water & sanitation
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

SUPPORT FOR THE IMPLEMENTATION AND MAINTENANCE OF THE WATER RECONCILIATION STRATEGY FOR THE WESTERN CAPE WATER SUPPLY SYSTEM

ADMINISTRATIVE AND TECHNICAL SUPPORT GROUP MEETING #2

DATE: 19 June 2018 **TIME:** 10H00 – 15H00
VENUE: WC DWS Regional Office, Bellville – Sigma Boardroom, Ground Floor
CHAIR: DWS D: National Water Resource Planning (NWRP)

PURPOSE OF MEETING: To support the implementation of the Western Cape WSS Reconciliation Strategy

MINUTES

ITEM	DETAIL	ACTION
1	**Welcome and Introduction**	
	Mr Daniels welcomed all to the meeting and introduced Dr Mwaka, the chairperson of the meeting from the DWS National Office. Dr Mwaka apologized to the meeting for starting a few minutes late. He welcomed everyone and explained that the Chief Director: Mr Luvhani Mabuda and the Director, Mr Mlilo were called to other meetings and he was delegated to chair this meeting.	
2	**Attendance and Apologies**	
	The attendance register is attached as Appendix A. Apologies were received from the following members: • Mr L Mabuda • Mr P Mlilo • Mr A Brutus • Mr N Faasen • Mr D Wright • Mrs W Kloppers • Ms Z Bila • Mr M Mgumo • Mr F Fourie • Mr M Killick • Mr M Murovhi • Mrs M Lintnaar Strauss • Ms P Shikwambana	

ITEM	DETAIL	ACTION
	• Mr S Mashicila	
3	**Additions/Changes to the Agenda**	
	The agenda was accepted with no changes.	
4	**Minutes of Previous ATSG (Meeting No 1 - 8 March 2018)**	
4.1	Approval of minutes The minutes were accepted with no changes. Mr Daniels accepted the minutes as a true reflection of the proceedings and this was seconded by Mr Wood from the CCT. The chairman was delegated to sign off the minutes. Ms Singh to insert a signature page to the minutes.	Ms Singh
4.2	Matters arising Climate change – Mr Makombe to provide the PSP with the contact person for the climate change discussions.	Mr Makombe
5	**Feedback from Strategy Steering Committee**	
5.1	Key outcomes from SSC Mr Tlou presented the outcomes of the SSC and how these are being addressed in the project. The presentation is provided in Appendix B. The following emanated from the discussions: • The communication strategy and plan to be distributed to the ATSG before finalization. • It was clarified that the CCT requested the DWS to consider their whole allocation to be provided at 1:200 supply assurance and not just components of the supply. • The project will focus on proposed intervention measures identified in the previous reconciliation strategies and confirm if they are being implemented or are still relevant for implementation. New or planned augmentation schemes will be looked at by the respective municipalities, however if they impact the supply area, these will need to be considered by the DWS. It was mentioned that the DWS implemented a temporary scheme at Misverstand and the intention is to make this permanent. As this scheme affects various users and municipalities it should be considered in this study. • Concern was raised as to whether the focus is to continue planning schemes or will there also be focus on implementation of schemes. It was clarified that this study will undertake a situation assessment to ascertain the current state of the WCWSS and determine whether the intervention measures identified are still relevant and provide guidance on timing of implementation. • Stormwater harvesting, and alien clearing should be included as augmentation options for the WCWSS. Alien vegetation clearing in particular should be addressed as a project at short notice as it is the	Ms Singh to distribute DWS to consider Note to PSP Note to PSP Note to PSP

ITEM	DETAIL	ACTION
	cheapest water and affects the yield by 30 million m^3 per annum. This project will also assist in addressing unemployment in farm workers. It was recommended that Working for Wetlands be invited to the ATSG meetings going forward.	Ms Singh to invite WfWetlands
6	**Relevant projects and initiatives undertaken in WCWSS**	
6.1	WC WSS Reconciliation strategy	
6.1.1	Progress on Population and socio-economic profile of the WCWSS Mr Tlou presented the assessment of the factors influencing water requirements to determine the water requirement forecast. His presentation is included as Appendix C. He explained that the exercise to revisit the demand projections was necessary and was previously raised in the 2007 water conservation and demand management strategy and in the recently undertaken Classification study. He indicated that the focus of his assessment was on municipal water use as this was the main driver of water use in the catchment. The agricultural sector was not looked at although aspects such as climate change can affect their water use. He also indicated that the figures for Cape Town do not include the Drakenstein and Stellenbosch populations. The following was raised in response to the presentation: • When considering the factors influencing water requirements, the study should acknowledge that other aspects such as the quality of water and the environmental flow requirements also affect user sectors such as agriculture and tourism. • Consider focusing on the economic impact of the lack of water rather than the value of the schemes. One of the reasons the CCT is looking at a high assurance of supply is to counter the large economic losses, and this must be considered in the overall planning in terms of schemes. In valuing schemes, a marginal cost of water is provided, however the impact of lack of water may require us to reconsider the way we look at valuing the water, the schemes and additional schemes required. Consideration must be given to the cost of supply as well as the cost of not having water and the knock-on-effects on capital formation, market loss and job losses, particularly in the agricultural and tourism sectors. It was noted that the 60% cut in agricultural water allocation, that was imposed on the farmers resulted in them only having 17% of their quota. • In terms of the factors influencing water requirements, it was suggested that the following be considered and incorporated into the study: o Household water use should be separated into income levels. The PSP to consult with the CCT for this information. The CCT indicated that this information was used to acquire substantial water savings. o Economic factors highlighted in the report on the impact of the drought on agriculture conducted by the Bureau for	Note to PSP Note to PSP Note to PSP

ITEM	DETAIL	ACTION
	Agricultural Production, Stellenbosch University and University of Pretoria. Mr André Roux will share this report with the group. o An article by Megan Cole on inequality in water use across SA, with a focus area on the Berg catchment. o The group to identify and provide the PSP with any other reports or studies that that highlight economic factors that should be considered in this study. • From the graphs presented it is evident that the unit consumption is decreasing, although the population is increasing. It was noted that the demography of the WC is changing, with hardened gardens, & changes in water use and implementation of WCWDM measures, which is reflected in the flattening of the seasonal water use. It was recommended that an average line reflecting the average change in unit consumption be included on the graph to establish how far away the CCT is from the benchmark. • The significance of the tariff setting was discussed. Further work needs to be done on this, but the opinion is that the tariff is punitive to an extent and will have an impact on the per capita consumption and probably on the bounce back. It has not been looked at in terms of elasticity of demands and the implications thereof. Preliminary feeling is that the benchmark (inelastic demand) is around 50 – 72l/per capita and thereafter becoming more elastic. • Groundwater resource assessment (GRA) must be updated to reflect the current levels of groundwater use as it has become a significant water source as people move away from CCT infrastructure. The water use patterns on this source should also be taken into consideration. • Water requirements forecast. Requirements based on past water requirements, excluding the period of restrictions. • It was noted that the EWR is impacting on the available resource and yield rather than the demand.	Note to PSP Note to PSP
6.1.2	Progress on Updating Water Requirements	
	Mr Sibanda provided a presentation on the update of the water requirements in the WC WSS (Appendix D). The following discussion and issues were raised in response to the presentation: • It was noted that the urban allocations are still being verified. • Mr Shand requested that the source of data in the allocation table should be noted in the table. • The figures quoted in the presentation should be verified and should not be used for firm plans going forward until then. Dr Mwaka indicated that discrepancies with these figures were raised at many meetings. Mr Wood from CCT, Mr B van Zyl from DWS and Mr Fischer-Jeffes raised their concerns with the allocation figures and compensation release figures and that the agricultural and urban	Mr Sibanda Mr Sibanda Note to PSP

ITEM	DETAIL	ACTION
	allocations do not add up. • It was recommended that in order to verify the allocations in the WCWSS, the PSP should obtain the actual licences, identify the legal sources of the allocations, such as the licences, the White Papers and append these to the reports. The Group was concerned that quoting other reports will continue promoting inaccurate information. It was acknowledged that various reports quote different figures, but it was recommended that these reports be collated and circulated to the ATSG for comment and on deciding which figures be used. • On the slide reflecting the table of restrictions, it was queried whether the date indicated, was the date of implementation of restriction or the gazette date. It was recommended that the table also indicate what restrictions were actually achieved. • Slide of the CCT Water Requirements bar graph, should be titled "actual water use per annum" and not historical water requirements. • Mr Wood raised a concern on the starting point for the future projections. If year 2014 is used and projected forward the results will look very different as opposed to using for example 2013. He noted that the CCT has been criticized for depending highly on demand management. • Dr Mwaka expressed concern on the future projections summary graph, indicating that the change is significant. This will require an explanation. Mr Wood queried whether this is the correct planning scenario. It may be that this scenario could be the upper limit, however further scenarios are necessary. Various aspects should be taken into considerations, such as the drought, lack of certainty on the bounce back, implemented intervention measures and economic growth. It was noted that the projections from 2007 and 2013/14 would probably link up with the future projections but this would likely be at the high growth scenario. • It was requested that the table on water requirements include information on the actual water use. Actual water use is provided in the monthly monitoring report and will need to be pulled into this study.	Mr Sibanda Mr Sibanda Mr Sibanda Note to PSP Note to PSP
6.1.3	Progress on Updating Water Resource Availability	
	Mr James Cullis made the presentation on behalf of Mr Killick. Refer to Appendix E for the presentation. Discussions around the presentation highlighted the following: • The WCWSS is going to face more risks with the system yield at 1:50 level of supply assurance, which has resulted in a decrease in yield of 35 million m^3/a. Until there is major development, an increase in yield is not feasible. • It was confirmed that the yield results presented were based only on surface water sources. • Scenario planning will therefore require integration of the surface	

ITEM	DETAIL	ACTION
	water yield with other sources of water. This requires consideration of various intervention measures, such as alien vegetation removal, desalination, effluent re-use, etc. • The Working for Water team should be invited to the next ATSG to discuss the programme in the WCWSS. It would allow for communication and liaison between the Working for Water team and the WCWSS stakeholders to promote alien vegetation removal in the supply area. • Mr Wood highlighted the fact that the CCT can supply their users at the 1:50 assurance of supply but other users cannot manage at this supply level. He queried the intervention implementation programme to support these users. He indicated that the CCT will need to conduct their own planning and queried if the intervention measures they implement will need to be within or outside the WCWSS. Dr Mwaka noted that it is therefore important to note what intervention measures are being implemented and the effects of these. • Mr Makombe noted that the annual status report, which is normally available around September, is used to advise the top management of the recommendations emanating from the study steering strategy committee on intervention measures. Mr Wood acknowledged the process, however he indicated that the CCT cannot wait until the report is made available. The CCT will proceed with their investigations and planning toward water security.	Ms Singh to invite the Working for Water team CCT to provide their intervention measures Note to DWS
6.2	DWS Studies	DWS
6.2.1	System augmentation	
	Mr Menard was not available but a presentation on the system augmentation and progress of the TCTA project will be requested for inclusion into the minutes. ***No presentation was available at time of distribution of minutes.***	Ms Singh to request presentation
6.2.2	WCWSS Operation and Monitoring	
	Mr Mondli Dlamini provided a presentation of the monitoring of system performance for the WCWSS. Refer to Appendix F for the presentation. Mr Dlamini indicated that the system monitoring is conducted on a monthly basis and anyone requiring the reports should provide him with their email address. The following discussions and issues were raised in response to the presentation: • As there are no gauging stations or suitable sites for a gauging station on the Lower Berg Irrigation Board area, the amount of water used below Misverstand Dam is not known and the information provided in the presentation for this area was queried. It was indicated that it was not correct if the releases from Misverstand Dam were taken as the cumulative usage. It was requested that the report carries a rider that there are no gauges and that the information provided is the best guesstimate.	Note to DWS

ITEM	DETAIL	ACTION
	• It was noted that the system is slightly improving but it has not yet recovered to the desirable level, so it is recommended that the intervention measures be continued to enable the system to fully recover. • It was also advised that operation of the system should be looked into, with the increasing dam levels, to maximum storage and recovery. Mr Bertrand van Zyl mentioned that they are operating the system to ensure a balance in the dams.	
6.2.3	Update on dam levels and water restrictions	
	Mr Daniels provided a presentation on the current dam levels and restrictions (Appendix G). He indicated that this should in future be presented by Mr B van Zyl. The following issues were raised: • Challenges have been experienced over the last year alone, many people have drilled boreholes which placed a lot of stress on the system as well as on the workload of the DWS. Those that drilled boreholes and are using water currently are not submitting records and National Government will need to sit down with other institutions and request their cooperation as this information is needed. • Mr Shand mentioned that the DWS has excavated the channel in Voelvlei Dam in order to draw down Voelvlei to the real outlet. Mr Bertrand indicated that one cannot draw down the dam to zero, but they can reduce it to below the current level of 12.5%. They have decided not to excavate the channel lower down as it would put the dam at risk. • Mr Shand recommended that the wall at the outlet should be removed. If this is not done now, it should be done as part of the Berg River augmentation scheme. At this stage it would be more difficult to remove but you could draw the dam down. Mr van Zyl mentioned that a separate inlet works will be built for the augmentation scheme. There would be a new inlet works but the same outlet works. This is a necessary intervention as there is currently a loss of 10% of the dam. Ideally for this to be done the dam would need to be empty. It would be cheaper to undertake this intervention in the dry season rather than the wet season. It was requested that a presentation on this should be made by the TCTA, as they have tendered the design phase of the scheme. The loss of capacity was not included in the feasibility study. Only when Swartland LM water supply needs was looked into was this loss of capacity noted. The CCT can use this additional supply, however it is difficult to distribute this to Swartland LM. The other possibility of supply was temporary from Aikenhof. Mr Shand has highlighted various options in a report to the DWS. It was recommended that the ATSG looked at the report and provide their feedback urgently. It was recommended that Mr Shand provide this report to Mr Daniels and the Committee for their feedback.	Note to Ms Singh Singh to arrange presentation by the TCTA Mr Shand to provide the report to the Committee

ITEM	DETAIL	ACTION
	• It was suggested that Swartberg consider buying the water directly from CCT. This was not considered in the augmentation options. The CCT did not want to commit their organization but indicated that it did make sense to bring the urban sector together, particularly around distributing the costs of augmented water. Mr Shand indicated that another option was to utilize the storage at Misverstand that will improve the efficiency of releases to the lower Berg and also for the operation of Withoogte Plant. He recommended that the scheme be incorporated into the TCTA Berg River augmentation scheme. He estimated that this would provide 4million m^3 storage in Misverstand which would greatly facilitate the operation of that scheme and probably improve the yield by drawing down in summer. • In previous years reports indicated that Voelvlei struggled with poor quality, but new reports do not say much with regard to quality. In the Voelvlei scheme, there is a low dilution operation, however uses still discharge poor quality. It was noted that the feasibility study did do a water quality exercise for Voelvlei Dam. In recent years there has been a change in the characteristics of Voelvlei Dam. Previously the water in the Dam was fairly clear, but now the water is turbid. It was also noted that there is a change in fish species in the Dam. • Dr Mwaka indicated that when the Dam is not spilling, water in the Lower Berg is as a result of a user requesting a release. Mr Enright explained that they do have records of users that have requested the water, however there is always water running past because it cannot be managed and there is no measuring gauge. Mr van Zyl indicated that they have surveyed the area and the hydrology section has done the design. However, when the geology study was conducted, the foundations were found not to be good and constructing a gauging weir at this point will be very expensive. • Recommendation made for the real time monitoring for the management of the system to enable efficient operation.	and Mr Daniels for comment
6.2.4	Validation Verification	
	Mr Daniels indicated that the validation verification project remains the same as the last presentation. The contract with the service provider has come to the end and the DWS is currently finalizing the information submitted. This should be finalized by the next meeting and the letters sent to the Chief Director for signature and then the Director General. The letters will then go out to the water users, who will have the opportunity to appeal the decisions. Mr Enright clarified that there is no verification for water from the system as this is Section 33. All irrigation boards are under Section 33. Although it is listed in the letter, it is not verification. Verification is section 35 of the NWA. He indicated that there is only one small section between Elandskloof and Theewaterskloof that is a section 62 area. According to section 62, if you didn't use the water, you will lose the water, so this area must be verified. The Elands Irrigation Board is also a section 62, however the Minister has already approved them as an existing lawful use in 1999. So as far as the system is concerned the Verification is not going to help in making water available. It may help in the tributaries where users can be cut back if they	

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	have exceeded what they used in 2000. Mr Shand explained that the tributaries are being taken into consideration in the yield model, but it is not looked at as a water use.	
6.2.5	Classification and RQOs	
	Mr Cullis gave a brief presentation on the Classification and RQOs in the Breede Gouritz and Berg River catchments on behalf of Melissa Lintnaar-Strauss, as Aurecon is involved on this project. He indicated that the project has set the scenarios and is now setting the RQOs. The current proposal is to maintain the Reserves in the Berg River catchment as was conducted for the Voelvlei augmentation study. The EWRs are built into the system model already. Scenario analysis has looked at slightly higher or lower ecological water requirements to see how they impact on the yield, but this was done with the "old" hydrology. The recommendation is to keep the current agreed Reserves in the Berg River. He noted however, that whether the water is actually reaching the estuary is not is not known.	
6.2.6	Water Quality	
	Mrs M Lintnaar-Strauss was not available and Mr Daniels give a short overview on her behalf. The region has partnered with companies that provide information on the water quality.	
6.2.7	WCWSS Water Availability Assessment Study	
	Mr Makombe provided feedback on the WCWSS Water Availability Assessment Study. He acknowledged the request for a reassessment of the hydrology in the system and the suggestion that this is done through the Water Availability Assessment Study He indicated that the DWS: National Water Resource Planning will try to prioritise this study in the upcoming years.	
6.2.8	Groundwater interventions	
	Mr van Niekerk provided a brief overview of groundwater intervention measures being implemented by the DWS. On 10 Feb the DWS started drilling programme into the Table Mountain Group Sandstone, which is in the Theewaterskloof catchment area. They are still in the exploratory phase, and still need to conduct hydro-chemical testing and analysis. Mr van Niekerk to provide a write-up on these interventions for the minutes. Dr Mwaka highlighted that going into emergency intervention measures without proper feasibility studies is an expensive exercise that may not be sustainable or provide the yield required to make an impact.	Van Niekerk to provide write-up for minutes
6.3	CCT Studies Mr Wood provided a brief update on the following in the CCT. • Current and future demands • Current and Planned Water savings and demand management initiatives	

ITEM	DETAIL	ACTION
	• Progress on Accelerated Augmentation Projects • Current system operation	
6.3.1	Current and future demands	
	This was discussed during the presentation on demand projections (refer to 6.1.1)	
6.3.2	Current and Planned Water savings and demand management initiatives	
	Mr Wood indicated that the CCT is saving 41% as a result of demand management. In January 2018, the CCT put together a project for advanced pressure management. There are currently 80 zones running water controllers. The cumulative savings at this point is 60Ml per day. In some parts of CT there is an intermittent supply of water as a result of the low pressures. The intervention seems to be delivering savings. The other benefit is that the new units are remote controlled, so they can be adjusted. Leak repairs – The CCT Council has approved the project to undertake repairs for indigent households on private households, where a large percentage of losses are located. It has not been approved for Council owned properties. Tariffs – The tariffs have had an impact on consumer behavior in terms of savings. It brought day zero to 2019. The CCT is in general happy with the way consumers and businesses have come to the party in saving water.	
6.3.3	Progress on Accelerated Augmentation Projects	
	Desalinated plants i) The plant at Strandfontein has been commissioned. Over the next few weeks they would get to a full production of 7Ml per day. ii) The desalination plant at the V&A waterfront is functioning at 0.5Ml per day. Its capacity is 2Ml per day. iii) The desalination plant at Monwabisi is 7Ml/day and will be commissioned in the next 2-4 weeks. iv) It was noted that these package plants are extremely expensive and no further plants such as these will be implemented. These are two-year plants after which they will be taken away. The price of this water is R40 to R45 per kiloliter. Groundwater – the CCT has focused on groundwater since the beginning of the year and they have steered away from the temporary desalination. They have at this stage: i) Sunk 100 boreholes into the Cape Flats Aquifer. They have been test pumped, however the quality of the water has not been good with colour and salinity problems amongst others. They are considering this water into the network or for secondary use, such as construction activities. The CCT will need to consider conventional treatment of this water. The yields are not as great as hoped, and they might end up in the region of 30-50Ml/day from the scheme. The other challenge is the recharge which is required as part of the licence conditions.	

ITEM	DETAIL	ACTION
	ii) Table Mountain Group – have done focused drilling at Steenbras and around the Dam. It did not go smoothly as they ran into environmental opposition as it is in a nature reserve and concerns of drilling impacts and infrastructure impacts such as power lines. Taken 3 months to conceptualise and the drilling is extremely time consuming to get around the environmental constraints. The internal Reserve management department has approved the concept for the scheme as they get the infrastructure designed. iii) Further work is happening in terms of exploration at Theewaterskloof dam as well. In area of Vyboom Irrigation Board on private land iv) Rest of TMG scheme has been problematic as well in terms of environmental concerns as they are in the Cape Nature area of control. It seems that in areas were the water is good there are environmental sensitivities and they are far from infrastructure, so difficult to get water to. These aspects must be taken into consideration in the reconciliation strategy as well. Reuse – had plans for 10Ml a day plant at the Zandvliet wastewater treatment plant which is being reviewed in terms of how the CCT is going to go ahead with it. They also have plans for a 70Ml per day plant, which will take 2-3 years to implement. This will take water from Zandvliet to Faure Water Treatment Plant. Further information is provided on Water Outlook 2018 which provide the thinking around the WC/WDM, tariff structure, etc.	Note to PSP re availability of suitable GW sources
6.3.4	Current system operation	
	CCT's main focus is on the Wemmershoek and Steenbras dams. The Steenbras Dam is artificially full due to transfers, but Wemmershoek has picked up nicely with the rains, so the CCT is trying to push their demand onto it. It is going to affect the draw on RSE. They noted that they cannot run the plants designed for 450Ml/day to supply 30Ml/d. Therefore, they need to find a way of shutting them down and rearranging the distribution system. Voelvlei was run at a very low production of 10Ml/d, although a 230Ml/d plant. Continued to maintain that level as part of drought response. The dams on Table Mountain are filling up and the CCT is trying to prevent them from spilling. Currently recharge of the aquifer is by using treated effluent. An environmental working group has been set up for the TMG which comprises a broad range of stakeholders. The purpose of the Group is to advise and provide an oversight function. It is not a decision-making body.	
6.4	West Coast DM The WCDM provided their apologies as they could not attend the meeting. The ATSG requested that they provide a brief report for the minutes.	Singh to follow up with the WCDM
6.5	Breede-Gouritz CMA & Berg-Olifants CMA	
	Mr Daniels provided feedback on the establishment of the catchment management forums.	

ITEM	DETAIL	ACTION
	The current state is that there will be 9 CMAs. The Catchment Management Strategy for the Breede is being updated to include the Gouritz catchment. Mr van Staden will be able to provide more feedback on this, however he was not able to attend this meeting.	
6.6	Berg-Olifants CMA Refer to item 6.5 above.	
6.7	Agricultural sector	
	Mr Enright provided a report on the agricultural sector water use. He indicated that the demands are capped. He highlighted the problems with the Lower Berg River schemes, that have a monitoring/metering problem. Schemes, like Wynand get water through a pipe directly from the Theewaterskloof dam so they get water even in winter. They have not used their full allocation though. There are still users with unused water allocations, which the Minister has approved, which may be a problem if there are further restrictions, as the water will not be available to them due to other users already having used this water. The sector is in discussions with the Drakenstein LM to use treated effluent as a water source. He indicated that some farmers are moving to citrus crops and will then use water in the early winter which can help in reducing the demand. The Lower Berg IB only gets a portion of their water allocation as the water is held in the Dam. They are no longer getting water through the canals. Mr Enright indicated that if there is no dam it is difficult to use their winter water rights. In the upper Berg there are limited dams. There is a possibility of getting this if the winter rights are pumped to Voelvlei. Mr Enright can provide the project team with the licences and demands for the agricultural irrigation sector. He indicated that the 60% restrictions imposed by the DWS, translated to 17% allocation for some irrigators. It was noted that curtailment rules are not reviewed as part of this strategy as this study focuses on longer term actions. Curtailment rules is short term management measures. Dr Mwaka emphasized that during the drought emergency period, meetings can be called to discuss concerns of stakeholders, including those related to restrictions.	Mr Enright to provide the licences and records of demands.
7	**Preparation for the SSC Meeting**	
	This will be discussed at the next ATSG meeting.	
8	**Communication**	
	The communication strategy to be distributed to the ATSG for their input and comments before being finalized.	
9	**General**	

ITEM	DETAIL	ACTION
	Need a list of augmentation options that have been implemented or is planned that will affect the whole system. Mr Shand requested the West Coast DM to seriously consider whether they build the desalination plant. He believes it is an expensive undertaking and it is not the best area in which to build the Plant. Mr Roux indicated that the mining sector felt it worth the risk to invest in the desalination plant as it is a criteria is the strategic use. Closing the plant if they don't have water, they will not reopen again, with huge financial implications for the whole Province.. Reduce risk for them. Maybe consider an alternative solution, example investing the money in increasing the storage of Misverstand. Can they be reassured that the risk is far, then they will reconsider this as an option. Dr Mwaka thanked the Western Cape WSS stakeholders for their contributions to this meeting.	The PSP to contact the stakeholders with aim of compiling this list. Note to West Coast DM.
10	**Next meetings Proposed** ATSG Meeting #3: 14 August 2018 SSC Meeting #2: 26 September 2018 ATSG Meeting #4: 13 November 2018	
11	**Closure**	
	The meeting closed at 15h30.	

ADMINISTRATIVE AND TECHNICAL SUPPORT GROUP MEETING #2

DATE: 19 June 2018 **TIME:** 10H00 – 15H00
VENUE: WC DWS Regional Office, Bellville – Sigma Boardroom, Ground Floor

Minutes compiled by:

_____
A. Singh
Date:

APPROVAL OF MINUTES

_____
Chairperson
Date

_____
DWS Project Manager
Date

APPENDIX A
ATTENDANCE REGISTER

SUPPORT FOR THE IMPLEMENTATION AND MAINTENANCE OF THE WATER RECONCILIATION STRATEGY FOR THE WESTERN CAPE WATER SUPPLY SYSTEM

ADMINISTRATIVE AND TECHNICAL SUPPORT GROUP MEETING #2

VENUE: WC DWS REGIONAL OFFICE - BELLVILLE - SIGMA BOARDROOM GROUND FLOOR

DATE: 19 JUNE 2018 **TIME: 10H00 - 15H00**

ORGANISATION	REPRESENTATIVES	POSITION	E-MAIL ADDRESS	CONTACT NUMBER	SIGNATURE
National Government					
Department of Water Affairs (Head Office)					
Directorate: National Water Resources Planning	Patrick Mlilo		Mliliop@dws.gov.za		
	Tendai Makombe		makombet@dws.gov.za	0836621414	
	Pamlah Shikwambana		shikwambana@dws.gov.za	APOLOGIES	
Directorate: Options Analysis	Menard Mugumo		mugumom@dws.gov.za		
Directorate: Water Resource Planning Systems – Groundwater Planning	Fanus Fourie		fourieF@dws.gov.za		
Directorate: Water Resource Planning Systems – Systems Operation	Jenny Pashkin		PashkinJ@dws.gov.za		
Directorate: Water Resource Planning Systems – Water Quality	Pieter Viljoen		Viljoenp2@dws.gov.za		
Directorate: Water Use Efficiency – Agricultural Sector	Jannie Fourie		FourieJ3@dws.gov.za		
Directorate: Water Use Efficiency – Municipal Sector	Nosipho Sombane (alt.)		SombaneN@dws.gov.za		
Directorate: Climate Change	Dr Smangele Mgquba		mgqubas@dws.gov.za		
	Chris Moseki		mosekic@dws.gov.za		

ORGANISATION	REPRESENTATIVES	POSITION	E-MAIL ADDRESS	CONTACT NUMBER	SIGNATURE
	Azwidohwi Neswiswi		neswiswia@dws.gov.za		
	Alloycious Salagae		salagaem@dws.gov.za		
Directorate: Water Resource Classification	Esther Lekalake		lekalakes@dws.gov.za		
	Adaora Okonkwo		okonkwoa@dws.gov.za		
Directorate: Water Resources Infrastructure Management Southern Operations	Bertrand van Zyl		vanzylb@dws.gov.za	082 887 3541	
DWS - PTA	Beason Mwaka		MwakaB@dws.gov.za	012 336 8788	
Department of Water and Sanitation (Regional Office					
Directorate: Institutional Establishment	Mashudu Murovhi		murovhim@dws.gov.za		Apology
Berg-Olifants WMA	Anneke Schreuder		anneke@dws.gov.za	0219416186	
Berg-Olifants WMA	Neels du Buisson		dubuissonn@dws.gov.za		
Berg-Olifants WMA	Derril Daniels		danielsd@dws.gov.za	082 370 3556	
Berg-Olifants WMA	Melissa Lintnaar-Strauss		melissa@dws.gov.za		Apology
Directorate: Water Use & Regulation					
Sub directorate: Water Use Authorisation	Warren Dreyer		dreyerw@dws.gov.za		
Sub directorate: Regulation	Anthony Brutus		brutust@dws.gov.za		Apology
B/O CMA	Rudi van wyk		vanwykr@dwsgov.za	0219416295	

ORGANISATION	REPRESENTATIVES	POSITION	E-MAIL ADDRESS	CONTACT NUMBER	SIGNATURE
Directorate: Water Planning & Information	N. Bila-Mupariwa		Bila-MupariwaN@dws.gov.za		
Programme Manager: RBIG	Simpiwe Mashicila		mashicilas@dws.gov.za		Apology *
Sub-Directorate: Groundwater	Nicolette Vermaak		VermaakN2@dws.gov.za		
	Nwabisa Makiwane		makiwaneN2@dws.gov.za		
Sub-Directorate: Resource Protection	Zenzile Bayanda		ZenzileB@dws.gov.za		
RBIG	Penina Sihlali		sihlalisn@dws.gov.za	021 944 6262	
	Simpiwe Mashicila		mashicilas@dws.gov.za		Apology * Duplicate *
Western Cape Provincial Government					
Presidential Infrastructure Coordinating Committee					
	Neil Macleod		Neilmac144@gmail.com		
DEA&DP					
Planning	Wilna Kloppers		Wilna.kloppers@westerncape.gov.za		Apology.
	Catherine Bill		Catherine.Bill@westerncape.gov.za		
	Amina Sulaiman		Amina.sulaiman@westerncape.gov.za		

ORGANISATION	REPRESENTATIVES	POSITION	E-MAIL ADDRESS	CONTACT NUMBER	SIGNATURE
Local Authorities					
City of Cape Town					
Water & Sanitation					
	Peter Flower		peter.flower@capetown.gov.za		
Bulk Water					
	Barry Wood		Barry.Wood@capetown.gov.za	0849000916	
	Mazunda Halwiindi		mazunda.halwiindi@capetown.gov.za	0761621610	
	Gisela Kaiser		Gisela.kaiser@capetown.gov.za		
	Melissa de Sousa Alves		Melissa.desousaalves@capetown.gov.za	0820516523	
Wastewater Treatment					
	Kevin Samson		Kevin.Samson@capetown.gov.za		
WDM & Strategy Branch					
	Zolile Basholo		zolile.basholo@capetown.gov.za		
	Mogamat Shahied Solomon		Mogamatshahied.solomon@capetown.gov.za		
WDM and Operations					

ORGANISATION	REPRESENTATIVES	POSITION	E-MAIL ADDRESS	CONTACT NUMBER	SIGNATURE
	Collin Mubadiro		collin.mubadiro@capetown.gov.za		
Water Services Development					
	Jaco de Bruyn		Jaco.deBruyn@capetown.gov.za		
West Coast DM					
	Nic Faasen		faasennf@wcdmwater.co.za		
CMAs					
Breede – Gouritz					
	Phakamani Buthelezi		smbombo@bocma.co.za		
	Jannie van Staden		jstaden@bocma.co.za		
WUAs / IBs					
Berg River Main IB					
	Willie Enright		wateright1@gmail.com		
PSP					
NFM MultiConsulting	Desire Sibanda		nfmkzn@outlook.com	0849530697	
	Hlengiwe Msani		Hlengiwe.msanio4@gmail.com		

ORGANISATION	REPRESENTATIVES	POSITION	E-MAIL ADDRESS	CONTACT NUMBER	SIGNATURE
Tlou Consulting	Toriso Tlou		toriso@tlouconsult.co.za	0824658781	
	Adhishri Singh		adhishri@tlouconsult.co.za	0722253797	
Aurecon	Mike Killick		Mike.Killick@aurecongroup.com		
Aurecon	JAMES CULLIS		james.cullis@aurecongroup.com		
Aurecon	Lloyd Fisher-Jeffes		lloyd.fisher-jeffes@aurecongroup.com		
DWS: WC: GEOHYDROLOGY	ASHTON VAN NIEKERK		VanNiekerkA@dwsgov.za	0633253660	
DWS: WC: GEOHYDROLOGY	KEZIA SMITH		SmithK@dws.gov.za	021 941 6066	
DWS: HO: Systems Operation	Mondli Dlamini		dlaminim@dws.gov.za	012 336 7913	
Dept. of the Premier	André Roux		andre@elsenburg.com	0829071127	
Berg River Main Irr Board	Willie Enright		waterright1@gmail.com	0828073535	
Aurecon	Mike Thand		mike.thand@aurecongroup.com	083 564 4461	

APPENDIX B
FEEDBACK FROM SSC – 14 MARCH 2018

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

IMPLEMENTATION AND MAINTENANCE OF THE WATER RECONCILIATION STRATEGY FOR THE WESTERN CAPE WATER SUPPLY SYSTEM

FEEDBACK FROM SSC #1 (14 MARCH 2018) AFFECTING THE RECONCILIATION STRATEGY UPDATE

Key outcomes from the meeting affecting the RECONCILIATION STRATEGY UPDATE

- The following was requested to be included into the Inception Report:
  - A demographic assessment in order to firm up on the population figures.

- The inclusion of a training component on the implementation of the Reserve and Classification in the Training and Capacity Building Programme.
  - This has been included in the training plan

Key outcomes from the meeting affecting the RECONCILIATION STRATEGY UPDATE

- The development of a communication strategy and plan for the project.
    - The communication strategy and plan has been developed

- Study should look into the hydrology and climate change and its impact on yield

Key outcomes from the meeting affecting the RECONCILIATION STRATEGY UPDATE

- Reconsider all augmentation projects identified in the original 2007 strategy.
  - This will be undertaken during the Scenario Planning and Options Analysis Task in July 2018.
- The ranking of recommended projects in the 2007 strategy must be revisited to ascertain if the ranking is still appropriate;
- Ranking of groundwater sources and other options such as reuse should also be undertaken;
- The mix of water sources other than only rainfall dependant to be considered in the study.
  - These activities will be undertaken during the Scenario Planning and Options Analysis Task in July 2018

Key outcomes from the meeting affecting the RECONCILIATION STRATEGY UPDATE

- The recovery of water use post drought requires careful consideration.
- Clarity on the application of supply assurance across user sectors.
- Consideration of planning for the urban sector being undertaken on a 1:200 supply assurance.
- Differentiated curtailments to be considered based on user investment in augmentation schemes.
- To confirm the over allocation of the WCWSS and whether all allocations granted have been taken into consideration.

Key outcomes from the meeting affecting the RECONCILIATION STRATEGY UPDATE

- Consideration of the recent licences granted from the Voelvlei sub-system having the potential to aggravate and already stressed situation, especially if the Berg to Voelvlei Augmentation does not happen.

APPENDIX C
FACTORS AFFECTING WATER REQUIREMENTS

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

IMPLEMENTATION AND MAINTENANCE OF THE WATER RECONCILIATION STRATEGY FOR THE WESTERN CAPE WATER SUPPLY SYSTEM

Assessment of the factors Influencing water requirements to determine the water requirement forecast

Structure of the presentation

- Background
  - Previous factors
  - Rationale for updating the projections
- Historical trends
  - Population & demographics
  - Socio-economic trends
  - Economic growth trends
  - Historic water requirements
- Drivers of future water requirements
- Recommended future water requirement growth forecast

Background & Rationale

- WCWSS Reconciliation Strategy development (2007)
  - A high growth rate forecast of water requirements of 3.09%
  - Based on key variables considered to have influenced forecasting decisions
    - Historical water requirements growth rates which declined from between 1972 - 1976 , growth of 2.8% - 3.9% between 1991-200, etc
    - Significant economic growth forecasts of 4.5% - 6.% from 2007
    - Population growth rates of 2.7% based on Stats SA
- WCWSS Recon Strategy update – 2016 developed water requirements scenarios
  - Changes in population
  - Economic growth
- Using past water requirements forecasts can have the following impact:
  - Impact on the investment decisions in major water infrastructure which may result in ether over or under- investment in the bulk infrastructure development
  - Current and future water allocation between sectors which may result in limiting economic development if prevailing and future economic conditions, growth sectors, water tariffs and rate structures and changes in population income are not factored in the forecasts
  - Delays in implementing the infrastructure build programme if the forecasts have been undertaken

Uncertainties in demand forecasts

- Demographics, which will involve reviewing the changes in the following:
  - Actual population figures since 2007 using the 2011 Census information or house-count information, compared to the forecasts made during the previous strategy development;
  - Land use;
  - Housing composition;
  - Industry composition.
- Socio-Economic Profile of the WCWSS since 2007; This will review the trends in the following:
  - changes in the household income and its effect on affordability given the changes in tariff and rate structure in the CCT;
  - Changes in the economic growth rate compared to planned growth and likely future growth rates.

Uncertainties in demand forecasts

- Policy changes.
  - Significant policy changes in the management of municipal water supplies particularly in the CCT brought about by the current drought and water shortages. The policy changes which are likely to influence future water requirements forecast include the following:
  - Technology in plumbing systems which has reduced unit consumption as well as implementation of effluent re-use;
  - Water Conservation and Demand Management and Behavioural norms;
  - Price and rate structure – punitive tariff system has been put in place to reduce the unit consumption, which is likely to influence future per capita unit consumption.

Uncertainties in demand forecasts

- Historic consumption will involve reviewing the following
  - Comparison of the actual water requirements from 2007 until 2015 to the forecast;
  - The changes in the unit per capita consumption from 2001 and 2011 using the census population.
- Climate and Weather
  - Seasonal distribution of water use patterns;
  - Rainfall, temperature, evapo-transipiration, ET changes over a period.

Historic trend analysis - Population

Population	1996	2001	2011
Western Cape	3 956 876	4 524 334	5 822 734
Historical Growth rate		2.72%	2.56%
Cape Town	2 563 095	2 893 249	3 740 026
Historical growth rate		2.45%	2.60%
Households Cape Town		777 389	1 068 572
			3.23%

Initial focus on the CCT

- 64% of the Western Cape residents in the Metro

There is a correlation between water requirements and population that it is crucial to development of the water requirements forecast scenarios

- Any changes in population growth has a direct correlation with domestic water requirement

Historic trend analysis – Growth forecast comparison with actual

Water requirement scenario	Population growth rate (% per annum) - Planned			Population growth rate (% per annum) – Actual/estimates	
	2006-2011	2011-2016	2016-2030	2001 - 2011	2011-2016
High	2.0	2.30	2.65	2.6	1.81
Low	1.12	1.38	1.74	2.6	1.81

2017 Mid-year population estimate

- CCT population increased to 4.16 million, @ 1.81% between 2011 & 2016
- Significant growth in households @ 3.23% per annum
- Average household size declined from 3.72 to 3.50 between 2001 & 2011

Historic trend analysis – Socio-economic Analysis

Household Income profile – Census 2001

Cape Town Monthly Household Income 2001	Black African		Coloured		Asian		White		Total	
	Num	%	Num	%	Num	%	Num	%	Num	%
No income	69 946	27.9%	22 434	7.2 %	697	6.9 %	8 994	4.4 %	102 071	13.1 %
R 1 - R 1 600	109 172	43.5%	74 716	24.1 %	1 176	11.7 %	15 058	7.3 %	200 122	25.7 %
R 1 601 - R 3 200	39 971	15.9%	69 901	22.5 %	1 329	13.2 %	19 664	9.6 %	130 865	16.8 %
R 3 201 - R 6 400	19 285	7.7%	73 813	23.8 %	2 153	21.4 %	38 386	18.7 %	133 637	17.2 %
R 6 401 - R 12 800	7 921	3.2%	47 303	15.2 %	2 343	23.3 %	51 889	25.2 %	109 456	14.1 %
R 12 801 - R 25 600	3 186	1.3%	17 409	5.6 %	1 625	16.2 %	45 366	22.1 %	67 586	8.7 %
R 25 601 - R 51 200	9 1 2	0.4%	3 12 8	1.0 %	514	5.1 %	18 657	9.1 %	23 211	2.9 %
R 51 201 - R 102 400	2 1 9	0.1%		0.2 %	133	1.3 %	4 380	2.1 %	5 479	0.7 %
R 102 401 or more	5 1 4	0.2%	1 01 5	0.3 %	95	0.9 %	3 340	1.6 %	4 964	0.6 %
Unspecified		0.0%		0.0 %		0.0 %		0.00 %	0	0.0 %
Total	251 126	100.00%	310 466	100.00%	10 065	100.00%	205 734	100.00%	777 391	100.00%

Household Income profile – Census 2011

Cape Town Monthly Household Income 2001	Black African		Coloured		Asian		White		Total	
	Num	%	Num	%	Num	%	Num	%	Num	%
No income	69 946	27.9%	22 434	7. 2 %	697	6. 9 %	8 994	4. 4 %	102 071	13.1 %
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Unspecified		0.0 %		0. 0 %		0. 0 %		0.00 %	0	0. 0 %
Total	251 126	100.00%	310 466	100.00%	10 065	100.00%	205 734	100.00%	777 391	100.00%

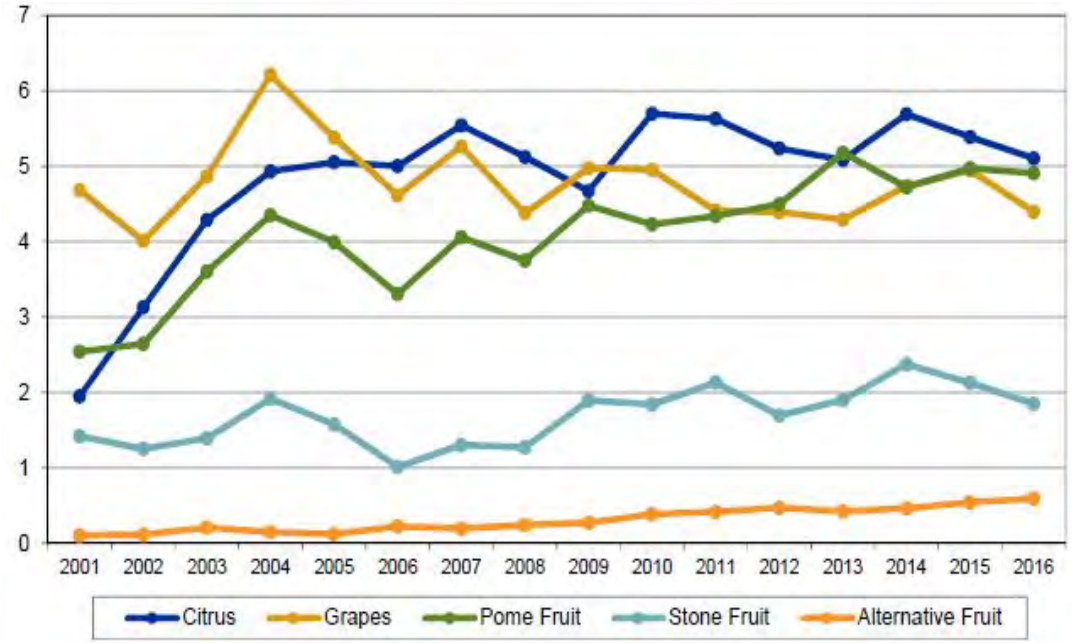
Historic trend analysis – Socio-economic Analysis

- A comparison of the two-census information illustrates the following:
  - In 2011, 47% of households in Cape Town had a monthly income of R3 200 or less, which has declined from the 2001 percentage, with 56% of households in Cape Town having had a monthly income of R3 200 or less.
  - 13,7% of households in Cape Town had a monthly income of R25 601 or more in 2011, with 4.2% having a monthly income of R25 601 or more in 2001.
  - The percentage of households with no monthly income increased slightly from 13% in 2001 to 14% in 2011.

Economic Growth trends

Key drivers of growth in the WCWSS which influence changes in water requirements

- Tourism – business & leisure tourism & more specialised niches
  - Moderately dependent on water
  - Use between 3 to 8 times more water than domestic sector
- Agri-processing – Value added activities (food & beverages
  - Heavily dependent on agriculture – primary sector
  - Heavily dependent on water in processing

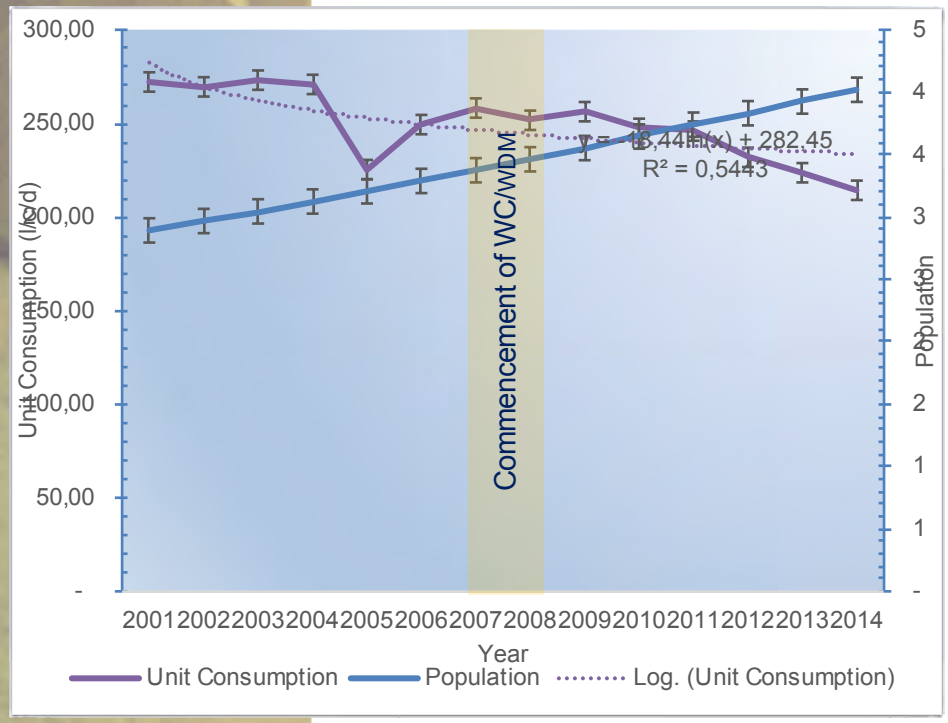


Comparison of economic growth forecasts & actual economic growth rates

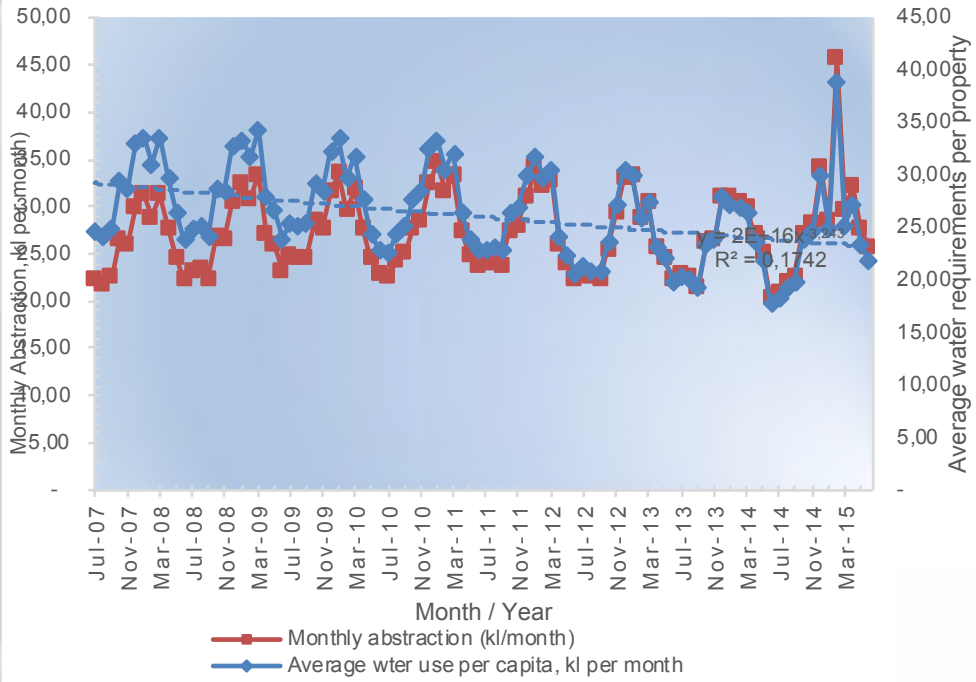
Water requirement scenario	Economic growth rate forecast (% per annum) (2007 strategy)		Economic growth rate (% per annum)		
	2006-2010	2010-2030	2006 - 2015	2015-2022*	2022 - 2042
High	4.50	6.00	3.00	1.80	4.50
Low	4.00	4.00	3.00	1.00	2.50

Historic water requirements trends

Change in unit consumption with change in population for the CCT



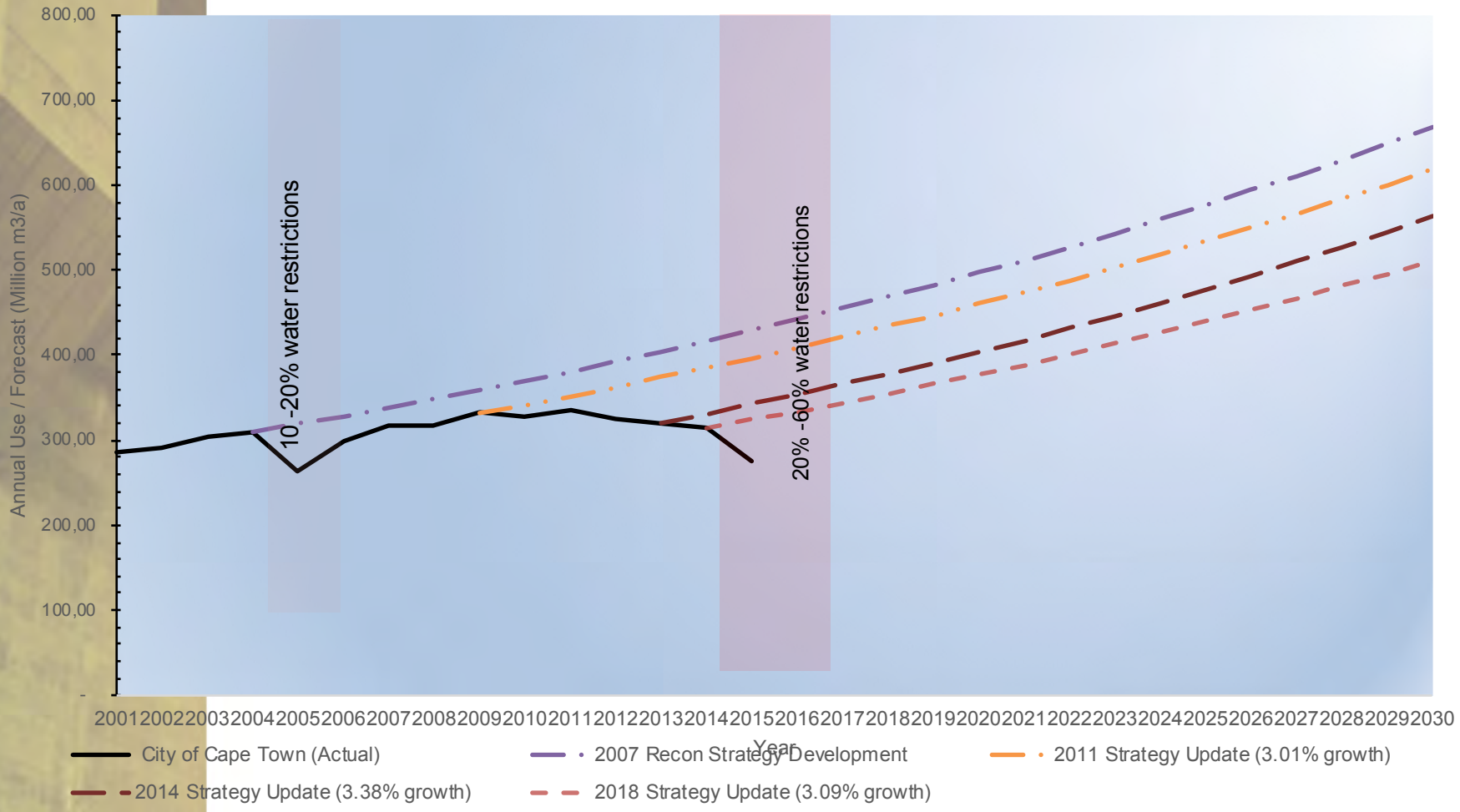
Average monthly water use, kl per month



Historical water requirements trends

- The preliminary assessment of the events over the period :
  - The extensive water efficiency programmes implemented since early 2007 which included pressure management, changes to the efficiency devices codes, leakage management, etc.
  - Implementation of water saving technologies in the City including smart metering, toilet flushing, and urinals in public buildings, etc.
  - Political and public acceptance to the need to reduce water losses and improve on the per capita water requirement.
  - Changes, such as increases in the water use tariff and rate structure adjustments.

Past Water Requirements Forecast



Update of factors influencing water requirement forecasts

- The key drivers of water requirements in the WCWSS and in particular the City of Cape Town that were identified are the three basic determines of
- ΔP, the change in population in capita, driven by the economic activity of the area or region
- Δr, the change in the ratio of population supplied with water over the planning period, which is driven by the growth in household, household income level, etc
- Δq, the change in the individual water ratio in litres per day per capita,
  - driven by the changes in the household income,
  - Policy and regulatory changes which include water tariffs and rate structures, etc.
  - There is empirical evidence of the relationship between water abstraction and water use, the per capita water abstraction has been used to factor in the system losses and inefficiencies

Proposed high growth rate water requirement

- High population growth forecast
  - Based on CCT assessment & WC PERO (2017)
  - Based on 2.05% per annum
- Changes in ration of pop
  - Based on the level of service
  - Ratio of population supplied with water to the total population
  - Estimated 0.90 – 0.94
- Changes in average per capita
  - Driven by regulation & tariff and rate structures
  - Changes in household income

High growth rate forecast

- Then the total "water requirements" Q_t expected at the end of the planning period is to be calculated as follows:
  - $Q_t = P_t/P_0 \times r_t/t_o \times q_t/q_o \times Qo$, where subscripts t refer to values at the end of the planning period which is 2042, and
  - 0 Reference year, which is 2014 respectively

- Growth rate ranges between 2.5% - 2.75% from base year 2014

APPENDIX D
UPDATE OF WATER REQUIREMENTS

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

WCWSS Reconciliation Strategy Update - Water Requirements

WATER IS LIFE, SANITATION IS DIGNITY

Presentation Content

- Understanding the Context
- Water Allocations
- Water Restrictions
- Historical Water Requirements
- Future Water Requirements

Understanding the Context

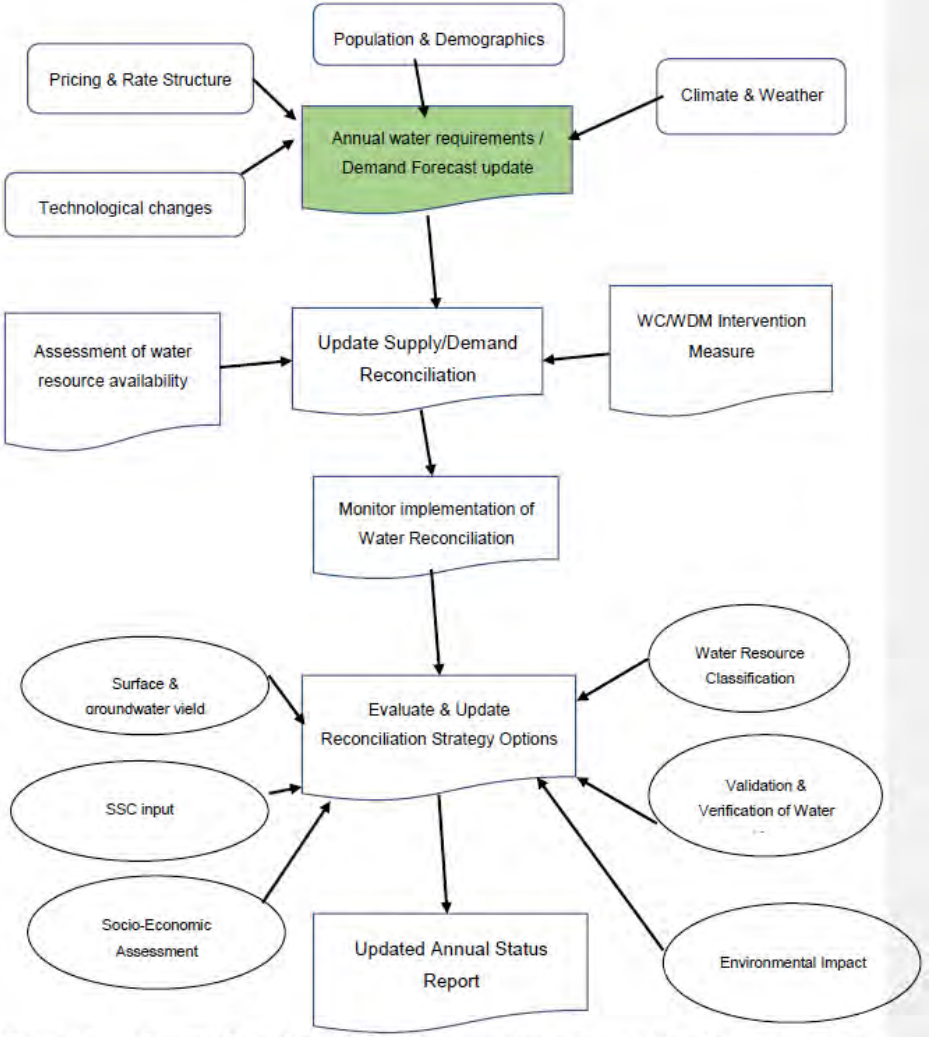
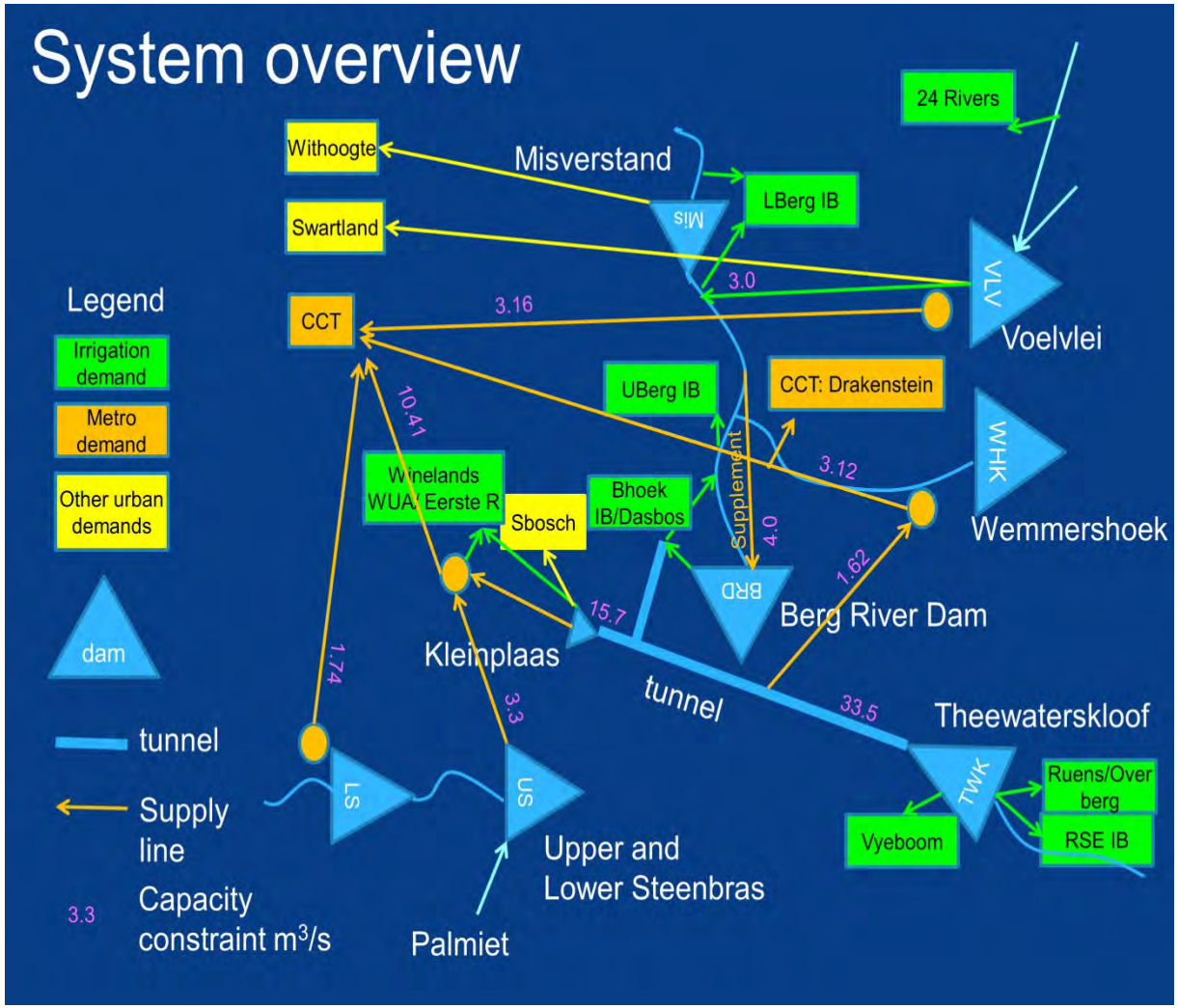


Figure 3.1: Process Flow chart for the implementation and updating of the reconciliation strategy

Understanding the Context



Water Allocations

- Water Allocations were covered in Water Allocation Report (DWS, 2015)
- New License issued since
  - WCDM issued 23/10/2017

Urban Allocations

User	Licensed / permitted abstraction	Allocation from own sources	Estimated River Losses	Requirement from WC WSS
City of Cape Town *)	370.70	12.80	-	357.90
West Coast DM	32.24	1.35	1.16	33 .75
Drakenstein LM **)	3.18	2.01	-	1.17
Stellenbosch LM **)	11.13	8.13	-	3.00
Overberg Water	3.00	-	1.00	4.00
Piketberg and PPC	2.37	-	0.51	2.90
Lower Berg	0.05	-	0.01	0.07
Wynland	1.04	-	-	1. 04
Urban total	**423.71**	**24.28**	**2.69**	**403.83**

[LF3]We have reduced to 8.5 as run of river meets at least 8 does not come from Dams
[LF4]31.5
[LF5]+- 15

Agriculture Allocations

WUA, IB	BWP capped allocation	WRPM capped allocation	Registered volumes	WC WSS allocation	WC WSS requirement
Lower Berg IB	18.1	18.1	11.04	20.97	27.66
Additional approved licences	-	-	10.23	10.3	13.73
Upper Berg IB	58.6	58.6	73.63	73.09	58.60
Additional approved licences	-	-	0.57	0.57	0.75
Compensation releases	-	16.5	-	-	16.50
Zonderend IB	31.5	31.5	35.92	36.11	41.46
Vyeboom IB	13.2	13.2	13.15		
Pump from Theewaterskloof Dam	1.5	1.5	1.03	29.51	29.51
Banhoek IB and others	1.8	1.8	1.80	1.80	1.80
Users on Dasbos outlet	-	-	0.2	0.18	0.18
Wynland WUA : Stellenbosch District	12.0	12.0	12.04	11.01	11.91
Wynland WUA : Helderberg District	12.1	12.1	12.11	11.00	11.00
Wynland WUA : Eerste River District	3.1	4.3	1.65	3.15	3.15
Irrigation surplus	10.4	-	-	-	-
Overberg Water	-	4.0	-	-	-
Total	**162.3**	**173.6**	**173.42**	**198.57**	**216.24**

Total Allocations

Agricultural allocations	**198.57 million m^3/a**
	[216 million m^3/a incl. losses]
Domestic allocations	**401.14 million m^3/a**
	[403.83 million m^3/a incl. losses]
Total allocations	**599.71 million m^3/a**
River losses / compensation	**20.36 million m^3/a**
Total requirements	**620.07 million m^3/a**

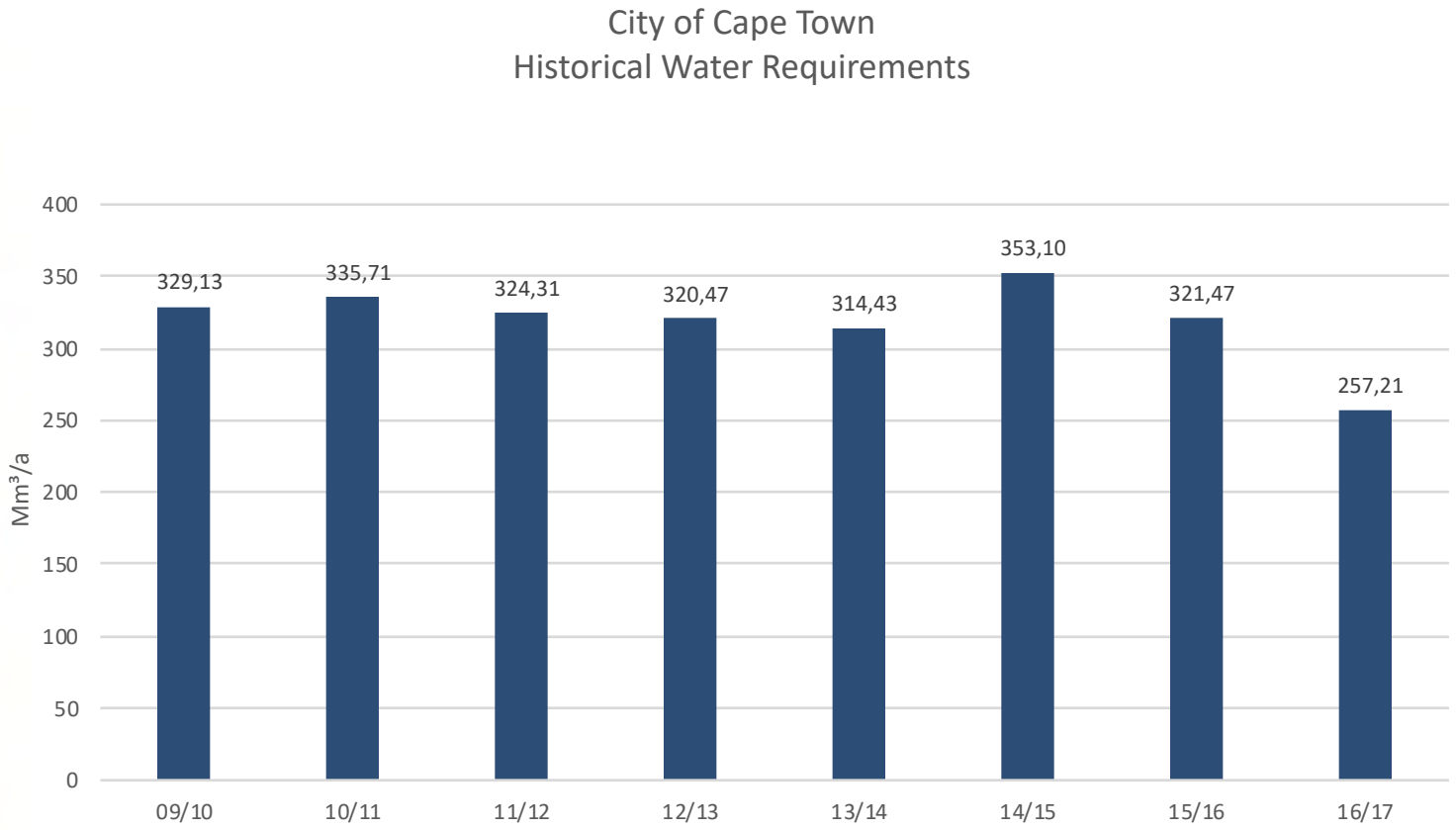
Restrictions Implemented in the WCWSS

Planning/operating year	Decision made	Gazetted on (formal gazette)	Effective date	Curtailment (%)	
				Domestic and industrial	Irrigation
Nov 2014 – Oct 2015	-	-	-	0%	0%
Nov 2015 – Oct 2016 (1)	16 November 2015 (SOF)	-	From 1 November 2015	0% ->10% (1)	0%
	10 December 2015 (Media Release)	-	From 1 January 2016	20% ->10% (1)	20% ->0%
	8 March 2016 (SOF)	-	From 1 April 2016	15%	15%
	6 June 2016 (Restriction Notice)	16 September 2016	From 1 June 2016	20% (2)	20% (2)
Nov 2016 – Oct 2017 (3)	16 November 2016 (SOF)	10 May 2017	From 1 March 2017	20% (4)	30% (4)
	4 October 2017 (Media Statement)	-	From 1 October 2017	40% (4)	50% (4)
Nov 2017 – Oct 2018	24 November 2017 (Drought Meeting)	12 January 2018	From 1 January 2018	45% (4)	60% (4)

City of Cape Town - Water Requirements

Description	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17
Surface water dam abstraction	140	124	130	101	115	95	99	60
Run-of-River abstraction	-	-	-	-	-	-	-	-
Groundwater abstraction	6	3	1	1	1	1	2	3
Water re-use for Potable System	-	-	-	-	-	-	-	-
Desalination (Sea Water)	-	-	-	-	-	-	-	-
Other Raw Water Resource / Purchased	184	209	192	218	198	256	221	195
Total from WCWSS	**329.13**	**335.71**	**324.31**	**320.47**	**314.43**	**353.10**	**321.47**	**257.21**
Total treated water after WTW	280	282	280	272	265	286	285	226
Bulk water sales to External WSAs	30	34	34	33	33	37	33	25
Bulk system losses after WTWs	19	20	10	16	16	35	3	11
Reticulation End Consumer Billings	227	227	223	223	214	231	220	176
Average Distribution Losses %	7%	7%	4%	6%	6%	12%	1%	5%
Average Purification Losses %	15%	16%	14%	15%	16%	19%	11%	12%

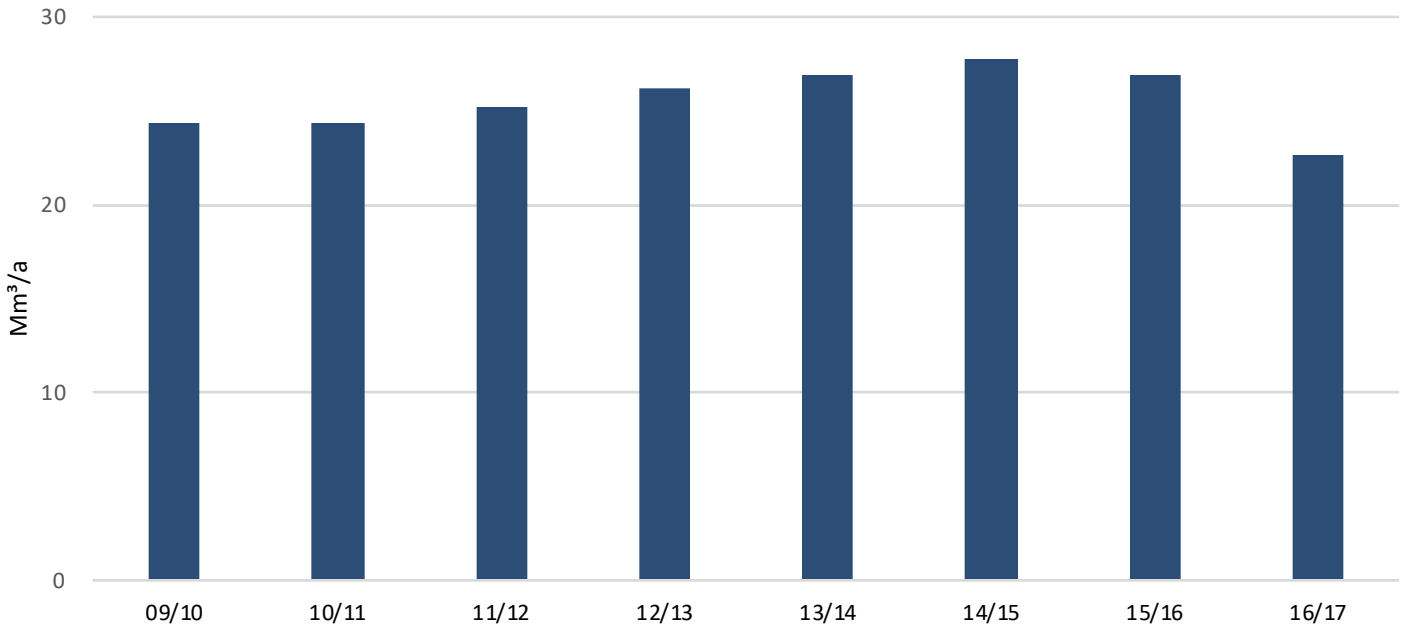
City of Cape Town - Water Requirements



West Coast DM – Historical Water Requirements

Source	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17
Withoogte from Misverstand Weir	16.93	16.71	17.53	18.69	20.36	20.74	19.82	16.18
Langebaan Road Aquifer	0.62	0.97	1.09	0.93	-	-	0.64	0.87
Swartland from Voëlvlei Dam	6.76	6.64	6.59	6.60	6.50	6.99	6.39	5.56
Total for West Coast DM	**24.32**	**24.31**	**25.21**	**26.22**	**26.86**	**27.73**	**26.85**	**22.61**
Total from WC WSS	**23.69**	**23.34**	**24.12**	**25.29**	**26.86**	**27.73**	**26.21**	**21.75**
Total treated water after WTW	-	-	-	-	-	26.30	25.24	21.78
Total Billed	-	-	-	-	-	24.27	23.57	21.35
Average Purification Losses %	-	-	-	-	-	6.03%	6.01%	3.70%
Average Distribution Losses %	-	-	-	-	-	7.90%	6.62%	1.94%

WCDM- Water Requirements



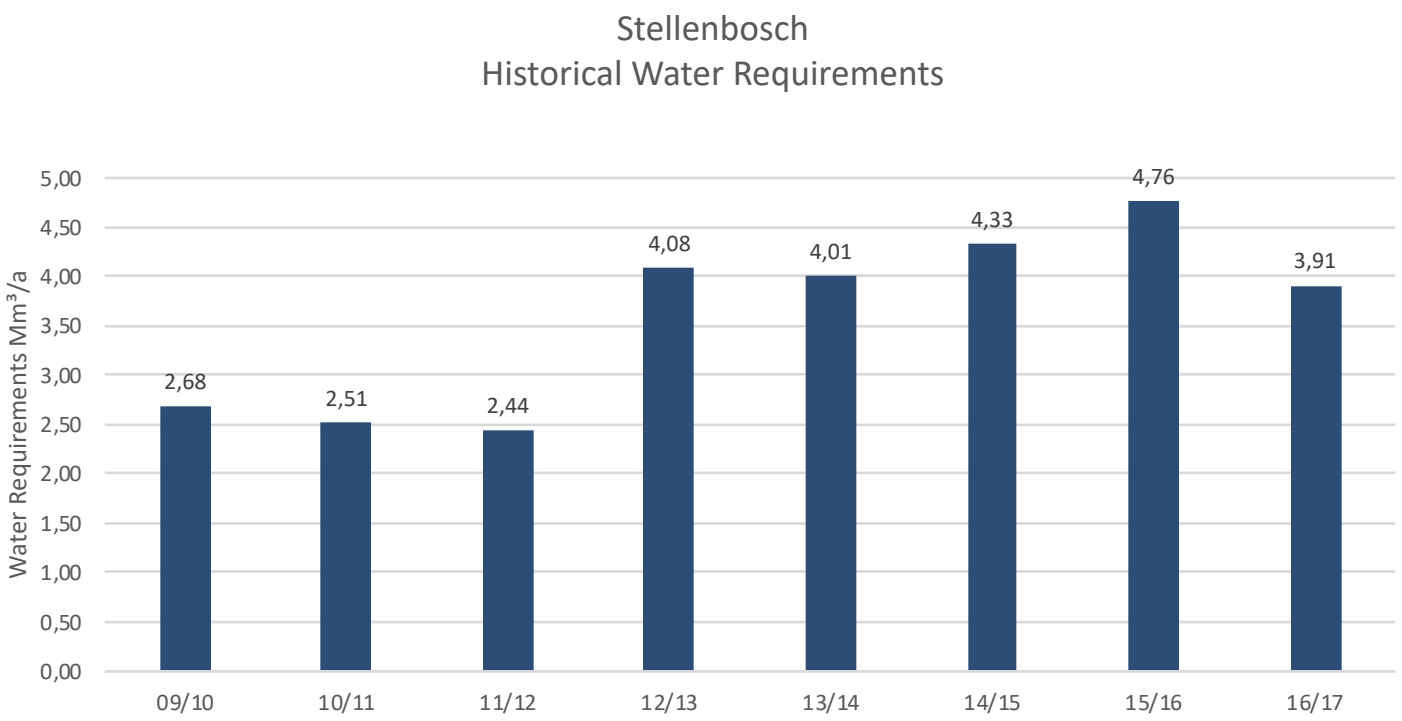
Drakenstein Local Municipality – Water Requirements

Source	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17
Bulk water Drakenstein **)	0.39	1.04	0.63	0.92	1.01	1.17	1.02	0.89

Stellenbosch Local Municipality – Water Requirements

Towns	Source	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17
Franschhoek	Mount Rochelle, Perdekloof, Du Toits River	0.80	1.58	1.38	0.74	1.11	0.48	0.24	0.25
	WCWSS	0.80	0.94	0.84	0.77	1.69	1.07	1.18	0.94
Dwarsrivier	WCWSS	0.65	0.74	0.70	0.89	0.89	0.83	0.76	0.72
Klapmuts	WCWSS	0.32	0.36	0.31	0.40	0.35	0.55	0.60	0.50
Stellenbosch	Eerste River	4.95	5.13	4.93	3.23	4.96	5.23	4.82	3.99
	WCWSS,	2.68	2.51	2.44	4.08	4.01	4.33	4.76	3.91
Total Stellenbosch Municipality		**11.02**	**12.80**	**12.46**	**11.98**	**13.36**	**13.81**	**13.56**	**11.28**
Raw water from WCWSS [2)]		**2.68**	**2.51**	**2.44**	**4.08**	**4.01**	**4.33**	**4.76**	**3.91**

Stellenbosch Local Municipality – Water Requirements



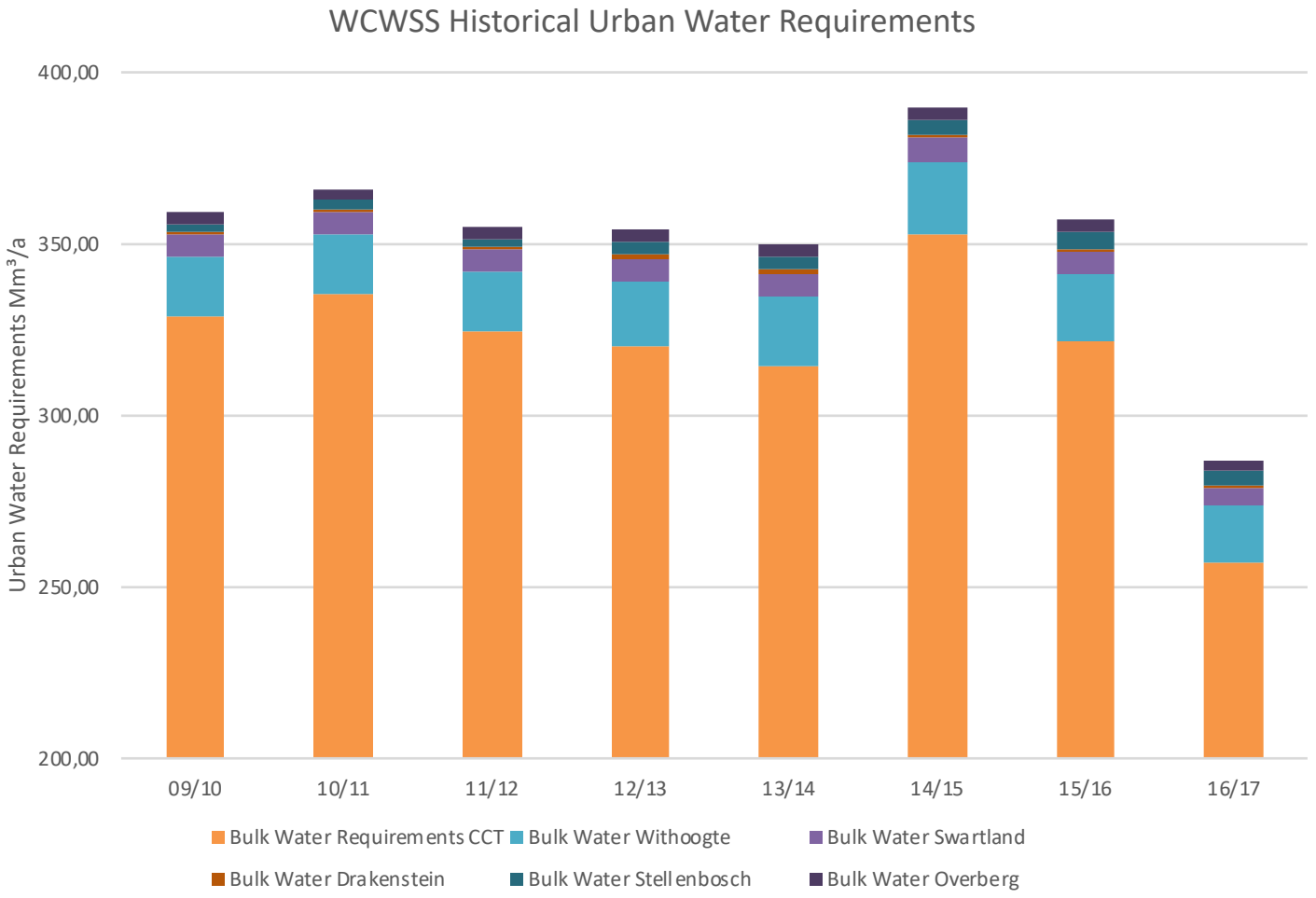
Overberg – Water Requirements

Source	Allocation	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17
Bulk water Overberg Water	3.0	3.09	3.33	3.19	3.18	3.22	3.40	3.40	3.10

Total Urban – Water Requirements

Source	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17
Bulk water CCT	329.13	335.71	324.31	320.47	314.47	353.10	321.47	257.21
Bulk water Withoogte	16.93	16.71	17.53	18.69	20.36	20.74	19.82	16.18
Bulk water Swartland	6.76	6.64	6.59	6.60	6.50	6.99	6.39	5.56
Bulk water Drakenstein **)	0.39	1.04	0.63	0.92	1.01	1.17	1.02	0.89
Bulk water Stellenbosch	2.68	2.51	2.44	4.08	4.01	4.33	4.76	3.91
Bulk water Overberg Water	3.09	3.33	3.19	3.18	3.22	3.40	3.40	3.10
Urban total from WCWSS	**358.99**	**365.93**	**354.69**	**353.93**	**349.57**	**389.73**	**356.86**	**286.85**

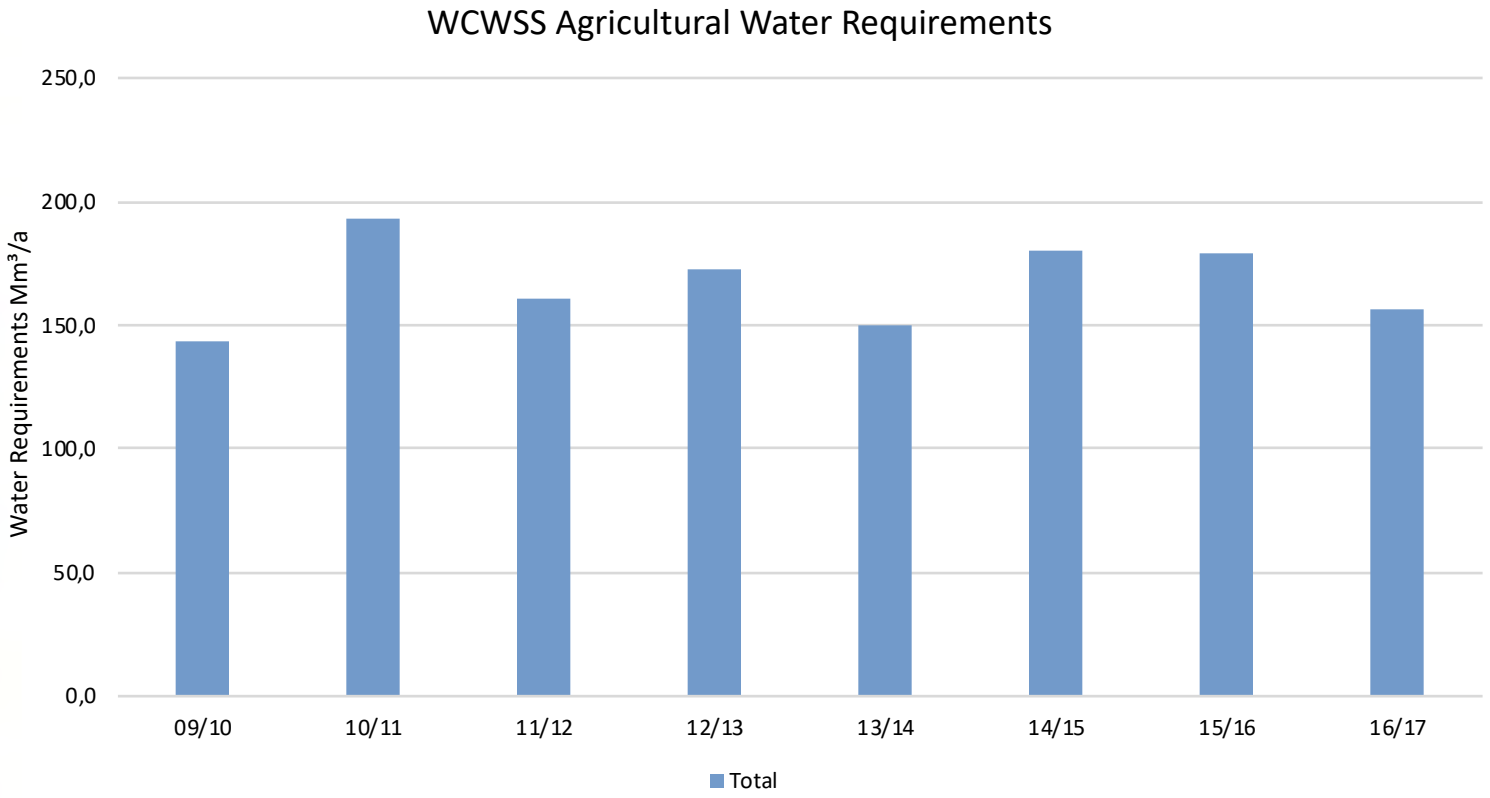
Total Urban – Water Requirements



Agricultural – Water Requirements

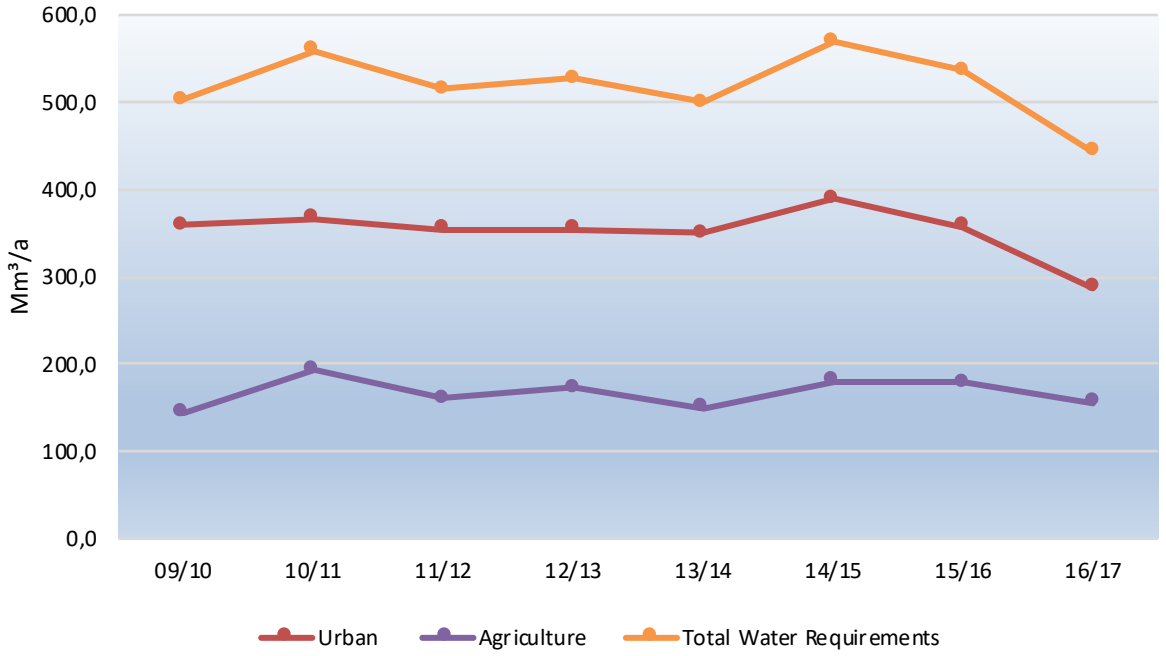
WUA, IB	Allocation	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17
Berg River Scheme (Voëlvlei Dam & Misverstand Weir)									
Lower Berg IB	31.3	37.2	58.3	23.2	22.9	18.1	18.1	18.1	18.1
24 Rivers IB *)		20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Riviersonderend / Berg River Scheme (Theewaterskloof Dam, Berg River Dam)									
Zonderend WUA	36.1	24.7	36.1	31.6	31.9	30.0	37.2	36.5	29.2
Vyeboom IB	13.5	9.6	10.8	8.4	8.9	8.0	9.3	10.0	8.8
Pump from Theewaterskloof Dam	16.0	1.5	1.5	1.5	1.5	1.5	1.8	7.5	7.5
Upper Berg IB	73.1	12.0	25.7	33.7	45.9	31.0	51.8	44.2	36.4
Banhoek IB / Dasbos	2.0	1.7	1.7	1.7	1.7	1.7	2.6	2.3	1.3
Helderberg IB + Stellenbosch IB	22.9	16.6	18.8	19.8	19.0	19.0	19.4	21.2	15.9
Wynlands WUA : Eerste River District	3.2	4.1	4.1	4.1	4.1	4.1	3.0	3.2	2.2
Compensation release		16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5
Total	**198.0**	**143.9**	**193.5**	**160.5**	**172.4**	**149.9**	**179.7**	**179.5**	**155.9**

Agricultural – Water Requirements



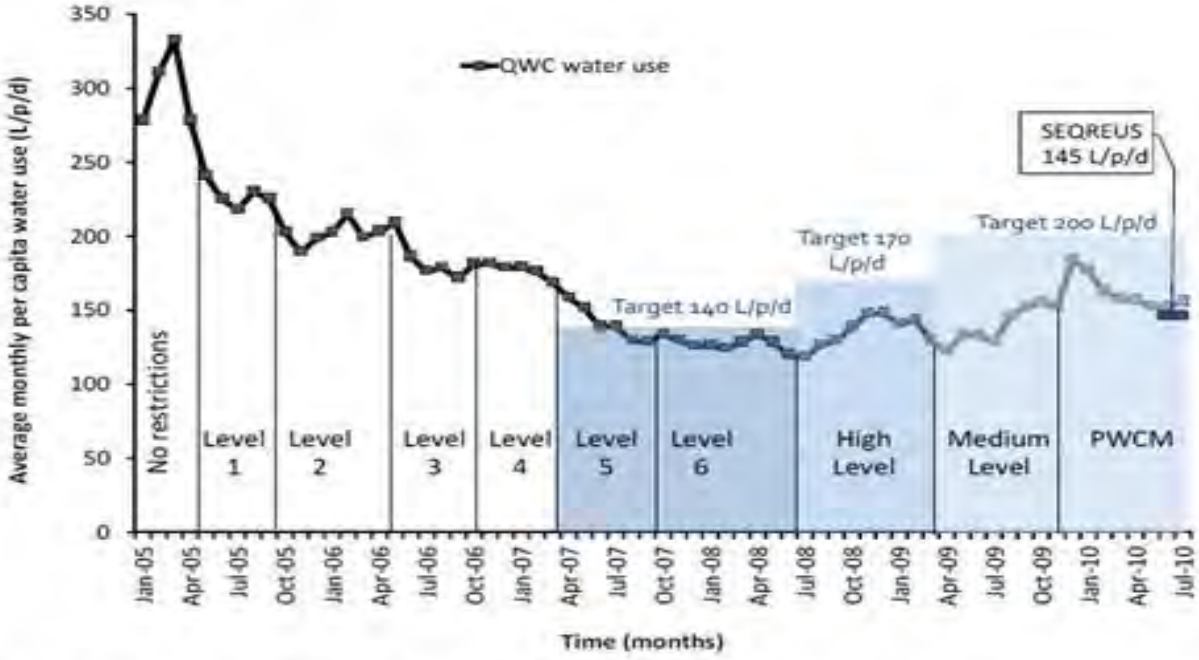
Summary – Historical Water Requirements

- Urban: 287 million m^3/a
- Irrigation releases: 156 million m^3/a
- TOTAL (estimated): 443 million m^3/a



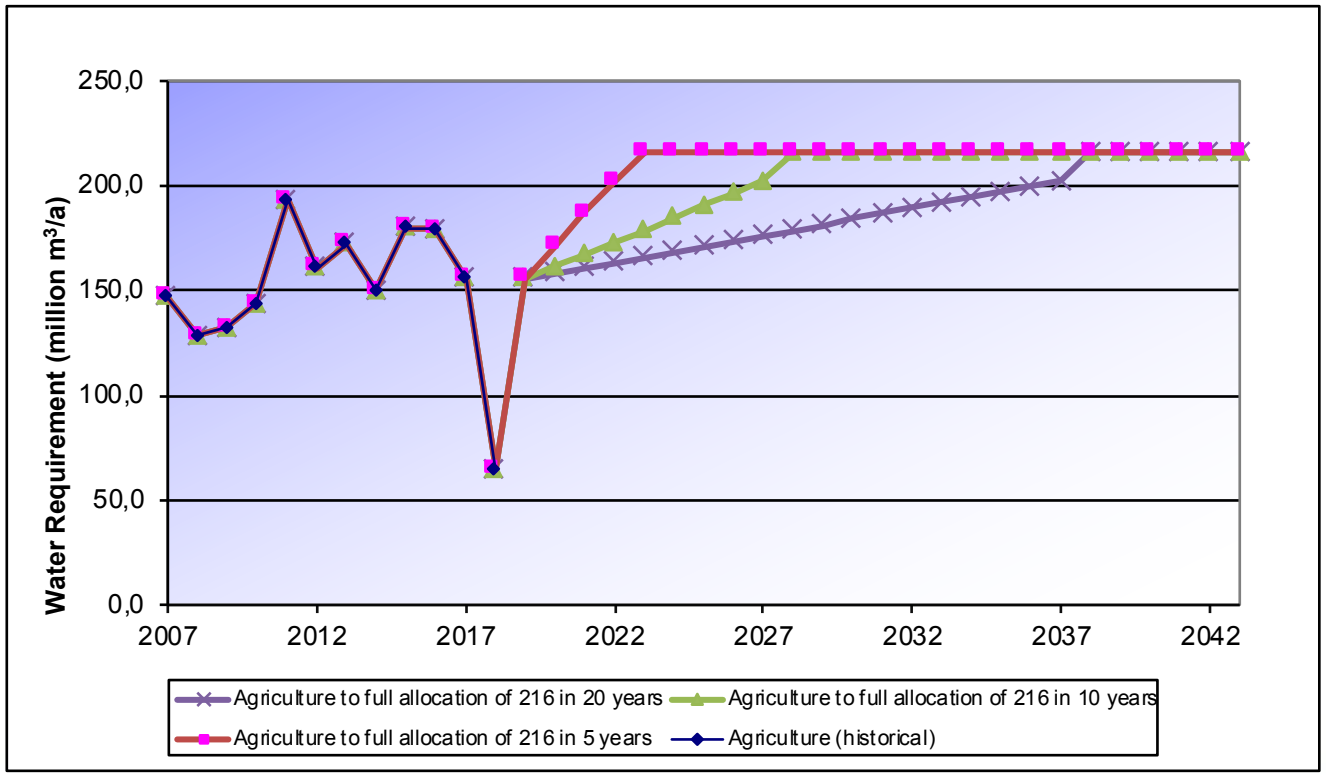
Future Urban Water Requirements

- Assumptions
  - 50% of the urban water requirements will bounce back immediately after the lifting of restrictions
  - The balance of the 50% will recover within a period of 3 years
  - A growth rate of 2.65% from the point of full recovery

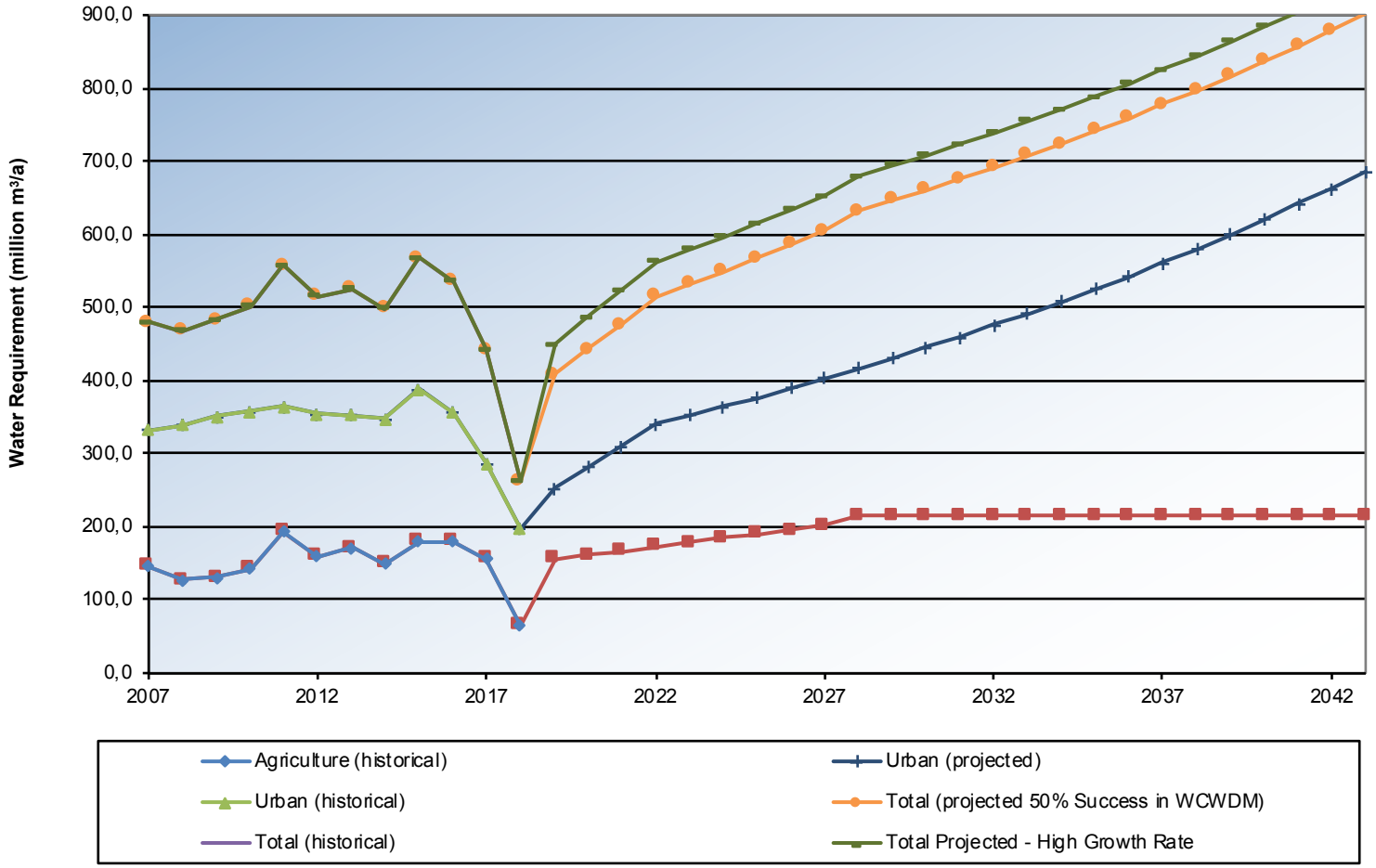


Future Agricultural Water Requirements

- Assumptions
  - Agriculture growing to its full allocation of 174Mm³/a
  - Agriculture growing to full allocation of 216 Mm³/a in 5 years and thereafter remain capped
  - Agriculture growing to full allocation of 216 Mm³/a in 10 years and thereafter remain capped
  - Agriculture growing to full allocation of 216 Mm³/a in 20 years and thereafter remain capped



Summary


Water Requirement (million m³/a)
900,0
800,0
700,0
600,0
500,0
400,0
300,0
200,0
100,0
0,0
2007
2012
2017
2022
2027
2032
2037
2042
Agriculture (historical)
Urban (historical)
Total (historical)
Urban (projected)
Total (projected 50% Success in WCWDM)
Total Projected - High Growth Rate

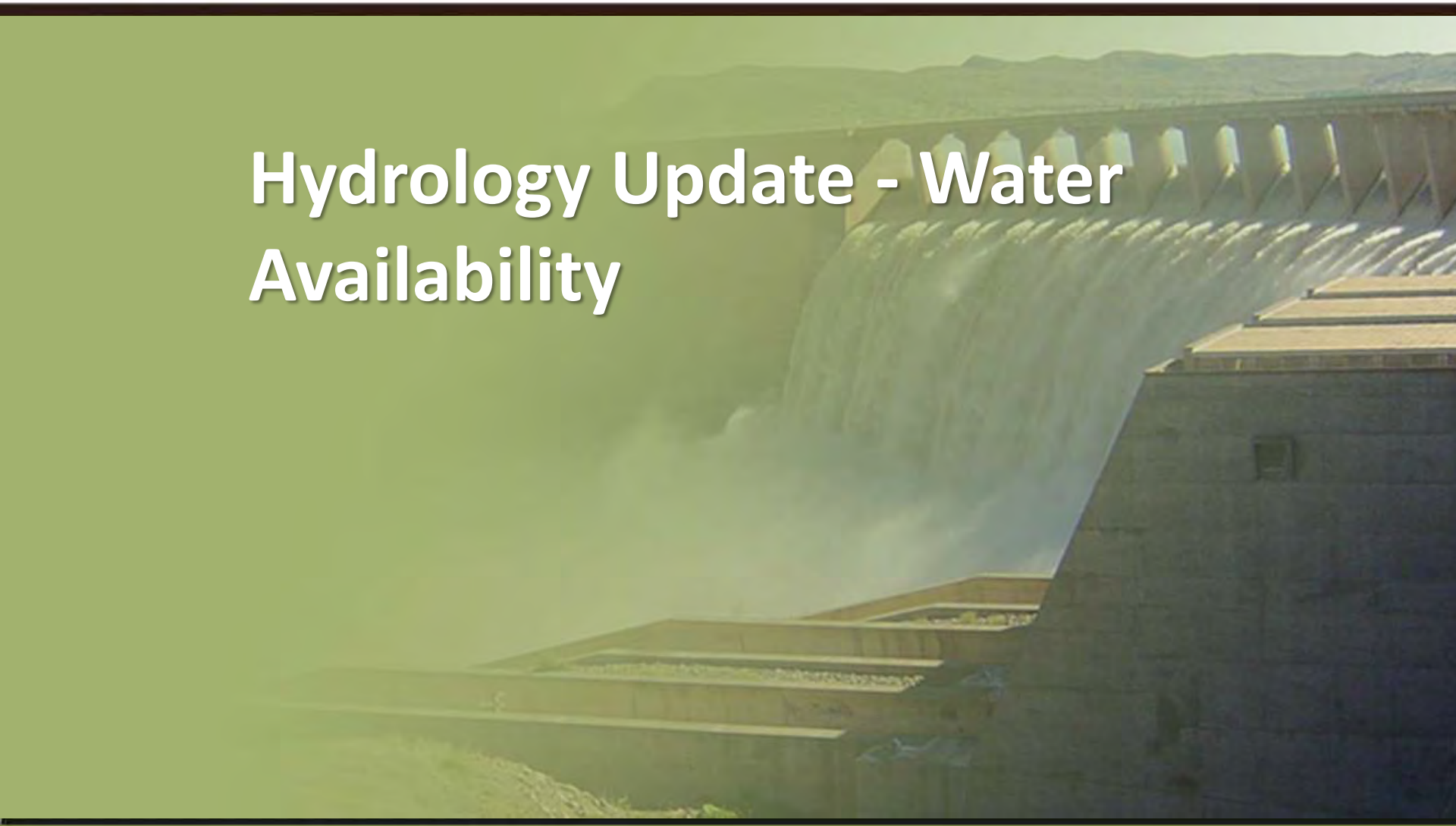
Thank You!

APPENDIX E
UPDATE OF WATER RESOURCE AVAILABILITY

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Hydrology Update - Water Availability



Presentation Content

- Background to the extension of the hydrology
- Validation of the model
- Changes to the Long-Term System Yield
- Initial consideration of potential Climate Change impacts

Understanding the modelling

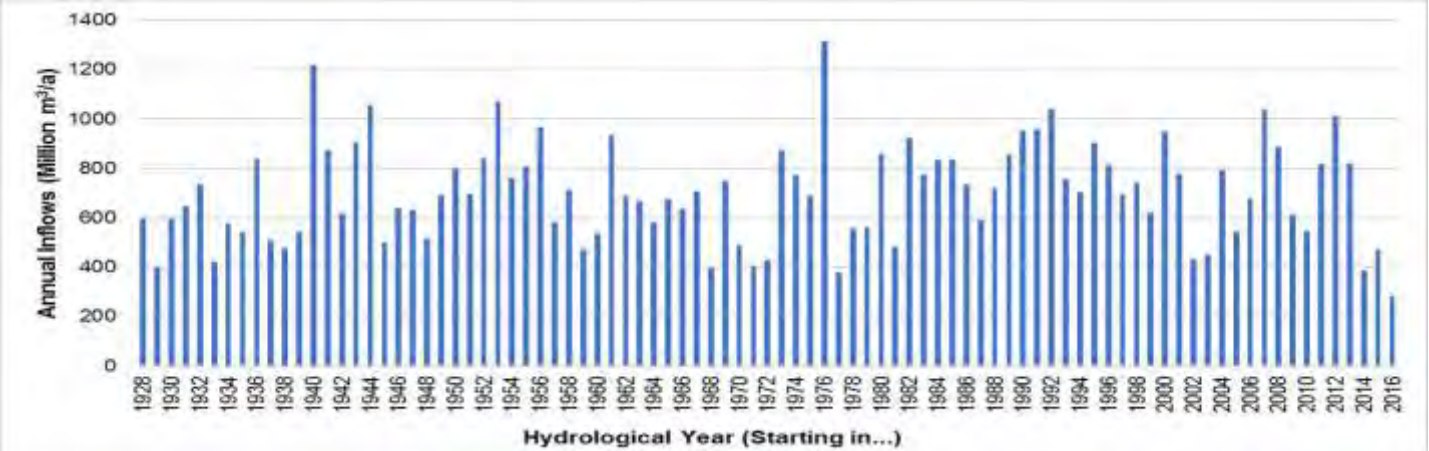
- The results assume that the system is maintained and operated optimally and according to a set of pre- determined rules.

- The 2004 modelling (as agreed at the time) assumed that stakeholders would manage, and reduce, the spread of invasive species
  - This has not happened to the degree assumed.

- The 2018 modelling assumes the 2016 spread of invasive species is not increased (although this is highly unlikely without urgent intervention)

Is this the worst drought on record?

- Yes! - 2017 runoff lowest of record



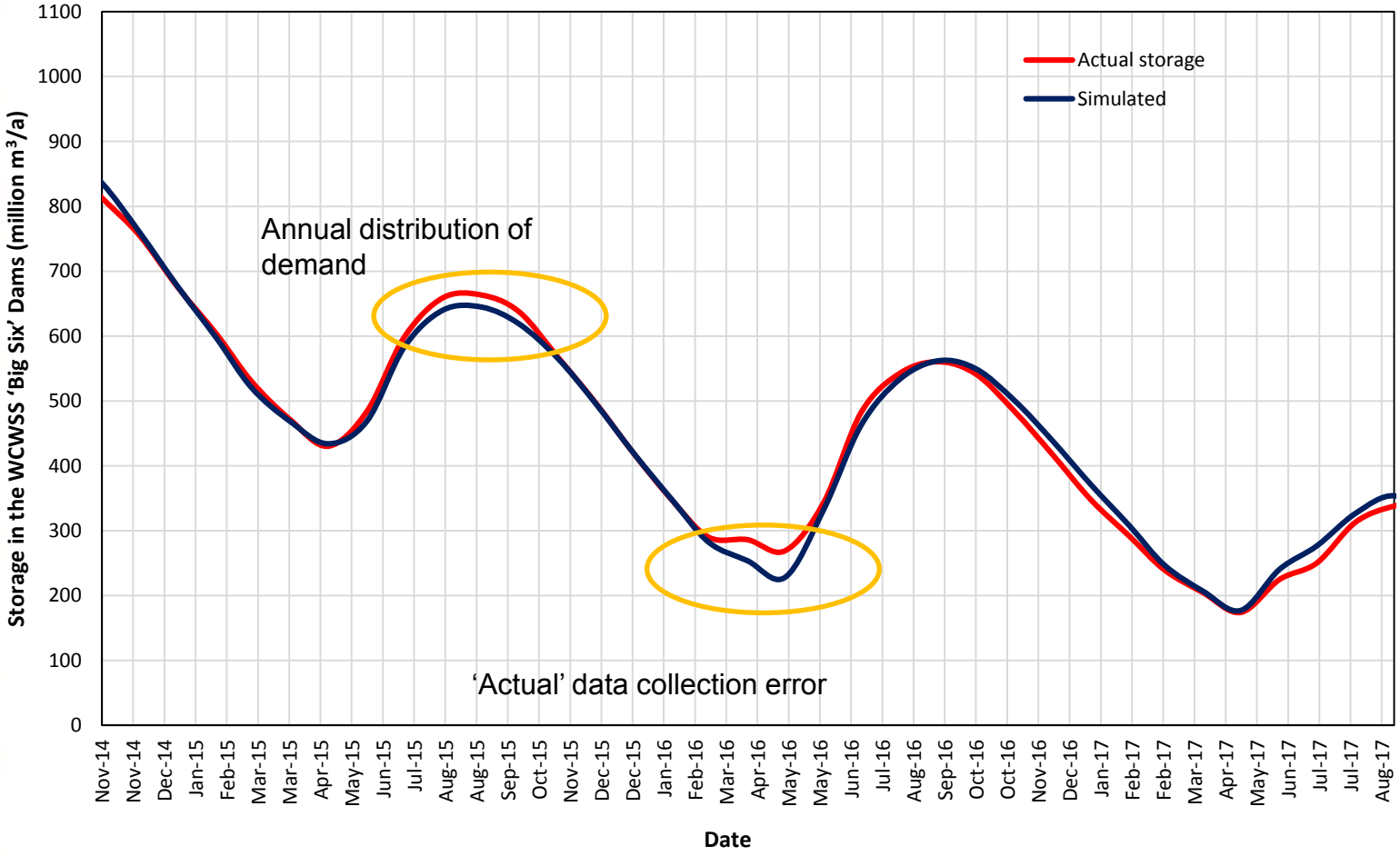
Ranking (from driest)	Year starting November	Winter	Annual inflow (million m³/a)	Return Period*
1	2016	2017	283	334
2	1977	1978	381	31
3	2014	2015	387	28
…	…	…	…	
12	2015	2016	472	9

*Based on a stochastically generated dataset with a sample of 17890 years of data

- No! - not in terms of historical firm yield
  - 1970's remains the critical drought (when reservoir failure is considered)
    - 4 years long (2017 is thus far 3 years – and if it goes on for another year will be the critical drought)
    - The spread of Alien Invasive Vegetation has increased (I.e. if 1970s were to occur today the effects would have been more severe)

Validation of the Extended Hydrology

Storage in the six major dams of the Western Cape Water Supply System (WCWSS)

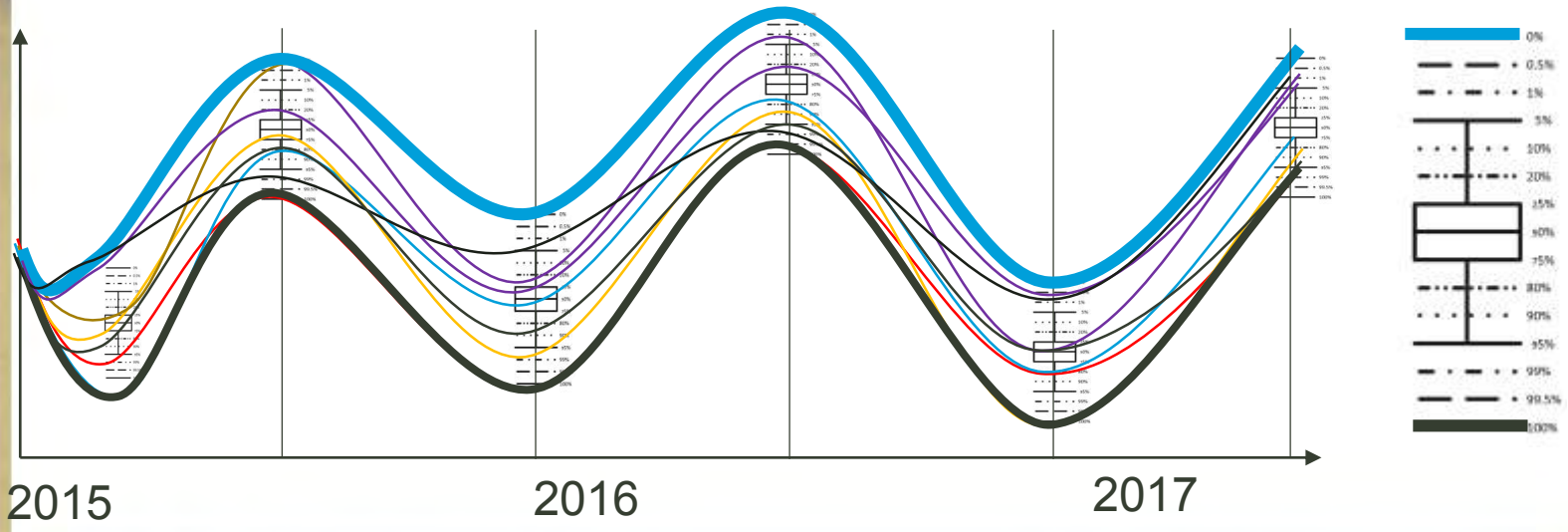


What has contributed to the difficulties in validating the extended hydrology?

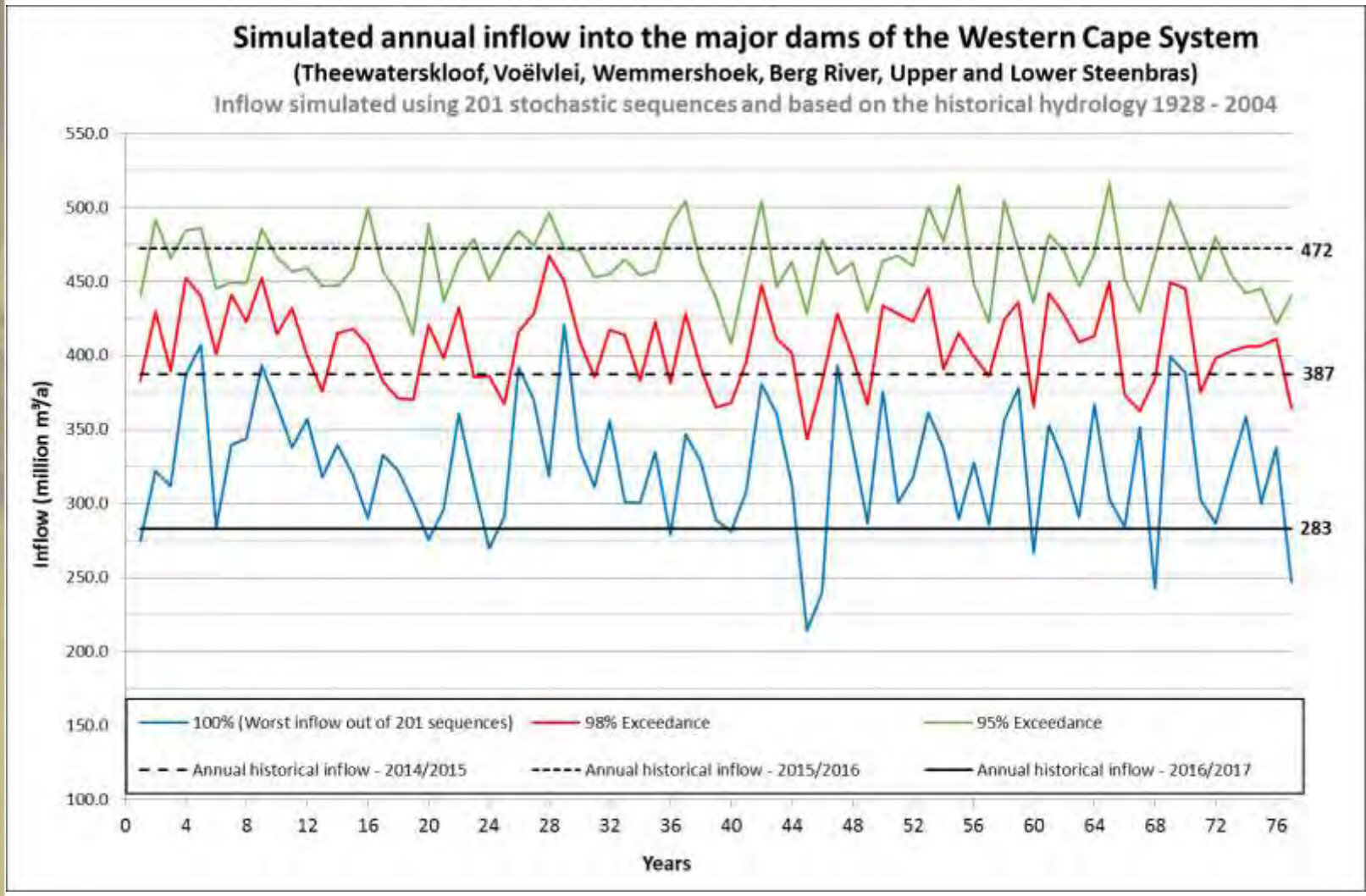
- Historical assumptions
  - Spread of invasive vegetation
  - Yield / supply from the City's local sources
- Management issues
  - Maintenance (Vöelvlei / 24 Rivers; Supplement scheme)
  - Allocation of additional licences
  - Supply / provision of water exceeding allocations

Understanding the modelled outputs

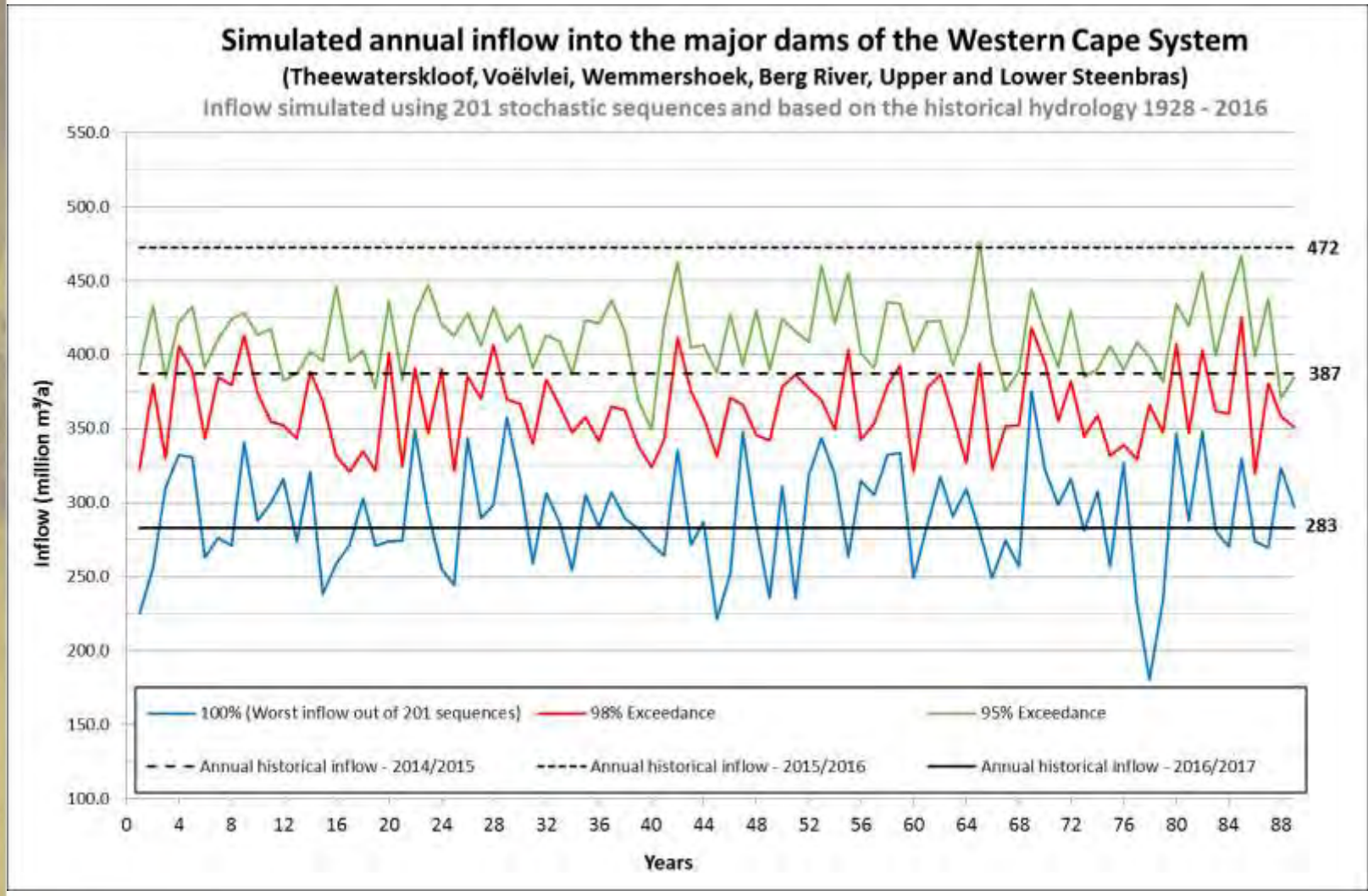
- Streamflow sequence generated synthetically
  - Sequence did not actually occur
  - Based on characteristics of historical streamflow's
- Generated by means of statistical (or “stochastic”) distributions
  - Generate random numbers
  - Apply selected annual statistical distribution models
  - Disaggregate annual into monthly flow values



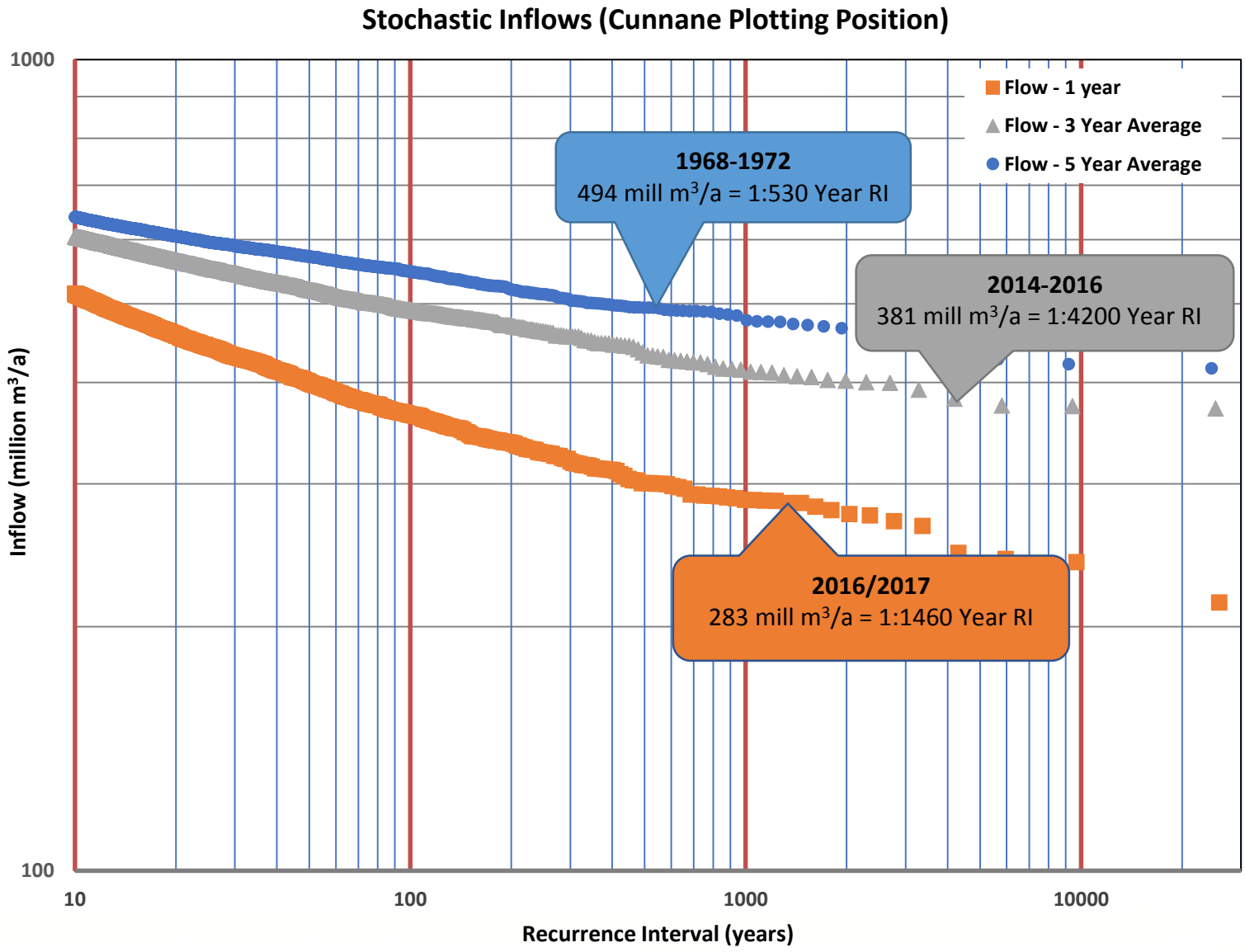
Stochastic Analysis using 2004/05 Hydrology



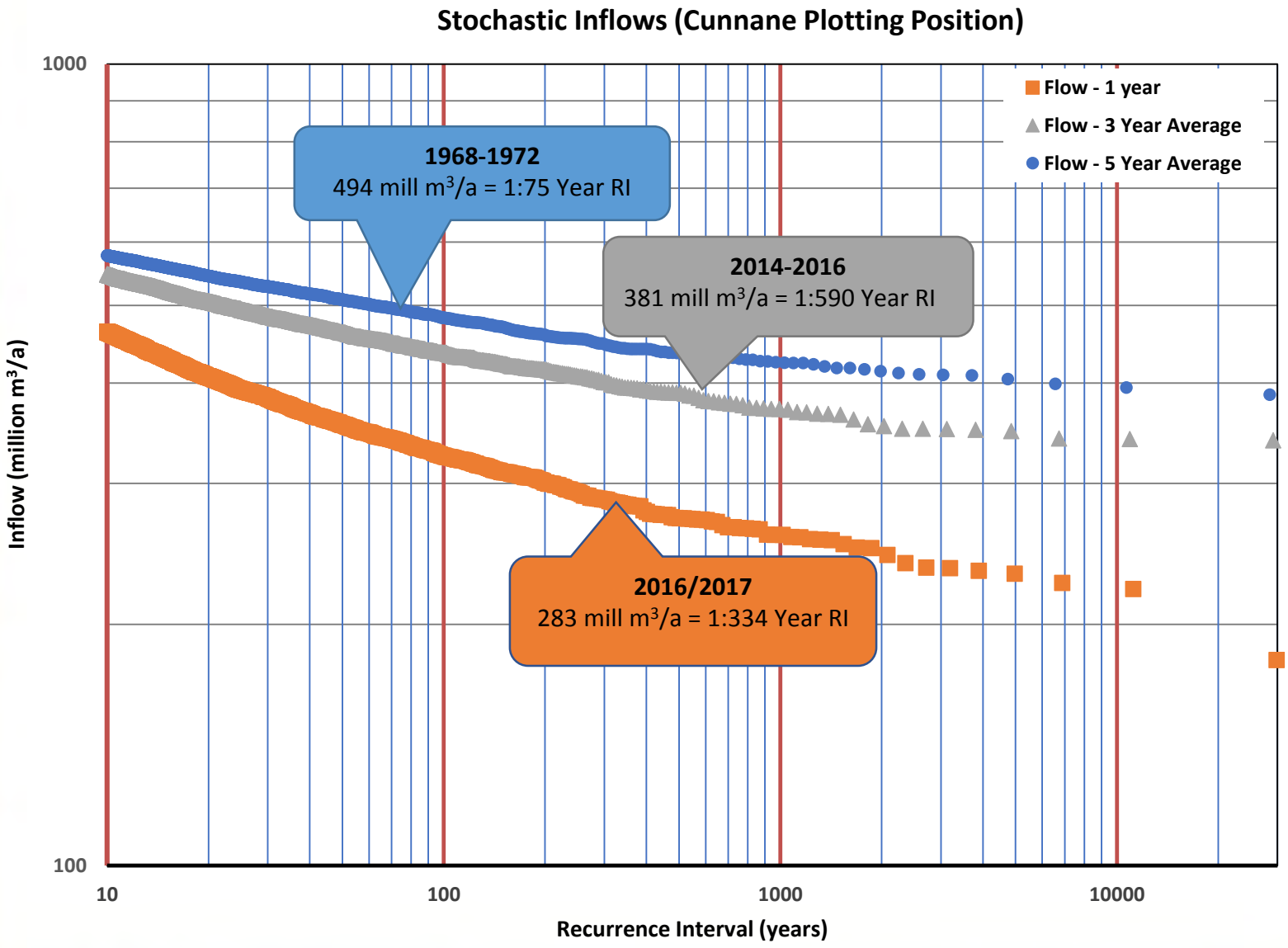
Stochastic Analysis using 2016/2017 Hydrology



Recurrence Intervals of Drought (2004/05 Hydrology)



Recurrence Intervals of Drought (2016/17 Hydrology)



Recurrence intervals of current single year drought

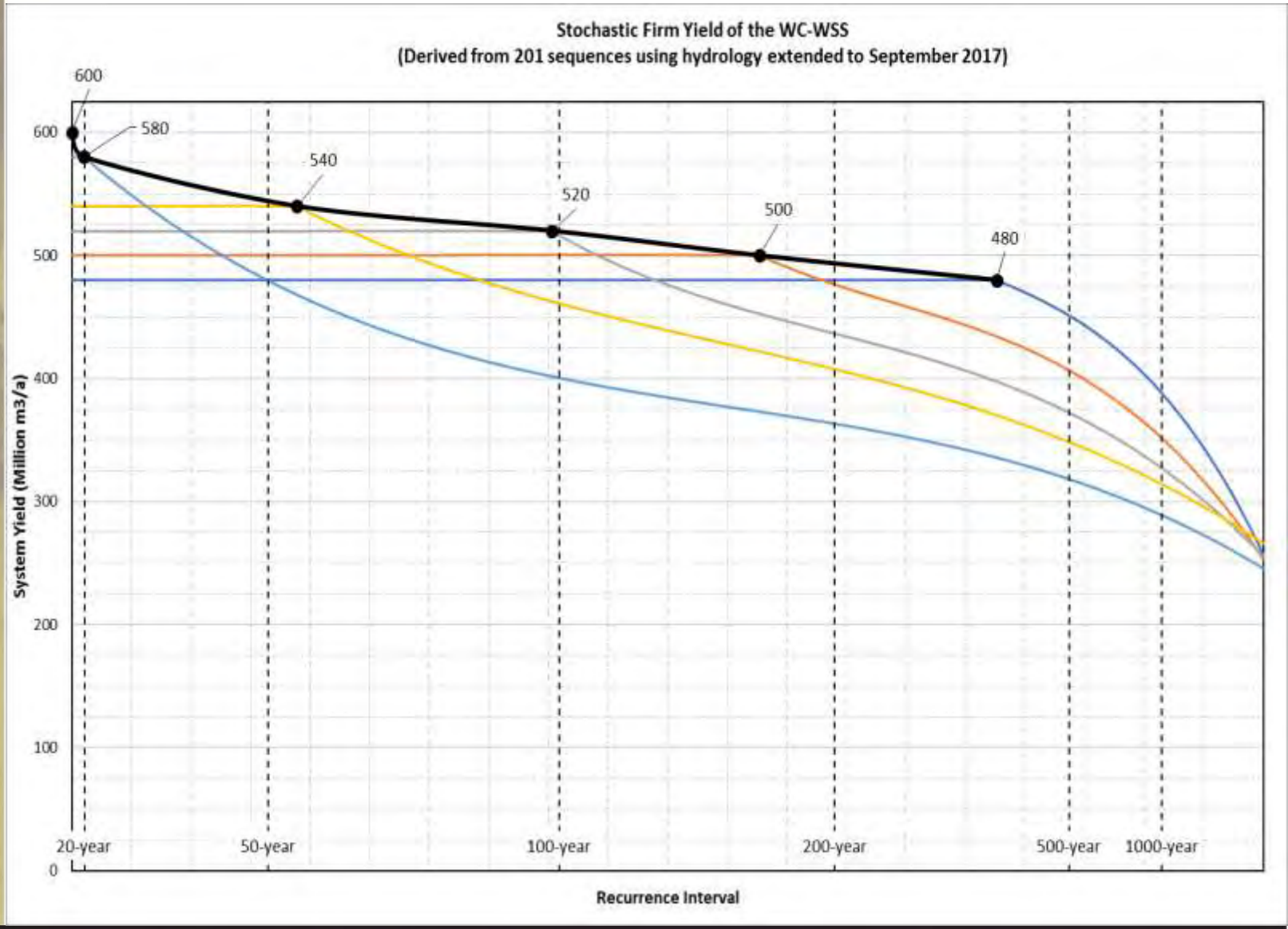
Ranking (from driest)	Year starting November	Winter	Annual inflow (million m³/a)	Recurrence Interval* 2004/05	Recurrence Interval* 2016/17
1	2016	2017	283	1460	334
2	1977	1978	381	68	31
3	2014	2015	387	62	28
…	…	…	…	…	…
12	2015	2016	472	17	9

*Based on a stochastically generated dataset with a sample of 15479 years (2004/05 Hydrology) and 17890 years (2016/17) of data

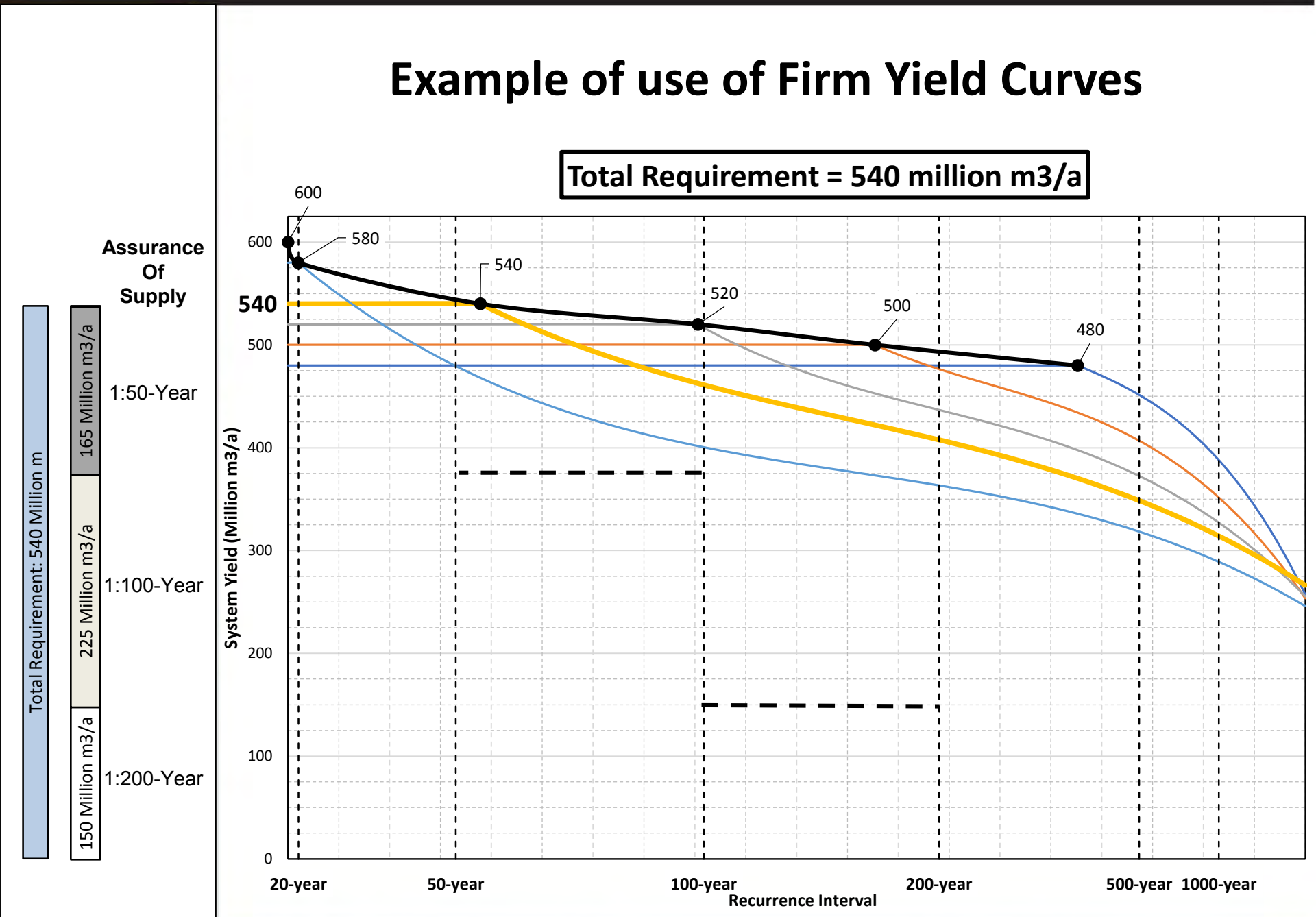
Changes in System Yield

Row No.	Description	System Yield (Million m^3/a)
	Historical Firm yields	
1	Legacy HFY (DWA, 2011)	549
2	Legacy HFY after introduction of EWR nodes and refinements	548
3	Legacy HFY + EWR nodes and refinements + Theewaterskloof and Kleinplaas changes	532
4	HFY of Updated System and WAAS naturalised stream flow – without BRVAS [1]	529.68
5	HFY of Updated Hydrology (to 2016/17)	507.81
6	HFY (assuming 2017 repeated)	476
	1 in 50 Stochastic Yields	
7	Legacy 1:50 Stochastic Yield (DWA, 2011)	570
8	Legacy 1:50 Stochastic Yield + Theewaterskloof and Kleinplaas data changes	553
9	1: 50 Stochastic Yield: Updated System and WAAS naturalized stream flow – without BRVAS [1]	579
10	1: 50 Stochastic Yield: Updated Hydrology (to 2016/17)	+-545

Updated WCWSS Long-term Yield curve

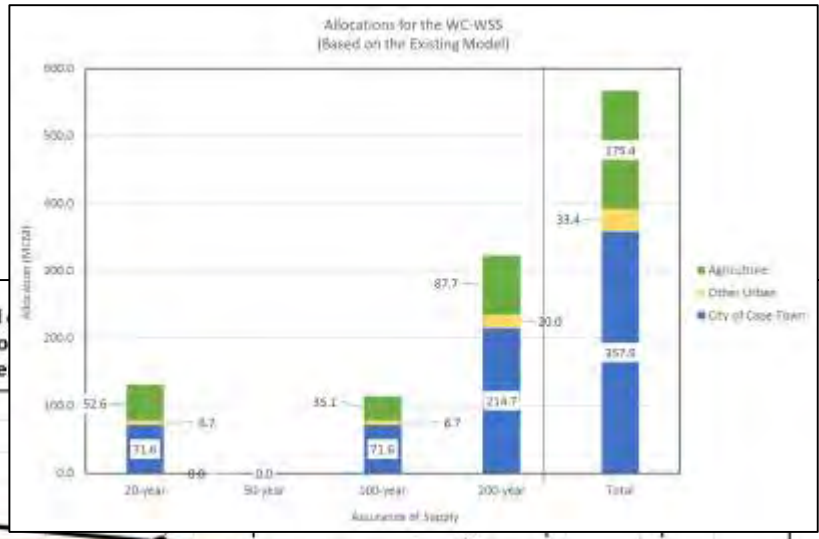


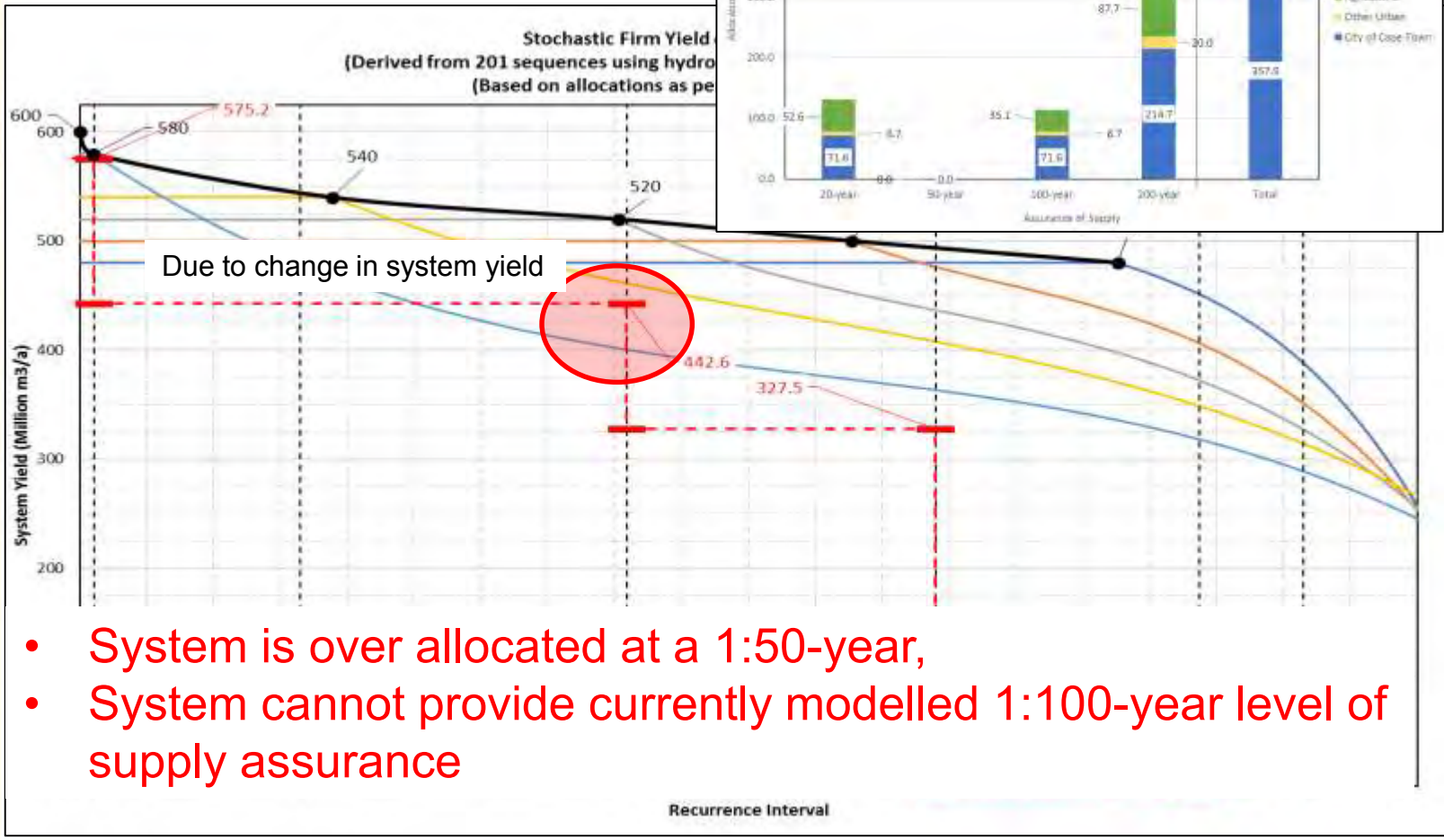
Example of use of Firm Yield Curves



Levels of supply assurance in WRPM

Assured Supply Levels				
Category	RI: 10	RI: 20	RI: 100	RI: 200
Agri	0.1	0.2	0.2	0.5
Urban	0.06	0.14	0.2	0.6
CCT	0.06	0.14	0.2	0.6

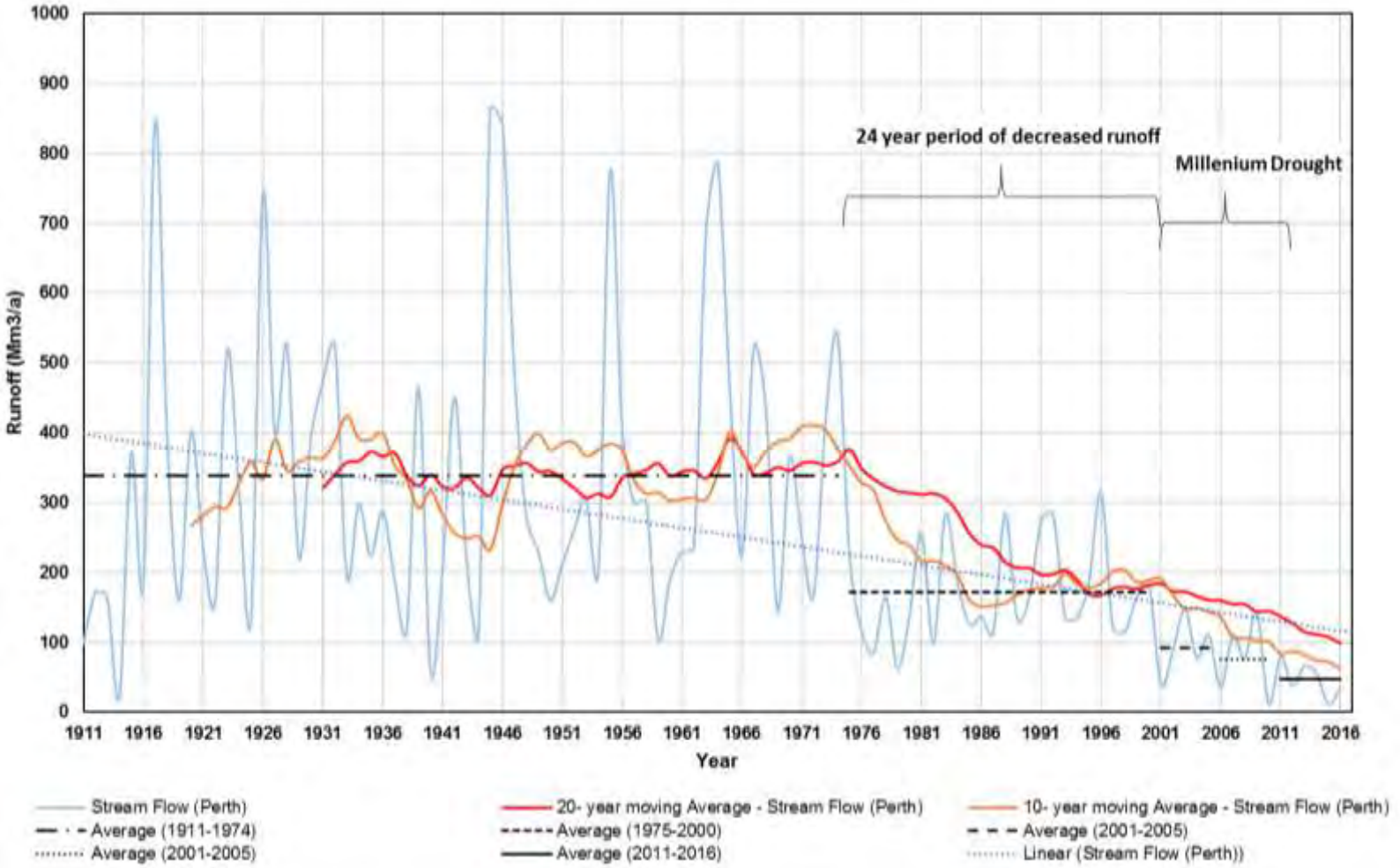




- System is over allocated at a 1:50-year,
- System cannot provide currently modelled 1:100-year level of supply assurance

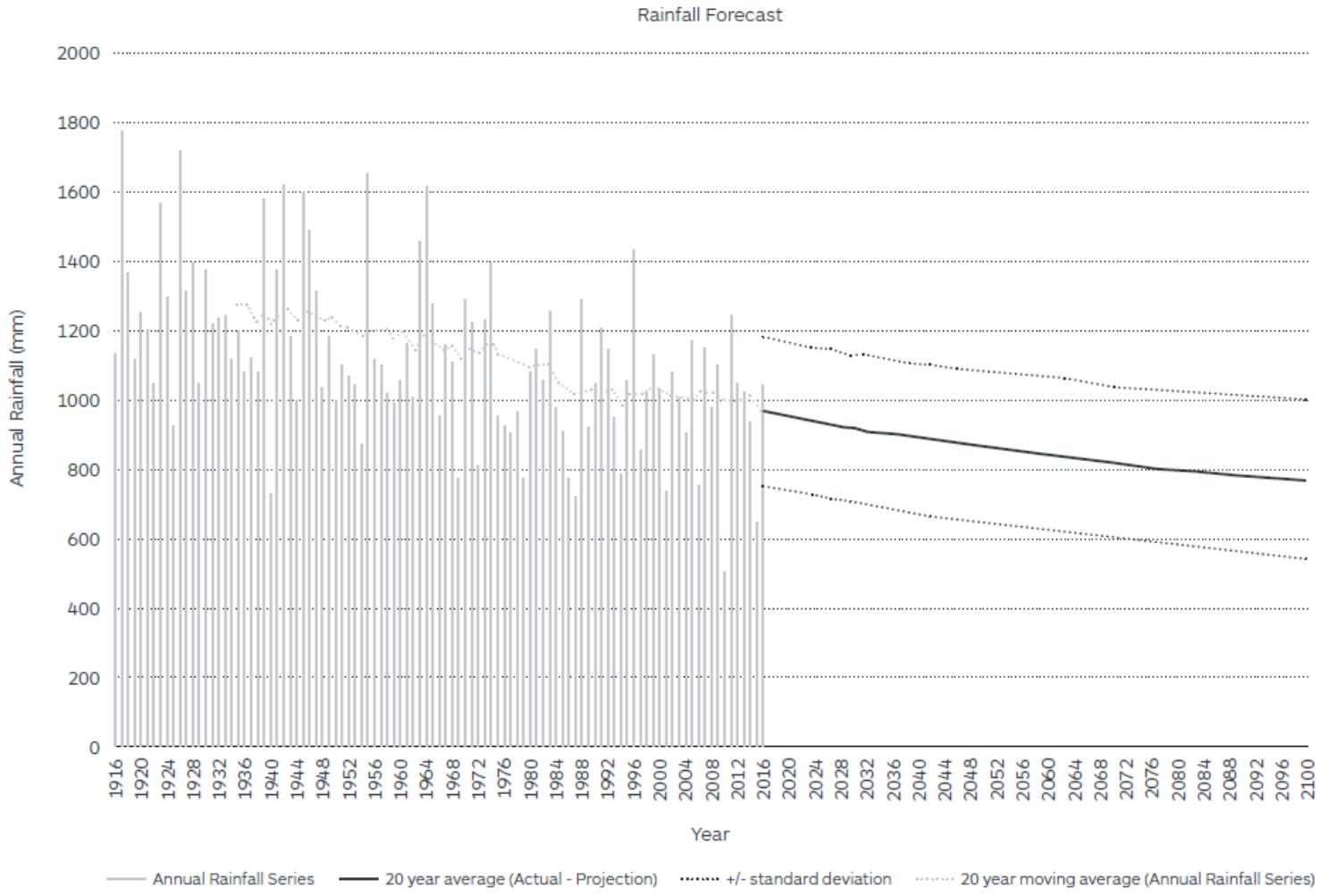
Climate Change

Perth's Historic Streamflow (Data Source: Water Corporation, 2018)

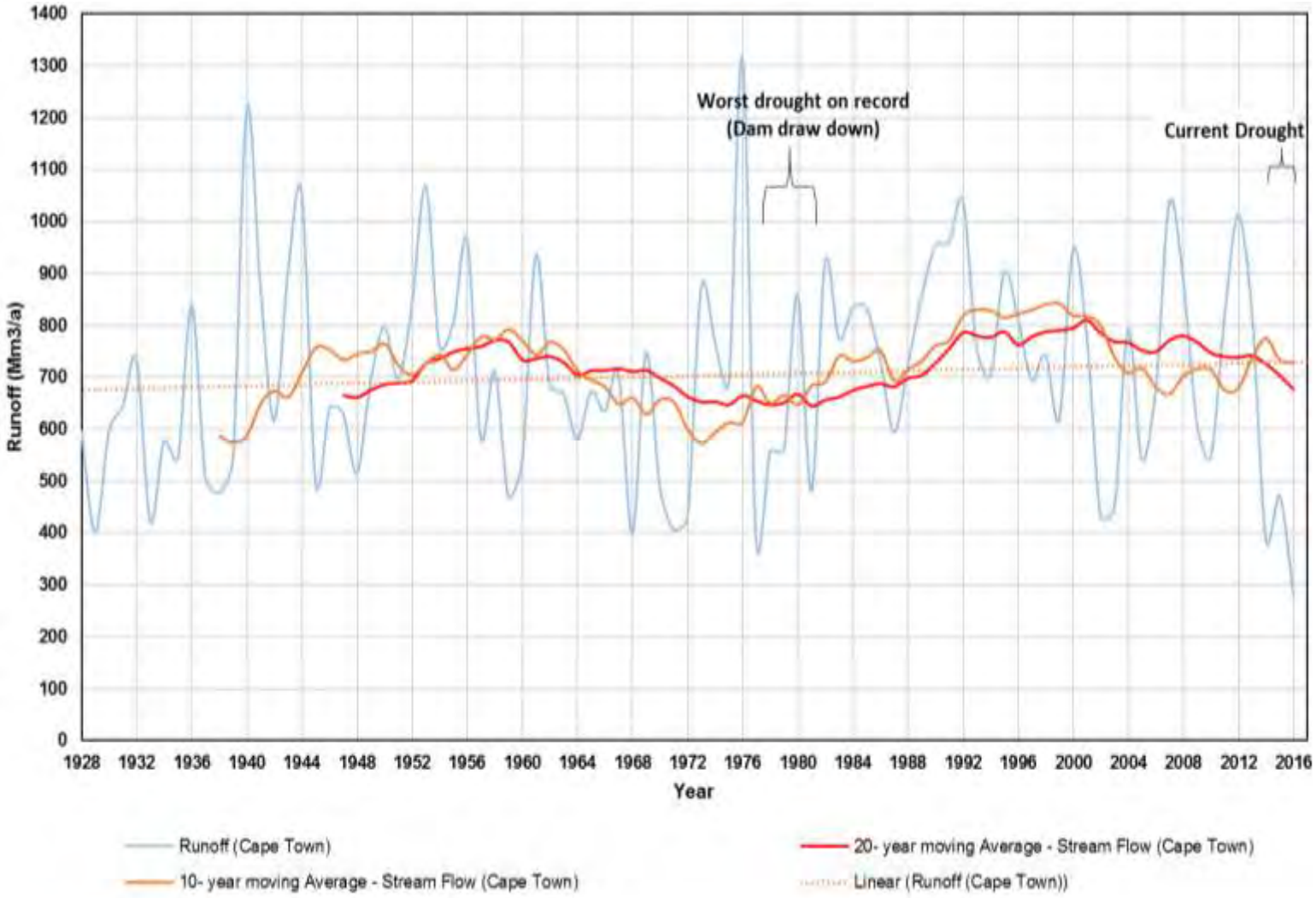


South Western Australia (Source: South32, 2017)

Diagram 1 South West of Western Australia, rainfall trends since 1916



WCWSS Historic Streamflow

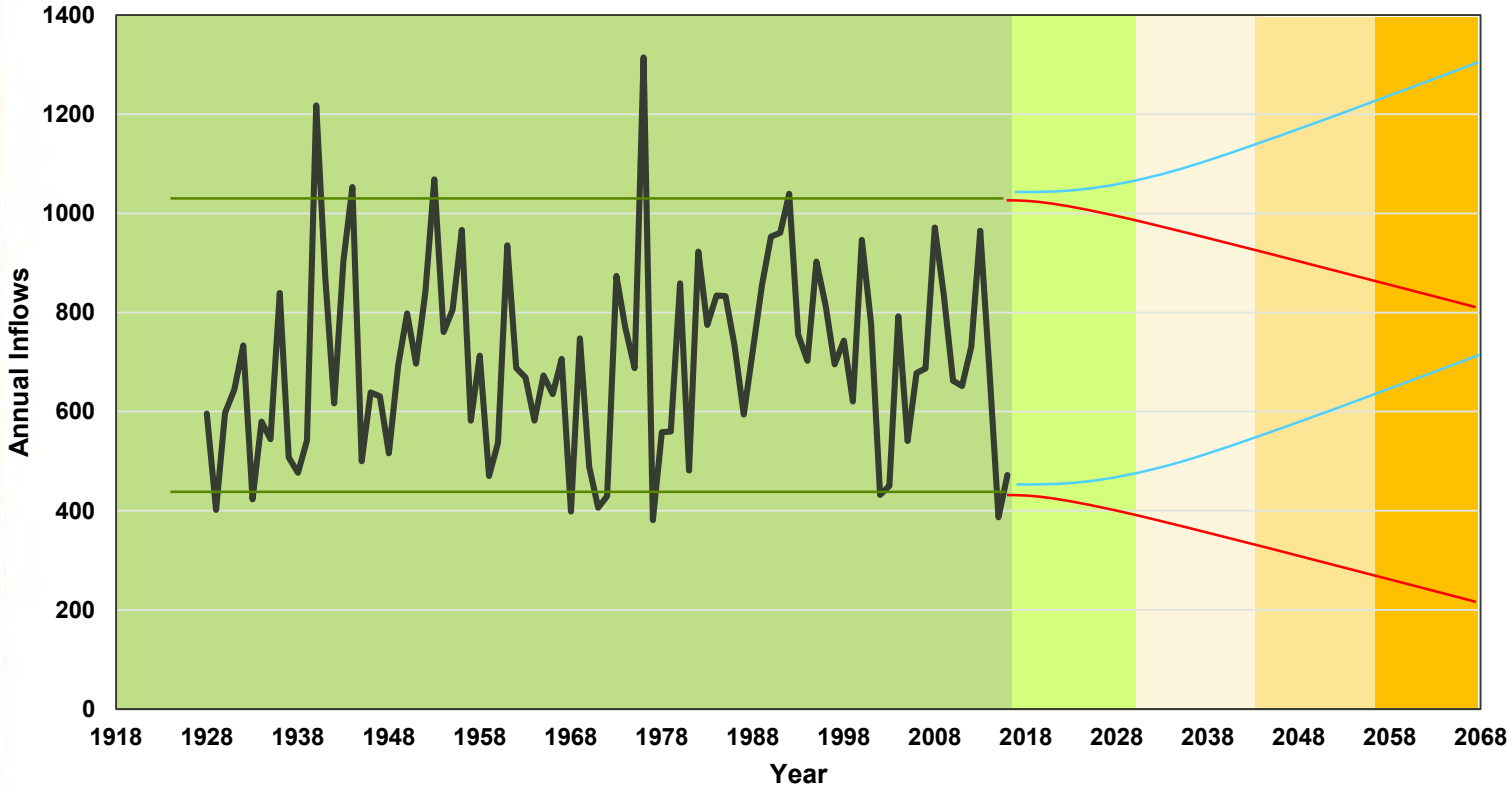


Modelling the Climate Change Impact on the Historical Firm Yield of the WCWSS (up to 2040).

Scenario Name	Scenario Description	Low flow requirement at the estuary (m^3s^{-1})	Historic Firm Yield (Million.m^3)
Scenario 4 (PES-FI)	Future infrastructure 2040 with 0.5 m^3s^{-1} minimum flow to the estuary.	0.5	771
Scenario 7 (PES-CC)	Climate change hydrology, Future infrastructure 2040 with 0.5 m^3 minimum flow to the estuary	0.5	711

SUMMARY (10^{th} % Dry): ΔMAP = -13% → ΔMAR = -15% → ΔHFY = -8%

Managing & Monitoring Climate change going forward



SUMMARY

- Revised yields determined are preliminary
- Additional investigations required to confirm and potentially revise the yields
- Climate change scenarios need to be included in the longer term planning

Motivation: Breede River Basin WAAS Study

- Update of hydrology and water use of Upper Breede River upstream of Brandvlei Dam included in Berg WAAS.
- Update successful for main-stem and tributary incremental sub-catchments, except for incremental main-stem between Michell's Pass and next downstream flow-gauging station, H4H006, near Brandvlei Dam.
- Poor quality of H4H006 streamflow record made it impossible to close water balance for Upper Breede River catchment.
- Feasibility Study analyses of impacts of Michell's Pass diversion to Voëlvlei Dam and potential mitigation options along Breede River main-stem to its estuary used Breede River Basin Study hydrology, completed in 2003.
- The above Feasibility Study concluded that, if implementation of Michell's Pass scheme were to be considered, a prerequisite would be first completing Breede River Basin WAAS.
- Both the 2010 CMS for Breede-Overberg CMA and the 2017 CMS for Breede-Gouritz CMA highlight the urgent need for a WAAS to address water availability uncertainties.

Motivation: WCWSS Hydrology Update

- Current drought - lowest three-year inflow total since 1928/29 into combined WCWSS major dams.
- Prior to current drought, lowest three-year inflow total was 1970/71 - 1972/73.
- WAAS Pitman model calibrations covered 33 gauged catchments, but only 42% of streamflow records used, included 1970/71 - 1972/73.
- Hence: Majority of WAAS Pitman model parameter sets not influenced by extremely low observed streamflows 1970/71 - 1972/73.
- Raw data for WAAS updates of areas under irrigation, plantations, IAPs and farm dams digitised from 2001-2002 1:10,000 aerial photography.
- Now available: 2018 coverage of IAPs; 2018 V&V details of increases in irrigation water use and farm dams (licensed and unlicensed) in the Berg; similar 2015 V&V details for Upper Riviersonderend.
- Some WAAS rainfall stations now closed. Necessitates re-patching of missing values & re-compiling monthly rainfall inputs to Pitman and WRYM models.

WCWSS Hydrology Update Requirements

- Re-patch rainfall records after 2004/05 - loss of some rainfall stations
- Re-compile WRSM/Pitman model input rainfall files for post-2004/05 period
- Update increased water use for post-2004/05 period – urban; irrigation (licensed and unlicensed); farm dams (licensed and unlicensed)
- Update post-2004/05 increases in areas under IAPs and changes in plantation areas
- Update and patch post-2004/05 streamflow records for relevant gauged catchments
- Re-calibrate WRSM/Pitman model for all relevant gauged catchments
- Generate with the re-calibrated WRSM/Pitman model, natural streamflow sequences for the 1928/29 – 2017/18 period at all incremental catchment input nodes in the WRYM configuration of the WCWSS
- Re-determine the WCWSS stochastic yields for various RIs of failure of supply

Conclusions

- System yield at a 1:50 level of supply assurance has decreased by 35 Million m^3/a
- Alien vegetation has a significant and ongoing impact on the system yield and clearing of this should be prioritised by DWS as an intervention
- The ‘allocations’ and ‘assurances of supply’ need to be reassessed
- Monitoring of the potential impacts of climate change should be a priority and should include regularly updating the hydrology
  - Every 10 years for ‘average’ conditions
  - Every 5-years during / following drought conditions

Thank You!

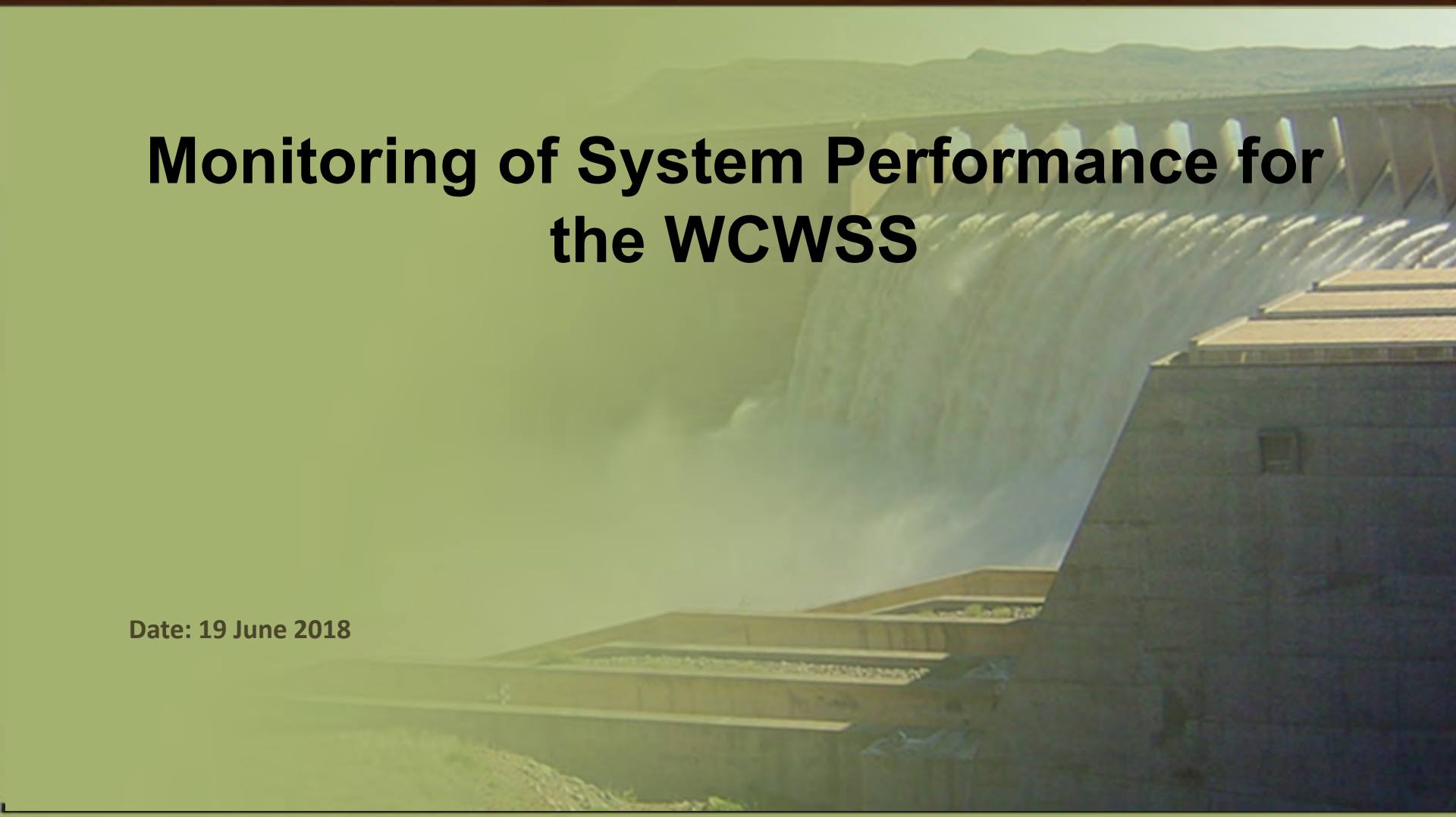
APPENDIX F
WCWSS OPERATION AND MONITORING

water & sanitation

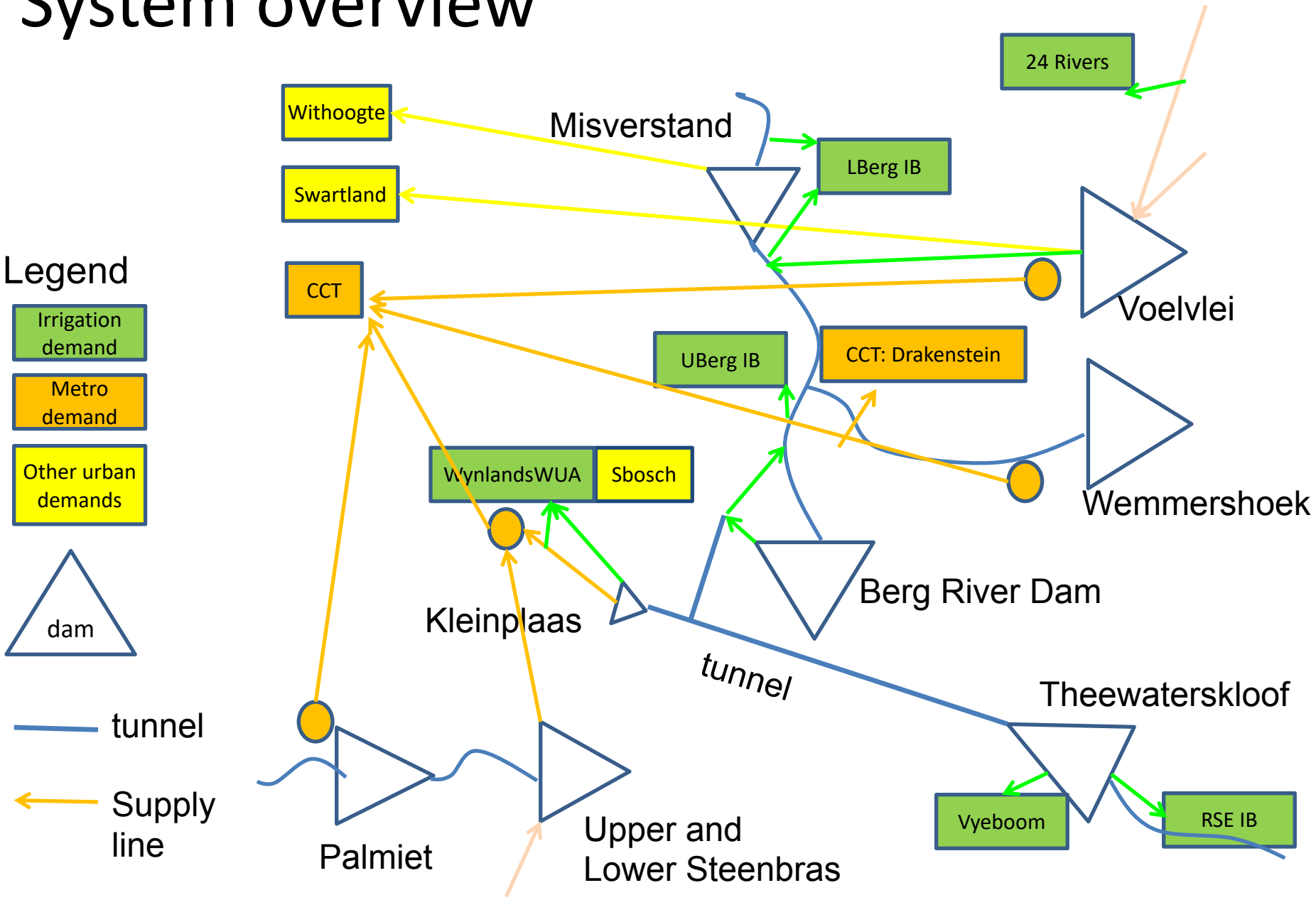
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Monitoring of System Performance for the WCWSS

Date: 19 June 2018



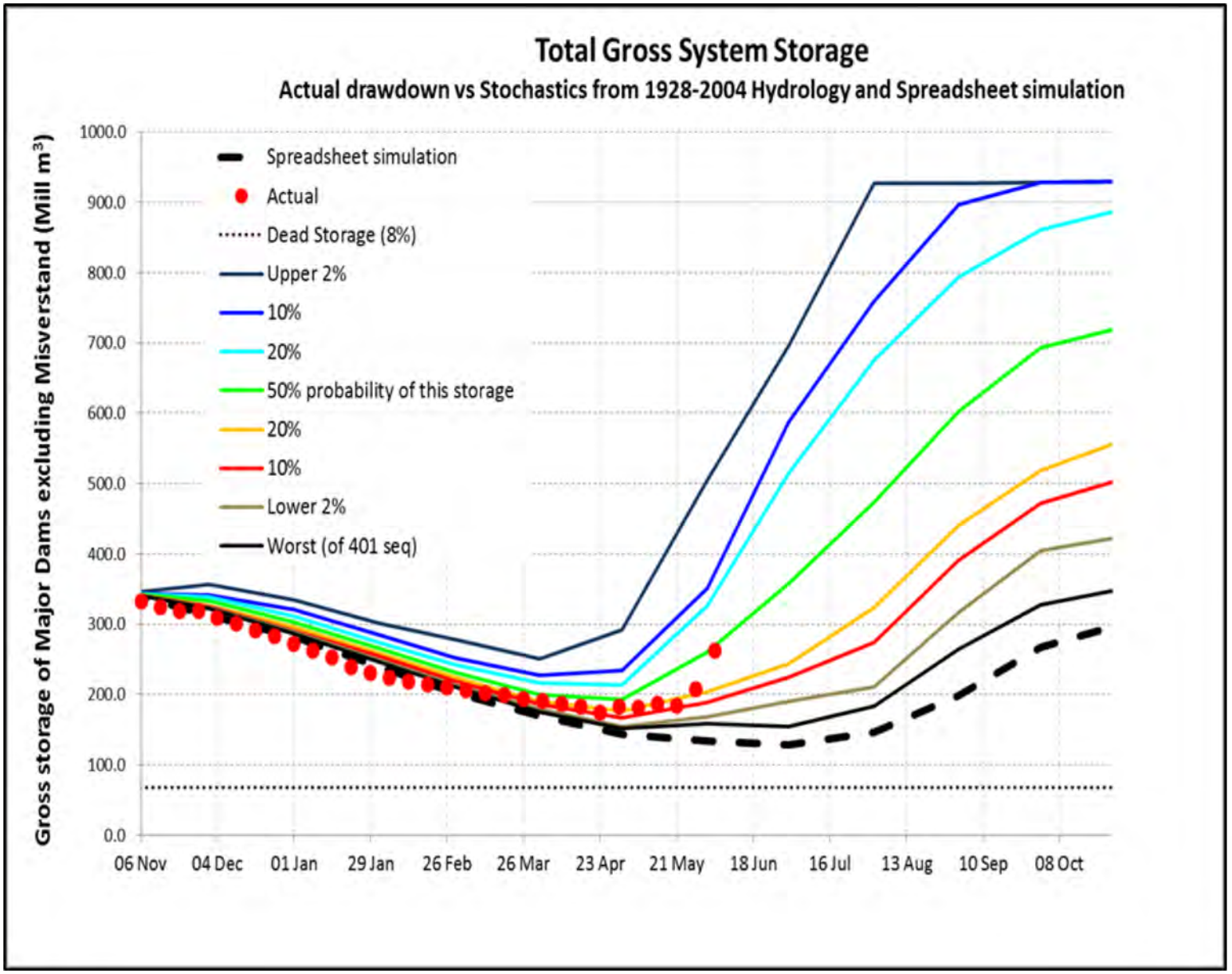
System overview

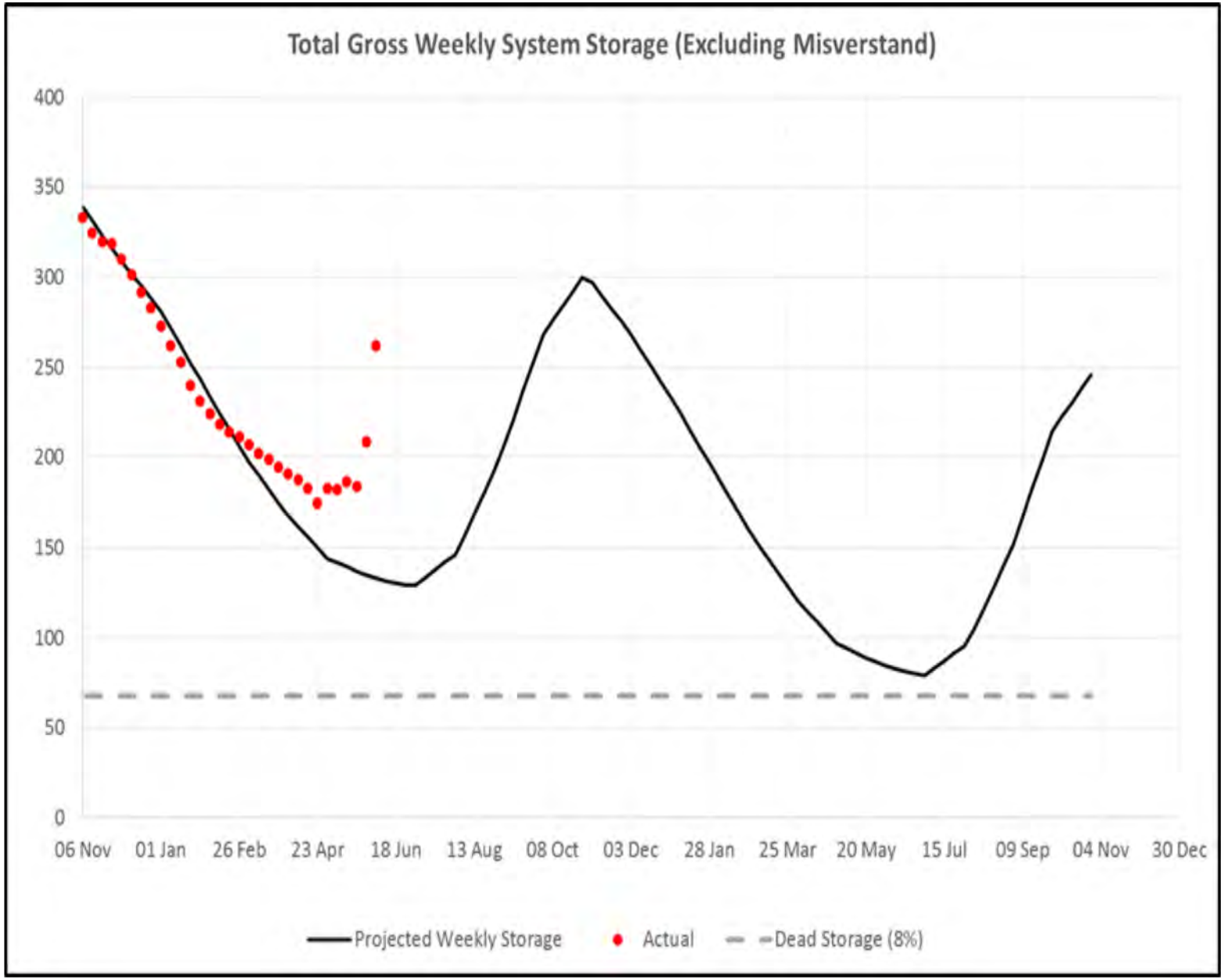


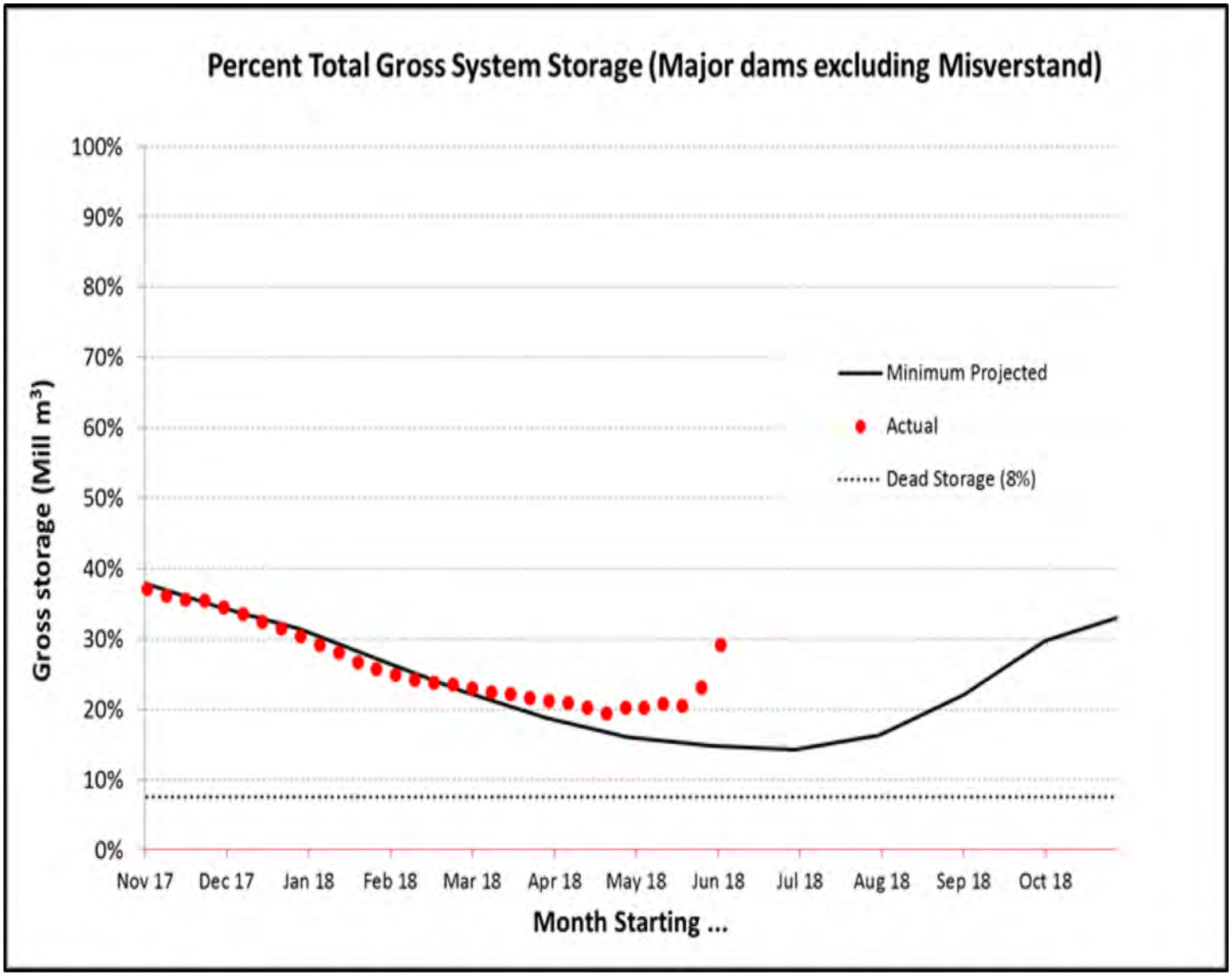
Monitoring of System Performance

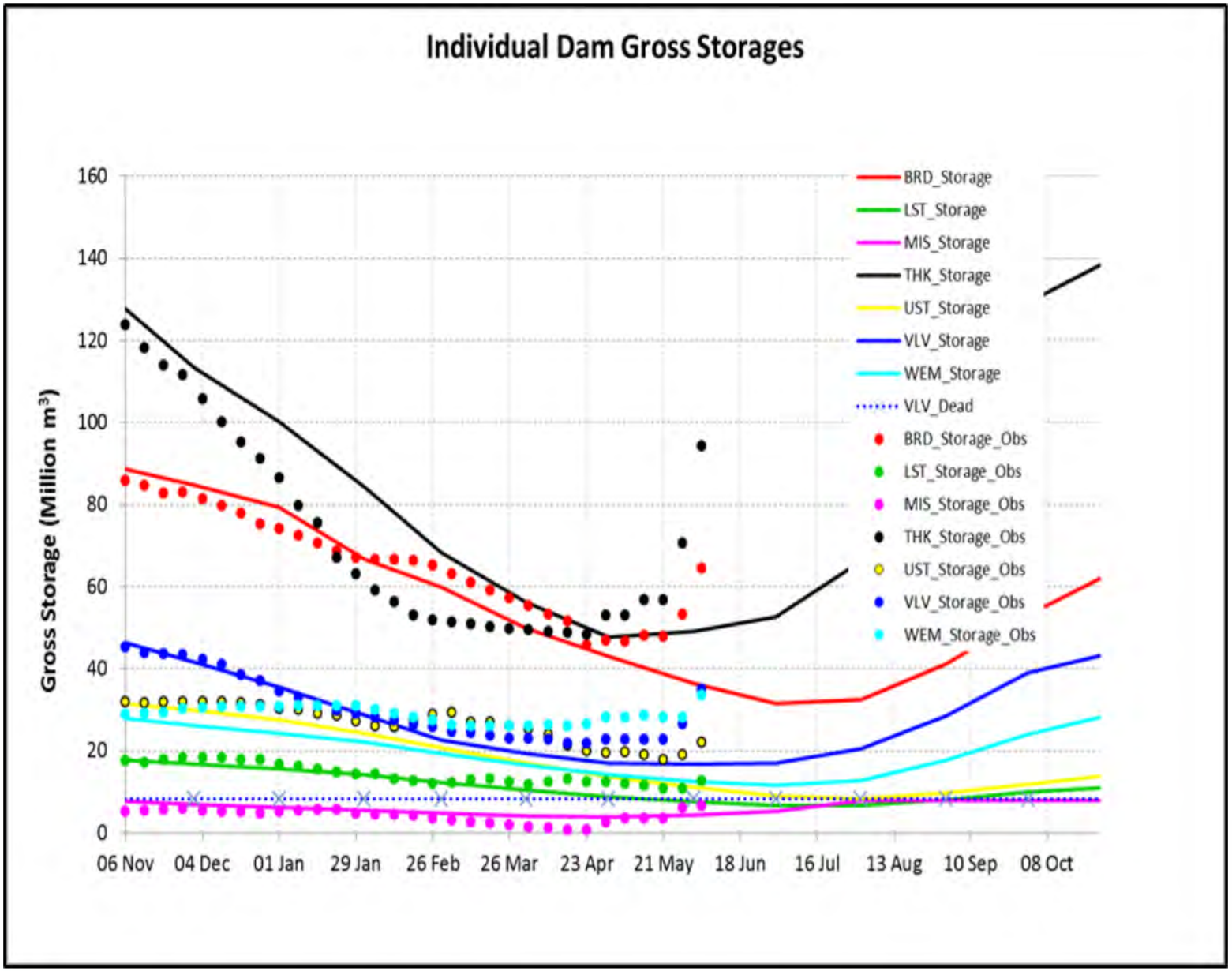
State of Storage

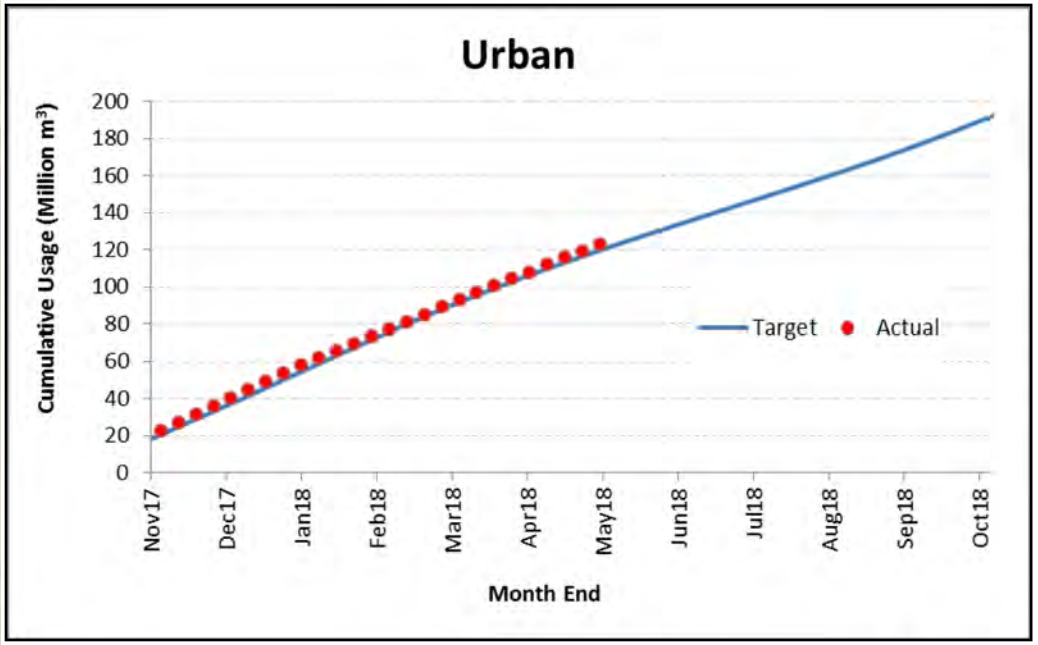
Dam	Nett Cap 10^6m^3	04 June 2018	11 June 2018	12 June 2017
Western Cape:	**889**	**29,13%**	**31,16%**	**21,6%**
Voëlvlei	159	22,04%	25,53%	17,17%
Berg River	127	50,69%	53,21%	30,06%
Theewaterskloof	479	19,67%	20,89%	15,18%
Wemmershoek	59	57,16%	58.56%	36,90%
Upper Steenbras	32	69,09%	76,78%	53,50%
Lower Steenbras	34	37,48%	38,96%	26,38%

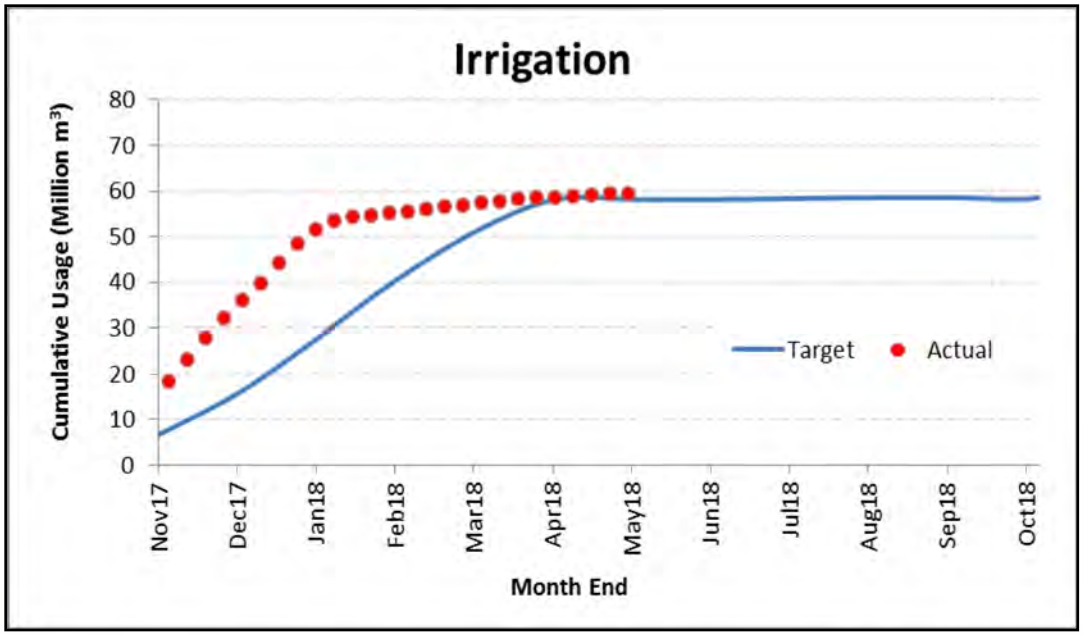

Total Gross System Storage
Actual drawdown vs Stochastics from 1928-2004 Hydrology and Spreadsheet simulation
Gross storage of Major Dams excluding Misverstand (Mill m³)
1000.0
900.0
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
Spreadsheet simulation
Actual
Dead Storage (8%)
Upper 2%
10%
20%
50% probability of this storage
20%
10%
Lower 2%
Worst (of 401 seq)
06 Nov
04 Dec
01 Jan
29 Jan
26 Feb
26 Mar
23 Apr
21 May
18 Jun
16 Jul
13 Aug
10 Sep
08 Oct

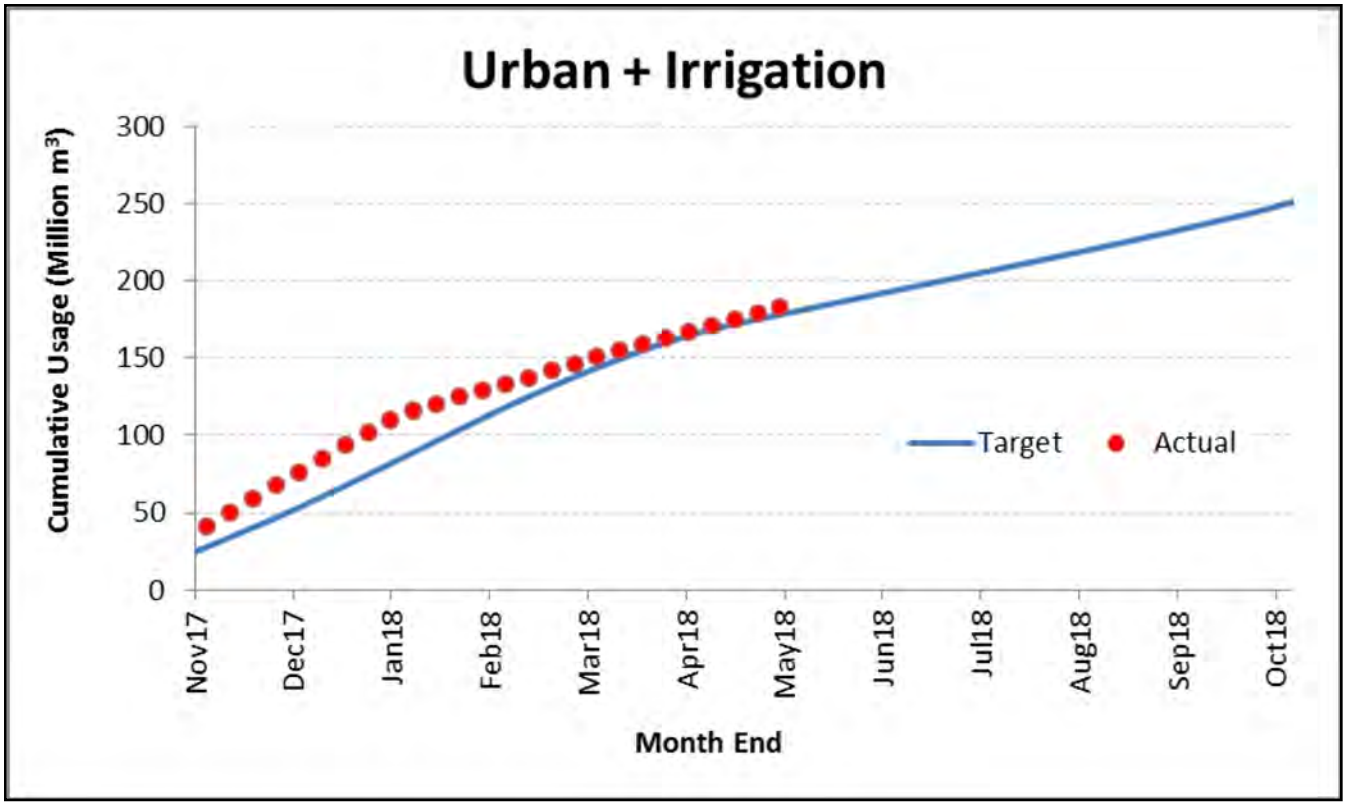

Total Gross Weekly System Storage (Excluding Misverstand)
400
350
300
250
200
150
100
50
0
06 Nov
01 Jan
26 Feb
23 Apr
18 Jun
13 Aug
08 Oct
03 Dec
28 Jan
25 Mar
20 May
15 Jul
09 Sep
04 Nov
30 Dec
Projected Weekly Storage
Actual
Dead Storage (8%)

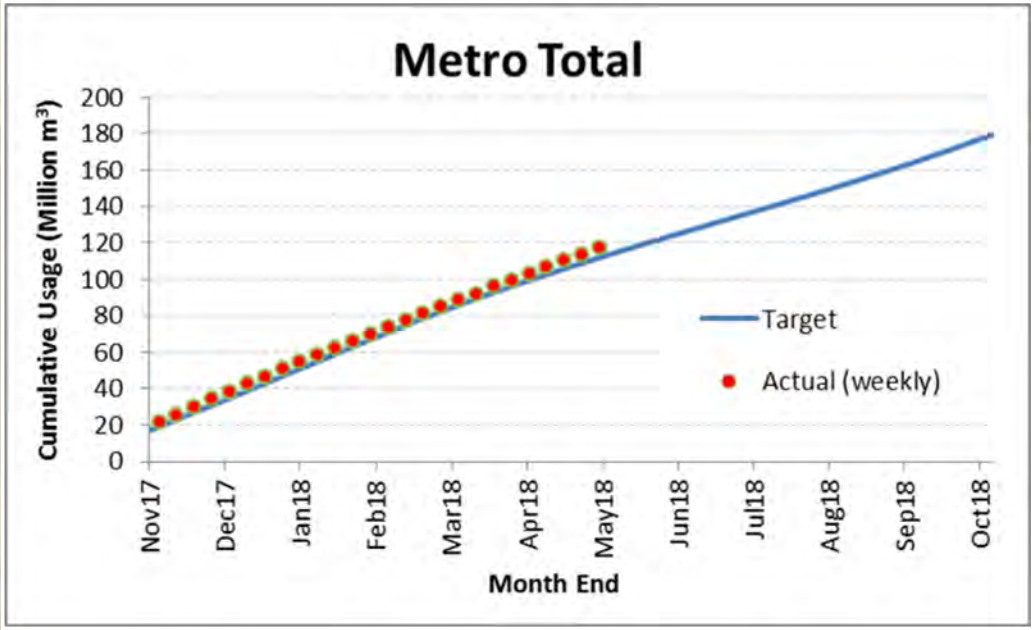

Percent Total Gross System Storage (Major dams excluding Misverstand)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Gross storage (Mill m³)
Minimum Projected
Actual
Dead Storage (8%)
Nov 17
Dec 17
Jan 18
Feb 18
Mar 18
Apr 18
May 18
Jun 18
Jul 18
Aug 18
Sep 18
Oct 18
Month Starting ...

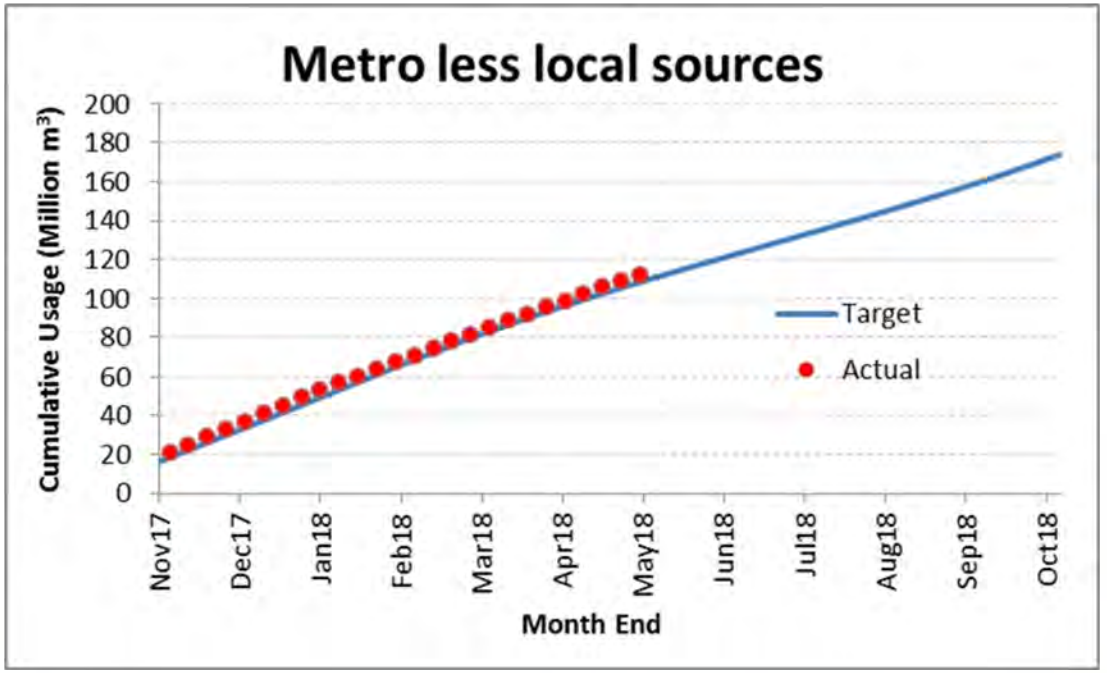

Individual Dam Gross Storages
Gross Storage (Million m³)
160
140
120
100
80
60
40
20
0
06 Nov
04 Dec
01 Jan
29 Jan
26 Feb
26 Mar
23 Apr
21 May
18 Jun
16 Jul
13 Aug
10 Sep
08 Oct
BRD_Storage
LST_Storage
MIS_Storage
THK_Storage
UST_Storage
VLV_Storage
WEM_Storage
VLV_Dead
BRD_Storage_Obs
LST_Storage_Obs
MIS_Storage_Obs
THK_Storage_Obs
UST_Storage_Obs
VLV_Storage_Obs
WEM_Storage_Obs

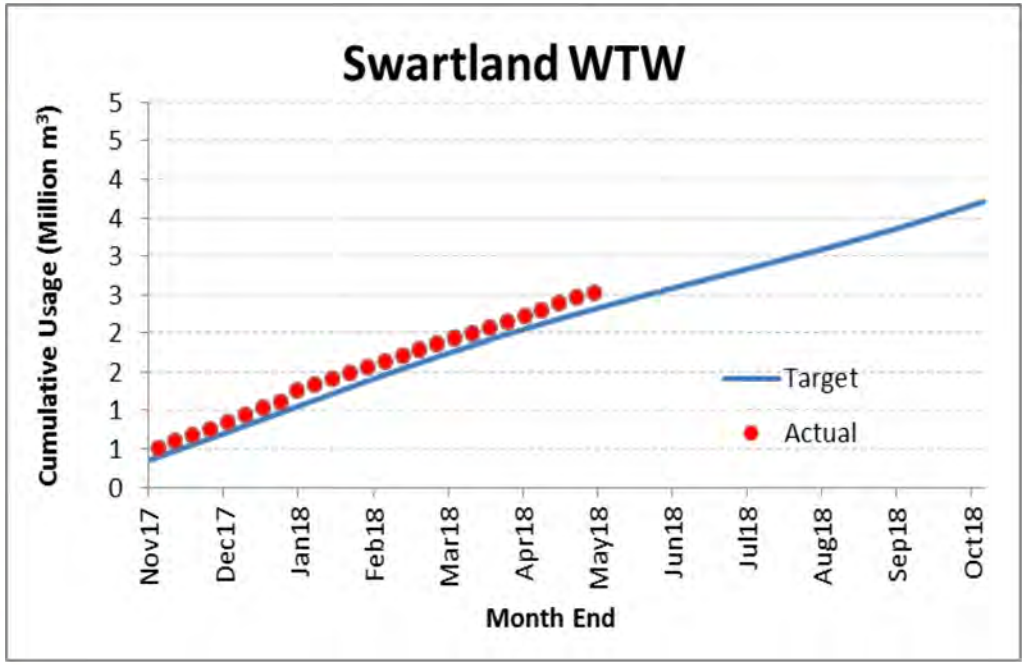

Urban
Cumulative Usage (Million m³)
200
180
160
140
120
100
80
60
40
20
0
Nov17
Dec17
Jan18
Feb18
Mar18
Apr18
May18
Jun18
Jul18
Aug18
Sep18
Oct18
Month End
Target
Actual

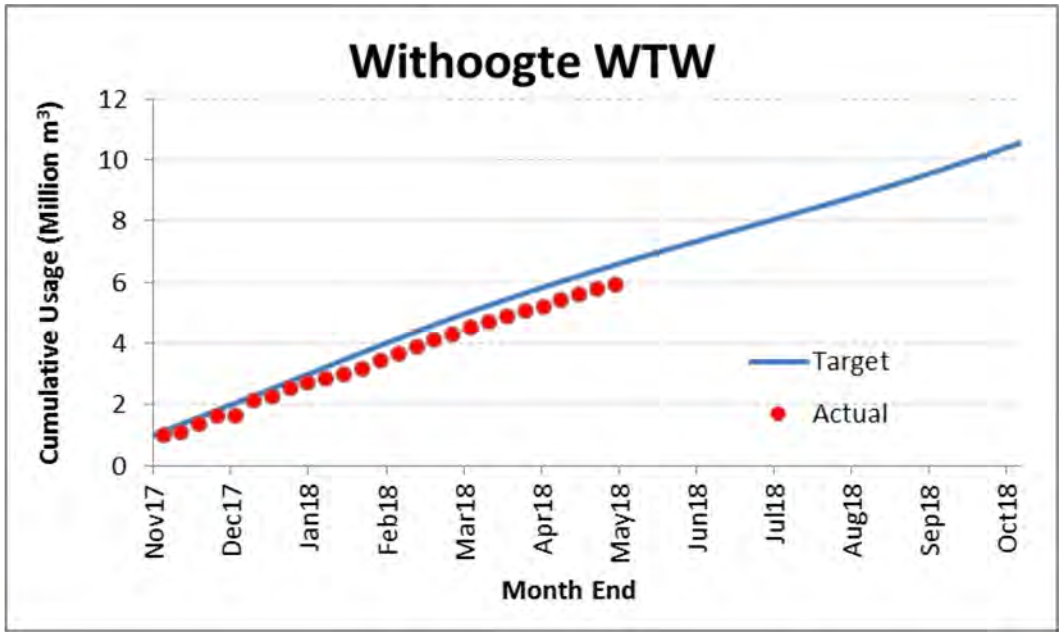

Irrigation
Cumulative Usage (Million m³)
80
70
60
50
40
30
20
10
0
Nov17
Dec17
Jan18
Feb18
Mar18
Apr18
May18
Jun18
Jul18
Aug18
Sep18
Oct18
Month End
Target
Actual

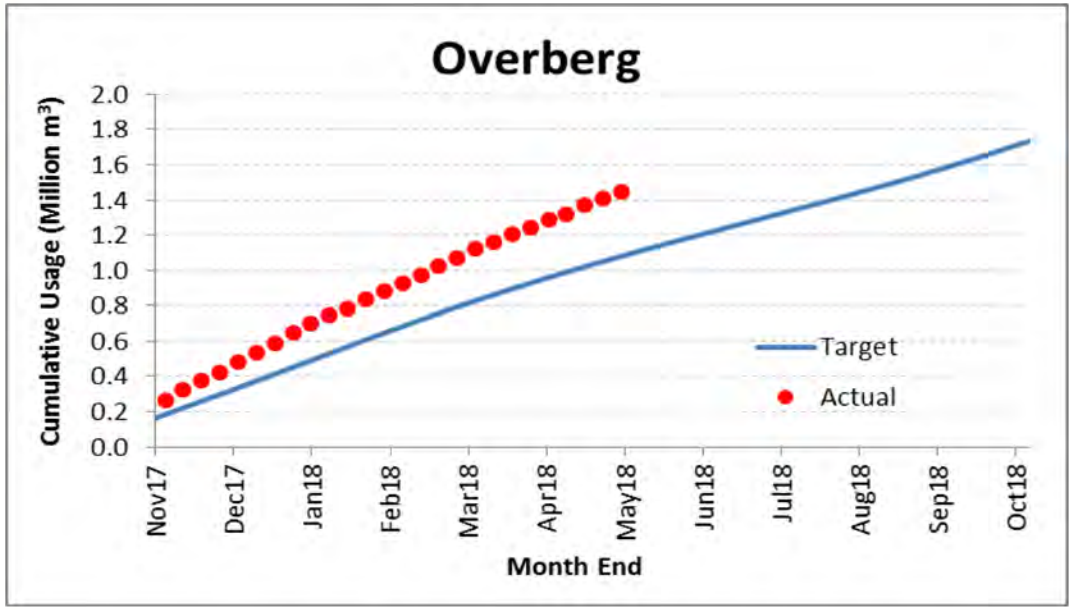

Urban + Irrigation
Cumulative Usage (Million m³)
300
250
200
150
100
50
0
Nov17
Dec17
Jan18
Feb18
Mar18
Apr18
May18
Jun18
Jul18
Aug18
Sep18
Oct18
Month End
Target
Actual

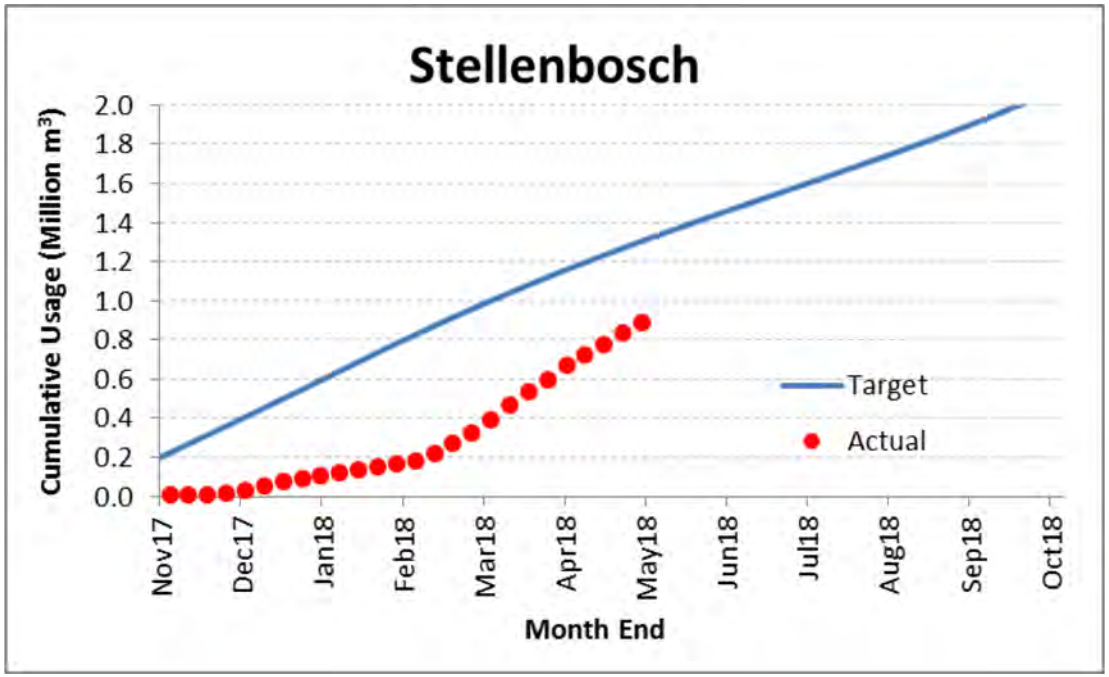

Metro Total
Cumulative Usage (Million m³)
200
180
160
140
120
100
80
60
40
20
0
Nov17
Dec17
Jan18
Feb18
Mar18
Apr18
May18
Jun18
Jul18
Aug18
Sep18
Oct18
Month End
Target
Actual (weekly)

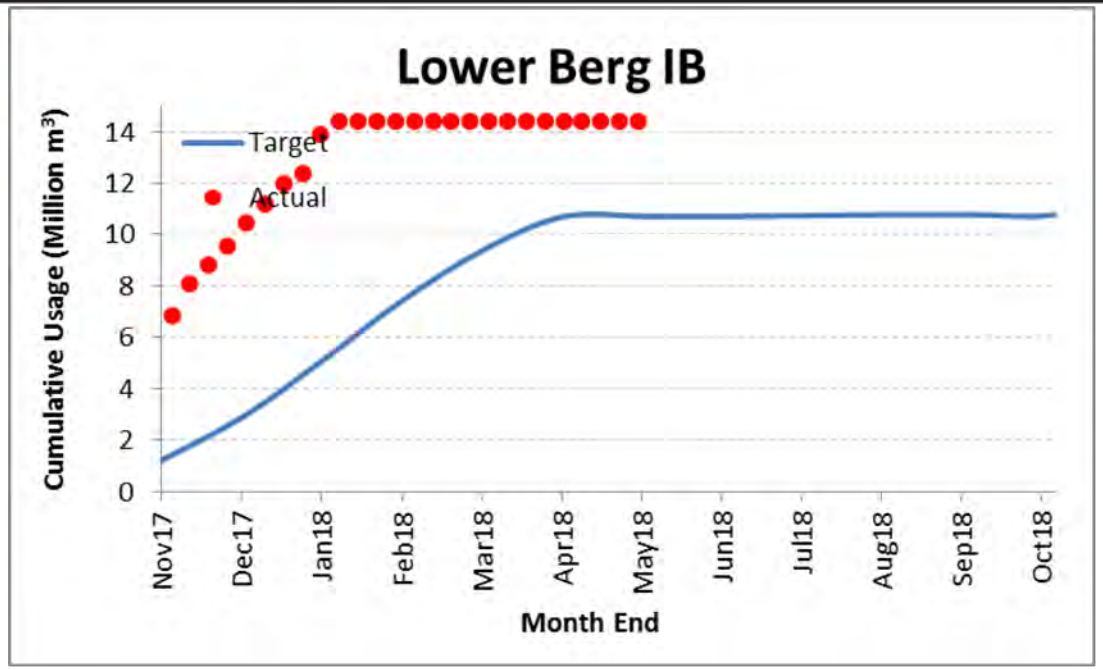

Metro less local sources
Cumulative Usage (Million m³)
200
180
160
140
120
100
80
60
40
20
0
Nov17
Dec17
Jan18
Feb18
Mar18
Apr18
May18
Jun18
Jul18
Aug18
Sep18
Oct18
Month End
Target
Actual

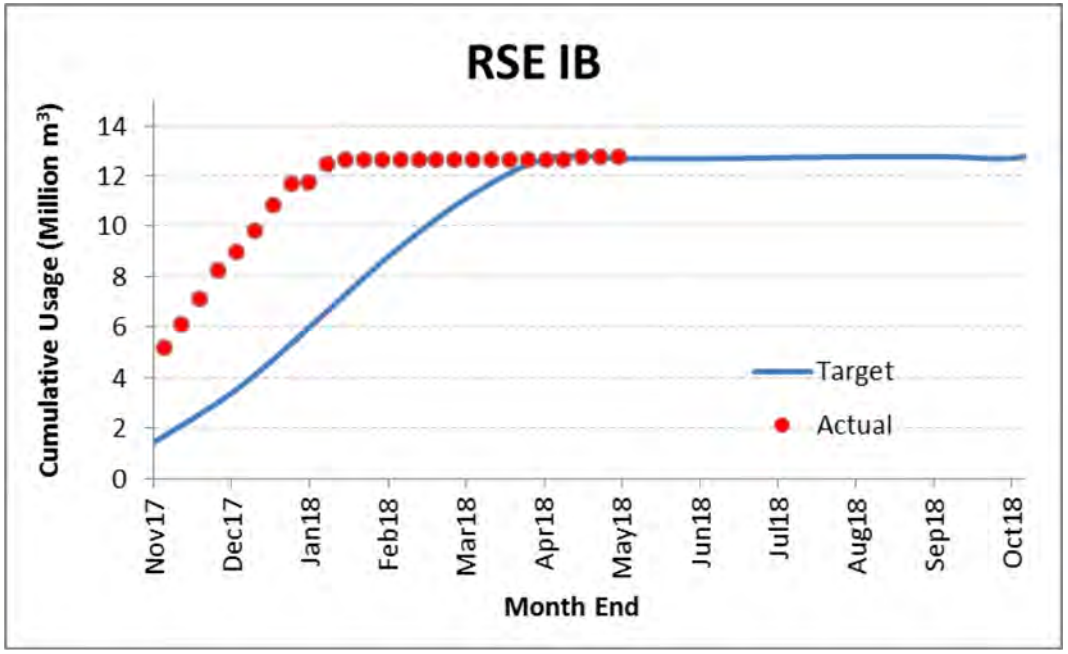

Swartland WTW
Cumulative Usage (Million m³)
5
5
4
4
3
3
2
2
1
1
0
Nov17
Dec17
Jan18
Feb18
Mar18
Apr18
May18
Jun18
Jul18
Aug18
Sep18
Oct18
Month End
Target
Actual

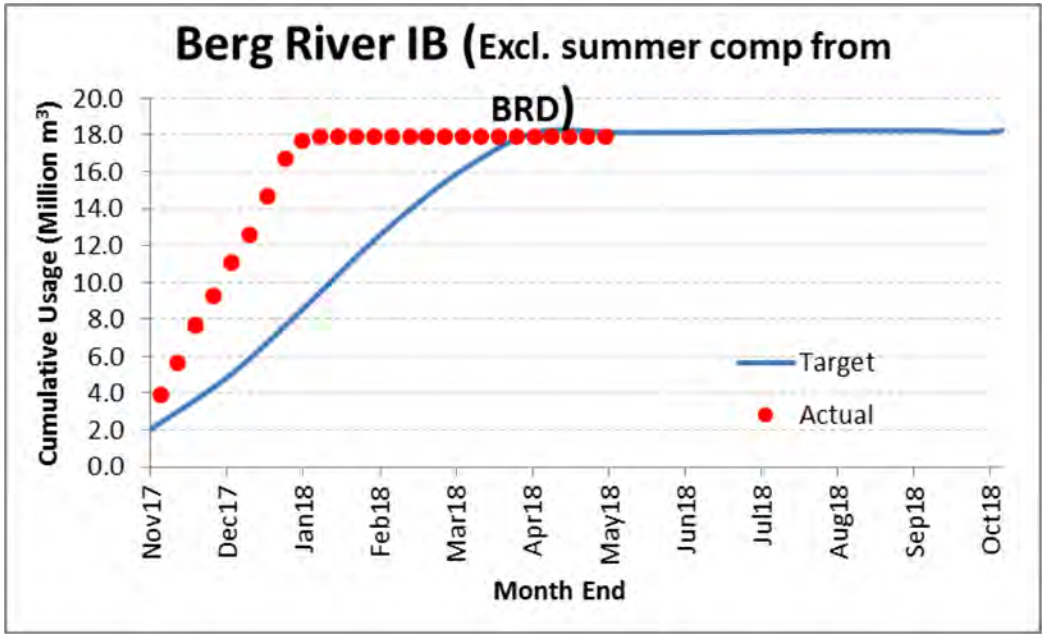

Withoogte WTW
Cumulative Usage (Million m³)
12
10
8
6
4
2
0
Nov17
Dec17
Jan18
Feb18
Mar18
Apr18
May18
Jun18
Jul18
Aug18
Sep18
Oct18
Month End
Target
Actual

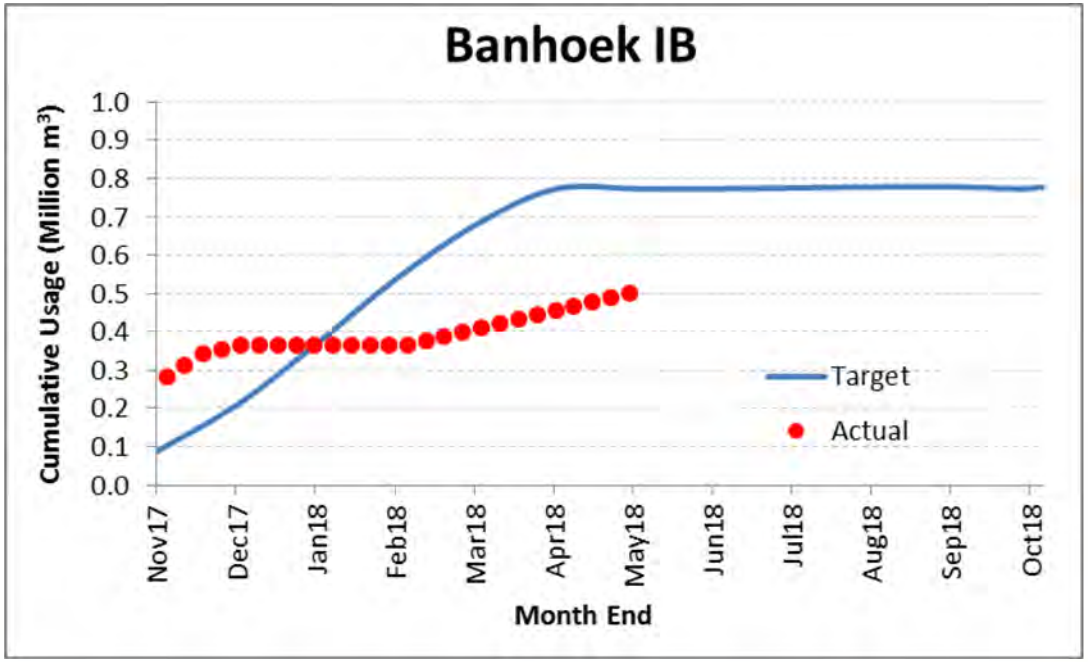

Overberg
Cumulative Usage (Million m³)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Nov17
Dec17
Jan18
Feb18
Mar18
Apr18
May18
Jun18
Jul18
Aug18
Sep18
Oct18
Month End
Target
Actual

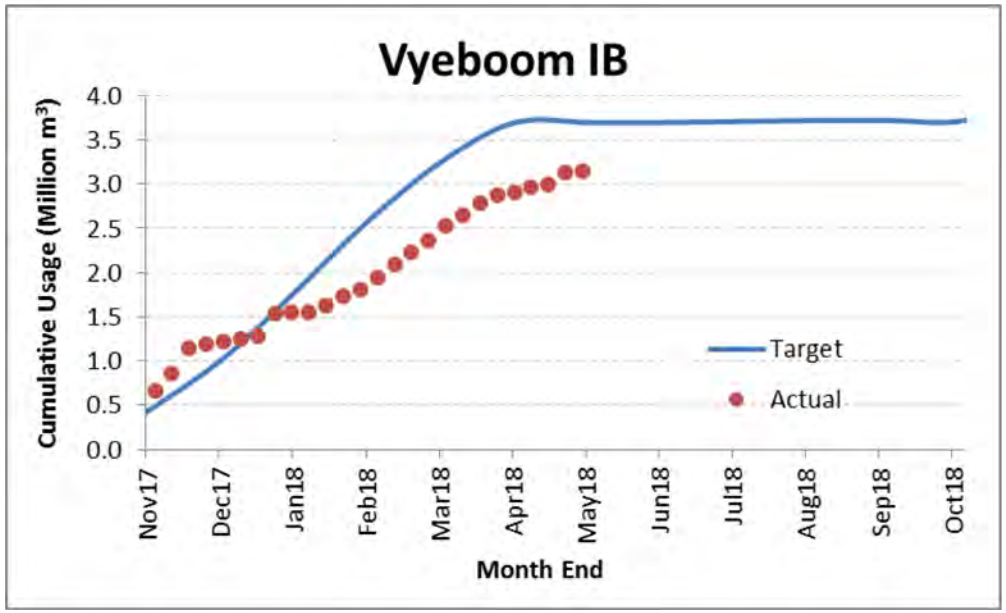

Stellenbosch
Cumulative Usage (Million m³)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Nov17
Dec17
Jan18
Feb18
Mar18
Apr18
May18
Jun18
Jul18
Aug18
Sep18
Oct18
Month End
Target
Actual

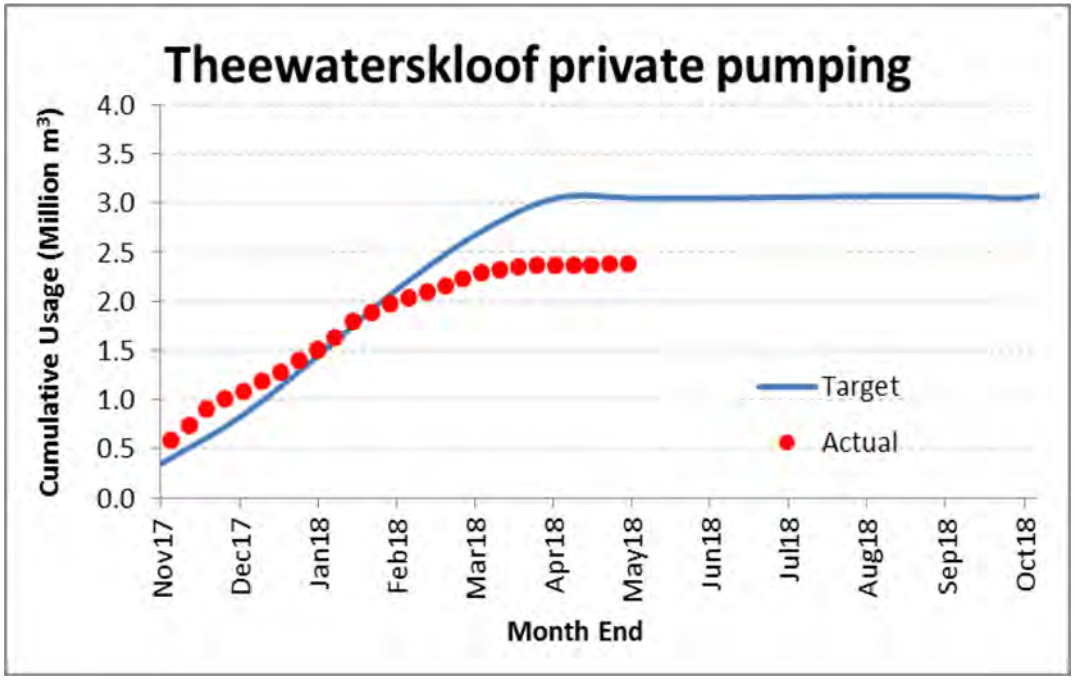

Lower Berg IB
Cumulative Usage (Million m³)
0
2
4
6
8
10
12
14
Target
Actual
Nov17
Dec17
Jan18
Feb18
Mar18
Apr18
May18
Jun18
Jul18
Aug18
Sep18
Oct18
Month End

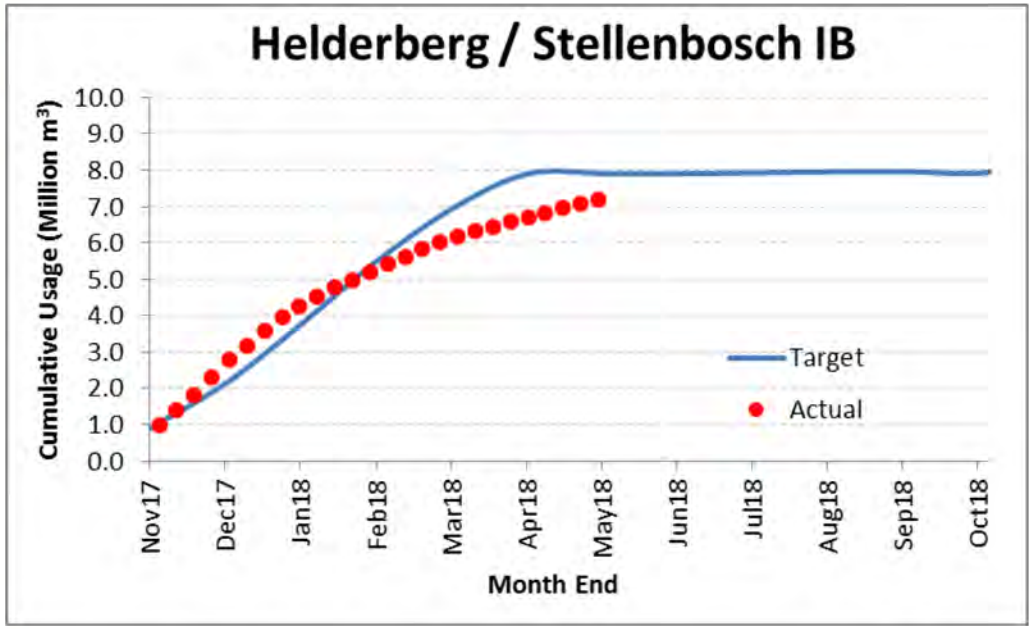

RSE IB
Cumulative Usage (Million m³)
0
2
4
6
8
10
12
14
Target
Actual
Nov17
Dec17
Jan18
Feb18
Mar18
Apr18
May18
Jun18
Jul18
Aug18
Sep18
Oct18
Month End

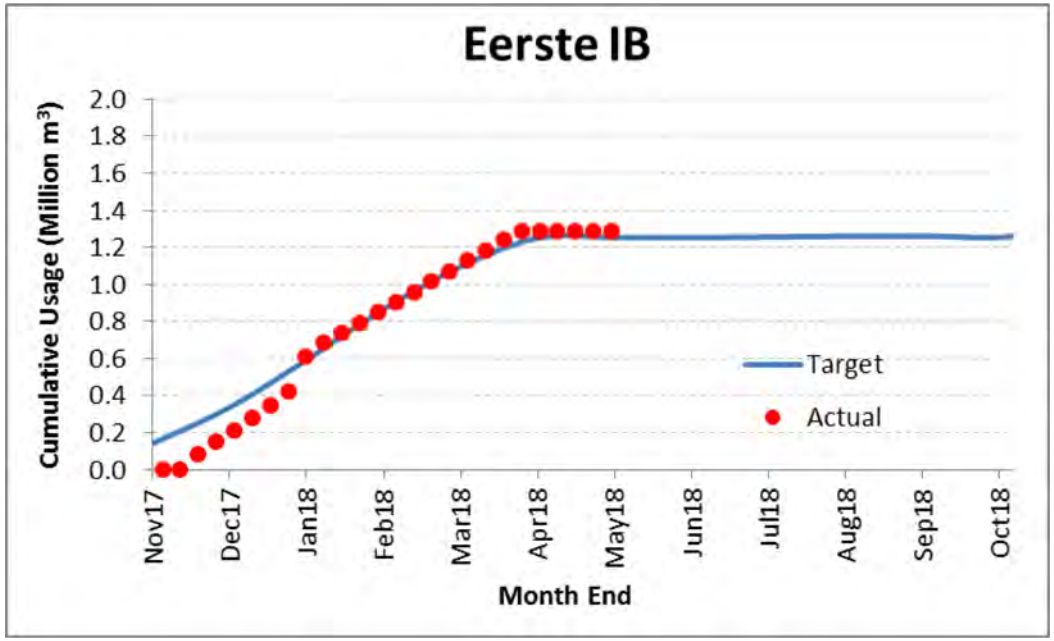

Berg River IB (Excl. summer comp from BRD)
Cumulative Usage (Million m³)
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Nov17
Dec17
Jan18
Feb18
Mar18
Apr18
May18
Jun18
Jul18
Aug18
Sep18
Oct18
Month End
Target
Actual


Banhoek IB
Cumulative Usage (Million m³)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Nov17
Dec17
Jan18
Feb18
Mar18
Apr18
May18
Jun18
Jul18
Aug18
Sep18
Oct18
Month End
Target
Actual

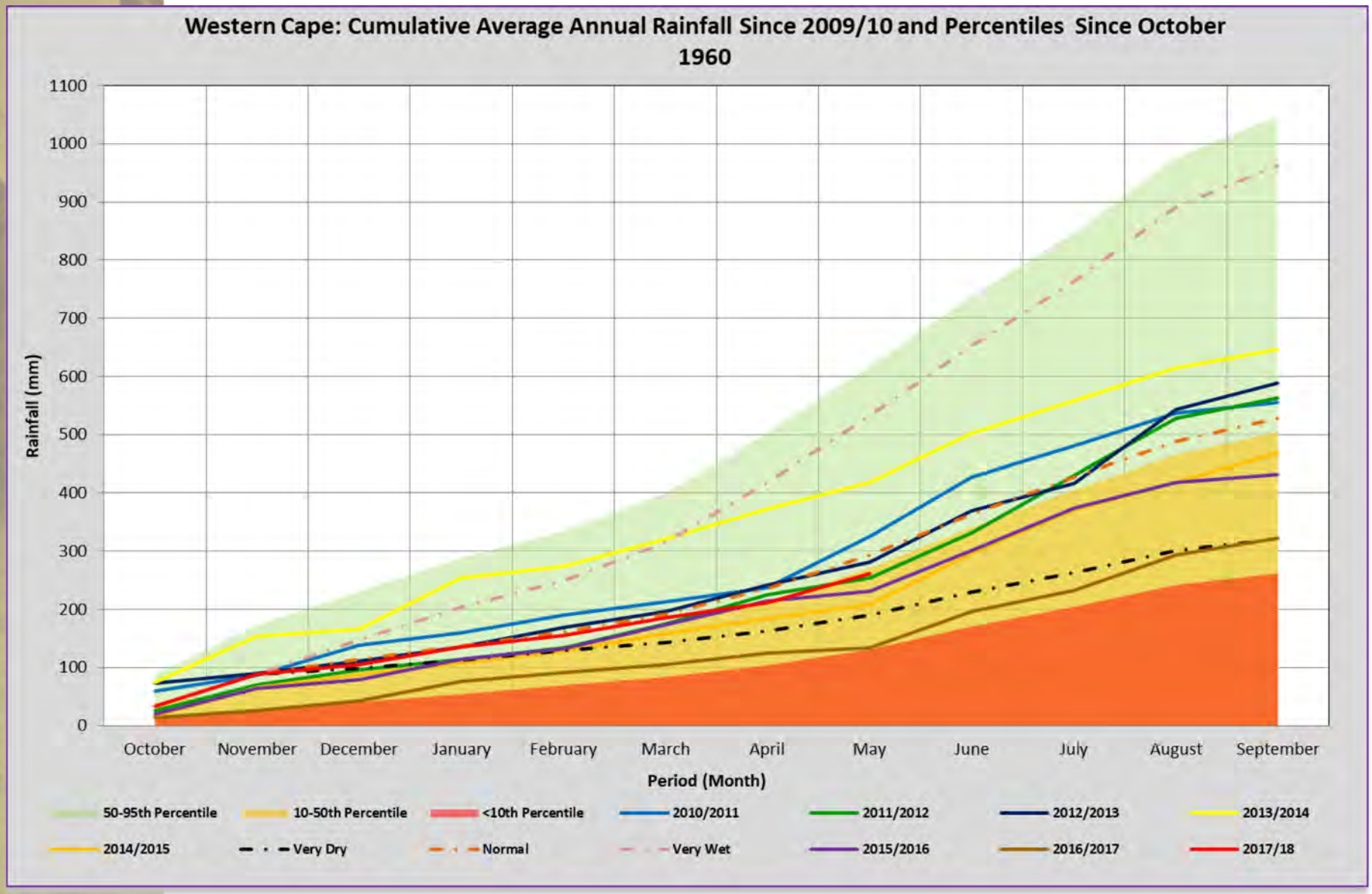

Vyeboom IB
Cumulative Usage (Million m³)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Nov17
Dec17
Jan18
Feb18
Mar18
Apr18
May18
Jun18
Jul18
Aug18
Sep18
Oct18
Month End
Target
Actual


Theewaterskloof private pumping
Cumulative Usage (Million m³)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Nov17
Dec17
Jan18
Feb18
Mar18
Apr18
May18
Jun18
Jul18
Aug18
Sep18
Oct18
Month End
Target
Actual

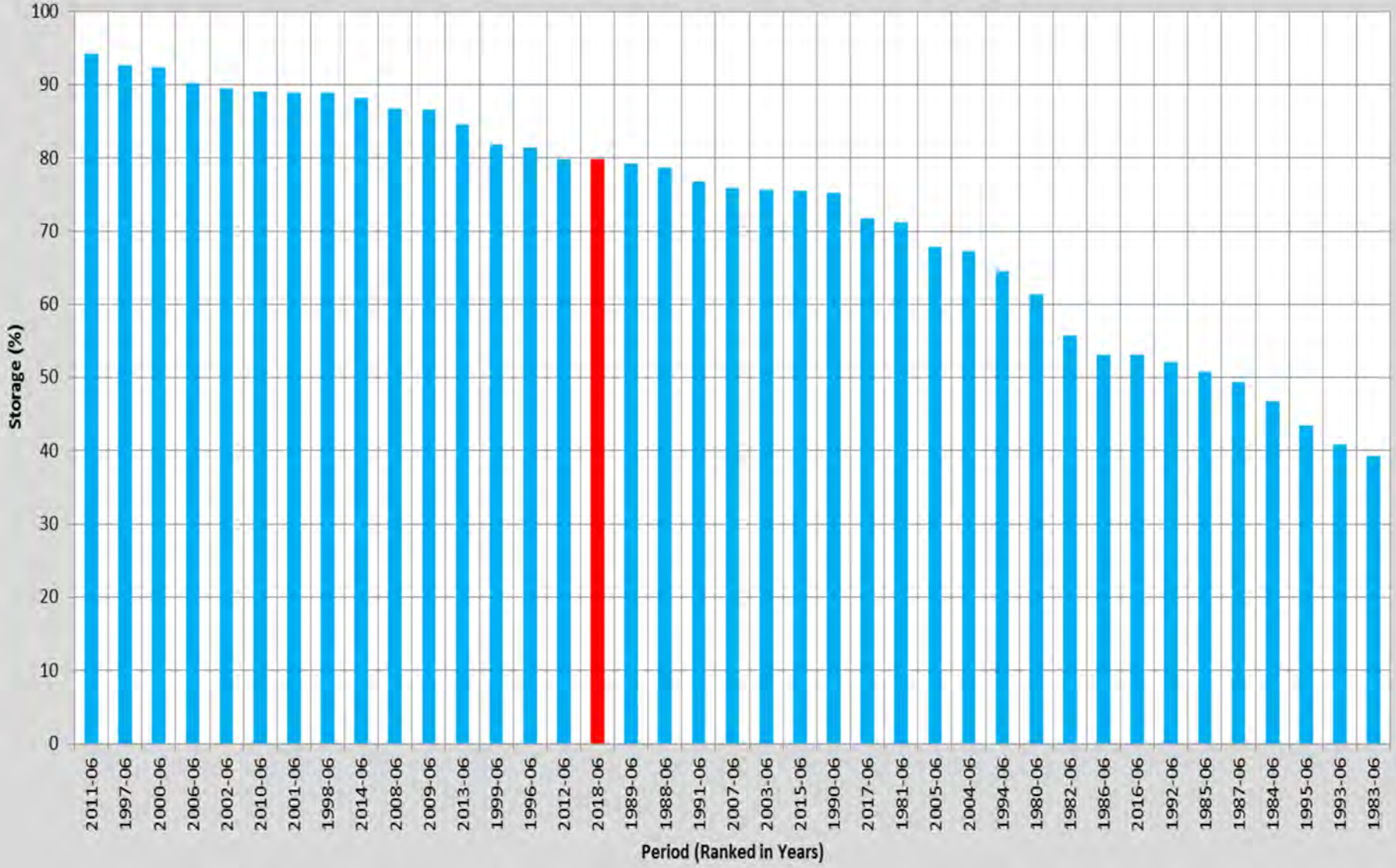

Helderberg / Stellenbosch IB
Cumulative Usage (Million m³)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Nov17
Dec17
Jan18
Feb18
Mar18
Apr18
May18
Jun18
Jul18
Aug18
Sep18
Oct18
Month End
Target
Actual


Eerste IB
Cumulative Usage (Million m³)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Nov17
Dec17
Jan18
Feb18
Mar18
Apr18
May18
Jun18
Jul18
Aug18
Sep18
Oct18
Month End
Target
Actual

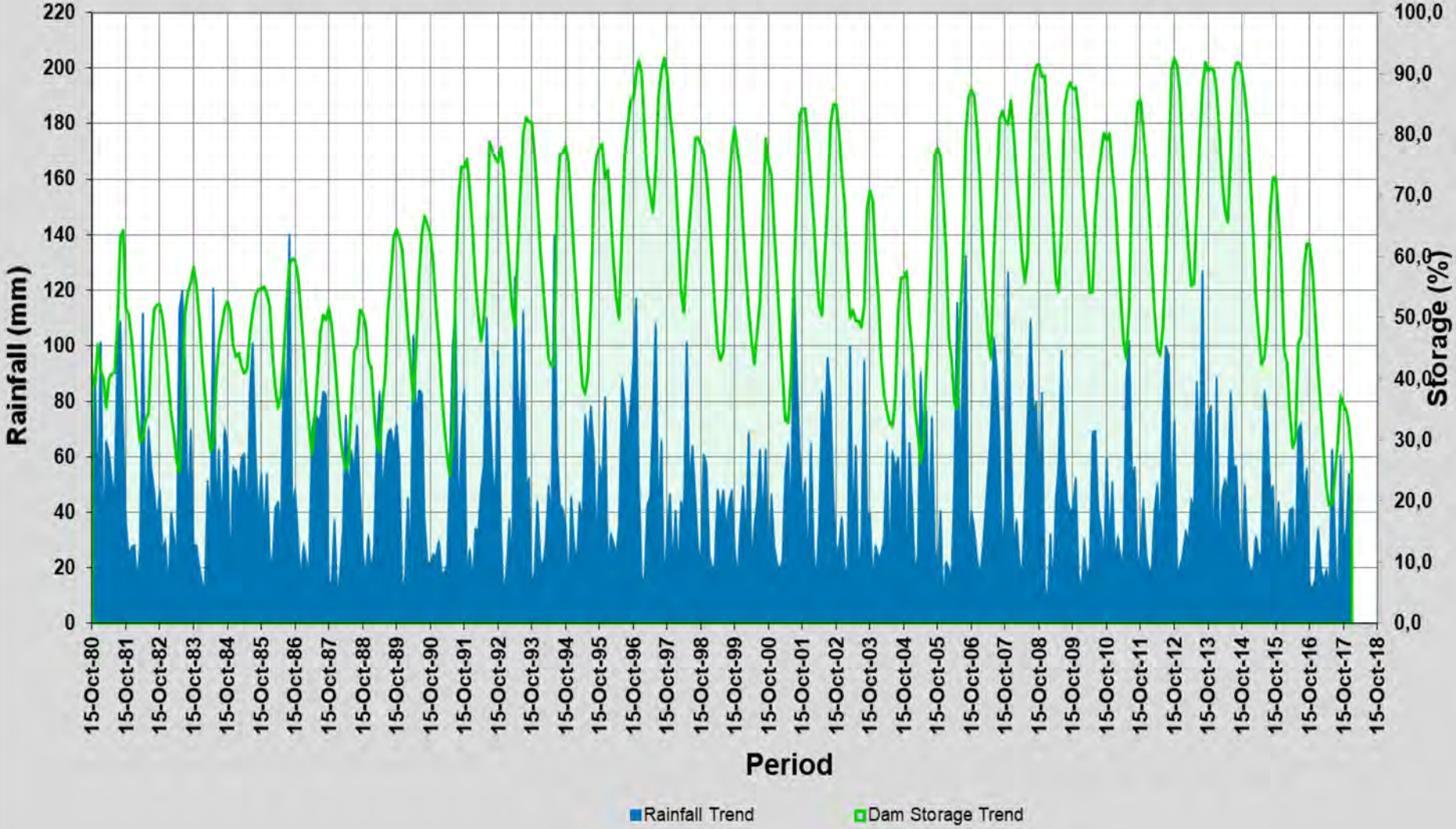
Western Cape: Cumulative Annual Rainfall



National: Reservoir Storage Ranked for June since 1980



Western Cape: Monthly Rainfall and Dam Storage Trend Oct 1980 to May 2018



Conclusion

- The actual gross storage of major dams is slightly improving over the few weeks
- The situation is remaining severe water restrictions and intervention measures should be continued to improve system storage to desirable level.

Thank You

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

APPENDIX G
CURRENT DAM LEVELS AND RESTRICTIONS

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

2030 NDP

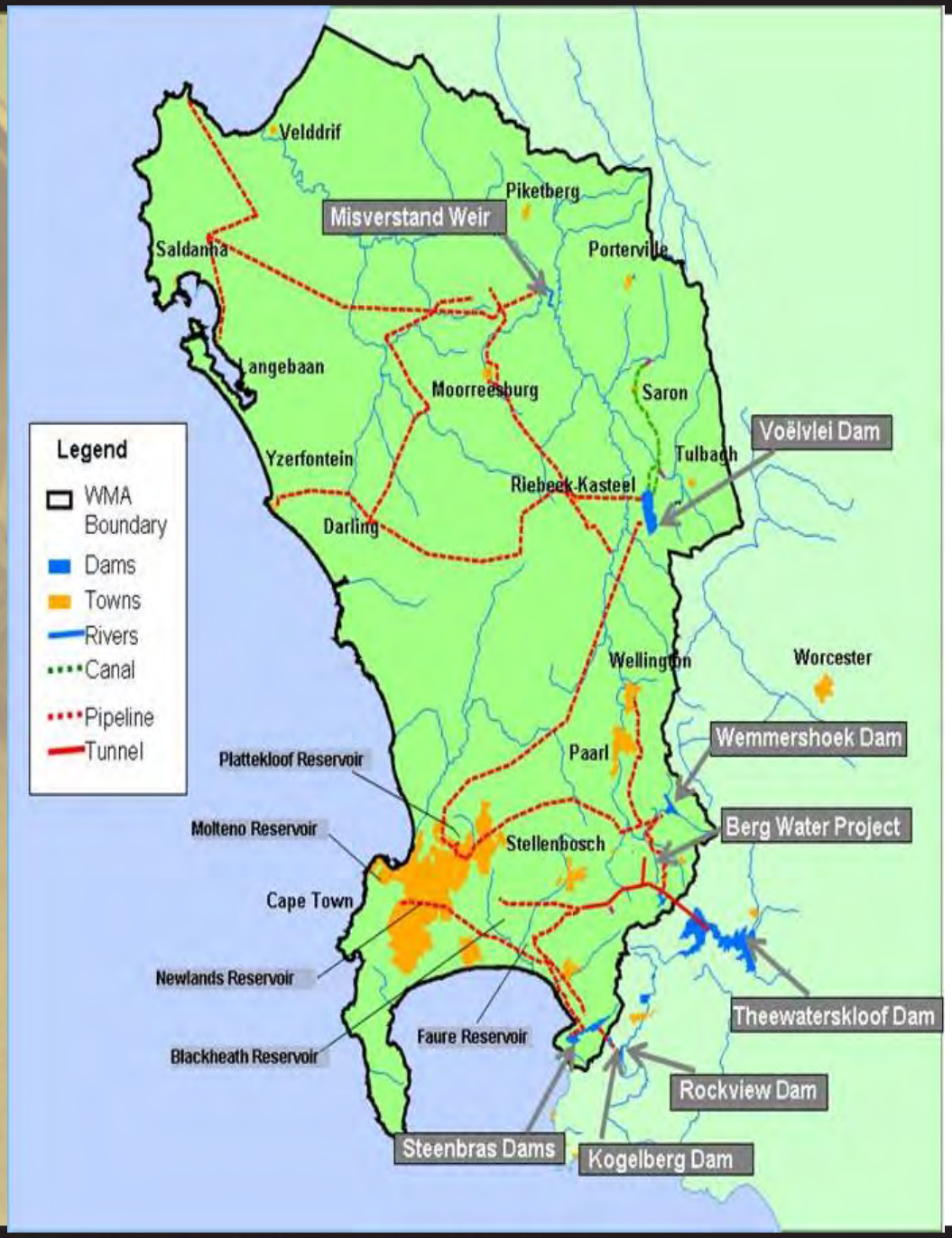
SUPPORT FOR THE IMPLEMENTATION AND MAINTENANCE OF THE WATER RECONCILIATION STRATEGY FOR THE WCWSS

"CURRENT DAM LEVELS AND RESTRICTIONS"

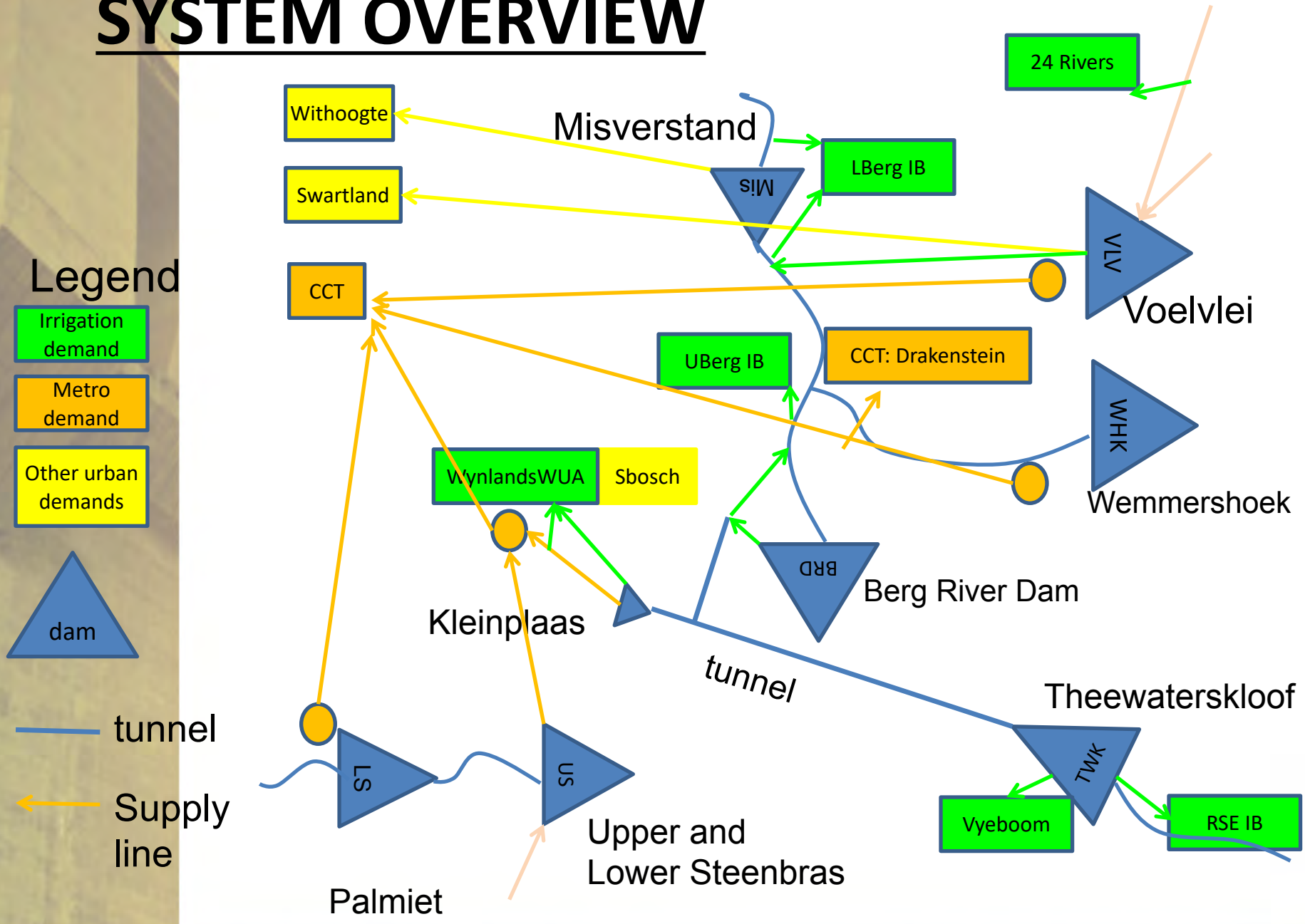
Presented by D Daniels

Date: 19 June 2018

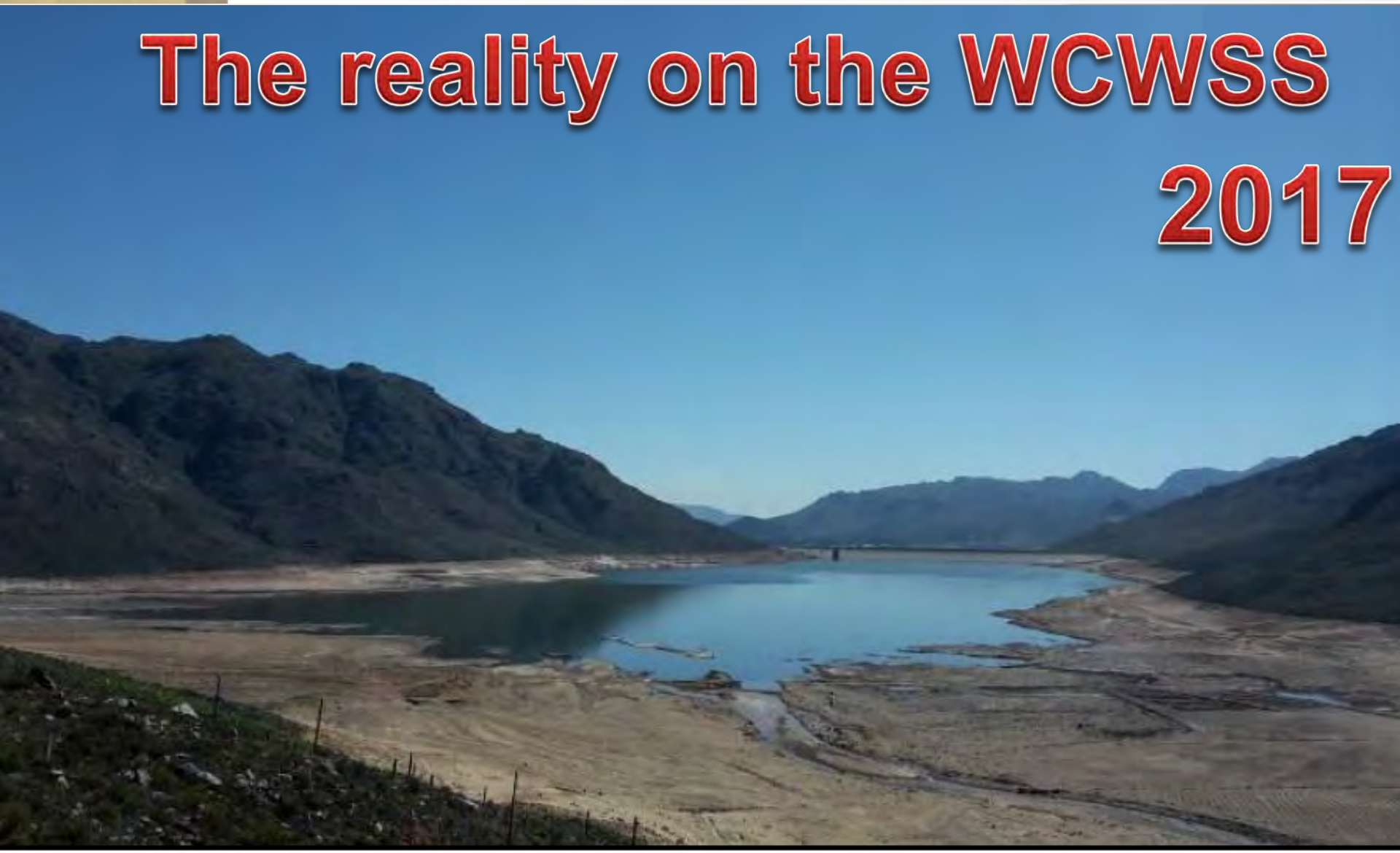
WCWSS


Velddrif
Piketberg
Misverstand Weir
Saldanha
Porterville
Langebaan
Moorreesburg
Saron
Voëlvlei Dam
Yzerfontein
Tulbagh
Riebeek-Kasteel
Darling
Legend
WMA Boundary
Dams
Towns
Rivers
Canal
Pipeline
Tunnel
Wellington
Worcester
Wemmershoek Dam
Paarl
Platteklоof Reservoir
Berg Water Project
Molteno Reservoir
Stellenbosch
Cape Town
Newlands Reservoir
Theewaterskloof Dam
Faure Reservoir
Blackheath Reservoir
Rockview Dam
Steenbras Dams
Kogelberg Dam

SYSTEM OVERVIEW



WCWSS: BERG RIVER DAM



Dam storage on year-on-year comparison

Name of dam / scheme	Full Storage Capacity (Nett x 106 m3)	% Full					
		24 June 2013	17 June 2014	15 June 2015	13 June 2016	June 2017	18 June 2018
Cape Town System Dams (Combined)	889,29	80,13	91,50	50,02	29,38	22,73	37,80
Berg River Catchment	415,72	81,14	86,65	48,88	30,94	30,49	51,82
Breede River Catchment	1058,26	68,05	81,85	44,62	27,53	19,01	25,65
Gouritz River Catchment	268,42	72,42	85,11	50,35	45,05	18,85	20,02
Olifants / Doorn River Catchment	128,24	94,13	81,01	18,02	16,74	15,16	38,42
Western Cape State of Dams	1870,64	73,41	83,35	44,59	30,06	21,27	31,54
Dams in the Berg River Catchment							
Misverstand	5,68	114,37	122,84	105,06	112,31	107,44	121,10
Steenbras Upper	31,81	86,84	99,83	55,32	58,44	58,69	82,19
Steenbras Lower	33,88	73,42	63,00	50,86	30,28	27,14	43,01
Voëlvlei	158,59	69,55	75,98	38,81	20,58	18,19	31,46
Berg River	127,05	92,45	101,35	55,26	27,33	32,66	61,75
Wemmershoek	58,71	85,69	86,19	51,49	43,32	36,89	67,29
Dam in the Breede River Catchment that provides water for use in the Berg River Catchment							
Theewaterskloof	479,26	79,72	96,12	51,84	29,14	17,18	26,62

Colour coding legend
Storage below 30%
Storage between 30 – 49.99%
Storage between 50 – 69.99%
Storage between 70 – 100%

Dam storage on 2 monthly comparison

Name of dam / scheme	Full Storage Capacity (Nett x 106 m3)	% Full				
		Last year this time	5 February 2018	3 April 2018	11 June 2018	18 June 2018
Cape Town System Dams (Combined)	889,29	22,73	25,17	21,43	31,51	37,80
Berg River Catchment	415,72	30,49	40,67	34,27	44,79	51,82
Breede River Catchment	1058,26	19,01	18,43	11,07	20,37	25,65
Gouritz River Catchment	268,42	18,85	21,81	23,10	20,26	20,02
Olifants / Doorn River Catchment	128,24	15,16	15,25	6,48	22,40	38,42
Western Cape State of Dams	1870,64	21,27	23,65	17,64	25,88	31,54
Dams in the Berg River Catchment						
Misverstand	5,68	*107,44*	69,46	23,01	*107,79*	*121,10*
Steenbras Upper	31,81	58,69	81,89	79,75	76,78	82,19
Steenbras Lower	33,88	27,14	42,21	34,45	38,96	43,01
Voëlvlei	158,59	18,19	17,68	14,47	25,53	31,46
Berg River	127,05	32,66	52,40	43,45	53,21	61,75
Wemmershoek	58,71	36,89	51,02	44,36	58,56	67,29
Dam in the Breede River Catchment that provides water for use in the Berg River Catchment						
Theewaterskloof	479,26	17,18	12,30	10,29	20,89	26,62

Colour coding legend
Storage below 30%
Storage between 30 – 49.99%
Storage between 50 – 69.99%
Storage between 70 – 100%

Restriction

- GW (12 Jan 2018):
  - D/I @ 45%
  - Agri @ 60%
- Surface Water

Sector	Level of restriction (%) vs the date of Implementation			
	1 Mar 17	22 Sept 17	12 Dec 17	Currently
D/I	20	40	45	45
Agri	30	50	60	60

- Measured over time period of 2010/11 to 2014/15
- Every water use (D/I/M/A, etc), regardless of the authorisation type, must install electronic water recording, monitoring devices of abstraction and storage …**records of metered volumes be forwarded to DWS every Monday**

The End