

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

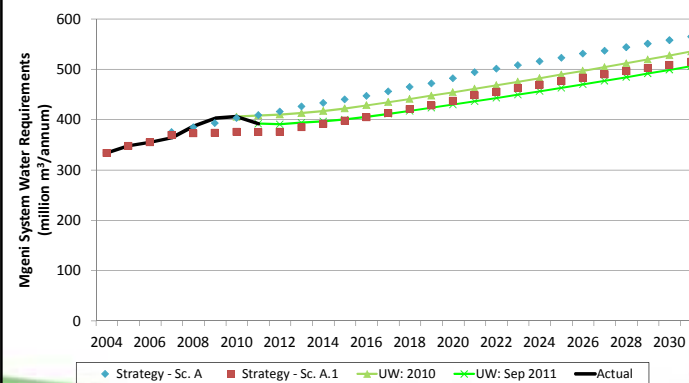
5. STATUS AND RECAP SINCE THE THIRD MEETING

Water requirement projections
Scenario definition
Risk analysis scenario results

14 March 2012



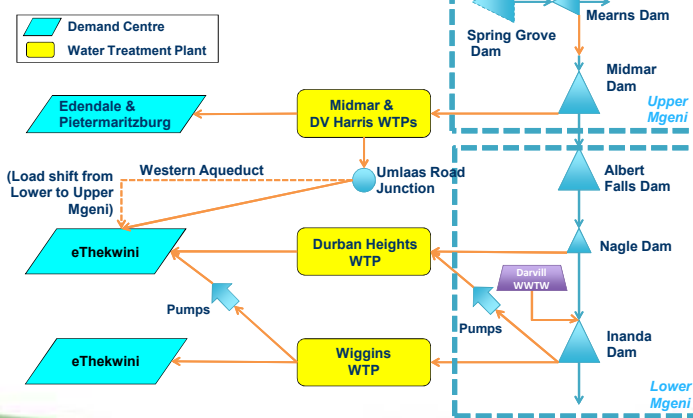
Water Requirement Scenarios



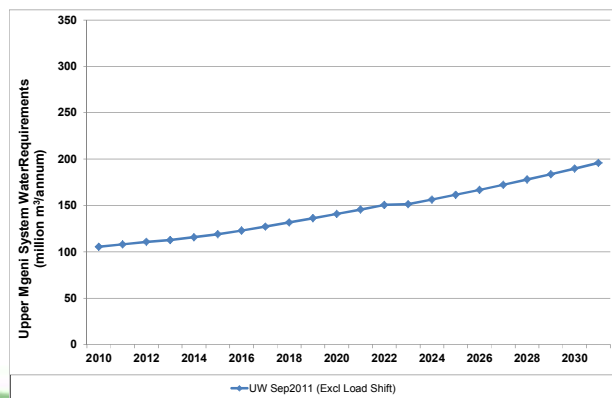
Scenario Description

Scenarios	Description	Purpose
Verification	March 2011 Water Requirements.	Verify WRPM against previous results (May 2011 Annual Operating Analysis. UW)
1	September 2011 Requirements. Spring Grove Dam: • 1 st Impounding May 2014. • MMTS Phase 2B delivery May 2015.	Projected risk of restriction with Mooi-Mgeni Transfer Scheme Implemented.
2	Scenario 1 with: eThekweni Direct Re-use (41 million m ³ /annum, Water Delivery May 2016)	Evaluate projected risk of restrictions against criteria & serve as reference to compare implications of load shift scenario.
3 (preliminary results)	Scenario 2 with: • Darvill Re-use (21.9 mill. m ³ /a, Delivery 2014). • Implementation of Western Aqueduct with load shift scenario of eThekweni.	Compare system behaviour against Scenario 2.

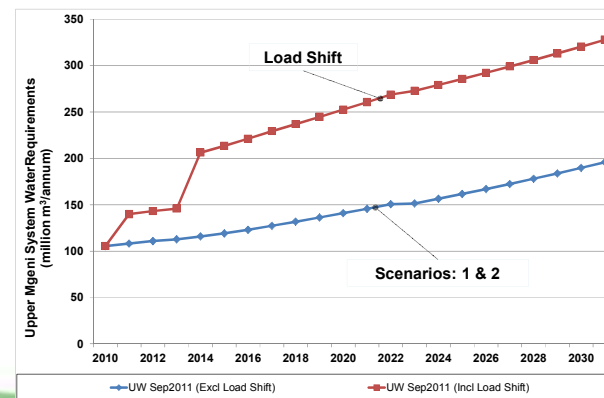
Schematic



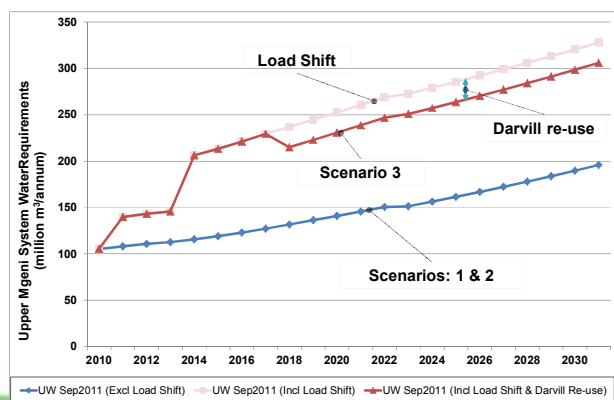
Upper Mgeni Water Requirements (Scenarios 1 and 2)



Upper Mgeni Water Requirements

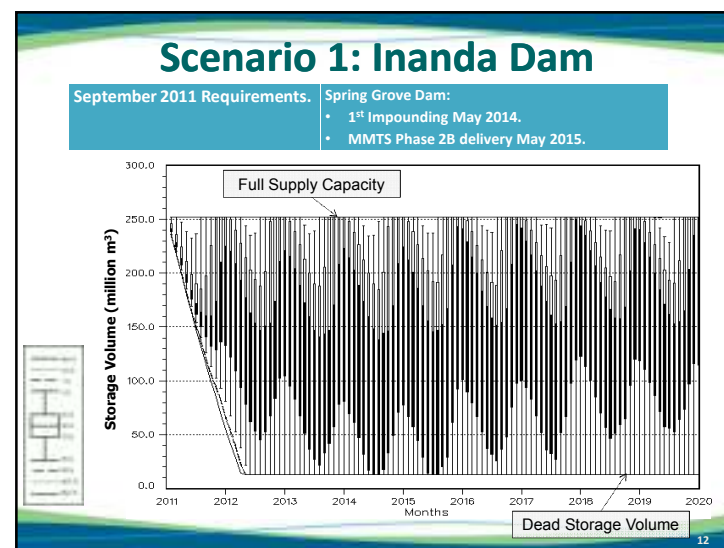
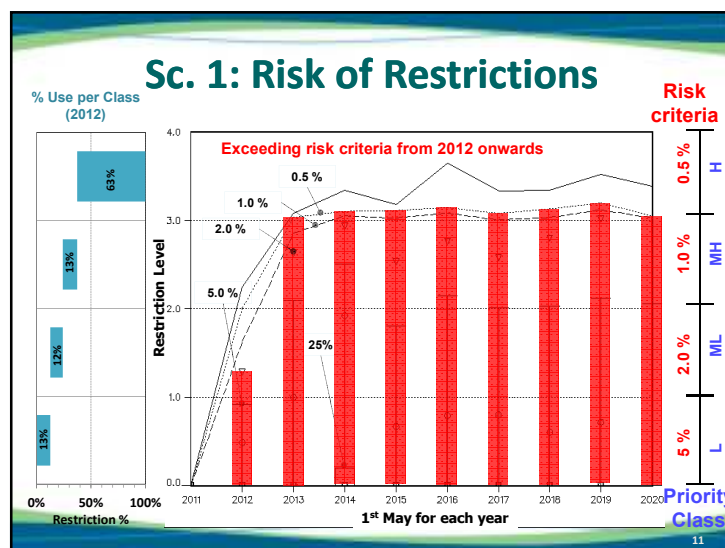
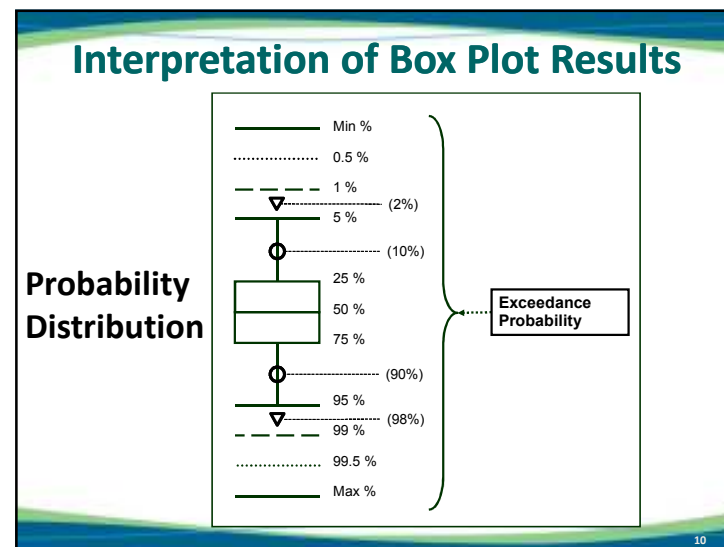
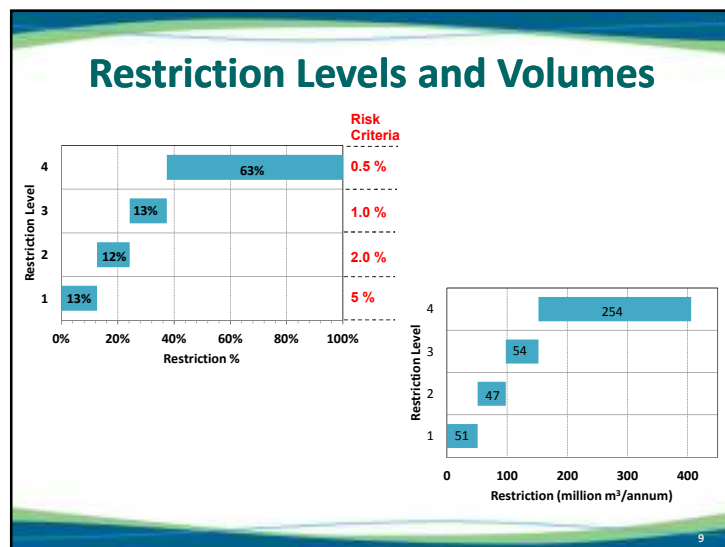


Upper Mgeni Water Requirements



User Priority Classification

User group	User Priority Classes			
	High (99.5% reliability)	Medium High (99% reliability)	Medium Low (98% reliability)	Low (95% reliability)
Urban Industrial	63 %	13 %	12 %	12 %
Mgeni Dam compensation releases	50 %	25 %	-	25 %
Industrial effluent re-use	70 %	25%	-	5%
Irrigation from dams	5 %	25 %	-	70 %
Restriction level	4	3	2	1

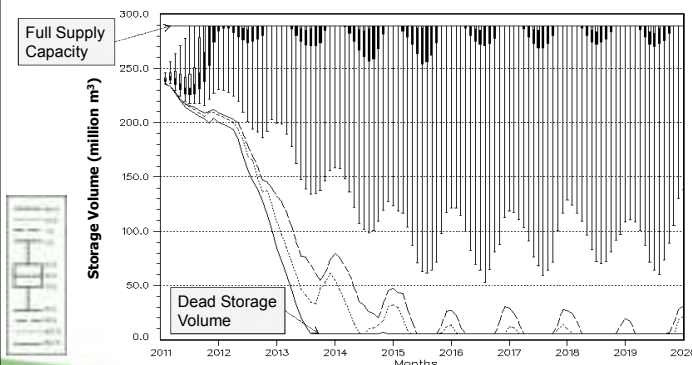


Scenario 1: Albert Falls Dam

September 2011 Requirements.

Spring Grove Dam:

- 1st Impounding May 2014.
- MMTS Phase 2B delivery May 2015.



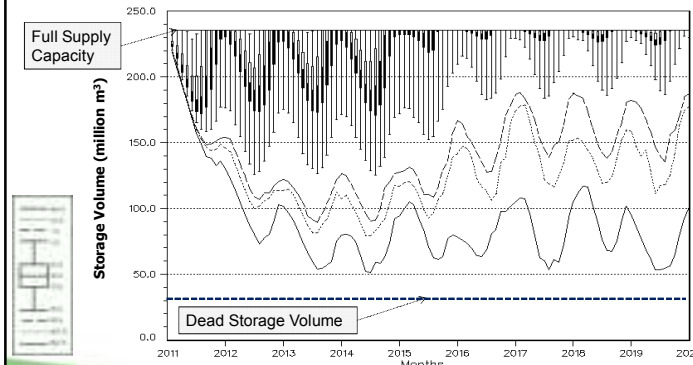
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Scenario 1: Midmar Dam

September 2011 Requirements.

Spring Grove Dam:

- 1st Impounding May 2014.
- MMTS Phase 2B delivery May 2015.



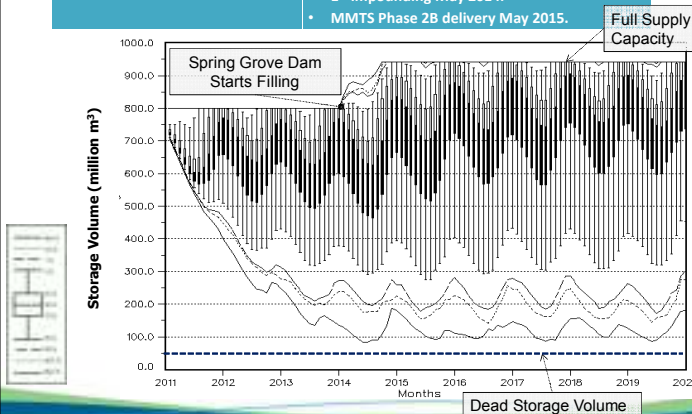
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Scenario 1: Total System Storage

September 2011 Requirements.

Spring Grove Dam:

- 1st Impounding May 2014.
- MMTS Phase 2B delivery May 2015.

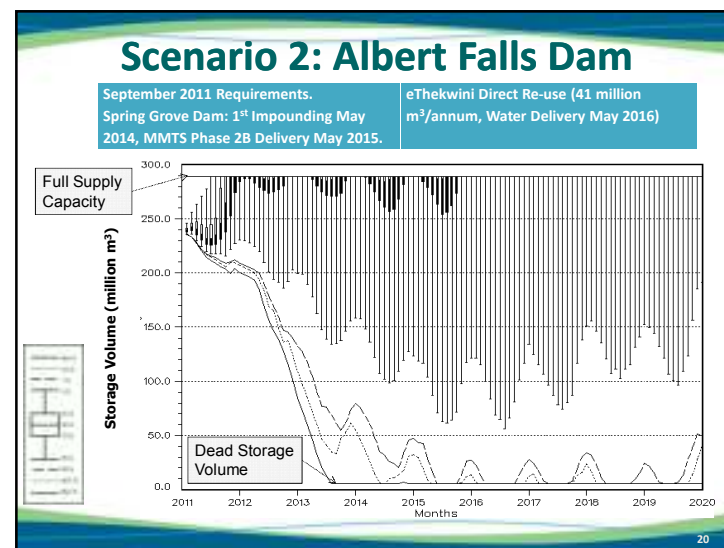
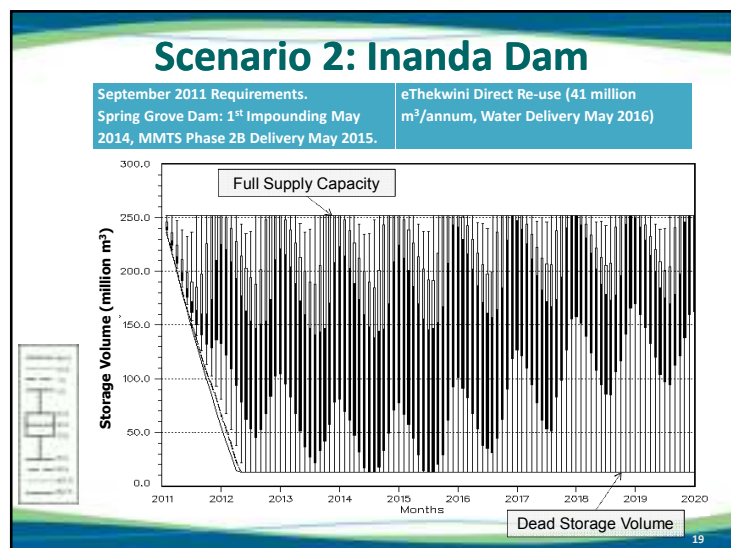
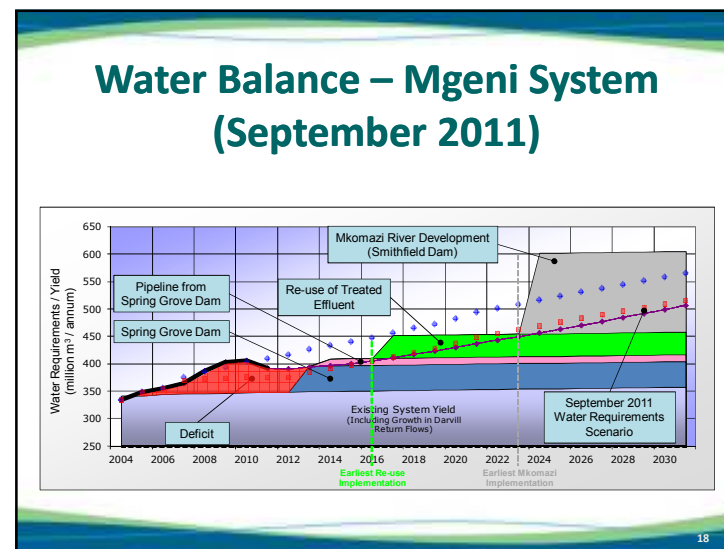
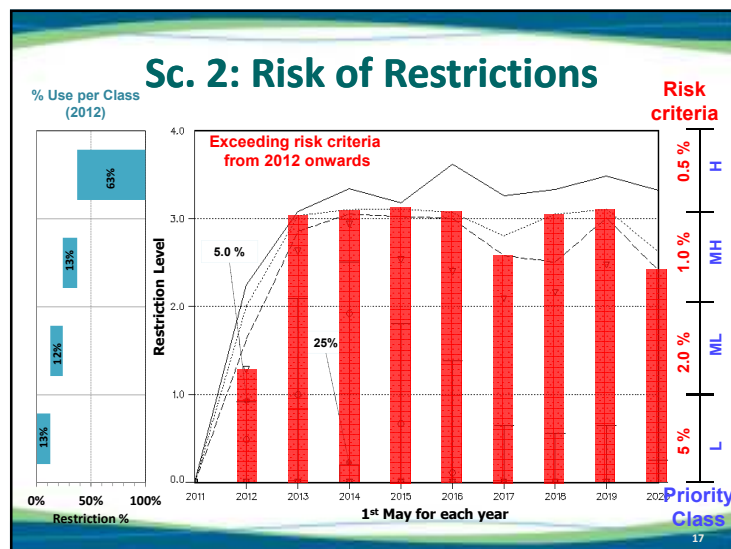


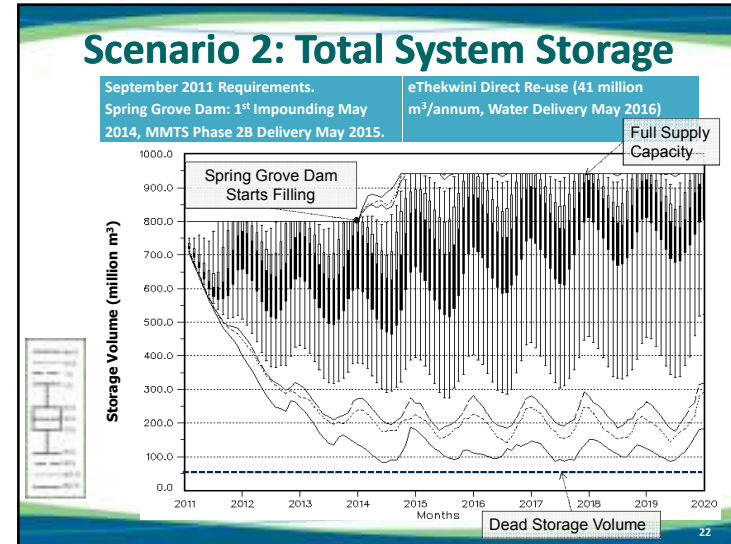
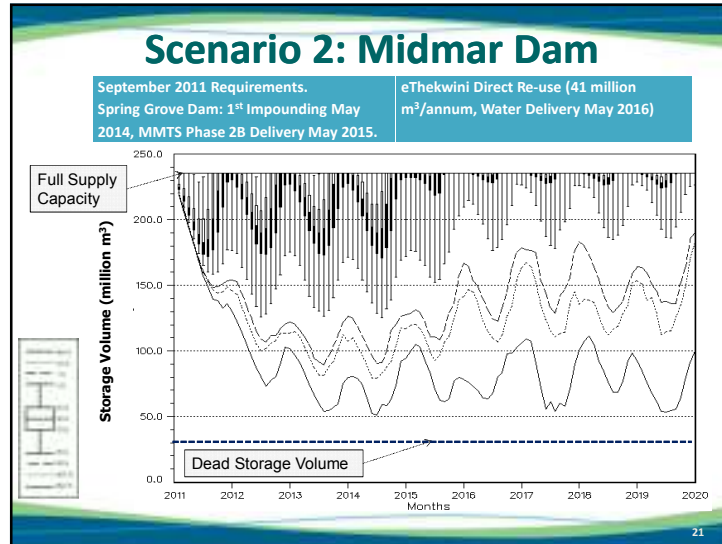
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Scenario Description

Scenarios	Description	Purpose
1	March 2011 Water Requirements.	Verify WTRM against previous results (May 2011 Water Operating Analysis UWI)
1	September 2011 Requirements.	Projected risk of restriction with Mool- Mgeal Transfer Scheme Implemented
2	Scenario 1 with: eThekweni Direct Re-use (41 million m³/annum, Water Delivery May 2016)	Evaluate projected risk of restrictions against criteria & serve as reference to compare implications of load shift scenario.
2	Scenario 2 with: • Direct Re-use (21.9 mill. m³/a, Delivery 2014) • Implementation of Western Aqueduct with load shift scenario of eThekweni.	Compare system behaviour against Scenario 2.

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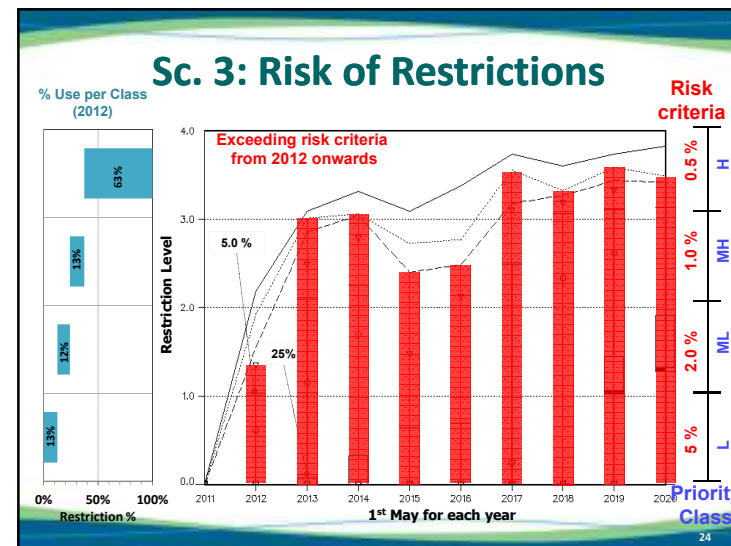




Scenario Description

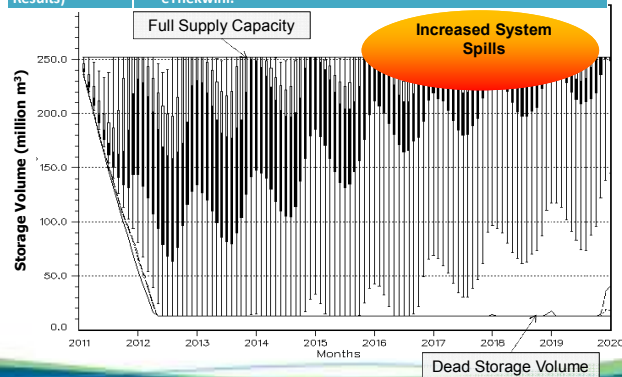
Scenarios	Description	Purpose
1	March 2011 Water Requirements.	Verify WRPM against previous results (May 2011 Annual Operating Analysis, UWR)
2	September 2011 Requirements. Spring Grove Dam: • 1 st Impounding May 2014. • MMTS Phase 2B Delivery May 2015. Scenario 1 with: eThekweni Direct Re-use (41 million m ³ /annum, Water Delivery May 2016)	Projected risk of restriction with Mool- Mgeol transfer scheme implemented. Evaluate projected risk of restrictions against criteria & serve as reference to compare implications of load shift scenario.
3 (preliminary results)	Scenario 2 with: • Darvill Re-use (21.9 mill. m ³ /a, Delivery 2014). • Implementation of Western Aqueduct with load shift scenario of eThekweni.	Compare system behaviour against Scenario 2.

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Scenario 3: Inanda Dam

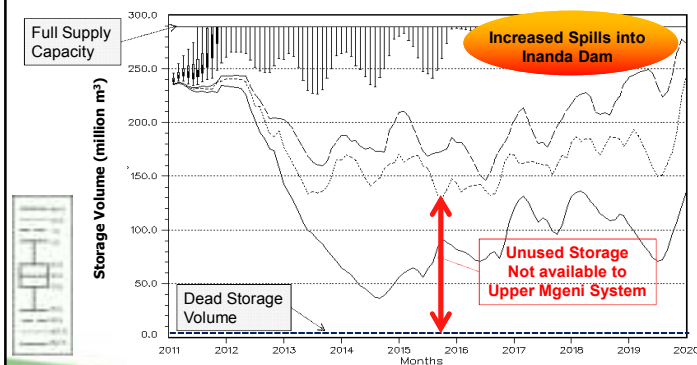
- Scenario 2 with:
(Preliminary Results)
- Darvill Re-use (21.9 mill. m³/a, Delivery 2014).
 - Implementation of Western Aqueduct with load shift scenario of eThekweni.



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Scenario 3: Albert Falls Dam

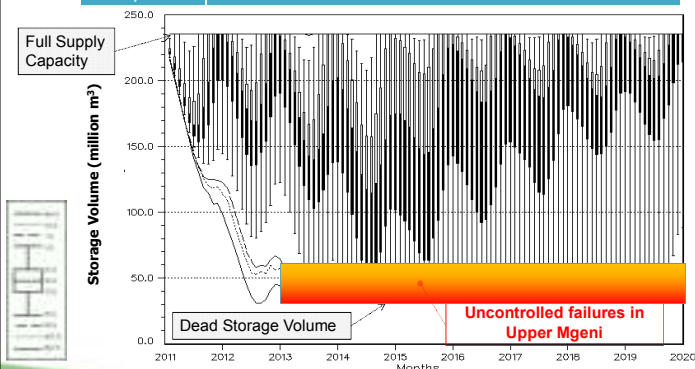
- Scenario 2 with:
(Preliminary Results)
- Darvill Re-use (21.9 mill. m³/a, Delivery 2014).
 - Implementation of Western Aqueduct with load shift scenario of eThekweni.



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Scenario 3: Midmar Dam

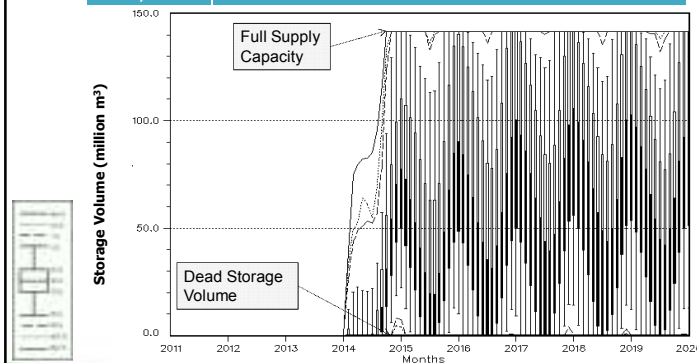
- Scenario 2 with:
(Preliminary Results)
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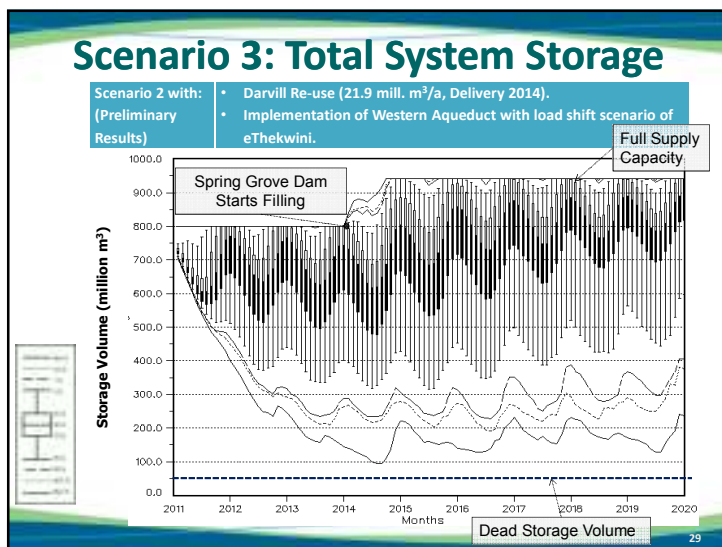
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Scenario 3: Spring Grove Dam

- Scenario 2 with:
(Preliminary Results)
- Darvill Re-use (21.9 mill. m³/a, Delivery 2014).
 - Implementation of Western Aqueduct with load shift scenario of eThekweni.



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Conclusions

- Direct Re-use (Sc. 2 vs. Sc. 1) reduces risk of restrictions, however, criteria violated until the year 2020.
- The particular load shift scenario (Sc. 3) causes imbalance between Upper and Lower Mgeni System.
- Unacceptable uncontrolled failures occurs with both Midmar and Spring Grove dams depleted for Scenario 3 at >95% exceedance probability.

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Recommendations

- Re-run Scenario 3 with revised assumptions.
- Determine load shift scenarios that will:
 - Achieve balanced restrictions of Upper and Lower Mgeni systems.
 - Prevent uncontrolled failures in Upper Mgeni System (at 99.5% exceedance probability level ?)
- Extend the WRPM analysis period up to the year 2040.
- Supplement annual balance diagrams with risk analysis – simulation analysis with the WRPM.

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Thank You

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