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REPUBLIC OF SOUTH AFRICA

**CONTINUATION OF WATER REQUIREMENTS
AND AVAILABILITY RECONCILIATION
STRATEGY FOR THE MBOMBELA MUNICIPAL
AREA**
(Crocodile Sabie River System Reconciliation
Strategy)

Strategy Steering Committee Meeting 2

Thursday, 22 November 2018

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Item 3: Acceptance of Agenda

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| AGENDA | | |
|--------|--|-----------------|
| 10:00 | 1. WELCOME AND INTRODUCTIONS | DWS Chair: CD |
| 10:05 | 2. ATTENDANCE AND APOLOGIES | Chair |
| 10:10 | 3. ACCEPTANCE OF AGENDA | Chair |
| 10:15 | 4. PURPOSE OF THE MEETING | K Mandaza |
| 10:25 | 5. APPROVAL OF THE MINUTES (StraSC 1 – 31 May 2018) | Chair |
| 10:30 | 6. MATTERS ARISING FROM StraSC 1: | Chair |
| | 6.1 Minutes point 5: StraSC members to review the Terms of Reference (ToR) and provide their comments. | |
| | 6.2 Minutes point 6a: The study team to follow-up on available information noted by StraSC members on climate change. | |
| | 6.3 Minutes 7.1b: Dr Tendai Sawunyama to provide an update on the Validation and Verification (V&V) study at StraSC 2. | |
| | 6.4 Minutes 7.5a: DWS and the City of Mbombela to meet and discuss the legal opinion on water trading. | |
| 10:40 | 7. STATUS OF THE STRATEGY INTERVENTIONS | Chair |
| 10:50 | 7.1 IUCMA Validation and Verification Study - update | Dr. T Sawunyama |
| 11:05 | Tea (15 minutes) | |
| 11:20 | 7.2 City of Mbombela WC/WDM | K Moabelo |

| AGENDA | | |
|--------|---|-----------------|
| 11:35 | 7.3 Bushbuckridge LM WC/WDM | R Baloyi |
| 11:45 | 7.4 WC/WDM in the Irrigation Sector: Crocodile River Irrigation Board | D van Rooyen |
| 11:55 | 7.5 Operationalisation of the Reserve | Dr. T Sawunyama |
| 12:10 | 7.6 DWS Feasibility Study for Identified Dam Options | K Bester |
| 12:15 | 8. OVERVIEW OF STUDY ACTIVITIES & COMPLETED TASKS | PSP |
| 12:35 | 9. CURRENT PROGRESS | PSP |
| | 8.1 Task 4: Water Conservation and Water Demand Management | |
| | 8.2 Task 5: Monitoring Network Expansion and Data Capturing | |
| | 8.3 Task 6: Water Resource Analysis | |
| 13:25 | 10. DISCUSSION AND COMMENTS | Chair |
| 13:40 | 11. COMMUNICATION | PSP |
| 13:50 | 12. DATE OF NEXT MEETING | Chair |
| 13:55 | 13. CLOSURE | Chair |
| 14:00 | LUNCH | |


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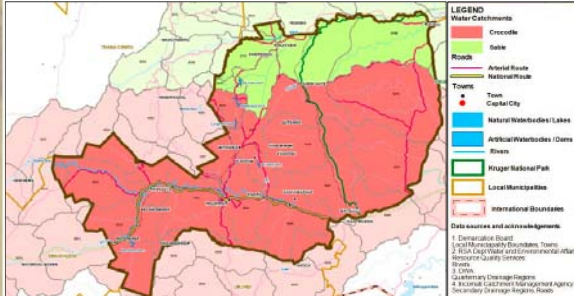
**CONTINUATION OF WATER REQUIREMENTS
 AND AVAILABILITY RECONCILIATION
 STRATEGY FOR THE MBOMBELA MUNICIPAL
 AREA**
 (Crocodile Sabie River System Reconciliation
 Strategy)

Item 4: Purpose of the Meeting

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BACKGROUND TO THIS ASSIGNMENT

- Reconciliation Strategy for the Mbombela Municipal area was developed (2014)
- Recommends sequence of management and infrastructural interventions required to maintain acceptable assurances of supply to the users.



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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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Purpose of the Meeting

- Overview of study activities since StraSC Meeting 1
- Feedback on Strategy interventions

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Item 5: Approval of Minutes

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Item 6: Matters Arising fro StraSC1

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Matters Arising

- **6.1 Minutes point 5:** StraSC members to review the Terms of Reference (ToR) and provide their comments.
- **6.2 Minutes point 6a:** The study team to follow-up on available information noted by StraSC members on climate change.
- **6.3 Minutes 7.1b:** Dr Tendai Sawunyama to provide an update on the Validation and Verification (V&V) study at StraSC 2.
- **6.4 Minutes 7.5a:** DWS and the City of Mbombela to meet and discuss the legal opinion on water trading.

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**Item 7: Status of Strategy
Interventions**

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| 2014 STRATEGY INTERVENTIONS SUMMARY | |
|--|--|
| Intervention | Primary Responsibility |
| Addressing Unlawful Irrigation Use (Compliance Monitoring and Enforcement) | IUCMA/DWS |
| WC/WDM Urban | City of Mbombela , Sembcorp & DWS |
| WC/WDM in the Irrigation Sector and Relinquishing of Water Savings | DWS Head Office (HO) |
| Water Re-allocation | DWS HO & Regional Office (RO) |
| Removal of IAPs | Working for Water |
| Groundwater Development | City of Mbombela (CoM) |
| Operationalisation of the Reserve | DWS HO DWS RO, IBs, WUAs, CoM, BLM, KNP |
| Pre-Feasibility Study into Dams | DWS HO |
| New Dam Constructed | DWS HO & Implementing Agency |
| System Operating Rules for Sabie River | DWS HO & DWS R |
| Operating Rules for Primkop Dam | DWS HO, IUCMA, Irrigators and CoM |

7.1 IUCMA Validation and Verification Study - Update

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**Tea Break
(15 Minutes)**

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7.2 City of Mbombela WC/WDM

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7.3 Bushbuckridge LM WC/WDM

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7.4 WC/WDM in the Irrigation Sector: Crocodile River Irrigation Board

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7.5 Operationalisation of the Reserve

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7.6 DWS Feasibility Study for Identified Dam Options

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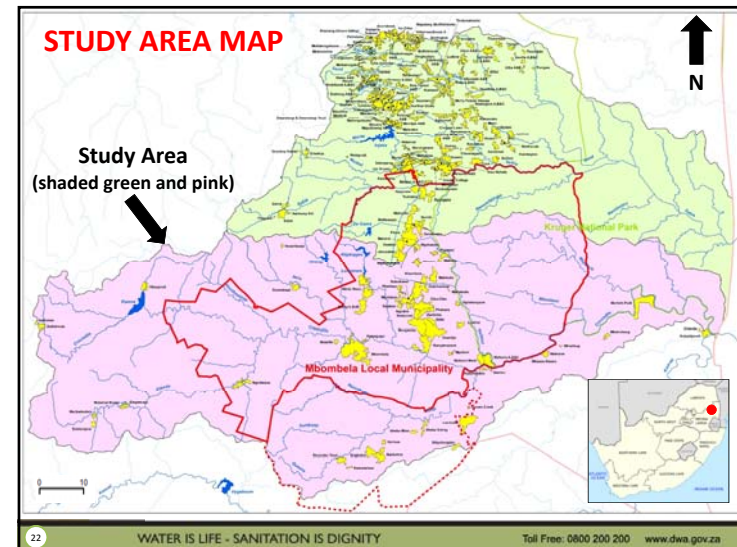
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**Item 8: Overview of Study
Activities**

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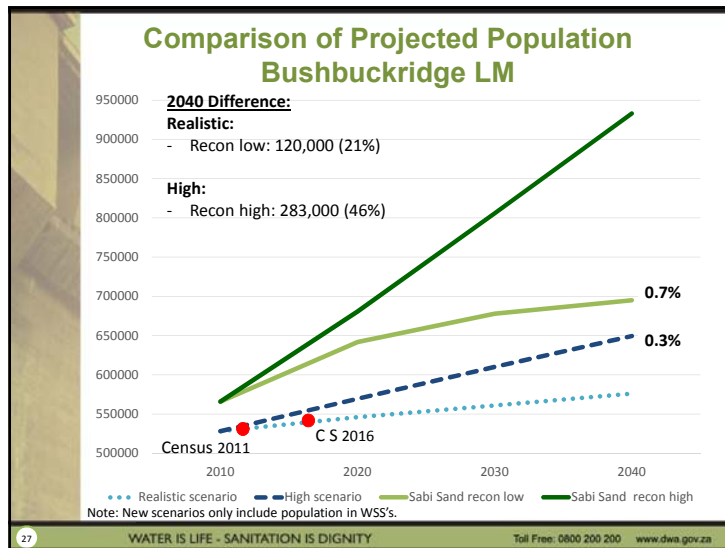
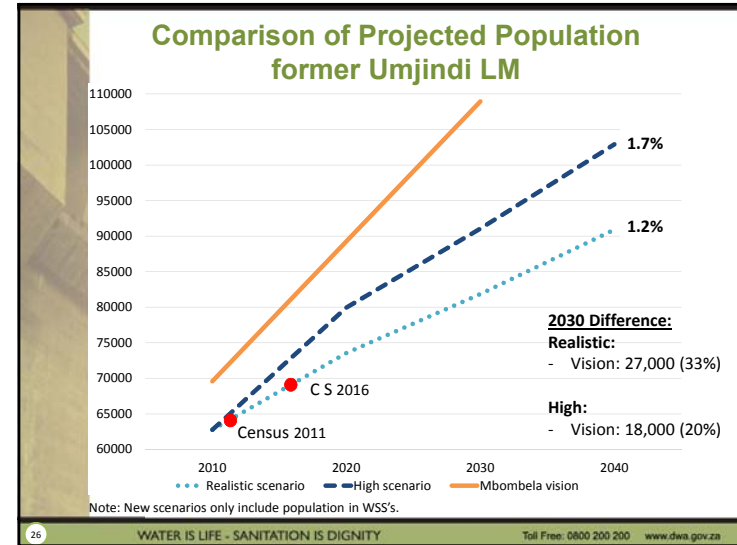
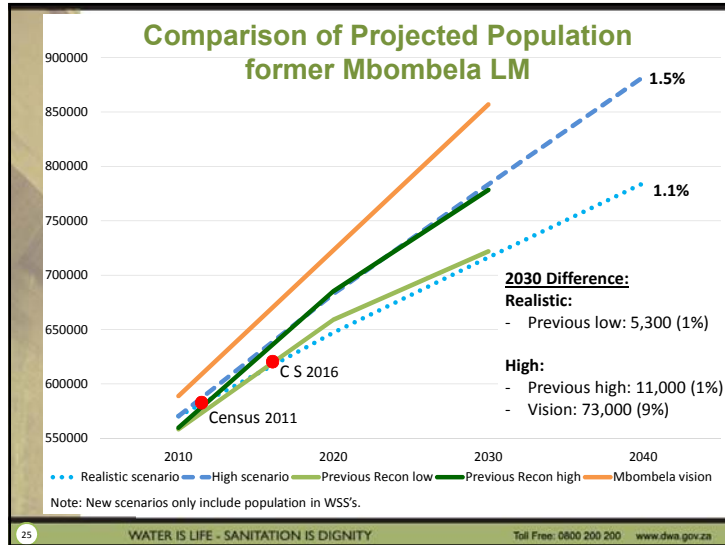
STUDY TASKS

| TASK NUMBER | TASK DESCRIPTIONS |
|-------------|---|
| 1 | Inception and Literature Review |
| 2 | Economic Growth and Demographic Analysis |
| 3 | Water Requirements and Return Flows |
| 4 | Water Conservation and Demand Management |
| 5 | Monitoring Network Expansion and Data Capturing |
| 6 | Water Resources Analysis |
| 7 | Infrastructure and Cost Assessment |
| 8 | Preliminary and Updated Reconciliation Strategy |
| 9 | Ad Hoc Support |
| 10 | Capacity Building and Training |
| 11 | Stakeholder Engagement |
| 12 | Study Reports |
| 13 | Study Management |

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**Economic growth and Demographic
Analysis Summary:
Final Signed Off Report Summary**

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Water Requirements and Return Flows Summary: Final Signed Off Report Summary

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Summary of Water Requirements

| Tertiary Catchments | Water Requirements in 2016 (million m ³ /a) | | | | |
|----------------------------|--|------------|------------|------------|------------|
| | Domestic and light Industrial | Industrial | Irrigation | Forestry | Total |
| Upper Crocodile (X21) | 2 | - | 21 | 52 | 90 |
| Middle Crocodile (X22) | 56 | - | 149 | 66 | 271 |
| Kaap (X23) | 6 | - | 92 | 40 | 138 |
| Lower Crocodile (X24) | 14 | 9 | 192 | 0.4 | 215 |
| Total for Crocodile | 78 | 24 | 454 | 158 | 714 |
| | 11% | 3% | 64% | 22% | 100% |
| Upper Sabie (X31) | 39 | - | 82 | 86 | 207 |
| Sand (X32) | 13 | - | 17 | 4 | 34 |
| Total for Sabie | 52 | 0 | 99 | 90 | 241 |
| | 22% | 0% | 41% | 37% | 100% |

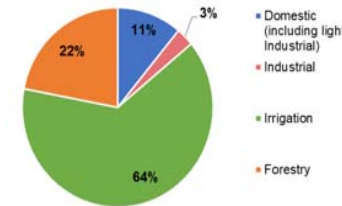
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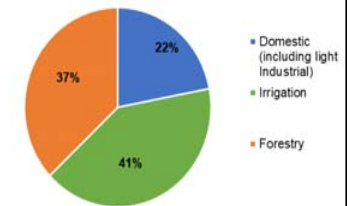
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Summary of Water Requirements

Crocodile (East) Sub- Catchment



Sabie Sub-Catchment



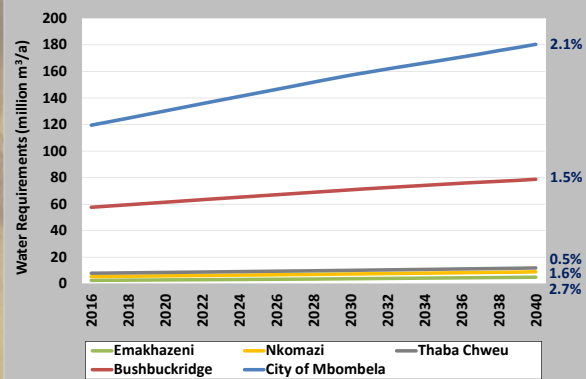
- Reserve requirements are variable
- International obligations are specified as minimum required flows that need to be adhered to. Water Resource Analyses task will confirm whether any additional support, over and above the EWRs is required

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Urban/Domestic Water Requirement Projection Summary



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CONTINUATION OF WATER REQUIREMENTS AND AVAILABILITY RECONCILIATION STRATEGY FOR THE MBOMBELA MUNICIPAL AREA
(Crocodile Sabie River System Reconciliation Strategy)

Item 9: Current Progress

| STUDY PROGRAMME | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| TASKS | | YEAR 1 (2017/2018) | | | | | | | | | | | | YEAR 2 (2018/2019) | | | | | | | | | | | |
| NO. | DESCRIPTION | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
| 4 | Water Conservation and Water Demand Management | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Monitoring Network Expansion and Data Capturing | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | Water Resource Analysis | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | Infrastructure and Cost Assessment | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | Updated Reconciliation Strategy | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | Ad Hoc Support | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | Training/Capacity Building | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | Stakeholder Engagement | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | Reports | | | | | | | | | | | | | | | | | | | | | | | | |
| | Report (1) Inception Report | | | | | | | | | | | | | | | | | | | | | | | | |
| | Report (2) Demographics | | | | | | | | | | | | | | | | | | | | | | | | |
| | Report (3) Water Requirements and Return Flows | | | | | | | | | | | | | | | | | | | | | | | | |
| | Report (4) Updated WCD/DM Plan | | | | | | | | | | | | | | | | | | | | | | | | |
| | Report (5) Water Resource Analysis Report | | | | | | | | | | | | | | | | | | | | | | | | |
| | Report (6) Infrastructure and Cost Assessment | | | | | | | | | | | | | | | | | | | | | | | | |
| | Report (7a) Interim Reconciliation Strategy Status Update | | | | | | | | | | | | | | | | | | | | | | | | |
| | Report (7b) Updated Reconciliation Strategy Report | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | Study Management | | | | | | | | | | | | | | | | | | | | | | | | |
| | Study Management (SM) | | | | | | | | | | | | | | | | | | | | | | | | |
| | Technical Support Group (TSQ) meetings | | | | | | | | | | | | | | | | | | | | | | | | |

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9.1 TASK 4: Water Conservation and Demand Management

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Continuation of the Mbombela Water Supply System Reconciliation Strategy - Strategy Steering Committee Meeting

Review of Water Conservation and Demand Management in the Urban Sector

15 November 2018

Presented by: Nsika Zondo / Willem Wegelin

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Objectives and background

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Background and Objectives

- Review annual water balances for all demand centres
- Review potential savings which can be achieved through WCWDM with budgets and timelines
- Assessment of previous projects undertaken in the study area and the success rate
- Development of high level action plan addressing technical, social, institutional and financial aspects
- Assess impact of WCWDM on total water demand and augmentation options

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Mbombela Targets - 2013

| Indicator | Current Value | Realistic Target | Optimistic Target |
|---|---------------|------------------|-------------------|
| System Input volume (million m ³ /a) | 54.71 | 48.87 | 43.03 |
| System Input volume (Mℓ / day) | 149.79 | 133.80 | 117.80 |
| Billed Authorised Consumption (million m ³ /a) | 26.73 | 28.62 | 29.07 |
| Unbilled Authorised Consumption (million m ³ /a) | 8.90 | 8.27 | 6.47 |
| Water Losses (million m ³ /a) | 19.08 | 11.98 | 7.49 |
| Non-revenue Water (million m ³ /a) | 27.98 | 20.25 | 13.96 |
| % Non-revenue water | 51% | 41% | 32% |
| % Water Losses | 35% | 25% | 17% |
| Input Volume (litres / capita / day) | 277 | 247 | 218 |
| Potential saving (million m ³ /a) | | 5.84 | 10.68 |
| % Reduction | | 11% | 20% |

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Targets Per Demand Centre - 2013

| Area | NRW (%) | | Water Losses (%) | | Efficiency (l/c/d) | |
|-----------------|------------|------------|------------------|------------|--------------------|------------|
| | Current | Target | Current | Target | Current | Target |
| Nelspruit | 27% | 20% | 22% | 15% | 723 | 614 |
| White River | 37% | 30% | 32% | 25% | 470 | 423 |
| Karino | 15% | 15% | 10% | 10% | 137 | 137 |
| Matsulu | 80% | 60% | 40% | 30% | 292 | 248 |
| Hazyview | 55% | 40% | 48% | 30% | 485 | 413 |
| Nsikazi North | 60% | 50% | 33% | 25% | 179 | 170 |
| Nsikazi South | 60% | 50% | 45% | 30% | 235 | 211 |
| Mbombela | 51% | 41% | 35% | 25% | 277 | 247 |

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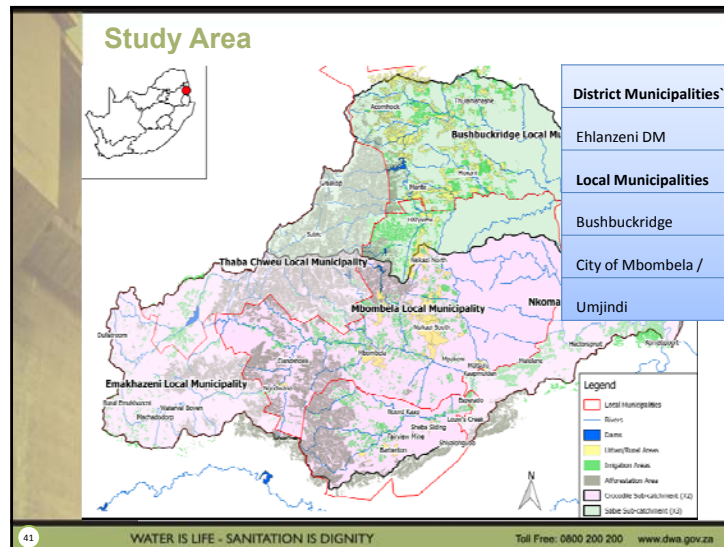


Progress and Status Quo

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Progress to Date

| Code | Municipality (WSA and WSP) | Main Town | Workshop | Status quo | Feedback |
|-------|----------------------------|---------------|----------|------------|----------|
| MP322 | City of Mbombela / Umjindi | Nelspruit | Yes | Yes | No |
| MP322 | Sembcorp | Nelspruit | Yes | Yes | No |
| MP325 | Bushbuckridge | Bushbuckridge | Yes | Yes | No |

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Common Challenges

- Large informal water supply areas
- Institutional arrangements
- Limited management information in some areas
- Lack of asset management and deteriorating infrastructure
- Skilled resources and capacity
- Limited community support
- Lack understanding of water business
- Metering, billing and cost recovery
- Limited water resources in some demand centres
- High indigent consumer base

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Common Challenges - Site Visit

Meter installed inside fence

Level of service

Buried domestic meters

Leakage reporting

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| City of Mbombela Financial Analysis (MTDEE) | | | | | |
|--|--------------------|-------------------------|--|---------------------------|---------------------------|
| Description | 2016/17 | Current Year 2017/18 | 2018/19 Medium Term Revenue & Expenditure Framework | | |
| | Audited Outcome | Adjusted Budget | Budget Year 2018/19 | Budget Year +1 2019/20 | Budget Year +2 2020/21 |
| Water Revenue ('000) | 187 912 | 134 183 | 99 843 | 105 234 | 111 022 |
| Water Expenditure ('000) | 303 778 | 299 231 | 317 850 | 333 179 | 352 355 |
| Surplus / Deficit ('000) | (115 866) | (165 049) | (218 008) | (227 945) | (241 333) |
| System input volume (m3/annum) | 63 590 000 | 55 027 656 | 52 276 273 | 49 662 460 | 47 179 337 |
| Billed authorised (m3/annum) | 20 680 043 | 18 218 676 | 20 040 544 | 22 044 598 | 24 249 058 |
| Average production cost (R/kl) | R 4.78 | R 5.44 | R 6.08 | R 6.71 | R 7.47 |
| Average selling cost (R/kl) | R 9.09 | R 7.37 | R 4.98 | R 4.77 | R 4.58 |
| Selling / production cost ratio | 1.9 | 1.4 | 0.8 | 0.7 | 0.6 |
| Piped Water inside Dwelling | 52 024 | 52 024 | 52 024 | 52 024 | 52 024 |
| Piped Water inside Yard | 72 178 | 72 178 | 72 178 | 72 178 | 72 178 |
| Using Public Tap | 13 334 | 13 334 | 13 334 | 13 334 | 13 334 |
| Other Water Supply | 61 715 | 61 715 | 61 715 | 61 715 | 61 715 |
| Sub-total | 199 251 | 199 251 | 199 251 | 199 251 | 199 251 |
| Avg cost/household/month | R 126 | R 90 | R 67 | R 71 | R 74 |

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| Bushbuckridge Water Tariff Structure | | | |
|--------------------------------------|---------|--------|-----------------|
| Water tariffs (2017/18) | Range | Unit | Domestic Tariff |
| Variable charge | 0 to 6 | R / kℓ | R 0.00 |
| Variable charge | 0 to 24 | R / kℓ | R 10.00 |
| Variable charge | > 25 | R / kℓ | R 11.00 |
| Fixed water charge | | R | R 114.00 |
| Metered borehole charge | | R | R 5.00 |
| Fixed borehole charge | | R | R 83.00 |
| Indigent - variable charge | 0 to 24 | R / kℓ | R 6.00 |
| Indigent: - Variable charge | > 25 | R / kℓ | R 7.00 |
| | | | Business Tariff |
| Metered water | > 0 | R / kℓ | R 14.00 |
| Fixed water | | R | R 481.00 |
| Metered borehole | > 0 | R / kℓ | R 7.00 |
| Fixed borehole | | R | R 328.00 |

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| Common Cost Recovery Challenges | |
|---|--|
| <ul style="list-style-type: none"> High levels of indigent households in participating municipalities Lack of coordinated planning and communication between technical and finance departments Sound non domestic and domestic metering but limited/no meter replacement or audit programmes Rising cost of water production and pumping Illegal and informal water connections Water loss from illegal connections not quantified Water tariff structure do not promote WCWDM | |

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| Industrial Water Use | | |
|--------------------------|------------------|---------------------------|
| Consumer Name | Water Use (2017) | |
| | MI/d | million m ³ /a |
| Sappi Ngodwana | 40 | 14.6 |
| Manganese Metal Company | 1.4 | 0.5 |
| Nelspruit Prison | 0.5 | 0.21 |
| University of Mpumalanga | 0.2 | 0.09 |
| Total | 42.1 | 15.4 |

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WDM Current Initiatives

Mbombela / Umjindi

- Upgrading of WTW and package plants
- Installation and replacement of bulk water meters
- Updated Customer charter, policy, bylaws, WSDP (Limited enforcement)
- Effective metering and billing (Formal areas)
- Procure equipment for water monitoring
- Improved service delivery

Bushbuckridge

- Upgrading of WTW
- Installation of domestic meters in some areas
- Drilling of boreholes and installation of storage tanks in rural areas
- Installation of water network including informal areas

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Current IWA Water Balance

| | | | | |
|----------------------------------|---------------------------------------|---------------------------------|--------------------------------|-------------------------------|
| System Input Volume = 113.567 | Authorised consumption = 62.936 | Billed authorised = 44.672 | Billed metered = 43.542 | Revenue water = 44.672 |
| | | Unbilled authorised = 18.264 | Unbilled unmetered = 14.764 | Non-revenue water = 68.895 |
| | Water losses = 50.631 | Apparent losses = 32.910 | Apparent losses = 32.910 | |
| 244 l/c/d | 45% | Real Losses = 17.721 | Real Losses = 17.721 | 61.1% |

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Key Performance Indicators

| Municipality | Population | SIV (million m ³ /a) | % Water Losses | % Non- revenue water | litres / capita / day |
|---------------|------------------|------------------------------------|-------------------|----------------------------|--------------------------|
| Mbombela | 644 616 | 58.05 | 36% | 55% | 247 |
| Umjindi | 70 433 | 5.84 | 52% | 53% | 229 |
| Bushbuckridge | 540 306 | 49.68 | 70% | 70% | 252 |
| Total | 1 255 355 | 113.57 | 52% | 61% | 244 |

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Water Loss Indicators Per Demand Centre

| Demand Centre | Population 2016 | System input volume Ml/day | System input volume million m ³ /a | Volume NRW million m ³ /a | % NRW | ℓ / c / d |
|-------------------------|--------------------|----------------------------------|---|---|--------------|------------|
| White River | 33 003 | 11.17 | 4.0 | 2.38 | 58% | 338 |
| Nelspruit | 73 336 | 38.63 | 3.98 | 7.59 | 54% | 526 |
| Nsikazi North | 172 509 | 28.00 | 10.10 | 5.14 | 50% | 162 |
| Nsikazi South | 274 968 | 52.88 | 19.20 | 10.65 | 55% | 192 |
| Hazyview | 4 937 | 4.11 | 1.50 | 0.79 | 53% | 832 |
| Matsulu | 54 723 | 16.99 | 6.20 | 4.40 | 80% | 310 |
| Karino | 27 000 | 4.1 | 1.8 | 0.3 | 20% | 152 |
| Elandshoek | 2 074 | 0.27 | 0.10 | 0.09 | 58% | 132 |
| Mpakeni | 1 578 | 0.14 | 0.05 | 0.04 | 64% | 86 |
| Ngodwana | 4 351 | 1.92 | 0.70 | 0.14 | 20% | 441 |
| Total - Mbombela | 648 479 | 157.09 | 57.05 | 31.38 | 55.0% | 242 |

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Water Loss Indicators Per Demand Centre...

| Demand Centre | Population 2016 | System input volume Ml/day | System input volume million m ³ /a | Volume NRW million m ³ /a | % NRW | ℓ /c/ d |
|------------------------------|------------------|----------------------------|---|--------------------------------------|--------------|------------|
| Sheba Siding | 2 093 | 0.27 | 0.10 | 0.04 | 35% | 131 |
| Shiyalongubo | 395 | 0.05 | 0.02 | 0.01 | 55% | 139 |
| Kamadakwa | 8 998 | 0.82 | 0.30 | 0.11 | 38% | 91 |
| Fairview Mine | 587 | 0.27 | 0.10 | 0.03 | 30% | 467 |
| Noord Kaap | 1 669 | 0.27 | 0.10 | 0.02 | 20% | 164 |
| Barberton | 60 317 | 14.30 | 5.22 | 2.87 | 55% | 237 |
| Total – Umjindi | 74 059 | 17.90 | 6.54 | 3.22 | 49.2% | 228 |
| Acornhoek | 218 719 | 53.75 | 19.62 | 13.66 | 69.6% | 246 |
| Hoxani | 153 991 | 37.59 | 13.72 | 9.56 | 69.6% | 244 |
| Marite | 36 897 | 9.07 | 3.31 | 2.31 | 69.6% | 246 |
| Thulamahashe | 143 637 | 25.70 | 13.03 | 9.08 | 69.6% | 249 |
| Total – Bushbuckridge | 553 244 | 136.11 | 49.68 | 34.60 | 69.6% | 246 |
| Total | 1 275 782 | 311.10 | 113.27 | 69.20 | 61.1% | 244 |

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Network Monitoring

- Network Pressure
- WTW Inflow and Outflow
- Consumption/ Volume
- Water Quality
(PH, Turbidity, TDS)
- Pump Status (on / off)
- Water Level (Reservoirs)

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| Category | Item | Status/Value |
|----------------------|---------------------------|--------------|
| Nalsogun Reservoirs | Anguila Reservoir | 94.1% |
| | Bang Reservoir | 62.3% |
| | Dakor Reservoir | 65.5% |
| | Farcane Reservoir | 81.3% |
| | Figtree Reservoir | 75.5% |
| | Grothe Reservoir 1 | 64.5% |
| | Grothe Reservoir 2 | 72.4% |
| | Grothe Reservoir 3 | 82.4% |
| | Marite Reservoir | 65.1% |
| | Marite Reservoir 2 | 59.9% |
| Nalsogun WTW Pumps | Modulo A Pump | 55.5% |
| | Modulo B Pump | 52.5% |
| | Proteus Pump | 57.5% |
| | Whitaker Reservoirs | |
| | Bushbuckridge Reservoir | 58.5% |
| | Bushbuckridge Reservoir 2 | 54.5% |
| | Phumbe Reservoir | 59.5% |
| | Whitaker Reservoir | 57.5% |
| | Karoro Reservoirs | |
| | Karoro PC Reservoir | 59.5% |
| Kanyemane Reservoirs | 4 Small Reservoir | 59.5% |
| | 5 Small Reservoir | 57.5% |
| | 6 Small Reservoir | 56.7% |
| | 7 Small Reservoir | 56.4% |
| | 8 Small Reservoir | 56.5% |
| | 9 Small Reservoir | 56.5% |
| | 10 Small Reservoir | 56.5% |
| | 11 Small Reservoir | 56.5% |
| | 12 Small Reservoir | 56.5% |
| | 13 Small Reservoir | 56.5% |
| Matshu Reservoirs | Expend Reservoir | |
| | Intermediate Reservoir | |
| | Intermediate Reservoir | |
| | Matshu W. High L.S. | |
| | Matshu W. Reservoir | |
| | Matshu W. 1st of Tank | |
| | Matshu W. 2nd of Tank | |
| | Matshu W. 3rd of Tank | |
| | Matshu W. 4th of Tank | |
| | Matshu W. 5th of Tank | |

Network Monitoring Devices



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Strategy

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Strategy Targets

- Efficiency
 - Target 180 to 200 litres per capita per day
 - Impacts on water security and augmentation
- Non-revenue water
 - >50% target 40%
 - 30% to 50% target 25%
 - <30% target 15%
 - Impacts on revenue and water use efficiency
- Water losses
 - Same as NRW with unbilled consumption not more than 5% of system input volume
 - Financially and environmentally not acceptable

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Study Area Targets

| Indicator | Current Value (2016) | Realistic Target | Optimistic Target |
|---|----------------------|------------------|-------------------|
| System Input volume (million m ³ /a) | 113.27 | 102.21 | 90.62 |
| System Input volume (Mℓ / day) | 311.10 | 280 | 249 |
| % Non-revenue water | 61% | 47% | 35% |
| % Water Losses | 46% | 38% | 33% |
| Input Volume (litres / capita / day) | 244 | 207 | 182 |

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Target Summary Per Demand Centre - 2016

| Demand Centre | Water Losses % | | Non Revenue Water % | | Efficiency (ℓ/c/d) | |
|----------------|----------------|--------|---------------------|--------|--------------------|--------|
| | Current | Target | Current | Target | Current | Target |
| White River | 55% | 25% | 58% | 30% | 338 | 242 |
| Nelspruit | 22% | 15% | 54% | 30% | 527 | 400 |
| Nsikazi North | 30% | 25% | 50% | 35% | 162 | 137 |
| Nsikazi South | 45% | 30% | 55% | 40% | 192 | 163 |
| Hazyview | 46% | 35% | 52% | 23% | 832 | 586 |
| Matsulu | 40% | 23% | 80% | 61% | 310 | 250 |
| Karino/Plaston | 15% | 7% | 20% | 12% | 152 | 140 |
| Elandsheek | 42% | 30% | 58% | 48% | 132 | 119 |
| Mpakeni | 14% | 10% | 64% | 61% | 87 | 84 |
| Ngodwana | 20% | 5% | 20% | 10% | 441 | 397 |
| Sheba Siding | 35% | 29% | 35% | 18% | 131 | 109 |
| Shiyalongubo | 30% | 10% | 55% | 51% | 139 | 133 |
| Kamadakwa | 28% | 21% | 38% | 33% | 91 | 86 |
| Fairview Mine | 30% | 24% | 30% | 24% | 467 | 438 |
| Noord Kaap | 20% | 6% | 20% | 6% | 164 | 141 |
| Barberton | 55% | 53% | 55% | 53% | 237 | 231 |
| Acornhoek | 70% | 64% | 70% | 64% | 246 | 246 |
| Hokani | 70% | 60% | 70% | 60% | 244 | 244 |
| Marite | 70% | 66% | 70% | 66% | 246 | 246 |
| Thulamahashe | 70% | 64% | 70% | 64% | 249 | 249 |

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| REALISTIC TARGET IWA WATER BALANCE | | | | |
|---|------------------------------------|---------------------------------|--------------------------------|--|
| System Input Volume = 102.210 207 l/c/d | Authorised consumption = 72.080 | Billed authorised = 53.816 | Billed metered = 52.686 | Revenue water = 53.816 |
| | | Unbilled authorised = 18.264 | Unbilled unmetered = 14.764 | Non-revenue water = 48.394 47% |
| | Water losses = 30.131 38% | Apparent losses = 19.585 | Apparent losses = 19.585 | |
| | | Real Losses = 10.546 | Real Losses = 10.546 | |
| | Reduced Input Volume = 11.357 | | | |
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| Comparison of Old And New Targets for - Mbombela (Excluding Umjindi and Bushbuckridge) | | | | | | |
|--|--------------|-------------------------|--------------------------|----------------------|--------------------------|---------------------------|
| Indicator | Value (2012) | Realistic Target (2012) | Optimistic Target (2012) | Current Value (2016) | Current Realistic Target | Current Optimistic Target |
| System Input volume (million m ³ /a) | 54.71 | 48.87 | 43.03 | 57.05 | 51.92 | 45.64 |
| System Input volume (Mℓ / day) | 149.79 | 133.80 | 117.80 | 157.09 | 142.95 | 125.67 |
| % Non-revenue water | 51% | 41% | 32% | 55% | 41% | 36% |
| % Water Losses | 35% | 25% | 17% | 33% | 30% | 26% |
| Input Volume (litres / capita / day) | 277 | 247 | 218 | 244 | 219 | 195 |
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| Possible Interventions | |
|---|---|
| INSTITUTIONAL / LEGISLATIVE INTERVENTIONS <ul style="list-style-type: none"> • Institutional review • Setup dedicated WDM teams • Training and capacity building • Customer charter, policy, bylaws | TECHNICAL INTERVENTIONS <ul style="list-style-type: none"> • Bulk and zone metering • Network Sectorisation • Active Leakage Control • Water monitoring equipment • Telemetry • Retrofitting and removal of wasteful devices and illegal connections • Formalise informal connections • Mains replacement • Pressure management • Control valve management • Consumer metering • Top consumer audit • GIS / CAD system • Management Information System • Water loss monitoring and audits |
| FINANCIAL INTERVENTIONS <ul style="list-style-type: none"> • Proper budgeting for capital projects • Prioritise WCWDM when budgeting • Effective metering and billing • Water tariffs • Informative billing | |
| SOCIAL INTERVENTIONS <ul style="list-style-type: none"> • Consumer Awareness Campaign • Consumer Help and Support Desk • Schools awareness • Promote water wise practice | |
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| Impact of WCWDM |
|---|
| <ul style="list-style-type: none"> • Scope for reducing total demand and reducing NRW in urban areas <ul style="list-style-type: none"> – Formal supply areas – Metering and billing systems are possible – Political support • Limited scope for reducing total demand and NRW in rural areas <ul style="list-style-type: none"> – Informal supply areas – Currently operate on intermittent supply and any saving will be redistributed – Difficult to implement metering and billing but can reduce inefficiencies and wastage |
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Risk Factors

- Inadequate metering and billing
- Inadequate tariffs which do not support WCWDM
- Insufficient capacity to implement and spend allocated budgets
- Limited political support for WCWDM
- Low revenue base
- Lack of capacity (financial, human and technical)
- Consumer apathy
- Rising cost of providing water services

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Summary

- The average consumption in most demand centers is very high
- The rural areas are characterized by intermittent supply
- Consumers revert to informal connections
- Limited WCWDM interventions
- 2012 target was not achieved
- Limited cost recovery
- Municipalities operating at a loss and lacks funding to implement WCWDM. Grant dependent

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Way Forward

- Engage with municipality to explain urgency and requirements
- Municipalities must take ownership of WCWDM
- Municipalities must be made aware that WCWDM is a strategic issue in a water scarce country and impact significantly on water security
- Implications on return flow volumes must be considered

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9.2 TASK 5: Monitoring Network Expansion and Data Capturing

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Monitoring Network Expansion and Data Capturing

Municipal Monitoring Network

- Presented under Task 4: WC/WDM

Water Resource Monitoring Network

- Rainfall Stations
- River Gauging Stations

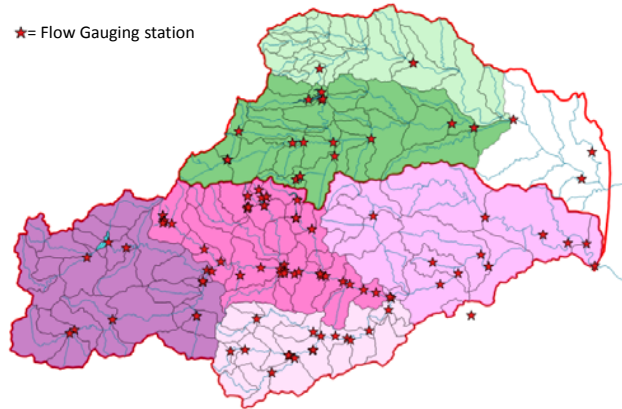
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Monitoring network and data capturing Flow Monitoring

★ = Flow Gauging station



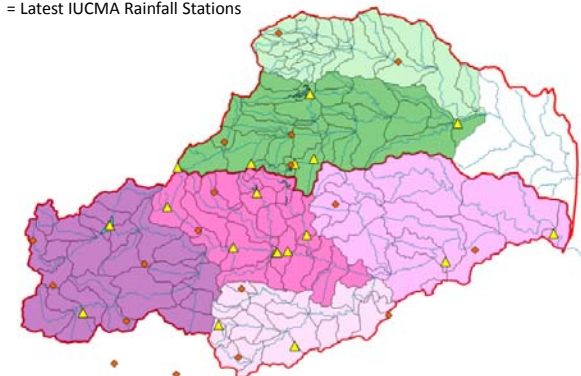
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Monitoring network and data capturing DWS and new IUCMA Rainfall stations

▲ = DWS Rainfall Stations
◆ = Latest IUCMA Rainfall Stations



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9.3 TASK 6: Water Resource Analysis

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Progress

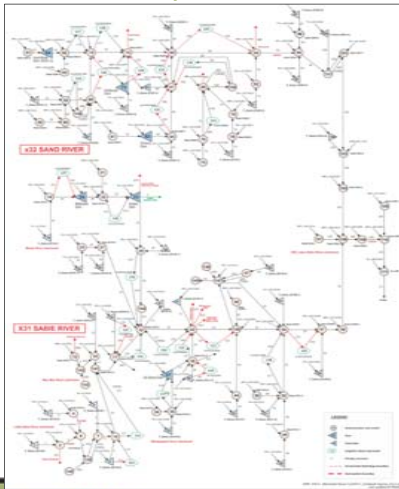
- Sourced information and decision support systems (DSS) from past studies:
 - IWAAS (WRYM, 2011)
 - WREMP (IUCMA operational analysis – 2017)
- Test WRYM for correct functionality
 - Smaller Dams yield in BBRLM not in agreement with IWAAS
 - Larger Dams get similar yields to IWAAS
- New information:
 - Updated Hydrology for the Kaap River (2018)
 - Updated Hydrology White River (2017)
 - DWS Stand Alone Dams AOA

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Base WRYM (Sabie Catchment)

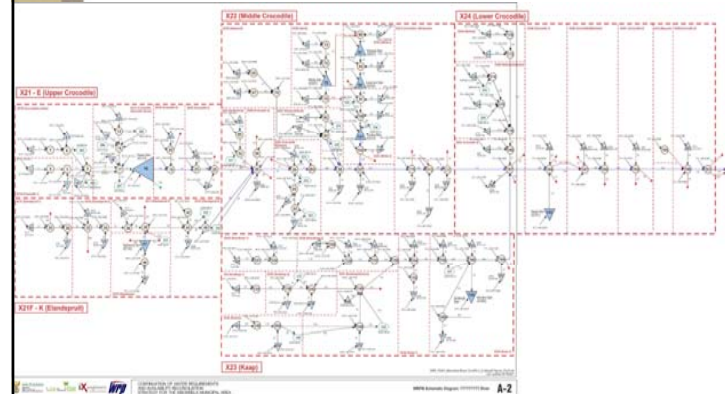


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Base WRYM (Upper, Middel & Lower Crocodile)

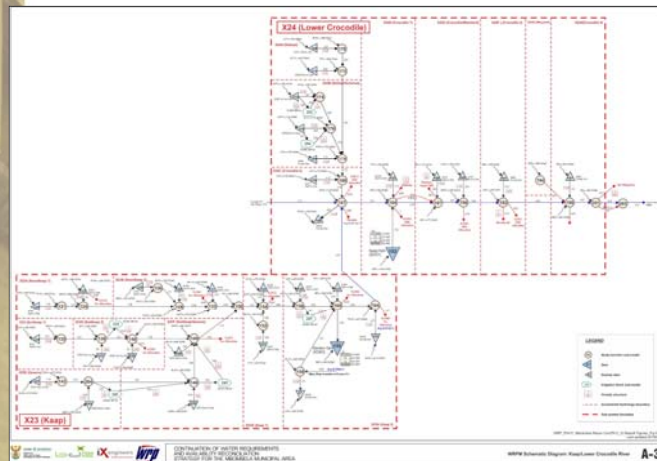


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Base WRYM (Lower Crocodile)



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Water Resource Analysis Status

- Water Quality: 2016/2017 IUCMA Water quality status report (Sabie & Crocodile Catchments) received
- Combining WRYMs for Crocodile and Sabie catchments
- Update models with current data

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CONTINUATION OF WATER REQUIREMENTS AND AVAILABILITY RECONCILIATION STRATEGY FOR THE MBOMBELA MUNICIPAL AREA

(Crocodile Sabie River System Reconciliation Strategy)

Item 10: Discussion and Comments

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CONTINUATION OF WATER REQUIREMENTS AND AVAILABILITY RECONCILIATION STRATEGY FOR THE MBOMBELA MUNICIPAL AREA

(Crocodile Sabie River System Reconciliation Strategy)

Item 11: Communication

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Communication

A StraSC meeting will be held \pm 6 months

After each meeting StraSC members will be provided with:

- Minutes of the StraSC meeting
- Media release

As members of the StraSC 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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StraSC membership

- \pm 130 stakeholders on the database
- **Representative of all relevant sectors in the study area – refer to Terms of Reference**

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CONTINUATION OF WATER REQUIREMENTS AND AVAILABILITY RECONCILIATION STRATEGY FOR THE MBOMBELA MUNICIPAL AREA

(Crocodile Sabie River System Reconciliation Strategy)

Item 12: Date of Next Meeting

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CONTINUATION OF WATER REQUIREMENTS AND AVAILABILITY RECONCILIATION STRATEGY FOR THE MBOMBELA MUNICIPAL AREA

(Crocodile Sabie River System Reconciliation Strategy)

Item 13: Closure

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