PRESSURE MANAGEMENT AS A PART OF WATER DEMAND MANAGEMENT IN DRAKENSTEIN MUNICIPALITY

Presented by **André Kowalewski**

Engineer: Water Services

13 July2012

DRAKENSTEIN
MUNISIPALITEIT • MUNICIPALITY • U MASIPALA WASE

Introduction

- Between the years of 1989 and 1999 Drakenstein Municipality experienced an average water demand growth of 3.5% per annum
- Non Revenue Water was unacceptably high - In excess of 33%(@ 1999)
- Static Pressure in the low laying areas were also unacceptably high [in excess of 9 bar (900kPa)]
- The total AADD of Paarl, which accounts for about 55% of the total population of Drakenstein Municipality, was in the vicinity of 17.9Mm^3/annum (17 900 000 000 litres)

DRAKENSTEIN
MUNISIPALITEIT • MUNICIPALITY • U MASIPALA WASE

Introduction (cont.)

- Goals of the Water Demand Management Scheme
  - ✓ Reduce the high percentage of non revenue water
  - ✓ Reduce the high static pressures
  - ✓ Reduce the high AADD value
  - ✓ To improve the total revenue collected by the Municipality
  - ✓ To provide a constant and efficient service to the consumer
  - ✓ To conserve water, which became a very scarce commodity

DRAKENSTEIN
MUNISIPALITEIT • MUNICIPALITY • U MASIPALA WASE

Methodology

Methodology (cont.)

- Total Population = 224 240
  - Paarl = 138 650
- Annual Water Demand - Paarl:
  - Prior Implementation of WDMS = 17 900Ml per annum
  - Post Implementation of WDMS = 11 500 Ml per annum
- Demand per capita = 250 litres/person/day
- Drakenstein Water Sources
  - Paarl Mountain (10%)
  - City of Cape Town (90%)

DRAKENSTEIN
MUNISIPALITEIT • MUNICIPALITY • U MASIPALA WASE

Methodology (cont.)

- Project Methodology and Design
  - Hydraulic modelling of master plan for reticulation network
  - Rising block tariff structure
  - Increased public awareness
  - Metering of all unmetered water metres
  - Promotion of water saving devices
  - Refurbishment/Replacement of network infrastructure
  - Leak Detection /Repair
  - ***Pressure Management***

DRAKENSTEIN
MUNISIPALITEIT • MUNICIPALITY • U MASIPALA WASE

Methodology (cont.)

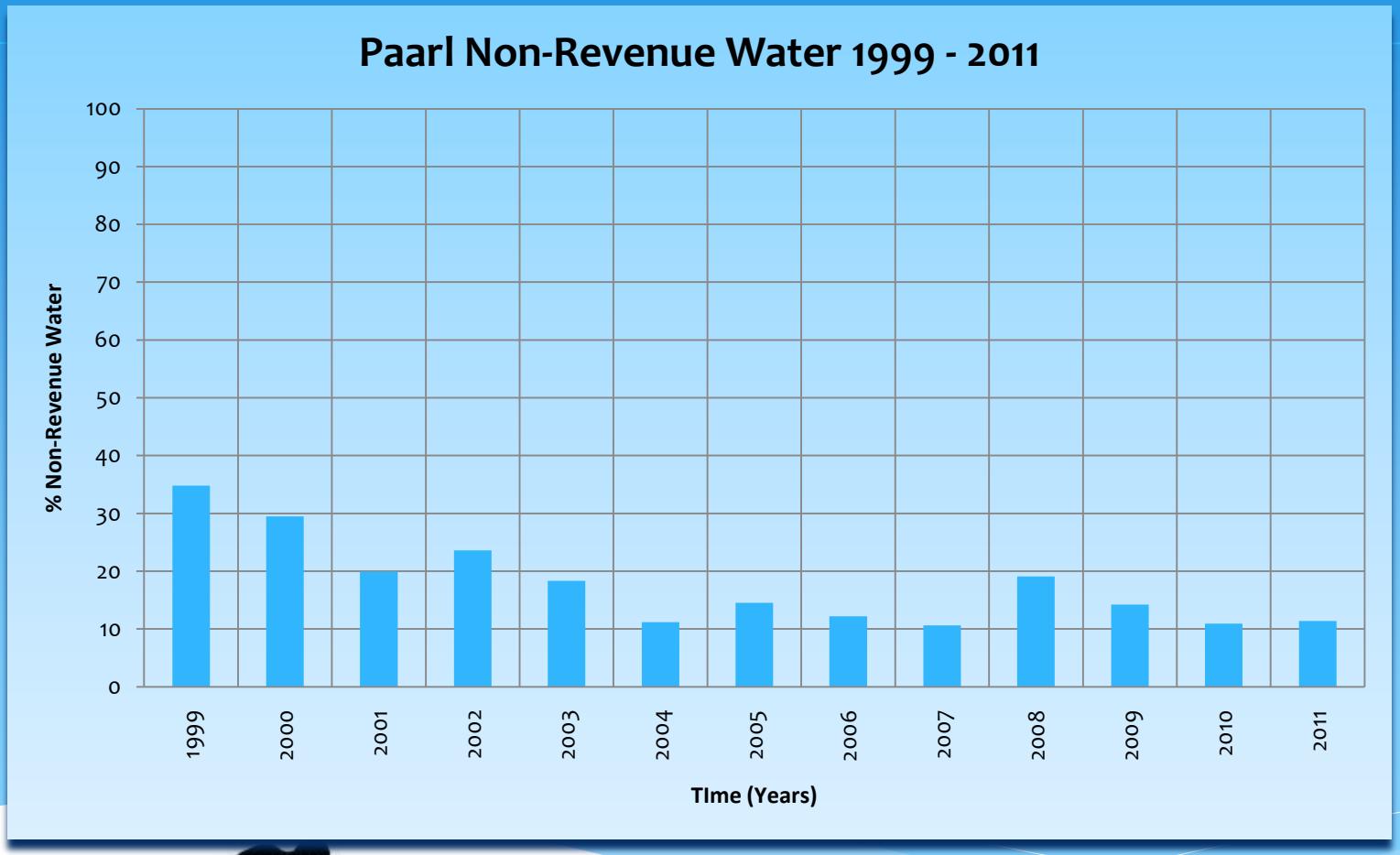
- **Pressure Management**
  - Water network consists of four pressure zones namely Main Road pressure zone, Central pressure zone, Leliefontein pressure zone and Denneburg pressure zone
  - The water network consists of 7 pressure reducing valves ranging from 100mm Ø to 300mm Ø with electronic controllers
  - Flow Modulation (Auto-watt & Modulo) ,Time Modulation (Auto-Watt & Modulo) and Loop Control (Regulo/Cello)
  - Various monitored pressure loggers at critical points
  - Controlling pressures during different times of the day, keeping lowest pressure at night when demands are lowest
  - Cost of implementation of pressure management system R2.6 Million (only during 2000/2001)

DRAKENSTEIN
MUNISIPALITEIT • MUNICIPALITY • U MASIPALA WASE

Results

	Denneburg Pressure Zone	Klein Drakenstein Pressure Zone	Van der Stel Pressure Zone
Average Inlet Pressure	6.10 Bar	6.80 Bar	8.50 Bar
Average Outlet Pressure during Low Demand Periods	3.30 Bar	2.60 Bar	3.60 Bar
Decrease in Inlet pressure During Low Demand Periods	45.90%	61.80%	57.40%
Average Outlet Pressure during High Demand Periods	4.50 Bar	3.70 Bar	4.70 Bar
Decrease Inlet pressure During High Demand Periods	26.20%	45.60%	44.70%
Average Pressure at Critical Point During Low Demand Periods (Summer)	3.05 Bar	5.84 Bar	2.31 Bar
Average Pressure at Critical Point During High Demand Periods (Summer)	4.25 Bar	7.02 Bar	1.8 Bar
Average Pressure at Critical Point During Low Demand Periods (Winter)	3.15 Bar	6.2 Bar	3.64 Bar
Average Pressure at Critical Point During High Demand Periods (Winter)	4.31 Bar	7.24 Bar	3.31 Bar
Total Consumption of Pressure Zone (Summer)	715.6 $m^{3/d}$	3562 $m^{3/d}$	4296.07$m^{3/d}$
Total Consumption of Pressure Zone (Winter)	606.2 $m^{3/d}$	3239 $m^{3/d}$	4137.12 $m^{3/d}$

Results (cont.)



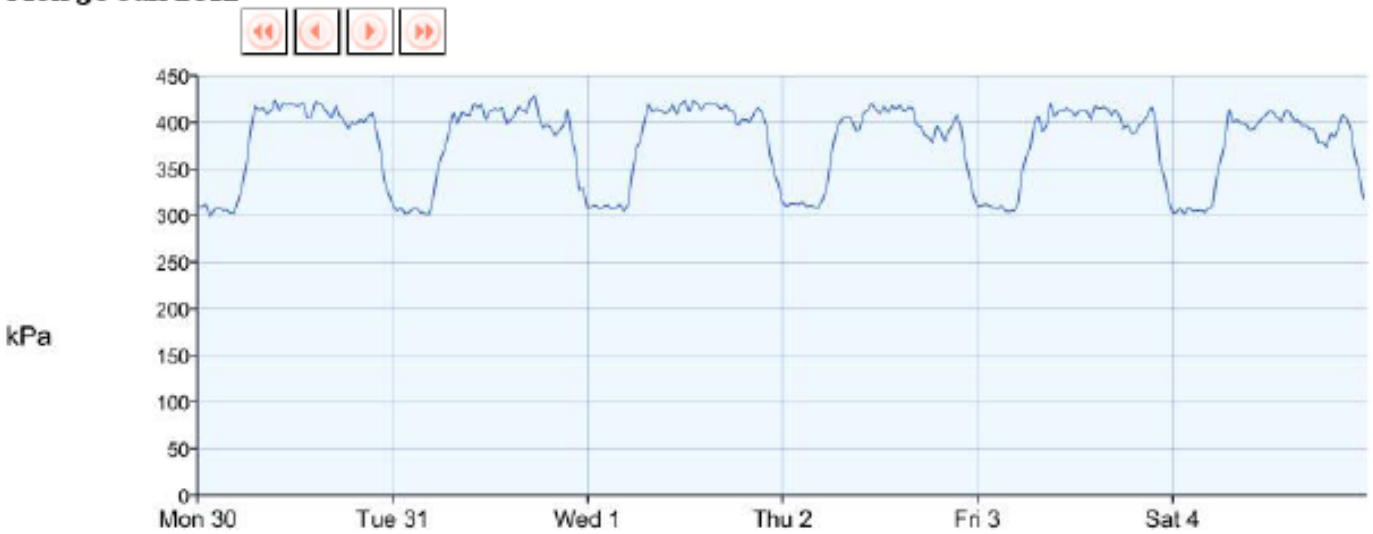
DRAKENSTEIN
MUNISIPALITEIT • MUNICIPALITY • U MASIPALA WASE

Results (cont.)

Drakenstein, Water, Water network, Water druk, Michele Street(F1360), Pressure

Back to site table

Mon 30 Jan 2012

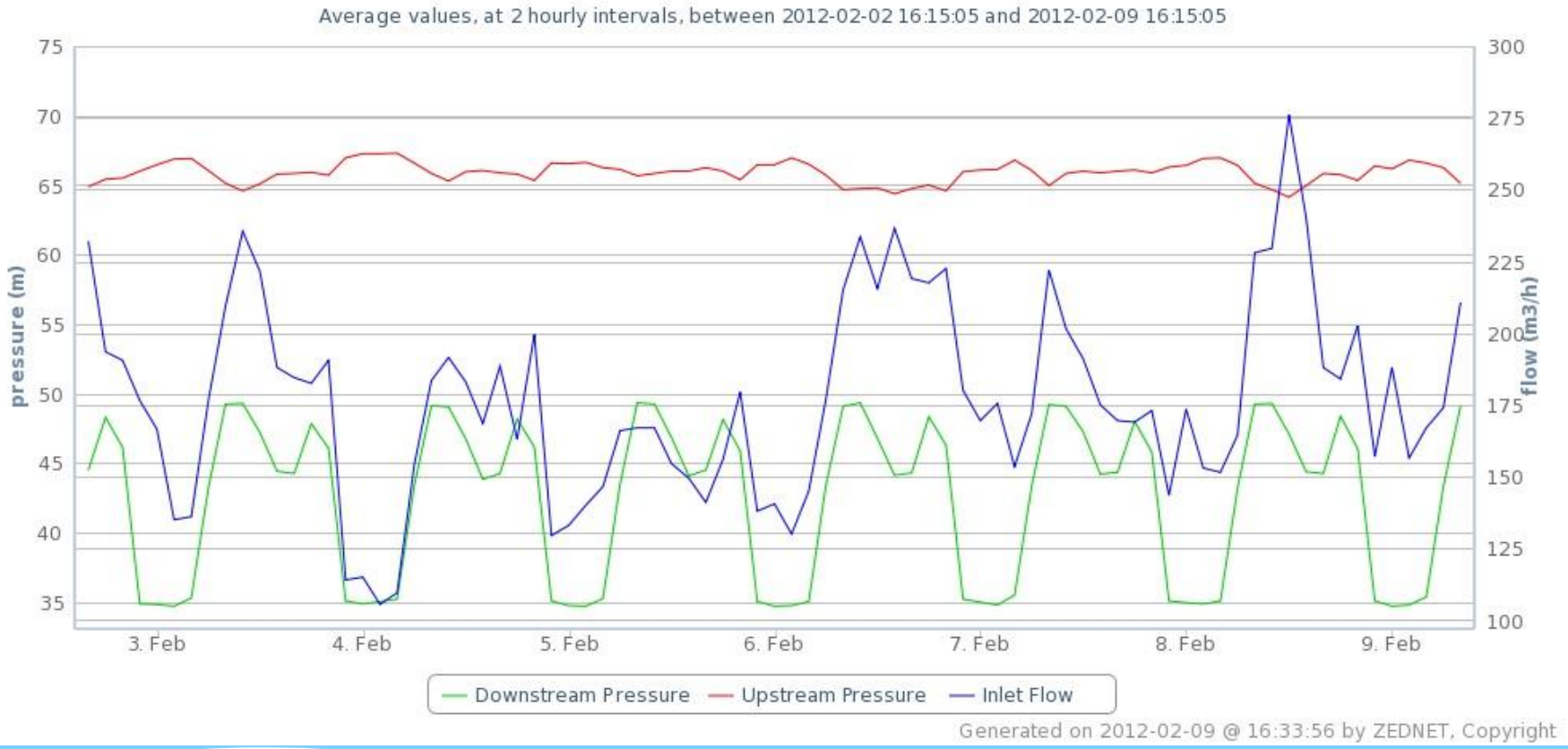


Parameter	Min	Avg	Max
Pressure	298.46966	376.8396271534	28.70712

My City

DRAKENSTEIN
MUNISIPALITEIT • MUNICIPALITY • U MASIPALA WASE

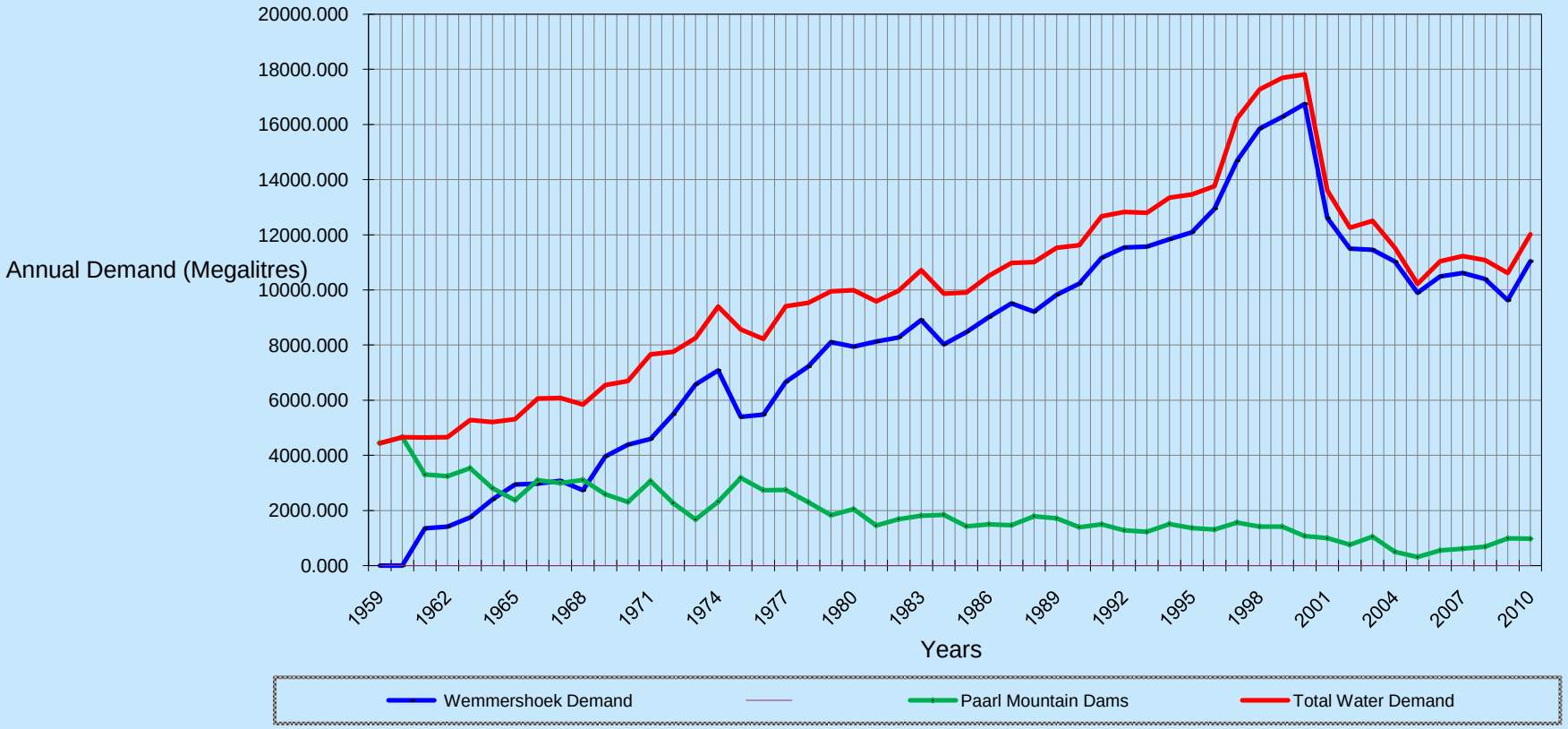
Results (cont.)



DRAKENSTEIN
MUNISIPALITEIT • MUNICIPALITY • U MASIPALA WASE

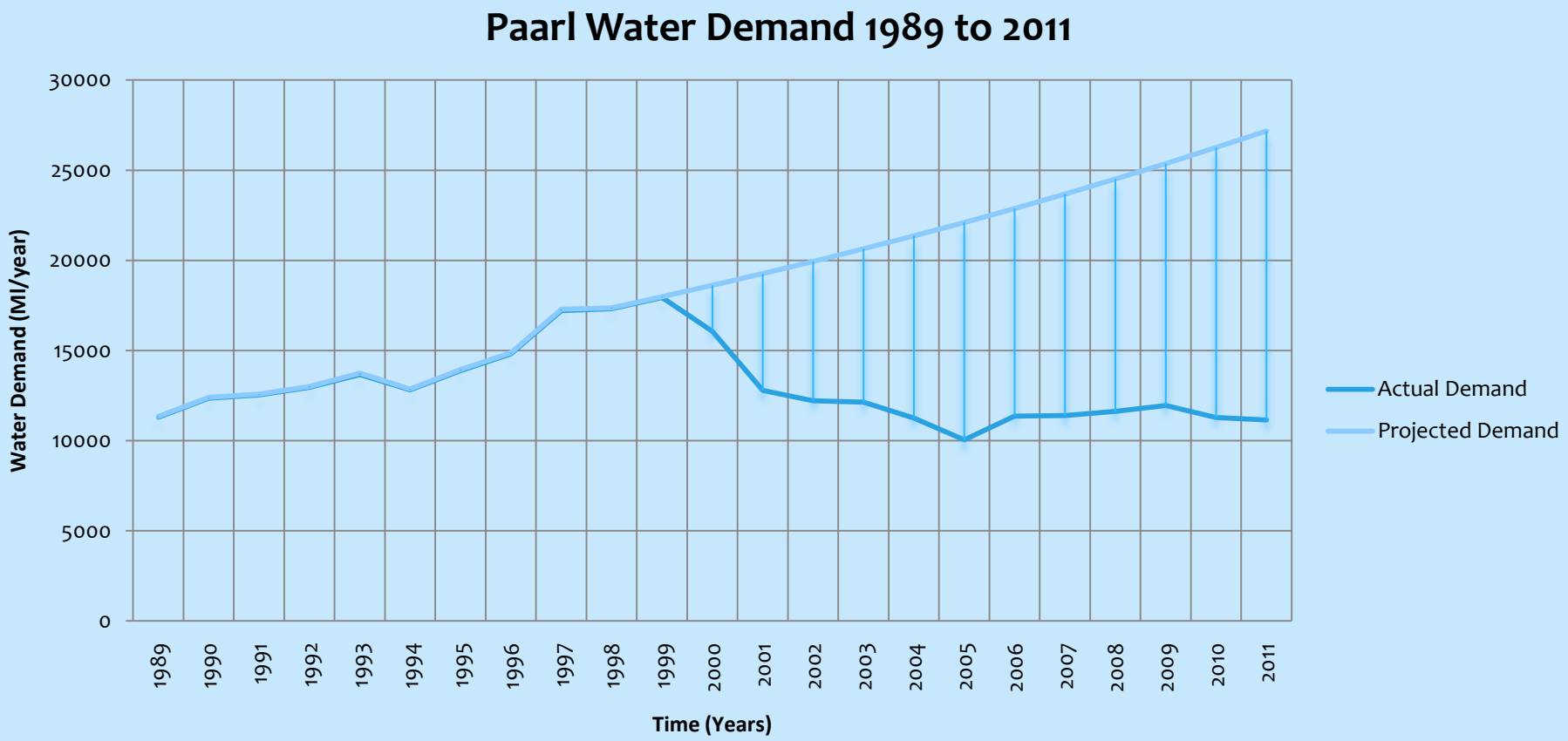
Zednet

Results (cont.)



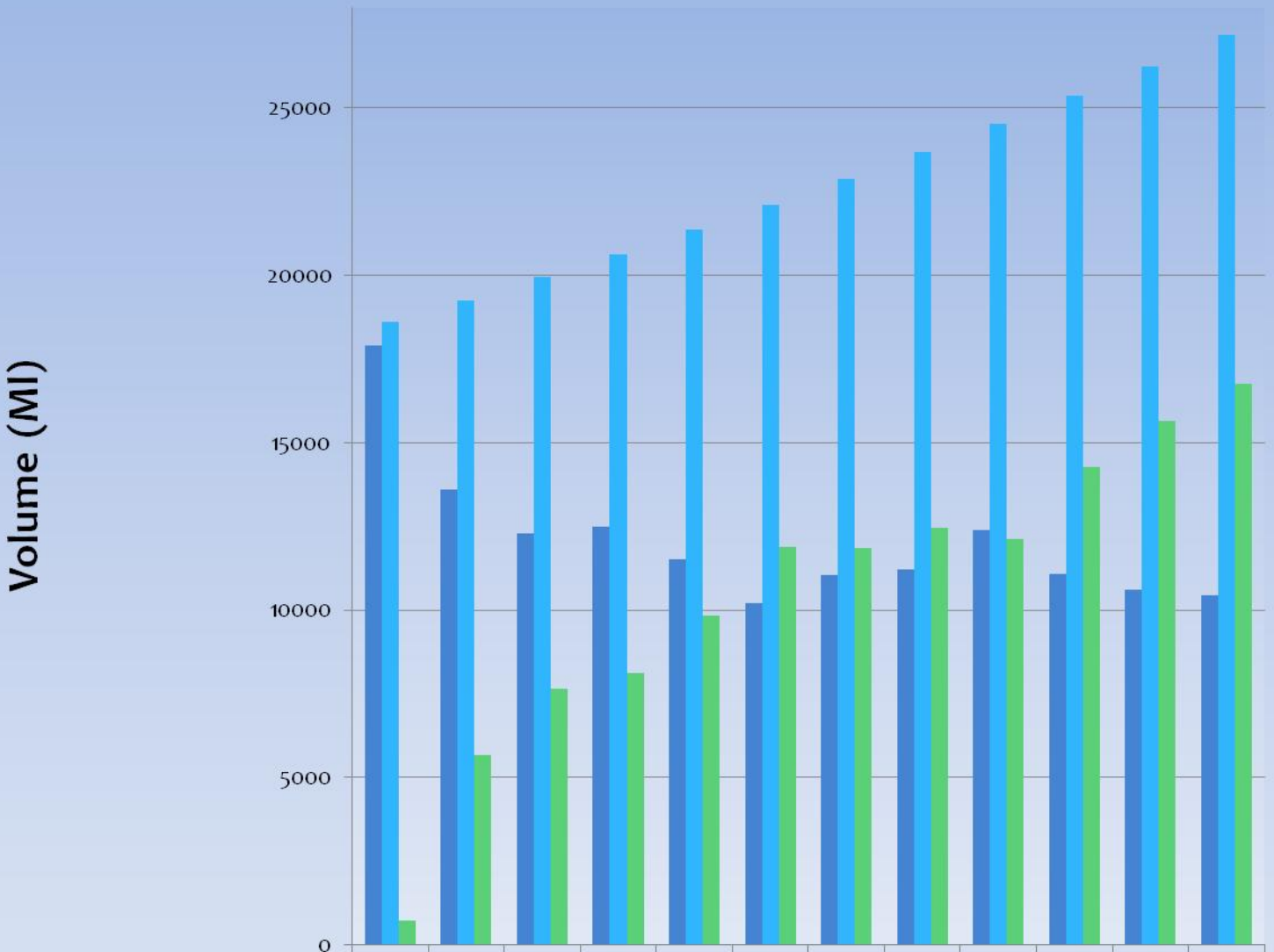
DRAKENSTEIN
MUNISIPALITEIT • MUNICIPALITY • U MASIPALA WASE

Results (cont.)



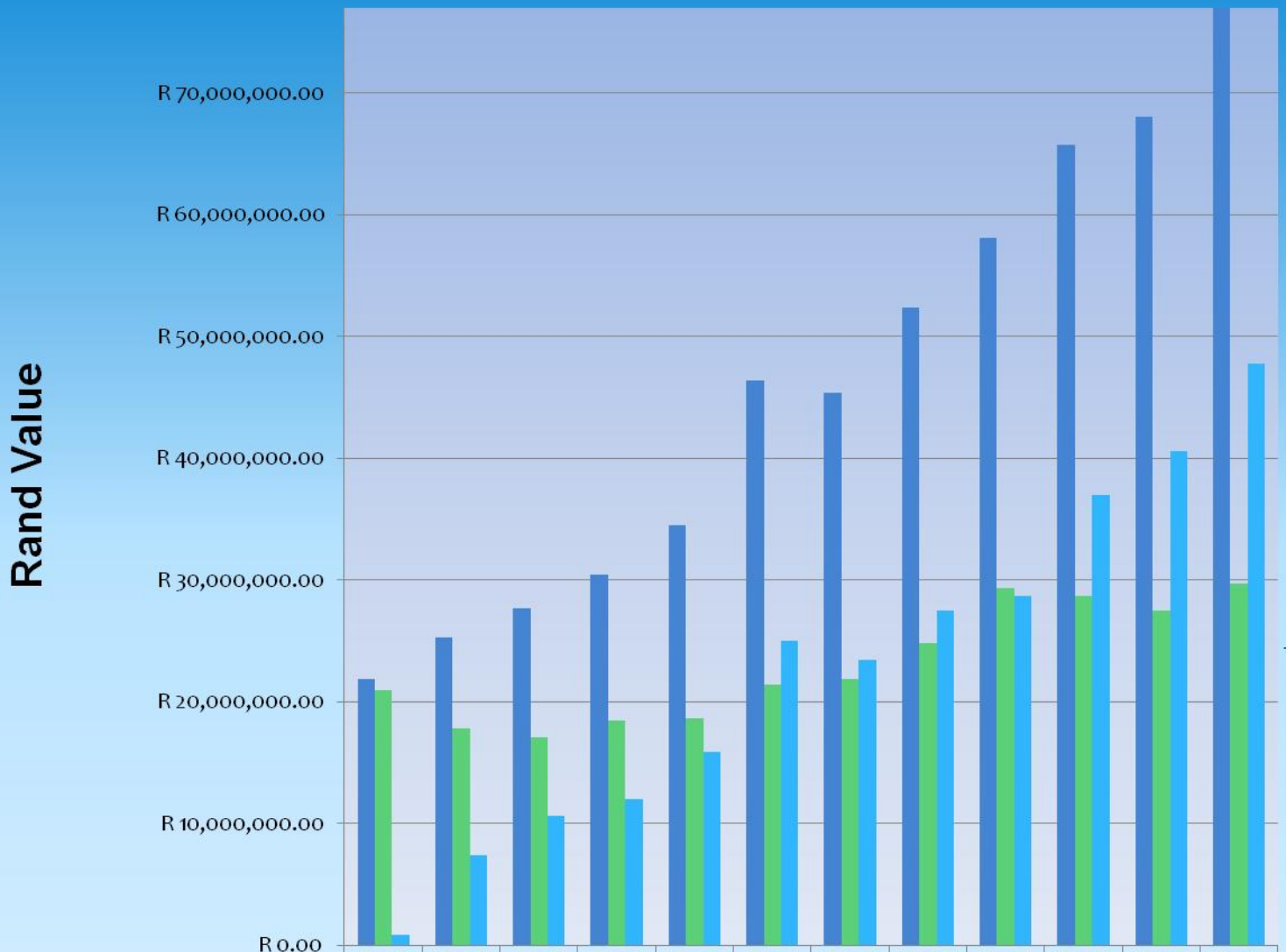
DRAKENSTEIN
MUNISIPALITEIT • MUNICIPALITY • U MASIPALA WASE

Theoretical Savings in Volume



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Actual Demand in Ml	17891	13604	12292	12500	11531	10204	11040	11231	12391	11080	10609	10429
Projected Demand @ 3.5% in Ml	18614	19265	19939	20637	21360	22107	22881	23682	24511	25368	26256	27175
Theoretical Savings in Ml	723	5661	7647	8137	9829	11903	11841	12451	12120	14288	15647	16746

Theoretical Savings in Rands



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Projected Demand Rand Value	R 21,8	R 25,2	R 27,7	R 30,4	R 34,5	R 46,3	R 45,3	R 52,3	R 58,0	R 65,7	R 68,0	R 77,4
Actual Demand Rand Value	R 20,9	R 17,8	R 17,0	R 18,4	R 18,6	R 21,4	R 21,8	R 24,8	R 29,3	R 28,6	R 27,4	R 29,7
Theoretical Savings in Rands	R 848,	R 7,42	R 10,6	R 11,9	R 15,8	R 24,9	R 23,4	R 27,5	R 28,7	R 37,0	R 40,5	R 47,7

Way Forward

- Ongoing and Planned Projects
  - Upgrading and replacement of water network: Paarl, Wellington, Mbekweni, Gouda and Saron.
  - Upgrading of 450mm Bulk water supply pipeline at Saron
  - Construction of a WTP and Dam at Saron
  - Replacement of water pipeline from Withoogte Dam to Conmarine Reservoir
  - Construction and installation of a PRV stations and loggers at Wellington
  - Installation of water meters on unmetered industrial fire connections (Paarl & Wellington)
  - Upgrading of 350mm Ø pipeline between Bethel dam and Klipdam reservoir

DRAKENSTEIN
MUNISIPALITEIT • MUNICIPALITY • U MASIPALA WASE

Challenges

- Funding
- Vandalism of infrastructure
- Buy in from council and technical management
- Scaricity of technical & trained staff & also retaining them
- Choosing and isolating the different pressure zones
- Keeping these pressure zones isolated

DRAKENSTEIN
MUNISIPALITEIT • MUNICIPALITY • U MASIPALA WASE


REX
D 400 SABS EN124


Flotron Technology PO Box 818 Stellenbosch 7
South Africa
+27 (0)21 880 1628
info@flotron.co
My City

Conclusions & Recommendations

- A thorough desktop study of the areas were pressure management is to be implemented must be undertaken
- Modelling of the water network to be pressure managed is crucial
- Zones with different pressure value must be identified and be properly demarcated
- Logging of existing pressures and flows of different demarcated zones is important to give a clear indication of the activities of the zone
- Size and positioning of PRV need to be correct to achieve effective and efficient pressure control
- Different PRV control modulations yield different results for different zones
- Continuous maintenance and monitoring of pressure zones is important to continue saving water

DRAKENSTEIN
MUNISIPALITEIT • MUNICIPALITY • U MASIPALA WASE

Acknowledgements

- Mr. S Nkonyane (Senior Technician: Water Services) who was/is in charge of the maintenance and management & installation of new pressure management systems.
- Drakenstein Municipality Council who approved, supported and financed the Pressure management part of the WDMS
- Raymond Vermeulen (4watersuppliers) for his advice and input in the installation and maintenance of the PRVs and Controllers

DRAKENSTEIN
MUNISIPALITEIT • MUNICIPALITY • U MASIPALA WASE

Thank You!

DRAKENSTEIN
MUNISIPALITEIT • MUNICIPALITY • U MASIPALA WASE