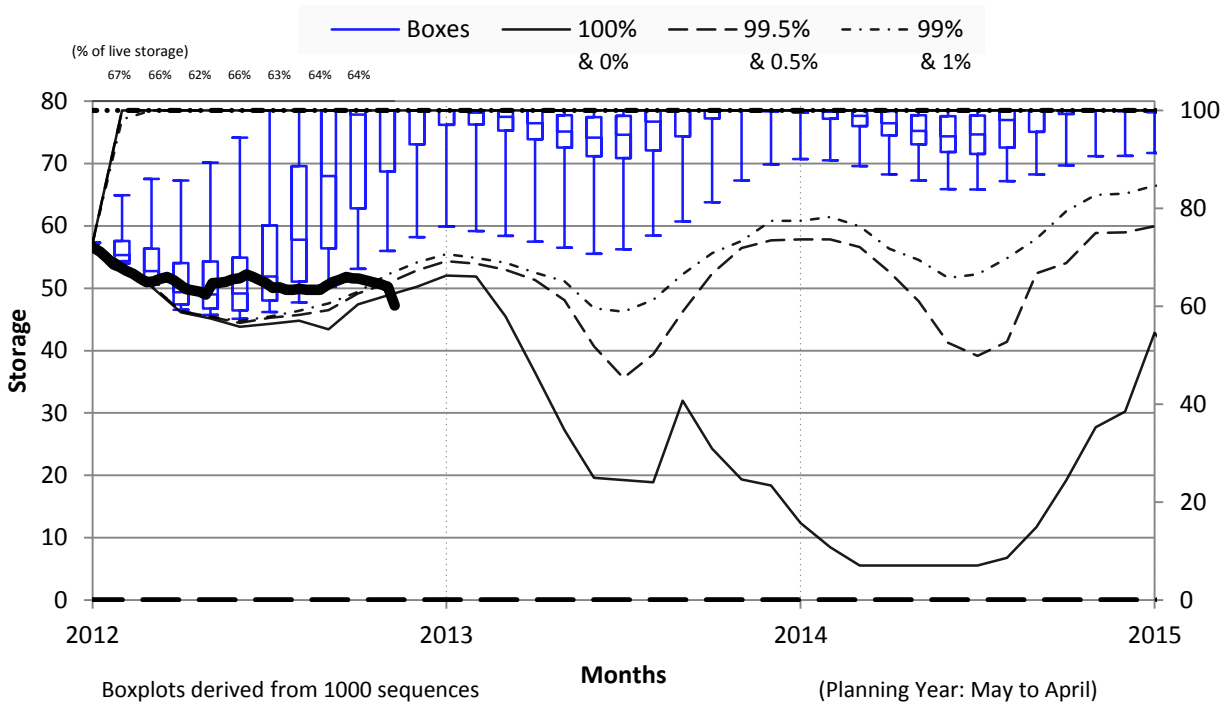


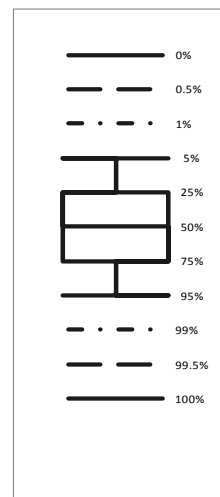
## Nooitgedacht Dam Scenario 4 (VT12E01)



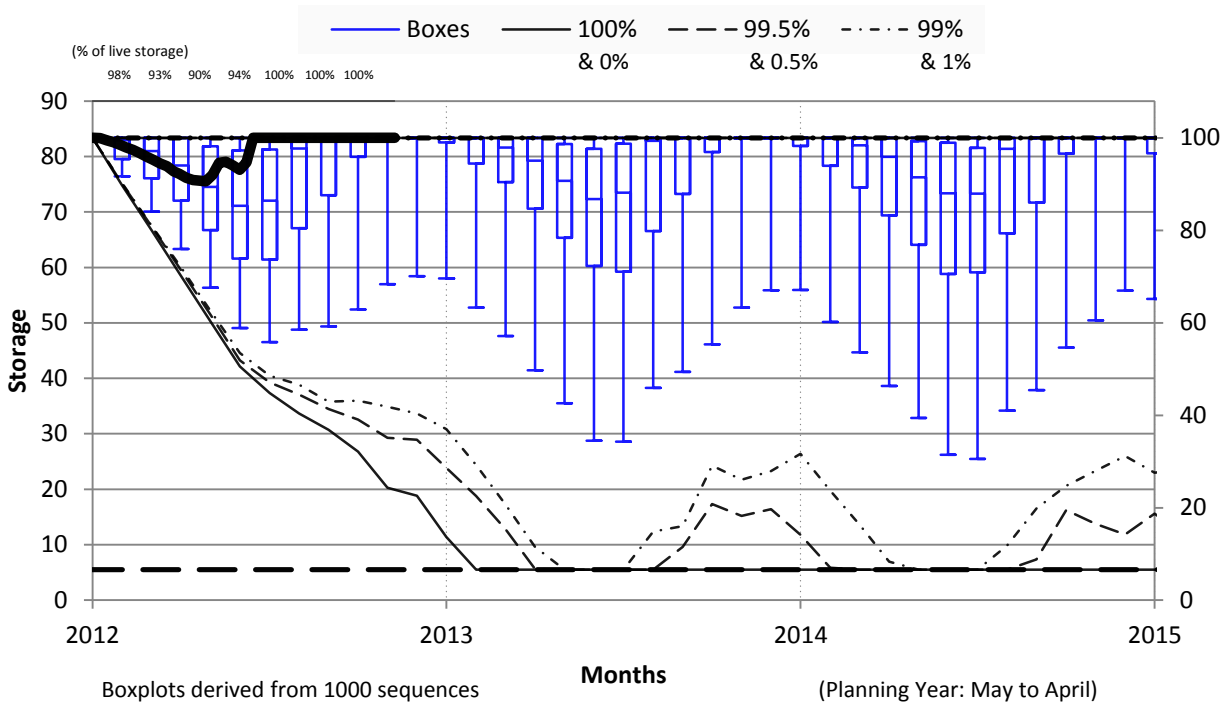
### Comments

- 1 Although transfers through the Usutu-Komati link commenced one month sooner than simulated, actual transfers up to the end of Oct 2012 are 4 million m<sup>3</sup> less than the cumulative target transfers for the same period causing actual storage levels to be lower.
- 2 Actual storage levels followed the worst sequence trajectory up to the end of June 2012.
- 3 During Jul, Aug and Sep 2012 actual storage levels were above the projected median levels.
- 4 On 12 Nov 2012 the actual storage was at about 64% of the FSC and just below the projected median storage level.
- 5 On 11 Feb 2013 the actual storage was at about 66% of the FSC and below the projected
- 6 On 18 March 2013, actual storage is at 60.21%, this is below the "worst" projected sequence. Transfers from Jericho to Nooitgedacht have decreased from 0.874 m<sup>3</sup>/s in Jan 2013 to 0.868 m<sup>3</sup>/s in Feb 2013 and is below the monthly target of 1.331 m<sup>3</sup>/s. Transfers from Nooitgedacht to Klipfontein have also increased from 0.735 m<sup>3</sup>/s in Jan 2013 to 0.935 m<sup>3</sup>/s in Feb 2013 but is slightly below the monthly target of 1.06 m<sup>3</sup>/s.

95% probability level. At end Jan 2013 only 31% of the target volume had been transferred from the Usutu to Nooitgedacht Dam.

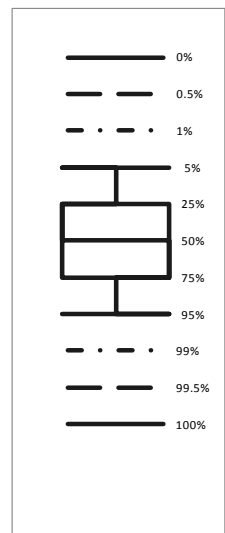


## Vygeboom Dam Scenario 4 (VT12E01)

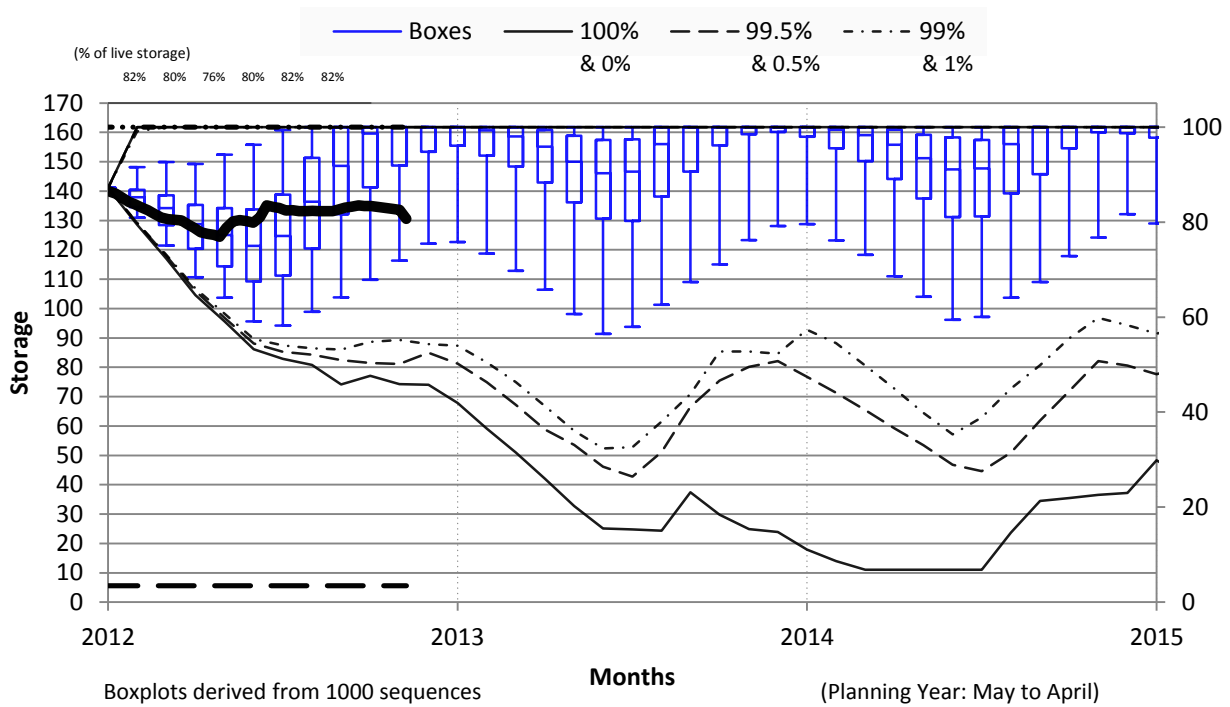


### Comments

- 1 The dam was at 93% at end of July 2012 and below the projected median storage level.
- 2 Although abstractions from the dam were made at the maximum capacity of conveyance infrastructure actual storage remained above the projected median level since Aug 2012.
- 3 Actual storage in the dam reached the 100% FSC level on 22 Oct 2012.
- 4 Although pumping from Vygeboom occurred at max capacity, the dam was still at its FSC level on 11 Feb 2013.
- 5 On 18 March 2013, Vygeboom is still at FSC, yet the transfer from Vygeboom to Bosloop has decreased from 2.356 m<sup>3</sup>/s in Jan 2013 to 2.175 m<sup>3</sup>/s in Feb 2013, this is below the monthly target of 2.78 m<sup>3</sup>/s.

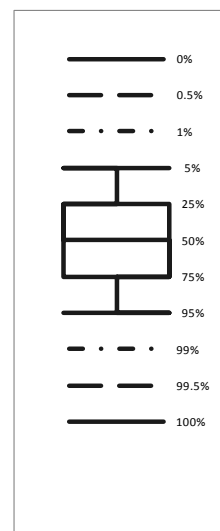


## Komati System Scenario 4 (VT12E01)

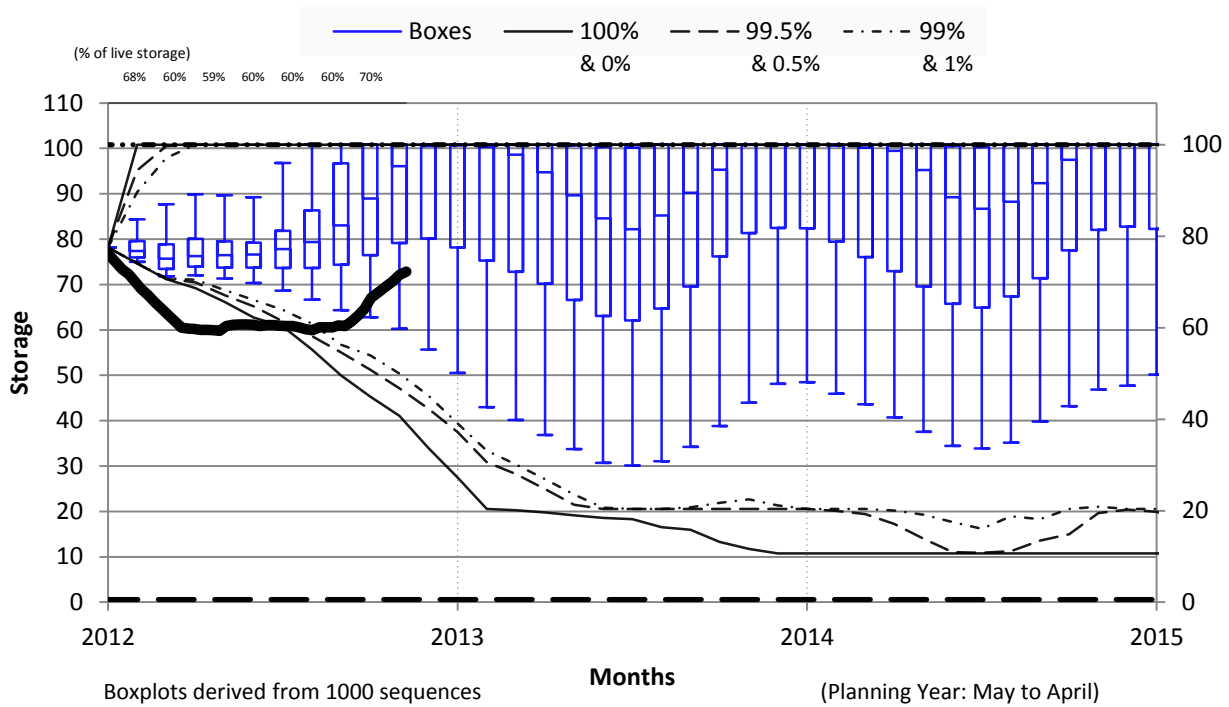


### Comments

- 1 Aactual storage in the Komati sub-system was initially below the projected median storage level, but from end Aug to 12 Nov 2012 it remained above the projected median level.
- 2 On 10 Dec 2012 the system was below the projected median storage level.
- 3 The actual system storage was at 83.4% of its FSC and below the projected 75% probability level on 11 Feb 2013.
- 4 On 18 March 2013, the actual system storage is at 80.7% which is below the median projected storage.

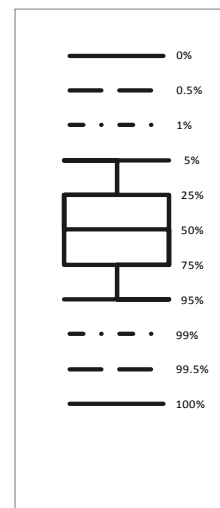


## Morgenstond Dam Scenario 4 (VT12E01)

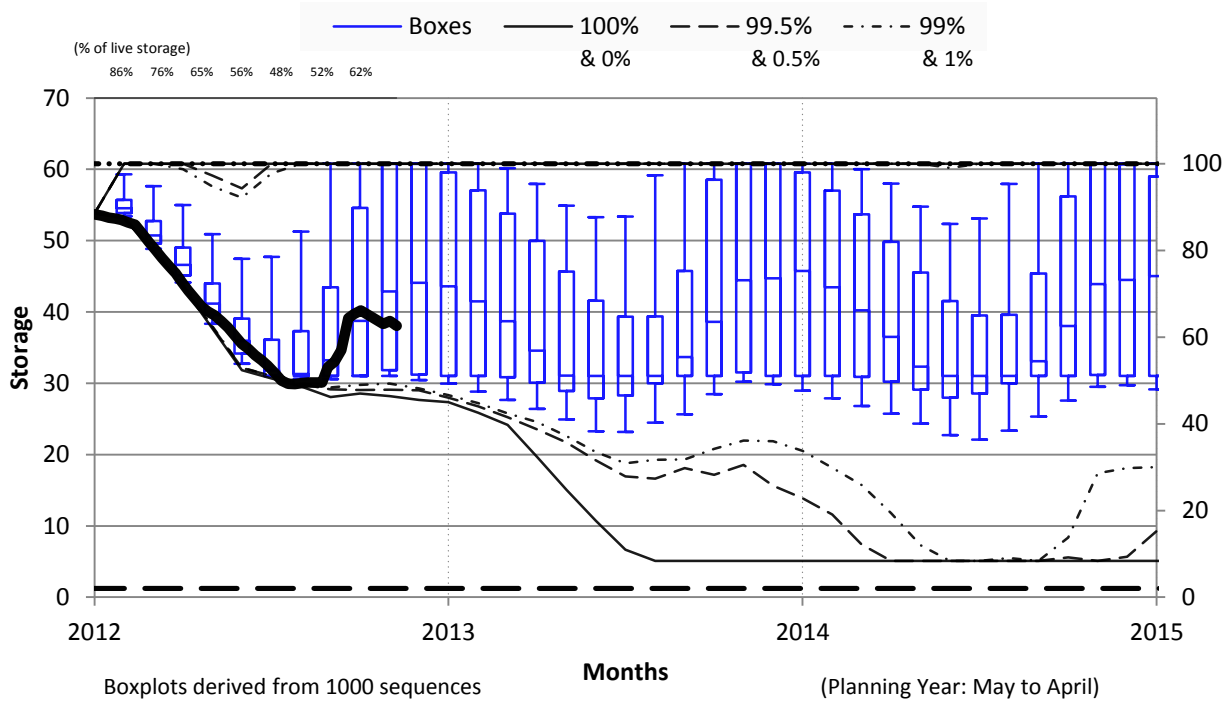


### Comments

- 1 The dam was drawn down below the worst sequence trajectory until end Oct 2012.
- 2 No transfers were made from Morgenstond to Jericho during Aug, Sep and Oct 2012 causing the actual storage to stabilise around 60% of its FSC.
- 3 No transfers were made from Heyshope despite actual storage in Morgenstond being below 80 million m<sup>3</sup> over the monitoring period (i.e. a deviation from operating rule).
- 4 On 12 Nov 2012 the actual storage was just above the projected worst sequence level.
- 5 Transfers from Heyshope commenced during Nov 2012. By end Jan 2013 only 2.77 million m<sup>3</sup> had been transferred causing actual storage to be at 66.7% of its FSC and just above the projected 95% probability level on 11 Feb 2013.
- 6 Actual storage increased from 66.57% in Feb 2013 to 72.28% as of 18 March 2013 but is still below the median projected storage. Increase in storage to to lack of transfer from Morgenstond to Jericho during Feb 2013.

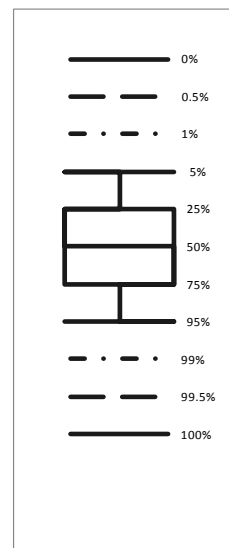


## Westoe Dam Scenario 4 (VT12E01)

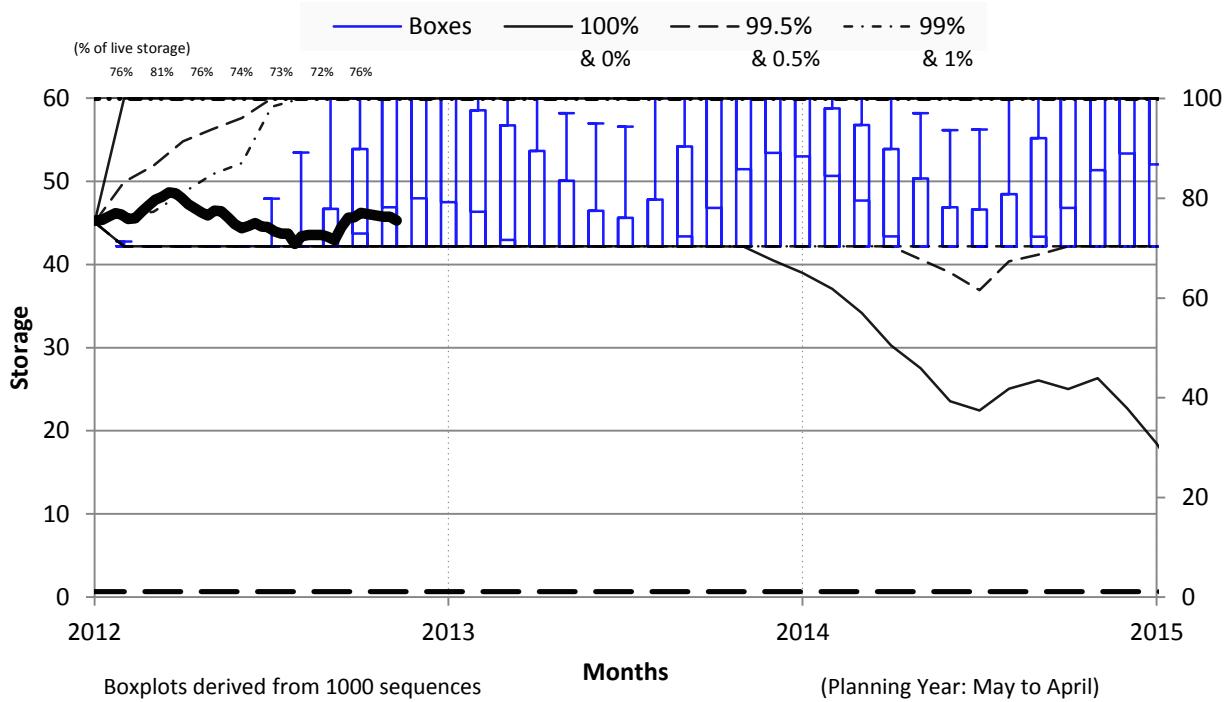


### Comments

- 1 The impact of the outage of the Westoe pipeline in May 2012 followed by the maximum transfers made since June 2012 is reflected in the actual response of the dam.
- 2 Actual storage followed the worst sequence storage trajectory up to the end of Aug 2012.
- 3 On 12 Nov 2012 actual storage was at 52% of the FSC and just below the projected median.
- 4 No transfers were made to Jericho in Dec 2012 as Westoe's storage was below 50%.
- 5 Transfers to Jericho commenced in Jan 2013 and the actual storage level was at 66.2% on 11 Feb 2013.
- 6 On 18 March 2013, actual storage was at 62.62% and below the median projected storage. Transfers from Westoe to Jericho have increased significantly from 0.217 m<sup>3</sup>/s in Jan 2013 to 1.27 m<sup>3</sup>/s in Feb 2013 but is still below the monthly target of 1.62 m<sup>3</sup>/s.

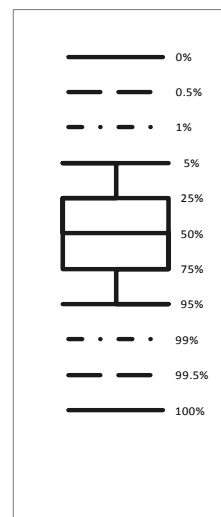


## Jericho Dam Scenario 4 (VT12E01)

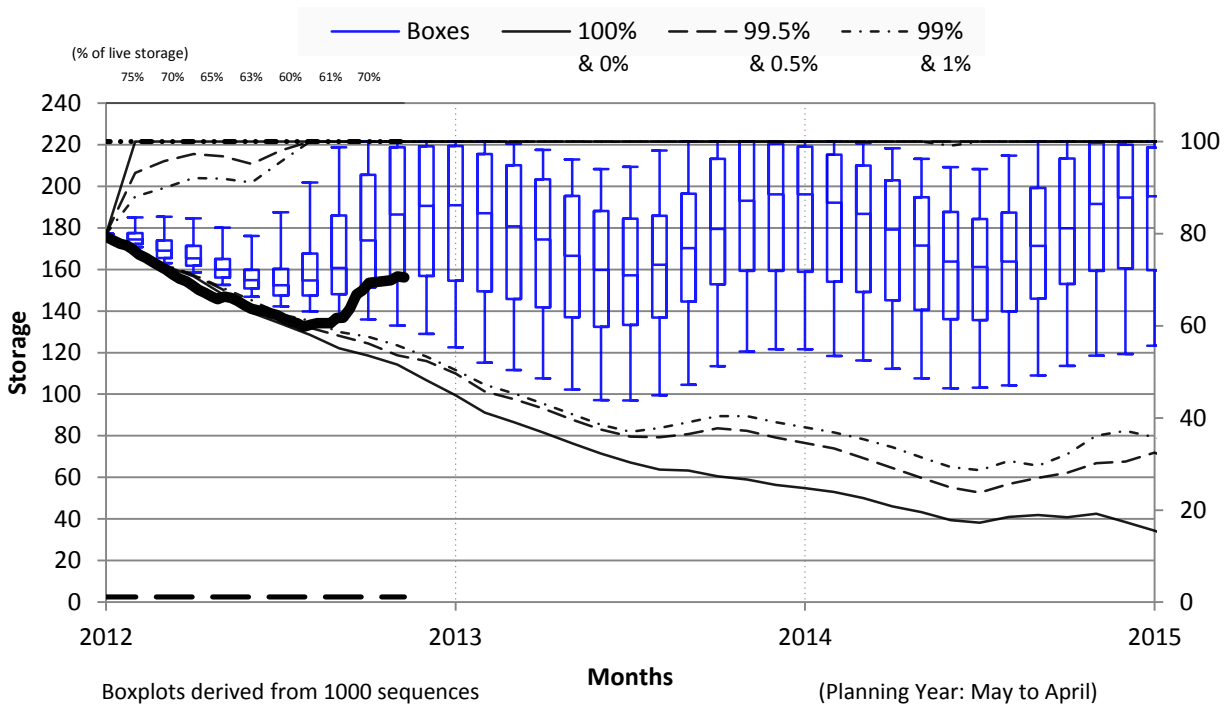


### Comments

- 1 Actual storage in Jericho remained above the Minimum Operating Level (MOL) of 70%.
- 2 On 12 Nov 2012 actual storage was at 73% of the FSC.
- 3 The actual storage was at 77% of its FSC and above the projected median storage level on 11 Feb 2013.
- 4 On 18 March 2013, actual storage was at 75.51% and below the median projected storage. Transfers from Jericho to Onverwacht have increased from 2.37 m<sup>3</sup>/s in Jan 2013 to 2.67 m<sup>3</sup>/s in Feb 2013 which is slightly below the monthly target of 2.85 m<sup>3</sup>/s. Transfers from Jericho to Nooitgedacht are similar at 0.87 m<sup>3</sup>/s for both Jan and Feb 2013 but is below the monthly target of 1.331 m<sup>3</sup>/s.

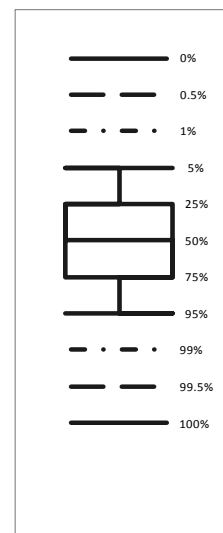


## Usutu System Scenario 4 (VT12E01)

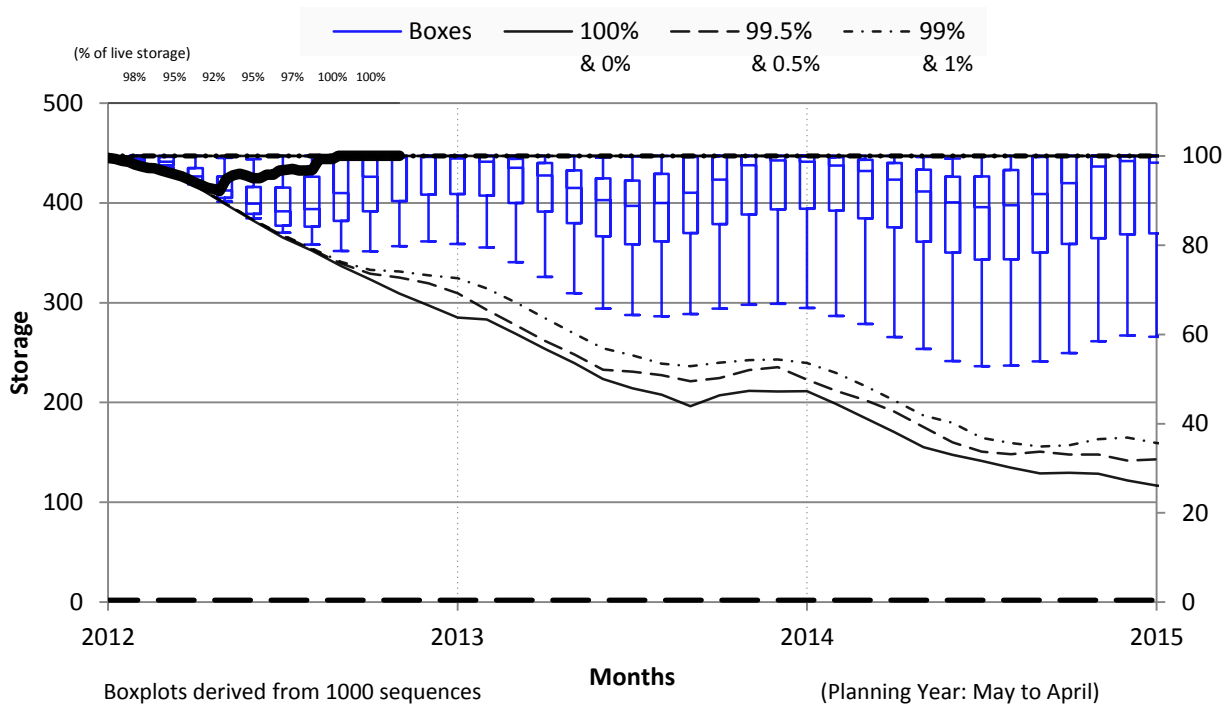


### Comments

- 1 Between end June 2012 and end Aug 2012 actual storage in the sub-system followed the worst sequence storage trajectory.
- 2 The actual response of the sub-system is lower than simulated due to the fact that no transfers were made from Heyshope to Morgenstond (a cumulative amount of about 18 million m<sup>3</sup> should have been made up to the end of Oct 2012).
- 3 On 12 Nov 2012 actual storage in the sub-system was at 62% of the FSC and corresponded to the projected 99.5% exceedance probability level.
- 4 The actual system storage was at 69.3% on 11 Feb 2013.
- 5 On 18 March 2013, actual storage was at 70.15% which is below the projected median storage

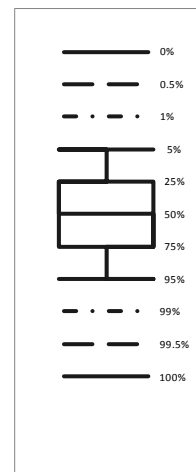


## Heyshope Dam Scenario 4 (VT12E01)



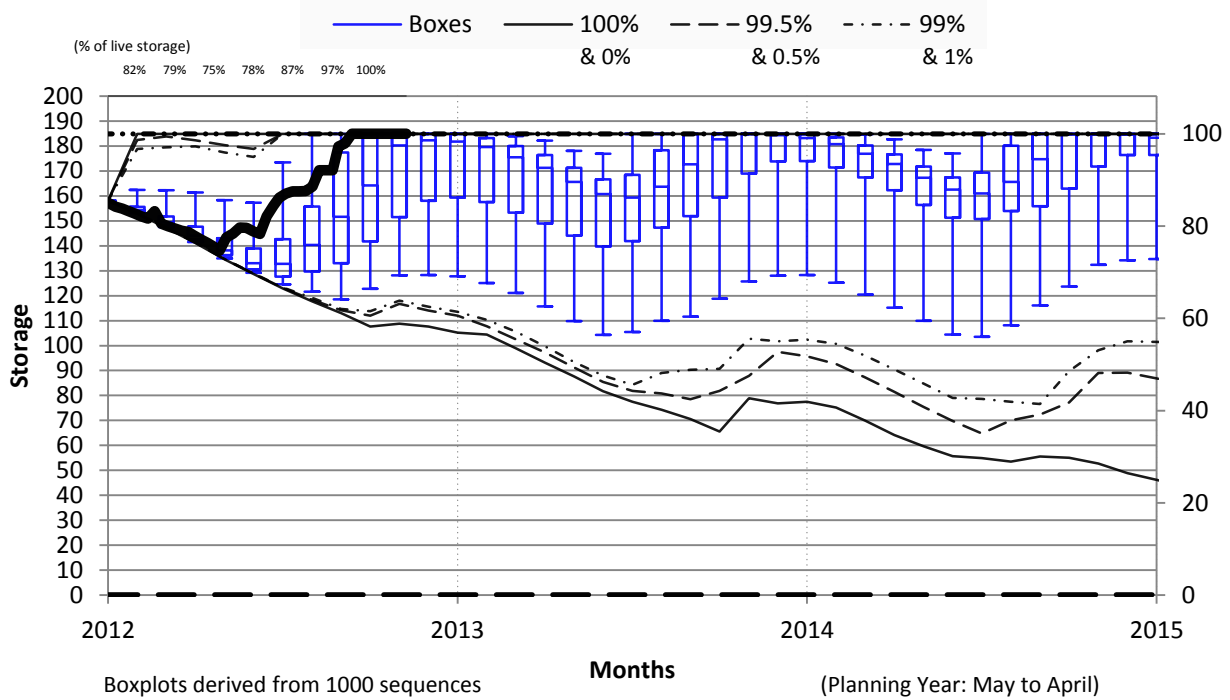
### Comments

- 1 Actual storage levels followed the projected worst sequence trajectory until end of Jul 2012.
- 2 Over the period Aug 2012 to Oct 2012 actual storage was above the projected median level.
- 3 A total of 23.6 million m<sup>3</sup> was transferred to Grootdraai Dam from 1 May 2012 to 31 Oct 2012.
- 4 On 12 Nov 2012 actual storage in Heyshope was at 97% of its FSC.
- 5 On 10 Dec 2012 actual storage was at 97%. The dam had to be monitored closely and transfers made to reduce the risk of the dam spilling (i.e. water being lost from the system).
- 6 From 7 Jan 2013 to 11 Feb 2013 actual storage remained at 100% of the FSC.
- 7 Heyshope Dam has been at FSC since the 7th of Jan 2013 till current (11 March 2013). Transfers from Heyshope to Morgenstond have decreased from 0.302 m<sup>3</sup>/s in Jan 2013 to 0.056 m<sup>3</sup>/s in Feb 2013 which is below the monthly target of 1.4 m<sup>3</sup>/s. The transfer from Heyshope to Grootdraai has also decreased from 1.625 m<sup>3</sup>/s in Jan 2013 to 1.494 m<sup>3</sup>/s in Feb 2013 which is below the monthly target of 4.28 m<sup>3</sup>/s.



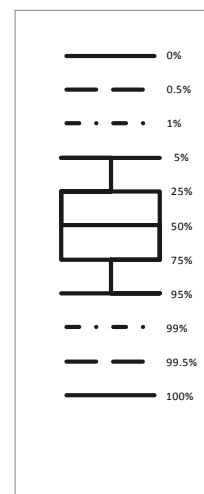


## Zaaihoek Dam Scenario 4 (VT12E01)

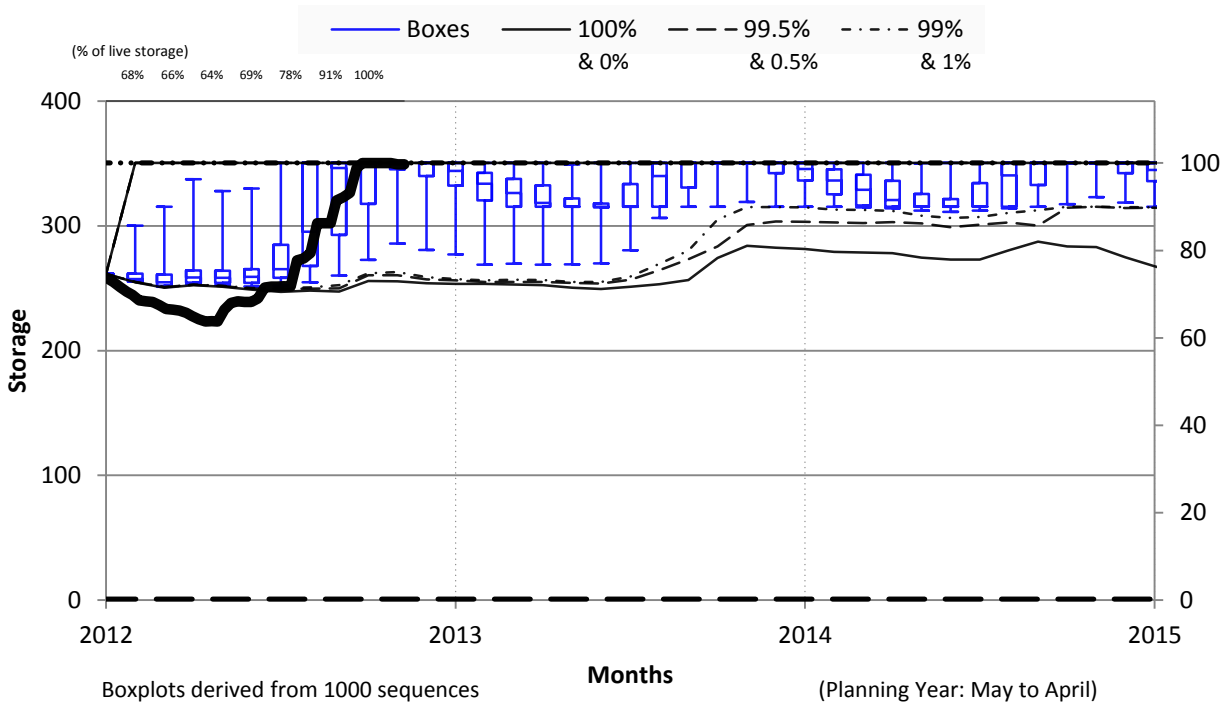


### Comments

- 1 Actual storage levels followed the projected median levels (which were close to the worst sequence storage trajectory) up to the end of August 2012.
- 2 From end Sep to 12 Nov 2012 actual storage was well above the projected median levels.
- 3 On 12 Nov 2012 actual storage was at 87% of the FSC.
- 4 On 14 Jan 2013 actual storage was at 97% of the FSC.
- 5 Actual storage levels remained at 100% of the FSC over the period 21 Jan to 11 Feb 2013.
- 6 Zaaihoek Dam has been at FSC since the 21st of Jan 2013 till current (18 March 2013).  
There has been no transfer from Zaaihoek to Grootdraai Dam since Dec 2012 even though Zaaihoek is spilling.



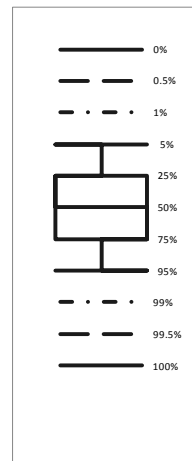
## Grootdraai Dam Scenario 4 (VT12E01)



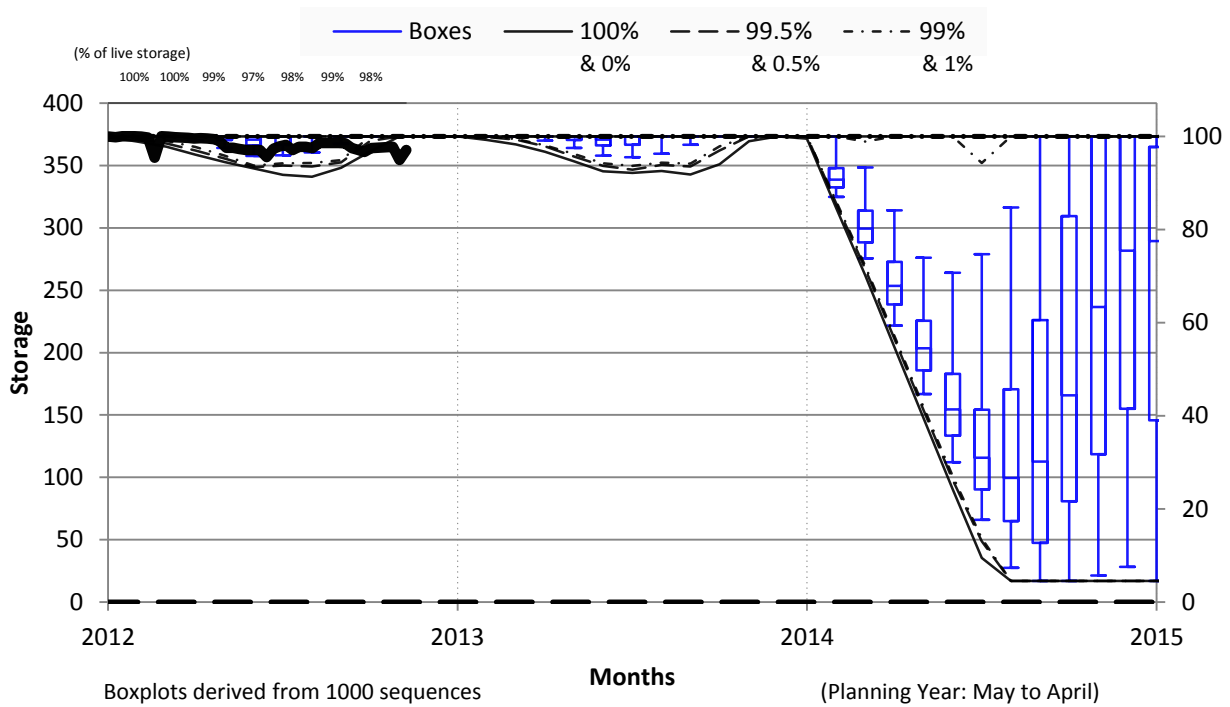
### Comments

- 1 Actual storage in Grootdraai was below the projected worst sequence trajectory until end Sep 2012. This is partly due to more water being abstracted through the Vlakfontein Canal than simulated (deviation from Vlakfontein Canal rehabilitation schedule).
- 2 Since actual storage was below 75% over the period May 2012 to Oct 2012 transfers were required from Heyshope and Zaaihoek. Actual transfers from these dams were not made at maximum transfer rates causing the dam to be at lower levels than simulated.
- 3 On 12 Nov 2012 the actual storage was at 72% of the FSC.
- 4 Although actual storage in Grootdraai was above 75% since 26 Nov 2012, transfers from
- 5 On 18 March 2013, actual storage was at 99.9%. Transfers from Grootdraai to ESKOM have increased from 2.64 m<sup>3</sup>/s in Jan 2013 to 2.79 m<sup>3</sup>/s in Feb 2013 to decrease spills from Grootdraai. Transfers from Grootdraai to the Vlakfontien canal have decreased from 2.76 m<sup>3</sup>/s in Jan 2013 to 0.127 m<sup>3</sup>/s in Feb 2013 which is below the monthly target of 1.07 m<sup>3</sup>/s

Heyshope continued during Dec 2012 and Jan 2013 due to the risk of Heyshope spilling.  
Grootdraai was at 100% of the FSC on 11 Feb 2013.

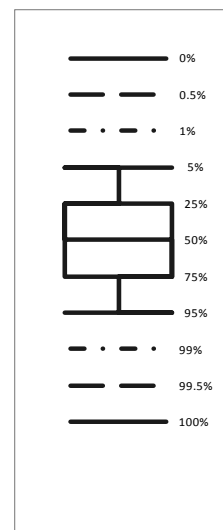


## Woodstock Dam Scenario 4 (VT12E01)

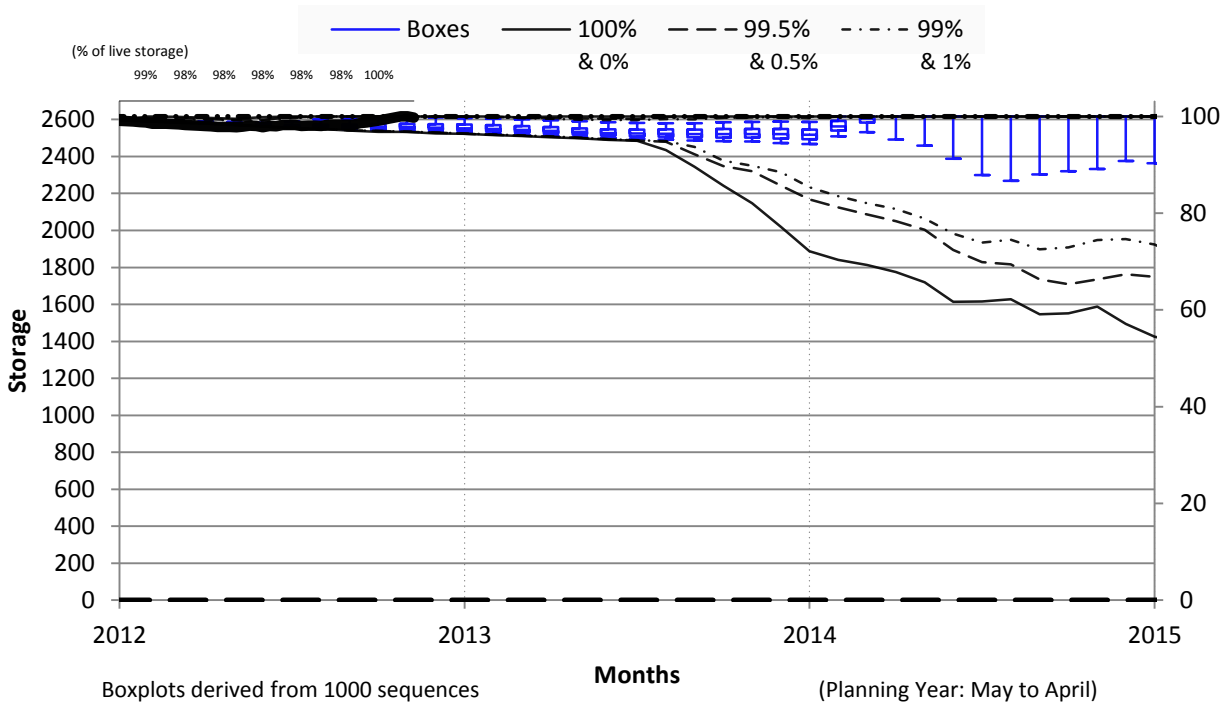


### Comments

- 1 The dam remains at relatively high storage levels as no transfers are made to the Vaal.
- 2 The actual storage levels are in line with the projected storage trajectories.
- 3 Actual storage was at 97.4% of the FSC and just above the projected worst sequence trajectory trajectory on 11 Feb 2013. During Jan 2013 about 10.9 million m<sup>3</sup> was transferred to the Vaal to make up for evaporation losses in Sterkfontein Dam.
- 4 On 18 March 2013, actual storage was at 97.07%.

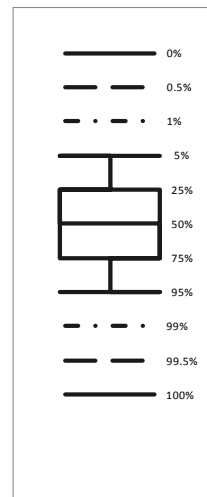


## Sterkfontein Dam Scenario 4 (VT12E01)

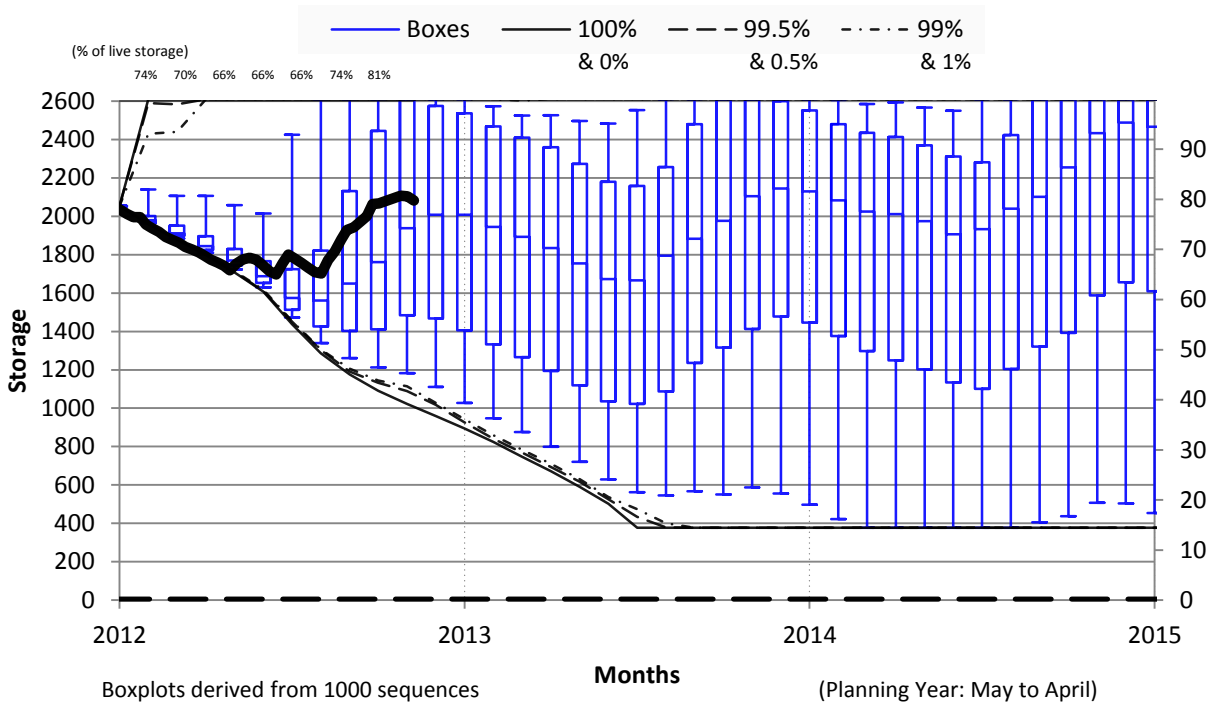


### Comments

- 1 The actual storage levels are in line with the projected storage trajectories up to 12 Nov 2012.
- 2 No transfers were made from the Thukela and no releases were made from the dam.
- 3 The fluctuations in actual storage levels reflect the impact of incremental natural runoff and net evaporation losses from the exposed surface area of the dam.
- 4 On 12 Nov 2012 actual storage was at 98% of the FSC.
- 5 Actual storage levels were increased by transfers from Woodstock in Jan 2013 as well as from incremental runoff. On 11 Feb 2013 the dam was at 99.2% of the FSC and above the projected 25% probability level.
- 6 On 18 March 2013, actual storage was at 99.77%

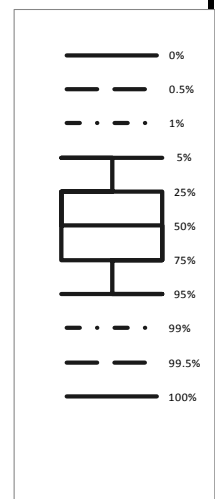


## Vaal Dam Scenario 4 (VT12E01)

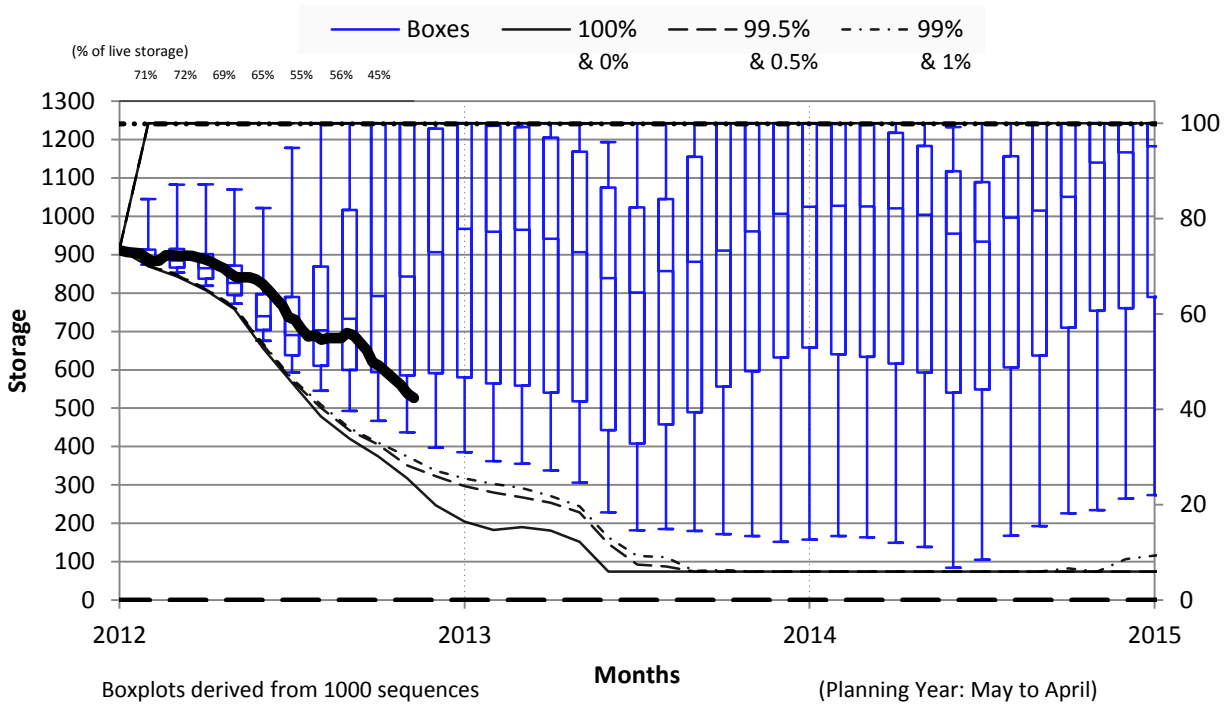


### Comments

- 1 Actual storage levels followed the projected worst sequence levels up to the end of Aug 2012 after which the actual storage remained above the projected median levels until 12 Nov 2012.
- 2 On 12 Nov 2012 actual storage was at 68% of the FSC.
- 3 The actual response of Vaal Dam over the period Oct 2012 to 11 Feb 2013 is influenced by transfers from the LHWP as well as increased incremental runoff due to rainfall.
- 4 On 11 Feb 2013 actual storage was at 79.2% of the FSC.
- 5 On 18 March 2013, actual storage was at 79.77% which is above the median projected storage. Decrease in transfer from Vaal Dam to Knoppiesfontein from 2.97 m<sup>3</sup>/s in Jan 2013 to 2.69 m<sup>3</sup>/s in Feb 2013 and is also below the monthly target of 5.07 m<sup>3</sup>/s.

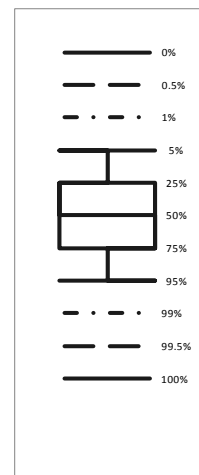


## Bloemhof Dam Scenario 4 (VT12E01)

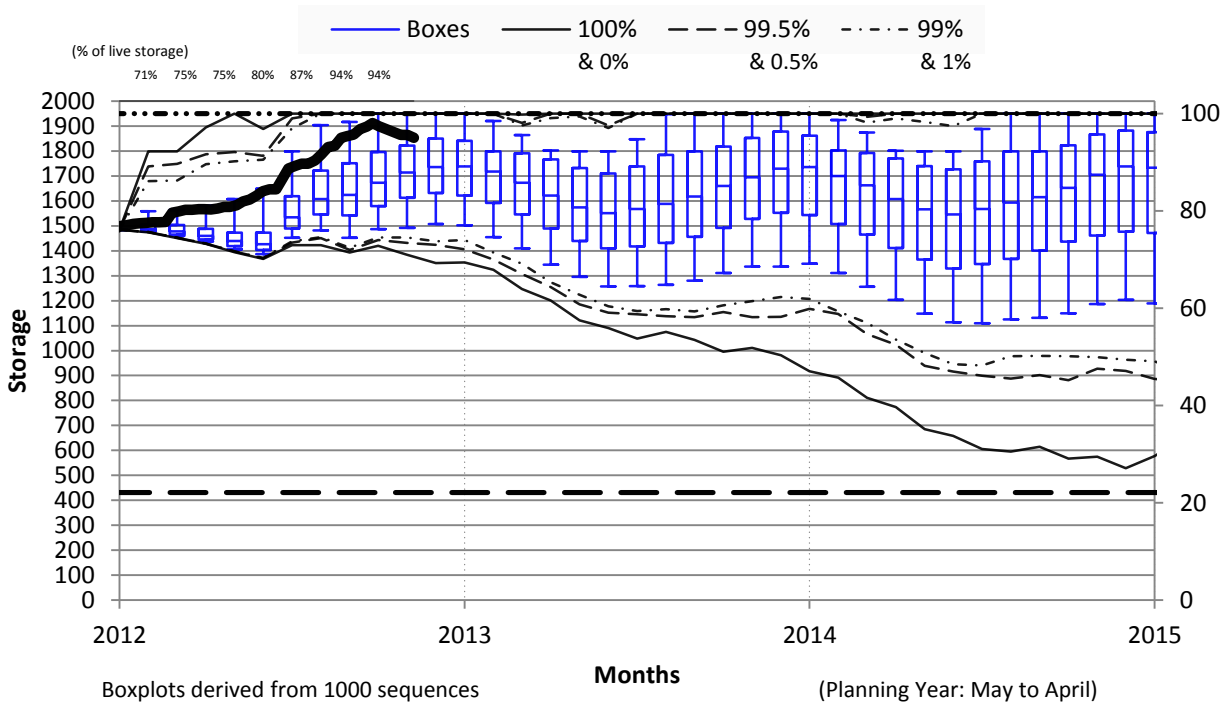


**Comments:**

- 1 From May 2012 to 12 Nov 2012 the actual storage remained above the projected median storage levels.
- 2 On 12 Nov 2012 actual storage was at 59% of the FSC.
- 3 Actual storage was at 49.2% of the FSC and just above the projected 75% probability level on 11 Feb 2013.
- 4 On 18 March 2013, actual storage was at 42.48% which is below the median projected storage

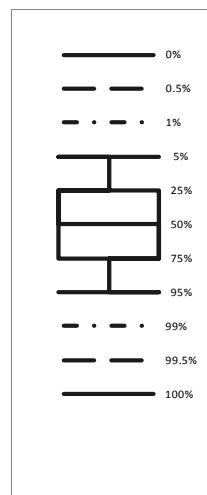


### Katse Dam Scenario 4 (VT12E01)

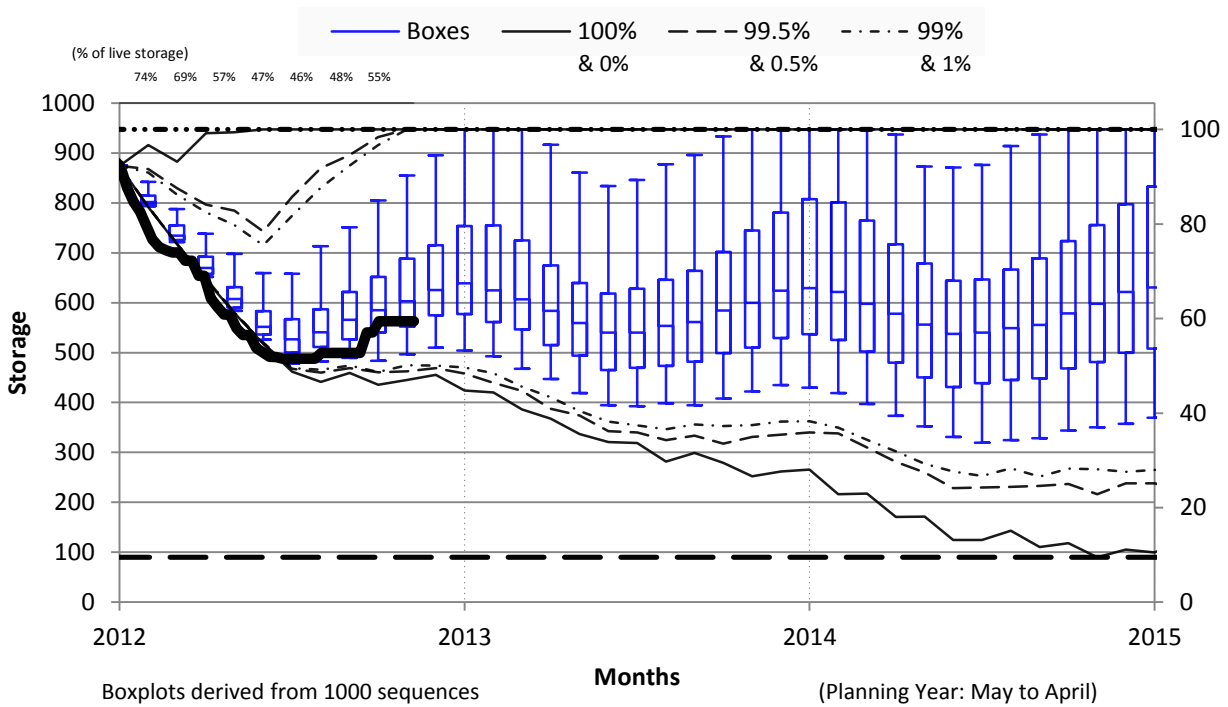


**Comments**

- 1 Actual storage levels did not follow the trend of the projected storage trajectories over the period May 2012 to 11 Feb 2013 with actual storage well above the projected median levels.
- 2 The significant increase in actual storage during Oct and Nov 2012 was due to the Muela station shut down with no water transferred to the RSA (Vaal) during these two months.
- 3 Comparison of actual storage levels of Katse and Mohale dams indicates that the actual operation of the Mohale-Katse transfer tunnel might be different than simulated with more water being transferred to Katse resulting in Katse to be at higher storage levels.
- 4 On 11 Feb 2013 actual storage was at 97.4% of the FSC.
- 5 On 18 March 2013, actual storage was at 95.00% which is above the median projected storage.

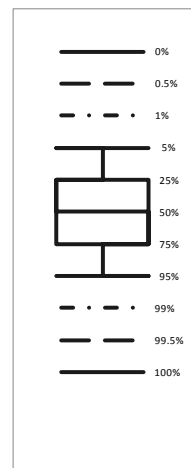


## Mohale Dam Scenario 4 (VT12E01)



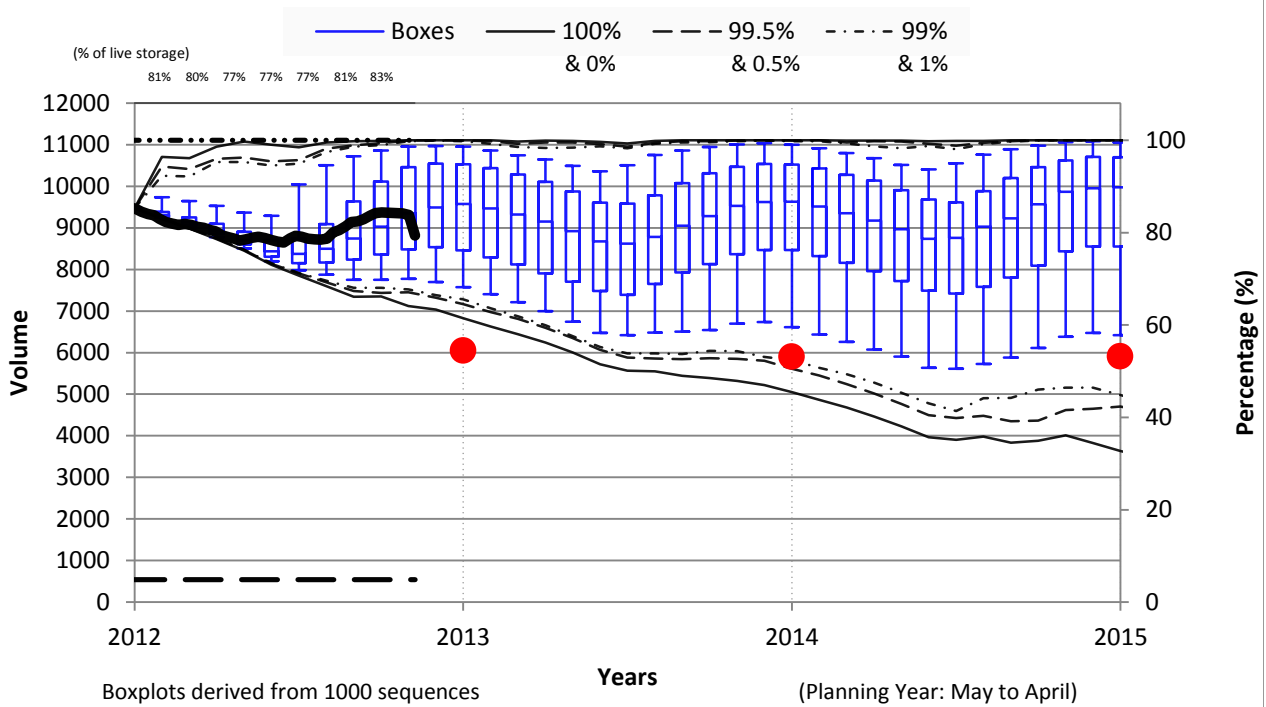
### Comments

- 1 Problems experienced with the capturing of actual weekly storage level information result in some values being duplicated. These constant levels are shown in the graph.
- 2 Although the actual storage level in Mohale followed the projected draw down trend, it was below the projected worst sequence trajectory until the end of Sep 2012.
- 3 During Oct, Nov and Dec 2012 the actual storage remained reasonably constant as no transfers were made to the RSA (Vaal) during Oct and Nov 2012.
- 4 Comparison of actual storage levels of Katse and Mohale dams indicates that the actual operation of the Mohale-Katse transfer tunnel might be different than simulated with more water being transferred to Katse resulting in Mohale to be at lower storage levels.
- 5 Mohale Dam remains at 59.44% storage for both Jan and Feb 2013, this is below the median projected storage.





## Total System Volume Scenario 4 (VT12E01)



### Comments (Levels at which restrictions will be required are indicated by red dots)

- 1 The observed total system storage levels followed the projected worst sequence trajectory during May and June 2012 and the projected median levels in July and Aug 2012.
- 2 During Sep and Oct 2012 the actual system storage was above the projected median levels.
- 3 On 12 Nov 2012 actual system storage was at 79% of the FSC and just above the projected 25% exceedance probability level.
- 4 The actual system storage was at about 84% of the FSC and well above the projected median storage level on 11 Feb 2013.
- 5 On 18 March 2013, the actual system storage was at 79.42% which is below the projected median storage level.

