



water & sanitation

Department:  
Water and Sanitation  
REPUBLIC OF SOUTH AFRICA



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

7 June 2017

### SCENARIO EVALUATION AND RECOMMENDATIONS: 7.4 YIELD RELATED IMPACTS & ISSUES TO CONSIDER FOR RECOMMENDATIONS

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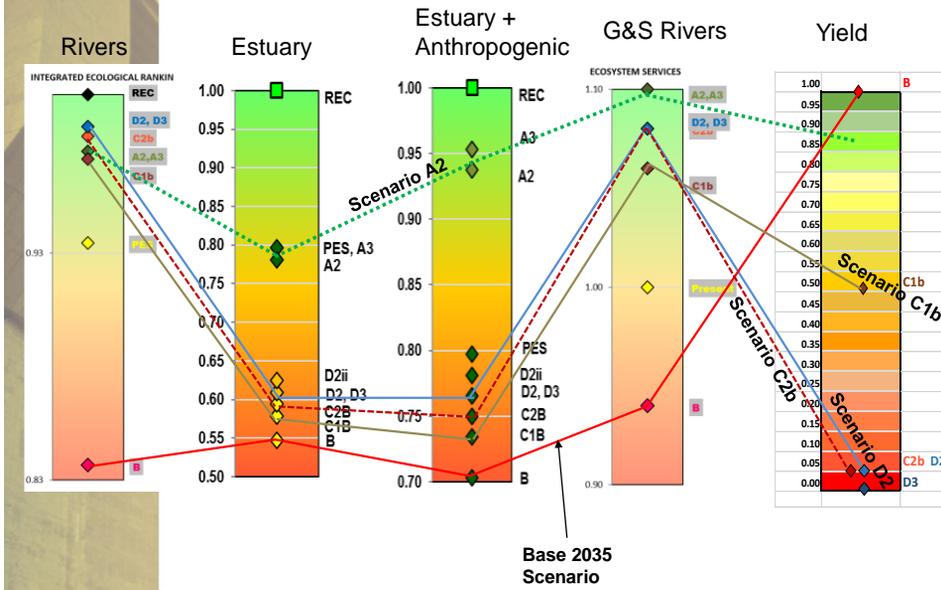
## SUMMARY KEY YIELD RESULTS

- **Scenario A –Base 2016**
- Scenario A & A2 – Both current system scenarios in balance – No additional yield impact
- Scenario A3 – Slight deficit  $\pm$  90 million m<sup>3</sup>/a
- **Scenario B –Base 2035**
- Scenario C1b – 425 million m<sup>3</sup>/a less than B
- Scenario C2b – 825 million m<sup>3</sup>/a less than B
  - Increased Vioolsdrift inflow
  - Unusable increased yield at Vioolsdrift
- Scenario D2 – 825 million m<sup>3</sup>/a less than B
- Scenario D3 – 865 million m<sup>3</sup>/a less than B

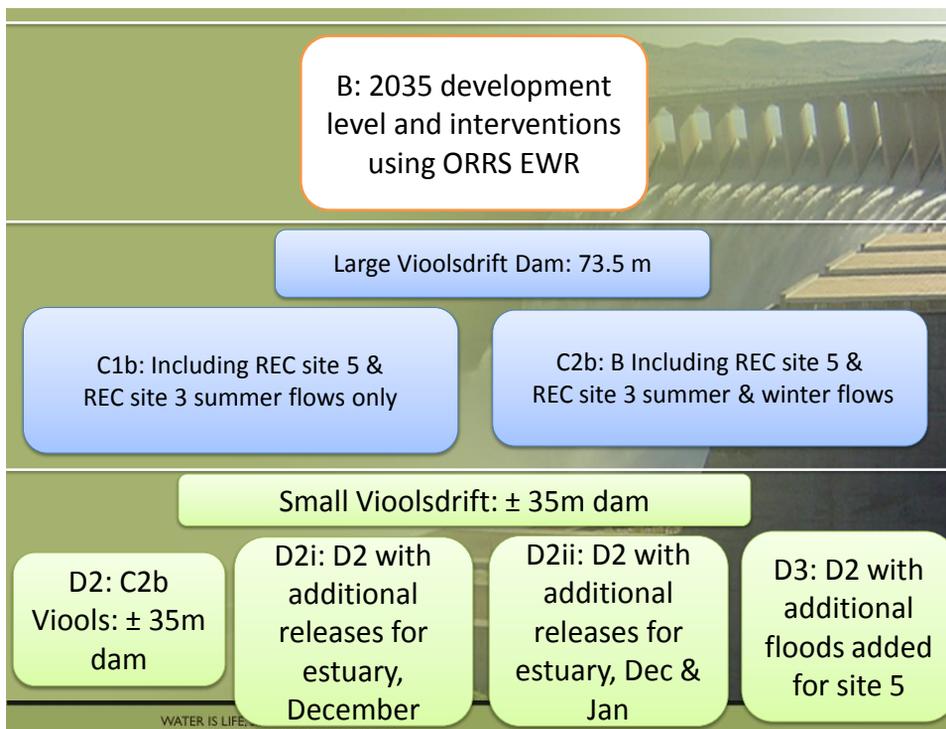
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# TRAFFIC DIAGRAMS



# LONG TERM POST DAM DEVELOPMENTS



## POST-DAM DEVELOPMENT SCENARIOS C – Scenarios (1 OF 3)

### Issues to consider for recommendations

- Scenario C1b & C2b significant yield difference: C2b 400 million m<sup>3</sup>/a reduction
  - Due to inclusion of winter low flows at EWR O3
  - Results high deficit in Upper Orange – Current planning no option to restore water balance
  - Results in a surplus in large Vioolsdrift – Can not be utilised due limited future d/s use
  - Inclusion of winter low flows at EWR O3 **Thus dictate small Vioolsdrift**
  - Exclusion of winter low flows at EWR O3 **Thus open possibility of large Vioolsdrift**

## POST-DAM DEVELOPMENT SCENARIOS D –Scenarios (2 OF 3)

### Issues to consider for recommendations

- Scenario D2 & D3: All include winter low flows at EWR O3 thus small Vioolsdrift
  - Result (400) deficit in Upper Orange – Current Planning no option to restore water balance
  - Boskraai Dam sufficient yield but eliminated in Orange Recon – Environmental
    - Replaced by Verbeeldingskraal – lower yield
  - Which is most important? Lower Orange ecology or Boskraai ecology
  - NB: In or Exclusion winter low flows at EWR O3 Guides decision small or large Vioolsdrift Dam

## POST-DAM DEVELOPMENT SCENARIOS (3 OF 3)

### Issues to consider for recommendations

- With winter low flows at EWR O3 - thus small Vioolsdrift (D scenarios)
  - Result (400) deficit in Upper Orange – High Capital expenditure required for upstream development - Boskraai Dam or reduce u/s irrigation
- Without winter flows at EWR O3
  - Large Vioolsdrift Dam & Orange in balance C1b
  - Small Vioolsdrift Dam: Require development upstream probably Raised Gariep or reduce u/s irrigation ( $\pm 200$  million m<sup>3</sup>/a)

## POST-DAM RECOMMENDATION ( 1 of 2)

### Evaluate before or during Classification

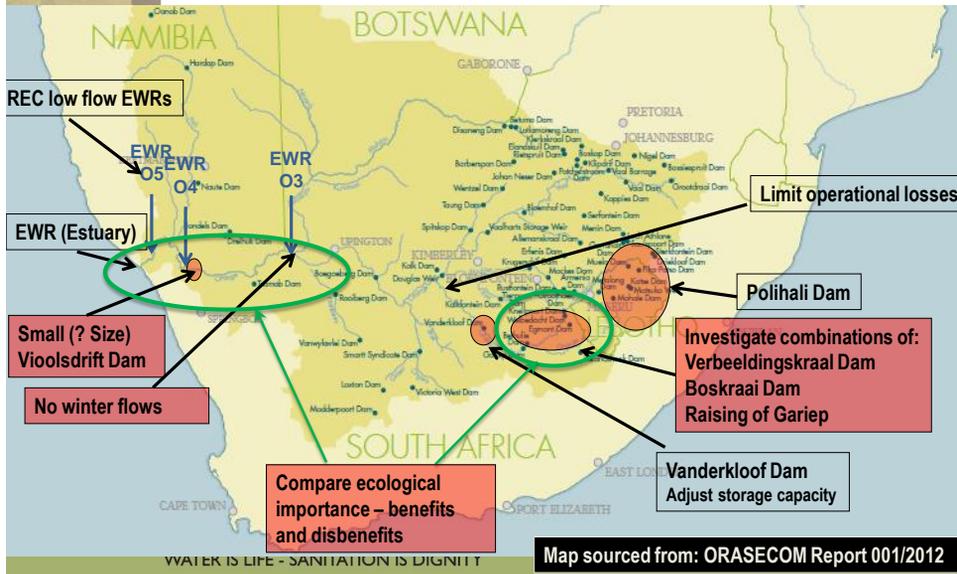
- Scenario with small Vioolsdrift Dam and no winter flows at EWR O3.
- Sc C1b (no winter flows) improves the PES (marginally) from C to B/C at EWR O3. Likely that a small Vioolsdrift with no winter flows will also improve or at least meet PES.
- Have to determine the biggest small Vioolsdrift that can still cost-effectively include a fishway.

## POST-DAM RECOMMENDATION ( 2 of 2)

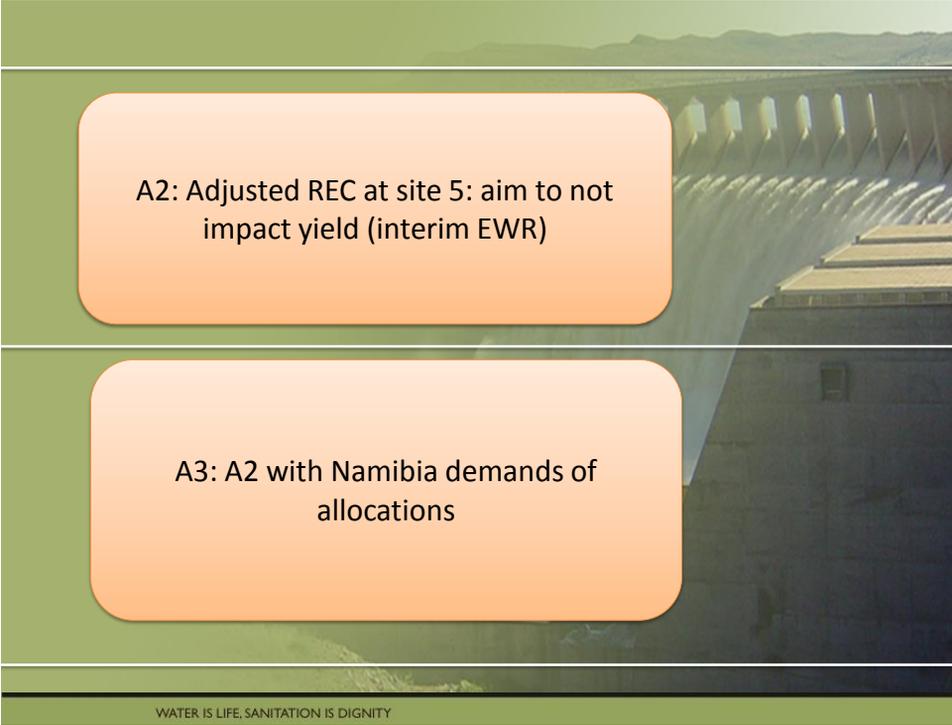
### Evaluate before or during Classification

- Based on Vioolsdrift available yield, have to evaluate most cost-effective upstream storage required. Balance against savings of small Vioolsdrift Dam.
- If necessary – undertake ecological ‘cost’ benefit study – importance of Boskraai ecology compared to DS National Park, Transfortier Park and Ramsar site.
- Optimised recommended scenarios in an iterative manner to achieve a half a category improvement at the estuary.

## POST DAM RECOMMENDATION



## SHORT TERM PRE DAM DEVELOPMENTS



A2: Adjusted REC at site 5: aim to not impact yield (interim EWR)

A3: A2 with Namibia demands of allocations

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## PRE-DAM DEVELOPMENT SCENARIOS Recommendation

- Scenario A2 & A3 both in green/high yellow traffic diagrams all 4 components and from yield perspective
- Scenario A3 includes 93 million m<sup>3</sup>/a increase in demand due to possible Namibian developments
  - Depends on Namibia
  - RSA and Namibia to agree
  - Most probably phased in over time
  - Thus start of with Scenario A2
- Both scenarios recommended

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# QUESTIONS FOR CLARIFICATION

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