



Purpose

- ◆ Determine the potential for water leak reduction to match limited water supply due to drought
 - Restrictions
 - Rand Water assessment of real losses in region
 - Efficiency model to indicate bulk meter DMAs with largest potential for leak reduction in region
 - Potential for leak reduction in region

August 2016 Water Restrictions

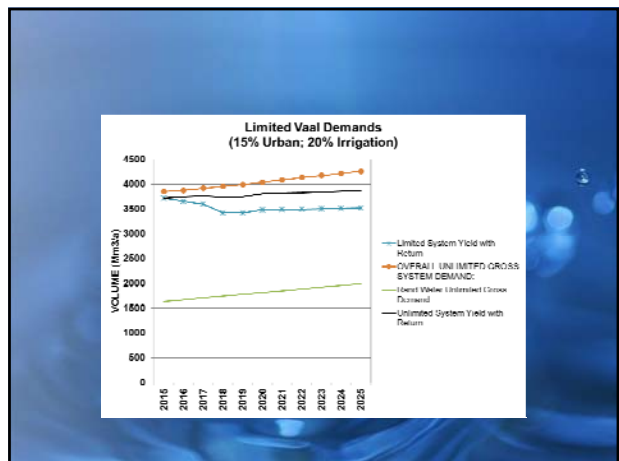
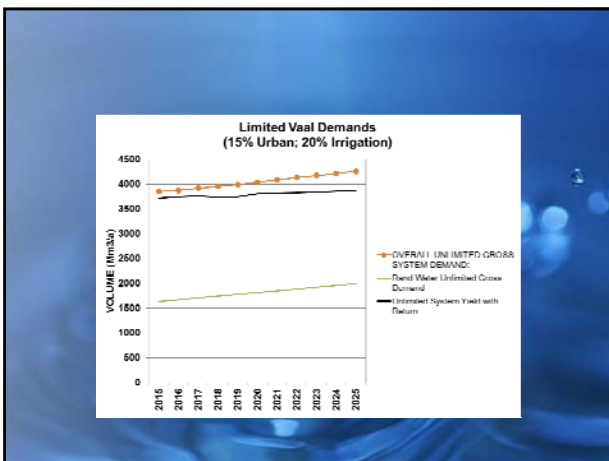
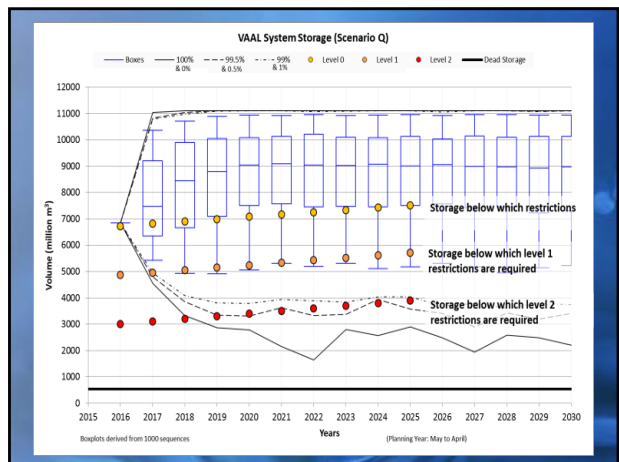
Restrictions for the Integrated Vaal River System were Gazetted on 12 August 2016:

- Level 0.5 Restrictions:
 - 15% for Urban users such as Rand Water
 - 20% for Irrigation users

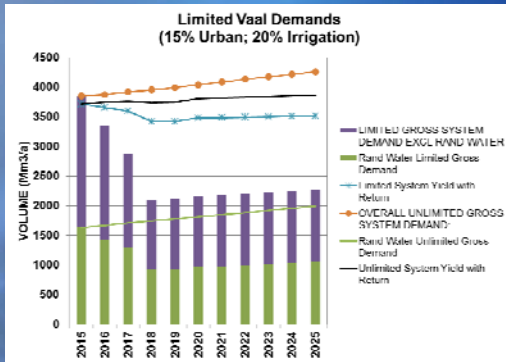
Due to deferred implementation of Lesotho Highlands Project Phase 2, the water shortage could continue until 2015, requiring even greater restrictions:

- Level 1 Restrictions:
 - 24% for Urban
 - 50% for Irrigation
- Level 2 Restrictions:
 - 47% for Urban
 - 80% for Irrigation

The graph on the next slide shows the expected dam levels if these restrictions are adhered to



Water Restrictions: Impact on Rand Water



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Impact of Level 0.5 Restrictions on Rand Water

Planned Unlimited Volume 1670 Mm3/a
 Target Abstraction 1420 Mm3/a
 Required Reduction (15%) -250 Mm3/a

QUESTION:
 How can this reduction in demand be achieved?

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ANALYSIS OF END-CONSUMER CONSUMPTION PATTERNS

- Some of Rand Water's meters are on direct connections, i.e. without reservoirs downstream of the meters
- This enables Rand Water to measure the actual consumption patterns of the end-user
- Rand Water (Dave Leach from Bulk Water Distribution) has logged a number of these meters over 7-day periods in 2014 and 2015. Based on the flow pattern, 34 meters were identified as direct supply meters – impact of mode of operations needs to be confirmed with the respective municipalities
- This analysis was also driven by the need for closer cooperation and sharing of information between water services authorities and providers in the Province

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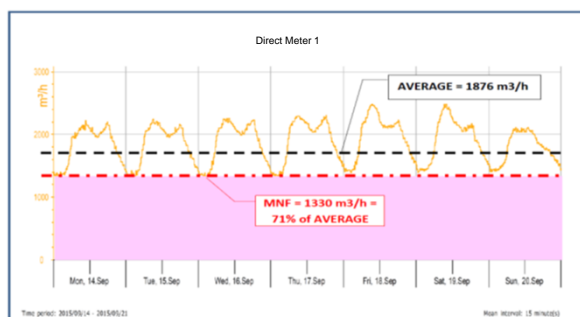
ANALYSIS OF END-CONSUMER CONSUMPTION PATTERNS

- Minimum Night Flow (MNF) analysis was done on the 34 direct meters
- Is a common method used to evaluate water losses in a water network.
- The ratio of MNF to average daily flow is often used as a rough indicator of leakage levels.
- A target value of around 20% would normally be considered in the industry as acceptable

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ANALYSIS OF END-CONSUMER CONSUMPTION PATTERNS

Example: Minimum Night flow analysis on direct meters



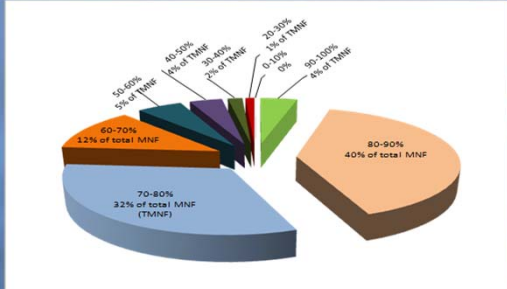
ANALYSIS OF END-CONSUMER CONSUMPTION PATTERNS

Municipality	Meter name	Average Flow in Mid	MNF in Mid	MNF %
Municipality 1	#1	7.97	6.70	84%
Municipality 1	#2	10.25	5.76	56%
Municipality 1	#3	9.00	4.49	50%
Municipality 1	#4	4.61	3.53	77%
Municipality 1	#5	4.42	3.53	80%
Municipality 1	#6	6.31	1.51	24%
Municipality 1	#7	3.02	0.05	2%
Municipality 2	#8	66.98	56.59	84%
Municipality 2	#9	45.02	31.92	71%
Municipality 2	#10	13.06	12.10	93%
Municipality 2	#11	12.86	11.23	88%
Municipality 2	#12	8.09	6.91	86%
Municipality 2	#13	10.27	6.91	67%
Municipality 2	#14	11.23	5.76	51%
Municipality 2	#15	4.15	3.10	75%
Municipality 2	#16	2.40	1.68	70%
Municipality 2	#17	1.92	1.13	59%
Municipality 2	#18	1.66	1.03	62%
Municipality 3	#19	39.07	33.00	84%
Municipality 3	#20	23.42	16.78	72%
Municipality 3	#21	16.25	9.77	60%
Municipality 3	#22	12.26	6.11	50%
Municipality 3	#23	7.78	5.57	72%
Municipality 3	#24	15.14	4.78	32%
Municipality 3	#25	4.30	2.64	61%
Municipality 3	#26	4.49	2.30	51%
Municipality 4	#27	8.02	5.71	71%
Municipality 5	#28	11.81	8.54	72%
Municipality 5	#29	3.07	2.11	69%
Municipality 6	#30	13.37	10.27	77%
Municipality 6	#31	6.46	4.22	65%
Municipality 6	#32	2.38	1.75	74%
Municipality 7	#33	13.01	6.24	48%
Municipality 7	#34	6.14	1.44	23%
TOTAL ALL TESTED DIRECT METERS		410.28	287.16	70%

About 10% or RW total supply

ANALYSIS OF END-CONSUMER CONSUMPTION PATTERNS

- Categories of MNF extent



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MNF AND WUE MODEL

- In comparison with water use efficiency model developed by Rand Water, the majority of the 34 selected meters (about 21) are located in the low and no efficiency areas.
- The likelihood is great that the MNF of these meters are mainly attributed to losses in distribution systems and end-user properties
- A breakdown of the MNF into components was done using South African Night flow user guide principles, WRC reports, Water balance information from DWS website and Rand Water model

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COMPONENTS OF MNF

RAND WATER DIRECT METERS LOGGED: SYSTEM INPUT VOLUME 410 Ml/d	ACTIVE USE 123 Ml/d 30% of SV	Active use 123 Ml/d		
	MINIMUM NIGHT FLOWS 287 Ml/d 70% of SV	Normal legitimate night use - 4.7Ml/d or 2% of MNF	Normal Residential night use - 3.2 Ml/d or 1% of MNF	Night consumption - 10.7 Ml/d or 4% of MNF
		Legitimate non-residential night use - 1.5 Ml/d or 0.5% of MNF	Legitimate non-residential night use - 1.5 Ml/d or 0.5% of MNF	
		Background leakage (unavoidable) - 6Ml/d or 2% of MNF	domestic background leakage - 1.3 Ml/d or 0.45% of MNF Background leakage on mains - 0.8 Ml/d or 0.3% of MNF Background leakage on connections - 3.9 Ml/d or 1.4% of MNF	
Night leakage (bursts and losses) - 276.3 Ml/d or 96% of MNF	Customer night leakage - estimated at 196.4 Ml/d or 68.43% of MNF	Distribution system night leakage - 79.90 Ml/d or 27.83% of MNF	Night leakage or losses - 476.3 or 96% of MNF	

- The losses are predominantly on properties.

RECOMMENDATIONS

- Reduction of distribution losses
 - Improved management through sectorization, water balance and response to leaks – (know network, utilize all available information optimally)
 - Active and passive leakage control (don't ignore simple methods)
 - Pressure management (highly effective WDM intervention)
 - Rationing of zonal supply in cases of extreme inefficiency
- Reduction of end-user leakage (where the majority of losses occurs)
 - Retrofitting household plumbing fittings
 - Installation of water efficient devices
 - Public education and awareness campaigns
 - Metering and billing

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CONCLUSION

- RW has a better understanding of the water use patterns and inefficiencies in its Area of Supply
- Able to have focused sessions with municipalities/customers on demand and planning issues
- Development of the scientific model enables Rand Water to fulfill its role in accordance with the National WC/WDM strategy of DWS
- Rand Water can efficiently participate and facilitate the integration of bulk supply planning for the region
- Rand Water can facilitate the development of equitable demand targets – scientifically determined

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IN A NUTSHELL.....

A systematic and scientific approach is used by Rand Water that ensures water demand management is applied equitably across its customer base

Recent studies by Rand Water have shown that the 15% demand reduction required to conform to the limitation of abstraction volumes due to the drought can be achieved by addressing real leaks in the municipal reticulation as well as in end-user plumbing systems

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