

Determination of Ecological Water Requirements for Surface Water (Rivers, Estuaries and Wetlands) and Groundwater in the Lower Orange WMA: WP10974

16 November 2016

OPERATIONAL SCENARIOS EWR

Manie Maré: WRP Consulting Engineers

WATER IS LIFE, SANITATION IS DIGNITY

RESOURCE UNITS: WHERE DOES IT FIT?

1. Initiate the BHN and EWR assessment

How will the study be executed?

2. Delineate RU, select study sites

Where will detailed work be undertaken?

4. Determine BHN and EWR

How much water do you need for basic human needs and to maintain a certain ecological status?

3. Determine reference condition, PES and EIS

What are the ecological status, importance and future ecological objectives?

5. Determine operational scenarios and evaluate consequences

How will the current state and ecological objectives be influenced by future changes in operation?

6. Ecological specification, monitoring and implementation information

How do we know that we will achieve our objectives?

WATER IS LIFE - SANITATION IS DIGNITY

Toll Free: 0800 200 200 www.dwa.gov.za

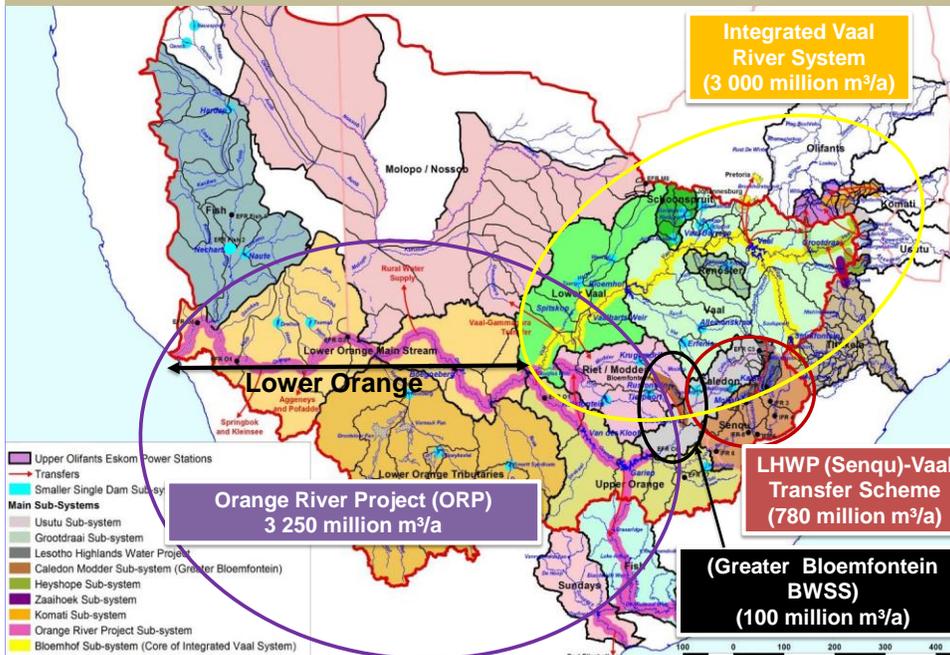
Scenario definition – Water Resource management and Planning Context

- Scenarios in this context are:
 - **Plausible definitions of all factors that influence Water Balance and Water Quality in catchment & system as a whole**
- The scale of the analysis
 - Requires the aggregation of land use effects
 - Individual & localised small scale developments will not significantly influence the study results

Introduction – Operational Scenarios

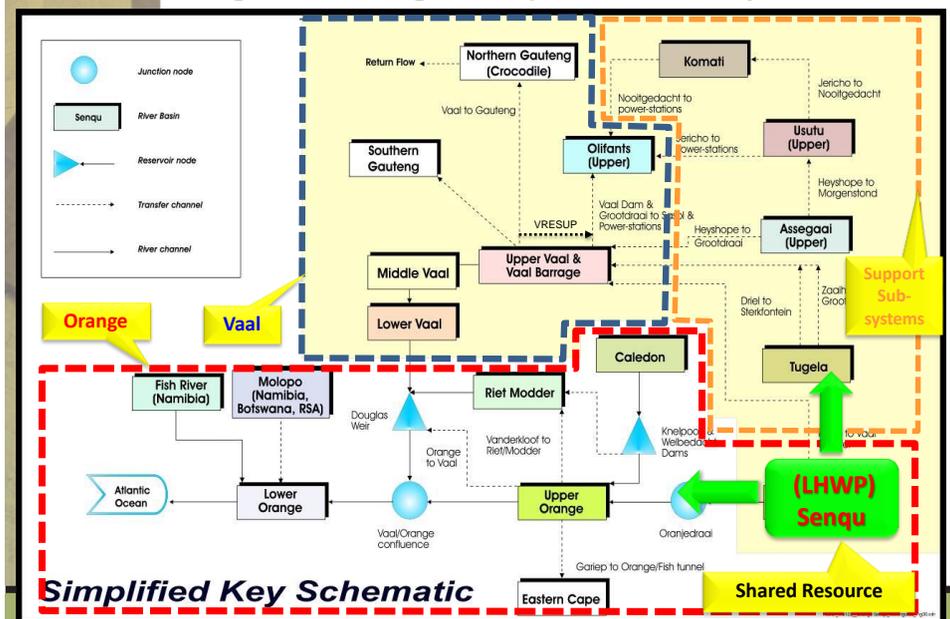
- Preliminary assessment scenarios to determine how changes in operation/development of system could influence:
 - Key EWR sites along Main Orange River
 - Orange River Estuary
- Orange Reconciliation Strategy study
 - Most likely future water resource developments
 - DWS is progressively implementing this strategy
 - Vioolsdrift Dam Feasibility study jointly with Namibia
- Instream Flow Requirements for the Senqu River
 - Recommended Ecological Water Requirements Polihali Dam
- IVRS Reconciliation Strategy Study

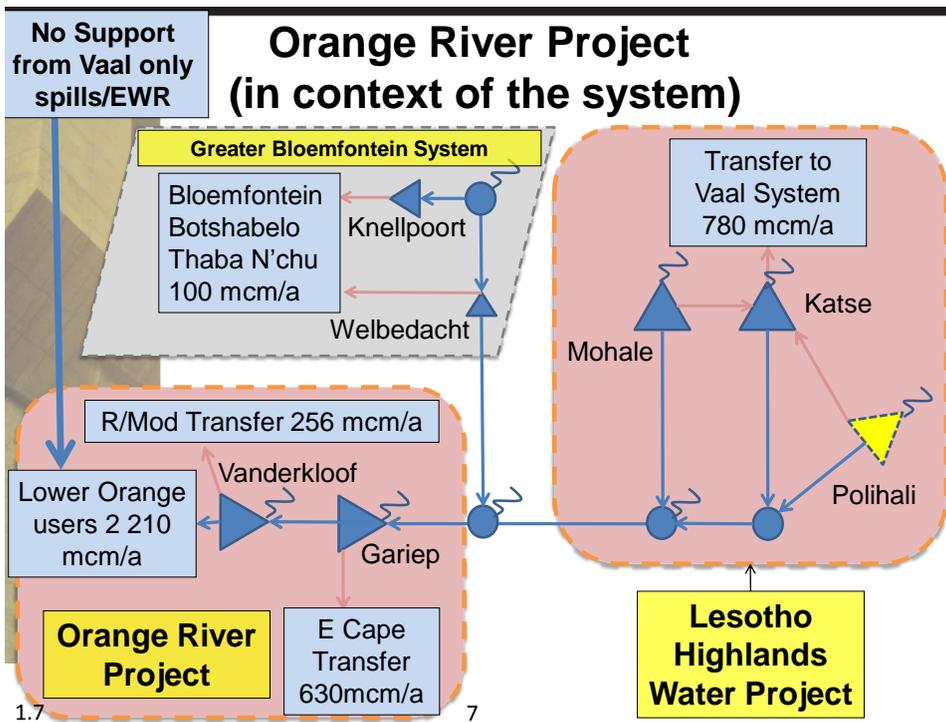
Integrated Orange/Senqu and Vaal Systems



Orange River System

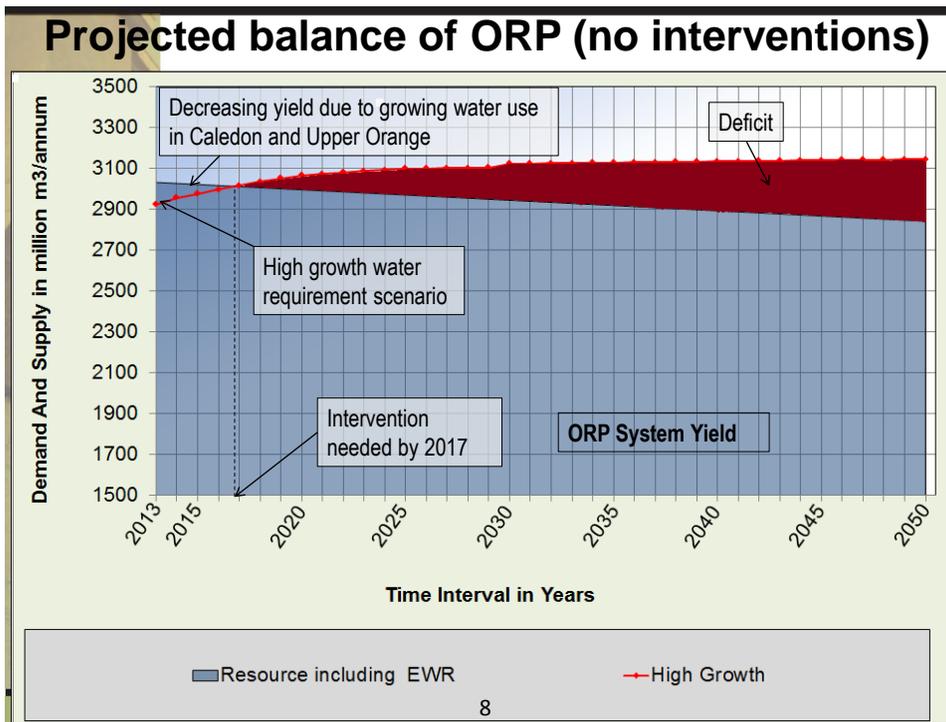
Integrated Orange-Senqu Vaal River System



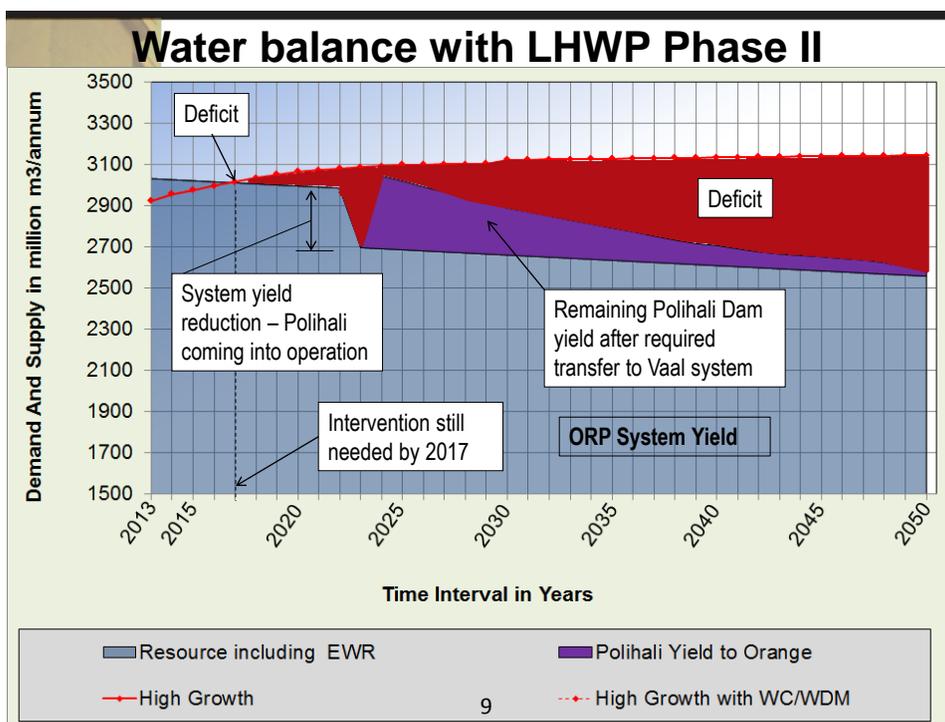


1.7

7

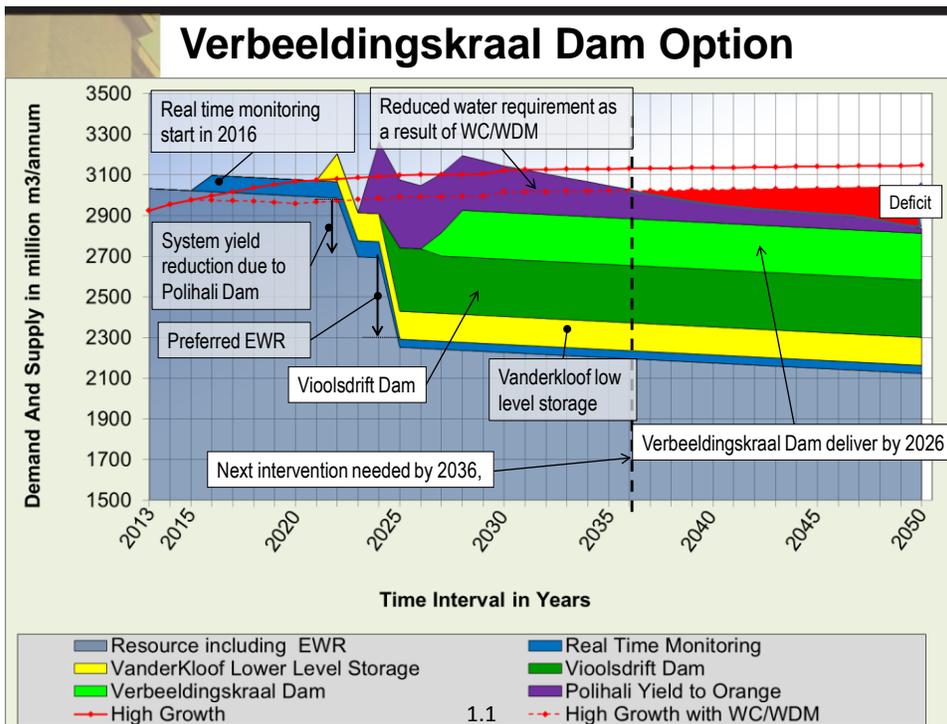
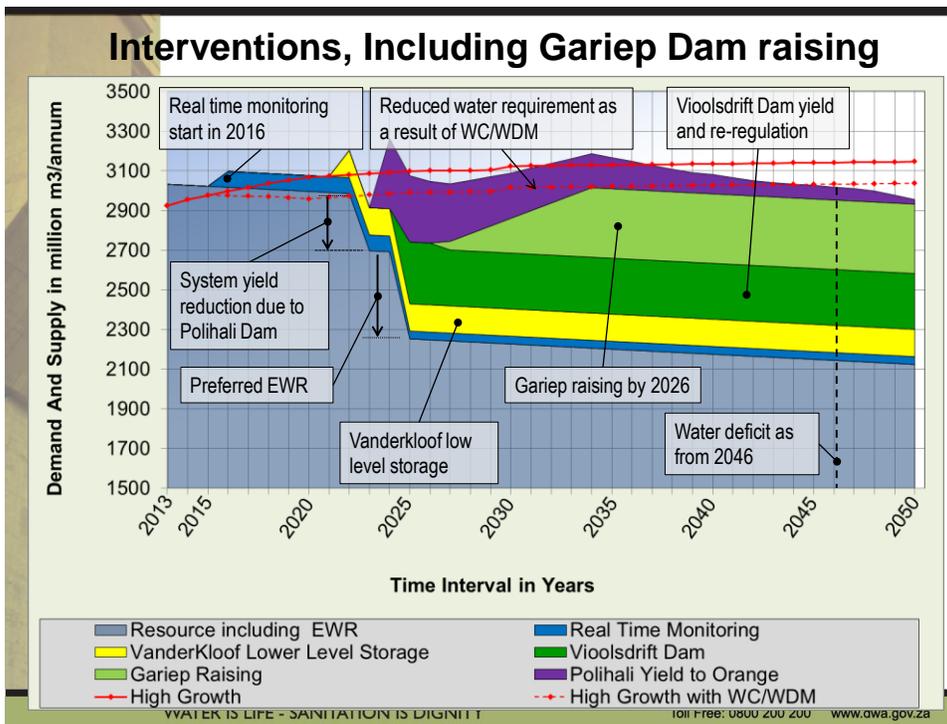


8



ORP Prioritised Interventions

- Water Conservation and Water Demand Management
- Real Time Monitoring – reduce operating losses
- Shared utilisation of Polihali Dam
- Vanderkloof low level storage
- Vioolsdrift Dam
- (Implement ecological preferred EWR)
- Raising of Gariep Dam / Verbeeldingskraal Dam (upstream of Gariep Dam)



Current Vioolsdrift Feasibility Study

- Recommend Size and location of Vioolsdrift Dam
Yield purposes
 - Dam wall height > 70m
 - Storage capacity > 2 800 million m³
- For Ecology a smaller dam is preferred
- Recommend operating rule
- Consequences of different EWR Scenarios downstream of Vioolsdrift Dam & for estuary were evaluated

1.13

WATER IS LIFE - SANITATION IS DIGNITY

Toll Free: 0800 200 200 www.dwa.gov.za

Integrated Vaal River System Strategy

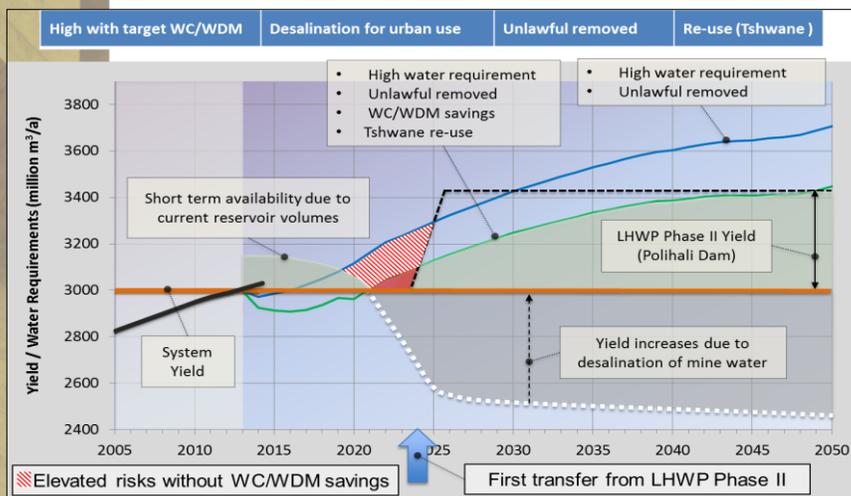
- Reconciliation Strategy
 - Eradicate unlawful irrigation water
 - Implementation of WC/WDM urban/industrial
 - Mine water effluent (AMD) treatment and re-use
 - Implementation of LHWP Phase II
 - Urban return flows re-use
- Implementation of the Reserve (EWR)
- Water Quality
- For Purpose of EWR Orange Operational Scenario analysis assume
 - Vaal Strategy is implemented as suggested
 - only with implementation dates according to latest estimates as used in 2016 IVRS annual operating analysis

1.14

WATER IS LIFE - SANITATION IS DIGNITY

Toll Free: 0800 200 200 www.dwa.gov.za

Integrated Vaal River System Water Balance (June 2015)



WATER IS LIFE - SANITATION IS DIGNITY

Toll Free: 0800 200 200 www.dwa.gov.za

Scenario Definition Matrix

Scenario	Scenario Variables								Ecological Water Requirements	
	Development Horizon (year)	Reduce operational losses	Vanderkloof Dam's lower level storage	Polihali Dam	Voolsdrift/Noordoewer Dam	Verbeeldingskraal Dam	Raised Gariep Dam	(h)	(i)	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)			
A	2016 ⁽¹⁾	N	N	N	N	N	N	Current	Current	
B	2035	Y	Y	Y	Y	Y	or Y	Current	Current	
C	2035	Y	Y	Y	Y	Y	or Y	REC	REC	
D	2035	Y	Y	Y	Y	Y	or Y	REC (excluding high flows)	REC (excluding high flows)	
D2	2035	Y	Y	Y	Y	Y	or Y	Refined (REC)	Refined (REC)	
D3	2035	Y	Y	Y	Y (smaller)	Y	or Y	Refined (REC)	Refined (REC)	
E	2025	Y	Y	Y	Y	N	N	To be selected	To be selected	
F	Best of above scenarios with an appropriate option to transfer water to Botswana.									

- (a) Constant development level over analysis period
- (b) Reduction of operating losses by 80 million m³/a
- (c) Utilize Lower level storage in Vanderkloof Dam (yield 137 million m³/a)
- (d) Polihali Dam increase transfer to IVRS by max 437 million m³/a
- (e) Voolsdrift Dam re-regulate, decrease operational losses & increase system yield
- (f) & (g) Verbeeldingskraal or Raised Gariep - evaporation losses very high
- (h) Optimum recommended flow release rules from Voolsdrift for estuary
- (i) EWR for river (optimised ecological releases from Voolsdrift study)

1.16

WATER IS LIFE - SANITATION IS DIGNITY

Toll Free: 0800 200 200 www.dwa.gov.za

DISCUSSION AND QUESTIONS FOR CLARIFICATION

WATER IS LIFE - SANITATION IS DIGNITY

Toll Free: 0800 200 200 www.dwa.gov.za

OPERATIONAL SCENARIO ANALYSIS IMPACTS: WAY FORWARD TO NEXT MEETING

1. Initiate the BHN and EWR assessment

How will the study be executed?

2. Delineate RU, select study sites

Where will detailed work be undertaken?

4. Determine BHN and EWR

How much water do you need for basic human needs and to maintain a certain ecological status?

3. Determine reference condition, PES and EIS

What are the ecological status, importance and future ecological objectives?

5. Determine operational scenarios and evaluate consequences

How will the current state and ecological objectives be influenced by future changes in operation?

6. Ecological specification, monitoring and implementation information

How do we know that we will achieve our objectives?

WATER IS LIFE - SANITATION IS DIGNITY

Toll Free: 0800 200 200 www.dwa.gov.za



Thanks