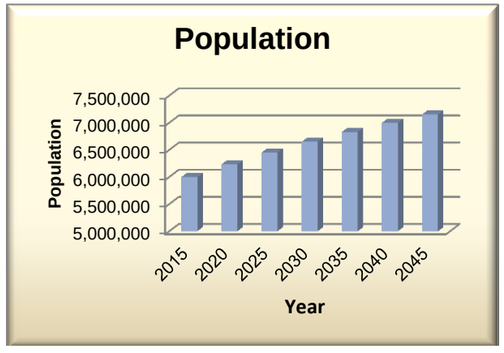
Population growth rates in Limpopo Province are expected to decline gradually over the project planning period from the current level of 0.77% per year to 0.44% in 2045. The most rapid growth is occurring in many of the declared provincial growth points. By contrast, several small and scattered settlements in remote rural areas are losing residents due to out-migration. The settlement pattern is therefore expected to change towards urban areas, including the peripheries of towns; and away from small and remote rural settlements.

Household sizes are also expected to shrink, from an average of 3.78 people for Limpopo Province in 2015, to 3.54 people in 2045.

STATISTICS

Year	Households	Population	Annual Growth	HH Size
2015	1 582 906	5 997 649	0.77%	3.78
2020	1 665 076	6 231 927	0.69%	3.74
2025	1 739 918	6 450 871	0.61%	3.70
2030	1 813 533	6 649 743	0.54%	3.66
2035	1 883 418	6 828 979	0.49%	3.62
2040	1 952 183	6 998 323	0.44%	3.58
2045	2 018 337	7 152 225	0.44%	3.54





EXPLANATORY NOTES

Planning population is a concept that was developed to facilitate water services planning in Limpopo. It is based on household sizes per settlement classification from Census 2011 and on the number of households counted by DWS from satellite images. Municipal population estimates that were derived in this manner were increased by 4% as a provision for circular migration. Population growth projections per municipality from 2011 to 2015 were derived from actual growth rates recorded by Statistics South Africa between 2001 and 2011. These two datasets reflect the elevated population growth rates of growth points in Limpopo. Probabilistic growth projections for SA by the United Nations Population Division from 2015 to 2045 (2015 Revision) were used as a guide to project population growth per municipality in Limpopo in five-year intervals. Statistics South Africa does not provide an equivalent set of population projections for the country. National Treasury therefore also use the UN population projections for long-term budget planning purposes.
The Limpopo Planning population figure of 5 997 649 people for 2015 is consistent with the Mid-year population estimate for Limpopo for 2015 (5 997 000) and reflects the 4% provision that has been made for circular migration. For project planning purposes, the long term growth rate for Limpopo was kept marginally above the growth rates that are published by the United Nations. This was done as mitigation against the risk that new mining developments that are not foreseen as yet, could become feasible in the mineral-rich Limpopo.

STRATEGIC ANALYSIS

The anticipated decline in the population growth rate in Limpopo is due to changes in birth rates and in the age composition of the provincial population, as well as to out-migration. Population growth will not be evenly distributed. Growth rates differ considerably among the five districts and the variation at the municipal level is even higher. Growth Point municipalities have had the highest population growth rates between 2001 and 2011 (census years) and these differentials are likely to remain, although the magnitude may level out over the project planning period. The implication is that new water requirements will increase more rapidly in some places than in others. A classification of high, intermediate and low population growth municipalities is reflected on the map on the opposite page.

The ten official growth points as identified in the Limpopo Development Plan are Polokwane, Lephalale, Burgersfort, Musina, Louis Trichardt, Mokopane, Tzaneen, Groblersdal, Phalaborwa and Thabazimbi. These growth points are shown in the map on the opposite page.

Statistical evidence of illegal immigration into SA and Limpopo is inadequate. Stats SA estimates in-migration of 160 000 Africans and 8 000 Asians to the country each year. If 10% migrate to Limpopo, the number will be 16 000 new Africans and 800 new Asians each year. This annual impact is relatively small, but it could accumulate over time. The local impact on preferred destinations may also be more acute, but this information is not available.

ACTIONS

1. The Limpopo Provincial Water Master Plan must provide for anticipated increases in residential and industrial water requirements at growth points in order to prevent access to water services from being a critical constraint to development.

2. The Limpopo Provincial Water Master Plan must also provide for the water services that are required to bring all households in Limpopo Province to RDP water service standards and to gradually raise service levels from that standard. Information on current water service levels is provided in the appropriate section.

3. More statistical evidence is required on illegal immigration. Information should include the preferred destinations of illegal immigrants and their length of stay to enable water services planning.

4. An effective working relationship between planning officials in DWS and Stats SA will contribute to clear specification of information requirements and to the efficient utilisation of survey results. It is recommended that Stats SA be requested up update the names of small places according to the names that are used by residents.

5. Out-migration from many small and remote rural settlements should be factored into the water services and integrated infrastructure planning processes. Populations are shrinking in these settlements and population growth rates are declining. The implication is that some of the demand for water and infrastructure services is being displaced from remote rural areas to more densely populated places.

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SETTLEMENT DEMOGRAPHICS 2015

Population Distribution

800,000

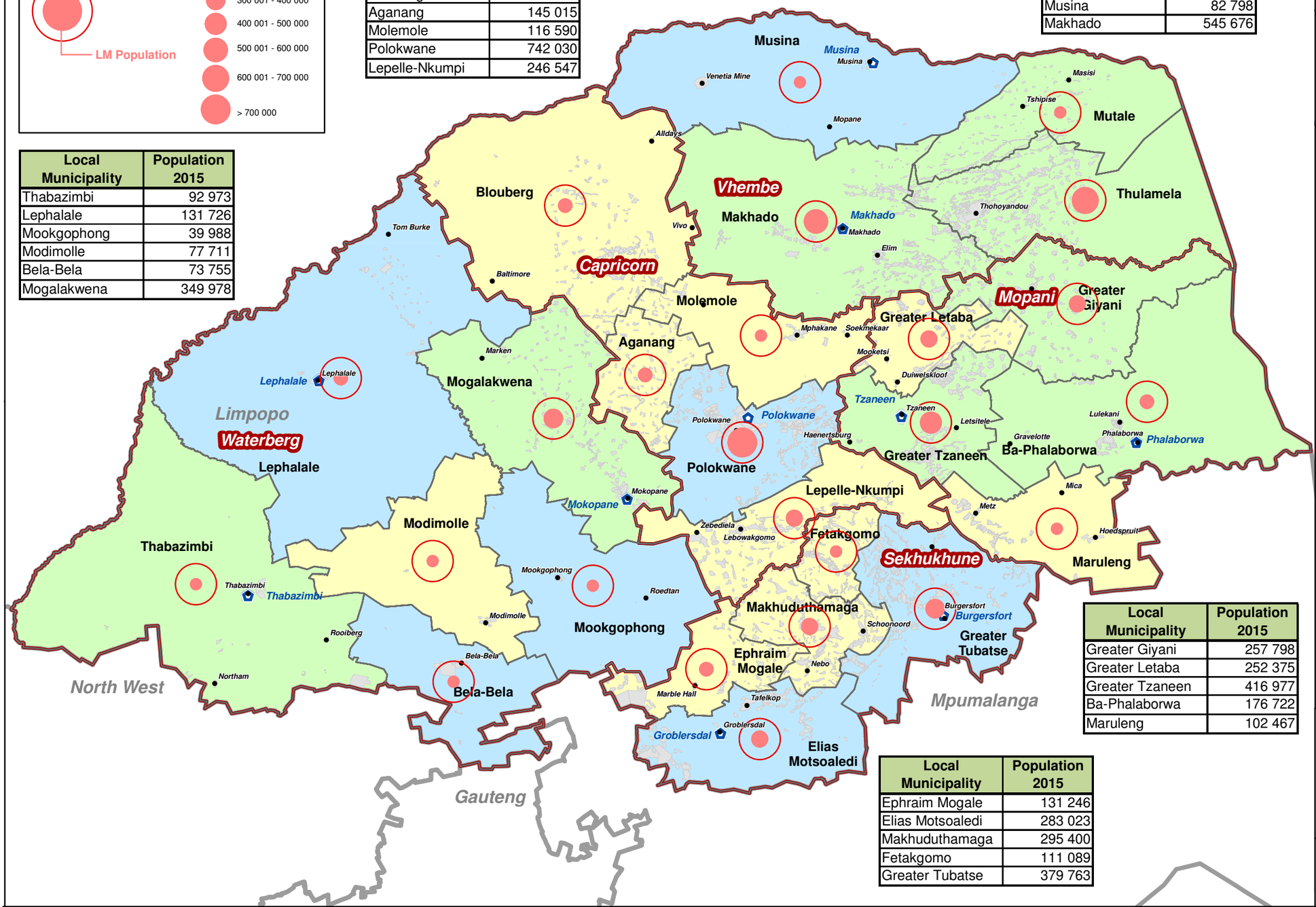
LM Population

- 0 - 100 000
- 100 001 - 200 000
- 200 001 - 300 000
- 300 001 - 400 000
- 400 001 - 500 000
- 500 001 - 600 000
- 600 001 - 700 000
- > 700 000

Local Municipality	Population 2015
Thabazimbi	92 973
Lephalale	131 726
Mookgophong	39 988
Modimolle	77 711
Bela-Bela	73 755
Mogalakwena	349 978

Local Municipality	Population 2015
Blouberg	196 370
Aganang	145 015
Molemole	116 590
Polokwane	742 030
Lepelle-Nkumpi	246 547

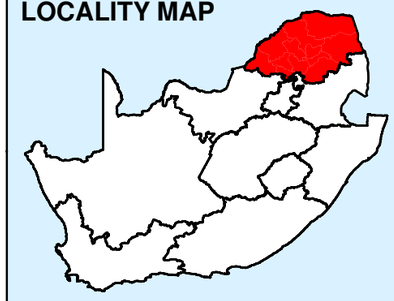
Local Municipality	Population 2015
Mutale	102 376
Thulamela	646 897
Musina	82 798
Makhado	545 676



Local Municipality	Population 2015
Greater Giyani	257 798
Greater Letaba	252 375
Greater Tzaneen	416 977
Ba-Phalaborwa	176 722
Maruleng	102 467

Local Municipality	Population 2015
Ephraim Mogale	131 246
Elias Motsoaledi	283 023
Makhuduthamaga	295 400
Fetakgomo	111 089
Greater Tubatse	379 763

LOCALITY MAP



Population Growth Rates

- High > 1%
- Intermediate 0.5% - 1%
- Low < 0.5%

Growth Points

Polokwane	Tzaneen
Lephalale	Mokopane
Burgersfort	Groblersdal
Musina	Phalaborwa
Makhado	Thabazimbi

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TOPIC 1 - DEMOGRAPHICS

01.4

BACKGROUND TO SERVICES LEVELS

TOPIC 2 – SERVICE LEVELS

02.1

DWS WATER SERVICES CATEGORISATION

The Dept of Water and Sanitation (DWS) has developed and improved a water services backlog database from 1996 to 2013. This dataset originally reflected the 5 criteria for the RDP water service level target. It was gradually upgraded to the current service level categorisation that has the capacity to distinguish between infrastructure and functionality issues. Within infrastructure, there are parameters to distinguish whether any particular settlement requires upgrading, or extension or refurbishment. The database also reflects planning information on the needs and quality relating to the water sources associated with each settlement. A description of the classification parameters is provided in the text box below. The information in this database is used to determine the most appropriate intervention action that is required for addressing services backlogs and functionality issues in particular cases. It was therefore utilised in the compilation of this Limpopo Provincial Water Master Plan. Specific information from the database is presented in pages that follow.

Statistics South Africa also present information on water supply levels from the census of 2001 and 2011, as well as in General Household Surveys that are conducted every year on the basis of a sample of approximately 30,000 households per Province. Household water service levels are classified as follows:

- Below RDP
- Adequate to RDP standard (i.e. street taps within 200m walking distance)
- Yard connections
- House connections.

The DWS database was calibrated with the census results although it only covers actual infrastructure service levels and not infrastructure functionality. In some cases infrastructure may be there, but no water is available for extended periods due to managerial, financial, operational, source shortage and other constraints.

The water supply status for the Limpopo Provincial Water Master Plan is therefore a combined dataset from the DWS and census information. This water supply dataset is used to determine the water demand and ultimately the water balance for the Province.

METHODOLOGY

LOGIC

New Water Services Needs Classifications and Categories were defined.

- New Households and Population fields were populated for each settlement according to the classification model. Settlements were categorised according to a single or combination of needs.
- The need allows for double counting e.g. if a section of a settlement has a Infrastructure upgrade need and the same section also an Infrastructure Refurbishment need, the need would be reflected in both categories.
- The model also allows for detailed breakdown and more accurate extraction of needs figures e.g. if a section of a settlement is adequate and another section has an Infrastructure upgrade need, it will be a Category 7; the adequate households must be listed under the appropriate adequate fields with the remainder of the households with the needs listed under the Infrastructure upgrade field.

Note: The household count was aligned with Census figures. Differentiated number of people per household from Census figures formed the basis to calculate the population. The DWS/MSA data set reflects the planning population, which includes for migration (ie the population which the infrastructure needs to cater for).

Definition	Classification	Description	Categorisation		
FORMAL					
- BELOW	- No Service	Whole community never had any formal (municipal) water supply system	10		
	- Infrastructure Upgrade	Existing infra not on RDP standard 1. Network: too small pipes 2. Storage: Add to exist / elevation 3. Source: Infra to increase exist yield	7	8	9
	- Infrastructure Extension	Communities have grown structurally and there are households that do not have water: TOTAL 1. Network: New infra 2. Storage: New & adjacent			
	- Infrastructure Refurbishment	Water can be restored to RDP by: Repair/Replace with same existing infra			
	- O&M Need (Total Settlement)	Water can be restored to RDP (where infra ok) by: enough & efficient staff and sufficient funds for O&M (incl. eg: quality at wtw, machines working, etc)	6		
	- Water Resources Needs	Includes Source Development Local Available Source: New BH, pipe Conserving & Demand Management Needs Water Source Quality Drinking Water Quality	5		
- ADEQUATE	- Stand Pipe	Adequate Infra	1 (C) / 3		
	- Yard Connection	Adequate Infra	1 (B) / 3		
	- House Connection	Adequate Infra	1 (A) / 3		
INFORMAL					
- BELOW	- No Services	Whole community never had any formal (municipal) water supply system. Permanent Housing must be provided	4		
- ADEQUATE	- Informal		2		

CONSOLIDATED LIMPOPO MASTER PLAN SERVICE LEVEL DATABASE

1. The rate, at which service levels were upgraded for each local municipality between 2001 and 2011 according to census results, was used to project upgrades per settlement on the DWS database until 2015.
2. This information was reviewed by experts on water service planning for each District in Limpopo who consolidated the information into an integrated database on water service levels for 2015
3. Targets of DWS were then used to evaluate the adequacy of the current rate of upgrading until 2019
Proposals for a more rapid pace of upgrading are made where targets are unlikely to be met at the current pace and the implications for increased water requirements were calculated
4. These requirements were ultimately compared to development options to increase water supply and the implications for water master planning are identified.
5. Sanitation backlogs were also identified. They are generally more than water service backlogs.

ACTIONS

1. The Limpopo Province water supply status dataset can be used as the master set for planning purposes by all relevant authorities in the Province.

2. WSAs in Limpopo in particular are encouraged to reflect this water supply status in future documentation (especially the WSDPs) as soon as they agree with the figures.

3. Sanitation service backlogs require more emphasis in WSDPs and alternative strategies to deal with waste are needed due to severe water supply constraints.

4. Continuous interaction between DWS and Statistics SA is required to refine census and General Household Survey questions regarding water services so that service quality and functionality matters can be effectively addressed in addition to issues of water infrastructure service levels.

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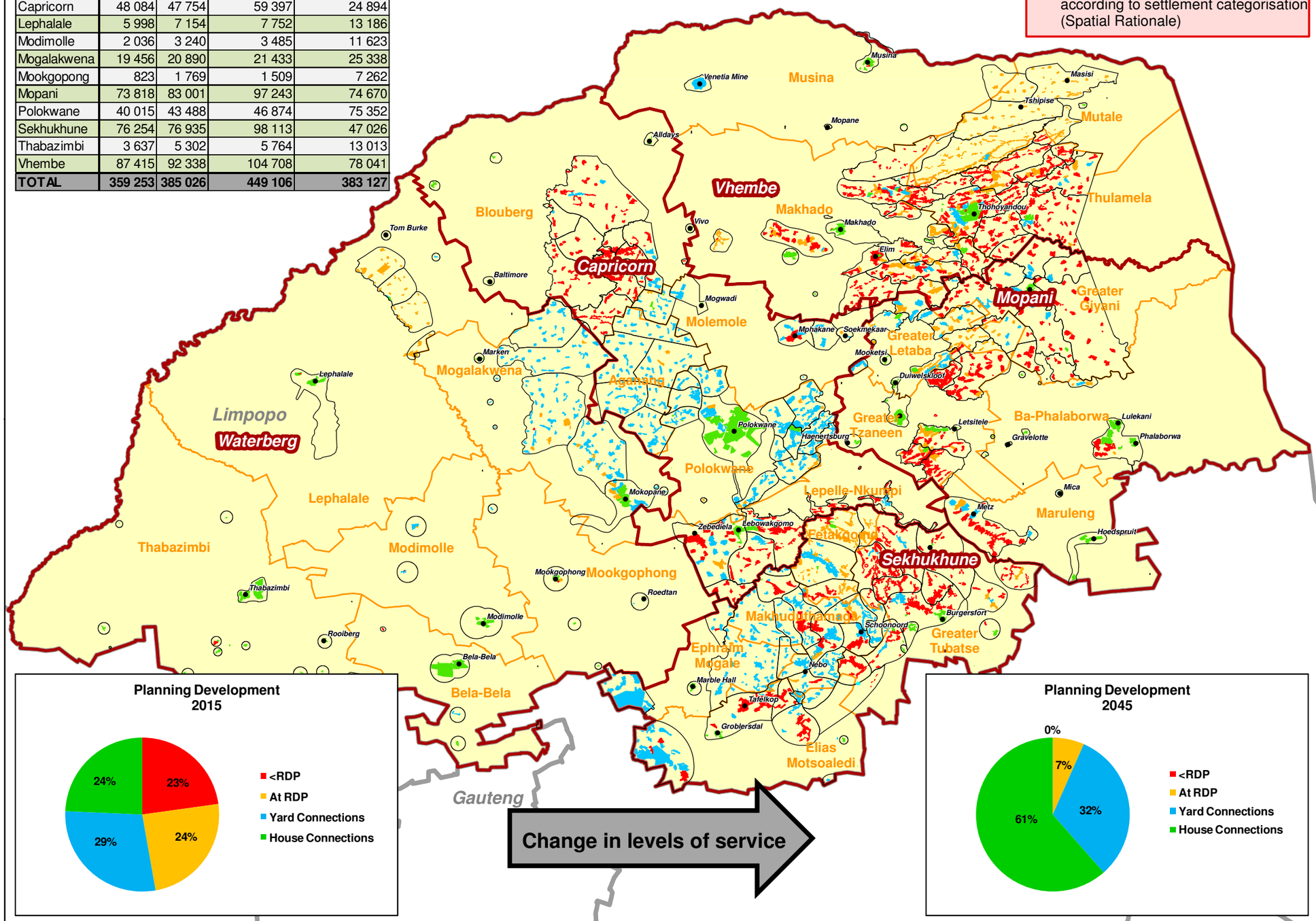
SERVICE LEVELS DEVELOPMENT

WSA	Households 2015			
	< RDP	At RDP	Yard Connections	House Connections
Bela-Bela	1 717	3 155	2 828	12 722
Capricorn	48 084	47 754	59 397	24 894
Lephalale	5 998	7 154	7 752	13 186
Modimolle	2 036	3 240	3 485	11 623
Mogalakwena	19 456	20 890	21 433	25 338
Mookgopong	823	1 769	1 509	7 262
Mopani	73 818	83 001	97 243	74 670
Polokwane	40 015	43 488	46 874	75 352
Sekhukhune	76 254	76 935	98 113	47 026
Thabazimbi	3 637	5 302	5 764	13 013
Vhembe	87 415	92 338	104 708	78 041
TOTAL	**359 253**	**385 026**	**449 106**	**383 127**

Planning Notes:

- Water demand projection determined from level of services differentiated according to settlement categorisation (Spatial Rationale)

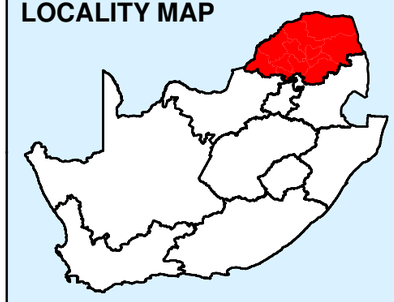


Change in levels of service

Planning Development 2015

Planning Development 2045

LOCALITY MAP



Water Supply Infrastructure at 2015 (Majority of Settlement):

- House Connections
- Yard Connections
- At RDP (Street tap at 200m)
- Below RDP

BASE MAP LEGEND

- Main Towns
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TOPIC 2 - SERVICE LEVELS 02.2

WATER SERVICE LEVELS: TOTAL COMBINED HOUSEHOLD STATUS

TOTAL HOUSEHOLD DIRECT BACKLOG: 453,042

LIMPOPO PROVINCE

Water Categorisation	Number of Settlements	FORMAL																		INFORMAL			
		Adequate								Water Resources Needs		O&M Needs		Infrastructure Needs						Adequate		No Services	
		House Connections		Yard Connections		Stand Pipes		Shared Services						Upgrades		Extensions		Refurbishment					
		HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%
1	85	96,260	75	12,217	10	19,709	15	279	0														
2	2							243	23											328	30	509	47
3	0																						
4	8									150	2									3,119	44	3,820	54
5	1	2,552	53	638	13					1,595	33												
6	0																						
7	17	8,208	35	4,031	17	2,680	11	853	4					75	0	7,509	32	307	1				
8	578	120,660	24	43,340	8	119,086	23	6,635	1			84,487	17	42,797	8	59,086	12	35,822	7	38	0	70	0
9	1,961	69,682	4	154,660	10	475,439	29	899	0	208,047	13	239,169	15	129,882	8	229,521	14	107,419	7	129	0	2,229	0
10	37									169	2					278	5			5,662	93		
Total Household Status		**297,362**		**214,886**		**616,914**		**8,909**		**209,961**		**323,656**		**172,754**		**296,394**		**143,548**		**5,829**		**5,746**		**4,878**	

This presents the Water Services Level in relation to **settlement category totals**

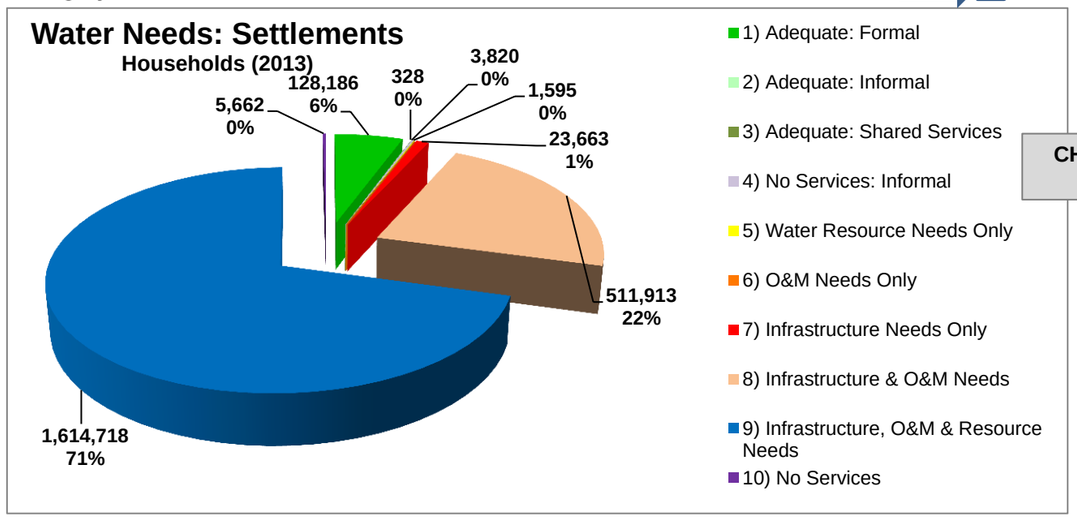
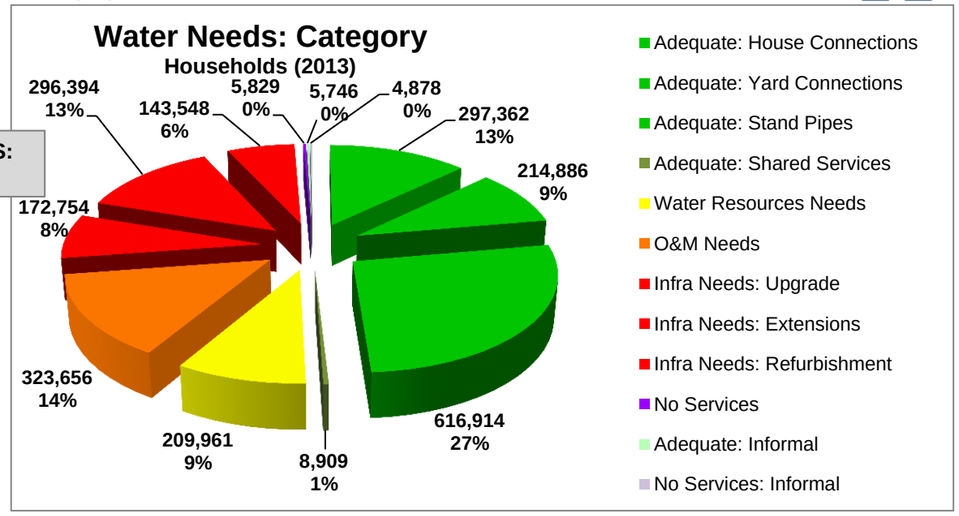


CHART VALUES: (HH, %)

This presents the Water Services Level in relation to the **need category totals**



1	Adequate	**3**	Adequate: Shared Services	**5**	Water Resources Needs **Only**	**7**	Infrastructure Needs **Only**	**9**	Infrastructure, O&M & Resource Needs
2	Adequate: Informal	**4**	No Services: Informal	**6**	O&M Needs **Only**	**8**	Infrastructure & O&M Needs	**10**	No Services

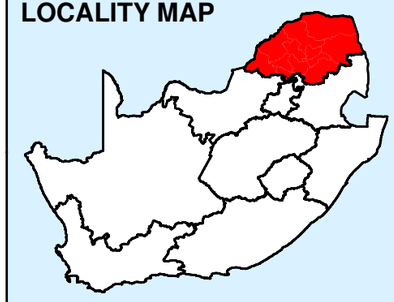
Data: DWS National Information System

OVERALL WATER NEEDS CATEGORISATION

Planning Note:

Direct water backlog (below RDP supply) affects 453 042 households (ie 29.7% of the population)

LOCALITY MAP



Settlement Categorisation

Formal

- 1) Adequate
- 3) Adequate: Shared Services
- 5) Water Resource Needs
- 6) O&M Needs
- 7) Infrastructure Needs
- 8) Infrastructure & O&M Needs
- 9) Infrastructure, O&M & Resource Needs
- 10) No Services

Informal

- 2) Adequate
- 4) No Services

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TOPIC 2 - SERVICE LEVELS

02.4

SANITATION SERVICE LEVELS: TOTAL COMBINED HOUSEHOLD STATUS

TOTAL HOUSEHOLD DIRECT BACKLOG:	919,946

LIMPOPO PROVINCE

Sanitation Categorisation	Number of Settlements	FORMAL																				INFORMAL			
		Adequate										Water Resources Needs		O&M Needs		Infrastructure Needs						Adequate		No Services	
		Waterborne		Waterborne Low Flush		Septic Tanks		Non Waterborne		Shared Services						Upgrades		Extensions		Refurbishment		No Services					
		HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%
1	45	12,526	19		0	29,778	46	23,122	35					1,265		34		67									
2	0																										
3	0																										
4	11									648				88		416		1				243		3,079		6,572	100
5	0																										
6	10	2,485				59		3,954						650													
7	8					7,850	31	4,259	17							700	3	12,216	49					1,361		5,444	
8	2,310	173,054	13	2,316	0	9,015	1	290,842	21			25		155,528	11	167,301	12	435,389	32	130,553	10	676		198			
9	303	19,923	4	1,348	0	6,271	1	129,907	26	161	0	49,168	10	62,617	12	36,698	7	171,734	34	24,031	5	79		114			
10	3	59										74										358	100				
Total Household Status		**208,047**		**3,664**		**52,973**		**452,084**		**809**		**49,267**		**220,148**		**205,149**		**619,407**		**154,584**		**1,356**		**4,752**		**12,016**	

This presents the Water Services Level in relation to **settlement category totals**

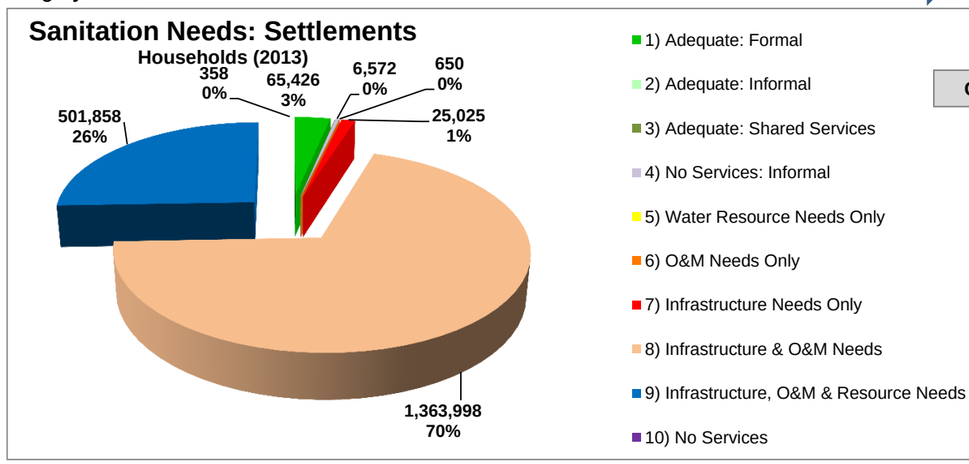
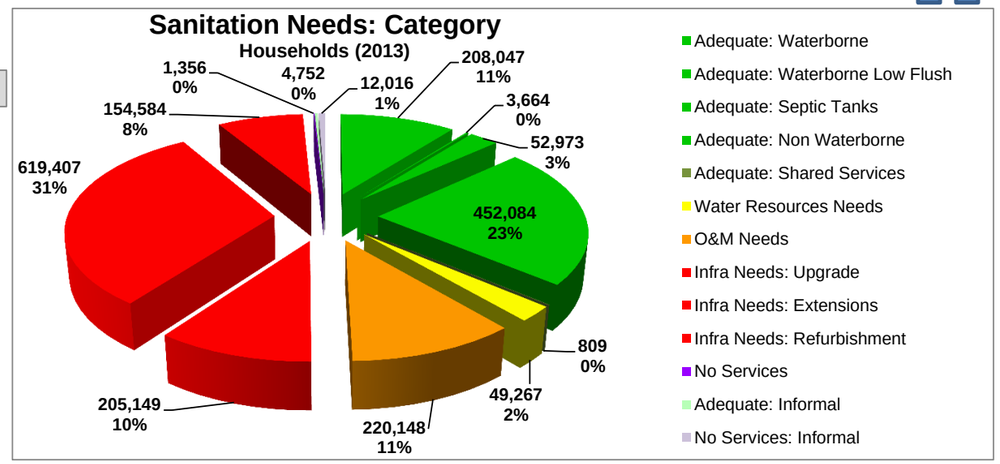


CHART VALUES: (HH, %)

This presents the Water Services Level in relation to the **need category totals**



1	Adequate	3	Adequate: Shared Services	5	Water Resources Needs **Only**	7	Infrastructure Needs **Only**	9	Infrastructure, O&M & Resource Needs
2	Adequate: Informal	4	No Services: Informal	6	O&M Needs **Only**	8	Infrastructure & O&M Needs	10	No Services

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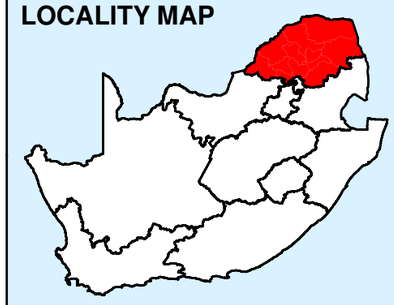
OVERALL SANITATION NEEDS CATEGORISATION

Planning Note:

Direct sanitation backlog (below RDP supply) affects 919 946 households (ie 60.4% of the population)

LOCALITY MAP



Settlement Categorisation

Formal

- 1) Adequate
- 3) Adequate: Shared Services
- 5) Water Resource Needs
- 6) O&M Needs
- 7) Infrastructure Needs
- 8) Infrastructure & O&M Needs
- 9) Infrastructure, O&M & Resource Needs
- 10) No Services

Informal

- 2) Adequate
- 4) No Services

BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries
- Water Scheme Areas
- Settlements

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TOPIC 2 - SERVICE LEVELS

02.6

METHODOLOGY TO DETERMINE TOTAL WATER DEMAND FOR LIMPOPO PROVINCE

TOPIC 2 – SERVICE LEVELS

02.7

STATEMENTS

A Water Supply and Demand Model was developed as part of this water master plan. It uses the latest information on water demand and water resources to calculate the water balance at 2015, with projections in 5 year intervals up to 2045. Continuous updates and refinement to the Demand Model is required.

Issues affecting the water supply model are inter alia:

- Effective management of water resources and consumption requires the measurement of water volumes from the sources to the user, modelling therefore has to rely on theoretical demands.
- Water resource abstraction information is limited
- Water scheme consumption information is also limited
- Limited systems for payment of water services lead to uncontrolled usage and wastage of water in all sectors – this aspect is not modelled.
- Free basic water services could result in households using more than the free basic amount (if the water is readily available).
- Non formal reticulation systems are difficult to control and higher water use is expected in such instances than what model parameters allow
- Several water scheme areas reflect very high water use per capita which indicates unacceptable wastage of water resources.
- The Water Demand Model does not provide for wastage of water. It assumes efficient water utilisation.

DOMESTIC AND BUSINESS

The Water Demand Model should be used as a first order calculation to establish the potable water demand required by WSAs. It uses the following variables to calculate water demand in 5 year intervals as from 2015 to 2045:

- Demographics: planning population derived from the Census 2011 and DWS satellite images with annual population growth percentages to project the population for each settlement for 2015 to 2045 in five year intervals.
- Service Levels: Derived from Census and DWS for 2015 with anticipated water use patterns/service level enhancements to achieve national and provincial development objectives.
- Water Demand: The Demand Model calculations include water required by indigent households, non-indigent users, institutional users (schools, health facilities etc.), business and industrial users and provision for water losses.

AGRICULTURE AND FORESTRY

Information for the irrigated and forestry areas (158 530 and 44 966 ha respectively) were obtained from the registration and verification of all water users in Limpopo. For irrigation an average of 8 000 m3/ha/a was used to calculate the water demand for 2015 and it was escalated by 0.5%per annum to obtain the water demand by 2045. Provision was also made for growth in hectares to 200 000 by 2019.

The forestry water demand of 2015 was obtained from the WARMS system. Growth of 0.1% per annum was allowed to project the 2045 water demand for forestry.

The number of livestock was obtained from the 2010 livestock census conducted by the Limpopo Dept. of Agriculture. Game counts for the Kruger National Park and on game farms and reserves were obtained from internet surveys and calculated from reports on the carrying capacity of the different veld types in the Province. Individual consumption rates were allocated to different species in order to calculate the water demand. The 2010 figure was increased by 0.1% per annum to project the water demand for 2045.

MINING AND INDUSTRY

The current water demand for mining was obtained from the annual reports of mines. This water demand was projected in 5 year intervals from 2015 to 2045 on the basis of company announcements and provincial growth point plans .
The 2015 water demand for manufacturing was based on actual consumption in Polokwane as a reference because this number is known. Consumption in other municipalities was estimated from the relative sizes of this sector and increased by 1% per annum to obtain the water demand for 2045.

STRATEGIC ANALYSIS

Metering of water flows at strategic points in the water supply chain will significantly improve the management of water requirements and the balancing of these requirements with available water resources. Appropriate user changes for water users who can afford to pay will also improve the efficiency of water consumption.

ACTIONS

1. The water demand model as a comprehensive tool should be used and refined by way of empirical information on water requirement, resources and losses.

2. Establish a mechanism to improve inputs to the Demand Model. For Example: the 8 000m³/ha/a as an irrigation requirement is an “industry” average which can be refined to reflect actual crop type requirements (calculated by SAPWAT).

3. DWS and WSAs can use the Demand Model to monitor and regulate water abstraction, distribution and use.

4. Investigate the viability to expand the model to function in a Geographical Information System (GIS) environment which is available to all water service planners, WSAs and water service regulators

5. Use the modelling information to plan and manage water resources and use with sufficient planning lead times to water availability.

6. Plan, insert and monitor bulk meters at strategic places to improve the management of water services.

7. Design and introduce an appropriate water pricing mechanism to improve the efficiency of water consumption.

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TOTAL WATER DEMAND

DOMESTIC AND BUSINESS

DEMOGRAPHICS

- Finalised 2015 population using growth from Census 2011
- Project population growth in 5 year intervals up to 2045
- Cluster towns and villages to development zones

SERVICE LEVELS

Current 2015

- Analyse Census service levels
- Analyse DWS backlog figures
- Consolidate service levels
- Establish development zonal service levels

Future 2020 to 2045

- Develop service level growth scenarios per development zone (probable, low, high)
- Develop and project increase service level profile to allow increased living standards

WATER DEMAND CALCULATION

Current

Calculate community domestic-, associated-, business & industrial demand and losses

Future

By using service level projections, calculate water demand for 5 years intervals (2020 to 2045)

AGRICULTURE AND FORESTRY

DATA

Hectares taken from presentations at 2015 water summit

Irrigation and Forestry Area and water consumption was extrapolated by 0.5% and 0.1% per annum from 2015 to 2045.

SERVICE LEVELS

Current 2015

- Discuss and confirm areas under irrigation and average precipitation with agricultural organizations.
- Confirm forestry areas and water use from WARMS

Future 2020 to 2045

- Develop average service level growth rates for irrigation and forestry for sustainable food production and to allow for increased living standards

WATER DEMAND CALCULATION

Current

Calculate irrigation and forestry water demands

Future

By using service level projections, calculate water demand for 5 year intervals (2020 to 2045) to allow for sustainable development

MINING AND INDUSTRIAL

DATA

From annual reports from mines and development zones, the current water demand was established

SERVICE LEVELS

Current 2015

The water demand was determined from the annual reports

Future 2020 to 2045

The future water demand was forecast from the ore bodies available and the current water demand per ton of ore available for exploitation

WATER DEMAND CALCULATION

Current

The water demand was determined from the annual reports

Future

The water demand of developed and non-developed ore bodies was calculated and extrapolated from 2015 to 2045

TOTAL WATER DEMAND, EXCLUDING ECOLOGICAL RESERVE

Note: Mining requirements can vary drastically due to changes in commodity prices.

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STRATEGIC ANALYSIS

All water use sectors requires assurance of the appropriate portion of water supply to enable socio-economic stability, food security and economic growth.

TOPIC 2 – SERVICE LEVELS

DOMESTIC AND BUSINESS WATER DEMAND

STATEMENTS

Sufficient and reliable water services to the people of Limpopo Province is required to ensure social, health and economic stability and upliftment. It is the obligation of Government to ensure the stability in water services in all communities. WSAs are responsible for water services provision in the local government designated areas.

There are limited information sources availale to provide decision makers in Limpopo Province with relevant knowledge on water demand, water resources and water balance. This master plan developed a tool to determine the projected growth in water demand (for the next 30 years to 2045 and beyond) from population growth and the higher levels of services due to an expected increase in living standards. This Water Demand Model was developed to ensure that basic information is available to guide planners and decision makers for early identification of water services and water resources needs.

WATER DEMAND MODEL METHODOLOGY

The demand model was developed to calculate the water demand at community (settlement) level. The diverse nature of the development status and potential requires a comprehensive approach to establish water demand in the province. The model applies variables at all levels for all communities to calculate the probable water demand per community. The steps to calculate the demand are reflected below.

STEP 1: COMMUNITY CLASSIFICATION AND CLUSTERING

The development zones coincide with the community domestic service levels, economic developement and population growth as detailed in the demographic topic. Economic development activities of communities were identified and the communities were clustered in predefined zones as follows (in accordance with the Spatial Rationale of the Limpopo Provinvce):

1. Functional Towns (Ftown), Provicial Growth Points (PGP), District Growth Points (DGP), Municipal Growth Point (MGP)
2. Population Concentration Point (PCP)
3. Local Service Point (LSP)
4. Scattered and Rural communities (Scattered)
5. Farms (the areas ouside of any settlement, eg commercial farms)

STEP 2: EXISTING AND FUTURE WATER USE LEVELS

The census and DWS information was used to identify existing service levels and backlogs per community connection type. The future service level mix and growth thereof are based on the economic development status of the community. A service level matrix was developed to derive a realistic current water use as follows:

Unit usage of water per spatial rationale, for each different connection type:

SR Code	Usage (l/c/d)*					
	Interim	Street tap	Yard Connection Low	Yard Connection High	House Connection Low	House Connection High
1.Ftown	16	25	60	120	180	200
1.PGP	16	25	40	100	160	190
1.DGP	16	25	35	80	140	180
1.MGP	16	25	35	70	130	170
3.LSP	16	25	35	65	120	160
2.PCP	16	25	35	60	110	150
4&5.Scattered	16	25	35	55	90	140
Farms	16	25	35	45	150	200

These inputs are variable in the model and are used in the Probable, Low and High Scenarios

Spatial Rationale Categories

Category Number	Abbreviation	Full Name
1.	Ftown	Functional Town
1.	PGP	Provincial Growth Point
1.	DGP	District Growth Point
1.	MGP	Municipal Growth Point
2.	PCP	Population Concentration Point
3.	LSP	Local Services Point
4&5.	Scattered	Scattered
	Farms	Farms

STEP 3: ASSIGN REALISTIC GROWTH FOR ASSOCIATED NEEDS AND REDUCTION IN LOSSES

Model addresses a gradual growth in associated water demand to allow for higher levels of services at schools, health centres, clinics, hospitals and other community facilities.

Associated Demand and Water Losses, as a percentage of the water demand:

SRCode	% Associated Demand							% WaterLosses						
	2015	2020	2025	2030	2035	2040	2045	2015	2020	2025	2030	2035	2040	2045
1.Ftown	20%	21.0%	22.0%	22.5%	23.5%	24.5%	25%	20%	19.5%	18.5%	17.5%	17.0%	16.0%	15%
1.PGP	20%	21.0%	22.0%	22.5%	23.5%	24.5%	25%	25%	23.5%	22.0%	20.0%	18.5%	17.0%	15%
1.DGP	15%	17.0%	18.5%	20.0%	22.0%	23.5%	25%	20%	19.5%	18.5%	17.5%	17.0%	16.0%	15%
1.MGP	15%	17.0%	18.5%	20.0%	22.0%	23.5%	25%	20%	19.5%	18.5%	17.5%	17.0%	16.0%	15%
3.LSP	15%	16.0%	17.0%	17.5%	18.5%	19.5%	20%	20%	19.5%	18.5%	17.5%	17.0%	16.0%	15%
2.PCP	20%	19.5%	18.5%	17.5%	17.0%	16.0%	15%	15%	15.0%	15.0%	15.0%	15.0%	15.0%	15%
4&5.Scattered	20%	18.5%	17.0%	15.0%	13.5%	12.0%	10%	15%	14.5%	13.5%	12.5%	12.0%	11.0%	10%
Farms	10%	10.0%	10.0%	10.0%	10.0%	10.0%	10%	15%	14.5%	13.5%	12.5%	12.0%	11.0%	10%

DOMESTIC WATER DEMAND

STEP 4: INTERPOLATE SERVICE LEVEL PROFILE

A service level profile growth pattern was developed that incorporates an initial rapid growth (10 years) in service levels to eradicate the backlogs. From 2035, the growth in service levels was applied gradually. The economic clustering (Spatial Rationale) was used to project the service level profile scenarios.

SR Code	2015						2045					
	PROBABLE SERVICES LEVEL (Part of %)						PROBABLE SERVICES LEVEL (Part of %)					
	Interim	Street tap	Yard Connection Low	Yard Connection High	House Connection Low	House Connection High	Interim	Street tap	Yard Connection Low	Yard Connection High	House Connection Low	House Connection High
1.Ftown	0.88	2.38	0.00	11.07	0.00	85.68	0	0	0	5	15	80
1.PGP	8.20	10.35	2.76	5.12	18.39	55.18	0	5	5	10	20	60
1.DGP	12.87	24.58	5.17	15.50	14.66	27.22	0	5	5	15	25	50
1.MGP	17.56	25.19	15.02	22.54	5.90	13.78	0	5	10	15	20	50
3.LSP	22.87	23.23	5.57	31.57	8.38	8.38	0	5	5	30	30	30
2.PCP	29.73	23.64	8.91	26.72	6.60	4.40	0	10	15	30	30	15
4&5.Scattered	29.82	30.51	7.75	23.26	4.77	3.90	0	10	15	40	20	15
Farms	2.57	25.97	11.55	11.55	0.00	48.36	0	0	10	10	0	80

STEP 5: DEVELOP PROBABLE-, LOW- AND HIGH SERVICE LEVEL SCENARIOS FOR 2045

The projection of the realistic service level growth for 2045 was done for probable, low and high scenarios to provide a range of possible water demands for the communities in Limpopo Province.

SR Code	2045																	
	PROBABLE SCENARIO (Part of %)						LOW SCENARIO (Part of %)						HIGH SCENARIO (Part of %)					
	Interim	Street tap	Yard Connection Low	Yard Connection High	House Connection Low	House Connection High	Interim	Street tap	Yard Connection Low	Yard Connection High	House Connection Low	House Connection High	Interim	Street tap	Yard Connection Low	Yard Connection High	House Connection Low	House Connection High
1.Ftown	0	0	0	5	15	80	0	0	0	10	20	70	0	0	0	0	10	90
1.PGP	0	5	5	10	20	60	0	10	10	10	15	55	0	0	0	10	25	65
1.DGP	0	5	5	15	25	50	0	10	10	15	20	45	0	0	0	15	30	55
1.MGP	0	5	10	15	20	50	0	10	15	15	15	45	0	0	10	10	25	55
3.LSP	0	5	5	30	30	30	0	10	15	25	25	25	0	0	5	25	35	35
2.PCP	0	10	15	30	30	15	0	15	20	25	25	15	0	0	15	25	40	20
4&5.Scattered	0	10	15	40	20	15	0	15	30	25	20	10	0	0	15	35	30	20
Farms	0	0	10	10	0	80	0	0	15	5	5	75	0	0	5	5	5	85

The model was further refined to differentiate between low and high water demands within the service level category:

SR Code	Yard connection (%)		House connection (%)	
	Yard connection low	Yard connection high	House connection low	House connection high
1.Ftown	0	100	0	100
1.PGP	35	65	25	75
1.DGP	25	75	35	65
1.MGP	40	60	30	70
3.LSP	15	85	50	50
2.PCP	25	75	60	40
4&5.Scattered	25	75	55	45
Farms	50	50	0	100

To ensure accurate water demand for major towns, documented reports were used to calculate water demand in the model, by adding fixed values to represent the business use demand.

DOMESTIC AND BUSINESS WATER DEMAND

TOPIC 2 – SERVICE LEVELS

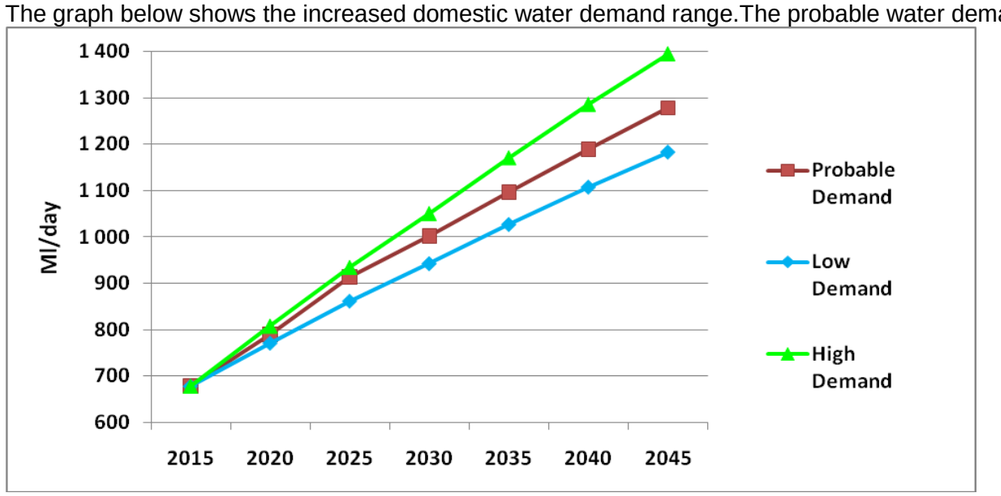
WATER DEMAND PROJECTION

The status quo and projections resulted in water demand growth per community. The table below is a summary of water demand scenarios per District and Local Municipality.

		PROBABLE WATER DEMAND SCENARIO (GAADD kl/d)							LOW WATER DEMAND SCENARIO (GAADD kl/d)							HIGH WATER DEMAND SCENARIO (GAADD kl/d)						
DM Name	LM Name	2015	2020	2025	2030	2035	2040	2045	2015	2020	2025	2030	2035	2040	2045	2015	2020	2025	2030	2035	2040	2045
Capricorn	Aganang	9 123	9 536	11 418	11 548	11 626	11 550	11 315	9 123	9 339	9 517	9 657	9 857	10 013	10 139	9 123	9 839	10 503	11 111	11 775	12 375	12 924
Capricorn	Blouberg	12 521	14 383	18 692	19 847	20 974	21 866	22 520	12 521	13 953	15 320	16 601	17 974	19 253	20 489	12 521	14 727	16 854	18 879	21 001	23 006	24 945
Capricorn	Lepelle-Nkumpi	27 059	31 521	35 292	37 464	39 549	41 268	42 755	27 059	29 708	32 234	34 317	36 475	38 435	40 311	27 059	30 739	34 286	37 374	40 548	43 495	46 343
Capricorn	Molemole	8 836	10 084	13 068	14 017	14 929	15 662	16 228	8 836	9 924	10 974	11 970	13 030	14 027	15 012	8 836	10 407	11 937	13 408	14 949	16 416	17 867
Capricorn	Polokwane	137 018	161 404	171 857	198 064	228 292	261 813	297 212	137 018	161 965	186 576	208 762	231 705	254 048	274 797	137 018	170 043	202 655	232 637	263 431	293 516	321 671
Mopani	Ba-Phalaborwa	32 445	37 832	37 143	41 860	46 855	51 719	56 456	32 445	36 295	40 006	43 242	46 646	49 804	52 877	32 445	37 538	42 493	46 970	51 647	56 058	60 378
Mopani	Greater Giyani	21 974	25 286	31 634	33 304	35 011	36 372	37 431	21 974	24 248	26 456	28 379	30 436	32 379	34 171	21 974	25 449	28 838	31 907	35 113	38 173	41 035
Mopani	Greater Letaba	19 058	21 387	26 547	27 806	28 970	29 766	30 218	19 058	20 657	22 160	23 562	25 075	26 462	27 800	19 058	21 675	24 183	26 572	29 081	31 436	33 720
Mopani	Greater Tzaneen	42 868	50 183	59 348	63 691	67 932	71 513	74 407	42 868	47 825	52 585	56 821	61 262	65 398	69 379	42 868	49 827	56 570	62 763	69 186	75 259	81 141
Mopani	Maruleng	8 989	9 863	12 083	12 779	13 440	13 951	14 318	8 989	9 832	10 632	11 317	12 041	12 700	13 328	8 989	10 234	11 429	12 500	13 610	14 643	15 632
Sekhukhune	Elias Motsoaledi	21 590	25 564	32 947	36 480	40 130	43 528	46 649	21 590	25 335	28 977	32 508	36 191	39 708	43 164	21 590	26 881	32 051	37 089	42 293	47 292	52 207
Sekhukhune	Ephraim Mogale	11 490	12 176	13 858	14 535	15 156	15 586	15 834	11 490	12 088	12 639	13 147	13 715	14 225	14 710	11 490	12 618	13 691	14 710	15 791	16 797	17 767
Sekhukhune	Fetakgomo	6 604	7 666	10 447	11 292	12 122	12 810	13 336	6 604	7 563	8 484	9 361	10 290	11 166	12 009	6 604	8 044	9 440	10 781	12 179	13 510	14 795
Sekhukhune	Greater Tubatse	28 316	35 751	49 105	56 030	63 765	71 870	80 230	28 316	36 442	44 371	51 827	59 432	66 706	73 713	28 316	39 214	49 861	59 966	70 220	80 059	89 542
Sekhukhune	Makhuduthamaga	19 578	23 148	32 471	35 363	38 323	40 970	43 300	19 578	23 113	26 549	29 814	33 237	36 490	39 683	19 578	24 512	29 332	33 960	38 763	43 358	47 867
Vhembe	Makhado	55 991	64 164	74 644	79 182	83 502	87 013	89 601	55 991	61 487	66 765	71 140	75 699	79 901	83 802	55 991	63 919	71 581	78 271	85 145	91 586	97 638
Vhembe	Musina	18 682	23 231	27 888	33 829	38 736	44 085	49 559	18 682	23 533	28 332	32 778	37 335	41 815	45 976	18 682	24 891	31 036	36 789	42 661	48 442	53 840
Vhembe	Mutale	7 365	8 817	11 701	12 415	13 103	13 662	14 076	7 365	8 467	9 524	10 430	11 351	12 202	12 993	7 365	8 925	10 425	11 757	13 101	14 355	15 529
Vhembe	Thulamela	64 495	76 607	93 664	100 926	108 608	115 617	121 677	64 495	73 602	82 459	90 156	98 135	105 679	112 723	64 495	77 020	89 237	100 200	111 456	122 185	132 284
Waterberg	Bela-Bela	17 860	20 177	19 429	20 868	22 333	23 672	24 799	17 860	18 822	19 764	20 526	21 395	22 233	22 930	17 860	19 489	21 093	22 499	24 018	25 499	26 810
Waterberg	Lephalale	17 684	22 457	25 755	30 886	37 226	43 707	50 747	17 684	22 668	27 587	32 285	37 127	41 899	46 353	17 684	24 274	30 782	37 026	43 421	49 727	55 642
Waterberg	Modimolle	15 160	15 999	15 036	15 541	16 326	16 969	17 573	15 160	15 354	15 530	15 619	15 815	15 989	16 075	15 160	15 873	16 564	17 158	17 863	18 542	19 113
Waterberg	Mogalakwena	49 642	55 261	61 480	64 511	67 614	70 204	72 485	49 642	53 382	57 022	59 748	62 654	65 356	67 713	49 642	55 167	60 559	64 974	69 566	73 909	77 819
Waterberg	Mookgophong	8 029	9 046	10 362	10 890	11 487	12 007	12 515	8 029	8 722	9 402	9 974	10 585	11 175	11 698	8 029	9 021	9 998	10 859	11 761	12 639	13 436
Waterberg	Thabazimbi	15 946	17 749	17 436	18 783	20 230	21 585	22 737	15 946	16 871	17 749	18 520	19 399	20 222	20 942	15 946	17 518	19 037	20 433	21 941	23 382	24 696
	TOTAL	**678 322**	**789 291**	**913 307**	**1 001 910**	**1 096 239**	**1 188 767**	**1 277 978**	**678 322**	**771 196**	**861 613**	**942 463**	**1 026 861**	**1 107 286**	**1 182 789**	**678 322**	**807 845**	**934 432**	**1 050 592**	**1 170 519**	**1 285 661**	**1 394 638**

GRAPH FOR GROWTH IN DOMESTIC AND BUSINESS WATER DEMAND

The graph below shows the increased domestic water demand range.The probable water demand increases from 678 Ml/day in 2015 to 1 278 Ml/day in 2045, which projects double water demand in the next 30 years



STRATEGIC ANALYSIS

- The Demand Model allows for increase in water demand for social and economic upliftment.
- The Demand Model does not make allowance for wastage of water. WC&WDM measures should be put in place to prevent uncontrolled use and wastage of water.
- No provision is made in the domestic demand model for agriculture and livestock - separate infrastructure systems are to be provided for this.
- The model is a comprehensive tool which should be refined (these inputs are of a first order magnitude only).

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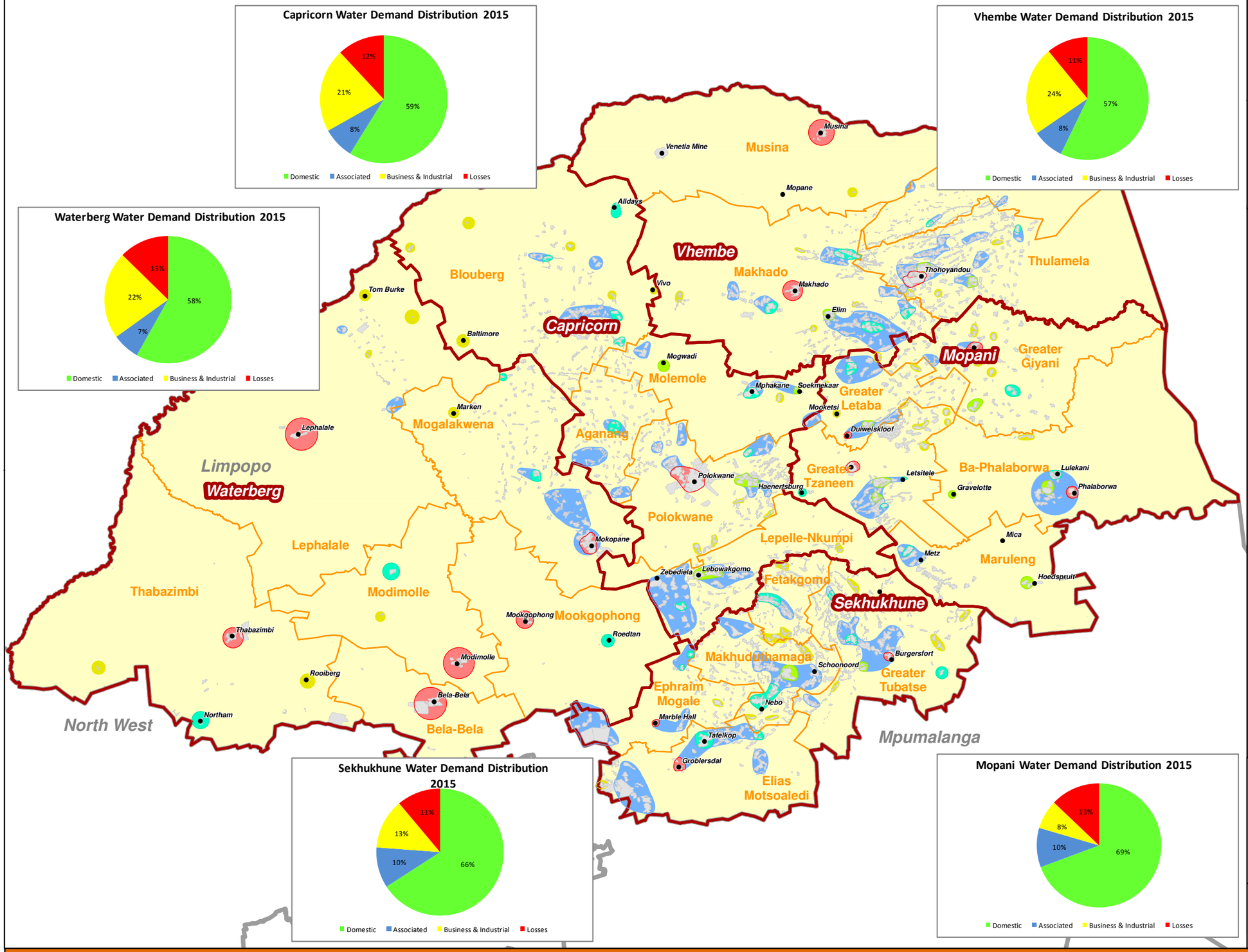
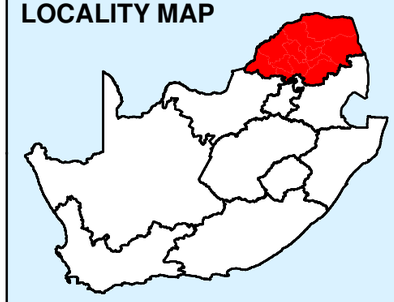
DOMESTIC & BUSINESS : WATER DEMAND 2015



LOCALITY MAP



Legend

Spatial Rationale Development Categories

- Provincial Growth Point
- District Growth Point
- Municipal Growth Point
- Population Concentration Point
- Local Services Point

BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries
- Settlements

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TOPIC 2 - SERVICE LEVELS

02.12

DOMESTIC AND BUSINESS WATER DEMAND

TOPIC 2 – SERVICE LEVELS

02.13

STATEMENTS

The aim of the Demand Model is to provide an early warning decision making tool for water demand in the Limpopo Province. Several studies have been conducted over the years but were not combined and summarised to provide a total Limpopo Province perspective.

There are many variable factors which influence water demand on a community level. An effort was made to develop the model to account for these variables. The model is a planning tool to calculate the magnitude of water demand and is not to replace engineering design calculations which are required in technical design reports. The demand should be updated once specific community design demands are available.

The water for domestic and business water demand is for potable water from Water Treatment Works or ground water.

Wastage of water and livestock water demands are not included in the domestic demand calculations. Communities should be encouraged to conserve every drop of potable water and not allow livestock to drink from the municipal water supply.

STATISTICS

It is reported in the WRC Report "The State of Non-Revenue Water in South Africa" that 37% of revenue potable water is lost through leaks and behaviour.

It further states that:

"*category A municipalities (metros) achieved non-revenue water levels of around 34,3% compared to the water losses of 72,5% (on average) achieved by B4 (small) municipalities. Non-revenue water levels of mid-sized municipalities range from 30.5% to 41.3% on average".*

The non-revenue water in Limpopo Province is expected to be more than 72.5% which is mainly ascribed to lack of systems for community water supply revenue collection.

The table below reflects the existing and future water use in the economic development zones.

	Economic Development Zone	2015					2045					Population Change (%)	Water Demand Increase (%)
		Population	Portion Population in Zone (%)	Water Demand (kl/d)	Water Use (%)	Water Use (l/capita/ day)	Population	Population in Zone (%)	Water Demand (kl/d)	Water Use (%)	Water Use (l/capita/ day)		
1	Functional Towns, Provincial Growth points, District Growth Points, Municipal Growth Points	1 695 722	28%	383 668	57%	226	3 055 218	43%	798 958	63%	262	80%	108%
2.	Population Concentration Points	1 470 019	25%	103 289	15%	70	1 629 588	23%	206 002	16%	126	11%	99%
3.	Local Service Points	295 128	5%	21 822	3%	74	280 115	4%	44 760	4%	160	-5%	105%
4& 5	Rural Scattered Areas	2 296 732	38%	131 094	19%	57	1 989 617	28%	187 494	15%	94	-13%	43%
	Farms	240 047	4%	38 429	6%	160	197 687	3%	40 763	3%	206	-18%	6%
	Total	**5 997 648**	100%	**678 302**	100%	113	**7 152 225**	100%	**1 277 977**	100%	179	19%	88%

Note: Unit water use reflected as l/cap/day includes businesses, industries, associated and losses.

STRATEGIC ANALYSIS

- An increase of 88% in water demand (687 302 kl/day to 1 277 977 kl/day) is expected from 2015 to 2045 due to mainly higher service levels and a population increase of 19%.
- The efficient use of water resources with proper regulation and control are needed to meet the demand.
- The retail cost of potable water (at a 2015 average rate of 7.82/kl) will increase from R 1 936 M/year in 2015 to R3 650 M/year in 2045.

ACTIONS

1. WSAs should take responsibility to plan, organise, lead and control the water sector.

2. The effective management of water services requires the measurement of water volumes from source to the tap.

3. The Water Demand Model is an important planning tool which should be further developed and maintained to ensure the integrity of information for water demand, water resources and the water balance.

4. Accurate metering of water used needs to be made a priority at WSA's so that historic records can be used to calibrate the theoretical models.

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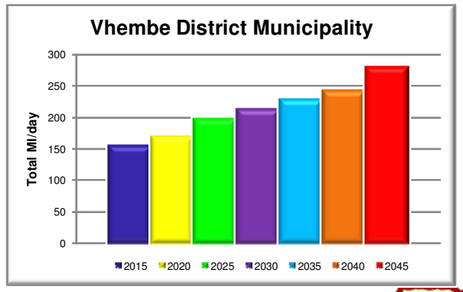
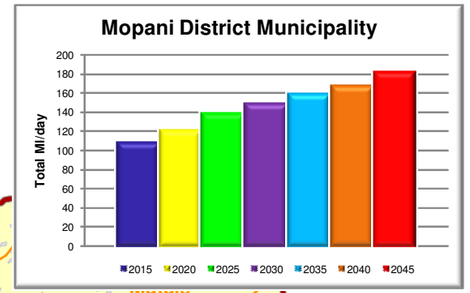
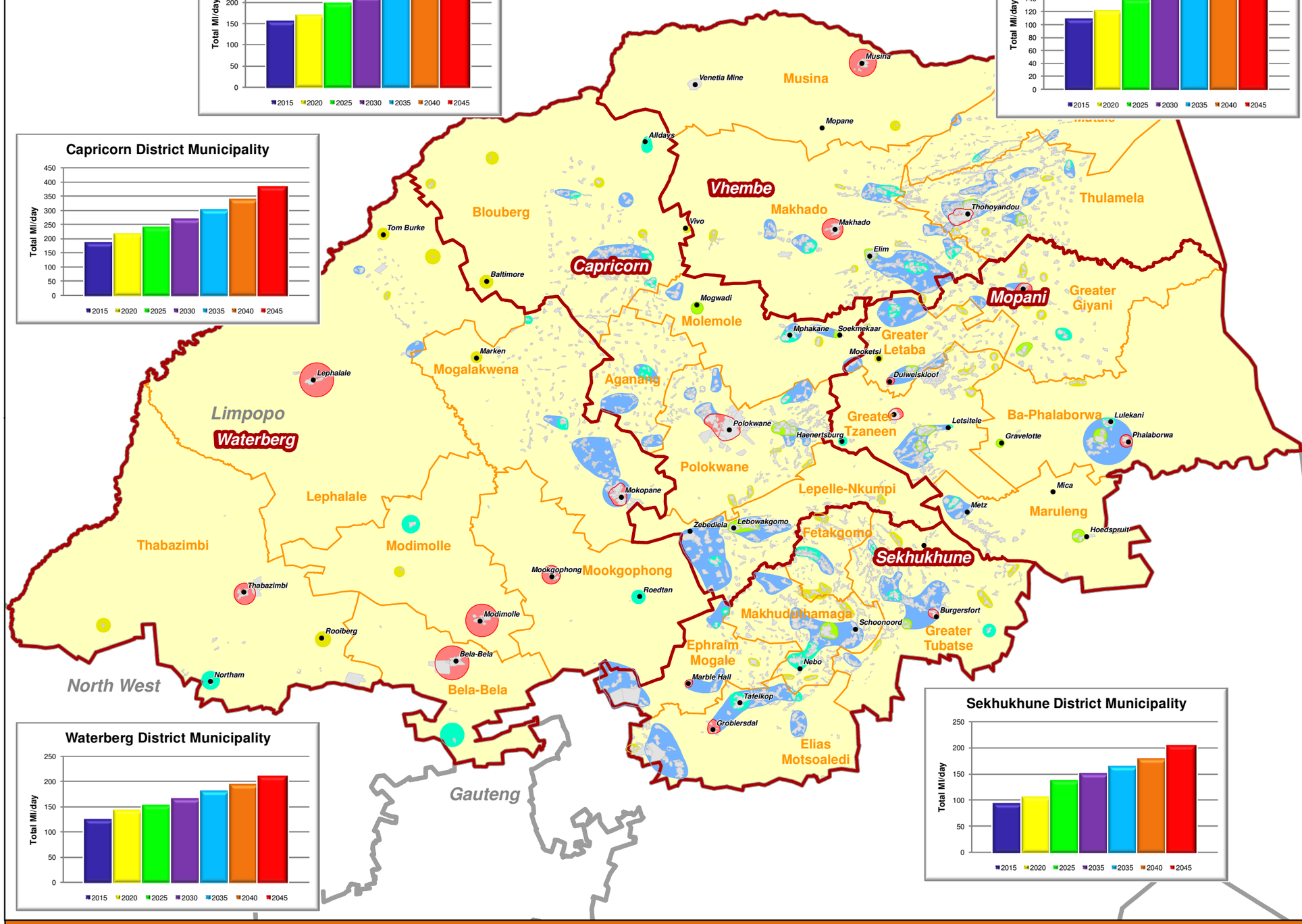
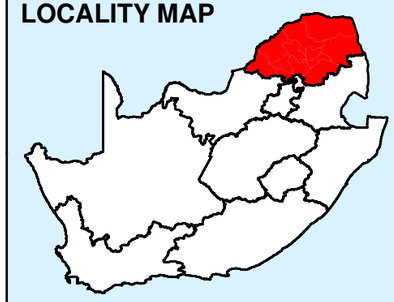
DOMESTIC & BUSINESS : WATER DEMAND GROWTH







LOCALITY MAP



Legend

Spatial Rationale Development Categories

- Provincial Growth Point
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BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
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TOPIC 2 - SERVICE LEVELS

02.14

AGRICULTURE: IRRIGATION WATER REQUIREMENTS

TOPIC 2 – WATER REQUIREMENTS

02.15

STATEMENTS

Limpopo Province has four organised agricultural structures representing farmers (commercial and non-commercial). The structures are Agri Limpopo, TLU SA Noord, AFASA and NAFU. A large number of farmers are not members of these structures. These groups were consulted to obtain the information required for the water master plan. A questionnaire was drafted and sent to each structure, which unfortunately resulted in very little feedback.
The Department of Water and Sanitation (DWS) is a source of information on legal water usage in agriculture as this was captured during the registration and verification process for water use licensing during the past 12 years.
Farmers anticipate that the current drought is in its beginning phases if the current practises are maintained. A continued drought will lead to job losses on farms and in towns. More water is needed to achieve the same production due to climate change.
A few of the major aspects affecting efficient use of water for irrigation are:

- DWS is implementing payment for water abstraction, but farmers complain that they do not receive any service from DWS in exchange for taxes paid. For example maintenance of canals is not attended to.
- The National Water Act is not seen in favourable light by the commercial irrigators – this is something that should receive attention.
- Land restitution is slow because there are not sufficient funds allocated to buy farms. Farmers are willing to sell. DAFF is not supporting new farmers with funds, knowledge and in field training. The success rate of new farmers is about 2%. Land restitution and its efficacy will have an influence on the water requirements.
- Water scarcity will force farmers to change from irrigation and cattle farming to dry land and game farming.
- Water use reduction methods should be evaluated: Crop production under shade nets to assist in water saving by keeping plants cooler. Drip irrigation that uses 3 x less than flood irrigation.

More food needs to be produced to feed the growing population. This can be achieved by more effective farming and irrigation practices and not necessarily by adding more hectares under irrigation. Dry land cultivation on a commercial basis is only possible on the Springbok flats. Irrigation farming is predominant in the province. Limpopo Province has diverse soils, which vary in productivity and sustainability for irrigation. The soils are also vulnerable to various forms of degradation (physical, chemical and biological) and hence appropriate management strategies are critical if productivity of the soils is to be improved or at least sustained.
All available water for irrigation is not being utilised effectively e.g. Nandoni dam allocation for 1100 ha has been available since 2004 and not uitilized, upstream ineffective use from Nzhelele Dam affects downstream availability, etc.

STATISTICS

The total land area of the province is 11 960 600 hectares of which 88.2 % (10 548 290 ha) constitutes farmland. Of the total farmland, 14.7% constitutes potential arable land in developing agriculture in the former homelands and 14% commercial agriculture.

Irrigated Area from Limpopo Dept of Agriculture 2015 and calculated water demand for 2015:

District Municipality	Irrigated Area (ha)	Main Crops Under Irrigation	2015 Water Demand (8 000 m³/ha/a) Mm³/a
Capricorn	12 185	Citrus, Potato, Pastures, Maize, Vegetables	97.5
Mopani	44 456	Citrus, Subtropical fruit, Tomatoes, Vegetables	355.6
Sekhukhune	31 338	Citrus, Grapes, Maize, Grains, Vegetables	250.7
Vhembe	24 616	Nuts, Citrus, Subtropical fruit, Tomatoes, Vegetables	196.9
Waterberg	45 937	Citrus, Grapes, Grains, Vegetables	367.5
Total	**158 530**		**1 268.3**

EXPLANATORY NOTES

The irrigated area in Limpopo was obtained from a presentation done by the Department of Agriculture Forestry and Fisheries (DAFF) during the water summit of 2015. DAFF planned a further expansion of 41 470 ha for irrigation in the province by 2019. To calculate the water requirements for irrigation with the additional 41 468 ha, the 2015 water demand calculated at 8 000 m³/ha/a was increased by 0.5% per annum up to 2045.

STRATEGIC ANALYSIS

The existing irrigated area of 158 530 ha was planned to have increased to 200 000 ha by 2019 according to the National Development Plan (i.e. a 26% increase). The existing irrigation water requirement of 8 000 m3/ha/annum with a growth of 0.5% per year after 2019 will increase to 1 472.95 Mm³ /a by 2045. To put this into context, this is equivalent to the volume or capacity of just over 4 De Hoop Dams or the yield of 23 De Hoop Dams by 2045.
With more scientific farming practices and more efficient use of water, it is expected that agriculture's contribution to Limpopo's GDP can increase. Agriculture is creating many jobs and income for local communities. The province needs effective and productive farms for the much needed food production.

ACTIONS

1. A strategy will have to be agreed on how to gather information from farmers and the interpretation thereof to set a solid foundation of information.
2. Targeted knowledgeable people will have to assist in doing forecasts on future water use.
3. Government should attend to the maintenance of water infrastructure e.g. maintenance of canals and dams.
4. More water sources have to be developed to allow for the higher water demand because of population growth.
5. Reduce use of water for flood irrigation.
6. DAFF should support new farmers with funds for production material, skills and equipment.
7. Dilapidated irrigation refurbished with existing water allocations should be under the guidance of experienced, knowledgeable officials.
8. Identify the irrigation schemes to form the target of 200 000 ha for Limpopo as per the National Development Plan that was to be put back into production and under irrigation by 2019.
9. The downstream activities like seed production and processing and establishment of nurseries as part of input supply should be developed.
10. Upstream activities or value adding activities such as agro-processing facilities, pack houses, community milling facilities, feed mills, and feedlots should be developed.
11. Appropriate management strategies are critical if productivity of the soils is to be improved and sustained
12. Education of the farming community on water saving irrigation methods is imperative.
13. All water users should observe the rules and only use what is legally allocated to them.
14. A viability study on agriculture should be conducted to determine crop suitability for different areas.
15. Labour based agriculture should be implemented and labour relations should be addressed
16. Partnering of up-coming farmers with established farmers to have knowledge transfer at grass roots level
17. Use of methods or specific cultivators to kerb evapo-transpiration, eg tunnels and shade nets.

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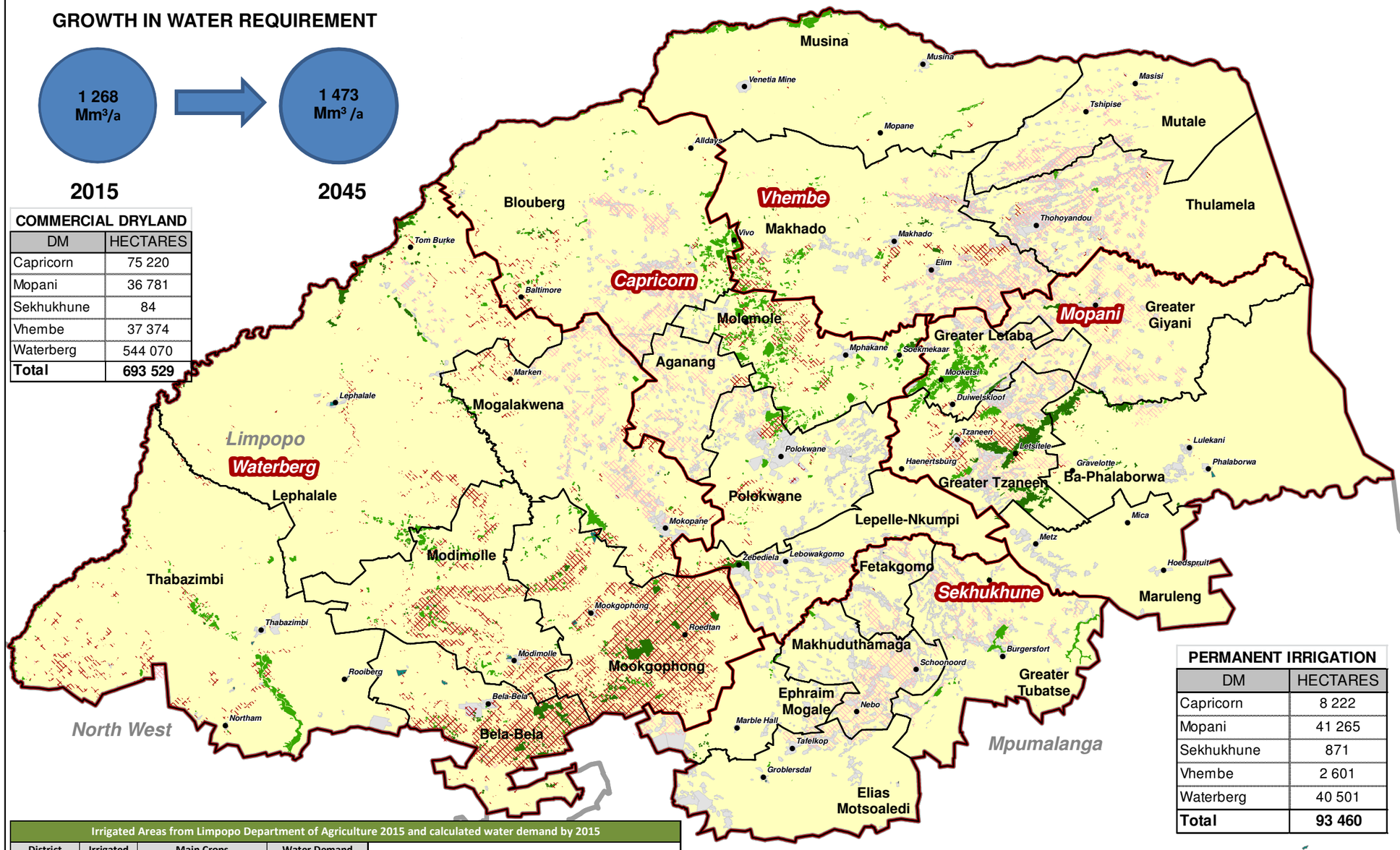
WATER REQUIREMENTS: IRRIGATION

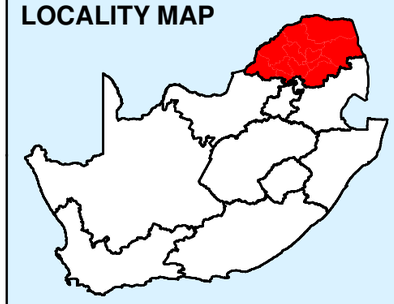
GROWTH IN WATER REQUIREMENT

2015 2045

COMMERCIAL DRYLAND	
DM	HECTARES
Capricorn	75 220
Mopani	36 781
Sekhukhune	84
Vhembe	37 374
Waterberg	544 070
Total	**693 529**



LOCALITY MAP



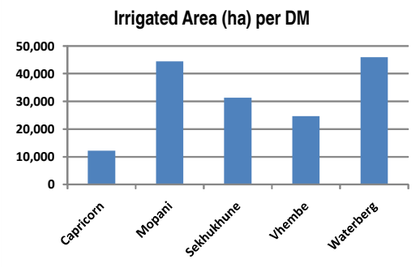
Legend

- Golfcourses
- Permanent Irrigation
- Commercial Irrigation
- Subsistance Farming
- Commercial Dryland

PERMANENT IRRIGATION	
DM	HECTARES
Capricorn	8 222
Mopani	41 265
Sekhukhune	871
Vhembe	2 601
Waterberg	40 501
Total	**93 460**

Irrigated Areas from Limpopo Department of Agriculture 2015 and calculated water demand by 2015

District Municipality	Irrigated Area (ha)	Main Crops	Water Demand (0.008 million m³/ha/a by 2015)
Capricorn	12,185	Citrus, Potato, Pastures, Maize & Vegetables	97.5
Mopani	44,456	Citrus, Subtropical Fruit, Tomatoes & Vegetables	355.6
Sekhukhune	31,338	Citrus, Grapes, Maize, Grains & Vegetables	250.7
Vhembe	24,616	Nuts, Citrus, Subtropical Fruit, Tomatoes & Vegetables	196.9
Waterberg	45,937	Citrus, Grapes, Grains & Vegetables	367.5
Total	**158,530**		**1268.3**



SUBSISTANCE FARMING	
DM	HECTARES
Capricorn	183 634
Mopani	181 020
Sekhukhune	150 035
Vhembe	414 050
Waterberg	115 976
Total	**1 044 715**

GOLFCOURSES	
DM	HECTARES
Capricorn	62
Mopani	198
Sekhukhune	100
Waterberg	2 595
Total	**2 955**

COMMERCIAL IRRIGATION	
DM	HECTARES
Capricorn	55 494
Mopani	32 542
Sekhukhune	9 201
Vhembe	23 091
Waterberg	51 091
Total	**171 419**

BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries
- Settlements

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MINING AND INDUSTRIAL WATER REQUIREMENTS

TOPIC 2 – WATER REQUIREMENTS

02.17

STATEMENTS

Limpopo Province has an abundance of minerals that have been developed or can still be developed. The following commodities are available: Platinum, Silicon, Copper, Phosphate, Chrome, Diamonds, Coal and other minerals. The larger recent developments for mining are in Mogalakwena, Lephalale, Ba-Phalaborwa and Tubatse Local Municipalities. The result of these minerals generates downstream use developments e.g. the power generation plants in Lephalale.

Processing facilities are developed and are adding value to the raw material. Water availability is important in the mining process as well as in the processing plants such as smelters and power stations.

Water requirements for Industry, Commerce, Offices & Other were determined for each local municipality in the Province and estimated up to 2045.

STATISTICS

Estimated Water Requirements for the Mining Sector in Limpopo Province:

District	Local Municipality	Commodity	Mining Sector Water Demand (Mm^3/a)				
			2015	2020	2025	2030	2045
Capricorn	Polokwane	Platinum Smelter	0.8	0.8	1	1.5	2
Capricorn	Polokwane	Silicon & Other	0.5	1	1.5	1.5	2
Capricorn	Aganang	Platinum	0	0	0	5	5
Mopani	Phalaborwa	Copper & Phosphate	20	20	20	20	20
Sekhukhune	Tubatse	Platinum & Chrome	17	24	34	40	46
Sekhukhune	Fetakgomo	Platinum	6	6	6	6	6
Vhembe	Musina	Diamonds	5	5	5	5	5
Vhembe	Makhado & Musina	Coal	0	7	14	18	18
Waterberg	Lephalale	Coal & Power Stations	30	70	100	120	150
Waterberg	Thabazimbi	Platinum	9	10	11	12	13
Waterberg	Mogalakwena	Platinum & Other	10	16	20	24	30
Total			**98.3**	**159.8**	**212.5**	**253**	**297**

Estimated Water Requirements for the Industrial, Commercial and Institutional Sectors (schools/hospitals/clinics) in Limpopo Province were calculated with a growth of 1% per year:

Commodity	Industrial, Commercial and Institutional Sectors Water Demand (Mm^3/a)				
	2015	2020	2025	2030	2045
Industry	36.342	44.254	61.576	64.787	68.168
Institutional	12.90	14.24	15.73	17.36	19.17
Total	**49.242**	**58.494**	**77.306**	**82.417**	**87.338**

EXPLANATORY NOTES

Sources of Information utilized to estimate water requirements in the mining sector were:
1. Company Annual Reports
2. Database from Limpopo River North Reconciliation Study
3. Infrastructure Master Planning for Lephalale
4. Socio-economic Assessment of the Mooihoek Water Scheme, Oct 2014
5. Socio-economic Context for Proposed Ebenezer and Olifantspoort Schemes, Aug 2014
6. Longer term projections by Glen Steyn & Associates.

Notes on estimating the water requirements for the Industrial, Commercial and Institutional Sectors in Limpopo:
1. All LMs are relative to Polokwane, which was determined on the basis of a survey
2. Relation to Polokwane was derived from relative sector sizes according to Quantec
3. Smelters and power stations are included under mining even though their Standard Industrial Classification (SIC) is industrial

ACTIONS

1. Once the mine shafts in the Mogalakwena area reach the end of their production, these shafts can be filled by using a bulk raw water system to artificially recharge the groundwater for the area.

2. Effluent from mining operations as well as from industries has to be treated to avoid pollution of the underground water and rivers. Effective procedures and management thereof should be implemented.

3. Mine dumps should be protected against erosion thus environmental rehabilitation practices should be implemented.

4. The poor quality of water downstream of sewerage purification plants should be improved by improving the operation of the plants. This does require experienced operators for the sewerage purification plants.

5. The mining potential and the required water requirements needed to develop the mines and the processing of raw material needs to be determined more accurately.

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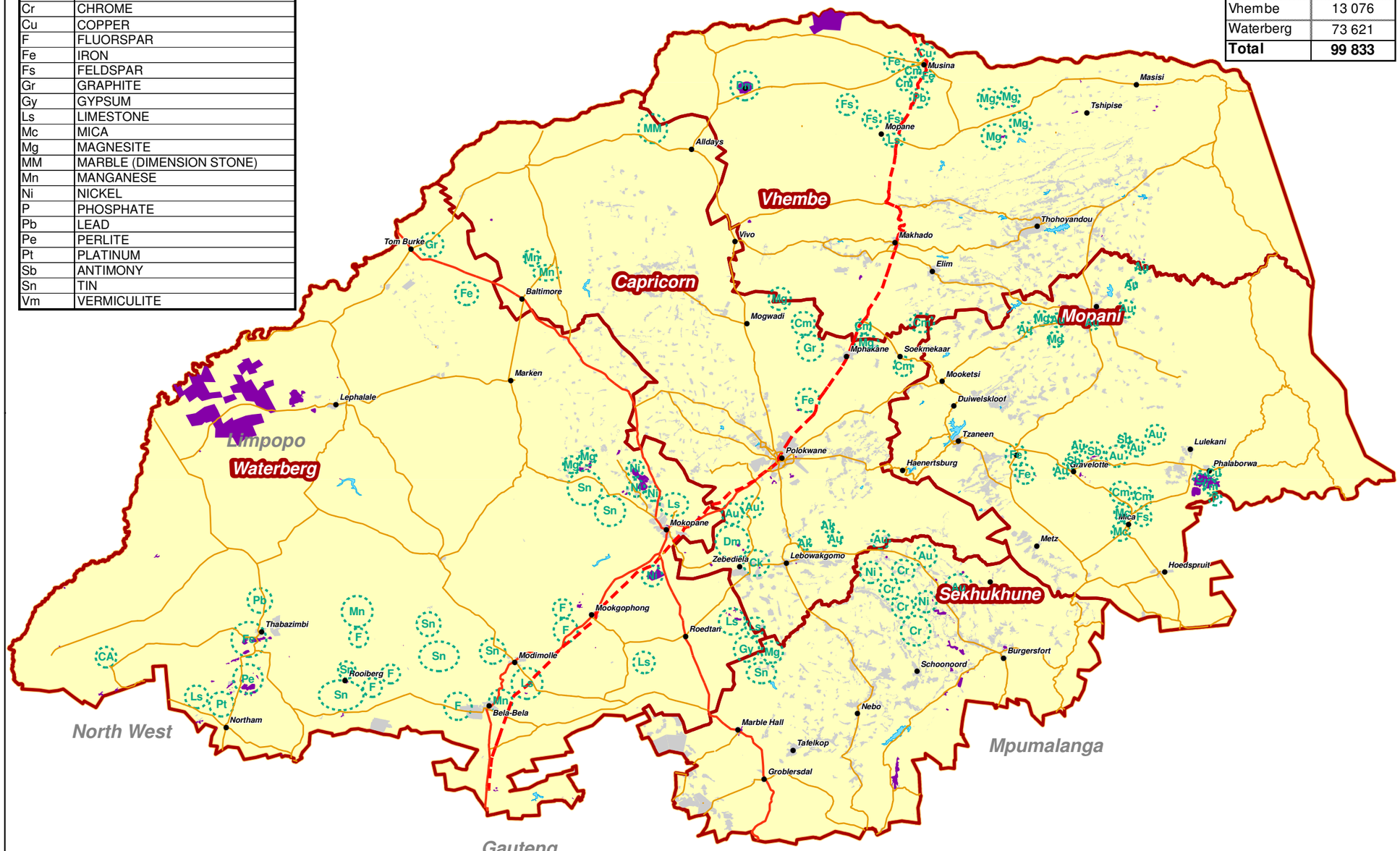
LIMPOPO PROVINCE MINING WATER REQUIREMENTS

MINERAL INDEX	
Ak	CROCIDOLITE (ASBESTOS)
Au	GOLD
C	COAL
CA	ATTAPULGITE/SEPIOLITE (CLAY)
Ck	KAOLIN (CLAY)
Cm	CORUNDUM
Cr	CHROME
Cu	COPPER
F	FLUORSPAR
Fe	IRON
Fs	FELDSPAR
Gr	GRAPHITE
Gy	GYPSUM
Ls	LIMESTONE
Mc	MICA
Mg	MAGNESITE
MM	MARBLE (DIMENSION STONE)
Mn	MANGANESE
Ni	NICKEL
P	PHOSPHATE
Pb	LEAD
Pe	PERLITE
Pt	PLATINUM
Sb	ANTIMONY
Sn	TIN
Vm	VERMICULITE

MINES	
DM	HECTARES
Capricorn	1 374
Mopani	6 086
Sekhukhune	5 676
Vhembe	13 076
Waterberg	73 621
Total	**99 833**



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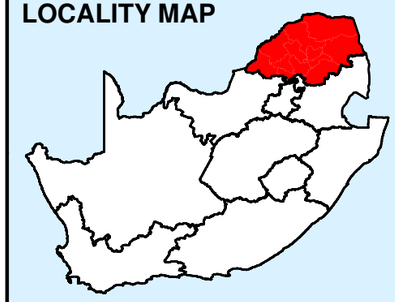
LOCALITY MAP



Legend

- Main Towns

Limpopo Roads

- Freeway
- National
- Main
- Dams
- Mines
- Mineral Potential

BASE MAP LEGEND

- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries
- Settlements

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TOPIC 2 - SERVICE LEVELS

02.18

LIVESTOCK AND GAME WATER REQUIREMENTS

TOPIC 2 – WATER REQUIREMENTS

02.19

STATEMENTS

The livestock census for 2010 for Limpopo was executed for non-control as well as for control areas both on commercial and communal farms. This was extrapolated by 0.1% per annum to estimate the water demand by 2045. Three different surveys were used to calculate the water demand of wild animals in the Kruger National Park (KNP). A drinking water consumption of one litre per animal per species per day was selected to calculate the water demands. This was extrapolated by 0.1% per annum to estimate the water demand by 2045 for wild animals in the province.

Game farms and Nature Reserves in Limpopo located outside of the Kruger National Park were deducted from GIS maps. From reports the approximate equivalent in large stock units (LSU) for game on different veld types per 100 ha was indicated as 5 units on mopani veld and 12 units on mixed thorn veld. These two veld types were indicated as a 50:50 ratio representing Limpopo game farms and nature reserves. Based on the carrying capacity of the veld, the number of LSU was determined. Giraffe, buffalo, white rhino, eland and zebra are regarded as LSU with an average consumption of 45 litres/ animal/ day.

The KNP is 19 485 km² (1 948 500 ha) of which approximately 1 169 100 ha is in Limpopo Province (i.e. about 60%). The total game farm area in Limpopo amounts to 4 082 503 ha and nature reserves amount to 320 379 ha. The mopani veld outside KNP can accommodate 110 072 LSU and mixed thorn veld can accommodate 264 173 LSU. At 45 litre per LSU per day the LSU outside the KNP will need 6.2 Mm^3/a, and the animals inside KNP will need 2 Mm^3/a.

STATISTICS

Total Estimated Livestock and game (in KNP only) with their water requirements:

Animals	Cattle	Sheep	Goats	Horse	Donkey	Mule	Pigs	Dogs	Ostriches	Fowl	Giraffe	Blue wildebeest
litre/animal/day	35	25	15	25	15	25	15	5	5	0.25	40	10
Number	1 080 755	140 425	484 817	2 463	39 161	782	686 562	143 117	6 110	1 149 813	8126	9743
Animals	**Leopard**	**Lion**	**Cheetah**	**Wild dog**	**Spotted hyena**	**Caracal**	**Serval**	**Jackal**	**Elephant**	**White Rhino**	**Reedbuck**	
litre/animal/day	7	10	5	3	6	4	3	3	100	50	2	
Number	1 500	1 643	135	210	4 170	1 500	2 000	3 000	13 375	9 050	350	
Animals	**Eland**	**Kudu**	**Sable**	**Roan**	**Waterbuck**	**Impala**	**Nyala**	**Bushbuck**	**Steenbok**	**Duiker**	**Sharpe's Grysbok**	
litre/animal/day	40	15	15	15	15	4	4	2	2	2	2	
Number	355	14 282	320	95	5 618	137 876	400	3 500	20 000	15 000	300	
Animals	**Warthog**	**Grey Rhebok**	**Oribi**	**Suni**	**Crocodile**	**Burchell's Zebra**	**Mountain reedbuck**	**Hippo**	**Buffalo**	**Tsessebe**	**Lichtenstein's Hartebeest**	
litre/animal/day	7	2	1	1	5	30	2	30	30	10	10	
Number	5 029	40	40	30	3 710	30 960	125	3 050	38 565	235	50	

EXPLANATORY NOTES

Estimates from various data bases and census were taken to determine the average drinking water requirements per animal per day and numbers of animals. The calculated water requirement for livestock and game by 2015 was obtained by multiplying the litre/animal/day with the number of animals. This figure was then increased by 0.1% per annum up until 2045 in 5 year increments to represent some growth.

	Water Demand (Mm^3/a)				
	2015	**2020**	**2025**	**2030**	**2045**
Livestock (Census 2010 increased by 0.1% per annum) Mm^3/a	22.23	22.34	22.46	22.57	22.91
Wild Animals (Different surveys increased by 0.1% per annum) inside KNP Mm^3/a	2.01	2.02	2.03	2.04	2.07
Wild Animals (Different surveys increased by 0.1% per annum) outside KNP Mm^3/a	6.21	6.24	6.27	6.30	6.40
Total (Mm^3/a)	**30.45**	**30.60**	**30.76**	**30.91**	**31.38**

ACTIONS

1. A survey of livestock and wild animals should be conducted to accurately determine the total water demand.

2. Scientific research should be executed to determine the daily drinking water requirement of the different animals for a study of this nature.

3. More emphasis should be placed on the well-being of livestock and wild animals as they are a source of food to the growing population.

4. The economic value of animals on game farms and parks should be determined to indicate their contribution to tourism and the GDP of Limpopo Province.

5. Water quality of rivers flowing to the parks should be checked regularly to avoid unnecessary illness and death of animals.

6. Consider the formal supply of drinking water for livestock in villages to reduce the load on the supply of purified water to the rural communities.
7. Develop opportunities for tourism and game hunters.

8. Game farming should be promoted in appropriate dry climate areas, which would be more suitable than irrigation and cattle farming.

9. Promote the huge export market for venison.

10. Manage health of Livestock and Game.

11. Manage numbers of Livestock and Game versus the carrying capacity of the veld and the climate.

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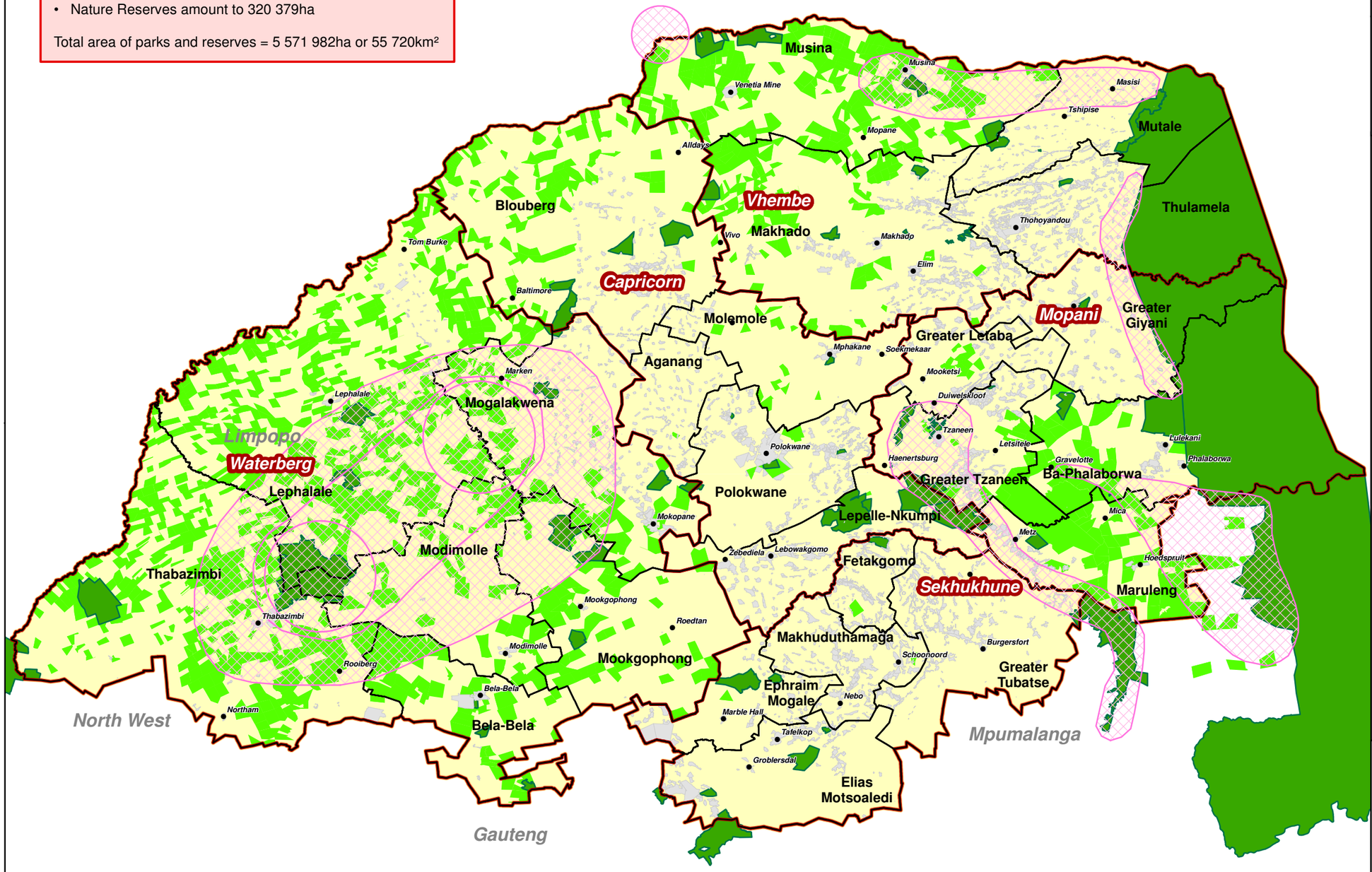
WATER REQUIREMENTS: GAME FARMS & RESERVES

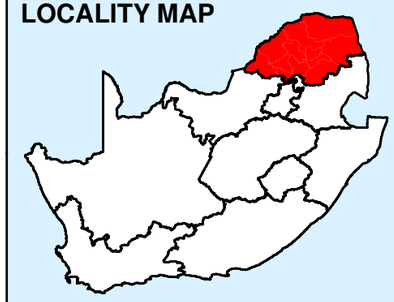
Planning Notes:

- Kruger National Park in Limpopo Province is 1 169 100ha
- Game farms amount to 4 082 503ha
- Nature Reserves amount to 320 379ha

Total area of parks and reserves = 5 571 982ha or 55 720km²



LOCALITY MAP



- Game Farms
- Nature Reserves
- Biospheres

BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries
- Settlements

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TOPIC 2 - WATER REQUIREMENTS 02.20

FORESTRY WATER REQUIREMENTS

TOPIC 2 – WATER REQUIREMENTS

02.21

STATEMENTS

As obtained from reports of registration and validation of water users, an area of 44 966 ha is forestry in the Limpopo Province.

From these reports the registered water demand average is 727m³/ha/a. with a spacing of 3m by 3m, 1 089 trees per hectare is possible and the consumption of a tree is calculated as 1.83 litre per day. Large blue gum trees have been reported to consume 200 litres per day when the water is freely available.

STATISTICS

Forestry water requirements for Limpopo Province are:

Local Municipality	Year	2015	2020	2025	2030	2045
	Area (ha)	Volume (Mm³/a)				
Greater Letaba	7 177	4 .782	4.807	4.831	4.855	4.928
Greater Tzaneen	34 553	26. 238	26.370	26.502	26.662	27.038
Lepelle-Nkumpi	676	0.563	0.567	0.569	0.572	0.581
Makhado	338	0.146	0.148	0.148	0.149	0.151
Molemole	2 222	0.956	0.961	0.966	0.971	0.985
Total	**44 966**	**32. 688**	**32.852**	**33.017**	**33.182**	**33.683**

EXPLANATORY NOTES

The calculated water requirement of 32.688 Mm³/annum for forestry was calculated for 2015. This data was obtained from the registration and verification process undertaken by DWS (the WARMS data). This was increased by 0.1% per annum up to 2045 as per the table above to represent a possible growth in forestry.

STRATEGIC ANALYSIS

Forest plantations are important to supply timber for construction and pulp for the paper industry as well as fire wood. Forests are shelters for birds and wild animals. Forest plantations use carbon dioxide from the air and make oxygen available. Without this cycle, life is not possible.

The forest industry is creating many jobs and opportunities for locals to earn a living.

ACTIONS

1. The actual water requirement of different species of trees should be established and checked so that accurate demands can be calculated.

2. Check licensing adherence and ensure no encroachment of planted trees into stream areas.

3. Investigate water saving species for forest plantations and promote if feasible.

4. Determine the growth or expansion of forest plantations to supply enough timber and wood products for the different industries. Is a growth of 0.1% adequate?

5. Protect natural forests of indigenous trees for hiking, camping and clean rivers.

6. Further support to the Working for Water initiative should be promoted.

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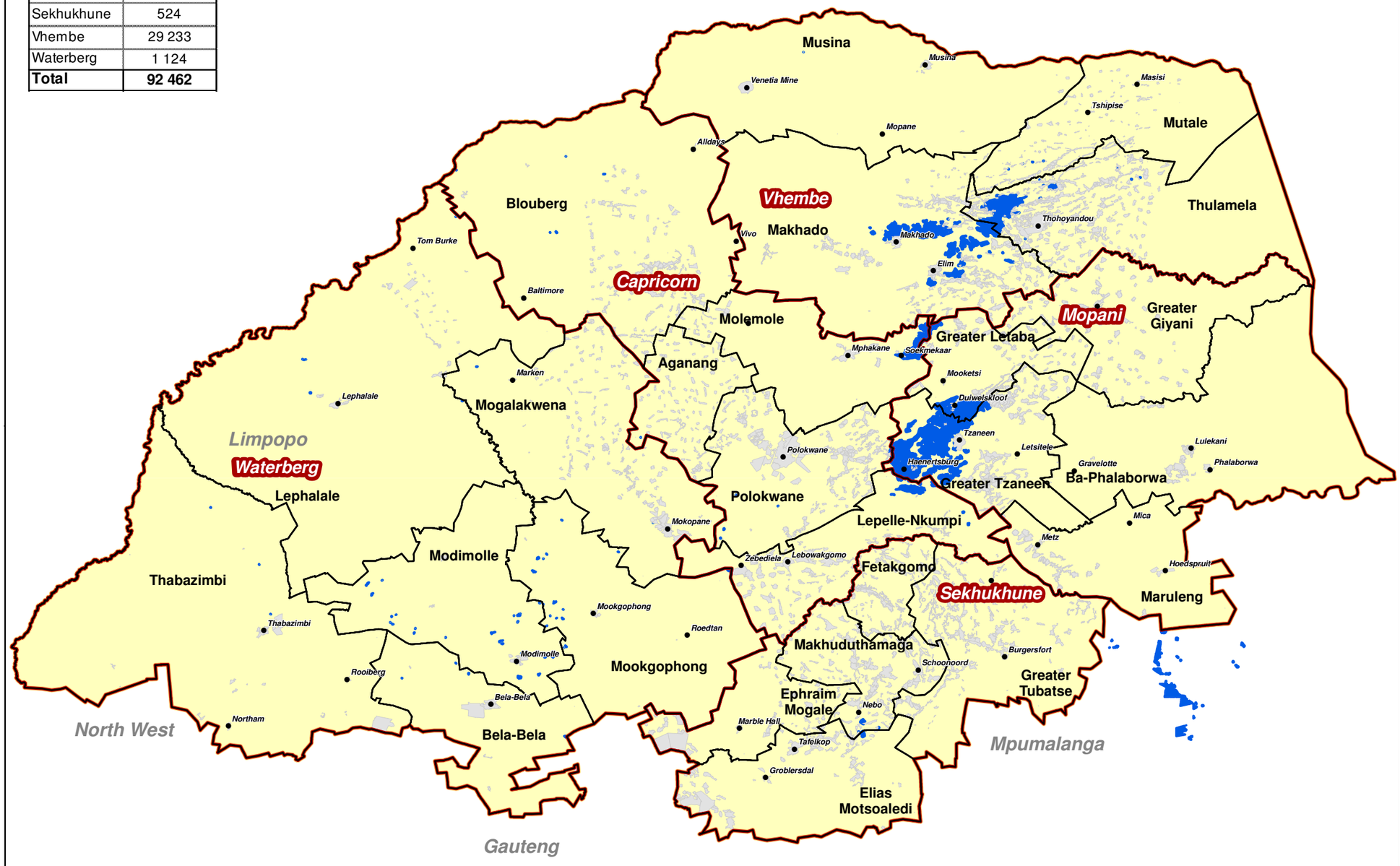
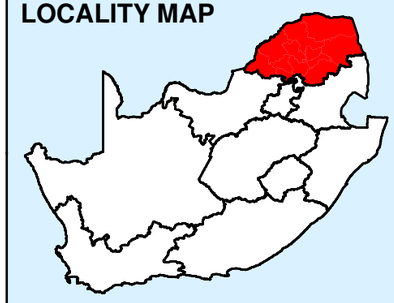
WATER REQUIREMENTS: FORESTS / PLANTATIONS

FORESTS / PLANTATIONS

DM	HECTARES
Capricorn	10 151
Mopani	51 430
Sekhukhune	524
Vhembe	29 233
Waterberg	1 124
Total	**92 462**



LOCALITY MAP



Forest / Plantations

BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries
- Settlements

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TOPIC 2 - WATER REQUIREMENTS **02.22**

SOCIO-ECONOMIC ISSUES

STATEMENTS

Limpopo Province has a water-intensive economic production structure as 26% of the value of production is derived from mining which requires water to function and irrigated crops is a major production contributor. The anticipated future economic growth path for the Province indicates that the role of mining is likely to increase, which implies that water requirements will also increase. Platinum (opencast and underground), diamonds (underground) and coal (opencast and underground) will be the most important commodities.

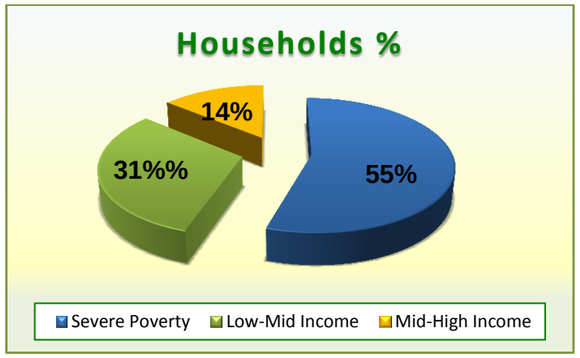
Urbanisation levels are low at 20% (2015), with most of the population (more than 70%) living in communal areas where water service levels are elementary. This has had a restraining effect on residential water consumption. Government is financing residential water consumption in communal areas, mostly due to limitations on household affordability.

An analysis of 2011 census results indicates that 55% of households in Limpopo cannot afford to pay for water, 14% can pay the full cost of water services and the remaining 31% can afford to contribute towards the cost of water services. Affordability levels are gradually rising, but are capped by the high unemployment rate of 18.8%, the 380,000 discouraged work seekers and the low labour force participation rate (Sept 2015).

STATISTICS

Largest Sectors in Limpopo Province Economy 2013

Sector	Contribution %
Mining	26
Government	17.6
Trade/Accommodation	13.9
Finance & Business Service	11.7
Transport & Communication	4.8
Other	26



Urban Planning Population

Settlement Class	Population 2015	Population 2045
Provincial Growth Points	785 300	1 889 358
District Growth Points	349 200	472 285
Functional Towns	10 255	18 344
Total Urbanised	1 144 755	2 379 987
Total Limpopo	5 973 051	7 152 225
Urbanisation Rate %	19	33
Total Farming Pop	220 860	197 687

EXPLANATORY NOTES

Water requirements for mining development and economic growth are spatially defined by mineral resources. Additional water requirements for platinum mining will mostly be in the Mogalakwena and Tubatse areas. Diamond mining and new industrial development requirements will mostly be in Musina, whereas new coal mining requirements will be in Lephalale and Makhado. Polokwane is the commercial hub of the Province, which means that industrial water requirements will also grow rapidly in this Municipality.

Residential water requirements are likely to increase throughout the Province as service levels are improved from current levels that are below RDP standards in several places. The sharpest rises across this broad base of increasing residential requirements are likely to be in the new mining and industrial areas listed above and these rises will occur as and when investment in new production capacity is made.

Several small towns that are classified as municipal growth or local service points in Limpopo, such as Haenertsburg and Roedtan, are not classified as urban due to limitations on size and potential for growth.

STRATEGIC ANALYSIS

The competitiveness of the provincial economy can be improved if water is available in anticipation of new developments and if public and private sector institutions co-operate effectively in this regard. However, the volumes of water required per sector must be justifiable and sustainable in comparison to the level of availability and the potential applications in other sectors. All water users should be expected to demonstrate the efficiency of their water utilisation.

The capital development and maintenance costs of residential water systems can be optimised in places where population density is highest. This should be an important consideration in the prioritisation of water development projects, in conjunction with the economic growth point places mentioned above.

Blanket subsidisation of residential water consumption in rural areas is likely to be unsustainable for the fiscus, it ignores the households who are able to pay and it can be associated with high levels of water wastage. It is possible to identify household affordability levels within different water scheme areas and to design cost recovery systems accordingly.

ACTIONS

1. It is important for Government to have a sound understanding of the economic development potential of growth points in Limpopo and the water requirements associated with that potential.

2. All industrial water users in the Province should be expected to demonstrate the efficiency of their water use and to justify the quantities that they consume in terms of sustainable benefits that can be compared across sectors.

3. Water scheme development and upgrading priorities should be informed by population densities and by the Growth Point Development Programme of the Province.

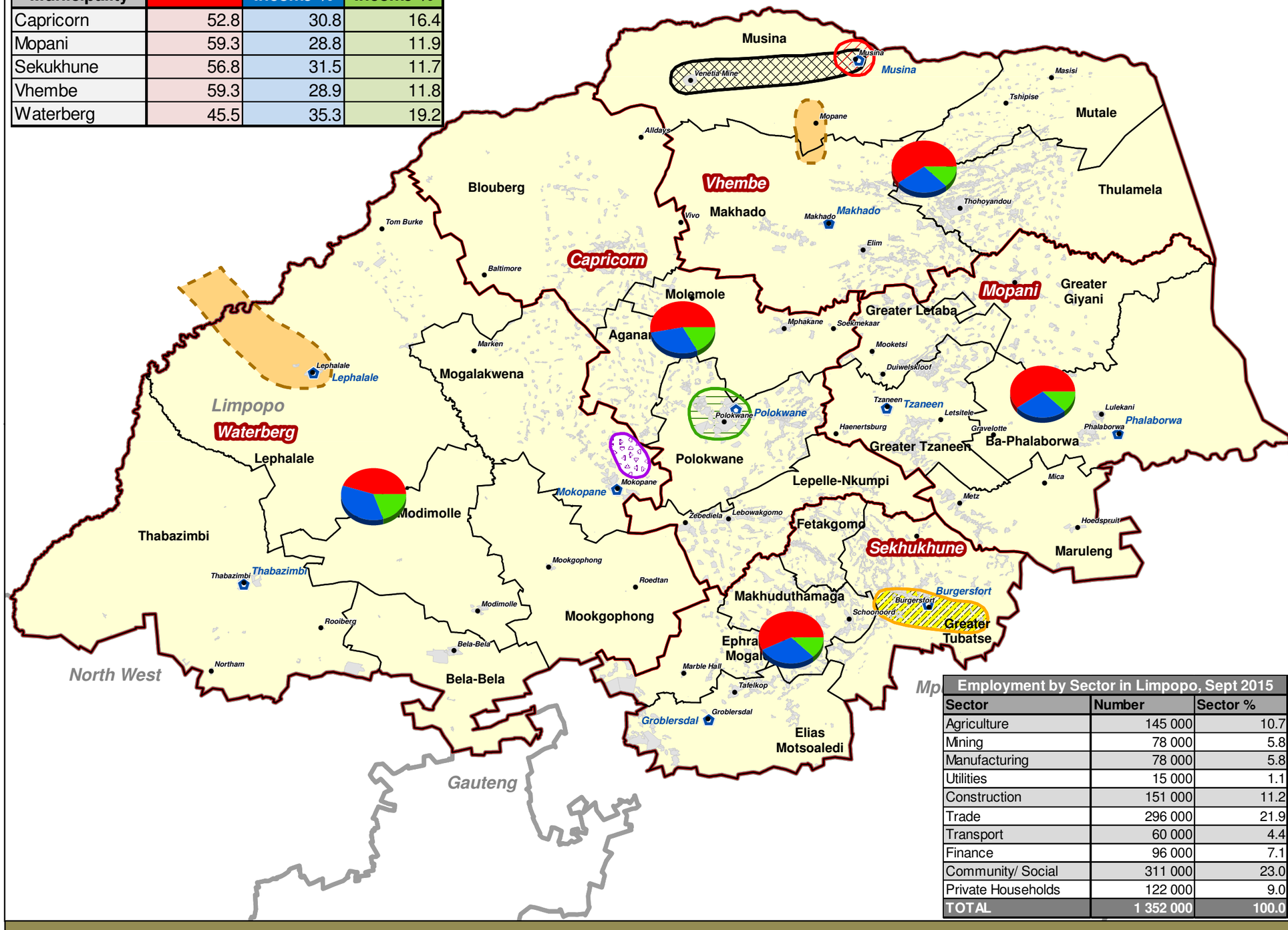
4. Cost recovery systems for residential water consumption are essential to prevent fiscal crises and should be designed according to available information on household affordability levels.

5. DWS also has an important role to play in promoting skills development among employees and in the communities they serve in order to encourage employability and rates of remuneration.

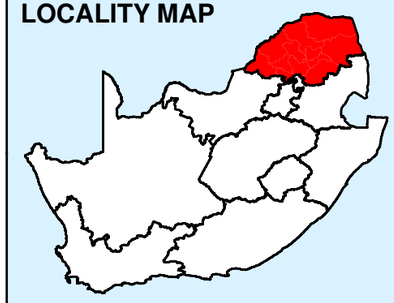
SOCIO-ECONOMIC ASSESSMENT

Household Income Distribution - 2011

District Municipality	Poverty %	Low-Mid Income %	Mid-High Income %
Capricorn	52.8	30.8	16.4
Mopani	59.3	28.8	11.9
Sekukhune	56.8	31.5	11.7
Vhembe	59.3	28.9	11.8
Waterberg	45.5	35.3	19.2



LOCALITY MAP



- Growth Points

Economic Growth Areas

- **Provincial Hub:** Polokwane/Seshego Urban Complex
- **Coal 1:** Lephalale to Botswana
- **Coal 2:** Soutpansberg
- **Diamonds:** Venetia to Musina
- **Industrial SEZ:** Musina Town
- **Platinum SEZ:** Tubatse/Steelpoort
- **Platreef:** Mogalakwena

Employment by Sector in Limpopo, Sept 2015		
Sector	Number	Sector %
Agriculture	145 000	10.7
Mining	78 000	5.8
Manufacturing	78 000	5.8
Utilities	15 000	1.1
Construction	151 000	11.2
Trade	296 000	21.9
Transport	60 000	4.4
Finance	96 000	7.1
Community/ Social	311 000	23.0
Private Households	122 000	9.0
TOTAL	1 352 000	100.0

BASE MAP LEGEND

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CROSS BOUNDARY WATER TRANSFER SCHEMES

TOPIC 4 – WATER SERVICES INFRASTRUCTURE

INTRODUCTION

The basic principle applied to water distribution is to balance out water demand with resource from within the same catchment area. Any surplus would be available for export and any deficit would need to be imported from other catchment areas. Such transfers typically cross Water Services Authority boundaries and in many instances cross provincial boundaries. The transfer schemes presented are the schemes that currently are in planning and development stages. The short background is only for orientation purposes highlighting issues hindering effective planning and implementation

WATER TRANSFER SCHEMES

LUVHUVHU RIVER GOVERNMENT WATER SCHEME (LRGWS)

The LRGWS hinges on the Nandoni Dam which was constructed in 2004.

Extensive bulk distribution infrastructure has already been constructed and put in use – current augmentation to the Xikundu System, Mavambe-Mudabula system, Malamulele East system and Thohoyando (Vondo System) already operational. Completion of the Mavambe to Valdezia section would be completed soon and construction of the link through to Louis Trichardt is planned for early 2017. The outstanding bulk pipe system required for the completion of the Phase 1 development is to Elim/Waterval and to the Matoks area.

The water transfer system to Mopani DM (Giyani and settlements along the route) was recently changed from an emergency raw water augmentation to a potable water augmentation. The construction implementation of this pipe system was problematic and is still not running efficiently.

The constraints for implementation of this transfer scheme that should receive attention are:

- Capacity adequacy of the Nandoni WTW needs to be evaluated to programme Phase 2 extension (a further 60 Ml/d)
- Ensure that all planning and programming for the pipe to Giyani has been addressed
- Assist Vhembe DM for funding downstream bulk infrastructure requirements for approx R 650 M.

MAGALIES WB TRANSFER TO BELA-BELA TO MODIMOLLE TO MOOKGOPHONG

The existing transfer pipe built in 1995 augments water to Bela-Bela. Water demands for increased augmentation have been demonstrated in 2007 already and current planning provides for a doubling of the pipe. This requires a parallel pipe that would deliver water to Pienaarsrivier, Bela-Bela, Mookgophong and Modimolle. Bela-Bela and Modimolle are especially water stressed.

Magalies Water Board have already assessed the need and are in agreement for the need to implement additional implementation. The planning includes WTW, bulk pipe and storage in North-West and Limpopo Provinces. Funding of at least R 22 700 M is required.

The constraints for implementation of the Magalies transfer scheme that should receive attention are:

- Funding for about R 2 700 M needs to be secured for works required in North-West and Limpopo Provinces
- This project needs to be elevated to a position of urgency.

OLIFANTS RIVER WATER RESOURCES DEVELOPMENT PROJECT (ORWRDP)

The Olifants River Water Resources Development Project (ORWRDP) was initiated to secure water for present and planned mining development within the Olifants River and Steelpoort River catchment areas, as well as to improve the water supply to domestic development and rural communities within the Middle Olifants Catchment Area. The project also extends into the Mogalakwena and Sand River catchments. Towns that will benefit from the project are Mokopane, Burgersfort, Steelpoort, Jane Furse, Polokwane, Lebowakgomo and rural communities in Lepelle-Nkumpi, Fetakgomo and Greater Tubatse and Polokwane.

Raw water is abstracted from the new De Hoop Dam and the raised Flag Boshielo Dam. Treatment and reticulation of water to municipal users is the responsibility of Waterboards, WSAs and Municipalities. The abstracted raw water is conveyed from these dams via a bulk distribution system consisting of:

- A bulk water pipeline from De Hoop Dam to Steelpoort, with various off-takes along its route;
- A bulk distribution system (pipelines & pumping station from Steelpoort along R37), linking with existing Olifants-Sand Transfer Scheme at Olifantspoort;
- Acquisition and incorporation of existing Lebalelo Water User Association infrastructure into the project;
- A bulk supply pipeline with three booster pump stations from Flag Boshielo Dam to a balancing dam at Pruissen near Mokopane.

ACTIONS

LUVHUVHU RIVER GOVERNMENT WATER SCHEME (LRGWS):

1. Capacity adequacy of the Nandoni WTW needs to be evaluated to programme Phase 2 extension.

2. Ensure that all implementation issues have been addressed for the pipe to Giyani.

3. Assist Vhembe DM for funding downstream bulk infrastructure requirements for approx R 155 M.

MAGALIES WB TRANSFER TO BELA-BELA TO MODIMOLLE:

1. Funding for about R 2 700 M to be secured for works in North-West and Limpopo Provinces.

2. This project should be elevated to a position of urgency.

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WATER RESOURCES TRANSFER SCHEMES

ACTIONS

OLIFANTS RIVER WATER RESOURCES DEVELOPMENT PROJECT (ORWRDP)

1. Signing of water supply agreements by commercial users should be pursued as a priority.

2. Construction of bulk water resources and conveyance infrastructure need to be rolled out at the same time as the municipal water services in order to minimize the risk of water infrastructure being vandalized.

3. The three regional WTW (Ga-Malekane, Steelpoort and Mooihoek) and potable water distribution infrastructure need to be commissioned in order to provide water to communities and put an end to service delivery protests and vandalism of infrastructure.

4. Provincial Government, with support from COGTA and National Treasury to facilitate financial support to municipalities for them to provide water to domestic users at affordable tariffs.

5. Additional funding to be provided to assist Polokwane and other municipalities to refurbish & upgrade infrastructure in order to reduce losses.

6. Refurbishment and preventative maintenance of existing water infrastructure must be given priority over the construction of new schemes or abandonment of vandalized infrastructure. This aspect needs support from Provincial Government.

MOKOLO AND CROCODILE WATER AUGMENTATION PROJECT (MCWAP)

1. TCTA to proceed with the implementation of Phase 2 of MCWAP as mandated by the Minister of Water and Sanitation

3. Provision of water to local communities in the region must be accelerated by developing the available groundwater resources. The All Towns Reconciliation Strategy for Lephalale Municipality confirms that the water demand for local communities along the Lephalale River can be adequately supplied from groundwater resources. The development of available groundwater resources has the added advantage that it can be made available faster and more cost effective than Phase 2 of MCWAP.

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OLIFANTS RIVER WATER RESOURCES DEVELOPMENT PROJECT (ORWRDP) continued

The original yield of each of the De Hoop Dam and Flag Boshielo Dam was 80 million m^3/a. Recent re-assessment has confirmed the yield to be significantly less: 61 Mm^3/a for De Hoop Dam and 49 Mm^3/a for Flag Boshielo Dam (after provision for the Reserve).

The date of delivery of water to Mokopane and Polokwane is expected by 2021.

The constraints for implementation of this transfer scheme that should receive attention are:

- Commercial entities (mining) and municipalities are the two main user groups for this project. According to the pricing strategy of DWS the mines need to fund their share through loans on their behalf. DWS has already funded significant components (ie De Hoop Dam) while the mines have funded components such as the Lebalelo Works. The signing of water supply agreements by commercial users should be pursued as a priority.
- In light of the funding constraints, water supply agreements not yet signed, and the reductions in dam yield, the project has been redefined by DWS with support from TCTA. DWS has currently secured R2.3 billion from the Medium Term Expenditure Framework and the tender documents have been structured so that sufficient flexibility was allowed to award the contract in full or in parts.
- The construction of bulk water resources and conveyance infrastructure need to be rolled out at the same time as the municipal water services. This will minimize the risk of water infrastructure being vandalized due to the perception that service delivery is not happening.
- The three regional WTW's (GaMalekane, Steelpoort and Mooihoek) and potable water distribution infrastructure need to be commissioned in order to provide water to communities. The current service delivery protests and vandalism of infrastructure in the Burgersfort area are a direct cause of the frustrations experienced by the communities not receiving potable water. This problem needs to be resolved at Municipal level.
- Water from this project will be expensive and municipalities will require financial support in order to be able to provide water to domestic users at affordable tariffs. Provincial Government will need to facilitate the process for such support, possibly involving COGTA and National Treasury.
- A significant percentage of water is lost in municipal distribution networks. Additional funding is needed to assist Polokwane, Lepelle Nkumpi and other municipalities to refurbish and upgrade their infrastructure in order to reduce losses. Refurbishment & preventative maintenance of existing water infrastructure must be given priority over the construction of new schemes or abandonment of vandalized infrastructure. This aspect needs support from Provincial Government.

MOKOLO AND CROCODILE WATER AUGMENTATION PROJECT (MCWAP)

The Mokolo (Mogol) River catchment is part of the Limpopo Water Management Area (WMA). The Mokolo River originates close to Modimolle (Nylstroom) and then drains to the north into the Limpopo River. The Mokolo Dam (formerly known as the Hans Strijdom Dam) was completed in July 1980, to supply water to Matimba Power Station, Grootegeluk Mine, Lephalale (Ellisras) Municipality and for irrigation downstream of the dam. A limited volume of water was also allowed to cater for anticipated growth in economic development in the area.

In 2007 Eskom commenced with planning of Medupi Power Station near Lephalale. The water need for this power station was not allocated for in the original scheme. The Mokolo and Crocodile River (West) Water Augmentation Project (MCWAP) was commissioned by DWS to establish additional bulk raw water transfer systems and associated infrastructure to meet the demand of Medupi as well as increased demand from further energy projects, mines and domestic development.

The main components of the scheme are abstraction weirs, pump stations, pipelines and balancing storage and will be implemented in two phases:

- Phase 1: Augment the supply from Mokolo Dam (completed in 2015 and supplying 30 million m^3/a); and
- Phase 2: Transfer scheme from the Crocodile River (West) to the Lephalale area.

Water is available from both the Mokolo Dam and the Crocodile River (West) system. The Mokolo Dam has a firm yield of 30 million m^3/a (after taking account of the Reserve, downstream irrigation allocation and allocation to incidental users). It currently supplies water to the towns of Lephalale, and the Matimba and Medupi power station operations. The Mokolo Dam has limited capacity for further extension. Water for further expansion and the emission control measures required for power stations, will be augmented from the Crocodile River (West). The water balance for the Crocodile West River system was assessed until the year 2050. The system has surplus water originating from growing treated wastewater generated in the urban areas of Northern Gauteng. The resulting water balance for the Crocodile West River system, including the transfers to the Lephalale area, shows that sufficient water is available in the Crocodile River (West) system until after 2050. The resource has been accounted for and prioritized in the Crocodile River (West) Water Supply System Reconciliation Strategy ("CRRS"), as updated from time to time by the DWS.

The constraints for implementation of this transfer scheme that should receive attention are:

Provision of water to local communities in the region must be accelerated by developing the available groundwater resources. The All Towns Reconciliation Strategy for Lephalale Municipality confirms that the water demand for local communities along the Lephalale River can be adequately supplied from groundwater resources. The development of available groundwater resources has the added advantage that it can be made available faster and more cost effective than Phase 2 of MCWAP.

CROSS BOUNDARY WATER TRANSFER SCHEMES

TOPIC 4 – WATER SERVICES INFRASTRUCTURE

04.3

GROOT LETABA RIVER WATER DEVELOPMENT PROJECT (GLeWaP)

The Groot Letaba River Water Resources Development Project (GLeWaP), although not a cross boundary transfer scheme, is included here as it is an important scheme that aims to improve water resource availability and management of the water resources in the catchment as a whole. It consists of non-infrastructure options to make more water available as well as the construction of infrastructure components. Agriculture is the economic mainstay activity within the region. GLeWaP intends to meet the growing domestic water requirements to a planning horizon of 2030 at an appropriate assurance of supply, make sufficient water available to sustain the ecology and to stabilise supply of water to commercial farming sector. It also aims to make water available to resource-poor farmers that have so far not had access to reliable water allocations.

The infrastructure components of the project include:

- Construction of the 34m high Nwamitwa Dam on the Groot Letaba River, downstream of the confluence of the Nwanedzi River, inclusive of construction of water treatment works, bulk water pipelines and pumping stations from the dam for domestic water supply to communities in the area.
- Raising of the Tzaneen Dam by 3m to increase storage from 157 million m^3 to 203 million m^3.
- Construction of new river flow gauging weirs downstream of Tzaneen Dam and downstream of the Nwamitwa Dam to facilitate effective operation and management of the river system.

Provision of the aforementioned infrastructure components need to be supported by:

- Implementation of water conservation and demand management, as well as water recycling and re-use, to ensure increased efficiency and effectiveness of water use.
- Development of local groundwater resources to be used to good effect for small-scale domestic water supplies and food plot irrigation, and also to supplement the limited surface water resources.
- Removal of invasive alien vegetation in the Groot Letaba Valley as a means of improving the yield in the river system.
- Improvement of irrigation efficiency by investing in modern technology, management and sophisticated equipment to improve water use efficiency.

Many of the existing surface water schemes in the Groot Letaba Catchment have existing allocations that exceed their yields. The overall yield of schemes in the catchment is 126 million m^3/a, and the total allocation for domestic, industrial and irrigation usage from these schemes is 177 million m^3/a.

Subject to recalibration of the hydrology of the Groot Letaba River, the availability of water will be:

- Tzaneen Dam: Current firm yield of 60 million m^3/a, which will increase to 64 million m^3/a after raising the dam by 3m. The increased yield should be used to increase the allocation for primary uses in the Greater Tzaneen Municipal area.

- Nwamitwa Dam: When constructed, a firm yield of 14 million m^3/a after provision for the ecological requirements have been accounted for, to meet the present and increasing domestic water needs in rural towns and villages. Water will be available for irrigation of approximately 2 000 ha downstream of Nwamitwa Dam by new resource-poor farmers, with a security of supply equal to that available to other irrigation farmers along the Groot Letaba River who produce high value fruit crops.

The estimated yields exclude provision for the Reserve downstream from Nwamitwa and maintaining the present availability of water for irrigation (basic allocations and security of supply with regular restrictions) from the Groot Letaba River.

The constraints for implementation of this scheme that should receive attention are:

- Pursue and finalise availability of funds and confirm the sources. The construction cost of the infrastructure components of the project is estimated to be in excess of R3 000 M. Funding sources are likely to include a private sector and a public sector component funded by the National Treasury.
- Lepelle Northern Water, as the Implementing Agent for the construction of the Nwamitwa Dam and raising of the Tzaneen Dam, need to commence as a matter of priority with the detail design of both projects.
- The estimate of the availability of water should be reviewed as a matter of urgency once the hydrology of the Groot Letaba River has been recalibrated.

ACTIONS

GROOT LETABA RIVER WATER DEVELOPMENT PROJECT (GLEWAP)

1. Pursue and finalise availability of funds and confirm the sources. The construction cost of the infrastructure components of the project is estimated to be in excess of R3 000 M. Funding sources are likely to include a private sector and a public sector component funded by the National Treasury.

2. Lepelle Northern Water, as the Implementing Agent for the construction of the Nwamitwa Dam and raising of the Tzaneen Dam, need to commence as a matter of priority with the detail design of both projects.

3. The estimate of the availability of water should be reviewed as a matter of urgency once the hydrology of the Groot Letaba River has been recalibrated.

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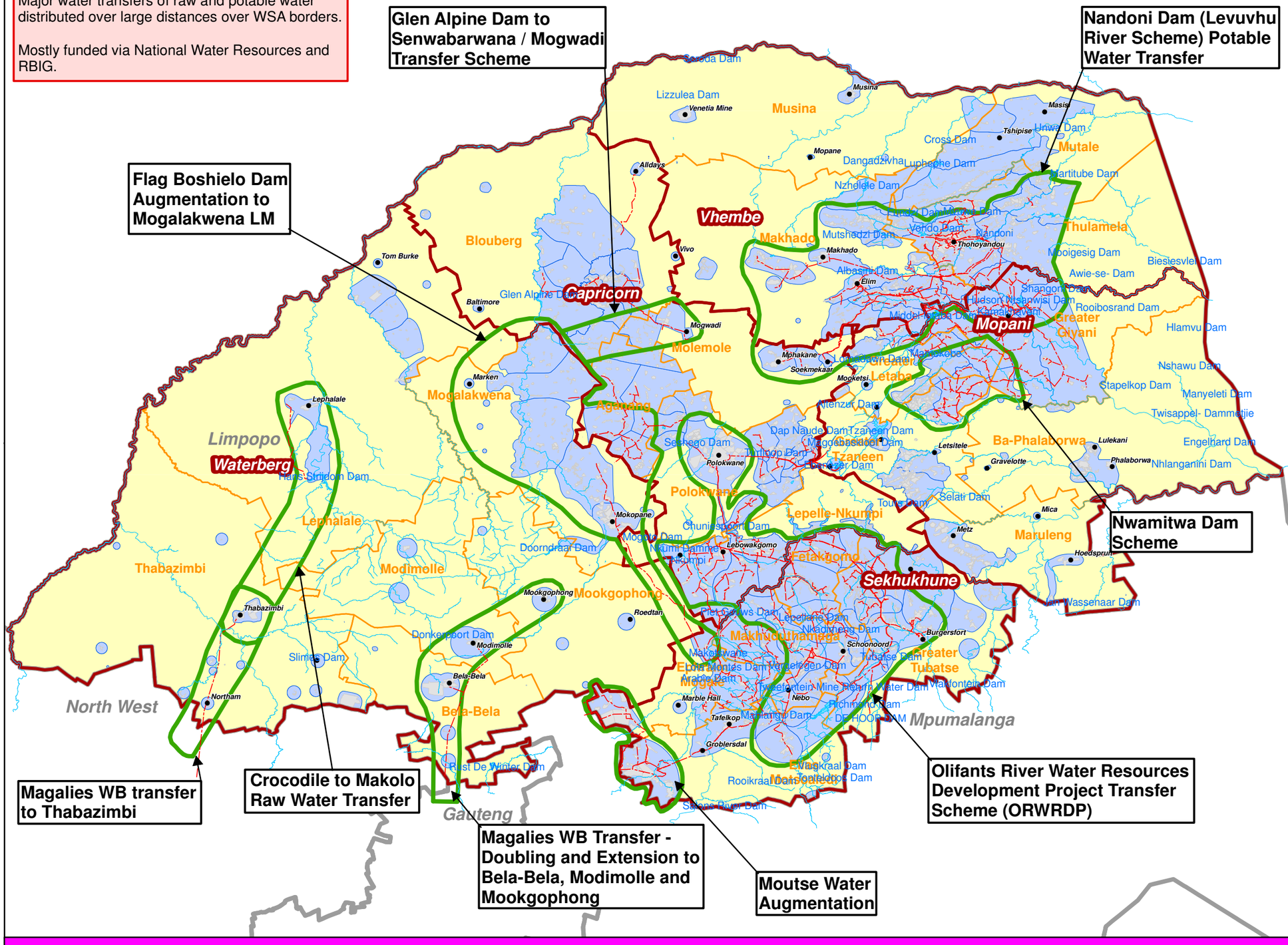
WATER RESOURCE TRANSFER MAP

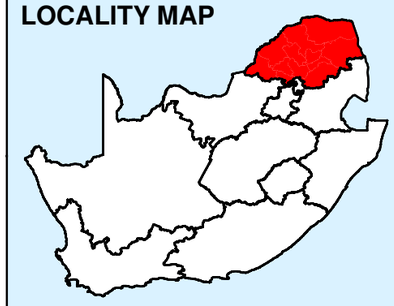
Notes:

Major water transfers of raw and potable water distributed over large distances over WSA borders.

Mostly funded via National Water Resources and RBIG.



LOCALITY MAP



Legend

- Rivers
- Water Bulk Pipelines
- Dams
- Major water transfer schemes (Raw and Potable water) Being Developed

BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries
- Settlements
- Water Scheme Areas

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TOPIC 4 - WATER SERVICES INFRASTRUCTURE

04.4

REGIONAL AND INTERNAL BULK WATER INFRASTRUCTURE REFURBISHMENT

TOPIC 4 – WATER SERVICES INFRASTRUCTURE

STATEMENTS

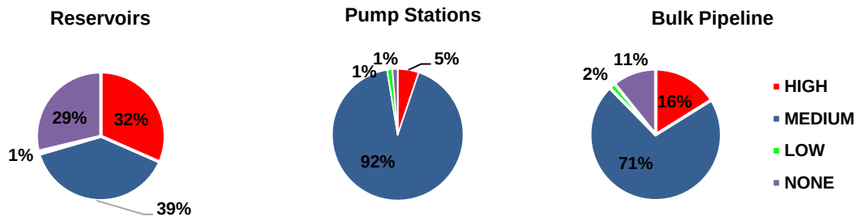
Refurbishment is part of the operation and maintenance lifecycle of infrastructure that is implemented after a period of usage (typically 5 to 10 years) which maintains or extends the remaining useful life of an asset.

Cabinet has recognized the importance of infrastructure maintenance within Government and the role that effective maintenance will play in support of development of the Nation. The vision is that infrastructure should be adequately maintained and operated, resulting in sustained service delivery, growth and employment creation, thus contributing to the national development goals. This will be achieved by improved infrastructure asset management planning, budgeting and implementation.

STATISTICS

The bulk regional and internal Infrastructure refurbishment needs quantities for the pipelines, reservoirs and pump stations are shown in the table below indicating that most of the infrastructure requires high and medium refurbishment intervention

EXISTING INFRASTRUCTURE REFURBISHMENT NEEDS	QUANTITY		
	BULK PIPELINE (km)	RESERVOIRS (No)	PUMPSTATION (No)
HIGH	1 174	343	26
MEDIUM	5 201	422	464
LOW	113	8	7
NONE	783	312	7
TOTAL	**7 271**	**1 086**	**503**



EXPLANATORY NOTES

According to the statistics more than 70% of the Province's water infrastructure requires high to medium refurbishment needs.

The life cycle of the bulk water infrastructure was estimated to be 30 years. High refurbishments needs were applied to infrastructure aged more than 15 years estimated to require 30% to 50% replacement of existing infrastructure. Infrastructure with more than 10 years of age were estimated as requiring 20% to 30% existing infrastructure replacement and were classified to be needing medium refurbishment intervention. The low refurbishment intervention need encompass infrastructure aged 5 to 10 years requiring 10% to 20% replacement values. Infrastructure with less than five years of age was assigned as requiring no intervention in the short term period.
High refurbishment intervention needs are mostly being required in Capricorn and Sekhukune District Municipalities partly attributed to the high prevalence of asbestos cement pipelines in these districts.

STRATEGIC ANALYSIS

Bulk water infrastructure has been identified and prioritized for strategic infrastructure maintenance budgeting in light of the national's heavy backlog on maintenance intervention. It is imperative for the Province to prioritise the backlogs due to refurbishment since this will inherently reduce capital budget in future.
The operation of comprehensive infrastructure asset management system focusing on effective and efficient service delivery should be put in place such that adequate infrastructure maintenance can be addressed which takes into account all the contributory factors that influence the life cycle costs of infrastructure such as;

- Current and future demand for services requiring infrastructure to support the delivery of those services;
- Current technology being utilised;
- Current condition of available infrastructure and its operating and maintenance costs;
- Potential remaining useful life of the infrastructure;
- Replacement and disposal strategy for the existing infrastructure.

Estimated Bulk Infrastructure Refurbishment Budget Forecast

Taking into account inflation of 8% per annum and targeting that all the high refurbishment intervention needs are attended to in the first five years and the medium intervention needs are funded in the succeeding ten years the provisional budget forecast for refurbishment of regional and internal bulk water infrastructure is as indicated in the table below

TERM	AMOUNT in MILLION RAND			TOTALS
	BULK PIPELINE	RESERVOIRS	PUMPSTATION	
SHORT TERM	3 460	94	21	**3 575**
MEDIUM TERM	5 247	230	472	**5 950**
LONG TERM	4 171	924	86	**5 181**
TOTALS	**12 878**	**1 248**	**579**	**14 705**

ACTIONS

1. The Province to prioritise refurbishment of the regional and internal bulk infrastructure assessed as needing High and Medium Refurbishment Intervention.

2. The estimated provisional budget forecast or the province is as shown in the table below

TERM	PERIOD	AMOUNT IN MILLION RAND
SHORT TERM	2015 - 2020	3 575
MEDIUM TERM	2020 - 2030	5 950
LONG TERM	2030 - 2045	5 181
TOTALS		**14 705**

3. Visual condition surveys to be conducted and maintenance needs of infrastructure and required funding properly compiled.

4. Rehabilitation Projects Priority list for the province should be compiled

5. The design of new projects to accommodate whole life costing assessment indicating stages for refurbishment and associated budget forecast

6. Competent Staff to be recruited for the operation and maintenance of infrastructure to ensure that the lifespan of infrastructure is extended

7. All Water Supply Authorities to implement Infrastructure Management Systems

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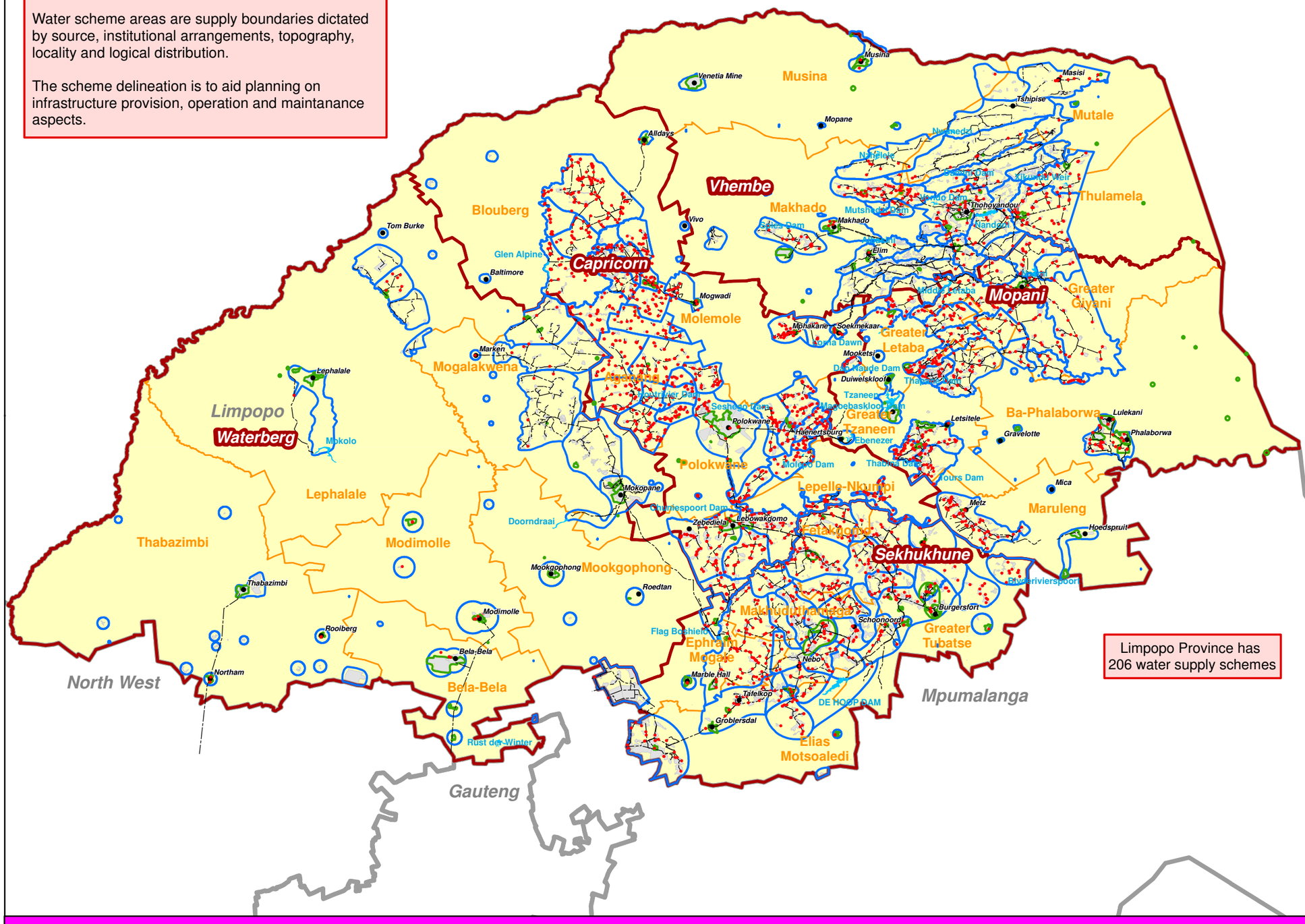
WATER SUPPLY SCHEMES

Planning note :

Each settlement and community resides in a water scheme area.

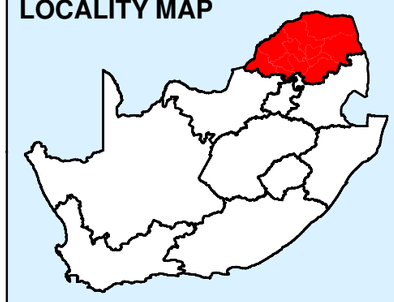
Water scheme areas are supply boundaries dictated by source, institutional arrangements, topography, locality and logical distribution.

The scheme delineation is to aid planning on infrastructure provision, operation and maintanance aspects.



Limpopo Province has
206 water supply schemes

LOCALITY MAP



Legend

- Reservoirs
- Water Bulk Pipeline
- Dams

BASE MAP LEGEND

- Main Towns
- Sanitation Scheme Areas
- Water Scheme Areas
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries
- Settlements

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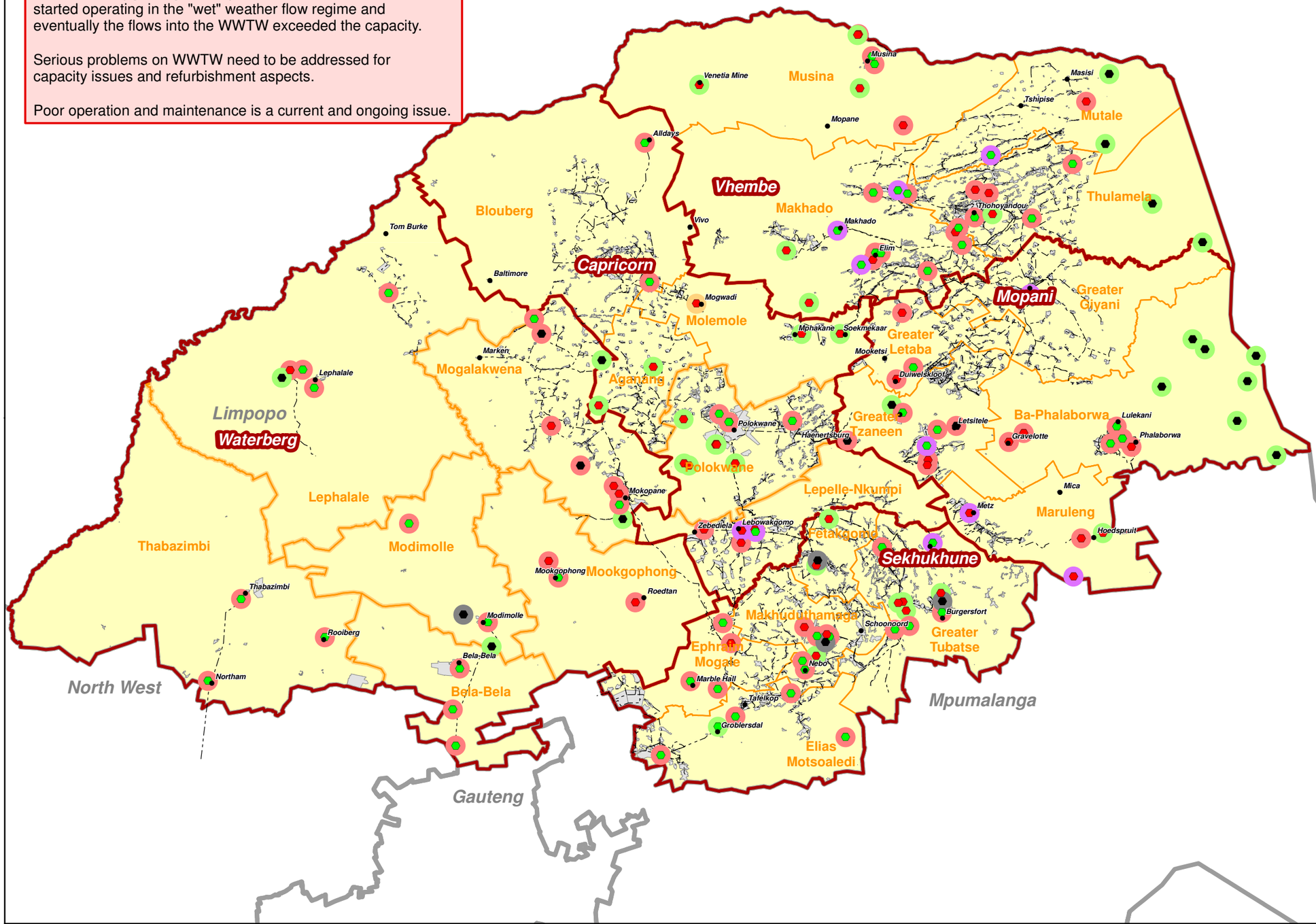
WATER SERVICES INFRASTRUCTURE: WASTE WATER TREATMENT WORKS

Planning note :

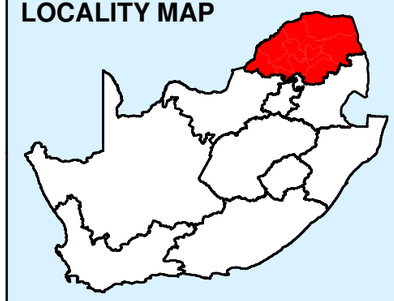
Waste Water Treatment Works generally did not receive attention for upgrading and expansions. The WWTW's started operating in the "wet" weather flow regime and eventually the flows into the WWTW exceeded the capacity.

Serious problems on WWTW need to be addressed for capacity issues and refurbishment aspects.

Poor operation and maintenance is a current and ongoing issue.



LOCALITY MAP



Infrastructure Component

- Waste Water Treatment Works
- Bulk Pipe Line

Refurbishment Need Status

HIGH	-	0
MEDIUM	-	95
LOW	-	0
NONE	-	43
UNKNOWN	-	0

** components are colour coded according to observation status*

Green Drop Certification Status 2013

Yes	(47)
No	(70)
Unknown	(21)

BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries
- Settlements

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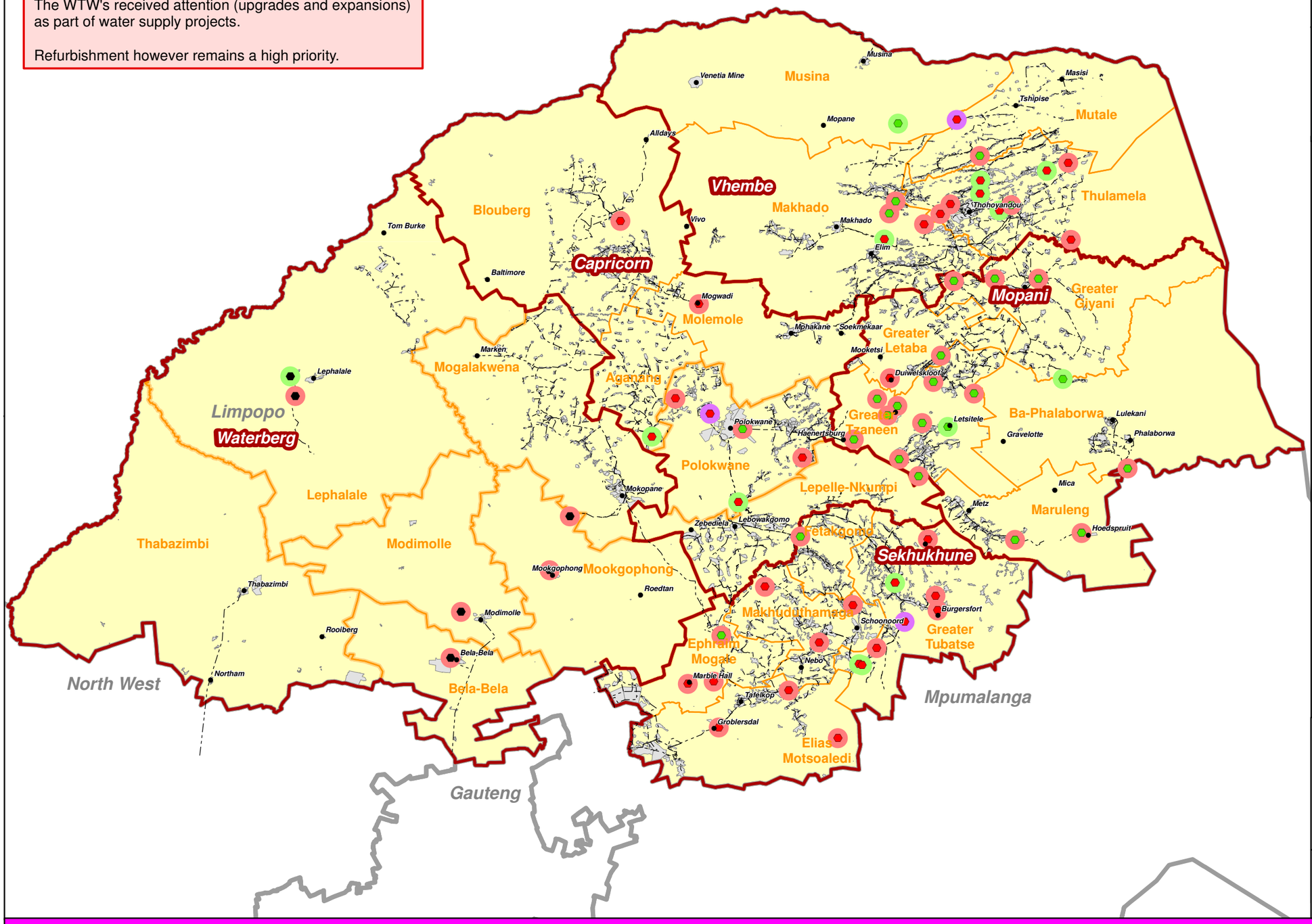
WATER SERVICES INFRASTRUCTURE: WATER TREATMENT WORKS

Planning note :

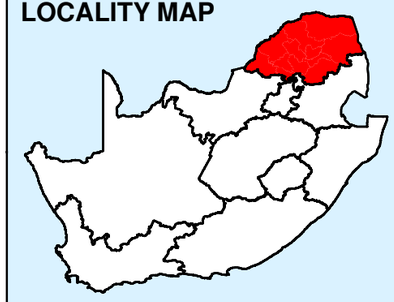
Water Treatment Works generally in acceptable condition.

The WTW's received attention (upgrades and expansions) as part of water supply projects.

Refurbishment however remains a high priority.



LOCALITY MAP



Infrastructure Component

- Water Treatment Works
- Bulk Pipe Line

Refurbishment Need Status

HIGH	-	3
MEDIUM	-	50
LOW	-	0
NONE	-	15
UNKNOWN	-	0

** component are colour coded according to observation status*

Blue Drop Status 2013

(data still in process)

Yes	(26)
No	(36)
Unknown	(6)

BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries
- Settlements

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TOPIC 4 - WATER SERVICES INFRASTRUCTURE 04.8

OPERATION AND MAINTENANCE

TOPIC 5 – OPERATIONS AND MAINTENANCE

05.1

STATEMENTS

It has been observed that lack of attention to the important aspect of Operation & Maintenance (O&M) of water supply schemes often leads to deterioration of the useful life of the systems necessitating premature replacement of many system components. Some of the key issues contributing to the poor Operation & Maintenance have been identified as follows:

- Lack of finance, inadequate data on Operation & Maintenance;
- Inappropriate system design; and inadequate workmanship;
- Multiplicity of Service Providers, overlapping responsibilities;
- Inadequate training of operators and Lack of performance evaluation and regular monitoring;
- Inadequate emphasis on preventive maintenance;
- Lack of power and transport management;
- Lack of community ownership and participation in management of services provided;
- Lack of real time field information and delayed response to system failures.

STATISTICS

The MuSSA assessment of the Vulnerability of the Limpopo WSAs yielded the following statistics:
Availability of an effective infrastructure operations and maintenance team is available (i.e. sufficient artisans, mechanical, electrical support with correct skills/qualifications and experience - 54% have noted that they have an ineffective O&M team in place with less than 50% of the required numbers/skills.

A maintenance facility/workshop that is secure and stocked with critical spare equipment (tools, etc.) is available – 36% have noted that they do not have an adequate maintenance facility/workshop.

Appropriate planned/preventative maintenance is performed at all WTWs and WWTWs and associated reservoirs pump stations and in distribution network – LP 27% have noted that no preventative/proactive maintenance occurs within the water and waste water systems.

Ability of WSA to show infrastructure maintenance costs as a function of total operating costs (%) – LP 36% don't know the proportion that maintenance costs represent of the total operating costs, while a further 9% state that it is below 5%.
Overall Limpopo Vulnerability to Operations and Maintenance of Assets - 73% of WSAs were identified as being Very Highly Vulnerable
WSA have implemented an IAM Program (including allocation of appropriate budget and staff) - 45% have not implemented an IAM Program.
Sufficient funds have been made available to address all identified wastewater and environmental safety related issues - 36% indicate that no funds have been made available to address identified wastewater issues.

EXPLANATORY NOTES

The parameters assessed by the MuSSA assessment give a qualitative perspective of the status of water services operation and maintenance in Limpopo Province. The key aspects of water services provision are assessed from the practical perspective and failures are clearly outlined as a vulnerability which requires correction.
Rudimentary schemes (single village) have severe challenges in being far from the satellite office and require community based management to reduce the cost of management

STRATEGIC ANALYSIS

The operation and maintenance of infrastructure is critical to the achieving of the service delivery targets of the various municipalities as the lifespan of the assets are severely affected by the mode of operation. The extent of the backlog caused by non-functional infrastructure reflects on the poor maintenance regimes prevailing in the Province.
The absence of a well trained, motivated and properly supervised workforce in most WSAs results in services not properly rendered, still incurring the costs of the rapid depreciation of assets not properly maintained and as well facing the wrath of the client populations who do not receive services due to a the poor reliability of the systems. A competency based bureaucracy needs to be established in WSA in which supervisory positions are held by competent well-trained personnel able to direct and motivate staff working under them. Presently workers come to work but are not directed to provide the WSA with an honest day's work, to the detriment of the service and the asset.
Budgeting for water services is on an ad hoc basis and is not planned from a cost build-up basis. Critical spares, equipment and materials are not always available. Water services planning, budgeting and expenditure is not ring-fenced to the water service function and as such the requirements of the water business are sometimes overlooked in favour of other activities.
Most WSAs are operating on a run to failure maintenance regime which has costly ramifications to consumers, the environment and the financial health of the WSA.
Most rural schemes have no cost recovery and WSAs have to rely on the equitable share allocation to finance water services to these poor communities. An evaluation of the sustainability of provision of these services needs to be taken in conjunction with National Treasury and CoGTA.
Waste Water Treatment plants require heightened levels of asset management and the current technical skills and managerial skills in the WSA are inadequate. The WWTW pollute water in streams and dams making existing water treatment works difficult to operate as they are not designed to cater for such level of pollution.

ACTIONS

1. Establishment of ring fenced water services units in WSAs, with mandate to budget, incur expenditure and receive revenue for the provision of services.

2. Appointment of appropriately skilled technical managers to whom appropriate delegation is given to ensure implementation of municipal plans as detailed in WSDP and IDP.

3. Establishment of community based NPO for water services management creating employment and community ownership of water schemes

4. Review funding model of Free Basic Services to allow for WSA sustainability

5. All WSAs to implement energy Management plan

6. All WSAs to prepare and implement Operation and Maintenance Management plan.

7. Preventative Maintenance management systems to be put in place and budgeted for in all WSAs.

8. Transfer of bulk water systems and critical infrastructure like Waste Water Treatment Works and cross-border schemes to Regional Water Utility

9. Implementation of cost based tariff setting and aligning service level to willingness to pay.

10. Training of water services interns at all systems to create skills backup in the water sector. Present situation of mature operators only has challenge of re-skilling and up-skilling due to low literacy levels and imminent exit from sector through retirement.

11. Resuscitation of National Community Water and Sanitation Training Institute (NCWSTI) as a key vehicle of skills development in the sector with programs streamlined by a stakeholder advisory body. The Advisory body will ensure alignment of courses and the needs of the sector and allow seamless student assimilation into the working environment.

12. Establishment of customer care centers in each WSA

13. Water conservation and demand management implementation and prioritization in all WSAs.

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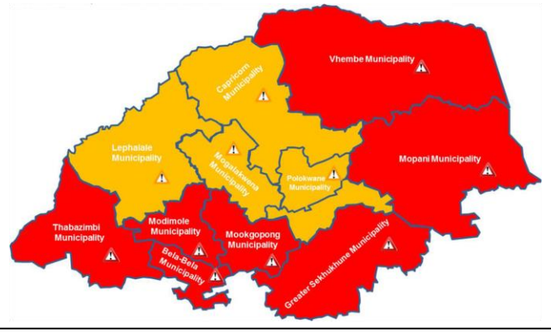
OPERATION AND MAINTENANCE VULNERABILITY

WSA	1. Water Services Planning	2. Management Skill Level (Technical)	3. Staff Skill Levels	4. Technical Staff Capacity (Numbers)	5. Water Resource Management	6. Water Conservation & Demand Management (WCDM)	7. Drinking Water Safety & Blue Drop Status	8. Wastewater/ Environmental Safety & Green Drop Status	9. Infrastructure Management (IAM)	10. Operation & Maintenance of Assets	11. Financial Management	12. Revenue Collection	13. Information Management	14. Organisational Performance Monitoring	15. Water Service Quality	16. Customer Care (CRM)
Bela-Bela	Low Vulnerability	Low Vulnerability	Moderate Vulnerability	Moderate Vulnerability	**Very High Vulnerability**	Low Vulnerability	High Vulnerability	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	Moderate Vulnerability
Capricorn	Low Vulnerability	High Vulnerability	**Very High Vulnerability**	**Very High Vulnerability**	Moderate Vulnerability	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	High Vulnerability	**Very High Vulnerability**	Low Vulnerability	High Vulnerability	Moderate Vulnerability	Low Vulnerability	**Very High Vulnerability**	Low Vulnerability
Greater Sekhukhune	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	High Vulnerability	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**
Lephalale	Moderate Vulnerability	**Very High Vulnerability**	**Very High Vulnerability**	Moderate Vulnerability	Moderate Vulnerability	**Very High Vulnerability**	Low Vulnerability	High Vulnerability	**Very High Vulnerability**	**Very High Vulnerability**	Low Vulnerability	Moderate Vulnerability	Low Vulnerability	Low Vulnerability	Low Vulnerability	**Very High Vulnerability**
Modimolle	High Vulnerability	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	High Vulnerability	Moderate Vulnerability	**Very High Vulnerability**	Moderate Vulnerability	**Very High Vulnerability**	High Vulnerability	**Very High Vulnerability**	Moderate Vulnerability	Low Vulnerability	High Vulnerability	High Vulnerability
Mogalakwena	Low Vulnerability	Low Vulnerability	Moderate Vulnerability	High Vulnerability	**Very High Vulnerability**	Low Vulnerability	Moderate Vulnerability	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	Low Vulnerability	**Very High Vulnerability**	Low Vulnerability	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**
Mookgophong	High Vulnerability	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	High Vulnerability	Low Vulnerability	Moderate Vulnerability	Moderate Vulnerability	**Very High Vulnerability**
Mopani	**Very High Vulnerability**	High Vulnerability	Moderate Vulnerability	**Very High Vulnerability**	Moderate Vulnerability	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	High Vulnerability	**Very High Vulnerability**	**Very High Vulnerability**
Polokwane	Low Vulnerability	Low Vulnerability	Moderate Vulnerability	High Vulnerability	**Very High Vulnerability**	High Vulnerability	Low Vulnerability	Moderate Vulnerability	High Vulnerability	Moderate Vulnerability	**Very High Vulnerability**	Low Vulnerability	Moderate Vulnerability	Low Vulnerability	**Very High Vulnerability**	Moderate Vulnerability
Thabazimbi	High Vulnerability	**Very High Vulnerability**	Moderate Vulnerability	**Very High Vulnerability**	**Very High Vulnerability**	Moderate Vulnerability	Low Vulnerability	High Vulnerability	**Very High Vulnerability**	High Vulnerability	**Very High Vulnerability**	High Vulnerability	Moderate Vulnerability	Low Vulnerability	Low Vulnerability	High Vulnerability
Vhembe	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	Moderate Vulnerability	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	**Very High Vulnerability**	Low Vulnerability	**Very High Vulnerability**	Moderate Vulnerability	High Vulnerability	**Very High Vulnerability**	**Very High Vulnerability**



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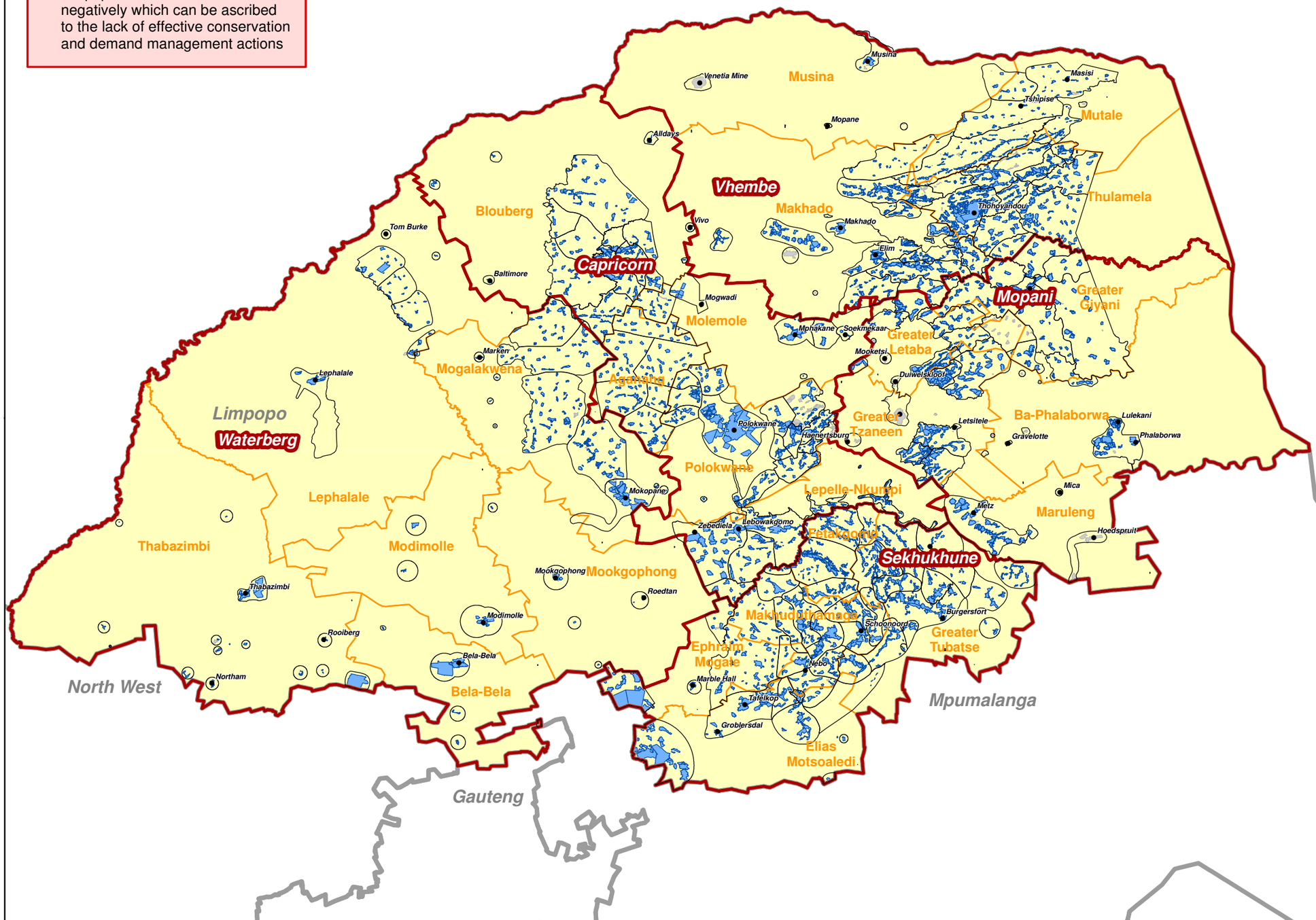
TOPIC 5 – OPERATION & MAINTENANCE

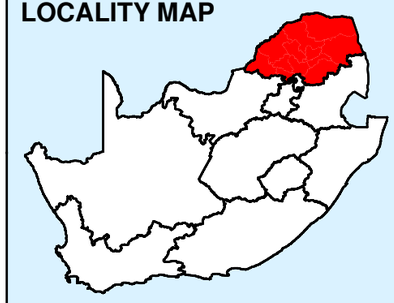
SETTLEMENTS NEGATIVELY AFFECTED DUE TO LACK OF EFFECTIVE CONSERVATION & DEMAND MANAGEMENT

Notes:

- More than 95% of settlements in Limpopo Province are affected negatively which can be ascribed to the lack of effective conservation and demand management actions



LOCALITY MAP



Intervention Requirement

Affected by conservation and demand management issues

Conservation & Demand Management	
Households	**Population**
836 396	3 306 957
Affected Settlements	
2 547	

BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries
- Water Scheme Areas
- Settlements

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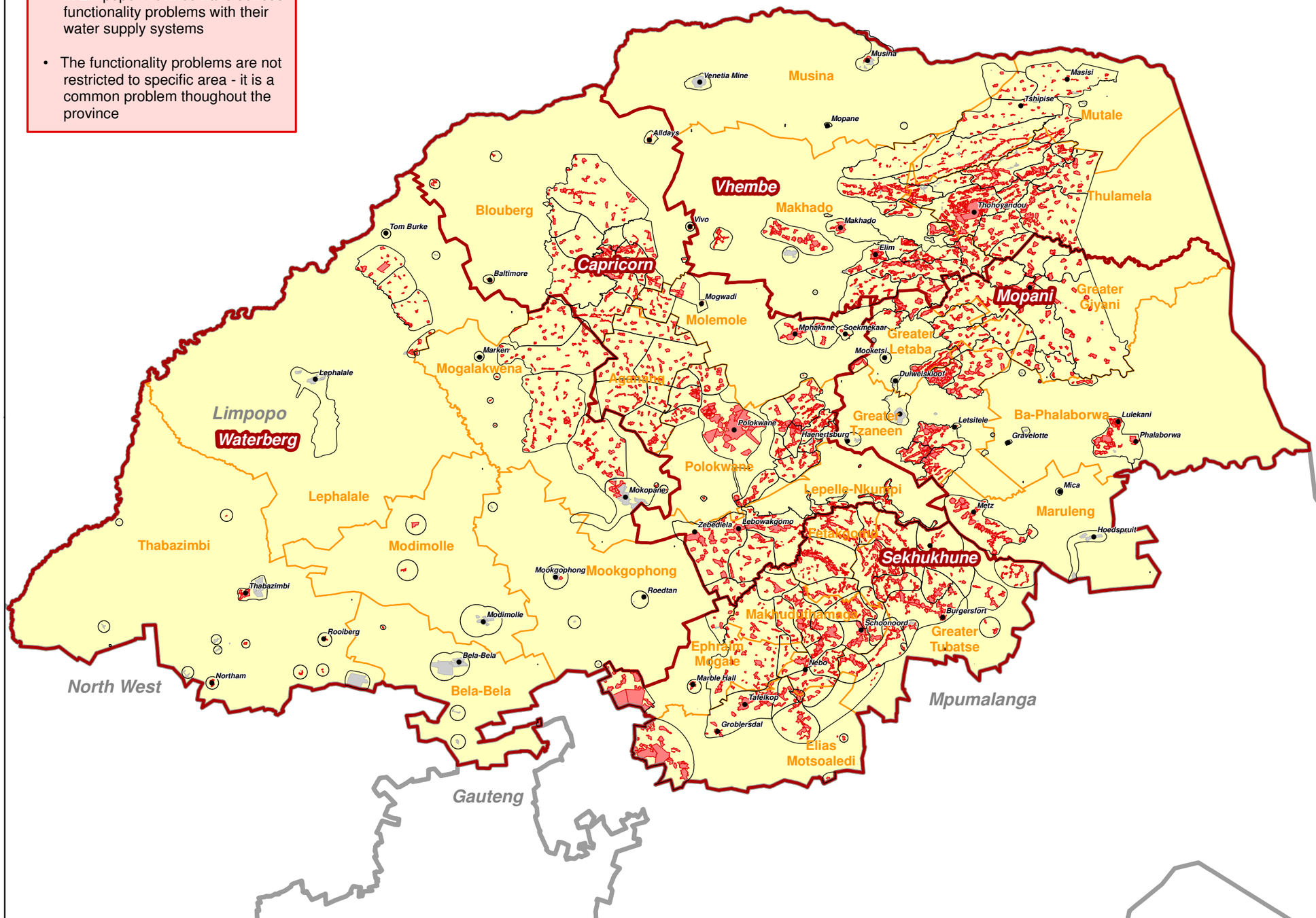
05.3 TOPIC 5 - OPERATION AND MAINTENANCE

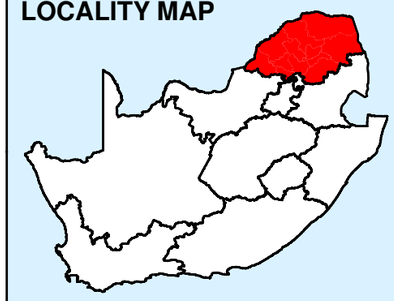
SETTLEMENTS AFFECTED BY SERIOUS FUNCTIONALITY ISSUES

Notes:

- More than 93% of settlements in Limpopo Province have serious functionality problems with their water supply systems
- The functionality problems are not restricted to specific area - it is a common problem thoughout the province



LOCALITY MAP



Intervention Requirement

Affected by serious functionality problems

Functionality problems	
Households	Population
581 103	2 299 369
Affected Settlements	
2 528	

BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries
- Water Scheme Areas
- Settlements

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TOPIC 5 - OPERATION AND MAINTENANCE

05.4

ASSOCIATED WATER SERVICES USERS

TOPIC 6 – ASSOCIATED SERVICES

06.1

STATEMENTS

Associated water users are government community service providers which uses potable water for their operations.

In Limpopo it became the norm that the government services sector departments develops its own on-site water and sanitation services. This situation results that the department have to divert their attention from their core functions to water services provision and in most cases are duplicating services which results in the wastage of financial and human resources. It is also financially wasteful to the country as duplication of infrastructure takes place.

It remains the obligation of the WSAs to ensure adequate water and sanitation functions in the areas of jurisdiction.

STATISTICS

The total calculated water demand for 2015 for the associated services sector in Limpopo, amounts to 72 618 kl/day or 26.5 Ml/year. At an average water tariff of R5.50/kl, the value of water used by the government sector in the Limpopo Province amounts to R 145.78 M/annum.

		Public Amenities					Education	Health Facilities		
District Municipality	**WSA**	**Police Stations**	**Magistrate Offices**	**Prisons**	**Resorts and Tourism**	**Mining**	**Schools**	**Health Centres**	**Clinics**	**Hospitals**
Capricorn	Capricorn	6		1			639	1	87	13
Capricorn	Polokwane	6	1	1			300	*Data not available*		
Mopani	Mopani	38	9	1			715	6	90	9
Sekhukhune	Sekhukhune	7	4		1		879	1	58	9
Vhembe	Vhembe	20		2		1	970	7	113	8
Waterberg	Belabela	2	*Data not available*				45		8	1
	Lephalale	2	*Data not available*				97		7	2
	Modimolle	2	*Data not available*				43		3	1
	Mogalakwena	3	*Data not available*				259		24	3
	Mookgophong	3	*Data not available*				30	1	3	
	Thabazimbi	4	*Data not available*				50		7	1
Total Number of Facilities		**93**	**14**	**5**	**1**	**1**	**4027**	**16**	**400**	**47**

STRATEGIC ANALYSIS

The WSAs should take responsibility for all government related water services provision in their areas of jurisdiction so that the provincial departments and organizations do not have to arrange their own water supply and storage systems. This will also ensure that duplication of services does not occur.

ACTIONS

1. Update the Limpopo Province data and ensure that all associated water use facilities are listed and that their water and sanitation services status are known.
2. Support WSAs to take ownership and total responsibility for reliable services at government and community services complexes.

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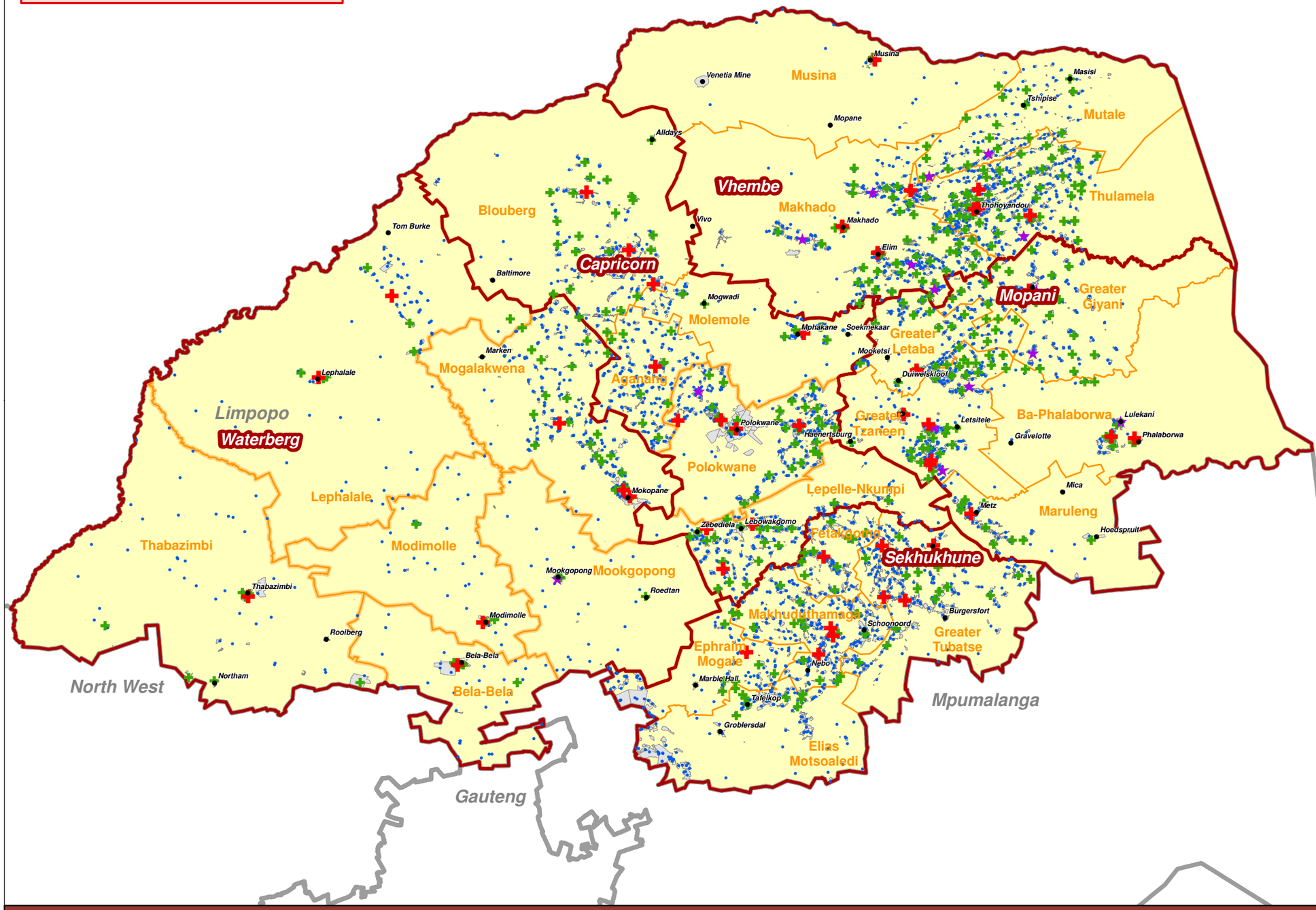
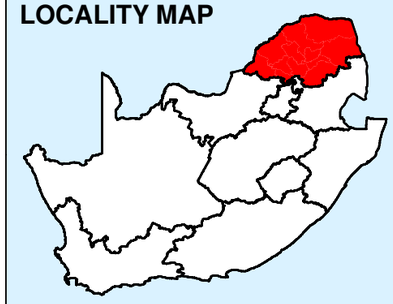
WATER SERVICES AT COMMUNITY FACILITIES

Planning Note :
This water supply status data is outdated (about 5 years) and efforts should be made to update the WSA/DWS reference framework database.



LOCALITY MAP



HEALTH FACILTIES

- Hospitals
- Health Centres
- Clinics

EDUCATION FACILTIES

- Schools

BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries
- Settlements

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TOPIC 6 - ASSOCIATED SERVICES

06.2

BOREHOLE INFORMATION AND MANAGEMENT (1 of 3)

TOPIC 7 – WATER RESOURCES (GROUND WATER)

07.1

STATEMENTS

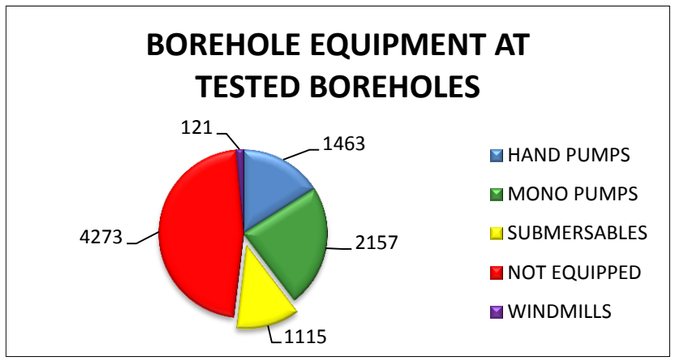
Ground water resources contribute significantly to the total volume of water supplied within the Limpopo Province. Surface and ground water sources play an ever increasing role in decisions that can influence the future economic growth for the Province. A large part of the Limpopo Province (approximately 60%) have a MAP (mean annual precipitation) of less than 500 mm/a.

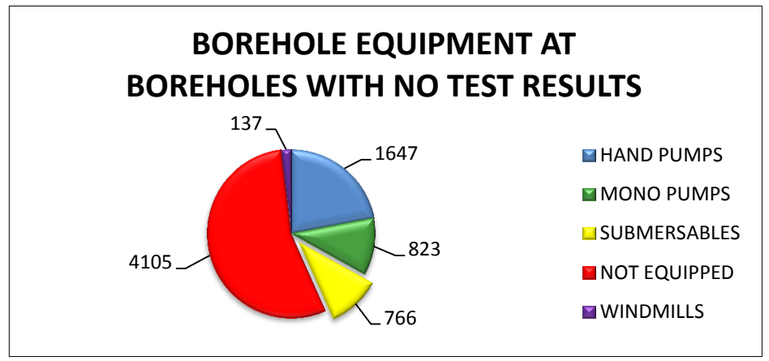
The groundwater resource is replenished by rainfall and it is a reliable source of water if managed through monitoring of abstraction, quality and the regional response of the static water level to pumping and rainfall. Ground water management also includes the protection of the resource against pollution. Good legislation should be in place and it must be properly enforced.

Poor management, limited or incorrect data and insufficient maintenance of the groundwater resource contributes to a negative attitude towards groundwater.

STATISTICS

The GRIP database is still extensively used in the province as the overarching data set. Tested boreholes with recommended yields, produce 742 073 m^3/day or 270.857 Mm^3 /a calculated from only 9 129 boreholes with recommended yields although only 4856 of these boreholes are listed with equipment. The data base indicates a further 7 478 boreholes with no test results of which 3 373 are equipped.





Borehole information includes borehole positions (coordinates) and data such as borehole depths, depths of weathering etc. for dry boreholes which is valuable and when available, it will minimize unnecessary attempts to drill boreholes in the vicinity where dry boreholes exist.

EXPLANATORY NOTES

Due to historic reasons production boreholes supplying villages are usually within a short distance (< 2 km) from communities and very few ground water wellfields exist within the province. Wellfield development in high ground water potential areas can be used for bulk supply areas and especially to supplement bulk surface water systems.

Although it is not advisable to have boreholes too close to one another in most geological formations due to influences between boreholes, monitoring during yield testing and detailed ground water models will supply sufficient information in order to design bulk systems from ground water sources. Technology such as electronic devices for monitoring, telemetry for borehole operations, protection for equipment against low water levels and electrical spikes together with scientific calculations regarding the groundwater sources, will ensure the sustainability of ground water wellfields.

STRATEGIC ANALYSIS

The availability and precision of ground water information is crucial for the accuracy of assumptions required for ground water exploitation and modelling, especially when time series ground water levels, monitoring data, rainfall figures and abstraction yields become available.

An adequate reporting structure allocating responsible people to record and maintain the borehole's equipment whilst monitoring water levels and abstraction volumes at regular intervals, can reduce breakdown costs, while creating employment opportunities.

ACTIONS

1. Ground water sources (Existing and new source development) should be included when upgrading, planning and designing bulk surface water systems.

2. Personnel must be employed and trained at local municipality level and each employee should be provided with infrastructure and tools (water level meters, GPS etc.) to effectively report at least on a weekly basis on any ground water related actions within his / her community.

3. All governmental / municipal boreholes are numbered with a specific H-Number for that area and if any none-private boreholes exist without an H-number, the correct number must be obtained and with a coordinate added to the database. When one dataset is utilized for all governmental / municipal institutions and the coordinates are correctly reported, any new data can be added or existing data requested to ensure already completed work is not duplicated.

4. The GRIP continuation reporting structure should not involve only the reporting on any activities at the utilized boreholes, but any drilling, testing etc. even within private yards. With such an established reporting basis and large quantities of data, the Limpopo province will have data and a system in place that can be utilized for detailed reporting, planning and development of future water source.

5. When employees/ operators grow into this concept and understand the importance of the data they submit, they will have pride in their work and soon the data accuracy will increase, more data will be submitted and they will take responsibility or even take over the ownership of the data or equipment.

6. Developing new ground water sources at strategic locations may not only add water into existing surface water systems but could ensure a more consistent supply of water and create jobs.

7. The drilling contractors should be compelled to register and supply data for any drilled borehole.

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BOREHOLE INFORMATION AND MANAGEMENT (2 of 3)

ACTIONS

1. Conduct a follow up hydro-census in all communities with the emphasis to collect information on additional ground water sources not listed on the current dataset and update the status of reported boreholes.

2. Launce projects to yield and chemically test at least the equipped boreholes with no available information on water quality and yields.

3. A centralized ground water data base (such as the GRIP data) is essential for the province; therefore the updating and capturing of data on the National and Limpopo province ground water databases must continue through a regulated and structured body. Information can be collected through a registration process, via a web-site, E-mails, SMS's or by electronic or hard copy submissions. The submission of ground water information should be enforced by a regulatory body, and offenders should be excluded from governmental appointments.

4. Create municipal or quaternary catchment specific projects focusing on the transfer of ground water from higher potential areas to lower potential. Establish a forum to train individuals for managing water supply systems. Increased training and an understanding of especially the ground water systems will result in taking responsibility and ownership of ground water sources.

5. The appointment of technically qualified and responsible persons to manage, monitor, operate and maintain boreholes will lead to more cost effective cost-recovery systems.

6. The existing DWS ground water monitoring network needs to be extended and maintained, this data forms an important component for regional evaluations and management decisions.

STATEMENTS

It is important to utilize sufficient, accurate and reliable ground water information when analysing data for statistical analysis and reporting such as this Limpopo Water Master Plan. The data utilized from the Limpopo "GRIP" data base is considered accurate and reliable but insufficient due to overdue follow-up hydro surveys to collect the data for additional boreholes drilled and the yield and chemical testing of boreholes with no available test results.

In some areas ground water is over-utilized while in other areas potential still exists for exploration and the identification of these areas is dependable on the accuracy and availability of data.

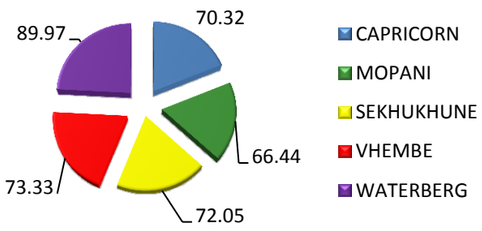
The department of Water and Sanitation (DWS) conducted various field surveys since 2001 to collect new ground water information and to update existing ground water data at villages within the Limpopo Province but due to limited funds this process is too slow and the current data set became outdated.

STATISTICS

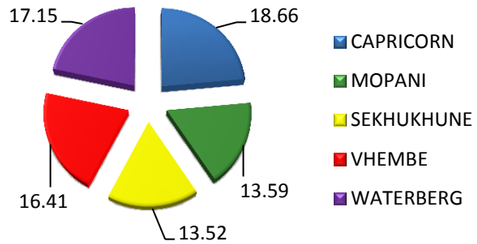
Out of the 25 372 total boreholes listed on the GRIP dataset, 9 129 has yielded test results, 4 856 are equipped (production boreholes), 13 738 have depths, 7 873 have recorded water levels, 8 396 have recommended yields and 4 894 have recorded water strike. This data is applied to determine the averages represented on the map in table format. Bela-Bela Local Municipality shows the highest average yield per borehole of 161.05 m^3/day although only 46 boreholes have yield test results for this local municipality. The Greater Tzaneen municipality represents the lowest average yield of 50.27m^3/day/ borehole calculated from 493 boreholes with available yield test results.

The average water strike depth for boreholes in the Limpopo Province is 47.29 m, while the Lephalale Local Municipality has the deepest average water strike of 101.12 m. The Thabazimbi Local Municipality has the shallowest average water strike depth of 24.75m. The average water level is calculated for each local municipality and illustrated on the tables within the attached map. The average measured static water level for the Limpopo Province is 15.90 m.

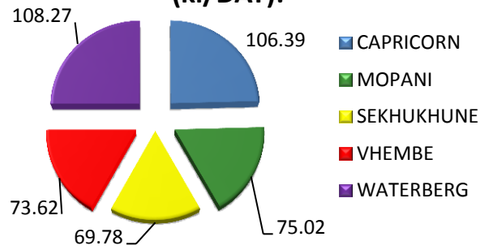
AVERAGE BOREHOLE DEPTH PER DISTRICT MUNICIPALITY (m):



AVERAGE WATER LEVELS PER DISTRICT MUNICIPALITY (m):



AVERAGE BOREHOLE YIELD PER DISTRICT MUNICIPALITY (kl/DAY):



EXPLANATORY NOTES

An estimated 50 new boreholes are drilled within the Limpopo Province daily, while less than 10% are reported or captured on the Limpopo Province ground water dataset and as a national resource, ground water information is the responsibility of all entities involved with ground water sources.

A huge quantity of ground water projects are completed every day, but when the data is not reported and captured on a central database, the data will not be available for future reference and huge amounts are spent on investigations, retesting of boreholes and even the drilling of new boreholes although good yielding boreholes exist but are just never equipped.

STRATEGIC ANALYSIS

Detailed ground water management strategies, along with sufficient operation and maintenance, will reduce water shortages while creating employment opportunities. Higher yields can be obtained through the implementation of detailed geological and geophysical investigations, especially in local municipalities with low average yields.

Although scheduled maintenance programs will reduce equipment breakdowns, it will also limit the periods the communities are without water and reduce long-term equipment replacement cost.

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BOREHOLE INFORMATION AND MANAGEMENT (3 of 3)

TOPIC 7 – WATER RESOURCES (GROUND WATER)

07.3

STATEMENTS

Correct, updated and available ground water information is valuable and therefore it is very important to ensure all ground water information is updated at regular intervals to ensure developers and planners can assess data with confidence from a central location such as the “GRIP” Web-site. Incomplete and limited data sets forces reporting institutions to make unnecessary assumptions through utilizing limited data sets.

The ground water information dataset (GRIP) hosts information such as water quality, borehole depths, water levels, water strike depths, yield test data, recommended abstraction yields, geological logs and more but require continuous updates, to ensure the data is a reliable representation of ground water.

Although the Department of Water and Sanitation (DWS) monitor water levels on a regional scale throughout the province, these stations do not include equipped (utilized) boreholes. The municipalities must extend the monitoring of water levels to the abstraction points (motorized boreholes) and should include abstraction volumes, on site rainfall figures and time series (bi-annually / annually) water quality information.

STATISTICS

When calculating the value of infrastructure of the information at hand it is clear that although the cost of equipment (motors, pumps, borehole pipes, pump rooms, pipe lines, trenching and storage) is high, the value of data and developing the ground water source is high and often not accounted for. The “BH” value calculated for each local municipality represents the cost (Rand value) for only developing the reported boreholes with the value of the data available on the data base. (drilling, yield tests, water quality results, calculations, geological logs, hydro census etc.), but excludes the value of the equipment installed, pipelines, etc.

Monitoring is done on a regional scale at 226 unequipped ground water sources within the Limpopo Province through utilizing electronic devices set to collect water levels at set intervals (hourly, six hourly, daily etc.). Although boreholes are tested, limited information and monitoring is done to ensure the boreholes are actually equipped and utilized at these calculated abstractions.

EXPLANATORY NOTES

Monitoring (time series data) forms an important and essential part of any reporting regarding ground water sources. With insufficient and incomplete datasets any reporting is considered, “thumb sucking”.

The local and district municipalities should ensure the data (water levels, abstraction volumes, rainfall and water quality data) is collected and reported.

The information collected can be used as an accurate tool to plan and budget for future ground water sources development and will also enable the municipalities to determine the over or under utilization of their valuable ground water sources, especially when over pumping occurs. The managers will receive early warning signals and can react timeously before the source runs dry long before it happens.

When water levels are significantly lowered at monitored boreholes that will mean the water levels away from the monitoring station at utilized motorized boreholes will already be critically deep and most probably too late to adjust pumping rates.

STRATEGIC ANALYSIS

Due to no monitoring at utilized motorized boreholes, communities are often without water for long periods, because the development of additional sources and the equipping thereof takes months.

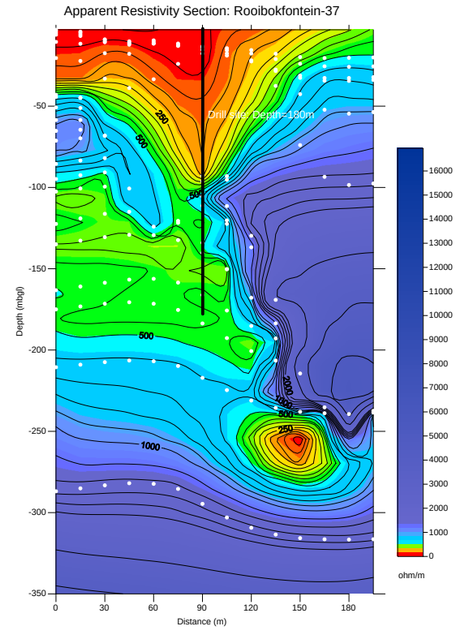
The volume of ground water stored underground is not visible, but the regular measuring of water levels and abstraction data make the interpolation of a sustainable yield possible.

Although ground water is replenished by rainfall, ground water stored under ground is not exposed to evaporation and although grass, plants and trees utilize some of the rain water entering the subsurface, ground water is not wasted or lost unless removed (pumped) to be utilized for consumption by humans and animals at the surface.

Boreholes are extremely vulnerable to theft and vandalism. Community awareness is required to emphasise the importance of protecting communal property.

ACTIONS

1. The existing DWS ground water monitoring network needs to be extended and maintained, this data forms an important component for regional evaluations and management decisions. Monitoring data must be available for planners, consultants and managers.
2. Monitoring data collected from mines and other sectors forms part of the water act and requirements of water-use authorization. Therefore needs to be included in the databases.
3. Especially during higher rainfall periods / seasons, it should be considered to implement projects to investigate the possibility of artificially recharging the ground water from surface water sources.
4. Rainwater harvesting and rain fog harvesting could be considered in higher rainfall regions and mountainous areas respectively to supplement the existing water supply.
5. Detailed geophysical investigations (Resistivity profile example below), correct test data and interpretations together with time series monitoring data will ensure more accurate targeting of structures, sustainable abstraction form boreholes and better assumptions regarding influences between ground water sources.



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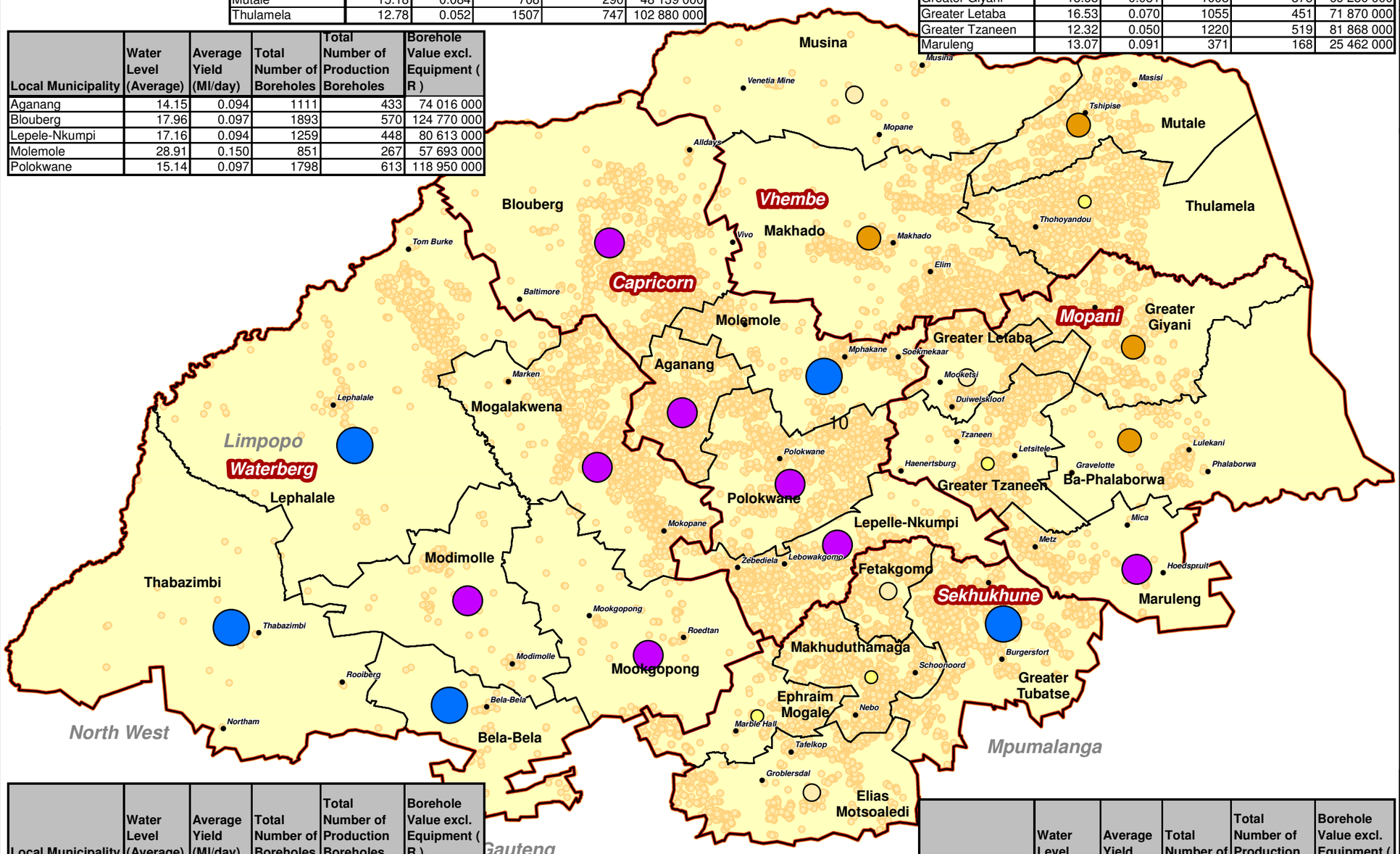
BOREHOLE INFORMATION SUMMARY

Local Municipality	Water Level (Average)	Average Yield (Ml/day)	Total Number of Boreholes	Total Number of Production Boreholes	Borehole Value excl. Equipment (R)
Makhado	17.63	0.084	1890	884	127 290 000
Musina	20.06	0.074	175	66	11 391 000
Mutale	15.18	0.084	708	290	48 139 000
Thulamela	12.78	0.052	1507	747	102 880 000

Local Municipality	Water Level (Average)	Average Yield (Ml/day)	Total Number of Boreholes	Total Number of Production Boreholes	Borehole Value excl. Equipment (R)
Aganang	14.15	0.094	1111	433	74 016 000
Blouberg	17.96	0.097	1893	570	124 770 000
Lepele-Nkumpi	17.16	0.094	1259	448	80 613 000
Molemole	28.91	0.150	851	267	57 693 000
Polokwane	15.14	0.097	1798	613	118 950 000

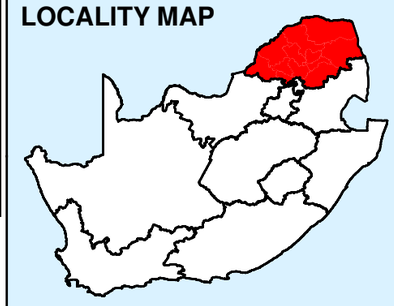
Local Municipality	Water Level (Average)	Average Yield (Ml/day)	Total Number of Boreholes	Total Number of Production Boreholes	Borehole Value excl. Equipment (R)
Ba-Phalaborwa	12.39	0.083	260	74	18 061 000
Greater Giyani	13.63	0.081	1003	375	69 250 000
Greater Letaba	16.53	0.070	1055	451	71 870 000
Greater Tzaneen	12.32	0.050	1220	519	81 868 000
Maruleng	13.07	0.091	371	168	25 462 000



Local Municipality	Water Level (Average)	Average Yield (Ml/day)	Total Number of Boreholes	Total Number of Production Boreholes	Borehole Value excl. Equipment (R)
Bela-Bela	19.75	0.161	91	35	6 360 500
Lephalale	12.12	0.104	742	261	49 391 000
Modimolle	14.13	0.086	176	52	11 587 000
Mogalakwena	13.82	0.086	2347	849	153 520 000
Mookgopong	18.81	0.089	125	56	8 452 400
Thabazimbi	24.28	0.124	28	10	1 918 100

Local Municipality	Water Level (Average)	Average Yield (Ml/day)	Total Number of Boreholes	Total Number of Production Boreholes	Borehole Value excl. Equipment (R)
Elias Motsoaledi	11.70	0.066	878	375	56 954 000
Fetakgomo	17.58	0.074	848	408	54 771 000
Greater Marble Hall	9.75	0.052	419	178	27 012 000
Greater Tubatse	17.43	0.106	1539	556	103 120 000
Makhuduthamaga	11.13	0.051	1564	620	102 410 000

LOCALITY MAP



Average Yield Per Day
M3/Day (Avg)

- 50.27 - 65.00
- 65.01 - 75.00
- 75.01 - 85.00
- 85.01 - 100.00
- 100.01 - 162.00
- Available Borehole Data

BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries

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TOPIC 7 - WATER RESOURCES (GROUND WATER)

07.4

GROUND WATER QUALITY

TOPIC 7 – WATER RESOURCES (GROUND WATER)

07.5

STATEMENTS

The chemical composition of water often renders ground water unsuitable for human consumption. The main problem constituents in the ground water are high salts (EC, TDS, Chloride), fluorides, nitrates and total hardness. Although hardness is not detrimental to health it does cause problems with the infrastructure.

Elevated chemical constituents such as fluoride is related to the geological formations intersected whilst the salt content (EC, TDS, Chloride) is mostly related to the residence time in the aquifer. Elevated nitrate concentrations are mostly often ascribed to poor on-site sanitation practices and agricultural activities in the vicinity of boreholes.

Treatment of the ground water or blending with other better quality water is often required to improve the quality.

STATISTICS

Ground water can be classified into five water quality categories. Class 0 (which is the best water quality) to Class 4 water that can cause severe health effects.

The chemical data sets available for the Limpopo Province show that 38.2% are classified as Class-3 or worse and only 28.8% Class-1 or better. 33% have Class 2 or marginal water quality. When comparing the total yields from tested boreholes against the chemical water quality classes, the largest volume available (35%) is classified Class-2, 22% (Class-1), 21% (Class-3), 13% (Class-0) and the remaining 9% Class-4 water.

Fluorides are elevated in the Waterberg and Sekhukhune districts. Elevated Fluoride is expected within the Nebo Granites and Waterberg Sandstones, Elevated salts are expected in the dryer western and extreme northern parts of the province.

Boreholes within or near communities, cattle kraals and overgrazed or intensively cultivated lands experience elevated nitrates due to poor sanitation and inappropriate agricultural activities.

Total Hardness (T.H.) averages Class-2 throughout the Limpopo province.

EXPLANATORY NOTES

The Limpopo ground water quality dataset is mapped as potability per local municipality area. The main elements used to determine the potability were salts (EC, TDS, and chloride), nitrates, fluorides and total hardness

The water quality classes for 8 092 boreholes were available and the totals for each Class are presented on the “Water quality per Class – Limpopo” diagram.

STRATEGIC ANALYSIS

Limpopo province has a representative ground water dataset but lacks time series data. It will be of utmost importance to maintain and expand this dataset. From the data sets analysed, it is evident that the average water qualities of the four elements reported, varies within local municipal boundaries and therefore blending water between boreholes and bulk systems with surface water sources may be viable.

Regular monitoring of water quality and abstraction volumes will assist service providers to manage blending. This is especially critical for ground water as the resource environment is not visible. Ongoing funding should be made available for the supply of information, monitoring of ground water sources and the updating of the already existing databases.

Many boreholes have useful recommended yields but are not in use due to unsuitable chemical water quality. Boreholes that are not used due to poor quality could be considered for blending or treatment.

While water treatment is often not an option due to high cost, smaller treatment plants should be considered where potable water for drinking and cooking is not available. Water treatment will require a detailed operation and management plan but can also create work opportunities and reduce unemployment.

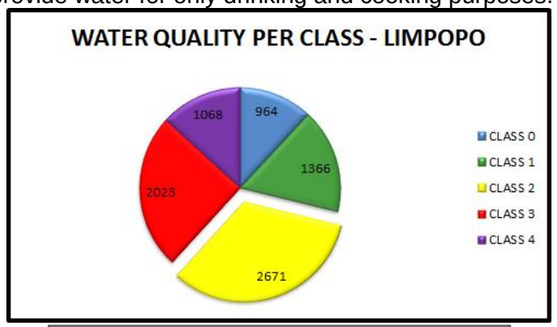
ACTIONS

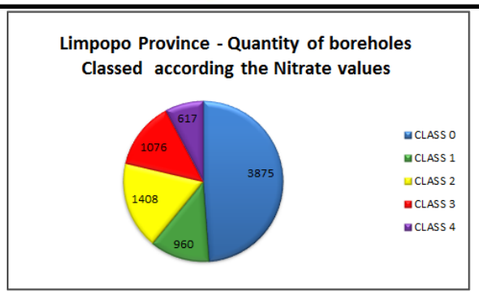
1. A network of water quality monitoring stations should be established throughout the Limpopo province.

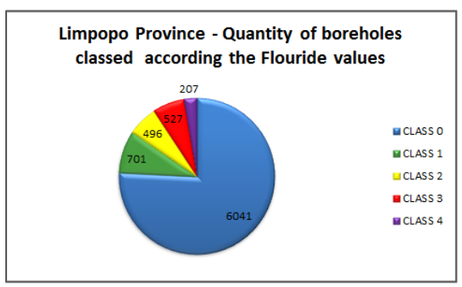
2. Blending between groundwater sources with different elevated chemical elements must be investigated as an alternative to treatment and implemented where feasible.

3. Where bulk surface water pipeline systems exist blending with high yielding poor quality boreholes should be considered to increase the quantity of water supplied.

4. Smaller treatment plants need to be considered to provide water for only drinking and cooking purposes.







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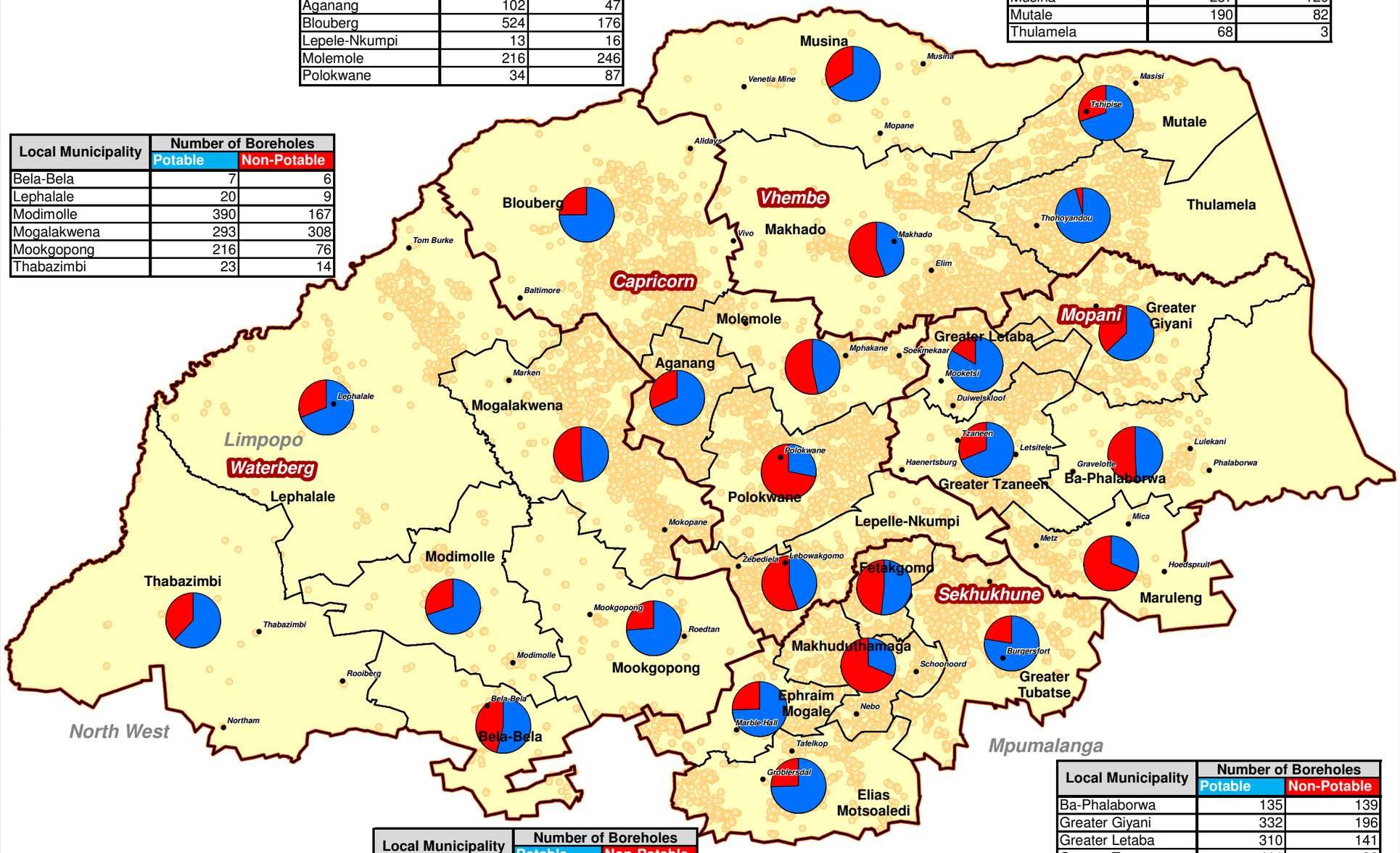
GROUND WATER POTABILITY

Local Municipality	Number of Boreholes	
	Potable	Non-Potable
Aganang	102	47
Blouberg	524	176
Lepele-Nkumpi	13	16
Molemole	216	246
Polokwane	34	87

Local Municipality	Number of Boreholes	
	Potable	Non-Potable
Makhado	243	302
Musina	237	120
Mutale	190	82
Thulamela	68	3

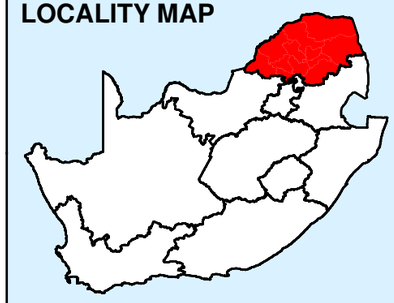
Local Municipality	Number of Boreholes	
	Potable	Non-Potable
Bela-Bela	7	6
Lephalale	20	9
Modimolle	390	167
Mogalakwena	293	308
Mookgopong	216	76
Thabazimbi	23	14



Local Municipality	Number of Boreholes	
	Potable	Non-Potable
Elias Motsoaledi	494	169
Fetakgomo	242	226
Greater Marble Hall	196	67
Greater Tubatse	128	37
Makhuduthamaga	74	162

Local Municipality	Number of Boreholes	
	Potable	Non-Potable
Ba-Phalaborwa	135	139
Greater Giyani	332	196
Greater Letaba	310	141
Greater Tzaneen	411	82
Maruleng	94	210

LOCALITY MAP



Potability

- Potable
- Non-Potable
- All Borehole Data

BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries

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TOPIC 7 - WATER RESOURCES (GROUND WATER)

07.6

GROUND WATER POTENTIAL

TOPIC 7 – WATER RESOURCES (GROUNDWATE)

07.7

STATEMENTS

Many users, especially in the rural communities are reliant on ground water as their only dependable water source.

Varying quantities of ground water is available and abstracted across the Limpopo Province. The changes in the volumes of available ground water are dependent on the underlying aquifer's hydro-geological characteristics - such as the transmissivity and storativity. Further the rainfall patterns and the recharge to the aquifer also impacts the ground water potential. In a number of catchments over-exploitation of ground water resources are evident where the abstraction rates exceed the recharge rates. In these instances ground water abstraction is deemed to be not-sustainable, and may lead to borehole failure and a bad reputation for ground water as a potential water resource. Ground water however is a manageable and reliable resource when the ground water is used in a sustainable manner.

The population density is not evenly distributed through the province. The quaternary catchments that are heavily populated are typically characterized by many settlements and high ground water abstraction for domestic supply, while other catchments are hardly populated at all.

The harvest potential, which formed the basis for the analysis, aims to provide estimates of the annual maximum volume of water that can be sustainably abstracted from a unit area. The harvest potential is then used to determine the area required to sustain the existing ground water abstraction and to recommend the potential for further ground water development.

STATISTICS

About 8 % of all the settlements in Limpopo are either already over-exploiting or had fully developed the available sustainable groundwater quantity. On a local community level 89 % of the communities have a potential to develop an additional 343 m^3/day (4 l/s) in a 2.5km radius around the villages. Only 3 % of the communities in Limpopo have a potential to develop more than 343 m^3/day in the close proximity to the village. The potential is based on the currently developed boreholes in use, and does not account for existing boreholes that are drilled, but not equipped or in use.

On a regional scale, 57 % of all the populated quaternary catchments have a low potential for further ground water development. This implies that while boreholes may form an important factor in local water supply networks, much of the ground water has already been developed and is no longer available for regional water supply schemes. Cross catchment boundary transfers of ground water can only be considered from quaternary catchments that are uninhabited with low existing ground water abstraction.

EXPLANATORY NOTES

The harvest potential is expressed as a volume of water that can be abstracted per unit area per annum ($m^3/km^2/a$). The harvest potential thus gives an indication of the area required to sustain ground water abstraction, and by conclusion the potential for further ground water development.

Unless otherwise specified in the GRIP database, ground water development within a 2.5 km radius from a community is deemed to be a local water supply. On an individual settlement level the sustainability of the existing ground water development is evaluated and colour coded to highlight communities that have the potential for further ground water development (High or Moderate Potential) in the vicinity, and those that do not (Low Potential).

On a regional scale the harvest potential and the already developed ground water sources are compared to classify each quaternary catchment according to the potential for further ground water development. Each quaternary catchment is classified as having either a low potential for further ground water development, a moderate potential for further development or a high potential for additional ground water development.

Areas with a high potential for further ground water development could be targeted for ground water development for inter-quaternary catchment water transfer.

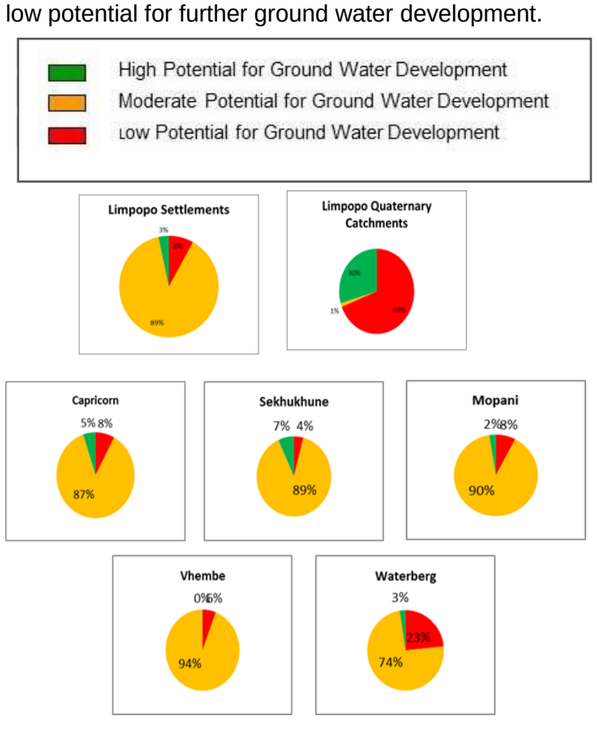
STRATEGIC ANALYSIS

All of the district municipalities still have potential to develop local ground water supply. 89 % of all Limpopo communities have a moderate potential for ground water development to supplement local supply. It is only in Capricorn and Sekhukhune where there are more than 5% of the local settlements where there is still a high potential for ground water development.

In all of the district municipalities 4% or more of the communities have fully developed their ground water potential, and other than the replacement or maintenance of existing boreholes, no further significant ground water development can be done to supplement local water supply.

ACTIONS

1. The development of the ground water resource should be based on both the local and regional ground water potential. Development of additional abstraction boreholes in areas that are already fully developed will result is unsustainable use and future borehole failure.
2. Accurate, reliable and current information regarding ground water use and abstraction rates are thus crucial for determining the potential for further ground water development.
3. Monitoring of the ground water environment, including ground water levels, water quality and cumulative abstraction may be the single most important component of good ground water management. Comprehensive monitoring programs need to be developed and implemented to ensure the sustainable use of this national resource.
4. An up-to-date and verified GRIP data set will facilitate the communication of ground water related information allowing consultants the opportunity to work on common data sets to the benefit of the overall management and use of the resource.
5. 69% of Limpopo quaternary catchments exhibit a low potential for further ground water development.



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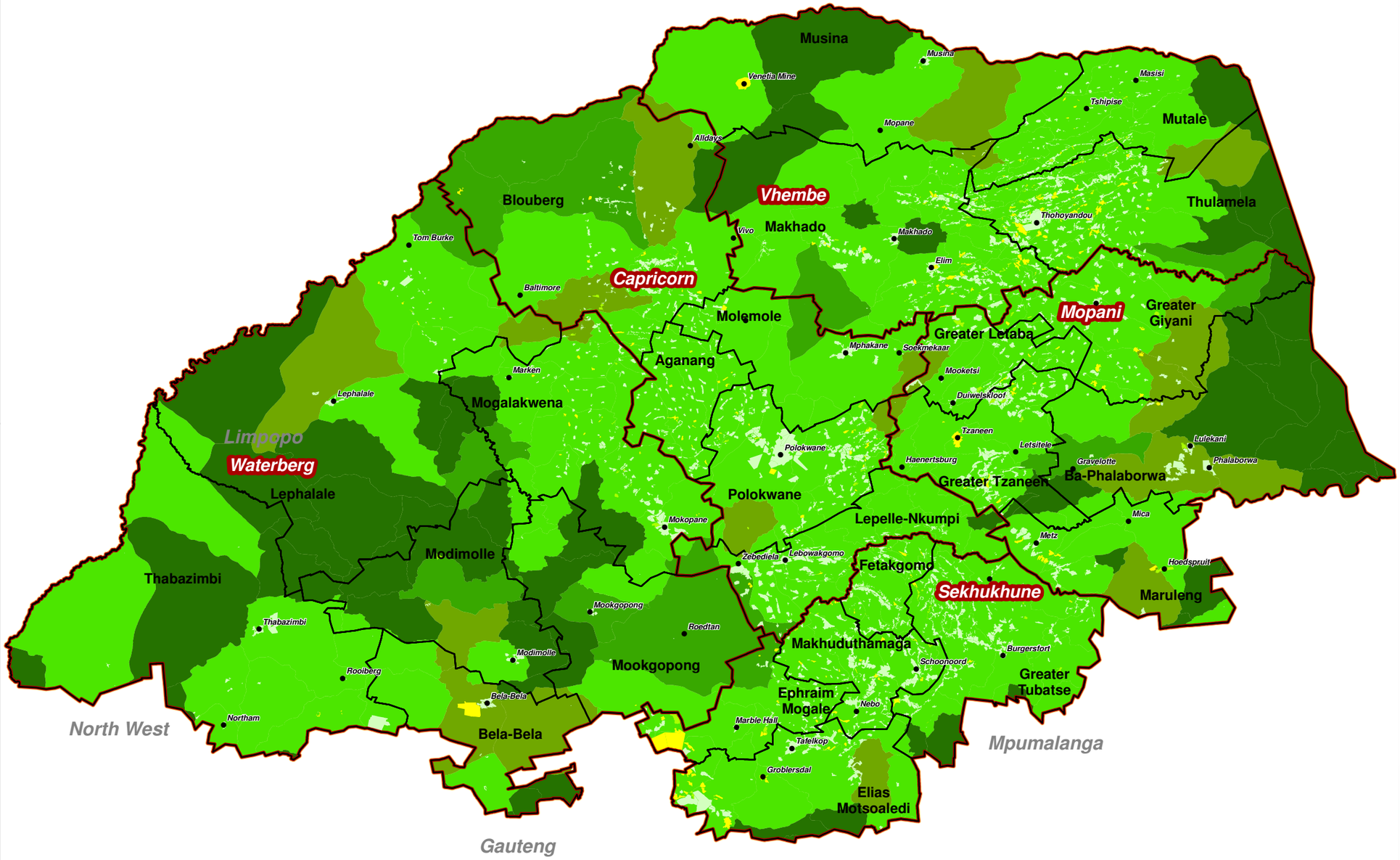
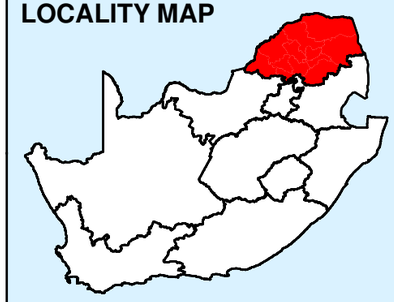
LIMPOPO GROUND WATER POTENTIAL



LOCALITY MAP



Local Development Potential

- Low Potential
- Moderate Potential
- High Potential

Wellfield Development Potential

- Low Potential
- Moderate Potential
- High Potential

Catchment Transfer Potential

- High Potential

BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries

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TOPIC 7 - WATER RESOURCES - GROUND WATER

07.8

SURFACE WATER (1 of 3)

TOPIC 7 – WATER RESOURCES (SURFACE WATER)

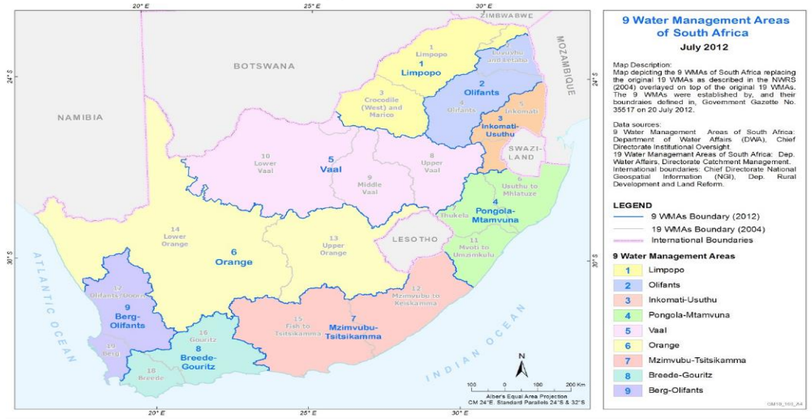
07.9

STATEMENTS

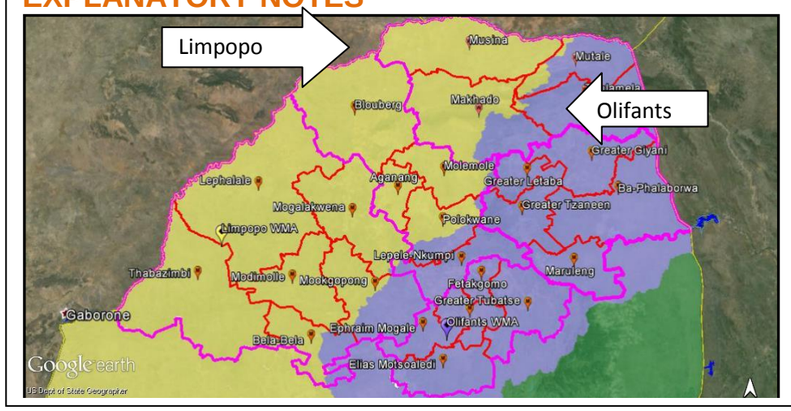
This section reports on the surface water resources for the Limpopo Province which is made up of Vhembe, Mopani, Greater Sekhukhune, Waterberg and Capricorn District Municipalities. In terms of water resources planning, Department of Water and Sanitation use catchments or Water Management Areas (WMAs) and not any institutional boundary. From a water resources planning perspective, the Limpopo Province is comprised of the Limpopo North and the Olifants Water Management Areas (WMA), as defined in the Second Edition of the National Water Resource Strategy (NWRS-2, 2012). Catchments within Limpopo Province are stressed with high demand for water for development activities. The majority of dams available are fully allocated and the quality of water renders surface water a limited resource for future development needs of the province.

The list of major dams in the Limpopo North showing the yields and the allocations/demands as well as transfers taking place

DAM	Historical Yield (million m³/a)	Allocations (million m³/a)		
		Domestic	Irrigation	Other (Mining)
Mokolo Dam	23.0	1.0	10.4	17.2
Doorndraai Dam	8.6	4.4	3.7	2.0
Glen Alpine Dam	5.6		5.9	
Nzhelele Dam	21.5	0.5	29.0	
Seshengo Dam	1.4	0.6		
Mutshedzi Dam	3.7	3.7	1.4	
Dap Naude Dam	5.6	4.9		
Ebernezer Dam	21.9	15.0	3.5	
Houtrivier Dam	0.6	0.6		
Albasini Dam		2.2		
Chuene/ Maja Dam		0.4		
Molepo Dam		0.9		
Roodeplaat Dam	21.3	3.0		
Luphephe Dam	5.9			
Olifantspoort Weir		5.6		



EXPLANATORY NOTES



The map shows local municipalities within Limpopo Province - North Water Management Area and Olifants Water Management Area

STRATEGIC ANALYSIS

There is projected surplus water in the Crocodile River which could supply augmentation needs of the Lephalale area (proposed Mokolo-Crocodile West Augmentation Project-2 transfer scheme).
Optimal use of local resources in the Waterberg area will continue and surplus water in the Crocodile River catchment will be transferred to the Lephalale area.
Water resources are extremely limited in the Sand River catchment. There are no major dams and water resources are limited to the smaller Seshego and Houtivier dams and run-of-river abstractions.
Urban water supply centres are augmented by transfers and these transfers form part of Olifants-Sand and Letaba Regional Water Supply System.
Two major dams exist in Mogalakwena River sub-area. The Doorndraai dam is over allocated (domestic and mining use), while Glen Alpine Dam is meant for irrigation use (allocation not fully utilised) and could be considered for domestic supply.

ACTIONS

The following are actions to be considered to augment surface water supply in Limpopo North Water Managment Area

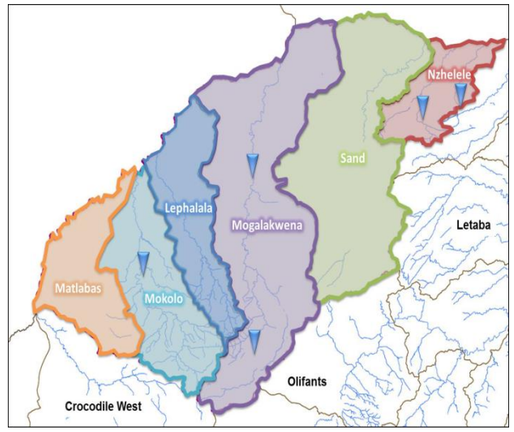
1. In the Mokolo River Sub-area the feasibility for the rising of the level of the Mokolo Dam.Constructing of a dam in the upper reaches of Mokolo River.

2. In the Mogalakwena River Sub-area, the possibility of constructing the Rooipoort Dam has been considered as additional supply source. Construction of infrastructure to transfer water from the Flag Boshielo Dam, in the Olifants WMA to supply new mining areas in Mokopane started in 2012.

3. Growing domestic requirements in the Modimolle and Mookgophong will require additional 8.5 million m^3/a by 2040 which will be supplied by either the Roodeplaat Dam or Klipvoor Dam on the Pienaars River (Crocodile River West).

4. In the Nzhelele sub-area, the rising of the level of Nzhelele dam (irrigation water supply), and the rising of the level of Mutshedzi dam (domestic water supply) are possible future options. Importing water from Mutale River or Vondo dam and transfering from Zhove dam in Zimbabwe to supply the coal mining developments and to augment irrigation supply could be a feasible option. Approximately 30 million m^3/a can be purchased from ZINWA. Transfer from Nandoni dam a possibility.

5. In the Sand River Sub-area possible future water sources identified include development of well-fields Albasini, Welgevonden, Nooitgedacht and Sand River well field in Louis Trichardt and alternative developments include the proposed Mapungubwe Dam and Vryheid Dam.



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SURFACE WATER (2 of 3)

ACTIONS

1. The intention of Department of Water and Sanitation is to operate Flag Boshielo Dam and the new De Hoop Dam in conjunction to alleviate the huge water demands placed on Flag Boshielo Dam. The infrastructure to do so is far from completion.

2. Groundwater development and wastewater re-use will play a major role in supplying enough water from Flag Boshielo Dam to meet the required demands.

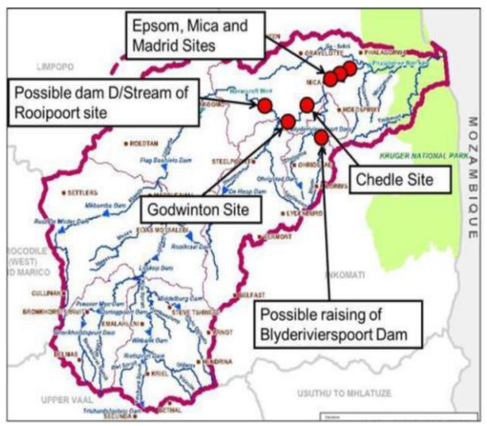
3. WC&WDM for irrigation and domestic water systems will free up a significant amount of water.

4. Eradicate unlawful water use will also ensure more water.

5. A feasibility study to get water from Tokwe Mukosi Dam in Zimbabwe to supply Limpopo Province has been tabled.

6. The system yield in the Olifants WMA includes transfers of water into the Olifants River Catchment from the Vaal , Usuthu and Komati River Catchments totaling 228 Mm^3/a for the seven ESKOM power stations within the catchment.

7. Possible Dam sites were identified



STATEMENTS

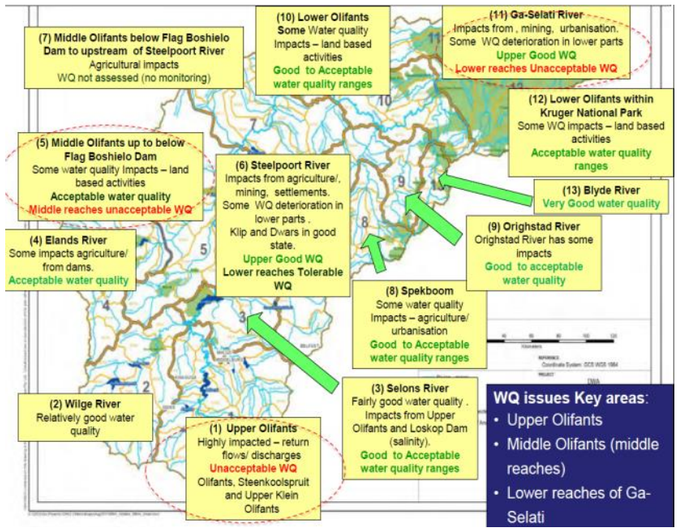
The Olifants River Water Supply System provides water for domestic and industrial water use purposes, irrigation, mining and power generation.

The list of major dams in the Olifants catchment showing the yields and the allocations/demands is presented. The catchment is fully allocated and alternative sources of water are needed.

DAM	Historic Yield (million m^3/a)		1:50 Yield (million m^3/a)	Allocations (million m^3/a)		
	Excluding EWR	Including EWR		Domestic	Irrigation	Other (Mining)
Blyderivierspoort Dam	110.0			2.3	60.0	
Ohrigstad Dam	18.9		19.8			
Mkombo Dam	11.7		11.7		0.4	
(Rhenosterkop dam)Weltevreden Weir	8.1	7.6	11.7	19.8		
Rust de Winterdam	9.8		9.8	1.6	2.0	0.5
Loskop Dam	161.0		168.0	8.4	200.7	
Bronkhorstspruitdam	16.9		23.5			
Middelburg dam	12.6		14.0			
Witbank dam	29.5		33.0	36.1	8.0	
Tzaneen dam			105.0			
Modjaji			5.8			
Nsami			0.7			
Flag Boshielo Dam	53.0	53.0	56.0	3.1	13.1	
De Hoop Dam	98.0	66.0	99.0	30.3	30.3	5.4

EXPLANATORY NOTES

The water quality status in the Olifants Water Management Area is presented on the map. This has a detrimental effect on the overall water availability within the catchment for domestic use.



STRATEGIC ANALYSIS

Interventions to consider that will reduce the water requirements in the Olifants catchment area are:
1.Water Conservation and Demand Management for the Irrigation, Urban and Mining Water Use Sectors with target saving of 58 Mm^3/a – phased in over 5 years for the former two sectors and over 10 years for the latter, all from 2013.
2. Eliminating unlawful water use – phased in over 5 years from 2015.

Interventions that will increase the water supply in the Olifants Water Management Area are:
1. Removal of invasive alien plants (IAPs) – implemented over 25 years from 2010.
2. Groundwater development from 2015 over the next 23 years.
3. Treatment of additional decant water from existing and decommissioned and rehabilitated coal mines.
4. Sewage water re-use in Polokwane and Mokopane by utilising increasing effluent.

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TOPIC 7 – WATER RESOURCES (SURFACE WATER)

07.10

SURFACE WATER (3 of 3)

TOPIC 7 – WATER RESOURCES (SURFACE WATER)

07.11

STATEMENTS

The Letaba catchment falls within the Olifants Water Managment Area and Luvuvhu catchment falls within the Limpopo Water Managment Area. The catchments are almost fully developed and demands from Letaba River currently exceed the yield capability of the system. Regulation of Letaba River is mainly provided by Middle Letaba, Ebenezer and Tzaneen dams. The completed Nandoni Dam located in the Luvuvhu catchment will be used in combination with Albasini, Vondo and Damani Dams to be managed as one system.

STATISTICS

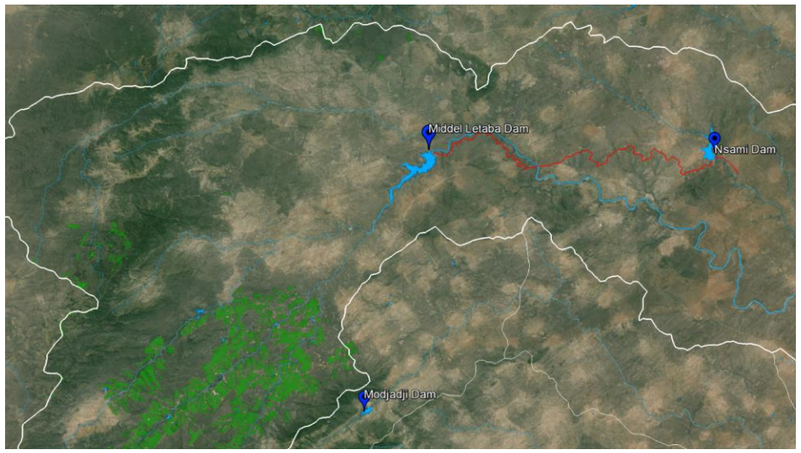
The following reservations were made in the National Water Resources Strategy with regards to transfers from the Luvuvhu and Letaba WMA to neighbouring WMA's:

1. The existing transfer of 2.4 Mm³/a from Albasini Dam to Makhado in the Limpopo WMA.

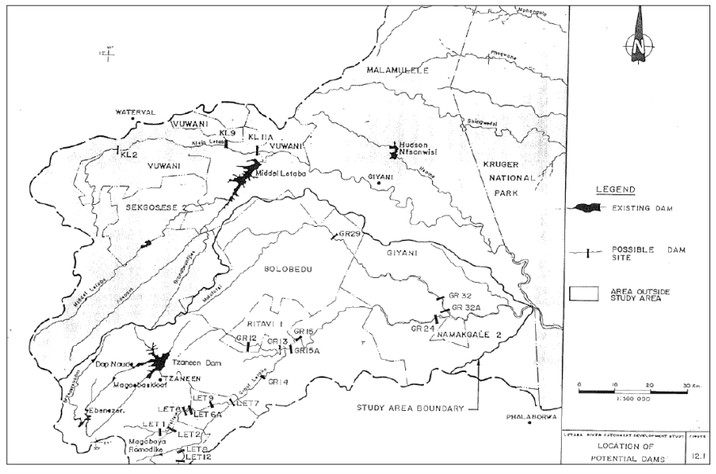
2. Additional allocation to be reserved from either the Albasini Dam or Nandoni Dam for possible transfer to Makhado and Matoks in the Limpopo WMA.

3. A maximum of 18.1 million m³/a available from Ebenezer Dam and Dap Naude Dam for transfer to Polokwane in the Limpopo WSA.

4. Existing transfers of approximately 0.7 million m³/a from the Groot Letaba River for mining near Gravelotte and to domestic users in the Olifants WMA.



EXPLANATORY NOTES



The following are possible dam sites and options for increasing water availability:

1. Raising of Tzaneen Dam

2. Construction of Janetsi Dam (SIte GR15A)

3. Construction of Hobson's Choice Dam (Site LET2)

4. Construction of Nandoni Weir (Site GR24)

5. Construction of Mulele Dam (Site GR29) or sand abstraction schemes along the Molotsi River (if feasible).

STRATEGIC ANALYSIS

- Strategic perspectives on the main interventions and options with respect to the future water availability and optimal utilisation of water in the Luvuvhu and Letaba water management areas are:
- Luvuvhu/Mutale subarea: Portion of domestic supply to come from Nandoni Dam and possible transfer to Makhado if there is surplus. Should coal fields be developed in future in the north of the WMA, then water could be sourced from Nandoni Dam, a possible new dam on the Mutale River or by abstraction from the Limpopo River.
- Shingwedzi subarea: Augmentation from Nandoni dam where ground water is insufficient as it is the primary source of water.
- Groot Letaba sub-area: There is need for compulsory licensing to reorganise water use in the catchment and possible mining developments may be supplied from proposed Nwamitwa Dam on Groot Letaba River which may alleviate impacts on other users because of implementation of the Reserve.

ACTIONS

1. Water supply for domestic use (via District and local municipalities) to receive priority and to be supplied from following sources in order of priority:
   - Water conservation and demand management
   - Groundwater
   - Further development of the surface water resources like construction of dams in the catchment.

2. The broader strategy is to implement compulsory licensing and the implementation of reserve is underway. To alleviate negative impacts the construction of Nwamitwa dam and raising of Tzaneen Dam has been approved and underway.

3. Improved operation of the system. The scope is to utilise Ebenezer Dam more efficiently to spread the risk between irrigators upstream and downstream of Tzaneen Dam.

4. An urgent drought analysis for Thabina Dam is required and construction of Ngwabu Dam to supply irrigation.

5. It is important to note that while Nandoni Dam will bring surplus within Luvhuvhu/Mutale sub area, water availability in the Great Letaba and Klein Letaba will be seriously impacted by implementation of the Reserve. The new surface water development is likely to be affordable for high value uses, such a mining and related uses. Water for poverty alleviation and rural development can partially be sourced from Nandoni Dam or from re-allocation of irrigation water.

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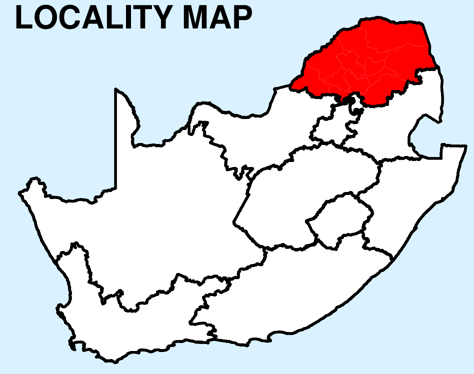
SURFACE WATER DEVELOPMENT

Dam Construction Sites

1 - Raising of Tzaneen Dam
2 - Construction of Janetsi Dam
3 - Construction of Hobson's Choice Dam
4 - Construction of Nandoni Weir
5 - Construction of Mulele Dam or Sand Abstraction
6 - Construction of Nwamitwa Dam
7 - Possible dam on Mutale River
8 - Raising of Mokolo Dam or Additional Dam
9 - Construction of Rooipoort Dam
10 - Raising of Nzhelele Dam a possibility
11 - Raising of Mutshedzi Dam a possibility

LOCALITY MAP



Possible Dam Sites
Dams
Rivers

Catchment Management Areas

Limpopo
Olifants

BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries

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DOMESTIC AND BUSINESS WATER SOURCE INFRASTRUCTURE BALANCE PER WSA

TOPIC 8 – WATER RESOURCES

08.1

STATEMENTS

The water source balance is the difference between the water demand (Topic 2) and the water resources (Topic 7) and will either reflect a surplus or deficit. The combined available ground and surface water is used as the available Water Resource. The total Domestic and Business water demand is used (i.e. the potable water required by the WSA/Water Scheme Area) and no provision is made for wastage of water, as it is assumed that proper WCLWDM is implemented.
The water balance further assumes the total functionality of water systems per water scheme area. No provision is made for community irrigation or livestock watering in the domestic demands. The water source balance was refined to accommodate source locality and feasible infrastructure constraints, resulting in the water source Infrastructure Balance

The figures in the tables below present the following calculated from the probable scenario:

- Developed 2015 : The 2015 water infrastructure balance,
- Developed 2045 : The 2045 water infrastructure balance if no further development takes place from 2015 (this shows the extent of the problem if no development takes place).
- Developed & Potential 2045 : The 2045 water infrastructure balance which assumes all available potential is utilised i.e. bulk conveyance infrastructure has been built to utilize all feasible water resources.

CAPRICORN

LM	Scheme Name	Water Scheme Area	Water Infrastructure Balance (Ml/day)		
			Developed 2015	No Development 2045	Developed & Potential 2045
Aganang	CAGBAK/NC3	Bakone GWS	*-0,726*	*-0,930*	*-0,478*
	CAGE/NC3	Aganang East GWS	*-0,478*	*-1,143*	*-0,728*
	CAGM/NC3	Ga Mokobodi GWS	*-0,469*	*-0,533*	*-0,131*
	CAGN/NC12	Aganang North GWS	*-0,119*	*-0,125*	0,055
	CPH/NP44-CDM	Houtrivier RWS - CDM	*-0,100*	0,011	0,516
	CPMS/NC8 - CDM	Moletje South GWS - CDM	*-0,964*	*-1,189*	*-0,175*
Blouberg	CAGV	Vivo Supply	*-0,111*	*-0,172*	*-0,130*
	CBALL	Alldays BS	*-0,376*	*-0,500*	*-0,381*
	CBARCH/NC12	Archibald GWS	*-0,118*	*-0,195*	*-0,087*
	CBAV	Avon GWS	*-0,310*	*-2,442*	*-1,877*
	CBB/NC11	Blouberg RWS	*-0,399*	*-0,944*	*-0,363*
	CBB0/1	Baltimore Supply	*-0,024*	*-0,054*	*-0,021*
	CBB0/2	Maasstroom Supply	*-0,102*	*-0,173*	0,000
	CBB0/3	Zwartwater Supply	*-0,124*	*-0,180*	0,000
	CBDAL	Dalmeny Local WS	*-0,002*	*-0,002*	0,000
	CBGH/NC12	Ga Hlako RWS	*-0,409*	*-1,023*	*-0,413*
	CBGor/NC11/NC12	Gorkum GWS	*-0,033*	*-0,071*	*-0,011*
	CBGR/NC12	Ga Rawesi GWS	*-0,041*	*-0,077*	0,000
	CBS/K/NC12	Silwermyn / Kirstenspruit GWS	*-0,217*	*-0,347*	*-0,046*
	CBS/NC11	Senwabarwana GWS	*-0,803*	*-3,370*	*-1,917*
	CBT/NN17	Taaiboschgroet GWS	*-0,620*	*-1,456*	*-0,220*
	CBTHA/NC11	Thalahane GWS	*-0,119*	*-0,238*	0,000
Lepelle-Nkumpi	CLNASH	Ashmole Dale WS	*-0,004*	*-0,005*	0,000
	CLNGRH	Groothoek RWS	*-2,028*	*-7,671*	*-2,537*
	CLNMAFEF	Mafefe Individual GWS	*-0,411*	*-0,633*	0,000
	CLNMAT	Mathabatha Individual GWS	0,175	0,418	1,275
	CLNMPHAHL	Mphahlele RWS	0,970	*-2,846*	*-0,141*
	CLNSPEC	Specon RWS	2,808	0,371	1,008
	NSA04	Flag Boshielo RWS/West WS	*-0,115*	0,707	2,507
Molemole	CMBOT	Botlokwa GWS	*-3,246*	*-3,137*	5,531
	CMMAKG	Makgalong A & B GWS	*-0,011*	0,099	0,245
	CMMW01	Mogwadi / Wurthsdorp GWS	*-0,399*	0,449	5,679
	CMMW02	Molemole West Individual GWS	*-0,046*	3,877	5,748
	CMN	Nthabiseng GWS	*-0,561*	*-0,727*	1,010
	CMR	Ramakgopa GWS	*-0,125*	*-0,246*	2,694
	CMRIET	Rietgat GWS	*-0,017*	*-0,015*	0,024

MOPANI

LM	Scheme Name	Water Scheme Area	Water Infrastructure Balance (Ml/day)		
			Developed 2015	No Development 2045	Developed & Potential 2045
Ba-Phalaborwa	MBP MURCH	Murchison WS	0,620	0,737	1,233
	MBP/1	Eiland Supply	0,000	0,000	0,000
	MBP/2	Prieska Supply	0,000	0,000	0,000
	MBP/NL	Namakgale / Lulekani RWS	0,000	15,852	19,713
	MBP/SN	Siluwane - Nondweni Extended RWS	2,515	0,678	2,140
	MBPGRAV	Gravelotte Local WS	*-0,497*	*-0,733*	*-0,253*
	MBPL	Leydsdorp Local WS	*-0,664*	*-0,370*	0,000
Greater Giyani	MG/GAB	Giyani System A/B WS	2,803	0,236	7,063
	MG/GCD	Giyani System C/D WS	*-6,274*	*-13,137*	*-5,805*
	MG/GD/SW	Giyani System D : South West WS	12,062	9,264	12,483
	MG/GF1	Giyani System F1 WS	1,634	0,612	3,099
	MG/GF2	Giyani System F2 WS	3,578	3,245	4,432
	MG/ML/BAB	Middle Letaba RWS : Babangu	6,152	4,467	8,009
	MGMAP/N	Mapuve / System N RWS	0,126	*-0,105*	1,024
	MGWOR/MOT	Worcester / Mothobeki RWS	0,210	*-0,266*	1,169
	ML/LM	Lower Molototsi RWS	0,192	*-0,192*	0,749
	VM/ML/MAG	Middle Letaba RWS : Magoro	2,955	*-0,621*	1,205
Greater Letaba	ML/ML/BOL	Middle Letaba RWS : Bolobedu NW	5,219	4,130	5,347
	MLMODJ	Modjadji RWS	5,455	1,501	3,724
	MLSEKG01	Sekgosese Individual Groundwater Scheme	*-0,244*	0,232	0,544
	MLSEKG02	Sekgopo Local GWS	*-0,715*	*-2,383*	*-1,496*
	MT/RIT/L	Ritavi / Letaba RWS	3,742	*-0,483*	1,819
	MTLET01	Letaba Individual Supply	*-0,083*	*-0,109*	*-0,072*
	MTTZ/MOD	Tzaneen / Modjadjiskloof WS	*-6,882*	*-10,789*	*-10,392*
Greater Tzaneen	MT/RIT2	Ritavi II RWS	*-3,895*	*-16,943*	*-14,801*
	MTTHA01	Thabina RWS	4,625	1,035	2,483
	MTTHA02	Thapane RWS	2,365	*-0,442*	1,727
	MTTOUR	Tours RWS	*-0,504*	*-2,698*	*-2,192*
	MTTZ/1	Haenertsburg Individual Supply	0,000	0,000	0,000
	MTTZ/2	Rubbervale Supply	*-0,006*	*-0,002*	0,479
Maruleng	MM/MS	Mametja Sekororo RWS	7,723	3,650	7,922
	MMH/K	Hoedspruit / Kampersrus WS	*-2,113*	*-3,249*	*-2,074*
	MMMAR01	Maruleng Individual Supply	0,104	0,100	0,154

POLOKWANE

LM	Scheme Name	Water Scheme Area	Water Infrastructure Balance (Ml/day)		
			Developed 2015	No Development 2045	Developed & Potential 2045
Polokwane	CPBAD	Badimong RWS	*-0,294*	*-0,077*	7,262
	CPBERG	Bergnek GWS	*-0,042*	*-0,071*	0,000
	CPBOY	Boyne RWS	*-0,682*	*-1,096*	*-0,167*
	CPC/M	Chuene Maja RWS	*-0,363*	*-1,025*	1,626
	CPH/NP44 - PlkLM	Houtrivier RWS - PlkLM	*-0,272*	0,005	0,694
	CPLH	Laaste Hoop RWS	*-0,430*	*-0,411*	0,818
	CPMAN	Mankweng RWS	*-4,713*	*-10,829*	*-5,381*
	CPME/NP110	Moletje East GWS	*-0,920*	*-1,353*	*-0,526*
	CPMN/NPO44	Moletje North GWS	*-0,105*	0,960	1,148
	CPMOL	Molepo RWS	*-0,416*	*-0,777*	0,600
	CPMOT	Mothapo RWS	*-1,498*	*-0,861*	0,016
	CPMS/NC8 - PlkLM	Moletje South GWS - PlkLM	*-0,459*	0,607	1,296
	CPOS	Olifants-Sand RWS	*-37,566*	*-179,092*	*-177,270*
	CPS/D	Sebayeng-Dikgale RWS	*-2,859*	*-5,117*	*-0,084*
	CPSEG	Segwasi RWS	*-0,093*	*-0,059*	0,551

EXPLANATORY NOTES

Transfer of water resources between water scheme areas are addressed to some extent in the model, but needs to be refined.

The model accepts that WC&WDM is implemented and does not account for wastage and unauthorised water use. There is no planning directive to design for inefficient systems other than to allow for generally accepted losses (not more than 15%).

The 2045 water balance scenario for when no further resources are developed is presented to reflect the impact of not extending the infrastructure to utilise these resources. Some Scheme Areas reflect a reduction in water balance needs due to declining population predicted in rural areas.

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DOMESTIC AND BUSINESS WATER BALANCE PER WSA

SEKHUKHUNE

LM	Scheme Name	Water Scheme Area	Water Infrastructure Balance (Ml/day)		
			Developed 2015	No Development 2045	Developed & Potential 2045
Elias Motsoaledi	NSA01	Flag Boshielo RWS/Flag Boshilo Central WS	*-1,176*	*-2,563*	2,103
	NSD09	De Hoop/Nebo Plateau/Carbonatites/Spitskop WS	*-0,454*	0,022	2,889
	NSD10	De Hoop/Nebo Plateau/Monsterlus WS	*-0,280*	*-1,959*	0,336
	NSD11	De Hoop/Nebo Plateau/Sephaku WS	*-0,286*	*-1,815*	0,160
	NSD12	De Hoop/Nebo Plateau/Zaaiplaas WS	*-0,812*	*-1,017*	3,987
	NSH	Elias Motsoaledi/Lukau WS	*-0,015*	*-4,704*	*-3,447*
	SLAER	Laersdrift WS	*-0,148*	*-0,161*	*-0,072*
	SMOT02	Kwandebele/Renosterkop/Elias Motsoaledi WS	*-0,418*	1,455	4,774
	SROS	Roossenekal WS	*-0,046*	*-0,119*	*-0,066*
Ephriam Mogale	NSA02	Flag Boshielo RWS/Eastern2 WS	0,003	*-0,077*	0,562
	NSA03	Flag Boshielo RWS/Eastern3 WS	0,693	*-3,108*	*-1,600*
	SMAR	Marble Hall WS	0,000	5,113	5,113
	SMOT01	Kwandebele/Renosterkop/Marble Hall WS	*-2,555*	*-3,922*	1,635
Fetakgomo	FetFS	Fetakgomo LM Farms Supply	0,000	*-0,011*	0,000
	NSD05	De Hoop/Nebo Plateau/Lepellane WS	0,191	*-1,438*	1,203
	NSOP02	Olifantspoort South Group 2 WS	7,962	4,399	6,136
	NSOP03	Olifantspoort South Group 3 WS	2,771	2,463	4,786
	NSR03	Lebalelo North WS	2,178	0,882	4,695
Greater Tubatse	NSD01	De Hoop/Nebo Plateau/Malekana WS	*-0,074*	*-1,484*	0,880
	NSD08	De Hoop/Nebo Plateau/Mampuru WS	*-0,434*	*-3,457*	0,318
	NSD13	De Hoop/Nebo Plateau/Annex WS	*-0,233*	*-0,243*	*-0,024*
	NSD14	De Hoop/Nebo Plateau/De Hoop Dam WS	1,473	1,455	1,504
	NSL03	Penge Local Sources WS	0,453	*-0,126*	*-0,009*
	NSL05	Leolo Local Sources WS	*-0,001*	*-0,166*	0,000
	NSR01	Lebalelo South WS	*-0,666*	*-4,810*	*-0,174*
	NSR02	Lebalelo Central WS	4,406	*-2,600*	4,426
	NST01	Lower Steelpoort Tubatse WS/Mooihoek/Tubatse	*-4,723*	*-25,936*	*-6,222*
	NST02	Lower Steelpoort Tubatse WSS/Praktiseer	0,244	*-9,621*	*-1,689*
	NST03	Lower Steelpoort Tubatse WSS/Tubatse North	0,463	*-0,134*	0,000
	NST04	Lower Steelpoort Tubatse WSS/Steelpoort Town	*-0,581*	*-2,146*	*-1,877*
	NST05	Lower Steelpoort Tubatse WSS/Tubatse East	*-0,396*	*-0,912*	*-0,511*
	SORIG	Orighstad WS	*-0,264*	*-0,338*	0,094
	STBOERB	Boerboomskraal WS	*-0,001*	*-0,002*	0,054
Makhudu-Thamaga	NSD02	De Hoop/Nebo Plateau/Middle Ngwaritsi WS	0,190	0,038	1,591
	NSD03	De Hoop/Nebo Plateau/Jane Furse/Glen Cowie WS	*-5,423*	*-17,425*	*-3,802*
	NSD04	De Hoop/Nebo Plateau/Ngwaritsi WS	*-0,235*	*-1,557*	1,203
	NSD06	De Hoop/Nebo Plateau/Nkadimeng WS	2,938	1,689	4,295
	NSD07	De Hoop/Nebo Plateau/Schoonoord WS	0,024	*-1,873*	0,584
	NSP01	Piet Gouws/Masemola WS	*-0,187*	*-1,469*	0,340
	NSP02	Piet Gouws/Veeplaas WS	0,278	0,436	0,744

WATERBERG

LM	Scheme Name	Water Scheme Area	Water Infrastructure Balance (Ml/day)		
			Developed 2015	No Development 2045	Developed & Potential 2045
Bela-Bela	BEL0	BelaBela Individual Supply	*-0,077*	*-0,071*	0,000
	BEL01	BelaBela RWS	*-6,452*	*-12,802*	*-11,740*
	BEL02	Pienaarsrivier RWS	0,000	*-0,046*	0,000
	BEL03	Rapotokwane Supply WS	0,000	*-0,071*	0,000
	BEL04	Vingerkraal WS	*-0,020*	*-0,037*	*-0,037*
Lephalale	LEP0/1	Marnitz Supply	0,007	*-0,001*	0,108
	LEP0/2	Tom Burke Supply	*-0,011*	*-0,004*	0,105
	LEP01	Lephalale Urban RWS	2,870	*-27,300*	*-24,868*
	NW100	Mmaletswai RWS	2,724	2,588	3,388
	NW114	Witpoort RWS	0,494	*-0,091*	1,311
	NW115	Ga-Seleka RWS	1,875	1,102	2,436
	NW116	Setuteng RWS	0,202	*-0,839*	*-0,443*
Modimolle	MOD01	Modimolle Urban RWS	*-3,658*	*-5,250*	*-4,130*
	MOD02	Mabatlane RWS	*-1,626*	*-2,394*	0,428
	MOD03	Mabaleng RWS	*-0,194*	*-0,345*	1,128
Mogalakwena	CBGA/NC12	Glen Alpine RWS	*-0,768*	*-0,975*	1,295
	MOG01	Biesjeskraal WS	*-0,013*	*-0,015*	0,000
	MOG02	Daggakraal WS	0,000	0,000	0,000
	NW0/1	Makapans Valley Supply	*-0,027*	*-0,032*	0,000
	NW0/2	Marken Supply	*-0,049*	*-0,034*	0,000
	NW0/3	Uitspan Supply	*-0,027*	*-0,034*	0,000
	NW0/4	Weenen Supply	*-0,011*	*-0,012*	0,000
	NW1	Rebone RWS	*-1,095*	*-1,202*	1,206
	NW2	Bakenberg RWS	*-1,660*	*-2,198*	3,059
	NW3	Mapela RWS	*-14,197*	*-25,658*	*-23,401*
	NW4	Mokopane RWS	*-0,211*	*-8,653*	*-8,653*
	NW5	Ga-Pahladira RWS	*-0,066*	*-0,136*	*-0,085*
Mookgophong	MOOK0/1	Roedtan/Thusang Supply	*-0,672*	*-1,503*	*-1,072*
	MOOK0/2	Military Base Supply	*-0,053*	*-0,042*	0,000
	MOOK0/3	Zoetfontein Supply	0,000	0,000	0,000
	MOOK0/4	Rietbokvalley Supply	*-0,019*	*-0,013*	0,000
	MOOK01	Mookgophong RWS	0,277	*-3,395*	*-3,395*
Thabazimbi	THB0/1	Amandelbult Supply	*-0,116*	*-0,099*	*-0,049*
	THB0/10	Swartkop Supply	*-0,026*	*-1,125*	*-0,868*
	THB0/11	Swartklip Supply	*-0,725*	*-0,572*	*-0,372*
	THB0/12	Schoongezicht WS	0,000	0,000	0,000
	THB0/2	Dwaalboom Supply	*-0,049*	*-0,037*	0,000
	THB0/3	Kromdraai Plots Supply	*-0,164*	*-0,060*	*-0,010*
	THB0/4	Leeupoort Supply	*-0,418*	*-0,424*	*-0,154*
	THB0/5	Middeldrift Supply	*-0,234*	*-0,062*	*-0,012*
	THB0/6	Raphuti Supply	*-0,041*	*-0,016*	0,000
	THB0/7	Rooiberg Supply	*-0,134*	*-0,089*	*-0,009*
	THB0/8	Sentrum Supply	*-0,010*	*-0,006*	*-0,001*
	THB0/9	Setaria Supply	*-0,003*	*-0,001*	0,000
	THB01	Thabazimbi RWS	0,000	*-1,990*	*-1,880*
	THB02	Northam RWS	0,000	*-0,513*	*-0,263*

VHEMBE

LM	Scheme Name	Water Scheme Area	Water Infrastructure Balance (Ml/day)		
			Developed 2015	No Development 2045	Developed & Potential 2045
Makhado	NL1/2	Tshakhuma RWS	2,923	0,391	0,852
	NL10	Tshitale RWS	*-0,842*	*-0,228*	6,445
	NL6MM	Middle Letaba RWS : Vyeboom Masia	0,707	*-0,840*	5,050
	NL9	Valdezia RWS	*-0,202*	0,297	1,883
	NN0/1	Bandelierkop Supply	0,000	*-0,003*	0,000
	NN0/2	Makhado Air Force Base Supply	*-1,039*	*-0,980*	0,000
	NN0/6	Waterpoort Supply	0,000	0,000	0,000
	NN1	Alexandra Scheme	0,000	0,000	0,000
	NN10	Matshavhawe / Kunda RWS	*-0,013*	*-0,031*	0,131
	NN12A	Mutale Main RWS	7,978	4,322	8,153
	NN13	Nzhelele North RWS	*-0,103*	0,166	2,443
	NN14	Nzhelele RWS	2,592	*-4,670*	*-1,388*
	NN16	Sinthumule / Kutama RWS	*-0,825*	0,709	7,832
	NN18	Tshifire Murunwa RWS	1,095	0,549	1,057
	NN20A	Vondo Central RWS	3,148	*-35,382*	*-6,364*
	NN20D	Vondo South RWS	*-0,283*	*-1,772*	1,516
	NN21	Levubu CBD WS	*-0,053*	*-0,299*	0,000
	NN22	Elim / Vleifontein RWS WS	*-0,515*	*-3,755*	3,879
	NN3	Buysdorp Scheme	0,075	0,003	0,121
	NN5	Makhado RWS	*-4,297*	*-12,517*	*-8,276*
	VM/ML/MAJ	Middle Letaba RWS : Majosi	1,758	*-2,832*	0,873
Musina	NN0/3	Mopane Supply	*-0,040*	*-0,361*	*-0,247*
	NN0/5	Venetia Mine Supply	0,000	0,000	0,000
	NN0/7	Tshipise Supply	0,000	*-0,020*	0,000
	NN2	Musina RWS	0,725	*-29,182*	*-15,026*
	NN6A	Luphephe / Nwanedzi Main RWS	*-0,337*	1,051	1,771
	NN6B	Luphephe / Nwandedzi North RWS	*-0,191*	*-0,144*	0,121
Mutale	NN0/4	Tshikondeni Mine Supply	*-0,211*	*-0,195*	0,000
	NN12B	Mutale Mukuya RWS	*-0,675*	*-2,044*	*-0,682*
	NN9	Masisi RWS	1,500	0,639	0,995
Thulamela	NL6MW	Middle Letaba RWS : Malamulele West	0,382	0,047	0,472
	NN11	Lambani RWS	0,466	0,288	1,194
	NN19	Tshifudi RWS	0,000	1,720	2,807
	NN20B	Vondo East RWS	0,000	0,236	1,047
	NN20C	Vondo North Rural RWS	*-0,084*	*-0,137*	0,300
	NN4	Damani RWS	2,061	*-1,220*	6,573
	NN7N	North Malamulele East RWS	8,999	5,380	7,710
	NN7S	South Malamulele East RWS	13,439	7,084	12,583
	NN8	Malamulele West RWS	0,244	*-1,622*	1,331

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TOPIC 8 – WATER BALANCE

08.2

DOMESTIC AND BUSINESS WATER BALANCE

TOPIC 8 – WATER BALANCE

08.3

STATEMENTS

The actual water balances are more negative when considering high levels of water wastage, functionality issues, vandalism, unauthorized irrigation and livestock use are taken into account.

Current issues that affect the water balance:

- WSAs find it extremely difficult to manage, regulate and control water uses as very limited systems are available to monitor actual water consumption.
- The behaviour of water users and limited capacity of the WSAs prevents the effective enforcement of by-laws.
- Revenue collection is virtually non-existent in especially the rural area and in some urbanised areas.
- The norm in some communities in Limpopo Province is that water is free water and communities do not appreciate the economic value of water.
- The lack of WC&WDM will place the Limpopo WSAs in a water resource and financial problem which could result in social and financial instability.

From above statements, it is clear that the water sector in Limpopo Province is in need of high level leadership and management intervention.

STATISTICS

Estimated un-billed water in Limpopo

	Economic Development Zone	Population (2015) (excluding farms 240 047)	Water Demand (kl/d)	Water Demand kl/year	Water Use (l/capita/day)	Average Unit Cost of Water/kl (Rand)	Average Total Cost of Water/year (Rand)	Estimated water billed kl/day	Estimated water billed kl/year	Estimated volume of water un-billed %	Estimated Water Billed (Rand)	Indigent Water Demand (kl/day)	Free Basic Water to indigents @ 25l/c/d paid by equatable shares (Rand)	Loss of income excluding FBW (Rand)
1	Functional Towns, Provincial Growth points, District Growth Points, Municipal Growth Points	1 695 722	383 668	140 038 820	226	7.50	1 050 291 150	250 464	91 419 360	34.7%	685 645 200	29 171	79 855 613	284 790 338
2.	Population Concentration Points	1 470 019	103 289	37 700 485	70	8.00	301 603 880	2 504	913 960	97.6%	7 311 680	24 826	72 491 920	221 800 280
3.	Local Service Points	295 128	21 822	7 965 030	74	8.50	67 702 755	1 091	398 252	95.0%	3 385 138	2 123	6 586 608	57 731 010
4& 5	Rural Scattered Areas	2 296 732	131 094	47 849 310	57	8.50	406 719 135	2 622	956 986	98.0%	8 134 383	51 992	161 305 180	237 279 572
	Total	**5 757 601**	**639 873**	**233 553 645**	**111**	**7.82**	**1 826 316 920**	**256 681**	**93 688 558**	**59.9%**	**704 476 400**	**108 112**	**320 239 320**	**801 601 200**

Note: Farm information excluded; unit water use reflected as l/cap/d includes for business, industrial, associated and losses

EXPLANATORY NOTES

WC&WDM is currently identified as very high priority in South Africa as can be seen from abstracts from the WRC report:

> *"Non-revenue water refers to all the water that is lost through physical leakage or commercial losses (meter under-registration, billing errors, theft etc.) as well as any unbilled authorised consumption (fire-fighting, mains flushing etc.).*
>
> *So-called category A municipalities (metros) achieved non-revenue water levels of around 34,3% compared to the water losses of 72,5% (on average) achieved by B4 (small) municipalities. Non-revenue water levels of mid-sized municipalities range from 30,5% to 41,3% on average.*
>
> *While the NWRS2 sets a target to reduce non-revenue water in municipalities to 15% by 2014, Mckenzie suggests that this may be difficult to achieve without the injection of many billions of Rand into the necessary water demand management interventions countrywide within the next two years. Without such a massive financial investment he believes that a target of 25% within ten years is achievable, especially considering municipalities' current resources."*

It can be accepted that the situation in Limpopo Province is also very critical as limited information on water consumption is available. The Limpopo Province un-accounted-for water is estimated to be 60% in volume which results in a loss of R 801.6 M per year (FBW is excluded from this amount as it is funded from the equitable share allocations).

STRATEGIC ANALYSIS

The loss of income from non-revenue water, places an extra financial burden which results in the neglected O&M and an increase in the functionality problem.

Investigate creative ways to ensure the implementation of WC&WDM measures.

ACTIONS

1. Community education and engagement is required to ensure sustainability and viability of WSAs.

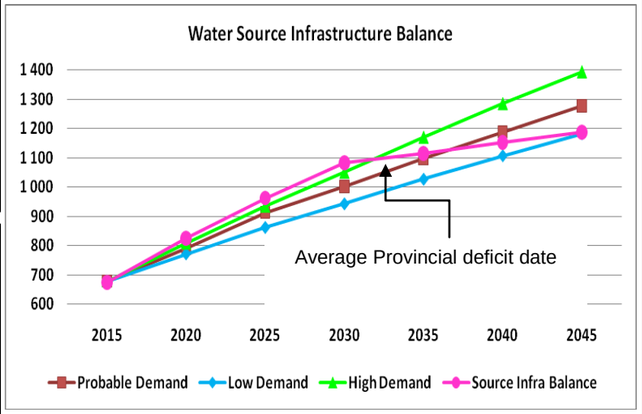
2. Develop WC&WDM policies, strategies, implementation plans and implement WC&WDM across the province.

3. Ensure the effective development, implementation and enforcement of by-laws.

4. Build capacity in WSAs to fulfil their functions as stipulated by the legislation. Consider the engagement and establishment of water utilities to train and capacitate WSAs.

5. Develop infrastructure for metered yard connections to allow for monitoring, regulation and control of water consumption.

6. Implement and maintain monitoring and control mechanisms for management purposes.



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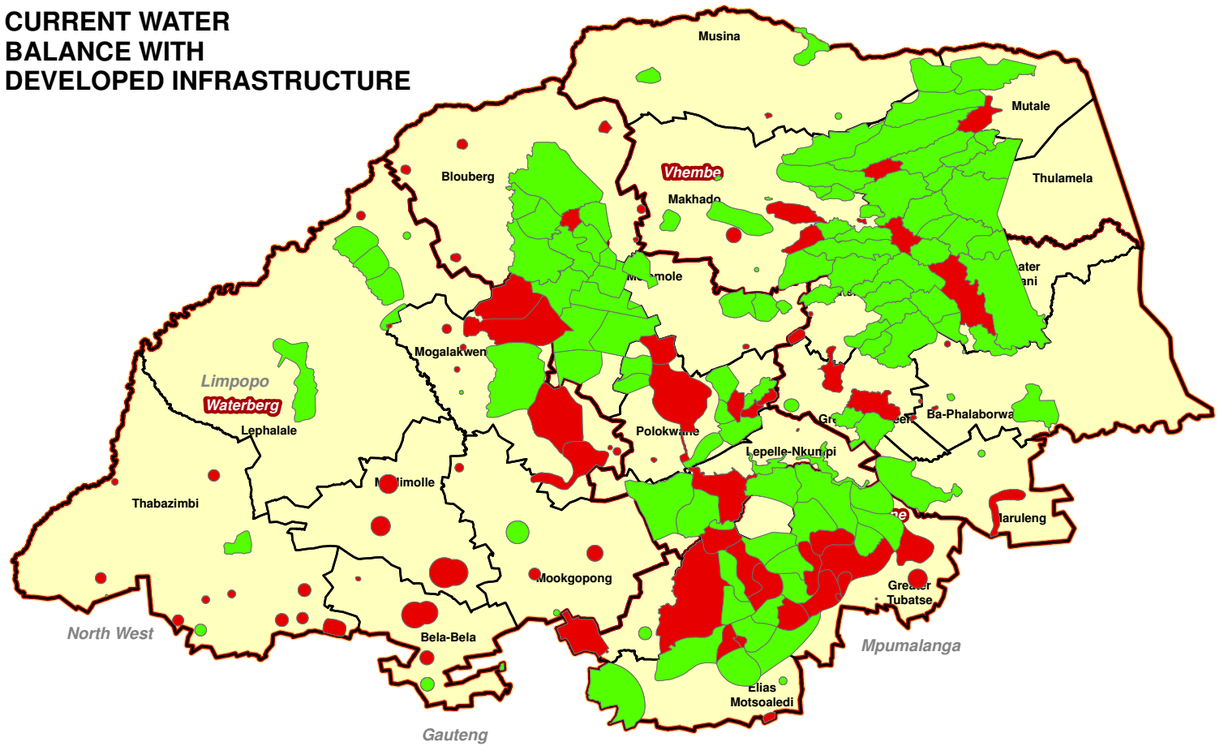
WATER BALANCE FOR DOMESTIC USE PER WATER SCHEME AREA

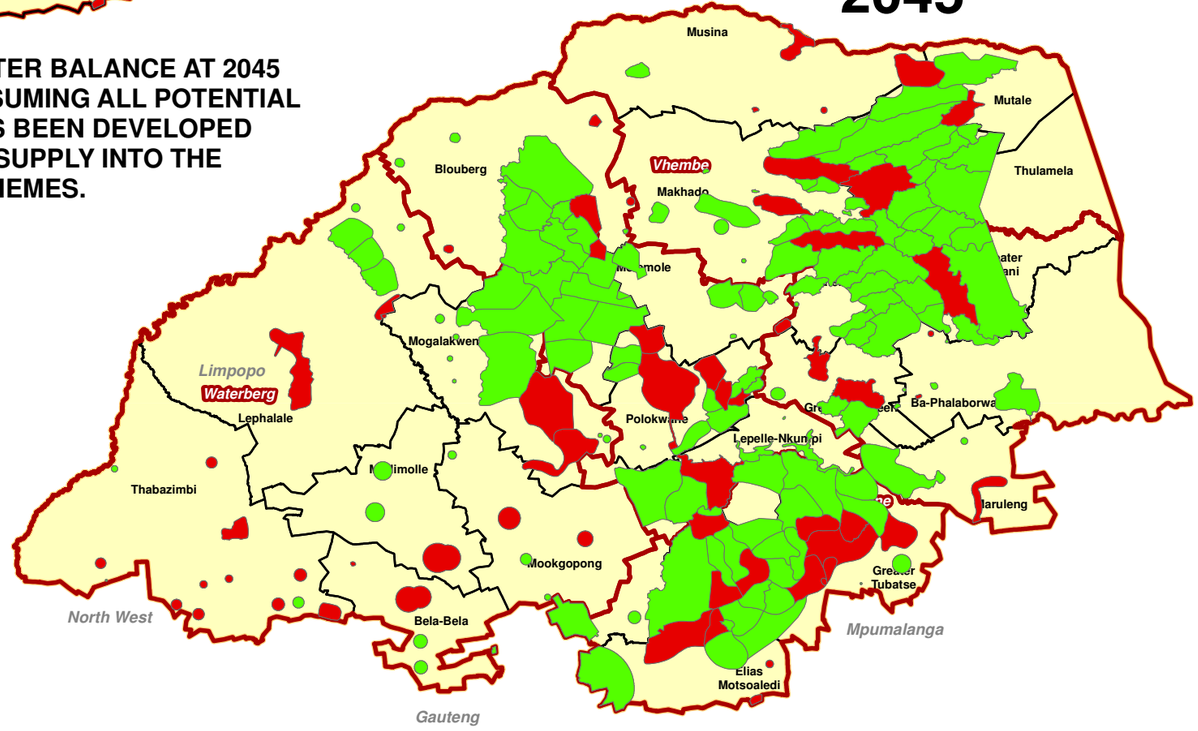
CURRENT WATER BALANCE WITH DEVELOPED INFRASTRUCTURE



2015

2045

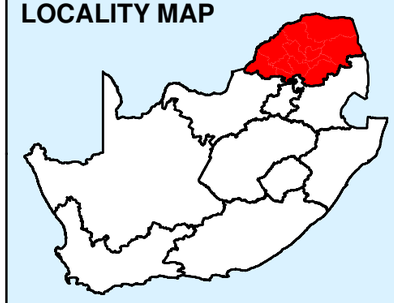
WATER BALANCE AT 2045 ASSUMING ALL POTENTIAL HAS BEEN DEVELOPED TO SUPPLY INTO THE SCHEMES.



Planning Note :

- Water source includes ground water and surface water

LOCALITY MAP



Legend

Water Balance per Scheme Area:

- Surplus Water Balance
- Deficit Water Balance

BASE MAP LEGEND

- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries

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TOPIC 8 - WATER BALANCE

08.4

IMMEDIATE TO 2020 INTERVENTION ACTIONS PER SCHEME AREA FOR WATER SOURCE

TOPIC 8 – WATER BALANCE

08.5

STATEMENTS

The tables on Pages 8.5 to 8.7 indicate the 2015 and 2020 scheme water infrastructure balance situation. These tables include the infrastructure constraints and potential. The 2020 balance is reflected firstly as a situation if no infrastructure development takes place from 2015 and secondly if bulk water infrastructure is constructed to address a deficit.

The proposed interventions per water supply scheme are indicated. In instances where the current projects are not adequate to wipe out the deficit or where there are no known projects to address the deficit, extraordinary intervention is required – these areas are depicted with a red warning dot. The interventions are in many cases being addressed through existing water resource infrastructure development projects (yellow dot) and monitoring the progress of these projects is required to ensure that the targets are met.

CAPRICORN

			Water Infrastructure Balance			
LM	SSchNum	Water Scheme Area	Developed 2015 Ml/day	No Development 2020 Ml/day	Developed & Potential 2020 Ml/day	WR infrastructure interventions required for address deficit
Aganang	CAGBAK/NC3	Bakone GWS	-0,726	-0,766	-0,690	Ground water development
	CAGE/NC3	Aganang East GWS	-0,478	-0,548	-0,483	Ground water development
	CAGM/NC3	Ga Mokobodi GWS	-0,469	-0,495	-0,412	Ground water development and WCWDM
	CAGN/NC12	Aganang North GWS	-0,119	-0,120	-0,073	Ground water development
	CPH/NP44-CDM	Houtrivier RWS - CDM	-0,100	0,170	0,237	
	CPMS/NC8 - CDM	Moletje South GWS - CDM	-0,964	-1018	-0,825	Ground water development and WCWDM
Elouberg	CAGV	Vivo Supply	-0,111	-0,126	-0,120	Ground water development and WCWDM
	CBALL	Alldays BS	-0,376	-0,446	-0,428	Ground water development and WCWDM
	CBARCH/NC12	Archibald GWS	-0,118	-0,152	-0,132	Ground water development
	CBAV	Avon GWS	-0,310	-0,420	-0,135	Ground water development
	CBB/NC11	Blouberg RWS	-0,399	-0,520	-0,420	Ground water development
	CBB0/1	Baltimore Supply	-0,024	-0,032	-0,027	Ground water development
	CBB0/2	Maasstroom Supply	-0,102	-0,119	0,000	Normal project implementation to address
	CBB0/3	Zwartwater Supply	-0,124	-0,138	0,000	Normal project implementation to address
	CBDAL	Dalmeny Local WS	-0,002	-0,002	0,000	Normal project implementation to address
	CBGH/NC12	Ga Hlako RWS	-0,409	-0,577	-0,468	Ground water development and WCWDM
	CBGor/NC11/NC12	Gorkum GWS	-0,033	-0,051	-0,042	Ground water development and WCWDM
	CBGR/NC12	Ga Rawesi GWS	-0,041	-0,054	-0,019	Ground water development and WCWDM
	CBS/K/NC12	Silvermyn / Kirstenspruit GWS	-0,217	-0,273	-0,172	Ground water development and WCWDM
	CBS/NC11	Senwabarwana GWS	-0,803	-1027	-0,107	Ground water development and WCWDM
	CBT/NN17	Taaiboschgroet GWS	-0,620	-0,780	-0,446	Ground water development and WCWDM
	CBTHA/NC11	Thalahane GWS	-0,119	-0,150	0,000	
Lepelle-Nkumpi	CLNASH	Ashmole Dale WS	-0,004	-0,004	0,000	
	CLNGRH	Groothoek RWS	-2,028	-3,347	-3,042	Ground water development and WCWDM
	CLNMAFEF	Mafefe Individual GWS	-0,411	-0,464	-0,181	Ground water development and WCWDM
	CLNMAT	Mathabatha Individual GWS	0,175	0,481	0,610	
	CLNMPHAHL	Mphahlele RWS	0,970	1,476	1,902	
	CLNSPEC	Specon RWS	2,808	-0,248	-0,190	Ground water development and WCWDM
	NSA04	Flag Boshielo RWS/West WS	-0,115	-0,158	-0,026	SDM SLA and WCWDM
Molemole	CMBOT	Botlokwa GWS	-3,246	-1242	-1,199	Ground water development
	CMMAKG	Makgalong A & B GWS	-0,011	-0,012	0,000	
	CMMW01	Mogwadi / Wurthsdorp GWS	-0,399	-0,564	-0,554	Ground water development and WCWDM
	CMMW02	Molemole West Individual GWS	-0,046	-0,047	-0,030	Ground water development and WCWDM
	CMN	Nthabiseng GWS	-0,561	-0,561	-0,542	Ground water development and WCWDM
	CMR	Ramakgopa GWS	-0,125	-0,125	-0,119	Ground water development and WCWDM
	CMRIET	Rietgat GWS	-0,017	-0,017	-0,011	Ground water development and WCWDM

LEDGEND
Extraordinary interventions required
Assume normal project will address
No projected imbalance

MOPANI

			Water Infrastructure Balance			
LM	SSchNum	Water Scheme Area	Developed 2015 Ml/day	No Development 2020 Ml/day	Developed & Potential 2020 Ml/day	WR infrastructure interventions required for address deficit
Ba-Phalaborwa	MBPMURCH	Murchison WS	0,620	0,627	0,701	
	MBP/1	Eiland Supply	0,000	0,000	0,000	
	MBP/2	Prieska Supply	0,000	0,000	0,000	
	MBP/NL	Namakgale / Lulekani RWS	0,000	0,000	0,000	
	MBP/SN	Siluwane - Nondweni Extended RWS	2,515	2,103	2,824	
	MBPGRAV	Gravelotte Local WS	-0,497	-0,565	-0,493	Ground water development and WCWDM
	MBPL	Leydsdorp Local WS	-0,664	-0,677	-0,585	
Greater Giljani	MG/GAB	Giyani System A/B WS	2,803	2,343	6,525	Implement current project
	MG/GCD	Giyani System C/D WS	-6,274	-7,850	-1,161	Ground water development and WCWDM
	MG/GD/SW	Giyani System D : South West WS	12,062	11,642	14,598	
	MG/GF1	Giyani System F1WS	1,634	1,407	3,280	Normal project implementation to address
	MG/GF2	Giyani System F2 WS	3,578	3,501	4,496	Normal project implementation to address
	MG/ML/BAB	Middle Letaba RWS : Babangu	6,152	5,722	8,183	
	MGMAP/N	Mapuve / System N RWS	0,126	0,031	0,765	Normal project implementation to address
	MGWOR/MOT	Worcester / Mothobeki RWS	0,210	0,052	0,426	
	ML/LM	Lower Molototsi RWS	0,192	0,073	0,429	Normal project implementation to address
	VM/ML/MAG	Middle Letaba RWS : Magoro	2,955	2,337	3,025	
Greater Letaba	ML/ML/BOL	Middle Letaba RWS : Bolobedu NW	5,219	4,992	5,175	
	MLMODJ	Modjadji RWS	5,455	4,595	4,928	
	MLSEKG01	Sekgosese Individual Groundwater S	-0,244	-0,342	-0,321	Ground water development and WCWDM
	MLSEKG02	Sekgopo Local GWS	-0,715	-1023	-0,890	Ground water development and WCWDM
	MT/RIT/L	Ritavi / Letaba RWS	3,742	2,732	3,077	
	MTLET01	Letaba Individual Supply	-0,083	-0,091	-0,073	Ground water development and WCWDM
	MTTZ/MOD	Tzaneen / Modjadjiskloof WS	-6,882	-8,008	-7,948	Raise Tzaneen Dam and WCWDM
Greater Tzaneen	MT/RIT2	Ritavi II RWS	-3,895	-6,350	-6,029	Ground water development and WCWDM
	MTTHA01	Thabina RWS	4,625	3,774	3,992	
	MTTHA02	Thapane RWS	2,365	1,694	2,019	
	MTTOUR	Tours RWS	-0,504	-0,740	-0,691	Ground water development and WCWDM
	MTTZ/1	Haenertsburg Individual Supply	0,000	0,000	0,000	
	MTTZ/2	Rubbervale Supply	-0,006	-0,006	0,066	Normal project implementation to address
Marulen g	MM/MS	Mametja Sekororo RWS	7,723	6,955	8,201	
	MMH/K	Hoedspruit / Kampersrus WS	-2,113	-2,171	-1995	Ground water development and WCWDM
	MMMAR01	Maruleng Individual Supply	0,104	0,101	0,109	

LEDGEND
Extraordinary interventions required
Assume normal project will address
No projected imbalance

ACTIONS

The following actions are required to ensure adequate water source availability to communities by 2020:

- Extraordinary intervention programme be launched to address areas where current and proposed projects would not be able to address the deficit,
- Monitor areas which are indicated to be addressed through normal capital works infrastructure projects.

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IMMEDIATE TO 2020 INTERVENTION ACTIONS PER SCHEME AREA

POLOKWANE

LM	SSchNum	Water Scheme Area	Water Infrastructure Balance: Developed 2015 Ml/day	No Development 2020 Ml/day	Developed & Potential 2020 Ml/day		WR infrastructure interventions required for address deficit
Polokwane	CPBAD	Badimong RWS	-0,294	0,517	2,911	🟢	
	CPBERG	Bergnek GWS	-0,042	-0,048	0,000	🟡	Normal project implementation to address
	CPBOY	Boyne RWS	-0,682	-0,375	-0,236	🔴	GW development
	CPC/M	Chuene Maja RWS	-0,363	0,374	0,534	🟢	
	CPH/NP44 - PlkLM	Houtrivier RWS - PlkLM	-0,272	0,107	0,315	🟢	
	CPLH	Laaste Hoop RWS	-0,430	0,011	0,882	🟢	
	CPMAN	Mankweng RWS	-4,713	-5,903	-1,275	🔴	WCWDM, Groundwater development
	CPME/NP110	Moletje East GWS	-0,920	-0,215	-0,091	🔴	WCWDM, Groundwater development
	CPMN/NPO44	Moletje North GWS	-0,105	0,944	0,972	🟡	Normal project implementation to address
	CPMOL	Molepo RWS	-0,416	-0,070	0,245	🟡	Normal project implementation to address
	CPMOT	Mothapo RWS	-1,498	-0,065	0,649	🟡	Normal project implementation to address
	CPMS/NC8 - PlkLM	Moletje South GWS - PlkLM	-0,459	0,554	0,658	🟢	
	CPOS	Olifants-Sand RWS	-37,566	-58,928	-58,654	🔴	Optimise allocations, Ebenezer allocation increase,
	CPS/D	Sebayeng-Dikgale RWS	-2,859	-0,215	2,944	🟡	Normal project implementation to address
	CPSEG	Segwasi RWS	-0,093	-0,060	0,148	🟡	Normal project implementation to address

LEDGEND	
🔴	Extraordinary interventions required
🟡	Assume normal project will address
🟢	No projected imbalance

SEKHUKHUNE

LM	SSchNum	Water Scheme Area	Water Infrastructure Balance: Developed 2015 Ml/day	No Development 2020 Ml/day	Developed & Potential 2020 Ml/day		WR infrastructure interventions required for address deficit
Elias Motsoaledi	NSA01	Flag Boshielo RWS/Flag Boshilo Central WS	-1,176	-1,561	-0,418	🔴	WCWDM, Groundwater development
	NSD09	De Hoop/Nebo Plateau/Carbonatites/Spitskop WS	-0,454	-0,702	-0,543	🔴	De Hoop Augmentation, WCWDM, Groundwater
	NSD10	De Hoop/Nebo Plateau/Monsterlus WS	-0,280	-0,467	-0,422	🔴	De Hoop Augmentation, WCWDM, Groundwater
	NSD11	De Hoop/Nebo Plateau/Sephaku WS	-0,286	-0,517	-0,471	🔴	De Hoop Augmentation, WCWDM, Groundwater
	NSD12	De Hoop/Nebo Plateau/Zaaiplaas WS	-0,812	-1,146	-0,907	🔴	De Hoop Augmentation, WCWDM, Groundwater
	NSH	Elias Motsoaledi/Lukau WS	-0,015	-0,195	-0,141	🔴	WCWDM, Groundwater development
	SLAER	Laersdrift WS	-0,148	-0,158	-0,145	🔴	WCWDM, Groundwater development
	SMOT02	Kwandebele/Renosterkop/Elias Motsoaledi WS	-0,418	-0,517	-0,375	🔴	Motse RWS, WCWDM, Groundwater
	SROS	Roossenekal WS	-0,046	-0,072	-0,064	🔴	WCWDM, Groundwater development
Ephriam Mogale	NSA02	Flag Boshielo RWS/Eastern2 WS	0,003	-0,033	0,054	🟡	Flag Boshielo Eastern Extension, WCWDM
	NSA03	Flag Boshielo RWS/Eastern3 WS	0,693	0,350	0,879	🟡	Flag Boshielo Eastern Extension, WCWDM
	SMAR	Marble Hall WS	0,000	0,000	0,000	🟢	
	SMOT01	Kwandebele/Renosterkop/Marble Hall WS	-2,555	-2,832	0,000	🟡	WCWDM, Groundwater development
Fetakgomo	FetFS	Fetakgomo LM Farms Supply	0,000	0,000	0,000	🟢	
	NSD05	De Hoop/Nebo Plateau/Lepellane WS	0,191	-0,081	0,051	🟡	Normal project implementation to address
	NSOP02	Olifantspoort South Group 2 WS	7,962	7,501	7,762	🟢	
	NSOP03	Olifantspoort South Group 3 WS	2,771	2,816	3,132	🟢	
	NSR03	Lebalelo North WS	2,178	1,842	2,580	🟡	Normal project implementation to address
Greater Tubatse	NSD01	De Hoop/Nebo Plateau/Malekana WS	-0,074	-0,390	1,001	🟡	Normal project implementation to address
	NSD08	De Hoop/Nebo Plateau/Mampuru WS	-0,434	-0,909	-0,799	🔴	De Hoop Augmentation, WCWDM, Groundwater
	NSD13	De Hoop/Nebo Plateau/Annex WS	-0,233	-0,258	-0,248	🔴	WCWDM, Groundwater development
	NSD14	De Hoop/Nebo Plateau/De Hoop Dam WS	1,473	1,470	1,475	🟢	
	NSL03	Penge Local Sources WS	0,453	-0,069	-0,050	🔴	WCWDM, Groundwater development
	NSL05	Leolo Local Sources WS	-0,001	-0,134	-0,051	🔴	WCWDM, Groundwater development
	NSR01	Lebalelo South WS	-0,666	-1,308	0,623	🔴	Mooihoek WTW and distribution to be
	NSR02	Lebalelo Central WS	4,406	3,515	5,835	🔴	Mooihoek WTW and distribution to be
	NST01	Lower Steelpoort Tubatse WS/Mooihoek/Tubatse	-4,723	-7,424	-1,745	🔴	Mooihoek WTW and distribution to be
	NST02	Lower Steelpoort Tubatse WSS/Praktiseer	0,244	-0,884	1,408	🔴	Mooihoek WTW and distribution to be
	NST03	Lower Steelpoort Tubatse WSS/Tubatse North	0,463	-0,082	-0,028	🔴	WCWDM, Groundwater development
	NST04	Lower Steelpoort Tubatse WSS/Steelpoort Town	-0,581	-0,883	-0,843	🔴	WCWDM, Groundwater development
	NST05	Lower Steelpoort Tubatse WSS/Tubatse East	-0,396	-0,575	-0,493	🔴	WCWDM, Groundwater development
	SORIG	Orighstad WS	-0,264	-0,300	-0,235	🔴	WCWDM, Groundwater development
	STBOERB	Boerboomskraal WS	-0,001	-0,002	0,006	🟡	Normal project implementation to address
Makhudu-Thamaga	NSD02	De Hoop/Nebo Plateau/Middle Ngwaritsi WS	0,190	0,118	0,275	🟢	
	NSD03	De Hoop/Nebo Plateau/Jane Furse/Glen Cowie WS	-5,423	-6,937	2,653	🟡	De Hoop Augmentation, WCWDM, Groundwater
	NSD04	De Hoop/Nebo Plateau/Ngwaritsi WS	-0,235	-0,522	-0,354	🔴	De Hoop Augmentation, WCWDM, Groundwater
	NSD06	De Hoop/Nebo Plateau/Nkadimeng WS	2,938	2,659	2,794	🟢	
	NSD07	De Hoop/Nebo Plateau/Schoonoord WS	0,024	-0,290	1,331	🟡	De Hoop Augmentation, WCWDM, Groundwater
	NSP01	Piet Gouws/Masemola WS	-0,187	-0,455	-0,409	🔴	WCWDM, Groundwater development
	NSP02	Piet Gouws/Veeplaas WS	0,278	0,270	0,295	🟢	

LEDGEND	
🔴	Extraordinary interventions required
🟡	Assume normal project will address
🟢	No projected imbalance

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TOPIC 8 – WATER BALANCE

IMMEDIATE TO 2020 INTERVENTION ACTIONS PER SCHEME AREA

TOPIC 8 – WATER BALANCE

08.7

VHEMBE

LM	SSchNum	Water Scheme Area	Water Infrastructure Balance: Developed 2015 Ml/day	No Development 2020 Ml/day	Developed & Potential 2020 Ml/day		WR infrastructure interventions required for address deficit
Makhado	NL12	Tshakhuma RWS	2,923	2,372	2,441	🟢	
	NL10	Tshitale RWS	-0,842	-1005	0,000	🟡	Normal project implementation to address
	NL6MM	Middle Letaba RWS : Vyeboom Masia	0,707	0,429	4,783	🟡	Normal project implementation to address
	NL9	Valdezia RWS	-0,202	-0,266	-0,009	🟡	Normal project implementation to address
	NN0/1	Bandelierkop Supply	0,000	0,000	0,000	🟢	
	NN0/2	Makhado Air Force Base Supply	-1039	-1038	0,000	🟡	Normal project implementation to address
	NN0/6	Waterpoort Supply	0,000	0,000	0,000	🟢	
	NN1	Alexandra Scheme	0,000	0,000	0,000	🟢	
	NN10	Matshavhawe / Kunda RWS	-0,013	-0,022	-0,005	🟡	Normal project implementation to address
	NN12A	Mutale Main RWS	7,978	7,157	7,731	🟡	Normal project implementation to address
	NN13	Nzhelele North RWS	-0,103	-0,136	0,000	🟡	Implement current project
	NN14	Nzhelele RWS	2,592	0,873	1365	🟢	
	NN16	Sinthumule / Kutama RWS	-0,825	-1252	0,000	🟡	Implement current project
	NN18	Tshifire Mururnwa RWS	1,095	0,931	1007	🟢	
	NN20A	Vondo Central RWS	3,148	-4,171	-3,570	🔴	WCWDM, Groundwater wellfield, Nandoni
	NN20D	Vondo South RWS	-0,283	-0,664	1778	🟡	Implement current project
	NN21	Levubu CBD WS	-0,053	-0,118	-0,118	🔴	WCWDM, Nandoni connection
	NN22	Elim / Vleifontein RWS WS	-0,515	-1369	-1283	🔴	WCWDM, Groundwater development, Nandoni
	NN3	Buysdorp Scheme	0,075	0,060	0,078	🟢	
	NN5	Makhado RWS	-4,297	-6,275	-2,320	🟡	Implement current project
	VM/ML/MAJ	Middle Letaba RWS : Majosi	1,758	0,875	2,196	🟡	Implement current project
Musina	NN0/3	Mopane Supply	-0,040	-0,067	-0,050	🟡	WCWDM, Groundwater development
	NN0/5	Venetia Mine Supply	0,000	0,000	0,000	🟢	
	NN0/7	Tshipise Supply	0,000	0,000	0,000	🟢	
	NN2	Musina RWS	0,725	-3,703	9,887	🟡	Normal project implementation to address
	NN6A	Luphephe / Nwanedzi Main RWS	-0,337	-0,458	-0,389	🔴	WCWDM, Groundwater development
	NN6B	Luphephe / Nwandedzi North RWS	-0,191	-0,252	-0,222	🔴	WCWDM, Groundwater development
Mutale	NN0/4	Tshikondeni Mine Supply	-0,211	-0,215	-0,180	🟢	
	NN12B	Mutale Mukuya RWS	-0,675	-0,985	-0,781	🟡	WCWDM, Groundwater development
	NN9	Masisi RWS	1,500	0,091	0,132	🟢	
Thulamela	NL6MW	Middle Letaba RWS : Malamulele West	0,382	0,250	0,314	🟢	
	NN11	Lambani RWS	0,466	0,397	0,533	🟡	Normal project implementation to address
	NN19	Tshifudi RWS	0,000	0,000	0,000	🟡	Normal project implementation to address
	NN20B	Vondo East RWS	0,000	-0,006	0,000	🟡	Normal project implementation to address
	NN20C	Vondo North Rural RWS	-0,084	-0,113	-0,070	🟡	Normal project implementation to address
	NN4	Damani RWS	2,061	1254	6,963	🟡	Normal project implementation to address
	NN7N	North Malamulele East RWS	8,999	8,272	8,622	🟢	
	NN7S	South Malamulele East RWS	13,439	11,818	12,643	🟢	
	NN8	Malamulele West RWS	0,244	-0,275	1,558	🟡	Normal project implementation to address

LEDGEND	
🔴	Extraordinary interventions required
🟡	Assume normal project will address
🟢	No projected imbalance

WATERBERG

WSA	SSchNum	Water Scheme Area	Water Infrastructure Balance: Developed 2015 Ml/day	No Development 2020 Ml/day	Developed & Potential 2020 Ml/day		WR infrastructure interventions required for address deficit
Bela-Bela	BEL0	BelaBela Individual Supply	-0,077	-0,079	0,000	🟢	
	BEL01	BelaBela RWS	-6,452	-8,661	-8,502	🔴	Magalies WB to implement 2nd tranfer pipeline
	BEL02	Pienaarsrivier RWS	0,000	0,000	0,000	🟢	
	BEL03	Rapotokwane Supply WS	0,000	-0,016	0,000	🟡	Normal project implementation to address
	BEL04	Vingerkraal WS	-0,020	-0,025	-0,025	🟡	Normal project implementation to address
Lephalale	LEP0/1	Mamitz Supply	0,007	0,005	0,081	🟢	
	LEP0/2	Tom Burke Supply	-0,011	-0,013	0,064	🟡	Normal project implementation to address
	LEP01	Lephalale Urban RWS	2,870	-1,045	-0,586	🔴	Transfer projects to be implemented
	NW100	Mmaletswai RWS	2,724	2,654	3,303	🟢	
	NW111	Witpoort RWS	0,494	0,366	1483	🟢	
	NW115	Ga-Seleka RWS	1,875	1,725	2,947	🟢	
	NW116	Sefuteng RWS	0,202	0,039	0,367	🟢	
Modimolle	MOD01	Modimolle Urban RWS	-3,658	-4,400	-4,009	🔴	Magalies WB to implement 2nd tranfer pipeline
	MOD02	Mabatlane RWS	-1,626	-1,726	-1,153	🔴	Groundwater wellfield investigation and WCWDM
	MOD03	Mabaleng RWS	-0,194	-0,210	0,092	🔴	Groundwater wellfield investigation and WCWDM
Mogalakwena	CBGA/NC12	Glen Alpine RWS	-0,768	-0,863	-0,734	🔴	Groundwater wellfield investigation and WCWDM
	MOG01	Biesjeskraal WS	-0,013	-0,014	-0,014	🟡	Normal project implementation to address
	MOG02	Daggakraal WS	0,000	0,000	0,000	🟢	
	NW0/1	Makapans Valley Supply	-0,027	-0,030	-0,009	🟢	
	NW0/2	Marken Supply	-0,049	-0,050	-0,032	🟡	Normal project implementation to address
	NW0/3	Uitspan Supply	-0,027	-0,031	-0,013	🟡	Normal project implementation to address
	NW0/4	Weenen Supply	-0,011	-0,011	0,000	🟡	Normal project implementation to address
	NW1	Rebone RWS	-1095	-1198	-0,989	🔴	Additional funding to Mogalakwena LM to implement
	NW2	Bakenberg RWS	-1660	-1936	-1,551	🔴	Additional funding to Mogalakwena LM to implement
	NW3	Mapela RWS	-14,197	-16,908	-16,570	🔴	Additional funding to Mogalakwena LM to implement
	NW4	Mokopane RWS	-0,211	-2,389	-2,389	🔴	Additional funding to Mogalakwena LM to implement
	NW5	Ga-Pahladira RWS	-0,066	-0,089	-0,081	🔴	Groundwater wellfield investigation and WCWDM
Mookgophong	MOOK0/1	Roedtan/Thusang Supply	-0,672	-0,871	-0,806	🔴	Groundwater wellfield investigation and WCWDM
	MOOK0/2	Military Base Supply	-0,053	-0,053	-0,008	🟡	Normal project implementation to address
	MOOK0/3	Zoetfontein Supply	0,000	0,000	0,000	🟢	
	MOOK0/4	Rietbokvalley Supply	-0,019	-0,019	0,000	🟢	
	MOOK01	Mookgophong RWS	0,277	-0,337	-0,337	🔴	Magalies WB to implement 2nd tranfer pipeline
Thabazimbi	THB0/1	Amandelbult Supply	-0,116	-0,122	-0,115	🟡	Normal project implementation to address
	THB0/10	Swartkop Supply	-0,026	-0,027	-0,026	🟡	Normal project implementation to address
	THB0/11	Swartklip Supply	-0,725	-0,737	-0,707	🔴	Investigate options and WCWDM
	THB0/12	Schoongezicht WS	0,000	0,000	0,000	🟢	
	THB0/2	Dwaalboom Supply	-0,049	-0,051	-0,045	🟡	Normal project implementation to address
	THB0/3	Kromdraai Plots Supply	-0,164	-0,167	-0,160	🟡	Normal project implementation to address
	THB0/4	Leeupoort Supply	-0,418	-0,448	-0,408	🟡	Normal project implementation to address
	THB0/5	Middeldrift Supply	-0,234	-0,238	-0,231	🟡	Normal project implementation to address
	THB0/6	Raphuti Supply	-0,041	-0,042	-0,038	🟡	Normal project implementation to address
	THB0/7	Rooiberg Supply	-0,134	-0,139	-0,127	🟡	Normal project implementation to address
	THB0/8	Sentrum Supply	-0,010	-0,010	-0,009	🟡	Normal project implementation to address
	THB0/9	Setaria Supply	-0,003	-0,003	-0,002	🟡	Normal project implementation to address
	THB01	Thabazimbi RWS	0,000	1,116	1,133	🟢	
	THB02	Northam RWS	0,000	0,000	0,000	🟢	

LEDGEND	
🔴	Extraordinary interventions required
🟡	Assume normal project will address
🟢	No projected imbalance

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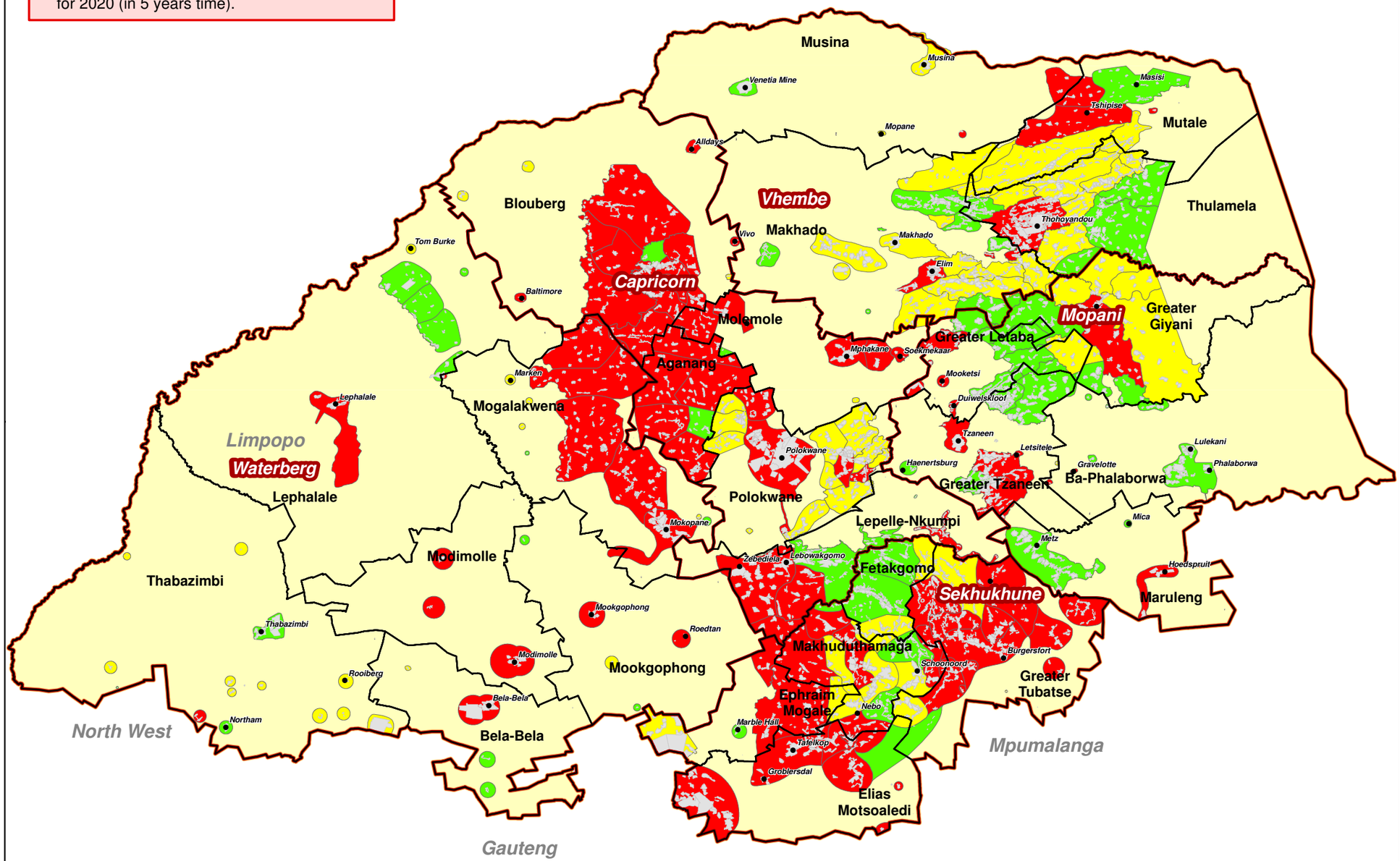
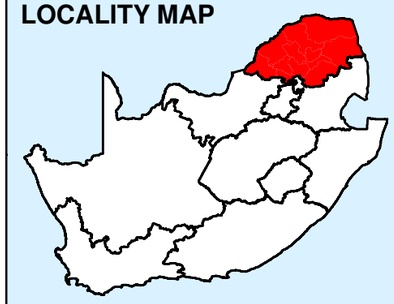
WATER SOURCE INFRASTRUCTURE BALANCE AT 2020 PER SCHEME AREA

Planning Note :

- Additional extraordinary intervention measures are required to ensure sufficient source development and connecting infrastructure for 2020 (in 5 years time).



LOCALITY MAP



Legend

Water Scheme Areas

Intervention Requirement Now until 2020:

-1 Extraordinary intervention required

0 Assume normal project implementation will address deficit

1 No deficit in water source infrastructure

BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries
- Settlements

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TOPIC 8 - WATER BALANCE 08.8

GROWTH AREAS WATER BALANCE

TOPIC 8 – WATER BALANCE

08.9

STATEMENTS

There are six provincial growth points identified in Limpopo Province which require water to allow the planned development to proceed. These economic and future economic development points in Limpopo area are indicated in Map 8.10. Water resources for these developments of the SEZs and growth points are not secured and further options needs to be explored as a matter of priority.

STATISTICS

Projected water demand requirements for mining, industrial and commercial are obtained from LEDA and the WSAs for the Growth Points and Special Economic Zones (SEZ). Domestic water demand is obtained from the domestic water demand model.

Growth Point	Water Scheme	2015 Water Demand (Ml/d)					2015 Water Resources (Ml/d)	2015 Water Balance (Ml/d)	2045 Water Demand (Ml/d)					2045 Water Resources (Ml/d)	2045 Water Balance (Ml/d)
		Domestic	Mining	Industrial	Commercial	Total			Domestic	Mining	Industrial	Commercial	Total		
Polokwane Urban	Olifants/Sand	76.338	3.562	10.959	10.959	**101.817**	63.502	-38.315	198.614	10.959	13.699	13.699	**236.970**	65.324	-171.646
Mogalakwena Northern Limb	NW3 and 4	27.083	27.397	4.932	3.014	**62.425**	26.712	-35.713	36.696	82.192	6.027	3.562	**128.477**	28.969	-99.508
Lephalale Coal/Energy Cluster	LEP01	10.829	82.192	2.192	1.096	**96.308**	13.699	-82.609	40.999	410.959	2.740	1.370	**456.067**	16.131	-439.936
Tubatse Eastern Limb SEZ	NSR01, NST1,2,4	11.624	63.014	2.466	1.096	**78.199**	11.235	-66.964	44.294	142.466	3.014	2.192	**191.965**	43.786	-148.179
Makhado/Soutpans-berg SEZ	NN5	7.371	0.000	5.479	2.740	**15.590**	9.875	-5.715	10.283	49.315	65.753	3.288	**128.639**	14.116	-114.523
Musina/Soutpansberg SEZ	NN2	11.981	13.699	1.205	0.904	**27.789**	15.305	-12.484	39.971	13.699	13.699	1.370	**68.738**	29.461	-39.277

The water balance for all the zones shows a serious water deficit and additional water allocations are to be secured from the planned and proposed bulk water resources. The status and proposed actions to meet the additional allocations for water resources are as follows:

Growth Point	Water Scheme	2015 Water Requirements (Ml/d)	2045 Water Requirements (Ml/d)	Proposed and Possible Water Resources Options
Polokwane Urban	Olifants/Sand	-38.35	-171.7	Finalise SLA for water allocations from the ORWRDP. WCWDM in ORWRDP and Olifants-Sand Scheme. Optimise the abstraction and use of local water resources, leak repairs and re-use of WWTW effluent. Increased allocations from the Ebenezer Dam. Conduct a feasibility study for an additional dam in the Olifants basin.
Mogalakwena Northern Limb	NW3 and 4	-35.7	-99.5	Finalise SLA for water allocations from the ORWRDP. WCWDM in ORWRDP and Olifants-Sand Scheme. Optimise the use of local water resources, leak repairs and re-use of WWTW effluent. Secure additional water from Flag Boshielo Dam and Acid Mine Drainage water from Gauteng area.
Lephalale Coal/Energy Cluster	LEP01	-82.6	-439.9	Finalise SLA for water allocations from the MCWAP. WCWDM, optimise local water resources. Re-use of WWTW and industrial effluent.
Tubatse Eastern Limb SEZ	NSR01, NST1,2,4	-67.0	-148.2	Finalise SLA for water allocations from the ORWRDP. WCWDM in ORWRDP. Optimise local water resources and re-use of effluent.
Makhado/Soutpansberg SEZ	NN5	-5.7	-114.5	Increase allocation from the Nandoni Dam and SLA. WCWDM and optimisation of local water resources. Re-use of effluent. Transfer of water from an underutilised WTW in Zimbabwe.
Musina/Soutpansberg SEZ	NN2	-12.5	-39.2	WCWDM and optimisation of local water resources. Re-use of effluent. Transfer of water from an underutilised WTW in Zimbabwe. Investigate Limpopo River off-channel storage options.

STRATEGIC ANALYSIS

There is an opportunity for mining, industrial and commercial investment in Limpopo Province which will create jobs and economic sustainability. The availability of water resources will have to be investigated and secured to ensure the long-term benefits that these investment opportunities can provide.

ACTIONS

1. Obtain water allocations and infrastructure development plans for the ORWRDP and recommend the water demand.

2. Compile and finalise service level agreements (SLA) with DWS for water allocations for Tubatse SEZ, Polokwane and Mogalakwena from the Olifants System (ORWRDP).

3. Compile and finalise service level agreements for water allocations from the MCWAP.

4. Implement WCWDM measures re-use of WWTW and industrial effluent.

5. Repair and replace aging infrastructure to reduce and prevent water losses.

6. Explore water supply options from local water resources, Nandoni Dam and the Zimbabwe underutilised infrastructure. Develop and finalise service level agreements.

7. Investigate the increase and optimisation of water allocations from existing water resources and major dams (Doorndraai, Ebenezer, Albasini, De Hoop, Flag Boshielo, ground water etc.).

8. Investigate the development of a new dam in the Olifants River basin.

9. Arrange funding for the development of water infrastructure to convey bulk water to the Growth Points and SEZ's.

10. Develop a programme for implementation of the actions and projects, manage and monitor progress and implementation.

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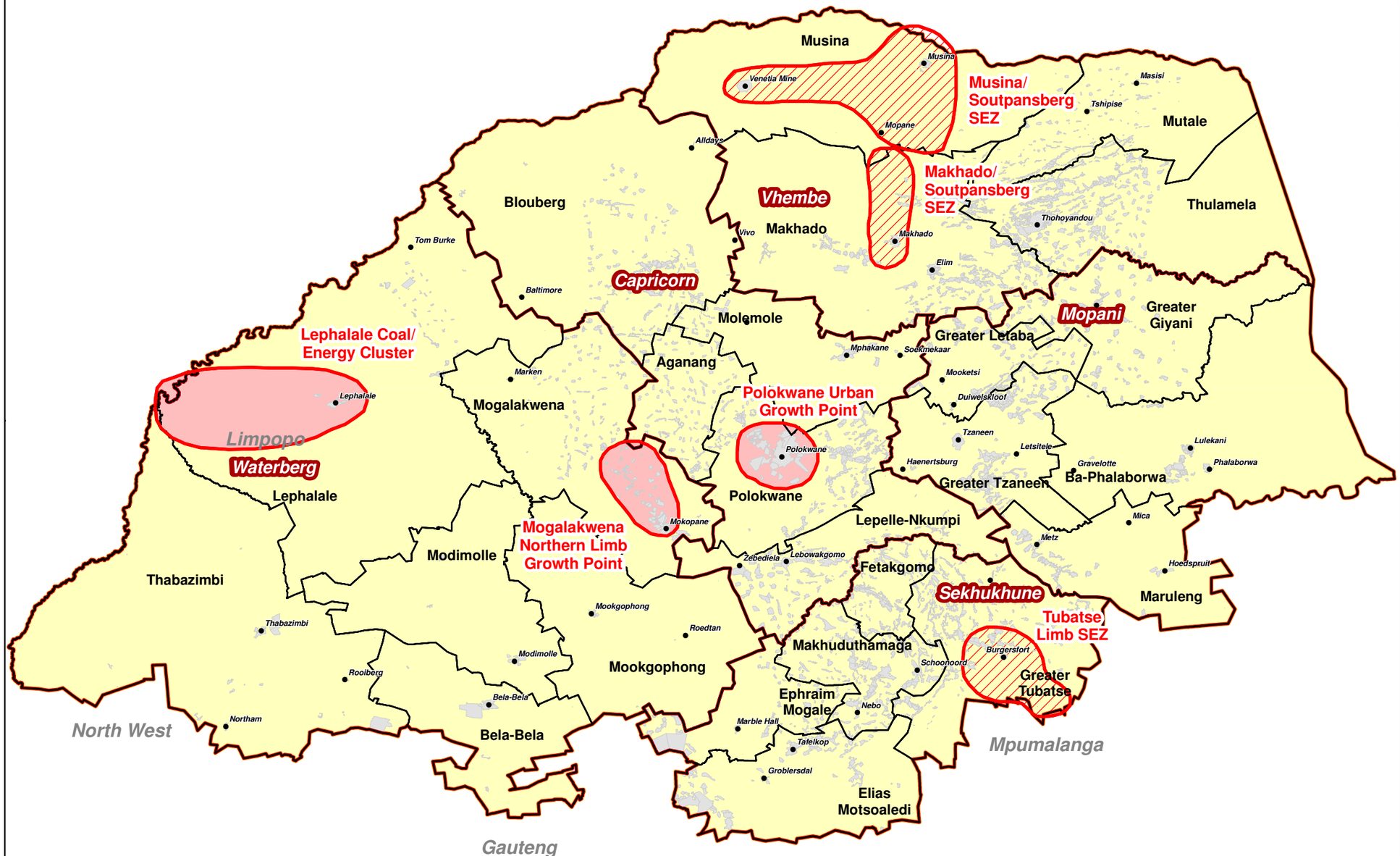
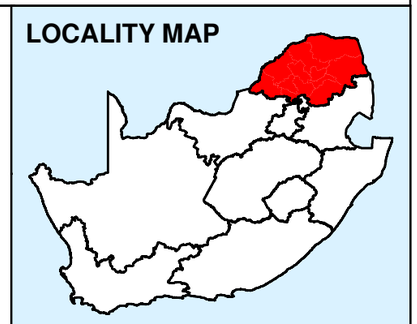
PROVINCIAL GROWTH POINTS



LOCALITY MAP



Legend

Selected Provincial Growth Points

- Special Economical Zone (SEZ)
- Growth Point

BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries
- Settlements

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TOPIC 8 - WATER BALANCE

08.10

TOTAL LIMPOPO PROVINCE WATER BALANCE 2015 TO 2045 (PRELIMINARY VALUES)

TOPIC 8 – WATER BALANCE

08.11

STATEMENTS

The water consumers in Limpopo Province consist of domestic water users, irrigation, farming, mining, power stations, industries, forestry, institutions (hospitals, schools, etc.), livestock and wild animals (nature reserves and game farms). With the information available of number of consumers and rate of consumption per day the total current (2015) water demand for the province was calculated. Expected growth rates were applied and the water demand was projected up to 2045.

The main water resources in Limpopo Province are from rivers, dams, boreholes and transfer schemes. The re-use of treated effluent, WC&WDM and rain water harvesting are required to ensure sufficient water resources utilisation.

To bring the demand for 2045 in balance with the water resources available, the water consumption needs to be reduced and new resources need to be developed.

STATISTICS

PRELIMINARY THEORETICAL CALCULATIONS

		2015	2020	2025	2030	2035	2040	2045
		Volume Mm^3/a	Volume Mm^3/a	Volume Mm^3/a	Volume Mm^3/a	Volume Mm^3/a	Volume Mm^3/a	Volume Mm^3/a
Sector Water Demand	Domestic Water Demand	247.6	288.1	333.4	365.7	400.1	433.9	466.5
	Agricultural Water Demand (Reistered Irrigation & Livestock)	1 290.5	1 322.6	1 355.6	1 389.3	1 424.0	1 459.5	1 495.9
	Mining and Industrial Water Demand (Raw water)	98.3	159.8	212.5	253.0	267.7	282.3	297.0
	Wildlife	8.1	8.2	8.2	8.3	8.3	8.4	8.4
	Estimated Total Water Demand	**1 644.5**	**1 778.7**	**1 909.7**	**2 016.3**	**2 100.1**	**2 184.0**	**2 267.7**
Water Resources	Estimated direct abstraction from rivers	183.8	183.8	183.8	183.8	183.8	183.8	183.8
	Estimated total yield from dams	336.4	336.4	336.4	336.4	336.4	336.4	336.4
	Estimated total from boreholes (Current tested / recommended use) All users	378.4	416.3	457.9	480.8	504.8	530.1	556.6
	Estimated total from boreholes (Future GW development & Testing) All users	89.9	98.8	108.7	119.6	131.6	144.7	159.2
	Total Water Resources	**988.4**	**1 035.3**	**1 086.8**	**1 120.5**	**1 156.5**	**1 194.9**	**1 235.9**
WATER BALANCE OF EXISTING WATER RESOURCES		**-656.1**	**-743.4**	**-822.9**	**-895.8**	**-943.5**	**-989.1**	**-1 031.8**
Estimated re-use and savings potential	Effluent Municipalities WWTW increase by 0.5% per year	0.0	65.9	67.6	69.3	71.1	72.9	74.7
	Effluent Mines (AMD Transfer)	0.0	0.0	100.0	100.0	100.0	100.0	100.0
	WCDM 20% of primary water demand	0.0	21.2	49.7	55.0	60.9	66.7	72.6
	Irrigation Savings of 20%	0.0	130.0	266.6	273.4	280.3	287.3	294.6
	Rain Water Harvesting	0.0	24.0	28.0	32.0	38.0	42.0	48.0
	Total estimated re-use potential	**0.0**	**241.1**	**511.9**	**529.7**	**550.2**	**568.9**	**589.9**
WATER BALANCE AFTER EXPLOTATION OF SAVINGS AND POTENTIAL		**-656.1**	**-502.3**	**-311.0**	**-366.1**	**-393.3**	**-420.2**	**-441.9**

Note: The large negative water balance deficit calculated for 2015 was not anticipated. Further detailed investigations are required to review the figures.

STRATEGIC ANALYSIS

This is the first attempt by the water services planners to collate all sector water use. The information was hard to obtain and assumptions had to be made to present a best estimate. The figures presented need to be verified and reviewed so that a higher confidence level can be obtained.

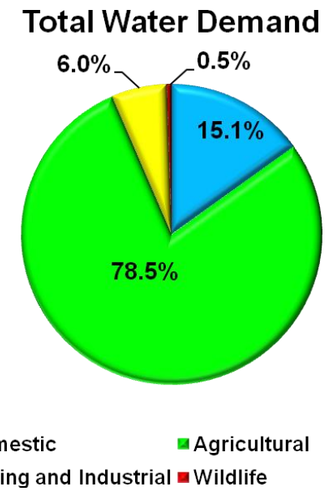
Many previous studies have indicated the water demand required by all sectors would outstrip the available water resources in the Limpopo Province, even if WC&WDM is implemented.

The reduction of demand of the biggest demand sector, namely agriculture, is possible by more than efficient use of irrigation water. This water could be made available for further irrigation or re-allocated for water services.

All sectors should investigate and implement water saving measures to ensure the efficient use of water.

ACTIONS

1. Confirm the assumed water consumption rate of each water user group with representative bodies.
2. Confirm the yield of existing and potential sources with Dept of Water and Sanitation.
3. Discuss with each water user group to use water more efficiently.
4. Get agreement with each water user group about their future growth rate.
5. Share all possible new sources (dams, well fields, cross border transfer schemes, desalinisation, etc) as well as costs of construction and price of water to the consumer.



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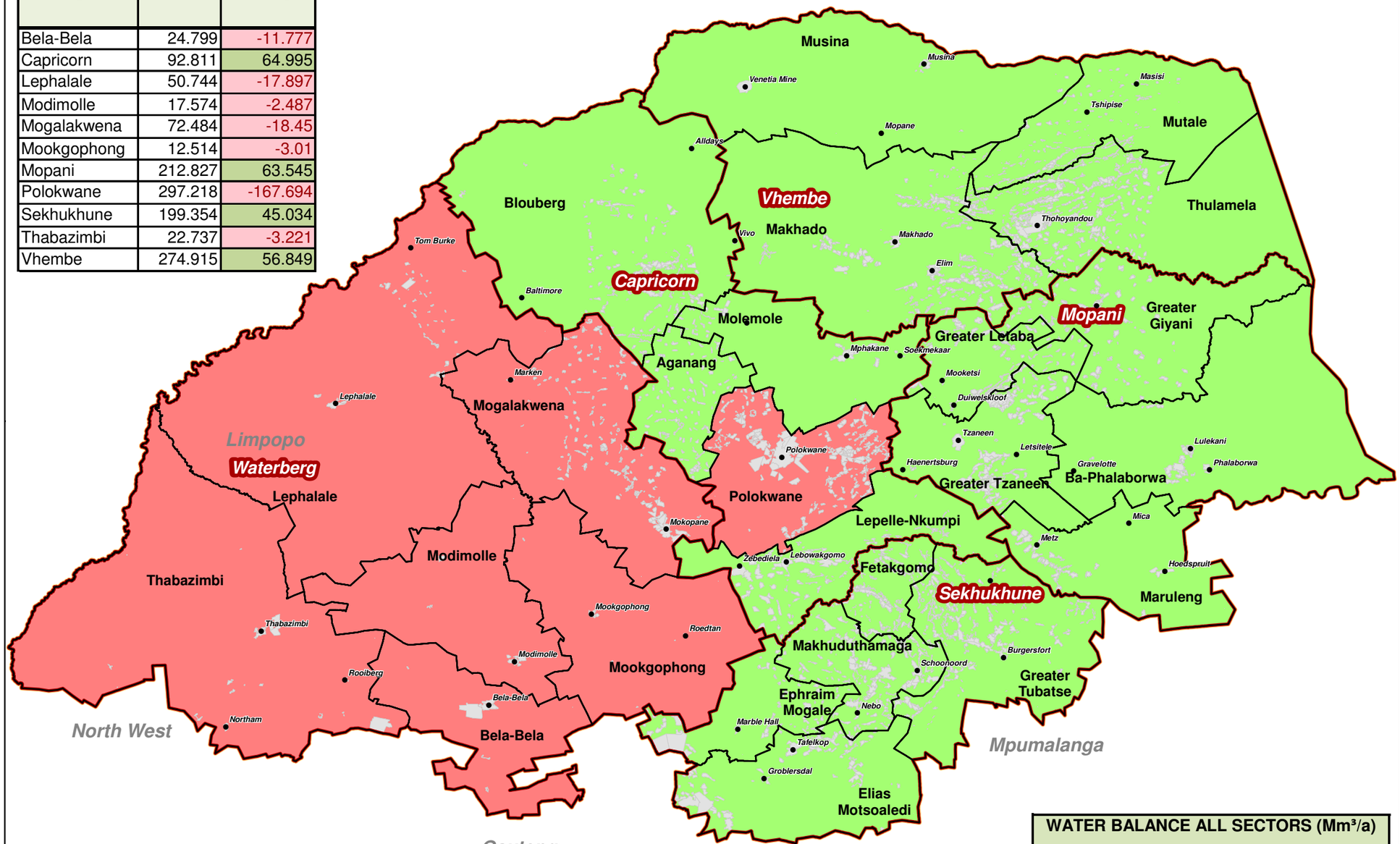
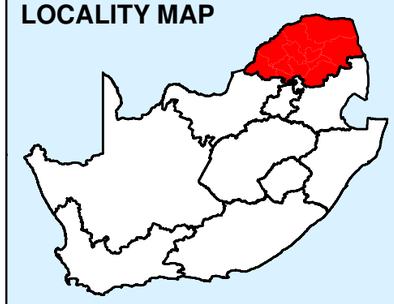
DOMESTIC WATER BALANCE 2045

DOMESTIC WATER INFRASTRUCTURE BALANCE 2045 Mm³/a		
WSA	**DEMAND**	**BALANCE**
Bela-Bela	24.799	-11.777
Capricorn	92.811	64.995
Lephalale	50.744	-17.897
Modimolle	17.574	-2.487
Mogalakwena	72.484	-18.45
Mookgophong	12.514	-3.01
Mopani	212.827	63.545
Polokwane	297.218	-167.694
Sekhukhune	199.354	45.034
Thabazimbi	22.737	-3.221
Vhembe	274.915	56.849



LOCALITY MAP



Legend

Domestic Water Balance

- WSA positive balance
- WSA negative balance

WATER BALANCE ALL SECTORS (Mm³/a)	
Water Demand	2 267.7
Water Resources	1 235.9
Additional Potential Source	589.9
Total Water Deficit	**-441.9**

BASE MAP LEGEND

- Main Towns
- Limpopo Province
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TOPIC 8 - WATER BALANCE

08.12

PROGRAMME FUNDING

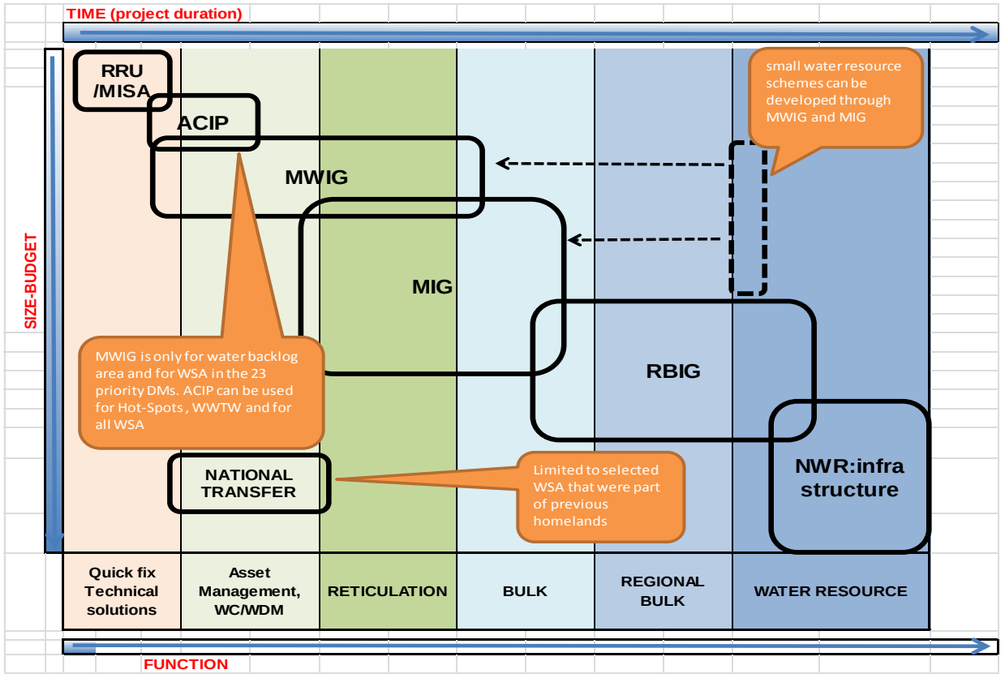
TOPIC 9 – FINANCIAL ANALYSES

09.1

GRANT FUNDING PROGRAMMES

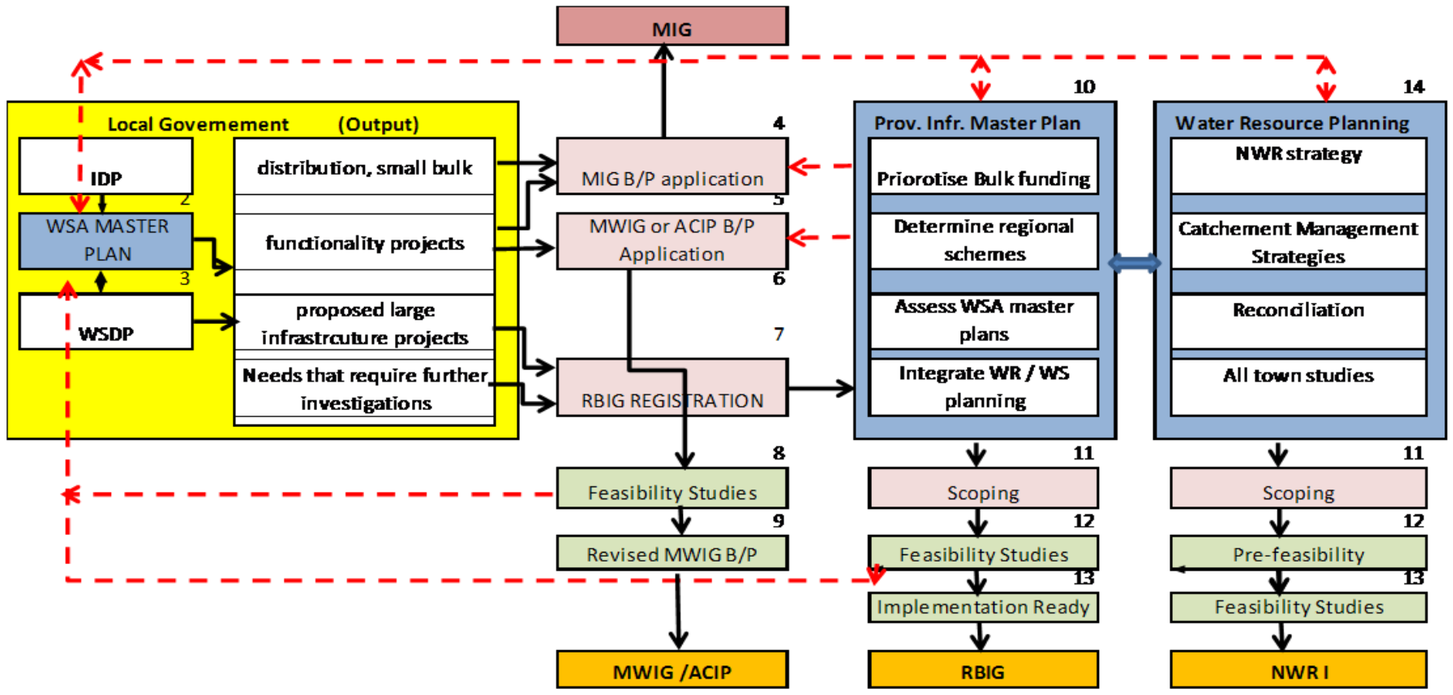
Many forms of grant funding are being used to fund capital works infrastructure and other programmes. The recent MWIG fund was introduced to address “hot spots” and to target infrastructure provision to ensure access to at least an interim water supply to all within a few years. Although this Interim/Intermediate Water Supply Programme (IIWSP) was initiated in 2012 by the minister as recognition of the plight of the many people without services, this program has so far brought little relief in Limpopo Province due to a slow start and inability to manage a quick response program such as this. Lack of professional ethos, trust and honesty also hampers effective implementation.

Water Services Authorities generally rely on both grant funding and own funding for capital works.



PLANNING SYNERGIES FOR VARIOUS FUNDING PROGRAMMES

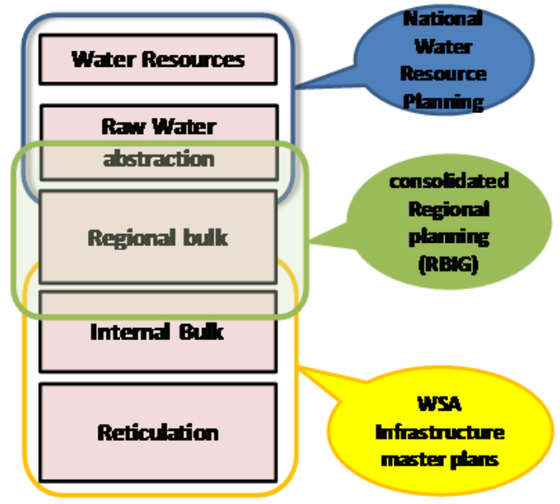
Funding to local government for capital works is complex but streamlined. National, provincial and local government planning spheres need to work together to implement a seamless capital works program. Upstream and downstream infrastructure need to be constructed according to a planned timeframe which all funders need to agree and adhere to. This seamless integration is often difficult to achieve



ACTIONS

1. Funding mechanisms for capital works programs are well structured and coordinated to complement one another. Provincial departments and municipalities are generally well equipped to implement these programs. Implementation should be divorced from corrupt procurement practices and incompetent contractors should be banned from tendering (a proper mechanism should be put in place to oversee this).
2. New programs (e.g. MWIG) take longer to start up than anticipated due to supply chain procurement requirements and general lack of capacity for effective implementation. Local government and general industry cannot implement innovative initiatives due to limited understanding of mechanisms in a complex structured governmental environment.
3. Operation and maintenance planning and funding mechanisms are not well established. Although capital works grant funding require proof of adequate O&M functionality, it is accepted as statements of intent Proper O&M should be guaranteed and proven before any grant funding is released
4. Combine different grants and programs into one fund.
5. Reduce the number of bodies responsible for water supply.

Water supply infrastructure components are dealt with by different sections of authority:



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FUNDING FOR CAPITAL WORKS FOR DOMESTIC WATER SERVICES

ACTIONS

1. Major capital works for water resources development is earmarked for Limpopo Province. The implementation thereof requires effective management which should be ensured.

2. Large amounts of grant funding (more than R 600 M/a) are returned unspent every year from various programmes. The real reason for this should be investigated and addressed.

3. Funds required from 2016/17 to achieve the 2019 goal of water and sanitation to everybody to at least RDP level requires R 28 024.6 M (this is from RBIG, MIG, MWIG and own funds). The allocated funds in DoRA up to 2017/18 amount to 25% of the total, leaving a requirement of R 21 055.6 M in less than 2 years. These funds are not available yet and need to be sourced otherwise the 2019 objective would not be met.

4. Sanitation to RDP level to all (VIP) requires at least R 6 000 M in the next 3 to 4 years. Current budgets are not sufficient and need to be increased. Sanitation programmes should be planned for and made ready for accelerated implementation.

5. Effective implementation of capital works is hampered due to a number of issues which should be investigated and resolved. Decisive methods to change current practices would be required.

6. Consideration for planning the next level of water supply service to rural areas should receive attention. Upgrading the reticulation to replace communal street taps to metered yard connections should provide systems which are easier to manage and maintain. The in-principle acceptance would be a first step followed by reviewed guidelines. A budget requirement of at least R 3 500 M would be required.

STATEMENTS

Grant funding for capital works for water supply services is firstly required to address the backlog (i.e. infrastructure below RDP standard of supply) and thereafter for a higher level of service. The scarcity of water, the long distances required to make water available and the acknowledgement that bulk supply infrastructure needs to cater for higher levels of services as well, require budget determination for capital works which includes for a mixed level of services. Traditionally this infrastructure for mixed levels of services to communities is mostly funded by grant funding. The most used level of services guideline is that of DWS for rural communities which provides for bulk infrastructure design for a 10 year growth and a 60 l/cap/day use – this is sufficient for a low use yard connection. Major schemes however are generally designed with a longer design horizon and an appropriate per capita use.

STATISTICS

Funding requirements for capital works for water services are determined by WSAs in the WSDPs and IDPs, but often reflects the 3 year (or 5 year) requirement and not the total budget requirement for a complete solution. DWS with the WSAs have determined budget requirements for intervention programmes. The recent intervention (2013/14) was the Municipal Water Infrastructure Grant (MWIG) for interim and intermediate solutions as well as addressing "hot spot" areas where civil unrest is expected due to services delivery. The Municipal Infrastructure Grant Program (MIG) is supposed to have a finite life, but seems to be required endlessly as the basic services targets are not met.
The existing funding streams and its application are reflected in the table below:

Fund	Budget Allocations for WS (R million)			
	2012/13	2013/14	2014/15	2015/16
National Water Resource	R 974.3	R 1 519.2	R 1 329.5	R 2 499.4
RBIG	R 593.3	R 675.0	R 745.0	R 953.7
MIG	R 877.5	R 2 412.0	R 1 221.4	R 1 120.5
MWIG	Nil	R 93.5	R 217.9	R 498.6
ACIP	R 10.8	R 31.3	R 11.6	R 6.0
Own funds	R 93.7	R 442.4	R 603.0	R 556.1
Total	**R 2 549.6**	**R 5 173.4**	**R 4 128.3**	**R 5 634.2**
Funds Returned Unspent	R 713.5	R 595.5	R 897.1	?

Generally for dams and raw water infrastructure, but also large bulk distribution systems of potable water

Potable infrastructure systems for bulk distribution systems

Mostly for connector bulk and reticulation (water and sanitation) as well as VIP sanitation program

Special intervention for intermediate water supply systems and hot spot areas (no sanitation)

Often supporting other funds or own water services infrastructure

The funds returned to national treasury as unused are indicative amounts from reports and data gathered. It is a combined value for all the programs, but is mostly from the MWIG, MIG and RBIG programs.

STRATEGIC ANALYSIS

Estimated funding required for the various intervention programs and types are:

Fund	Estimated Budget Allocations for WS (R million)				Remarks
	2015/16	2016/17	2017/18	Future	
National Water Resource	R 2 499.4	R 2 454.9	R 2 985.7	*R 24 267.7*	
RBIG	R 953.7	R 1 029.5	R 955.6	*R 10 644.7*	
MIG	R 1 120.5	*R 1 204.5*	*R 1 294.9*	*R 9 711.5*	Assume 7.5% increase per annum
MWIG	R 498.6	R 805.7	R 878.8	*R 699.4*	For interim supply and "hot spot" areas
Own funds	R 556.1	*R 400.0*	*R 400.0*		Assume from typical historical figures
Total	**R 5 628.2**	**R 5 894.6**	**R 6 514.9**	**R 45 323.3**	
Note: Figures in italics are estimated					

Funds required from 2016/17 to achieve the 2019 goal of water and sanitation to everybody to at least RDP level requires R 28 024.6 M (this is from RBIG, MIG, MWIG and Own funds). The budget required VIP sanitation part of this is estimated at R 5 935 M. The sanitation implementation would have to be increased dramatically to achieve VIP sanitation or better to everybody.

Addressing the backlogs often is underestimated due to moving targets partly ascribed to influx of people, aging infrastructure that needs replacement, lack of maintenance that results in infrastructure degradation as well as costs required for infrastructure that is suitable for higher levels of services. Planning and implementing water reticulation upgraded from communal street tap to yard connection should be considered as it is easier to manage and maintain. It is estimated that about R 3 500 M would be required for this upgraded reticulation to yard connections.

Effective implementation of capital works are hampered by lack of funds (although funds are being returned), lack of forward planning to have the project implementation ready (all EIAs, licensing, legislated approvals, social dynamics, safety issues, etc sorted out), lack of consultants and contractors that can perform adequately, inappropriate award of contracts (often due to corrupt practices, CIDB rating for contractors which do not accurately reflect their ability) and community related problems due to a more recent public demand for direct benefit of "what's in it for me" instead of what is good for the country.

FINANCIAL CONSIDERATIONS TO achieve FUNCTIONING WATER SUPPLY SYSTEMS

TOPIC 9 – FINANCIAL ANALYSES

09.3

STATEMENTS

Operations and maintenance of water services infrastructure in the Limpopo Province is not effective and is a serious concern. The cause could inter alia be ascribed to lack of funds, lack of capacity (human resource and equipment), vandalism and theft which cripples the systems (copper theft and transformer vandalism for the copper in the transformer), lack of dedication of O&M staff, lack of technical skills and lack of proper managerial systems.

The Blue Drop (for water treatment works) and Green Drop (for wastewater treatment works) achievement recognition has been implemented for a number of years and seems to be an excellent method for national monitoring and reporting. The WSAs react well to the Blue and Green Drop results and really make an effort to achieve high scores. The Blue and Green Drop evaluations are however not consistent in timing and coverage, and the results are not systematically available at a specific time each year).

Civil unrest often emanates from water supply systems being dysfunctional. Community demands are sometimes met by implementing short term solutions which result in more serious long term problems – often enforced political decisions.

Water Conservation and Demand Management (WC&DM) is not necessarily difficult to implement if the community and operating authority is willing, and if here are funds to support it. The WC&DM would also free up water which typically is not available to others. Wrongful use of domestic water for irrigation of crops and live stock watering would be addressed in any WC&DM program.

STATISTICS

Equitable share is made available to WSAs to fund operation and maintenance costs for the provisioning of Free Basic Water and Sanitation. The equitable share monies received by Limpopo Province WSAs are:

	Budget Allcations for WS (R million)						Remarks
	2015/16		2016/17		2017/18		
	Water	Sanitation	Water	Sanitation	Water	Sanitation	
Equitable Share	R 969.1	R 781.2	R 1 081.8	R 859.4	R 1 202.1	R 940.1	Excl Waterberg DM
Equitable Share	R 126.2	R 103.3	R 129.9	R 106.4	R 133.7	R 109.4	Waterberg Estimate = 30% of total
Total	**R 1 095.3**	**R 884.5**	**R 1 211.7**	**R 965.8**	**R 1 335.8**	**R 1 049.5**	
Note: From DoRA 2015							

The estimated volume of water to be made available as Free Basic Water (from the water demand model) and its cost to produce at R7.82 /kl are:

	2015	2045
Volume of FBW	46 096.6 Ml	81 882.6 Ml
Cost to Produce	R 360.48 M	R 640.32 M

The available equitable share monies seem to be adequate for covering the production and delivery costs for water.

STRATEGIC ANALYSIS

DWS (with WSA involvement) have determined the costs estimates required to rectify functionality and WC&DM:

	Functionality Problems			Conservation & Demand Management		
	Number of Affected Settlements	Affected Households	Affected Population	Number of Affected Settlements	Affected Households	Affected Population
Number	2 528	565 284	2 237 481	2 547	836 396	3 306 949
Total Cost Required	R 2 553.0 M			R 623.0 M		

The settlements that are affected by water supply functionality problems are presented in the map on the opposite page.

ACTIONS

1. Limpopo Provincial structures to support and consider additional funding to enable annual Green Drop and Blue Drop evaluations of the treatment works. This type of monitoring and reporting should be considered for water supply effectiveness to communities. This program should present annual results at a fixed date every year.

2. Equitable share funds to WSAs seem to be inadequate to cover production and delivery costs. E.g. it is not sufficient for Delivery from De Hoop Dam to Jane Furse. This aspect should be evaluated. A breakdown of the use of equitable share monies should be determined and evaluated.

3. Free Basic Water volume (at efficient use) should increase from the current estimated 126.3 Ml/d (2015) to 224.3 Ml/d (2045). This is based on 25 l/cap/day and not the FBW 6 kl/month allocation per household. The 6 kl/month per household was based on 25 l/cap/d for a household consisting of 8 persons. The avg. household size in Limpopo Province is between 1.9 and 4.6 – this may affect the determination of the FBW monthly volume.

4. The WSAs should have at least R 2 553 M to address functionality problems and R 623 M to address water conservation and demand management issues. These funds should be provided with management development support.

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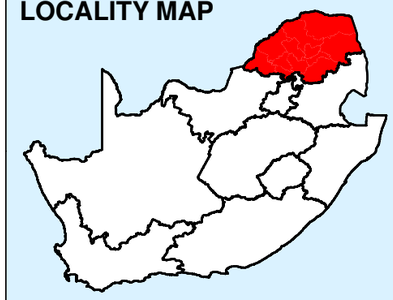
INTERVENTION REQUIREMENTS: SINGLE TYPE SETTLEMENTS
Individual settlement with rudimentary type solution

LOCALITY MAP



Intervention Requirement

Single Type Settlement

Individual settlement with rudimentary type solution

Single Type Settlements	
Households	Population
61 596	241 492
Affected Settlements	
304	

BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries
- Water Scheme Areas
- Settlements

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WATER SERVICES INSTITUTIONAL ARRANGEMENTS

TOPIC 10 – INSTITUTIONAL ARRANGEMENTS

10.1

STATEMENTS

The Municipal Strategic Self-Assessment (MuSSA) is a monitoring mechanism that is used by DWS to identify and prioritise areas of vulnerability in the municipal part of the water cycle. The latest assessment was conducted in 2013/14 when it was found that the most critical vulnerabilities in Limpopo Provice were related to:

1. Wastewater/Environmental Safety and Green-drop Status,
2. Technical Staff Capacity in terms of Numbers,
3. Water Resource Management,
4. Technical Skills of Staff, and
5. Customer Care.

Six of the 11 Water Service Authorities (WSAs) in Limpopo were considered to be extremely vulnerable on these counts and the remaining 5 were classified as highly vulnerable. No WSAs in Limpopo were assessed to have moderate or low vulnerability levels for water service management. Mopani District is the highest on the vulnerability index, followed by Greater Sekhukhune District Municipality. The provincial vulnerability index has not improved since the previous year.

STATISTICS

WSA		MuSSA Vulnerability Index (VI) (2013)
1.	Mopani District Municipality	0.98
2.	Greater Sekhukhune District Municipality	0.96
3.	Mookgophong Municipality	0.94
4.	Vhembe District Municipality	0.89
5.	Capricorn District Municipality	0.80
6.	Mogalakwena Municipality	0.78
7.	Polokwane Municipality	0.72
8.	Modimolle Municipality	0.60
9.	Bela-Bela Municipality	0.58
10.	Thabazimbi Municipality	0.54
11	Lephalale Municipality	0.52
Key		Extreme Vulnerability (VI ≥ 0.75) – Red High Vulnerability (VI ≥ 0.5) – Orange Moderate Vulnerability (VI ≥ 0.25) – Yellow Low Vulnerability (VI < 0.25) – Green

INDICATORS OF VULNERABILITY FOR WSAS IN LIMPOPO

Indicator	No of WSA's
Extremely vulnerable regarding waste water	7
Less Than 50% of required staff at WTWs	5
Future water resources shortages	5
No adequate maintenance facilities	4
Less than 50% of staff with required skills	4
No customer service representative or complaints register	3

EXPLANATORY NOTES

MuSSA calculates a vulnerability index on the basis of 16 key institutional attributes of municipal water cycle management. Scores below 50% indicate extreme vulnerability, while scores from 50-60% are classified as highly vulnerable. More than 75% is considered as low vulnerability. The five critical vulnerabilities listed in the statement section above are associated with extreme vulnerability. Areas of high vulnerability include water services planning, water conservation and demand management, as well as revenue collection.

STRATEGIC ANALYSIS

MuSSA results are used to compile Municipal Priority Action Plans (MPAPs) to address vulnerabilities. These action plans should be reflected in WSDPs, in IDPs, in Service Delivery and Budget Implementation Plans, as well as in the Provincial Master Plans. It should be noted, however, that institutional capacity constraints imply the risk that vulnerabilities may not be addressed unless capacity is augmented. It emerged from some WSAs, for example, that water quality is deteriorating. Several other WSAs are not aware of what their water quality is. This could have severe implications for community health and for social discontent. The steady deterioration in the proportion of households in Limpopo who rate DWS services as good, should be interpreted in this context.

In situations where capacity is constrained, the predictable response is to compromise on maintenance. This may not reflect immediately in institutional assessments, but is costly to reverse once it is institutionalised.

Analyses of community protests in South Africa reflect strong public discontent with respect to municipal service delivery and an increasing tendency to commit violent crimes during protests. Lack of access to clean water is the second most common grievance after housing. This information from the analysis of community protests is consistent with the findings of the Stats SA annual General Household Surveys that satisfaction levels with water services are declining, especially in the Limpopo Province.

ACTIONS

1. Despite the extreme vulnerabilities that were identified with regard to waste water quality and green drop status, several WSAs indicated that no waste water issues had been tabled before Council for action and that no funds had been made available for this purpose. The implication is that this priority is not being addressed as it should. Capacity building will have to be addressed at council, managerial and operational levels before any improvement can be expected. This matter should be given top priority because of the potentially severe implications that water quality deterioration can have on community health.

2. Compromises on water system maintenance may not reflect in the initial stages, but are costly to undo once system functionality is negatively affected. This gives rise to the functionality gap that is being raised by Statistics South Africa and that was reported on in the previous page. The functionality gap raises the risk of community health concerns and of violent social discontent.

3. Progress with the implementation of Municipal Priority Action Plans must be monitored on a quarterly basis by the DWS Provincial Office as recommended in the MuSSA report so that timeous action can be taken to refine priorities and mobilise additional resources if necessary.

4. MPAPs should be compiled for all WSAs that do not have them yet.

5. Results of the annual General Households Surveys by Stats SA, especially on the qualitative aspects of service deliver, should be important information in the WS planning process.

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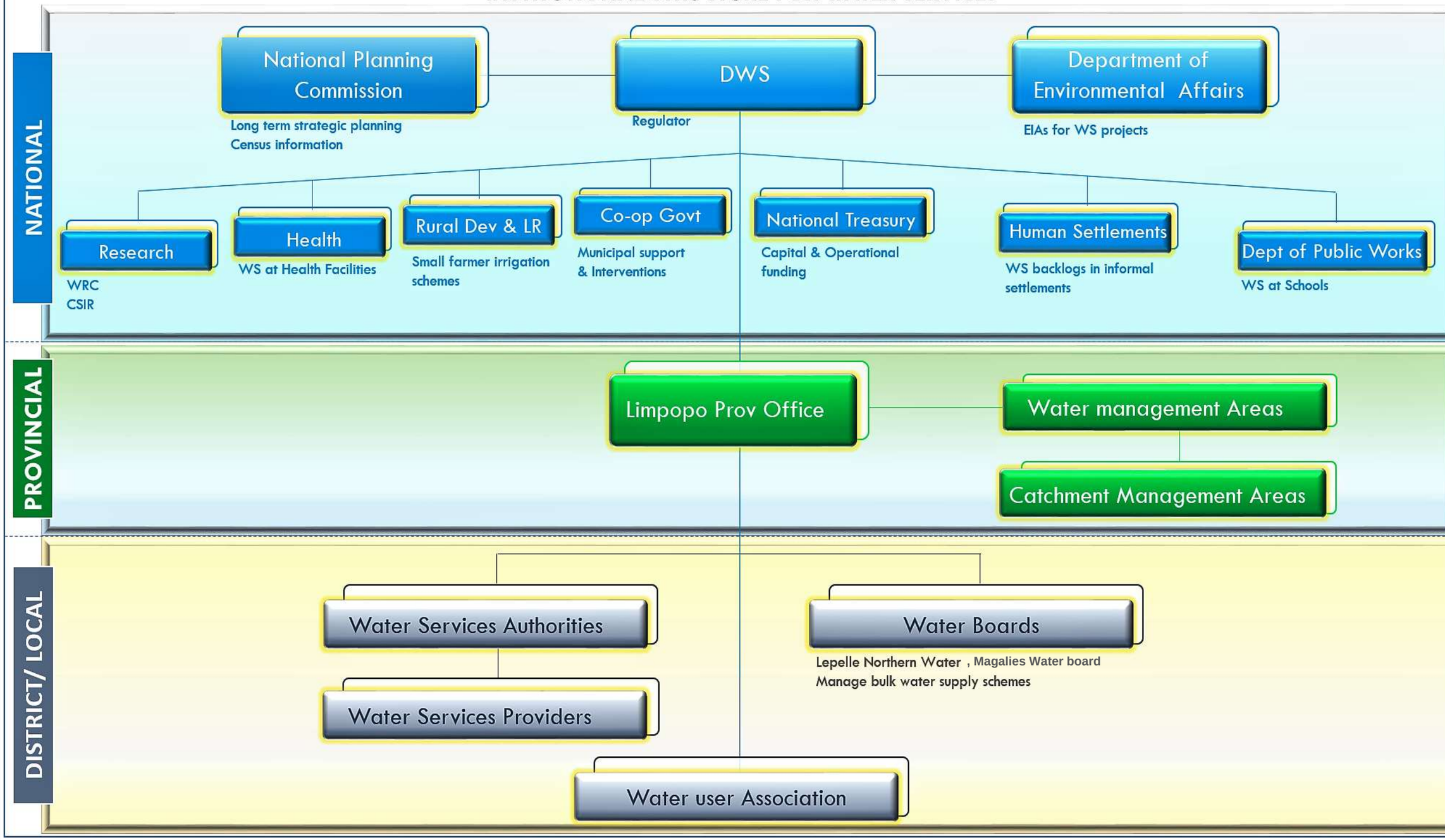
INSTITUTIONAL ARRANGEMENTS

INSTITUTIONAL STRUCTURE FOR WATER SERVICES



WATER SERVICES INSTITUTIONAL ARRANGEMENTS

TOPIC 10 – INSTITUTIONAL ARRANGEMENTS

STATEMENTS

DWS is required to provide an enabling environment for effective water use and management by leading and regulating the water and sanitation sectors, developing policy and strategy; and also by monitoring performance and providing support to the sector. The Department operates at national, provincial and local levels across all elements of the water cycle. The Limpopo Provincial Office of DWS is an important institution in this context. Several other national departments also participate in the water cycle. Certain functions are constitutionally assigned to sector partners. An institutional map of the sector is provided on the opposite page. It is evident that primary sector partners include water boards, water service authorities and water services providers. On the national level the country has been divided into 9 WMAs of which two occur in Limpopo Province (Limpopo and Olifants rivers of WMAs, each comprising several catchment management areas). These water management areas are reflected on the second institutional map. Water resource management functions will be increasingly delegated to Water Management Areas as they become operational.

Limpopo Province has 11 Water Service Authorities as listed in the statistics section below. There are 2 operating water boards, namely Lepelle Northern Water (with the larger area of operation) and Magalies Water Board. A process is currently underway in DWS to restructure water boards into regional water utilities so as to improve efficiency. They should be capable of providing support to WSAs and to CMAs where needed. There are also several water user associations at the local level. These are co-operative associations of individual water users who wish to undertake water-related activities for their mutual benefit. Restructuring of WUAs is also being considered.

DETAILS AND STATISTICS

WS Institutions in Limpopo

INSTITUTION	DESCRIPTION/REMARKS
DWS	Limpopo Regional Office in Polokwane
WMA_1	Limpopo North with 6 CMAs
WMA_2	Olifants with x CMAs
Water Board	Lepelle Northern Water & Magalies
WSAs	See separate list
WUAs	See separate list

WSAs in Limpopo

- Capricorn DM
- Sekhukhune DM
- Vhembe DM
- Mopani DM
- Polokwane LM
- Lephalale LM
- Mogalakwena LM
- Modimolle LM
- Mookgophong LM
- Thabazimbi LM
- Bela-Bela LM

Water User Associations in Limpopo

- Lebalelo
- Letaba
- Mokolo Irrigation Board
- Albasini GWS
- Nzhelele GWS
- Mogalakwena GWS
- Politsi GWS

EXPLANATORY NOTES

Water Services is governed by the National Water Act (1998) and the Water Services Act (1997). These are currently being amalgamated. The National Resource Strategy (2013) sets out the strategic direction for water resources management until 2030, with reference to protection, use, development, conservation and control. It introduces the concept of water management at the catchment level. The official policy position and strategy for sanitation services requires more clarification and integration with water services.

The Strategic Framework for Water Services of 2003, which is currently under review, sets out a comprehensive approach to the provision of water and sanitation. The Limpopo Water Master Plan supports the national water strategies, as well as the Limpopo Development Plan. It is also supported by district and local water service development plans.

Legislation requires each WSA to develop a WSDP that integrates technical, social, institutional, financial and environmental planning. This WSDP is supposed to be updated at least every 5 years. As per DWS requirements, before any water project can proceed a Feasibility Study is required followed by a Technical Report

STRATEGIC ANALYSIS

DWS aims to ensure reliable and equitable supply of water for sustainable economic and social development, as well as to protect water resources. It is committed to two strategic investment projects that were announced by the Presidency and that relate to the eradication of backlogs in water and sanitation services, the consolidation of water services institutions, as well as the implementation of water leak management and water demand awareness programmes. The vision for all staff and stakeholders is integrated water resource management. National Treasury has made substantial funding available through the Municipal Water Infrastructure Grant (MWIG) to assist with the eradication of backlogs. Effective metering and billing are crucial instruments to achieve this vision and to balance growing water needs with constrained resources. Current water usage exceeds reliable yield, which could become a crisis during prolonged periods of drought.

Four areas are assessed as part of the DWS Performance Measurement System, i.e. technical efficiency, customer satisfaction, financial viability and institutional effectiveness. The Stats SA GHS for 2014 reported that only 35.3% of households in Limpopo rated water services as good compared to 61.4% for the country. This was the lowest among all provinces. The proportion of households in Limpopo reporting water supply disruptions for more than two days has increased from 59.1% in 2010 to 61.4% in 2014. A gap is emerging between the physical provision of infrastructure and the functionality of it.

The Municipal Strategic Self-Assessment (MuSSA) shows that all WSAs in Limpopo are highly vulnerable in terms of institutional effectiveness. A summary of the 2013/14 MuSSA assessment results for Limpopo is provided on the next page.

ACTIONS

1. Intentions regarding institutional restructuring and consolidation within the water cycle, including the formation and capacitation of catchment management areas, as well as water user associations, should be clarified as a matter of urgency in order to avoid stakeholder alienation.
2. Government policies and strategies for improved sanitation services also require more clarification and integration with water services.
3. The proportion of rural households who report that water services are good is dropping every year according to the results of annual General Household Surveys by Statistics SA. This deterioration is pronounced in Limpopo Province. It reflects a growing functionality gap between the rate of water infrastructure provision and the efficiency or utilisation levels of that infrastructure. Avenues could be explored to train community members to become more proactive in preserving their own local water networks.
4. All Water Service Authorities in Limpopo are institutionally vulnerable, specifically with regards to technical staff capacity and skills. This requires strategic intervention and is addressed in more detail in the section that follows.
5. Many WSAs are not compiling to the requirement for compiling WSDPs. This situation needs to be addressed.

STATUS OF WSDPs IN LIMPOPO

WSA	WSDP Date	Comments
Capricorn	2015	
Polokwane	2014	
Mopani	2015	
Sekhukhune	2015	
Vhembe	2012	
Belabela	2012?	In progress
Lephalale	2011	
Modimolle	2012?	In progress
Mookgophong	2012?	
Mogalakwena	2011	In progress
Thabazimbi	2010?	

WSDP information of all WSAs was captured by DWS on the DWS Module 1 web-based compliancy check system in 2014. This Module 1 reflects core data and the quality compliance of each WSDP.

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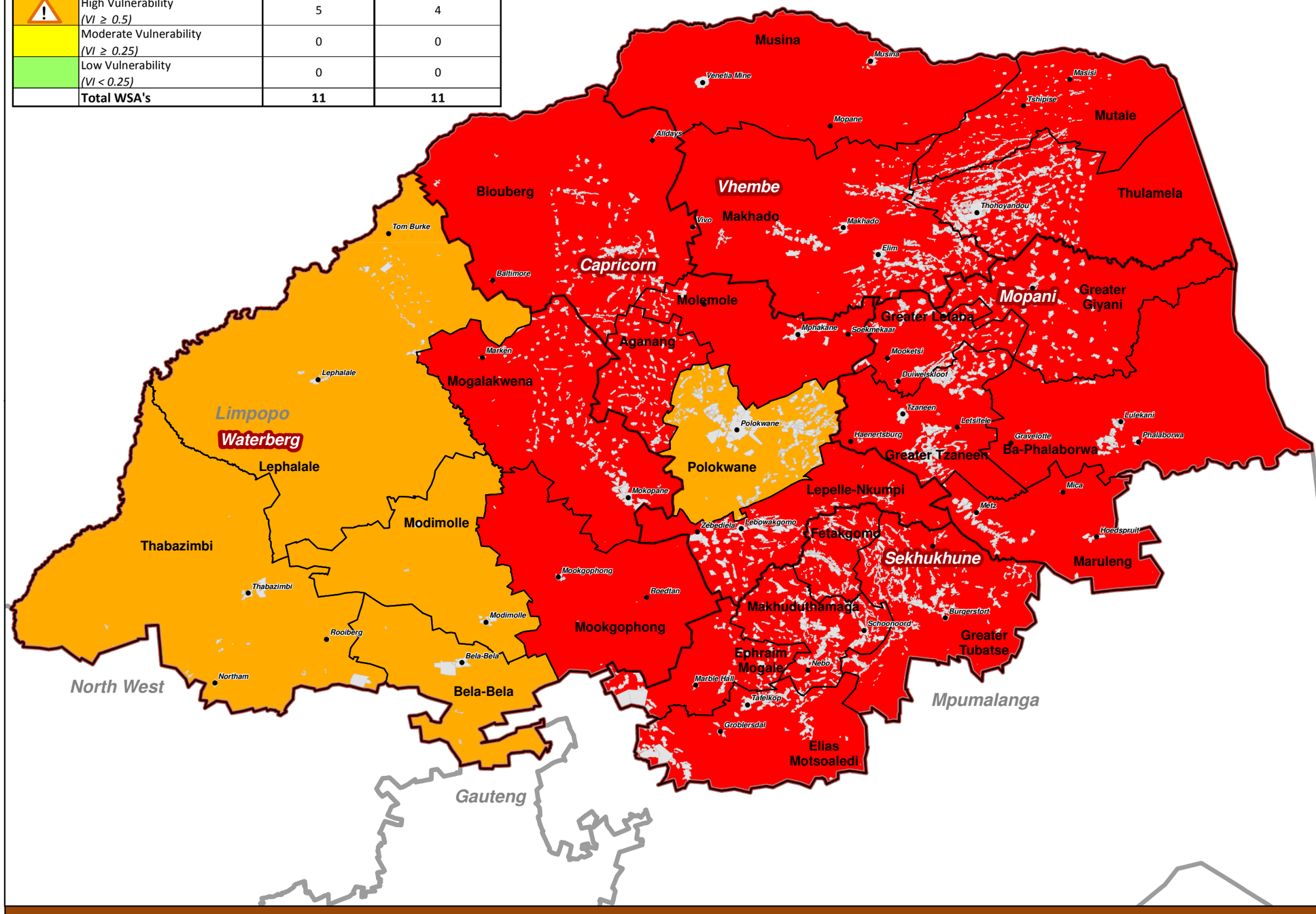
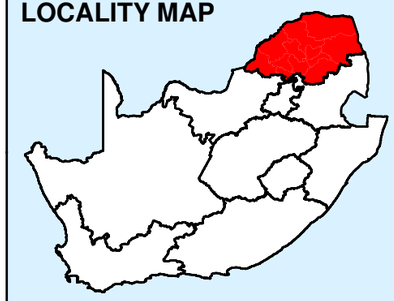
MuSSA INSTITUTIONAL VULNERABILITY INDEX

Status		Current Status: 2013/2014	Previous Status: 2012/2013
⚠	Extreme Vulnerability *(VI ≥ 0.75)*	6	7
⚠	High Vulnerability *(VI ≥ 0.5)*	5	4
	Moderate Vulnerability *(VI ≥ 0.25)*	0	0
	Low Vulnerability *(VI < 0.25)*	0	0
	Total WSA's	**11**	**11**



LOCALITY MAP



BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries
- Settlements

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TOPIC 10 - INSTITUTIONAL ARRANGEMENTS

10.4

SOCIAL AND CUSTOMER SERVICE REQUIREMENTS

TOPIC 11 – SOCIAL & CUSTOMER SERVICES

11.1

STATEMENTS

Water service quality and customer care are two of the 16 water service attributes that are measured and monitored in the Municipal Strategic Self-Assessment (MuSSA) of Water Service Providers (WSAs) in the 9 provinces of the country. Such assessments were conducted for Limpopo in 2012 and in 2013. Customer care was found to be one of the most critical vulnerabilities in Limpopo in 2013/14, with an extreme vulnerability index of 55%. All four district municipalities that are WSAs, as well as the local municipalities of Mogalakwena and Mookgophong, were found to be extremely vulnerable. From 2012 to 2013 there was a further deterioration in the customer service vulnerability of Capricorn and Mopani districts, but Lephalale LM showed an improvement.

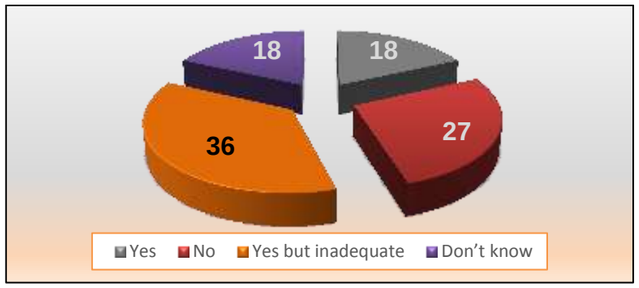
On water service quality, the provincial index for extreme vulnerability for 2013/14 was lower at 36% and 18% for high vulnerability. This reflects considerable improvement on the 2012 assessment, when water quality was one of the most vulnerable attributes of the water business in Limpopo. The vulnerability relating to water service quality was particularly acute in the district municipalities of Mopani, Sekhukhune and Vhembe, as well as in the local municipality of Polokwane as reflected in the 2013/14 assessment. Institutional capacity could be an important contributor to water service quality.

STATISTICS

Levels of Water Service Vulnerability in Limpopo

Level	Customer Care	Water Quality
Extremely Vulnerable	55%	36%
Highly Vulnerable	0	18%
Moderate Vulnerability	27%	18%
Low Vulnerability	18%	27%

Customer Service Rep and Complaints Register in Place



EXPLANATORY NOTES

The MuSSA vulnerability index is a useful aid that allows WSAs to compare their performance against a national standard and against each other. Extreme vulnerability refers to cases where a WSA is unable to meet 50% of its performance specifications and high vulnerability is when only 50-60% of these specifications are met.

Three WSAs (out of 11 in Limpopo) do not have customer representatives or a complaints register, while another two WSAs are not aware if they have it. Two more WSAs indicated that their customer care system is not functional.

The water service quality vulnerability index has deteriorated significantly in Mopani District between 2012 and 2013 (30%). It has also deteriorated in Lephalale Local Municipality by 10% over the same period, as well as in Sekhukhune District by the same magnitude. Statistics SA also report a consistent decline in the satisfaction levels of households with regard to municipal water services, from 56.1% in 2005 to 35.3% in 2014. This deterioration in Limpopo is far more acute than the average deterioration rate in household satisfaction levels about water service quality in the rest of the country.

STRATEGIC ANALYSIS

DWS is currently in the process of compiling Municipal Priority Action Plans (MPAPs) for WSAs that are extremely vulnerable. A pilot project has been completed for Vhembe District and the process is being rolled out in other WSAs within Limpopo. This is a structured approach to reduce vulnerability regarding water service delivery in terms of which progress is monitored through periodic updates of the MuSSA. New assessments are compared to previous priority actions as a basis for refining interventions in subsequent periods.

The strategy of DWS is that the Provincial Office and each WSA should analyse the respective vulnerabilities and set targets to reduce them in the first phase of a municipal priority action plan. The second phase is to consider the most appropriate approach to achieve the targets and the third phase is to compile an action plan to implement the most appropriate approach. The fourth phase is to monitor, evaluate, communicate about and refine the interventions for optimal results. These interventions should be submitted to municipal councils for approval and should be reflected in the IDPs and WSDPs of all municipalities.

Technology is available to create customer service information systems where residential users can log complaints and receive feedback per sms. This will facilitate more effective management and monitoring of complaints, as well as more efficient communication between WSPs and consumers. Social contracts between WSAs and their consumers should also be considered as a means to communicate and manage respective responsibilities.

ACTIONS

1. Close co-operation between DWS-Limpopo and WSAs is required to finalise Municipal Priority Action Plans (MPAPs) as a matter of priority.

2. DWS has a clear policy and strategy for customer care, which must be reflected in MPAPS where this attribute is found to be vulnerable.

3. MPAPs must be presented to councils for approval and appropriate resourcing and must be incorporated in IDPs and WSDPs.

4. If institutional capacity is a constraint in WSAs, then that constraint must be specifically addressed in the MPAP. This must be carefully considered because it could be an important determinant of water service quality and the level of customer care.

5. Functionality has to be the key consideration and not only the physical existence of systems.

6. The feasibility of creating electronic databases of consumers for every WSA should be investigated. A sms-based communication functionality within the database will enable households to log complaints from their cellular phones. Formal logging of complaints will facilitate systematic responses and the monitoring of these responses.

7. The concept of a social contract between government and consumers provides for improved recognition that the sustainable provision of quality water services implies responsibilities for consumers as well as for all agencies in the water cycle. Responsibilities of residential consumers include payment for water used in excess of the free basic service allocation.

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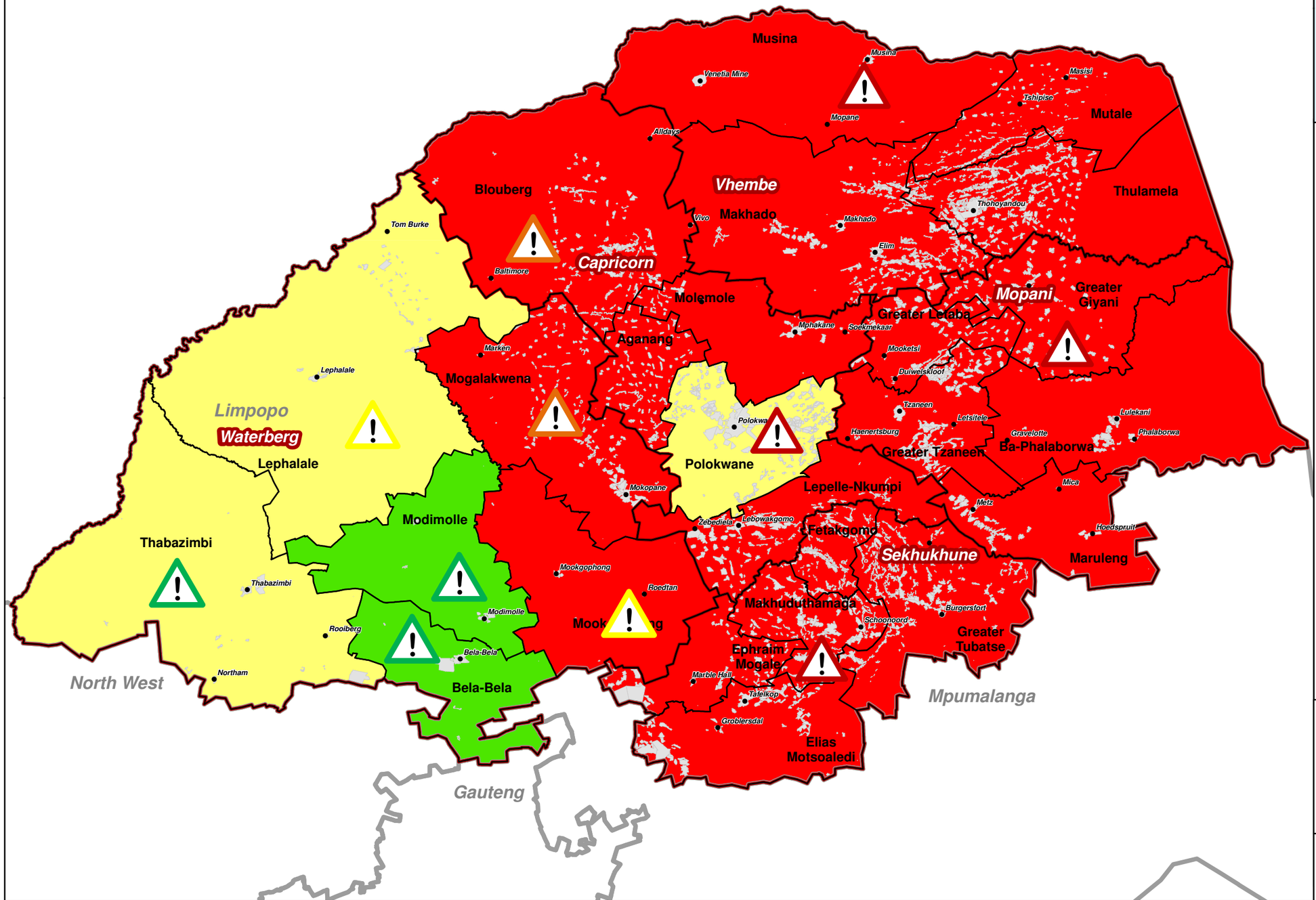
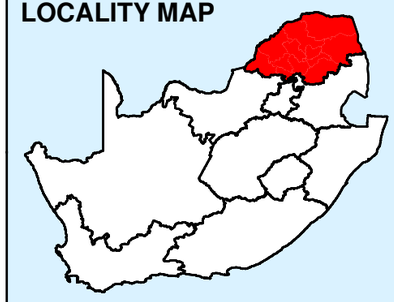
SOCIAL AND CUSTOMER SERVICE REQUIREMENTS



LOCALITY MAP



Customer Service

- Very poor customer service
- Poor customer service
- Reasonable customer service
- Excellent customer service

Water Service Quality

- Very poor water service quality
- Poor water service quality
- Reasonable water service quality
- Excellent water service quality

BASE MAP LEGEND

- Main Towns
- Limpopo Province
- Provincial Boundaries
- District Municipal Boundaries
- Local Municipal Boundaries
- Settlements

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TOPIC 11 - SOCIAL AND CUSTOMER SERVICES

11.2

ADDRESSING THE RESOLUTIONS OF LIMPOPO WATER AND SANITATION SUMMIT OF 2015 (1 of 2)

RESOLUTION FOR LIMPOPO WATER AND SANITATION SUMMIT 2015

STATEMENTS

The Limpopo Water Summit held in Jul 2015 resulted in the agreement that a Water Master Plan is to be developed which addresses these resolutions. The Limpopo Water Master Plan Framework Document was compiled as a first step toward the fulfilment of these resolutions. This table presents where the details of the specific resolution can be found in this water master plan document.

No	Resolution of Summit	Responsibility	Addressed in Mar 2016 Water Master Plan	Comments
1.	To circulate the Draft Limpopo Water Infrastructure Master Plan for stakeholders inputs.	Office of the Premier.	Throughout the whole document.	The draft document of this water master plan was submitted to LNW and all WSAs for comments during March 2016. Refinements are done and further development is required. See projects and actions.
2.	Development of Limpopo Sanitation Plan, including alternative technology and targeting rural sanitation programme for implementation.	CoGHSTA, Department of Water and Sanitation and University of Limpopo.	The sanitation backlog is presented on Topic 2, page 2.5. Some infrastructure information in Topic 4. Programmes and budget requirements are in Topic 9, page 9.3.	The backlog data derived from the 2011 Census. The development of the Sanitation Master Plan is required to assess the current backlog, develop policies, develop solutions and provide financial requirements for the eradication of the backlog. Details and projects are proposed in action plan See projects and actions.
3.	Establish a dedicated Technical Team to consider approval of Technical Reports.	OTP, CoGHSTA and Department of Water and Sanitation.	An action plan is presented in Topic 12, pages 12.3 onwards.	The need for the establishment of a technical team is required to coordinate all the planning actions, projects and activities. The need for the coordination and management of water and sanitation development is expressed in most Topics. See projects and actions.
4.	Develop an implementation plan focusing on the water services hotspots (eg Polokwane, Mokopane, Mogalakwena and Mopani municipalities).	CoGHSTA, Department of Water and Sanitation and affected municipalities.	The water demands (Topic 2), associated needs (Topic 6), water resources (Topic 7) derived to the water balance (Topic 8). Part of the action plan in Topic 12, pages 12.3 onwards	The water service hotspots are addressed within the water demand model. Further detailed work is required to assess the water service hotspots as O&M, WC&WDM, finances and institutional arrangement factors are to be addressed. Solutions of the implementation plan needs to be developed in Phase 2 of the master plan. See projects and actions.
5.	Submit a report on the implementation of bulk water infrastructure plans targeting the provincial growth points.	CoGHSTA and the Department of Water and Sanitation.	Regional bulk and transfer schemes are covered in Topic 4 (Infrastructure, pages 4.1 to 4.5). Part of the action plan in Topic 12, pages 12.3 onwards	The DWS RBIG master plan was updated in 2015 to reflect the latest approved DWS RBIG projects and budget requirements. Ongoing review needs to be included in phase 2, see projects and actions.
6.	All municipalities should comply with Infrastructure Planning and Project Management Cycle as determined by DoRA.	Provincial Treasury, CoGHSTA and the Department of Water and Sanitation, Department of Public Works, Roads and Infrastructure.	Topic 4 (Infrastructure) Topic 9 (Finances) Topic 10 (Institutional arrangements) Part of the action plan in Topic 12, pages 12.3 onwards.	Project development plans are to be acquired, evaluated and monitored in Phase 2, see projects and actions.
7.	All vacant Technical Services Managers and other critical technical posts should be filled by end of November 2015.	CoGHSTA.		Monitor, evaluate and manage.
8.	All municipalities should ring-fence a minimum of 10% of their Capital Budget for Maintenance and Operations costs.	Provincial Treasury, CoGHSTA and Office of the Premier.	Topic 5 (Operations and Maintenance) and Topic 9 (Finances).	To be implemented and monitored. See projects and actions.
9.	All municipalities should use the IDP-Budget Review process for 2016/17 MTEF period to finalise draft water development plans and other related plans.	Office of the Premier, CoGHSTA and the Department of Water and Sanitation.	Topic 4 (Infrastructure) and Topic 9 (Finances)	Guidance is available from the municipal water master plans. Implementation and monitoring is required.
10.	The Limpopo Water Services and Resources Management Technical Working Group (TWG) to provide the overall strategic coordination on the implementation of all water and sanitation projects.	Office of the Premier.	Topic 7 (Water Resources) and Topic 8 (Water Balance). An action plan is presented in Topic 12, pages 12.3 onwards.	The need for the establishment of an authority to manage resources allocations and utilisation is urgently required. The working group should provide guidance to coordinate all the water allocations, licencing, water resources projects and activities. See projects and actions.

ADDRESSING THE RESOLUTIONS OF LIMPOPO WATER AND SANITATION SUMMIT OF 2015 (1 of 2)

Continued.....

No	Resolution	Responsibility	Inclusion in Water Master Plan	Comments
11.	Develop a Funding Framework, Cost Recovery Model and Public-Private Partnership mechanism to facilitate a sustainable provision of water for both social and economic development.	Office of the Premier, Provincial Treasury, CoGHSTA, LEDET, the Department of Water and Sanitation and DBSA.	Topic 8 (Water Balance) and Topic 9 (Finances) Part of the action plan in Topic 12, pages 12.3 onwards.	To be actioned for full development in phase 2. Refer to Actions and Projects
12.	To facilitate the review of Water Powers and Functions as a mechanism to promote integrated planning and management.	The MEC, CoGHSTA and SALGA.(Limpopo Province)	Topic 10 (Institutional arrangements). Part of the action plan in Topic 12, pages 12.3 onwards.	To be actioned for full development in phase 2.Refer to Actions and Projects
13.	To facilitate the review of Water use management and support social needs and economic development especially Agriculture and Mining.	Department of Water and Sanitation.	Topic 2 (Water Demand) and Topic 8 (Water Balance). Part of the action plan in Topic 12, pages 12.3 onwards	To be actioned for full development in phase 2.Refer to Actions and Projects

LIMPOPO WATER MASTER PLAN : PROGRAMME IMPLEMENTATION AND ACTION LIST

13.1

TASK TEAM	PROJECTS/ACTIONS	PROPOSED SCOPE OF WORK/DESCRIPTION	Proposed **Responsibility** Members *Role-players*	Priority Activity 2016/17	To continue 2017-onwards
Limpopo Water Management Committee	Establish a Limpopo Water Management Committee (LWMC) to coordinate, manage and oversee activities and implementation of projects of the LWMP	a. Appoint/designate LWMC secretariat and convener b. Draft LWMC constitution, establish authority and management structures c. Convene the LWMC, approve constitution and constitute d. Establish secretarial, management and administrative structures and implement procedures e. Designate Task Team portfolios, delegation of authorities, responsibilities and accountabilities to departments f. Draft appointments and performance agreements of Task Teams g. Assess, agree and finalise activities and projects as proposed in the LWMP (refinements are required to ensure effective implementation) h. Develop LWMC programme and agree on milestones i. Manage and oversee the functionality of the LWMC and Task Teams j. Monitor, coordinate and oversee the functionality of Task Teams activities/projects, implementation priorities and programmes.	**Office of the Premier** WSAs MMs DWS Managers CoGHSTA Managers LNW CEO & managers LMP PSP	a, b, c, d, e, f, g, h	i, j
	Convene, appoint and establish Task Teams 1 to 5 to manage and implement designated actions/projects	a. Identify role players for each Task Team (Departments /institutions/WSAs/Water Boards/forums and individuals) b. Identify suitable leaders/managers (individual authorised managers of functional institutions) for each Task Team c. Appoint leaders for Task Teams and draft delegations of authority d. Assist in preparation of ToR and constitution of Task Teams	**Office of the Premier** WSAs delegates DWS Managers CoGHSTA Managers LNW CEO & delegates	a, b, c, d	
	Update the Limpopo Water Master Plan	a. Identify role players for inputs/comments b. Present the contents of the master plan to the c. Obtain feedback and comments in recommendations made in the LP Master Plan d. Identify crucial gaps and requirements for updates and prioritise e. Identify and capture relevant inputs and comments f. Incorporate Task Teams inputs, strategies and projects to update the Limpopo Water Master Plan g. Publish the Limpopo Master Plan yearly for comments and inputs	**Office of the Premier** WSAs DWS CoGHSTA LNW LMP PSP	a, b, c, d, e, f	g
	Monitor and report municipalities' compliance of infrastructure Planning and Project Management Cycle as determined by DORA.	a. Identify the compliance criteria of the DORA b. List and publish compliance criteria requirements c. Delegate specific requirements to Task Teams d. Develop monitoring system and programme e. Implement system and programme f. Compile progress and compliance reports for NT	**Office of the Premier** WSAs MMs DWS Managers CoGHSTA Managers LNW CEO	a, b, c, d	e, f
	Review the Limpopo Spatial Rationale	a. Evaluate the further use of the Spatial Rationale a basis for the prioritisation of service level upgrades. b. Review the Spatial Rationale development proposals c. Update the spatial data and geodata. d. Ensure that the Spatial Development Rationale would assist in more accurate forecasts and planning.	Office of the Premier Limpopo DDG	a, b, c, d	
	Host the water services planning spatial information and data on a website for access by planners	a. Evaluate and compile requirements for hosting the water services planning database on the web b. Obtain approvals for hosting the web and display of available data from DWS c. Prepare views and data for loading on website d. Launch website e. Maintain and manage feedback as on-going project	**Office of the Premier** WSAs DWS CoGHSTA LNW LMP PSP	a, b, c, d	e
	Water Services Planning and Implementation Forum	a. Identify all relevant roll players b. Identify all planning and implementation projects in Limpopo c. Assess status of planning and compiled a combined programme d. Assess all options and identify solutions e. Prioritise all projects f. Identify corrective measures g. Update programme h. Monitor and evaluate outcomes	Office of the Premier WSAs **DWS** CoGHSTA LNW LMP PSP	a, b, c, d, e, f, g	d, e, f, g, h

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TASK TEAM	PROJECTS/ACTIONS	PROPOSED SCOPE OF WORK/DESCRIPTION	**Proposed <u>Responsibility</u> Members** ***Role-players***	**Priority Activity 2016/17**	**To continue 2017-onwards**
	Manage and assist with water resources development initiatives for growth points	a. Obtain water allocations and infrastructure development plans for the ORWRDP and recommended the water demand b. Compile and finalise service level agreements (SLA) with DWS for water allocations for Tubatse SEZ, Polokwane and Mogalakwena from the ORWRDP c. Compile and finalise service level agreements for water allocations from the MCWAP. d. Explore water supply options from local water resources, Nandoni Dam and the Zimbabwe underutilised infrastructure. Develop and finalise service level agreements e. Implement WCWDM measures, re-use of WWTW and industrial effluent f. Investigate the increase and optimisation of water allocations from existing water resources and major dams (Doorndraai, Ebenezer, Albasini, De Hoop, Flag Boshielo, ground water etc.) g. Arrange funding for the development of water infrastructure to convey bulk water to the Growth Points and SEZ's h. Repair and replace aging infrastructure to reduce and prevent water losses i. Investigate the development of a new dam in the Olifants River basin j. Develop a programme for implementation of the actions and projects k. Manage and monitor progress and implementation	Office of the Premier WSAs **<u>DWS</u>** CoGHSTA LNW LEDA LMP PSP	a, b, c, d	d, e, f, g, h, i, j, k

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13.3

TASK TEAM	TOPIC	PROJECTS/ACTIONS	STRATEGIC ACTIONS AND PROJECTS	MONITORING, IMPLEMEMTATION AND MAINTENANCE ACTIONS AND PROJECTS	Proposed **Responsibility** Members *Role-players*	Priority Activity 2016/17	To continue 2017-onwards
Task Team 1	Topic 1 Demographics	Enhance demographics data	a. Study and review the use of the provincial demographic data set for water planning –(households, population and growth rates per settlement) for water services planning purposes b. Evaluate the use of the provincial demographic GIS data set (households, settlement polygons) as basis for all infrastructure master plans for the province c. Incorporate Spatial Rationale revisions in the demographic data set d. Review and update the demographics data set and take ownership	e. Promote the use of the dataset by all planners f. Review and update the dataset on a yearly basis.	**Office of the Premier** WSAs DWS CoGHSTA LNW LMP PSP	a, b, c, d, e	e, f
	Topic 2 Water Service Levels and Demand	Refine the domestic Water Demand Model with inputs from all role players	a. Assess service levels and backlogs for each settlement and align with Census information, considering the WSDPs, DWS data, Spatial Rationale, etc. b. Propose further development and refinement of the domestic water demand model c. Review and update water demand Model d. Promote the use of the water demand model by all planners	e. Devise update procedures and continuously maintain and update the water demand model (demographics, backlogs, service levels) and maintain links with the GIS systems and WSAs	**Office of the Premier** WSAs DWS CoGHSTA LNW LMP PSP	a, b, c, d	e
	Topic 2 Water Service Levels and Demand	Develop Limpopo Sanitation Master Plan	a. Assess and update household sanitation backlog (WSAs, DWS and Census) b. Categorise sanitation requirements and appropriate solutions c. Develop appropriate sanitation solutions for clusters d. Assess the consequences (financial, environment, O&M, affordability, etc.) of different sanitation service level upgrade scenarios on bulk infrastructure requirements and environmental aspects. e. Develop provincial policy and strategy for service levels and solutions f. Develop sanitation development programme for Limpopo g. Agree with WSAs on sanitation solutions and programme	h. Monitor capital roll-out	**Office of the Premier** WSAs DWS CoGHSTA LNW LMP PSP	a, b,	c, d, e, f, g, h
	Topic 2 Water Service Levels and Demand	Develop irrigation, mining, livestock, game and forestry water demand model and strategy	a. Identify all role players and water use sectors b. Involve sector role players in the identification of water use c. Develop a water demand model d. Develop a strategic plan on the sustainability of water allocation for all sectors in close collaboration with sectors and Task Team 4	e. Monitor water use, maintain and refine the water demand model	Office of the Premier WSAs **DWS** CoGHSTA LDA LNW LMP PSP Organised Agriculture Emerging Agriculture Mining houses	a, b, c, d	d, e
	Topic 6 Associated Services	Develop and refine Associated needs database	a. Define and categorise the associated water use sector b. Identify all associated water sector users in all WSAs c. Develop geodata base and GIS system to provide required information of the assets d. Develop an associated water sector policy and strategy e. Develop and ensure capacity is established at delegated utility (WSAs, dept as determined by policy) to perform functions of sustainable management, O&M of the assets f. Develop SLAs and performance contracts between functional departments and WSAs g. Develop a programme for transfer of assets to WSAs	h. Monitor service delivery and the functionality of assets	Office of the Premier WSAs DWS **CoGHSTA** LNW LDPW LDA LDOE LDOH SAPS LMP PSP	a, b, c, d	e, f, g, h

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TASK TEAM	TOPIC	PROJECTS/ACTIONS	STRATEGIC ACTIONS AND PROJECTS	MONITORING, IMPLEMEMTATION AND MAINTENANCE ACTIONS AND PROJECTS	Proposed **Responsibility** Members *Role-players*	Priority Activity 2016/17	To continue 2017-onwards
Task Team 2	Topic 4 Water Services Infrastructure	Identify emergency water services interventions requirements (Hotspot solutions)	a. Establish links with the DWS MWIG programme and processes b. Identify areas where further urgent interventions are requirements due to health threats, service level backlogs, service delivery issues, water resources availability, O&M and refurbishment requirements c. Investigate the establishment of a fast acting emergency response unit with authority, capability and capacity to resolve water services related defects d. Assess and categorise the needs and requirements and assess technical solutions e. Develop and assess solutions for interventions f. Prioritise projects and solutions for the proactive eradication of water service delivery issues	g. Monitor and oversee intervention projects and programmes	Office of the Premier WSAs **DWS** CoGHSTA LNW LMP PSP	a, b, c, d, e, f, g	d, e, f, g
		Develop Schematic Bulk Water layouts for schemes	a. Develop schematic BWS system flow layout to indicate inputs (water resources), treatment, pumping, distribution pipelines, storage and outputs b. Indicate capacities of components and design criteria (processes) c. Indicate scheme service areas d. Indicate communities served (check with demand scenario and update) e. Link with asset registers (if possible) f. Confirm naming/numbering of components g. Link with GIS h. Link with water demand balance	i. Ensure that understanding of systems are documented and transferred to the operating authority	Office of the Premier WSAs DWS CoGHSTA **LNW** LMP PSP	a, b, c, d, e, f, g, h	f, g, h, i
		Develop Regional Bulk Infrastructure GIS system and update BWS Master Plan	a. Update the DWS geodata system as follows: ○ Existing infrastructure details (capacities, layout, condition, functionality, etc.) ○ Future components (layout, scheme extent, etc.) ○ Identify refurbishment and replacement requirements ○ Investigate and ensure links with WSA assets register ○ Investigate software and web-based solutions ○ Implement GIS maintenance procedures to ensure real-time updates	b. Implement and maintain asset management system structures and procedures	Office of the Premier WSAs DWS CoGHSTA **LNW** LMP PSP	a	b
		Manage scheme development plans and monitor scheme development of Regional Bulk Water and Sanitation projects	a. Update DWS Regional Bulk Project list as per expenditure and IDP/WSDPs b. Identify mayor regional bulk and transfer scheme development issues and intervention requirements c. Assist with and manage SLA agreement with WSA/WSP/DWS d. Assist WSA to ensure linkages of regional bulk development plans with reticulation projects e. Assess scheme development proposals, plans and technical reports f. Assist WSAs with calculation of O&M funding and determination of institutional requirements	g. Monitor and assist on capital and operational funding arrangements of schemes h. Monitor and assist with programming and implementation of scheme development	Office of the Premier **WSAs** **DWS** CoGHSTA **LNW** LMP PSP	a, b, c, d, e, f	c, d, e, f, h
Task Team 3	Topic 5 Operations and Maintenance	Develop a Provincial O&M Plan and Strategy	a. Establish and constitute the O&M Task representative Team to advise, oversee, assist and monitor WSAs O&M implementation to ensure: ○ Ring-fenced water services units in WSAs, with mandate to budget, incur expenditure and receive revenue for the provision of services. ○ Appointment of appropriately skilled technical managers with authority to ensure implementation of municipal plans as detailed in WSDP and IDP. ○ Review funding model of Free Basic Services to allow	b. Water conservation and demand management implementation and prioritisation in all WSAs.	Office of the Premier **WSAs** **DWS** CoGHSTA **LNW**	a	a, b

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TASK TEAM	TOPIC	PROJECTS/ACTIONS	STRATEGIC ACTIONS AND PROJECTS	MONITORING, IMPLEMEMTATION AND MAINTENANCE ACTIONS AND PROJECTS	Proposed **Responsibility** Members *Role-players*	Priority Activity 2016/17	To continue 2017-onwards
			for WSA sustainability and Implementation of cost based tariff setting with alignment of service levels to willingness to pay. o All WSAs to prepare and implement Operation and Maintenance Management plan, as well as Preventative Maintenance management systems. o Transfer of bulk water systems and critical infrastructure like WWTWs and cross-border schemes to Regional Water Utility (but only if the regional utility is capable) o Training of water services interns in all systems to create skills in the water sector. o Resuscitation of National Community Water and Sanitation Training Institute (NCWSTI) as a key vehicle for skills development in the sector with programmes streamlined by a stakeholder advisory body. o Establishment of effective customer care centres in each WSA				
Task Team 4	Topic 7 Water Resources	Develop a provincial WC&WDM policy and strategy	a. Propose WC&WDM procedures, policy and strategy for the coordination of provincial expectations for water services. b. Calculate FBW funding requirements	c. Ensure policy synergy in the Limpopo Province	Office of the Premier **WSAs** **DWS** CoGHSTA **LNW**	a, b, c	
		Revive the Limpopo Ground Water Information Programme (GRIP)	a. Acquire funding and budget commitment for the long-term continuation of the GRIP b. Revive the provincial GRIP to gather ground water information c. Investigate and study ground water utilisation on local and regional levels d. Recommend ground water abstraction and utilisation e. Investigate the feasibility to develop a real-time groundwater abstraction information and monitoring systems	f. Implement systems and measures to ensure the long-term sustainability of ground water utilisation	**Office of the Premier** WSAs **DWS** CoGHSTA LNW LMP PSP	a, b, c	c, d, e, f
		Conduct a Provincial Water Resources Study to establish long-term strategy	a. Establish links with authors/custodians of the catchment reconciliation strategies b. Establish links with the GRIP c. Study and assess the catchment reconciliation strategies and ensure understanding of the recommendations and proposals d. Collectively with all roll players, develop a WR development plan e. Combine water demand requirements from Task Team 2 with the WR strategies to derive to a refined provincial water balance f. Identify and develop new strategies for WR utilisation and new WR development (to include effluent re-use) g. Assess viability of WR development options and proposals	h. Assess and recommend WR schemes to be developed with cost estimates for construction as well as running costs to the consumer i. Ensure linkages with proposed catchment management agencies to assess and monitor WR utilisation	**Office of the Premier** WSAs **DWS** CoGHSTA LNW LMP PSP	a, b, c	c, d, e, f, g, h, i
	Topic 8 Water Balance	Develop a Provincial Water Balance Framework	a. Develop and maintain a comprehensive, GIS based water balance model b. Investigate systems to enhance the system to reflect real-time data updates o link with asset register o link to the Water Demand Model o link with surface water model		**Office of the Premier** WSAs **DWS** CoGHSTA **LNW** LMP PSP	a, b	a, b

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TASK TEAM	TOPIC	PROJECTS/ACTIONS	STRATEGIC ACTIONS AND PROJECTS	MONITORING, IMPLEMEMTATION AND MAINTENANCE ACTIONS AND PROJECTS	Proposed **Responsibility** Members *Role-players*	Priority Activity 2016/17	To continue 2017-onwards
			○ link with DWS GRIP Ground Water, and funding ○ link with Water Quality, WSAs WQM system				
Task Team 5	Topic 3 Socio-economics	Develop a Provincial Water Affordability Framework	a. Assess, monitor and advise WSAs on the National Indigent Policies b. Assess, monitor and advise WSAs on indigent policies and requirements c. Advise and monitor the updates and maintenance of the WSAs indigent registers d. Link with Task Teams 2 and 4 to acquire water tariffs e. Determine the social component requirements as derived from the Indigent Registers	f. Ring-fence and recommend on equitable share allocations g. Monitor and report on equitable share utilisation	**Office of the Premier** WSAs DWS DOL **CoGHSTA** LNW LMP PSP	a, b, c, d, e, f	e, f, g
	Topic 9 Finances	Manage, Advice, Oversee and Secure Water Sector Finances	a. Establish links with all Task Teams to reconcile funding requirements for submission to funders and NT b. Establish and maintain links with WSA, WBs and Departmental finances sections c. Reconcile and funding requirements and needs from all WSAs, Departments and utilities (WBs, WUAs, etc.) d. Identify and confirm funding conditions and requirements from funders (Private, DBSA, MISA, NT, DWS MWIG, DWS RBIG, DWS ACIP, DWS RRU, DWS MPIS, DWS OA, DWS WR, MIG, CoGHSTA etc.) e. Identify and explore more funding sources f. Assess conditions and compile funding applications to funders	g. Arrange and secure funding for: ○ O&M of systems (also ring-fenced social component) ○ Refurbishment of water services and water resources assets ○ WC&WDM programmes ○ Intervention programmes ○ GRIP ○ Regional Bulk projects ○ Service level improvements (water and sanitation) ○ Sanitation Development programmes ○ Feasibility and viability studies ○ LWMP Task Team activities and projects h. Manage, advice, monitor, reconcile, audit and oversee the utilisation of all Water Sector funding and expenditure	**Office of the Premier** WSAs DWS DOL CoGHSTA LNW Auditor General	a, b, c, d, e, f, g	c, d, e, f, g, h
	Topic 10 Institutional Arrangements	Oversee, Manage, Monitor and Advice Water Sector on Institutional Arrangements		a. Advice and monitor Water Sector Institutional arrangements to include ○ Water Licensing ○ Service Level Agreements ○ Funding arrangements and adherence to conditions ○ Legal advice on contracts, arbitration and interventions ○ Staffing, mentoring and capacity development ○ Water Tariffs ○ IDPs, WSDPs, ○ Procurement Policies ○ Regional water utility options, priorities and functions b. Identify all aspects to monitor and report	**Office of the Premier** WSAs DWS DOL **CoGHSTA** LNW	a	a, b
		Assess, Monitor and Evaluate WSDPs	a. Assess the status of all WSA WSDPs b. Assess the WSDPs on the project priorities and feasibility of proposed projects c. Evaluate the WSDPs and recommend gaps for further development	d. Assess linkages with the WSA IDPs e. Monitor and evaluate WSDP projects implementation f. Monitor copliance of the WSDPs	**DWS** WSAs	a, b, c, d	d, e, f
	Topic 11 Customer Care	Develop a Provincial Customer Care System	a. Assist WSAs and WB to develop compatible customer care systems	b. Monitor and maintenance and implementation of the customer care systems c. Link all customer care systems to a Provincial system all WSA and WB based d. Monitor response times and that services are reinstated and complaints are resolved e. Oversee maintenance, compliance, improvement of customer care systems and responses	**Office of the Premier** WSAs DWS DOL CoGHSTA LNW	a, b, c, d, e	a, b, c, d, e

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Document Name	Author	Date
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Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region Greater Sekhukhune District Municipality and Makhuduthamaga Local Municipality: Molebeledi, Mohwelere, Ga-Mashabela, Kanaan B, Kanaan A, Diphagane, Ga-Phahla, Lobethal, Ga-tisane, Ga-Marishane, Kapaneng, Magolapong, Ga-Maloa, Polaseng, Mogorwane, Moripane, Phushulang, Maseshegwane, and Mampe - First Order Reconciliation Strategy for De Hoop/Nebo Plateau/Ngwaritsi Cluster	SRK Consulting	DRAFT VERSION 1.3 April 2011
Contract WP 9711 Development of a Reconciliation Strategy for all Towns in the Northern Region Greater Sekhukhune District Municipality and Makhuduthamaga Local Municipality: First Order Reconciliation Strategy For the De Hoop Group De Hoop/Nebo Plateau/Lepellane Water Supply Scheme: Ga-Machacha, Dinotsi, and Ga-Maila Segolo	SRK Consulting	DRAFT VERSION 1.3 April 2011
Contract WP 9711- Development of a Reconciliation Strategy for all Towns in the Northern Region Greater Sekhukhune District Municipality and Makhuduthamaga Local Municipality: First Order Reconciliation Strategy for De Hoop/Nebo Plateau/Nkadimeng Cluster Mathibeng, Madibaneng, Sebitsane, Malegale, Mangineng, Maseleseleng, Tsatane Ext, Tsatane, Ga-Mokadi, Ramphelane, Ga-Maila Mapitsane, Marulaneng, Manganeng, Modiketsi, Disesane, Masite, Molapong, Ga-Magolego, and Ga-Mohlala	SRK Consulting	DRAFT VERSION 1.3 April 2011
Contract WP 9711- Development of a Reconciliation Strategy for all Towns in the Northern Region Greater Sekhukhune District Municipality and Makhuduthamaga Local Municipality: First Order Reconciliation Strategy For the De Hoop/Nebo Plateau/Schoonoord Water Supply Scheme Tsopaneng, Ga-Mogashoa Manamane, Makgeru, Ga-Ratau, Schoonoord, and Ga-Mogashoa Senkgapudi	SRK Consulting	DRAFT VERSION 1.3 April 2011
Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region Greater Sekhukhune District Municipality and Makhuduthamaga Local Municipality: First Order Reconciliation Strategy for the De Hoop/Nebo Plateau/Mampuru Water Supply Scheme Legotong and Stoking	SRK Consulting	DRAFT VERSION 1.2 April 2011
Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region Greater Sekhukhune District Municipality and Makhuduthamaga Local Municipality: First Order Reconciliation Strategy for De Hoop/Nebo Plateau/ Carbonatites / Spitskop, Ngwaritsi, Lehlakong, Klipspruit farm, Ga-Madiba, Klipspruit, Kotupu, Sebetha, Mare, Eenzaam, Nebo, and Maserumule Park.	SRK Consulting	DRAFT VERSION 1.3 April 2011
Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region Greater Sekhukhune District Municipality Greater Tubatse Local Municipality: First Order Reconciliation Strategy for De Hoop/Nebo Plateau/Malekana Water Supply Scheme :Ga-Maepa, Ga-Masha, Ga-Rantho, Ga-Ratau, Hlalanekahle, Kotollo, Maphopha, Maseven, Ga-Malekana and Ga-Mphana	SRK Consulting	DRAFT VERSION 1.2 April 2011
Contract WP 9711- Development of a Reconciliation Strategy for all Towns in the Northern Region Greater Sekhukhune district Municipality Greater Tubatse Local Municipality: First Order Reconciliation Strategy for De Hoop/Nebo Plateau/Mampuru and De Hoop/Nebo Plateau/Annex Clusters Mampuru Settlements: Mampuru, Mampuru Ext, Mapodile, Mapodile A, Kalkfontein, Tokakgomo A, Tsakane, Ga-Phasha, and Tokakgomo Ext.	SRK Consulting	DRAFT VERSION 1.3 April 2011
Contract WP 9711- Development of a Reconciliation Strategy for all Towns in the Northern Region- Greater Sekhukhune District Municipality- Fetakgomo Local Municipality: First Order Reconciliation Strategy for De Hoop/Nebo Plateau/Lepellane water supply scheme :Ga-Mmela, Ga-Oria, Ga-Phahla, Ga-Radingwana, Manoge, Masehleng, Mashilavele, Mphanama, Phageng, Shenyaneng and Ga-Baneng	SRK Consulting	DRAFT VERSION 1.3 May 2010
Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region- Sekhukhune District Municipality and Elias Motsoaledi Local Municipality: First Order Reconciliation Strategy for De Hoop/Nebo Plateau/Carbonatites/Spitskop Cluster Syferfontein, Magukubjane, Talane, Hlogotlou and Ga-Phetla	SRK Consulting	DRAFT VERSION 1.2 May 2011
Contract WP 9711- Development of a Reconciliation Strategy for all Towns in the Northern Region Sekhukhune District Municipality and Elias Motsoaledi Local Municipality: First Order Reconciliation Strategy for De Hoop/Nebo Plateau/Monsterlus Cluster :Jerusalem, Monsterlus Town, Ga-Madiba, Mmotwaneng(Elias Motsoaledi), and Thabaleboto North	SRK Consulting	DRAFT VERSION 1.2 May 2011
Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region Sekhukhune District Municipality and Elias Motsoaledi Local Municipality: First Order Reconciliation Strategy for De Hoop/Nebo Plateau/Sephaku Cluster : Nkosini, Vlakfontein, Motsephiri, Thabaleboto South and Sephaku	SRK Consulting	DRAFT VERSION 1.2 May 2011
Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region Sekhukhune District Municipality and Elias Motsoaledi Local Municipality: First Order Reconciliation Strategy for De Hoop/Nebo Plateau/Zaaiplaas Cluster Jeije, A Re Aganeng, Khathazweni, Mathula, Dindela, Elandslaagte, Holnek, Rondebosch, Kosini, Sehlakwane and Masoyeng	SRK Consulting	DRAFT VERSION 1.2 April 2011
Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region Greater Sekhukhune District Municipality - Makhuduthamaga Local Municipality: First Order Reconciliation Strategy for Flag Boshielo Regional Water Supply Scheme	SRK Consulting	DRAFT VERSION 1.3 November 2010
Contract WP 9711- Development of a Reconciliation Strategy for all Towns in the Northern Region Greater Sekhukhune District Municipality Greater Marble Hall Local Municipalities: First Order Reconciliation Strategy for Flag Boshielo Regional Water Supply Scheme Flag Boshielo Settlements in the Eastern, Central and Western Clusters	SRK Consulting	DRAFT VERSION 1.3 June 2010
Contract WP 9711- Development of a Reconciliation Strategy for all Towns in the Northern Region - Capricorn District Municipality- Lepelle-Nkumpi Local Municipality -First Order Reconciliation Strategy for Flag Boshielo RWS/West Lepelle-Nkumpi Local Municapility Cluster (Kgwaripe, Kgwaripe Ext, Klipheuvel, Khureng, Maletane, Mehlareng)	SRK Consulting	DRAFT VERSION 1.3 December 2010
Contract WP 9711 - Development of a Reconciliation Strategy - for all Towns in the Northern Region Capricorn District Municipality Blouberg Local Municipality: First Order Reconciliation Strategy for the Ga-hlako Rural Water Scheme Including the settlements of: Ga-Hlako, Sesalong, Kutumpa, Kwaring, Ga-Malokela, Kobe, Ga-Mampote, Dithabaneng, Mongalo, Udney 1, Udney 2, Miltonduff 1, Bodie, Manye, Brodie Hill, Mokumuru, Gamakgwata, Ga-Mokopane, Werden, Ga-Mabeba, Ga-Maselela	SRK Consulting	DRAFT VERSION 1.2 April 2011
Contract WP 9711- Development of a Reconciliation Strategy - for all Towns in the Northern Region Capricorn Capricorn District Municipality - Aganang Local Municipality: First Order Reconciliation Strategy for the Ga-Mokobodi Ground Water Supply Area Incorporating the towns of: Ga-Lepadima, Ga Mokobodi, Ga-Phaka, Ga-Ramakadi- Kadi, Goedgevonden, Hwibi, Juno, Moetagare, Schoongelegen, Tibana, Ga-Mabitsela, Ga-Ramotlokana, Leokaneng, Mamehlabe, Pinkie, Rozenkranz and Ngwanallela	SRK Consulting	DRAFT VERSION 1.3 May 2011
Contract WP 9711- Development of a Reconciliation Strategy for all Towns in the Northern Region Waterberg District Municipality - Mogalakwena Local Municipality: First Order Reconciliation Strategy for Ga-Phahladira Cluster	SRK Consulting	DRAFT VERSION 1.2 October 2010
Contract WP 9711- Development of a Reconciliation Strategy - for all Towns in the Northern Region Capricorn District Municipality - Blouberg Local Municipality: First Order reconciliation Strategy for the Ga-Rawesi Ground Water Scheme Incorporating the Settlements of: Uitkyk 2, Mesehleng 1, Mesehleng 2, Mokudung, Kgokonyane, Nonono, Setlaole, Ga-Masekwa, Rotlokwa, Ga-Rawesi, Murasie, Ga- Letswalo, Lekiting, Aurora, Ga-Ngwepe and Schoongezicht	SRK Consulting	DRAFT VERSION 1.3 April 2011
Contract WP 9711- Development of a Reconciliation Strategy for all Towns in the Northern Region Waterberg District Municipality - Lephalale Local Municipality First Order Reconciliation Strategy for Ga-Seleka RWS	SRK Consulting	DRAFT VERSION 1.1 June 2010
Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region Capricorn District Municipality- Blouberg Local Municipality: First Order Reconciliation Strategy for the Gorkum Groundwater Scheme Including the settlements of: Berg-en-Dal, Ga-Mamoleka, Gorkum, Varedig, Sekhung and Morotsi	SRK Consulting	DRAFT VERSION 1.3 May 2011

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Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region Greater Sekhukhune District Municipality and Makhuduthamaga Local Municipality: Molebeledi, Mohwelere, Ga-Mashabela, Kanaan B, Kanaan A, Diphagane, Ga-Phahla, Lobethal, Ga-tisane, Ga-Marishane, Kapaneng, Magolapong, Ga-Maloa, Polaseng, Mogorwane, Moripane, Phushulang, Maseshegwane, and Mampe - First Order Reconciliation Strategy for De Hoop/Nebo Plateau/Ngwaritsi Cluster	SRK Consulting	DRAFT VERSION 1.3 April 2011
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Contract WP 9711- Development of a Reconciliation Strategy for all Towns in the Northern Region Capricorn District Municipality - Lepelle-Nkumpi Local Municipality First Order Reconciliation Strategy for Mafefe Individual GWS Cluster (Betle, Ditabongong, Dublin, Ga-Madiba, Ga Mampa, Ga-Moila, Gemini, Kapa, Magope, Mahlatjane, Malakabaneng, Mankele, Manthlane, Mantukulu, Maredi, Maredi Ext 1, Mashushu, Mataung, Matsoong, Mosola, Motsane, Motsane Ext 1, Motsane Ext 2, Mphape, Ngwaname, Pitsaneng, Potlaneng, Ramonwane, Sekgwarapeng, Setaseng, Shadibeng)	SRK Consulting	DRAFT VERSION 1.4 May 2011
Contract WP 9711- Development of a Reconciliation Strategy for all Towns in the Northern Region Vhembe District Municipality - Makhado Local Municipality First Order Reconciliation Strategy Makhado Regional Water Supply Scheme Tshikota and Louis Trichardt	SRK Consulting	DRAFT VERSION 1.2 January 2011
Contract WP 9711- Development of a Reconciliation Strategy for all Towns in the Northern Rregion Vhembe District Municipality- Thulamela Local Municipality First Order Reconciliation Strategy for Malamulele West Regional Water Supply Scheme: Mahonisi, Jimmy Jones, Mavambe, Makumeke, Khakhanwa, Mulenzhe, Dididi, Makhovha, Phaphazela, Mukhomi, Gumbani, Mulamula, Hasane, Tshitomboni, Thovhowani, Mavambe, Mbhalati and Mudabula	SRK Consulting	DRAFT VERSION 1.2 December 2011
Contract WP 9711- Development of a Reconciliation Strategy for all Towns in the Northern Region Mopani District Municipality- Maruleng Local Municipality First Order Reconciliation Strategy for Mametja Sekororo RWS Cluster: Balloon, Lorraine, Ga-Sekororo, Ticky Line, Sofaya, Bismarck, Metz, Maderia, Turkey Zone 1, Turkey Zone 2, Turkey Zone 3, Turkey Zone 4, Enable, Worcester, Finale, Sedowa, The Willows, The Oaks, Mabins A, Mabins B and Makgaung	SRK Consulting	DRAFT VERSION 1.2 May 2010
Contract WP 9711 Development of a Reconciliation Strategy for all Towns in the Northern Region Capricorn District Municipality- Polokwane Local Municipality First Order Reconciliation Strategy Mankweng Regional Water Supply Scheme: Ga-Magowa, Ga-Makanye, Ga Ramogale, Ga-Thoka, Makgwareng, Mankweng A, Mankweng B, Mankweng C, Mankweng D, Moshate and Phomolong	SRK Consulting	DRAFT VERSION 1.3 May 2011
Contract WP 9711- Development of a Reconciliation Strategy for all Towns in the Northern Region Waterberg District Municipality- Mogalakwena Local Municipality: First Order Reconciliation Strategy for Mapela Cluster	SRK Consulting	DRAFT VERSION 1.2 October 2010
Contract WP 9711- Development of a Reconciliation Strategy For All Towns in the Northern Region Greater Sekhukhune District Municipality - Greater Marble Hall Local Municipality: First Order Reconciliation Strategy For Marble Hall Water Supply Scheme Marble Hall Town	SRK Consulting	DRAFT VERSION 1.3 October 2010
Contract WP9711- Development of a Reconciliation Strategy For all Towns in The Northern Region Vhembe District Municipality- Mutale Local Municipality First Order Reconciliation Strategy for Masisi Regional Water Supply Scheme Including the towns of: Sigonde, Gumbu, Tshenzhelani, Domboni, Mukununde, Tshamutavha, Maramanzhi, Ramalata, ushithe, Sanari, Mukumawabani, Mutele A, Mutele B, Masis, Madangani, Dovhu, Duluthulu, Tshikuyu, Bileni, Nkotswe and Bendmutale	SRK Consulting	DRAFT VERSION 1.4 December 2011
Contract WP 9711 - Development of a Reconciliation Strategy For All Towns in The Northern Region Capricorn District Municipality Lepelle-Nkumpi Local Municipality First Order Reconciliation Strategy for Mathabatha Individual Gws Cluster (Makopeng, Mmashadi, Maseseleng, Ga-Makgoba, Madikeleng, Mahlaokeng, Ga- Mathabatha, Success, Grootfontein)	SRK Consulting	DRAFT VERSION 1.4 May 2011
Contract WP 9711- Development of a Reconciliation Strategy for all Towns in the Northern Region Capricorn District Municipality Molemole Local Municipality First Order Reconciliation Strategy for Matoks Supply Area Cluster (Ga-Phasha, Sekakene, Mangata, Mphakane, Ramatshowe, Matseke, Makgato, Ramatjowe, St Brendans Mission School, Ramakgopa, Eisleben, Mokganya, Nthabiseng, Morebeng and Capricorn Park)	SRK Consulting	DRAFT VERSION 1.4 May 2011
Contract WP 9711 Development of a Reconciliation Strategy For All Towns in the Northern Region Vhembe District Municipality- Makhado Local Municipality First Order Reconciliation Strategy Matshavhawe/Kunda Regional Water Supply Scheme: Khunda, Matshavhawe and Piesanghoek	SRK Consulting	DRAFT VERSION 1.2 January 2011
Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region Mopani District Municipality- Greater Giyani Local Municipality First Order Reconciliation Strategy Middle Letaba Regional Water Supply Scheme	SRK Consulting	DRAFT VERSION 1.2 January 2011
Contract WP 9711- Development of a Reconciliation Strategy for all Towns in the Northern Region Waterberg District Municipality Modimolle Local Municipality: First Order Reconciliation Strategy for Modimolle (Nylstroom) Town Cluster Modimolle (Nylstroom), Phagameng and Diflymachineng	SRK Consulting	DRAFT VERSION 1.3 August 2010
Contract WP 9711 - Development of a Reconciliation Strategy For All Towns in the Northern Region Mopani District Municipality -Greater Letaba Local Municipality First Order Reconciliation Strategy Modjadji Dam Regional Water Supply Scheme	SRK Consulting	DRAFT VERSION 1.2 January 2011
Contract WP 9711 - Development of a Reconciliation Strategy For All Towns in the Northern Region Mopani District Municipality -Greater Tzaneen Local Municipality First Order Reconciliation Strategy for Modjadjiskloof Scheme: Tzaneen	SRK Consulting	DRAFT VERSION 1.3 October 2010
Contract WP 9711 - Development of a Reconciliation Strategy For All Towns in the Northern Region Waterberg District Municipality Mogalakwena Local Municipality: First Order Reconciliation Strategy For Mokopane Cluster	SRK Consulting	DRAFT VERSION 1.2 May 2010
Contract WP 9711- Development of a Reconciliation Strategy for All Towns in the Northern Region Waterberg District Municipality - Lephalale Local Municipality First Order Reconciliation Strategy for Mokuranyane RWS	SRK Consulting	DRAFT VERSION 1.2 September 2010
Contract WP 9711- Development of a Reconciliation Strategy For All Towns in the Northern Region Capricorn District Municipality- Molemole Local Municipality First Order Reconciliation Strategy for Molemole West Supply Area Cluster Including the towns of: Ga-Mollele, Schellenburg A, Schellenburg B, Ga- Broekmane, Ga-Mokwele, Brilliant, Koekoek, Ga Poopedi, Bouwlust, Brussels, Ga- Mokgehle, Schoonveld 1, Schoonveld 2, Reinland, Ga-Kgare, Ga-Sako, Sakoleng, Overdijk West, Ga-Madikana, Wurthsdorp, Mogwadi, Fatima, Mohodi and Koniggratz	SRK Consulting	DRAFT VERSION 1.4 May 2011
Contract WP 9711- Development of a Reconciliation Strategy For All Towns in The Northern Region Capricorn District Municipality - Polokwane Local Municipality First Order Reconciliation Strategy Molepo Regional Water Supply Scheme: Bethel, Ga-Lekgothoane, Ga-Mogano, Ga-Molalemane, Ga-Ramphere, Ga-Sebati, Lekgadimane, Lithupaneng, Makatiane, Makubung, Mamatsha, Maripathekong, Marobo, Sebyeng, Sekgweng and Tsebela	SRK Consulting	DRAFT VERSION 1.2 May 2011
Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region Capricorn District Municipality - Polokwane Local Municipality First Order Reconciliation Strategy Moletje East Regional Groundwater Supply Scheme :Chokoe, Ga-Mabotsa, Hlahla, Kobo, Mabitsela, Mabotsa 1, Mabotsa 2, Makibelo, Mashita, Masobohleng, Matikireng, Ramongwane 1, Ramongwane 2, Semenya and Setati	SRK Consulting	DRAFT VERSION 1.2 April 2010
Contract WP 9711 - Development of a Reconciliation Strategy For all Towns in the Northern Region Capricorn District Municipality- Polokwane Local Municipality First Order Reconciliation Strategy- Moletje North Individual Groundwater Supply Scheme: Ditengteng, Kgoroshi (Mphela), Kgoroshi (Thansa), and Mahwibitswane,	SRK Consulting	DRAFT VERSION 1.2 April 2010
Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region Capricorn District Municipality- Polokwane Local Municipality- First Order Reconciliation Strategy Moletje South Individual Groundwater Supply Scheme : Chebeng, Doornspruit, Ga-Mapangula, Makweya, Newlands, Pax College, Sengatane, Setotolwane College, Vaalkop 1 and Vaalkop 2	SRK Consulting	DRAFT VERSION 1.2 December 2010
Contract WP 9711 - Development of a Reconciliation Strategy - for all Towns in the Northern Region Capricorn District Municipality - Aganang Local Municipality: First Order Reconciliation Strategy for the Moletje South Ground Water Scheme Incorporating the settlements of: Boetse, Diana, Ga-Kgasha, Ga-Madiba, Ga- Mangou, Ga-Matlapa, Glen Roy, Jupiter, Mandela Park, Manyapye, Mapateng, Matlaleng, Maune, Mohlonong, Montwane 1, Montwane 2, Moshate, Naledi, Ngopane, Sebora, Sefahlane, Segoahleng, Sepanapudi, Utjane, Venus and Waterplaats	SRK Consulting	DRAFT VERSION 1.3 May 2011

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Contract WP9711 - Development of a Reconciliation Strategy For all Towns in the Northern Region Capricorn District Municipality- Polokwane Local Municipality First Order Reconciliation Strategy Mothapo Regional Water Supply Scheme: Cottage, Ga-Mothiba, Makotopong 1, Makotopong 2, Nobody-Mothapo, Nobody- Mothiba and Ntshichane	SRK Consulting	DRAFT VERSION 1.2 May 2011
Contract WP 9711 - Development of a Reconciliation Strategy for All Towns in the Northern Region Vhembe District Municipality and Mutale Local Municipality First Order Reconciliation Strategy for Mukuya Regional Water Supply Scheme: Tshamdisa, Fandani, Mutshikilini, Domboni, Ngewnani A, Dotha, Gondeni, Maholoni, Mutandani, Guyuni West, Guyuni East, Musunda and Ha-Willie	SRK Consulting	DRAFT VERSION 1.3 December 2011
Contract WP 9711 - Development Of A Reconciliation Strategy For All Towns In The Northern Region Mopani District Municipality - Ba-Phalaborwa Local Municipality : First Order Reconciliation Strategy For Murchison RWS Cluster (Murchison)	SRK Consulting	DRAFT VERSION 1.2 June 2010
Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region Vhembe District Municipality - Musina Local Municipality: First Order Reconciliation Strategy For Musina Regional Water Supply Scheme: Messina, Harper and Nancefield	SRK Consulting	DRAFT VERSION 1.3 September 2011
Contract WP 9711 - Development of a Reconciliation Strategy for all towns in the Northern Region Vhembe District Municipality- Mutale Local Municipality :First Order Reconciliation Strategy for Mutale Main Regional Water Scheme	SRK Consulting	DRAFT VERSION 1.2 December 2011
Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region Vhembe District Municipality and Thulamela Local Municipality: First Order Reconciliation Strategy for Mutale Mukuya Regional Water Supply Scheme: Khavhambe' Baloyini, Tshitomboni, Nwiini and Lamvi B	SRK Consulting	DRAFT VERSION 1.2 January 2012
Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region Mopani District Municipality - Ba-Phalaborwa Local Municipality :First Order Reconciliation Strategy for Namakgale - Lulekani Rws Cluster Ben ABC, Mashishimale R1, Mashishimale R2, Mashishimale R3, Makushane R1, Makhushane R2, Maseke, Namakgale, Humulani, Lulekani A & B and Matiko-Xikaya	SRK Consulting	DRAFT VERSION 1.2 December 2010
Contract WP 9711 Development of a Reconciliation Strategy for all Towns in the Northern Region Vhembe District Municipality- Thulamela Local Municipality: First Order Reconciliation Strategy for North Malamulele East Regional Water Supply Scheme : Mhinga, Matiani, Gonani, Joseph, Maphophe, Mabiligwe, Makuleke, Makahlule, Botsoleni, Nkavele, Ntlhaveni D, Saselemani, Magomani, Xikundu, Nhlengani, Manghena and Phaweni		DRAFT VERSION 1.2 December 2011
Contract WP9711 - Development of a Reconciliation Strategy for all towns in the Northern Region Waterberg District Municipality- Thabazimbi Local Municipality: First Order Reconciliation Strategy for Northam Scheme	SRK Consulting	DRAFT VERSION 1.2 May 2010
Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region Vhembe District Municipality- Makhado Local Municipality: First Order Reconciliation Strategy for Nzhelele Regional Water Supply Scheme :Manvuka, Manyii, Matsa A, Matsa B, Tshikuwi, Tshikuwi B, Luvhalani, Thembaluvhilo, Tshirolwe, Makhado, Tshituni B, Ha Mapila, Siyawoadza, Divhani, Tshiswenda, Mavhunga, Mauluma, Makungwi, Posaito, Ha Rabali, Dzanani, Matanda, Raliphaswa, Ha Funyufunyu, Ha Mphaila, Siloam, Tshikombani, Tsha Gavhe, Tshafhasi, Pfumbada, Madzhatsha and Migavhini	SRK Consulting	DRAFT VERSION 1.2 December 2011
Contract WP 9711 Development of a Reconciliation Strategy for all Towns in the Northern Region Vhembe District Municipality -Thulamela Local Municipality: First Order Reconciliation Strategy for Nzhelele Regional Water Supply Scheme : Manyuwa, Ha-Matshareni, Shanzha, Tshifhedzakhanga, Tshikhalani, Thondoni, Khalavha, Mutavhani, Matsherere, Tshivhilidulu, Makhavhani, Dopeni, Tshivhambe, Domboni, Makanga, Mbadoni, Mandala B, Fondwe, Tshatharu, Tshikombani, Mandala A, Malamba, Tshitasini, Tshithuthuni and Tshiheni	SRK Consulting	DRAFT VERSION 1.2 December 2011
Contract WP 9711- Development of a Reconciliation Strategy for All Towns in the Northern Region Greater Sekhukhune District Municipality - Greater Tubatse Local Municipality: First Order Reconciliation Strategy for Ohrigstad Town Ohrigstad Town	SRK Consulting	DRAFT VERSION 1.3 April 2011
Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region Greater Sekhukhune District Municipality - Fetakgomo Local Municipality: First Order Reconciliation Strategy for Olifantspoort South Water Supply Scheme: Olifantspoort South Water Supply Settlements	SRK Consulting	DRAFT VERSION 1.3 May 2010
Contract WP 9711 - Development of a Reconciliation Strategy for All Towns in the Northern Region Greater Sekhukhune District Municipality - Greater Tubatse Local Municipality: First Order Reconciliation Strategy for Penge Local Sources Water Scheme: Ga-Mmamogolo, Ga Mokgotho, Lefahla, Lenkwaneng, Maadiswane, Maretlwaneng, Old Weltevrede Myn, Penge, Poung, Serorong	SRK Consulting	DRAFT VERSION 1.3 April 2011
Contract WP 9711- Development of a Reconciliation Strategy - for all Towns in the Northern Region Waterberg District Municipality Bela-Bela Local Municipality: First Order Reconciliation Strategy for the Piennaarsrivier Supply Area Pienaarsrivier	SRK Consulting	DRAFT VERSION 1.3 August 2010
Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region Greater Sekhukhune District Municipality and Makhuduthamaga Local Municipality: First Order Reconciliation Strategy for Piet Gouws/Masemola Cluster	SRK Consulting	DRAFT VERSION 1.3 April 2011
Contract WP 9711 - Development of a Reconciliation Strategy for All Towns in the Northern Region Greater Sekhukhune District Municipality and Makhuduthamaga Local Municipality: First Order Reconciliation Strategy for Piet Gouws Veeplaas/ Olifants Water Supply Scheme Kgwaripe, Mmotwaneng, Nkotowane, Phelindaba, Tswaing, Vlakplaas A and Vlakplaas B	SRK Consulting	DRAFT VERSION 1.3 April 2011
Contract WP 9711 - Development of a Reconciliation Strategy - For All Towns in the Northern Region Waterberg District Municipality - Bela-Bela Local Municipality: First Order Reconciliation Strategy for the Rapotkwane Supply Area Including the towns of: Rapotokwane and Rus de Winter	SRK Consulting	DRAFT VERSION 1.1 December 2010
Contract WP 9711 Development of a Reconciliation Strategy For All Towns in the Northern Region Waterberg District Municipality and Mogalakwena Local Municipality: First Order Reconciliation Strategy for The Rebone Cluster	SRK Consulting	DRAFT VERSION 1.2 October 2010
Contract WP 9711 Development of a Reconciliation Strategy for All Towns in the Northern Region Mopani District Municipality - Greater Tzaneen Local Municipality :First Order Reconciliation Strategy for Ritavi I / Letaba Water Supply Scheme Mamanyoha, Taulome, Hlohlokwe, Mawa, Mabyepelong, Mothomeng, Morapalala, Mookgo, Miragoma, Runnymede, Ka-Xihoko, Jopi, Mavele, Babanana, Musiphana West, Musiphana East, Nkamboko, Nwamitwa, and Mandlakazi	SRK Consulting	DRAFT VERSION 1.2 August 2010
Contract WP 9711 - Development of a Reconciliation Strategy for All Towns in the Northern Region Mopani District Municipality - Greater Tzaneen Local Municipality : First Order Reconciliation Strategy for Ritavi Ii RWS Scheme Cluster: Khujwana North, Mohlaba X, Sasekane, Sasekane North-West, Mohlaba Head Kraal, Dan, Nkowankowa, Mariveni, Petanenge, Zangoma, Makotlo, Kwitini, Co-op, Lefara, Rita, Kgampakga, Mangweni, Mafarana, Ntsako, Bonn, Sedan, Mulati, Letsitele	SRK Consulting	DRAFT VERSION 1.2 August 2010
Contract WP 9711 - Development of a Reconciliation Strategy for All Towns in the Northern Region Waterberg District Municipality and Thabazimbi Local Municipality: First Order Reconciliation Strategy for Rooiberg Water Supply Scheme	SRK Consulting	DRAFT VERSION 1.1 May 2010
Contract WP 9711 Development of a Reconciliation Strategy for All Towns in the Northern Region Sekhukhune District Municipality and Elias Motsoaledi Local Municipality First Order Reconciliation Strategy for Roossenekal Water Supply Scheme Roossenekal	SRK Consulting	DRAFT VERSION 1.2 May 2011
Contract WP 9711- Development of a Reconciliation Strategy for All Towns in the Northern Region Capricorn District Municipality - Polokwane Local Municipality :First Order Reconciliation Strategy Sebayeng-Dikgale Regional Water Supply Scheme: Dibibe, Dikgale 1, Dikgale 2, Dikgale 3, Ga-Kololo, Ga-Maphoto, Ga-Mawashasha, Ga-Mokgopo, Ga-Moswedi, Ga-Motholo, Kgokong, Kgwareng, Lenyenye, Madiga, Makengkeng, Makgoba 1, Makgoba 2, Makgwareng, Mamotintane, Mantheding, Masekho, Masekoleng, Masekwatse, Maselaphaleng, Mehlakong, Mnashemong, Moduwane, Mphalong, Sebayeng A, Sebayeng B, Sentserere, Toronto Zondo	SRK Consulting	DRAFT VERSION 1.2 May 2011

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Contract WP 9711 - Development of a Reconciliation Strategy for All Towns in the Northern Region - Mopani District Municipality - Greater Letaba Local Municipality First Order Reconciliation Strategy Sekgopo Groundwater Supply Scheme : Sekgopo	SRK Consulting	DRAFT VERSION 1.2 January 2012
Contract WP 9711 - Development of a Reconciliation Strategy For All Towns in the Northern Region Mopani District Municipality- Greater Letaba Local Municipality: First Order Reconciliation Strategy for Sekgoses Individual Groundwater Supply Scheme: Itielene, Lemondokop, Thakgalane 1, Thakgalane 2, Thakgalane 3, Thakgalane 4, Tshabalane West and Tshabalane East	SRK Consulting	DRAFT VERSION 1.2 January 2012
Contract WP 9711- Development of a Reconciliation Strategy - for All Towns in the Northern Region Capricorn District Municipality -Blouberg Local Municipality : First Order Reconciliation Strategy for the Senwabarwana Ground Water Scheme Incorporating the settlements of: Bochem, Bochem North, Bochum, Borkum, Cumbrae (Senwabarwana), Ga-Mashalane and Witten	SRK Consulting	DRAFT VERSION 1.4 May 2011
Contract WP 9711- Development of a Reconciliation Strategy For All Towns in the Northern Region Waterberg District Municipality - Lephalale Local Municipality First Order Reconciliation Strategy for Shongwane RWS	SRK Consulting	DRAFT VERSION 1a October 2010
Contract WP 9711- Development of a Reconciliation Strategy for All Towns in the Northern Region Capricorn District Municipality- Blouberg Local Municipality :First Order Reconciliation Strategy for the Silwermynkirstenspruit Groundwater Scheme Including the settlements of: Driekoppies, Silwermyn, De Villiersdale 1, De Villiersdale 2, Swarts, Non-Parella, Mons, De Villiersdale, Thabanantlhana, De La Roche, Kirstenspruit, Grootdraai, Vergelegen, Ga Mankgodi, Papegaai, Sebotlana, Madibeng, Ga-Ntshireletsa and Nieuwe Jerusalem	SRK Consulting	DRAFT VERSION 1.3 May 2011
Contract WP 9711- Development Of A Reconciliation Strategy for All Towns in the Northern Region Vhembe District Municipality- Makhado Local Municipality First Order Reconciliation Strategy :Sinthumule/Kutama Regional Water Supply Scheme: Diiteleni, Midorini, Tshikhodobo, Dzumbathoho, Zamenkom, Tshikwarani B, Makhita, Tshikwarane, Raphalu, Ha-Manavhela, Muduluni, Muraleni Block B, Muraleni Block C, Ha-Madonga, Ravele, Ha Mamburu, Gogobole, Tshiozwi, Ha-Ramahantsha, Ramakhuba, Madombidzha Zone 1, Madombidzha Zone 2, Madombidzha Zone 3, Rathidili, Ha-Magau, Mutavhani, Raliphaswa, Siyawoodza, Moebani and Mutayhani	SRK Consulting	DRAFT VERSION 1.2 January 2011
Contract WP 9711 - Development of a Reconciliation Strategy For All Towns in the Northern Region Vhembe District Municipality - Thulamela Local Municipality: First Order Reconciliation Strategy for South Malamulele East Regional Water Supply Scheme	SRK Consulting	DRAFT VERSION 1.2 December 2011
Contract WP 9711 - Development of a Reconciliation Strategy for All Towns in the Northern Region Greater Sekhukhune District Municipality - Greater Tubatse Local Municipality: First Order Reconciliation Strategy for Steelpoort Town, Winterveld Mine and Mahlokwaneng	SRK Consulting	DRAFT VERSION 1.3 April 2011
Contract WP 9711- Development of a Reconciliation Strategy - for all Towns in the Northern Region Capricorn District Municipality - Blouberg Local Municipality: First Order Reconciliation Strategy for the Taaiboschgroet Groundwater Scheme Including the settlements of: Simpson, Grootpan, Sais, Slaaphoek, Donkerhoek, Voorhout, Royston, Juniorsloop, Berseba, Wegdraai, Ga-Raphokola, Gideon, Thlonasedimong, Eldorado, Fonteine Du Champ, Esaurinca, Louisenthaal, The Grange, Longden, Taaiboschgroet, De Vrede, Kromhoek, Pax, Johannesburg,Lovely, Burgerregt, Edwinsdale, The Glen and Glenferness	SRK Consulting	DRAFT VERSION 1.2 April 2011
Contract WP 9711- Development of a Reconciliation Strategy for all Towns in the Northern Region- Waterberg District Municipality and Thabazimbi Local Municipality: First Order Reconciliation Strategy for Thabazimbi Urban Scheme	SRK Consulting	DRAFT VERSION 1.2 May 2010
Contract WP 9711- Development of a Reconciliation Strategy For All Towns in the Northern Region Mopani District Municipality - Greater Tzaneen Local Municipality :First Order Reconciliation Strategy for Thabina RWS Cluster: Letsitele Line (Lenyenye, Marumufase, Moime, Uplands, Galideka) Mogoboya Line (Lephepane, Craighead, Mogoboya, Longvalley, New Co-op, Khujwana South, Thabina Valley) and Maake Line (Yosmite, Matlala, Maake, Serare, Ramalema and Sunnyside)	SRK Consulting	DRAFT VERSION 1.2 May 2010
Contract WP 9711- Development of a Reconciliation Strategy - For All Towns in the Northern Region Capricorn District Municipality - Blouberg Local Municipality: First Order Reconciliation Strategy for the Thalahane Groundwater Scheme Including the settlements of: Kgatalala, Buffelshoek and Thalahane	SRK Consulting	DRAFT VERSION 1.2 April 2011
Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region Mopani District Municipality - Greater Tzaneen Local Municipality First Order Reconciliation Strategy for Thapane RWS Cluster : Madumane, Pjapjamela, Mothomeng, Semarela, Seopeng, Botludi, Moruji, Thako, Sethone, Jokong, Moleketla, Mopye, Motupa, Marinoni, Kobjana, Mapitlula, Relela, Bokuta, Thapane, Fobeni, Lerejene, Mohlakeng, Leokwe, Moruji and Sefolwe	SRK Consulting	DRAFT VERSION 1.2 August 2010
Contract WP 9711- Development Of A Reconciliation Strategy For All Towns in the Northern Region Mopani District Municipality - Greater Tzaneen Local Municipality First Order Reconciliation Strategy For Tours RWS Scheme Cluster : Gabaza, Burgersdorp, Sunnyside, Myakayaka, Makudibung, Maselapata, Shiluvane, New Phepheng, New Pharare, Mogapeng, New Nyanyukana, Matawa, Solani, Rhulani, Bordeaux Rural, Hoveni, Sebela, Mashilwane, Calais	SRK Consulting	DRAFT VERSION 1.2 August 2010
Contract WP 9711 - Development of a Reconciliation Strategy for all Towns in the Northern Region Vhembe District Municipality- Makhado Local Municipality :First Order Reconciliation Strategy Tshakuma Regional Water Supply Scheme : Rembander, Khwekhwe, Tshakuma, Tsianda, Khodesa, Ha-mutsha and Khwekhwe	SRK Consulting	DRAFT VERSION 1.2 January 2011
Contract WP 9711- Development of a Reconciliation Strategy for All Towns in the Northern Region Vhembe District Municipality- Makhado Local Municipality :First Order Reconciliation Strategy Tshifiri Murunwa Regional Water Supply Scheme: Dzumbathoho, Phadzima, Mazhazhani, Mazuwa, Gudumabama, Maelula, Vuvha, Tshedza and Tshitavha	SRK Consulting	DRAFT VERSION 1.2 December 2011
Contract WP 9711- Development of a Reconciliation Strategy for all Towns in the Northern Region Vhembe District Municipality - Thulamela Local Municipality First Order Reconciliation Strategy for Tshifudi Regional Water Supply Scheme : Muvomoni, Duvhuledza, Mpandoni, Ha-Begwa, Lukalo, Matoroni, Tshikopane, Masiwane, Tshaulu B, Tshaulu A, Gonela, Buluni, Manzemba, Khambela, Gaba, Phaswana, Tshifudi A, Tshidzini B, Tshidzini A, Musenga and Vhufumba	SRK Consulting	DRAFT VERSION 1.2 December 2011
Contract WP 9711- Development of a Reconciliation Strategy for all Towns in the Northern Region Vhembe District Municipality- Makhado Local Municipality :First Order Reconciliation Strategy Tshitale Regional Water Supply Scheme: Kwaaidraai, Vlakvillage, Thembisa, Miula, Donkerhoek, Ha-Mamphagi, Mulima, Ha- Mathule, Ha-Matala, Magobo, Mpofu, Masete, Tshifhefhe, Thondoni, Manyima, Masethe, Likhade, Putulule, Lambani, Salaunavhe, Mukondeni, Mangovhe, Muwaweni, Muumoni, Ha-Mulima, Ramatshila, Ha-Mufundzi, Ha-Maake, Pfananani A, Pfananani B, Ramura A, Ramura B, Mangulwani, Mathatji, Geraldine and Selangere	SRK Consulting	DRAFT VERSION 1.2 January 2011
Contract WP 9711- Development of a Reconciliation Strategy for all Towns in the Northern Region -Mopani District Municipality - Greater Tzaneen Local Municipality : First Order Reconciliation Strategy for Tzaneen Individual Supply Clearwater Cove, Haenertsburg, Misty Cove and Rubbervale,	SRK Consulting	DRAFT VERSION 1.2 October 2010
Contract WP 9711 - Development of a Reconciliation Strategy for All Towns in the Northern Region Vhembe District Municipality- Makhado Local Municipality :First Order Reconciliation Strategy Valdezia Regional Water Supply Scheme E: Ribyeni, Valdezia, Amancini, Maboko, Saundi, Juda, Ndhekeni, Maphophe, Mashau-Tondoni, Nghatsani, Nkuna, Mogwena A and Mogwena B	SRK Consulting	DRAFT VERSION 1.2 January 2011
Contract WP 9711- Development of a Reconciliation Strategy For All Towns in the Northern Region Vhembe District Municipality - Makhado Local Municipality: First Order Reconciliation Strategy Vhembe Individual Regional Water Supply Scheme : Waterpoort, Bandelierkop and Makhado Air Force Base	SRK Consulting	DRAFT VERSION 1.2 January 2011

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Contract WP 9711- Development of a Reconciliation Strategy For All Towns in the Northern Region Vhembe District Municipality - Thulamela Local Municipality :First Order Reconciliation Strategy Vondo Regional Water Supply Scheme	SRK Consulting	DRAFT VERSION 1.2 December 2011
Contract WP 9711- Development of a Reconciliation Strategy for All Towns in the Northern Region Vhembe District Municipality - Makhado Local Municipality :First Order Reconciliation Strategy Vondo South Regional Water Supply Scheme: Manavhela, Tshino, Vuwani, Hanani, Ha Davhana A, Ha Davhana B, Tshivhangani, Thsitungulwane, Tshivhulana, Tshimbupfe A, Tshimbupfe B, Tshirululuni and Tshilata	SRK Consulting	DRAFT VERSION 1.2 January 2011
Contract WP 9711- Development of a Reconciliation Strategy for All Towns in the Northern Region Waterberg District Municipality - Lephalale Local Municipality First Order Reconciliation Strategy for Witpoort RWS	SRK Consulting	DRAFT VERSION 1.1 October 2010
DWA First Order Reconciliation Strategy Study for Flag Boshielo RWS/West Lepelle Nkumpi Cluster		2010
DWA First Order Reconciliation Strategy Study for Groothoek RWS Cluster, Specon RWS Cluster and Mphahlele RWS Cluster.		2010
DWA Limpopo Dam Utilisation report		2011
DWA First Order Reconciliation Strategy Study for the Matoks Supply Area.		2011
DWA First Order Reconciliation Strategy Study for the Aganang East Groundwater Scheme.		2011
DWA First Order Reconciliation Strategy Study for the Aganang North Groundwater Scheme.		2011
DWA First Order Reconciliation Strategy Study for the Bakone Groundwater Scheme.		2011
DWA First Order Reconciliation Strategy Study for the Ga-Mokobodi Groundwater Scheme.		2011
DWA First Order Reconciliation Strategy Study for the Hout River RWS		2011
DWA First Order Reconciliation Strategy Study for the Moletje South Groundwater Scheme.		2011
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