



water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Directorate: Water Resources Planning Systems

Development of Annual Operating Rules for the Integrated Vaal River System (IVRS)

April 2018 Monthly Monitoring Report



May 2018

Vaal River System: Annual Operating Analysis 2017/2018

Three yearly reservoir projections for all major dams in system

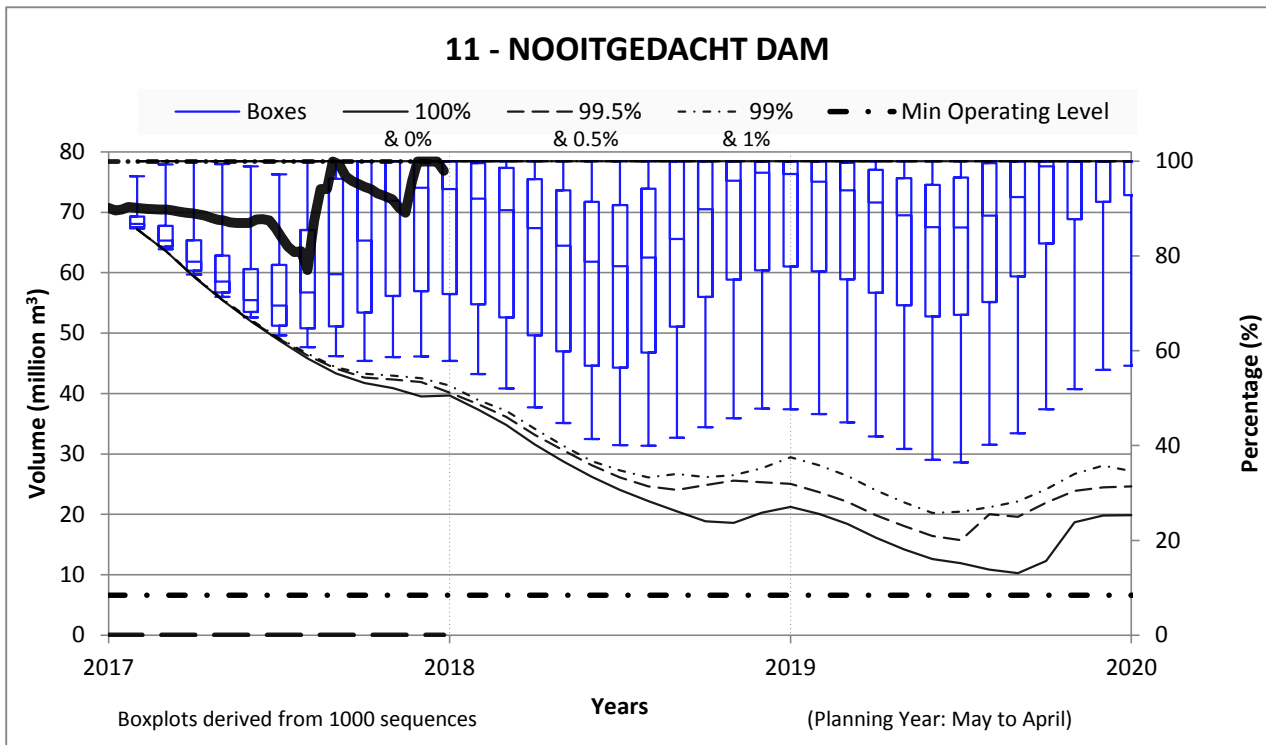
Note : Historical reservoir performances were updated to include actual dam storages up to 7 August 2017

It is important to note that the simulated reservoir trajectories are based on a scenario which was analysed as Scenario 17Ec which includes the updated system operating rules for the 2017/2018 AOA adopted at the SOF Meeting held on 10 Jul 2017. A detailed description of the operating rules adopted for Scenario 17Ec is provided below.

OPERATING RULES (2017/2018) : Based on Scenario 17Ec (10 Jul 2017)

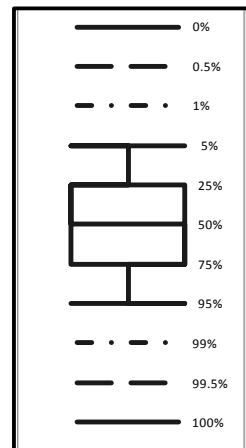
Demand Projections	a	Rand Water: Long-term demands were based on the RW 2003 Questionnaire projection passing through the actual water use of 1629 million m ³ /a recorded for 2015/2016 as starting point. This High water requirement projection does not include Water Conservation and Water Demand Management. The demand projection is the same as was used in 2015/16.	
	b	Eskom: May 2017 Base Scenario water requirement projections. These projections show a reduction of about 40 million m ³ /a from 2020 of which 20 million m ³ occurs in the system supplied from the Komati System. DWS should update the consumption data for all the Komati 3rd Party Users (i.e Hendrina, Anglo American, Optimum, Eyesizwe, Koorfontein Gloria, Yacht club).	
	c	Midvaal WC and Sedibeng Water: The revised May 2017 projections were adopted.	
	d	Sasol Secunda (Sasol 2&3) : The May 2017 demand projection (which included a 14 Ml/d intake from RW until end June 2024) was adopted for the analysis. The projected demand remains below 85 million m ³ /a until Jun 2024 when it increases to 90 million m ³ /a.	
	e	Sasol Sasolburg (Sasol 1): The updated water requirement projection provided in May 2017 was used for this analysis.	
	f	Mittal Steel (previously known as Iscor): A reduced projection below 10 million m ³ /a was used for this analysis because the consumption for the last 5 years has been below 10 million m ³ /a.	
	g	Other Urban/Industrial Users including small towns in the VRESS: The High Demand projections obtained from the All Towns Reconciliation Strategy Study (May 2011) as well as the Stand Alone Dams Study (April 2013) were adopted for consumption centres who do not receive their water from bulk water suppliers. The projections for Kroonstad and Potchefstroom were adjusted for use in the 2013/2014 AOA based on the 2012/2013 actual water use information. The Vaal Gamagara water use projection was revised based on information compiled as part of the Reconciliation Study undertaken for the Vaal Gamagara Scheme (August 2011).	
	h	Irrigation: Information from the Water Use Compliance Enforcement Study for the Upper Vaal WMA, as presented in the 2014/15 AOA report indicated that the gross 2014 unlawful irrigation water use for 2014 was about 28.6 million m ³ more than the targeted 22.7 million m ³ (significantly less than the original unlawful use of 235 million m ³ /a). It was assumed that this additional 28.6 million m ³ /a was eliminated in 2015. It was also assumed that the existing lawful use in the Upper Vaal WMA was used.	
	i	VRESAP 3rd Party Users: It was assumed that the projected VRESAP 3 rd Party use reached the full allocated amount of 9 million m ³ /a in 2016.	
	j	Qwa-Qwa Water Supply Scheme (WSS): Phase 1 abstractions from Sterkfontein Dam were included in the analysis. It was also assumed that Phase 2 of the WSS will be completed by the end of February 2019 with Phase 2 abstractions commencing in March 2019. Total capacity from both phases is 7.3 million m ³ /a.	
	k	Witbank (Region B) users: Modelled within Olifants sub-systems with no support from Vaal for the entire period of analysis.	
Curtailment	l	Compensation and Environmental Releases Vygeboom compensation releases. Compensation releases of 0.65 m ³ /s (20.5 million m ³ /a) from Vygeboom Dam for the entire period of analysis. Grootdraai and Zaihoek compensation releases. Revised compensation releases for Grootdraai (22.1) and Zaihoek Dams (11.4) based on normal inflow: (Additional releases of 22.1 and 5.1 Mm ³ /a respectively). Senqu environmental releases. Revised releases from Katse and Mohale Dams for the Ecological Reserve modelled by means of adjusted IFR structures in accordance with an assessment that was made in 2003 (LHDA 2003) Releases from Driel: Compensation release of 2m ³ /s made from Driel for downstream users. Release from Nootgedacht Dam: 0.15m ³ /s Releases from Westoe, Jericho and Morgenstond Dams modelled in WRPM are 0.037, 0.015 and 0.038 m ³ /s	
	m	Grootdraai releases to Standerton and the EWR. According to the Recon strategy the releases will be the maximum of either Standerton's demand (about 11 million m ³ /a) or the EWR (about 20 million m ³ /a during normal years). i.e. Not the sum of both... In winter Standerton's requirements will predominate, while in the wet season / summer the EWR may predominate	
	n	For Bloemhof-Vaal sub-system reduce the yield of the short-term characteristic curves for nett storages less than 60% by 15%. This adjustment ensured that there is a less than 1 in 200 risk that the storage available to Randwater (in the Katse, Mohale, Sterkfontein and Vaal Dams) will reach their dead storage (940 million m ³) prior to the delivery from LHWP phase II (Polihali). One reason for this adjustment is that the curtailment of consumers in the Upper Vaal is based on the combined storage in the Vaal, including Bloemhof. Increased dilution releases from the Vaal Dam (due to Acid Mine Drainage) result in a larger portion of this combined storage sitting in Bloemhof Dam, rather than the Vaal Dam, where it is inaccessible to consumers in the Upper Vaal. If the AMD treatment is fast tracked or the TDS is less than expected then less water will be released into the Bloemhof Dam then one could consider reverting to the original, unadjusted STCC.	
	o	Strategic Demands (Eskom / Sasol) uncurtailed	
	p	Urban Demands Urban demands on the Mooi and Renoster Rivers from the following dams were uncurtailed : Mooi River (Klerkskraal, Boskop, Lakeside/Potchefstroom & Klipdrift Dams) & Renoster River (Koppies Dam))	
	q	Irrigation uncurtailed (including irrigation demands on the Mooi and Renoster Rivers)	
	r	Allemanskraal Dam: Urban users unrestricted and irrigation users restricted by 25%	
	s	Erfenis Dam: Urban and irrigation users unrestricted	
	t	Westoe-Jericho gravity feed: Transfers (with maximum transfer capacity of 1.62m ³ /s from 1 Aug 2017) regulated by the revised Usutu inter-reservoir operating rules adopted in 2006.	
	Infrastructural constraints	u	Morgenstond-Jericho Transfer: Transfers (with maximum transfer capacity of 3.182 m ³ /s from 1 Jul 2017) regulated by the revised Usutu inter-reservoir operating rules adopted in
		v	Jericho-Camden transfer. 2m ³ /s until 31 Jul 2017, thereafter 2.8m ³ /s.
w		Usutu to Komati: Because of the reduced demand in the Komati the Usutu-Komati link need not be used.	
x		Heyshope-Grootdraai: Heyshope pump station capacity increased from 3.0 to 4.3 m ³ /s on 1 Aug 2017.	
y		Zaihoek to Grootdraai. Assume full 2.16m ³ /s available.	
z		Katse-Mohale tunnel. Closed for maintenance until 31Jan 2018	
ab		Thukela-Vaal transfer: Assume that up to 14.6m ³ /s (of the 18.8 capacity) can be pumped from the Driel to Kilburn and up to 20m ³ /s (of the 24 capacity) can be pumped from Kilburn to Sterkfontein if there is sufficient inflow. In the current year (2017/18) transfers will stop when the Sterkfontein Dam is full and no releases will be made from Sterkfontein Dam. Releases are normally planned during the rain season.	
ac		Vaal River Eastern Sub-system Project (VRESAP): For the first two years of analysis assume that the VRESAP pipeline can transfer 3.3m ³ /s, increasing to the capacity of 5.07m ³ /s in the third year. The scenario assumed that only when Grootdraai Dam drops to 50% capacity would water be supplied via VRESAP to reduce pumping costs. However, after the analyses were finalized, Sasol obtained water quality information which indicated it would be cheaper to use some water from the Vaal Dam on a continuous basis and the targets were adjusted to include a minimum demand of 60 million m ³ /a on the VRESAP pipeline. This also ensures continuous operation and maintenance of pumps.	
ad		Vlaktefontein Canal Rehabilitation: It was assumed that future maintenance of the canal will be planned without interrupting the flow in the canal.	
ae		Rietfontein-Matla (Kusile) Pipeline: Increased by 0.45 m ³ /s to 3.68 m ³ /s .	
af		Eskom pipeline from Rietfontein (near Matla) to Duvha: The new Eskom pipeline was assumed to have a capacity of 1.6m ³ /s for the full period of analysis. Although the capacity was assumed to be 1.6m ³ /s it was assumed that Eskom would only be able to supply up to 50% of Duvha's water use from the Vaal in the first year from May 2017 and 90% thereafter. Limiting the water supply from the Vaal to Duvha Power Station via the new Rietfontein-Duvha pipeline causes a shift in demand from one sub-system to another. Because of the reduction in demands on the Komati System the Duvha link is unlikely to be used.	
ag	Minimum Operating Levels * Vaal Dam: 18% supply to Rand Water (Level = 1473.25m, Storage = 470 million m ³) BUT WRPM currently uses 167 million m ³ * Vaal Dam: 16% supply to VRESAP (Level = ?m, Storage = 419 million m ³). * Vaalharts Weir: 90% level (1189.67 m). * Bloemhof Dam: 6% (Level = 1219.32m, Storage = 74.55 million m ³). * Trichardsfontein: 50% (Level = 1630.3)		
ah	Lesotho Highlands Phase 2 (Polihali) was not modelled. It may start delivery in December 2024.		

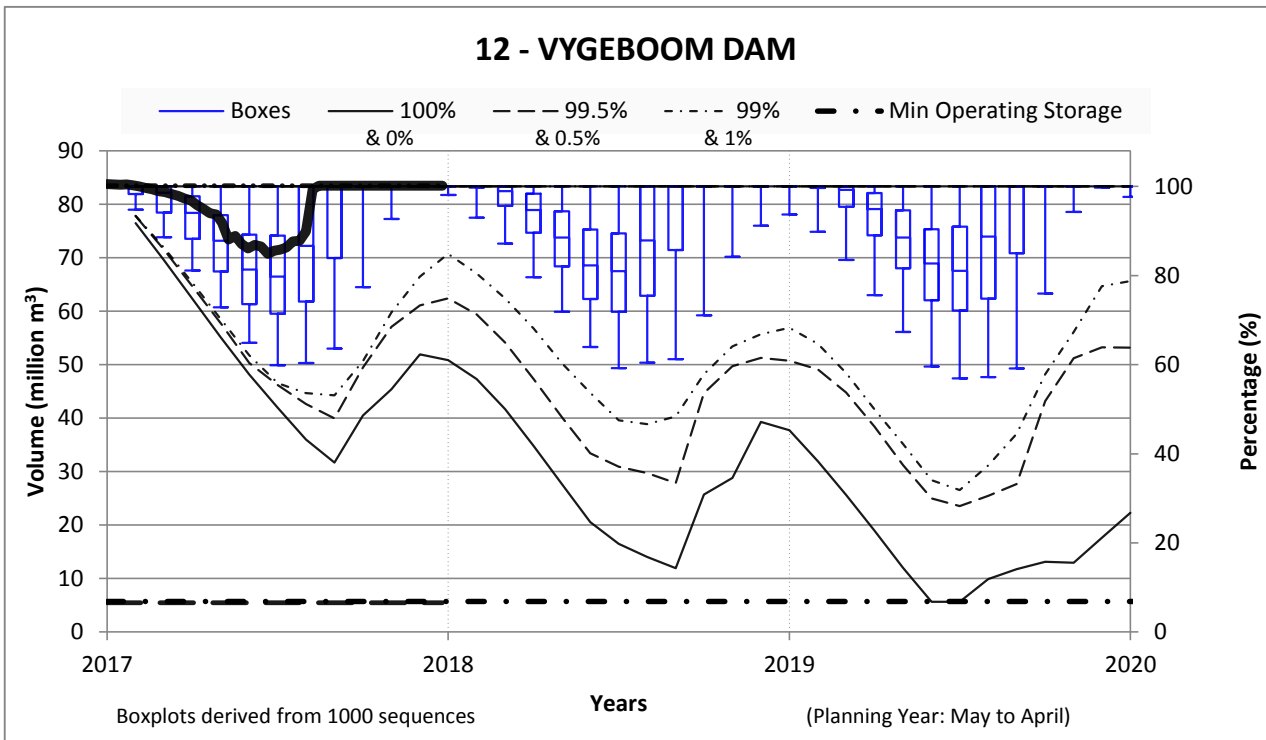
Operating Rules	ai	Revised Usutu Inter-Reservoir Operating Rules: The revised 2006 inter-reservoir operating rules were adopted for this scenario. Draw down sequence from the "Usutu system: Inter-reservoir operating rules" plot: 1 Westoe Upper 50% 2 Jericho Upper 30% 3 Morgenstond Upper 79% 4 Westoe Bottom 50% to RL 1537.5 5 Morgenstond (10% to 21%) 6 Jericho Bottom 70% to RL1457 7 Morgenstond Bottom 10% to RL 1358.15
	aj	Transfers to Grootdraai Dam (Heyshope-Grootdraai and Zaihoek-Grootdraai): The modelled operating rule for 2017/18 transferred from Heyshope to maintain Grootdraai Dam @ 90% (90% FSC storage = 315.38 mill m ³ with level of 1548.02m). However it is recommended that for revised VRESAP operating rule that the transfers occur even when Grootdraai Dam is full. No transfer from Zaihoek Dam in the 2017/18 year but thereafter the transfers are only made when Grootdraai Dam drops to 75% storage level of 1546.462m
	ak	When Grootdraai Storage drops below 50% water the abstractions supplied from Grootdraai via the Vlakkfontein Canal are transferred to the Vaal Dam via the VRESAP pipeline.
	al	Rietfontein-Duvha link switched off from 1 May 2019 because of the surplus water available in the Komati Basin
	am	Heyshope Dam Buffer Storage: When the storage in Grootdraai Dam drops below the following levels transfers to Grootdraai Dam are stopped to keep the water in reserve to transfer to Morgenstond: * May 2016 to March 2018 - Reserve storage below 150 million m ³ (Level of 1294.54m) for transfer to the Usutu; * March 2019 to end of analysis period - Reserve storage below 58 million m ³ (Level = 1289.63 m) for transfer to the Usutu.
	an	Heyshope - Morgenstond transfer: from May 2016 onwards transfer when Morgenstond is below 50 million m ³ (level = 1378.144 m). Heyshope and Geelhoutboom pump stations assumed to be constrained as described above
	ao	Dilution rule: Rand Water supplied from Vaal Dam with releases from Vaal Dam to maintain the TDS concentration downstream of Vaal Barrage at 600 mg/l, i.e. apply dilution rule in Vaal Barrage according to the newly developed Dilution Model. (Note: Simulated results based on dilution releases as determined by the water quality rule incorporated in the WRPM configuration). This results show the storage in the Bloemhof Dam increasing to over 250 million m ³ during extreme droughts (driest sequence out of 1000 sequences analysed) at the same time as the dams supplying Gauteng are almost empty
	ap	Mine Dewatering and re-use thereof: During 2016 the observed Acid Mine Inflow from the Central and Eastern basin were 22.7 mill m³ @3900mg/l and 25.2 mill m³ @ 2400mg/l and these values were adopted for 2017. It was assumed that the water from the Central and Eastern Basins would be treated from Jan 2022 and provided to Rand Water at a TDS concentration of 200 mg/l. From Feb 2022 onwards it was assumed that only discharges from the Far Western Basin (amounting to 16.44 million m ³ /a) were made to the river systems with an associated TDS concentration of 700 mg/l.
	aq	Releases to Bloemhof Dam: There is no need for releases from the Vaal Dam to the Bloemhof Dam this year as the storage in Bloemhof remains well above minimum operating level of 6%.
Transfers	ar	LHWP scheduled transfers: The monthly transfer schedule provided by the LHDA (amounting to 780 million m ³ /a), was adopted for the 2016/17 planning period. No provision was made for releases into the Caledon River to support Bloemfontein.
	as	Grootdraai and VRESAP to Usutu-Vaal Power Stations: Transfer 37 million m ³ from Grootdraai and VRESAP pipeline to the Usutu-Vaal Power Stations (according to the monthly flow rates provided in the Monthly Monitoring Report). That means, for example, that 84% of Matla's water requirements could be supplied from Grootdraai Dam and the VRESAP pipeline.
	at	Usutu to Usutu-Vaal Eskom PS (Camden, Kendal, Kusile, Kriel and Matla) and DWA 3rd Party Users: Transfer 77.1 million m ³ from the Usutu to the remaining Usutu-Vaal PSs (i.e. 100% of the Camden, 100% DWS 3rd Party users, Kendal and Kriel demands and 16% of Matla's demand to be supplied from the Usutu) . Transfers to be made according to the monthly flow rates provided in the Monthly Monitoring Report.
Miscellaneous	au	Rietspruit Dam: This dam is monitored as a stand-alone system and has a separate, dedicated SOF and will no longer be included as part of the Vaal monitoring report. Drought restrictions have been implemented.
	av	Spitskop Dam: This dam is monitored as a stand-alone system and has a separate, dedicated SOF and will no longer be included as part of the Vaal monitoring report.



Comments:

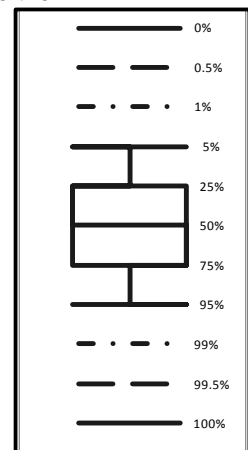
- 1 On 1 May 2017, storage was 90.2%.
- 2 On 5 June 2017, storage was 90.1%.
- 3 On 3 July 2017, storage was 89.9%.
- 4 On 7 August 2017, storage was 88.9% and tracking above the 25% exceedance probability level.
- 5 On 4 September 2017, storage was 87.6% and tracking above the 25% exceedance probability level.
- 6 On 30 October 2017, storage was 85.9% and tracking above the 25% exceedance probability level.
- 7 On 27 November 2017, storage was 81.1% and tracking below the 25% exceedance probability level.
- 8 On 01 January 2018, storage was 100% full.
- 9 On 29 January 2018, storage was 95.2%.
- 10 On 30 April 2018, storage was 98.6%.

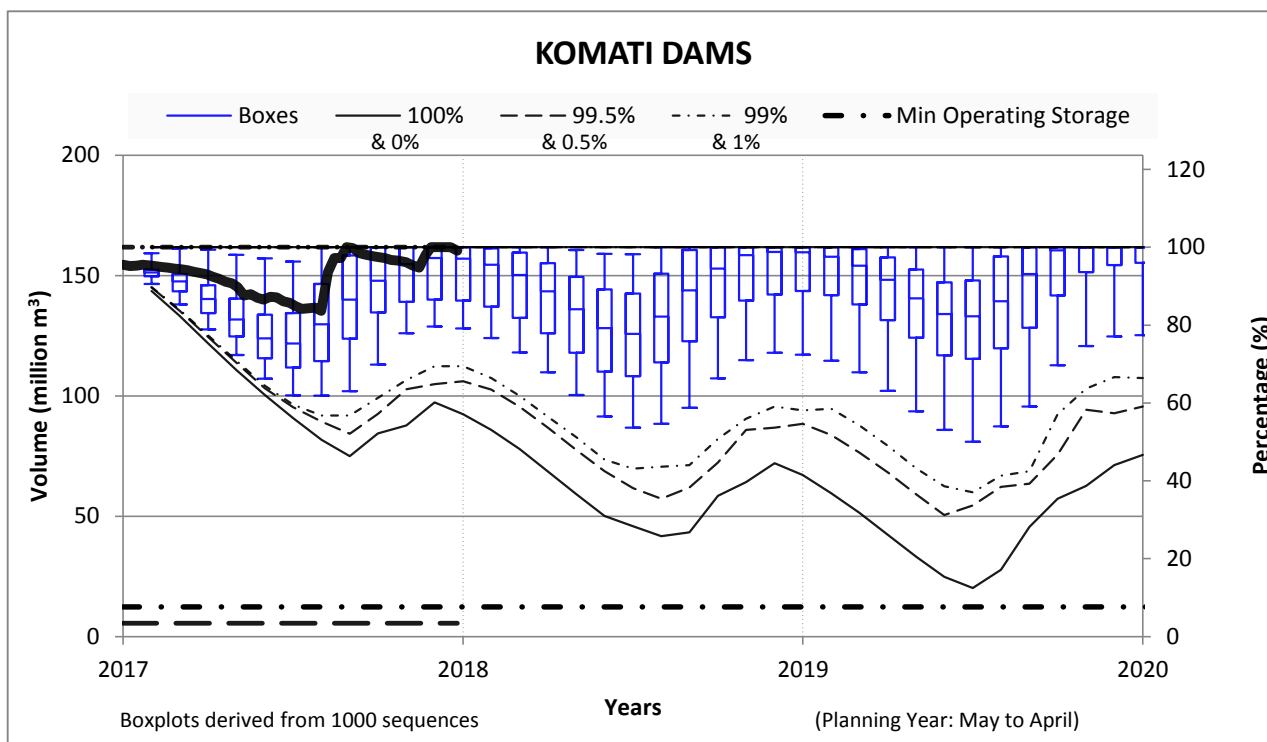




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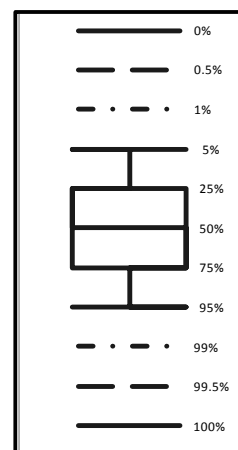
- 1 On 1 May 2017, Vygeboom Dam was full.
- 2 On 5 June 2017, storage was 99.8%.
- 3 On 3 July 2017, storage was 98.6%.
- 4 On 7 August 2017, actual storage was 95.7% and tracking just above the 50% exceedance probability level.
- 5 On 4 September 2017, actual storage was 91.7% and tracking just above the 50% exceedance probability level.
- 6 On 30 October 2017, actual storage was 85.5% and tracking above the 50% exceedance probability level.
- 7 On 27 November 2017, actual storage was 87.7% and tracking above the 50% exceedance probability level.
- 8 On 01 January 2018, storage was 100% full.
- 9 On 29 January 2018, storage was 100% full.
- 10 On 30 April 2018, storage was 100.7% full.



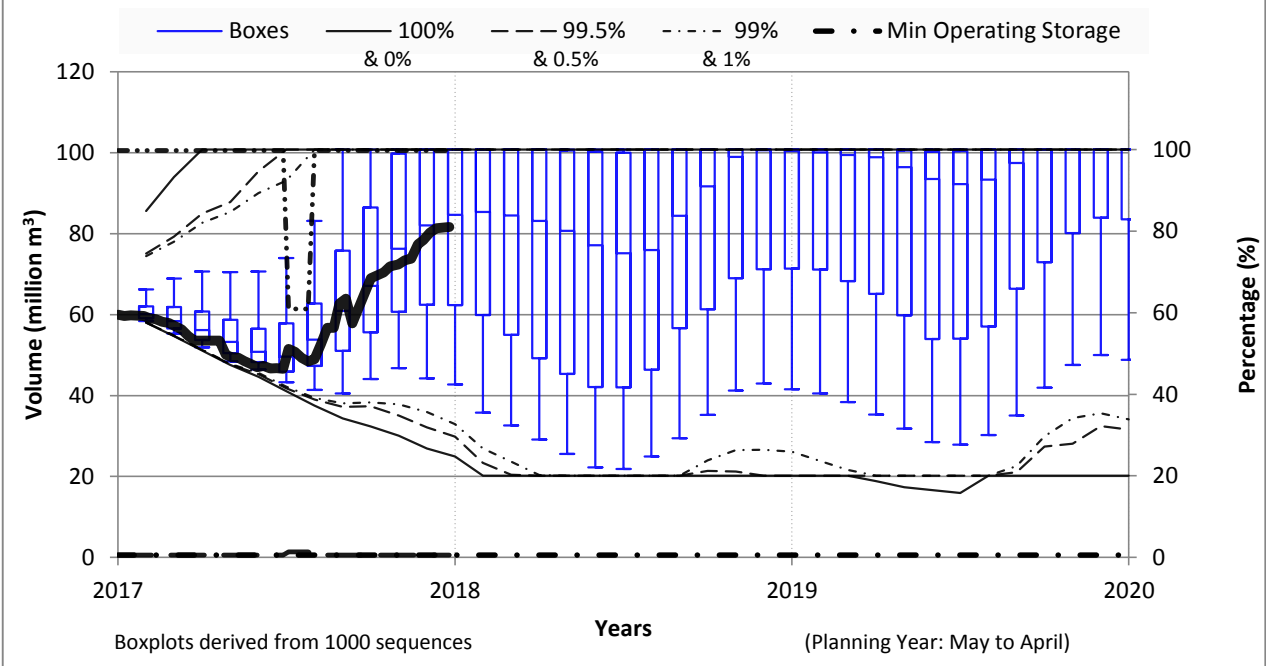


Comments:

- 1 On 1 May 2017, actual storage in the Komati was 95.5%.
- 2 On 5 June 2017, actual storage was 95.1%.
- 3 On 3 July 2017, actual storage was 94.3%.
- 4 On 7 August 2017, actual storage was 92.4% and tracking above the 25% exceedance probability level.
- 5 On 8 September 2017, actual storage was 89.7% and tracking above the 25% exceedance probability level.
- 6 On 30 October 2017, actual storage was 85.7% and tracking above the 25% exceedance probability level.
- 7 On 27 November 2017, actual storage was 86.1% and tracking above the 25% exceedance probability level.
- 8 On 01 January 2018, storage was 100% full.
- 9 On 29 January 2018, storage was 97.7%.
- 10 On 30 April 2018, storage was 99.1% full.

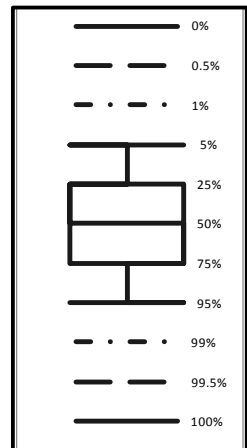


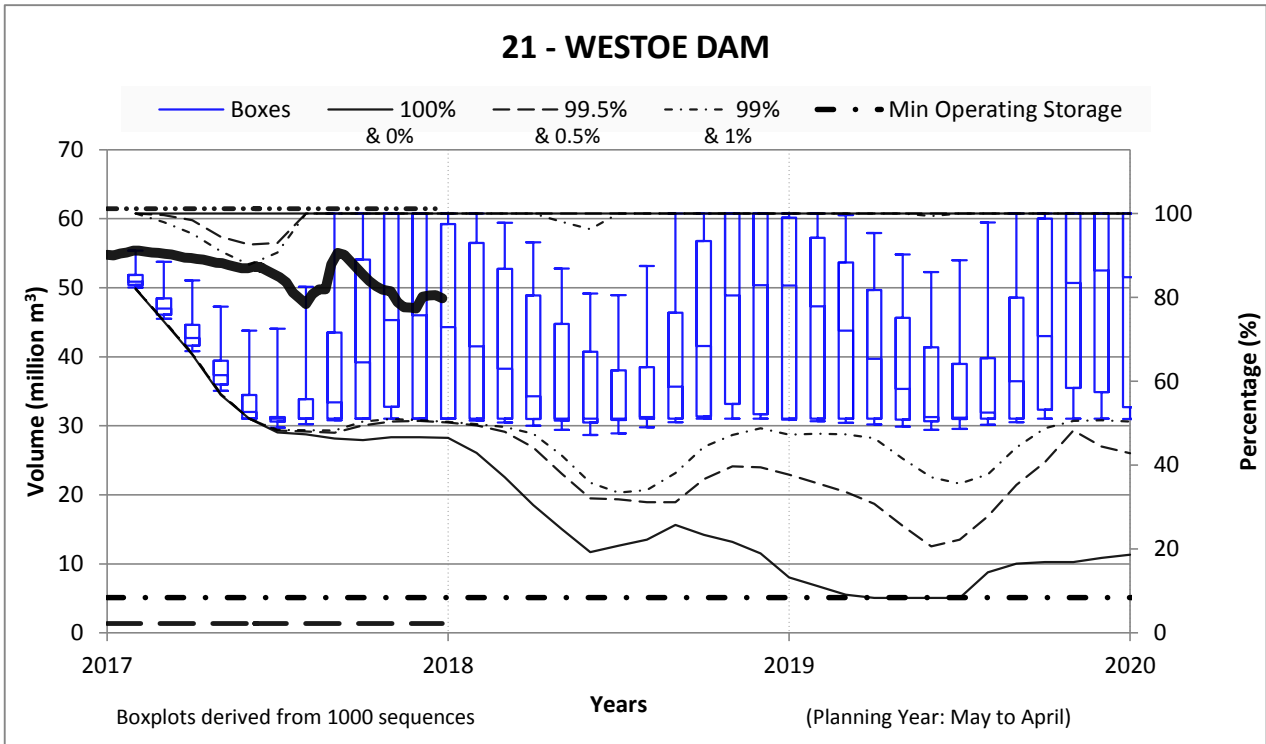
23 - MORGENSTOND DAM



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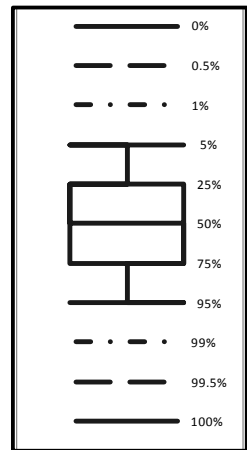
- 1 On 1 May 2017, actual storage was 59.6%.
- 2 On 5 June 2017, actual storage was 58.8%.
- 3 On 3 July 2017, actual storage was 56.8%.
- 4 On 7 August 2017, actual storage was 53.3%.
- 5 On 4 September 2017, actual storage was 49.2% and tracking just above the 95% exceedance probability level.
- 6 On 30 October 2017, actual storage was 46.3% and tracking on the 75 % exceedance probability level.
- 7 On 30 October 2017, actual storage was 47.3% and tracking on the 75 % exceedance probability level.
- 8 On 1 May 2017, actual storage was 62.4%.
- 9 On 29 January 2018, storage was 67.7%.
- 10 On 30 April 2018, storage was 81.1% full.

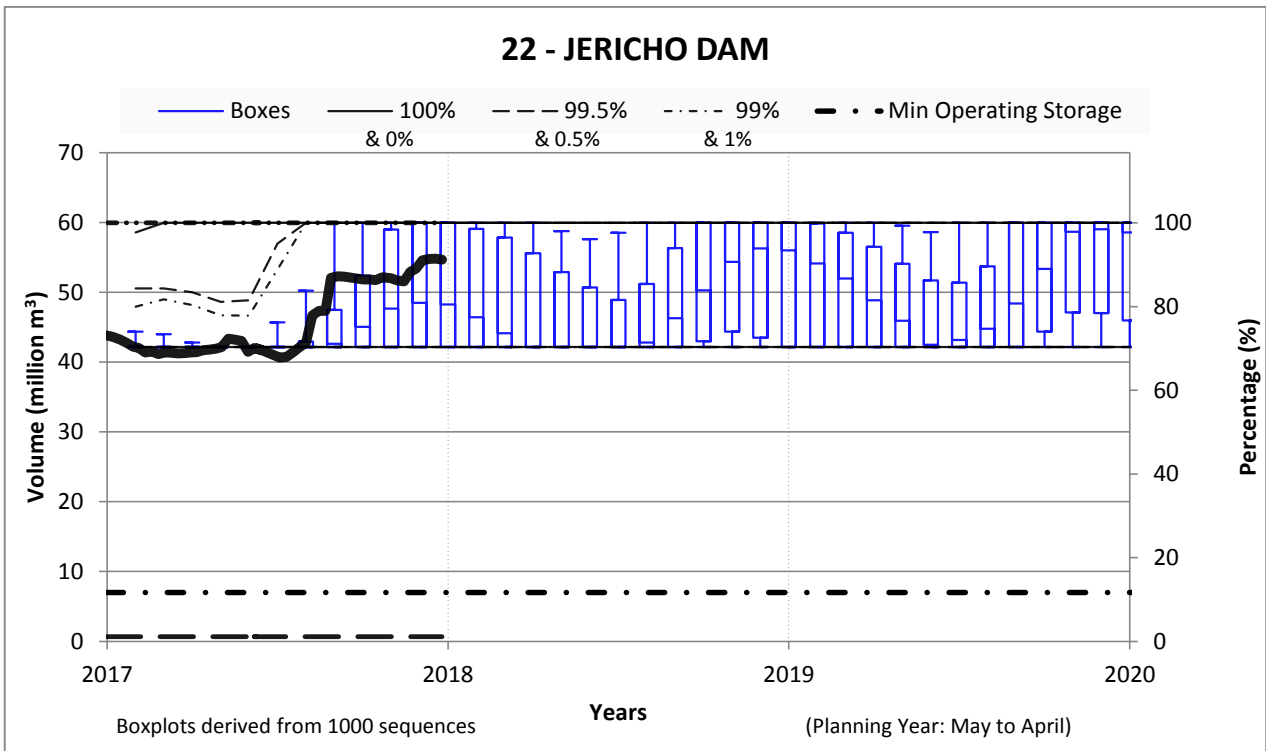




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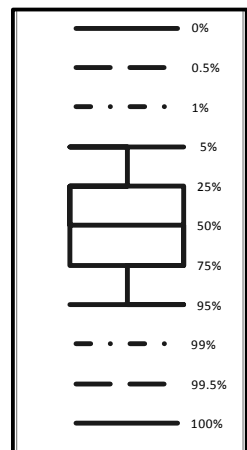
- 1 On 1 May 2017, actual storage was 89.1%.
- 2 On 5 June 2017, actual storage was 90.1%.
- 3 On 3 July 2017, actual storage was 89.4%.
- 4 On 7 August 2017, actual storage was 88.2%.
- 5 On 4 September 2017, actual storage was 87..2%.
- 6 On 30 October 2017, actual storage was 86.1%.
- 7 On 27 November 2017, actual storage was 78.9%.
- 8 On 01 January 2018, actual storage was 86.9%.
- 9 On 29 January 2018, actual storage was 89.1%.
- 10 On 30 April 2018, storage was 78.4%.

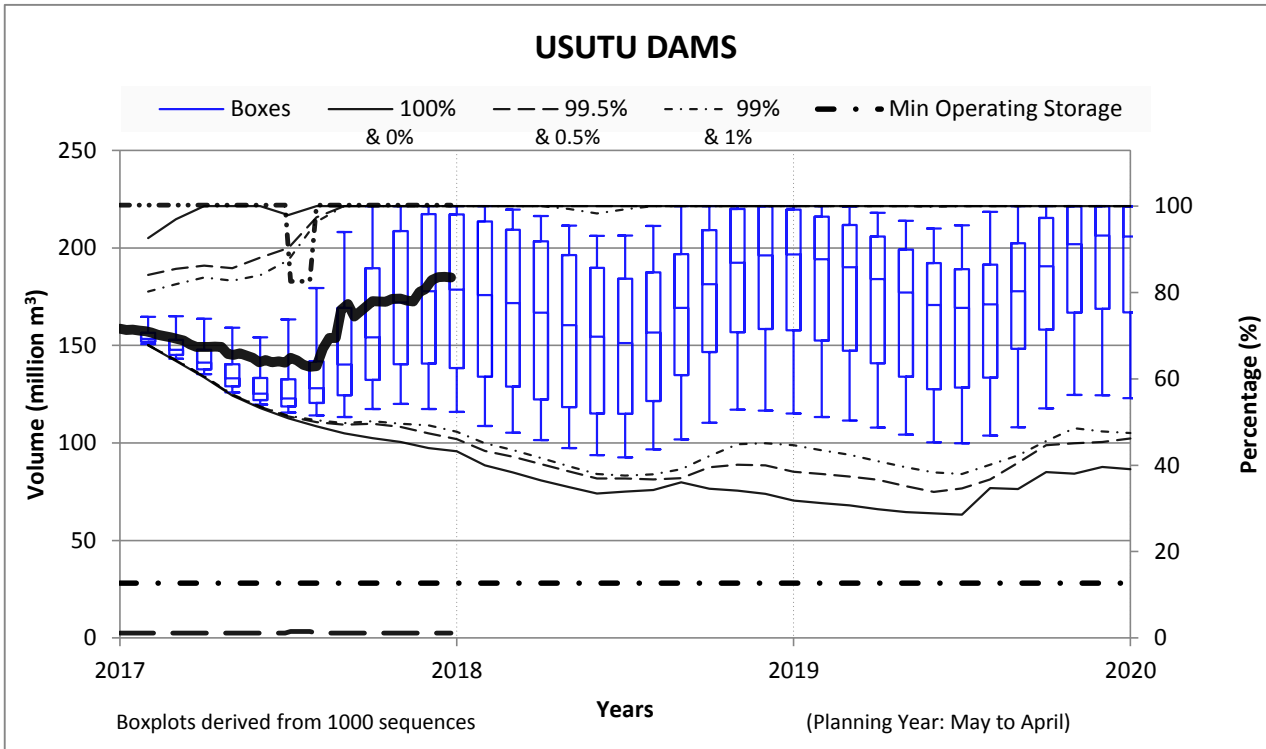




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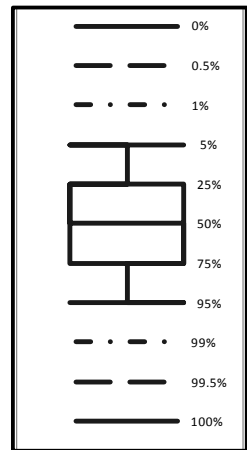
- 1 On 1 May 2017, actual storage was 73.1%.
- 2 On 5 June 2017, actual storage was 70.1%.
- 3 On 3 July 2017, actual storage was 69%.
- 4 On 7 August 2017, actual storage was 69.1%.
- 5 On 4 September 2017, actual storage was 70.4%.
- 6 On 30 October 2017, actual storage was 69.6%.
- 7 On 27th November 2017, actual storage was 70.2%.
- 8 On 01 January 2018, actual storage was 86.9%.
- 9 On 29 January 2018, storage was 86.5%.
- 10 On 30 April 2018, storage was 91.1%.



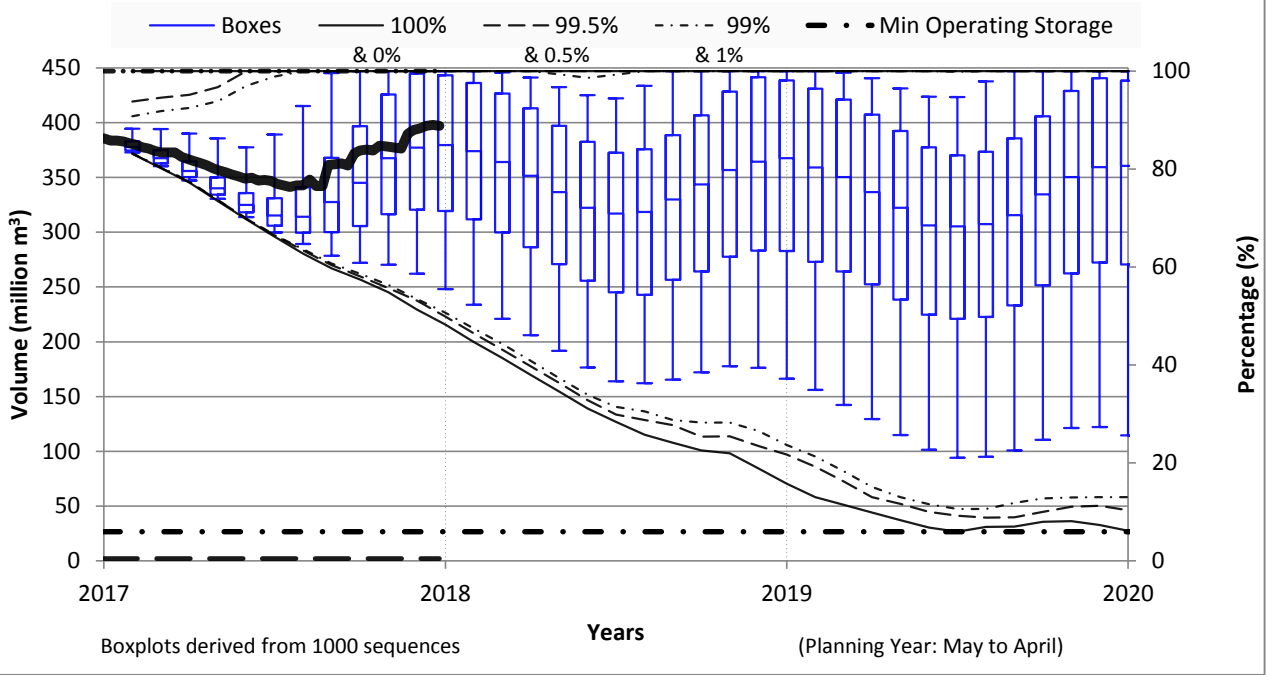


Comments:

- 1 On 1 May 2017, actual storage in the Usutu dams was 71.4%.
- 2 On 5 June 2017, actual storage was 70.5%.
- 3 On 3 July 2017, actual storage was 69.1%.
- 4 On 7 August 2017, actual storage was 67.2%.
- 5 On 4 September 2017, actual storage was 65.4%.
- 6 On 30 October 2017, actual storage was 63.6%.
- 7 On 27th November 2017, actual storage was 70.2%.
- 8 On 01 January 2018, actual storage was 75.8%.
- 9 On 29 January 2018, actual storage was 74.3%.
- 10 On 30 April 2018, storage was 83.3%.

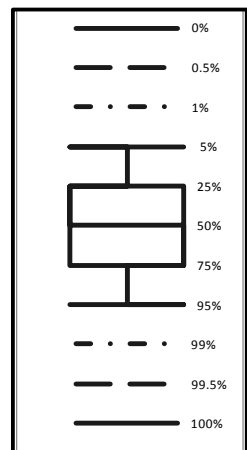


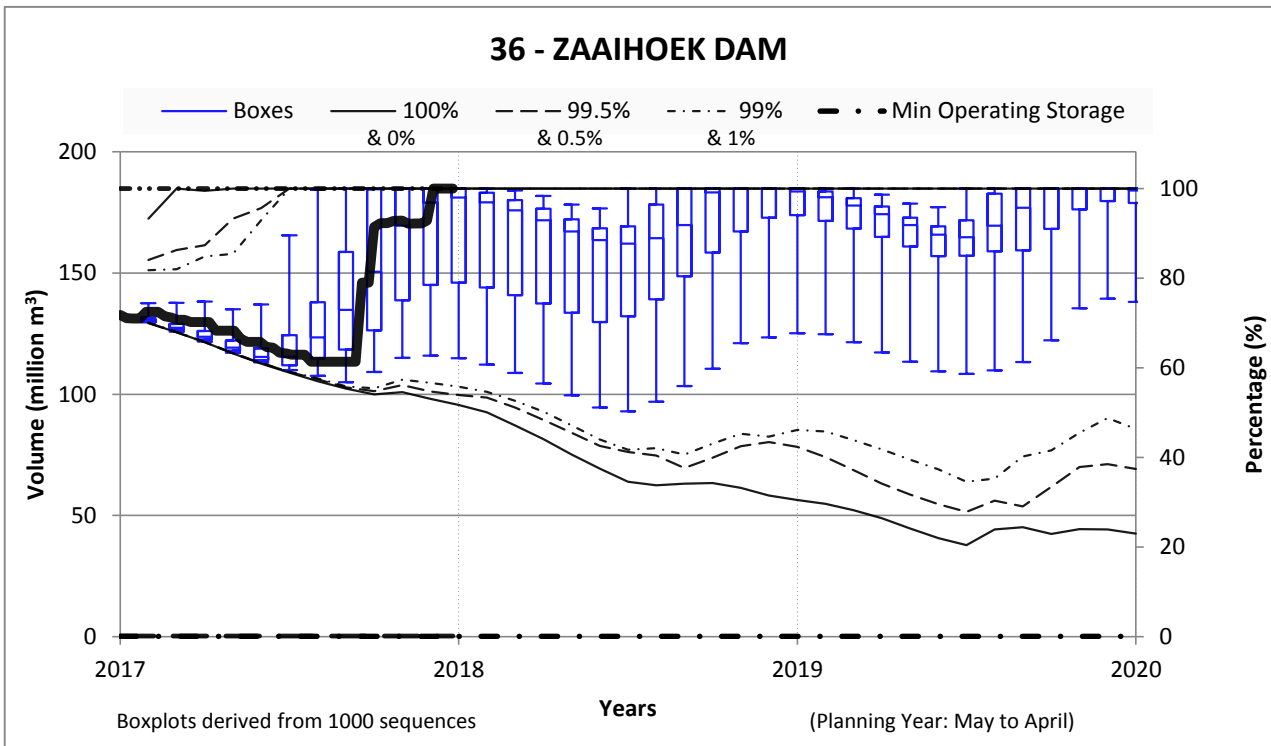
35 - HEYSHOPE DAM



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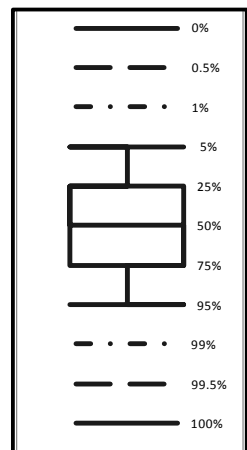
- 1 On 1 May 2017, actual storage was 86.2%.
- 2 On 5 June 2017, actual storage was 84.9%.
- 3 On 3 July 2017, actual storage was 83.4%.
- 4 On 7 August 2017, actual storage was 81.6%.
- 5 On 4 September 2017, actual storage was 79.8%.
- 6 On 30 October 2017, actual storage was 77.6 %.
- 7 On 27th November 2017, actual storage was 76.6%.
- 8 On 01 January 2018, actual storage was 80.9%.
- 9 On 29 January 2018, actual storage was 83.3%.
- 10 On 30 April 2018, storage was 88.8%.

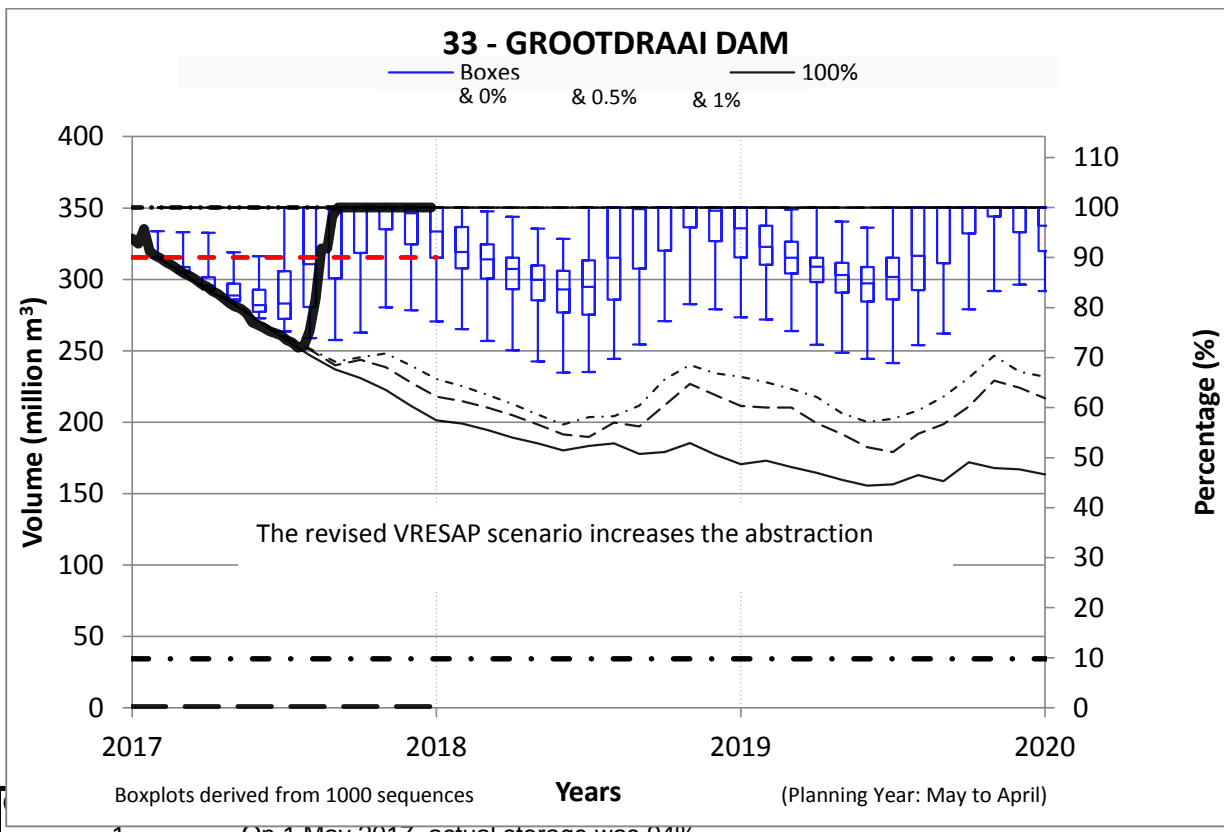




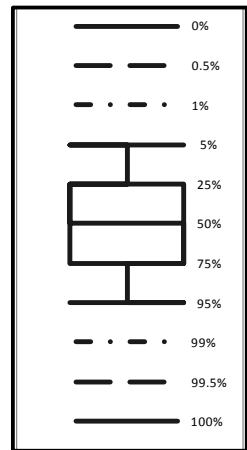
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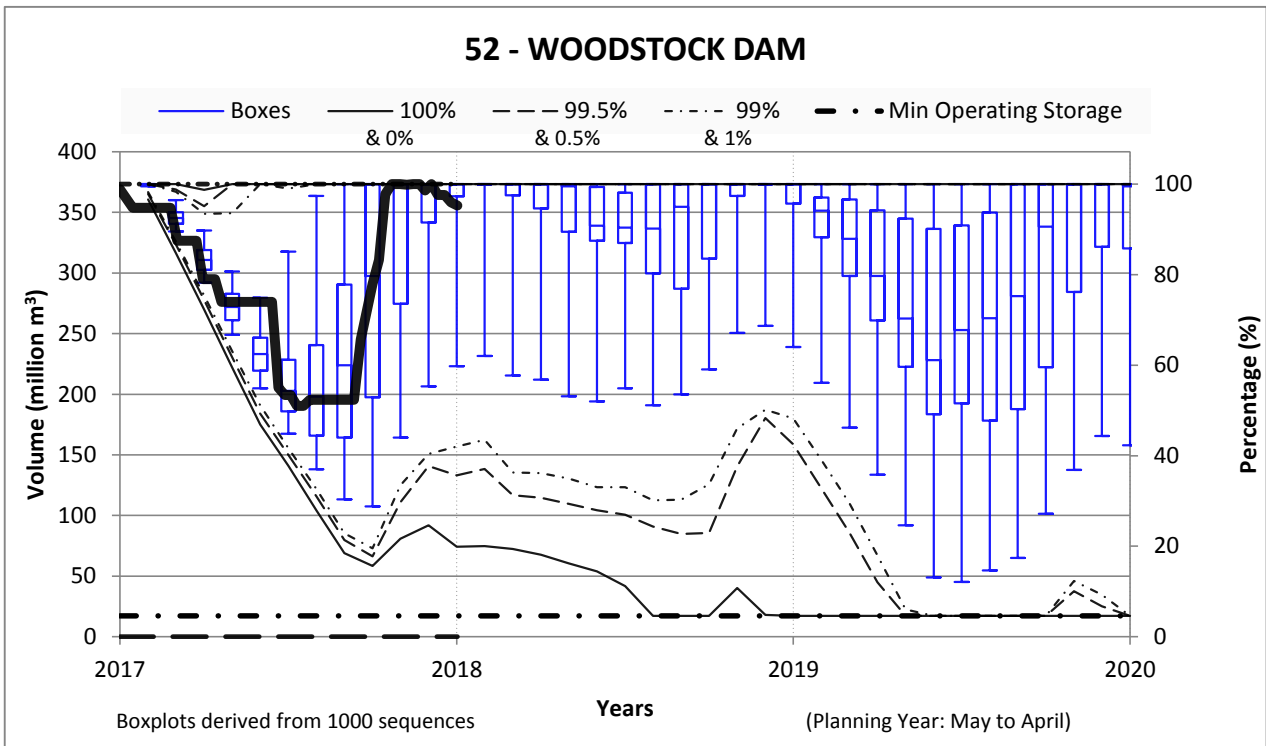
- 1 On 1 May 2017, actual storage was 71.8%.
- 2 On 5 June 2017, actual storage was 72.5%.
- 3 On 3 July 2017, actual storage was 70.7%.
- 4 On 7 August 2017, actual storage was 70.2%.
- 5 On 4 September 2017, actual storage was 68.3%.
- 6 On 30 October 2017, actual storage was 63.2%.
- 7 On 27th November 2017, actual storage was 61.3%.
- 8 On 01 January 2018, actual storage was 61.3%.
- 9 On 29 January 2018, storage was 79.0%
- 10 On 30 April 2018, storage was 100.0%.





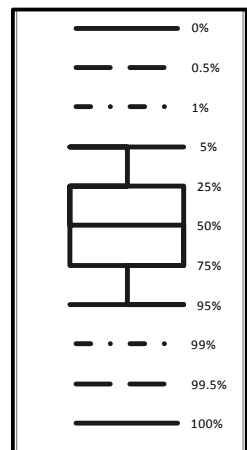
- 1 On 1 May 2017, actual storage was 94%.
- 2 On 5 June 2017, actual storage was 90.1%.
- 3 On 3 July 2017, actual storage was 87%. The operating rule for the 2017/18 AOA is to transfer to maintain Grootdraai at 90%.
- 4 On 7 August 2017, actual storage was 83.5%.
- 5 On 4 September 2017, actual storage was 80.4%.
- 6 On 30 October 2017, actual storage was 74.6%.
- 7 On 27th November 2017, actual storage was 72.4%.
- 8 On 1 January 2018, actual storage was 98.5%.
- 9 On 29 January 2018, storage was 100.2%.
- 10 On 30 April 2018, storage was 99.9%.



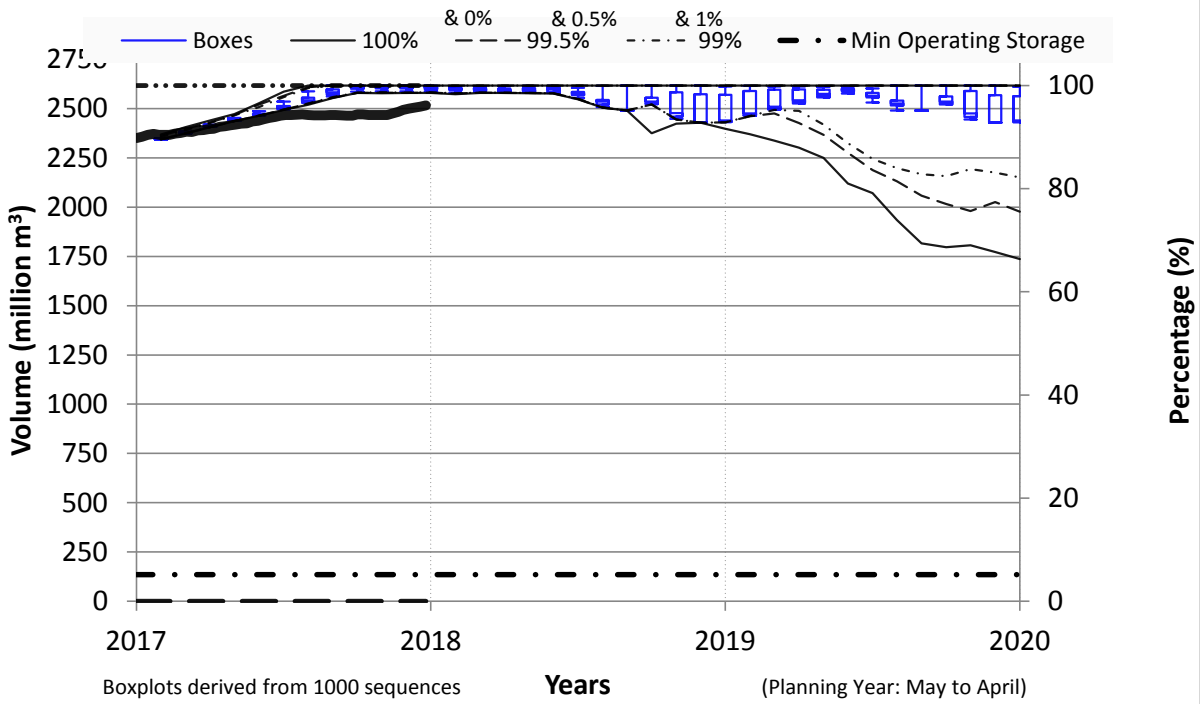


Comments:

- 1 On 1 May 2017, actual storage was 98.9%.
- 2 On 5 June 2017, actual storage was 94.8%.
- 3 On 3 July 2017, actual storage was 87.5%.
- 4 On 7 August 2017, actual storage was 79%.
- 5 On 4 September 2017, actual storage was 74%.
- 6 On 30 October 2017, actual storage was 53.4%.
- 7 On 27th November 2017, actual storage was 52.3%.
- 8 On 1 January 2018, actual storage was 52.3%.
- 9 On 29 January 2018, storage was 65.6%.
- 10 On 30 April 2018, storage was 96.0%.

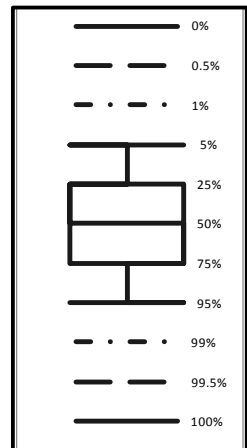


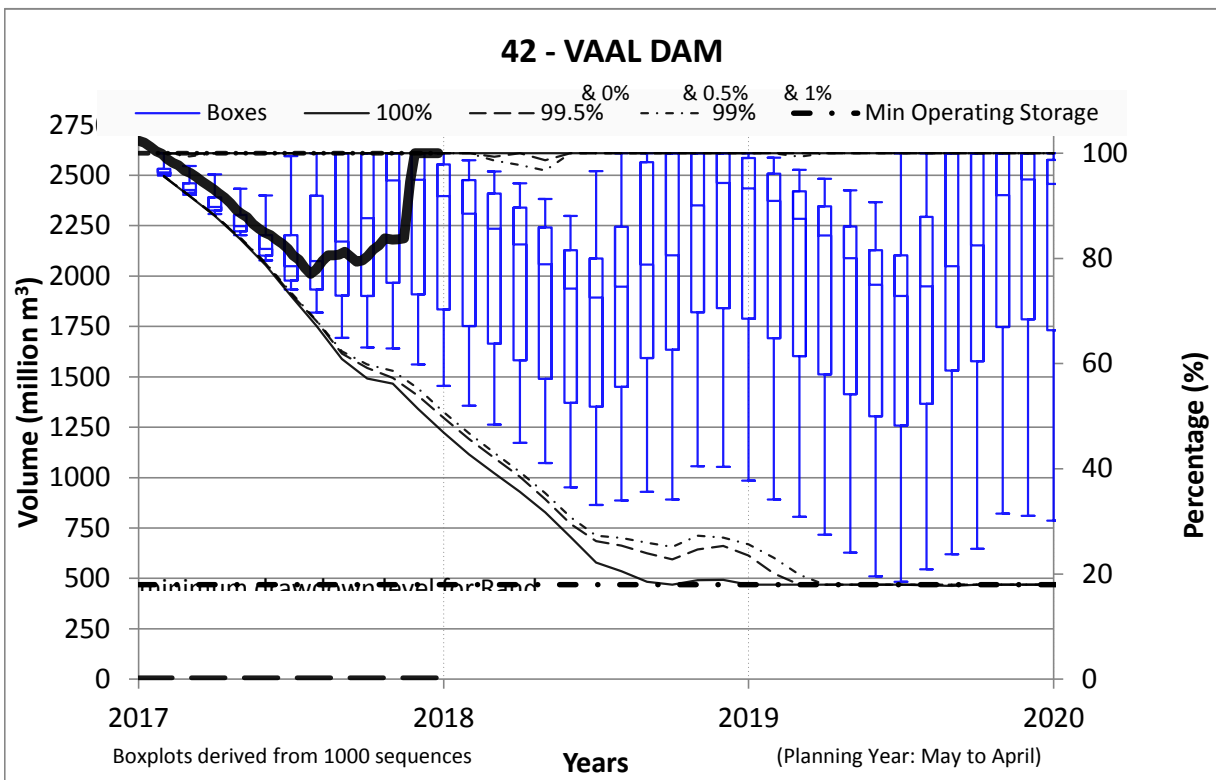
44 - STERKFONTEIN DAM



Comments:

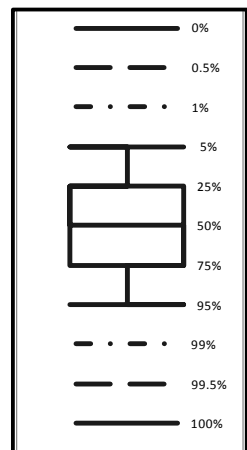
- 1 On 1 May 2017, actual storage was 89.8%.
- 2 On 5 June 2017, actual storage was 90.4%.
- 3 On 3 July 2017, actual storage was 91%.
- 4 On 7 August 2017, actual storage was 91.6%.
- 5 On 4 September 2017, actual storage was 92.4%.
- 6 On 30 October 2017, actual storage was 94.1%.
- 7 On 27th November 2017, actual storage was 94.4%.
- 8 On 1 January 2018, actual storage was 94.3%.
- 9 On 29 January 2018, actual storage was 94.2%.
- 10 On 30 April 2018, storage was 96.1%.



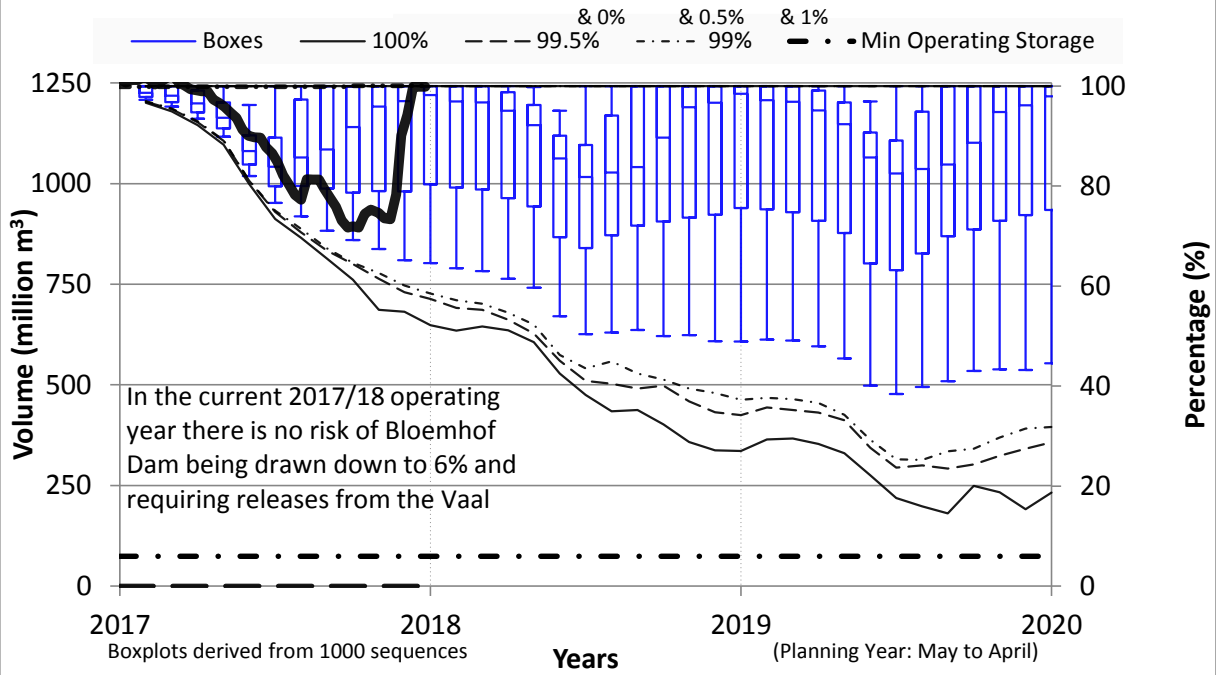


Comments:

- 1 On 1 May 2017, Vaal dam was full.
- 2 On 5 June 2017, actual storage was 98.9%.
- 3 On 3 July 2017, actual storage was 96.2%.
- 4 On 7 August 2017, actual storage was 92.4%.
- 5 On 4 September 2017, actual storage was 88.5%.
- 6 On 30 October 2017, actual storage was 81.8%.
- 7 On 27th November 2017, actual storage was 77.0%.
- 8 On 1 January 2018, actual storage was 80.7%.
- 9 On 29 January 2018, storage was 79.6%.
- 10 On 30 April 2018, storage was 104.6%.

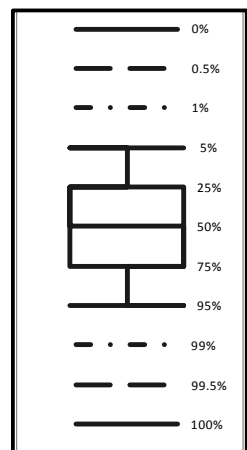


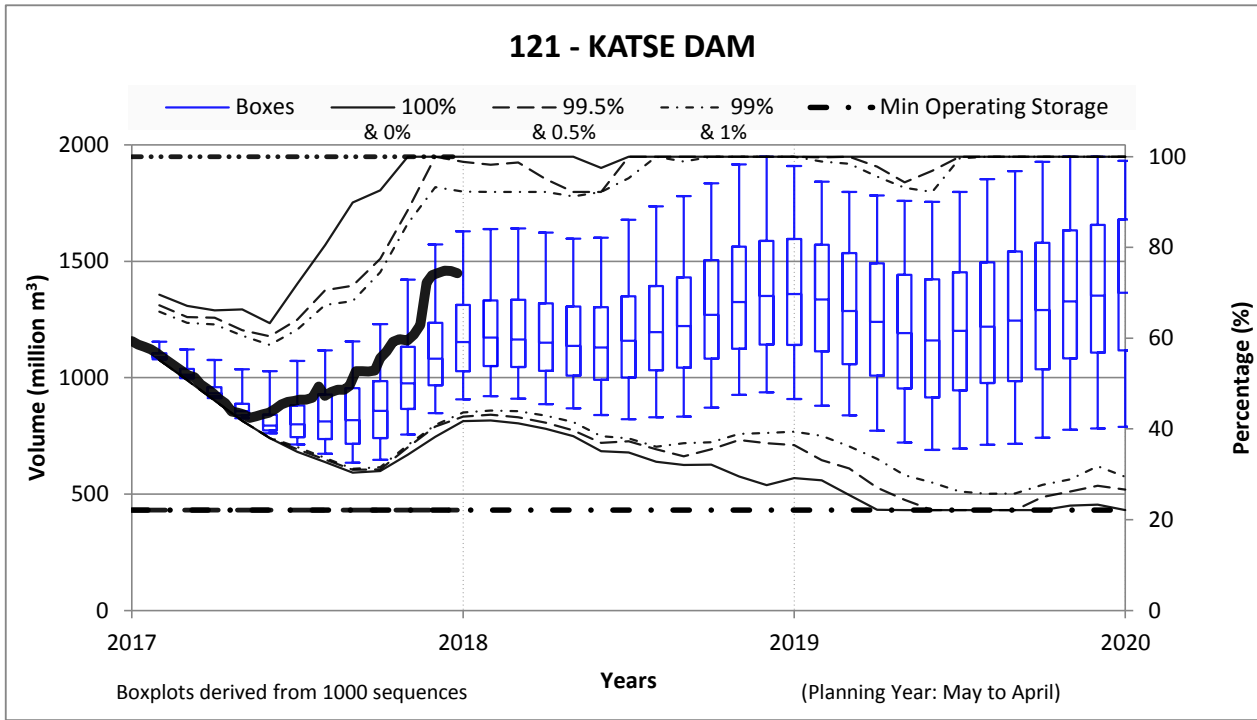
65 - BLOEMHOF DAM



Comments.

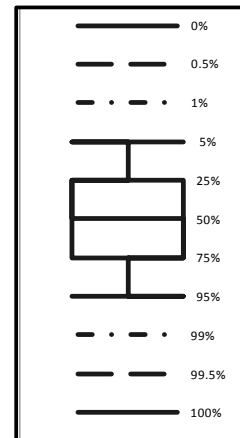
- 1 On 1 May 2017, Bloemhof Dam was full.
- 2 On 5 June 2017, Bloemhof Dam was full.
- 3 On 3 July 2017, Bloemhof Dam was full.
- 4 On 7 August 2017, actual storage was 99.1%.
- 5 On 4 September 2017, actual storage was 96.0%.
- 6 On 30 October 2017, actual storage was 86.7%.
- 7 On 27th November 2017, actual storage was 81.5%.
- 8 On 1 January 2018, actual storage was 79.7%.
- 9 On 29 January 2018, actual storage was 71.8%.
- 10 On 30 April 2018, storage was 101.8%.

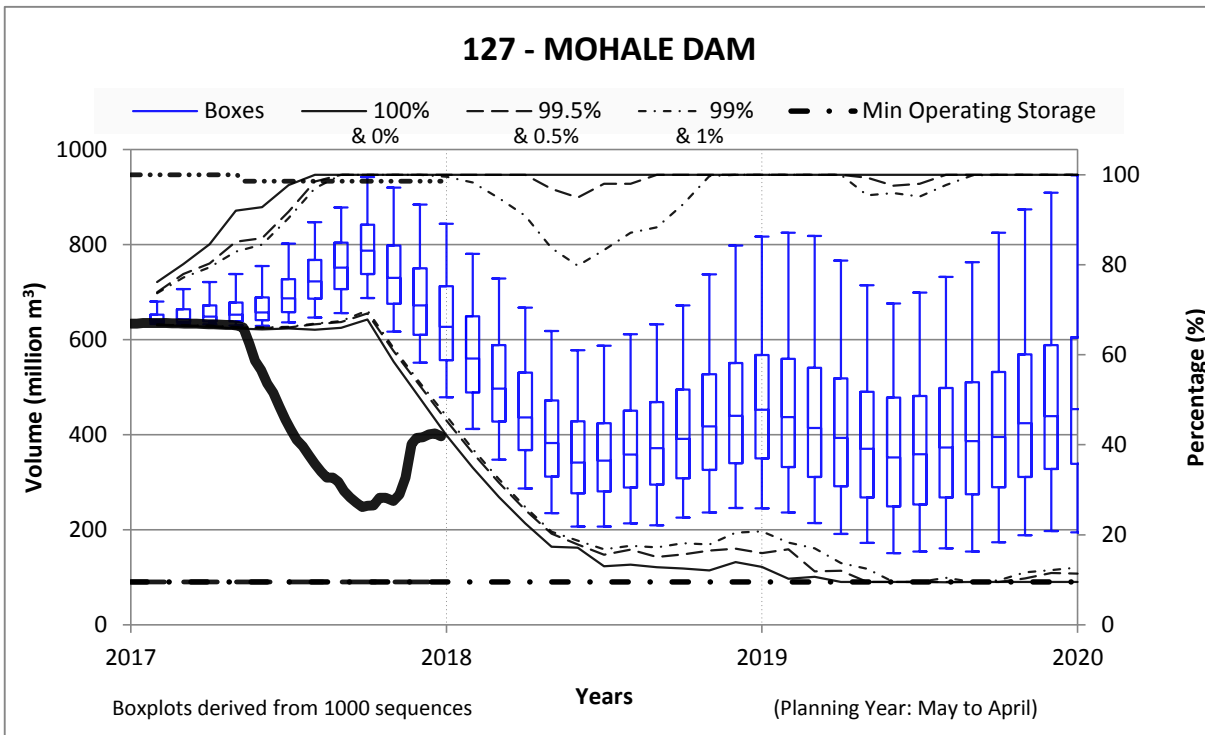




Comments:

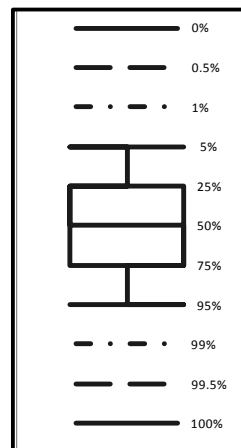
- 1 On 1 May 2017, actual storage was 59.4%.
- 2 On 5 June 2017, actual storage was 55.8%.
- 3 On 3 July 2017, actual storage was 51.8%.
- 4 On 7 August 2017, actual storage increased to 65%.
- 5 On 4 September 2017, actual storage was 43.2%.
- 6 On 30 October 2017, actual storage was 46.2%.
- 7 On 27th November 2017, actual storage was 49.3%.
- 8 On 1 January 2018, actual storage was 79.5%.
- 9 On 29 January 2018, storage was 52.9%.
- 10 On 30 April 2018, storage was 67.0%.

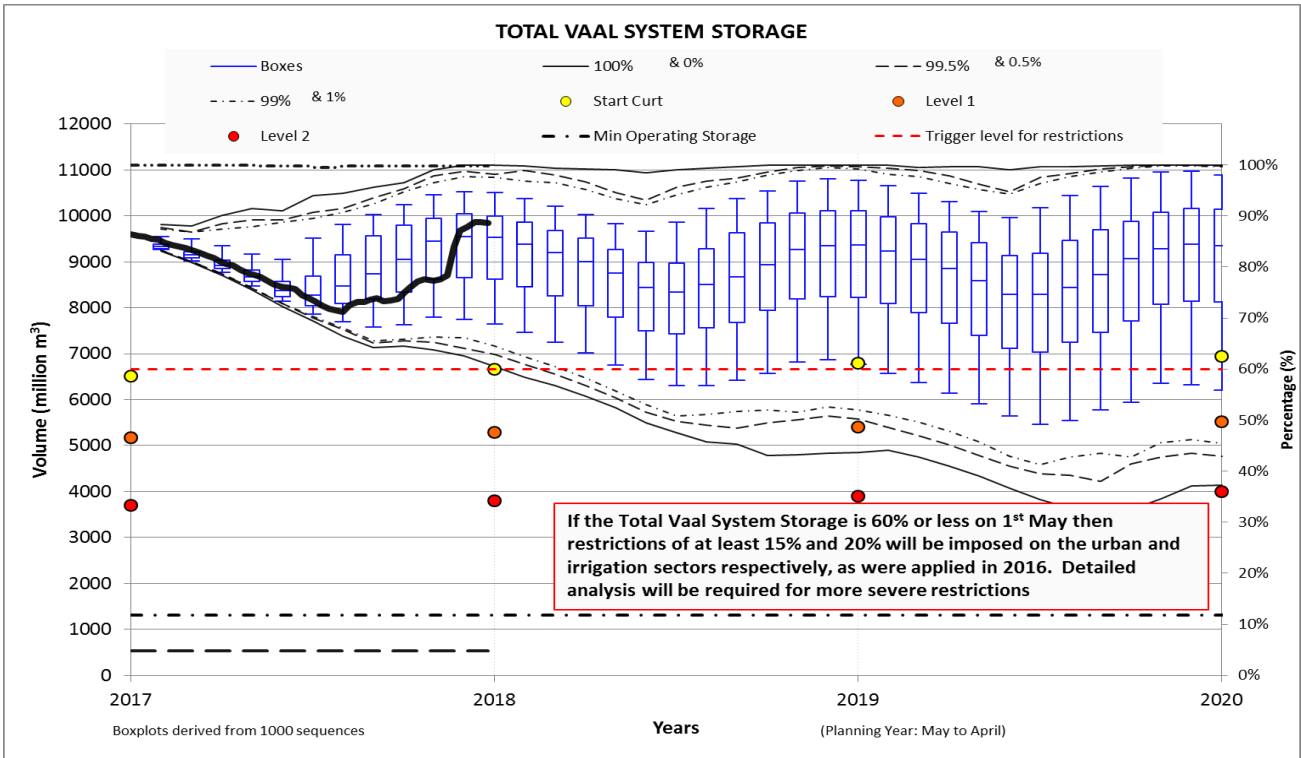




Comments:

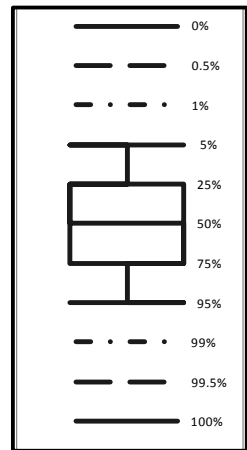
- 1 On 1 May 2017, actual storage was 66.9%.
- 2 On 5 June 2017, actual storage was 67%.
- 3 On 3 July 2017, actual storage was 66.9%.
- 4 On 7 August 2017, actual storage was 66.7%.
- 5 On 4 September 2017, actual storage was 66.5%.
- 6 On 30 October 2017, actual storage was 46.2%. The Katse-Mohale tunnel was re-open on the 8th of September 2017, 5 months earlier than the anticipated date hence the actual storage is plotting outside the projected storage.
- 7 On 27th November 2017, actual storage was 38.2%.
- 8 On 1 January 2018, actual storage was 32.3%.
- 9 On 29 January 2018, storage was 26.6%.
- 10 On 30 April 2018, storage was 36.4%.



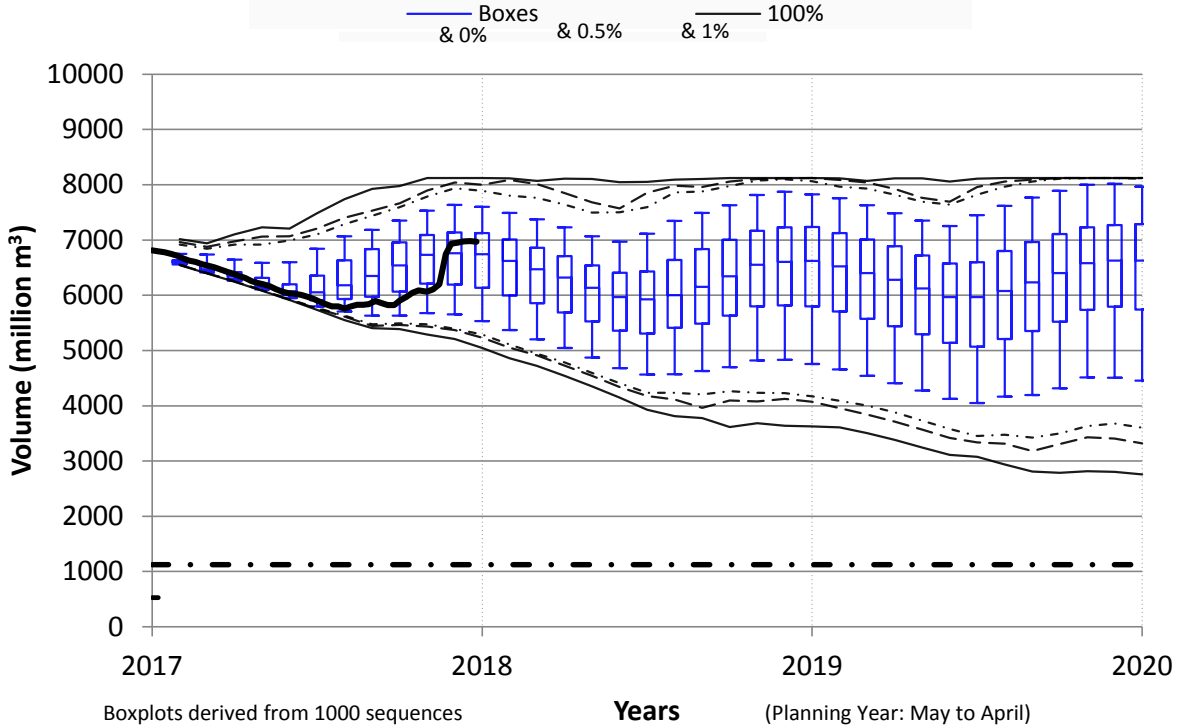


Comments:

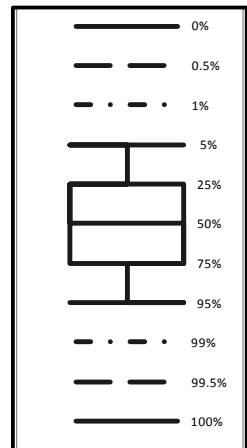
- 1 On 1 May 2017, actual storage in the Vaal system was 86.5%.
- 2 On 5 June 2017, actual storage was 84.9%.
- 3 On 3 July 2017, actual storage was 83.3%.
- 4 On 7 August 2017, actual storage was 83.9%.
- 5 On 4 September 2017, actual storage was 78.6%.
- 6 On 30 October 2017, actual storage was 74.0%.
- 7 On 27th November 2017, actual storage was 71.1%.
- 8 On 1 January 2018, actual storage was 73.7%.
- 9 On 29 January 2018, actual storage was 73.5%.
- 10 On 30 April 2018, storage was 88.8%.



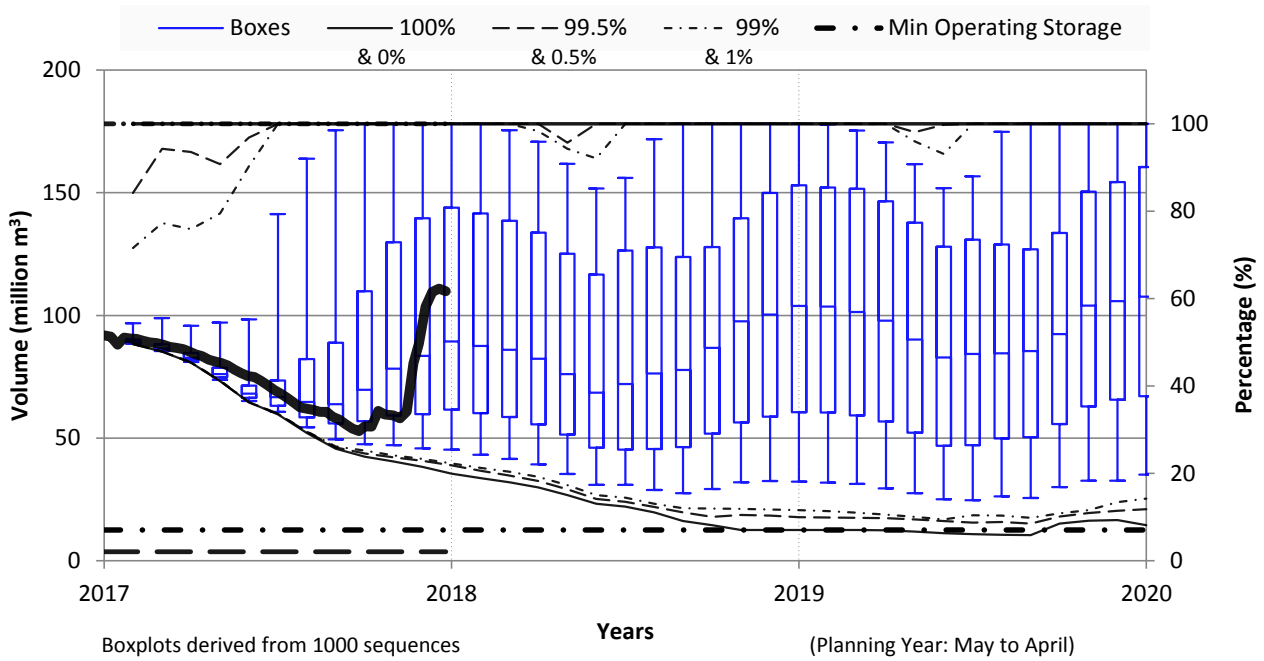
KMSV - Katse, Mohale, Sterkfontein, Vaal



- 1 On 1 May 2017, actual storage was 83.9%.
- 2 On 5 June 2017, actual storage was 82.1%.
- 3 On 3 July 2017, actual storage was 80.5%.
- 4 On 7 August 2017, actual storage was 82.6%.
- 5 On 4 September 2017, actual storage was 76.3%.
- 6 On 30 October 2017, actual storage was 73.1%.
- 7 On 27th November 2017, actual storage was 71.1%.
- 8 On 1 January 2018, actual storage was 72.0%.
- 9 On 29 January 2018, actual storage was 71.8%.
- 10 On 30 April 2018, storage was 86.0%.

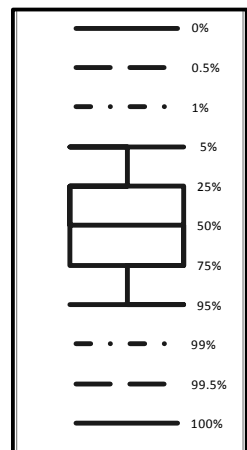


79 - ALLEMANSKRAAL DAM

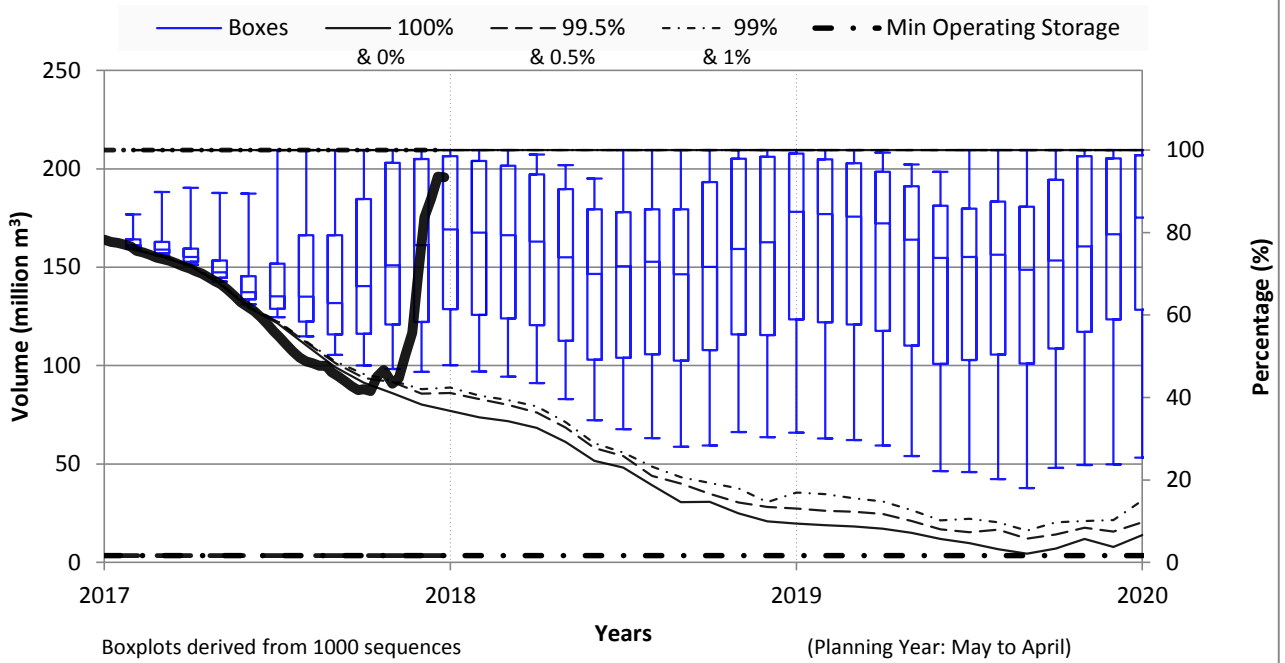


Comments:

- 1 On 1 May 2017, actual storage was 51.6%.
- 2 On 5 June 2017, actual storage was 50.7%.
- 3 On 3 July 2017, actual storage was 49.4%.
- 4 On 7 August 2017, actual storage was 47.3%.
- 5 On 4 September 2017, actual storage was 45.3%.
- 6 On 30 October 2017, actual storage was 39.1%.
- 7 On 27th November 2017, actual storage was 35.1%.
- 8 On 1 January 2018, actual storage was 33.0%.
- 9 On 29 January 2018, actual storage was 29.7%.
- 10 On 30 April 2018, storage was 60.9%.

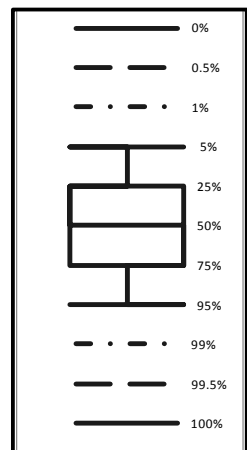


80 - ERFENIS DAM

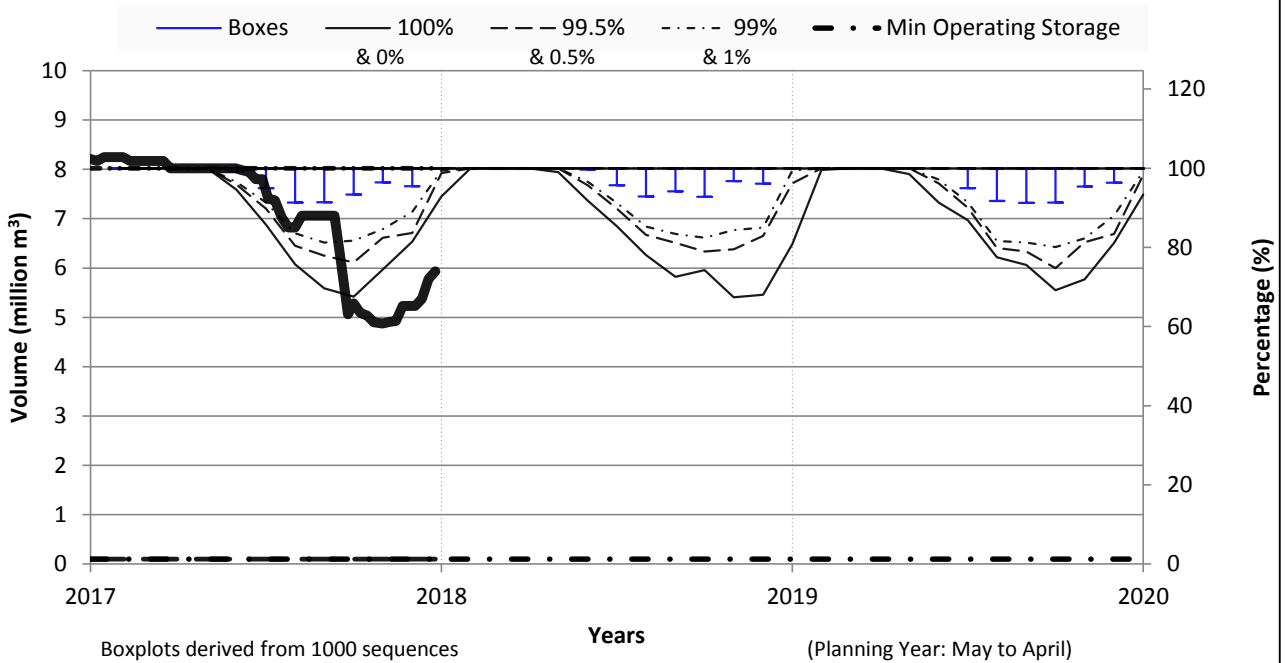


Comments:

- 1 On 1 May 2017, actual storage was 78.3%.
- 2 On 5 June 2017, actual storage was 75.6%.
- 3 On 3 July 2017, actual storage was 73.6%.
- 4 On 7 August 2017, actual storage was 70.7%.
- 5 On 4 September 2017, actual storage was 67.5%.
- 6 On 30 October 2017, actual storage was 56.0%.
- 7 On 27th November 2017, actual storage was 49.7%.
- 8 On 1 January 2018, actual storage was 46.1%.
- 9 On 29 January 2018, storage was 41.8%.
- 10 On 30 April 2018, storage was 93.3%.

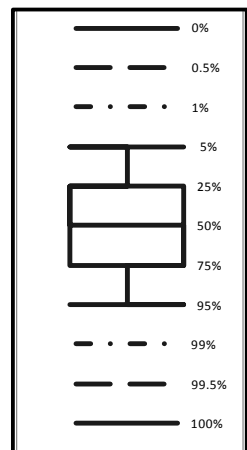


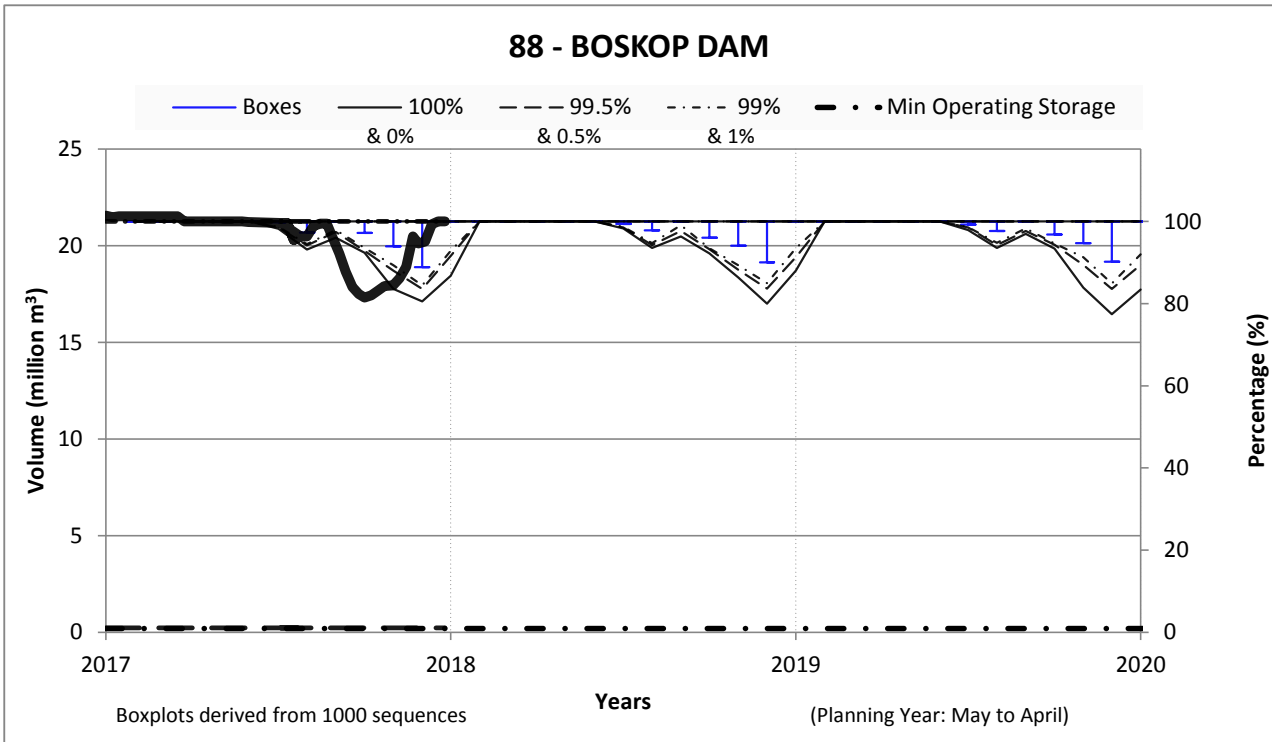
67 - KLERKSKRAAL DAM



Comments:

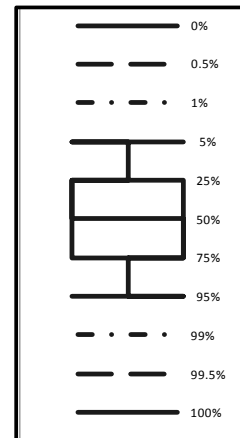
- 1 On 1 May 2017, Klerkskraal Dam was full.
- 2 On 5 June 2017, Klerkskraal Dam was full.
- 3 On 3 July 2017, Klerkskraal Dam was full.
- 4 On 7 August 2017, Klerkskraal Dam was full.
- 5 On 4 September 2017, Klerkskraal Dam was full.
- 6 On 30 October 2017, Klerkskraal Dam was 97.2 %
- 7 On 27th November 2017, actual storage was 85.1%.
- 8 On 1 January 2018, actual storage was 80.0%.
- 9 On 29 January 2018, storage was 63.1%.
- 10 On 30 April 2018, storage was 73.6%.

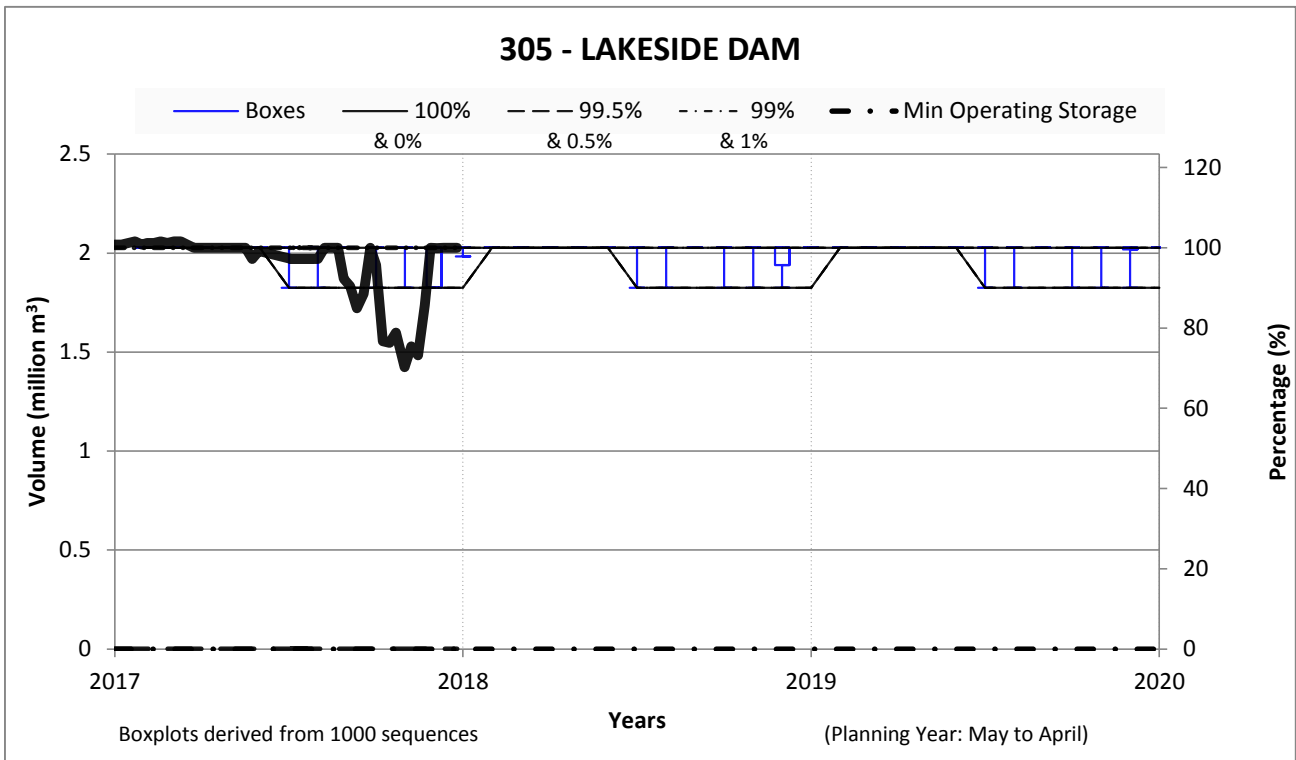




Comments:

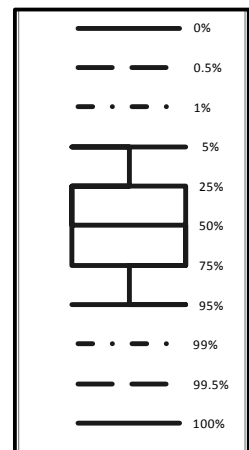
- 1 On 1 May 2017, Boskop Dam was full.
- 2 On 5 June 2017, Boskop Dam was full.
- 3 On 3 July 2017, Boskop Dam was full.
- 4 On 7 August 2017, Boskop Dam was full.
- 5 On 4 September 2017, Boskop Dam was full.
- 6 On 30 October 2017, Boskop Dam was full.
- 7 On 27th November 2017, actual storage was 96.3%.
- 8 On 1 January 2018, actual storage was 96.2%.
- 9 On 29 January 2018, storage was 82.4%
- 10 On 30 April 2018, storage was 100.9%.



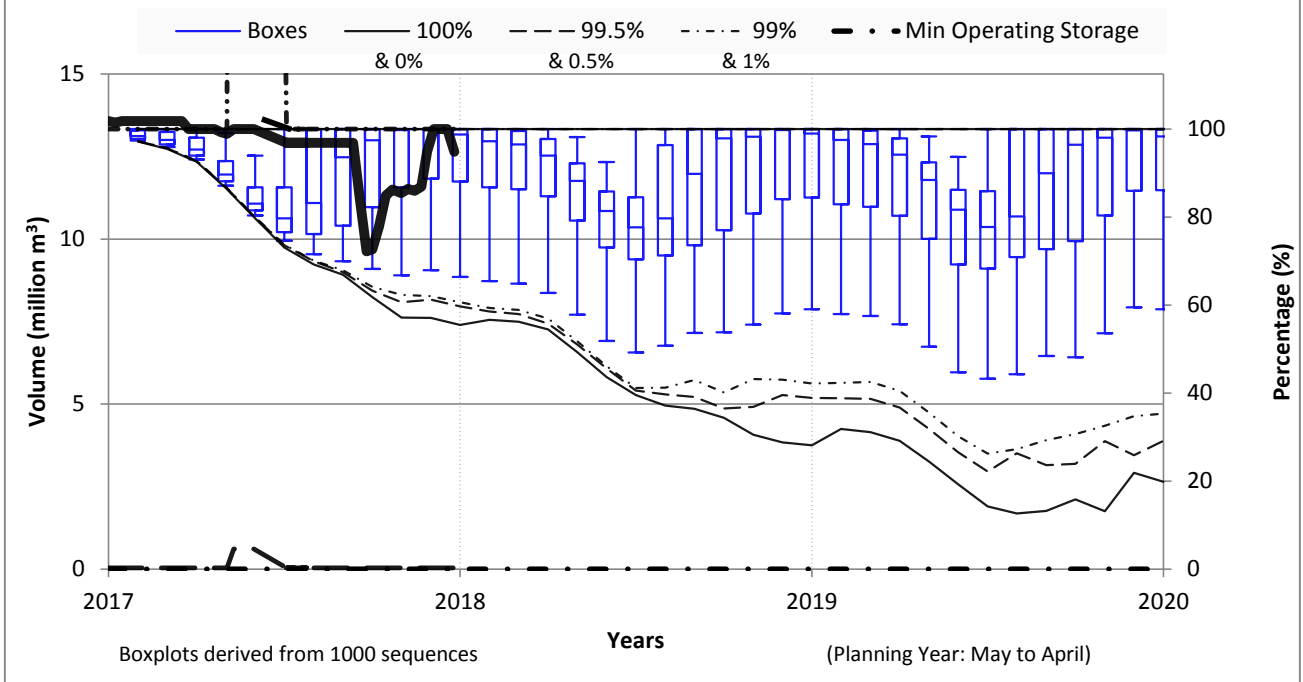


Comments:

- 1 On 1 May 2017, Lakeside Dam was full.
- 2 On 5 June 2017, Lakeside Dam was full.
- 3 On 3 July 2017, Lakeside Dam was full.
- 4 On 7 August 2017, Lakeside Dam was full.
- 5 On 4 September 2017, Lakeside Dam was full.
- 6 On 30 October 2017, actual storage was 97.2%.
- 7 On 27th November 2017, actual storage was 97.2%.
- 8 On 1 January 2018, actual storage was 92.2%.
- 9 On 29 January 2018, storage was 100.0%
- 10 On 30 April 2018, storage was 100.0%.

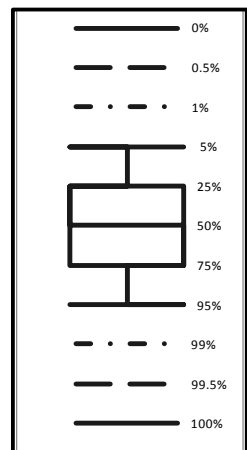


69 - KLIPDRIFT DAM

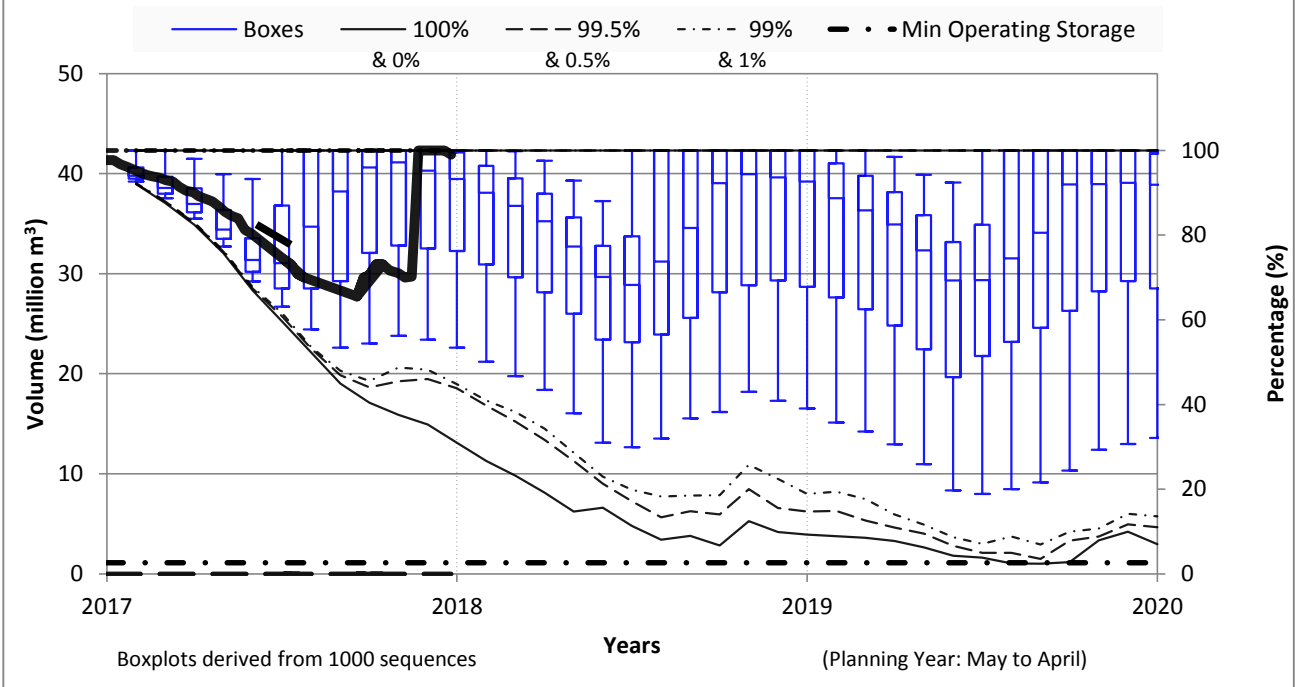


Comments:

- 1 On 1 May 2017, Klipdrift Dam was full.
- 2 On 5 June 2017, Klipdrift Dam was full.
- 3 On 3 July 2017, Klipdrift Dam was full.
- 4 On 7 August 2017, Klipdrift Dam was full.
- 5 On 4 September 2017, actual storage was 99.0%.
- 6 On 30 October 2017, actual storage was 96.8%.
- 7 On 27th November 2017, actual storage was 96.9%.
- 8 On 1 January 2018, actual storage was 96.9%.
- 9 On 29 January 2018, storage was 72.3%
- 10 On 30 April 2018, storage was 94.8%.



71 - KOPPIES DAM



Comments:

- 1 On 1 May 2017, actual storage was 97.7%.
- 2 On 5 June 2017, actual storage was 94.9%.
- 3 On 3 July 2017, actual storage was 93%.
- 4 On 7 August 2017, actual storage was 89.2%.
- 5 On 4 September 2017, actual storage was 85.5%.
- 6 On 30 October 2017, actual storage was 75.9%.
- 7 On 27th November 2017, actual storage was 69.9%.
- 8 On 1 January 2018, actual storage was 64.2%.
- 9 On 29 January 2018, actual storage was 73.1%.
- 10 On 30 April 2018, storage was 99.0%.

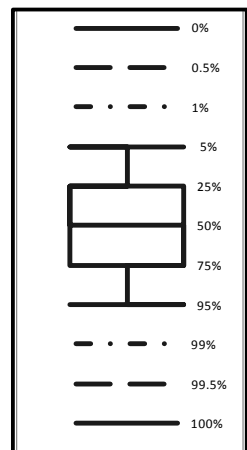


Table A.1: Comparison of Actual and Target transfers during Planning Year 2017/2018

Description	Units	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	Annual Transfer
Modelled (Lower Quartile)	Million m ³ /m	2.39	1.90	1.86	1.42	1.15	1.19	3.89	4.02	4.02	3.66	4.02	3.89	33.41
	Cumulative	2.39	4.30	6.16	7.58	8.73	9.92	13.81	17.83	21.85	25.51	29.53	33.41	
Modelled (Median)	m ³ /s	0.89	0.79	0.69	0.53	0.45	0.45	1.50	1.50	5.81	7.15	1.50	1.50	1.87
	Million m ³ /m	2.39	2.04	1.86	1.42	1.15	1.19	3.89	4.02	15.55	17.45	4.02	3.89	58.87
Actual	Cumulative	2.39	4.43	6.29	7.71	8.86	10.06	13.95	17.96	33.51	50.96	54.98	58.87	
	m ³ /s	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	2.44	66.74	0.00	6.61
	Million m ³ /m	2.68	2.59	2.68	2.68	2.52	2.68	2.59	2.68	2.68	5.96	178.75		208.48
	Cumulative	2.68	5.27	7.95	10.63	13.14	15.82	18.41	21.09	23.77	29.73	208.48		

Fig A-1: Heyshope to Morgenstond transfer

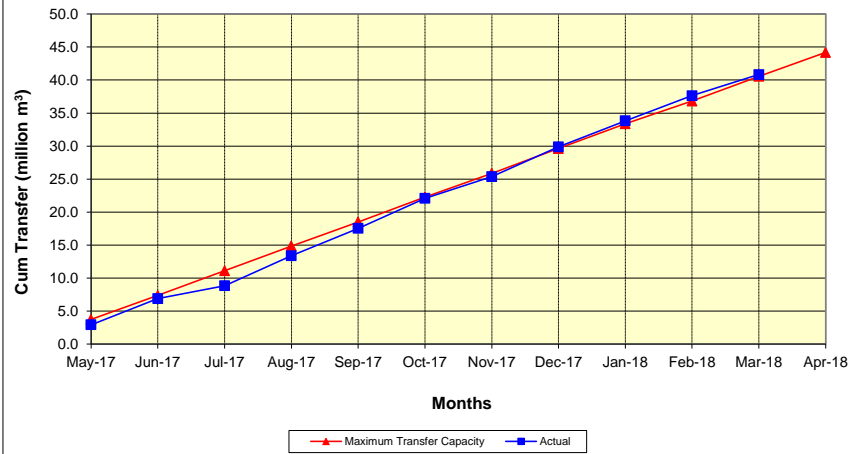


Fig A-2: Morgenstond to Jericho transfer

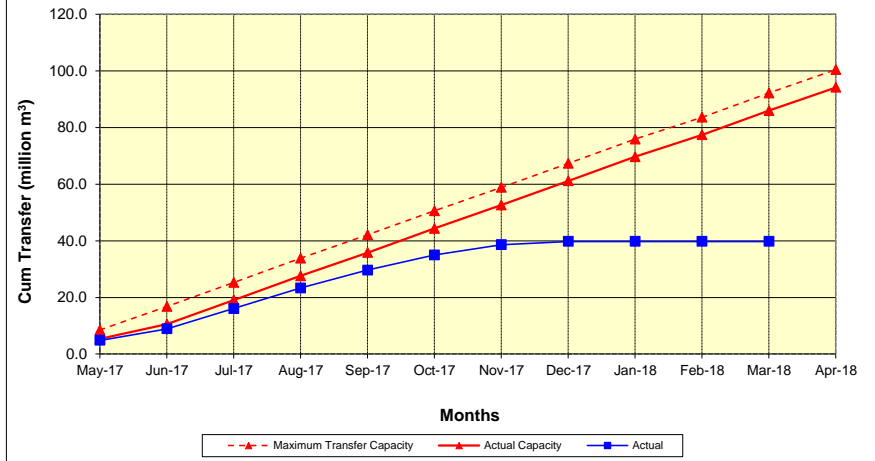


Fig A-3: Westoe to Jericho transfer

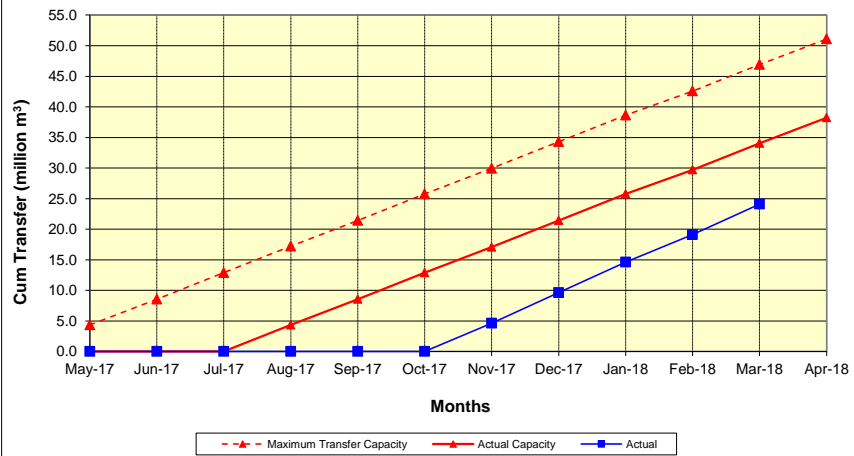


Fig A-4: Jericho (Onverwacht) to Nooitgedacht transfer

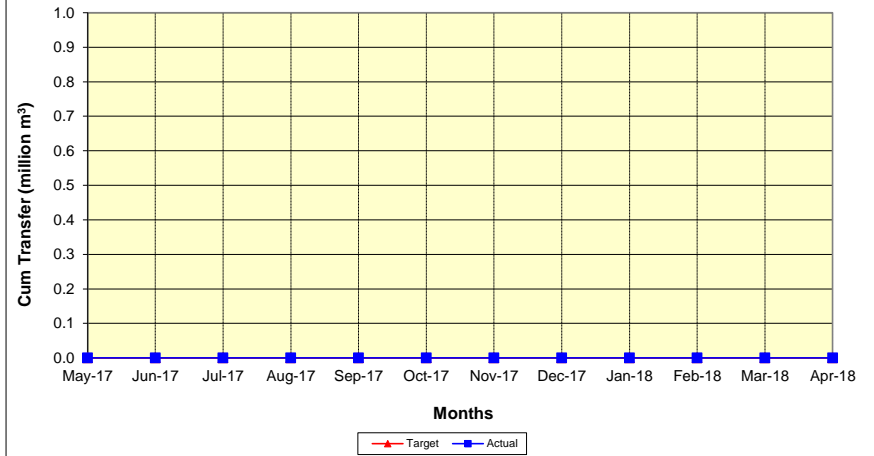


Fig A-5: Jericho to Camden, Kriel, Kendal & Others (excl. Nooitgedacht)

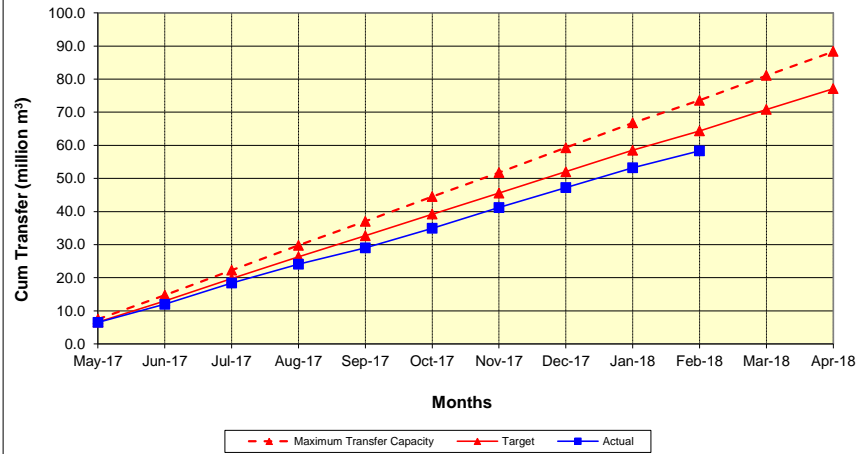


Fig A-6: Grootdraai/VRESAP transfer to Eskom Power Stations

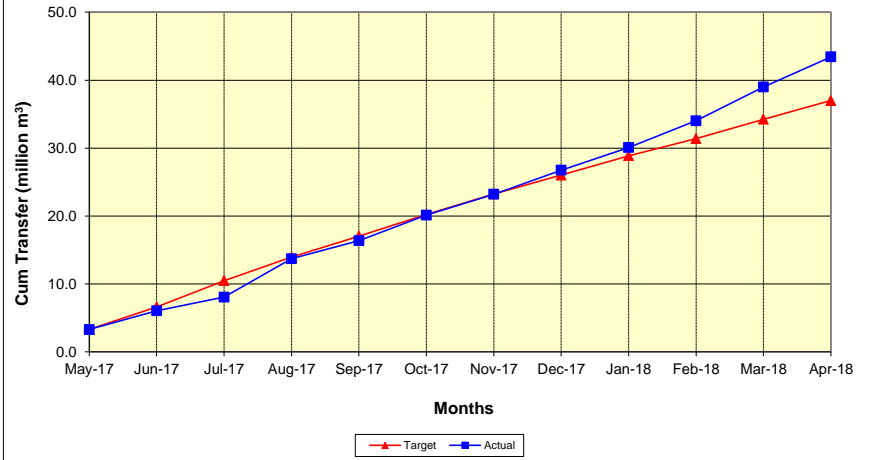


Fig A-7: Vlakfontein Canal (Grootdraai Dam to Knoppiesfontein)

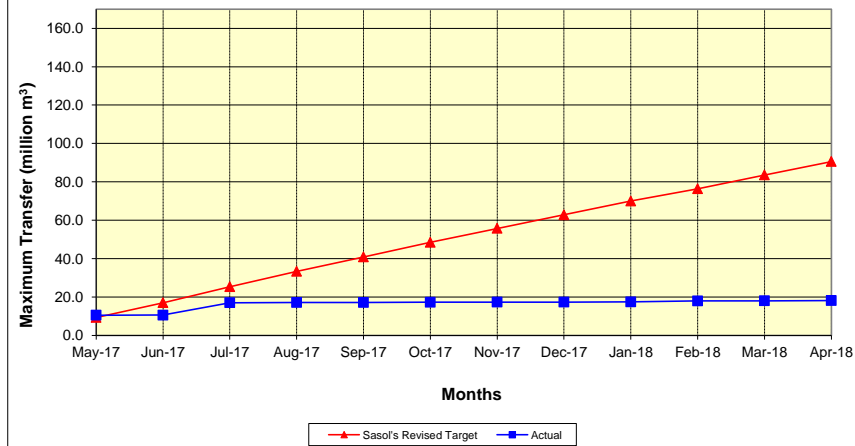


Fig A-8: VRESAP Pipeline (Vaal Dam transfer to Knoppiesfontein)

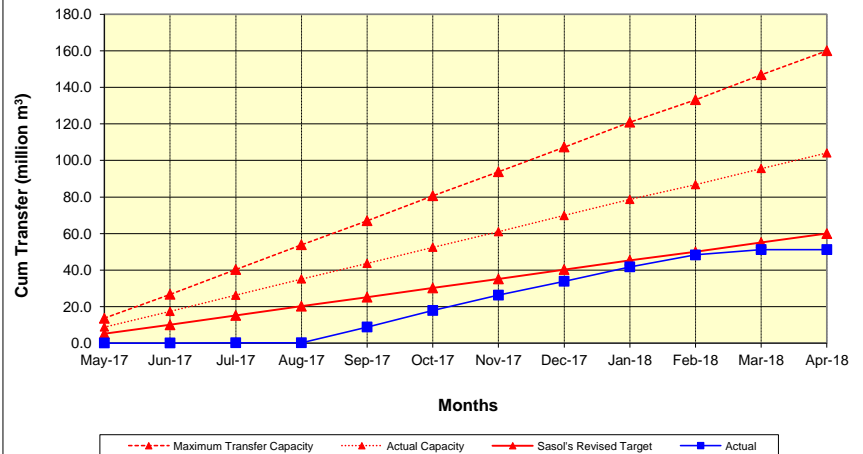


Fig A-9: Transfer from Vaal (Grootdraai/VRESAP) to Duvha PS

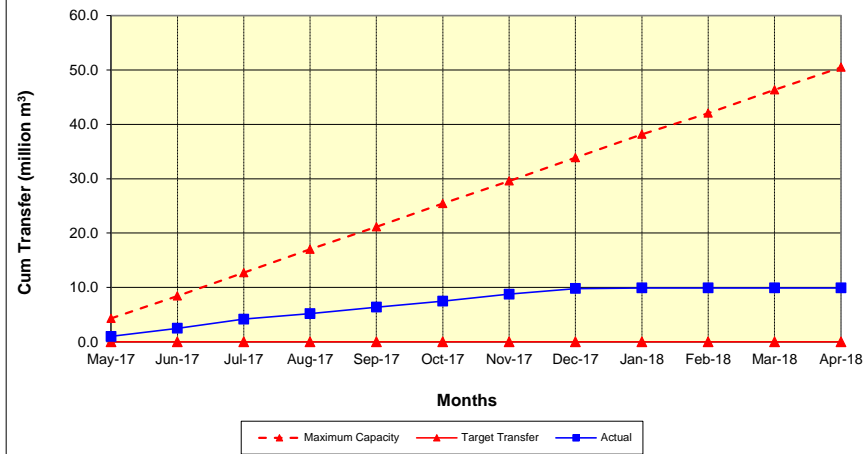


Fig A-10: Heyshope to Grootdraai transfer

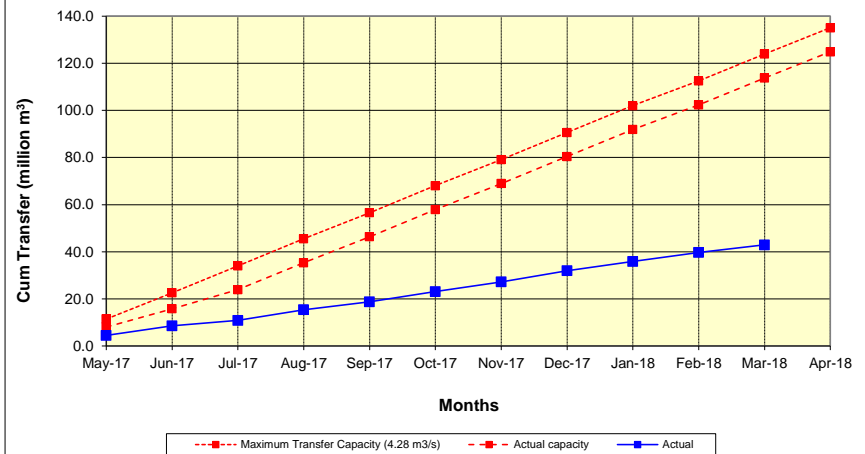


Fig A-11: Zaaihoek to Grootdraai transfer

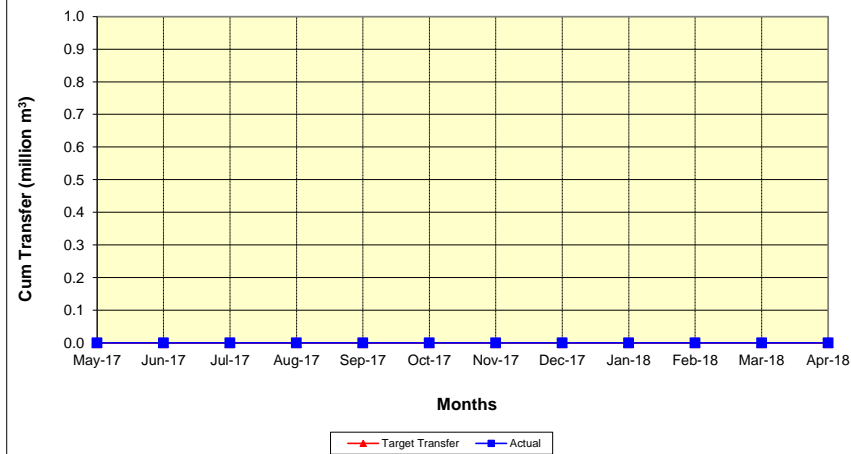


Fig A-12: Thukela-Vaal Transfer (Woodstock to Sterkfontein)

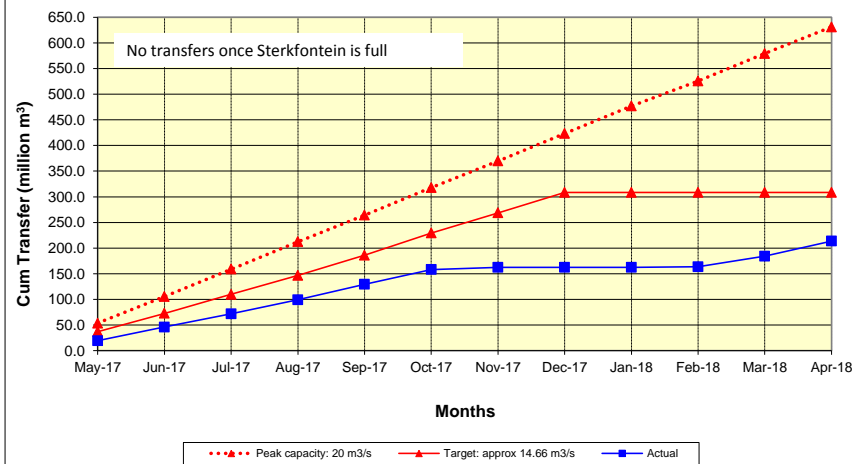


Fig A-13: Pumping from Vygeboom to Bosloop

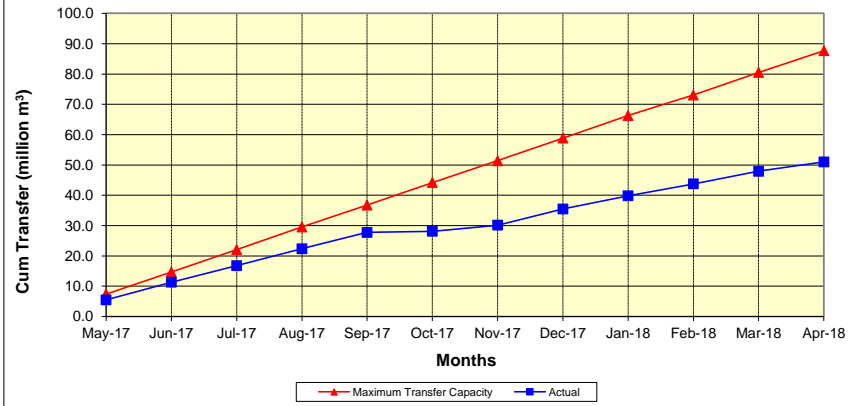


Fig A-14: Pumping from Gemsbokhoek to Bosloop

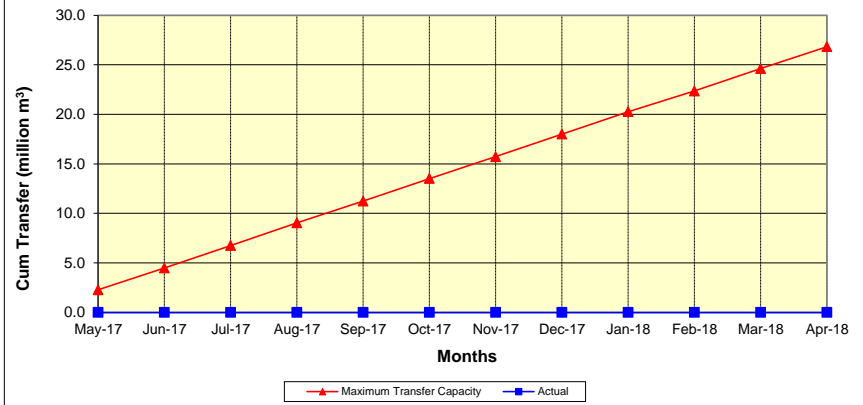


Fig A-15: Pumping from Bosloop to Wintershoek

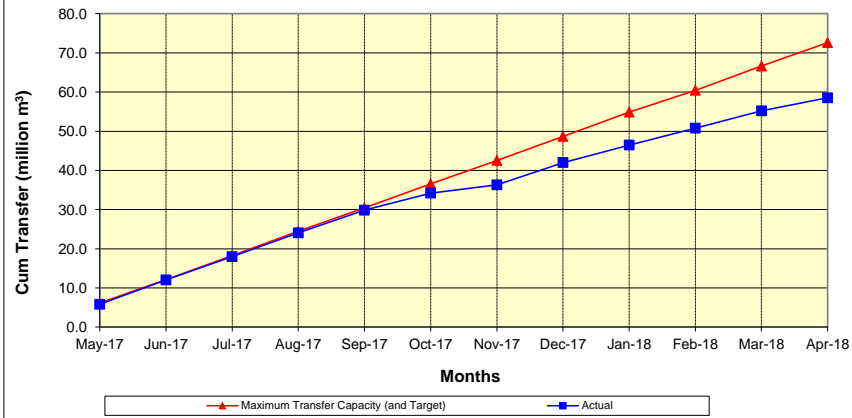


Fig A-16: Pumping from Wintershoek to Piccadilly

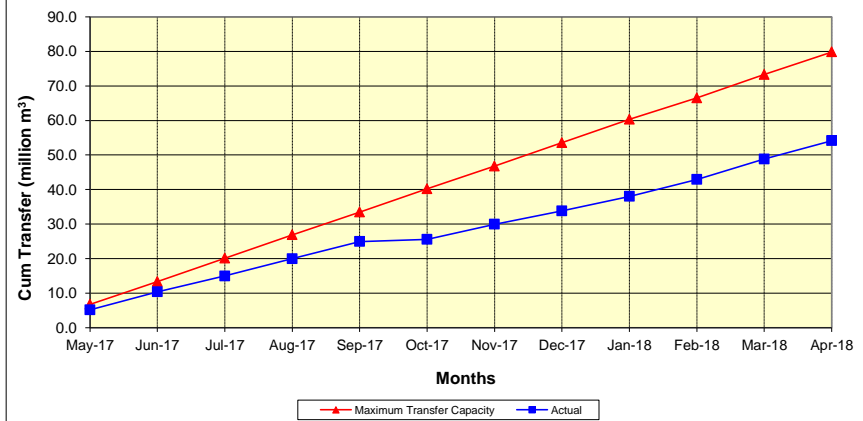


Fig A-17: Pumping from Nooitgedacht to Klipfontein

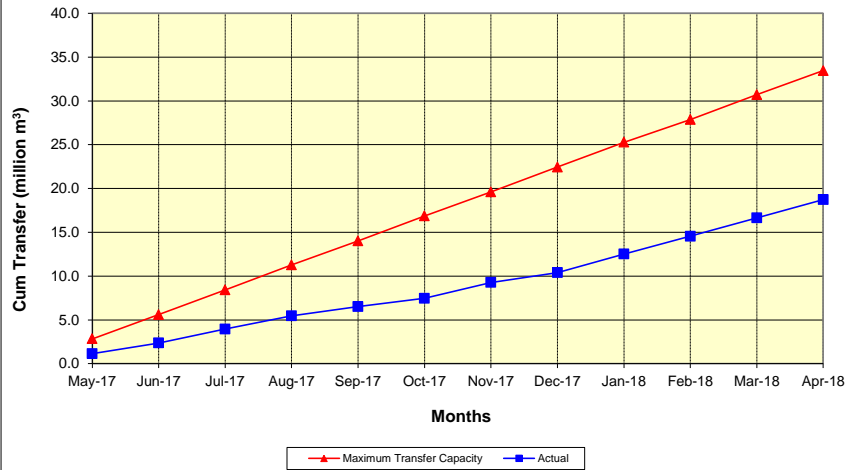


Fig A-18: Transfer from Lesotho

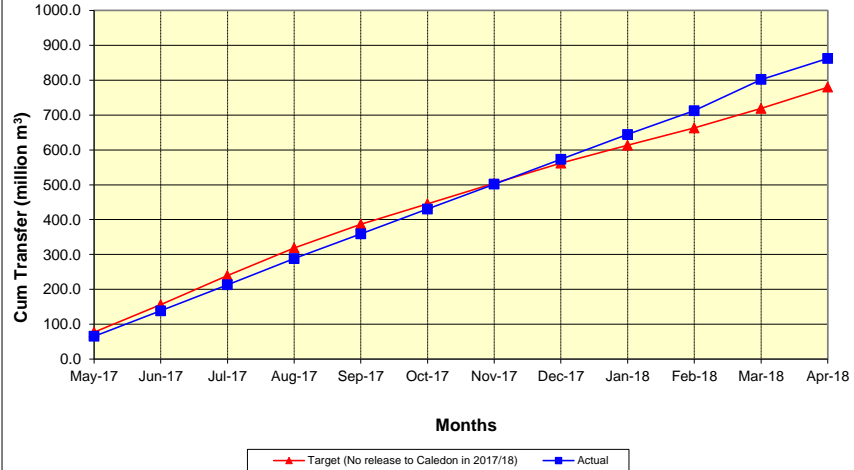


Fig A-19: Releases from Sterkfontein Dam

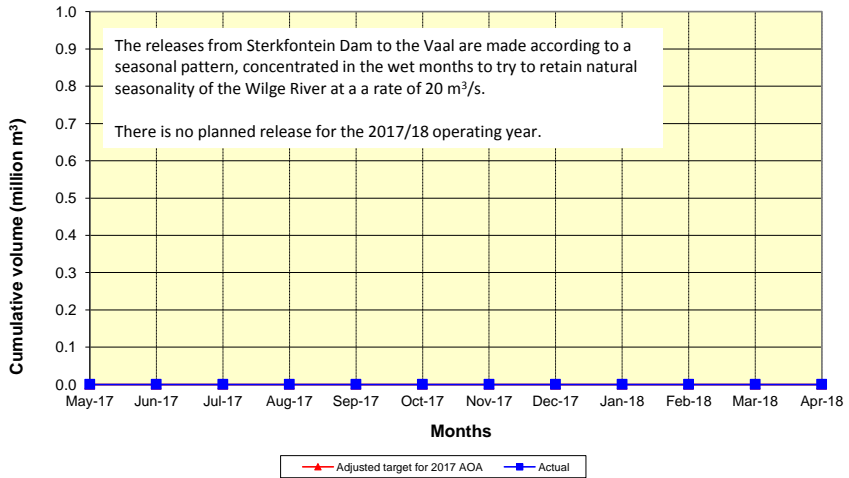


Fig A-20: Compensation releases from Vygeboom Dam



Fig A-21: Compensation Releases from Westoe Dam

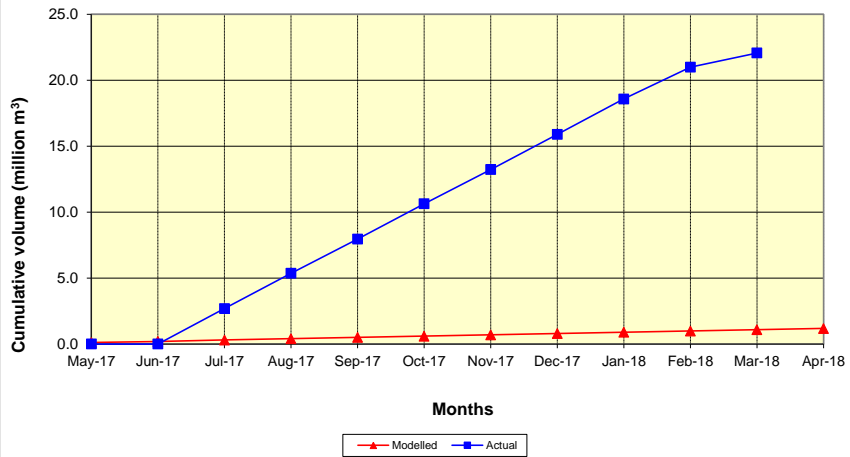


Fig A-22: Compensation Releases from Jericho Dam

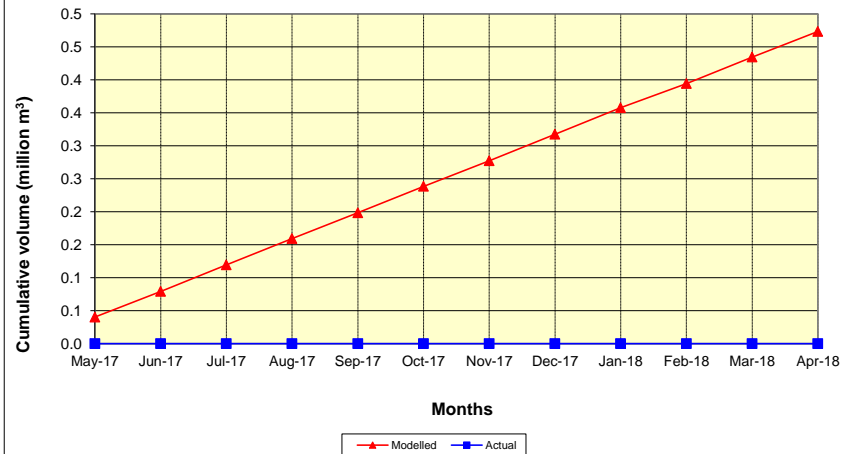


Fig A-23: Compensation Releases from Morgenstond Dam

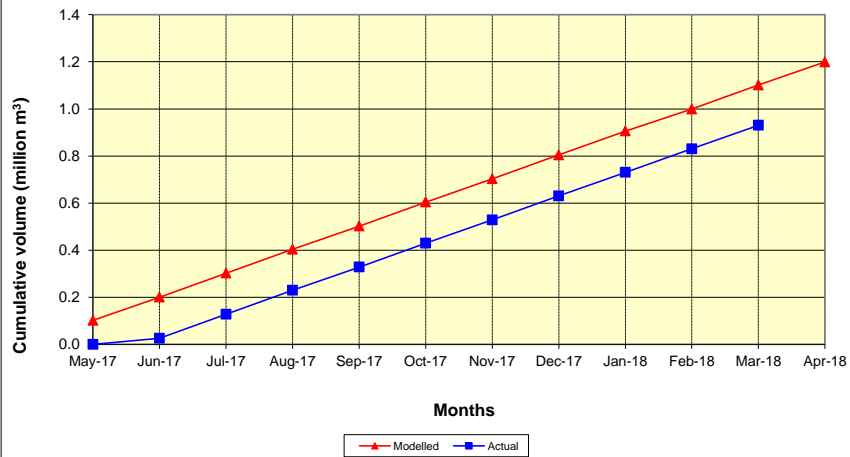


Fig A-24: Compensation Releases from Heyshope Dam

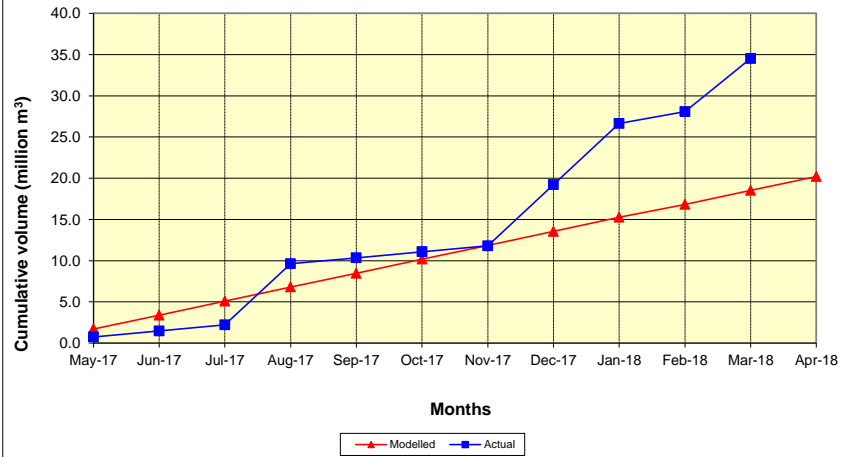


Fig A-25: Releases from Nooitgedacht Dam

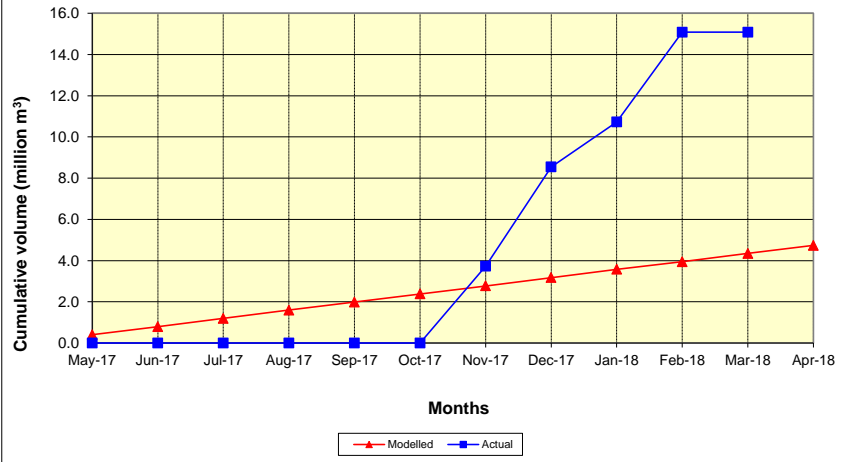


Fig A-26: Releases from Grootdraai Dam

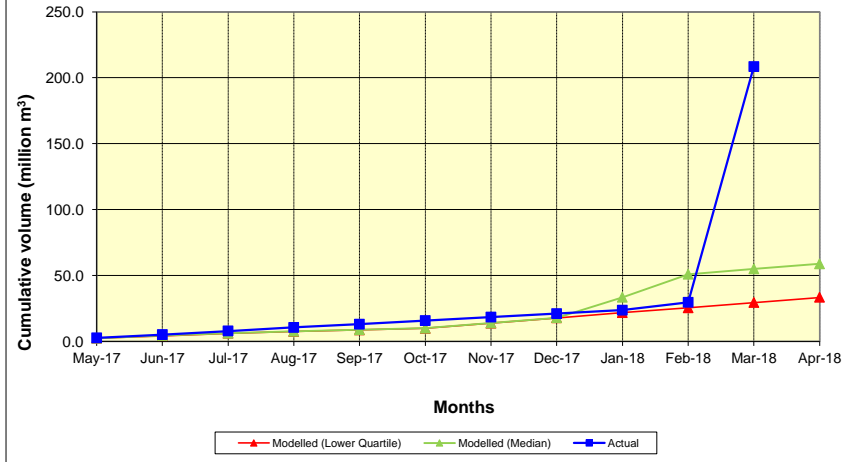


Figure Nr.	Comments on transfers
	It is important to note that revised operating rules for the 2017/2018 planning period were approved at the SOF meeting held on 10 July 2017.
A-1,2,3,4,5	The transfers in the Usutu are made according to the operating rule. All transfers up to end of January are at or below the maximum capacity because the dam levels have not reached the thresholds that trigger the rules for transfer.
A-6	The actual cumulative transfer at the end of April 2018 from the Vaal (Grootdraai and Vaal dams) to Eskom Power stations is above the target.
A-7	Actual cumulative transfer through Vlakfontein Canal is below target in April 2018.
A-8	The cumulative transfer volume up to the end of April 2018 is below the minimum target.
A-9	The target for 2017/18 AOA is zero. The actual cumulative transfers from the Vaal to Duvha PS are above the target in April 2018.
A-10	The operating rule for 2017/18 AOA is to transfer from Heyshope to maintain Grootdraai at 90% capacity. The actual cumulative transfers from Heyshope to Grootdraai for March 2018 were below the actual capacity however, Grootdraai Dam is 100% full.
A-11	The target transfer from Zaaihoek to Grootdraai is zero for the 2017/18 operating year.
A-12	The target transfer from Thukela to Vaal is to transfer until Sterkfontein is full at an average rate of 14.4 m ³ /s. The actual cumulative transfer up to the end of April 2018 was below the target.
A-13-17	Actual cumulative transfers from Vygeboom and Gembokhoek are below the maximum capacity values by end of April 2018.
A-18	The actual cumulative transfer from Lesotho is above the target in April 2018.
A-19	There are no releases planned from Sterkfontein Dam for the 2017/18 operating year.
A-20	The cumulative compensation releases from Vygeboom Dam are below target in March 2018.
A-21	Compensation releases from Westoe Dam in March 2018 is above the target.
A-22	There have been no compensation releases from Jericho Dam from May 2017 to April 2018.
A-23	The compensation releases from Morgenstond Dam from May 2017 to March 2018 are below the modelled values.
A-24	The compensation releases from Heyshope Dam in March 2018 are above the modelled values.
A-25	The releases from Nootgedacht Dam are above target in March 2018.
A-26	The actual cumulative releases from Grootdraai Dam are above the modelled values for March 2018 .

Table A-2: Comparison of Actual and Target requirements during Planning Year 2017/2018

Description	Units	May-17 31.00	Jun-17 30.00	Jul-17 31.00	Aug-17 31.00	Sep-17 30.00	Oct-17 31.00	Nov-17 30.00	Dec-17 31.00	Jan-18 31.00	Feb-18 28.25	Mar-18 31.00	Apr-18 30.00	Annual 365.25
Rand Water: projected requirement includes Sasolburg and Sasol Secunda intake of 25ML/d but excludes authorised users (i.e. Eskom, Iscor, Sasol Sasolburg, Mittal Steel and Small users)														
Projected Requirement 2017 (Gross requirement)	m ³ /s	53.716	55.021	51.285	52.676	56.161	56.945	55.387	55.680	52.962	54.063	56.612	50.822	54.28
	Million m ³ /m	143.87	142.62	137.36	141.09	145.57	152.52	143.56	149.13	141.85	131.96	151.63	131.73	1712.9
	Cumulative	143.87	286.49	423.85	564.94	710.51	863.03	1006.59	1155.73	1297.58	1429.53	1581.16	1712.90	
Actual	m ³ /s	48.909	50.099	46.714	51.854	48.700	53.670	51.212	48.683	51.941	50.361	51.675	47.000	50.075
	Million m ³ /m	131.00	129.86	125.12	138.89	126.23	143.75	132.74	130.39	139.12	122.92	138.41	121.82	1580.25
	Cumulative	131.00	260.85	385.97	524.86	651.09	794.84	927.58	1057.98	1197.10	1320.02	1458.42	1580.25	
Difference: actual from projected	Monthly	-9%	-9%	-9%	-2%	-13%	-6%	-8%	-13%	-2%	-7%	-9%	-8%	
Difference: actual from projected	Cumulative	-8.9%	-8.9%	-8.9%	-7.1%	-8.4%	-7.9%	-7.8%	-8.5%	-7.7%	-7.7%	-7.8%	-7.7%	
Eskom requirement distribution														
		1.02	1.04	1.11	1.04	1.01	1.01	0.99	0.94	0.96	0.94	0.96	0.96	
Projected Requirement 2017	m ³ /s	10.894	11.478	11.856	11.108	11.147	10.788	10.926	10.040	10.254	11.017	10.254	10.595	10.88
	Million m ³ /m	29.18	29.75	31.75	29.75	28.89	28.89	28.32	26.89	27.46	26.89	27.46	27.46	343.3
	Cumulative	29.18	58.93	90.69	120.44	149.33	178.22	206.55	233.44	260.90	287.79	315.25	342.72	
Actual	m ³ /s	9.631	9.674	9.159	8.895	9.039	9.050	9.174	8.139	8.796	9.308	9.633	9.059	9.127
	Million m ³ /m	25.79	25.08	24.53	23.82	23.43	24.24	23.78	21.80	23.56	22.72	25.80	23.48	288.04
	Cumulative	25.79	50.87	75.40	99.23	122.66	146.90	170.68	192.48	216.04	238.76	264.56	288.04	
Difference: actual from projected	Monthly	-12%	-16%	-23%	-20%	-19%	-16%	-16%	-19%	-14%	-16%	-6%	-15%	
Difference: actual from projected	Cumulative	-12%	-14%	-17%	-18%	-18%	-18%	-17%	-18%	-17%	-17%	-16%	-16%	
Sasol Sasolburg														
Projected Requirement 2017	m ³ /s	0.748	0.748	0.748	0.748	0.748	0.748	0.748	0.748	0.748	0.748	0.748	0.748	0.75
	Million m ³ /m	2.00	1.94	2.00	2.00	1.94	2.00	1.94	2.00	2.00	1.83	2.00	1.94	23.6
	Cumulative	2.00	3.94	5.94	7.95	9.89	11.89	13.83	15.83	17.83	19.66	21.66	23.60	
Actual	m ³ /s	0.736	0.689	0.665	0.732	0.795	0.739	0.733	0.724	0.736	0.737	0.698	0.737	0.727
	Million m ³ /m	1.97	1.79	1.78	1.96	2.06	1.98	1.90	1.94	1.97	1.80	1.87	1.91	22.93
	Cumulative	1.97	3.76	5.54	7.50	9.56	11.54	13.44	15.38	17.35	19.15	21.02	22.93	
Difference: actual from projected	Monthly	-2%	-8%	-11%	-2%	6%	-1%	-2%	-3%	-2%	-1%	-7%	-1%	
Difference: actual from projected	Cumulative	-2%	-5%	-7%	-6%	-3%	-3%	-3%	-3%	-3%	-3%	-3%	-3%	
Sasol Secunda														
Projected Requirement 2017	m ³ /s	2.655	2.655	2.655	2.655	2.655	2.655	2.655	2.655	2.655	2.655	2.655	2.655	2.66
	Million m ³ /m	7.11	6.88	7.11	7.11	6.88	7.11	6.88	7.11	7.11	6.48	7.11	6.88	83.8
	Cumulative	7.11	14.00	21.11	28.22	35.10	42.22	49.10	56.21	63.32	69.80	76.92	83.80	
Actual	m ³ /s	2.613	2.861	2.709	2.766	2.604	2.569	2.813	2.591	2.841	2.950	2.472	2.496	2.688
	Million m ³ /m	7.00	7.42	7.26	7.41	6.75	6.88	7.29	6.94	7.61	7.20	6.62	6.47	84.84
	Cumulative	7.00	14.41	21.67	29.08	35.83	42.71	50.00	56.94	64.55	71.75	78.37	84.84	
Difference: actual from projected	Monthly	-2%	8%	2%	4%	-2%	-3%	6%	-2%	7%	11%	-7%	-6%	
Difference: actual from projected	Cumulative	-2%	3%	3%	3%	2%	1%	2%	1%	2%	3%	2%	1%	
Vaalharts														
Projected Requirement 2017	m ³ /s	6.710	5.860	8.080	6.502	21.565	20.131	12.532	14.874	20.505	18.952	14.461	7.154	17.16
	Million m ³ /m	17.97	15.19	21.64	17.42	55.90	53.92	32.48	39.84	54.92	46.26	38.73	18.54	541.5
	Cumulative	17.97	33.16	54.80	72.22	128.12	182.04	214.52	254.36	309.28	355.54	394.27	412.81	
Actual Use	m ³ /s	4.723	5.212	7.807	8.576	5.204	9.745	10.069	9.745	10.865	12.414	12.582	13.194	9.162
	Million m ³ /m	12.65	13.51	20.91	22.97	13.49	26.10	26.10	26.10	29.10	30.30	33.70	34.20	289.13
	Cumulative	12.65	26.16	47.07	70.04	83.53	109.63	135.73	161.83	190.93	221.23	254.93	289.13	
Vaalharts Canal (C9H018)	Million m ³ /m	14.60	22.00	22.80										
	Cumulative	14.60	36.60	59.40										
Difference: actual from projected	Monthly	42%	12%	3%	-24%	314%	107%	24%	53%	89%	53%	15%	-46%	
Difference: actual from projected	Cumulative	42%	27%	16%	3%	53%	66%	58%	57%	62%	61%	55%	43%	
MidVaal Water Company														
Projected Requirement 2017	m ³ /s	1.469	1.469	1.469	1.469	1.469	1.469	1.469	1.469	1.469	1.469	1.469	1.469	1.47
	Million m ³ /m	3.93	3.81	3.93	3.93	3.81	3.93	3.81	3.93	3.93	3.59	3.93	3.81	46.4
	Cumulative	3.93	7.74	11.68	15.61	19.42	23.35	27.16	31.10	35.03	38.62	42.55	46.36	
Actual Use	m ³ /s	1.201	1.426	1.396	1.394	1.426	1.337	1.578	1.445	1.452	1.673	0.000	0.000	1.191
	Million m ³ /m	3.22	3.70	3.74	3.73	3.70	3.58	4.09	3.87	3.89	4.08			37.60
	Cumulative	3.22	6.91	10.65	14.39	18.08	21.66	25.75	29.62	33.51	37.60			
Difference: actual from projected	Monthly	-18%	-3%	-5%	-5%	-3%	-9%	7%	-2%	-1%	14%	-100%	-100%	
Difference: actual from projected	Cumulative	0.22	0.12	0.10	0.09	0.07	0.08	0.05	0.05	0.05	0.03	#DIV/0!	#DIV/0!	
Sedibeng Water (Balkfontein only)														
Projected Requirement 2017	m ³ /s	2.291	2.788	2.060	2.025	2.622	2.182	2.342	2.271	2.276	2.502	2.284	2.365	2.33
	Million m ³ /m	6.13	7.23	5.52	5.42	6.80	5.85	6.07	6.08	6.09	6.11	6.12	6.13	73.5
	Cumulative	6.13	13.36	18.88	24.30	31.10	36.94	43.01	49.10	55.19	61.30	67.42	73.55	
Actual Use	m ³ /s	2.643	2.674	2.087	2.356	2.160	2.102	2.647	1.759	2.852	2.343	2.341	1.806	2.314
	Million m ³ /m	7.08	6.93	5.59	6.31	5.60	5.63	6.86	4.71	7.64	5.72	6.27	4.68	73.02
	Cumulative	7.08	14.01	19.60	25.91	31.51	37.14	44.00	48.71	56.35	62.07	68.34	73.02	
Difference: actual from projected	Monthly	15%	-4%	1%	16%	-18%	-4%	13%	-23%	25%	-6%	2%	-24%	
Difference: actual from projected	Cumulative	-0.13	-0.05	-0.04	-0.06	-0.01	-0.01	-0.02	0.01	-0.02	-0.01	-0.01	0.01	

Mittal (Iscor)														
Projected Requirement 2017	m ³ /s	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.27
	Million m ³ /m	0.73	0.70	0.73	0.73	0.70	0.73	0.70	0.73	0.73	0.66	0.73	0.70	8.6
	Cumulative	0.73	1.43	2.16	2.88	3.59	4.31	5.02	5.74	6.47	7.13	7.86	8.56	
Actual use (from Arcelor Mittal)	m ³ /s	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Million m ³ /m													0.00
	Cumulative	0.00	0.00	0.00	0.00									
Actual use (from RW meters)	m ³ /s	0.234	0.250	0.221	0.273	0.269	0.235	0.247	0.250	0.261	0.229	0.223	0.208	0.242
	Million m ³ /m	0.626	0.649	0.592	0.730	0.696	0.630	0.640	0.670	0.700	0.560	0.597	0.539	7.63
	Cumulative	0.63	1.27	1.87	2.60	3.29	3.92	4.56	5.23	5.93	6.49	7.09	7.63	
Difference: actual from projected	Monthly	-100%	-100%	-100%	-100%	-100%	-100%	-100%	-100%	-100%	-100%	-100%	-100%	
Cumulative difference	Cumulative	#DIV/0!	#DIV/0!	#DIV/0!	11.1%	8.9%	10.0%	10.0%	9.8%	9.1%	9.9%	10.9%	12.3%	

All users total														
Projected Requirement 2017	m ³ /s	78.755	80.292	78.424	77.455	96.639	95.190	86.331	88.009	91.140	91.677	88.755	76.080	85.69
	Million m ³ /m	210.94	208.12	210.05	207.46	250.49	254.96	223.77	235.72	244.11	223.77	237.72	197.20	2704.3
	Cumulative	210.94	419.05	629.11	836.56	1087.05	1342.01	1565.78	1801.50	2045.61	2269.38	2507.10	2704.30	
Actual Use	m ³ /s	70.455	72.635	70.536	76.573	69.929	79.211	78.226	73.086	79.484	79.787	79.401	74.291	75.284
	Million m ³ /m	188.71	188.27	188.92	205.09	181.26	212.16	202.76	195.75	212.89	194.75	212.67	192.56	2375.79
	Cumulative	188.71	376.98	565.90	771.00	952.25	1164.41	1367.17	1562.92	1775.81	1970.56	2183.23	2375.79	
Difference: actual from projected	Monthly	-11%	-10%	-10%	-1%	-28%	-17%	-9%	-17%	-13%	-13%	-11%	-2%	
Cumulative difference	Cumulative	0.12	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	

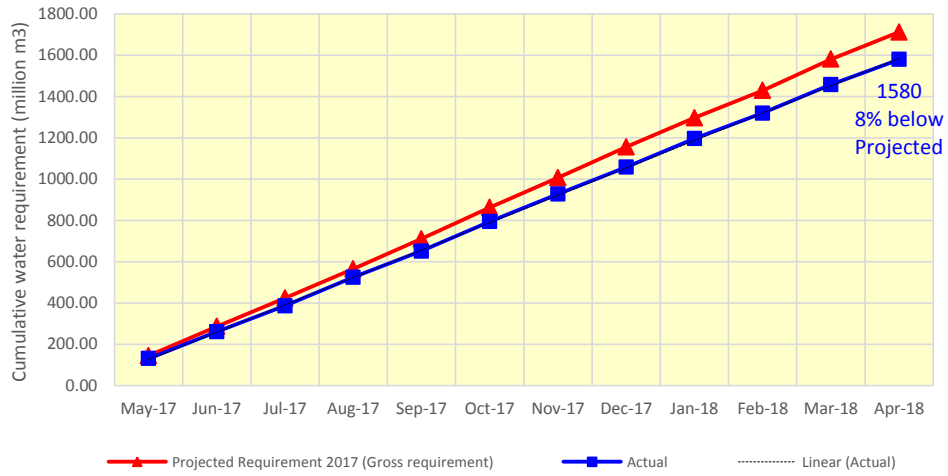
Urban users total														
Projected Requirement 2017	m ³ /s	72.045	74.432	70.344	70.953	75.074	75.059	73.799	73.134	70.635	72.725	74.294	68.926	72.61
	Million m ³ /m	192.96	192.93	188.41	190.04	194.59	201.04	191.29	195.88	189.19	177.51	198.99	178.66	2291.5
	Cumulative	192.96	385.89	574.30	764.34	958.93	1159.97	1351.26	1547.14	1736.33	1913.84	2112.83	2291.48	
Actual Use	m ³ /s	65.732	67.423	62.729	67.997	64.724	69.467	68.156	63.341	68.619	67.373	66.819	61.097	66.122
	Million m ³ /m	176.06	174.76	168.01	182.12	167.77	186.06	176.66	169.65	183.79	164.45	178.97	158.36	2086.66
	Cumulative	176.06	350.82	518.83	700.96	868.72	1054.78	1231.44	1401.09	1584.88	1749.33	1928.30	2086.66	
Difference: actual from projected	Monthly	-9%	-9%	-11%	-4%	-14%	-7%	-8%	-13%	-3%	-7%	-10%	-11%	
Cumulative difference	Cumulative	10%	10%	11%	9%	10%	10%	10%	10%	10%	9%	10%	10%	

Notes:

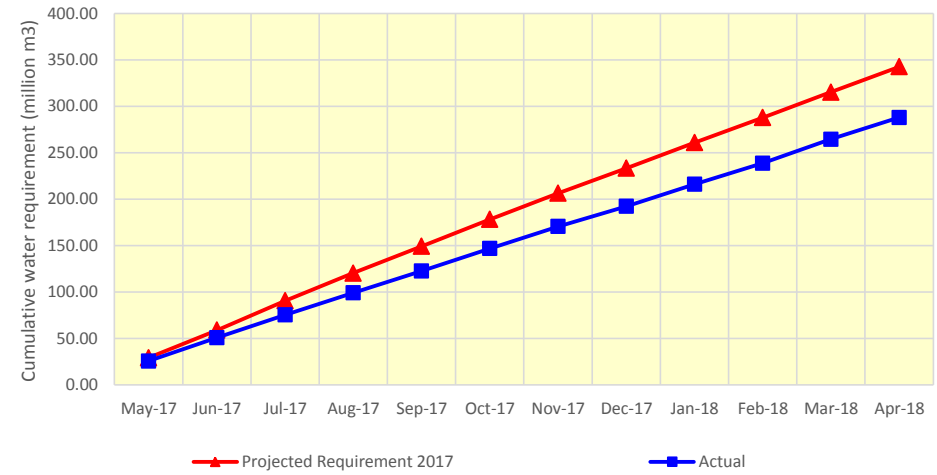
"Rand Water" includes all raw water abstracted from the Vaal River for the purpose of producing potable water. It excludes the raw water abstracted for supply as raw water to Authorised Users. Source: STATS OCTOBER 2016

"Mittal (Iscor)" includes consumption via Rand Water raw water meters 3103, 3104 and 3072. SOURCE: CONS-201610

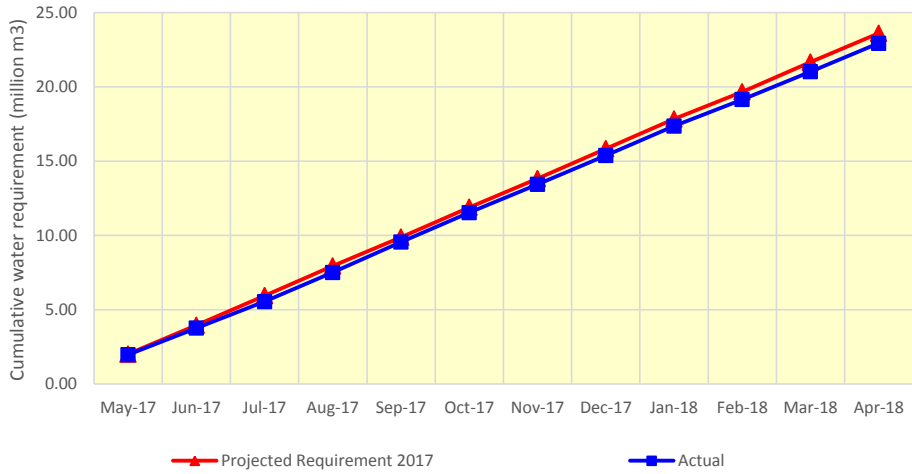
Rand Water: Water Requirements 2017/2018



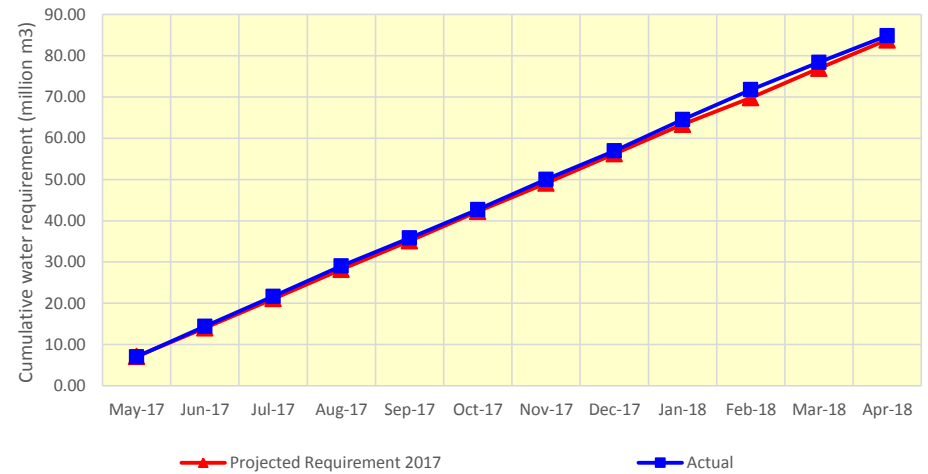
Eskom: Water Requirements 2017/2018



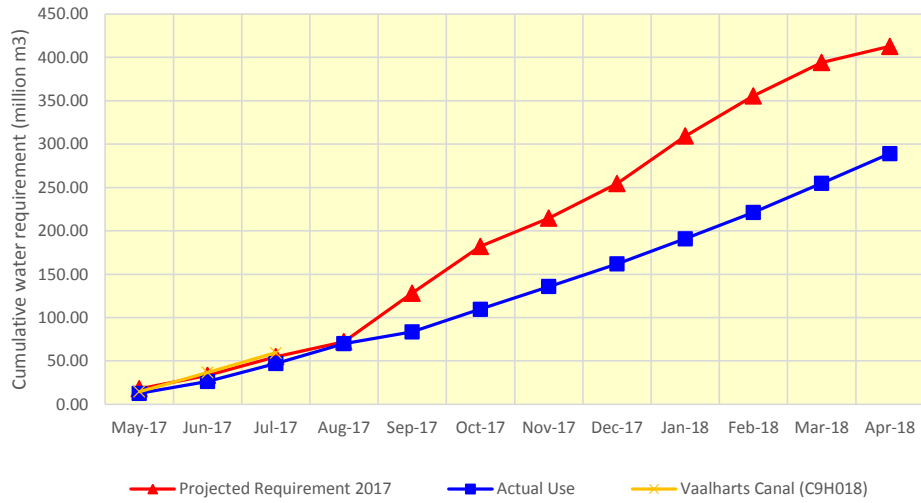
Sasol Sasolburg: Water Requirements 2017/2018



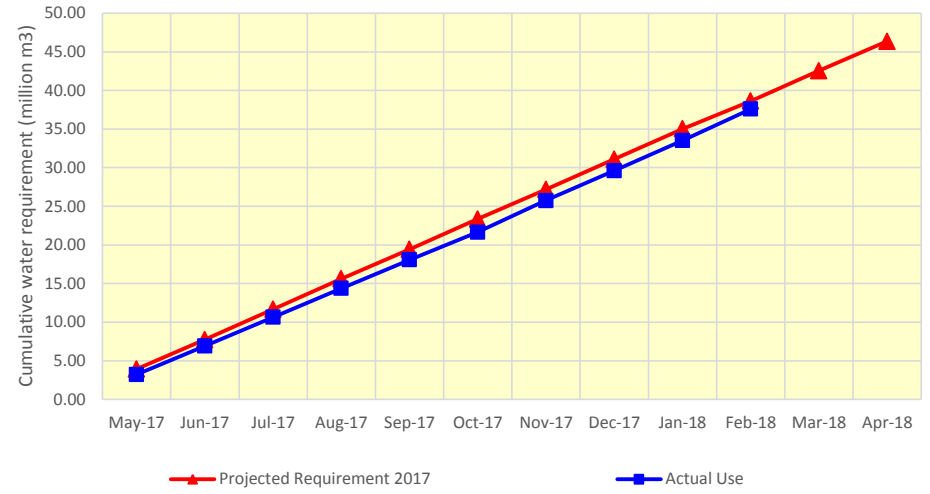
Sasol Secunda: Water Requirements 2017/2018



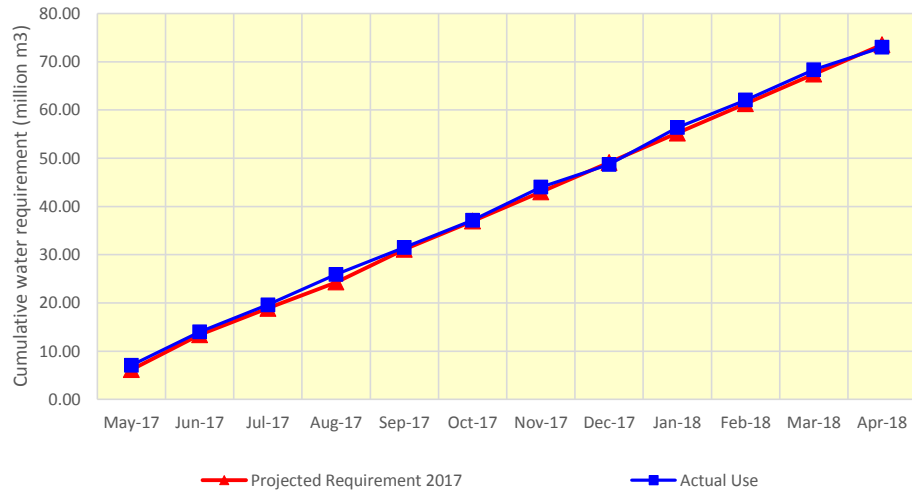
Vaalharts: Water Requirements 2017/2018



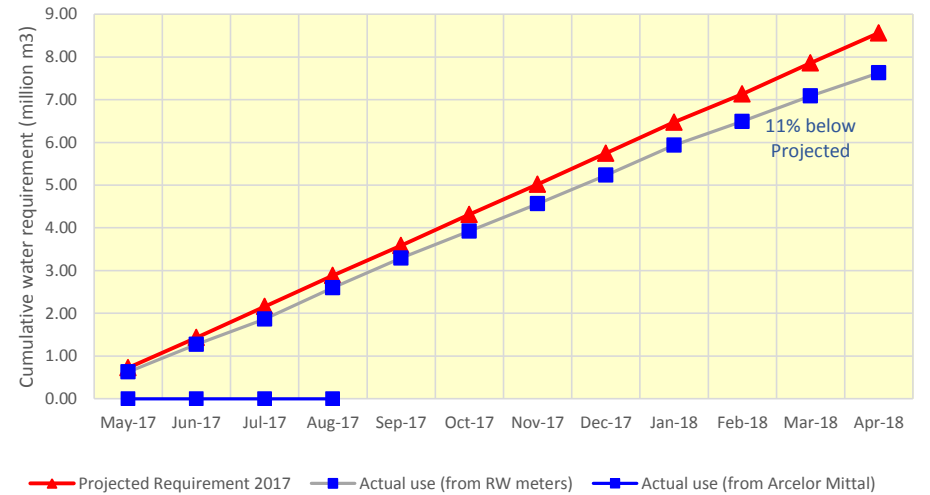
MidVaal Water Company: Water Requirements 2017/2018



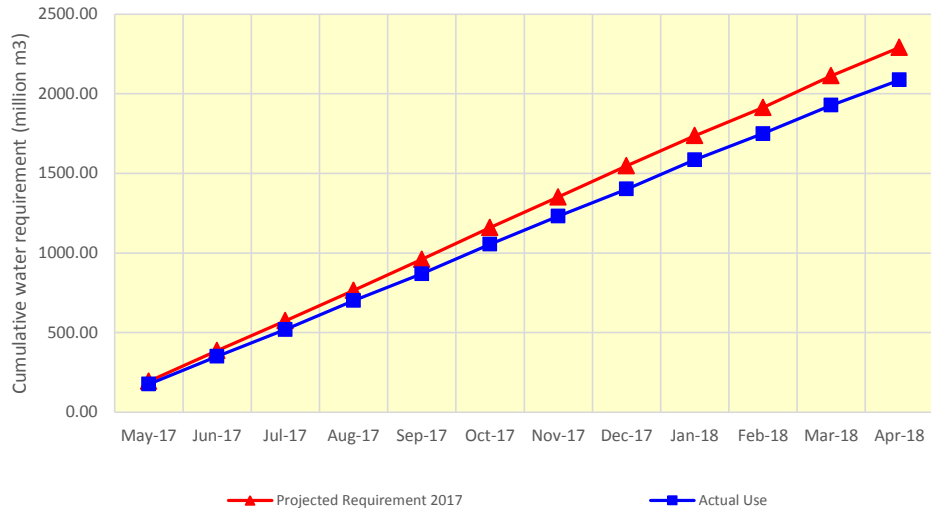
Sedibeng: Water Requirements 2017/2018



Mittal: Water Requirements 2017/2018



Urban Users: Water Requirements 2017/2018



All users: Water Requirements 2017/2018

