



DEPARTMENT: WATER AFFAIRS
Directorate: National Water Resources Planning

OLIFANTS RIVER WATER SUPPLY SYSTEM:

Strategy Steering Committee (SSC) for the Implementation of the Reconciliation Strategy

STATUS REPORT March 2013

1 INTRODUCTION

The Department of Water Affairs (DWA) and other key stakeholders under a Study Steering Committee developed a Reconciliation Strategy for the Olifants River Water Supply System in 2011. The aim of the strategy is to ensure that sufficient water is made available to supply the current and future water needs of all the users supplied from the system. The Strategy recommends specific in-catchment interventions comprising of demand side measures and water resource developments to be implemented over the next twenty to thirty years.

The Strategy identified that the water use sectors in the Olifants River catchment are irrigation, domestic, industrial, mining, power generation, forestry and ecology. Irrigation is the largest water use in the Olifants River catchment followed by power generation which receives its water from other catchments and then domestic, mining and industrial. There is limited afforestation, mainly in the higher rainfall areas of the Olifants River catchment. There are also significant areas of the catchment that have been invaded by alien vegetation, and this also results in a reduction in streamflow. Increase in water demands in the Olifants WMA is mainly driven by domestic use and the mining industry.

The Strategy further states that there are several large dams as well as smaller dams and farm dams that provide water to users. Water transfers from other catchments to the power stations in the catchment as well as ground water contribute to the yield of the Olifants River system. The available groundwater is spread over the entire Olifants River catchment but

higher yielding aquifers are found in the dolomite sub-structures in the Upper Olifants and along the escarpment which traverses the Middle Olifants Sub-catchment from North-West to South-East.

Furthermore there are currently water quality problems in the catchment, most of which are caused by contamination from point sources such as effluent discharges from towns and the decanting from the mines. A separate water quality management strategy is required to address the water quality management issues. The Reserve has not yet been implemented in the Olifants River catchment and it is estimated that it would significantly reduce the available yield.

The Strategy also identified institutions that should be responsible for implementing specific recommendations and on 7 March 2013 the Strategy Steering Committee (SSC) was established and its first meeting was held to, among other things, solicit commitments as well as build partnerships amongst these institutions to take ownership of the respective strategy actions.

This document presents the outcome of the SSC meeting and reports on the status of implementation of the Reconciliation Strategy.

2 ESTABLISHMENT OF A SSC FOR IMPLEMENTATION OF THE RECONCILIATION STRATEGY

One of the recommendations of the Reconciliation Strategy was that a Strategy Steering Committee (SSC) be established to guide the roll-out of the strategy's recommendations. The overarching functions of the SSC's is to oversee the implementation of the strategy, continuously review the recommendations and provide guidance to DWA to ensure the strategy remains relevant under changing condition that may influence the water balance of the Olifants River System. The SSC members' role is also to disseminate information of the strategy and communicate the meeting outcomes within their respective organisations.

The Strategy recommends a wide range of measures that require higher levels of management than the easier to augment supply options of the past. An orchestrated effort is necessary to ensure that the Strategy objectives are achieved. The cooperation of organizations identified as crucial stakeholders in all aspects of implementation of the strategy is of utmost importance for achieving the strategy targets

A wide range of stakeholders were invited to be part of the SSC, including National Government Departments, Provincial Government Departments, District and Local

Municipalities, Water Boards, Water User Associations, Irrigation Boards, Mining Companies, Nature Conservation and Research Organizations. The detailed list of stakeholders invited was provided in the hand-out pack distributed at the meeting.

The meeting deliberations commenced with presentations that provided an overview of the reconciliation strategy, the proposed Terms of Reference of the SSC and other current initiatives that are taking place and may have a bearing on the strategy and system water balance. This was followed by a session to confirm and assign responsibilities to those institutions that will have to take up the respective recommended interventions and actions of the strategy.

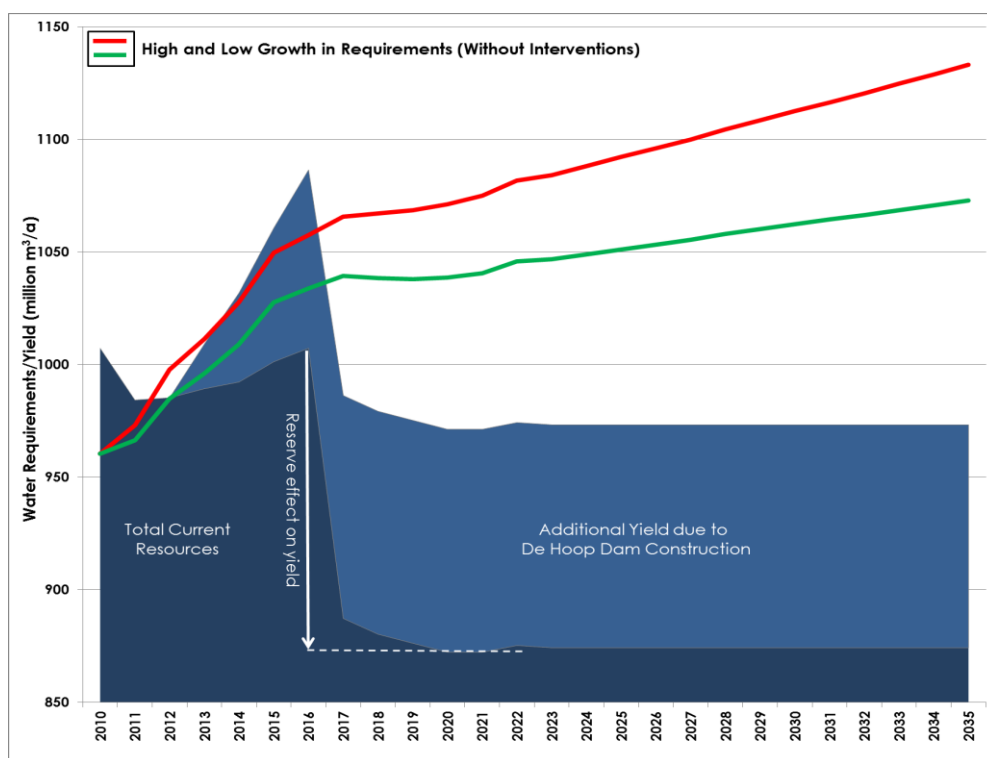
3 STRATEGY RECOMMENDATIONS AND RESPONSIBILITIES

3.1 Overview

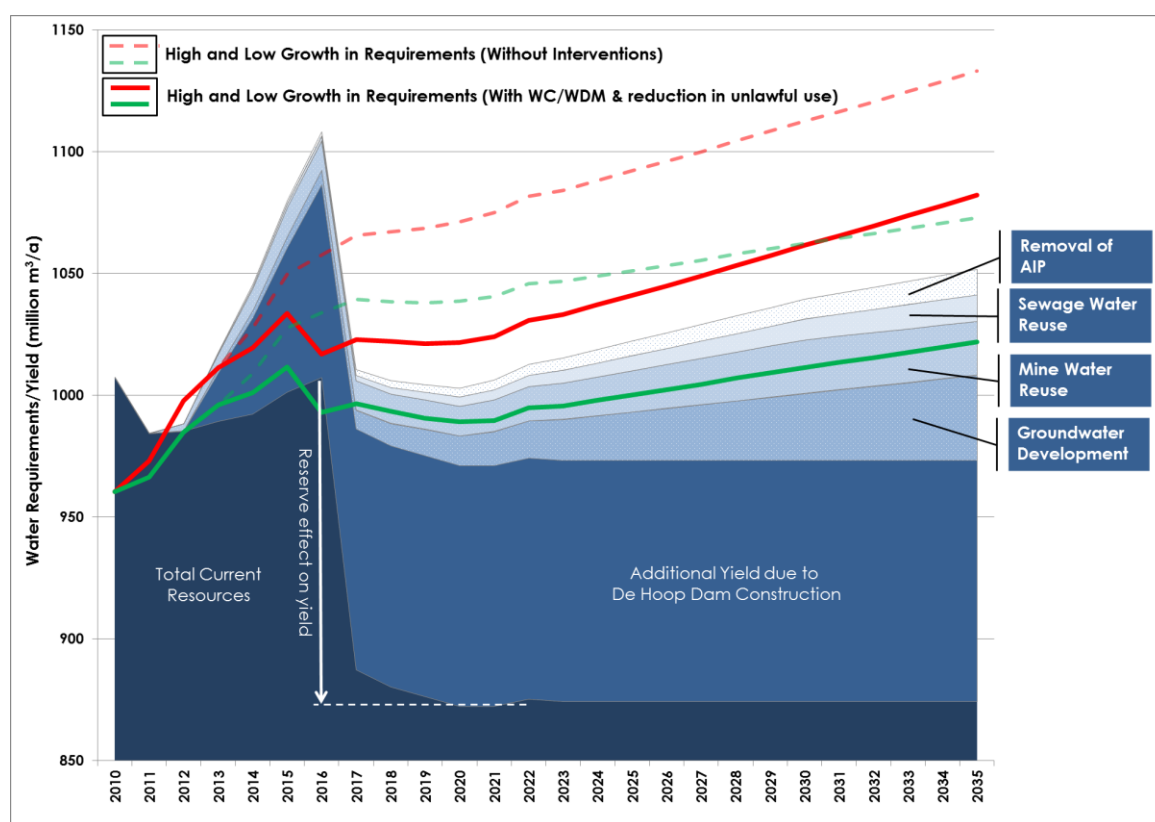
A number of interventions, including De Hoop Dam which is currently being constructed, were identified in the Strategy to ensure a positive water balance in the water supply system up to 2035. Two water use scenarios were defined, i.e. high and low growth projections and provision was made for the implementation of the Reserve once De Hoop Dam has sufficient water in storage.

The water balance in **Figure 3-1** represents the situation if water requirements are allowed to increase, but there is no further water resources development after the construction of the De Hoop Dam, with its yield phased in over 5 years to allow for filling. The ecological Reserve that reduces the system yield was assumed to be operationalized in a phased approach with the full Reserve being implemented from 2016 onwards, as reflected in the drop in the existing system yield. It is clear from **Figure 3-1** that for this “do nothing further” scenario the system would run into deficit by 2017 if no other interventions are implemented. It also shows a total deficit of about 150 million m³ per annum by 2035.

The **Figure 3-2** shows a “50% Intervention Success Scenario”. By choosing a conservative 50% success rate for some of the demand management and increase in resource options, the following can be shown: The significant reduction of future requirement projections by implementing demand management options can be seen from the difference between the “do nothing further” scenario (faint dotted lines) and the “50% Intervention Success Scenario” (solid lines). The supply options are shown added to the current system resources (yield including De Hoop Dam).



**Figure 3-1: Projected Water Balance for whole Olifants Water Supply System
(With no further water resources development after De Hoop Dam)**



**Figure 3-2: Projected Water Balance for whole Olifants Water Supply System
(50% Intervention Success Scenario – Meeting Low Growth Projection)**

It is evident from **Figure 3-2** that the projected “low growth in requirements” could be met comfortably by the “50% Intervention Success Scenario”, but not so for the projected “high growth in requirements” and additional measures would be required. A number of additional options are available and would have to be phased in if, and only if, the higher water requirement scenario becomes a reality.

The first option that is available is to increase the success rate for the measures that were selected. Moving the target success rate from 50% to about 75% would ensure a balance for the projected “high growth in requirements”. The second and final fall back option for this system is to buy-out water from inefficient users (most likely low value irrigation use) and supply that to new users when it is required. Even mentioning this option may cause significant emotional reactions, but if it is considered that the total water use by irrigation is currently 486 million m³/a, then a very moderate 6% may also be enough to cover for the difference between the “50% Intervention Success Scenario” and what is required for the projected “high growth in requirements”

The additional options available based on the monitored trend of water use illustrates why the Reconciliation Strategy will remain a “living” strategy and is not a blue print for the future. The actual growth in water requirement will guide the need for implementing additional measures when it becomes necessary.

The main principles of the Strategy are as follow:

- The Reserve needs to be operationalized as soon as practical.
- Water required to supply the current and future social and economic activities in the Olifants catchment will have to come from the catchment's local resources, except for the power stations within the catchment which will continue to be supplied from the Usuthu, Komati and Vaal systems.
- Water required by the Polokwane and Mokopane supply areas will be augmented from the Olifants catchment.
- Water requirements must be balanced by availability through the implementation of recommended interventions

The available intervention recommendations for the Olifants River Supply System are as follow:

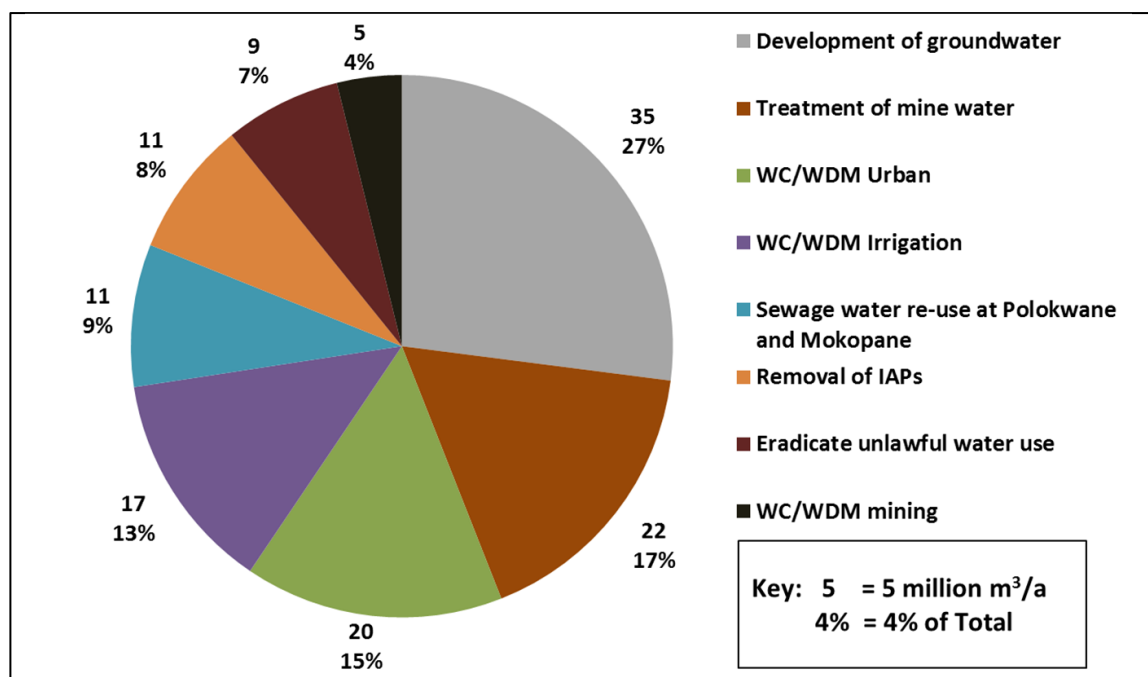
- Eliminating unlawful water use.

- Introducing water conservation and water demand management (WC/WDM) in all sectors.
- The introduction of a mechanism whereby water saved through water use efficiency (WUE) measures, especially in agriculture, can be traded back into the market. This means that water users will be in a position to sell their water savings, and not use this water to expand horizontally.
- The treatment of acid mine drainage water to an acceptable standard, either for immediate direct use or before it is allowed to decant into the river system.
- Invasive alien plants must be removed.
- Groundwater resources must be developed as a priority.
- Return flows from Polokwane and Mokopane should be reused by the urban or mining sector.

The strategy with its design of management interventions which falls across the responsibility of various institutions carries a number of risks and uncertainties. There is other independent work that still has to be completed by DWA and by other institutions that is part of the strategy recommendations.

If these proposed implementation measures are not as successful as assumed, in spite of the fact that the assumed measures are conservative, the water will have to be reallocated to other use by means of compulsory licensing or by buying out water entitlements from irrigation.

The estimated contributions for the proposed interventions (over and above the additional yield of De Hoop Dam) for the 50% success Scenario are illustrated in **Figure 3-3**, indicating a total contribution of 130 million m³/annum.

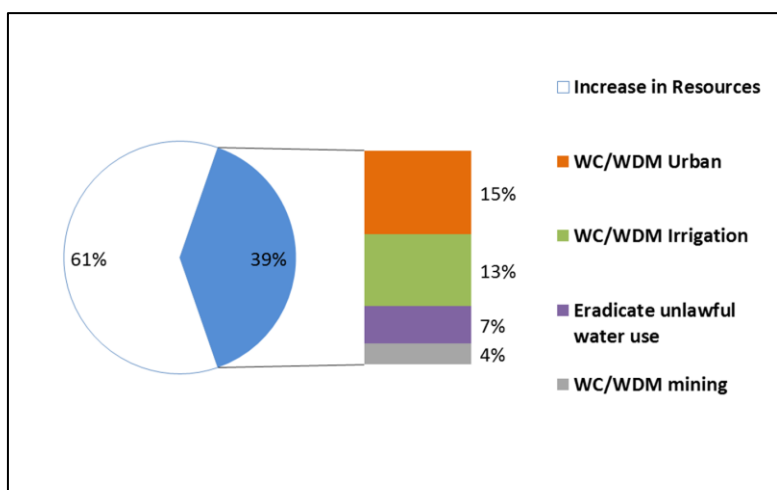


**Figure 3-3: Estimated saving/increase in resources for all Strategy Interventions
("50% Intervention Success Scenario")**

Sections 3.2 and 3.3 provide further information on the individual interventions, firstly presenting the interventions affecting reductions in water requirements and, secondly, measures to increase the water resources. (The reader is referred to the Reconciliation Strategy Reports (<http://www.dwa.gov.za/Projects/OlifantsRecon/documents.aspx>) for more detail descriptions and motivations of the selected intervention options.)

3.2 Interventions for reducing water requirements

Figure 3-4 indicates 39% of the intervention contributions will be achieved through reductions in water use. The breakdown of the individual measures is also provided.



**Figure 3-4: % Contribution of requirement reduction interventions to total water balance
("50% Intervention Success Scenario")**

These measures are discussed in the subsequent sections.

3.2.1 Water Conservation and Water Demand Management (WC/WDM) in urban domestic and industrial sector

The Reconciliation Strategy made use of all the known sources of information to estimate the potential savings in reducing losses in the urban areas receiving water from the Olifants River System. In most cases the losses were estimated to be 30% of the water requirements. The total targeted reduction in losses was set to be 15% of the water use (or 50% of the losses).

Table 3-1 provides the estimated target savings in water requirements for the individual urban areas as well as the champion organizations that were identified during the SSC Meeting to take responsibility for the implementation of the loss management measures and report back on progress in subsequent meetings

3.2.2 Water Conservation and Water Demand Management in Irrigation

The Reconciliation Strategy identified several areas where improved irrigation systems and converting leaking conveyance systems to pipelines (such as what was done in the Blyde River scheme) will increase the efficiency of irrigation in the Water Supply area. Although the conversion of conveyance systems to pipelines is very expensive, at least 50% of the estimated savings can be obtained by changing irrigation systems. **Table 3-2** provides the estimated target reduction in requirements for the irrigation users as well as the champion organizations that were identified during the first SSC Meeting to take responsibility for the implementation of the loss management measures and report back on progress in subsequent meetings.

Table 3-1: Target reduction in water requirements and champion organisations for WC/WDM measures in the urban areas

Urban Areas	Target Saving (million m ³ /a)		Champion Organizations
	50% Scenario	100% Scenario	
Western Highveld	7.66	15.32	Kungwini LM, City of Tshwane (P. van der Walt), Thembisile Hani LM (M. Tholo) and Rand Water (K. Mare), DWA Gauteng RBIG Project -
Emalahleni	7.16	14.32	DWA Mpumalanga, Rand Water (K. Mare), Emalahleni LM Nkangala DM.
Phalaborwa	1.56	3.12	Mopani DM, Ba-Phalaborwa LM, Lepelle Northern Water (M. Zebulon, A. Netshidaulu)
Lebowakgomo	0.75	1.50	Lepelle-Nkumpi LM, Capricorn DM, Lepelle Northern Water (M. Zebulon, A. Netshidaulu)
Polokwane (only from Olifants)	0.68	1.36	Polokwane LM, Capricorn DM,
Lydenburg	0.68	1.36	Thaba Chweu LM, Ehlanzeni DM
Middelburg	0.37	0.74	Steve Tshwete LM (R. Boucher), Nkangala DM
Bronkhorstspuit	0.31	0.62	City of Tshwane (P. van der Walt)
Hoedspruit	0.25	0.50	Maruleng LM, Mopani DM
Groblersdal/Marble Hall	0.19	0.38	Elias Motsoaledi LM, Ephraim Mogale LM, Greater Sekhukune DM
Delmas	0.19	0.38	Victor Khanye LM, Nkangala DM
Belfast	0.19	0.38	Emakhazeni LM, Nkangala DM
Burgersfort	0.06	0.12	Greater Thubatse LM, Greater Sekhukune DM
Orightstad	-	-	Greater Thubatse LM, Greater Sekhukune DM (Estimated target savings to be determined)
Total	20	40	15% - 18% Contribution to water balance

3.2.3 Eradication of unlawful use

The eradication of unlawful water use is a long and complex process undertaken by DWA Head Office and Regional Offices. It includes:

- Validation and Verification Studies
- Directives to unlawful water users
- Legal action where needed
- Maintenance of lawful water use in controlled areas

Table 3-2: Target reduction in irrigation water requirements and champion organisations for WC/WDM in the irrigation sector

Urban Areas	Target Saving (million m ³ /a)		Champion Organizations
	50% Scenario	100% Scenario	
<ul style="list-style-type: none"> • Loskop Area (Including Flag Boshielo, Hereford, Metzirr Scheme) • Steelpoort Area (Groot Dwars, Origstad, Central Steelpoort, Laer Spekboom, Kaspernek-Vyehoek, Groot Dwars) • Blyde River Scheme 	17.5	35.0	<ul style="list-style-type: none"> • DWA Head Office and Regional Offices (P. Herbst) • DAFF (J. Potgieter) • Provincial Government Departments (M. Gouws, M van Rooyen, P. de Witt, D. Enslin) • Loskop Dam Irrigation Board (D. Ferreira) • Lower Blyde WUA (J. van Vuren) • Olifants River Irrigation Board (J. Burger) • AgriLimpopo (D. Enslin)
Total	17.5	35.0	13% - 16% Contribution to target water balance

Although a start has been made on the Verification and Validation Study for the Olifants River, the Regional Office is currently experiencing problems with resources and budgets to take this process forward. The Reconciliation Strategy made rough estimates of the possibly unlawful irrigation use in the catchment by using the growth in irrigation since 1998 from the initial Validation Study information for the Olifants River System. Although these values will only be confirmed after the total process has been finalized these figures are used as a first estimate of the possibly unlawful irrigation use in the catchment.

Table 3-3 provides the estimated volume of unlawful irrigation water requirements as well as the champion organizations that were identified during the first SSC Meeting to deal with these interventions.

Table 3-3: Indicative reduction in unlawful irrigation water requirements

Irrigation in Reservoir Catchment Areas	Indicative Target Saving (million m ³)		Champion Organizations
	50% Scenario	100% Scenario	
Bronkhorstspuit	3.7	7.4	<ul style="list-style-type: none"> • DWA Regional Offices (J. van Aswegen) • DWA Legal Services (Later) • CMAs (Later when established)
De Hoop	2.0	4.0	
Loskop	1.5	3.0	
Middelburg	1.1	2.2	
Witbank	0.5	1.0	
Total	9	18	7% -8% Contribution to water balance

3.2.4 Water Conservation and Water Demand Management in the Mining Sector

The Reconciliation Strategy identified that there are opportunities in process adaptations to enable recycling and water use in mines. Retrofitting of water saving devices should also be

considered. Potential saving is apparent especially in the Middle Olifants and Phalaborwa areas; however this should be a goal for all mines in the catchment especially the coal mines in the upper Olifants River area. **Table 3-4** provides the estimated saving in mining requirements and the champion organization that was identified during the first SSC Meeting.

Table 3-4: Target reduction in mining water requirements through WC/WDM measures

Mines	Target Saving (million m ³ /a)	Champion Organizations
	50% Scenario	
All mines in the Upper Middle and Lower Olifants River Water Supply Area	5	<ul style="list-style-type: none"> • DWA Head Office and Regional Offices (P. Herbst) • DME • Chambers of Mines • Mine Owners and Operators (B. Bierman, S. Mungaroo)
Total	5	2% - 4% Contribution to target water balance

3.3 Interventions to increase available resources

Figure 3-5 indicates 61% of the intervention contributions will be achieved through increased resources. The breakdown of the individual measures is also provided.

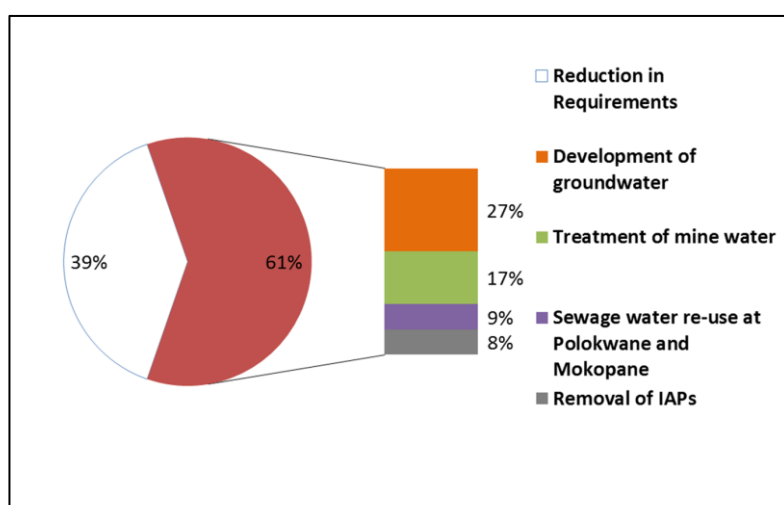


Figure 3-5: % Contribution of increased resource interventions to total water balance ("50% Intervention Success Scenario")

These measures are discussed in the subsequent sections.

3.3.1 Development of Groundwater Resources

During the development of the Reconciliation Strategy an analysis was done for the whole of the catchment to identify the amount of diffuse and dolomitic groundwater resources that can be made use of in addition to the surface water resources. An important finding from the

investigation was that there are several areas where over-abstraction of groundwater is already occurring. These areas were excluded as sources of additional groundwater. The groundwater development potential was estimated to be 70 million m³/annum and is the largest contributor of all the interventions identified in the strategy.

The next step will be for DWA to build on the analysis done during the development of the Reconciliation Strategy to look at where the potential groundwater resources are and to undertake pre-feasibility and feasibility studies for the development of the resources. The SSC raised concerns about the availability of human and other resources to manage and operate groundwater schemes. This highlights the need to incorporate operation and management requirements in all further investigations. DWA and the Mines have already started with some initiative of making use of groundwater resources however some water quality problems have been identified with some of the sources.

Table 3-5 provides the estimated targeted increase in yield due to groundwater development and the champion organization that was identified during the first SSC Meeting.

Table 3-5: Target increase in yield due to groundwater resource development

Mines	Target Increase in Yield (million m ³ /a)		Champion Organizations
	50% Scenario	100% Scenario	
Diffuse sources and dolomites in non-over abstracted areas	35	70	<ul style="list-style-type: none"> DWA Head Office and Regional Offices (F. Fourie) DMs, LMs Magalies Water, Lepelle Northern Water
Total	35	70	27% - 32% Contribution to target water balance

3.3.2 Treatment of mine water

The Reconciliation Strategy identified that a portion of the water that is pumped from the coal mines in the Upper Olifants Management Zone can be regarded as additional yield. However this water will require treatment since the river system does not have the capacity to dilute this highly polluted water to an acceptable quality. The Strategy estimated that 36 million m³/annum of mine water can be treatment for use in the system and of this 22 million m³/annum would add to the available yield of the system. This is in addition to the current plants already in operation or being commissioned. A key aspect that was highlighted at the SSC Meeting is to involve the Department of Mineral and Energy in further planning investigations, particularly with respect to the financing and long-term sustainability of further mine water reclamation projects.

Table 3-6 provides the estimated targeted increase in yield due to mine water treatment and the champion organization that was identified during the first SSC Meeting.

Table 3-6: Target increase in yield due to treatment of mine water

Areas	Target Increase in Yield (million m ³ /a)	Champion Organizations
Witbank and Middleburg Dam Catchments	22	<ul style="list-style-type: none"> DWA Head Office and Regional Offices (P. Viljoen) DME Chambers of Mines Mine Owners and Operators (B. Bierman, S. Mungaroo) Strategic Water Partnership Network
Total	22	10% - 17% Contribution to target water balance

3.3.3 Removal of Invasive Alien Plants (IAP)

The Reconciliation Strategy Study carried out system wide analysis to estimate the possible increases in yield due to the removal of IAPs. The investigation included a consolidation of previous studies and provided motivated rationale for deviating from past study results.

Table 3-7 provides the estimated increase in yield that is expected for the indicated catchment areas due to the removal of IAP.

Table 3-7: Estimated increase in yield due to removal of IAPs

Reservoir Catchment Areas	Target Increase in Yield (million m ³ /a)		Champion Organizations
	50% Scenario	100% Scenario	
Loskop	3.4	6.8	<ul style="list-style-type: none"> DEA Working for Water Programme DWA (P. Herbst)
Blyde River	3.0	6.0	
Flag Boshielo	1.6	3.2	
Witbank	1.1	2.1	
Moomba	0.6	1.1	
Bronkhorstspuit	0.4	0.8	
Rust de Winter	0.4	0.7	
Middelburg	0.2	0.3	
De Hoop	0.0	0.0	
Total	11	22	8% - 9% Contribution to water balance

3.3.4 Reuse of sewage at Polokwane and Mokopane

Extensive reuse of the effluent from Polokwane and Mokopane is already currently taking place. The additional reuse volumes estimated in the Strategy were based on the natural

projected growth of effluent in these two towns. Further investigations into reuse will have to consider all aspects related to the management and operation of reuse plants such as the implication of water supply restrictions, human resources and capacity as well as the financial implication on the operators.

Table 3-8 provides the estimated target increase in yield due to sewage reuse at Polokwane and Mokopane.

Table 3-8: Target increase in yield due to reuse of sewage in Polokwane and Mokopane

Areas	Target Increase in Yield (million m ³ /a)	Champion Organizations
Polokwane and Mokopane sewage treatment	11	<ul style="list-style-type: none"> DWA Head Office and Regional Offices (P. Viljoen) Polokwane LM, Capricorn DM
Total	11	5% - 9% Contribution to target water balance

4 STRATEGY RECOMMENDATIONS AND RESPONSIBILITIES

The following linkages with other studies and initiatives were identified during the first SSC Meeting:

- Olifants River Classification Study
- Water Use Efficiency Studies
 - Mines (Chamber of Mines)
 - Municipalities (DWA)
 - Agricultural (WMA Plans)
- IAP Removal Initiatives
- Validation and Verification Studies
- Olifants River - Resources Quality Objectives Study
- Development of a WQ Strategy for the Olifants River
- DWA AMD initiatives from SD: WQP
- Waste Water Discharge Tariffs
- Olifants Water Resources Development Project
- Highveld Water Balance Study: Mines Water Balance (Eskom)
- WRC Project entitled New Paradigm for South Africa
- US Aid Projects – Biodiversity and global warming, IWRM Planning (SADC & Limcom)
- Water Resources Plan (City of Tshwane)

5 WAY FORWARD

The following technical tasks will be undertaken and reported back on by the next SSC Meeting.

5.1 Configuration of a risk-based mathematical model for the Olifants Water Supply System

The Professional Service Provider (PSP) will update the existing Water Resources Planning Model (WRPM) with the reduction in water requirements and increases in yield as defined by the Reconciliation Strategy. The projected water balance timelines will be verified. This configuration of the WRPM will then be used to undertake risk analysis (assurance of supply from all dams in the system) as a baseline scenario. As updated data of the progressive implementation of interventions and monitored use data becomes available, the base scenario can be updated to see the effect on the projected water balance.

5.2 Action for water requirement reductions

The following actions are required for water requirement reductions:

- Champions for the all the urban centres need to be approached to inform and discuss with them their contributions and responsibilities defined in the strategy. Improved estimates of actual water use and losses need to be obtained during these engagements. Champion persons from the municipalities and water service providers need to be identified and a tracking system need to be established for monitoring.
- Champions for the irrigation boards, WUA and DAFF should be identified and the WMA Plans for Agriculture, developed by the Regions, should be obtained and assessed.
- DWA Mpumalanga Regional Office should provide an updated schedule for the Validation and Verification Study.
- Champions should be identified from the Chamber of Mines or the Strategic Water Partnership Network to keep the SSC up to date with WC/WDM activities in mining.

5.3 Action for increased water resources

The following actions are required for increases in water resources:

- The analysis of groundwater resources will be reviewed to assess where the possible diffuse groundwater resources are located as well as what the potential of the identified dolomitic resources are. Pre-feasibility and feasibility studies should be initiated by DWA.

- The development of mine water reuse plants should be monitored via the mine owners and the Chamber of Mines.
- The DEA should be contacted to determine who the champions are for the removal of IAP projects in the water supply area. Information of progress and size of the reduction in IAP should be obtained as baseline and monitored progressively.
- The champions at the Polokwane LM and Capricorn DM should be identified and the status of the reuse and infrastructure problems should be monitored. Feasibility studies for the future re-use of growing effluent should be considered.

6 GENERAL INFORMATION

More information on this study can be found at the following link:

<http://www.dwa.gov.za/Projects/OlifantsRecon/default.aspx>

The DWA Project Manager is Mr Tendani Nditwani. He can be contacted on (Tel) 012 336 8189 or (E-mail) nditwanit@dwa.gov.za.