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## CONTINUATION OF THE INTEGRATED VAAL RIVER SYSTEM RECONCILIATION STRATEGY STUDY – PHASE 2

### Strategy Steering Committee Meeting 1

**DWS Chair: L Mabuda**  
**Chief Director: Integrated Water Resources Planning**

Tuesday, 27 February 2018

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## Continuation of the Integrated Vaal River System Reconciliation Strategy Study: Phase2

### Item 3: Acceptance of Agenda

Tuesday, 27 February 2018

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AGENDA		
09:00	<b>1. WELCOME AND INTRODUCTION OF MEMBERS</b>	DWS Chair: L Mabuda
09:15	<b>2. ATTENDANCE AND APOLOGIES</b>	Chair
09:20	<b>3. ACCEPTANCE OF AGENDA</b>	Chair
09:25	<b>4. PURPOSE OF THE MEETING</b>	Chair
09:30	<b>5. ROLE OF THE STRATEGY STEERING COMMITTEE (SSC)</b>	Chair
09:50	<b>6. BACKGROUND AND INTRODUCTION OF THE STUDY</b>	S Rademeyer
	<ul style="list-style-type: none"> <li>Background</li> <li>Objective of the study</li> <li>Appointed PSP</li> </ul>	
10:15	<b>7. OVERVIEW OF STUDY ACTIVITIES</b>	PSP
10:30	<b>Tea (15 minutes)</b>	
10:50	<b>8. WATER BALANCE STATUS</b>	PSP
11:10	<b>9. STRATEGY INTERVENTIONS</b>	Chair
11:15	<b>9.1 WATER CONSERVATION / WATER DEMAND MANAGEMENT</b>	W Wegelin
	9.1.1 Current status	
11:30	<b>9.2 RAND WATER PROJECT 1600</b>	S Gow
	9.2.1 Current status	

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AGENDA		
11:50	<b>9.3 City of Tshwane Water Resources Master Plan Implementation</b>	City of Tshwane (T)
	9.3.1 Current status	
12:05	<b>9.4 ERADICATION OF UNLAWFUL IRRIGATION</b>	M Mokgwabone
	9.4.1 Current status	
12:20	<b>9.5 IMPLEMENTATION OF INFRASTRUCTURAL AUGMENTATION OPTION (LHWP Phase 2)</b>	L Tromp
	9.5.1 Current status	
12:35	<b>9.6 IMPLEMENTATION OF THE AMD LONG-TERM SOLUTION</b>	J van Wyk
	9.6.1 Current status	
12:45	<b>9.7 NOORDOEVER/VIOOLSDRIFT DAM FEASIBILITY STUDY</b>	S Rademeyer
	9.7.1 Current status	
12:55	<b>10. DISCUSSION AND COMMENTS</b>	Chair
13:05	<b>11. COMMUNICATION AND CONFIRMATION OF SSC MEMBERSHIP</b>	Chair
13:15	<b>12. DATE OF NEXT MEETING</b>	Chair
13:20	<b>13. WAY FORWARD AND CLOSURE</b>	Chair
13:25	<b>LUNCH</b>	

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**Continuation of the Integrated Vaal River System Reconciliation Strategy Study: Phase2**

**Item 4: Purpose of the Meeting**

Tuesday, 27 February 2018

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**PURPOSE OF THE MEETING**

- Introduce the study to all stakeholders
- Establish and define the role of the Strategy Steering Committee (SSC)
- Overview of study activities and water balance status
- Feedback on Strategy interventions
- Confirmation of SSC Membership

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**Continuation of the Integrated Vaal River System Reconciliation Strategy Study: Phase2**

**Item 5: Role of the Strategy Steering Committee (SSC)**

Tuesday, 27 February 2018

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**ROLE OF THE SSC**

- Provide executive guidance to the direction and outcomes of the study
- Make available supplementary information and input from a local and regional perspective
- Facilitate strategic linkages with other initiatives
- Disseminate information from study into the relevant organisations
- Incorporate strategies' recommendations into development plans such as IDPs etc;
- Ensure the implementation of the Strategy recommendations.

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## Continuation of the Integrated Vaal River System Reconciliation Strategy Study: Phase2

### Item 6: Background and Introduction of the Study

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## RECONCILIATION STRATEGY - WHAT IS IT?

- Plans of action or policy designed to ensure sufficient water is made available to towns over the next +-20 years.
- Uses existing information collected (building blocks) on:
  - Water requirements
  - Water use and infrastructure
  - Water resources
  - WC/WDM
- Develop scenarios to meet water requirements for current and future use, including optimisation of local resources, improved water services and water resource management.

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## RECONCILIATION STRATEGY - WHAT IS IT?

- It aims to answer the following questions:
  - How much water is needed? - now and in the future
  - What water resources are available or can be made available?
  - Which interventions can be considered to achieve a balance between water needs and supply?
- Focuses on the projected annual water balance.
- Also considers the accuracy of all the components that make up the water balance.

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## VAAL WATER RESOURCE MANAGEMENT HISTORY

1983	Drought Analysis ( before systems & stochastic models )
1990	Vaal River System Analysis
Since 1989	Vaal River Annual Operating Analysis
1996	Vaal Augmentation Planning Study ( VAPS )
2001	Vaal River System Analysis Update Study ( VRSAU )
2001	Thukela Water Project Feasibility Study
2003	Thukela Water Project Decision Support Phase
2004	Internal Strategic Perspectives (ISP)
2004	Vaal River Eastern Subsystem Augmentation Project ( VRESAP )
2007	Potential Savings Through WC/WDM in the Upper and Middle Vaal WMA
2009	<b>Vaal River System: Large Bulk Water Supply Reconciliation Strategy</b>
2009	Development of an Integrated Water Quality Management Plan for the Vaal River System
2010	Comprehensive Reserve Determination: Integrated Vaal River System
2010	Comparative Study Between LHWP Phase II And Thukela Water Project
2012	Classification of Significant Water Resources ( WMA 8,9,10 )
2013	Feasibility Study for the Long-Term Solution to address the AMD from the Eastern, Central & Western mining basins
2015	<b>Continuation of the IVRS Reconciliation Strategy Study ( Phase 1 )</b>
2016	Classes and Resource Quality Objectives of Water Resources for Catchments of the Upper, Middle and Lower Vaal
Current	This Study

### OUTCOMES OF PREVIOUS ASSIGNMENT (2015)

- Options for reconciling increasing water requirements with the current supply in the Integrated Vaal River System:
  - WC/WDM (Project 15%)
  - Eradication of unlawful water use in the irrigation sector
  - Desalination of mine water
  - Re-use of water (Tshwane Project)
  - Lesotho Highlands Water Project Phase 2

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### WHY CONTINUATION OF A STRATEGY? (THIS STUDY)

- Water balances need to be continuously monitored / investigated and the strategy regularly updated to remain technically relevant.
- Ensures that intervention planning can be implemented taking into account any changes that may impact on the projected water balance.
- Study Objective:** In-depth review, systematically update and improve the water resource reconciliation strategy so that it remains **relevant, technically sound, economically viable, socially acceptable and sustainable** and thus **enabling the implementation of the strategy by the relevant authorities.**

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### APPOINTED PSP

- The Professional Service Provider (PSP) appointed to undertake the study : **Batatise Consulting Engineers** in association with **UWP Consulting Engineers** and **WRP Consulting Engineers** (Joint Venture).

#### DWS Enquiries

**Seef Rademeyer**  
Chief Engineer: NWRP  
(Central)  
Tel: (012) 336 7500  
Email:  
[rademeyerS@dws.gov.za](mailto:rademeyerS@dws.gov.za)

#### Technical Enquiries

**Leon de Jager**  
Batatise/UWP/WRP  
Tel: (012) 424 9700  
Email:  
[leondj@uwp.co.za](mailto:leondj@uwp.co.za)

**Sibusiso Sithole**  
Batatise/UWP/WRP  
Tel: 082 921 1600  
Email:  
[sibusisos@romh.co.za](mailto:sibusisos@romh.co.za)

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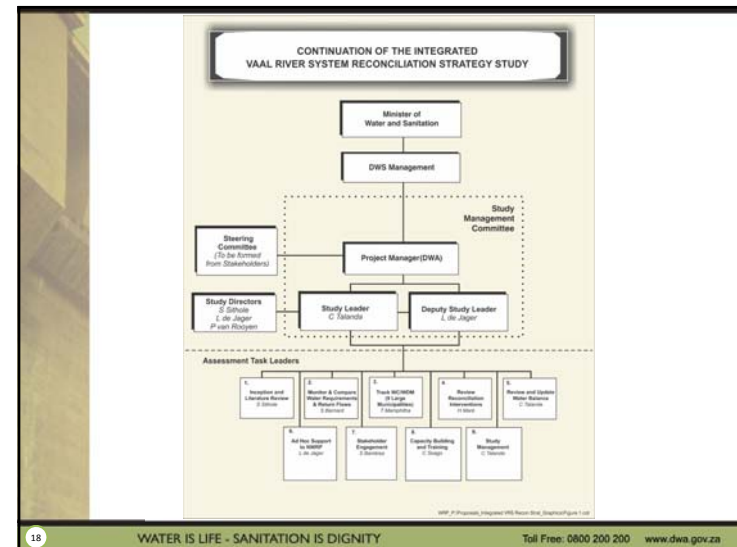
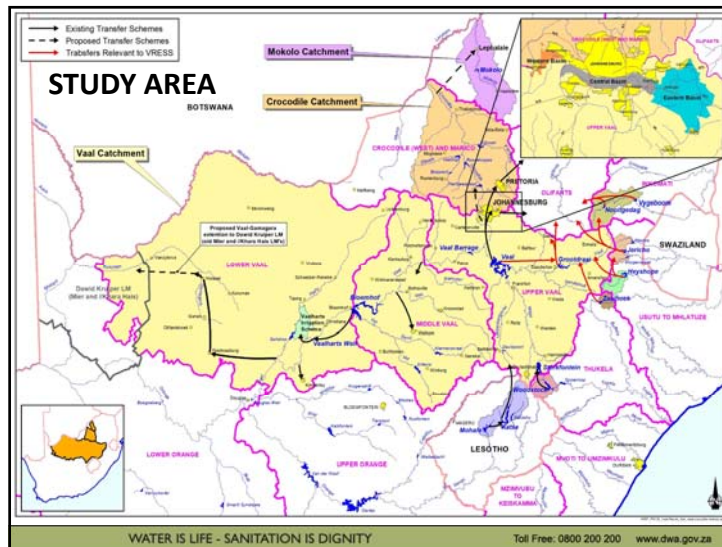


### CONTINUATION OF THE INTEGRATED VAAL RIVER SYSTEM RECONCILIATION STRATEGY STUDY – PHASE 2

### Item 7: Overview of Study Activities

Tuesday, 27 February 2018

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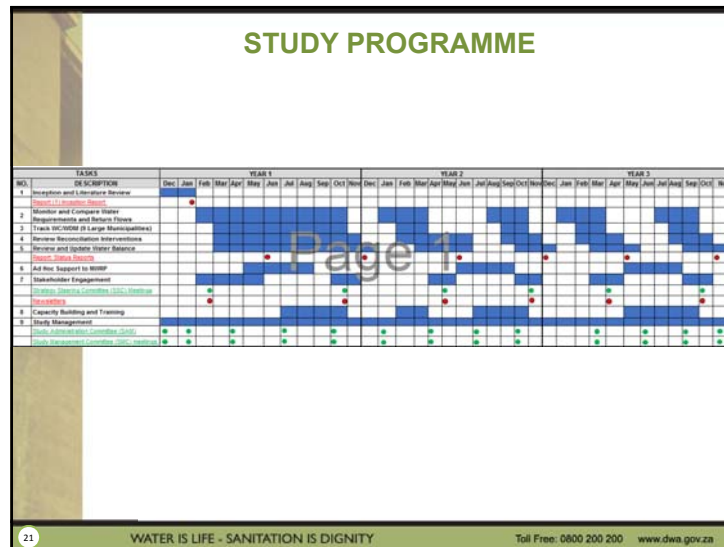
STUDY TASKS	
TASK NUMBER	TASK DESCRIPTIONS
1	Inception and literature review
2	Monitor and compare water requirements and return flow
3	Track Water Conservation and Water Demand Management
4	<p>Review reconciliation interventions:</p> <ul style="list-style-type: none"> <li>Bloemhof Dam excess utilisation investigation</li> <li>Acid Mine Drainage (AMD) management option implementation monitoring</li> <li>Evaluate the need to activate further planning of Thukela Water Project if required</li> <li>Implications of reduced operational capacity on sustainable yield</li> <li>Monitor/Track Progress: WCWDM, Eradication of unlawful irrigation, Implementation programme of LWHP Phase 2, Planning in the Crocodile (West) and Olifants River system that may influence this Reconciliation Strategy</li> </ul>


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STUDY TASKS	
TASK NUMBER	TASK DESCRIPTIONS
5	Review and update water balance
6	Stakeholder engagement
7	Capacity building and training
8	Ad Hoc Support
9	Study management

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## Continuation of the Integrated Vaal River System Reconciliation Strategy Study: Phase2

### Item 8: Water Balance Status

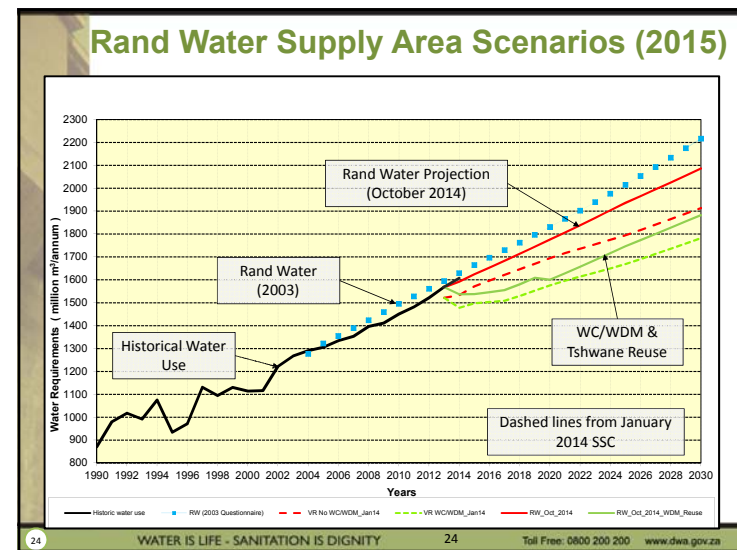
Tuesday, 27 February 2018

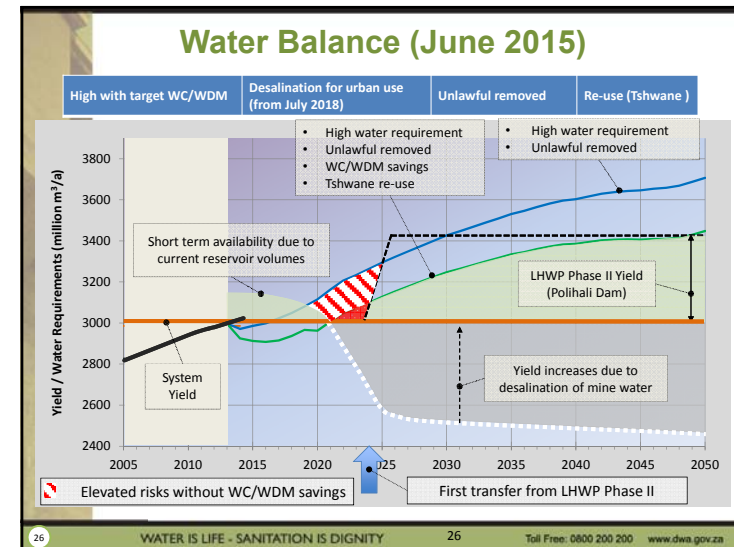
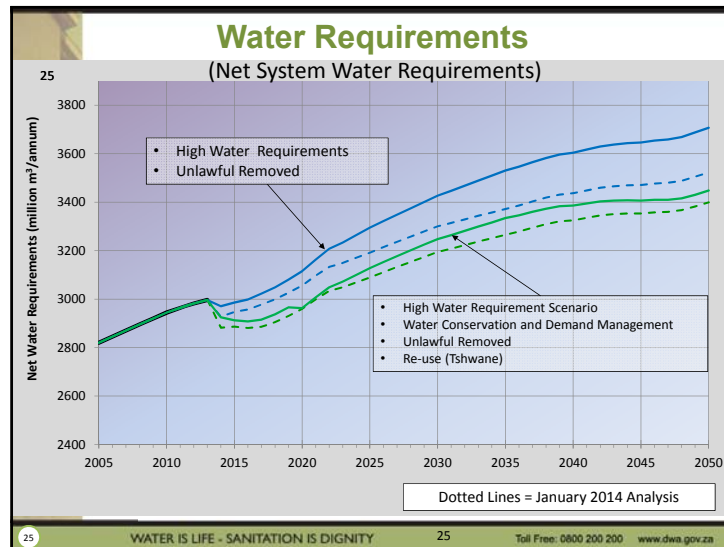
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### Presentation Layout

- **Water balance status - SSC June 2015 recap**
- **Revised information:**
  - Information from Annual Operating Analysis 2017:
    - AMD Desalination date – January 2022
    - High Water Requirement Scenarios - Rand Water
    - Risk analysis of projected drought water restrictions
  - Eskom water requirement projections - April 2017
  - LHWP Phase 2 – transfer water by December 2025
- **Preliminary revised water balance**
  - Risk and difference analysis

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### Reconciliation Perspectives (2015)

The following are essential to maintain balance Until LHWP Phase 2 can deliver water:

- Water Conservation & Water Demand Management
- Eradication of Unlawful Use
- Desalination and Re-use of Mine Water
- Tshwane Re-use Project

### Strategic Interventions (2015)

- Eradication of unlawful water use by **2015**.
- Implementation of WC/WDM (project 15%) – achieve target savings by **2017**.
- Implement phase 2 of LHWP by **2023**.
- Mine water effluent treatment and use by **2018**.
- Tshwane water augmentation project (re-use).
- Plan yield replacement scheme in Orange.
- Manage uncertainties: Vaal, Crocodile and Olifants.
- Implementation of integrated water quality management plan.

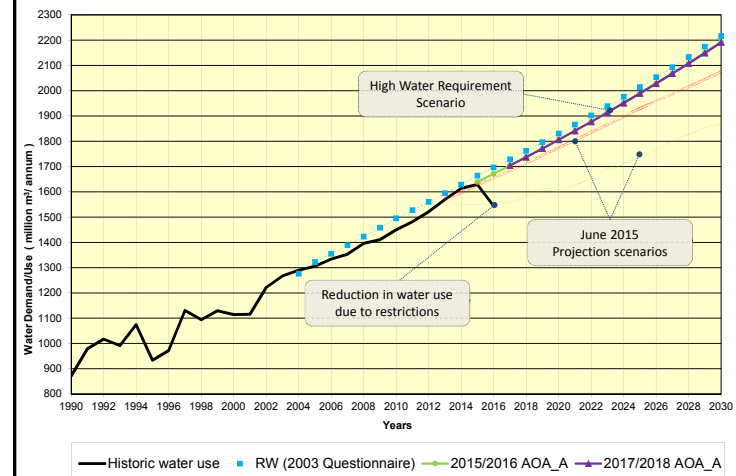
## Preliminary revised water balance (February 2018)

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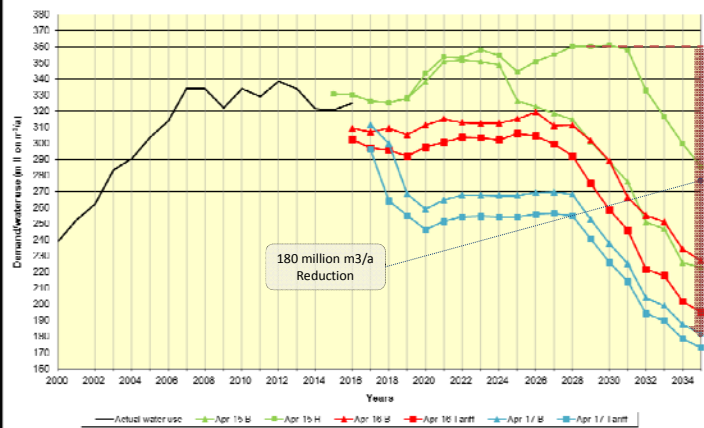
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## Rand water demand projections for 2017/2018 AOA



## Eskom (Total for Integrated Vaal River System)

(April 2017 projection)



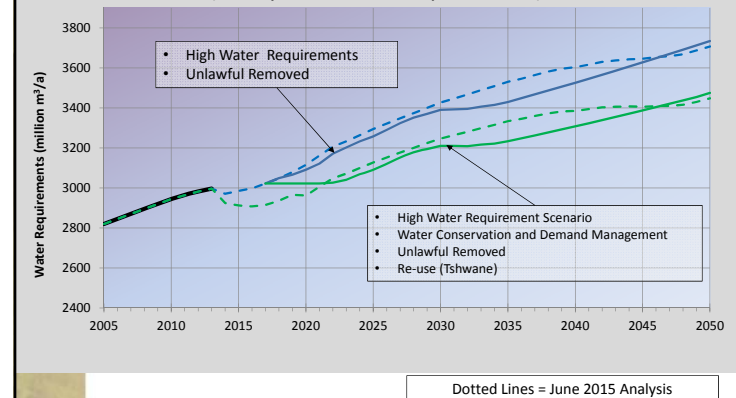
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## Water Requirements (2015)

(Net System Water Requirements)



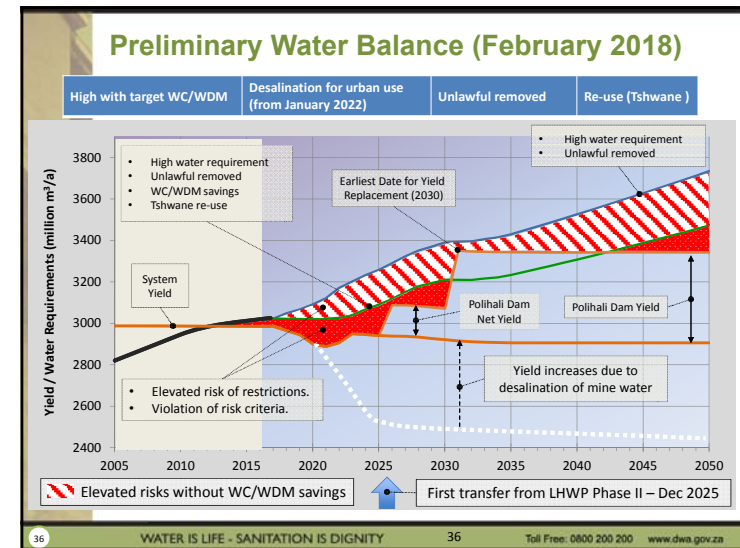
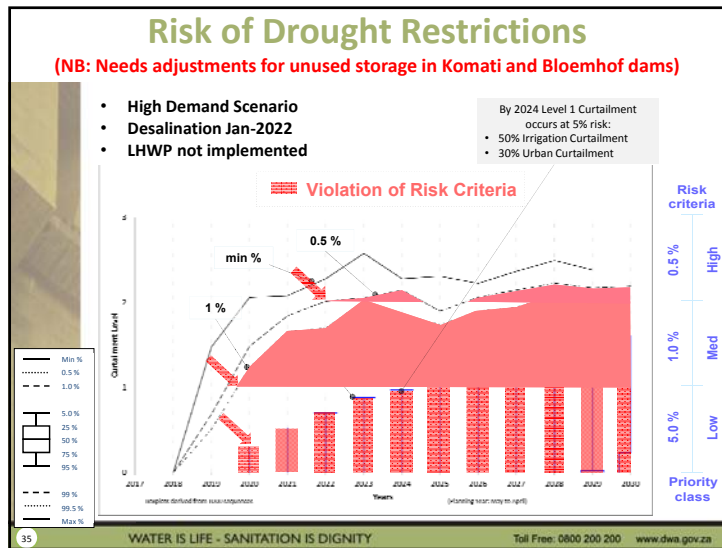
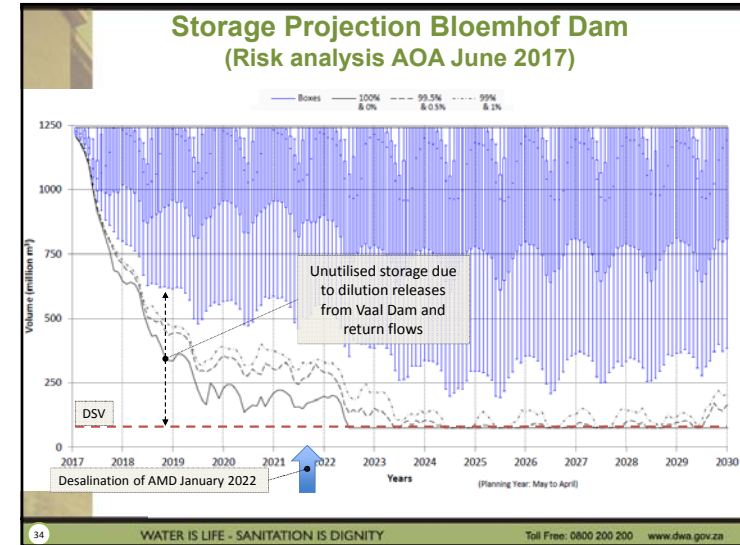
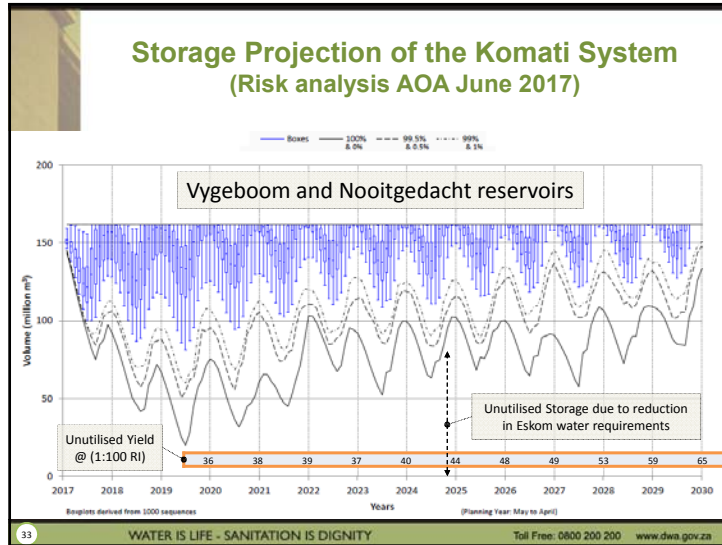
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## Observations

- **Reduction in system yield due to:**
  - Excessive dilution releases from Vaal Dam until desalination of AMD (January 2022.)
  - Unused yield in Komati Subsystem due to reduction in Eskom power station water requirements.
- **Elevated risks of restrictions prior to implementation of LHWP Phase 2.**
- High Water Requirement Scenario exceeds risk criteria throughout the planning period.
- Further augmentation needed by 2043 - High Water Requirement Scenario with WC\WDM savings

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## Reconciliation Perspectives (2015)

- **Water Conservation & Water Demand Management, Eradication of Unlawful Use, Desalination and Re-use of Mine Water as well as Tshwane Re-use Project are all essential to reduce the risk of restrictions Until LHWP Phase 2 can deliver water.**
- **Prepare for augmentation from the Thukela Water Project.**
  - Revive Feasibility Study

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## Activities

- **Update irrigation water use with current V&V information.**
- **Review yield capability of Thukela Water Project.**
- **Track progress of interventions:**
  - Implementation of LHWP Phase 2.
  - Mine water effluent treatment.
  - Tshwane water augmentation project (re-use).
  - WC/WDM savings.
- **Plan yield replacement scheme in Orange.**
- **Integration with Crocodile (west) and Olifants reconciliation interventions.**
- **Implement integrated water quality management plan.**

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## Continuation of the Integrated Vaal River System Reconciliation Strategy Study: Phase2

### Item 9: Strategy Interventions

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## 9.1: Water Conservation / Water Demand Management

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## Background

- Baseline study completed in 2004/2005
- An estimated 196 million m<sup>3</sup> or 15% could be saved over a period of 10 years
- Average consumption was expected to reduce from 330 ℓ/c/d to 290 ℓ/c/d
- The four biggest municipalities were expected to contribute 94.3% of the total saving
- The targets set in 2005 were revised in 2010 and 2012

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## Expected Savings per Municipality

Area	2008/09 Annual Demand (million m <sup>3</sup> /a)	Current Non-Revenue Water (million m <sup>3</sup> /a)	2005/06 Possible Savings (million m <sup>3</sup> /a)	% Contribution of total saving	% Reduction
City of Johannesburg	502.7	160.9	110.2	56.2%	21.9%
Ekurhuleni	326.8	124.2	28.3	14.4%	8.6%
City of Tshwane	214.2	62.1	20.4	10.4%	9.5%
Emfuleni	77.1	31.6	26.1	13.3%	33.9%
Rustenburg	27.9	9.8	3.0	1.5%	10.6%
Mogale	26.4	7.1	1.7	0.9%	6.6%
Govan Mbeki	20.4	5.9	1.5	0.8%	7.5%
Matjhabeng	18.9	6.6	4.3	2.2%	22.9%
Randfontein	8.7	2.6	0.4	0.2%	4.1%
<b>Total</b>	<b>1 223.0</b>	<b>410.8</b>	<b>195.9</b>	<b>100%</b>	<b>16%</b>

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## Summary of Data Submissions

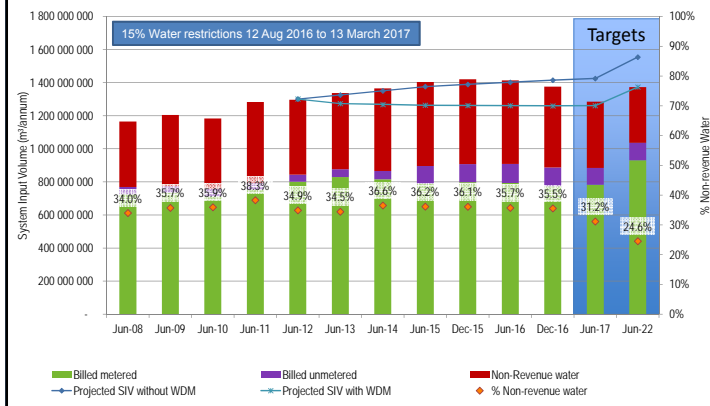
Municipality	Last submission
City of Johannesburg	November 2016
City of Tshwane	April 2017
Emfuleni LM	June 2017
Ekurhuleni MM	November 2017
Lesedi LM	April 2017
Merafong LM	June 2017
Midvaal LM	October 2017
Mogale City LM	December 2016
Rand West City LM (Randfontein Region)	June 2017
Rand West City LM (Westonaria Region)	November 2017

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## Integrated Vaal River System



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## Total Targeted vs Actual Savings

Year ending	Projected SIV without WDM (X) kl/annum	Projected SIV with WDM (Z) kl/annum	Projected % savings $(X - Z) / X * 100$	Actual demand (Y) kl/annum	Actual % savings $(X - Y) / X * 100$
Jun-12	1 300 613 343	1 300 613 343	0.0%	1 296 073 215	0.3%
Jun-13	1 325 208 539	1 273 402 875	3.9%	1 337 536 245	-0.9%
Jun-14	1 350 262 570	1 268 011 188	6.1%	1 365 380 179	-1.1%
Jun-15	1 375 784 167	1 262 935 804	8.2%	1 403 523 126	-2.0%
Dec-15	1 388 841 060	1 261 797 859	9.1%	1 420 101 889	-2.3%
Jun-16	1 401 897 953	1 260 659 914	10.1%	1 413 031 287	-0.8%
Dec-16	1 414 954 845	1 259 521 968	11.0%	1 374 064 291	2.9%
Jun-17	1 424 217 581	1 261 854 997	11.4%		
Jun-22	1 554 334 603	1 373 114 426	11.7%		

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## Dec 2016 Summary of Targeted vs Actual Savings

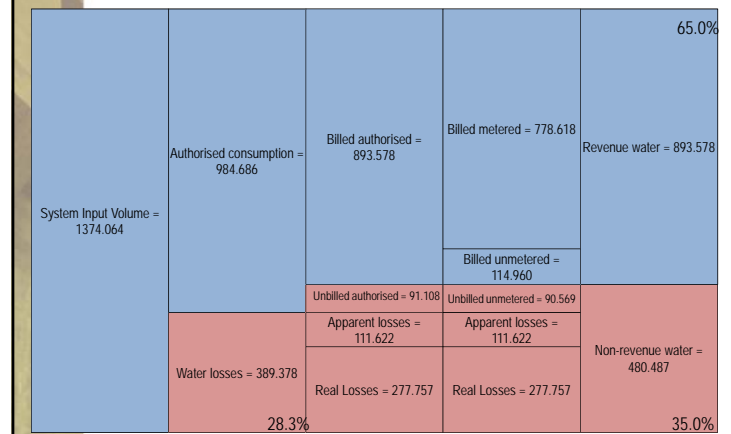
System	Projected SIV without WDM (X) kl/annum	Projected SIV with WDM (Z) kl/annum	Projected % savings $(X - Z) / X * 100$	Actual demand (Y) kl/annum	Actual % savings $(X - Y) / X * 100$
Johannesburg	588 066 982	493 829 325	16.0%	573 852 765	2.4%
Tshwane	341 884 714	327 517 148	4.2%	332 387 892	2.8%
Ekurhuleni	369 315 955	346 720 055	6.1%	352 297 242	4.6%
Emfuleni	93 946 677	70 942 157	24.5%	95 965 374	-2.1%
Midvaal	14 756 008	13 853 121	6.1%	12 639 915	14.3%
Lesedi	6 984 510	6 660 163	4.6%	6 921 103	0.9%
Mogale City*	29 553 459	27 943 452	5.4%	33 408 509	-13.0%
Randfontein*	9 903 720	9 589 349	3.2%	9 668 710	2.4%
Westonaria*	7 192 187	6 460 157	10.2%	0	
Merafong City*	13 324 128	12 056 011	9.5%	13 476 658	-1.1%
<b>Total</b>	<b>1 474 928 340</b>	<b>1 315 570 936</b>	<b>10.8%</b>	<b>1 430 618 168</b>	<b>3.0%</b>
*Total excl West Rand DM	<b>1 414 954 845</b>	<b>1 259 521 968</b>	<b>11.0%</b>	<b>1 374 064 291</b>	<b>2.9%</b>

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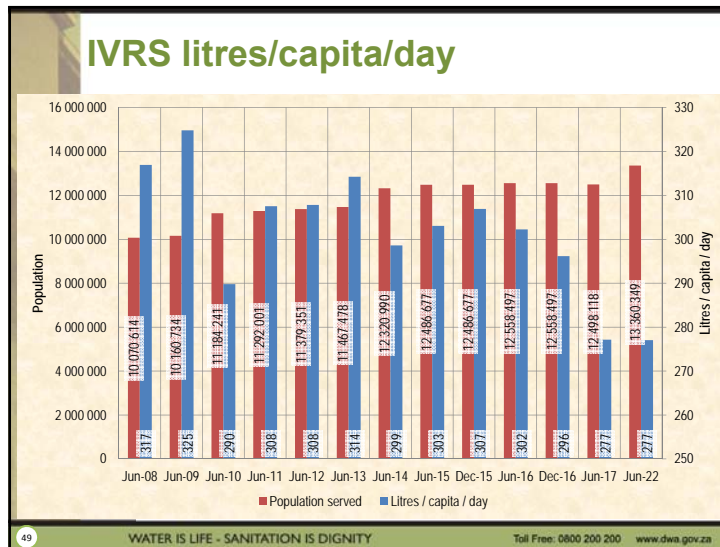
## 2016 IVRS Water Balance



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### Conclusions

- Updated water balance information required to assess the status quo.
- It is expected that the demand returned to previous levels once the water restrictions were lifted
- It is unlikely that municipalities in the IVRS have been able to reduce their consumption by 112 million m<sup>3</sup>/a or 9% to achieve the 2017 target
- Most municipalities are tracking the High demand – no WCWDM scenario

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## 9.2: Rand Water Project 1600

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### 9.3: City of Tshwane Water Resources Master Plan Implementation

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### 9.4: Eradication of Unlawful Irrigation

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### 9.5: Implementation of Infrastructural Augmentation Option (LHWP Ph2)

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### PROJECT MANAGEMENT UNIT (PMU)

The following project management activities are on-going:

1. Procurement activities for consultancy services contracts.
2. Procurement activities for the construction contracts.
3. Contract administration of all awarded contracts in Phase II.

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## Procurement Summary

Phase II Procurement Status (December 2017):

1. 13 contracts, mostly designs and Environmental & Social studies are complete.
2. 23 Contracts have been awarded and are in force. **Of significance are the dam and tunnel consultancy contracts**
3. 10 contracts are in evaluation and approval stages.
4. No contracts are at the bidding/tendering stage.

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## Procurement Summary

5. Bids for the first 3 construction contracts (North East Access Road, Polihali Village civil works and the Polihali Dam Diversion Tunnel around the dam wall) currently under evaluation –awarded by end March 2018.
6. Geotechnical drilling (investigations for the Polihali Dam and Polihali – Katse Tunnel) at an advance stage. Will be complete in time for the Dam design and Tunnel design consultants to factor into the designs.

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## Procurement Millstones

Rev 10.9	Forecast
Advanced Infrastructure commence	Mar 18
Impoundment commence	Nov 23
Dam Complete	Dec 24
Tunnel Complete	Dec 25
Water Delivery	From end Dec 2025

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## 9.6: Implementation of the AMD Long-Term Solution

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### 1. Progress with LTS Commissioning

- PSP for designing/ optimising the STI into an LTS (i.e. Desalination) has been identified following an open bidding process; and
- TCTA to consider identified PSPs before end February 2018 and ratify decision on appointment.

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### 2. Progress with EIA

- EIA Practitioner (Nemai Consulting) appointed in Sep 2017;
- Nemai Consulting, DWS and TCTA met with DEA in Nov 2017 to discuss project and map way forward; and
- Formal application for LTS EIA dependent on project designs being available (hence LTS design PSP should be appointed a.s.a.p.).

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### 3. Funding Options

- Funding still via fiscus with 1/3 recovery from Vaal River Tariff; and
- Future funding stream could be revenue generated from sale of desalinated AMD to bulk water user, environmental levy and/or WDCS.

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### 4. Potential Off-takers

- Engagements with potential bulk off-takers such as Ekurhuleni and City of Jo'burg, as well as Sasol is on-going;
- Aside from economic issues, the actual determination of suitable off-taker will be guided by project design and optimisation (further motivating that LTS design PSP should be appointed a.s.a.p.);
- No significant deviations from LTS Feasibility Study fundamentals anticipated; and
- Target commission date for the LTS is Oct-Nov 2020.

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**9.7: Noordoever/Vioolsdrift Dam  
Feasibility Study**

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## Continuation of the Integrated Vaal River System Reconciliation Strategy Study: Phase2

### Item 10: Discussion and Comments

Tuesday, 27 February 2018

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## Continuation of the Integrated Vaal River System Reconciliation Strategy Study: Phase2

### Item 11: Communication and confirmation of SSC membership

Tuesday, 27 February 2018

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## Communication

**A SSC meeting will be held ~ 6 months**

**After each meeting SSC members will be provided with:**

- Minutes of the SSC meeting
- Status Report
- Media release

**As members of the SSC your responsibility is to:**

- Disseminate information into the relevant departments / organisations
- Incorporate strategies' recommendations into development plans

**Web site: Please visit: <http://www.dwa.gov.za/projects.aspx> for all project related information**

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## SSC membership

- ~ 270 stakeholders on the database
- Representative of all relevant sectors in the study area – refer to Terms of Reference

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**Continuation of the Integrated Vaal River  
System Reconciliation Strategy Study:  
Phase2**

**Item 12: Date of Next Meeting**

Tuesday, 27 February 2018

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**Continuation of the Integrated Vaal River  
System Reconciliation Strategy Study:  
Phase2**

**Item 13: Way Forward and Closure**

Tuesday, 27 February 2018

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