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Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA

Implementation and Maintenance of the Water Reconciliation Strategy for the KwaZulu-Natal Coastal Metropolitan Areas

Investigation of Load Shift from the Lower to the Upper Mgeni System

11 SEPTEMBER 2012
SSC Meeting 5

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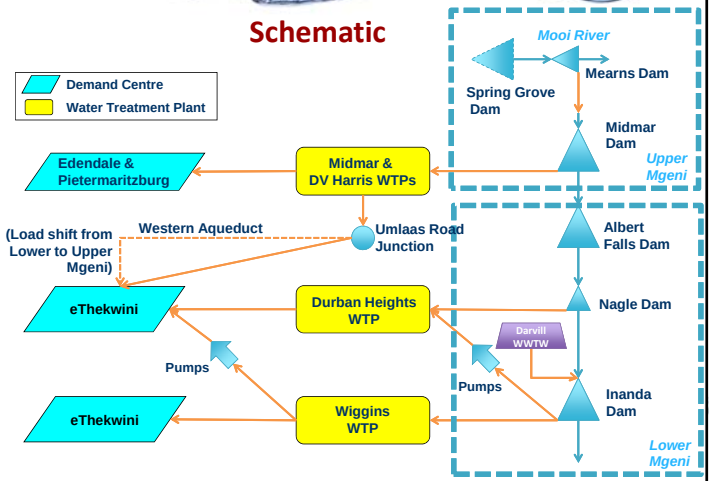
Schematic



Background (1 of 2)

- The impact of the projected load shift from the Lower to the Upper Mgeni System through the implementation of the Western Aqueduct was investigated by the study
- The results showed:
  - Unacceptable risks of failures are experienced in the Upper Mgeni River System
  - The load shift causes an imbalance between the Upper and Lower Mgeni River System
- Some volume of water (less than the requirements) could however be supplied from the Upper Mgeni to the Western Aqueduct without experiencing failures

Background (2 of 2)

- The volume that could be supplied from the Upper Mgeni to the Western Aqueduct will change over time (growth in demands in the Upper Mgeni System, starting storage conditons, etc.)
- Umgeni Water commissioned study: Development of an Allocation Tool for the Short-Term Operating of Load Shift from the Lower to the Upper Mgeni River System

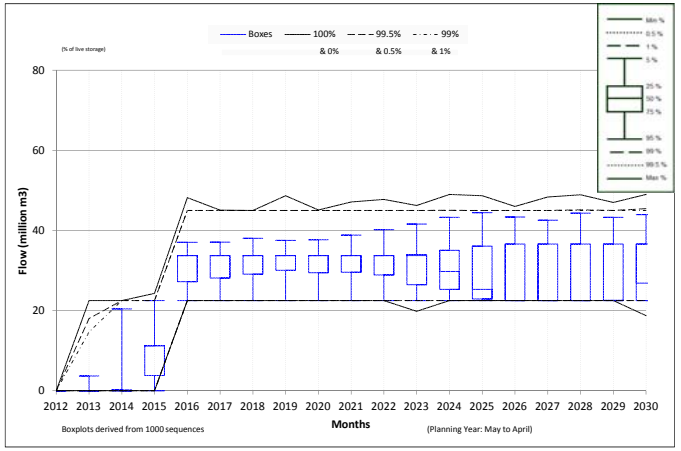
Criteria

- Analysis conducted using the WRPM
- WRPM configured to represent current conditions i.e.
- The allowable draw down risk/probability of Midmar Dam was considered for the following levels (99.5% assurance of supply criteria):
  1. Midmar Dam drawn down to the lowest level without failing
  2. Midmar Dam drawn down to a level where sufficient storage remains to supply the Upper Mgeni demand centres for 3 months
  3. Midmar Dam is drawn down to a level where sufficient storage remains to supply the Upper Mgeni demand centres for 6 months

Criteria

- Analysis conducted using the WRPM
- WRPM configured to represent current conditions
- The allowable draw down risk/probability of Midmar Dam was considered for the following levels (99.5% assurance of supply criteria):
  1. Midmar Dam drawn down to the lowest level without failing
  2. Midmar Dam drawn down to a level where sufficient storage remains to supply the Upper Mgeni demand centres for 3 months
  3. Midmar Dam is drawn down to a level where sufficient storage remains to supply the Upper Mgeni demand centres for 6 months

Results (1 of 3)



Results (2 of 3)

- Load shift from Lower to Upper Mgeni System results in higher storage levels and in turn higher spills in the Lower Mgeni System (Inanda Dam)
- The risk of curtailments/restrictions for two scenarios (excluding and including load shift) were compared

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Results (3 of 3)

Difference in Annual Average Demand Supplied for two Scenarios (million m^3/a)	Exceedance Probability
-6.153	100%
-4.313	99%
-3.477	95%
-2.335	75%
-1.581	50%
-0.742	25%
0.515	5%
1.592	1%
2.642	0%

Conclusion

- According to the selected criteria a minimum load shift volume of 22.5 million m^3/a (62 Ml/day) can be supplied to the Western Aqueduct, up to a maximum of about 45 million m^3/a (123 Ml/day)
- Load shift has a slight impact on the risk of curtailments/ restrictions
- The rule used in the configuration to generate the presented results will be used to determine the acceptable load shift volume on an annual basis

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