



Water Loss Management in the City of Tshwane: updated up to end March 2012

Presented by
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Water and Sanitation Division
Public Works and Infrastructure Development



CoT STATISTICS



- 10 727 327 km of bulk and distribution mains
- 163 storage reservoirs with 1 843 MI storage
- 39 water towers with 13,156 MI storage
- 420 Control Valves (PRV's, Flow control etc)
- 240 Bulk Management Meters
- 415 000 Consumer connections

BULK METER DATA



A. OWN SOURCES- CALCULATIONS											
SOURCE	Days: 31 31 30 30 31 36 27 28 31										
	MID	MID	MID	MID	MID	MID	MID	MID	MID	MID	MID
RIETVLEI PURIFICATION PLANT	37.12	32.33	40.23	45.07	38.19	38.05	32.30	33.55	39.55		
RIETVLEI SPRINGS	7.14	7.36	0.00	0.00	7.20	7.20	7.20	7.20	7.20		
STERKFOONTEIN SPRINGS	6.27	6.40	6.42	6.30	8.68	6.50	17.49	17.13	17.19		
FINDLAY TOWN 1	0.10	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00		
FINDLAY TOWN 2	3.43	5.78	5.99	0.00	0.00	4.13	5.92	6.97	6.20		
FINDLAY TOWN 3	31.95	32.60	31.81	34.55	33.51	27.83	23.17	31.69	27.87		
FINDLAY TOWN PTA WEST	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
SAR FINDLAY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
LOWER FOUNTAIN PUMP1	3.88	3.44	1.86	1.87	1.86	0.00	-0.04	-0.02	0.00		
LOWER FOUNTAIN PUMP2	0.00	0.00	0.00	0.00	0.00	1.85	1.81	1.85	1.64		
PP 16 BOREHOLE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
PP 16 BOREHOLE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
ERASMIA BOREHOLE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
RIETVLEI BOREHOLES	3.21	4.79	1.93	1.49	4.26	5.44	5.45	5.35	5.86		
VALHALLA BOREHOLE	1.47	1.47	1.43	1.09	1.39	1.47	1.32	1.39	1.48		
TOTAL	94.35	94.18	89.87	90.37	94.86	92.47	93.72	105.12	106.80		
UPPER FOUNTAINS	23.27	23.21	22.88	22.51	19.09	23.72	19.62	26.38	22.59		
LOWER FOUNTAINS	58.69	22.46	45.88	64.40	42.12	15.50	13.11	18.07	15.68		

BULK METER DATA



B. SUPPLY FROM OTHER SOURCES- CALCULATIONS											
VARSFOONTEIN WATERRAAD	2.48	0.90	2.14	2.68	2.08	0.92	2.51	2.88	1.69		
	2.50	2.52	2.30	2.53	2.44	1.95	0.00	0.00	0.00		
KENTRON BOREHOLE (Irene Estate)	47.87	48.42	51.11	46.89	36.36	43.25	46.44	46.46	46.68		
ROODEPLAAT Magalies Water	862.29	875.24	846.38	840.02	834.69	871.37	872.21	899.21	839.78		
RAND WATER	14.54	17.80	17.78	16.77	14.43	15.85	16.55	17.79			
RAND WATER Kungwint											
TEMBA Water Supply	59.87	58.55	55.23	55.41	55.87	56.69	54.81	44.06	55.65		

NRW CALCULATION 2011 2012



Month March 2012

Total Bulk input = 305 198 306 kl/year

Formal Water Sales = 200 575 117 kl/year

“Sales” to Informal Areas = 31 940 227kl/year

NRW = $\frac{\text{Total Bulk input} - (\text{Formal Water Sales} + \text{“Sales” to Informal Areas})}{\text{Total Bulk input}}$

$$= \frac{72\,682\,962}{305\,198\,306} \times 100$$

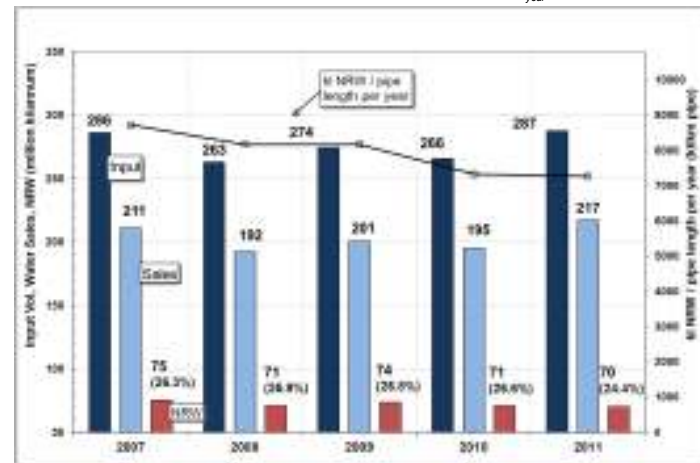
$$= 23,81 \% \text{ (down from 24,4\% in September)}$$

NRW FOR CoT SUPPLY AREAS

Entire Tshwane (JAP area, ODI, Temba, Kungeni Road & West, Wellesmeathal and Cullinan)														
	Billed Authorized			Non Revenue Water			Water Loss WPIs							
	Bulk Input	Billed Metered	Billed Unmetered (at zero rate)	NRW	Unauthorized Authorized	Unauthorized Metered	Unauthorized Unmetered	Water Loss	Leakages	Unmetered	Unauthorized	Unauthorized	Unauthorized	
	Total Bulk Input (kl)	Total Billed Metered (kl)	Total Billed Unmetered (kl)	Total NRW (kl)	Total Unauthorized Authorized (kl)	Total Unauthorized Metered (kl)	Total Unauthorized Unmetered (kl)	Total Water Loss (kl)	Total Leakages (kl)	Total Unmetered (kl)	Total Unauthorized (kl)	Total Unauthorized (kl)	Total Unauthorized (kl)	
	kl	kl	kl	kl	kl	kl	kl	kl	kl	kl	kl	kl	kl	
2010-07	279 688 636	182 046 844	23 576 252	4 202 344	69 863 198	25.0%	0	69 863 199	25.0%	8 163.0	399 453	16	0.33	
2010-08	280 139 335	182 465 615	24 388 710	4 190 028	69 154 074	24.7%	0	69 154 074	24.7%	8 163.0	395 840	16	0.33	
2010-09	280 318 715	182 973 369	24 555 989	4 200 966	68 588 302	24.4%	0	68 588 302	24.4%	8 250.3	396 286	16	0.32	
2010-10	283 680 545	185 142 787	25 039 148	4 219 066	69 279 524	24.4%	0	69 279 524	24.4%	8 250.3	398 695	16	0.33	
2010-11	286 570 122	188 851 072	25 371 148	4 227 428	71 119 873	24.8%	0	71 119 873	24.8%	8 250.3	397 029	16	0.34	
2010-12	287 633 087	186 712 440	25 401 712	4 086 790	71 422 143	24.8%	0	71 422 143	24.8%	8 250.3	397 029	16	0.34	
2011-01	286 485 888	186 019 254	25 260 994	4 953 784	70 651 854	24.7%	0	70 651 854	24.7%	8 250.3	401 088	16	0.33	
2011-02	286 410 883	185 959 389	25 377 711	4 628 253	69 447 648	24.7%	0	69 447 648	24.7%	8 434.1	399 135	16	0.32	
2011-03	285 908 223	187 350 124	24 578 158	4 664 652	69 315 291	24.2%	0	69 315 291	24.2%	8 434.1	408 931	16	0.33	
2011-04	325 274 046	214 727 189	25 325 584	4 721 754	80 499 512	24.7%	2 217 067	78 282 445	24.1%	9 554.9	438 356	16	0.34	
2011-05														
2011-06	326 554 630	215 388 646	26 285 422	4 764 540	80 116 012	24.5%	0	3 371 270	76 744 742	23.5%	9 554.9	442 604	16	0.33
2011-07														
2011-08	286 661 703	187 508 611	25 736 270	4 733 973	68 652 838	24.0%	0	68 652 838	24.0%	8 438.8	410 066	16	0.31	
2011-09	305 754 372	195 673 370	27 145 738	4 790 737	77 884 504	25.5%	0	3 439 544	74 544 960	24.4%	9 559.1	445 073	16	0.31
2011-10	304 731 530	196 123 873	26 973 695	4 811 401	76 822 587	25.2%	0	3 429 114	73 393 443	24.1%	9 559.1	445 167	16	0.31
2011-11	305 210 403	196 180 595	26 871 312	4 808 168	77 372 417	25.4%	0	3 413 103	73 959 314	24.2%	9 559.1	445 404	16	0.31
2011-12	305 198 306	197 152 014	27 100 078	4 840 149	76 096 085	24.9%	0	3 413 103	72 682 982	23.8%	9 545.5	445 561	16	0.31

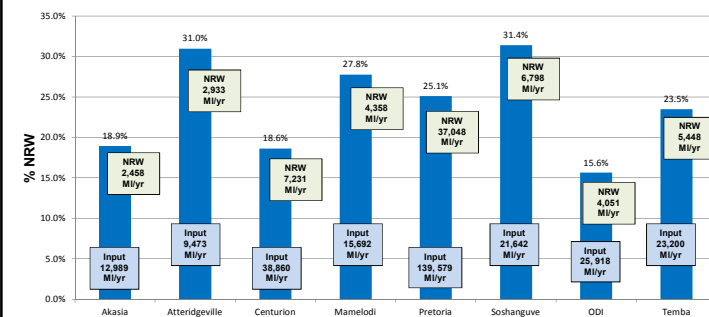
CoT NRW

Source: NRW figures from W&S figures ending June for each financial year



NRW FOR CoT SUPPLY AREAS

(12 Month Period Ending January 2012)





ACTIONS UNDERTAKEN BY WATER AND SANITATION TO REDUCE NRW AND DEMAND

CoT WDM STRATEGY

Item No.	Description	Max Points	Score
1	Development of Standard Water Balance	4	3
2	Pressurised Supply to all consumers 100% of time	4	4
3	Commercial and Industrial Metering System	4	3
4	Residential Metering System	4	3
5	Effective Billing System including Informative Billing	4	3
6	Network (Leakage) Complaints System	4	3
7	Billing and Metering Complaints System	4	2
8	Asset Register for Water Reticulation System	4	3
9	Asset Management - Capital Works	4	3
10	Asset Management - Operations and Maintenance	4	2
11	Dedicated WDM support	4	3
12	Active Leakage Control	4	2
13	Effective Sectorisation	4	3
14	Effective Bulk Meter Management	4	3
15	Credit Control Policy and Implementation	4	3
16	Pressure Management and Maintenance of Pressure Reducing Valves	4	2
17	As-Built Drawings of Bulk and Reticulation Infrastructure	4	3
18	Schematic Layout of Water Infrastructure	4	4
19	Regulation of Water Fittings	4	1
20	Implementation of By-Laws and National Standards or better	4	3
21	Technical Support to Customers	4	2
22	Removal of Illegal Connections	4	2
23	Community Awareness and Education Programmes	4	2
24	Schools Awareness and Education Programmes	4	2
25	Newspaper & radio articles plus posters and leaflets for distribution	4	1
Totals		100	65

INFORMAL AREAS



- All informal areas provided with standpipe level of service being progressively metered
- Consumptions calculated for few areas not yet metered as reported in previous report

METER AUDITS IN CoT INDUSTRIAL AREAS



- Audit of all connections in industrial areas (large users)
- Locate un-metered connections
- Identify and replace all old, broken, illegible meters
- Ensure all meters are on billing system
- Assess Impact

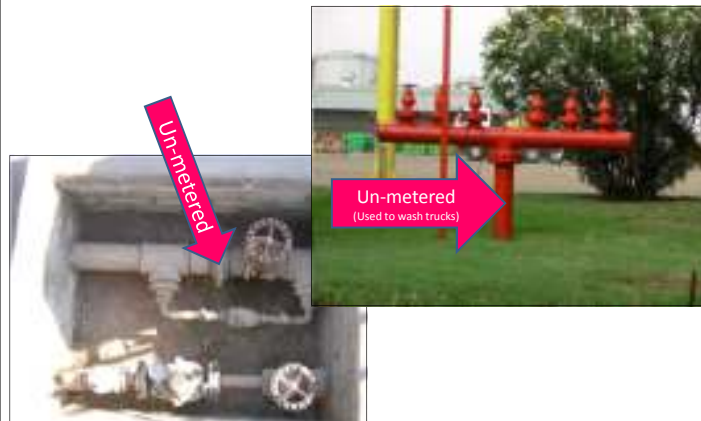
Photos of Meter Audit Process



Problem Identified: Old Meters



Problem Identified: Un-metered Connections

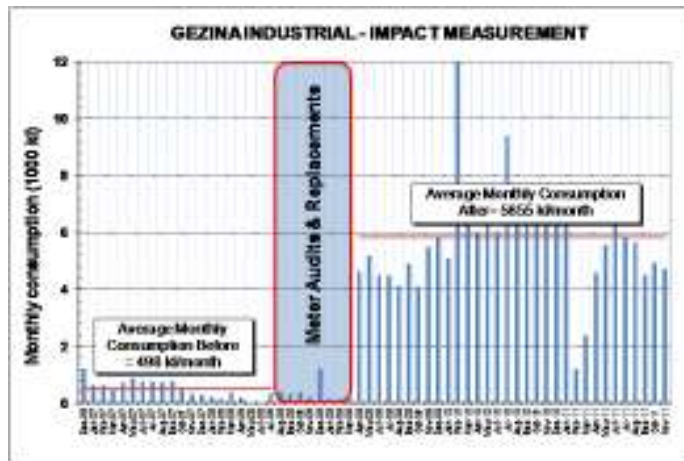
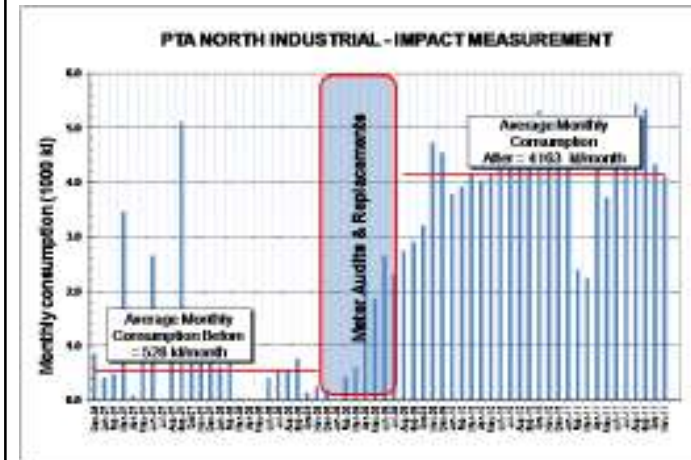


Audit Summary (Industrial Areas)

- 15 Industrial/ Commercial Areas Audited.
- 2 500 connections Audited.
- 128 un-metered connections, 250 broken meters identified.
- 100 Meters not on billing system.

Audit Summary (Irrigated Road Islands)

- 11 Park Depot Areas
- 290 connections Audited
- 7 un-metered connections, 66 broken meters identified
- 92 Meters not on billing system



Meter Audits - Summary of Results

Area	No. of Conn	Increase in Metered Consumption (kl/yr)	Cost (R)	Water Tariff: Increase in Revenue (R/yr)	Sanitation Tariff: Increase in Revenue (R/yr)	Total Increase in revenue (R/yr)	Return Period (Months)
Rosslyn N	138	60 000	R 338 541	R 595 200	R 138 600	R 733 800	6
Rosslyn S	236	36 000	R 438 238	R 357 120	R 83 160	R 440 280	12
Pretoria Indus	144	108 000	R 455 897	R 1 071 360	R 249 480	R 1 320 840	4
Waltloo, Silvertendale	550	88 416	R 1 344 327	R 877 086	R 204 241	R 1 081 327	15
PTA West	355	83 460	R 1 109 255	R 827 923	R 192 793	R 1 020 716	13
Koedoespoort	93	68 028	R 144 799	R 674 838	R 157 145	R 831 982	2
Hermanstad	189	100 272	R 227 769	R 994 698	R 231 628	R 1 226 327	3
Hennopspark	168	63 768	R 126 256	R 632 579	R 147 304	R 779 883	2
Sunderland Ridge	169	25 644	R 175 510	R 254 388	R 59 238	R 313 626	7
Lyttelton Manor	52	4 080	R 104 726	R 40 474	R 9 425	R 49 898	25
Pretoria Street	159	19 836	R 170 103	R 196 773	R 45 821	R 242 594	9
Gezina	217	32 160	R 224 352	R 319 027	R 74 290	R 393 317	7
Kirkney	60	4 464	R 170 351	R 44 283	R 10 312	R 54 595	38
Total	2 873	698 064	5 283 833	6 924 794	1 612 528	8 537 322	-

PRESSURE MANAGEMENT (e.g. NELMAPIUS EXT 8)



- No consumer meters installed in Nelmapius Ext6,7,8 (high leakage)
- Special pressure reducing valve (PRV) fitted to handle high pressure reduction ratio
- Electronic Time Modulated Controller fitted onto PRV to reduce pressure further during night

PRESSURE MANAGEMENT INTERVENTIONS BY CoT OVER LAST FEW YEARS



Pressure Management initiatives (excluding annual servicing of all pressure reducing valves)

Pressure management Area	Savings kl/yr	Savings in R/yr (Based on R4.39/kl)
Mamelodi Ext 11	20 000	87 000
Nelmapius Ext 3,4	365 000	1 602 000
Nelmapius Ext 6,7,8	230 000	1 009 000
Valhalla	52 000	228 000
Lotus Garden	100 000	439 000

ODI – PRV Installations – Summary of Savings

Meter #	Average Flow before PM (kl/h)	Average Flow after PM (kl/h)	Savings in Average Flow (kl/h)	Savings / Year (kl)
Meter 53	2.2	1.8	0.4	3 504
Meter52	15.2	6.1	9.1	79 716
Meter 51	1.9	1.4	0.5	4 380
Meter 62	3.4	0.7	2.7	23 652
Meter 50	3.8	2.4	1.4	12 264
Meter 55	29.6	24	5.6	49 056
Meter 56	33.5	24.6	8.9	77 964
Erasmus	1.2	0.9	0.3	2 628
Hebron	240	195	45	394 200
Hebron E	23.5	12.4	11.1	97 236
TOTAL	354.3 kl/h	269.3 kl/h	85 kl/h	744 600 kl

PIPE REPLACEMENT PROJECTS



- Pipe networks are replaced annually where high maintenance cost or high risk of subsequent damage require immediate interventions due to budgetary constraints
- IMQS has module for prioritising pipe replacements according various criteria and loss factors
- Required annual budget for replacing pipes to prevent pipes older than 50 years: R 100 million p.a. for 10 years

TRAIN A PLUMBER PROGRAM



- The program consists of how to :-
 - ✓ Read a water meter
 - ✓ Detect leaks using water meter
 - ✓ Fix a leaking toilets
 - ✓ Fix a dripping tap
 - ✓ Be waterwise
 - ✓ Read water invoices
 - ✓ Report street pipe leakages

DESIRED OUTPUT



- Communities(wards and schools) that are water wise
- Communities to be able to identify and attend to their water leakages as well as to stop illegal water connection
- Be able to report street leaks and illegal water connections to their local Municipality
- Municipal and communities to benefit economically from this program

PROGRESS TO DATE



From January 2011 to 09 December 2011,

- 872 learners from seven(7) schools have been trained as young plumbers.
- 76 ward community members have been trained as plumbers
- 5521 community members have been taught how to read their water meter as well as how to be waterwise
- A total of 6469 people have been reached

INCREASED LEAK REPORTING AND REPAIRS



Operation & Maintenance Re-active Leak Repair and Meter Replacement

Year	Consumer meter replace /yr	Consumer meter replace /day	% of meters replaced /yr	Leaks repaired /yr	Leaks repaired /day
08/09	32 416	89	±8%	31 871	87
09/10	59 031	162	±15%	32 758	90
10/11	44 669	122	±12%	36 049	99

SUMMARY OF WDM INTERVENTIONS BY CoT OVER LAST FIVE YEARS



- Preparing detailed monthly water balance (few municipalities in RSA prepare monthly water balances)
- Meter Audits in 15 Industrial Areas (2500 connections audited) 128 unmetered connections located, 250 existing meters required replacement. Increase in Revenue for CoT for 4 areas = R8.5mil/yr.
- Meter Audits for all irrigated road islands (290 connections): 7 unmetered connections located, 66 meters require replacement. Impact to be determined by mid 2012.

SUMMARY OF WDM INTERVENTIONS BY CoT OVER LAST FEW YEARS



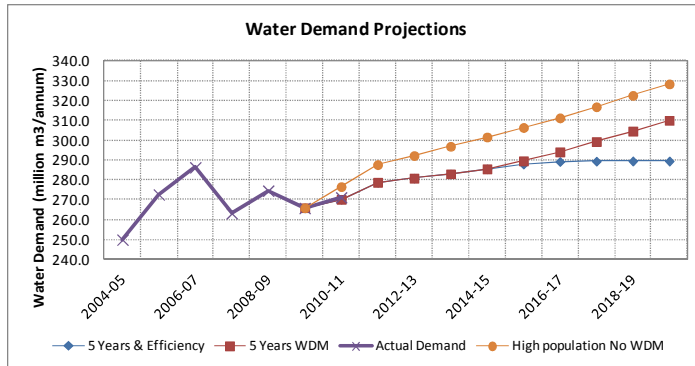
- No further domestic meters installed for unmetered houses in Mamelodi and Soshanguve etc in 2012 due to community intimidation of contractors. If a low consumption of 15kl per property per month assumed for 20 000 erven then potential additional metered consumption of 300 000 kl/mnth @ R6.71 = additional income of R24.2 mil/yr.
- 38 426 from 1 April 2011 to 31 March 2012
- 285,347 km length of network mains replaced from 2006/2007 to March 2012

SUMMARY OF WDM INTERVENTIONS BY CoT OVER LAST FEW YEARS

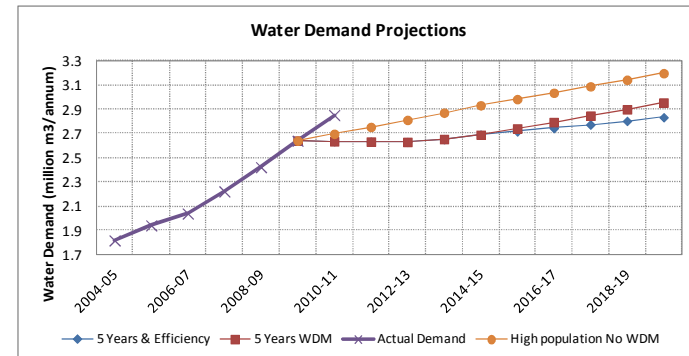


- 582 illegal connections found and removed/legalised in 2009/10 (this excludes un-metered connections located in industrial areas)
- 30 School's workshops held in 2010/11 to promote water conservation
- 90 Community workshops held in 2010/11 to promote water conservation reaching 2881 community members

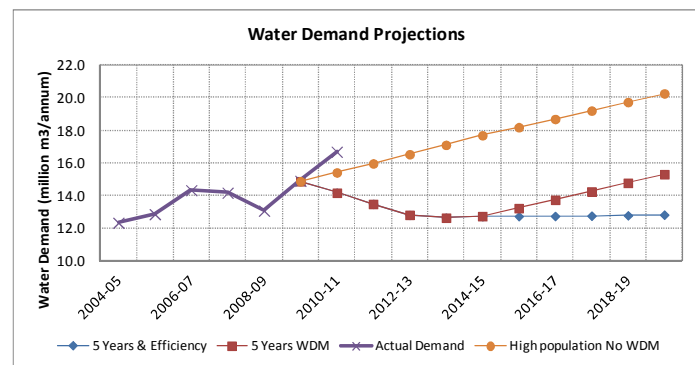
**DWA PROJECT 15% WATER DEMAND TARGET
FOR CoT (PROJECT AIMED AT REDUCING
WATER DEMAND BY 15% BY 2015)**



**DWA PROJECT 15% WATER DEMAND TARGET
FOR NOKENG (PROJECT AIMED AT REDUCING
WATER DEMAND BY 15%)**



**DWA PROJECT 15% WATER DEMAND TARGET
FOR KUNGWINI (PROJECT AIMED AT
REDUCING WATER DEMAND BY 15%)**



**ACHIEVEMENTS OF CoT
REGARDING WATER LOSS
REDUCTION**



- First prize in DWA national Water Demand Management Sector Awards in 2009, runner up in 2012
- Over the last three years CoT has managed to reduce the water demand and water losses consistently
- The CoT has one of the lowest percentages NRW of all Metros in the RSA
- CoT is one of the few Municipalities/Metros that is currently succeeding in achieving the required water demand targets set by DWA for project 15%



Thank You